5-2011

The Size of the risk: An environmental history of the nuclear Great Basin

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THE SIZE OF THE RISK: AN ENVIRONMENTAL HISTORY OF THE NUCLEAR GREAT BASIN

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Bachelor of Arts
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2005

A dissertation submitted in partial fulfillment of
The requirements for the

Doctor of Philosophy in History
History Department
College of Liberal Arts

Graduate College
University of Nevada, Las Vegas
May 2011

THE GRADUATE COLLEGE

We recommend the dissertation prepared under our supervision by

Leisl Carr Childers

entitled

The Size of the Risk: An Environmental History of the Nuclear Great Basin

be accepted in partial fulfillment of the requirements for the degree of

Doctor of Philosophy in History

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May 2011

ABSTRACT

The Size of the Risk: An Environmental History of the Nuclear Great Basin

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Throughout the twentieth century, Congress has managed the nation's public lands for the greater good of the country under a multiple-use construct. Land-use decisions based on serving the nation's public interest entailed federal land management agencies finding the utility of the land in order to put as much of it as possible into some kind of economic production and provide equitable access, as much as was feasible, to all the various public land users. But every federal program enacted on the nation's public lands has had an associated cost; not everyone or every environment has benefitted from multiple-use public land programs. The problems associated with these programs include range degradation, radioactive fallout, a lack of protected natural places, and frustrated wild horse management. In considering public land programs across the Great Basin, an area predominately consisting of public domain, this study makes a holistic evaluation of these costs by setting each of the different public land programs across the region alongside each other to better understand their conflicting relationship. The "size of the risk," a term atomic scientist Enrico Fermi used to describe his estimation of the possible problems associated with a continental nuclear test site, is the sum of the collective costs of all the public land programs throughout the twentieth century. Moving between the

national and the local by capturing the voices of those residents and federal officials involved in the creation and implementation of public land programs, this work determines the cost of land-use conflicts, the size of which is the Great Basin's human and natural environment.

The themes developed in this work include a closer examination of the multiple-use concept and its impact on the nation's public lands. Multiple-use theoretically promoted maximum efficient and equitable use of public land, but in actual practice, it created a contradictory hierarchical scale of use which privileged national interests over local development, economic value over existence value, profitability over sustainability, and maximization over sufficiency. Persistent efforts by public land users to maximize one or more aspects of their version of land use often required other users to minimize their land-use. Maximization created a pattern of public land management replicated throughout the American West that created conflict over the very purpose of nation's public lands. In one way or another, contention about the use of the Great Basin's lands arose out of people's perception of the region as a wasteland. This region, historically considered the nation's wasted land because it remained in the public domain, was populated by marginal cultural groups including Mormons, Basques, southern European immigrants, and Native Americans. For these groups, the wasteland was their homeland. The tension between those that lived in the Great Basin and used its public lands and those who were responsible for the management of those lands created an insider-outsider, local-national dichotomy that further informed the region's development. Taken together, these concepts fuelled the land-use conflicts that informed the size of the risk.

ACKNOWLEDGEMENTS

The completion of this dissertation was contingent upon the support of many individuals who gladly gave of their time and expertise. I am indebted to the committee members who fostered this project from its earliest stages to its final conclusion. My entire committee wisely guided me towards a project rich in local resources and facilitated the fundamental intellectual components of this dissertation. Their tolerance allowed me to embark on this very large project and they made no attempts to curb my enthusiasm, instead fostering the confidence and inspiration necessary to see a dissertation, even one this large, to completion. My committee chair David Wrobel brilliantly supported my interests and unfailingly provided sage guidance and important criticism, always with inspired witticisms. Committee members Andrew Kirk, Elizabeth Nelson, and Robert Futrell provided valuable comments that significantly improved the quality of my project. My sincerest thanks to Greg Hise, who joined the committee in the final two years of the project; his keen insights have been most valuable. Elizabeth Fraterrigo, an original committee member, continued to provide intellectual support and engaging dialogue throughout the final stages of the project. My greatest debt is to Mary Palevsky, Director of the Nevada Test Site Oral History Project. Without her guidance, input, and support this dissertation would not have emerged out of the work we did together on the oral history project.

I maintain that historians are only as good as the archivists they work with and I have had the opportunity to work with many wonderful people in several archives. Peter Michel and the staff at the University of Nevada's Special Collections in Las Vegas have my utmost gratitude, especially Su Kim Chung and Thomas Summers who gladly hauled

many, many manuscript boxes up and down elevators. There can be no better research facility than the one that is closest to home and UNLV's Special Collections was my home for several semesters. Susan Searcy, Chris Driggs, and Elizabeth Moore were incredibly helpful at the Nevada State Archives in Carson City, allowing me to come early and stay late when my time up north ran short. Jacquelyn Sundstrand and the staff at the University of Nevada's Special Collections in Reno provided numerous nuggets of information on Great Basin history and the region's residents. My special thanks to Tina Nappe for use of her father's photographs which were essential for the completion of the chapter on wild horses. Glendon Collins at the Public Lands Foundation Archive at the Bureau of Land Management Training Center in Phoenix similarly provided valuable insight into the inner-workings of the BLM. Finally, the staff at the Denver Public Library and Alan Kania provided important assistance in the early stages of the project and helped me understand the Great Basin from the outside.

None of this dissertation would have been possible if not for the wonderful people who gave their oral histories to the Nevada Test Site Oral History Project and those whom I interviewed independently. In particular, Gracian Uhalde, Helen Uhalde, Donald James, Jeanne Sharp Howerton, Charles Costa, Virginia Sanchez, Kim Townsend, were incredibly open and honest about their experiences living and working in the Great Basin. They provided the foundation for the project, and my greatest task throughout the research and writing process was to better understand how their experiences in the Great Basin embodied the different landscapes in the region. Representing their lives and their work as accurately as possible presented the most important challenge of the entire project. There are many others whose names are listed in the Nevada Test Site Oral

History Project archive who contributed to this dissertation. All the interviewees have my sincerest gratitude.

Of course, the support and care provided by my family and friends has been essential. My parents, Ron and Sandy, my siblings Brian, Debbie, and their families, have been wonderfully supportive. I owe my in-laws Dale and Barbara many thanks for their willingness to provide me another home in which to write during the summer and winter breaks. Cathy and Bob Evans and Dave Harrison also opened their home to me whenever I needed a place to stay in Carson City. My many friends in Las Vegas and elsewhere have provided much emotional rejuvenation when I needed a break. I give my sincerest thanks to the collective Harrison clan, Christian, Valerie, Bradley, Andy, and Amber, who suffered through many conversations about each and every aspect of my project. Tonya Guiliani looked after my emotional well-being and never let me forget that there are other things at least as important as dissertations. Kristen and Marshall Evans and all the rest who knew I would eventually finish this project helped give me the confidence to do so. I am especially grateful to those friends in my cohort, Michelle Turk, Charlie Dietrich, and Aaron McArthur, who kept me going, cheered me on, and never let me slow down. They can be assured I will repay the kindness. Other friends scattered across the United States, Europe, and Africa supported me and this project as well; they include the Jaegle family, Stephanie Thompson, Eloise Leher, Jami and the entire Bassett family, Martin Sayer, and a host of others I with whom I taught, travelled, and laughed. Finally, I owe the largest debt of gratitude to Michael Childers, who has gone through the process of earning a doctorate twice. His patience and care bridged the gap between endurance and enjoyment.

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CHAPTER 1

THE FOUR LANDSCAPES

The underlying principle of conservation has been described as the application of common sense to common problems for the common good. If the description is correct, then conservation is the great fundamental basis for national efficiency. In this stage of the world's history to be fearless, to be just, and to be efficient are the three great requirements of national life. National efficiency is the result of natural resources well handled, of freedom of opportunity for every man, and of the inherent capacity, trained ability, knowledge and will, collectively and individually to use that opportunity. Theodore Roosevelt (1909)

The genesis of this study occurred somewhere on the dirt road around Water Gap after a discussion with Gracian Uhalde, a Nevada rancher, who lives on the western edge of Garden Valley in the heart of the Great Basin only sixty miles north of the Nevada Test Site. The energetic Uhalde had spent much of our conversation describing his family and their livestock operations, what it was like to live and work in one of the least populated regions in the country, and how troubled he was by the increasing number of conflicts resulting from different public land uses throughout the twentieth century. As a third-generation cattle and sheep operator, Uhalde inherited his outfit from Basque ancestors who had migrated to the Great Basin before the turn of the twentieth century. He and his father had experienced many of the conflicts regarding public land use first-hand. During our visit, Uhalde focused in particular on explaining the trouble his family had with wild horses and atomic tests. In a strange and fundamentally interrelated way, mushroom clouds and wild equines were fundamentally intertwined in his family’s life on the geography of his home. The questions that remained after the interview with Uhalde were how and why these two public land programs had shaped his experiences.

Wild horses and the infamous mushroom cloud produced by atmospheric atomic tests historically have been two of the iconic images of the Great Basin. The animals and

atmospheric tests once shared a space on the region's public lands. Both were the result of different national and regional interests that found expression on the landscape through Congressional legislation which deemed these activities acceptable and carved out space for them in the federal domain. But the programs the nation's legislature created for wild horses and atomic tests determined two very different and conflicting uses of public land. Although atomic testing and wild horse preservation have created two distinct hybrid landscapes that combine natural and human elements which historians have traditionally treated as separate and discrete stories, they are in fact fundamentally and problematically related. Expressed by the presence of both wild horses and atomic mushroom clouds in the Great Basin on the region's public land, these landscapes are evidence of an underlying cultural ideology that accepted conflicting uses of the federal domain for the greater national good with little thought towards or regard for the associated costs of the conflicts between them. Through examining the development of four hybrid landscapes which express the different ways in which this nation constructed different public land programs on the federal domain to fit specific human cultural and economic needs, I argue the underlying and conflicting interconnectedness of these landscapes has exacted significant costs from the Great Basin's human population and natural ecology, the size and scope of which envelope the entire region.

Landscape is the physical result of different groups constructing places for diverse purposes. It is also a way of seeing the land itself, a particular perspective that emphasizes certain aspects of the geography that appeal to our sense of beauty, economy, and cultural memory. For agriculturalists, verdant growth indicates water resources and the potential for prosperity, but barren rock and playa indicate the opposite. Sand dunes

used to signal a grueling obstacle travelers tried to avoid, but today are a sandy playground to off road vehicle enthusiasts. Some homesteaders disparaged settling in the high desert at the same time others found redemption in the dry sagebrush plain. We map landscapes, both physically and mentally, according to our categorical preferences and experiences which change and morph over time. These changes shape and reshape the environment itself through our expectations and interaction. This has created landscapes that are hybrid combinations of human and natural environments. According to Richard White, hybrid landscapes are not purely wild or built, rural or urban, rather they are complex constructions of natural and cultural systems that dynamically shape and create a place. They can be understood through urban planner Kevin Lynch's three components of environmental image: identity, structure, and meaning. Each of the four Great Basin landscapes developed an identity through a distinct public land program, each manifested a specific structural pattern which placed it in conflict with the others, and each carried important meaning and associated costs for those that engaged with them.[1]

Beginning with the Taylor Grazing Act of 1934 and the establishment of the Nevada Test Site in 1950, and including the Land Classification and Multiple Use Act of 1964, and the Free-Roaming Wild Horses and Burros Act of 1971, the federal government placed physical and conceptual boundaries around the use of the nation's public lands. Each of these public land programs created the ranch, military-nuclear, outdoor recreation, and wild horse landscapes respectively, constructing cultural, economic, and environmental patterns that highlight both the beneficent intent of these land management programs and their unintended consequences. Each significantly benefited the nation as a whole when Congress created them and the costs associated with them seemed small.

However, conceptual processes, clearly defined in federal legislation, and geographic locations, clearly delineated on federal agency maps, converged on the landscape in physical conflict. Instead of the crisp lines drawn on maps, the actual boundaries of the land uses these laws enacted as they existed on the ground were messy, ever-expanding, and have exacted a high price from local populations and the Great Basin environment.

The origin of the conflicts between these public land programs and their associated landscapes is in the ideological framework of nineteenth-century neoclassical economics, particularly within the concept of utility, which influenced progressive politicians, conservationists, and public land managers throughout the twentieth century. Although succeeding economists criticized neoclassical theorists' reliance on *laissez-faire*, preferring to advocate federal involvement through some regulation of the nation's economy, few questioned the use of utility theory to guide decision-making because it created the greatest degree of opportunity to achieve satisfaction—economic, social, or political gain—for the greatest number of Americans. Utility theory also rendered all that public lands provided, the natural resources that they contained, and the activities that could be accomplished on them as commodities. Congress embedded utility, along with the corresponding concepts of maximization and efficiency, in public land legislation through the multiple-use construct, which purported equitable access for all public land users, efficient and balanced resource use and development, and the right of the American public, either as individuals or corporations, to use the public domain. In actual practice, however, multiple-use created a contradictory hierarchical scale of use which privileged national interests over local development, economic value over existence value, profitability over sustainability, and maximization over sufficiency.

In examining the human and environmental costs of public lands grazing, military and nuclear testing, outdoor recreation and wilderness designations, and wild horse management, this study makes a more holistic evaluation of the associated costs of these programs. All of the landscapes are federally administered and all of them affect local as well as national populations.[2] Through the establishment of these public land programs, the relationship that federal land managers cultivated in the Great Basin with residents, which grew out of attempts to render the nation's wasted land economically productive, proved frustrating and often ineffective. As the definition of productive land changed from producing cash crops and extracting mineral resources to providing amenity and scientific values, public land users prized the region's open space as much for its isolation and primitive state as its range land and ore. As a result, space itself remained the most important asset public land offered and, because of its public ownership, had to be equitably assigned multiple utility values. These varied uses constituted the practice of multiple-use in which no user group was overtly denied access and both land managers and users presumed there were no conflicting uses. However, in lieu of a formally legislated hierarchy of use, a de facto use pattern emerged throughout the twentieth century which preferred some uses and some users over others creating polarizations between and unmet expectations among the different groups. In addition, to most public land users, their land requirements were not substitutable, a condition that severely aggravated public land conflicts.

This work is not a history of most Americans or even most Americans in the Great Basin. Instead, it is a history of the land in between the major population centers of the region and the people that live there. However, this study has great bearing on our

understanding of the ways in which we enact national ideas at the local level, how local interests translate at the national level, and how the tension between the intent and actuality of public land programs informs the shape of the land itself. William DeBuys argued that in California's Salton Flat this reciprocal process of "alteration and accommodation never ended, for both dreams and places are restless things and change continually." This is also true in the Great Basin. The development of different landscapes, resulting from the consequences of different visions and perceptions of the region which intersected and overlapped in conflict illustrates this. It would be impossible to tell the full history of each of the region's landscapes, so in this work, each landscape is chronicled through a narrative which conveys the story of what DeBuys called the "busiest and most history-afflicted portion" of the area.[3]

Encapsulated in archival sources and oral histories, the human voices of residents and federal officials alike detail the ways in which the creation of grazing districts, the problem of radioactive fallout and its effects on the environment, failed attempts to establish recreational and wilderness areas in the region, and the highly contested wild horse management program affected the lives of Americans on both the local and the national scale. Despite the dominant role taken by federal government, the influence and agency of local communities cannot be obfuscated. Local forces manipulated the Great Basin environment and its residents have had powerful voices assisting their interests at the national level. Sometimes forgotten victims buried in the nation's trash heap and sometimes complicit architects of their own success or demise, rural populations of the Great Basin acted and reacted within the framework of federal land-use programs.[4] This environmental history details the conflicts between the federal government and locals

over defining and promoting the greater good of communities and the nation, and the unanticipated associated costs of the public land programs created in the process. To borrow a phrase from atomic scientist Enrico Fermi, these associated costs constitute the "size of the risk."[5]

Several themes emerge throughout the study which clarifies the meaning of the size of the risk. The multiple-use concept is a land management ethic broadly defined to allow for maximum utilization of public land for economic and cultural purposes. Multiple-use can encompass everything which the federal government permits on public land in combination on undesignated land or on reservations, including mining, ranching, recreation, nature preservation, military, and scientific activities. But historically different public land users have defined it differently, often narrowing the idea to include only activities within a certain category of land use. The driving principle behind multiple-use is that by balancing as many uses of public land as possible as close to their maximum use as possible, the nation's federal domain can provide the greatest utility for the greatest number to utilize natural resources in the most efficient manner. This concept works best in areas where forage, timber, water, open space, and scenic beauty are in relative abundance. In the Great Basin, however, most of these resources are scarce given the deceptive amount of available open space. The nation's attempts to maximize public land use in the region have produced a series of land management policies with unintended consequences magnified by their physical intersection and overlapping administration. We tend to think of these activities independently, but when we examine them together in this vast desert space, the problems of the multiple-use concept surface with astounding clarity. As Richard White so aptly noted, "despite multiple use, land

cannot be simultaneously range, parking lots, and wilderness."[6] In thinking them separate, we actually inhibit equitable and efficient use.

The problem of maximization is closely related to the multiple-use concept as it addresses the ways in which different interests have informed federal land management programs. In the Great Basin, livestock operators (ranchers), wild horses, atomic tests, and recreationalists problematically operate within separate federal institutional frameworks that each seek to maximize a particular public land use. Many of these efforts arise from both economic and cultural motives to increase a particular public land use for different participating groups and individuals. In addition, different federal land management agencies have produced diverse landscape patterns across the Great Basin environment rarely in cooperation with each other in pursuit of their own agenda. Grazing programs increased forage resource production, military and nuclear testing required more air and ground space for hazardous training experiments, outdoor recreation and nature preservation groups expanded zones for hiking and camping, and wild horse advocates pushed for more territory for wild horses to roam. But different agencies have given the American public conflicting messages about public land use and their management programs have produced a tangled web of overlapping and scientifically-based legislation created in different eras of federal management. Noted public land manager and former Bureau of Land Management director Marion Clawson viewed federal land management as a linear progression, implying an ordered evolution brought about by rational logic intent upon making public land management more efficient and equitable from the top down.[7] While Clawson's view implies a positive progression towards maximum utility, what has instead occurred is devolution towards

public land users' dissatisfaction. The very nature of maximization creates conflict and contradiction.

The consistent characterization of the Great Basin as a wasteland informed the ways in which development manifested in the region. Explorers, surveyors, and travel writers disparaged the region's undulating geography, alkali soil, and scarcity of water. Regional boosters tried to promote the possibilities, however small, of irrigated farming and minimize the impossible reality of taming the sagebrush ocean in a culture that found no redemption in letting land go to waste. But settlement in the Great Basin merely clung to the periphery, developing in urban nodes such as Las Vegas, Reno, Boise, and Salt Lake City, which left the interior relatively unpopulated. The hope of striking a rich vein of ore, as Henry Comstock had in Virginia City in 1859 or Jim Butler had in Tonopah in 1900, drew many migrants to the region and even into its interior so long as the strikes lasted. But population was predicated on the boom and bust cycles of the mining industry and people came and left with the rising and ebbing tides of gold and silver strikes. Those who did stay in the region's interior were an eclectic mix of Mormon, Basque, southern and eastern European immigrants, and Native American populations. They have been notoriously resistant to government interference, whether local, state, or federal, electing officials who support very little regulation at any level. Nevada, almost entirely located within the Great Basin, has the smallest state bureaucracy in the country and contains a tiny rural population scattered over the majority of its geography.[8] Yet because of the region's wasteland characteristics, under one-fifth of the land is privately owned. Residents are fundamentally dependent upon access to the federal domain for grazing, mining, and tourism among other activities. As a result, the small population maintains

their presence on tiny privately-owned islands in a sea of public land, stubbornly resistant to leaving their communities despite facing increased economic difficulty perpetuated by shifting national interests and economics.[9]

The relationship between different Great Basin residents and the federal government often existed within an insider-outsider, local-federal oppositional framework. Most of the region's residents were Mormon, Basque, southern European immigrants, and Native Americans, groups historically marginalized within mainstream American culture. Ideas about home and family informed their perception of the region and their years of experience on the land had cultivated an intimate understanding of the place. Some served as municipal leaders or legislators at the state level. In many respects, these residents, along with the Great Basin environment itself, have been the "indicator species" of the efficacy of these programs.[10] By contrast, Congressional delegates, administrators in the Department of the Interior, the Atomic Energy Commission (AEC), the Bureau of Land Management (BLM), and other agencies who worked in the nation's capital a long distance away from the Great Basin had little of the same kind of knowledge. Instead, these federal officials understood the nation's needs and interests, and translated them into programs that governed the region's public lands. None of these individuals aimed to injure or ruin each other, though on occasion they infused their rhetoric against those taking opposing positions with vitriolic statements. Some individuals moved between the local and the national, shifting from small communities into positions of authority in different land management agencies, as did several range managers in the BLM. These individuals, who grew up with an experiential knowledge of the Great Basin, often became outsiders by enforcing unpopular federal mandates. Others

were outsiders, such as the Public Health Service (PHS) radiation monitors, who after decades of living and working in the region became insiders, a part of the lives of many of the ranching families, intimately knowledgeable about the land, and willing to disclose classified material to protect their friends. The tension inherent in the insider-outsider, local-national dichotomies informed the ways in which the different public land programs produced these conflicting hybrid landscapes on the Great Basin's geography. In order to better understand them, like the region's residents we must better understand the physical space that is the Great Basin.

The Interior Space

The Great Basin is one of North America's interior spaces and the largest desert within the United States.[11] It is also one of the nation's least populated regions; most residents of the Great Basin settled in cities scattered predominately around its edges.[12] It is a physiographic region bounded on its eastern and western edges by two of the continent's major mountain ranges, the Sierra Nevada and the Wasatch Front of the Rocky Mountains, spanning the five hundred miles in between. Its northern and southern boundaries are less specific and certainly less dramatic. The Snake River Plain in Idaho meanders across its northern border and the Mojave Desert, four hundred miles distant, abuts its southern boundary. It is also a hydrographic region determined by its internal flow of water. From its edges through its interior, water in the Great Basin flows into sinks and playas which have no outlet to either the Pacific or Atlantic oceans (fig. 1). The waterlines of two Pleistocene lakes dominate much of the Great Basin's geography. In the east, ancient Lake Bonneville stretched from the Wasatch Mountains throughout much of the western part of Utah and the many-tentacled Lake Lahontan covered the

entirety of western Nevada. The alkaline Great Salt Lake is the thin remnant of Bonneville at the foot of the Wasatch. There is even less left of Lahontan; Pyramid Lake, Walker Lake, and the Carson Sink near Reno are its only remnants.[13]

Despite its history of water, the Great Basin has only a few rivers coursing through its sage-covered land and little of the element pools on its surface. The region is comprised of five hydrologic subsystems, the Northwest Lakes in Oregon, the Lahontan system and Central Basins in Nevada, the Death Valley system predominately in California and the Bonneville system in Utah. While the majority of southern Idaho drains into the Snake River Basin which flows into the Columbia River system and on to the Pacific Ocean, it has become convenient for cultural and ecological reasons to expand the northern boundary of the hydrologic Great Basin to include it as well. The major rivers flowing through the Great Basin include the Truckee, Carson, Walker, Owens, Mojave, and Amargosa river originating in the eastern Sierra Nevada mountains; the Humboldt, Reese, and White rivers which flow out of the mountain ranges which form the spine of the Great Basin; and the Bear, Weber, Provo, and Sevier rivers originating in the Wasatch Mountains and southern Utah chains. Many of these rivers naturally end in sinks rich in vegetation and *playas* or dry lakes which fill and evaporate seasonally, providing essential avian habitats along the Pacific flyway. Others pour into the few permanent lakes in the region, some freshwater such as Pyramid, Walker, Bear, and Utah lakes, some alkali such as Mono and the Great Salt Lake. Two prominent lakes are currently bone dry and dusty: the famed Owens Lake in eastern California was drained by the city of Los Angeles in the early twentieth century and the Sevier Lake in eastern Utah, which has historically fluctuated, has remained utterly desiccated except in the flood years of

the mid-1980s because of irrigated agriculture from Richmond to Delta. The entire region is underscored by varying levels of groundwater resources, some of which manifest as springs or, in the case of proximity to geothermal outlets, as hot springs. There are around four hundred hot springs scattered throughout the Great Basin. Water in the region is the most important but scarcest resource and has played critical role in shaping the settlement and economic development of the place.[14]

Scattered between the ancient lake beds are ranges of volcanic and fault-block mountains rising out of a sea of sediment. There are so many mountain ranges in the region that travel in the Great Basin can be frustrating; one range can look very much like another and they go on for hundreds of miles. The ranges are mainly oriented on a north-south axis parallel to the central crustal bulge at the region's center. Each mountain range is essentially located along an existing fault line. Valleys on the far western and eastern edges are generally deeper and the mountains taller than towards the Great Basin's interior. John McPhee describes the Great Basin topography as basin, fault, range, another basin, fault and range and another, stretching from horizon to horizon. It is a region best understood laterally, in terms of elevation and not from an overhead perspective. These pieces of fractured earth are tilted at odd and often sharp angles as fault-block mountains alternate with volcanic peaks. The seemingly endless ranges are constantly rising, sometimes violently and abruptly, and at the same time are being eroded away by the wind and rain.[15]

Photographer Peter Goin described the region as a "land of contradictions that often defy description," where "the sound of quiet can be deafening." Goin, traveling through the region trying to capture its essence with a camera lens, wrote, "When the wind

whistles and the dust storms grow, even the most experienced traveler can become disoriented. Distances are deceiving as human scale becomes obscured and unpredictable." The Great Basin is an uncomfortable place; consisting of what author William Fox called a "frontier of cognitive dissonance," which is "a state of confusion defined as trying to hold two contradictory ideas or perceptions in mind at the same time. The Great Basin is a place where our eyes have trouble getting a grip, no matter how many numbers we throw around trying to quantify it … All our experience with distance is confounded by the difficulties we undergo in adjusting our sight values to the Basin. This cognitive dissonance is caused by our visual expectations being wildly out of synch with these perceptual realities."[16]

The immense amount of sagebrush, its proper name *artemisia*, that covers the region certainly does not help the eye to differentiate distances. Shimmering gray-green across the alluvial fans sloping from the mountainsides to the edges of the playas, sagebrush, often accompanied by shadescale and greasewood, *atriplex* and *sarcobatus* respectively, offer cover for a multitude of wildlife and shelters a precious understory of native grasses. At the higher elevations, a variety of conifers including pinyon (*pinus*), juniper (*juniperus*), and several species of pine trees cling to the often steep and rocky mountain slopes. The longest-lived of all trees, the bristlecone pine (*pinus longaeva*), is found at the highest elevations, just below the tree-line. These mountain ecologies form sky-islands in the sagebrush ocean. Charismatic ungulates include antelope, mule deer, and big horn sheep which are hunted by mountain lions in the higher elevations. Rabbits, squirrels, and other rodents species proliferate throughout the region as do a variety of snakes, lizards, tarantulas, scorpions, and a host of insects. Magpies, ravens, sparrows,

and even golden eagles thrive in the skies above the region. There are rare species of fish such as the Lahontan cutthroat trout and the Devil's Hole pupfish. The flora and fauna of the Great Basin are products of the region's aridity, isolated mountain ranges, and transitional position between the Sierra Nevada and the Rocky Mountain ecosystems.

The region is not a hospitable environment and early explorers found little to redeem its harsh and dry climate. Nineteenth-century settlers felt a similar sense of despair as they struggled to bring the region's land into agricultural production. During the twentieth century, the Great Basin's ecological system became markedly different from its earlier self. Cattle, sheep, and horses competed with native grazers for forage resources. Invasive plant species such as Russian thistle (*salsola*), more commonly known as the tumbleweed, halogeton (*halogeton glomeratus*), and cheat grass (*bromus techtorum*), competed with native grass species for purchase in the shallow soil and hard ground. A few reclamation projects organized water resources for agricultural production and urban development. Mining operations razed the sides of mountains, delved deep into their reaches to pull out valuable ore, and deposited mounds of toxic tailings on the alluvial fans.[17] In less than one hundred years, the region's population grew from a few thousand to several million. However, in the spaces between the agricultural and population centers, between the ranches and the mines, there still existed a vast amount of land not possessed by private interests. Perhaps uniquely within the continental United States, the region's ecology reflects both the alterations made by human culture on the landscape and the resilience of nature to resist those alterations in dramatic ways.

Writer Joel Garreau placed the Great Basin, along with most of the western United States and the northern reaches of Canada, in the Empty Quarter. Garreau suggested that

this area “is definitively the West” because of its low population density and hostile climate. Aridity dominates the region’s environment, precipitation averages between four to twelve inches annually. It is a region that is best seen in a cross-section; elevations range between two hundred feet below sea level to fourteen thousand feet above sea level, though most of the region lies between two and four thousand feet. The Empty Quarter is the largest of Garreau’s nine ecological and cultural “nations” of North America and the least populated, containing on average only about one person per square mile. Out of the hardship of living in the region, according to Elizabeth Raymond, settlers “developed in self-defense a regional identity that grew from their pride in the basic accomplishment of simply having endured in such an unlikely place. Whether they loved the desert landscape or hated it, residents uniformly catalogued its challenges. Far from transforming the landscape, they constantly risked annihilation by it.” However, Raymond saw little that would “redeem this landscape from its enduring symbolic role as America’s resolutely unblooming wasteland,” the attitude of much of the nation towards the region. The United States’ portion of this region is predominately controlled by the federal government and as such, the relationship between its residents and the nation’s government shapes its economic and political structure.[18]

More specifically, the region is home to many Mormons, Basque, and Native Americans. Located east of the verdant California Eden and west of Brigham Young’s religious Zion, the Great Basin is home to historically marginalized populations. Once envisioned as Deseret, the new home to a persecuted population whose boundaries mirrored those of the hydrographic Great Basin, the Mormon region established in the mid-nineteenth century contracted significantly throughout the next century, leaving

behind isolated and even stranded Mormon settlements. Still, many of the small agricultural communities around the periphery, especially in eastern Nevada, contain significant Mormon populations and maintain their ties with the more populated Mormon cultural centers in Utah. Geographer Donald Meinig described this Mormon territory as the Mormon Cultural Region, an area dominated by the Mormon religion and noted for its highly-successful communal irrigation projects. Meinig argued that in this cultural region, Mormonism left an indelible mark on the development of the Intermountain West visible as verdant farming oases in the brown desert. The religion's emphasis on agricultural production, hard work, population increase, and community created characteristics shared by other Christian communities throughout the country.[19]

The Great Basin is also home to significant numbers of Basque settlers and other southern European immigrants. The Basque are a distinct linguistic group from the western Pyrenees Mountains between France and Spain historically persecuted for granting equitable legal status to their women. The Basque cultural region overlaps the Mormon cultural region in the northern and central Great Basin, especially around the Reno, Boise, and Winnemucca population centers. Often sheepherders, they were a significant nomadic society in the Great Basin during the early twentieth century with their distinctive dress, wagons, and herding dogs. According to William Douglass, Basque sheepherders were "the indispensible backbone of the sheep industry," though most ranchers in the livestock industry only latently recognized their economic contribution. Because they were non-Anglo immigrants and led a nomadic lifestyle ranging across thousands of miles of territory to graze their herds, Basque sheepherders became unwanted competitors for the limited forage resources throughout the region.

Known generally for their unique language and "an almost mystical capacity for the solitude and privations of life on the open range," Basques established a strong ethnic presence throughout the Great Basin. Along with other immigrant groups from southern Europe such as Italians, Basque immigrants provided an important source of labor for ranches in the region.[20]

Less visible than the Mormon and Basque cultural regions in the Great Basin is the small but persistent Native American culture. Western Shoshone and Paiute tribes of the Great Basin are not as prominent in the region as the Sioux tribes in the Great Plains or the Navajo on the Colorado Plateau. A loosely-defined hunter-gatherer people, the Western Shoshone and Paiute did not have a centralized political structure to cope with the influx of settlers in the mid-nineteenth century. Nomadic and small, these tribes did not exhibit the same cultural characteristics or have access to guns and horses as did the larger tribes of the Great Plains. Explorer Jedediah Smith's accounts of encounters with Great Basin Native Americans publically described the tribes as "the lowest form of humanity." Settlers gave these Indian tribes descriptions that echoed their disdain of the region's environment, calling them uncivilized, filthy, diggers, and worthless because they did not farm and they did not have the charismatic cultural markers of the tribes elsewhere in the country.[21]

During the establishment of the national reservation system, most Western Shoshone and Paiute tribes resisted leaving their ancestral valleys in the central Great Basin for the Pyramid Lake Paiute Reservation which the federal government created in 1859. Acknowledging their reluctance and because there was no immediate pressure to remove Native Americans from the Great Basin, the Treaty of Ruby Valley in 1863 recognized a

large land area belonging to the Western Shoshone and did not extinguish aboriginal claims to most of their native territory. The federal government hoped to buy time in order to begin establishing acceptable reservations and persuade the Western Shoshone and Paiute tribes to relocate. But the pressures of increasing numbers of Anglo miners, farmers, and ranchers accelerated the process. As a result, the federal government established only a few reservations for Great Basin Native American tribes. One-third of the native population of the region relocated to these reservations while the remaining tribes lived a marginal existence off the reservation as laborers and hired hands, ignored by the Bureau of Indian Affairs. Nevertheless, the presence of Western Shoshone and Paiute continued in the Great Basin.[22]

Each of these distinct cultural groups shares a similar vision of the Great Basin.[23] Mormon families farm and ranch in the region's valleys, constructing communities and irrigation delivery systems, molding the land to their desires in order to eke out a living in the harsh arid environment their prophet and leader Brigham Young commanded them to settle. Their vision of the Great Basin is as much spiritual as it is economic; it is the place their ancestors fled to escape religious persecution in the mid-nineteenth century. Basque families and other immigrants from southern Europe labor in the Great Basin in whatever capacity they are able. Their ancestors settled in the region looking for better economic opportunities in and around existing mining and ranching communities and their vision of the Great Basin is one of possibility. Similar to Mormons, they share a sense of pride in surviving the hardships of the region. The Native American tribes are the indigenous population of the Great Basin. Their ancestors lived and died here in the same way generation after generation until Anglo farmers, ranchers, and miners pushed them slowly

out of their traditional mountains and valleys. Their vision of the Great Basin is deeply spiritual—their sacred spaces of creation and worship are scattered throughout the region. To all three groups, the region is home.

These cultures reshaped the land through a particular vision of what they desire to accomplish. The Mormon landscape is one of irrigated fields, orchards, and pasture while the iconic Basque landscape is that of open range occupied by scattered herds of sheep and sometimes cattle. The Native American landscape is subtler but equally as prevalent in the region. They worked on most ranches as laborers, housekeepers, and cowboys. But each of these groups valued a subtly different outcome in the creation of their landscapes which often set them in conflict with each other. In the Great Basin, Mormons endeavored to create an agricultural paradise and focused on obtaining water rights and range control. Basque sheepherders recreated their ancient nomadic lifestyle, often poaching range resources. Native Americans worked to continue their relationship with their ancestors without the ability to own land, which made them trespassers in their own country. Irrigated agriculture, ranching, and maintaining a connection with the past transformed the region's land into particular landscapes. Overlying the Mormon, Basque, and Native American cultural production of landscape in the Great Basin was the larger national construction of the region.

The Great Basin's remaining public land, that which was not privatized, is administered by the federal government. State, municipal, and private property holdings are small and scattered relative to larger public domain. The Bureau of Land Management (BLM) is the largest land manager in the Great Basin. In Nevada, the BLM oversees forty-eight million acres out of almost seventy-one million. In contrast, the

Forest Service manages only about six million acres, the Fish and Wildlife Service (FWS) manages just over one million acres, and the National Park Service (NPS) manages less than one million acres in Nevada. In Utah, the BLM administers less than half that at nearly twenty-three million acres, most of the Forest Service and NPS land is located outside the boundaries of the Great Basin, and very little land is managed by the FWS. The Department of Defense (DOD) and the Department of Energy (DOE) are also large land managers in the Great Basin. In Nevada, the two agencies administer nearly four and a half million acres; in Utah, they oversee nearly two million acres (fig. 2).[24]

Throughout the twentieth century, Congress passed laws governing public lands intended to ameliorate the dissatisfaction, even anxiety, the federal government and the nation as a whole experienced over the remaining and relatively useless public domain. Land without category or use, without a know utility, proved terribly wasteful of potential natural resources. As a result, Congress designed the major land laws of the twentieth century specifically to make use of land purported to be going to "waste." As such, they reshaped the Great Basin's geography according to the needs of American culture along the lines dictated by the national political and social economy, they codified existing land-use patterns, and the laws informed the ways in which Americans interacted with the land. Collectively, they transformed the Great Basin environment from an undesirable and inhospitable region to a hybridized landscape for the purposes of ranching, military training and nuclear testing, outdoor recreation, and wild horse management.

These land laws can be organized into four hybrid landscapes, four ways in which American cultural practices and the nation's political and social economy framed and

determined human interaction with the Great Basin geography. These landscapes have distinct intellectual foundations and scholarly treatments. Their evolution originated out of both American cultural preferences and public land laws which codified them in region. They are often problematically romanticized and polarized by a variety of groups who stand on opposing sides of public land issues. Taken together, these landscapes are fundamental to understanding the environmental and cultural impact these public land programs have had on the Great Basin's environment and residents. The first is the Ranch Landscape, established by the Taylor Grazing Act during the Great Depression which created grazing districts across the American West in order to put the remaining public land, most of which was unfit for farming, into economic production, the accepted understanding of the highest use of the land. The second is the Military-Nuclear Landscape, created in answer to the imperatives of military development during World War II through executive orders which segregated large portions of the Great Basin for the purposes of increasing national security through troop training and weapons development. The third, the Outdoor Recreation Landscape arose out of the postwar era boom in outdoor recreation as increasing numbers of Americans engaged in leisure activities on public land and sought to preserve the last of the nation's open space to improve Americans' quality of life. Lastly, the Wild Horse Landscape encapsulates the transformation of the horse from work animal to symbol of the American West as a national heritage species and represents the difficulties of wildlife management on a complicated and crowded rangeland. Taken together, these landscapes provide an overlapping and complex environmental map of their national construction, their implementation in the American West, and their efficacy in the Great Basin.

The Ranch Landscape

Geographer Paul Starrs once wrote "the ranch lies nearly everywhere in the American West … pretty much everyplace where cities aren't there are ranches."[25] This observation is important in terms of the geography controlled by ranches and not because of the population involved in ranching. In the Great Basin, ranches exist in every foothill and playa across the state, but go relatively unseen by the urban populations of the area because few travel through the region on its two-lane highways and because ranch structures are usually several miles off of the paved roads. From a satellite's perspective, ranches are easily spotted as tiny green dots in a sea of varying shades of brown. Evidence of ranches exist along many of the region's highways in the form of holding corrals and dirt access roads with signs labeled "ranch" and directional arrows, or a set of numbers affixed to a mail box. Sometimes the arched-topped ingeniously-organized wagons used by sheep herders appear in the mountain foothills. Great Basin ranches differ from their counterparts in many other parts of the American West in that most have small land bases, a handful of water rights, and are utterly dependent upon public land grazing.[26]

The ranching industry in the Great Basin has not produced the same type of historic cattle ranches as seen in Texas and California which established vast private estates in water-rich areas.[27] The economics of most livestock operations in the region are marginal at best. Scattered parcels of private property comprise the base of most livestock operations and are the only economic anchors besides a handful of mines for the Great Basin's rural population.[28] While ranching represented "a great adaptive strategy to dry land" for a nation looking to put all of its territory into economic production, it often

proved to be a poor one ecologically.[29] Range scientists James Young and Abbot Sparks commented that "the development of ranching in the sagebrush/grasslands was a grand experiment initiated by men willing to venture beyond the limits of accepted environmental potential" to settle the Great Basin. Livestock operations have historically overgrazed these delicate rangelands.[30] Nevertheless, in a land which resisted most other forms of development and a region latently populated, ranching in the Great Basin, though a distant second to mining, became an important economic activity relative to the few residents who lived outside its cities because of its economic viability.

The 1934 Taylor Grazing Act, the first multiple-use act on federal land, established this fundamental landscape as the last-ditch solution to the management problem of a still-disorganized public domain. As written, the act meant "to stop injury to the public grazing lands by preventing overgrazing and soil deterioration, to provide for orderly use, improvement, and development, to stabilize the live stock industry dependent upon the public range, and other purposes."[31] Ideally according to the Department of the Interior, the agency responsible for implementing the act, ranchers, states, the federal government, and the range environment would benefit from coordinated use based on ecological principles. The act authorized the Secretary of Interior to establish grazing districts on the public domain when requested by ranchers who desired federal oversight to assist them in conserving and using the range. F.R. "Ferry" Carpenter, rancher and director of the new Grazing Service charged with holding local hearings across the west to establish the grazing districts, stated that the grazing conditions in the Great Basin in particular were "intolerable."[32]

To residents of the northern part of the region, frustrated by unsavory interlopers poaching locally regulated grasslands, the federal government in some senses was a welcome arbiter. Prior federal range organization, local custom and a few state laws administered the area's rangeland, mostly ineffectively. But to others in the center of the Great Basin, federal range oversight represented an unprecedented intrusion into their free use of the public domain as ranchers and homesteaders. Because of the already marginal nature of the forage resources, these ranchers maintained they could not afford to pay for use of the public rangeland. In the Great Basin, federal administration threatened to limit the land disposal process if ranchers on public rangeland used control over water resources to keep homesteaders out. While most western states had only a third to half of their public lands carved into grazing districts, the Great Basin was comprised of mostly undesignated public land that fell under the jurisdiction of the General Land Office and was thus open to both grazing and homesteading. The United States Forest Service, the other major federal agency present in the region, established a presence in the areas where small stands of timber grew above five thousand feet, which carved out little forested islands weirdly isolated in a sea of rangeland devoted more to grazing than to lumbering. As such, the ranch landscape developed across the entire Great Basin, canvassing virtually the entirety of its geography (fig. 3).

The Taylor Grazing Act codified the ranching landscape and gave ranchers legal status, but it did not provide them with the same rights as property owners or give them protection in conflicts with homesteaders, miners, recreationalists, and other land users. Where ranchers saw themselves as primary land users with priority given them through consistent occupancy and legislation, the federal government refused to legitimize

grazing ranges as ranchers' private property. The Taylor Grazing Act itself prioritized land disposal over livestock operations.[33] As the twentieth century progressed, ranchers watched their access to grazing allotments deteriorate through land classification and exchanges. In 1964, the Classification and Multiple Use Act (CMUA) triggered intense protest from ranchers because it mandated the recalculation of grazing fees and a reexamination of land use. In addition, the law ended ranchers' home rule by shifting control of range management to the Bureau of Land Management (BLM) district offices by abolishing the grazing advisory boards.

By the time the Federal Land Policy Management Act (FLPMA) officially mandated the concept of multiple-use for the BLM in 1976, ranchers already felt themselves the victims of federal coercion as their animal units per month (AUM), the amount of livestock allowed on the public range, decreased.[34] Their response, in part, was a political movement called the Sagebrush Rebellion which began as an expression of the frustrations ranchers in the Great Basin had with the increasing level of federal control over land use that worked against their ability to earn a living. Yet despite the erosion of the political influence they wielded through the congressional delegations across the American West, a decline in their overall numbers, and the increasing pressure from Congress to pay a fair fee for use of public land resources, ranchers have been able to minimize their grazing fees consistently throughout the twentieth century. In 1970, the Public Land Law Review Commission (PLLRC) mandated gradual increase of grazing fees across the country. However, in 2009, the BLM charged only $1.35 per AUM, a fee which has not increased since 1985. Ranchers consistently maintained across the American West that they cannot afford any grazing fee increase.[35]

As a result, the ranch landscape in larger American culture has two very different personas. The first resonates with a romance which appeals to those who see it as representative of a better, simpler time. According to Starrs, ranching represents community, "a valued closeness of people to nature that is all too seldom now achieved," a grossly overly-romantic but widely-held belief. Regardless of the economic status of the ranch, whether it is a large operation or a small one, to some it represents a certain connection to the old West. Cowboys, buckaroos, and vaqueros are the iconic laborers, spending their days outside, exposed to the elements and sleeping under the stars. They are the keepers of an intimate knowledge of the geography of the ranges where they run hundreds if not thousands of head of livestock. They also have an intimate connection to the horse derived from their use in running both cattle and sheep across vast territories, a mysterious and intimidating creature to many people. Popular attraction to ranch work, cowboys, and horses appears in the perception that many Americans have about rodeo. The rural sports' events mirror the daring, roping skills, and horse sense cowboys had to develop. It is also a popular sport in the small communities that support livestock operations throughout the region, a status demonstrated by the regularly sold-out attendance at the National Finals Rodeo held annually in Las Vegas.[36]

Similarly, dude ranches allow aficionados of ranch life and cowboy culture to interface with a softer, more pleasurable version of the American West's ranching past. Concomitant with the end of the open range era, the dude ranch emerged as a way for non-westerners to experience the region's most iconic occupation. Most dude ranches were established in the late nineteenth century by migrants who had traveled to the American West and returned to establish profitable livestock operations. Often these

ranches hosted guests from the east coast and Europe, offering accommodations, entertainment, and participation in regular ranch activities for a fee. National parks access was a key feature of the dude ranch experience; guests could tour the wonders of the western landscape and work on authentic western ranches. Dude ranching became a popular outdoor recreational draw for tourists. Famous guests of early dude ranches included Isabella Bird, Theodore Roosevelt, and Owen Wister, who all wrote famous accounts of their fascination with ranch life and cowboy culture as representations, whether real or imagined, of the old West. By the turn of the twentieth century, destination vacations in the American West at these ranches produced a reasonable income for ranchers in addition to their livestock operations. Western communities, including those in the Great Basin, looked to dude ranching to help establish their local tourist industry.[37]

The second persona is much more negative. The ranch landscape and its associated symbols have created a highly contested environmental geography. Historic conflicts over range access between ranchers, altercations over water rights between urban areas and livestock operations, and grazing fee battles between ranchers and the federal government punctuate the chronology of the West's development. To critics of the industry, ranchers are the plunderers of the public rangeland, subsidized by the American taxpayer and grazing every blade of grass for their own personal profit. Cowboys are the coarse and often cruel uneducated laborers who captured wild horses for sport to make an extra dollar selling the animals to the slaughterhouse. The ranch landscape is anachronistic, stuck in an era of livestock production long since gone. Livestock operators in rural counties in the Great Basin have had a choke-hold on the politics of the

region, preventing commercial and recreational development. Ranchers have also been notoriously resistant to changing environmental regulations. They are the wasters of valuable water resources, pouring gallons onto open fields of alfalfa instead of relinquishing their water rights for use in thirsty urban areas. Ranching on public lands has been biologically destructive and in the opinion of many Americans, unduly subsidized.[38]

But to the residents of the Great Basin and many environmental advocates, ranching has become the best way to preserve open space and conserve biodiversity in the Great Basin and throughout the American West. Instead of selling out to commercial interests, environmental groups and ranchers are increasingly working together to use the ranch landscape as a means to prevent commercial development.[39] The ranch landscape therefore remains an essential component of the geographic construction of the American West and especially the Great Basin. It is an economic landscape which facilitates the livelihood of a small number of residents. It is also a contested landscape which calls into question the impacts of multiple-use land management policies and the environmental consequences of public land grazing in the twentieth century. Ranchers are often frustrated and embittered by the changes enacted upon the landscape at the federal level under Congressional direction, but so too are they complicit in creating the conditions which necessitate these changes in the land management policy. Nothing illustrates this better than the intersection of ranching and the development of the nation's military and nuclear industries. The perception that the land was going to waste that made public land ranching in the Great Basin possible also facilitated troop training, and nuclear weapons development.

The Military-Nuclear Landscape

The twentieth-century American West, according to Kevin Fernlund, "bristled with airfields, army bases, naval yards, marine camps, missile fields, nuclear test sites, proving grounds, bombing ranges, weapons plants, military reservations, training schools, toxic waste dumps, strategic mines, transportation routes, lines of communication, laboratories, command centers, and arsenals."[40] However, it does not merely occupy the spaces in between cities for it is woven more deeply into the nation's cultural fabric. It is the economic foundation of many of the region's urban areas and a landscape created for the purposes of facilitating national defense and security. Through this landscape, the military, the national laboratories, and other federal agencies engaged in the nation's defense and weapons development transformed land into an outdoor laboratory complete with bunkers, bombing range markers, testing areas, and underground complexes. In many ways, therefore, this is a national landscape as well as a regional one.

The military-nuclear landscape helped drive the American West's urbanization process in the twentieth century in major cities such as Los Angeles, San Francisco, and Seattle, and was extended to outlying spaces proximate to urban areas for the purposes of weapons testing and troop training. Roger Lotchin describes this type of urban entity as the "martial metropolis." Spanish garrisons of the seventeenth century on the California coast established the early defense centers, later replaced by the army forts and naval ports of the nineteenth century and the modern military bases of the twentieth century. Aerospace contractors that manufactured aircraft such as Hughes, Boeing, Lockheed Martin, and Northrop Grumman, in particular helped facilitate significant urban growth in the region. In addition, each military base, ammunitions depot, and testing facility

further attracted population and economic growth to the immediate region around the installations which relied upon support services and supplied a ready consumer market. Fort Irwin, China Lake naval weapons testing area, and Edwards Air Force Base in the California desert drew residents to towns such as Barstow, Ridgecrest, and Lancaster respectively. The military-nuclear landscape has been both an economic boon and a source of identity, especially during the Cold War.[41]

This nation's nuclear capacity began in the mid-twentieth century with the development of the first atomic bomb. While the majority of the United States' nuclear reactors, power plants, and waste storage facilities are located east of the Mississippi River near energy-hungry metropolises, the largest number of the nation's nuclear test sites are in the American West.[42] According to Maria Montoya, the increasing urbanization and militarization after World War II made places deemed "empty" or "wasted" valuable for "military installations, proving grounds, testing sights, and laboratories." Montoya argued these sites "share their desert environment in common," and that federal officials chose these locations "precisely because of their landscape." Richard White has added that "for military planners all the old liabilities of the West suddenly became virtues. Vast distances, low population density, and arid climate had seemed detriments to economic development. Now remoteness, isolation, and a climate that allowed people to work outdoors much of the time became major assets." Yet despite the isolation of these places, they still existed within little more than an hour's drive from the nearest urban center and most developed their own urban node. For example, the Nevada Test Site contained the town of Mercury complete with a post office and general store and was only 65 miles from Las Vegas.[43]

World War II and the Cold War both "transformed" and "deformed" the West, according to Montoya who argued "the desert land, its flora, its fauna, and its human inhabitants have been sacrificed so that the federal government could test its weapons and Americans could sleep safer knowing their country's potential to protect itself."[44] The Cold War arms race increased the size and presence of the military-nuclear landscape more than other previous conflict. During the forty years of the Cold War, Congress spent up to twenty percent of the nation's gross national product annually on military expenditures. It was at this time that the federal government created a large-scale network of bases, research facilities, weapons testing centers, and other installations.[45] Currently, there are 440 military bases in the continental United States, one-third of which, and all of the largest, are located in the American West (fig. 4). The most prominent of these locations is the Nellis Range Complex (NRC), comprised of the Nellis Test and Training Range (NTTR) and Nellis Air Force Base (NAFB), the Air Force's largest aerial and surface combat training area. The Nevada Test Site (NTS), now the Nevada Nuclear Security Site, is located in the center of the NRC at the southern end of the Great Basin in central Nevada. This continental nuclear test site is bordered on the north by the Tonopah Test Range (TTR), the military's top secret aircraft test range, and the base at Groom Lake, better known as Area 51. This complex is one of several, including Dugway, China Lake, Fort Irwin, Yuma, and White Sands, the United States military operates throughout the Great Basin and the greater Southwest. In total, there are sixteen major ranges which provide the Army, Navy, and Air Force with land and air space in order to conduct an assortment of combat training and weapons testing.[46]

Besides a significant land-base, the military-nuclear landscape includes a much larger population than the ranch landscape. Since 1950, the Department of Defense has maintained close to 1.5 million troops on active duty. There are also nineteen national laboratories throughout the country that employ significant numbers of scientists, administrators, and other civilian personnel. The entire national laboratory system originated with the Manhattan Project and the development of the atomic bomb. The nation's three nuclear laboratories Los Alamos, Lawrence Livermore, and Sandia, established between 1943 and 1952, are also located in the American West, though interestingly, none of them are in the Great Basin despite the presence of the Nevada Test Site. Nevertheless, the military and nuclear industrial complex, comprised of federal agencies and their contractors, dominates the economy and culture of many western towns. Gerald Nash has noted that the "large military establishment became a permanent fixture, a way of life," in the America West.[47] The funds and resources the nation poured into developing this landscape and its utter reluctance to give up a large standing military and a vast store of weaponry is evidence that national defense is a priority in America's political and social economy.

The components of this landscape have conflicting personas that represent both the positive and negative aspects of their production in the public's perception. The signs and symbols of this landscape convey specific messages about the activities conducted on the land it occupies. The federal government constructed the military aspect for the purposes of troop training and weapons development. Its iconic images are tanks, fighter jets, aircraft carriers, and other unmistakable vehicles used in the pursuit of war. It is also a landscape underscored by violence, destruction, and death. The government created the

nuclear component of this landscape for the purposes of knowledge, weapons development, and alternative energy production. Its iconic images are mushroom clouds, subsidence craters, cooling towers, and radioactive hazard signs. It is a landscape which denotes scientific achievement and ingenuity, intelligence and innovation. It is a rational landscape and also a contaminated one, rife with radioactivity, an unseen and controversial phenomenon that is at once both natural and human-created. This landscape is innately hazardous, guarded by "Warning" and "No Trespassing" signs. From Geiger counters and film badges to Kevlar helmets and vests, the scientists, engineers, and troops who work within this landscape must wear protective gear to minimize damage from the toxic, radioactive, and explosive materials. The military-nuclear landscape is littered with the garbage and toxic waste of past wars and experiments.

The military-nuclear landscape also has a peculiar culture that precluded public discussion of many of the activities conducted by its personnel. Retired military and Central Intelligence Agency personnel, after years of careful nondisclosure, still pale when the name Area 51 is used publically. Reinforcing this power is the fact that this landscape is a secret one, accessible only to authorized personnel through main gates, security checkpoints, and identification badges. Photographer Peter Goin wrote of his experiences in the Great Basin that entering the test site "feels like crossing an international boundary." Only a small population participates in this landscape because few people meet the various scientific, technical, and background aspects of the requirements necessary to keep their work secure. This veil of secrecy precludes any form of democratic access for those who remain on the outside and affects the ability of those who participated in its development to share their experiences. It also precludes any

direct form of communication with the public regarding innovations in weapons, energy, or even troop developments or deployments.[48]

The Cold War in particular produced a culture of paranoia, mistrust, and secrecy driven by the very real fear of the atomic bomb. Paul Boyer wrote most major decision makers at the beginning of the Cold War were aware of the political and cultural implications of developing nuclear technologies. But, he criticized they ignored the implications of these technologies in order to accommodate the interests of the military-nuclear industrial complex which worked to ensure the nation's security and dominant international role. Instead of disclosing information about the hazards of radioactivity, they played on the public's fear of nuclear terror and communist takeover to encourage public cooperation and downplayed radioactive exposure. They converted military nuclear development into the more beneficial "Atoms for Peace" program which Boyer argued redirected public attention away from protesting nuclear development and towards supporting growth of the nuclear industrial complex. Former Nevada Congresswoman Dina Titus reiterated that "frightened by possible Communist aggression, the American people were receptive to almost any government action that they believed would preserve the democratic way of life." But despite this negative view, the Americans involved in the nation's atomic program were fundamentally concerned about the welfare of their country and its citizenry. Atomic scientists worked to reduce the risks associated with nuclear testing and create a continental nuclear testing program that maximized both scientific knowledge and radiation safety. [49]

These two divergent positions dominate discussion of this landscape. On the one side are those who fundamentally believe that what has been accomplished as a result of the

development of a military-nuclear industrial complex "made winning the Cold War possible." Nuclear weapons in particular are seen as "the determining factor in keeping the struggle from becoming, at some point, an all-out hot war." On the other side are those who decry the "tragic consequences" produced by global militarism and nuclear power. Valerie Kuletz has lamented the hidden and unacknowledged environmental and social consequences of this landscape created by the military, scientific community, and industrial community at the expense of "the often dispossessed and marginalized people who inhabit these zones of sacrifice."[50] But between these two poles is the actual development of the military-nuclear landscape as experienced by the residents of the Great Basin.

North and east of the NTTR, the TTR, Area 51, and NTS are rural ranching communities whose grazing allotments border the boundaries of the military-nuclear landscape. During the period of atmospheric testing, these families suffered exposure to radioactive fallout, their ranches located in the known zone of potential damage. Underground testing in the succeeding decade significantly reduced the amount of fallout but did not eliminate it. While some residents within these communities benefitted from employment in the defense industry, others loudly protested its impacts.[51] The military-nuclear landscape is thus a highly localized landscape and also a national one, the perception of it marked by feelings of national loyalty and betrayal because there was no practical way to prevent damage, despite the best efforts of federal officials, except to cease testing and training activity. Including the military-nuclear landscape in the discussion of federal multiple-use programs, though not typical, underscores the cost-benefit analysis associated with making decisions based on the greater good.

The Outdoor Recreation Landscape

Most people experience the nation's vast public domain through outdoor recreation, a category of activity on public land which Congress legitimized by creating protected natural areas for the purposes of enjoying nature. The outdoor recreation landscape, more than the other three landscapes, requires individual participation in activities which Americans choose to engage for their enjoyment and pleasure. Touring, hiking, hunting, fishing, camping and forms of recreation in the nation's beautifully charismatic places such as national parks and wilderness areas are the fundamental ways which motivate people to embrace the preservation of natural spaces. According to Samuel Hays, "outdoor activities [reflect] a desire to interact with rather than overcome nature," a notable shift in the nation's political and social economy that moved away from conceiving of natural resources as commercial products. Richard White argued that "Nature has become an arena for human play and leisure. Saving an old-growth forest or creating a wilderness area is … a victory for leisure and a defeat for work." Conservationist Aldo Leopold agreed with that sentiment, arguing that recreation is a measure of American culture and its embrace of the outdoors. But this implies that humans are not a part of the natural environment. As White also pointed out, we "condemn ourselves to spending most of our lives outside of nature, for there can be no permanent place for us inside," because this wilderness ethic separates us from nature. This separation has turned "public lands into a public playground," where nature has become an escape and not a reality, an "organic Disneyland" without the accompanying acres of asphalt parking lots.[52] This is the fundamental dichotomy of this landscape which both includes and precludes multiple-use activities. Through the preservation of natural

areas, other uses of public land are precluded. But, the federal government's delineation of protected natural areas creates a desirable space for multiple types of outdoor recreation. In the Great Basin, however, the government made very few of these designations.

The creation of the Forest Reserve System in 1891 and the National Park System in 1916 launched the first generation of legislation which engaged conservationists' concern for preserving the scenic beauty and resources of the nation. This created an alternative landscape which placed an equal cultural value on conservation and preservation as on extraction and industrial development. Through the Forest Service and the National Park Service (NPS), Congress codified the concepts of preservation, conservation, and recreation in American public land management. In 1946, the newly-formed Bureau of Land Management (BLM) consolidated the remaining unsettled lands, mining claims, and grazing ranges. Unlike the other two land management agencies, the BLM lacked a preservation and recreational mandate because the agency's primary missions were land disposal, mineral leasing, and grazing. But this changed in the post-World War II era. During the early 1960s, both the Forest Service and the BLM enacted laws which placed the multiple-use concept at the forefront of public lands management. The Forest Service's Multiple-Use Sustained-Yield Act (MUSY) in 1960 declared that national forests were to be maintained for "outdoor recreation, range, timber, watershed, and wildlife and fish purposes." This act broadened the mandate of the agency to include recreation along with timber management in the hierarchy of use. Four years later, in 1964, the Classification and Multiple Use Act (CMUA) began the BLM's onerous process of inventorying public lands to determine the activities for which public lands

were most valuable. These classifications included everything from settlement and commercial development to outdoor recreation, agriculture, mining, grazing, timber, wildlife, watershed protection, and wilderness preservation.[53]

The implementation of CMUA became one of the most hotly-contested aspects of Secretary of the Interior Stewart L. Udall's administration. Every public land user had a stake in ensuring their preferred activity or land use was codified in the classification process. With so many demands on the remaining public land, the Department of the Interior put a halt to the homesteading process in order to clean up decades of problematic agricultural land applications in the American West, especially in the Great Basin. At the same time, the Udall administration worked to designate a new tier of national parks that fleshed out the system's representation of the different North American ecological systems. The Department of the Interior in cooperation with many of the region's communities proposed a Great Basin National Park in the lower Snake Range at the center of the region. However, a variety of local interests conflicted over the best use of the proposed park; where outdoor recreationalists saw hiking opportunities and scenic views, ranchers saw good grazing going to waste and nothing special about the scenery. As a result, the Great Basin did not get a national park until the mid-1980s. Between the ruckus over the end of homesteading and the creation of a national park, public land use in the region defaulted to the widest version of multiple-use. Congress allowed the CMUA to expire in 1970 and relied on the recommendations of the Public Land Law Review Commission (PLLRC) to guide the process of delineating future land uses. However, the PLLRC only sought refuge in the equitable and efficient sounding multiple-use concept despite its inherent problems.[54]

In 1976, the Federal Land Policy Management Act (FLPMA) gave the BLM a multiple-use mission commensurate with the Forest Service and the National Park Service. The organic act mandated that public lands would remain under federal management and that they would be "managed in a manner that will protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resource, and archeological values, … will preserve and protect certain public lands in their natural condition, … will provide food and habitat for fish and wildlife and domestic animals, … [and] will provide for outdoor recreation and human occupancy and use." Through FLPMA, the last of the laws defining the mandates of the three most important public land management agencies, the BLM embraced the Forest Service's sustained yield concept, the NPS's dual mandate of preservation and recreation, and added environmental protection to the equation for a very broad definition of multiple-use. Most importantly for the Great Basin, the act mandated the creation of BLM wilderness areas, a designation which many urban residents had sought but which ranchers and strongly opposed. The region's only wilderness area, until the late 1980s, had been established in 1964 with the original legislation in the Jarbidge Mountains, a remote range in northeastern Nevada.[55] In addition, FLPMA was so broad, that its implementation has been determined by the political agenda of the nation's highest executive office, the funding given it by Congress, and its interpretation by the courts.[56]

The dearth of wilderness in the Great Basin has had important implications. Roderick Nash has argued that "wilderness was the basic ingredient of American civilization."[57] Whether Americans feared the uncharted and unsettled places or valued them, the relationship between humans and untrammeled nature exists both within human

civilization and outside of it. Until the late nineteenth century, wilderness in American culture remained something to be settled and tamed. But because of its increasing scarcity and "expanding settlement and growing mechanization," Outdoor recreationalists valued wilderness for its natural condition, the opportunities for solitude and "primitive and unconfined" recreation, and scientific, historic, and scenic value. The creation of the National Park System embodied this movement for recreation and preservation in the early twentieth century. In 1964, the Wilderness Act codified this new relationship with wilderness by securing "for the American people of present and future generations the benefits of an enduring resource of wilderness." The act defined wilderness as "an area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain," and set aside a congressional process by which sections of public land would be designated as such.[58] From scenic mountain ranges to deep canyons, the wilderness landscape is often idealized as spectacular features and grand vistas. Most wilderness areas designated in 1964 were in national forests in areas above the timberline for both aesthetic and economic reasons.

In the Great Basin, the small and scattered units of national forest did not contain vast stands of timber or the multiple craggy peaks and grassy mountain valleys that characterized most wilderness areas. The Forest Service protected these areas as primarily as watersheds. The region's higher elevations provided essential grazing range and potentially contained mineral resources valuable to the region's economy.[59] Despite its lack of explicit prohibition on lumbering and grazing, wilderness advocates persuaded public land management agencies to interpret the Wilderness Act in such a manner as to preclude these activities. Samuel Hays wrote that this landscape "came to be prized for

both [its] environmental values and because [it] symbolized what America was and ought to be." However, as Nash has pointed out, "the growth and appreciation for the wilderness in the American mind inevitably resulted in an increasing demand for actual contact with the wild country."[60] Most Americans embraced wilderness because the idea encapsulated the idea of untouched nature and preserved natural areas against commercial development. But in the Great Basin, natural resources such as forage and minerals were considered too important to lock away in an area preserved for other purposes. The very absence of wilderness and national parks marked the region's undesirability.

The establishment of this landscape in the Great Basin, despite the national popularity of outdoor recreation, produced the most profound protests. The Great Basin now includes many small wilderness areas, several wildlife refuges and national forests, a small national park, and a handful of recreation areas and preserves (fig. 5). But, Congress only latently established these areas and they tended to be small where located near grazing allotments and large near military installations or in fundamentally uninhabitable desert areas. By the end of the 1970s, land users throughout the region, but especially those in Nevada, were outraged at federal management of public lands which seemed to be increasingly restrictive. In 1979, Nevada enacted a law which asserted claim to lands within the state boundaries administered by the BLM. Utah's Senator Orrin Hatch proposed a similar law at the federal level several years later. According to McGreggor Cawley, the Sagebrush Rebellion essentially became a "protest against the growth of environmental regulations throughout the 1960s and 1970s, orchestrated by various western public land users interested in pursuing commodity development

activities such as grazing and mining." Cawley contended that public land users were concerned that environmentalists had succeeded in gaining a dominant position in determining federal land policies, that their influence had created a bias towards preservation and away from development of federal lands. Cawley argued the Sagebrush Rebellion birthed both the conservative Wise Use Movement and the radical environmental group Earth First!. At the very least, it "marked the beginning of a period in which virtually every assumption about federal land policy underwent challenge and reconsideration."[61]

The Wild Horse Landscape

Writer Paula Morin contended that "the mustang is present everywhere in the Great Basin," even in the mountains and valleys that comprise America's continental nuclear testing site. The region historically has contained the largest concentration of wild horses in the country (fig. 6). Of the nearly 37,000 wild horses roaming public lands, two-thirds live in Nevada alone. It is a thrilling moment when they are spotted running in the distance and there are plenty of photographs which attest to their beauty and grace. Hope Ryden, journalist and renowned wild horse advocate, wrote that when she first saw "wild horses sweeping across a mountain slope, tails and manes streaming, screaming with exuberance never heard in any pasture," her "whole view of modern America brightened." But wild horses are often difficult to find. Ryden has attributed this difficulty to the protective nature of westerners who live in close proximity to herds which historically have been threatened; these residents value wild horses as part of their local landscape.[62]

The wild horse landscape is both an animal geography and a human one; horses, public land managers, and ranchers often work at cross-purposes. Similar to wolves repopulating the nation's northern mountain ranges after receiving protection under the endangered species act, wild horses repopulated the Great Basin after their near-decimation without regard to grazing district, wilderness area, or recreational boundaries. But unlike wolves, they are difficult to recognize as "wild" horses because they resemble just another herd of horses turned out to pasture. This resemblance is no coincidence and the relationship wild horses have with trained animals is a close one to the extent that wild horses can be trained to submit to human control. Biologists recognize that wild horses essentially are "feral animals whose ancestors were once domesticated."[63]

Yet, despite their status as an introduced species and feral animals to all environments except the Mongolian Plateau, Congress granted wild horses a legal place within the native ecosystems of the United States, as have legislatures in France, the Iberian Peninsula, Australia, and parts of southern Africa. This is because horses have a special status in human culture as animals historically used for work and transportation, and as companions. In 1938, Phil Strong, lamented that "in general horses have not been fairly treated by American historians." Despite vehicles employing the internal combustion engine superseding the horse for work and transportation, in Strong's estimation, "the delusion that the horse is vanishing is about as stupid as the opinion … in 1928, that poverty was forever banished from the land." Strong understood the emotional attachment Americans had to the animals. In the late twentieth century, people used horses more for sport and pleasure than work, but that has only increased their cultural value as pets and companions. Wild horses, however, are valued for a different set of

reasons, and their cultural cache was changed over time. Strong noted in the first half of the twentieth century that "the first American settlers of the Western country seem to have been more annoyed than pleased by these wild aristocrats."[64]

Wild horses occupy a material space and compete for natural resources on the nation's public lands, especially on the marginal rangeland of the Great Basin. Ranchers in other areas of the American West had eradicated loose livestock which posed unnecessary competition to ranching and farming and often proved a nuisance when vegetable gardens matured. The loose livestock in the Great Basin, which included cattle, pigs, sheep, and goats as well as horses, were less problematic. Often, ranchers turned select horses out with local bands to improve the bloodlines and ensure hardy strong animals which they then rounded up for their own use at very little cost. When the federal government organized the rangeland into grazing districts, every animal counted towards ranchers' allowed animal unit months (AUMs). Unless ranchers claimed the feral horses, the federal government considered them surplus, unwanted competition slated for removal. At the same time, the Great Depression increased the demand for meat for both human and pet consumption. Wild horses in the Great Basin provided a valuable source of meat and income for cowboys and ranchers willing to risk capturing them.[65]

This situation began to change in the late twentieth century as many Americans viewed wild horses as intimately tied to the frontier settlement of the American West. There are small pockets of feral horses throughout North American, but biologists thought the animals in the western part of the continent carried the genetic markers of the Spanish horses used by the Conquistadors, which elevated their historic value in the nation's political and social economy. In addition, horses had historically provided the

primary means of transportation and power people used to transform the American West into a commercially productive region. As a result, the wild horse landscape became an emotional, historic, and a particularly contentious one. People rarely think about or engage with it except in circumstances which raise issues of animal cruelty such as rounding up horses for slaughter. The methods cowboys and ranchers used rounding up the unfortunate animals were hardly humane. As a result, the Nevada state legislature enacted the first law in the nation addressing wild horses in 1959. This law, proposed by Great Basin residents led by Velma "Wild Horse Annie" Johnston, who valued the presence of the wild herds and supported by animal rights advocates who sought to ameliorate the cruel and unnecessary slaughter of animals, regulated the way in which wild horses could be captured by outlawing the use of mechanized equipment to round up horses. Nothing popularized the law more than the repeated publication of a series of photographs taken by Gus Bundy that exhibited the cruelty of these methods. As the famous Marylin Monroe and Gary Cooper film *The Misfits* (1961) portrayed, roundups could be horrifyingly bloody and often fatally damaging to the animals. Similar to the techniques used in predator control programs to eradicate cougar and wolves from the grazing range, ranchers shot, dragged, suffocated, and poisoned wild horses to remove them from what they viewed as their rangeland.

The Great Basin residents and animal rights advocates who had supported the Nevada law nationalized their campaign to create a special place for wild horses on the public rangeland. In 1963 and 1968, the Department of the Interior carved the first two wild horse refuges out official ranges for the animals in Nevada and Wyoming. The National Wild Horse Range on the north end of the Nevada Test Site provided Great Basin wild

horses with a place of their own, but their management fell in the gap between the Bureau of Land Management (BLM) which was presumed to be responsible for the animals and the military which had jurisdiction over the land. Only when wild horse numbers periodically climbed to troubling levels did the military authorize BLM managers to remove the animals. The Pryor Mountain Wild Horse Range on the border between Wyoming and Montana provided another, smaller area for the animals, but their management was dependent upon a local BLM office unsympathetic to their protection. These tenuous situations did not secure the safety of wild horses nor satisfy the desires of most wild horse advocates who launched a national letter-writing campaign to press for a federal law protecting the animals. In 1971, Congress passed the Free-Roaming Wild Horses and Burros Act which declared wild horses the "living symbols of the historic and pioneer spirit of the West" and gave the animals federally protected status on public land under the care of the BLM. The act prohibited the capture and/or slaughter of wild horses for any reason.[66] Although wild horse advocates intended the legislation to place the animals above other categories of public land users, wildlife biologists, conservationists, and ranchers were more inclined to think that the added presence of the animals stressed the already crowded rangeland. The presence of wild horses on the landscape of the American West, particularly in the Great Basin, thus pitted the many public land users against each other and polarized the issue of wild horse protection such that no one wanted to be accused of hurting the animals.

But the boundaries of the herd management areas are extremely fluid. Horse herds wander over large stretches of land for forage and compete with cattle and native wildlife for the meager range and water resources. The 1971 wild horse legislation placed the

animals under federal management and removed them from the local control of ranchers, range managers, and the state's wildlife officials. This federalization has made wild horses the unwanted burden of livestock operators who used to manage their numbers according to the level of available local resources and who used to benefit directly from that management by acquiring inexpensive horses for their own use. Ranchers have grown increasingly irritated that the BLM requires them to provide water resources for wild horses, but yet ranchers have no control over their populations. Frustrated wildlife biologists argue that wild horses negatively affect their ability to ensure quality range resources for livestock and wildlife because the animals notoriously destroy water sources and devour important range feed without regulation or effective population controls. Wild horses share a rangeland diet with cattle and ungulates such as elk, mule deer, antelope, and big horn sheep. Wildlife managers doubt the ability of wild horses to self-regulate their population; with no natural predators and the tendency to dominate the scarce water holes in the Great Basin, horses out-compete all other forms of wildlife. Even if the BLM controls their numbers through roundups and some animals are adopted out, the problem of what to do with the remaining excess population remains unsettled.[67]

Wild horse advocates such as Ryden counter that very few wild horse herd management areas exhibit heavy vegetation damage from the horses and that relative to the four-million plus domestic livestock which graze on the nearly forty-two million acres of public land, the impact of the mere 37,000 horses is negligible. Wild horse advocate groups are passionate about the animals' protection and want to see the numbers of equines and the numbers of livestock at least equalized. They view wild horses as national heritage species having a higher place in the rangeland hierarchy than even

wildlife and resent reductions in horse numbers to increase game animals hunted by sportsmen. Advocates prefer a state of virtual non-management for wild horses in which herd populations are allowed to rise and fall according to natural conditions. In the opinion of many BLM officials, wild horse advocates "are fighting so hard for non-control," they are "letting horses outgrow their ranges and their food supply." So while wild horses occupy an important and positive place in American culture, their management creates negative feelings among other public land users and wildlife managers. Wild horse advocates have continued to use emotional images of captured wild horses to polarize the public's response to the issue of their management through depicting them as families and individuals who are harassed and persecuted by the BLM. Wild horses are therefore the veritable lightning rods of the supposedly compatible multiple-use management concept which governs public lands. As journalist Deanne Stillman has pointed out, there is no better representation of the nation's environmental problems than "what we have done and continue to do to the wild horse."[68]

A Geography of Conflict

Geographer John Wright argued that "places are best seen as shifting stages where the exercise of power and resistance to it vie for dominance."[69] This is a very real pattern within the Great Basin. The region has been a virtual as well as actual ground zero for nearly all the public land management programs enacted during the twentieth century. Once a region avoided and overlooked, the Great Basin has become an overburdened landscape because of the demands placed upon its environment. Not a single public land use has been excluded. Residents pressured the federal government to organize grazing districts and adjudicate the over-used rangeland; the nation's nuclear scientists preferred

the Nevada desert for a continental nuclear test site; the region was relatively bereft of national parks and wilderness areas until environmental groups agitated for the Great Basin to be as equally valued for recreation as extraction in the late twentieth century; and the Nevada state legislature enacted the first laws protecting wild horses on a tide of animal welfare activism. It is no accident that Great Basin was also ground zero for the Sagebrush Rebellion of the late 1970s, the battleground for missile systems and a high-level nuclear waste repository, and a host of contentious litigation involving property rights and access to public lands.[70]

Wright noted that "the result of all this reaping and sowing of land is an elaborate, involuted, multifarious, and bollixed-up tenure pattern, one that reflects diverse values and often contradictory intentions." Political scientist Martin Nie attributed many of these conflicts to "the vague, contradictory, and problematic language found in public land law," which "drives and perpetuates many conflicts and often turns them into prolonged and complicated legal battles."[71] The intersections of these multiple-use land policies produced, despite the establishment of boundaries between them, significant user conflicts; within this wildly disparate and conflicting pattern of development on the Great Basin's public lands are the multiple-use, maximization, wasteland, and insider-outsider, local-national themes, which affected the construction of land-use policies and deeply altered the region's environment. The ranch, military-nuclear, outdoor recreation, and wild horse landscapes together produce a convoluted map of the Great Basin (fig. 7). The only public land use activity not listed here is mining. This is not to misunderstand that mining remained the most economically important activity on public lands. Few of the public land laws which followed the late-nineteenth century mining law precluded

locating mining claims on any part of the public domain. Any threat of infringement on potential mineral extraction was enough to gut prohibitions Congress proposed in most succeeding laws. But whereas much has been written on mining and the environment in the history of the Great Basin, few works have touched on the impact of the other federal land laws. In addition, mining only encompasses a small use of the land, whereas the other public land programs engage much larger areas the region.

Measuring the effects of the conflicting public land programs requires a fundamental shift in perception. The nation sees these impacts as small relative to the greater good accomplished by the public land programs (fig. 8). Their overlap actually only impacted a small portion of the national population. But the actual geography affected was quite large, about a quarter or more of the entire country. The discussion surrounding the establishment of the Nevada Test Site actually illustrates this point. In 1950, after several years of atomic testing in the Pacific's Marshall Islands, the Atomic Energy Commission (AEC) believed, though only reluctantly, the international situation required creation of a continental test site. At Los Alamos National Laboratory, key decision-making members of the organization worked out the probable cost of a continental atomic testing program. At the time, one of America's top atomic scientists, Enrico Fermi, worked out that there was a one percent probability that four hundred persons in a four hundred square mile area at the center of the Great Basin would be affected by radioactive fallout. This was Fermi's estimation of the potential human and environmental problems associated with a continental atmospheric atomic testing program, the "size of the risk" of the Nevada Test Site. Other scientists working on the nascent nuclear program determined another number called the hazard factor of conducting tests that preferred the Nevada site above all others

by using an equation that took into account only a handful of variables, most of which were environmental. Wind speed and direction, the presence of clouds, their dispersion rate, and the size of the population at various distances from ground zero, the locus of detonation, seemed as predictable in the illustrative equation as did the bomb's yield and the behavior of the population surrounding the test site.[72]

But as Fermi and the other scientists soon discovered, the actual effects of the testing program and the environmental and cultural variables at work in the testing process were far from predictable or controllable. Where the one percent probability looked small from a national perspective, in the lives of Great Basin residents, it loomed much larger. The continental nuclear testing program was only one of several programs the federal government conducted in the Great Basin which deeply affected the region's population and environment. As described earlier in this chapter, all of the public land programs have had an impact on the region's human population and environment. All of them have had significantly greater consequences than initially imagined. Created in the public's interest for "the greater good," programs from public land grazing to outdoor recreation and wild horses which directed and controlled the use of natural resources and human interaction with the natural environment benefitted the nation at large, but had interesting consequences on the region. Similar to the quantifiable cost of the nuclear testing program, the size of the risk can be calculated for all the multiple-use programs in the Great Basin. The succeeding chapters of this study examine the exploration and settlement of the region and the development of the four landscapes, explaining how each evolved and functioned during the mid-twentieth century and the ways in which each landscape problematically affected the others.

The next chapter, “The Desert Within,” introduces the Great Basin’s human and natural geography and establishes the wasteland and maximization themes and the insider-outsider, local-national dichotomies. Explorers and surveyors slowly gave shape to the region’s topography, but disparaged its ability to be economically productive in any way except through mineral extraction. The dry and sagebrush covered expanse seemed too inhospitable an environment to offer hope for any but the smallest and most intermittent modes of agricultural production. As a result, the region contained the nation’s left over land, that which was going to waste economically. Yet people did settle in the Great Basin. Mormon, Basque, and other immigrants came to the region to mine and raise livestock. They anchored themselves on the land by establishing patents and water rights. The Western Shoshone, who once were the region’s primary users, were left almost entirely out of this process, but provided valuable labor resources. All the region’s residents understood the Great Basin as a marginal place, but it was also their home.

Chapter three, “A Good Use for Dry Land,” examines the ranch landscape and how its wasteland construction facilitated the multiple-use concept. Ranching dominated the Great Basin’s geography in the late nineteenth century, but ranchers using public land grazing range lacked legal protection and permanency. Beginning with the application of the first multiple-use act, the 1934 Taylor Grazing Act, the federal government organized millions of unsettled acres as a vast national grazing estate, most of which lay within the Great Basin. In lieu of agricultural development and homesteaded settlement, ranching offered an intermediary solution to the Great Basin’s wasted land but did not preclude other uses. Public lands ranching proved a viable regional economic activity, but was not particularly nationally important, though it kept a handful of individual families

employed and put the wasteland into economic production. As the federal government codified other public land programs in the region that provided additional uses of the wasteland, ranchers struggled to maximize their operations and consistently lost ground and access to their grazing ranges. Despite the voluntary process of grazing district creation, in 1951, the Bureau of Land Management (BLM) forced the organization of the last district as the atomic testing program began.

The fourth chapter, "Mushroom Cloud on the Range," analyzes the development of the military-nuclear landscape through the influence of the wasteland perception and the tension between locals and the federal government, specifically between ranchers and the Atomic Energy Commission (AEC) officials conducting the atomic testing program. As scientists pushed for greater understanding of nuclear technology, increased atmospheric testing produced public relation problems. By appropriating the range management science of the BLM, the AEC shifted the blame for livestock burns from radioactive fallout to toxic weeds, drought, and the aridity of the Great Basin environment itself, to ensure continued nuclear testing for the purposes of national security. The region's residents, especially the livestock operators, experienced profound frustration trying to articulate their concerns and the damage they and their livestock suffered. Despite the injury caused by exposure to radioactive fallout, Great Basin residents rarely received any compensation from the federal government for the harm done. Instead, residents were thanked for their cooperation and acceptance of the atmospheric testing program.

In the fifth chapter, "Multiple Abusers," the wasteland, multiple-use, and maximization themes continue as different residents and federal officials struggled to establish an outdoor recreation landscape in the region. The fight over creating Great

Basin National Park and opposition to the Classification and Multiple-Use Act of 1964 rendered the region without a major recreational anchor or wilderness areas. Regional and national interests engaged in fostering outdoor recreation fought mining and livestock operators to create a national park in the Great Basin. The drive to create the park failed, but the outdoor recreation landscape expanded anyway, beyond the islands of early national forests in the Great Basin to intrude on lands used primarily for grazing. At the same time, in an effort to make public land management more efficient, the Department of the Interior suspended the agricultural land application process. The public outcry of Great Basin residents over the end of homesteading, the expansion of outdoor recreation, and attempts to exclude public land from development created a fundamental rift between livestock operators and the federal government.

Chapter six, "A Matter of Mustangs," discusses wild horse landscape and the alternative meanings of maximization and multiple-use. For nearly a century, ranchers had rounded up wild horses when their populations interfered with cattle and sheep herds. They kept some of the animals, but sent the rest to the slaughter house to make extra cash. By mid-century, wild horses engendered strong emotional responses from the American public through animal welfare groups and mass publication of a series of photographs which captured the brutality of roundups. These groups opposed virtually any interference with wild horses, especially that which involved the destruction of herds or even individual animals. Using polarizing rhetoric and emotionally charged images, animal welfare advocates fought to secure the Free-Roaming Wild Horses and Burros Act in 1971 which declared wild horses a national heritage species. Neither livestock nor wildlife, wild horses lived in the middle of a management battle between ranchers and

wild horse advocates. Caught in the middle of this turmoil and charged with the implementation of the 1971 act, the BLM became the most despised land agency in the region.

Chapter seven, “The Size of the Risk,” explores the ongoing physical conflicts between the four landscapes beginning with the Public Land Law Review Commission’s report in 1970, highlighting four unresolved issues that shaped the debate over public land-use throughout the decade. Instead of clarifying public land policy, the report allowed ranching, outdoor recreation, and wild horse use equally. It also acknowledged that military and national security interests remained at the top of the public land use hierarchy. This created a series of controversies surrounding increased grazing fees, radiation monitoring, off-road vehicle use, wilderness areas, and wild horses. After Congress passed the controversial Federal Land Management Act in 1976 which mandated this wide vision of multiple-use, Great Basin residents, frustrated with the land management process, argued the law infringed upon their liberty and ability to earn a living. For many of the ranchers and other residents, the Sagebrush Rebellion articulated their dissatisfaction with conflicting public land use. National groups supporting military weapons development, outdoor recreation, and wild horses used similar arguments to exclude public land from traditional commercial uses such as grazing and mining. Embedded in their rhetoric are the wasteland, multiple-use, maximization themes and the insider-outsider, local-national dichotomies. The resulting conflicts between the four landscapes reveal an inadequate public lands management framework ill-suited to the scarcity characteristics of the Great Basin and the variety of the region’s human and natural environments.

Images

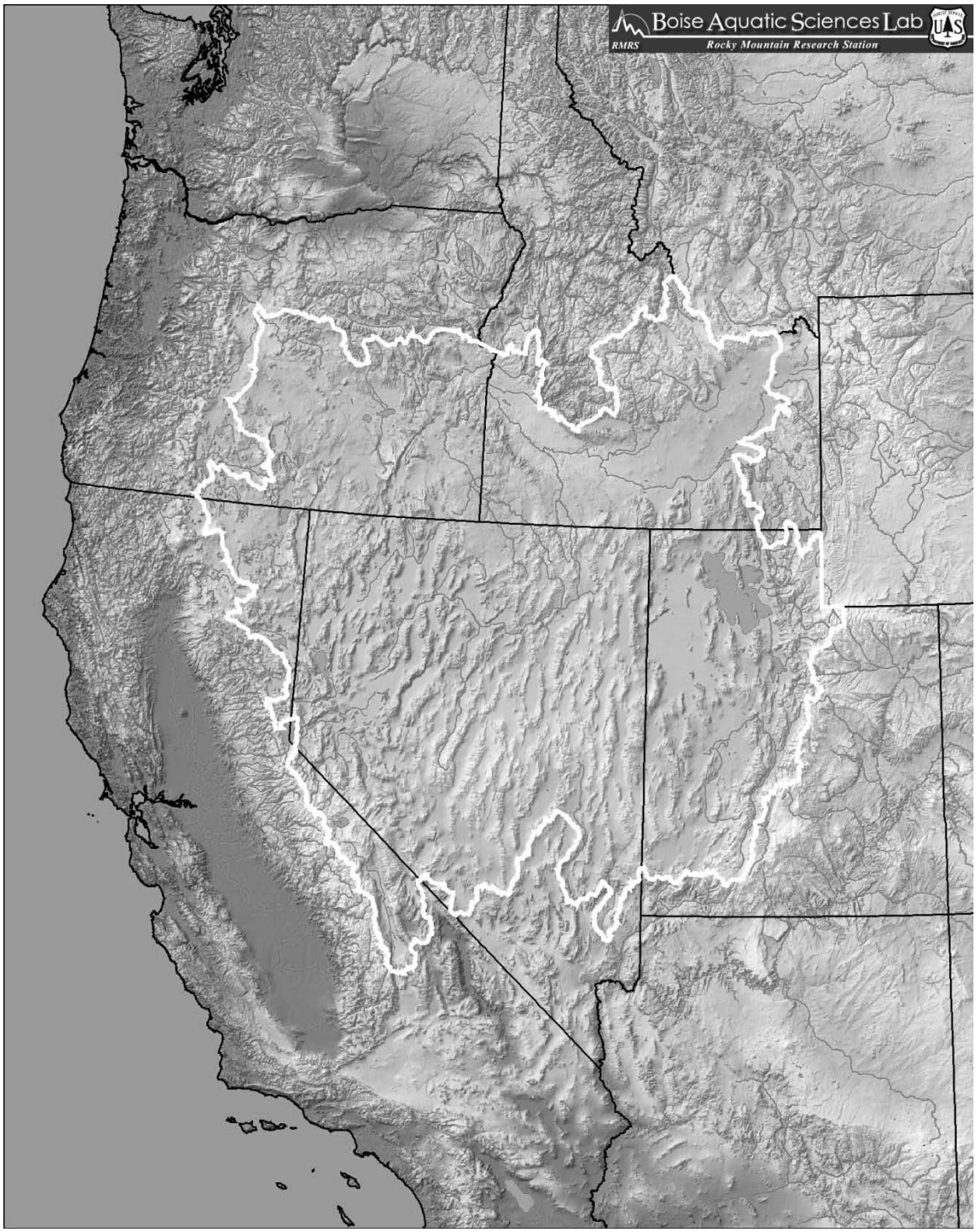

Fig. 1 The Great Basin. This map delineates the most common boundaries of the Great Basin desert based on the region's hydrologic and cultural boundaries. However, as the Basin and Range Province, the boundaries expand to include the Sierra Nevada, Colorado Plateau, Rocky Mountains, Snake River Plain, and the Mojave Desert. Courtesy the Boise Aquatics Sciences Lab, USDA Forest Service.

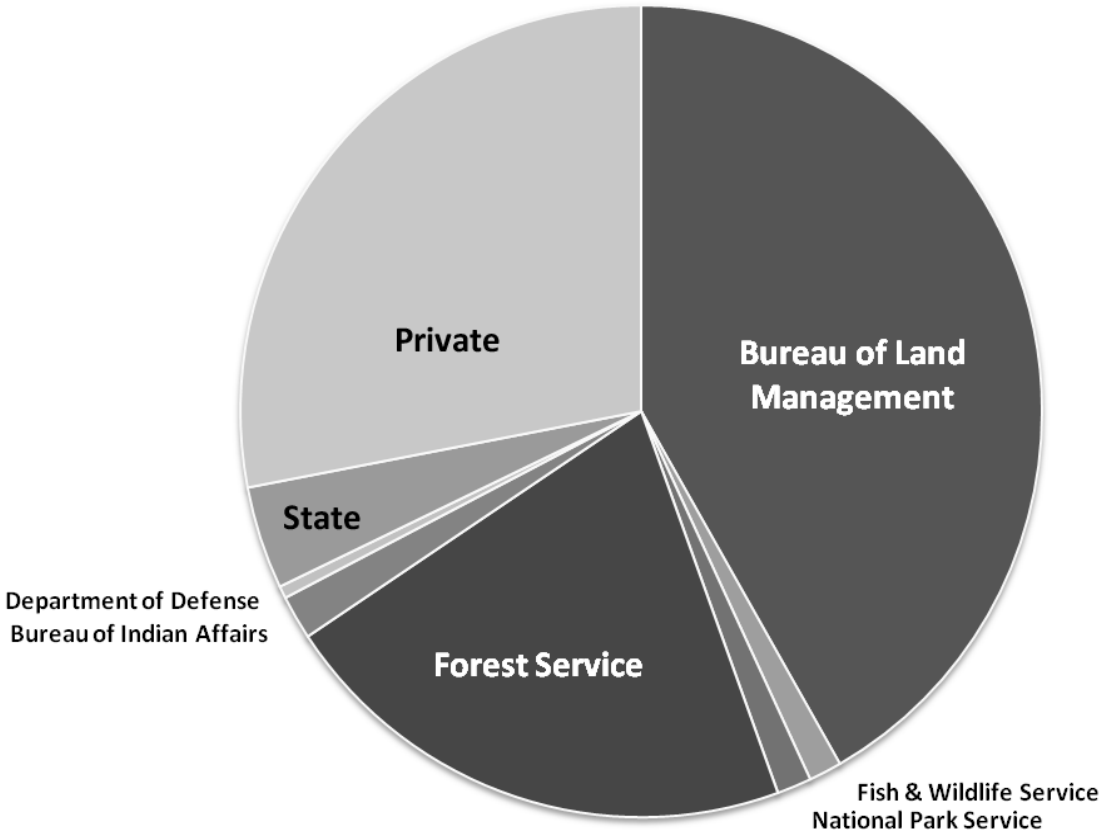

Fig. 2 Great Basin Public Land by Agency. This chart indicates the proportion of public land in the four Great Basin states—Nevada, Utah, Idaho, and Oregon—administered by the different federal land management agencies compared to that administered by the state and private entities. While portions of eastern California and the Arizona Strip in the northern part of the state also lie within the Great Basin, adding their statistics to that of the other four states only increases the percentage of land managed by the Bureau of Land Management. Land managed by the Department of Energy in these states mostly lies within the boundaries of that which is administered by the Department of Defense. Chart by author based on statistics publically available through the land management agencies' official websites.

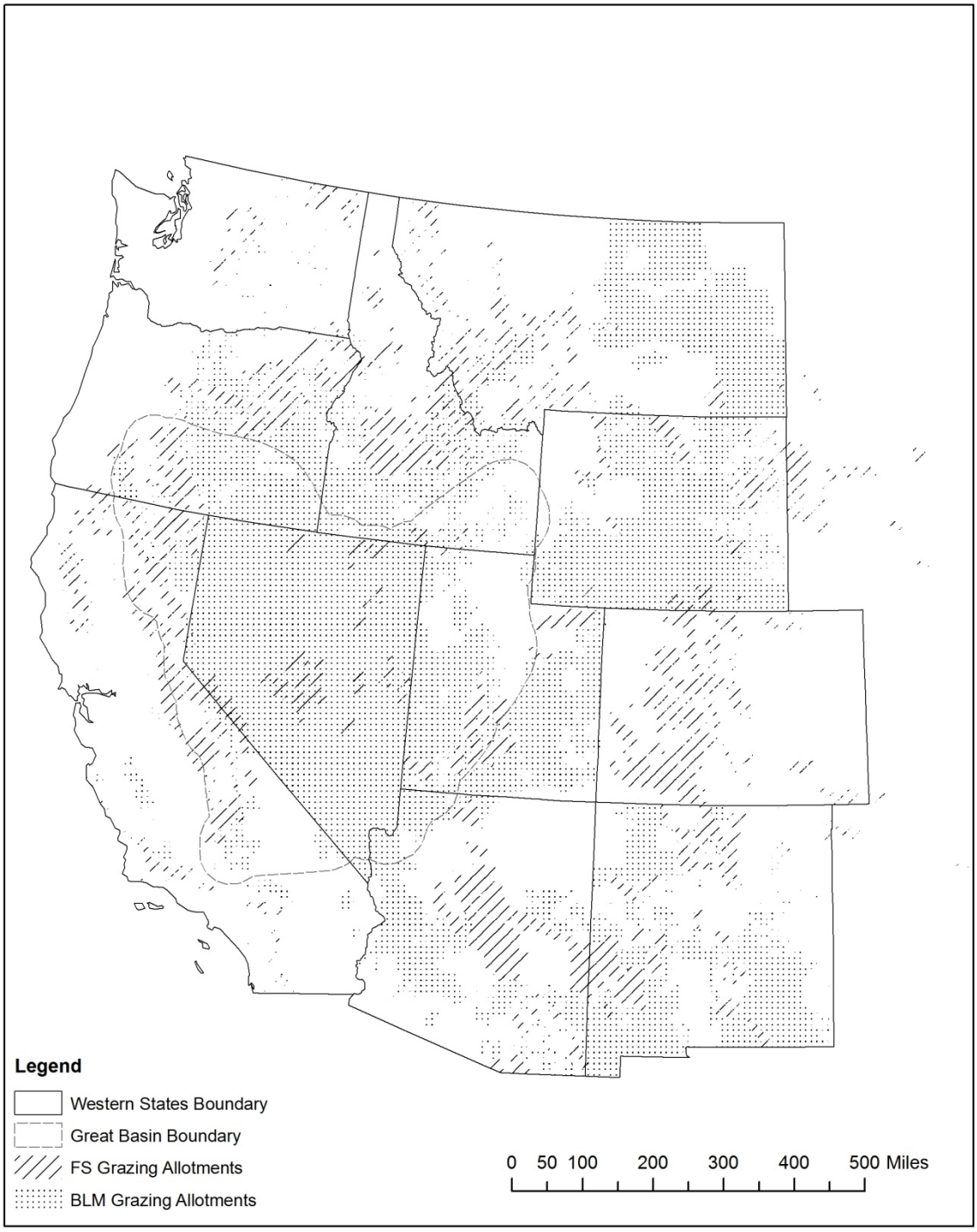

Fig. 3 The Ranch Landscape. This map depicts the area in the Great Basin administered by the Bureau of Land Management and the Forest Service as grazing districts which were established between 1935 and 1951. Note that nearly the entirety of the region is blanketed by grazing districts. This map does not include BLM grazing allotment data for Colorado at this time. The state office is scheduled to release the GIS data in 2011. Map by author using GIS data courtesy of the BLM and USFS.

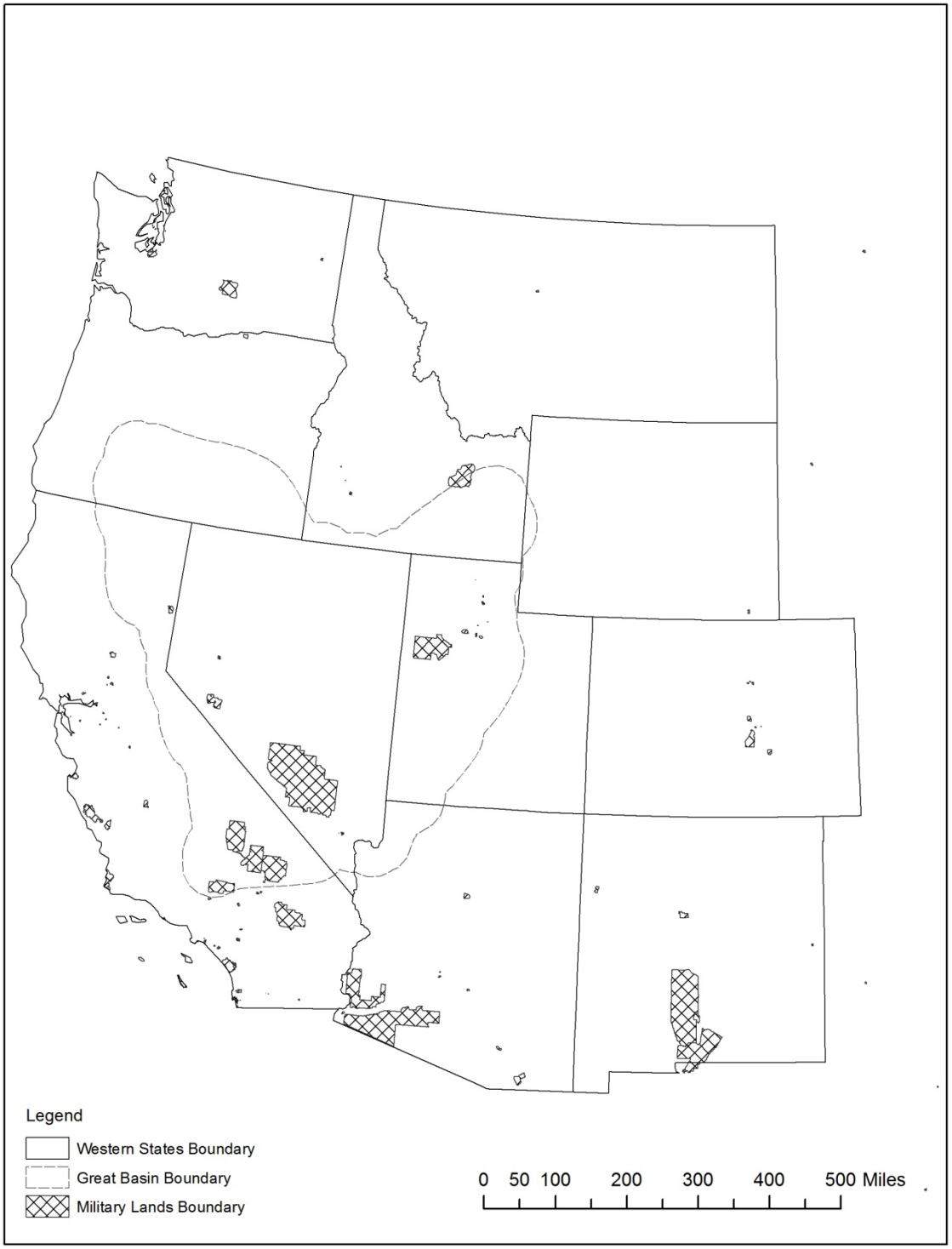

Fig. 4 The Military-Nuclear Landscape. This map depicts the military and nuclear sites in Great Basin. The Nevada Test Site is contained within the Nellis Test and Training Range in the south-central portion of the region. Most of the largest parcels of land managed by the Department of Energy in the western states are contained within military lands. Map by author using GIS data courtesy the Department of Defense. Map does not contain any GIS data from the Department of Energy.

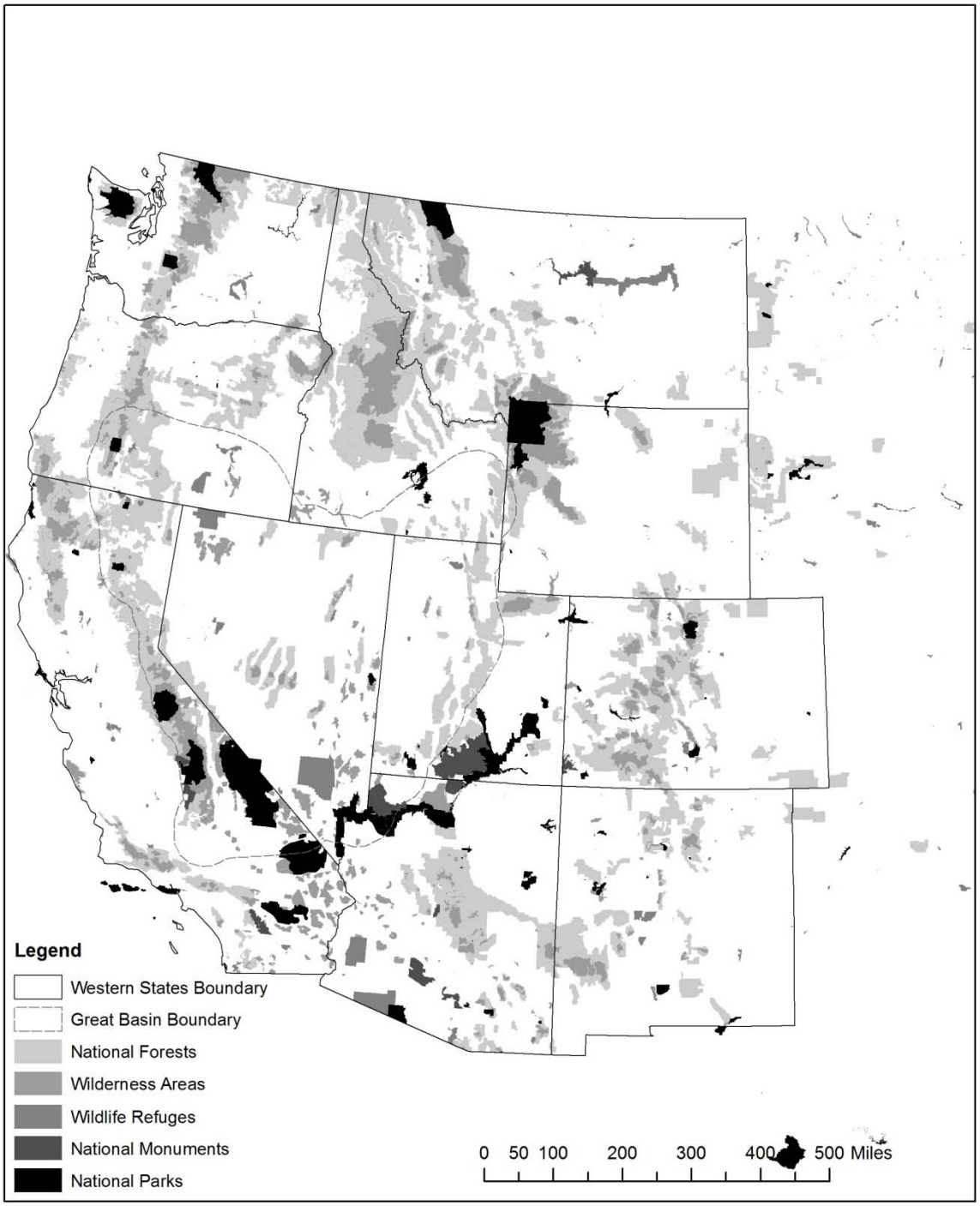

Fig. 5 The Outdoor Recreation Landscape. This map depicts national forests, wilderness areas, wildlife refuges, and national parks. Notice how few protected areas exist in the Great Basin. Map by author using GIS data courtesy the Forest Service, Bureau of Land Management, Fish and Wildlife Service, and National Park Service.

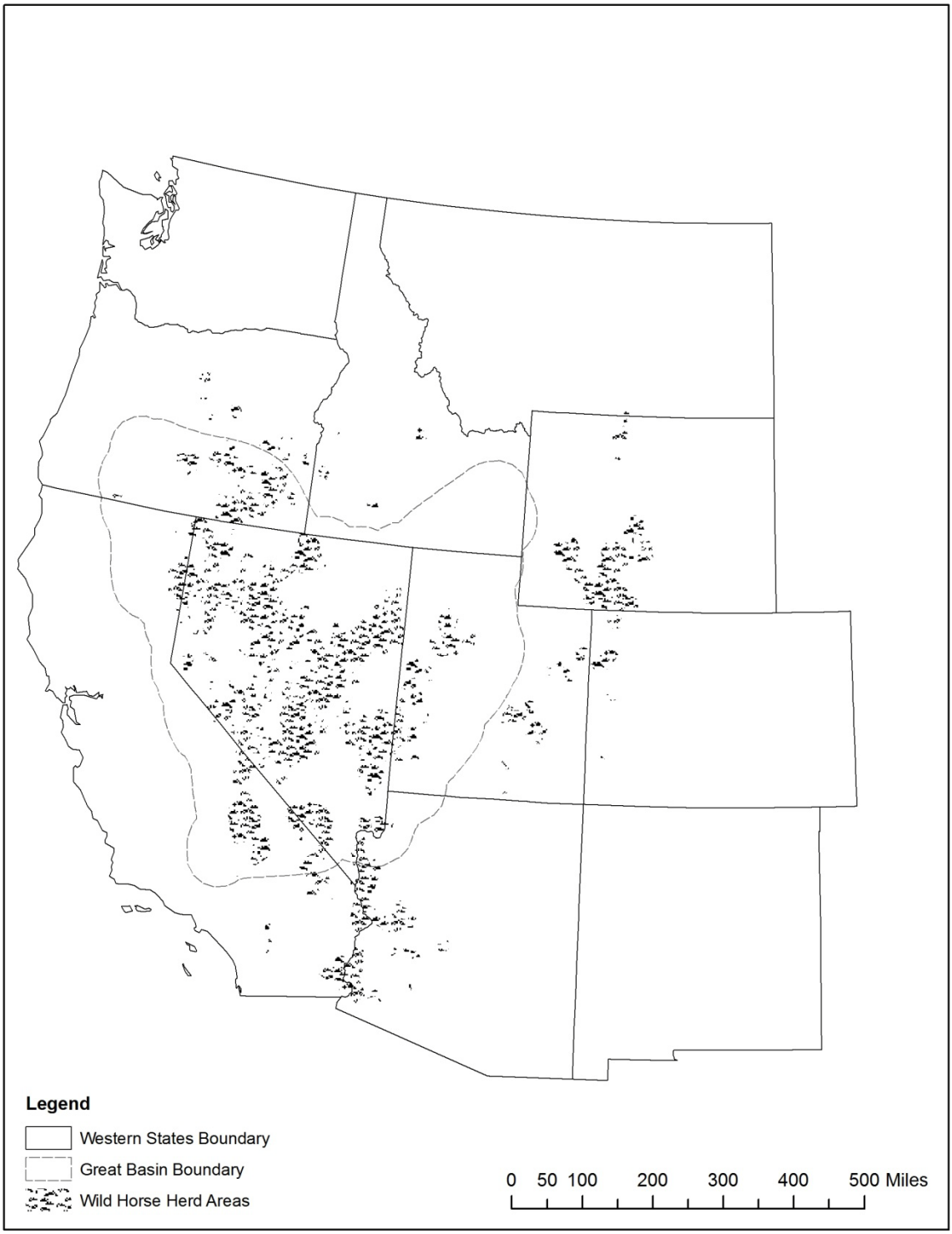

Fig. 6 The Wild Horse Landscape. This map depicts the wild horse herd management areas where wild horses are protected in the Great Basin. Notice that the northeastern section of the region is devoid of wild horses. This area is mainly Elko County in Nevada where much of the region's livestock is raised. Map by author using GIS data courtesy of the Bureau of Land Management and the Forest Service.

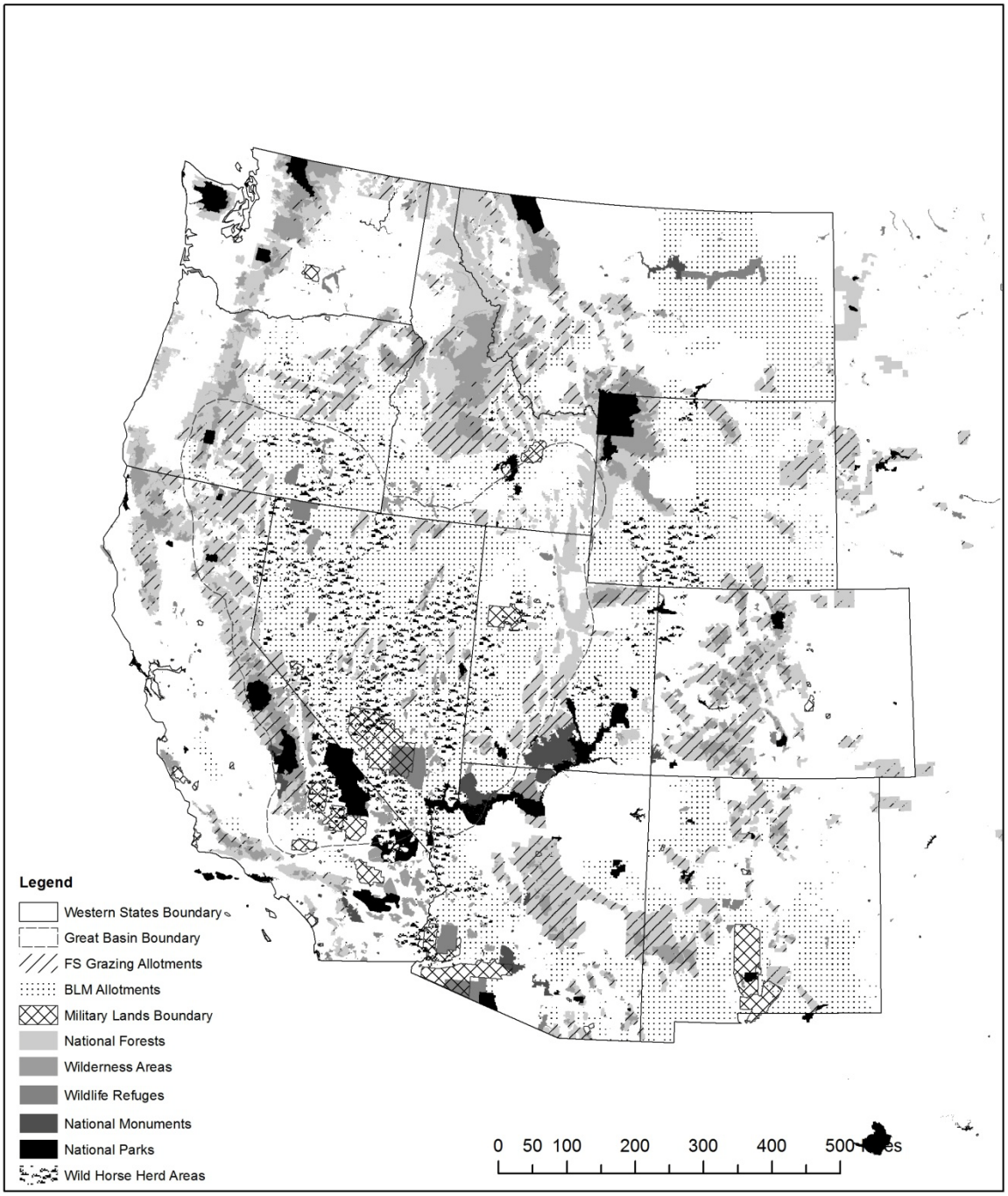

Fig. 7 The Overlapping Landscapes. This map depicts the overlap between the Ranch, Military-Nuclear, Wild Horse, and Wilderness-Recreation Landscapes. Map by author using GIS data courtesy the Forest Service, Bureau of Land Management, Fish and Wildlife Service, National Park Service, and Department of Defense.

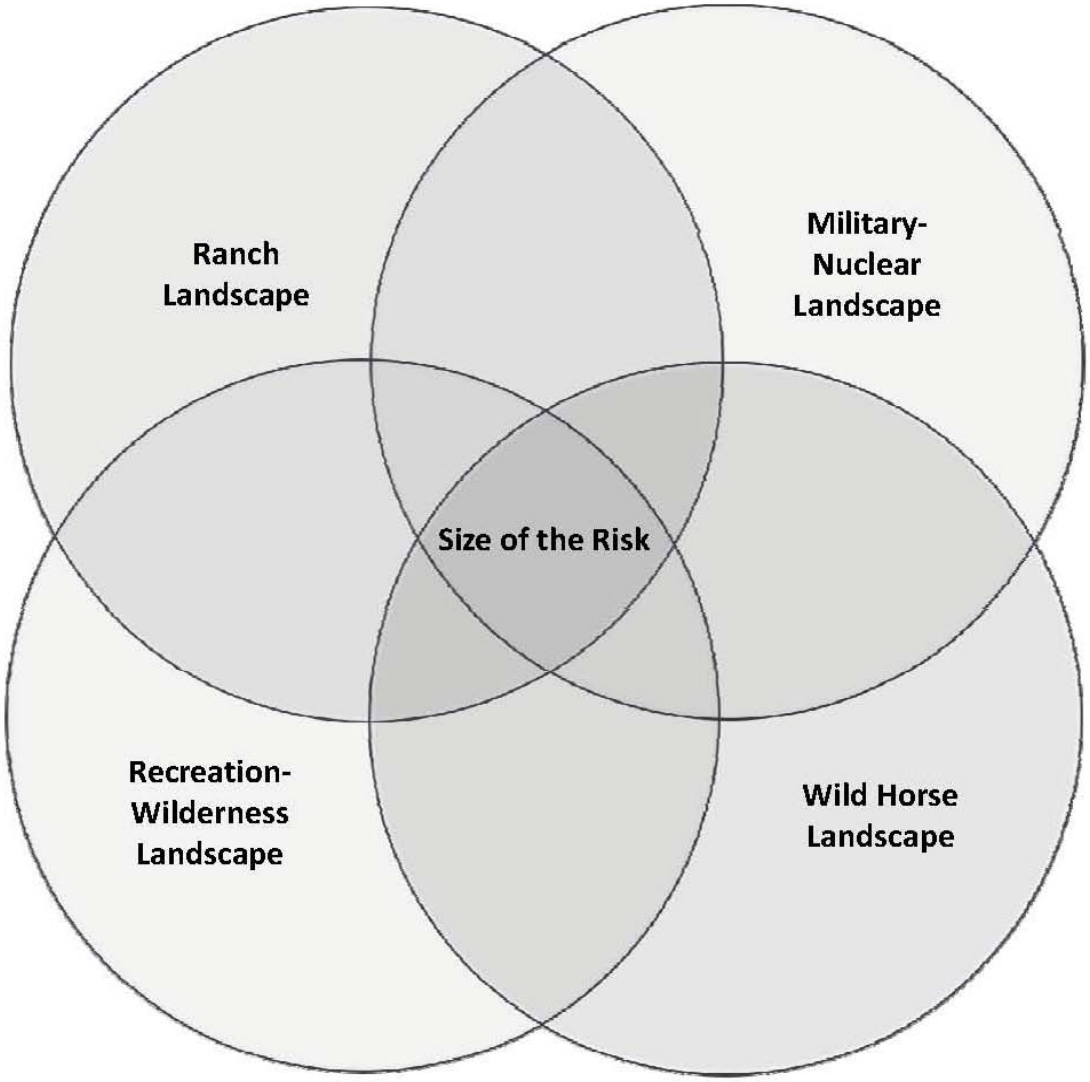

Fig. 8 The Size of the Risk. This Venn diagram depicts the overlap of the four Great Basin landscapes from the perspective of most of the population. Although most of these public land programs have benefitted the nation, the area of their overlap represents the conflicts produced by the policies which has negatively affect the region's population and environment.

Notes

[1] In surveying the current trends in environmental history Richard White reviewed the works of several environmental historians such as Joseph Taylor, Mark Fiege, Nancy Langston, and William DeBuys, who have rejected the seemingly hard dividing line between the natural and the cultural. Instead, these authors have focused on the ways in which different forces shape and inform landscapes. These historians and their counterparts, cultural geographers, interpret landscape as the result of cultural processes on natural surroundings which produce a particular view of nature and reflect cultural values. Landscape is also the result of the physicality of a place, particularly its environment, informing and reshaping cultural process and values. Carl Sauer has noted that cultures construct landscapes which contain features that are valuable for use in sustaining human civilization. "The physical qualities of landscape," he wrote, "are those that have habitat value, present or potential." His 1925 essay proposed that the best way to observe the changing relationship between humans and nature was to examine the landscape produced as a result of that relationship. However, Sauer attributed the more dynamic aspects of the relationship to culture rather than nature. Kenneth Olwig argued that landscape is both substantive, where "environment, economics, law, and culture are all important," and symbolic, "to be perceived, read, and interpreted on the ground, in written texts, and through artistic images." Through examining the development of landscape, cultural geographers better understand the "peoples and societies which created it." In addition, according to Donald Meinig, "the landscape is a great exhibit of consequences." Meinig and other geographers have considered "all landscapes as symbolic, as expressions of cultural values, social behavior, and individual actions worked upon particular localities over a span of time." To Meinig, the most profound landscapes are those closest to humans, the seemingly ordinary ones. These often over-looked landscapes proved endless possibilities for examining the development of landscape as an historical process. Meinig does note, however, that "the links between specific attitudes decisions, actions, and specific results may be difficult to trace with assurance." Enthographers such as Keith Basso have argued that the ways in which places are depicted and utilized are "actualizations of the knowledge that informs them … outward manifestations of underlying systems of thought." In addition, Yi-Fu Tuan writes that geography broadly is "the study of Earth as the home of people," and that home is profoundly personal. Richard White, "From Wilderness to Hybrid Landscapes: The Cultural Turn in Environmental History," *The Historian* 66 (September 2004): 562-664; Carl Sauer, "The Morphology of Landscape," in Timothy S. Oakes and Patricia L. Price, eds., *The Cultural Geography Reader* (New York: Routledge, 2008), 100; Kenneth R. Olwig, "Recovering the Substantive Nature of Landscape," *Annals of the Association of American Geographers* (December 1996): 645; Donald Meinig, "The Beholding Eye: Ten Versions of the Same Scene," in Donald Meinig, ed., *The Interpretation of Ordinary Landscapes* (New York: Oxford University Press, 1979), 43-45; Donald W. Meinig, "Introduction," in *The Interpretation of Ordinary Landscapes*, Donald W. Meinig, ed. (New York: Oxford University Press, 1979), 6; Keith H. Basso, *Wisdom Sits in Places: Landscape and Language Among the Western Apache* (Albuquerque: University of New Mexico Press, 1996), 110; Yi-Fu Tuan, "A View of Geography," *Geographical Review* 81 (January 1991): 99-103; Timothy S. Oakes and Patricia L. Price, eds. *The Cultural Geography Reader* (New York: Routledge, 2008), 149; Kevin Lynch, *The Image of the City* (Cambridge, MA: The MIT Press, 1960), 2-9.

[2] Richard White argued that during the twentieth century, the federal government ceased to function as an agent transferring resources to private ownership and "asserted permanent public ownership of portions of the remaining public domain and began to manage and supervise use of those lands." Its allies in this process were urban areas and corporations, the "emerging power bases of the West;" its opponents were western politicians and citizens who felt "deprived of what they regarded as their patrimony," their access to land and opportunity. In addition, Gerald Nash wrote that the federal government was the dominant force which shaped the West in the twentieth century. Richard White, *"It's Your Misfortune and None of My Own": A New History of the American West* (Norman: University of Oklahoma Press, 1991), 391; Gerald D. Nash, *The Federal Landscape: An Economic History of the Twentieth-Century West* (Tucson: University of Arizona Press, 1999).

[3] William DeBuys' work on the Salton Sea has demonstrated the benefits of examining the complex and contentious history of a region's nucleus. Rather than write an environmental history of the entire Colorado Desert in California, DeBuys focused on its most important, but narrow geographic area between Palm Springs and the Mexican border. Similarly, this environmental history of the Great Basin closely examines

the region's most conflicted area between Las Vegas, Ely, and Tonopah. William DeBuys, *Salt Dreams: Land and Water in Low-Down California* (Albuquerque: University of New Mexico Press, 1999), 2-3.

[4] Nowhere are these consequences better understood than in the lives of people who create and endure the process of constructing different and often conflicting landscapes. Oral history captures the past remembrances of those individuals who participated in the evolution of landscape. Keith Basso has proposed that "places animate the ideas and feelings of persons who attend to them" and that "these same ideas and feelings animate the places on which attention has been bestowed." In this way, landscape is constructed through the lives of the people who interact with it in addition to the federal laws managing it. Additionally, Paul Thompson argued that the oral component of historical research makes valuable information available to historians in ways that traditional archival research cannot. Essentially, "oral history is built around people," and beneath every discussion of systemic evolution are the people who created, enacted, and were affected by the scope of public land governance. In the Great Basin, where the small rural population and the federal government worked, often in tension with each other, to construct landscapes which were economically productive, environmentally sensitive, and nationally acceptable, oral history provides the necessary details to understanding the ways in which the landscapes of the region developed and clashed. Basso, *Wisdom Sits in Places*, 107; Paul Thompson, *The Voice of the Past: Oral History, Third Edition* (Oxford: Oxford University Press, 2000), 23, 117.

[5] NV0030434, "Discussion of Radiological Hazards Associated with a Continental Test Site for Atomic Bombs," Los Alamos Scientific Laboratory, September 1, 1950, Nevada Nuclear Testing Archive, Las Vegas, Nevada (hereafter Nevada Nuclear Testing Archive).

[6] Richard White, "Trashing the Trails," in *Trails Toward a New Western History*, Patricia Nelson Limerick, Clyde A. Milner II and Charles Rankin, eds. (Lawrence: University Press of Kansas, 1991), 37.

[7] For more information on the Clawson's historic stages of land management in the United States, see Marion Clawson, *Man and Land in the United States* (Lincoln: University of Nebraska Press, 1964).

[8] The Nevada state bureaucracy is the smallest in the nation based on the per capita spending by the state government and the number of state employees per the total employment in the sate according to the 2000 US Census. Nevada's public lands comprise just less than 80% of its total land area, the highest percentage in the nation. Most of the state's public lands are administered by the Bureau of Land Management.

[9] Environmental history provides a greater understanding of environmental policy-making, the evolution of the biological and ecological sciences, nature-as-capital economic models, and the application of cultural theory to the environment. For example, Donald Worster argued that "all landscapes," whether intentionally created by humans or not, "are the result of interactions between nature and culture." By studying the relationship between the two, environmental historians can come to a better understanding of the landscapes American culture has created. According to White, "historians must find some way to fix with care and precision the causes and consequences of the changes that they study," they must "attempt to determine the nature of cultural attitudes toward the environment in the past, how they evolved, and how they influenced action." Similarly, William Cronon advocated studying humans and their interactions with nature in order to take responsibility for protecting the places people live, recreate, and revere. Donald Worster. "Seeing Beyond Culture," *The Journal of American History* 76 (March 1990): 1142-1147; Richard White, "American Environmental History: The Development of a New Historical Field," *Pacific Historical Review*, 54 (1985): 334; William Cronon, "The Trouble With Wilderness; or Getting Back to the Wrong Nature," in William Cronon, *Uncommon Ground: Rethinking the Human Place in Nature* (New York: W.W. Norton & Company, 1996), 69-90.

[10] In the biological sciences, indicator species are animals, plants, and other forms of life which can be used to measure the health of the total environment. If a group of indicator species exhibits signs of stress or decline, this alerts biologists to possible environmental problems within the ecosystem in which the indicator species live.

[11] The interior regions of North American include the Basin and Range province, the Rocky Mountains, Great Plains, and the Interior Lowlands and Highlands. The Interior Lowlands and Highlands are well-watered and vegetated while the Great Plains and Basin and Range province are arid and sparsely vegetated, requiring irrigation for agriculture, industry, and settlement. The most arid regions of the North American continent are its deserts and effectively all of them lie within the Basin and Range province. North America contains four major deserts, though arguably, there are many other arid subregions such as the Colorado Plateau. The Sonoran and Chihuahuan deserts straddle the borderlands between the United States and Mexico. The Mojave Desert is the least vegetated of the North American deserts and is located

between California, Nevada, and Arizona. Collectively, these three deserts comprise the American Southwest. The fourth North American desert, the Great Basin Desert, is the largest in North America and the most northern. For basic information about the physiographic regions of North America, see Anthony R. Orme, ed., *Physical Geography of North America* (New York: Oxford University Press, 2000). For more information about the four North American deserts, see also Desert USA at http://www.desertusa.com, a desert traveler's guide.

[12] The US Census Bureau defines an urban area as one which includes at least 2,500 people located in a given area. However, most counties in Nevada, a state almost exclusively located in the Great Basin and which is the subject of this study, hover on or below 5,000 persons, many of which live in the county seat. In Nevada, the two major population centers—the Las Vegas-Henderson-North Las Vegas area (which includes the unincorporated regions between and surrounding them) and the Carson City-Reno-Sparks area (essentially Carson City, Washoe, and Douglas counties)—are located at the southern and western boundaries of the Great Basin. These two urban hubs contain 69 and 22 percent of the state's population and have a population density of 174 and 59 persons per square mile respectively. As a result, it is difficult to claim that the remaining 9 percent of Nevada's population (at a comparative 2 people per square mile population density), which is spread out over 95,000 square miles, is urban even if concentrated in towns of over 2,500 people. These numbers are from the 2000 Census and can be retrieved from the Census Bureau Quick Facts site at http://www.quickfacts.census.gov.

[13] The National Park Service's website on Great Basin National Park provides an informative discussion about the different boundaries ascribed to the region at http://www.nps.gov/grba/. For information about the Great Basin ecology see the National Biological Information Infrastructure at http://www.nbii.gov.

[14] Samuel G. Houghton, *A Trace of Desert Waters: The Great Basin Story* (Reno: University of Nevada Press, 1994); Charles G. Oviatt, "Late Pleistocene and Holocene Lake Fluctuations in Sevier Lake Basin, Utah, USA," *Journal of Paleolimnology* (July 1988): 9-21.

[15] Orme, *Physical Geography of North America*, 385; John McPhee. *Basin and Range* (New York: Farrar, Straus and Giroux, 1981), 44-54.

[16] Peter Goin, "Magical Realism: The West as Spiritual Playground," in Gary Hausladen, editor, *Western Places, American Myths: How We Think About the West* (Reno: University of Nevada Press, 2003), 254; William I. Fox, *The Void, the Grid & the Sign: Traversing the Great Basin* (Reno: University of Nevada Press, 2000), 11-12.

[17] James W. Hulse, *Nevada's Environmental Legacy: Progress or Plunder* (Reno: University of Nevada Press, 2009), 15-34.

[18] Joel Garreau, *The Nine Nations of North America* (Boston: Houghton Mifflin Company, 1981), 301-303; Orme, *Physical Geography of North America*, 395-397; Elizabeth Raymond, "When the Desert Won't Bloom: Environmental Limitation and the Great Basin," in *Many Wests: Place, Culture, and Regional Identity* ed. David Wrobel and Michael Steiner (Lawrence: University Press of Kansas, 1997), 83. Where Raymond sees little alteration to the Great Basin environment, other historians and writers see devastating alterations. In particular, Valerie Kuletz writes that nuclear culture and technology has "profoundly changed our lives and our environment," especially in the Great Basin, in *The Tainted Desert: Environmental and Social Ruin in the American West* (New York: Routledge, 1998). This tension between the Great Basin environment resisting and being devastated by alterations produces an interesting polarization apparent in the impact of every land law enacted in the region.

[19] Donald W. Meinig, "The Mormon Culture Region: Strategies and Patterns in the American West, 1847-1964," *Annals of the Association of American Geographers* 55 (June 1965): 199, 213-220. In Nevada, the region between Las Vegas and Ely, throughout Lincoln County in particular, contains a high concentration of Mormons. However, despite the homogeneity of the Mormon religion to outsiders, there are in fact distinct differences between Mormons in Las Vegas and those in the rural communities of Alamo and Lund. In addition, in 2006, the Fundamentalist Church of Jesus Christ of Latter Day Saints (FLDS) planted a community at Pony Springs near Pioche. The FLDS is an alternative sect of Mormonism which practices polygamy.

[20] Gloria P. Totoricaguena, *Identity, Culture, and Politics in the Basque Diaspora* (Reno: University of Nevada Press, 2004), 19-54, 66, 71, 126; William A. Douglass, *Basque Sheepherders of the American West* (Reno: University of Nevada Press, 1985), 16-33. So closely identified were Basques with sheepherding that "to say 'sheepherder' was to mean 'Basque'." According to Douglass, no other ethnic group has been so closely identified with a single occupation. Despite all Basques originating from the Pyrenees Mountain

region, there is a distinct difference between Spanish Basques and French Basques. Most of those immigrants who settled in northern and central Nevada were Spanish Basque. The communities of Ely, Elko, and Reno contain large concentrations of Basques.

[21] Stephen Crum, *The Road on Which We Came: A History of the Western Shoshone* (Salt Lake City: University of Utah Press, 1994), 1-15.

[22] Crum, *The Road on Which We Came*, 25-26, 59. Nevada contains some of the smallest reservations in the Bureau of Indian Affairs (BIA) system. The primary reservations for the Western Shoshone are located in the northeastern and central part of the state. They include the Duck Valley, South Fork, Yomba, Battle Mountain, Duckwater, and Goshute reservations. In addition, the Western Shoshone also have colonies established in towns such as Elko, Ely, Wells, and Sparks. The primary reservations for the Paiute are located in the western and southern portions of the state. They include Pyramid Lake, Walker River, and Moapa River. Collectively, the lands in Nevada held in trust for native tribes by the Bureau of Indian Affairs and amounts to just over one million acres. In comparison, native lands held in trust in New Mexico comprise nearly four million acres and in Utah comprise nearly six million acres. Arizona contains the largest amount of lands held in trust at over eighty-five million acres. For more information see the Bureau of Indian Affairs at http://www.bia.gov/.

[23] The ways in which these cultures view the Great Basin both frames and determines their interaction with its geography. William Cronon wrote "the shape of the landscape [is] a visible confirmation of the state of human society." Mormons, Basque, Native Americans established a relationship between the region's environment and their different cultures, a dialectical relationship where the natural conditions of the Great Basin shaped their economic choices relative to the nation's economy and their cultures reshaped the region's environment in conjunction with national trends. In this quote, Cronon refers to early American author Benjamin Rush's observation that the alteration of the New England environment from forest to cultivated fields embodied the progression form savage to civilized life. Cronon continues that "Whether interpreted as declension or progress, the shift from Thoreau's forest of 'nobler animals' to Rush's fields and pastures of prosperous farmers signaled a genuinely transformed country-side, one whose changes were intimately bound to the human history which had taken place in its midst." Environmental historians, cultural historians, cultural geographers, ethnographers, established and utilized this framework to examine the ways in which different cultures create landscape artistically, structurally, and economically. William Cronon, *Changes in the Land: Indians, Colonists, and the Ecology of New England*, rev. ed. (New York: Hill and Wang, 2003), 6-13.

[24] For further information on the lands administered by these different agencies, see the following reports available from the different public land management agencies: Bureau of Land Management at http://www.blm.gov ; Forest Service, *Table 4 – Areas by State, February 29*, 2008, (Washington, DC: Department of Agriculture, 2008); Fish and Wildlife Service, *Annual Report on the Lands Under the Control of the US Fish and Wildlife Service as of September 30, 2008* (Washington, DC: Department of the Interior, 2008); National Park Service at http://www.nps.gov/index.htm; Department of Defense, *Base Structure Report* (Washington, DC: Department of Defense, 2007); Department of Energy Office of Legacy Management at http://www.lm.doe.gov.

[25] Paul F. Starrs, "An Inescapable Range, or the Ranch as Everywhere," in *Western Places, American Myths: How We Think about the West*, ed. Gary J. Hausladen (Reno: University of Nevada Press, 2003), 57-60.

[26] Paul F. Starrs, *Let the Cowboy Ride: Cattle Ranching in the American West* (Baltimore: Johns Hopkins University Press, 1998, 9-13.

[27] Between 1866 and 1884, over five million cattle from Texas were shipped north to the slaughterhouses. This style of ranching influenced the industry's development in Arizona, Colorado, and throughout the northern Great Plains into Canada. As the industry expanded, eastern and foreign speculators in land and livestock invested millions creating a system of absentee ownership birthing the "beef bonanza" of the 1880s. The indelible image of the open range, the rugged and individualistic character of the Texas cowboy, and the tradition of western horse culture became lasting cultural contributions of the Texas model. The California model of cattle ranching relied on a much different set of practices. Ecological extremes of flood and drought in the region necessitated some level of control of nature. Rather than utilizing open range practices of stationary grazing and seasonal cattle drives, California ranchers engineered the landscape to suit their seasonal needs. Ranchers accumulated scattered parcels of pasture in

California's San Joaquin Valley, eastern Oregon, and northern Nevada. This system of ranching was much more labor intensive than the Texas model and required a vast amount of labor rather than land to ensure success. Other western regions borrowed variations of these two models but on much smaller scales. Throughout the Great Basin and the Rocky Mountain region, cattle ranches fed more localized mining populations or other smaller but burgeoning urban areas such as Portland and Denver. In Utah and northern Arizona, Mormons developed a collaborative ranching system, rejecting the entrepreneurial and corporate models in favor of small-scale community production. For more information on cattle ranching in the United States see David Igler, *Industrial Cowboys: Miller & Lux and the Transformation of the Far West 1850-1920* (Berkeley: University of California Press, 2001); Terry G. Jordan, *North American Cattle-Ranching Frontiers: Origins, Diffusion, and Differentiation* (Albuquerque: University of New Mexico Press, 1993); and Richard Slatta, *Comparing Cowboys and Frontiers* (Norman: University of Oklahoma Press, 1997).

[28] Most agricultural operations in Nevada—cattle ranching, onion, carrot, and potato farming, alfalfa growing—gross around $60,000 annual and only 3-4% of the agricultural operations in the state net over $500,000. The cattle ranching and sheep herding industries have comprised nearly half the agricultural income of the state, though agriculture itself only comprises less than one-fifth of the state's economy. Less than two percent of the state's population is involved on agriculture. Ranching has declined in Nevada during the twentieth century. In 1918, there were 520,000 cattle and 1,268,000 sheep on Nevada's ranges. By 2008, there were less than 500,000 cattle and 70,000 sheep. In 1918, the beef-cattle industry produced $24.7 million (today that is $525 million) and the sheep industry produced $17.6 million (or $170 million today). By 2008, the cattle industry produced around $500 million and the sheep industry produced $4 million. Nevada Agricultural Foundation, "Sizing up Nevada Agriculture," *Nevada Agricultural Foundation News* (January 28, 2003), http://www.nvagfoundation.org/NAF/news/article.cfm?id=34; Diane Glazman, "Agricultural Communities Face the Future," Nevada Business (July 2001), http://www.nevadabusiness.com/issue/0701/1/155.

[29] Starrs, "An Inescapable Range," in *Western Places, American Myths*, 66, 72.

[30] James A. Young and B. Abbott Sparks, *Cattle in the Cold Desert*, rev. ed. (Reno: University of Nevada Press, 2002), xv.

[31] Department of the Interior, *The Taylor Grazing Act of June 28, 1934, with Amendments to September 1, 1955* (Washington, D.C.: U.S. Government Printing Office, 1955).

[32] Karen R. Merrill, *Public Lands and Political Meaning: Ranchers, the Government, and the Property between Them* (Berkeley: University of California Press, 2002), 135-156; "Public Domain Question Settled," *Los Angeles Times* (June 29, 1934); "Taylor Grazing Bill Discussed By Legislators," *Tonopah Daily Times and Bonanza* (January 24, 1935); "Cattle, Sheepmen Shortsighted Charges Ickes," *Tonopah Daily Times and Bonanza* (February 12, 1935).; Maxine F. Shane, *Taylor Grazing Act in Nevada, 1934-1984* (Reno: Nevada State Office of the Bureau of Land Management, 1984), 1-4; "Nevada Allotted Only 2 Districts Under Taylor Act," *Tonopah Daily Times and Bonanza* (May 2, 1935); "Nye, Esmeralda, Lander, Eureka Ranch Owners Protest New Grazing District," *Tonopah Times-Bonanza* (March 2, 1951).

[33] The one caveat to this statement is that the federal government did not revoke grazing privileges without an imperative external pressure such as that created by national security issues. Also, grazing ranges could be factored into the value of the ranch at large for the purpose of acquiring bank loans or other matters of credit. *Taylor Grazing Act of 1934*, Public Law 482, 73rd Cong., 2nd sess. (June 28, 1934).

[34] An Animal Unit Month is determined by the amount of forage needed for one cow or horse for one month or five sheep for one month. The BLM has decreased AUMS by more than 1000 nationwide since the passage of FLPMA. In terms of the national market, this is essentially a negligible decrease. For AUM statistics see Range Net at http://www.rangenet.org/tools/blmgrazing/blm.html. James R. Skillen, *The Nation's Largest Landlord: The Bureau of Land Management in the American West* (Lawrence: University Press of Kansas, 2009), 65-67, 102-111; Bureau of Land Management, *History of Public Land Livestock Grazing* (Washington, DC: Department of the Interior, 2009).

[35] Skillen, *The Nation's Largest Landlord*, 81-87, 120-123; John P. Workman, "Federal Grazing Fees: A Controversy That Won't Go Away," *Rangelands* 10 (June 1988): 128-130.

[36] Starrs, "An Inescapable Range," in *Western Places, American Myths*, 58; Starrs, *Let the Cowboy Ride*, 1-2; Kristine Fredriksson, *American Rodeo: From Buffalo Bill to Big Business* (College Station: Texas A&M University Press, 1985); Wayne S. Wooden and Gavin Ehringer, *Rodeo in America: Wranglers,*

Roughstock, and Paydirt (Lawrence: University Press of Kansas, 1996), 3-7; Michael Allen, *Rodeo Cowboys in the North American Imagination* (Reno: University of Nevada Press, 1998).
[37] Lawrence R. Borne, *Dude Ranching: A Complete History* (Albuquerque: University of New Mexico Press, 1983).
[38] Contrary to popular belief, the majority of cattle raised in the United States are actually east of the Mississippi River. As a consequence, ending subsidized grazing on public land would have very little impact on the nation's beef supply. But, it would severely impact the lives of the majority of rural residents in the Great Basin. George Wuerthner and Mollie Matteson, *Welfare Ranching: The Subsidized Destruction of the American West* (Sausalito, CA: Foundation for Deep Ecology, 2002), 1.
[39] W. William Weeks, "Cloudy Sky over the Range: Whose Home and Why it Matters," in *Ranching West of the 100th Meridian: Culture, Ecology, and Economics*, Richard L. Knight, Wendell C. Gilgert, and Ed Marston, eds. (Washington, DC: Island Press, 2002): 219-222; Starrs, *Let the Cowboy Ride*, 20-22.
[40] Kevin J. Fernlund, editor, *The Cold War American West, 1945-1989* (Albuquerque: University of New Mexico Press, 1998). 1.
[41] Lotchin noted that cities in California by the mid-twentieth century had already acquired a long history of military development. Every port city along the California coast had naval, army, and air bases before the start of World War II. Militarization was a fundamental component to California's major cities. This was also true of Seattle. Roger W. Lotchin, ed., *The Martial Metropolis: U.S. Cities in War and Peace* (New York: Praeger, 1984), 223-232; Roger W. Lotchin, *Fortress California 1910-1961: From Welfare to Warfare* (New York: Oxford University Press, 1992), 1-2; Greg Hise, *Magnetic Los Angeles: Planning the Twentieth-Century Metropolis* (Baltimore, MD: Johns Hopkins University Press, 1999), 117-120; Matthew Klingle, *Emerald City: An Environmental History of Seattle* (New Haven: Yale University Press, 2007), 205-211.
[42] The Nevada Test Site hosted 100 of 210 atmospheric tests and 828 of 844 underground tests. The other locations include Railroad Valley and Fallon in Nevada, Alamogordo, Carlsbad, and Farmington in New Mexico, Rifle and Grand Valley in Colorado, Amchitka Island in Alaska, and Hattiesburg in Mississippi. The Pacific testing ground was located in the Marshall and South Pacific Islands. Department of Energy, *United States Nuclear Tests July 1945 Through September 1992* (Las Vegas, Nevada Operations Office, December 2000), xii-xiii.
[43] Maria E. Montoya, "Landscapes of the Cold War West," in *The Cold War American West, 1945-1989*, Kevin J. Fernlund, ed, (Albuquerque: University of New Mexico Press, 1998), 14, 24; White, *"It's Your Misfortune and None of My Own"*, 497.
[44] Montoya, "Landscapes of the Cold War West," in *The Cold War American West*, 14.
[45] Fernlund, *The Cold War American West*, 2-4; Gerald D. Nash, *The Crucial Era: The Great Depression and World War II*, 2nd ed. (New York: St. Martin's Press, 1992), 182.
[46] Between New Mexico, Arizona, California, Nevada, and Utah the United States military manages sixteen testing and training complexes which total 22,232 square miles. This comprises nearly 4% of the total land between the five states and 8.5% of their total public lands. These numbers are based on the federally reported square miles for each installation compared with the Bureau of Land Management numbers for total land area and public land area within each state. The sixteen installations are: White Sands Missile Range and Fort Bliss in New Mexico; Yuma Proving Grounds and the Barry M. Goldwater Range in Arizona; Chocolate Mountains Aerial Bombing and Gunnery Range and Impact Area, Twenty-Nine Palms, Edwards Air Force Base, Fort Irwin, and the China Lake Naval Weapons Center in California; The Nellis Range Complex in Nevada which contains the Nevada Test Site and the Tonopah Test Range; the Utah Test and Training Range which contains Dugway Proving Grounds and the Wendover Bombing Range. All of these ranges are surrounded by vast stretches of public land. For information on the nation's military installations see the Native American Graves Protection and Repatriation Act (NAGPRA), *Military Bases in the Contiguous United States* (Washington, DC: National Park Service, 2010).
[47] For more on military personnel, see Department of Defense, *Military Personnel Statistics* (Washington, DC: Department of Defense, 2010). For information on the national laboratory system see Department of Energy, National Laboratories at http://www.er.doe.gov/National_Laboratories/, Los Alamos National Laboratory at http://www.lanl.gov/history/, Lawrence Livermore National Laboratory at https://www.llnl.gov/, and Sandia National Laboratory at http://www.sandia.gov/about/history/. Nash, *The Crucial Era*, 182.
[48] Peter Goin, *Nuclear Landscapes* (Baltimore: Johns Hopkins Press, 1991), xix-xxii.

[49] Paul S. Boyer, *By the Bomb's Early Light: American Thought and Culture at the Dawn of the Atomic Age* (Chapel Hill: University of North Carolina Press, 1985); Barton C. Hacker, *Elements of Controversy: The Atomic Energy Commission and Radiation Safety in Nuclear Weapons Testing 1947-1974* (Berkeley: University of California Press, 1994), 42; A. Constandina Titus, *Bombs in the Backyard: Atomic Testing and American Politics*, 2nd ed. (Reno: University of Nevada Press, 2001), 167-168.
[50] Terrence R. Frehner and F.G. Gosling, *Origins of the Nevada Test Site* (Washington, DC: Department of Energy, 2000), 86-87; Valerie Kuletz, *The Tainted Desert: Environmental and Social Ruin in the American West* (New York: Routledge, 1998), xii-xix, 290.
[51] In particular, Great Basin residents protested the MX missile development and the Yucca Mountain Project in the region. For more information, see Matthew Glass, *Citizens Against the MX: Public Languages in the Nuclear Age* (Chicago: University of Illinois Press, 1993), xv-xxii and Samuel J. Walker, *The Road to Yucca Mountain: The Development of Radioactive Waste Policy in the United States.* Berkeley: University of California Press, 2010.
[52] Samuel P. Hays, *Beauty, Health, and Permanence: Environmental Politics in the United States 1955-1985* (New York: Cambridge University Press, 1987), 115;.Aldo Leopold, *A Sand County Almanac and Sketches Here and There* (New York: Oxford University Press, 1949), 173; Richard White, "'Are You an Environmentalist or Do You Work for a Living?': Work and Nature" in *Uncommon Ground: Rethinking the Human Place in Nature*, William Cronon, ed. (New York: W.W. Norton, 1996), 173, 185.
[53] The BLM is the largest landowner in the country, followed by the USFS and the NPS. Hays, *Beauty, Health, and Permanence*, 100-102; Skillen, *The Nation's Largest Landlord*, 14; *Multiple Use and Sustained Yield Act of 1960*, Public Law 517, 86th Cong., 2nd sess. (June 12, 1960); *Classification and Multiple Use Act of 1964*, U.S. Code. Vol. 43, secs. 1411-18 (September 19, 1964).
[54] R. McGreggor Cawley, *Federal Land, Western Anger: The Sagebrush Rebellion & Environmental Politics* (Lawrence: University Press of Kansas, 1993), 35-37.
[55] *Federal Land Policy Management Act of 1976*, Public Law 579, 94th Cong., 2nd sess. (October 21, 1976).
[56] Skillen, *The Nation's Largest Landlord*, 102.
[57] Aldo Leopold in *A Sand County Almanac* echoes this sentiment writing "wilderness is the raw material out of which man has hammered the artifact called civilization." Roderick Nash, *Wilderness and the American Mind*, rev. ed. (New Haven, CT: Yale University Press, 1973), xv.
[58] *National Park Service Organic Act of 1916*, U.S. Code. Vol. 16, secs. 1, 2, 3, and 4 (August 25, 1916); *Wilderness Act of 1964*, Public Law 577, 88th Cong., 2nd sess. (September 3, 1964).
[59] Congress designated the Jarbridge Wilderness in 1964 on the Nevada-Idaho border. Other wilderness areas did not receive consideration until the 1976. The majority of wilderness areas in the Great Basin did not receive their designation until after 1986.
[60] Hays, *Beauty, Health, and Permanence*, 99; Nash, *Wilderness and the American Mind*, 263.
[61] Cawley, *Federal Land, Western Anger*, 1-14.
[62] Paula Morin, *Honest Horses: Wild Horses in the Great Basin* (Reno: University of Nevada Press, 2006), 5-6; Hope Ryden, *America's Last Wild Horses, 30th Anniversary Edition*. (Guilford, CT: The Lyons Press, 1999), 13, 15-16.
[63] Joel Burger, *Wild Horses of the Great Basin: Social Competition and Population Size* (Chicago: University of Chicago Press, 1986), 9. Burger used the term *feral* to refer to "a wild state of existence for domesticated animals." According to him, "The process of feralization is straightforward; it merely involves an animal's fending for itself." The distinction between wild and feral is critical in understanding this landscape. In the hierarchy of wildlife preservation, wild/native species take priority over introduced/feral animals. Burger argues that 'the only true extant native horses are Przewalski's horses" from the Mongolian Plateau. By this definition, wild horses in the Americas, especially in the Great Basin, because their ancestors were introduced by the Spanish in the sixteenth century and because they are derived from domesticated stock, are introduced/feral animals and do not have priority under the laws of wildlife preservation, especially the laws governing the United States. Another set of laws, created between 1959 and 1998, were enacted to give wild horses, and their feral cousins the wild burros, protected status.
[64] Phil Strong, *Horses and Americans* (New York: Frederick A. Stokes Company, 1939), xx, 313, 175.
[65] Morin, *Honest Horses*, 129-134; 207-211, 219-226; 238-245.
[66] *Free-Roaming Wild Horses and Burros Act of 1971*, Public Law 195, 92nd Cong., 1st sess. (December 15, 1971).

[67] "State Wildlife Agency Backs BLM in Wild Horse Suit," *Reno Gazette-Journal*, December 19, 2009; Heather Smith Thomas, *The Wild Horse Controversy* (Cranbury, NJ: A.S. Barnes and Co., Inc., 1979), 190-196; Morin, *Honest Horses*, 73-81.
[68] Ryden, *America's Last Wild Horses*, 305-306; Thomas, *The Wild Horse Controversy*, 221; Deanne Stillman, *Mustang: The Saga of the Wild Horse in the American West* (New York: Houghton Mifflin Company 2008), xix.
[69] John B. Wright, "Land Tenure: The Spatial Musculature of the American West," in *Western Places, American Myths: How We Think About the West*, Gary J. Hausladen, ed. (Reno: University of Nevada, Las Vegas, 2003), 85.
[70] The very first grazing district was organized in Rawlins, Wyoming, on March 20, 1935. The first district in Nevada was organized in Elko County, Nevada, on April 8, 1935. For a brief history of the Taylor Grazing Act, see Joseph V.H. Ross, "Managing the Public Rangelands: 50 Years Since the Taylor Grazing Act," *Rangelands* 6 (August 1984): 147-151. For a brief history of the Taylor Grazing Act in Nevada see Maxine F. Shane, *Taylor Grazing Act in Nevada, 1934-1984* (Reno: Bureau of Land Management Nevada State Office, 1984). In 1950, the nuclear scientists in charge of the Los Alamos laboratory and the nuclear testing program preferred the Nevada site for continental testing because of its, arid climate, current military designation, and low population density. For a brief history of the establishment of the Nevada Test Site see F.G. Forsling, *Origins of the Nevada Test Site* (Washington, DC: Department of Energy, 2000). In 1959, the Nevada state legislature passed the first wild horse law which banned the mechanized round-up of the animals. For a brief history of wild horse legislation, see Heather Smith Thomas, *The Wild Horse Controversy* (Cranbury, NJ: A.S. Barnes and Co., Inc., 1979). Most of the other ten western states had one or more national parks established by the mid-twentieth century, including Hawaii. Alaska's parks were designated in 1980. Great Basin National Park was established in 1986 after two decades of wrangling between ranchers, mining interests, the Sierra Club, and wilderness advocates in the state and at the national level. For more information on Great Basin National Park, see http://www.nps.gov/grba and the available historic resource study Harlan D. Unrau, *Basin and Range: A History of Great Basin National Park* (Washington, D.C.: United States Department of Interior National Park Service, 1990). Only Idaho, also a Great Basin state, remains without a national park, however, the state does have multiple national monuments. The Sagebrush Rebellion originated in Nye County, Nevada, in 1979 in protest of the BLM implementing the 1976 Federal Land Policy Management Act. Sagebrush Rebels advocated prioritizing local interests over federal mandates. For an overall history of the Sagebrush Rebellion see R. McGreggor Cawley, *Federal Land, Western Anger: The Sagebrush Rebellion and Environmental Politics* (Lawrence: University Press of Kansas, 1993). See J. Samuel Walker, *The Road to Yucca Mountain: The Development of Radioactive Waste Policy in the United States* (Berkeley: University of California Press, 2010) and Alison M. Macfarlane and Rodney C. Ewing, eds., *Uncertainty Underground: Yucca Mountain and the Nation's High-Level Nuclear Waste* (Cambridge: Massachusetts Institute of Technology Press, 2006) for more information on the issue of a high-level nuclear waste repository.
[71] Wright, "The Spatial Musculature of the American West," in *Western Places, American Myths*, 85, 92; Martin Nie, *The Governance of Western Public Lands: Mapping its Present and Future* (Lawrence: University Press of Kansas, 2008), 33.
[72] NV0030434, "Discussion of Radiological Hazards Associated with a Continental Test Site for Atomic Bombs," Los Alamos Scientific Laboratory, September 1, 1950, Nevada Nuclear Testing Archive; NV0028596, AEC Memorandum, "Desirability of an Area in the Las Vegas Bombing Range to be Used as a Continental Proving Ground for Atomic Weapons," November 22, 1950, Nevada Nuclear Testing Archive.

CHAPTER 2

UNDERSTANDING THE DESERT WITHIN

> The first thought that comes to the man of insight on viewing the region is the utter futility of individual effort in the stupendous struggle with nature. There is soil fertile and enduring beyond that of any other land, but nature neglects to water it with unfailing rains. The men of an earlier and more superstitious age would have fallen on their knees in prayer; but an eternity of such prayers would bring no response from the smiling sky. Men learn from their environment a better way to pray. William Smythe (1905)

The Great Basin is the desert at the center of the American West and the portrayal of the region as a wasteland consistently informed its historic development. This portrayal created tension between residents and outsiders, locals and the national government in the struggle to populate the region which required multiple forms of external assistance. Never considered an attractive place to homestead or one conducive to agriculture, most of the region's population grew relative to the discovery of new ore, the construction of irrigation systems within the region, and the investment made by corporate industry and the federal government or shrank when those activities dissipated. The wasteland theme and the tension between insiders and outsiders and local and national interests fundamentally shaped the ways in which humans interacted with the Great Basin's environment. Before examining each landscape, we need to establish the baseline for this perception of wasteland and the relationships that existed in tension. This chapter examines the Great Basin from outside and inside the region through exploration and settlement. The individuals discussed here appear in the succeeding chapters as national, regional, and local agents working to secure their interests on the region's public lands.

In an age of satellite imagery and computer programs which can locate and chart the surface features of the earth, it is difficult to remember that there were once blank spots on maps labeled *terra incognita*. Richard Francaviglia described them as not just "blank

spaces," but "essentially 'silences'." In the continental United States, the last vacant area cartographers filled on the nation's maps was the Great Basin, the nation's most interior desert. Bordered by the Colorado River and Mojave Desert to the south, the Sierra Nevada to the west, the Columbia River to the north, and the Rocky Mountains and Colorado Plateau to the west, the Great Basin was relatively inaccessible to early expeditions. For more than two hundred years, Spain avoided the area until Father Dominguez and Father Escalante traveled through the Colorado Plateau in 1776 and grazed the eastern portion of the region. In the early nineteenth century, German cartographer Alexander von Humboldt, American explorer Zebulon Pike, British mapmaker Aaron Arrowsmith, and the Spanish cartographer Juan Pedro Walker created the most detailed maps of their time, but none portrayed more than a few speculated mountain ranges and rivers in the region. The mythic river which many Americans hoped connected the southern Rocky Mountains with the Pacific Ocean at San Francisco sometimes made an appearance as well. The only feature that began appearing consistently in the Great Basin was Lake Timpanogos, later known as the Great Salt Lake (figs. 9 and 10). But when the political and economic powers in the United States became interested in expanding into this region controlled by a newly independent Mexico beginning in the 1820s, the federal government funded expeditions into *terra incognita*.[1] As more and more people interacted with the region, the reports from these explorers, the travelers who accompanied them, and the settlers who came after, consistently portrayed the area as an utter wasteland.

For most of the nineteenth century, most people saw the Great Basin as the unforgiving, soul-crushing desert stretched out between the Rocky Mountains and the

rugged Sierra Nevada, the dessert passage on the way to verdant California. Those who traversed its breadth loathed the aridity and repetitive basin and range undulations. Beginning with the earliest forays into the Great Basin, explorers and surveyors described the region as a desolate, irredeemable wasteland. The more Americans discovered about the area, the more this impression solidified itself in the national consciousness. From John C. Fremont to George M. Wheeler, the reports began and ended the same way, with diligent descriptions of each and every characteristic observed in the area punctuated with exclamations of the land's worthlessness. The heat and the cold, the aridity, the lack of green grass carpets and forests blanketing the rugged mountains made them disparage the long, unbroken view of playa and rock. Their view of the region was from the outside looking into the Great Basin. They saw and sought to avoid both mentally and physically the impact the region's scarcity of water and vegetation had on human habitation. Inhospitable and unforgiving, vast stretches of the Great Basin's environment remained unsettled throughout the century.

Nevertheless, some people did brave the aridity and climactic extremes to settle in the region. Some arrived in the Great Basin drawn by the mining booms and stayed because they reaped the benefits of cheap land and unclaimed water. Most Mormons settled in the region because their religious leadership sent them to make homes in the furthest reaches of the new territory of Deseret. Other immigrants came to the Great Basin because the environment was similar to their homeland in the Basque country or the Italian hills of Europe and equally conducive to livestock production. Those that stayed in the Great Basin had a different view of the region; it was their home. But they were not necessarily boosters of the area or apologetic about how hard they worked to ameliorate the scarcity

of water and other resources. None of these groups created large communities or burgeoning metropolises. The region contained a minimal population well into the twentieth century; settlers developed Reno, Boise, and Salt Lake City along the periphery of the Great Basin next to the few sources of water from the mountains and a few smaller towns scattered along major transportation corridors. Along the Interstate 80 corridor between Reno and Salt Lake City there are towns dotted along the freeway, mostly old railheads such as Lovelock and Elko. Further south, along Highway 50, there are some small settlements and ranch roads, but few gas stations and no fast food establishments. Most residents in the urban centers still avoid the interior of the region. There are, however, numerous abandoned shacks, plenty of dirt roads, a handful of towns, and until very recently, a shoe tree which contained several hundred pairs of shoes hanging precariously on an old cottonwood's branches at Middlegate. The Great Basin is in some ways a wasteland, but it is also an interesting, odd, and beautiful place filled with small but compelling communities.

The Perception of Wasteland

Mapping the Great Basin became an important aspect of American expansion, if for no other reason than it was the territory between the lucrative settlements in California and those to the east of the Rocky Mountains. The Great Basin was an enigma to the scientific surveys of the nineteenth century. John C. Fremont recognized its endorheic nature; Clarence King's Fortieth Parallel survey identified the borders of the Basin's two primeval inland lakes, Bonneville and Lahontan; and George Wheeler and his cadre of geologists, cartographers, and photographers named many of the peaks dotting the region's landscape.[2] Accurate maps of the region were the blueprints for expansion and

consolidation of geographical control. The printed descriptions of the Great Basin penned by these explorers reached a riveted national audience interested in the last undiscovered place in the continental United States. Their observations and geographic calculations established the first focused maps of the region, identifying important relative locations between the outlying Mormon settlement in Salt Lake City and the well-cultivated agricultural paradise of California. Their words and their reactions formed the nation's first perception of the region and it was not a favorable one. Time and again, explorers used rhetoric which indicated the abysmal even retched nature of the landscape and the small indigenous population. *Terra incognita* became synonymous with desert and wasteland. So while increasingly accurate maps helped bring Americans through the region, they did nothing to prepare them for the idiosyncratic nature of the Great Basin.

John C. Fremont, pathfinder and ambitious explorer, was the first surveyor to popularize the Great Basin's hydrographic characteristics and give the region its fundamental identity. His task as set by the federal government was to survey the interior of the continent, namely *terra incognita*. Basing the region's name on his own observations and those of fellow explorer Joseph Walker, Fremont wrote that the Great Basin was "the immediate region between the Rocky Mountains and the next range [the Sierra Nevada] containing many lakes with their own system of rivers and creeks (of which the Great Salt Lake is the principle) and which have no connexion [sic] with the ocean or the great rivers which flow into it. The Great Basin [has] yet to be adequately explored." Arriving in the fall of 1842, Fremont was appalled by the condition of the native tribes whom he called "digger Indians," and speculated their condition was due to the poor environment. Fremont commented: "on this western slope of our continent, the

usual order or distribution of good and bad soil is often reversed; the river and creek bottoms being often sterile, and darkened with the gloomy and barren Artemisia; while the mountain is often fertile and covered with rich grass, pleasant to the eye and good for flocks and herds." After a year-long journey and many frustrating weeks of travelling through sagebrush and sand, never a day passing without some view of snow-capped peaks, Fremont wrote "it is called a desert, and, from what I saw of it, sterility may be its prominent characteristic, but where there is so much water, there must be some oasis."[3] However, Fremont never found more than a few small patches of vegetation.

Fremont's account of the region became important for the ways in which it produced the first national mental landscape of the Great Basin. The popularly publicized saga of his journey dispelled the fantastical stories of whirlpools, subterranean passages, and the mythical river to San Francisco, giving the region a much more realistic and harsher identity. His account of the Great Salt Lake region's agricultural production possibilities and its isolation directly led Mormon settlers to its shores at the foot of the Wasatch Mountains.[4] Charles Preuss' map, which resulted from Fremont's exploration and accompanied his official report of the intermountain American West became the most essential cartographic production of its day (fig. 11 and 12). The map gave identity and description to a great portion of the former *terra incognita.* Its major features, such as the Great Salt Lake and Pyramid Lake, the Humboldt River and the successive mountain ranges it courses around, documented landmarks for future travelers and gave a sense of proportion to the region.[5] Yet it was Fremont's account of the Great Basin that birthed its identity as a wasteland. There were oases in the Great Basin, but they were seasonal and heavily dependent upon annual rainfall. The Carson and Humboldt sinks harbored lush

grasses and reeds which supported large flocks of migratory birds, but their soil was too alkali for cultivation. Fremont, like many other Americans, saw only the absence of fertility.

Because of Fremont's reports and Preuss's maps, greater numbers of settlers traversed the area's expanse, the most dreaded obstacle to immigrants journeying to California on the rutted wagon roads from Salt Lake City to San Francisco. Despite Fremont's less than glowing descriptions of the Great Basin, settlers did come to the region searching for gold and some stayed to the extent that Congress carved four states from its territory. The Mormons settled Utah in 1848 and established colonies in Idaho throughout the succeeding decades. Dominated by the Mormon theocracy and politically unacceptable because of their tolerance of polygamy, Utah and Idaho achieved statehood decades after their initial territorial organization. Miners flocked to western Nevada in 1859 for the first of several gold and silver rushes, the same year Oregon, with its center of settlement in the Willamette Valley, officially became a state. While Nevada's population experienced the most radical fluctuations, it followed Oregon into the Union in 1864, in time to aid President Abraham Lincoln's re-election. This divided the Great Basin into two white-dominated cultural sections, the eastern part of the region oriented towards Mormon culture centered in Salt Lake City and the western section which developed around mining and livestock production centered in the Carson Valley and Reno. In 1869, the transcontinental railroad bisected the Great Basin, shrinking the space between these two emerging urban areas.

The two halves of the Great Basin, divided along the broad central ridge which delineates the Lahontan basin to the west from the Bonneville basin to the east, formed

two separate subregions of development. Utah in the east was synonymous in the popular imagination with agricultural interests and distinct from the mining interests in Nevada to the west.[6] American humorist Samuel Clemens noted this division in his 1861 travels to Salt Lake City and Carson City. Arriving in the Mormon capital, Clemens observed thriving orchards, winding streams, and gardens such that "a grand general air of neatness, repair, thrift and comfort" permeated the whole area. Clemens's description of Carson City was stark in contrast. The region was indeed a desert, "walled in by barren, snow-clad mountains. There was not a tree in sight. There was no vegetation but the endless sage-brush and greasewood. All nature was gray with it." The state capital of Nevada was a dusty wooden town. Though some Mormon settlers populated the Carson Valley and raised livestock and hay, it was a far cry in Clemens's mind from the agricultural paradise and brick and stone city the Mormon Church had built in Utah.[7]

Clemens had particularly vitriolic words for his travels between Salt Lake City and Carson City and echoed Fremont's disparagement of the region. Crossing the Great Salt Lake Desert, he commented "we entered upon one of that species of deserts whose concentrated hideousness shames the diffused and diluted horrors of Sahara—'alkali' desert." For sixty-eight miles, Clemens and his traveling companions panted and sweated their way across its flat and cracked surface under the sweltering heat of the merciless sun. "Imagine a vast, waveless ocean stricken dead and turned to ashes; imagine this solemn waste tufted with ash-dusted sage-brushes; imagine the lifeless silence and solitude that belong to such a place; imagine a coach, creeping like a bug through the midst of this shoreless level," he wrote. All the romance Clemens felt for transcontinental travel evaporated under the hot desert sun. Seventeen days from Salt Lake City, his travel

party had traversed the salt flats only to freeze at the feet of the Ruby Mountains. Two days later, he was engulfed in the Forty-Mile Desert of the Humboldt and Carson sinks. "From one extremity of this desert to the other, the road was white with the bones of oxen and horses," Clemens wrote.[8]

Death and desolation marked Clemens' journey across the Great Basin and he bore no love for the region. However, his travels did make for good publicity. After establishing a reputation in Nevada for witty publications and taking the penname Mark Twain, a slang phrase which meant the line between calm and dangerous water, Clemens worked as a reporter and began writing accounts of his travels in the West and Europe. In the 1870s, Clemens gave lectures in New York and Chicago which popularized his stories and gave the Great Basin a singular reputation for its harsh environment and rowdy population. The construction of a transcontinental railroad, which had been interrupted by the Civil War, resumed in the post war period and its completion in 1869 made the journey across the Great Basin a matter of a mere several days compared to Clemens' onerous several weeks.[9] Even so, the region's mystery remained as the railroad followed a similar route to the old wagon trails from Salt Lake City along the Humboldt River to the Truckee Meadows and Reno. Much of the Great Basin had yet to be explored.

In order to better understand the southern Great Basin and survey a railroad route across the region south of the transcontinental line under construction in 1867, one of the nation's many railroad companies commissioned travel writer William A. Bell to chronicle his excursions throughout the area. Bell's account of his experiences in the Great Basin gave it a primitive and immature character. "The plateau of the Basin region was undoubtedly the last part of the western continent raised from the sea," he wrote.

"Even now subterranean fires are active and the process of gradual upheaval may still be going on. Earthquakes are frequent, mud-volcanoes are still to be found in places, huge cracks in the earth's surface have occurred within the memory of living men, craters recently active dot the whole district, and hot-springs are so numerous that I have counted fifty-two jets of steam issuing from the ground, like pillars of smoke, in one valley alone."[10]

Bell believed the dry climate had left the Great Basin in a primeval state, such that "a sufficient quantity of rain never fell upon this Basin region, to form a complete system of drainage from the highest lands down to the sea." The hundreds of basins remained in a primitive and isolated condition "because the separate streams have never had force enough to break through the barriers which all streams have at first to encounter, and to unite their waters as to form a complete drainage-system." As a result, the lakes were never permanent, evaporating the water they captured in moments of rain to leave only the dry and barren alkali flats. Bell believed the valleys between the many ranges, of which the basins formed their lowest point, were "so sandy as to be worthless, even if irrigated." He acknowledged that his conclusion could be premature given that "many of the lands most productive when irrigated, look sandy and utterly worthless in their parched and wild conditions" such as the valleys of the Reese, Carson, Truckee, and Walker rivers in Nevada and those spilling out of the Wasatch Mountains in Utah. But these areas had already been settled by the Mormons. In effect, all that was left to cultivate from the Great Basin was its mineral wealth. Bell argued that scattered throughout the region, within the many barren and monotonous mountain ranges, especially in central Nevada and western Utah, were vast deposits of silver ore.[11]

Concomitant with Bell's journey, United States Geological surveyor Clarence King led the fortieth parallel survey across the Great Basin between 1867 and 1872. The first of two intense federally funded surveys across the region, King document and mapped the area around the fortieth parallel, the general route of the transcontinental railroad, in a one hundred mile band from Carson City in Nevada to Cheyenne, Wyoming (fig. 13). King's endeavor produced the most thorough description of the Great Basin to date.[12] His scientific surveying methods observed, categorized, and demystified *terra incognita*, but the identity of the region did not change. Understanding the details of the Great Basin did nothing for its image and only reinforced the existing perception of wasteland. King's team contracted malaria while surveying the Humboldt Sink in a particularly wet year. Robert Ridgeway, the group's ornithologist, nearly fell off his mule before having the sense to dismount in the blazing hot sun and take shelter underneath the animal prior to losing consciousness. Ridgeway later wrote in his report "upon the whole, the entire region was one of the most desolate and forbidding that could be imagined, and in these respects is probably not surpassed by any other portion of the land of 'alkali' and the 'everlasting sage-brush.' The effluvium from the putrid water and decaying vegetation of the marshes was at times sickening." Ridgeway echoed Fremont's description of the lush mountains and the barren valleys. In their Ruby Valley encampment, Ridgeway observed lush meadows above the initial canyon sides in mountain saddles and the usual sea of sagebrush everywhere else. But beyond the Ruby Marsh up the alluvial slopes of the valley to the north, he also observed the effects of irrigated cultivation. Ridgeway wrote "the meadow-lands of the valley had become transformed by cultivation into broad fields of grain, more than a thousand acres of the valley thus being reclaimed."[13]

The survey's botanist Sereno Watson, however, disagreed with Ridgeway's optimistic observations. Watson remarked that the conditions in the Ruby Valley were rare. He observed in his report "with few exceptions … these [the Great Basin's] mountains are for most of the year wholly destitute of water, with but small rivulets in the principal canons [sic], frequently with only scanty springs here and there at their bases, irrigating a few square yards of ground. Even where the mountain supply is sufficient to send a stream into the valleys it is usually either soon entirely evaporated, sinks into the porous soil, or becomes demoralized with alkali and is 'lost' in the mud of the plain. The lowest portion of nearly every valley is occupied by some extent of alkali flat, where in the winter season the water collects and the softened clay-like mud is bottomless and impassable. As the moisture evaporates under the heat of the coming summer the level of naked surface becomes hard and pavement-like, or covered with a snowy inerustation [sic] or deposit of salt or carbonates. The springs and wells even are more or less saline, and thermal springs are not rare."[14] Without consistent water resources, agricultural cultivation of thousands of acres in any basin was impossible.

The fortieth parallel survey was not the final, nor the most extensive, examination of the Great Basin. Beginning in 1869, the same year John Wesley Powell launched his famous exploration of the Colorado River drainage system, George M. Wheeler, at the behest of the War Department and the United States Geological Survey, began his early reconnaissance of the Great Basin in eastern Nevada and western Utah. In 1871, when the King survey began its last field season, the federal government expanded Wheeler's surveying territory to include the Southwest and tasked him with generating the first detailed topographical maps of the unsettled territory west of the 100th meridian.[15]

Wheeler's team surveyed some 332,515 square miles ranging from California, Arizona, and New Mexico through Colorado, Wyoming, Utah, Nevada, Idaho, and Oregon. In lectures, articles, and speeches delivered to interested audiences, Wheeler emphasized to Congress and the American public the importance of developing accurate maps of the region for future settlement. More than any other surveyor, Wheeler gave the Great Basin a subtler identity. Only four years into his monumental task, he wrote in 1874 "the government still possesses lands of which little is known, large parts of which no one representing the government, except now and then a desultory scout, has ever traversed."[16]

Wheeler tried to detail every mountain and valley in the unsettled American West. As part of his surveying procedure, he began a land classification process which designated unallocated land within a multiple-use framework as good for a combination of agriculture, timber cultivation, grazing, or barren and good for nothing at all. In addition to more accurate topographical maps which portrayed the Great Basin's distinctive features, his land classification process noted which parts of the region private interests could develop beyond extracting mineral wealth. In Wheeler's estimation "it cannot be said of a large portion of the area that the agriculturalist has great attractions extended to him." Rather, there were instead "vast fields, suitable for grazing purposes, ready with their perennial and perpetual supply of nutritive grasses, sufficient for numerous herds of cattle and sheep."[17] Understanding the Great Basin environment was the first step in creating permanent settlements. But in 1879, Congress terminated the Wheeler survey's funding and consolidated the western surveying process in the United States Geological Survey.[18] The detailed descriptions and accurate locations Wheeler's survey cataloged in

the Great Basin finally brought the region into focus. No longer *terra incognita* as in unexplored, the Great Basin became *terra incognita* because of its undeveloped landscape (fig.14).

There was disagreement among Wheeler's contemporaries as to the production capabilities of the Great Basin. General William B. Hazen, the second chief of the Army's Signal Service, the progenitor of the National Weather Service, took a special interest in publicizing accurate information about the possibilities of development in the region. Concerned that land speculators and corporate interests, especially those running the Northern Pacific Railroad which had received the largest land grant of any railroad company, would lure settlers to the inhospitable arid regions of the American West, Hazen took it upon himself to accurately characterize the area. Hazen argued the successes of irrigated agriculture in Arizona, Colorado, and Utah had been due to extraordinary efforts on the part of residents and had only developed "slightly over a hundredth of the area." Hazen continued that though the aggregate grazing capacity of the entire Intermountain West region was adequate, "farms for grazing purposes … will never be found here. Wherever there is unfailing water there will be an owner of it, who will control the range about it, either by cession or legal assignment, and the next water may be thirty miles away." Hazen cited a recent article in the Reno paper which described starving livestock, poisoned by alkali ingestion, and depleted hay resources as a common occurrence every few years in the Great Basin. "Until there is proper provision made for such seasons," Hazen wrote, "stock-raising in the Territories will be a snare and a deception."[19]

Geologist Israel Cook Russell, a researcher with the United States Geological Survey, concurred with Hazen's evaluation, writing that the Great Salt Lake Desert, though smaller than it once was imagined, was "a barren waste, and fulfills all our expectations of what a true desert should be. Although but a fraction of the desert area represented in the geographies of our youth, it is yet of quite respectable dimensions, as any one will admit who has traversed its dreary expanse." Russell claimed that the Great Basin, "so different from other portions of our country," was barren, but not hopeless; "Where water can be had for irrigation, the soil is productive." The trouble was the inherent scarcity of water in the region. Russell argued "the great wealth of these desert regions, however, lies in the mines of gold and silver and other metals found within its borders. In the desert plains and in the saline and alkaline lakes there are accumulations of salt, borax, carbonate of soda, and sulphate of soda, etc., which at no distant day will form the basis of a great industry." Russell however hopelessly believed that precipitation would increase over the Great Basin as it had evidently done so in the geologic past and allow for the agricultural improvement of the region.[20]

Unsurprisingly, mining became the economic foundation of the Great Basin during this time. Once a throughway to the gold fields of California, by the 1860s and the discovery of the Comstock Lode and similar veins of ore, mining companies dominated the exportation of the Great Basin's mineral wealth and urban settlements which grew up around the rich deposits. The region contained gold, silver, copper, gypsum, and graphite in the higher elevations. On the playas salt, borax, and coal were prolific. Hubert Howard Bancroft touted that "throughout the entire length and breadth of the great basin, mineral and metalliferous deposits abound, the largest veins thus far having been found in high

altitudes; and who shall tell whether the half of them have been yet discovered." Mining, however inconsistent, offered the only truly profitable activity in the region and drew investors from San Francisco. Railroad companies constructed thousands of miles of rail lines as spurs off the transcontinental railroad to provide cost-effective transportation to the precious ore. Nevada, in particular, became the nation's primary silver producer. To take advantage of this economic momentum, the 1872 Mining Law opened the public domain to mineral development in the same way the Homestead Act of the previous decade opened the public lands to agricultural settlement. In the Great Basin, the law was highly successful, unlike the agricultural development laws, because of its continued rich mineral resources. The nineteenth-century law allowed settlers and later corporations to stake mineral claims on the public domain for a small annual fee of one hundred dollars and exacted no royalties for the federal government from the extraction of those minerals.[21] Any other activities on the region's public lands would have to contend with the economic primacy of mining in the Great Basin.

Even so, agricultural development continued to be culturally important to the future of the Great Basin. William H. Brewer, a geography professor at Yale University and one-time mountain climbing companion of Clarence King, expressed considerable frustration about the region's persistent aridity. Brewer wrote "over the whole region the actual rain-fall is vastly less than can be evaporated from the surface and this scantiness of rain-fall is the all-controlling factor as to its agricultural resources and its fitness for the homes of men. The economic foundation of civilization is agriculture, and for agriculture there must be rain in considerable quantities … Crops may be grown for a time by irrigation in a rainless region, but they cannot be grown so for an indefinite

period of time." Brewer argued that the soil of the Great Basin itself, the saline and alkaline content, doomed it for cultivation. Even under irrigation, "if all the water is evaporated from the cultivated soil," he wrote, "injurious salts are left behind which accumulate and finally destroy the fertility of the land and turn it back again into desert." Brewer believed "for irrigation to be permanently successful, there must be some rain, and in occasional years a sufficient water to wash out and carry the deleterious salts away."[22]

However unsuited to agriculture and civilization the Great Basin may have been, Brewer acknowledged its many small regions of great beauty and fertility. The seasonal verdant green of the Carson Valley, the mountain pastures of various mountain ranges, the numerous hot springs, all provided a wealth of very different and very primitive "combination of features which belongs to it alone." Brewer believed the ranching industry provided the only possibility of sustaining settlement in the Great Basin. "There is some pasturage," he wrote, "in the regions not adapted to cultivation where herds and flocks, more or less nomadic, have been pastured and will continue to be grown as in other dry regions, but the capacity of this country in this direction is small as compared with the regions favored with more abundant rains." Brewer lamented the area's decline in population since its settlement, especially Nevada's, but warned "the Great Basin must ever remain a region of relatively sparse population, because of its scanty rain-fall" (Fig. 15). He believed that the region would "ever be an intensely interesting region because of its strong contrasts between inhospitable desert and productive fertility," and despite its general desolation, it would "be visited because of its inherent and especial beauty."[23]

In the early twentieth century, William E. Smythe, publisher and promoter of western settlement, blamed much of the Great Basin's population instability on mining barons who had no great concern for agriculture and spent their wealth elsewhere, railroad companies which made no effort to invest in regional development, and a minority of "rich stockmen" who sought to monopolize water privileges and grazing ranges. A booster of western settlement, he argued that agriculture, achieved through irrigation in the arid American West, was the cornerstone of stable settlement in the United States. He believed the small Mormon communities in Utah and Idaho which had made extensive use of scarce water resources could be replicated throughout the Great Basin, which would save the region's land from going to waste. He thought Nevada in particular, as the most desolate of all the Great Basin states, was in desperate need of irrigation projects. In addition, Smythe considered the lesser mineral resources of the region to have only just begun to produce sustained wealth. The days of the major mining booms perceived to be over, Smythe preferred to think that a more sober industrial development would take shape in the region place of the mining bonanzas.[24]

Sunset Magazine's Homeseeker's Bureau agreed with Smythe. Its 1911 publication *Agricultural Nevada* decried the negative "preconceived opinion in the minds of the public" that the Great Basin was "as hopeless of transformation into fields of husbandry as are the tablelands of central Asia, or the Desert of Sahara." The tract reminded potential farmers that the major problems of irrigation and transportation technology had been solved. With reservoirs for water storage, irrigation systems, good roads, and relatively close railroad access, the area could be turned into a reasonable agricultural zone. Already the region exported potatoes and fattened livestock, an industry that had

become second only to mining. Hay crops, especially alfalfa, comprised the chief agricultural staple and had a ready market inside the state; more farms would create the possibility of hay exports. Alfalfa was "sure money" and required little attention to cultivate. In addition, the publication commended livestock owners who recognized that the arable lands on their ranches were "too valuable for mere grazing purposes," and subdivided their great tracts of private land. With increasing amounts of government supervision on the remaining public lands and state regulation of water resources, the days when the livestock operators threatened small farmers who encroached upon their rangelands seemed to have ended.[25] It took several decades and many federal dollars to stabilize the region's population. Despite these efforts, Nevada contained a population that remained significantly lower than the other Great Basin states (fig. 16).

Time and time again, the Great Basin's monotonous shades of brown tortured travelers who ventured across its reaches. The region's scarcity of water was a limitation not even the energetic Nevada Senator Francis Newlands could ameliorate with the National Reclamation Act of 1902. The Newlands Project along the Truckee and Carson rivers became the most important water project in the state until Hoover Dam stopped the flow of the Colorado River in the mid-1930s. The population of the Great Basin grew slowly in the early twentieth century, especially in Nevada where the silver mines continued to decline. It was not until the advent of automobile travel and the security of paved roads that the Great Basin experienced another growth pattern. Even then, few visitors found the region as attractive as Brewer. The old Lincoln Highway, the first coast-to-coast automobile thoroughfare, spanned the width of the desert in the early 1920s and U.S. Highway 93, called the Great Basin Highway, bisected it along the Utah-

Nevada border by the end of the 1930s. In spite of the mobility automobiles afforded, not much had changed the perception of the Great Basin. The *New York Times* reported that despite federal improvements across much of the Great Basin's vast territory, "there is not a signpost to guide the traveler. Every fifty miles or so there is some poor fellow who ekes out an existence selling gasoline to the few cars that traverse the waste. In the opinion of those who have trailed the desert, the day will never come when any considerable part of it can be reclaimed."[26] Scorched in the summers and frozen in the winters, dry and dusty in all seasons, the region challenged perceptions of survival and aesthetic beauty. The Great Basin remained wasted land which resisted conventional methods of cultivation and existed outside the scope of normal agrarian economic production. Nevertheless, people did settle in the region. Most migrants to the area came because of mining or other job opportunities. Not everyone stayed, but those that did formed the nucleus of many small rural communities.

The Wasteland as Home

The Great Basin's nearly 155,000 square miles remained predominately and therefore problematically unsurveyed and unmapped until well into the twentieth century when several federal highway programs allocated funds to help stretch ribbons of asphalt and concrete across its vast terrain making travel through its expanse easier. These roads also created access to the interior spaces of the Great Basin which fostered smaller ranching operations in more remote locations in addition to the larger ones clustered along the railroad between Salt Lake City, Elko, and Reno. The Great Basin in the early twentieth century became one of the last places in the country to run cattle and sheep on the open range. Ranching in the area depended upon the amount of public land which remained

unallocated and unreserved, under federal administration by default, because of its marginal productive capacity (fig. 17). Only the Great Basin's mineral resources provided the consistent opportunity for attracting settlers, but not in a sustainable capacity. Most settlers hoping to replicate the riches of the Comstock Lode in 1859 failed in their mining endeavors. The American public, so appreciative of verdant and agriculturally productive landscapes, believed the Great Basin the nation's barren wasteland. Residents of the region themselves argued on multiple occasions that the Great Basin was not worth any kind of administration because the land was submarginal, without any possibility of cultivation.

The region's reputation as a wasteland only solidified when the United States Census Bureau declared the western frontier closed as the line between settlement and the uncivilized wild blurred and the most desirable and cultivatable land had been settled.[27] This declaration came without any foreknowledge of the significant increase in the numbers of acres homesteaded at the turn of the twentieth century (fig. 18). However, the Great Basin had experienced fewer homesteaders than other western states and the variety of land disposal laws Congress enacted to meet the specific conditions of the American West failed to create significant agricultural settlements in the region (fig. 19 and 20).

The 1862 Homestead Act had provided settlers title to 160 acre parcels in exchange for permanent residence and a small fee. In the arid American West however, the acreage size was inadequate and the five-year term of residence was untenable. In 1912, Congress reduced the term of residence to three years and in 1916, increased the acreage available to 640 acres for the purposes of stock-raising instead of farming. The Timber-Culture Act

of 1873 was designed to encourage timber cultivation on the Midwestern prairie and was of little use in the American West. It was repealed for this reason and the amount of fraudulent filings it induced. The 1877 Desert Land Act and the 1894 Carey Act both facilitated land disposal specifically in the most arid regions. These acts allocated greater acreages per settler, required less land to be cultivated for a shorter period of time, but entailed the construction and operation of expensive irrigation projects that settlers often could not afford. Congress created the 1878 Timber and Stone Act, specifically to assist settlement of "unoccupied, unimproved, surveyed, non-mineral land that was unfit for cultivation" and which contained limited water resources. But similar to the other disposal acts, it encouraged abuse, promoted land speculation, and put more land in the hands of private corporations than assisted individual settlement.[28]

Of the land that was legally granted to corporations, the railroads received the majority. In the Great Basin, Congress granted the Central Pacific Railroad almost five million acres of the best agricultural and rangeland in Nevada, half of the total acreage privately patented in the state, in a checkerboard pattern along the Humboldt River. The railroad demanded high prices for small parcels of land and charged high fees for grazing access.[29] As a result, the Great Basin remained relatively undeveloped even into the mid-twentieth century, its landscape dotted with livestock operations that gambled on free grazing range year after year with no security and no certainty (fig. 21).

Livestock operators in the region used access to water to control the movement of their herds and ensure their access to the grazing range. Water rights were the most important aspect of property ownership in the region. Without an adequate number of flowing rivers and streams, ground water proved critical to settlement and economic

development. Nevada's state water law, implemented and enforced by the state engineer, became the standard by which water rights were determined in the Great Basin. The state legislature enacted Nevada's first water statute in 1866 and by the 1920s, the water statutes delineated two criteria upon which the state engineer was allowed to grant water rights: prior appropriation, defined as "first in time, first in right," and beneficial use, which was determined by the use of water in making economic contributions through agricultural and industrial production or through domestic and municipal use. The state engineer's office issued certificates to validate water rights and recorded vested water rights, those which demonstrated beneficial use of surface water prior 1905 and use of underground sources prior to 1913.[30]

Once granted, a water right could only be lost, according to Nevada law, by abandonment or forfeiture if the water was not used for five consecutive years.[31] If settlers wished to succeed in the region, it was essential that they anchor their presence not just through land patents, but also through vested or certified water rights. For livestock operators, this was even more important. There were cautionary tales of ranchers who got squeezed out of accessing grazing range near them because they had not secured water rights. Hubert Grant Welch, born in the booming mining town of Pioche in 1912, lived on a ranch east of the Quinn Canyon Range, just over the Cherry Creek Canyon from Railroad Valley. His father Green Berry and brother Albert had homesteaded 160 acres each along Pine Creek in Garden Valley. They secured the water rights to Pine Creek and Carpenter Spring and constructed ditch diversions from Cottonwood Creek for irrigation and stock watering. In 1920, Welch patented a small homestead of 33 acres along Pine Creek and secured a water right to irrigate hay fields

and use for domestic purposes. Welch applied for several other rights for stock watering purposes, but was denied based on how those rights negatively affected other livestock operations in the same region that already had access to existing water rights. Denied access to water to raise livestock, Welch turned to prospecting in the mountains nearby.[32]

In 1925, the Nevada State Legislature passed the Stock Watering Act which declared the use of water for livestock grazing on public rangeland a beneficial use of that water and determined that prior established development and use of watering holes on the public range constituted a water right and would be recognized as such by the state engineer. This unprecedented acknowledgement of the livestock industry in the Great Basin legitimized ranchers' presence and economic activity and state legislators hoped it would establish order and stability on the public rangeland. It also made water rights the anchor for an alternate form of land ownership; instead of owning the land outright, Great Basin ranchers merely legitimized their water usage with the Nevada State Engineer's office which converted prior usage into a water right and the grazing range into a pseudo property. The state engineer's office rationalized the act as a means by which "range control could be indirectly accomplished, in a measure at least, through administration of water resources, over which the State exercised unquestioned control."[33]

An additional statute passed in 1927 gave the Nevada State District Courts jurisdiction over the supervision and control of the state's orders of determination which distributed the water rights according to the decisions made by the state engineer's office. The great benefit this new law provided the state of Nevada, in addition to helping stabilize the livestock industry by regulating range access, was a more consistent means upon which to collect the property taxes charged per head of livestock. If the state

engineer's office knew who owned the water, they knew who owned the livestock and could conduct accurate head counts, a feat which had been relatively impossible in much of the state. The law also precluded nomadic herds by denying them access to water and grazing within three miles of known water rights. As livestock operators consolidated their water holdings and developed new water rights in the gaps within those holdings, this left little room for nomadic operators to graze.[34]

Several ranchers in the Great Basin challenged the new water law and Nevada's ability to regulate grazing on the public range throughout 1926 and 1927 in the state's courts, including its Supreme Court. Petitioners in the case complained that the Stock Watering Act infringed upon the power of the federal government to "dispose of and make needful rules and regulations respecting the grazing lands belonging to the United States," that it impinged upon the right of every citizen to graze livestock on the public domain, and that in effect, it rendered established water rights secured before the act "as useless as if [the] water itself was taken." These cattle ranchers were disgruntled that the legislation gave legitimacy to sheep operations they had hoped to eradicate in the process of stabilizing range use in the state. The Nevada Supreme Court responded by reiterating the right of the State of Nevada to assert regulatory power in order to "promote the public convenience or the general prosperity, as well as regulations designed to promote the public health, the public morals, or the public safety." The court also reminded the ranchers that the federal government had not explicitly conferred any grazing rights to anyone, but had "merely suffered the lands to be so used." Most importantly, the justices reminded livestock operators that "the right to the use of water for watering live stock in this arid state depends for its value on the public range." Therefore the regulation of

water rights for the purposes of regulating the range properly connected the two issues and using the one to control access to the other was an appropriate form of regulation. The state's high court summarily dismissed the case.[35]

Two years later in 1929, Elko County District Judge E. P. Carville, who served a decade later as Nevada's governor, ruled in favor of granting water rights to livestock owners "whose animals have continuously watered themselves at water holes or running streams" and have "thereby acquired by usage a valid right to such streams and water holes, without having filed upon their waters and without having diverted them by means of pipe lines, ditches or other physical works."[36] This decision resonated throughout the Great Basin as it recognized prior users of watering holes as having a priority of water use regardless of whether or not any investment had been made in the development of the water at the site. Vernon Metcalf of the Nevada Livestock Association declared "that the welfare of the big majority of the livestock interests of Nevada" depended upon Carville's decision. Frank Gedney, an Idaho rancher, stated that ranchers in Idaho and Utah would directly benefit from the Carville decision as it legitimized their use of the Nevada range.[37]

Since the establishment of the stock water law, State Engineer George Malone had worked diligently to create a state range map which delineated "the boundaries of the range rights claimed by the various stockmen and rangers of the state of Nevada." The importance of clearly establishing water rights along with the essential nature of developing water resources underscored the entire livestock industry throughout the Great Basin. Those livestock operators who had legal water rights controlled the public ranges surrounding them. The Stock Watering act of 1925 allowed the state government

to solidify range control in Nevada and throughout the region. The range rights the law helped establish "were later recognized to a considerable extent" by the federal government.[38] The key for livestock operators, however, was to file for certificates and proofs of appropriation of their water rights with the state engineer's office as soon as possible after 1925. Ranchers created, bought, and sold water rights throughout the 1920s and 1930s in order to secure their access to the rangelands. These water rights did not encompass a broad area, but were scattered throughout the Great Basin's many different valleys along with small private properties. Each of the region's valleys had its own set of water rights, land patents, and settlers.

In the central Great Basin, the long Railroad Valley, the narrow Pahranagat Valley, and those other, smaller valleys, which surround them illustrate this importance and serve as a convenient focal point for discussing much of the region's history. Land and water records reveal that ranching families lived and worked adjacent to each other throughout the region. The area borders the Nellis Bombing and Gunnery Range and the Nevada Test Site on the east and south and stretches north to Highway 50, the country's loneliest road (fig. 22). The highest mountains in the area are the Toiyabes at eleven thousand feet, but they are difficult to see for all the other mountain ranges in the region have peaks nearly as high. All the ranges contain the remnants of the region's mining booms; Manhattan, Monarch, Belmont, Tybo, Troy, Reveille, and others contain mills, mines, and other structures which once contributed to the area's mining industry. This part of the Great Basin is predominately grazing range dotted by the occasional wild life refuge, national forest, and wilderness area. Wild horse herds proliferate throughout the area.

The residents in the region consisted of a diverse blend of Mormon, Basque, Italian, and Scottish immigrants along with the pervasive, if not always recognized, Western Shoshone. Most of them had ancestors who originally settled in Nevada to prospect in the mountains and used ranching as a means to increase their income. Most livestock operators in the area herded cattle, though a few sheep operations existed to the east across the Grant Range and there were several ranchers who ran both cattle and sheep. Ranch owners typically secured water rights even before they filed homestead patents. Those who did not were eventually denied access to their proximate rangelands. Many of these water rights they purchased from earlier livestock operations such as the United Cattle and Packing Company and the Adams-McGill Company which had been negatively affected by the water permitting process and by the depression in agricultural prices in the 1920s and 1930s. The defunct companies sold what assets they had left to the livestock operators who remained. Most of the ranchers in the valley and throughout central Nevada also purchased failed homesteads adjacent to their property and secured these additional water rights in order to irrigate pasture to provide supplemental hay feed. In addition, many ranching families continued to work small mining claims near their ranches which nicely supplemented their income if they found ore.

Livestock operators drove their cattle to Tonopah where the railroad hauled them to Las Vegas. In the late 1930s, ranchers began hauling cattle by truck. Electricity, telephone and television service came late to this area; most ranches did not have any of these amenities until the 1950s. Tonopah was the closest town of any real size 80 miles away, followed by Ely at nearly 100 miles. Children attended small schools within their ranching community, often in one-room structures where a single teacher instructed

multiple grade levels. The small settlement at Alamo provided some staples, but the big towns with the stockyards and grocery stores, Las Vegas, Reno, and St. George, were several hundred miles distant. [39]

Mormons arrived in the central Great Basin as early as the 1860s, as missionaries and farmers. One such family, the Sharps, settled in the long, flat Pahranagat Valley in eastern Nevada around 1865. The family's patriarch, Henry Sharp, worked as a blacksmith in North Hampshire, England, before settling in Birmingham where he converted to Mormonism in 1854. He immigrated to America soon after and married another English immigrant, Charlotte Morris. The Sharps migrated west to Nebraska and Utah, arriving in Deseret in 1861. After settling briefly in the southern part of the territory, the Sharps, unlike many of their Mormon counterparts, moved on to Lincoln County in Nevada soon after its statehood to take advantage of the area's mining boom. Henry Sharp homesteaded 110 acres at the north end of the Pahranagat Valley near the town of Hiko at the foot of Mount Irish.[40] While most of the family stayed in the area, Henry's fourth son, George Sharp, settled near the Grant Range at Butterfield Springs on the east side of Railroad Valley. Between 1901 and 1917, George purchased failing homestead claims in Railroad Valley including the properties adjacent to Butterfield, particularly Bacon Flat and Blue Eagle Ranch. He also obtained key water rights on the east side of the valley, including Mud Spring, Blue Eagle Well, Blind Spring, and several artesian wells near the Grant Range (fig. 23). As did the water rights for every rancher in the valley, Sharp's included some kind of improvement to pipe water in for livestock annually. But on one application George complained that "sheep men trespass on the reserve and water their sheep" using his improvements. Besides running cattle, George

also bred horses, importing the blooded horses he preferred and turning them out with nearby wild horse bands to produce hardy, smart mounts. His avid riding caused his death in 1934 when he got lost when out with his horse and died of exposure.[41]

George married Mary McCann, whose family lived two valleys to the west and ran a supply station on the road between Tybo and Belmont which was then the Nye County seat. George and Mary had several children, two of whom continued ranching in Railroad Valley. Howard purchased the Nyala Ranch in 1950 just to the south of the ranch lands put together by his father George. Nyala, located essentially in the middle of Railroad Valley, sat at the foot of the Quinn Canyon Range near Willow and Big creeks and had been a natural stop for travelers between mining towns because of its location (Fig. 24).[42] The site changed hands several times until Emery Garrett, a Nye County commissioner, purchased the property and enlarged it with a homestead claim and water rights at Troy Creek. In 1940, Garrett sold the land to Sheldon Lamb, the son of a prominent Mormon rancher from the Pahranagat Valley, who sold it a decade later to Howard Sharp. When the federal government carved the region into grazing districts, the Bureau of Land Management granted him an adjacent allotment commensurate with the operation's water rights. Howard controlled the water rights at Willow Creek, Monitor Spring, Troy Creek, Big Creek, Jack Spring, Antelope Spring, Deep Creek Canyon, Goat Ranch Springs, Trough Spring, and the Seeps, and had constructed several reservoirs for water storage. He and his wife Minnie struggled through the 1950s during the drought and Minnie's hair fell out one year during atmospheric nuclear testing. Their sons, Gerald and Norman, continued ranching into the late twentieth century, expanding their land base by

homesteading several hundred acres as late as 1967and increasing their water holdings as other ranchers in the area sold out in an effort to consolidate their operations.[43]

At the same time Howard Sharp built up the Nyala property, his brother Jim, a handsome, clean-cut and well-dressed man according to his photograph, managed the family's main property at Blue Eagle Ranch (fig. 25). He filed for water rights at Andrews Spring, Cazier Spring, Cold Spring, Sawmill Spring, and Box Canyon Spring with Howard and utilized the Blue Eagle grazing allotment adjacent to the Nyala allotment. Jim Sharp was an active member of several agricultural associations. In 1941, he was the first president of the local chapter of the farm bureau and served as the state's farm bureau president throughout the 1950s. He was a crucial figure in protesting the implementation of the Taylor Grazing Act in central Nevada, arguing against federal organization and fees for a range they considered sparse even in good years. Jim's style of cattle ranching reflected the declining quality of the central Great Basin's overgrazed range and a new understanding of conservation practices. He voluntarily cut the size of his herd and rotated them off the range in winter, feeding them the hay crop he had irrigated during the summer. Jim's wife Lina, a pretty, dark-haired woman, was the school teacher at several of the valley's one-room school houses, moving from the one near Blue Eagle Ranch to Currant, Duckwater, and then Twin Springs (fig. 26). The Sharps grew their own fruits and vegetables, preserving the produce for the winter in glass canning jars. In the 1940s, the Sharps acquired a Kohler generator, a low watt battery storage unit, which produced enough energy for lights. Two decades later, the family acquired a much more powerful Witte diesel generator. In the 1970s, power lines from Ely plugged Blue Eagle and Nyala into the nation's electrical grid. Phones and

television also came late to the area; a one-party line reached the ranches first and soon thereafter, the families were able to get two to three television stations. Their daughter Carol and her husband Carl Hanks took over Blue Eagle after Jim's death in 1965.[44]

The Swallows, similar to the Sharps, were Mormons who had emigrated from England. George Swallow, the son of an unskilled laborer, arrived in the United States in 1868. Within two years, he had migrated to Fillmore, Utah. Swallow worked moving supplies from Fillmore to Milford and the Nevada mining town of Pioche. He also trailed cattle from Pioche to Elko. While working as a cowboy, he met Benjamin Kimball of Shoshone, a small mining community near Ely, who had a small farm operation which Swallow helped him work throughout the 1870s. In 1880, he paid Kimball's debt on the land in exchange for its title. This property formed the core of the Swallows' ranching operations at the western foot of Mount Washington in the lower Snake Range. Swallow filed on a 120-acre Desert Land Act patent to expand his farming operations, which included grain and hay production, and both cattle and sheep. Whenever the opportunity presented itself, Swallow also purchased neighboring ranches to expand his operation. He also secured essential water rights during the 1920s, an important measure to ensure that when mining operations increased at nearby Osceola and dried up the nearby creek, the Swallows had enough water to run their operations.[45] George and his wife Anna Day had seven children, all of whom worked on the ranch, along with several Native Americans who provided additional labor on the ranch. In 1907, George, who was now quite elderly, sold his ranch to sons Richard and Alfred. A third Swallow brother, Ray, bought a share of the ranch in 1910. George Swallow, who had grown his ranching operation to 1200 cattle and almost 6000 sheep, moved to Salt Lake City with the younger members of his

family where he constructed and operated the Swallow Apartment building in the early 1910s just three blocks away from the Salt Lake City Temple.[46]

Richard Thomas Swallow, a graduate of the Mormon Church's business college in Salt Lake City, managed the Swallow brothers' livestock operations throughout the early twentieth century. The Swallow brothers added 160 acres to the operation in 1924 under the Desert Land Act and another 440 acres in 1927 under the Desert Land Reclamation Act. They held water rights along several creeks and at many springs throughout the south end of Spring Valley, including Dry Creek and Commissary Creek, Rosencrante, Cole, Mud, Meadow, Coyote, Frenchman, Cobb, Camp, White Rock, and Willow springs. He bought the first automobile in Spring Valley in 1911 and proudly toured his friends and extensive family around the valley's dirt roads. Just before the Great Depression hit, Swallow began diversifying the ranch's operations and invested $250,000 in the construction of the new Hotel Nevada in Ely which quickly became the town's hub of gambling and bootlegging. The following year, he purchased the Geyser Ranch to the south in Lake Valley. He also served in the Nevada State Legislature for several years. But the economic ruin brought on by the stock market crash of 1929 wracked even the small town of Ely. By 1931, the Hotel Nevada sold at a terrible loss and the Swallows lost their entire investment which endangered payments on the new ranch and made paying old debts difficult. In addition, the corresponding drought dramatically decreased haying and livestock production. In 1935, the Swallows sold the Geyser Ranch to recoup some of their financial losses. When the Taylor Grazing Act took effect and the ranch became part of the Ely Grazing District, the Swallow's place on the public rangeland was

assured, but the measure did not put money in their pockets. To assuage the problem, Matilda began raising chickens to help with the family's finances.[47]

Richard's son George Neils financed the ranch to pay off the remaining debts in 1936. The following year, the second generation of Swallow brothers obtained a clear title to the family ranch. In the early 1940s, George N. Swallow, an ambitious and serious man, worked briefly as a real estate broker in eastern Nevada to increase the ranch's cash flow and became a leader in the region's ranching community. In 1949, as spokesman for and secretary of the United Stockmen's Association, he organized the famous Operation Haylift during a terrible winter that left thousands of livestock stranded throughout the central Great Basin. During the drought of the early 1950s, George Neils, like many ranchers in the region lost a significant number of livestock. His sheep herds were also negatively affected during the atomic testing program in the middle of the decade. Their sheep losses created significant financial hardships for the family. By 1959, the Swallow family owned about 3,000 acres and needed financing to continue their ranch operations. Deeply discouraged and disillusioned with both the economic opportunities available in the central Great Basin and the belief system of the Mormon Church, George Neils felt that he was fighting an uphill battle just to make a living. To secure the necessary funds, he sold the property and repurchased it under new financing which allowed him to pay in installments. He also added 320 acres under the Desert Land Act in 1960. Throughout the early 1960s, he used the funds from the sale to purchase three more properties in order to increase the size of the operation's land base, believing that expanding livestock operations was the way out of the financial mess. However, this expansion led to the family's final financial ruin. In 1965, George Neils was deeply in debt and again tried to

sell his ranch in order to repurchase it with new financing. This time, his resale scheme failed to work and the Swallows lost their entire operation.[48]

Another prominent Mormon family in the area was the Lambs. William S. Lamb arrived in the Pahranagat Valley in the 1910s. He and his son William (Billy) Granger Lamb homesteaded 164 acres just south of Alamo in the 1920s. The two filed for water rights in Coyote Spring and Tickaboo valleys in addition to the Pahranagat Valley. Billy rode for other livestock outfits in the area, worked as a janitor at the Alamo schools for a while, and served as a general handyman for the town. In 1939, he died trying to save a young boy on a runaway horse at the Fallon rodeo. His untimely death left his oldest son Floyd in charge of the ranching operations with brothers, Ralph, Sheldon, Darwin, and Larry, and uncle Carleton (Carty) Lamb to help. In the late 1930s, the hard-working Floyd married Eleanor Schofield, whose grandfather William Jonah Schofield in the 1910s had owned the Buckhorn Ranch at Crystal Springs at the north end of Pahranagat Valley near Hiko. Eleanor's father, William Udall Schofield had been educated at Brigham Young Academy and taught school at Sharp later renamed Adaven, a small community of ranchers in the Grant Range, and at Alamo and Hiko. He also briefly served as bishop of the Mormon Church. Her brother William Udall Schofield, Jr., converted their grandfather's second ranch, the Roeder Ranch, into a dairy operation during the 1950s and 1960s, selling milk to Las Vegas. When the Atomic Energy Commission sent radiation monitors to collect milk in the area, they always stopped by the Schofield's dairy (fig. 27).[49]

The Schofields owned water rights in the Tickaboo Valley and at Hiko Springs in the Pahranagat Valley. Floyd's outfit, the Buckhorn Land and Cattle Company, had been

compiled in part from the old Schofield holdings and he ran his livestock south and west of Alamo across the Pahranagat Range into Tickaboo and Emmigrant valleys. In the mid-1940s, he and Carty expanded their ranch's water rights into the Kawich Valley, causing other ranchers in the area to protest Lamb's increased water allocation by the state engineer's office. At the same time, the nation's military carved a large bombing range out of the region. In the Kawich Valley, the Lamb's cattle grazed where the Air Force dropped their bombs. A decade later, their livestock foraged in areas adjacent to the Nevada Test Site. The politically ambitious Floyd served for several years as a Lincoln County commissioner and was elected to the Nevada state senate in 1956. In the 1960s, when the continental nuclear testing program had made their ranching operations untenable because of continued damage to their livestock and the state reapportioned its legislative districts, most of the Lamb family moved to Las Vegas so Floyd could keep his state senate seat. Still, the Lambs ran cattle in Lincoln County until the late 1970s when the Bureau of Land Management cancelled his grazing privileges for repeatedly incurring late fees. In Las Vegas, the Lambs opened several businesses, including the Cowboy Supply and Western Store. He also served on the Nevada National Bank's board of directors and as its president throughout the 1970s. In the 1980s, the Federal Bureau of Investigation arrested Floyd Lamb, by that time a powerful incumbent state senator, for accepting bribes from an undercover agent. He was convicted and served several months in prison before his release because of poor health.[50]

But Mormons were not the only marginal cultural group who immigrated to the Great Basin. The nomadic Basque herders of the Pyrenees Mountains between France and Spain found better economic possibilities in the region than in the increasingly crowded

and politically unstable Iberian Peninsula. In the mid-nineteenth century, many Basque young men arrive in the Americas to acquire land and herds of their own, especially in Argentina. The California gold rush attracted many of them north to work as herders supplying beef and wool to the mining camps. In the United States, Basques acquired a reputation for high herd production at low costs on public lands which created large, attractive profit-margins for investors. The nomadic herding style of many Basque and the easy, unregulated access to public land made this possible for several decades. In the Great Basin, however, most Basque immigrants, unlike their counterparts in other parts of the Americas and United States, avoided participation in the partisan politics of their homeland. These Basque immigrants focused on their families and local issues, cutting all but their basic cultural ties to Euskadi, the Basque's homeland government.[51]

One such Basque immigrant, Beltran Paris, immigrated to the United States in 1912 to take advantage of the sheep-raising opportunities the American West afforded. Contrary to popular perception of the time, not all Basque ranchers were nomadic herders; quite a few in the Great Basin established thriving ranches. Paris controlled property in White Pine, Lincoln, and Nye counties. In the early 1910s, Beltran Paris began herding in Elko County near Jarbidge, after a brief season in Wyoming. In 1918, he bought into a sheep operation with John Uhalde, owner of the Thirty Mile Ranch near Ely since 1917, and Michel and Joe Irigoyen. John Uhalde's brother Gracian had died in the Spanish Flu epidemic and he needed a partner. John Uhalde, also a Basque sheep herder, had settled in Nevada in 1881 after working as a sheep herder in Idaho and soon after bought the ranch near Ely. Both Paris and Uhalde began expanding their sheep herds during the decline of the Adams-McGill Company, the largest in the area.[52]

The Adams-McGill partnership began in 1896 between former governor Jewett Adams, owner of the Blue Eagle and Hot Creek ranches, and William Neil McGill, a former blacksmith and surveyor from Virginia City who struck it rich in Hamilton with the Monitor Mine in the 1880s, who pooled their resources to homestead land and run livestock. Incorporated in 1912, the livestock company predominately ran sheep; at the peak of its success in 1915, Adams-McGill herded more than 40,000 head of sheep and 5,000 head of cattle, owned over 98,000 acres in private land, and controlled the water rights in the Steptoe, Spring, Garden, White River, Dry Lake, and Cave valleys in western White Pine, Lincoln, and northern Nye counties. But with the death of Jewett Adams in 1920 and William McGill in 1923, a depression in wool prices, and a major miscalculation as to the efficacy of using mechanized shearing machines, the company went bankrupt and the bank which held the organization's assets in San Francisco began selling off the company's land water rights.[53]

The early 1920s were hard on sheep operations; wool and lamb prices plummeted to less than half of the previous years'. Despite having to downsize their sheep herds, the Paris and Uhalde families were able to develop ranch properties and water rights adjacent to each other, working cooperatively to secure their range access and using bank loans, with their herds as collateral, to supply the funds. In 1922, Bertran Paris bought a ranch at Gleason Creek, just southeast of Thirty Mile, and the adjacent Gibson ranch five years later. During this same time, Beltran married John Uhalde's wife Marianne's twin sister Marie who had been widowed by the death of Gracian Uhalde. In 1926, the Parises purchased the Young's Creek Ranch in Butte Valley and relocated there from Gleason Creek two years later. That same year, the Uhaldes purchased part of the ranch at

Gleason Creek and another ranch at Adaven, also called Sharp, on Little Cherry Creek in the Quinn Range (fig. 28). Bertrand Paris filed homestead claims under both the Homestead and Stock-Raising Homestead Acts to acquire greater pasture for his sheep herds. The Parises and Uhaldes acquired critical the water rights in Butte, Steptoe, and Jake's valleys in White Pine County, Coal and Garden valleys in Nye County, and Sand Springs and Dry Lake valleys in Lincoln County which allowed them to expand their grazing operations.[54]

However, the drought in 1933 and 1934 cut both the Paris and Uhalde herds by about fifty percent and forced them to ship their sheep to Colorado for better pasture. This caused consternation among Colorado cattlemen who envisioned their rangelands being decimated by nomadic foreign-sounding sheep herders. The presence of Paris, Uhalde, and other Basque sheep operators spurned Coloradans to support passage of the Taylor Grazing Act. After 1935, range conditions in Nevada improved and the Paris and Uhalde herds moved back to White Pine, Nye, and Lincoln counties. The following year, Bertran Paris acquired access to the Telegraph Mountain range in the northern part of White Pine County and by 1940, both operations were again expanding in their respective valleys. Beltran's children Grace, Bertrand, and Peter Paris and John's children Marianne, Gracian Michael, and Alfred Uhalde continued to expand their families' livestock operations in conjunction with one another. But, the winter of 1948-1949 brought epic snows to the Great Basin and colder temperatures than normal, nearly decimating their herds. In one of the classic stories old-timers tell about the cooperative nature of ranching before the arrival of government regulation, airplanes full of hay that pilots dropped on the range for starving livestock across the region saved ranchers from losing entire herds.

Residents credited the origin of the haylift to Beltran Paris's efforts to save his animals. Gracian and Alfred Uhalde and Bert Paris, stuck at the Uhalde Ranch in the Quinn Range, fought deep snow and high winds to reach Hiko and call for help. They met John Uhalde, seventy years old by this time and still out with his herds, and the four reached their destination where they organized the local ranchers. Beltran Paris gathered other ranchers in Ely and the group from the central Great Basin lobbied the Nevada governor and state legislators to push for federal assistance. Most ranchers lost one-quarter of their herds that year and suffered damages in the drought of the early 1950s.[55]

During atomic testing the Uhaldes ranged their sheep and cattle close to the northern boundary of the Nevada Test Site and incurred damages from exposure to radioactive fallout. Nevertheless, the Paris and Uhalde families survived and throughout the mid-twentieth century as both families continued to expand their acreage through homestead entries, land exchanges, and land sales. They also secured multiple grazing allotments throughout White Pine, Nye, and Lincoln counties; during the organization of the region's grazing districts, they had the unfortunate position to be sometimes under federal organization and sometimes not, depending upon where their customary range was located. This gave them an interesting perspective on the changes between federal and local management of the range. In the 1960s, with the arrival of off-road vehicles, the Uhaldes in particular had trouble with motorists not respecting their herds and their property. Often these ranchers were the only help for miles around when accidents occurred. In addition, the family became involved with wild horses, managing their local herds in Garden and Coal valleys in particular until federal law prevented their management by local ranchers. John Uhalde's grandson Gracian Neil served on Nevada's

Wild Horse Commission for many years in addition to serving on the regional wool growers association.[56]

Besides Mormon and Basque families, other immigrants settled in the central Great Basin, particularly Italians. Across the Quinn and Grant ranges, the Bordoli family also established a small ranch. Martino and Santina Bordoli were Italian immigrants from the subalpine area near Como who developed a livestock operation in the area in 1897. Their sons Henry and Alfredo (Jack) managed the ranch for their parents and ran herds of sheep and cattle throughout the region. The Bordoli ranch sat adjacent to Ox Spring where another Italian immigrant, Abramo Arigoni, had homesteaded 160 acres and controlled the water rights, and the family eventually bought out Arigoni. The Bordolis held water rights at Bordoli Creek, Hooper Canyon Spring, Big Creek, Blind Spring, Little Meadows Creek, Twin Springs Slough, Buttes Well, Stone Corral Well, and Troy Creek. The Italian family also filed cooperative water rights with the Locke family who owned Locke's Station to the north, suggesting the alliances ranchers made with their neighbors to access water and grazing resources. Their filings were duly protested by ranchers affected by the state engineer's decision such as the Sharps.[57]

The Sharps and Bordoli ranches shared common territory at Cherry Creek Canyon and in the southern Grant Range and their water rights overlapped in those areas. The Bordoli grazing range made a U-shape around the southern Sharp range and bordered the Locke range on the south. These three families essentially controlled the northern half of Railroad Valley at this time. Henry Bordoli moved to the northernmost part of Railroad Valley at that time, buying the Vanover ranch in Duckwater, but died in 1943. His brother Jack remained at their parent's ranch near Nyala after the deaths of Martino and

Santina. The harsh winter of 1948-1949 took a toll on their herds and those of the Sharps and Fallinis in Railroad Valley, in addition to the Uhaldes and Parises in the valleys to the east. But like the other families in the region, the Bordolis recovered. But a decade after the death of the youngest member of the Bordoli family ended their ranching operations. Jack and his wife Martha Baird's little boy Martin was just seven years old when leukemia manifested in his system. Martin died in 1956 despite blood transfusions and other therapies. The heartbroken Bordolis believed their son had acquired the cancer after exposure to radioactive fallout during atmospheric nuclear testing. Soon after Martin's death, they abandoned their ranch and moved to Carson City where Jack died in 1960. Martha remained frustrated and bitter about the death of her son and the continued health problems of her remaining children.[58]

Where the Sharps, Lockes, and Bordolis controlled the northern half of Railroad Valley, the southern half was predominately utilized by the United Cattle and Packing Company. Operating between 1916 and 1940, the livestock operator was the largest in central Nevada, controlling water rights between Ralston Valley near Tonopah to Sand Spring Valley near Hiko and Monitor Valley north of Belmont to Pahute Mesa near Beatty. In the early 1930s, at the height of their operations, United Cattle and Packing Company ran 10,000 head of cattle. Headquartered in Hawes Canyon in the Kawich Range at the southern end of Railroad Valley, brothers Orville Knighton (OK) and Edward Reed had merged their cattle holdings with a packing operation owned by brothers Herbert and Jacob Humphrey out of Goldfield. (fig. 29) The Humphreys had homesteaded several hundred acres in Elko County in the Tuscarora Range and in Nye County in the Monitor Valley, 240 acres of which was a successful Desert Land Act

entry. OK Reed similarly utilized the Desert Land Act to patent 320 acres in the Kawich Range. In addition, the organization owned several other ranches purchased throughout central Nevada.[59]

The operation hinged on grazing livestock year-round with little oversight and many of the other ranchers in the region found United Livestock cattle mixed in with their own. Livestock operators separated the cattle in the spring, but as irrigated hay became more important to the livestock industry in the Great Basin and as range access became increasingly competitive, ranchers found mixed herds problematic. Most of the water utilized by the United Cattle and Packing Company were held by possessory right, though some were held as deeds. These possessory rights did not translate into water permits during the 1930s when the State Engineer George Malone worked to map and certify the water rights of ranchers throughout Nevada and organize the state's range usage. This affected United Cattle and Packing Company's support of the grazing act; if central Nevada remained outside the scope of the act, then the organization was more likely to be able to operate on an increasingly restrictive range environment. But the grazing act passed and by 1940, the company had no livestock on record and the Reeds and Humphreys sold United Cattle and Packing Company off in pieces to various other operations in the area.[60]

Their assets helped other Italian immigrant families homesteaded in the southern portion of Railroad Valley. Giovani Batista Fallini homesteaded 150 acres at Eden Creek and established corresponding water rights at there and at Crystal Spring in the Kawich Range. Giovani Fallini had arrived in Nevada in the 1870s, hauling freight for the charcoal kilns around Eureka and then Tybo. In 1900, he moved south to Reveille, a

mining district established in 1866 that had a productive mill operation, where he ran a small grocery store. He enlisted the help of Abramo Arigoni from Ox Spring and built a stone house at Eden Creek (fig. 30). He took any extra work he could get and use to funds to buy a cow or calf, building his herd one animal at a time.[61] Giovanni's sons, William, Raymond, and Joseph (Joe), moved the family's ranching operation from Eden Creek north to Twin Springs, at the center of the Fallini's livestock range, in the 1930s in order to keep better control over the herds and prevent other operations from stealing their cattle (fig. 31). The Fallinis purchased Herman Reischke's property near Warm Spings and most of the United Cattle and Packing Company's spread in southern Railroad Valley. As one of the larger ranching operations in the area, the Fallinis controlled a great number of water rights, including major springs located in the Kawich Range around the Gila and Bellehellen mines, at Bellehelen, Eden, and Little Meadows creeks, at the southern end of Railroad Valley including Pyramid, Summer, Cedar, Warm and Twin Springs, Hot and Warm Springs Creek, and received numerous underground allocations which allowed them to develop a variety of wells to water their livestock. The family ran several thousand head of cattle, driving them to the shipping facilities in Tonopah until the advent of truck hauling in the late 1930s (Fig. 32-34).[62]

The Fallinis raised their own fruits and vegetables, canning much of the produce for use during the winter. They corned and jerked some of the beef they raised for their own use and went to Tonopah twice a year to get other food stuffs such as flour, sugar, coffee, and dried fruit which they ordered through the mail. Their ranch, as did the others in the region, operated on a seasonal schedule. The calving began in the late winter and early spring, they rounded up their cattle herds in July and separated out those animals for sale

and shipping, and grazed the remaining herds the rest of the summer on ranges in the higher elevations. They weaned the calves in the fall and turned the herds out onto the winter range until the calving began again the following year. Winters proved tough if the weather was particularly cold. The Fallinis had to keep the troughs and pipes clear of ice to make sure the cattle had access to enough water. When feed ran short on the winter range, the family had to purchase hay to supplement the animals' feed which was an added expense they hoped to avoid. Every member of the family helped out with the ranch chores, but they also hired local Shoshone for seasonal work such as roundups and branding. Some of these individuals became more than seasonal employees and worked for the Fallinis for several decades and lived on the ranch with the family.[63] Despite the Fallini's efforts at controlling access to their range, their Reveille allotment was considerably downsized because of military training, nuclear testing, and wild horse management. Joe, his wife Helen, Martha Bordoli's sister, and their son Joseph (Joe), Jr., and his wife Sue, were continually frustrated with the federal government. They lost grazing range to the military in the 1940s. In the 1950s, Helen suffered from radiation burns as did their cattle, horses, and dogs (fig. 35-36). They have been to court several times with the Department of the Interior wrangling over water rights and range management techniques. Every new federal regulation, procedure, and stipulation makes their ability to earn a living more and more difficult. Still, they continue ranching at Twin Springs, keeping a fire extinguisher in the office which the younger Joe Fallini had labeled "BLM Repellent."[64]

Few residents were more frustrated than the Native groups that called the Great Basin home. Although they were rarely property owners, the persistent presence of Native

Americans significantly populated the region's communities, working for ranchers such as the families previously mentioned. The Paiute tribes rimmed the western and southern part of the region while the Shoshone considered the central Great Basin, Newe Sogobia, their territory, an area which stretched from Boise to Barstow, and Bishop to Baker. The dismal condition of the region's Shoshone characterized by John C. Fremont did not stem from their life in the wasteland. Rather, their impoverishment stemmed from significant "economic and military disadvantage" that came from existing on fringes of several powerful empires including the Utes as well as the United States. There had been no Indian wars in the Great Basin of the scale fought on the Great Plains in the 1850s and 1860s. The Shoshone tribes were small extended family units that banded into larger groups when conducting raids on Americans traveling through their territory on the way to the mining camps near the Sierra Nevada. The mass American migration to the gold fields of California had depleted the natural resources of the region and the abuse the Shoshone tribes suffered at the hands of many travelers making the journey embittered them. The Shoshone raided emigrant trains and settlements for food, horses, and guns, which prompted the arrival of federal forces at Ruby Valley in 1862.[65]

In the treaty signed the following year, the Western Shoshone, a loosely-organized group that included all the Great Basin tribes, though not all the tribes signed the treaty, the United States recognized Shoshone title to their territory and the Shoshone agreed to cease their attacks. The treaty required the federal government to make provision for large Shoshone reservations on which the tribes could establish cattle ranches and farms. But by 1880, the Great Basin Native American groups had only five reservations. The Congress established three small Paiute reservations, those at Pyramid Lake and Walker

River near the Sierra Nevada, and Moapa near Las Vegas. The Shoshone/Bannock reservation at Fort Hall in Idaho was the largest of these reservations and the much smaller Duck Valley Shoshone reservation straddled the border between Idaho and Nevada. Duck Valley was the only reservation created specifically for the Western Shoshone, but it existed outside their traditional lands on an area not included in the treaty, leaving the group dissatisfied with their only land allocation.[66]

The prejudicial attitudes that accompanied dealings with the Great Basin's Native American tribes, especially the Western Shoshone, bred suspicion and fear despite the relative initial success of the 1863 treaty. Americans in the newly-created state of Nevada clashed with Shoshone over water rights and believed that the Mormons in Utah were provoking them into violent acts and even war. To make matters worse, the Bannock War of 1878 threatened to draw Western Shoshone tribes into open conflict. The mass hysteria these rumors caused polarized Great Basin communities who already harbored racial prejudices against Native Americans. As mining towns boomed in the central Great Basin such as Austin, Hamilton, Eureka, Elko, Pioche, Caliente, and Ely, and ranching communities developed around them, the Western Shoshone suffered the erosion of their control over Newe Sogobia.[67]

As not all the tribes could or would live on the reservation at Duck Valley, the vast majority of Western Shoshone lived interspersed with Great Basin residents, farming and working as laborers in the mines and towns and as cowboys or housekeepers on the region's expanding number of ranches. Many Shoshone were skilled ranch hands and good with horses. One Western Shoshone, George Adams from Ely, won the Elko Rodeo in 1913. Prevented from competing in the Salt Lake City Rodeo because of his race,

Adams won unanimously at Elko for his display of skill. At G.S. Garcia's Wild West exhibition at Moana Springs near Reno, Adams and other rodeo cowboys, including a woman who rode bucking horses sidesaddle, put on a crowd-pleasing spectacular display of athletic ability riding rank horses and performing roping tricks. Skill with cattle and horses became important aspects of Native American identity and economy in general throughout the region.[68]

The Western Shoshone never assimilated so much as they acculturated, speaking English, working for Americans, but retaining their native traditions. A few of the non-reservation Shoshone filed homestead claims, if they met the stringent requirements of the Indian Homestead Act, or received public land allotments under the 1887 General Allotment Act, but few could file under the 1862 Homestead Act because they were not declared citizens until 1924. This placed the Western Shoshone in an untenable position; by the 1863 treaty, Newe Sogobia was theirs to utilize, but because they were not United States citizens, they could neither file for homesteads nor water rights. When the 1925 Nevada water law streamlined and solidified water rights in the Great Basin to ensure proper range management, the Western Shoshone were virtually left out of the process and divorced from their ability to irrigate and cultivate farmland, and raise livestock. In 1917, the Congress authorized the creation of small Shoshone colonies adjacent to several Great Basin towns such as Elko and Ely, in places where many Western Shoshone lived and worked. Still, the federal government largely ignored the non-reservation Western Shoshone, who in effect remained a landless people.[69]

The 1934 Indian Reorganization Act proved a critical turning point for the Western Shoshone; it authorized federal funds for the purchase of Native Americans reservations

and the organization of tribal governments. It took several years for Congress to release funds for the purchase of land for reservations, but in 1941, the Western Shoshone acquired the South Fork reservation at the north end of the Cherry Creek Range, the Yomba reservation at the southern end of the Reese River Valley between the Shoshone and Toiyabe ranges, and the Duckwater reservation at the northern end of Railroad Valley. The Indian Bureau cobbled these properties together by purchasing the existing ranches of livestock operators devastated by the drought and depression. At Duckwater, livestock operator Angelo C. Florio was more than happy to sell out to the government.[70]

During the late 1920s, Florio, a rancher from Eureka, had purchased the old Mendes homestead and ran a fairly successful sheep business. William Mendes had filed an 80-acre Desert Land Act Entry and secured water rights at Duckwater Creek, one of the main water sources for the north end of the valley and one of the few continually running streams in the area. Warm springs fed Duckwater Creek in part and the area around it was lush with Tule and native grasses (Fig. 37). Florio expanded the water rights to include Home Spring and Coyote Spring in the foothills of the Hot Creek Range to the west. But in 1931, Florio's partner and son Angelo, Jr., died from complications from a ruptured appendix. The following year, Florio's bunkhouse and attached storage shed burned in an accidental blaze, destroying thousands of dollars worth of feed, wool, and other property. Florio also had trouble with nomadic sheep herds poaching the range and incursions from other livestock operations that beat him to the delicate early spring grasses and destroyed his feed supply. Florio even shot and nearly killed one rancher from Elko in 1933 when he found the rancher feeding cattle on his winter range. The drought in 1934 and the economic difficulties of the Great Depression proved the final blow to Florio's operation.

By 1940, Florio made arrangements to sell the Duckwater ranch to the Indian Bureau and moved to Ely to marry a hair dresser.[71]

Western Shoshone already lived at the north end of Railroad Valley and had worked in the hay fields for decades before the turn of the twentieth century. Known as hard workers, they only lost out on jobs when Mormons underbid them on labor contracts. When the Western Shoshone acquired Duckwater, the Blackeye, Johnson, Collin, and Bullcreek families already lived in the area and worked for the handful of local livestock operators. Will Blackeye, the chief of the Duckwater Shoshone, worked for Florio and was well-loved by the rancher's family. Wagon Johnnie and Brownie Sam also worked for Florio and had mentioned to him that the government might buy his ranch in the late-1930s. It was this relationship combined with the mutually beneficial opportunity afforded both the Duckwater Shoshone and Florio which prompted the sale of the ranch to the tribe. Chief Blackeye, Wagon Johnnie, Brownie Sam, Henry Sam, Richard Birchum, Willie Smith, Raymond Graham, Tom Adams, and Mike Millet formed the Committee of Southern Shoshone Indians, later the Duckwater Tribal Council, to press for purchase of the 3,272-acre ranch.[72]

In 1941, the Indian Bureau purchased the Florio ranch and established the Duckwater Reservation (fig.38). Twenty-one families lived on the newly-created reservation; besides the Blackeyes, Johnsons, Collins, Bullcreeks, and their extended families, the Johnnie, Sam, Graham, Millet, Smith, Ike, Boot, Adams, Charles, Allison, and George families joined the reservation. The tribe formally filed a constitution with the federal government, formed the Duckwater Stockmen's Association, and secured grazing rights to the Duckwater allotment (fig. 39). However, this was not the typical experience for

most Western Shoshone, especially those who lived off the reservation. While tribes with reservations had both land title and water rights, such as at Duck Valley and Yomba, individual Shoshone struggled to gain access. Only about eighty Shoshone applied for land patents; most of those occurred in Churchill and Elko counties, but eighteen of them occurred in Nye County. Of those, most never filed for water rights and of those who did, most were unable to secure them. Tim Hooper, a Shoshone who settled in the Monitor Valley near Pine Creek, secured a land patent, but did not secure the water rights. His son Albert also filed for land patents at the north end of Stone Cabin Valley, but like his father, failed to secure the water rights. In Nye County, only Mike Millet and One-Arm-Bob managed to establish both land titles and corresponding water rights.[73]

At the same time, the Duckwater Shoshone initiated their livestock operation many of their young men joined the military to serve in World War II, which took a severe toll on the tribe's population. Most of the twenty Shoshone families living in Duckwater lost a son in the conflict. In addition, during atmospheric continental nuclear testing, the tribe along with other residents of Railroad Valley and the surrounding areas suffered hair loss, burns, and illness from exposure to radioactive fallout. For the Shoshone, the problems associated with low-level exposure to radioactivity proved worse since their traditional lifestyle included harvesting pine nuts and hunting game which were often additional sources of contamination. At the same time, Shoshone tribes fought the federal termination policy which ended federal assistance to Native Americans and threatened to abolish their hard-won reservations. Many federal legislators in the Great Basin, including Nevada senators George Malone and Patrick McCarran, and Representative Clifford Young, worked to end tribes' communalism and perceived mismanagement of

herds. Nevertheless, the Duckwater Shoshone managed to hold onto their livestock operation and gained the assistance of the University of Nevada's Agricultural Extension Service, but lost their children's school. In addition, the tribes faced all the same problems other ranchers in the region faced with the growing encroachment of off-road vehicle recreationalists and the effects of increased numbers of wild horses on their grazing range. In addition, the issue of native sovereignty complicated all of the conflicts as the Western Shoshone had yet to surrender their claims to Newe Sogobia.[74]

These families in the central Great Basin are representative of the larger rural population of the region. Their livestock operations, sheep, cattle, or both, are subsistence operations, but not in the sense of the word that evokes utter poverty. This population profoundly understood the limitations of the wasteland environment and they often were frustrated by those limitations. Successful ranching in the Great Basin was a matter of scale and control over resources. Since establishing their livestock operations, the Sharps, Swallows, Lambs, Parises, Uhaldes, Bordolis, Fallinis, and Duckwater Shoshone have fought to maintain control over the resources they need to conduct their business. Their land patents and water rights ensured their successful ventures up to a point. They struggled to balance their livestock numbers with the amount of forage available, guessing from year to year as to the proper size of their herds and buying supplemental feed when necessary. They relied on the federal government for financial assistance during droughts and storms, and for improvement loans. The Great Basin environment, as earlier explorers and surveyors had so eloquently observed was still a marginal landscape and no matter how hard these ranchers worked, the land itself could not sustain the large livestock operations as in other, greener parts of the American West.

Images

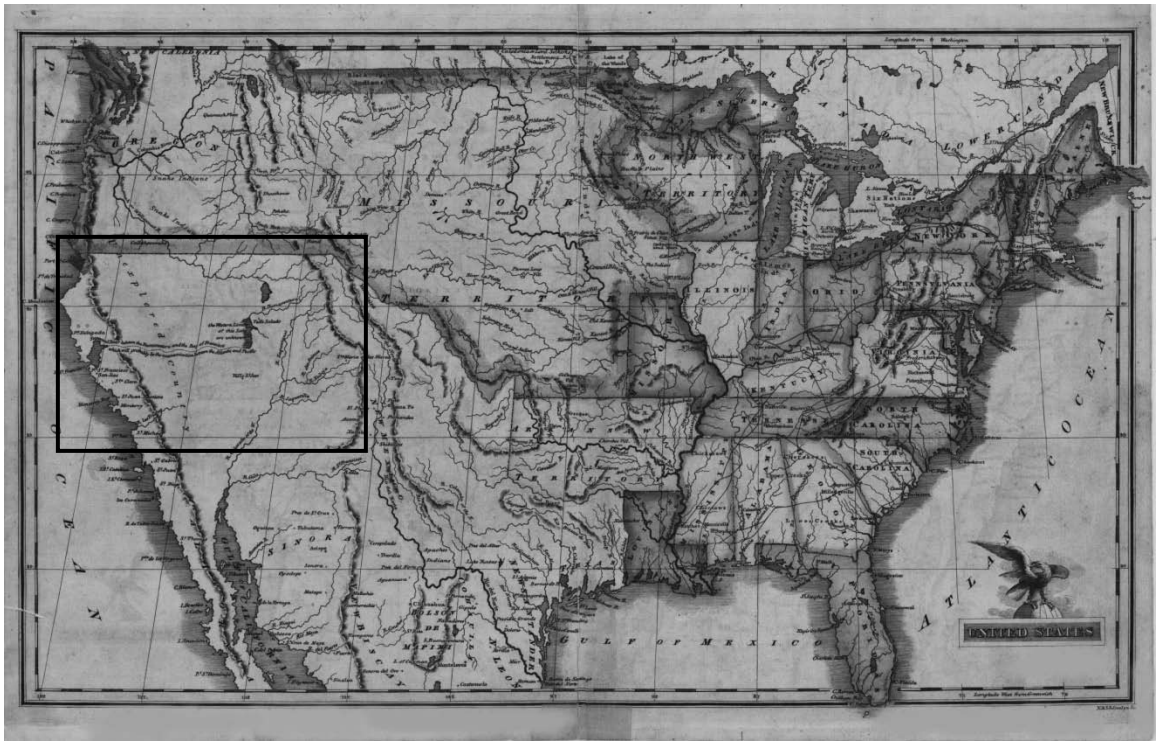

Fig. 9 *Map of the United States* (1823). This map clearly shows the Great Basin as a vacant region without any geographical characteristics except the Great Salt Lake in what eventually became northern Utah. Courtesy the Nevada Historical Society and the DeLaMare Library at the University of Nevada, Reno.

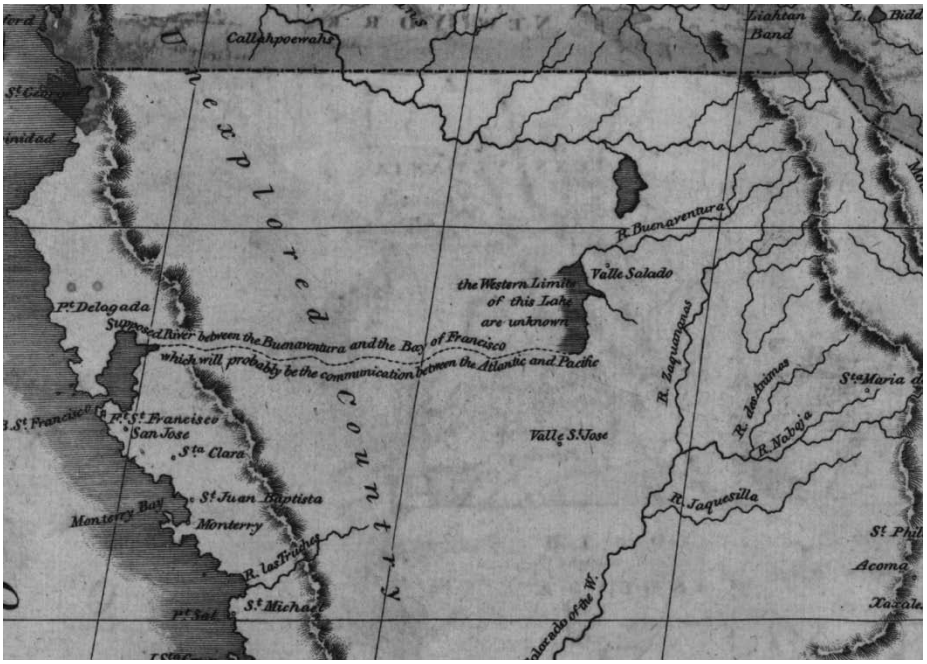

Fig. 10 Detail of Fig. 9. The Unexplored Country shown on this map contains the mythical Buenaventura river which Americans hoped flowed between the Great Salt Lake and San Francisco Bay.

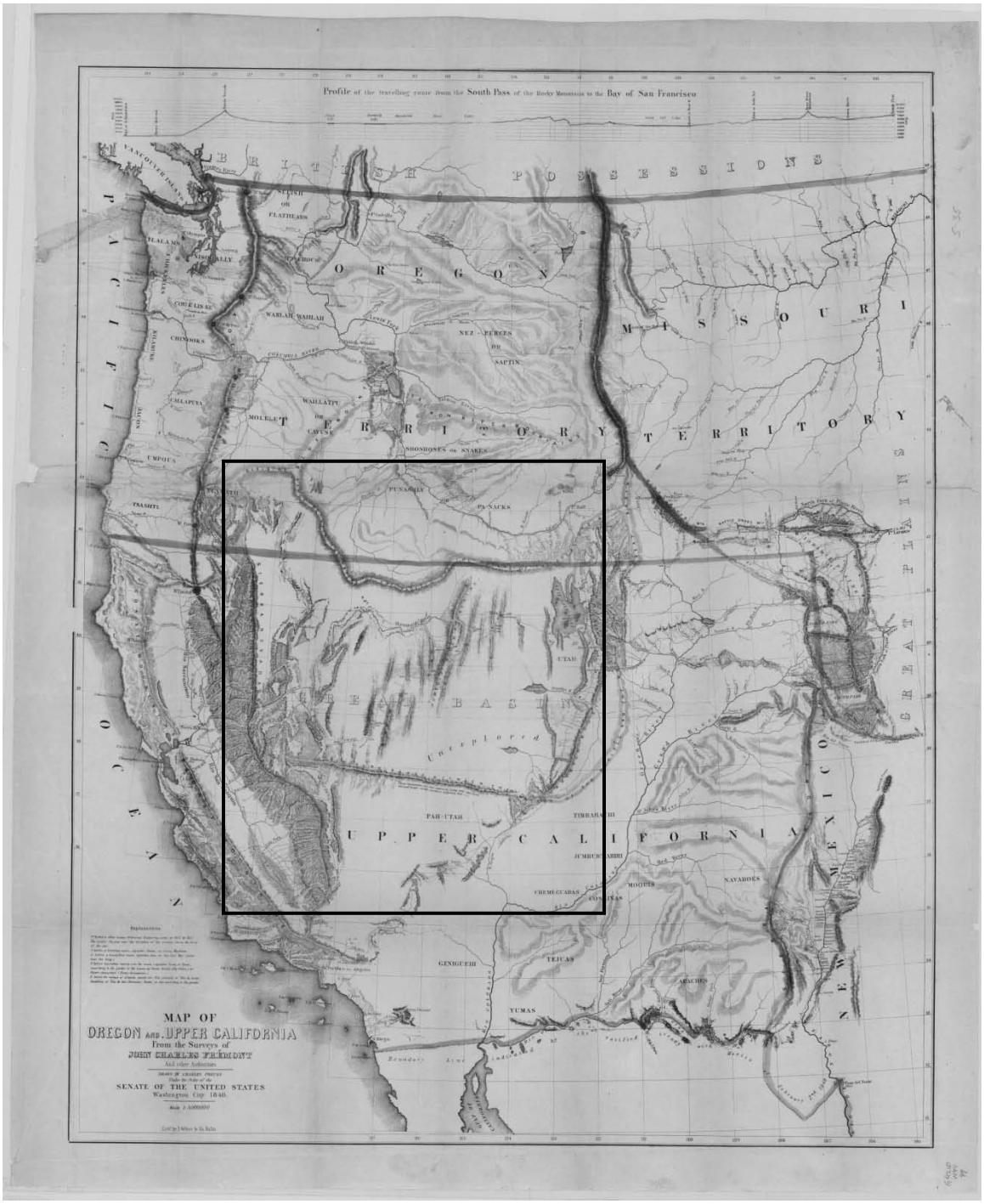

Fig. 11 *Map of Oregon and Upper California, from the Surveys of John Charles Fremont and Other Authorities* (1848) by Charles Preuss. This map demonstrates the striking difference between the pre-exploration maps and the ones published after Fremont's survey and is the first to name the region Great Basin. Courtesy the Nevada Historical Society and the DeLaMare Library at the University of Nevada, Reno.

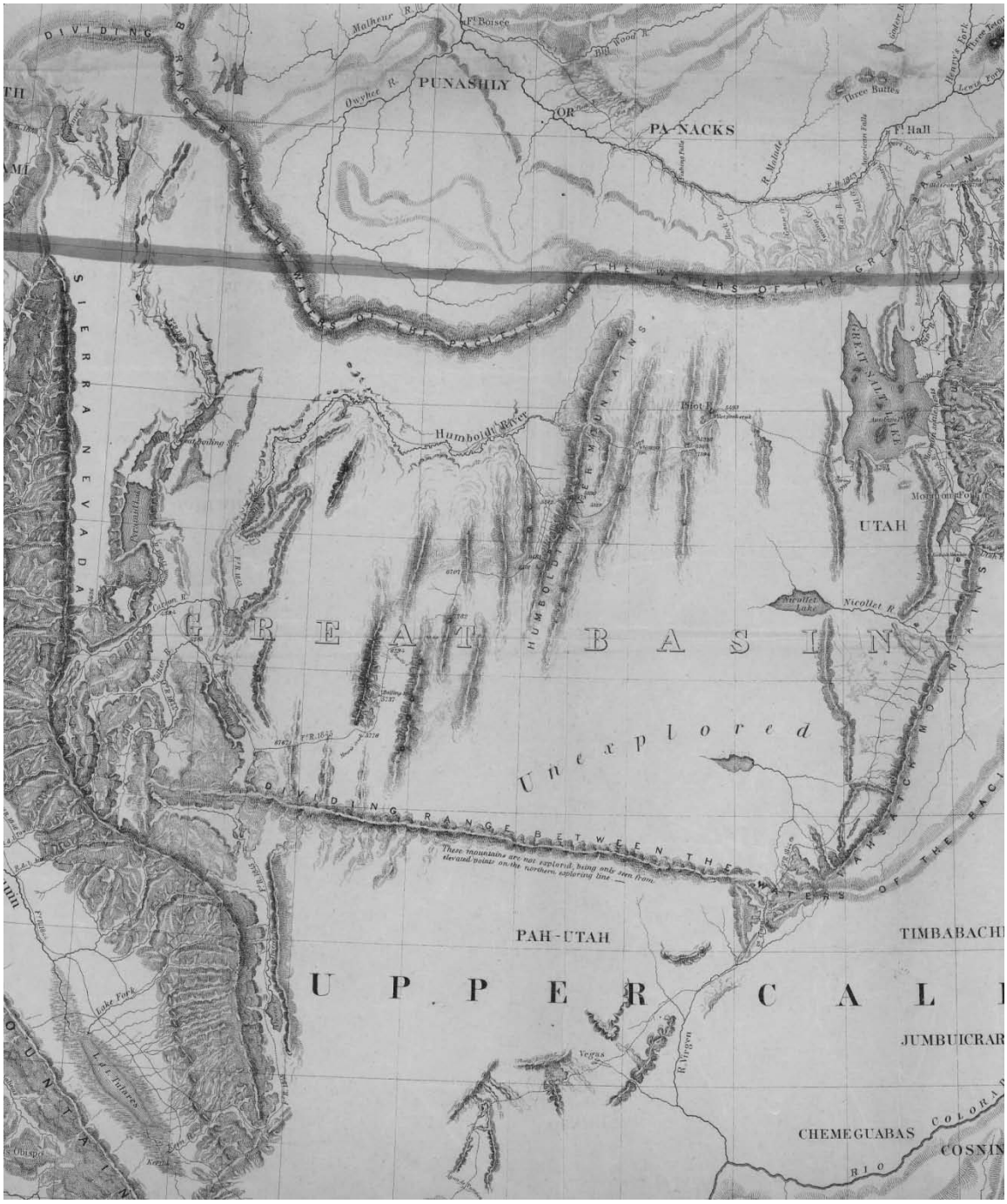

Fig. 12 Detail of Fig. 11. Like many geographers during the nineteenth century, John C. Fremont thought that mountain ranges were barriers to the flow of water. In the Great Basin, Fremont believed that a long chain of mountains surrounded the region and kept the water from flowing to the Pacific Ocean.

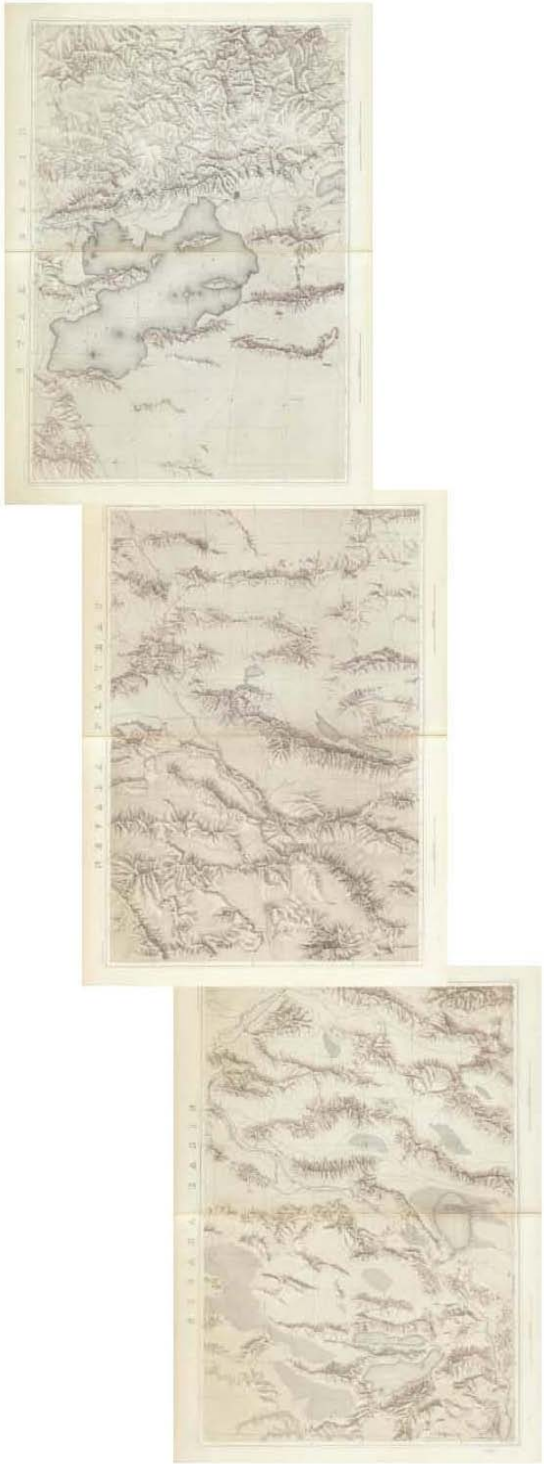

Fig. 13 *Nevada Basin Map V, Nevada Plateau Map IV, and Utah Basin Map III (1877).* This series of maps displayed here as a continuous landscape along the 40th parallel shows many of the Great Basin's mountain ranges along the route taken by the transcontinental railroad. Many Americans, like Bell, believed that each mountain range contained untold mineral riches. A second mining boom in the early twentieth century in Nye County seemed to bear out this belief. Courtesy Special Collections, University of Nevada, Las Vegas, Nevada.

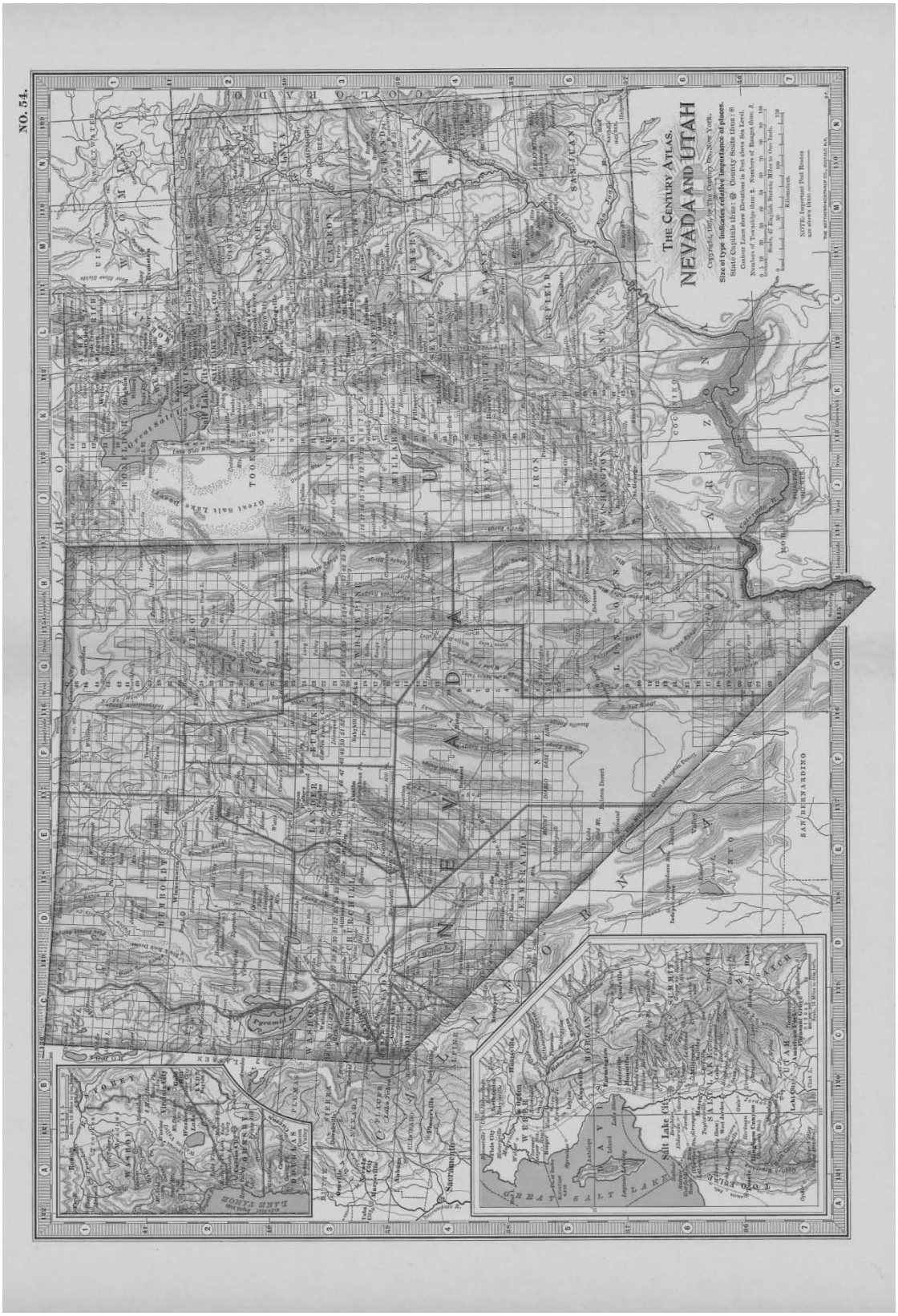

Fig. 14 *Nevada and Utah* (1897). Courtesy Special Collections, University of Nevada-Reno Library.

Fig. 15 *Map Showing in Five Degrees of Density the Distribution of Woodland within the Territory of the United States* (1873) by William Brewer. A measure of a region's water, the woodlands denoted here also indicate the areas of adequate rainfall. But unlike the Midwest, shown here with tentacles of rivers reaching across its stretches, most of the Great Basin lacked water even for irrigation. Only the northern section of the region and the areas which abutted the Sierra Nevada to the west and Wasatch Mountains to the east offered modest amounts of water. Thus the region, according to Brewer, would remain undeveloped and unpopulated. Only the mineral resources of the Great Basin offered any draw to settlers and then only temporarily until the veins of ore played out. Courtesy the DeLaMare Library at the University of Nevada, Reno.

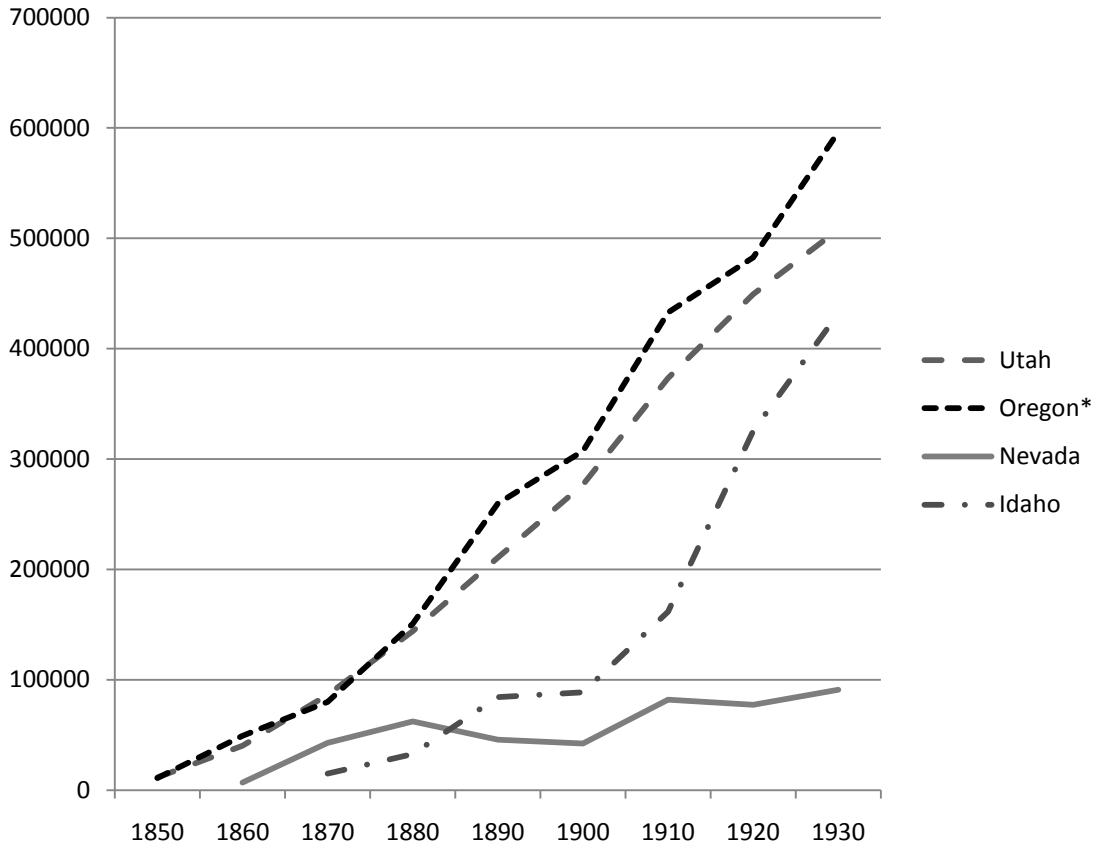

Fig. 16 Population Increase in the Great Basin 1850-1930. This chart shows the increase in the population of the Great Basin by state in the late nineteenth and early twentieth century. The populations in Nevada and Idaho fluctuated between 1880 and 1910. Both these states were strongly affected by the boom and bust cycles of the mining industry. But where Idaho's population increased dramatically after 1900, Nevada's had not quite reached the 100,000 mark by 1930. The steady increase in Utah's and Oregon's population over the same time period was largely due to a more sophisticated irrigated agricultural industry. *Oregon's population does not include the Willamette Valley and the coastal cities. By comparison, California's population over the same period grew from about 93,000 to nearly 7,000,000. Arizona, a state similar in history to those in the Great Basin, experienced a population increase from about 6,500 to almost 500,000, a growth rate much like Utah and Oregon. Only Nevada remained relatively unpopulated in the early part of the twentieth century. Chart by author.

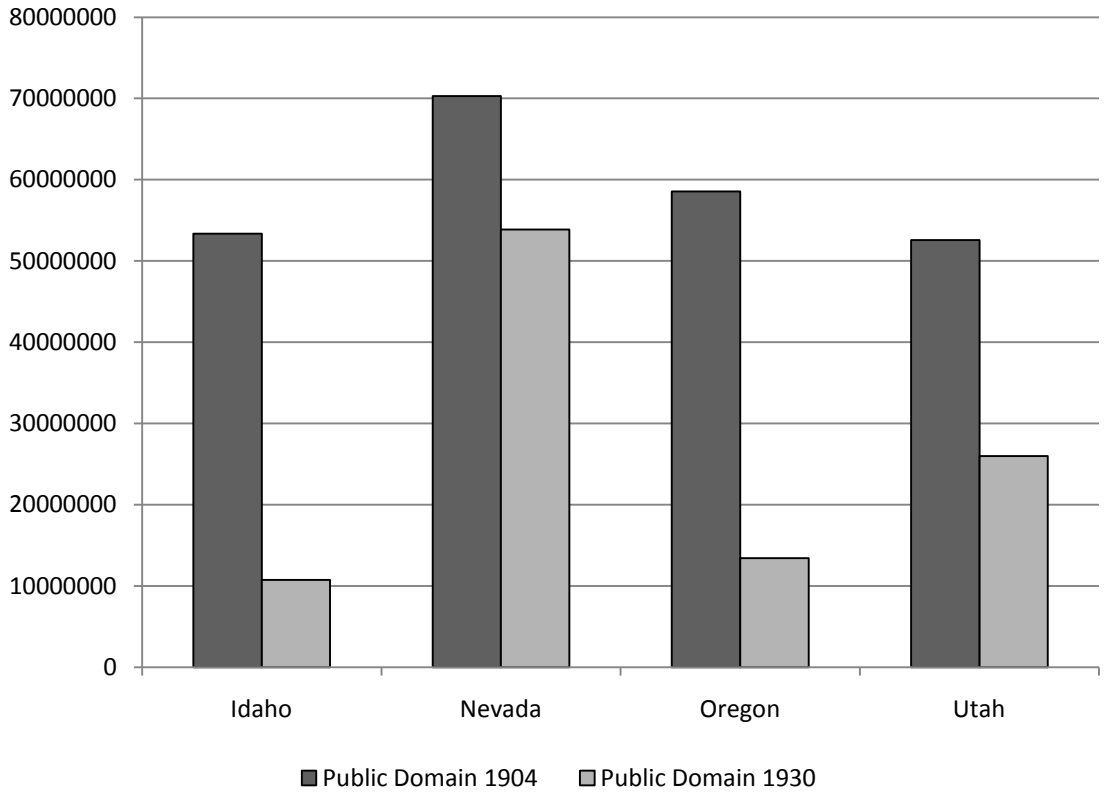

Fig. 17 The Public Domain 1904 and 1930. This chart compares the unallocated and unreserved public lands by acre in the Great Basin states in 1904 and 1930. All eleven western states began the twentieth century with about the same proportion of public land. By 1930, only about one-fifth of land in most western states remained unallocated and unreserved. But in the Great Basin, a larger percentage of the total land remained available for settlement, especially in Nevada and Utah where more than half of the total land area continued to be unallocated and unreserved well into the twentieth century. These lands were almost exclusively utilized by ranchers for the purposes of grazing throughout the region. Chart by author.

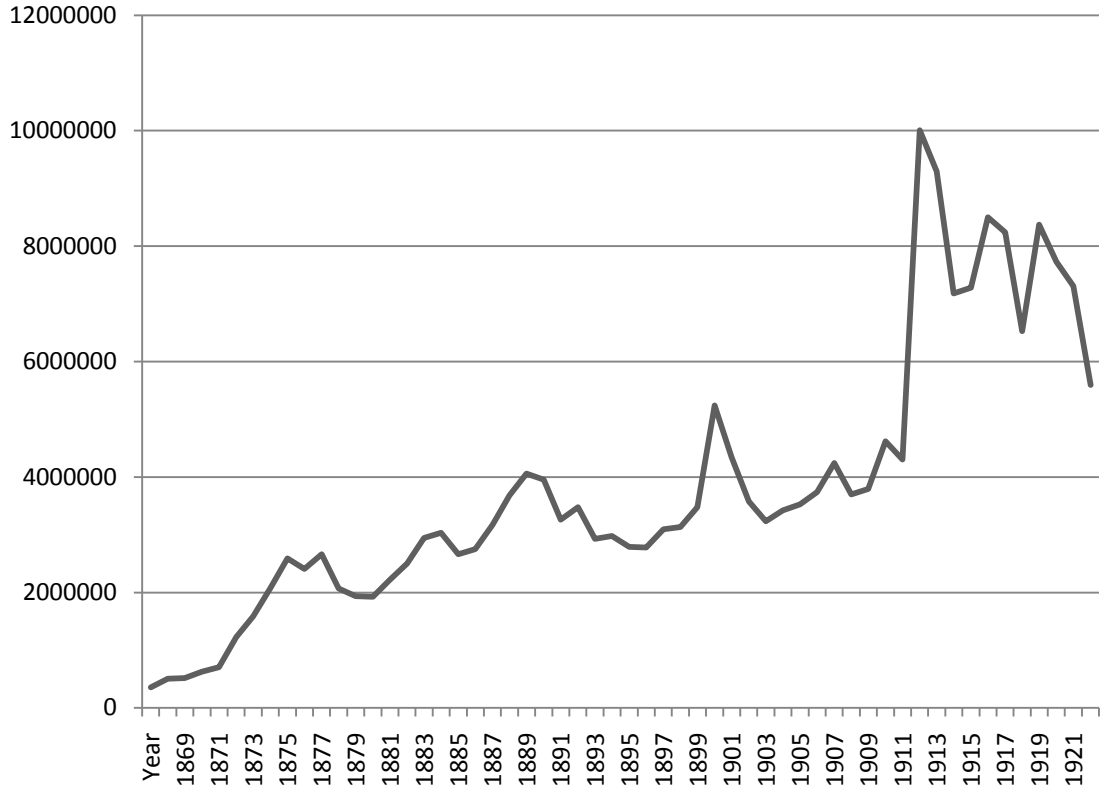

Fig. 18 Homestead Act Acres 1868-1923. This chart demonstrates the increase in the number of acres homesteaded from 1868 to 1923. While the total number of acres homestead across the country increased, the vast majority of those acres were settled in the Rocky Mountain region and the Midwest. The greatest amount of land homesteaded in any state occurred in Montana and Nebraska at more than twenty-five million acres. Of the Great Basin states, Idaho had almost seven million acres homesteaded while Utah and Oregon experienced less than one million. Nevada contained the fewest acres homesteaded of any western state. Chart by author.

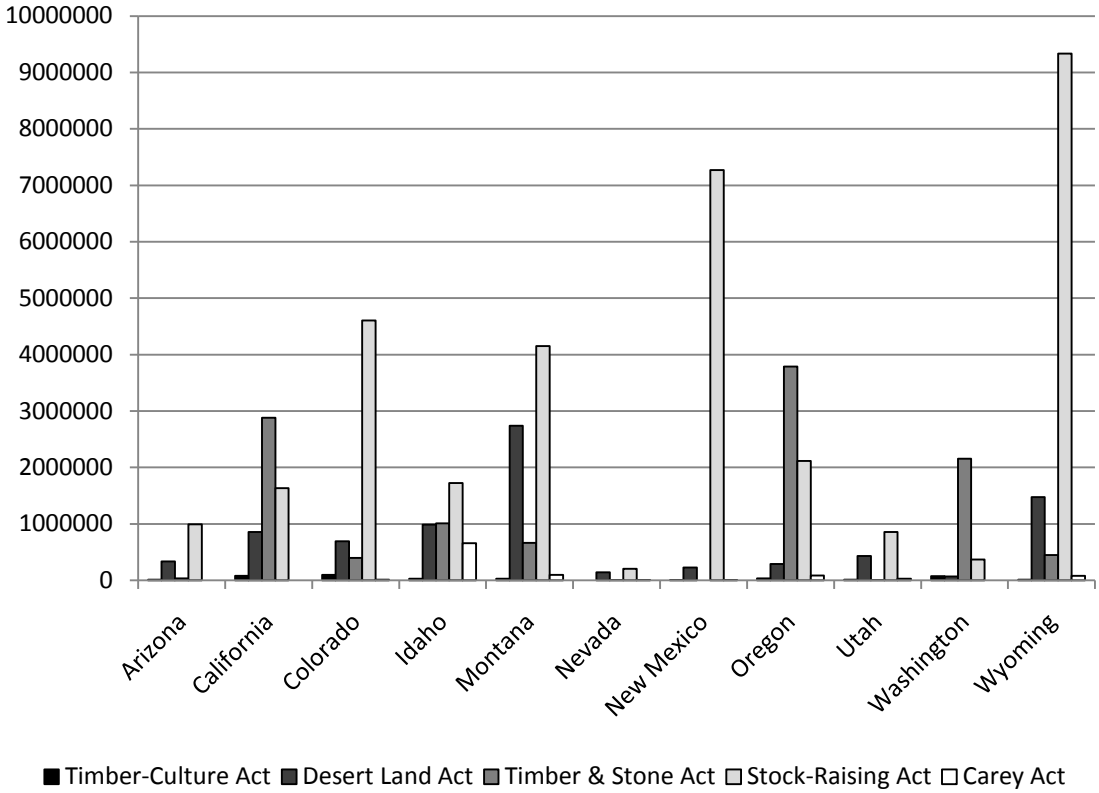

Fig. 19 Comparison of Land Disposal Authorities in the American West 1923. This chart illustrates the comparative success of the five major land disposal acts as of 1923 specifically created to help settle the American West. Notice the small acreage settled by any of the acts in the two states almost solely located within the Great Basin, Nevada and Utah. Chart by author.

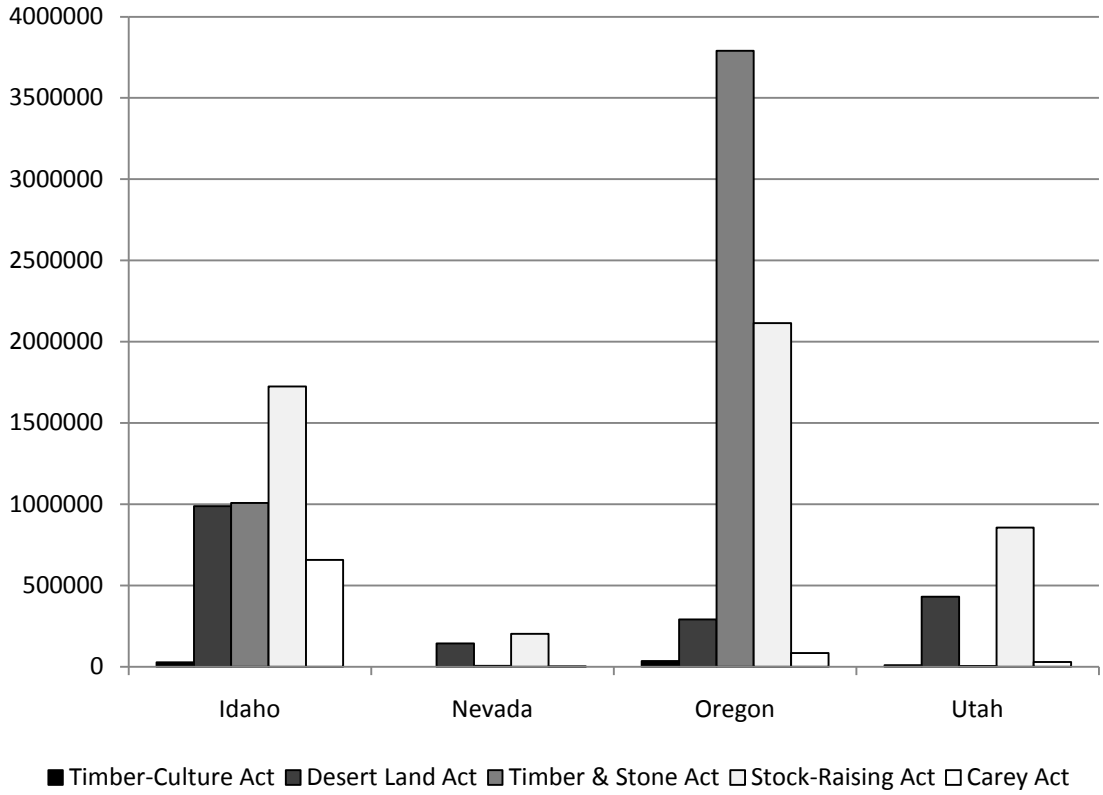

Fig. 20 Comparison of Land Disposal Authorities in the Great Basin 1923. This chart provides a detail of the five land disposal acts in the Great Basin States. Notice how few acres were disposed of in Utah and Nevada. Chart by author.

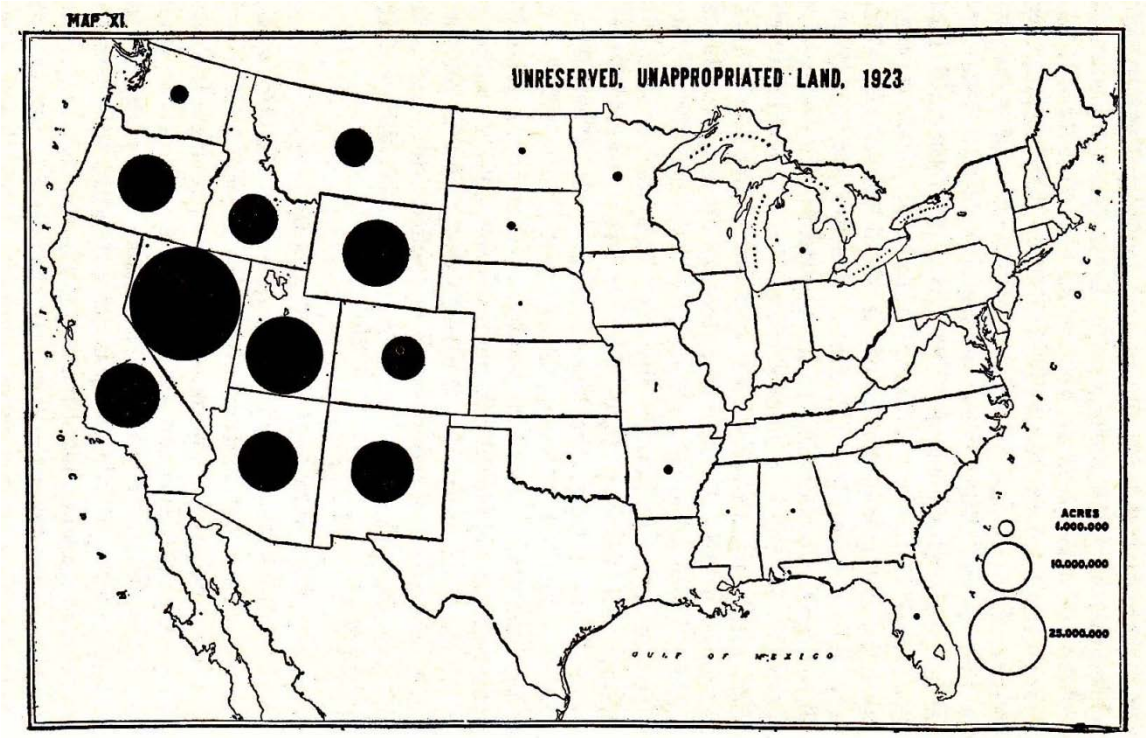

Fig. 21 *Unreserved, Unappropriated Land, 1923* by Benajmin Hibbard in *A History of the Public Land Policies* (1924).

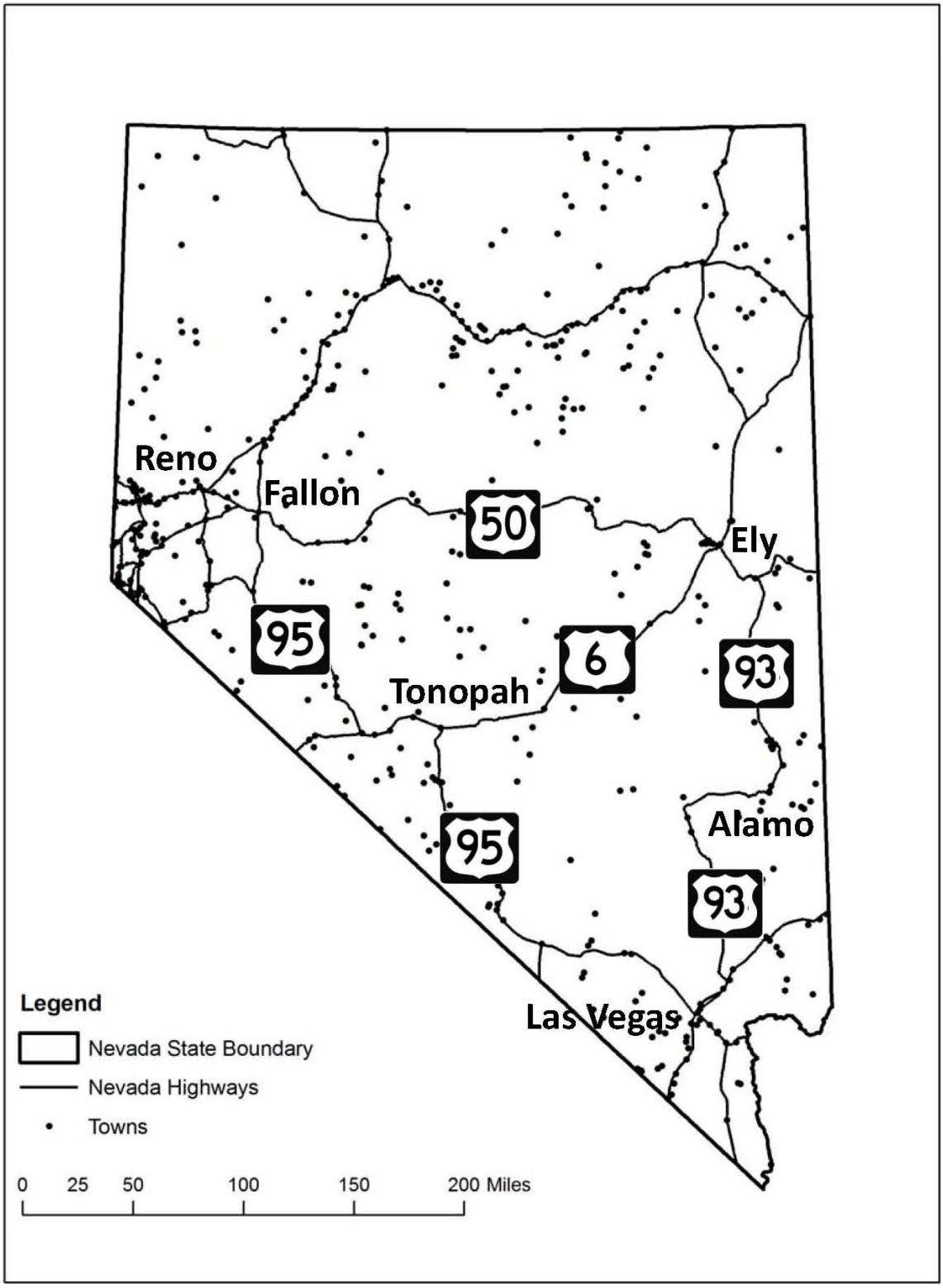

Fig. 22 Nevada Highways and Towns. Map by author.

Fig. 23 Blue Eagle Peak. The 9500 foot Blue Eagle Peak in the Grant Range dominates Railroad Valley in the east. Blue Eagle springs and the Sharp ranch sits at the foot of the peak. Photo by author.

Fig. 24 Nyala from the Railroad Valley Road. This photo looks northeast towards the Grant Range circa 1968. Courtesy Donald James.

Fig. 25 Blue Eagle Ranch. This photo looks west towards the Pancake Range. Photo by author.

Fig. 26 One-Room Schoolhouse. This is the one-room schoolhouse at Twin Springs circa 1955. Photo courtesy Special Collections at the University of Nevada, Las Vegas.

Fig. 27 The Schofield Dairy at Hiko. Public Health Service radiation monitor Donald James collects a milk sample from Bill Schofield at his dairy near Hiko 1965. Courtesy Donald James.

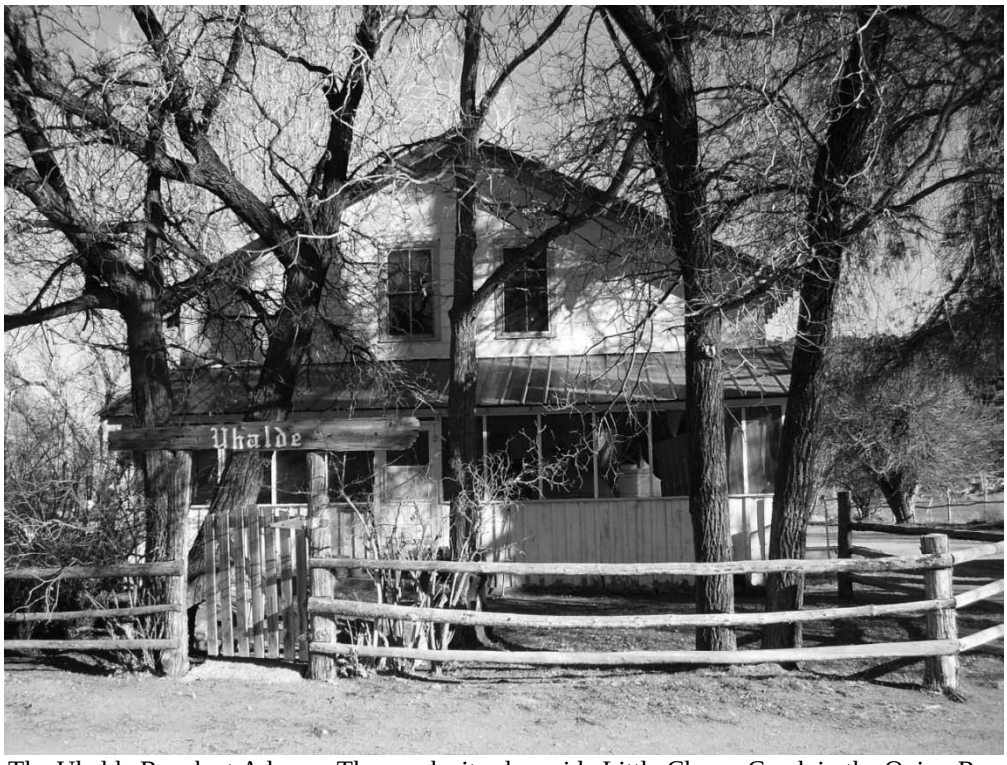

Fig. 28 The Uhalde Ranch at Adaven. The ranch sits alongside Little Cherry Creek in the Quinn Range. Photo by author.

Fig. 29 O.K. Reed in 1919 with one of his horses at Cedar Pipeline near the south end of the Kawich Range. Courtesy Special Collections at the University of Nevada, Las Vegas.

Fig. 30 Giovanni Fallini in front of his home at Eden Creek, Kawich Range, Nye County, Nevada circa 1932. Courtesy Special Collections at the University of Nevada, Las Vegas.

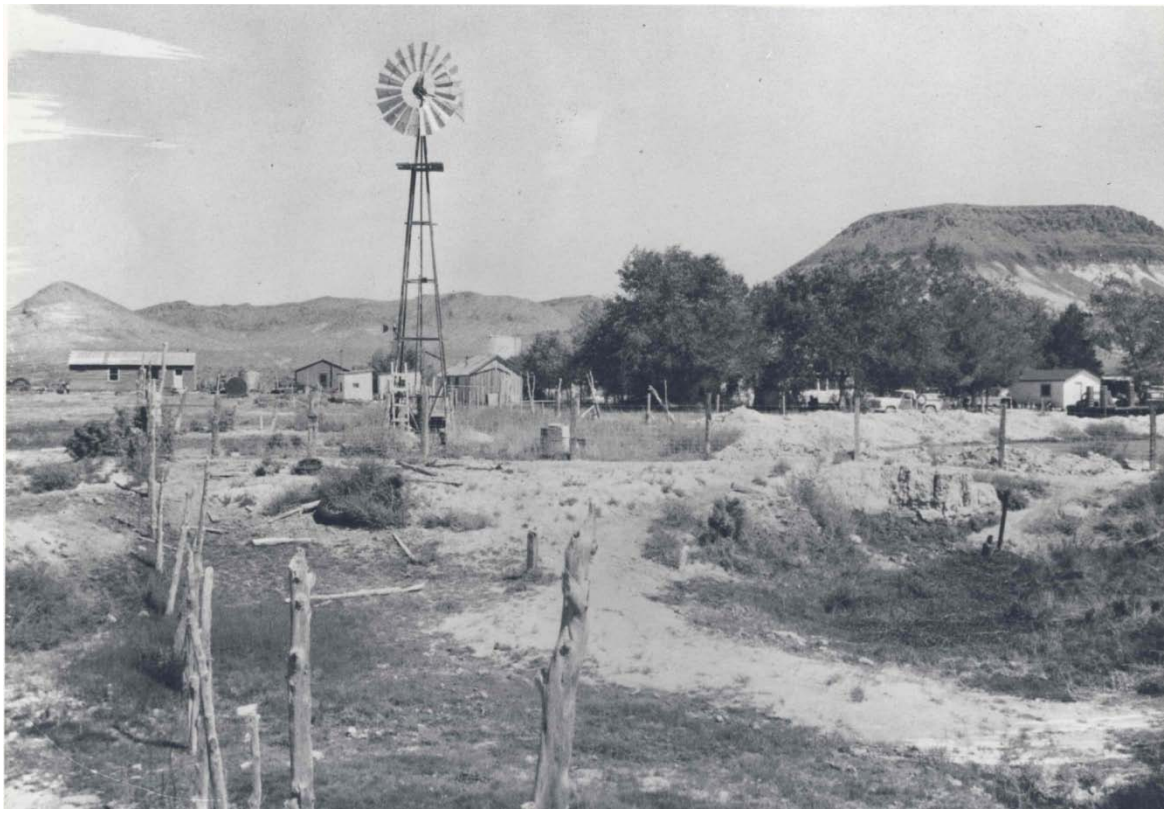

Fig. 31 Twin Springs ranch in the early 1950s. Courtesy Special Collections at the University of Nevada, Las Vegas.

Fig. 32 The Fallinis driving their cattle to the Tonopah stock yards for shipment on the railroad to Las Vegas circa 1935. Courtesy Special Collections at the University of Nevada, Las Vegas.

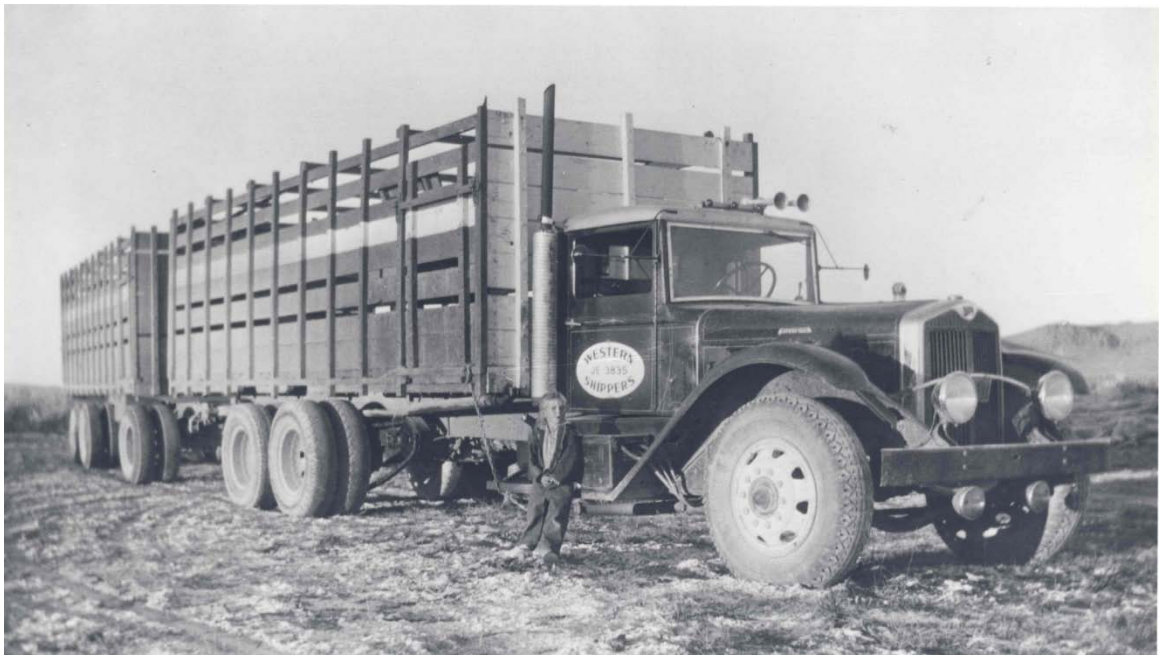

Fig. 33 One of the first diesel trucks that hauled cattle off the Fallini Ranch circa 1938. Courtesy Lied Collections at the University of Nevada, Las Vegas.

Fig. 34 Branding cattle on the Fallini ranch circa 1940. Ray Fallini is kneeling and Joseph Fallini is on horseback. Courtesy Special Collections at the University of Nevada, Las Vegas.

Fig. 35 Joseph Fallini at Eden Creek circa 1934. Courtesy Special Collections at the University of Nevada, Las Vegas.

Fig. 36 Helen and Joseph Fallini in Tonopah circa 1935. Their son Joe is in the cab of the truck. Courtesy Special Collections at the University of Nevada, Las Vegas.

Fig. 37 One of the several ponds at Duckwater created by the areas springs. Photo by author.

Fig. 38 The Duckwater Shoshone Reservation. Photo by author.

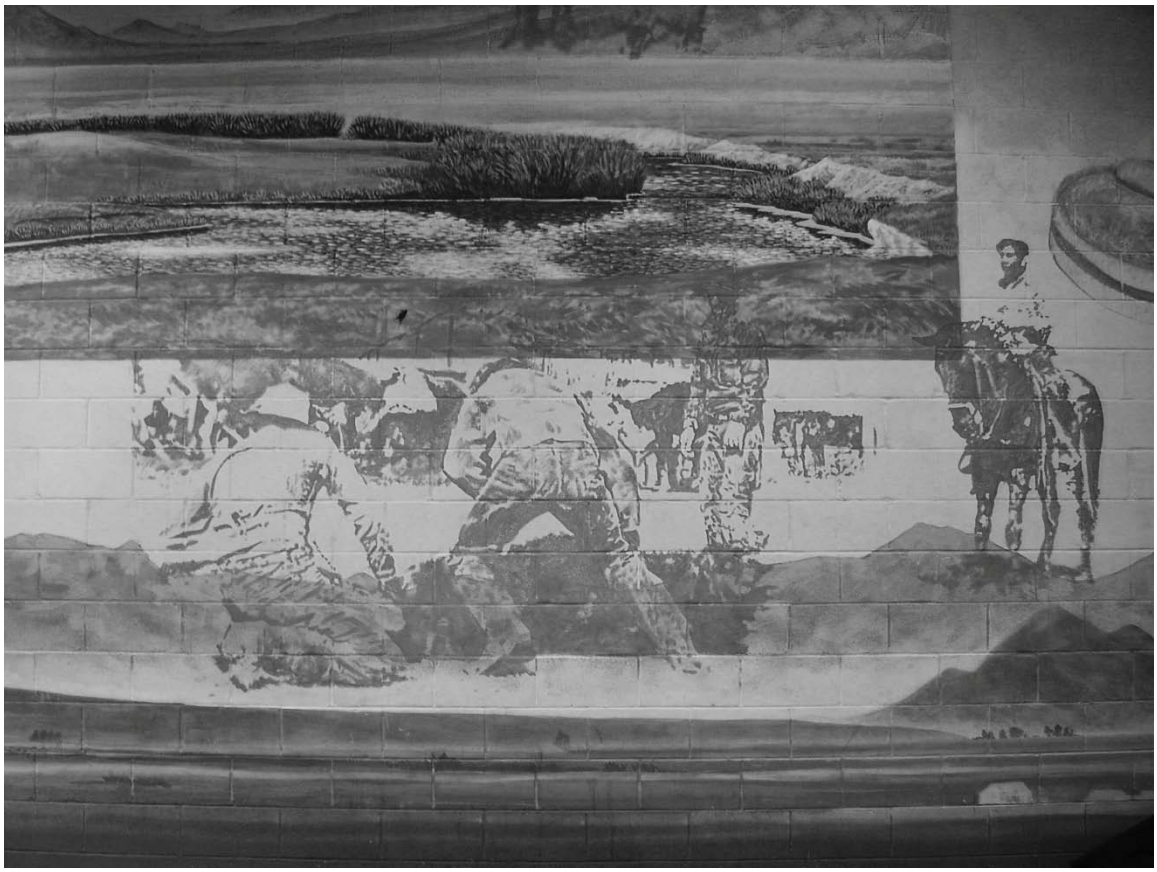

Fig. 39 The Duckwater School Mural. Photo by author.

Notes

[1] Richard V. Francaviglia, *Mapping and Imagination in the Great Basin: A Cartographic History* (Reno: University of Nevada Press, 2005) 23, 35-36, 43-68.
[2] Francaviglia, *Mapping and Imagination in the Great Basin*, 73, 83-95. For more information on the federal surveys in the region, see the classic Richard A. Bartlett, *Great Surveys of the American West* (Norman: University of Oklahoma Press, 1962).
[3] John C. Fremont, *Report of the Exploring Expedition to the Rocky Mountains in the Year 1842 and to Oregon and North California in the Years 1843-44* (Washington, DC: Gales and Seaton, Printers, 1845), 139, 175-176, 275-277.
[4] Fremont's wife, Jessie Benton, turned his descriptions and stories into popular literature. They were both adventure stories and tutorials in western expansion. Through their pages, the American West was both romanticized and exploited. H.G. Culter, "The Dead Pathfinder," *Chicago Daily Tribune*, July 20, 1890; Richard White, *"It's Your Misfortune and None of My Own": A New History of the American West* (Norman: University of Oklahoma Press, 1991), 123-124.
[5] Francaviglia, *Mapping and Imagination in the Great Basin*, 83-95.
[6] Ibid., 94-95, 123.
[7] Mark Twain, *Roughing It* (Hartford, CT: The American Publishing Company, 1872), 93-94, 145-146, 175. For more on the difficult and incomplete transformation of Mormon areas of the Great Basin into an irrigated agricultural paradise see Mark Fiege, *Irrigated Eden: The Making of an Agricultural Landscape in the American West* (Seattle: University of Washington Press, 1999).
[8] The Nevada State Historic Preservation Office claims the hostile Forty Mile Desert destroyed 1,061 mules, 5,000 horses, and 3,750 cattle in the years between 1843 and 1850. During this same time, surveyors counted 953 graves. The heaviest traffic coursed across the desert between 1849 and 1869 when the transcontinental railroad made the overland route much easier. Twain, *Roughing It*, 126-128, 136.
[9] Mark Twain, "Early Days in Nevada," *Chicago Tribune*, January 16, 1870; "Mark Twain," *Chicago Tribune*, December 20, 1870; "Mark Twain's Lecture," *New York Times*, January 25, 1872; White, *"It's Your Misfortune and None of My Own"*, 195-196.
[10] William A. Bell, "On the Basin of Colorado and the Great Basin of North America," *Journal of the Royal Geographical Society of London* 39 (1869): 114.
[11] Bell, "On the Basin of Colorado and the Great Basin of North America," 114-117. For more information on Bell's travels see his classic work *New Tracks in North America: A Journal of Travel and Adventure Whilst Engaged in the Survey for a Southern Railroad to the Pacific Ocean during 1867-1868* (London: Chapman and Hall, 1869); Francaviglia, *Mapping and Imagination in the Great Basin*, 125-126.
[12] Clarence King led the Geological Exploration of the Fortieth Parallel, which surveyed a cross-section of the United States from the Great Plains to the Sierra Nevada along forty degrees latitude between 1867 and 1872. The King survey mapped the region for one hundred miles around the newly constructed transcontinental railroad, dispelled several misconceptions of the region, including the diamond hoax in northwestern Colorado, helped end fraudulent reports of mineral wealth and naïve investment, and published the most comprehensive atlas of the American West. In 1879, King became the first director of the newly created United States Geological Survey, a government agency which institutionalized the surveying process. Richard A. Bartlett, *Great Surveys of the American West* (Norman: University of Oklahoma Press, 1962), 158-160, 208; Francaviglia, *Mapping and Imagination in the Great Basin*, 126-130; White, *"It's Your Misfortune and None of My Own"*, 130-131.
[13] Robert Ridgeway, "Ornithology," in Clarence King, *Report of the Geological Exploration of the Fortieth Parallel, Volume IV* (Washington, DC: Government Printing Office, 1877), 353, 357-360; Bartlett, *Great Surveys of the American West*, 167-168.
[14] Sereno Watson, "Botany," in Clarence King, *Report of the Geological Exploration of the Fortieth Parallel, Volume V* (Washington, DC: Government Printing Office, 1871) reprinted in Ridgeway, "Ornithology," in King, *Report of the Geological Exploration of the Fortieth Parallel, Volume IV*, 315.
[15] Perhaps the most well-known survey is John Wesley Powells's expedition of the Colorado River from source to the confluence of the Virgin River in 1869. Most of the drainage systems of the great rivers of the United States had been explored, but the system of rivers which fed the largest river in the Southwest remained uncharted. Setting out at Green River, Wyoming, in four boats, the Powell expedition travelled the Colorado River as it traversed Flaming Gorge, Desolation, Marble, and Grand Canyons crossing the

confluences of the Yampa, Green, and little Colorado. In a second expedition in 1872, Powell explored the expansive Colorado Plateau. His 1879 *Report on the Lands of the Arid Region* recommended an alternative pattern of settlement for the American West based on reclamation and irrigation. George Wheeler of the Army Corps of Engineers conducted the broadest of the surveys beginning in 1871 covering more than seventy-two thousand square miles in the isolated wastes of the Colorado Plateau, Great Basin, Mojave and Sonoran Deserts. The Wheeler expedition surveyed Death Valley in temperatures cresting one hundred degrees Fahrenheit, Black and Boulder Canyons along the Colorado, and the rugged terrain of what is now southern Utah and Arizona. Continuing his methodical surveying until 1878, Wheeler developed four classifications of western lands based on their economic suitability and systematically mapped the last great unknown region in the contiguous United States. William A. Bell was Wheeler's photographer on the survey. John Wesley Powell, *Report on the Lands of the Arid Region of the United States: With a More Detailed Account of the Lands of Utah* (Washington, DC: Government Printing Office, 1879); Bartlett, *Great Surveys of the American West*, 325-328, 350-352; Francaviglia, *Mapping and Imagination in the Great Basin*, 130-135.

[16] Many of the place names in the Great Basin were given by George Wheeler during the survey. George M. Wheeler, *Annual Report upon the Geographical Surveys of the Territory of the United States West of the 100th Meridian* (Washington, DC: Government Printing Office, 1878), 100; George M. Wheeler, "Western Exploration," *New York Times*, December 24, 1974; George M. Wheeler, "Western Exploration," *Journal of the American Geographic Society of New York* 6 (1874): 249; Francaviglia, *Mapping and Imagination in the Great Basin*, 130-131.

[17] Wheeler, "Western Exploration," 245-246; Bartlett, *Great Surveys of the American West*, 352.

[18] Congress terminated funding for the surveys led by Ferdinand Hayden, John Wesley Powell, George Wheeler, and a handful of others because of the expense incurred in maintaining them. According to historian Richard Bartlett, the situation implied "waste, competition, and extravagance" in government spending. However, ending these surveys before their completion left a significant amount of territory uncharted. It was not until the mid-1960s that the federal government completed the last of the cadastral or rectangular surveys in the United States. Bartlett, *Great Surveys of the American West*, 373-374.

[19] William B. Hazen, "The Great Middle Region of the United States, and Its Limited Space of Arable Land," *The North American Review* 246 (January 1875): 18-20 ; Cleveland Abbe, "Obituary: William Babcok Hazen," *Nature* (April 17, 1887): 541-543. See also William B. Hazen, "Barren Lands in the Interior of the United States," *New York Tribune*, February 27, 1874.

[20] We may surmise from Russell's statement that larger expanse of land designated as "desert" on earlier maps actually refers to unexplored territory. The description of desert on the map would then indicate areas that are unknown and assumed to be unpopulated as well as places which are arid. Israel C. Russell, "The Great Basin," *Overland Monthly and Out West Magazine* (April 1888): 421-426.

[21] Hubert Howard Bancroft, *History of Nevada, Colorado, and Wyoming, 1540-1888* (San Francisco: The History Company, Publishers, 1890), 20-21; Eugene P. Moehring, *Urbanism and Empire in the Far West, 1840-1890* (Reno: University of Nevada Press, 1996), 156-161; Gordon Morris Bakken, *The Mining Law of 1872: Past, Politics, and Prospects* (Albuquerque: University of New Mexico Press, 2008), 1-15.

[22] William H. Brewer, "The Great Basin," *Journal of the American Geographical Society of New York* 21 (1889): 205; Russell H. Chittenden, "Biographical Memoir of William Henry Brewer, 1828-1910," *National Academy of Sciences Biographical Memoir* Vol. XII (1927): 302-304.

[23] Brewer, "The Great Basin," 197, 215-219, 224-227.

[24] William E. Smythe, *The Conquest of Arid America* (New York: The Macmillan Company, 1907), 164-184, 190-206; David M. Wrobel, *Promised Lands: Promotion, Memory, and the Creation of the American West* (Lawrence: University Press of Kansas, 2002), 54-56; Census Bureau, "Table 27: Idaho – Race and Hispanic Origin 1870-1990," September 13, 2002, Census Bureau Quick Facts, http://quickfacts.census.gov; Census Bureau, "Table 43: Nevada – Race and Hispanic Origin 1860-1990," September 13, 2002, Census Bureau Quick Facts, http://quickfacts.census.gov; Census Bureau, "Table 52: Oregon – Race and Hispanic Origin 1850-1990," September 13, 2002, Census Bureau Quick Facts, http://quickfacts.census.gov; Census Bureau, "Table 59: Utah – Race and Hispanic Origin 1850-1990," September 13, 2002, Census Bureau Quick Facts, http://quickfacts.census.gov. Nevada met the required 60,000 in population for statehood in 1880, but declined to 45,000 during the next three decades. It was not until the 1910 census that Nevada began to maintain a population consistently over the requirement for statehood. Nevada's population did not begin to significantly increase until after World War II.

[25] C.A. Norcross, *Agricultural Nevada* (San Francisco: Sunset Magazine Homeseekers Bureau, 1911), 3-29.
[26] Several senators visited the Great Basin in order to determine the best route for a new highway which would connect Salt Lake City and Los Angeles. "Senators Emerge from Great Desert," *New York Times* (September 19, 1925); White, *"It's Your Misfortune and None of My Own"*, 405-406.
[27] The "closing" of the western frontier referred to the United States Census Bureau's bulletin in 1890 that "Up to and including 1880 the country had a frontier of settlement, but at present the unsettled area has been so broken into by isolated bodies of settlement that there can hardly be said to be a frontier line. In the discussion of its extent, its westward movement, etc., it can not , therefore, any longer have a place in the census reports." For historian Frederick Jackson Turner, this meant that the first epoch of American history had come to an end. "Up to our own day," he wrote in 1893, "American history has been in a large degree the history of the colonization of the Great West. The existence of an area of free land, its continuous recession, and the advance of American settlement, westward, explain American development." Now that the frontier was closed, the most desirable and cultivatable land was gone, the very conditions which Turner believed had created American institutions and society had disappeared. Turner and his contemporaries wondered what conditions would take the place of the frontier in maintaining American democracy. Frederick Jackson Turner, "The Significance of the Frontier in American History," in John Mack Faragher, *Rereading Frederick Jackson Turner: 'The Significance of the Frontier in American History' and Other Essays* (New Haven, CT: Yale University Press, 1998), 31-60.
[28] Benjamin Horace Hibbard. *A History of the Public Land Policies*. (1924; Madison: University of Wisconsin Press, 1965), 383-471.
[29] The Central Pacific land grants spanned the region between Salt Lake City and Reno in the Great Basin for the purposes of constructing the first transcontinental railroad. The territory granted the railroad company in Utah essentially spanned the Great Salt Desert and was considered of little value. Hibbard, *A History of the Public Land Policies*, 247-249, 264, 267-268; Cruz Venstrom, "Railroad Grant Lands of Nevada," Preliminary Draft, October 1939, Folder 655, Public Lands Foundation Archive, Phoenix, AZ.
[30] Hugh A. Shamberger, *Evolution of Nevada's Water Laws, as Related to the Development and Evaluation of the State's Water Resources, from 1866 to About 1960* (Carson City, NV: Division of Water Resources, 1991).
[31] Nevada State Engineer, Division of Water Resources, "Nevada Water Rights Fact Sheet," August 15, 2001, Nevada Division of Water Resources, http://water.nv.gov.
[32] Homestead Entry Survey Number 117, March 1, 1919; General Land Office Record 762229, July 16, 1920; Nevada State Water Application for Permit 4349, March 9, 1917; Homestead Entry Survey Number 118, September 16, 1919; General Land Office Record 674359, April 16, 1919; Nevada State Water Certificate 447, May 5, 1919; Nevada State Water Certificate 1860, November 16, 1932; Nevada State Water Certificate 1906, January 17, 1933; Homestead Entry Survey Number 153, March 10, 1919; General Land Office Record 769857, August 26, 1920; Nevada State Water Application for Permit 4348, March 9, 1917; Nevada State Water Application for Permit 7615, January 8, 1926; Nevada State Water Application for Permit 8058, March 28, 1927; Nevada State Water Application for Permit 10053, November 19, 1936; Robert D. McCracken and Jeanne Sharp Howerton, *A History of Railroad Valley Nevada* (Tonopah, NV: Central Nevada Historical Society, 1996), 196-198.
[33] Office of State Engineer, *Water Law of Nevada Embracing All Amendments to the Present Time and the Stock Watering Act of April 1, 1925*, (Carson City, NV: State Printing Office, 1927), 33-34; Shamberger, *Evolution of Nevada's Water Laws*, 48.
[34] Office of State Engineer, *Water Law of Nevada*, 13; Clel Georgetta, *Golden Fleece in Nevada* (Reno, NV: Venture Publishing Company, Ltd., 1972), 129-147.
[35] "Nevada Livestock Growers Will Discuss Range Problems," *Reno Evening Gazette*, December 9, 1926; "Eureka Water Case is Heard," *Reno Evening Gazette*, September 10, 1927; "Stockmen Hear State Engineer," *Reno Evening Gazette*, October 31, 1927; *In Re Calvo*, 50 Nev. 125 (1927); "Nevada Stockmen Gather in Elko for Important Convention Next Friday," *Reno Evening Gazette*, November 16, 1927; Georgetta, *Golden Fleece in Nevada*, 140.
[36] "Water Rights on the Open Range," *Tonopah Daily Times Bonanza*, December 10, 1929.
[37] "Stock Water Law Test is Filed Before High Court," *Reno Evening Gazette*, October 31, 1929; "State Livestock Association to Join in Effort to Have Stock Water Law Sustained," *Reno Evening Gazette*, December 6, 1929.

[38] "State Range Map Work Started at Carson," *Reno Evening Gazette*, January 11, 1928; "Development of Water for Stock Holds Importance," *Ely Daily Times*, February 6, 1930; Shamberger, *Evolution of Nevada's Water Laws*, 49.

[39] According the U.S. Census Bureau's historical census statistics, after the major mining boom of the early twentieth century, Tonopah's population dropped by half to around 2000 residents by 1930, where it stayed until the 1980s when a brief surge in population came from the defense industry. Ely's population hovered between 3000 and 4000 during the same period. St. George grew from 2500 to 4500 residents between 1930 and 1950. Las Vegas grew from just over 5000 residents in 1930 to almost 25,000 residents in 1950. By 1960, the city's population exceeded that of Reno, which had been the largest city in the state up to that point. See the online data available at Census Bureau Selected Historical Decennial Census Population and Housing Counts, http://www.census.gov/population/www/censusdata/hiscendata.html.

[40] His oldest son William worked there as a miner and homesteaded 160 acres just north of Alamo. His twin boys Joseph and Hyrum settled just near Alamo, just twenty miles south of Hiko, at Ash Springs. Joseph prospected in the nearby mountain ranges and located the gold vein which set off a minor mining boom at Delamar in 1889. The core of his ranching operations was the Grove Ranch near Ash Springs where he established water rights. Joseph, his son Lawrence, and his grandson Ainslee continued ranching operations at what became the Sharp Ranch in Alamo throughout the twentieth century. In addition, Ainslee served as the local deputy sheriff during the 1950s and often worked in conjunction with the Atomic Energy Commission setting up roadblocks during nuclear testing series. General Land Office Record 006391, February 3, 1889; General Land Office Record 006695, May 3, 1900; Nevada State Vested Water Right V01705, May 29, 1920; Nevada State Vested Water Right V01354, June 25, 1922; Nevada State Vested Water Right V01789, June 25, 1922; Nevada State Water Certificate 932, December 21, 1923; Robert D. McCracken, Interview with Lina Sharp, August 14, 1992, Nye County Town History Project, Special Collections, University of Nevada, Las Vegas, Nevada (hereafter Special Collections, UNLV); McCracken and Howerton, *A History of Railroad Valley Nevada*, 161-167; Louise B. Stewart, *The History of Pahranagat Valley*, (Provo, UT: J. Grant Stevenson, 1979), 8-9, 14, 35; James W. Hulse, *Lincoln County, Nevada: 1864-1909* (Reno: University of Nevada Press, 1971), 51-53; Philip Fradkin, *Fallout: An American Nuclear Tragedy* (Boulder, CO: Johnson Books, 1989), 6-7.

[41] In 1881, Henry's brother Lewis Sharp, purchased the Blue Eagle Ranch in nearby Railroad Valley from Jewett Adams, a cattle rancher and former governor. Adams had originally purchased the property from Alex Beatty, the original Railroad Valley resident in 1867 who started the mining boom nearby in Troy canyon with gold strike. After running livestock in the valley for twenty years, Lewis Sharp sold out to small-time rancher Martin Horton in 1901 and moved to Elko County to take advantage of the higher quality grazing range with his adult sons. George Sharp registered his "21" cattle brand with the state in the same year his uncle moved to Blue Eagle to commemorate his birthday, and aimed to construct a livestock operation in the area. Alexander Beaty's original homestead entry is General Land Office Record NVNVAA 001432, March 30, 1880; *History of Nevada with Illustrations and Biographical Sketches of its Prominent Men and Pioneers* (Oakland, CA: Thompson & West, 1881), 516, 526; Nevada State Water Certificate 1790-1793, March 31, 1932; Nevada State Water Certificate 1927, March 17, 1933; "Body of Missing Rancher Found," *Nevada State Journal*, July 24, 1934; McCracken and Howerton, *A History of Railroad Valley Nevada*, 162-173; Stewart, *The History of Pahranagat Valley*, 8-9.

[42] Originally settled by a Mormon family, Nyala had been developed by Herman Reischke, a prospector from the Reveille Range to the south and owner of the Last Chance mine. During Reischke's tenure, Nyala had hosted competitors of the 1908 automobile race between New York and Paris as the route took them along the old wagon road from Currant east of Ely straight through Railroad Valley to Twin Springs and then on to Tonopah. Nyala even had a post office beginning in 1914 well into the 1930s. Herman Reischke's homestead record is General Land Office Record 010318, January 6, 1932; McCracken and Howerton, *A History of Railroad Valley Nevada*, 148-150, 162-173.

[43] Emery Garrett's homestead record is General Land Office Record 1052609, November 21, 1921;General Land Office Record 052802, November 11, 1960; Land Record NVN 0048648, October 22, 1964; Land Record NVN 0056206, December 18, 1967; Land Record NVN 005790, April 4, 1980. Nevada State Water Certificate 2207-2208, February 24, 1936; Nevada State Water Certificate 2842, January 16, 1945; Nevada State Water Certificate 3011, November 25, 1946; Nevada State Vested Water Right V02340-V02341, February 10, 1947; Nevada State Water Certificate 3039, March 20, 1947; Nevada State Vested Water Right V02353, September 20, 1948; Nevada State Water Certificate 3429, March 22, 1950; Nevada State

Water Certificate 4104, July 21, 1954; Nevada State Water Certificate 4050, January 25, 1954; Nevada State Water Certificate 4254-4255, December 1, 1955; Nevada State Water Certificate 4623, December 30, 1957. Gerald and Norman Sharp purchased the Arigoni, Bordoli, Christian, Garett, Hail, Taylor, and some United Cattle and Packing Company water rights. See Nevada State Water Certificates 0200, 3085, 3348, 3893, 0261, 2243, 2244, V00736, V02203, V02248, 0048, 2207, 2208, 2373, 3046, 3047, 5836, 0287, 0288, 2220, 0324, 2533. The men acquired their father Howard Sharp's water rights. See Nevada State Water Certificates and Vested Water Rights 4104, 4329, 3011, 5040, 4255, 4254, 4623, 2841, V02340, V02341, V02353. They also acquired a water right from their brother in-law Carl Hanks. See Nevada Water Certificate V02878. They expanded their water holdings mainly through underground allocations. See Nevada State Water Certificate 3902, November 10, 1952; Nevada Water Certificate 4798, September 8, 1958; Nevada Water Certificate 4800, September 8, 1958; Nevada Water Certificate 5506-5508, September 12, 1963; Nevada Water Certificate 7531, January 5, 1971; Nevada Water Certificate 7228-7729, February 22, 1972; Nevada Water Certificate 7730-7731, February 23, 1972; Nevada Water Certificate 7967, January 3, 1973; Nevada Water Certificate 7994, January 11, 1973; Nevada Water Certificate 7999, January 11, 1973, Nevada Water Certificate 10518, December 31, 1982; Nevada Water Certificate 12327, November 6, 1989; Nevada Water Certificate 12846, May 29, 1991; Nevada Water Certificate 14757, December 4, 1997. McCracken and Howerton, *A History of Railroad Valley Nevada*, 150-151, 240-241, 286.

[44] Neither Nyala nor Blue Eagle had electricity until well into the twentieth century. They used kerosene lamps and wood stoves for light and heat, cooking meals with water hauled from the well next to the houses. From the outside, the Sharps' lives seemed primitive, but Lina and her family, in particular, have travelled extensively, including taking safaris in Africa. Nevada State Water Certificate 4162-4166, January 24, 1955; Nevada State Water Certificate 8024, February 1, 1973; Nevada State Vested Water Right V02878-V02879, June 21, 1976; Nevada State Vested Water Right V02990, June 21, 1976; Nevada State Water Certificate 8819, August 20, 1976; Nevada State Water Certificate 15009, September 4, 1998; "Nye Farm Bureau Plans Discussed, *Reno Evening Gazette*, November 25, 1947; "Nevada Farm Bureau Hits Re-Route Plan," *Reno Evening Gazette*, December1, 1956; "Sharp Renamed Head of State Farm Bureau," *Reno Evening Gazette*, November 23, 1959; McCracken and Howerton, *A History of Railroad Valley Nevada*, 173-178; Robert D. McCracken, Interview with Lina Sharp, August 14, 1992, Nye County Town History Project, Special Collections, UNLV.

[45] Nevada State Vested Water Right V01026, February 23, 1911; General Land Office Record 668067, February 28, 1919; Russell M. Robison, *Our Swallow Heritage, Volume I* (Morrisville, NC: Lulu Enterprises, Inc., 2006), 44-87; Russell M. Robison, *Our Swallow Heritage, Volume II* (Morrisville, NC: Lulu Enterprises, Inc., 2006); Effie O. Read, *White Pine Lang Syne: A True History of White Pine County, Nevada* (Denver, CO: Big Mountain Press, 1965), 182-183.

[46] Their children were George William, who died while still a child, Richard Thomas, Alfred Marion, May, Ray, Birdie, and Ida Pearl, and an adopted Shoshone girl named Mamie. After eighty years of hard work, visiting his ranch every summer even after his retirement, George Swallow died in 1932. Robison, *Our Swallow Heritage, Volume II*.

[47] By 1913, the second brother, Alfred M. Swallow, had grown tired of ranching, sold out his share of the ranch, and moved across the Snake Range to Garrison, Utah, where he ran a general store. Several years later, in 1916, Ray, whose wife was ill, sold his interest in the ranch, which left the whole operation to Richard. General Land Office Record 938903, May 24, 1924; General Land Office Record 999993, April 12, 1927; General Land Office Record 1001918 and 1001919, May 21, 1927; General Land Office Record 1003370, June 1, 1927; Nevada State Vested Water Right V01970-V02027, December 19, 1925; Nevada State Vested Water Right V02111-V02125, October 11, 1927; Nevada State Vested Water Right V02198, December 17, 1928; Nevada State Vested Water Right V02199, December 17, 1928; Nevada State Vested Water Right V02201, December 17, 1928; Nevada State Water Certificate 2410, August 8, 1929; Robison, *Our Swallow Heritage, Volume II*.

[48] George Neils and brothers Arlo Bryan and Richard M. Swallow worked the ranch together for several decades. But when Richard died in 1943, George Neils took over the ranch's operations full-time. "Stockmen Face Heavy Losses as Winter Storms Continue," *Reno Evening Gazette*, January 21, 1949; "Airplanes Start Food Lift To Supply Starving Stock," *Reno Evening Gazette*, January 24, 1949; "Air Force Orders Reinforcements for Nevada's 'Operation Haylift'," *Reno Evening Gazette*, January 29, 1949; "Haylift Crews Speed Up Tempo of Operations," *Reno Evening Gazette*, February 2, 1949; "Operation

Haylift Burns Gasoline to Feed Livestock," *Reno Evening Gazette*, February 5, 1949; "Haylift Helped by Mild Weather," *Reno Evening Gazette*, February 10, 1949; "First Nevada Ram Sale Set at Ely Aug. 3-4," *Reno Evening Gazette*, July 17, 1956; "First Ram Sale in White Pine Called Success," *Reno Evening Gazette*, August 11, 1956; Bureau of Land Management Record 1207591, April 13, 1960; *Swallow Ranches, Inc., v. Leonard Bidart and Bidart Brothers*, 525 F.2d 995 (9th Cir. 1975); Robison, *Our Swallow Heritage, Volume II*.

[49] Nevada State Water Certificate 208, July 22, 1914; Nevada State Water Certificate 350, July 23, 1917; Nevada State Water Certificate 468, December 3, 1919; Nevada State Vested Water Right V01505, May 17, 1917; Nevada State Vested Water Right V01506-V01507, May 17, 1917; Nevada State Vested Water Right V01798, June 25, 1922; General Land Office Record 935763, April 4, 1924; General Land Office Record 940203, June 18, 1924; Obituary: William G. Lamb," *Nevada State Journal*, July 16, 1939; Stewart, *The History of Pahranagat Valley*, 16-17, 32, 38-39, 42; Al Delagach and George Reasons, "Lamb is the Name of the Game in Nevada," *Los Angeles Times*, April 15, 1977; Ed Koch and Mary Manning, et al., "Lamb, Longtime Nevada Politician, Rancher, Dies," *Las Vegas Sun*, June 3, 2002.

[50] Nevada State Water Certificate 2778, March 9, 1944; Nevada State Water Certificate 2830, January 5, 1945; "Alamo Ranchers Ask More Water," *Reno Evening Gazette*, April 9, 1947; "Lamb Privileges Revoked," *Beaverton Valley Times*, March 18, 1977; Koch and Manning, et al., "Lamb, Longtime Nevada Politician, Rancher, Dies," *Las Vegas Sun*, June 3, 2002; Stewart, *The History of Pahranagat Valley*, 16-17, 32, 38-39, 42; Vikki P. Allen and Christopher L. Harper, et al., *The Prospects Look Good: A View of 10 Ranching and Mining Sites on Nellis Air Force Range* (Las Vegas, NV: Dames and Moore, Inc., November 1998), 9-1-9-18; Fradkin, *Fallout*, 102, 149.

[51] Gloria P. Totoricaguena, *Identity, Culture, and Politics in the Basque Diaspora* (Reno: University of Nevada Press, 2004), 63-68, 70-72.

[52] Beltran Paris, *Beltran: Basque Sheepman of the American West* (Reno: University of Nevada Press, 1979), 37-54, 63-67, 87-88, 108-109; Leisl Carr, Interview with Gracian N. Uhalde, December 1, 2006, Nevada Test Site Oral History Project, Special Collections, UNLV.

[53] The Adams-McGill Company did not file for many water rights, which Byrd Wall Sawyer argued contributed to their demise. However, state water records indicate that the company did receive a number of water rights which would have helped them maintain access to the rangeland had the company remained solvent. Bertran Paris wrote that the Adams-McGill made a poor decision investing in shearing machines, noting that the early machines took the wool off the sheep right down to the skin leaving them little protection from the sun or cold. He remembered around 10,000 dying the first year the company used the machines because they sheared their sheep early and they froze to death in a spring snow storm. It was after that massive loss that the company went broke. The absence of the Adams-McGill herds left a void on the range which nomadic herders soon filled. General Land Office Record 01220, June 3, 1914; General Land Office Record 02369 and 02370, July 25, 1916; General Land Office Record 02373, June 13, 1916; General Land Office Record 02706, July 18, 1920; General Land Office Record 03236, July 5, 1918; General Land Office Record 03283, February 27, 1918; General Land Office Record 03284, October 28, 1918; General Land Office Record 03285, August 27, 1918; General Land Office Record 03363, May 17, 1920; General Land Office Record 03830 and 03864, May 29, 1922; General Land Office Record 04294, April 18, 1923; General Land Office Record 04612, February 20, 1923; General Land Office Record 04614, November 16. 1924; Nevada State Water Certificate 167, January 14, 1914; Nevada State Water Certificates 302-303, December 20, 1916; Nevada Water Certificate 854, November 21, 1923; Nevada State Water Certificates 679-680, January 5, 1923; Nevada State Water Certificate 1215, September 10, 1926; Nevada State Water Certificates 1259-1260, October 18, 1922, Nevada State Water Certificate 1366, April 16, 1926; Nevada State Water Certificates 2091-2093, March 23, 1935; Nevada State Vested Water Right V00797, October 26, 1912; Nevada State Vested Water Right V00799, V01142, and V01216, November 13, 1913; Nevada State Vested Water Right V01265, November 12, 1913; Nevada State Vested Water Right V01268, V01286, V01288, V01290, February 18, 1914; Nevada State Vested Water Right V01294 and V01301-V01302, March 5, 1914; Nevada State Vested Water Right V01365, April 6, 1915; Nevada State Vested Water Right V01415-V01416, August 27, 1915; Nevada State Vested Water Right V01486, December 2, 1926; Nevada State Vested Water Right V01786, June 29, 1923; Nevada State Vested Water Right V01790-V01792, April 3, 1922; Nevada State Vested Water Right V01878-V01896, April 4, 1925; Nevada State Vested Water Right V01959-V01961, January 12, 1926; Nevada State Vested Water Right V01966-V01967, January 5, 1929; Nevada State Vested Water Right V02067-V02068,

December 30, 1926; Nevada State Vested Water Right V020768, March 30, 1917; Michael Kimmelman, "Art's Last, Lonely Cowboy," *New York Times*, February 6, 2005; Leisl Carr, Interview with Gracian N. Uhalde, December 1, 2006, Nevada Test Site Oral History Project, Special Collections, UNLV; Paris, *Beltran*, 37-54, 63-67, 87-88, 108-109; Georgetta, *Golden Fleece in Nevada*, 310-327; McCracken and Howerton, *A History of Railroad Valley Nevada*, 180-186; Byrd Wall Sawyer, *Nevada Nomads: A Story of the Sheep Industry* (San Jose, CA: Harlan-Young Press, 1971), 83-87, 101-102; Totoricaguena, *Identity, Culture, and Politics*, 63-68, 70-72.

[54] The Paris family's water rights include Nevada State Water Certificate 14550, May 21, 1911; Nevada State Water Certificate 30, June 25, 1912; Nevada State Water Certificate 119-120, May 14, 1913; Nevada State Water Certificate 549-550, March 15, 1921; Nevada State Water Certificate 838, October 30, 1923; Nevada State Water Certificate 1708-1710, June 8, 1931; Nevada State Water Certificate 1711-1717, June 12, 1931; Nevada State Water Certificate 1822, June 16, 1932; Nevada State Water Certificate 2071, April 4, 1934; Nevada State Water Certificate 2471-2472, June 21, 1939; Nevada State Water Certificate 4503, March 26, 1957; Nevada State Vested Water Right V01508-V01510, May 7, 1917; Nevada State Vested Water Right V07311-V07313. Their land records include General Land Office Records 1024072 and 1024073, February 20, 1929. The Uhalde family's water rights include Nevada State Water Certificate 392, December 16, 1818; Nevada State Water Certificate 529-530, March 10, 1921; Nevada State Water Certificate 546, March 15, 1921; Nevada State Water Certificate 578, 610-617, February 8, 1922; Nevada State Water Certificate 734 and 785, August 31, 1923; Nevada State Water Certificate 904, 906-907, 909, December 11, 1923; Nevada State Water Certificate 930, December 21, 1923; Nevada State Water Certificate 941-944, December 26, 1923; Nevada State Water Certificate 1000, March 3, 1924; Nevada State Water Certificate 1019, March 31, 1924; Nevada State Water Certificate 1026, April 4, 1924; Nevada State Water Certificate 1047-1048, August 14, 1924; Nevada State Water Certificate 1061, September 24, 1925; Nevada State Water Certificate 1208, September 10, 1926; Nevada State Water Certificate 1254-1258, October 18, 1926; Nevada State Water Certificate 1355, April 13, 1928; Nevada State Water Certificate 1450-1451, September 29, 1928; Nevada State Water Certificate 1516-1517, February 21, 1929; Nevada State Water Certificate 1544-1545, March 6, 1929; Nevada State Water Certificate 1553, March 21, 1929; Nevada State Water Certificate 1567, April 8, 1929; Nevada State Water Certificate 1698, June 1, 1931; Nevada State Water Certificate 1810, April 27, 1932; Nevada State Water Certificate 1920, February 18, 1933; Nevada State Water Certificate 1953, 1959-1960, May 10, 1933; Nevada State Water Certificate March 24, 1936; Nevada State Water Certificate 2329-2330, March 9, 1937; Nevada State Water Certificate 4454 and 4456, October 23, 1956; Nevada State Water Certificate 4871, March 3, 1959; Nevada State Water Certificate 6129, January 18, 1967; Nevada State Water Certificate 7177, October 10, 1969; Nevada State Vested Water Right V00794-V00795, V00800, V01035, V01139-V01141, V01143-V01145, October 26, 1912; Nevada State Vested Water Right V01152-V01153, July 22, 1912; Nevada State Vested Water Right V01266, November 12, 1913; Nevada State Vested Water Right V01539-V01541, January 22, 1918; Nevada State Vested Water Right V01542-V01544, February 18, 1918; Nevada State Vested Water Right V01636, September 6, 1919; Nevada State Vested Water Right V01804-V01805, October 9, 1922; Nevada State Vested Water Right V01947-V01848, May 15, 1924; Sawyer, *Nevada Nomads*, 81-83, 87-99; Totoricaguena, *Identity, Culture, and Politics*, 63-68, 70-72.

[55] "Ranges in Worst Shape on Record," *Nevada State Journal*, August 25, 1934. The Paris's also acquired two more ranches in Butte Valley, the Stratton Ranch in 1942 and the Snow Creek Ranch in 1952. These purchases effectively gave the Paris operation complete control of Butte Valley. The Paris's also acquired rangeland in Sand Spring Valley in Lincoln County to add to their winter range during this time. Bureau of Land Management Record NVN 0056685, June 13, 1961; Bureau of Land Management Record NVN0043739, July 28, 1961; Record NVN 0058566FD, December 7, 1965; Bureau of Land Management Record 005821, January 10, 1979; James A. Young, "Operation Hay Lift: The Winter of 1949," *Rangelands* 6 (June 1984): 116-119; Paris, *Beltran*, 129-140, 143-154, 157-169.

[56] Leisl Carr, Interview with Gracian Uhalde, December 1, 2006, Nevada Test Site Oral History Project, Special Collections, UNLV.

[57] General Land Office Record 972036, January 8, 1926; Homestead Survey Entry 62, February 17, 1919; Nevada State Water Certificate 200, June 20, 1914; General Land Office Record 933182, March 3, 1924; General Land Office Record 961245, June 24, 1925; Homestead Entry Survey Number 61, February 26, 1919; Nevada State Vested Water Right V0736, July 12, 1909; Nevada State Water Certificate 261, March 27, 1915; Nevada State Water Certificate 2243, May 8, 1936; Nevada State Vested Water Right V02203,

November 24, 1928; Nevada State Vested Water Right V02248, August 17, 1931; Nevada State Water Certificate 2244, May 8, 1936; Nevada State Water Permit Application 10507, May 18, 1940; Nevada State Water Permit Application 10835, June 11, 1942; Nevada State Water Permit Application 10836, June 11, 1942; Nevada State Water Certificate 3085, December 10, 1947.

[58] The state engineer cancelled these particular water rights because Locke, Titus, and the Bordolis failed to make the stated improvements by the state's deadline. Nevada State Water Permit Application 12758, December 7, 1948; Nevada State Water Certificate 3348, December 14, 1949; Nevada State Water Certificate 3893, October 15, 1952; Nevada State Water Certificate 3902, November 10, 1952; "Wool Sales are Reported," *Reno Evening Gazette*, April 18, 1939; "Santina Bordoli Rites Conducted," *Tonopah Daily Times*, January 23, 1942; "Matron Dies in Tonopah," *Reno Evening Gazette*, January 24, 1942; "Ranch Operator Dies in Utah," *Nevada State Journal*, July 22, 1943; "Grazing Rights Meet Conducted," *Nevada State Journal*, July 16, 1947; "Cattle Suffer From Blizzards," *Reno Evening Gazette*, March 1, 1949; "Child Needs Blood," *Nevada State Journal*, February 12, 1956; "Alfred Bordoli Services Held," *Reno Evening Gazette*, August 12, 1956; Carole Gallagher, *American Ground Zero: The Secret Nuclear War* (Cambridge, MA: The MIT Press, 1993), 114-119; McCracken and Howerton, *A History of Railroad Valley Nevada*, 151-152, 190, 230, 256, 283-286; Fradkin, *Fallout*, 126-136.

[59] According to their water permit applications, by the mid-1930s, United Cattle and Packing Company and the affiliate Humphrey Reed Land and Cattle Company applied for and were denied multiple water rights in Railroad and Ralston valleys, the two major areas of the company's operations. Without their water rights acknowledged by the state engineer's office, the company would lost control of their range. Water rights associated with the company's properties were transferred as part of the ranches' sale to later owners. Humphrey's land in Elko County consisted of more than a dozen 40-acre entries under the Homestead Act. General Land Office Records 02239 through 02252, dated March 3 and April 24, 1916 and General Land Office Records 02256-02260, dated March 3, 1916; General Land Office Record 557813, December 8, 1916; General Land Office Record 583052, May 7, 1917; General Land Office Record 583053, May 7, 1917; General Land Office Record 613396, January 7, 1918; General Land Office Record 637109, June 20, 1918. General Land Office Record 898286, March 7, 1923; Nevada State Water Permit Application 4294, February 5, 1917; Nevada Water Permit Application 4223, November 18, 1916; Nevada Water Permit Application 4231, November 25, 1916; Nevada Water Permit Application 4294, February 5, 1917; Nevada Water Permit Application 4662, October 26, 1917; Nevada Water Permit Application 8640, July 26, 1928; McCracken and Howerton, *A History of Railroad Valley Nevada*, 186-191.

[60] The water rights the United Cattle and Packing Company held were bought or transferred to many of the other ranches operating in proximity to the company in its various locations throughout central Nevada. McCracken and Howerton, *A History of Railroad Valley Nevada*, 186-191.

[61] The five or six cattle ranches in the Reveille district in the 1880s were not doing very well. Bautista and Constant Vener homesteaded 160 acres to the east of the Kawich Range and held water rights there until the early 1940s. They had purchased some of these rights from the United Cattle and Packing Company in the mid-1920s. General Land Office Record 1097583, June 9, 1938; Nevada State Vested Water Right V01936, July 3, 1925; General Land Office Record 915720, August 30, 1923; Nevada State Water Certificate 812, September 29, 1923; *History of Nevada with Illustrations and Biographical Sketches of its Prominent Men and Pioneers* (Oakland, CA: Thompson & West, 1881), 526; Robert D. McCracken, Interview with Helen L. Fallini, October 25 and 26, 1987, Special Collections, UNLV; McCracken and Howerton, *A History of Railroad Valley Nevada*, 195, 281-285.

[62] Many of their water rights were purchased from the United Cattle and Packing Company and relatives such as Gustaf Peterson, who had homesteaded 320 acres near the Bellehelen mine and whose wife Minnie was an aunt to the Fallinis. General Land Office Record 833630, November 21, 1921; Nevada State Water Certificate 318, December 23, 1916; Nevada State Water Certificate 388 December 16, 1918; Nevada State Water Certificate 521, March 7, 1921; Nevada State Water Certificate 665-666, November 12, 1922; Nevada State Water Certificate 949, December 26, 1923; General Land Office Record 919004, October 2, 1923; Nevada State Water Certificate 1077-1079, December 5, 1924; Nevada State Water Certificate 1110 March 13, 1925; Nevada State Water Certificate 1235, September 10, 1926; Nevada State Water Certificate 1393, May 4, 1928; Nevada State Water Certificate 1937, March 22, 1933; Nevada State Water Certificate 2155, November 19, 1935; Nevada State Water Certificate2533, May 7, 1940; Nevada State Water Certificate 2892, August 29, 1945; Nevada State Water Certificate 2909-2912, October 24, 1945; Nevada State Water Certificate 3103-3106, April 9, 1948; Nevada State Water Certificate 3123, June 21, 1948;

Nevada State Water Certificate 3253, April 21, 1949; Nevada State Water Certificate 3297, October 28, 1949; Nevada State Water Certificate 3325, December 14, 1949; Nevada State Water Certificate 3383-3386, January 9, 1950; Nevada State Water Certificate 3430, March 22, 1950; Nevada State Water Certificate 3512, September 21, 1950; Nevada State Water Certificate 3521-3522, November 17, 1950; Nevada State Water Certificate 3536, November 28, 1950; Nevada State Water Certificate Nevada State Water Certificate 3571-3573, February 5, 1951; Nevada State Water Certificate 3515, 3615, May 1, 1951; Nevada State Water Certificate 3618-3621, May 23, 1951; Nevada State Water Certificate 3659-3660, July 12, 1951; Nevada State Water Certificate 3696, September 24, 1951; Nevada State Water Certificate 3797, June 24, 1952; Nevada State Water Certificate 3844, September 22, 1952; Nevada State Water Certificate 3932, February 25, 1953; Nevada State Water Certificate 4213, February 14, 1955; Nevada State Water Certificate 4624, December 30, 1957; Nevada State Water Certificate 5048, November 23, 1960; Nevada State Water Certificate 5209, September 27, 1961; Nevada State Water Certificate 5615-5616, September 19, 1963; Nevada State Water Certificate 5739, June 24, 1964; Nevada State Water Certificate 5763, October 6, 1964; Nevada State Water Certificate 6872-6873, December 6, 1968; Nevada State Water Certificate 6979, April 10, 1969; Robert D. McCracken, Interview with Helen L. Fallini, October 25 and 26, 1987, Nye County Town History Project, Special Collections, UNLV, Nevada; McCracken and Howerton, *A History of Railroad Valley Nevada*, 195, 281-285.

[63] Interview with Helen L. Fallini, October 25 and 26, 1987, Special Collections, UNLV.

[64] Keith Rogers, "Yucca Mountain Rail Line: Residents Oppose Route," *Las Vegas Review Journal*, April 25, 2004; Robert D. McCracken, Interview with Helen L. Fallini, October 25 and 26, 1987, Special Collections, UNLV; McCracken and Howerton, *A History of Railroad Valley Nevada*, 195, 281-285; Fradkin, *Fallout*, 126-136.

[65] White, *"It's Your Misfortune and None of My Own,"*, 85-118, 439-441; Inter-Tribal Council of Nevada, *Newe: A Western Shoshone History* (Salt Lake City: University of Utah Press, 1976), 14-58, 71-78; Steven J. Crum, *The Road on Which We Came: A History of the Western Shoshone* (Salt Lake City: University of Utah Press, 1994), 17-84; Moehring, *Urbanism and Empire*, 121-166; Ned Blackhawk, *Violence Over the Land: Indians and Empires in the Early American West* (Cambridge, MA: Harvard University Press, 2006), 10-11, 154-157, 244-266.

[66] White, *"It's Your Misfortune and None of My Own"*, 85-118, 439-441; Inter-Tribal Council, *Newe*, 14-58, 71-78; Crum, *The Road on Which We Came*, 17-84.

[67] Inter-Tribal Council, *Newe*, 14-58, 71-78; Crum, *The Road on Which We Came*, 17-84; Moehring, *Urbanism and Empire*, 121-166.

[68] "Shoshone Indian Wins Gold Belt For Riding," *Reno Evening Gazette*, September 8, 1913; "Cowboys Will Show Sunday," *Reno Evening Gazette*, September 12, 1913; "Many Features Enliven Day at Moana Springs," *Reno Evening Gazette*, September 15, 1913; Peter Iverson, *When Indians Became Cowboys: Native Peoples and Cattle Ranching in the American West* (Norman: University of Oklahoma Press, 1994); White, *"It's Your Misfortune and None of My Own"*, 85-118, 439-441; Inter-Tribal Council, *Newe*, 14-58, 71-78; Crum, *The Road on Which We Came*, 17-84; Moehring, *Urbanism and Empire*, 121-166.

[69] Inter-Tribal Council, *Newe*, 82-100; Crum, *The Road on Which We Came*, 59-117; Blackhawk, *Violence Over the Land*, 280-293.

[70] Inter-Tribal Council, *Newe*, 82-100; Crum, *The Road on Which We Came*, 59-117.

[71] General Land Office Record 836205, December 1, 1921; Nevada State Vested Water Right V01339, September 30, 1914; Nevada State Vested Water Right V01736, March 25, 1921; Nevada State Water Certificate 1989, June 22, 1933; Nevada State Water Certificate 2003, June 22, 1933; "Eureka Stockmen Expect Good Season," *Reno Evening Gazette*, March 24, 1928; "Prices on Wool Show Low Average," *Nevada State Journal*, September 22, 1929; "Angelo Florio Dies in Hospital in Ely," *Nevada State Journal*, December 16, 1931; "Snow Blocks Pinto Summit," *Nevada State Journal*, January 27, 1932; "Railway Traffic Halted By Snow," *Reno Evening Gazette*, January 29, 1932; "Flames Destroy Ranch Building," *Reno Evening Gazette*, February 1, 1932; "Trespass Cases Will Be Heard," *Reno Evening Gazette*, January 2, 1933; "Prominent Elko Stockman Shot and Badly Wounded," *Reno Evening Gazette*, March 9, 1933; "Stockman Wounded in Dispute," *Nevada State Journal*, March 9, 1933; "Elko Sheepman Given Chance to Recover," *Reno Evening Gazette*, March 13, 1933; "Hearing Set for A. Florio," *Reno Evening Gazette*, March 16, 1933; "Trespass Case in Tonopah Creates Great Interest," *Nevada State Journal*, November 25, 1933; "Stockmen Attend Trespass Case in Tonopah," *Reno Evening Gazette*, November 28, 1933; "Elko Sheepmen Protest Action of Stock Owner," *Nevada State Journal*, December 12, 1933; "Cattle are Sold to

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[73] Indian Cattle Sale," *Nevada State Journal*, October 1, 1943; "Indians of Nevada Form Tribal Group," *Reno Evening Gazette*, April 14, 1949; "General Land Office Record 08409, July 22, 1919; General Land Office Record 06965, April 6, 1920; General Land Office Record 010807, February 14, 1925; General Land Office Record 07362, January 25, 1946; Bureau of Land Management Record 08182, November 9, 1954; Bureau of Land Management Record 07330, February 16, 1955; Bureau of Land Management Record NVN 0005760PT, May 8, 1958; Bureau of Land Management Record 05750, March 17, 1961; Nevada State Vested Water Right V01156, June 22, 1912; Nevada State Water Certificate September 22, 1958; Martha C. Knack, "The Saga of Tim Hooper's Homestead: Non-Reservation Shoshone Indian Land Title in Nevada," *Western Historical Quarterly* 39 (Summer 2008): 125-151; "Leisl Carr Childers, Interview with Virginia Sanchez and Kim Townsend, December 4, 2008; Crum, *The Road on Which We Came*, 110-183.

[74] "Indians of Western States are Eager to Join Service," *Reno Evening Gazette*, March 25, 1942; Extension Unit Takes Over Job on Reservations," *Reno Evening Gazette*, April 29, 1955; "Leisl Carr Childers, Interview with Virginia Sanchez and Kim Townsend, December 4, 2008; Crum, *The Road on Which We Came*, 110-183; White, *"It's Your Misfortune and None of My Own"*, 439-442, 579-588; R. Douglas Hurt, ed., *The Rural West Since World War II* (Lawrence: University Press of Kansas, 1998), 12-37.

CHAPTER 3

A GOOD USE FOR DRY LAND

> [I]t seems a fair judgment to say that grazing is perhaps the lowest use in the scale of values on public lands. This does not mean that grazing will produce the least income or that it will be restricted to a small area but only that other uses of land are probably superior to grazing in the general social interest and must take precedent over grazing. Marion Clawson, Director, Bureau of Land Management 1948-1953

The critical land management problem the nation faced during the early twentieth century was how to put the remaining federal domain to its highest, most productive use in a consistent, organized manner. Congress created three public land commissions to deal with the matter, but their recommendations to retain the remaining public domain proved unsatisfactory. Congress refused to cover the cost of administration. When the federal government attempted to transfer management of the remaining unsettled lands to the states, legislatures resisted for the same reason. The Great Basin states consistently maintained that the surface rights to this vast public domain were worthless without the mineral estate. Because the land was uncultivable for anything except minimal haying and ranching operations, residents also made the case they required federal assistance, either direct programs or financial subsidies, to overcome these conditions and render the region even remotely productive. Ranchers in particular wanted to secure their position on the range using federal funds, but wanted those funds controlled locally. The tension between resisting the federal physical presence and requiring federal aid was fundamentally rooted in Great Basin residents' response to the region's environment. It also formed the basis of the complicated relationship between Great Basin residents and public land management agencies.

The livestock industry already developed and entrenched in the vast spaces between the few roads and federal highways in the region seemed to offer the best solution to the problem of "wasted" land. When the federal government took administrative possession of the remaining public lands in the 1930s, a new land management agency focused on forage resources organized the Great Basin as grazing range, a ranch landscape, because it was already being used as such and because that usage had become relatively stable. Rather than reorganize the existing system, the federal government recognized and legitimized what was already happening in the region down to the ways in which the government determined grazing rights. In 1934, the Taylor Grazing Act codified the ranch landscape in the Great Basin and legitimized the livestock operations in the region, which had utilized the land for a generation prior its passage, by making ranchers' grazing ranges akin to private properties. Passed in a moment of environmental crisis, the law reflected the federal government's acceptance of its custodial and even proprietary responsibility towards remaining public lands.

Driven by environmental conditions and pressures from existing livestock operators to protect their economic investments in water rights and land, the Taylor Grazing Act established a system by which ranchers and the federal government used cooperative conservation practices in range management, such as forage surveys, permitting, and fee structures, instead of competition to stabilize livestock operations throughout the American West and ensure their longevity. Through the process of determining grazing districts, the newly-organized Division of Grazing allocated range access based on priority, first in time, first in right, and commensurability, the ability of a base property to support livestock when range access was limited which required water rights in the Great

Basin. According to the agency's first director Farrington Carpenter, "the man who has the feed [and water] to take care of his livestock when the public range is not used will be the man getting the first crack at the public range."[1] In lieu of the family farm, the ranch in the Great Basin became the most important anchor in the barely populated region. Next to the mining industry, the livestock business was an important source of revenue for all of the region's rural economies. It was also the largest land-user in the region and to some it represented the worst of the nation's political schemers and abusers.[2]

In the late 1940s and early 1950s, Bernard DeVoto penned multiple articles for *Harper's* magazine detailing the hardship the livestock industry wreaked upon the natural resources of the American West. DeVoto wrote that livestock operators would "shovel most of the West into rivers," given half a chance, destroying valuable watersheds and the ability of the land to recover. Their federally subsidized, rampant exploitation of the natural grazing resources of public lands was nothing less than robbery of the American people. DeVoto believed fundamentally that "the public lands are public property which Congress long ago decided to preserve and develop in the common interest." He insisted that Americans through the federal government were co-owners of these lands and they ought to be managed for the public's benefit. But DeVoto conflated reservation of the national forests in the late nineteenth century and its natural resource conservation policies with that of the nascent Grazing Service, the successor to the Division of Grazing. "The reservation of the public lands," he wrote, "was the outcome of the realization that much of our heritage of natural resources had been wasted, that much of what remained was impaired, and that all of it was in grave danger of being exhausted." This certainly applied to the Forest Reserves and the agency which managed them, but

did not apply to the unallocated and unappropriated lands grazed in the Great Basin for the first half of the twentieth century. Even he recognized these lands as the "waste that lies between Utah and California.[3]

Yet the general sentiment DeVoto expressed, that federal oversight, fair fees, and strict conservation practices were what many members of Congress and their constituents expected in the management of the federal domain grew increasingly important throughout the century. Great Basin ranchers proved resistant to these ideas, arguing that the marginal nature of the region's rangeland put them at an unfair disadvantage in the national livestock production market. They advocated tailoring the regulatory structure of the new legislation to their specific environment so that the Grazing Service recognized their heavy investment in stock watering systems and other range improvements. Some livestock operators in the central part of the region resisted grazing district organization altogether. These ranchers argued that the marginal forage in the area would cost more to administer than was worth the effort and staved off attempts to bring them into a grazing district for nearly twenty years. Nevertheless, once range organization began, the federal government preferred to see the entire public land grazing range administered in some fashion, especially the ranches and grazing ranges that abutted the atomic testing site.

Adjudicating the Remaining Public Domain

The federal government has appointed only four public land commissions to date, three between the end of the greater surveying process in 1879 and the beginning of the New Deal in 1933, and one in the post World War II era, to address the issue of the remaining public domain. Available land had been one of the nation's greatest assets throughout the nineteenth century and the disposal of this land had significantly

influenced the nation's development and its identity. But increasingly, the remaining arid lands proved difficult to settle. In the late 1870s, President Rutherford B. Hayes highlighted the problem the arid lands posed to the nation's political and social economy in his first annual message to Congress. He announced "these lands are practically unsalable under existing laws, and the suggestion is worthy of consideration that a system of leasehold tenure would make them a source of profit to the United States, while at the same time legalizing the business of cattle raising which is at present carried on upon them."[4] The first commission, which included Clarence King and John Wesley Powell, produced a statistical and descriptive compilation of the public lands within the larger national domain. They calculated the public domain to be about 794,416,838 acres of which 17,800,000 acres were classified as arable, 30,000,000 acres were classified as irrigable, and 548,550,977 acres, the vast majority, were classified as "pasturage, grazing, desert, and all other lands useless for agriculture by reason of altitude, lack of water or soil." The commission argued that the federal government should "part title direct to the desert land" because "if granted free of acreage in sufficient quantity, these lands may be developed by private interests."[5]

One of the members of the commission, Thomas Donaldson, a former General Land Office employee familiar with the frustrations of the land disposal process, further commented on the remaining public land in 1881. Donaldson argued that the mineral and timber lands of the public domain were its most valuable assets and that the pasturage lands were "of nominal value." He wrote "the largest portion of the remaining public domain, is at present, a common—herders, wood-cutters, lumbermen, and prospectors roam over it at will, most of them unable to acquire title under the present laws to what

they require for their actual wants, and public benefit." Donaldson commented that the "pasturage or grazing lands, [were] usually destitute of water," covered an area which included all eleven western states except California and deserved special attention. "Vast herds of sheep and cattle, and bands of horses, worth millions of dollars, roam over these barrens fit only for grazing," he wrote, "two-thirds of these lands are desert wastes, with here and there a stream or spring. The water commands the land. The owner of the water-holes … is supreme."[6]

Donaldson worried that the present system of range management organized around the mutual consent of users needed protection because "the grasses upon these lands [we]re fast dying out, largely because of over-pasturing and neglect." Donaldson recommended a measure of oversight be adopted "whereby herd-owners can obtain protection, if not a title to their ranges" to legitimize the already de facto ownership ranchers had on the rangeland. Definite range ownership, while it concentrated land title into the hands of only a few individuals was "requisite for the increase and growth of this valuable industry" and met the criteria for economic production and therefore appropriate land disposal. Donaldson believed, as many in Congress did, "the object of the nation should be to fill the public lands with actual settlers or occupants" in a formalized legal manner.[7]

Donaldson's recommendations went unheeded by Congress for several decades. While great attention was paid to the nation's timber resources and places of spectacular beauty, very little concern was given to the grazing resources.[8] The Great Basin posed a unique problem to settlement in that it was a region without widespread and consistent water and forage resources to make even small-scale agriculture functional year after

year, even with irrigation. Ranching was a better option than farming provided livestock had plenty of room to roam for forage and consistent access to small regular, if artificially developed, water resources. The Great Basin's sagebrush-filled grasslands offered the "last virgin grazing resource in the United States."[9]

By 1880, the ranching industry dominated the agricultural development of the northern Great Basin. The Central Pacific railroad, which ran from Salt Lake City to Sacramento, opened up markets to livestock operators from California to the Midwest. The Humboldt River valley, from its three forks near Elko to its sink north of Fallon, harbored the small base properties out of which Great Basin ranchers conducted their operations. All the valleys to the north and south of the Humboldt, including Pine, Ruby, Paradise, Reese River, and Quinn River, had enough water and forage for browser cattle and sheep.[10] Many ranchers had access to these lands as "unallotted commons," or leftover lands which had no federal or private designation and abutted their ranch properties making them easily accessed and free to those who would use them.[11]

But grazing livestock on the public domain was a risky venture at best and ranchers worked diligently to protect their range access and ensure adequate water and feed for their cattle or sheep. Acquiring water rights for wells and small-scale irrigation development was fundamental to ranching in the Great Basin and became more important as livestock operations moved south into the dryer sections of the region. In summer, livestock browsed the native sagebrush and grasses, but in winter, especially after a devastating freeze in 1890, herds required hay to survive. Ranchers created irrigation systems to cultivate enough hay to see their stock through the cold winters. Too much irrigation, however, and unwanted salts drained into the lowest lying lands rendering

them unproductive. Too little water and the soil became laden with hard minerals which also decreased production. Irrigated hay crops produced an overall increase in the production of livestock throughout the Great Basin, but when water supplies ran short and when ranchers disagreed over range access, the entire industry was in danger of collapse.[12]

In addition, livestock operators had little awareness of the damage overgrazing did to watersheds and often ravaged a range in summer, returning the next year to find it completely degraded and unable to regenerate for lack of topsoil. Most of the ranching industry in the Great Basin was dominated by cattle operations, especially in Elko County, Nevada. However, beginning in the 1890s, small nomadic sheep herds, mainly owned by Mormon and Basque families, competed with cattle for range and water resources. Without some kind of range regulation and with no operator able to afford purchase of their traditional grazing ranges, conflicts between cattle and sheep operations increased and ranchers continued to deplete the range resources at an alarming rate.[13] Biologist Garrett Hardin described the ensuing situation produced by unregulated use as the "tragedy of the commons," where ranchers who were consistently motivated to grow their herds did so at the expense of their neighbors and the health of the range.[14]

By the early twentieth century, range conditions had deteriorated to an alarming extent. In 1903, progressive President Theodore Roosevelt organized the second public land commission to address this problem and that of the failed settlement laws. The Congressional Public Lands Commission of 1904 used the same language to describe the marginal nature of the greater part of the public domain, most of which by then was located in the Great Basin, and highlighted the increasing problem of multiple livestock

operators in conflict with each other on public lands. The report stated that "the general lack of control in the use of public grazing lands has resulted, naturally and inevitably in over-grazing and the ruin of millions of acres of otherwise valuable grazing territory. Lands useful for grazing are losing their only capacity for productiveness, as, of course, they must when no legal control is exercised."[15] The source of this conflict was too many livestock needing too much access to grazing forage resources on public land. The commission was inclined to blame the sheep operators, however, many cattle ranchers also ran sheep herds and so the perception that sheep operators were the problem had more to do with their Mormon and Basque heritage, lack of property, and state residency than it did with the type of animal they raised.

Despite traditional use patterns and agreements made between individual operators, there was no systematic oversight which ensured cooperation and thus the range continued to deteriorate. The commission recommended, and President Roosevelt agreed, that a formalized leasing system be established to streamline range access and prevent overlapping use which invariably led to user conflict. Many western ranchers had taken to illegally fencing grazing areas they considered their rightful range. Roosevelt urged Congress to pass legislation to provide for federal range oversight similar to that which the government provided for timber resources through the Forest Service. However, he argued that "local control of the range should be in the hands of western men familiar with stock raising, and there should be a full local hand in the management of the range." Roosevelt stated "there is no need at present that the government should get a net revenue from grazing on the public range, but merely enough to pay for administration and development." The caveat to a leasing program was that the grazing system would be

secondary to the process of land disposal for settlement and not inhibit it in any way. But to the frustration of Great Basin livestock operators, who favored Roosevelt's plan, Montana ranchers strongly opposed any federal regulatory measure and no federal oversight was established.[16]

The progressive notion of federal regulation of rangeland resources had its origin in the new land economics developed by Richard T. Ely. Rejecting the neoclassical *laissez-faire* economic model, Ely advocated federal or state involvement in managing natural resources, utilities, and other aspects of the American economy in the interests of public welfare. Along with his colleague Frederick Jackson Turner at the University of Wisconsin in Madison, Ely was concerned about the economic, political, and social consequences of the cessation of the settlement process because of the lack of desirable land. Turner expressed his concern in the frontier thesis essay in 1893 arguing that the end of the process of westward settlement, the end of the frontier period, which had been predicated on the availability of inexpensive and good farming land, was the end of the first phase of the nation's development. Without the availability of this land, which had ameliorated much of the historical unrest that had occurred in urban areas of Europe, the country would begin to suffer some of the same crises. At the same time, Ely articulated his concerns by arguing that without the abundance of free land, a powerful "factor in shaping the economic development of the United States" which had "kept up the wages of labor," the nation had to remake its economy to compensate for the inevitable increase in population density and the consequences of this increase without a frontier.[17]

Ely advocated federal involvement in administering the remaining public domain, an unpopular idea among neoclassical economists who opposed government involvement in

economic sectors. Ely, however, reasoned that federal conservation of the nation's land and its natural resources ensured "the preservation in unimpaired efficiency of the resources of the earth, or in a condition so nearly unimpaired as the nature of the case, or wise exhaustion, admits." He agreed with his colleague John R. Commons that the most valuable quality of land was its ability to furnish "room and situation." But Ely argued that "not all space is valuable." To him and the other new economists of his generation, "idle land [wa]s never neutral; it always place[d] a burden on private or public owners" because it unnecessarily stretched the connection between resources and increased the costs of transportation. Ely believed that "excessive space" was "a weak point in the American resource pattern." Conservation was the antidote to wasteful use of land and natural resources "dictated by the common interest," but impossible under the *laissez-faire* system of non-intervention. Ely recommended the federal government use a process of land zoning or classification to determine the best use of land and its natural resources to prevent the continuation of "misuse of the soil on the public domain."[18]

But despite his progressive mind-set towards the management of public land and natural resources, Ely did not disagree with the fundamental premise of utility embedded in both neoclassical economics and the new land economics. Rather, he differed as to the means by which utility could be achieved. Where neoclassical economists held that the perpetual balance between individual self-interest and sacrifice "brought the best good for all of society," Ely believed that these forces were dependent upon historical and scientific developments. Rather than rely upon a rigid ideology to govern the nation's economy, he preferred to think of society as an organic system governed by the interdependent relationship between individuals represented by the "state." Ely supported

a progressive system that promoted liberty for individuals by providing opportunities to engage in economic relationships and fostered efficiency through federal management of land and natural resources. In this way, Ely's new land economics used liberty and efficiency to maximize the utility of land. The creators of the nineteenth-century land disposal policies, influenced by neoclassical economists, had argued their *laissez-faire* approach accomplished the same objective. So the goal remained the same, to maximize the ability of public land to serve the interests of the nation.[19]

Two decades after the second commission's report, public land historian Benjamin Hibbard, a colleague of Ely's at the University of Wisconsin, noted that the federal government proceeded in its land disposal policies according to the assumption that "land should be made private property as rapidly as possible, that new states should be settled with the utmost rapidity." Yet despite the previous efforts of the federal government to create a variety of means by which Americans could acquire land, "there was little opportunity for the development of a conscious, workable, vigorous land policy." Hibbard believed that the nation's depressed agricultural economy in the 1920s was a direct result of an inadequate public land policy and federal encouragement of farming in sub-marginal regions. Of the remaining 186,000,000 acres of unreserved and unallocated public domain, Hibbard wrote, some of the "mountain peaks, alkali plains, and plateaus covered with rocks," could be ranched though very little of it could be irrigated. Hibbard, who agreed with Ely's land economics, argued that timber stands and grazing resources were the least suited to operate in a capitalist system ruled by *laissez faire*; "the former," he wrote, "can hardly succeed without a large measure of public ownership and management. The latter might, but has not yet done so in a marked degree."[20]

At the same time, Hibbard commented that grazing operations had been successful in California and Texas under state and private ownership, a model which could be applied to the more arid regions of the Intermountain West. He attributed the existing range degradation to the problem of uncertain ownership: "the range has been treated as booty rather than as property," such that "a short-time view is preferable to a long-time view in range management." Hibbard advocated a comprehensive land policy created and administered by the federal government which would find a suitable and regulated use for sub-marginal lands with a means of both ownership and oversight and promote mineral development.[21]

Responding to this situation in the late 1920s, the Hoover administration made a serious attempt to rid itself of the remaining unallocated and unreserved public lands in the American West. In a letter addressed to the governors of the western states, written just as cattle prices finally began to climb out of their depressed state and only months before the nation's economic collapse, Hoover made a tentative proposal to transfer the surface rights of the unallocated and unreserved public land to the states. He argued "the most vital question in respect to the remaining free public lands for both the individual states and the nation is the preservation of their most important value … grazing."[22] Hoover commented "the grazing value of these lands is steadily decreasing due to overgrazing and their deterioration, aside from their decreased value in the production of herds, is likely to have a marked effect upon the destruction of the soil and ultimately upon the water supply." Since the lands brought in no revenue and the federal government was "incapable of the adequate administration of matters which require so large a matter of local understanding," Hoover believed the best course of action was to

let the states handle their administration and possibly transfer title to the stockmen who used the land. Many stockmen in the Great Basin were sympathetic to this idea.[23]

Initially, the western governors, including Nevada's Frederick Balzar, expressed their approval of the plan, as did Chairman of the Senate Committee on Public Lands and Surveys Gerald P. Nye. Each supported Hoover's appointment of a public land commission to study the matter. However, several western congressmen worried that a land transfer would burden the states with "worthless land" and deprive them of the valuable oil and mineral rights and essential federal highway funds.[24] Utah Governor George Henry Dern reportedly commented, "without the forest lands and the minerals, the land would be more of a liability than an asset to the States which would have to administer it," as the wealth of the unallocated lands was generally believed to be in their timber and mineral resources. One Utah paper put the problem this way: "The surface rights on this public owned land is practically worthless except for grazing purposes. It is an established fact that all such lands suitable for grazing are now grazed to the limit. The transfer of ownership would not provide forage for one single extra sheep." The mining industry also took issue with the proposal. Miners expressed concern about different governments administering the public domain because it "would create hardships for mining men" and could produce confusion with the existing mining law. By October, just before the collapse of the stock market, the public land commission, under the direction of James R. Garfield, former Secretary of the Interior under the Roosevelt administration, began their work.[25]

Organized in 1929, the Committee on the Conservation and Administration of the Public Domain included many westerners. One of the most significant members

appointed to the committee was Nevada State Engineer George W. Malone. Along with William Peterson of Utah and I.H. Nash of Idaho, Malone represented the Great Basin and understood from first-hand experience in the field the problems of grazing in the region. Malone met with the members of the Nevada Livestock Association, the representative body of livestock operators who ranched throughout the area, in late October to ascertain their perspective on the issue. The seriousness of the committee's investigation could not be overstated as one paper reported, "Nevada contains nearly one-third of all the federal lands—ninety per cent of the state's area being public domain—and as her entire cattle and sheep industry is grounded on the grazing rights to these lands." Many felt a wrong decision could cause "heavy expense and trouble to the business for many years to come." In anticipation of regulating the region's range resources, the state had organized a range commission "to decide upon the laws and best practices most beneficial to the livestock industry as a whole."[26]

Members of the Nevada Livestock Association recommended to Malone that stock operators be extended permanent grazing rights on the ranges they used which they could sell or transfer like water rights or mining claims. Since virtually none of the land in question was fit for homesteading, a fact evident to ranchers because lands on which they ran their cattle had been "open to homesteaders for many years" had "not been entered," and were therefore "fit for grazing and mining only." Nevada ranchers argued that such a land grant would stabilize ranch investments, encourage ranchers to make range improvements without fear of infringement from other users, and legalize the "situation which has prevailed since the beginning of stock-raising land settlement in the state."[27]

At the close of the series of meetings, stock operators agreed that "unless the system of range control is changed the livestock business in Nevada is doomed. The rancher must not only have control of the water but must control the range. Otherwise he is powerless to stop the invasion of his range by the nomad herd … he never knows when a band of sheep will swoop down upon the range he is using and demolish it, leaving his herds without feed." Regardless of which government administered the public land, though many agreed with President Hoover's proposal, ranchers argued "control of the range must go direct to the rancher who has established his right by use of the range." They also reiterated that purchase of these ranges was impossible "owing to the inability of stockmen to pay taxes upon them." These sentiments did not fall on deaf ears; Malone was in an excellent position to assist the stock operators as both a member of the president's commission and as state engineer. Malone urged the ranchers to be of one mind on the issue and assured them that their water rights controlled their range usage and that he would not grant water rights to any individuals other than the traditional range user on their customary grazing range.[28]

Not every rancher in the Great Basin agreed with the Nevada Livestock Association or the big livestock operators in Utah and Idaho. In Nevada's White Pine County, state Assemblyman Clel Georgetta was one of the few ranchers who opposed the state's efforts to further solidify range control among the large livestock operators. In a speech before the state legislature, Georgetta complained about the Forest Service's preference for timber management over developing forage resources and what he feared was "petty, self-important, fine-print bureaucrats who would choke us to death with piles of rules and regulations that would accomplish nothing but extermination."[29] In Nye County, the

state's largest administrative unit and the one containing nearly one hundred percent public land, rancher, county commissioner, and state legislator William A. Marsh worried that state ownership of public lands would make the state "a vast grazing domain for a few large livestock companies," crowding out the small landowners who ran stock operations on a much smaller scale. Nye County was the traditional winter range for many of the state's northern sheep operations, most of which had no property on which to grow hay. But resident ranchers in the county relied upon access to their proximate ranges year round, especially in winter since the region lacked the essential water resources to irrigate pasture. This put Nye County ranchers in direct conflict with northern Great Basin ranchers for range access.

The problem was that stock operators who owned land in Nye County were latecomers to the state's ranching industry. Although they owned property in the county, the northern sheep herds had the right of customary use on Nye County ranges during the winter which depleted the range for resident ranchers. Marsh favored local control with federal oversight because the federal government was more likely to recognize the property rights of ranchers in Nye County over the usage rights of northern sheep herders whereas state control would most likely mean large livestock operators would dominate range-use decisions.[30] Marsh had a legitimate concern. Ranchers, especially those located in the comparatively fertile Elko County, had a disproportionate amount of political power relative to their population—only about five percent of the state's population participated in the industry and yet they controlled most of the water rights in the state. But in Nye County, this kind of regulated use threatened the small resident livestock operators who essentially believed that the proximity of their properties to the range gave

them the right of use above those who had established water rights through the stock water law.

In the end, Nevada and Utah ranchers were concerned that the states, if granted the surface rights to public lands, would simply sell them as they had sold most of their lands prior to that point. However, as the failure of the homestead grazing law in Nevada had demonstrated, its public lands were "invariably worthless as homesteads." In fact, the bulk of public domain remaining in the Great Basin in the late 1920s was "not of such nature that would inspire a person to pack up his belongings and rush out to homestead." Livestock operators could not afford to purchase their grazing ranges outright, and pay property taxes on both the land and livestock, and only supported a situation which granted them continued and permanent access to their grazing ranges at low or no cost. Granting permanent water rights and permanent grazing rights would encourage ranchers to benefit directly from any water and range improvements they made. It would also provide the security for acquiring the farm loans necessary to continuous operation through poor production years, because in most cases, the ranch property was worthless without the range.[31]

Some Great Basin congressional delegates had been working to make this happen. Utah Representative Donald B. Colton introduced a grazing bill in 1928 which would have set up locally governed grazing districts throughout the public domain. Secretary of the Interior Hubert Work supported the bill stating that grazing district organization was "the best use of the remaining public lands for the benefit of the whole people." In reviewing the legislation, representatives from New Mexico and Wyoming opposed its measures while Nevada's Representative Samuel S. Arentz indicated he might vote for it.

For a while, it appeared the bill might be restricted to Utah, but Colton worried that because grazing was an interstate problem, neither Hoover's plan to turn the public lands over to the states or a law which only addressed a single state's grazing problem would redress the issue of conflicting range use and degraded ranges. But a handful of other Utah representatives in Congress killed the bill. Representing Sanpete and Daggett counties which were heavy nomadic sheep producing regions, they believed the bill would "strengthen the big livestock interests against the smaller ones." Clel Georgetta, a the assemblyman from White Pine County, said the letters and telegrams sent by ranchers to several state senators, including Vail Pittman and Tasker Oddie in Nevada, killed the bill for the same reason.[32]

Similarly, other residents of the Great Basin opposed federal transfer of the public domain to the states or any type of dual regulation system. At the end of 1929, the Nevada Livestock Association passed a resolution which declared Hoover's plan to turn the surface rights of public lands over to the states would "not provide a practical solution fitted to Nevada conditions." Nevada State engineer and public land commission member Malone actively opposed any sort of dual range control in which the state administered the grazing range and the federal government retained title, arguing that situation would lead to "interminable disputes."[33] Other western states agreed with Nevada ranchers' position and favored some kind of loose federal oversight with greater local administration. None of the eleven states were in a position to fund the range conservation programs necessary to improve their degraded condition unless they charged significant grazing fees.[34] What Great Basin residents seemed to want was

federal administration using federal funds with local decision-making powers that would ensure ranchers' place on the public rangeland they had used historically.

The tentative report of Hoover's public land commission at the end of 1930 recommended the federal government retain the subsurface rights in the public domain as well as the lands already reserved in national forests, reclamation projects, and Indian reservations. Those states who wished to manage grazing rights on the public domain could apply for a transfer of the public lands surface rights within ten years. But the fundamental disagreement regarding transfer of the subsurface rights eventually ended the investigation without producing a viable uniform solution. Colorado's representative on the commission, C.J. Moynihan, publically opposed the federal government retaining the valuable subsurface rights, arguing that would in effect make the federal government the American West's "permanent landlord." With reference to grazing regulation, the commission recommended that the states regulate the range except "that in case the States are unable to do so, the Federal government create out of public domain a national range to be administered by the United States."[35]

By 1931, the most likely course of action to ensure occupancy and use of the remaining public lands, especially in the Great Basin, was to create a federal grazing system to ameliorate the problems of ranching in a region deemed worthless for much else. The public land ranchers used for grazing ranges in the Great Basin may have been of little national value without the mineral rights, but it was of great value to individual ranchers. In addition, the marginal forage they offered, while sparse compared to more fertile ranges, provided the basis for the only agricultural production possible in the Great Basin—livestock. And while the livestock industry throughout the region, especially in

Nevada, was fundamentally important to the region's economics, it was merely a fraction of the overall livestock production in the country (fig.40 and 41).[36] For the stability of the livestock industry throughout the American West, especially in the Great Basin, and to ensure the much-desired occupancy and utilization of the last unsettled region in the country, a federal system of grazing regulation that relied on federal dollars seemed the best option, but with the caveat that locals would influence the decision-making.

Establishing the Grazing Range

Lying in the rain shadow of the Sierra Nevada, on average, the Great Basin receives between three and twelve inches of precipitation annually depending upon elevation and latitude. Because of the region's aridity, temperatures regularly run in the extremes—below freezing temperatures in the winter and at night and above one hundred degrees Fahrenheit in the blazing summer sun. Dry playas, dunes, and powdery clays produce fine particulate matter which covers the entire region in a fine layer of dust.[37] A dry year in this high desert often meant the difference between scraping by and losing the ranch. The mid-1920s had been fairly dry in the Great Basin, causing a production crisis in the livestock industry as both forage and hay were lean. Overproduction in all agricultural sectors in 1921 had significantly depressed farm prices and lowered production helped stabilize the livestock industry. Between 1925 and 1929, cattle prices increased indicating that the depression in the livestock industry seemed to be over. In addition, the summer rains of 1929 deluged much of the Great Basin to the delight of ranchers, creating a bumper range and hay crop and alleviating unnecessary expenditures in imported feed.

However, by 1930, the Great Depression hit the livestock industry with full force and livestock prices dropped to fifty percent of their peak value in 1920. [38] To make matters

worse, the drought that accompanied the depression made the previous decade's water crisis seem moderate. Livestock operators across the country faced collapse, but those in the Great Basin, already living with a scarcity of water and increasing range competition despite the efforts of Nevada's state engineer George Malone to regulate the resource, faced the worst conditions of their operation since the collapses of the industry in the late 1880s when ranchers experienced over a ninety-five percent loss in cattle numbers.[39]

Clarence L. Forsling, Director of the Great Basin Experiment Station run by the Forest Service in western Utah and later director of the Grazing Service, reminded attendees at the first national water-user's conference in 1930 that "Grazing for a long time was considered a transient industry. Many people thought it did not matter what happened during the brief time before the land passed to other use." Now, he stated, "the public has finally awakened to the fact that large areas in the West will always have grazing as the only possible commercial use. In the meantime, a true knowledge of the potential productivity and methods conserving the resource have not been fully developed and the principles developed have not been applied." Forsling believed federal organization and regulation of the western range was now essential. Even these "left-over lands after three generations of settlement," which were "the driest and poorest producing lands in the United States," and had no value by themselves, became indispensable "in connection with the private lands and water that largely control their use."[40]

Ranchers in the Great Basin were desperate for federal assistance by 1934, one of the driest years on record. The already degraded rangelands of the 1920s were nearly unproductive in the 1930s, denuding vast stretches of the region. Instead of the General Land Office patenting more land under private ownership, settlers ceded homesteaded

lands back into the public domain as more and more of them defaulted on hundreds of thousands of acres. This seemingly unproductive land threatened to unduly burden western states. The Drought Relief Service, created in spring of that year began purchasing cattle across the country in drought stricken areas, destroying those unfit for human consumption and hauling the rest to regions short of food.[41] In Utah, the federal government purchased 85% of the ranchers' cattle in Beaver County. The numbers of sheep dropped dramatically in Toole County and the Grantsville Dust Bowl, a smaller version of that which plagued the Great Plains, threatened to eradicate both the sheep and human population southwest of the Great Salt Lake. From Box Elder to Iron County, at least two-thirds of the cattle and sheep herds as well as the alfalfa crop failed. Similar problems existed in the other Great Basin States, including Nevada where the federal government purchased more than twenty thousand cattle for slaughter.[42]

Unlike the discussions of grazing regulation in previous decades, conversations about federal regulation of range management took on a new sense of urgency because of the drought. Most livestock interests in the Great Basin had supported the failed Colton Bill in the late 1920s which would have created locally-controlled federally-owned grazing districts. When Representative Edward T. Taylor, a Democrat from Colorado and several other supporters introduced a similar measure to Congress in 1933, his bill also received the support of most ranchers in the Great Basin states. However, Wyoming, Arizona, and some Nevada ranchers maintained consistent opposition to any kind of federal control. Many residents of states with large tracts of public land believed that if the federal government actively managed the remaining public domain, then "the hope of expanding

the agriculture [farming] within those [public land] States, except in isolated instances and through reclamation, finally [would] be dashed."[43]

Taylor's grazing bill passed the House of Representatives on April 11, 1934. The following month, livestock operators throughout the Great Basin held several meetings to discuss the measure. At discussions in Elko, Lincoln, Nye, and Eureka counties in Nevada, ranchers indicated their opposition to federal management which they believed would preclude their existing range usage. But cattlemen in White Pine County said "they favored the plan to transfer control of the range lands [to a federal grazing service] providing that it is amended to protect customary use rights and to provide for the formation of grazing districts." Nevada Governor Morley Griswold echoed this sentiment as did State Engineer George W. Malone who again went to Washington, DC, as the state's representative. The state range commission resolved to approve the Taylor Bill provided it was "amended to recognize customary range use and grazing permits," conformed to "the requirements of the federal land bank, so as to enable loans to be granted over a complete ranch," that fees were "limited to the actual cost of range supervision and improvement," and "grazing districts be established only by consent of a majority of the stockmen concerned."[44]

Nevada Senator Pat McCarran explained the necessity of these measures to his congressional house; he reiterated that in Nevada, where there was very little cultivated land on the tax roll, the state was "dependent for its income on the taxing of personal property including the herds using the public domain." Reducing the number of livestock reduced the income of Nevada. Only the measures which guaranteed some kind of stability in the livestock industry of the region would ameliorate the problem. In addition,

McCarran pushed for stipulations in the act which allowed ranchers to factor the value of their grazing allotments into the worth of their property for loan purposes—effectively placing value on land that had previously had none—and ensured that they would be guaranteed renewal of grazing permits provided they complied with range rules and regulations which included who could run livestock and where but not how many could be run.[45] Nevada Senator Key Pittman hastily tried to secure these measures in the bill but reminded Nevada ranchers, who seemed reluctant to accept some of the more restrictive aspects of the proposal, "if we do not pass some grazing act containing as much protection to states [water] rights and stock raisers as possible then the President will issue a proclamation and turn over the public lands to the Secretary of the Interior to regulate and control as he sees fit for grazing purposes." Pittman wrote that under a federally granted license, stock operators would have the legal legitimacy and protection they heretofore had lacked.[46]

At the same time the Senate debated the Taylor Bill, the choking red, black, and grey dust from the Great Plains reached the steps of the nation's capital and ranchers throughout the Great Basin began to panic. Winter precipitation over the past several years had consistently decreased. Lander, Eureka, White Pine, Nye, Lincoln, and southern Elko counties in Nevada already had acute drought conditions. Livestock were reportedly dying "like flies" and only 30% of the offspring during the lambing season had survived.[47] President Franklin D. Roosevelt and Secretary of Interior Harold L. Ickes argued the controls the Taylor Bill instituted on public land were necessary to stabilizing the western range livestock industry. By mid-June, the bill passed the Senate and most of its opposition ceased. [48]

The president signed the Taylor Grazing Act on June 28, 1934. Congress intended the measure "to stop injury to the public grazing lands by preventing overgrazing and soil deterioration, to provide for orderly use, improvement, and development, to stabilize the live stock industry dependent upon the public range, and other purposes." This sweeping designation made the act the first multiple-use public land management tool. The Taylor Grazing Act declared the highest use of the remaining federal domain, in lieu of homesteads and mining claims, was as rangeland. In essence, it recognized that as a grazing range, the Great Basin's wasteland was consistently productive. This proved to be a better situation than waiting for settlers to claim the land under the farming-based land disposal laws or the mining act. The act did not preclude those activities, but it did presume that they may not occur. In addition, ranchers, states, the federal government, and the range environment would benefit from coordinated use of the rangeland based on new ecological principles which also included wildlife management.[49]

The act authorized the Secretary of Interior to establish grazing districts on no more than eighty million acres of the public domain at the voluntary request of operating ranchers who desired federal oversight to assist them in conserving and using the range. The broad stipulations of the act had widespread ramifications throughout the livestock industry, from the smallest operator to the largest company, and required procedural clarification before it could be implemented in the field. As a result, the Department of the Interior arranged for a series of hearings across the western states to survey the variety of regional needs. Assistant Secretary of the Interior Oscar L. Chapman reported consistent cooperation and an increasing number of applications for the establishment of grazing districts at the hearings. Chapman believed "ranchers throughout the West

realize[d] that the vast public ranges which are being overgrazed and depleted must be protected and restored or they will soon be replaced by acres of desert land."[50]

By the fall of 1934, Secretary Ickes established the Division of Grazing to oversee the creation and administration of the grazing districts. Of the twenty original employees, nine worked for the United States Geological Survey, seven worked for the General Land Office, three worked for the Forest Service, and one, director Farrington R. "Ferry" Carpenter was a Colorado rancher and Harvard-educated lawyer. Half of them lived and worked in the Great Basin, where the majority of the rangeland was located.[51] Carpenter was particularly concerned about the state of grazing conditions in Nevada, which were, in his estimation, "intolerable." Nevada ranchers whole-heartedly agreed, as did Oregon, Idaho, and Utah stock operators who ranged across state borders, and considered the state primary to public lands ranching.[52]

As in 1929, when it came time for Nevada to elect a representative to attend regional meetings discussing the creation of grazing districts and grazing policy, ranchers again nominated State Engineer George W. Malone. John Robbins, a state senator from Elko County, and former governor Morley Griswold joined him at the national convention. In Malone's estimation a "wide latitude in administration" was "necessary to meet local conditions, with particular reference to the Nevada situation." In his opinion, a system of valuation which connected the grazing range to the ranch headquarters and water rights was the only way to secure consistent access to credit and the ensure industry's stability. Malone, as he had demonstrated before, understood the essence of assigning the range in the Great Basin.[53]

In Arizona and New Mexico, which used water alone to control range access through development of wells that provided surface water where there was none, ranchers relied on water rights to secure range access. In the northern and mountain states such as Colorado, Wyoming, Montana, livestock operators needed a large enough base property to produce hay to feed livestock in winter. Ranchers controlled range access through ownership of a base property and this seemed to be the model the Department of the Interior understood best. But in the Great Basin, livestock operators utilized summer and winter ranges controlled by both base properties and water rights. Malone believed "the livestock man will protect and build up his range unit if he can control it," and that the entire operation had to be based on "land holdings and water rights so that regardless of the disposition which may be made of them later complete units can be preserved." [54]

For Malone, the ultimate goal of the process was to transfer the entire ranch "unit," grazing range, headquarters, and water rights, to the stock operator. Clel Georgetta, then president of the Utah-Nevada Wool Growers Association, agreed. Georgetta wrote that the livestock operators were growing increasingly incensed at the first organizational conference relative to implementing the Taylor Grazing Act held in Denver in early 1935. Georgetta and many other ranchers present were concerned that grazing permits would be granted on the basis of land ownership instead of property ownership which included water rights "the same as land" and that grazing on the public domain would be governed by eastern bureaucrats who resented westerners profiting off of public land use without payment. They felt Secretary of the Interior Harold Ickes, as the final authority on the grazing act and its corresponding regulations, was "ignorant of livestock problems of the west and [wa]s unwilling to learn," that Ickes demonstrated a refusal "to consider

possible to solutions to pressing problems that exist, which if unsolved, will exterminate much of the livestock industry," and called for his resignation.[55] After the initial meetings which Malone also attended, he wrote Nevada Governor Richard Kirman that he believed he had impressed upon the Division of Grazing the importance of creating a credit structure, stable livestock units, and a local board to assist in authoring the range regulations with respect to local conditions.[56]

Division of Grazing Director Farrington Carpenter agreed with Malone's recommendations. He explained the situation to ranchers this way: "Boys, the Congress let you have it [the range] as long as you could for nothing and now they've got a collar and you've got to stick your head through it. If you don't another fellow will stick his head through it and we'll let him have the range." Carpenter understood that "in Nevada, the man who did not develop water on the range in 1926, ran on there as a criminal," because "that was their range rights." In the rules for guiding the creation of grazing districts and figuring grazing allotments, Carpenter, in consultation with western ranchers at regional meetings held throughout 1935, created a hierarchy of range use based on property ownership, water rights, and prior use to determine which livestock operators received permits and which ones did not. Carpenter provided a list of clarifying definitions to aid in determining who got range access. He defined property as "land and its products or water owned or controlled within or near a district, which according to local custom is used in connection with livestock operations;" dependent property as "property whose proper use requires supplemental public land range," commensurate property as "property which has livestock carrying capacity to supplement the public range land;" the concept of near as "close enough to be used in connection with public

range in the district in usual and customary livestock operations;" and prior use as "use of the public land range according to local custom for grazing livestock prior to the year 1935." He ordered that "recent use and consecutive use shall be given consideration in rating priorities." Livestock operators with adjacent dependent commensurate property and long established use of the range were the first to receive permits, securing their operations and range access in perpetuity.[57]

In the Great Basin, commensurate property included water rights in addition to private holdings which produced hay for winter feed. To those who did not meet the requirements for the first tier, Carpenter wrote "after residents, bona fide settlers, and occupants within or immediately adjacent to grazing districts who have dependent commensurate property are provided with range," other applicants with near dependent commensurate property with some prior use, applicants with prior use but not adequate commensurate property, and applicants with dependent commensurate property but without prior use could apply in that order. Decisions of range use were not to exceed 1934 numbers and would be lowered if the capacity of the range required it. Carpenter issued no long-term permits in the initial permitting process, but only temporary licenses with no fee attached. He announced that there would be no fees until the range had been properly classified and adjudicated and the values of the ranch units properly determined. Most importantly, Carpenter "declared that interstate movement of cattle created a danger similar to that of the nomad sheepman, who commercializes pasture lands without any overhead expense," and created the new grazing districts within states.[58]

As such, Nevada ranchers initially petitioned for eleven different grazing districts, an area which covered the entire state, for ten thousand cattle and eighty thousand sheep.

Other western states made similar requests but not across an area which covered their entire territory. Most other requests for grazing districts radiated out from the Nevada range to encompass the entirety of the Great Basin. Only the requests made in Colorado, Wyoming, Montana, and New Mexico ranges were outside the region. Livestock operators met in Reno in January to elect twenty-eight representatives in equal numbers from the cattle and sheep industries to form the state's first advisory committee and begin "drawing the lines for the lands which [should] properly be included in grazing districts and excluding those public lands, which, because of their character or isolation should properly be left out of the grazing districts."[59]

Unlike the state's internal political boundaries, the grazing district boundaries followed the natural landscape and traditional ranching patterns. One group of ranchers proposed the East Central Nevada Grazing District include southeast Elko County, southern Eureka and Lander counties, northern Nye and Lincoln counties, and all of White Pine County, an area particularly suited to browsing livestock, both cattle and sheep, and well within the Mormon cultural region. Another group proposed including southern Lander and Eureka counties and all of Nye and White Pine counties in a district. According ranchers, "this area was designated as such because it is particularly adapted to the growing of feeder livestock and stockmen in the district have many interests in common." Proposed as the fourth Nevada grazing district, this central range included cattle ranchers only.[60]

However, the 80 million acreage limitation on grazing districts set in the Taylor Grazing Act precluded creating several districts because Division of Grazing director Farrington Carpenter focused on "areas in which range administration was most urgently

needed" and where "the lands [we]re conveniently located for administration." By the fall of 1935, the Division of Grazing authorized thirty-four districts in high-use, high-demand areas. Utah received all its grazing districts on the fertile Wasatch and Sevier plateaus and the eastern rim of the Great Basin. Oregon and Idaho ranchers gained districts adjacent to those in northern Nevada, though Carpenter authorized only one of three proposed districts in Idaho. In Nevada, Carpenter allowed two of the proposed five districts, one in Elko County and Eureka and Lander counties north of the Humboldt River and the other in Humboldt and Pershing counties and Washoe County north of the Truckee River (fig. 42). Ranchers in the central and southern parts of the Great Basin, an area with marginal rangeland and too inconvenient to administer, worried that ranchers eliminated from the two districts would move south to the unorganized range, making the region "the dumping ground for transient livestock, both cattle and sheep, from surrounding districts in Nevada, Utah and California."[61]

Nevada Senators Pat McCarran and Key Pittman worked diligently in Congress to create an amendment to the Taylor Grazing Act which would increase the acreage by about 62 million acres to include all requests for range organization and ensure that ranchers could include their grazing rights as an asset on credit applications. However, Secretary of the Interior Harold Ickes and President Franklin Roosevelt disagreed with the bill before Congress. Ickes believed increasing the acreage would cause "the despoilment of the remaining public domain in the name of conservation or set the stage for the abandonment of homesteads by small owners under pressure from the livestock interests." Besides including an acreage increase, the bill mandated the federal government exchange public land with states at their request, lease discontinuous tracts

of land to users who owned or occupied adjacent tracts, and employ local personnel to enforce grazing regulations. This bill proposed by Congress and created by the western livestock interests advantaged existing large livestock operators and did little for the "small stockman and homesteader" according to Ickes. President Roosevelt vetoed the bill on these grounds.[62]

The Department of the Interior considered the range organization process a success and reported at the end of 1935 that fifty-two percent of the 10,458 cattle grazing permits went to cattle ranchers operating less than fifty head of stock and ninety-three percent of the total permits went to those operating less than five hundred head of stock. Only four permits had been issued to livestock operators with over 10,000 head, which seemed to demonstrate that the Taylor Grazing Act had curtailed large cattle operations taking advantage of public lands grazing. Of the 1,738 sheep permits, nearly thirty-nine percent went to sheep ranchers with less than five hundred head, eighty-six permits went to those with less than three thousand head while only fourteen permits had been issued to livestock operators with over 10,000 head. In total, 1,576,976 cattle, 145,753 horses, 6,515,825 sheep, and 172,481 goats legitimately grazed the 80 million acres of organized range. Utah claimed the most permits and livestock, followed by Colorado, New Mexico, and Oregon (fig. 43 and 44).[63] On the 80 million acres of organized range, ranchers seemed productive and content. There was no great national need to add more acreage to the grazing reserve. However, the Great Basin range had barely been organized and the entire central portion of the region had no federal grazing oversight of any kind. The central Great Basin remained outside the federal system (fig. 45).

Ranchers in White Pine County, southern Eureka and Lander counties, and northern Nye County proposed organizing outside the Taylor Grazing Act system to protect their range rights against predicted incursions by displaced range-users to the north and east. White Pine County ranchers were particularly disappointed their grazing range had not been included in the 80 million acres; they consistently had supported range organization and were the first in the state to petition for a district under the Taylor Grazing Act. In a letter to U.S. Senator Key Pittman, the White Pine County Farm Bureau based in Ely pleaded "following several years of drought and misuse of the range the forage crop on this area has become denuded to such an extent that our livestock population has decreased seventy per cent in cattle since 1925 and fifty per cent in sheep since 1929" (fig. 46). The organization reminded Senator Pittman that they had "heartily supported range legislation" to protect and conserve forage resources in an area "suited only to the growing of range sheep and cattle and the production of forage, small grains and root crops." Ranchers in that part of central eastern Nevada, surrounded by the northern and western grazing districts and national forests, would "take the blunt of any misuse of the range which might, in the future, come about by improper range management on these unregulated ranges."[64]

Soon after, ranchers in Lincoln, Clark, and Churchill counties likewise proposed organizing two additional districts. Division of Grazing director Farrington Carpenter assured them their organization would be recognized, though not regulated, by the Department of the Interior. However, the Nevada Livestock Association proposed repealing the act unless "the Department of Interior lives up to the representations of the act," providing oversight and regulation on all rangeland, and enlarged the acreage to

include these other districts. This district was the largest proposed in the state, covering 10 million acres. The other two districts proposed, but not yet approved, in Nevada included Churchill, Esmeralda, Mineral, and Lincoln counties. By early 1936, senators from several western states were again pushing for an increase in the acreage limitation to regulate grazing in these areas, and even Secretary Ickes was sympathetic.[65]

Skeptical about central and southern Nevada's ability to support even a meager livestock industry, Senator Key Pittman remarked in a letter to Nevada Governor Richard Kirman that even he "had doubts as to whether the land around Las Vegas should be included in a grazing district." Many others, including Carpenter had reservations about the whole area; he had not recommended any of these three districts as part of the 80 million acre grazing district withdrawal. He was mystified by ranchers who fought intensely for access to meager amounts of rangeland; he found "the drier the land is and the more worthless it is, the harder stockmen fought for it." Some of the ranchers in already organized parts of the Great Basin agreed with Carpenter and Pittman. But, by July 1936, Congress lifted the acreage limitation through the first amendment to the Taylor Grazing Act and increased the acreage to 142 million. Out of a total of 163 million acres of unreserved and unallocated public land, nearly ninety percent was designated as grazing range. Soon after Congress increased the grazing district acreage, the Division of Grazing authorized Nevada districts 3, 4, and 5, and the remaining two districts in Idaho as well as those in southern Wyoming. However, none of these areas included the nearly 20 million acres rangeland in the very center of the Great Basin, in southern Eureka, Lander, and Lincoln counties or Nye County (fig. 47).[66]

To ranchers of the northern and eastern Great Basin frustrated by competing livestock operations poaching their locally regulated grasslands, the federal government was a welcome arbiter. But to those in the center of the region, it represented an unprecedented intrusion into their use of the public domain. The central Great Basin had very few livestock operators. These ranchers had succeeded in dividing the rangeland amongst themselves with the support of the state engineer's office which managed the water rights and resolved any conflicts through that office. Since the area was much drier and the existing ranchers there strictly controlled its water resources, the likelihood of nomadic herds poaching the range was much less. The Forest Service in the Department of Agriculture had begun permitting livestock operators in 1906 on the national forests in the area much to the dissatisfaction of ranchers. By giving the Department of the Interior authority to regulate grazing districts under a new set of rules this seemed to complicate their livestock operations unnecessarily.[67]

The Department of the Interior's Division of Grazing operated on the principle of home rule. The few administrators from the agency relied on the local grazing advisory boards to manage a grazing district's livestock operators. As a result, the new grazing regulations did not really disrupt the status quo, mostly facilitating ranch operations as they had previously existed. The Forest Service and its stricter grazing regulations, developed from their nascent research in range management, seemed much more intrusive. However, most ranchers in the Great Basin after thirty years of Forest Service regulation had, as Nevada Governor Richard Kirman stated, "very little complaint about the government supervision of the forest ranges." Ranchers seemed to be able to adjust to the new regulations. Kirman and Division of Grazing officials believed ranchers initially

opposed to organized districts and the permitting process would eventually come around. However, during the late 1920s, livestock operators had vigorously complained that the Forest Service policies were unsuited to the special conditions in Nevada and the rest of the Great Basin. Unlike the other national forests in the American West, those in the Great Basin, the Humboldt and Toiyabe forests, were not harvested for timber resources. Instead, they were primarily the region's prime grazing range. According to Vernon Metcalf, then secretary of the Nevada Livestock Association, "Existing forest service range policies [were] in exact opposition to state policy," as established by the stock water law which provided livestock operators with some permanency on the range.[68]

Similar complaints surfaced about the new grazing regulations by the late 1930s. Division of Grazing Director Farrington Carpenter indicated to ranchers operating in unorganized areas that unless they formed grazing districts, made possible by the Congressional increase in acreage under the Taylor Grazing Act, they would be subject to a leasing process potentially more expensive than the permitting process. Section 15 of the Taylor Grazing Act authorized the Secretary of the Interior to lease vacant, unappropriated, unreserved lands not included in a grazing district for grazing purposes. However, where the Division of Grazing granted permits for up to ten years based on a fee structure developed in consultation with the local grazing advisory boards, the leases were more expensive and granted for a much shorter period of time. In light of this, some ranchers in central Nevada initially resistant to organizing a grazing district began to rethink their position, but for the next decade, most ranchers in area consistently voted to remain unorganized.[69]

In central Nevada around Tonopah and the majority of Nye County, an area purportedly suffering from critical range depletion and which the Division of Grazing considered sub-marginal for livestock production, ranchers continued to oppose any type of organization or government regulation. In 1936, the White Pine County Farm Bureau named those livestock operators who had "circulated a petition asking that their ranges not be included within a district." Among those were the United Cattle and Packing Company of Tonopah, who headed the petition and was said to control most of the water rights in the region, Grant Welch, George and Howard Sharp representing the Sharp family, Sarah Locke for her husband Madison, Harvey Titus, Sarah's son-in-law, Bautista Vener, and the Fallini brothers. These individuals operated livestock in the southern portion of Railroad and Big Smokey valleys, Reveille, Ralston, Stone Cabin valleys, and the San Antonio, South Monitor, Kawich and Reveille mountain ranges.[70]

In their investigations, range agents for the grazing service found "the range in the vicinity of the watering places has, on account of climatic conditions and over-use of their summer ranges in the vicinity of their watering places, become seriously denuded" (fig. 48). The farm bureau worried that other ranchers in adjacent Hot Creek, Fish Lake, Monitor, and Big Smokey valleys dependent upon a portion of the same grazing range for the wintering of their herds would suffer needlessly from the lack of regulation in the region. William A. Marsh, a Nye County commissioner and state senator, recommended these areas be left out, for now, of any organized district as he had previously recommended the federal government not turn any of these lands over to the state. Most of the livestock operations in Nye County lacked the required adjacent dependent commensurate property to secure a grazing allotment. All these ranchers could prove was

prior use which ranked at the bottom of the permitting hierarchy. Many of them instead had patented mining claims and some water rights; an inadequate amount of property required to support livestock in non-grazing seasons.[71]

In a very interesting way, this mere handful of ranching families in and around Railroad Valley in the central Great Basin played a significant role in shaping the nature of grazing district policy. Jim Sharp at the Blue Eagle Ranch was certain that the grazing act had been passed because of the extreme drought conditions pervasive in the American West at that time, but which no longer existed. In addition, he believed the federal government could not provide the necessary responsiveness to local range conditions. Worried as to the effects of the act in Railroad Valley, he joined the newly formed American Farm Bureau Federation chapter in Nye County in 1941 and was elected their first president. Jim's wife Lina noted that Railroad Valley was not "encumbered" by the Taylor Grazing Act until the mid-1940s. She said, "I guess we were so isolated they forgot about us. It's the empty core … there was nothing much here."[72]

In the 1940s, brothers William and Joseph Fallini testified before Pat McCarran's Committee on Public Lands as to the efficacy of the Grazing Service's rangeland management and their preference to remain self governing. Alfred Uhalde also testified, on behalf of his father John, before Senator Pat McCarran that the core of the family's ranching operations was their water rights. Developing their water resources comprised the bulk of their expenditures and any alteration to that system separated the livestock operators from their most important property. The Parises and Uhaldes, related by marriage, ran sheep herds which were more time-intensive than managing cattle that often precluded them from attending meetings. Both families seemed satisfied with the

organization of the rangelands in central and eastern Nevada prior 1934, having secured their range access through some water rights, and began participating in several meetings with the state engineer's office to create a base map of range rights in the state.[73] John Whipple, in the nearby Pahranagat Valley, and his neighbors the Lambs and Schofields during this time attended the meetings of the fourth grazing district. But, Whipple governed his western range as the Nye County Agricultural Conservation Association's president outside grazing district organization.[74] After McCarran's hearings, Uhalde served a term on the grazing district advisory board for District 4 to help guard his family's range interests. But although Uhalde's ranch in Garden Valley joined the White River unit of District 4, the family expressed no interest in having their southern grazing range organized.[75]

These families consistently expressed concern or opposed organizing the range lands in their region under the Taylor Grazing Act. In 1945, the Whipples, Sharps, Lambs, Schofields, and several others in the Pahranagat Valley signed a petition appealing to Senator Pat McCarran that he prevent their grazing range from being organized into a grazing district. Believing that the grazing act's potential implementation in Nye County might curtail his livestock operation, Madison Locke volunteered to represent Nye County as its director on the Central Nevada Livestock Association, a board created in 1947 bent on staving off the seemingly inevitable organization of the region into the last grazing district. Members of the association included Alfredo Bordoli, Harvey Titus, Howard Sharp, A.C. Florio from Duckwater, Joseph Clifford at Stone Cabin, Joseph and Ray Fallini of Twin Springs, and others, from Nye County.[76]

Joseph Clifford in particular attended meetings of livestock owners in central Nevada in which ranchers discussed and protested their organization into a grazing district. He also served on the executive committee of the Nye County Agricultural Conservation Association. In 1950, along with the Fallinis, Sharps, Bordolis, and other stock operators in the area, the Cliffords expressed concern that, by pressuring them to organize under the Taylor Grazing Act, the federal government was attempting to usurp the rights of stockmen.[77] The Lambs also actively participated in opposing the organization of central Nevada into a grazing district. Their decision to oppose joining federal grazing districts under the Taylor Grazing Act was one way to retain the size of their grazing range. The range and water rights in this region, including those used or owned by the Cliffords and the Fallinis, overlapped with the United States Army's Tonopah Army Airfield. The issue of water rights had put the Lamb family in conflict with the military over rangeland use for the past decade. Grazing service officials wanted to create an allotment that prevented these conflicts. By opposing organization, these ranchers fundamentally prevented the area's voluntary participation in joining federal range management and preserved the size of their rangeland access.[78]

Despite the efforts of many ranchers in the central Great Basin, especially in Nye County, the Department of the Interior worked to bring that rangeland under federal administration. In 1940, some ranchers in the area had made a petition for their organization into a grazing district. However this petition request was "offset by the number of livestock growers who [were] opposed to the formation of the grazing district." But rather than being voluntary, grazing district organization became compulsory. Much of this had to do with the changing culture of the Grazing Service, the

Department of the Interior, and the creation of the Bureau of Land Management (BLM) in the mid-1940s. Clarence Forsling, a former Forest Service range management expert who had worked extensively in the Great Basin, sought to bring more professional control and oversight to the Grazing Service as its new director in 1944. Where ranchers had been allowed a significant amount of "home rule" through their initial role in establishing the grazing districts and through their continued management via the grazing advisory boards, Forsling sought to assert greater federal oversight over its public lands. This suited Secretary of the Interior Harold Ickes' vision of federal control over the public lands which had been written into the legislation, giving him the power to make rules and regulations governing grazing districts. On May 18, 1943, Assistant Secretary of the Interior Oscar L. Chapman posted a public notice for the parts of Nye, Esmeralda, Eureka, Lander, and Lincoln counties not already organized into grazing districts, "a substantial amount of public domain," announcing hearings in Tonopah and Alamo which would organize the area into one or more grazing districts.[79]

From 1935 until 1943, the handful of ranchers in this region had not paid a single penny for either permits or leases, running livestock on the unallotted commons essentially for free. The unorganized area had been conceivably "overlooked" by the Grazing Service. Yet these ranchers had actively chosen to oppose any federal regulation of the grazing range in their area beginning with voting in 1935 to stay out of the administration of the Taylor Grazing Act. In 1943, virtually all the livestock operators in the area around Tonopah and Alamo, sent their protests to Senators Pat McCarran and George Malone, the former state engineer, and Congressman Vail Pittman, who convinced the Secretary of Interior to postpone the initial hearings. The ranchers

reasoned that the act of organizing would create additional hardships for them during the war effort and that there was "no emergency calling for a grazing district in this area."[80]

In 1946, the federal government restructured its land management agencies and ranchers throughout the American West hoped that the Forest Service in the Department of Agriculture would be given over to the Department of the Interior and grazing operations would be handled by one department. To those dependent upon the use of public rangelands, the Forest Service problematically prioritized grazing range well below timber cultivation and did not issue long term grazing permits to ranchers. But instead, the federal government merged the General Land Office (GLO) with the Grazing Service to form the BLM and placed Fred Johnson, the GLO commissioner, at the helm when livestock operators had hoped for a "livestock man." Nevada ranchers were particularly upset by this and sent a delegation to testify before the House of Representatives and curtail the activities of the new BLM. Secretary Ickes granted the Nevada ranchers' postponement, but retired soon after, leaving the problem in the hands of the new secretary Julius A. Krug.[81]

The following year, Secretary Krug pursued the ranchers in central Nevada, issuing an ultimatum that required livestock operators to either "declare for formation of a grazing district under the Bureau of Land Management or become subject to lease application under section 15" of the Taylor Grazing Act by November 6th of that year. Section 15 leases technically applied to "all public lands range outside of organized districts," but the lease system, although threatened, had not been implemented in this part of the Great Basin. In fact, there had been no federal oversight in this region except by the Forest Service, and then only in the mountain ranges included in the national

forests. Either way under this ultimatum, ranchers were going to have to submit to the administration of public rangeland under the federal government and pay for their use of it. Stockmen from Nye, Lander, Eureka, and Esmeralda counties meeting in Tonopah complained that a large portion of the twelve million acres of unorganized land was "absolutely useless for grazing purposes," and the stockmen voted to request a year-long postponement in order to thoroughly study the matter and make an informed decision. The state's leading newspaper in Reno reported that "had it not been for pressure brought to bear in the [I]nterior [D]epartment by eastern senators who imagine the stockmen are fattening their pocketbooks at the expense of the federal government it is unlikely the department would have molested the stockmen ranging cattle over the usable portions of the 12,000,000 acres involved."[82]

Ranchers in the central Great Basin felt that there was "no reason in the world why the government should force the stockmen using this 12,000,000 acres of desert land to accept federal regulation." There was "no doubt" the "best possible use" was being made of the land under the current arrangement. They thought the land was worthless, "practically desert; only the fringe of which where there is water, may be considered good grazing land," and that the "bulk of it is absolutely for any purpose other than mining—and little of it can be designated mineral land." With the backing of Senator George Malone, ranchers argued that once the federal government charged them for the use of "these desert acres," they would be forced out of business. They countered that the government was "receiving more in the form of income taxes; the state and the counties involved [we]re receiving greater revenue, and more badly needed beef [wa]s being

raised, than could possibly accrue to these varied interests under any form of control the government could devise."[83]

By December 1948, six months after Secretary of the Interior Krug's deadline and on the advice of Senator Pat McCarran that their time had run out, ranchers in the central Great Basin voted to organize a grazing district in preference to taking Section 15 leases, fearing federal prosecution and fines. But this decision came in the middle of a bad winter which blanketed much of the Great Basin in deep, windblown snow drifts. In January 1949, livestock operators requested that Governor Vail Pittman declare a state of emergency in Nevada. Ranchers in Utah, Wyoming, and Montana had already required significant assistance and some ranchers had lost nearly fifty percent of their herds that winter.[84] Federal oversight from this perspective seemed less onerous because it provided assistance. Although the Section 15 leases would have ensured less oversight, permits granted through the grazing districts were far more secure in the long term.

The new director of the BLM appointed in that year was Marion Clawson, a Nevada native, Harvard economist, and a western range livestock industry expert. Clawson was deeply interested in making public land administration more efficient. He worked to make the merger of the Grazing Service and GLO seamless and the BLM a thorough manager of public lands through centralized policies and decentralized oversight. Clawson stated that "the responsibility to place the public domain suitable for grazing purposes under administration continues" with the effort to organize the last grazing district, as "only upon the lands now in established grazing districts" has this responsibility been fulfilled. He declared, as had his superiors, that the areas not included in the final grazing district would be subject to Section 15 leases. The BLM announced a

public hearing in Tonopah to set the Battle Mountain District grazing allotment boundaries in 1950. Yet the livestock operators in the area continued to hold out hope that despite the government's "upper hand in [the] matter of forcing stockmen to form a grazing district," grazing administrators would "recognize the barrenness of [the] bulk of the land it is proposed to organize into the new district, and will make proper allowances for this fact."[85]

In early 1951, after giving consideration to the concerns of central Nevada's livestock operators, the BLM announced the formation of the sixth grazing district in Nevada and the last one with the federal grazing system.[86] This "sudden announcement" came as a surprise to ranchers, as "they believed that at least an additional meeting would be held before any final action was taken." But their cooperation was not necessary. In a desperate attempt to stave off grazing district organization and fee implementation indefinitely, they petitioned Nevada's Governor Charles Russell to make an appeal to the new Secretary of the Interior Oscar Chapman. Citing greater wool and beef demand and potential economic upset to a valuable state industry, Russell protested the establishment of the grazing district "against the wishes of the great majority of the stockmen involved."[87]

Ranchers wondered what the BLM could possibly gain from a region which would potentially be managed at a financial loss to the federal agency. But Secretary Chapman believed that in forcing the organization of this district he was "taking the right action in order to secure more efficient and economic use of grazing lands and preserve lands from overgrazing." Yet the economic value of the central Great Basin was not a deciding factor in bringing the last of the public rangeland under federal administration. The

grazing fees collected in that area would be pennies on balance with the dollars collected in other grazing districts. In fact, when the Grazing Service organized the districts in Nevada, of the more than 300,000 cattle in the state, Nye County contained only 18,500, and the southern desert counties had 8,000 head or less. Of the more than 800,000 sheep in the state, Nye County contained 31,000 and the southern desert counties had fewer than half that. The central Great Basin had significantly increased in cattle and sheep production in the early 1920s, but by the mid-1930s, livestock numbers had plummeted to half of their peak.[88] In addition, when compared to national numbers in the 1950s, BLM director Marion Clawson ranked Nevada last amongst states in the range livestock region in cattle and sixth to last in sheep. Those numbers amounted to the Nevada livestock industry contributing a little over 1% to the national cattle industry and 3% to the national sheep industry.[89]

The BLM was not disturbed by these numbers or the potential that the area might cost more to administer than the government would receive in fees. Overgrazing was not an issue either. The Central Nevada Stockmen's Association, the region's most recent range organization, stated that ranchers in the area "had made every effort to conserve the range they use," and that there had been no instances of range abuse or overgrazing.[90] The impetus of the BLM to bring the central Great Basin under federal administration came predominately from the desire of the federal government to oversee the vast majority of the nation's public lands in order to make their economic production more efficient through the central administration of range management. However this was not the only motivation for the federal government to organize and supervise public lands in the central Great Basin.

Aside from Clawson's desire to place all range under federal control, the other motivation behind the organization of the sixth grazing district in Nevada was the security required to protect the newly established atomic testing program and the danger it potentially posed to livestock operators in the area. In 1950, the Atomic Energy Commission (AEC) announced a permanent presence in central Nevada at Frenchman Flat in Nye County, considered by the government, atomic scientists, and the military, to be the most isolated and favorable site for a continental nuclear test site. The new Nevada Proving Ground was enclosed within the Las Vegas Bombing and Gunnery Range and the Tonopah Bombing and Gunnery Range existed just to the north. Between the two ranges, the area spanning Tickaboo, Kawich, and Emigrant valleys, Yucca, Frenchman, and Cactus flats, Pahute Mesa, and as far north as Ralston, Big Smokey, Monitor, Stone Cabin, and Little Fish Lake valleys, was considered too dangerous for civilians to occupy during military activities. Since its establishment in the early 1940s, the United Sates Air Force required that livestock operators and prospectors stay out of the area when they conducted bombing missions.[91]

Operating predominately in Frenchmen Flat, but with potential danger to ranchers in adjacent valleys including Hot Creek, Railroad, Coal, Garden, White River, and Pahranagat valleys, the AEC published notices of dangerous operations being conducted in the area. Both the Air Force and the AEC were concerned about trespassers and announced publically that their safety could not be guaranteed. "Every possible effort," the AEC announced, "is being made to clear all persons and all livestock from the area." The surest way for the Air Force and the AEC to remove trespassers, especially ranchers, from the testing range was to ensure the establishment of grazing districts which would

abut but not legally overlap the military areas. Ranchers in central Nevada objected strongly to what they believed was "arbitrary action on the part of the Department of Interior" in establishing the sixth grazing district. BLM Director Marion Clawson responded that the ranchers' opposition had no significance and announced that as of February 9, 1951, the district had been created and was legally in operation. Still, nearly two hundred ranchers continued to protest the action until Secretary of the Interior Oscar Chapman refused their requests.[92]

Initially, the AEC envisioned putting the new Nevada Proving Ground to use in the fall of 1951. However, Los Alamos had determined that preliminary tests in Nevada were crucial to a successful testing series in the Pacific for Operation Greenhouse slated for spring of 1951. The AEC rushed to prepare five tests for February. Connecticut's Senator Brien McMahon, chairman of the Joint Committee on Atomic Energy, assured the national public as well as Nevada residents that the AEC and Los Alamos scientists were taking the appropriate precautions to ensure Americans' safety, including providing a radioactive fallout monitoring program and ensuring the absence of civilian populations within thirty miles of the test site. Senator McMahon encouraged public support by stressing that the test site "promises to strengthen the security of the United States," a sentiment with which the American public readily agreed.[93]

The preparation process included ensuring the removal of any livestock operators and miners who lingered on what had now become AEC property. Officially, only one unnamed rancher from Las Cruces, New Mexico, held a grazing permit on the range and the AEC relocated his livestock north to Yucca Flat. The organization suspected several miners worked mining claims "illegally" in the mountain ranges surrounding Frenchman

Flat and advised civilians of the dangers when entering the new test site. The military continued to warn ranchers to stay off the bombing range during any military or AEC scheduled operations, while the AEC's test preparations rapidly moved forward. By January 1951 with the official announcement of the continental test site, the AEC conducted patrols and restricted the air space above the range, including ranchers who had taken to using small airplanes to locate stray cattle in the area, to ensure absolute security and secrecy protected the continental atomic tests (fig. 49).[94]

By the end of May, the AEC had conducted the first round of atomic tests at their Nevada Proving Ground and completed a series in the Marshall Islands at the Pacific Proving Grounds, and they were preparing for another series in Nevada that fall. Evidence of the correlation between organizing the last grazing district and the start of the nation's nuclear testing program appeared in one of the regional newspapers. Though not important enough to warrant headlines on the front page, two articles appeared side by side on the first page of the second section which covered matters of regional importance. Next to the article entitled "Chapman Turns Down Plea to Delay Grazing District" ran the telling title "More Atomic Test Planned." Secretary of the Interior Chapman declared that "all factors were considered," but that the "orderly and systematic use of the range" was of greater importance and benefit. In the adjacent column, Captain Caroll L. Tyler, Los Alamos Scientific Laboratory's head of their Santa Fe operations, the group responsible for the tests in Nevada, declared "we are proceeding to permantize [sic] and will conduct future tests there [at the Nevada Test Site] and may be required to advance the nuclear weapons program." The central Great Basin had finally been carved into neatly organized grazing districts at the same time the nation's nascent continental

nuclear testing program began. The last grazing district, Nevada's District 6, elected its first officials in October and those livestock operators, including the Fallinis, Sharps, Bordolis, Lockes, Whipples, and others filled out their grazing applications.[95] The entire Great Basin was now a landscape devoted to the ranching economy, but not solely a ranching landscape. The mushroom cloud also became a prominent fixture on the region's range.

In addition, the Taylor Grazing Act did not preclude other uses. Homesteading and mining remained higher uses of the land despite the grazing law and ranchers could be subject to having their grazing permits terminated if the Department of the Interior chose to reclassify the land based on other claims which served the nation's interests. As long as ranching remained in the Great Basin, ranchers and the land on which they ranged livestock was still wasted land. Clarence Forsling, the third director of the Grazing Service and a former forester, emphasized the holistic language of the grazing act which placed the orderly, developed, and stabilized use of the grazing range alongside preventing damage to the area, soil conservation, and preserving wildlife habitat. As BLM Director Marion Clawson suggested, grazing was only one use of public lands and in the hierarchical scale of use, it ranked low in benefitting the nation at large. Public lands grazing, while it benefitted a few local residents, did not serve the national interest quite as well as using the area as an atomic test site. By the 1950s, the ranch landscape began to take a backseat to other public land uses that served broader national purposes.[96] Clawson argued for the concept of multiple-use, which he maintained was written into the Taylor Grazing Act itself. But multiple use inherently created conflicted, especially when maximum utilization of grazing areas by ranchers impaired and reduced the range

value for other users and vice versa. As the demands of public land users changed with the nation's shifting economic and social conditions, the BLM, according to Clawson, was obligated to respond and reorient the use of public lands. It took only a few decades after enactment of the Taylor Grazing Act for many conservation-minded Americans like Clawson to embrace Bernard DeVoto's criticism of public lands ranching.[97]

As interpreted by ranchers, however, the Taylor Grazing Act created the public grazing range solely for the economic use of ranchers. While the act did not preclude wildlife management, homesteading, or establishing mining claims, it certainly made these activities much less important by giving ranchers priority in using the land. Solidifying the presence of the livestock industry on public lands had benefitted the American political and social economy during the Great Depression when preventing the collapse of the industry proved crucial and during the two world wars when increased livestock production was essential to support the war effort. The Taylor Grazing Act in essence not only softened the wasteland status of the Great Basin, it also, at least for a time, served the greater good by deeply rooting a failing economic industry in land that was going to waste.

But conforming to changing public land use demands proved difficult for livestock operators who depended upon a consistent and stable system of access to public rangeland. Used to negotiating herd depletions relative to natural conditions such as harsh winters, range fires, and drought, ranchers resented seeing their allocated livestock numbers shrink relative to other users. Lina Sharp, wife of James Sharp, recalled that after five decades of managing the range themselves, putting their livestock out in good years and using pastures in bad ones, the federal government forced them to pay for the

right and told them how they needed to run their livestock operation. Helen Fallini, wife of Joseph Fallini, said that if the federal government had let them run their own business, their ranch operations would have been fine, but instead, the BLM has made it "so damn miserable for a person to try to run stock of any kind, or do anything anymore." Beltran Paris remarked that putting the range under federal control was a "pretty good idea" at first, and for a few years, livestock operations were fairly smooth. But the possibility of increased grazing fees loomed large over the Fallinis, Parises, and other ranching families. The threat of paying more for less access made livestock operators' lives "worse and worse." [98].

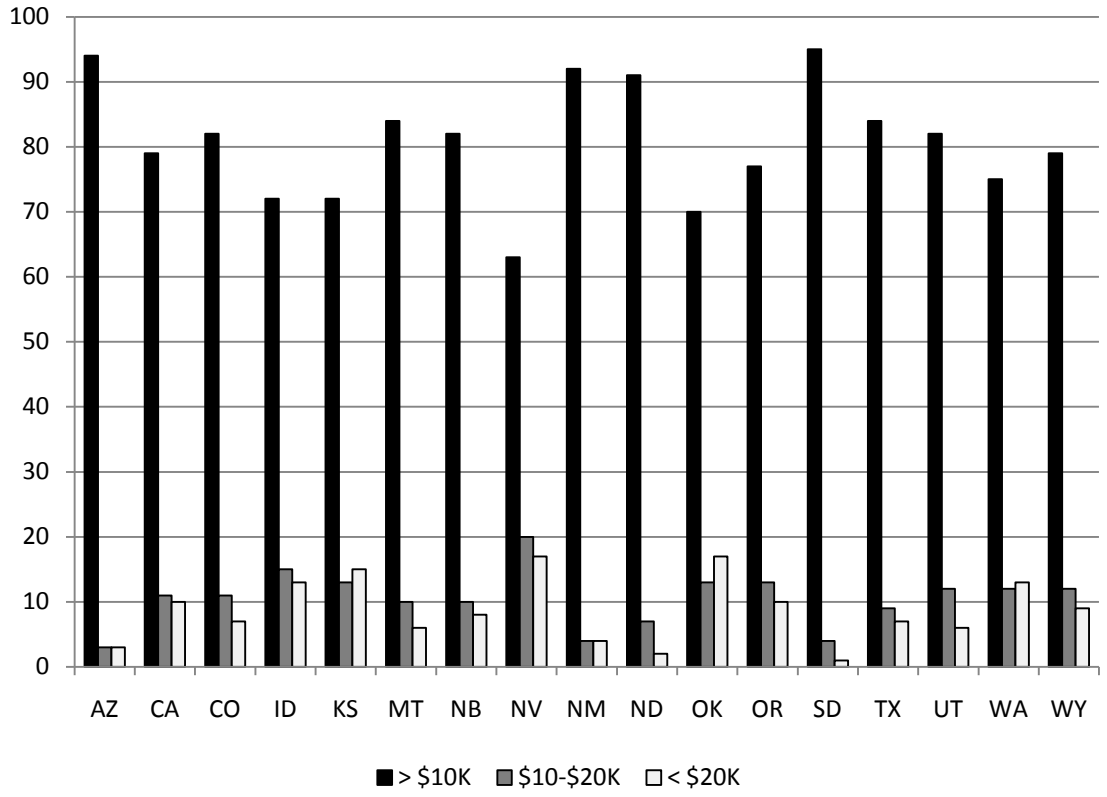


Fig. 40 Ranch Income by Total Percentage. This chart compares incomes by percentage of ranches in three categories, in each of seventeen range livestock states in the 1920s. Notice the Great Basin states, especially Nevada, seemed relatively productive and mostly on par with other ranching states. Chart by author.

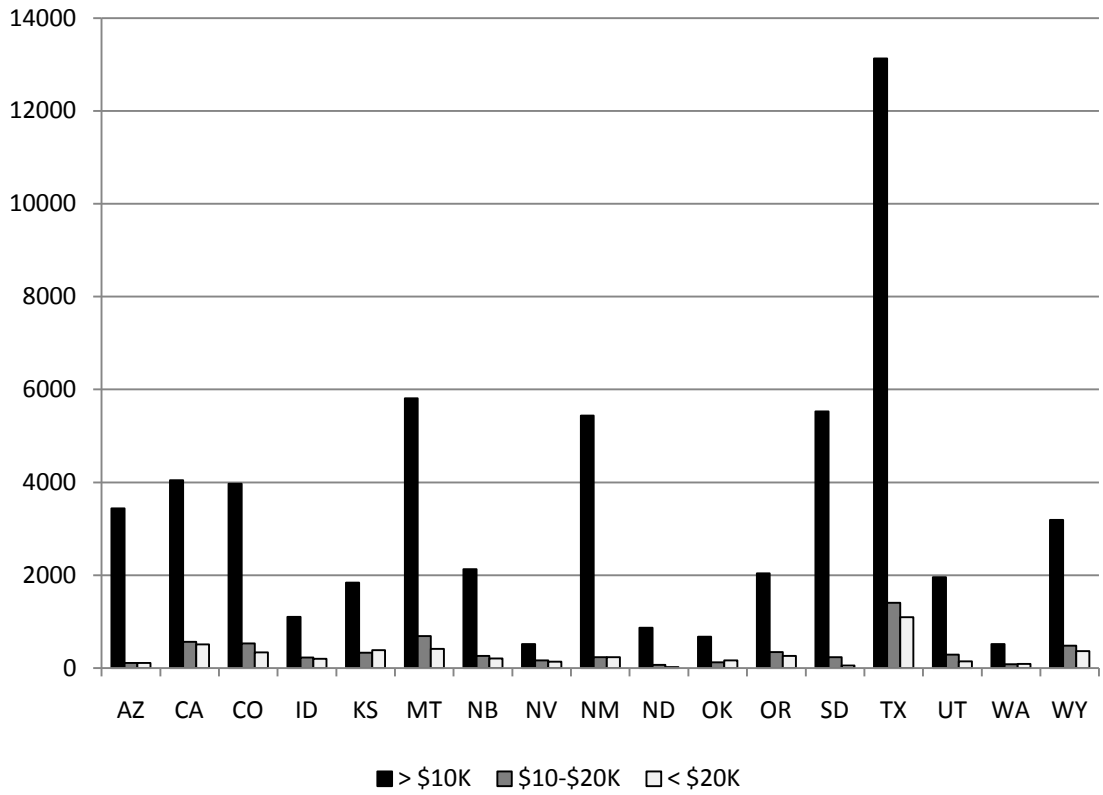


Fig. 41 Ranch Income by Total Quantity. This chart compares the incomes by number of ranches in each of the seventeen range livestock states in the 1920s. Notice that the Great Basin states contained the fewest number of ranches and that the majority of those ranches earn less than $10,000 annually. The Great Basin in general contained the fewest number of productive ranches throughout the American West and Midwest. Chart by author.

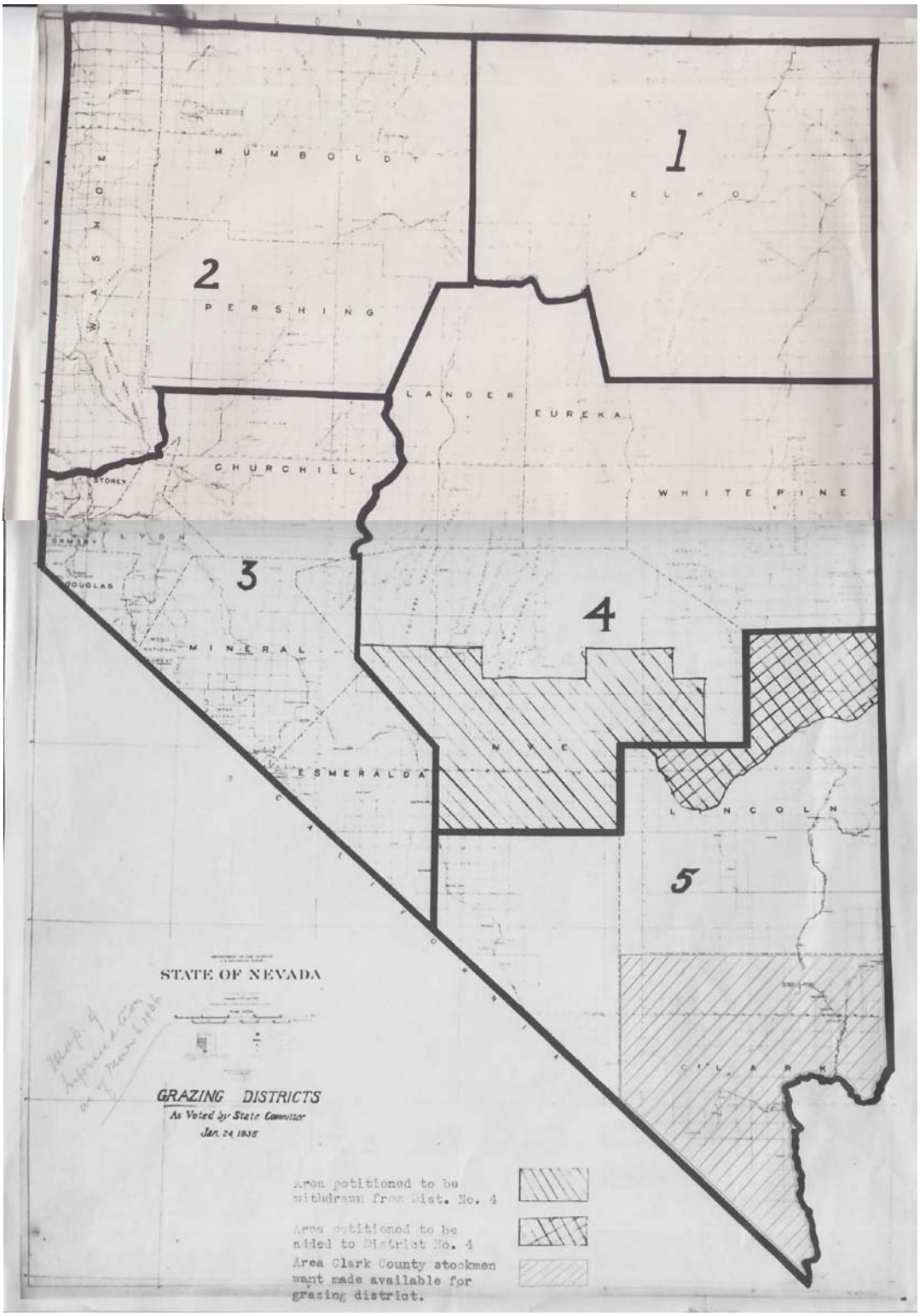


Fig. 42 Proposed Nevada Grazing Districts January 1935. These district boundaries reflect the decision made by the majority of Nevada residents. The northern area of District 5 petitioned for inclusion in District 4. The southern part of the state requested to join District 5. The area in the southern part of District 4 rejected organization altogether. Map by the State of Nevada in the Richard Kirman Papers, Nevada State Archives.

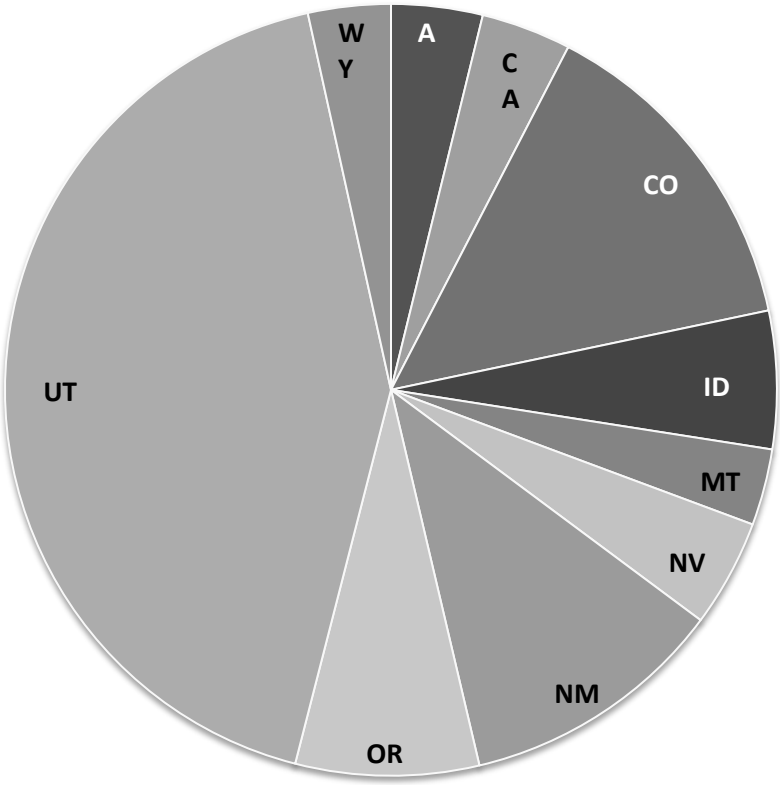


Fig. 43 Percentage of Grazing Permits by State. This chart indicates the percentage of permits received in 1935 by the ten states which organized grazing districts under the Taylor Grazing Act:

AZ – Arizona
CA – California
CO – Colorado
ID – Idaho
MT – Montana
NV – Nevada
NM – New Mexico
OR – Oregon
UT – Utah
WY - Wyoming

The Great Basin states contained more than sixty percent of the livestock permitted on the grazing range. Yet while Utah and Oregon had been organized as had most of Idaho, Nevada remained relatively unorganized in 1935. Chart by author.

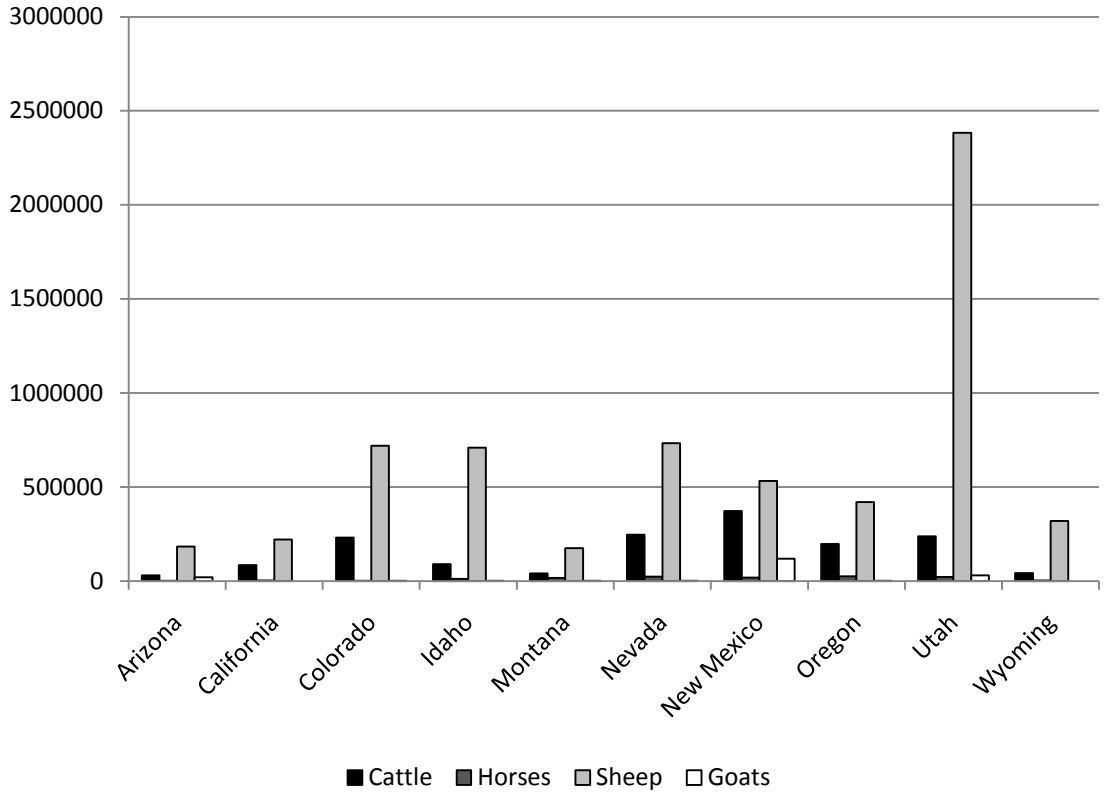


Fig. 44 Livestock Permitted by State. Chart compares the permitted number of livestock in four categories throughout states administered under the Taylor Grazing Act in 1935. Chart by author.

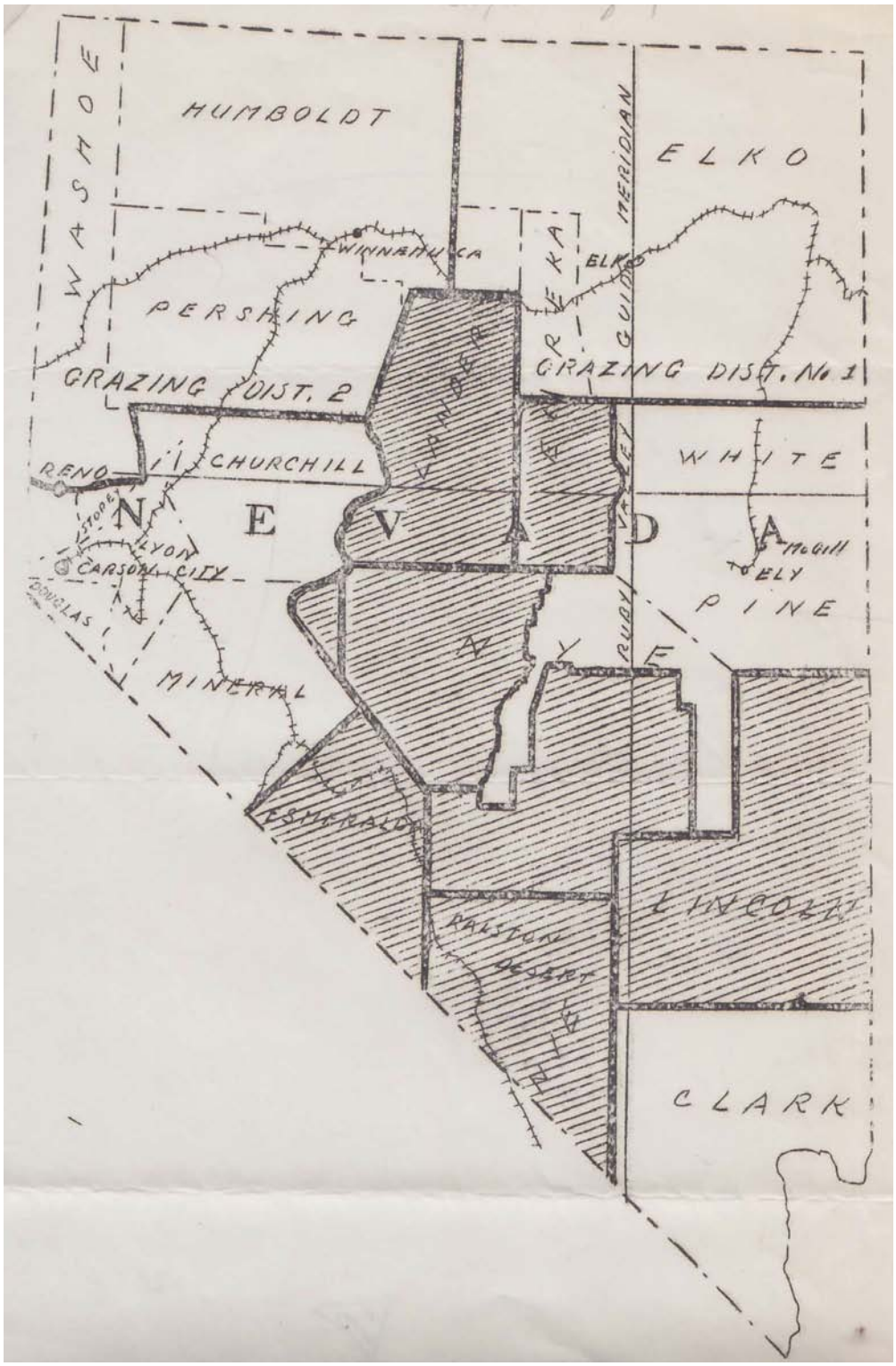


Fig. 45 Actual Nevada Grazing Districts August 1935. The Grazing Service approved District 1 and 2 in the northern part of the state as part of the initial 80 million acres. When Congress allocated an additional 62 million for grazing districts, the Grazing Service approved the three southern districts shown here in white. The central part of the state once again refused to organize into a grazing district. Map by the Nevada Agriculture Extension Service's Circular 12 in the Richard Kirman Papers, Nevada State Archives.

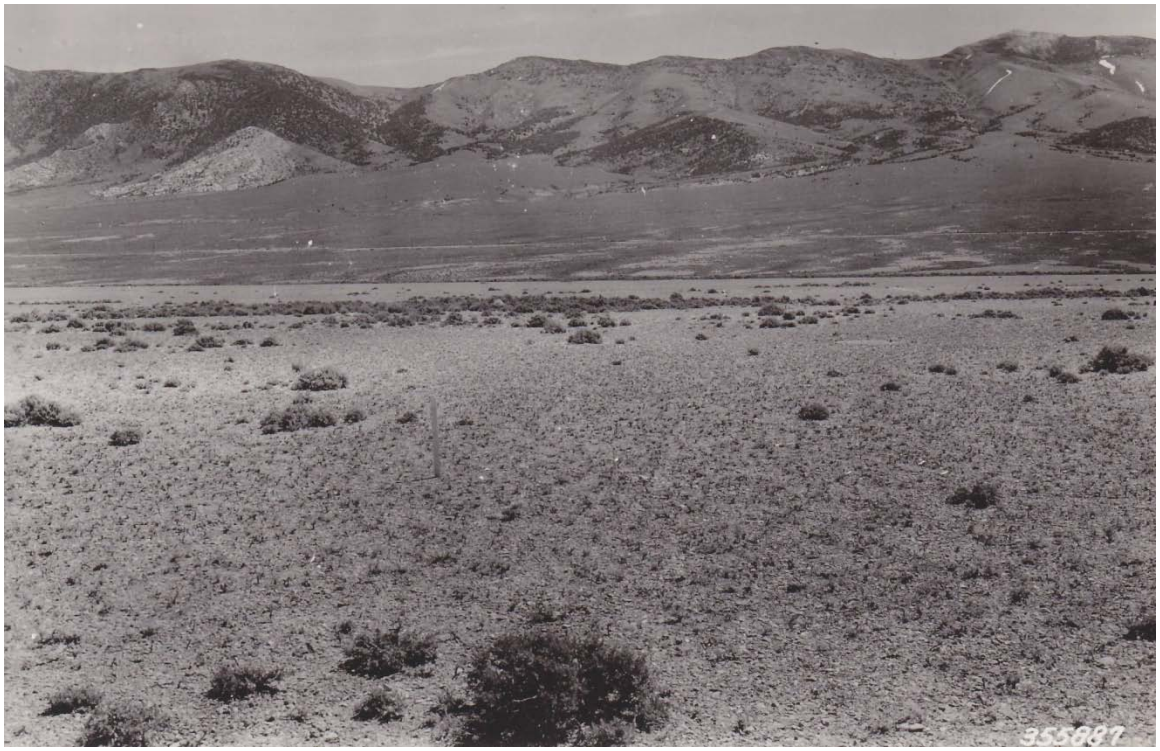


Fig. 46 The Rangeland in White Pine County. This photo depicts the area just north of Ely, Nevada in 1935. Notice the closely cropped grass bunches and sandy patches between. Such was the condition of the range in this region. Photo courtesy the Public Lands Foundation Archive, Phoenix, Arizona.

Fig. 47 Areas Included In the Taylor Grazing Districts as of January 1937. Note that the bulk of the grazing region is located in the Great Basin and Colorado Plateau. Map from James Muhn and Hanson R. Stuart, *Opportunity and Challenge: The Story of the BLM* (Washington, DC: Bureau of Land Management, United States Department of the Interior, 1988), 39.

Fig. 48 The Rangeland in Railroad Valley. This photo depicts the eastern end of Nye County, Nevada, in 1937. Note the bunched grasses between sagebrush. This range was in slightly better condition than that of the range near Ely, but was still far sparser than the northern areas in the Great Basin. Photo courtesy the Public Lands Foundation Archive, Phoenix, Arizona.

WARNING

January 11, 1951

From this day forward the U. S. Atomic Energy Commission has been authorized to use part of the Las Vegas Bombing and Gunnery Range for test work necessary to the atomic weapons development program.

Test activities will include experimental nuclear detonations for the development of atomic bombs – so-called "A-Bombs" – carried out under controlled conditions.

Tests will be conducted on a routine basis for an indefinite period.

NO PUBLIC ANNOUNCEMENT OF THE TIME OF ANY TEST WILL BE MADE

Unauthorized persons who pass inside the limits of the Las Vegas Bombing and Gunnery Range may be subject to injury from or as a result of the AEC test activities.

Health and safety authorities have determined that no danger from or as a result of AEC test activities may be expected outside the limits of the Las Vegas Bombing and Gunnery Range. All necessary precautions, including radiological surveys and patrolling of the surrounding territory, will be undertaken to insure that safety conditions are maintained.

Full security restrictions of the Atomic Energy Act will apply to the work in this area.

RALPH P. JOHNSON, Project Manager
Las Vegas Project Office
U. S. Atomic Energy Commission

Fig. 49 Atomic Energy Commission Warning Notice. The AEC's official public notice of atomic testing activities in the central Great Basin. Image from the Nevada State Archives Charles Russell papers.

Notes

[1] Farrington Carpenter, "Beginnings of the Division of Grazing: Reminiscences of Ferry Carpenter Part II," *Our Public Lands* (July 1963), 17.
[2] Philip O. Foss, *Politics and Grass: The Administration of Grazing on the Public Domain* (Seattle: University of Washington Press, 1960), 175; Marion Clawson, *The Western Range Livestock Industry* (New York: McGraw-Hill Book Company, 1950), 121, 378-382.
[3] Bernard DeVoto, "The West Against Itself," (January 1947) in Douglas Brinkley and Patricia Nelson Limerick, eds., *The Western Paradox: A Conservation Reader* (New Haven, CT: Yale University Press, 69-70; Bernard DeVoto, "Sacred Cows and Public Lands," (July 1948) in Brinkley and Limerick, eds., *The Western Paradox*, 77; Bernard DeVoto, "Two-Gun Desmond is Back," (March 1951) in Brinkley and Limerick, eds., *The Western Paradox*, 120-121; Bernard DeVoto, "Billion Dollar Jackpot," (February 1953) in Brinkley and Limerick, eds., *The Western Paradox*, 130; Bernard DeVoto, "To the Traveler's Eye," in Brinkley and Limerick, eds., *The Western Paradox*, 200.
[4] James D. Richardson, *A Compilation of the Messages and Papers of the Presidents, Volume 6* (New York: Bureau of National Literature, 1914), 4428.
[5] While not as familiar as John Wesley Powell's *Report on the Lands of the Arid Region of the United States: With a More Detailed Account of the Lands of Utah* (Washington, DC: Government Printing Office, 1879), Donaldson's study provides a much more pessimistic outlook on the settlement of the remaining public lands. Powell estimated that 2,560 acres were the minimum amount necessary for a pasturage farm or ranch. In the Great Basin, this acreage would only form the base property of a ranch. Powell did note, however, that "this estimate will disappoint many of his western friends, who will think he has placed the minimum too low." In Powell's estimation, "after making the most thorough examination of the subject possible," he believed "the amount to be sufficient for the best pasturage lands, especially such as are adjacent to the minor streams of the general drainage." Powell envisioned a very small population in the region with vast gaps of unused land in between. John Wesley Powell, *Report on the Lands of the Arid Region of the United States: With a More Detailed Account of the Lands of Utah* (Washington, DC: Government Printing Office, 1879), 19-23; Milton A. Pearl, "Public Land Commissions," *Our Public Lands* (Summer 1967): 14; Public Land Commission, *The Public Domain: Its History with Statistics* (Washington, DC: Government Printing Office, 1881), 25-27.
[6] Donaldson differed from the commission's overall findings in this statement. According to the commission, the region's "arid and semi-arid lands had considerable value for grazing." Pearl, "Public Land Commissions," *Our Public Lands*: 16; Thomas Donaldson, "The Public Lands of the United States," *The North American Review* 133 (August 1881): 204-210.
[7] Donaldson, "The Public Lands of the United States," *The North American Review*: 208-210.
[8] In 1891, Congress enacted the Forest Reserve System which allowed the president to reserve timberland in the public domain and manage it as an agricultural crop for future generations. The Forest Service, created in 1906, was tasked with the management of the National Forests. By 1923, the agency managed 146 national forests embracing 161,325,734 acres in the continental United States. Of that total, 49,147,601 acres were located in the Great Basin states. If the forested regions in Oregon and Idaho are removed which are not part of the Great Basin, only 13,230,988 acres of national forest were located within the region itself. In addition, Congress created 18 national parks between 1872 and 1924. They were Yellowstone, Sequoia, Yosemite, Mt. Rainier, Crater Lake, Wind Cave, Mesa Verde, Glacier, Rocky Mountain, Hawaii Volcanoes, Haleakala, Lassen, Denali, Acadia, Grand Canyon, Zion, Hot Springs, and Bryce Canyon. While Zion and Bryce Canyon are located in Utah, they are part of the Colorado Plateau and achieved park status for their stunning red, yellow, and white sandstone formations and are indicative of the plateau region drained by the Colorado River. Created in 1916, the National Park Service administers these areas for the recreational enjoyment of future generations. That same year, the richly forested Oregon and California Railroad Company Lands surrounding the Willamette Valley in Oregon were reconveyed to the federal government for administration by the General Land Office as a timber reserve. For a brief summary of the forest reserves in 1923, see Benjamin Horace Hibbard, *A History of the Public Land Policies*. (1924; Madison: University of Wisconsin Press, 1965), 529-534. For a brief summary of the national park system in 1923 see Hibbard, *A History of the Public Land Policies*. 535-536.
[9] James A. Young and B. Abbott Sparks, *Cattle in the Cold Desert, Expanded Edition* (Reno: University of Nevada Press, 2002), 35-36.

[10] While ranching was the most important agricultural industry in the Great Basin, mining was the most important industry and the economic driver for the region, especially in Nevada. Other forms of agriculture including grain, fruit, and vegetable production remained an important part of the Mormon cultural region and Utah and Idaho's development. Some Mormon families ranched in eastern Nevada and western Utah, but most participated in farming. Young and Sparks, *Cattle in the Cold Desert*, 48-49.
[11] This term was utilized by former Bureau of Land Management Battle Mountain District Manager Jim Fox to describe the range in central Nevada which ranchers utilized free of charge until the 1950s.
[12] Young and Sparks, *Cattle in the Cold Desert*, 137-151, 15-179.
[13] Clel Georgetta, *Golden Fleece in Nevada* (Reno, NV: Venture Publishing Company, Ltd., 1972), 134-136; 113-128. Clel Georgetta, a sheep rancher and lawyer on the Nevada-Utah border near Ely, wrote prolifically about his experiences as a rancher and the region's ranching history. While often severely opinionated about the negative impacts of the "federalization" of public land since the establishment of the Forest Reserves, Georgetta nevertheless provides much insightful information about the industry in the early 20th century. Young and Sparks, *Cattle in the Cold Desert*, 237-256.
[14] Garrett Hardin, "The Tragedy of the Commons," *Science* (December 13, 1968): 1243-1248.
[15] Hibbard, *A History of the Public Land Policies*, 479.
[16] "Roosevelt Declares Himself on the Public Land Question," *Ogden Standard Examiner*, February 13, 1907; "Stockmen are Not Unanimous," *Salt Lake Herald*, February 14, 1907; Pearl, "Public Land Commissions," *Our Public Lands*: 16-17; Hibbard, *A History of the Public Land Policies*, 479-483.
[17] Frederick Jackson Turner, "The Significance of the Frontier in American History," in John Mack Faragher, *Rereading Frederick Jackson Turner: 'The Significance of the Frontier in American History' and Other Essays* (New Haven, CT: Yale University Press, 1998), 31-60; Richard T. Ely, *Outlines of Economics* (Meadville, PA: Flood and Vincent, 1893), 56-57; Richard T. Ely, Thomas S. Adams, et. al., *Outlines of Economics* (New York: The Macmillan Company, 1923), 68-70; David M. Wrobel, *The End of American Exceptionalism: Frontier Anxiety from the Old West to the New Deal* (Lawrence: University Press of Kansas, 1993), 38-39.
[18] Richard T. Ely and Ralph H. Hess, et. al., *The Foundations of National Prosperity* (New York: The Macmillan Company, 1918), 3-10, 27-46; Richard T. Ely, *Land Economics* (New York: The Macmillan Company, 1940), 48-73, 222-270; Benjamin G. Rader, *The Academic Mind and Reform* (Lexington: University of Kentucky Press, 1966), 29-53; Richard T. Ely, *Ground Under Our Feet* (New York: Arno Press, 1977), 234-241, 279-282.
[19] Rader, *The Academic Mind and Reform*, 41-53, Hibbard, *A History of the Public Land Policies*, 552-553.
[20] Hibbard, *A History of the Public Land Policies*, 562-569; Rader, *The Academic Mind and Reform*, 200-201.
[21] Many livestock operators echoed this sentiment. Throughout the Great Basin, ranchers rushed their herds and flocks to different grazing areas hoping they would not arrive to find their competition had grazed the entire area ahead of them. Grazing grasses too early caused the worst sort of damage to the health of the entire rangeland by preventing the grasses from maturing and reseeding the area. Nomadic sheep herds were especially troublesome as herders rarely owned a base of operations and moved seemingly at random across the public rangelands. Most ranchers used a base property and water rights to anchor their operations and relied on regular access to the rangelands encompassing their property. Hibbard, *A History of the Public Land Policies*, 565-570.
[22] The previous seven years had been fairly dry in the Great Basin and hay and forage was lean. The summer rains in 1929 deluged much of the Great Basin to the delight of ranchers. "Reveille Valley Under Water of the Bottom Land," *Tonopah Daily Times*, August 17, 1929; "Cattle Outlook Good, Declared in Local Meeting," *Ely Daily Times*, August 28, 1929; "Range Revival Bound to Come with Rich Feed," *Tonopah Daily Times*, August 28, 1929. For a brief history of agricultural prices see Jerry L. Holecheck, Jerry Hawkes, and Tim D. Darden, "Macro Economics and Cattle Ranching," *Rangelands* (June 1994): 118-123.
[23] "Letter Clearly States His Policies on Public Domain," *Los Angeles Times*, August 27, 1929; "Hoover Land Proposal Taken Up by Stockmen," *Reno Evening Gazette*, October 11, 1929. For a further discussion of Hoover's decision, see Karen R. Merrill, *Public Lands and Political Meaning: Ranchers, the Government, and the Property Between Them* (Berkeley: University of California Press, 2002), 105-107; David Thomson, *In Nevada: The Land, the People, God, and Chance* (New York: Alfred A. Knopf, 1999), 127-128.

[24] "Hoover Proposal Looked Upon as Basis for New Policy," *Reno Evening Gazette*, August 30, 1929. While many congressmen agreed with Hoover that the administration of the public lands was an unnecessary financial burden, western states such as Nevada relied upon federal funds for basic services such as road construction. The paper in Ely published an article which declared "Nevada don't want that government land if federal aid for highways is to cease." The article indicated that there was no possible way the state could realize the same kind of financial benefit from the public lands. Papers in Utah also indicated that residents of that state were equally concerned about losing federal highway funds. Clel Georgetta, lawyer, sheep rancher, and state assemblyman from White Pine County and a consistent opponent to any form of federal regulation on the public domain acknowledged that "it is possible Nevada has profited more by the public domain road program that if all the public domain had been turned over to the state. In Nevada, millions of acres of the public domain are quite desolate. Such areas do contain some feed for livestock but the land, where not already privately owned, is so barren that it would be a long, long time before all, or most, of it, would ever be on the tax roles. It would be a long, long time before the state or the counties ever collected enough taxes or derived other income from such lands by sale or otherwise to pay over three hundred million dollars for the construction of highways." Georgetta, *Golden Fleece in Nevada*, 201; "Governors Back Plan," *Ely Daily Times*, August 27, 1929; "New Public Lands Policy," *Los Angeles Times*, August 28, 1929; "Public Lands Control will be Referred," *Tonopah Daily Times*, August 28, 1929; "Western Senators Protest Hoover's Public Land Plan," August 28, 1929; "Need Federal Aid for Nevada Roads," *Ely Daily Times*, August 28, 1929; "Balzar Visits in Ely; Tells About Governor's Meet," *Ely Daily Times*, August 29, 1929.

[25] "New Lands Idea Urged," *Los Angeles Times*, August 27, 1929; "Government Should Keep Public Land," *Garfield County News*, October 4, 1929; "Public Land Plan Discussed by Mining Men at Meet," *Reno Evening Gazette*, October 2, 1929; "Garfield to Head Public Domain Board of Hoover," *Reno Evening Gazette*, October 16, 1929; "President Names Garfield to be Public Lands Chairman," *Reno Evening Gazette*, October 17, 1929.

[26] "Malone is Named as Member of Public Land Board," *Reno Evening Gazette*, October 18, 1929; "Ely Plans Meet of Stockmen Tuesday," *Reno Evening Gazette*, October 24, 1929; "Rage Livestock Program Adopted," *Tonopah Daily Times Bonanza*, December 6, 1929..

[27] Many stock operators ranched in Nevada whether they owned base property in the state or not. Ranch operations in eastern Oregon, southern Idaho, and western Utah could easily access the northern Nevada ranges. As a result, any livestock association in Nevada included ranchers from other states."Permanent Grazing Rights on Nevada's Public Lands Advocated by Stockmen," *Reno Evening Gazette*, October 29, 1929.

[28] "Stockmen's Meeting Considered a Success as Progress is Made," *Ely Daily Times*, October 30, 1929; "Stockmen of Ely Discuss Land Proposal," *Reno Evening Gazette*, November 1, 1929.

[29] Georgetta, *Golden Fleece in Nevada*, 141-146.

[30] "Fears Federal Lands Under State Control Will Not Be Handled for Benefit of Small Settler," *Tonopah Daily Times Bonanza*, November 8, 1929; "Rancher Voices Objection to Land Plan," *Reno Evening Gazette*, November 9, 1929.

[31] Public land historian Karen R. Merrill has argued that organized ranchers' response to Hoover's proposal to turn the surface rights of the remaining public lands over to the states represented a significant shift towards state's rights sentiment. This is generally true in the western states; most ranchers at the time preferred state control to federal control, especially if it meant avoiding Forest Service regulation. But in the Great Basin, especially in Nevada and Utah, states which traditionally sold their lands to private operators at premium prices to generate revenue, most ranchers could not afford to purchase their grazing ranges outright and did not stand to benefit in any way from state control of public land. For more information on the Garfield Commission and Hoover's proposal see Merrill, *Public Lands and Political Meaning*, 103-134. "Permanent Grazing Rights on Nevada's Public Lands Advocated by Stockmen," *Reno Evening Gazette*, October 29, 1929; "Stockmen Voice Opinions on Acceptance by Nevada of Unappropriated Lands," *Reno Evening Gazette*, December 7, 1929; "Grazing Lands Profits Grow, Report Shows," *Los Angeles Times*, December 12, 1929; O.A. Fitzgerald, "Do You Want 'Free' Land?" *Los Angeles Times*, January 5, 1930; "Development of Water for Stock Holds Importance," *Ely Daily Times*, February 6, 1930; "Stockmen Bring Parley to Close with Smoker Given by Businessmen," *Ely Daily Times*, October 29, 1930.

[32] John Bristol, "Colton Grazing Bills Meet Opposition," *Salt Lake Telegram*, February 6, 1928; "Smoot Grazing Bill Hard Hit; Colton Draft Gets Support," *Duchesne County Newspapers*, February 17, 1928; "Public Lands Committee Discusses Colton Bill," *Duchesne County Newspapers*, March 9, 1928; "Colton Bill May Be Restricted," *Salt Lake Telegram*, March 13, 1928; "The Colton Grazing Bill As Referred to the Committee on Public Lands," *Vernal Express*, March 7, 1929; "Colton Sees New Public Land Bill," *Salt Lake Telegram*, March 10, 1931; "Colton Grazing Measure Okehed," *Salt Lake Telegram*, June 22, 1932; "Grazing Land Measure Favored by Stockmen," *Salt Lake Telegram*, October 26, 1932; Colton Grazing Plan Memorial is Killed in House," *Garfield County News*, February 10, 1933; Georgetta, *Golden Fleece in Nevada*, 198-206.

[33] "Stockmen Voice Opinions on Acceptance by Nevada of Unappropriated Lands," *Reno Evening Gazette*, December 7, 1929; "Against Proposal to Dispose of Public Domain," *Tonopah Daily Times Bonanza*, December 9, 1929.

[34] Utah's representative on Hoover's public lands committee William Peterson advocated federal control of the national grazing range. Similar to Nevada, Utah relied on the livestock industry, second only to its agricultural industry. Peterson advocated development of a conservation program through the Forest Service as they had "already expressed a willingness and a desire to co-operate." While many ranchers may have agreed with Peterson as to the necessity of developing a range conservation program under the auspices of the federal government, very few wanted the Forest Service to be the governing agency. "William Peterson, "Problem of Range Management Discussed," *Duchesne County Newspapers*, December 1, 1922; William Peterson, "Public Land Should Be Ceded Back to States, Hoover Board Reports," *Salt Lake Telegram*, March 9, 1931; "Gift of Domain May be Incubus," *Los Angeles Times*, January 5, 1930; George H. Cecil, "Public Lands," *Los Angeles Times*, November 6, 1930.

[35] "Land Problem Compromised," *Los Angeles Times*, November 28, 1930; "Land Report Given Hoover," *Los Angeles Times*, February 15, 1931; "Public lands Row Flares," *Los Angeles Times*, January 13, 1931. At the Western State's Governor's Conference in October 1931, the executives of the eleven western states, despite wide spread support of the surface transfer of the public domain, were unable to construct any unifying legislation which would have requested the federal government grant western states the surface rights to the remaining public domain. "Public Lands Change Urged," *Los Angeles Times*, March 9, 1931; Pearl, "Public Land Commissions," *Our Public Lands*: 17.

[36] According to the 1930 Census of Agriculture, only 67,000 ranches (distinguished from a farm by the sale of livestock as a chief source of income and by use of native forage as feed for livestock) existed in the range livestock region comprised of the seventeen states on or west of the 100th meridian. Of that number, Idaho, Nevada, Oregon, and Utah contained a total of eleven percent of the ranches in the region while Texas alone contained one-quarter. Despite their small numbers, ranches in the Great Basin, especially Nevada, are relatively profitable. Clawson, *The Western Range Livestock Industry*, 179-190.

[37] Anthony R. Orme, ed., *Physical Geography of North America* (New York: Oxford University Press, 2000), 380-401.

[38] "Reveille Valley Under Water of the Bottom Land," *Tonopah Daily Times*, August 17, 1929; "Cattle Outlook Good, Declared in Local Meeting," *Ely Daily Times*, August 28, 1929; "Range Revival Bound to Come with Rich Feed," *Tonopah Daily Times*, August 28, 1929; Holecheck, Hawkes, and Darden, "Macro Economics and Cattle Ranching," *Rangelands*: 118; Merrill, *Public Lands and Political Meaning*, 137-138; White, *"It's Your Misfortune and None of My Own"*, 464-465.

[39] For a brief discussion of the effects of drought, overgrazing, and severe winter weather in the 1880s Great Basin see James Hulse, *The Silver State: Nevada's Heritage Reinterpreted* (Reno: University of Nevada Press, 2004), 133-142. It was this decline in the cattle industry that facilitated the development of a range sheep industry which operated at a lower overhead cost. This happened again in the 1920s throughout the region. James A. Young and R.A. Evans, "Silver State Rangelands: Historical Perspective," *Rangelands* (October 1989): 202; White, *"It's Your Misfortune and None of My Own"*, 477-480.

[40] Clarence L. Forsling, "Relationship of Forest and Range Lands to Erosion Control as Affecting the Water Use," *Proceedings of the First National Water Users' Conference, Reno, February 26-28, 1930* (Reno, NV: American Farm Bureau Federation, 1930), 45; Grazing Service, Second Annual District Advisors' Conference, Division of Grazing, Salt Lake City, Utah, December 9-11, 1936, 4.

[41] Initially, ranchers had rejected an Agricultural Adjustment Act assistance program in 1933 because in exchange for income supplements, ranchers had to accept federally mandated reductions in production. But, "as the droughts grew worse and the laissez-faire noose tightened, they began to repent." Donald

Worster, *Dust Bowl: The Southern Plains in the 1930s, 25th Anniversary Edition* (New York: Oxford University Press, 2004): 112-114; White, *"It's Your Misfortune and None of My Own"*, 478-479.
[42] For more information on the history of Utah counties, see the Utah Historical Society's Centennial Series by county. Martha Sonntag Bradley, *A History of Beaver County* (Salt Lake City: Utah State Historical Society, 1999), 221-297; Ouida Blanton, *A History of Toole County* (Salt Lake City: Utah State Historical Society, 1998), 226-246; Young and Evans, "Silver State Rangelands: Historical Perspective," *Rangelands*: 202; "Ely First in Cattle Purchase," *Ely Daily Times*, June 25, 1934.
[43] "Stock Raisers Hail Proposed Change in Land," *Salt Lake Telegram*, January 22, 1934; "West Battles Grazing Bill," *Los Angeles Times*, April 29, 1934; Merrill, *Public Lands and Political Meaning*, 138.
[44] Nevada actually reported a loss in cattle and sheep numbers but a gain in value for 1933, providing a false sense of security and leverage. "Range Measure Discussed," *Reno Evening Gazette*, May 1, 1934; "Elko Stockmen Ask Places on Board," *Reno Evening Gazette*, May 2, 1934; "Nevada Governor is Opposed to Taylor Bill," *Reno Evening Gazette*, May 4, 1934; "State Range Group Condemns Taylor Control Bill," *Ely Daily Times*, May 5, 1934; "Livestock Value in State Shows Increase," *Reno Evening Gazette*, May 7, 1934; "Forestry Service Transfer to Be Made Part of Bill," *Reno Evening Gazette*, May 19, 1934; E. Louise Peffer, *The Closing of the Public Domain: Disposal and Reservation Policies, 1900-1950* (New York: Arno Press, 1972), 214-222; Lee Sharp, "Overview of the Taylor Grazing Act," *The Taylor Grazing Act: 50 Years of Progress 1934-1984* (Boisie: Idaho State Office Bureau of Land Management, 1984), 9.
[45] Senator Pat McCarran has been credited with fighting to include the grazing range in the value of the ranch property in order to ensure greater access to credit for ranchers. However, it was State Engineer George W. Malone who presented the "unit earning power" amendment to McCarran who then offered to present it to the Senate and "filibuster the entire bill if the amendment were not accepted." "Grazing Measure is Considered by Senate Group," *Reno Evening Gazette*, May 23, 1934; State Engineer George W. Malone, "Meeting of Livestock Men," September 26, 1934, Richard Kirman Papers, Box 92, Folder 4, Nevada State Archives, (hereafter, cited as Nevada State Archives); E. Louise Peffer, *The Closing of the Public Domain: Disposal and Reservation Policies, 1900-1950* (New York: Arno Press, 1972), 247-278.
[46] "Clause in Taylor Bill Will Protect Vested Water Rights, Says Pittman," *Ely Daily Times*, May 7, 1934. Secretary Harold Ickes continued to eviscerate stock operators even after the Taylor Grazing Act passed for their complaining and reluctance. He accused them of "destroying their own livelihood through short-sight competition for grazing for their flocks and herds." Pointing out how over-grazing caused erosion and depletion of water supplies, Ickes pushed the plans forward to administer the act. "Ickes Blasts Stock Raisers," *Ely Daily Times*, February 12, 1935; "Cattle, Sheepmen Shortsighted Charges Ickes," *Tonopah Daily Times Bonanza*, February 12, 1935.
[47] "Stock Industry in State Badly Hit by Dry Season," *Ely Daily Times*, May 21, 1934; "Nevada Drought May Drop Prices on State Livestock," *Ely Daily Times*, May 31, 1934; "West Will Ask Drouth Funds," *Salt Lake Telegram*, June 15, 1934.
[48] President Roosevelt and several senators believed the public rangelands ought to be administered by the Forest Service. However, a deep-seeded animosity already existed between the timber agency and western ranchers. As a result, the Taylor Bill left it to the Secretary of the Interior to create a management system for the rangelands. "Taylor Range Control Bill on Must List," *Ely Daily Times*, May 23, 1934; "Range Control Bill Passes Senate," *Ely Daily Times*, June 13, 1934; "Taylor Range Bill Opposition Eases," *Ely Daily Times*, June 26, 1934. In addition, not all ranchers considered the drought and its effects on securing the passage of the Taylor Grazing Act the same way. Some believed the bill was introduced in Congress in a manner which unfairly emphasized the denuded range environment and stressed the need for range controls. Robert D. McCracken and Jeanne Sharp Howerton, *A History of Railroad Valley Nevada* (Tonopah: Central Nevada Historical Society, 1996).
[49] *Taylor Grazing Act of 1934*, Public Law 482, 73rd Cong., 2nd sess. (June 28, 1934); Department of Interior, "The Taylor Grazing Act of June 28, 1934, with Amendments to September 1, 1955," (Washington, D.C.: U.S. Government Printing Office, 1955); "Grazing Measure Signed by President; Aim Called to Conserve Public Lands," *Reno Evening Gazette*, June 28, 1934; "Public Domain Question Settled," *Los Angeles Times*, June 29, 1934; Merrill, *Public Lands and Political Meaning*, 135-156.
[50] Similar to the Reclamation Act of 1902, the Taylor Grazing Act of 1934 applied to the arid unallocated and unreserved lands west of the 100th meridian. Pending classification, only eighty million acres of these lands were initially able to be organized into grazing districts. However, within the first two years, one

hundred forty-two million acres required organization. *Taylor Grazing Act of 1934*, Public Law 482, 73rd Cong., 2nd sess. (June 28, 1934); John T. Woolley and Gerhard Peters, "Executive Order 6910 on Withdrawal of Public Lands for Conservation." *The American Presidency Project* (http://www.presidency.ucsb.edu/index.php), (November 26, 1934).;"Grazing Act Affects a Large Number," *Kane County Standard*, August 10, 1934; "Department of the Interior Memorandum for the Press," August 26, 1934, Folder 76-06 Public Lands Foundation Archive, (hereafter Public Lands Foundation Archive).

[51] Farrington Carpenter was a livestock operator in the Yampa Valley between 1912 and 1933. Also during that time, he worked for the Colorado District Attorney's office assisting with prosecuting cattle thieves. Carpenter felt it essential that livestock operators be involved in administering the Taylor Grazing Act instead of "people manly interested in something else besides livestock." William G. Leavell's summary of Virgil Starr's notes, April 1996, Folder 76-06, Public Lands Foundation Archive; Gale Chambers, "Ferry Carpenter," *The Taylor Grazing Act: 50 Years of Progress 1934-1984* (Boise: Idaho State Office Bureau of Land Management, 1984), 7-8; Jerry A. O'Callaghan, Historical Interview with Farrington, R. Carpenter, October 17, 1971.

[52] Nevada State Cattle Association President William B. Wright to Governor-Elect Richard Kirman, December 21, 1934, Richard Kirman Papers, Box 92, Folder 4, Nevada State Archives; "Public Domain Question Settled," *Los Angeles Times*, June 29, 1934; "Taylor Grazing Bill Discussed By Legislators," *Tonopah Daily Times and Bonanza*, January 24, 1935; Maxine F. Shane, *Taylor Grazing Act in Nevada, 1934-1984* (Reno: Nevada State Office of the Bureau of Land Management, 1984), 2-4; "Cattle, Sheepmen Shortsighted Charges Ickes," *Tonopah Daily Times and Bonanza*, February 12, 1935.

[53] Farrington Carpenter commented that the state engineer in Nevada, in this case George W. Malone, controlled the water and therefore the public lands in the state. State Engineer George W. Malone to Director F.R. Carpenter, December 21, 1934; Richard Kirman Papers, Box 92, Folder 4, Nevada State Archives; State Engineer George W. Malone, "Range Control," February 11, 1935, Richard Kirman Papers, Box 92, Folder 4, Nevada State Archives; State Engineer George W. Malone, "Statement by Nevada Representatives Before the Secretary of the Interior," February 12, 1935, Richard Kirman Papers, Box 92, Folder 4, Nevada State Archives; "Nevada Officials Attend Denver Meeting Today," *Tonopah Daily Times Bonanza*, February 12, 1935; Attorney John S. Sinai to Governor Richard Kirman, January 26, 1935, Richard Kirman Papers, Box 92, Folder 4, Nevada State Archives; Governor Richard Kirman to Director F.R. Carpenter, February 9, 1935, Richard Kirman Papers, Box 92, Folder 4, Nevada State Archives; Jerry A. O'Callaghan, Historical Interview with Farrington, R. Carpenter, October 17, 1971, Nevada State Archives.

[54] State Engineer George W. Malone to Director F.R. Carpenter, December 21, 1934; Richard Kirman Papers, Box 92, Folder 4, Nevada State Archives; State Engineer George W. Malone, "Range Control," February 11, 1935, Richard Kirman Papers, Box 92, Folder 4, Nevada State Archives; State Engineer George W. Malone, "Statement by Nevada Representatives Before the Secretary of the Interior," February 12, 1935, Richard Kirman Papers, Box 92, Folder 4, Nevada State Archives.

[55] Clel Georgetta remembers that during the conference in Denver, "the local press made some mention of the livestock opposition to the proposed rules, but from then on little was said in the papers about the 'livestock rebellion,'" and that the later transcript of the meeting contained no mention of the ranchers' vote of no confidence in Secretary of Interior Harold Ickes. Georgetta, *Golden Fleece in Nevada*, 231-235.

[56] Malone stated as a postscript in his letter in late 1934 to Ferry Carpenter "the livestock owners themselves, with a period of 60 years' experience in this area behind them, are better able to assist in outlining the necessary principles and policies than any other agency." State Engineer George W. Malone to Director F.R. Carpenter, December 21, 1934; Richard Kirman Papers, Box 92, Folder 4, Nevada State Archives; State Engineer George W. Malone to Governor Richard Kirman, February 12, 1935, Richard Kirman Papers, Box 92, Folder 4, Nevada State Archives; State Engineer George W. Malone to Governor Richard Kirman, February 16, 1935, Richard Kirman Papers, Box 92, Folder 4, Nevada State Archives.

[57] Division of Grazing, "Proposed Rules for the Guidance of District Advisors in Recommending the Issuance of Grazing Licenses," circa February 1935, Richard Kirman Papers, Box 92, Folder 4, Nevada State Archives; Grazing Service, "Second Annual District Advisors' Conference, Division of Grazing, Salt Lake City, Utah," December 9-11, 1936, 23; Farrington Carpenter, "Beginnings of the Division of Grazing: Reminiscences of Ferry Carpenter Part I," *Our Public Lands* (April 1963), 11.

[58] "Range Safeguards Promised Ranchers Under Taylor Bill," *Ely Daily Times*, January 24, 1935; "Taylor Grazing Bill Discussed by Legislators," *Tonopah Daily Times Bonanza*, January 24, 1935; Division of Grazing, "Proposed Rules for the Guidance of District Advisors in Recommending the Issuance of Grazing Licenses," circa February 1935, Richard Kirman Papers, Box 92, Folder 4, Nevada State Archives; "Livestock Owners to Benefit from Taylor Graze Act," *Tonopah Daily Times Bonanza*, February 22, 1935.
[59] "Rancher Aid Summarized," *Ely Daily Times*, January 11, 1935; "Livestock Men Urged to Attend Conference," *Tonopah Daily Times Bonanza*, January 18, 1935; "Taylor Range Meet in Reno Thursday," *Ely Daily Times*, January 21, 1935.
[60] The political apportionment of the Nevada legislature at this time, and until the reapportionment of 1965, was based on county units. Each county elected one senator and a number of assembly persons based on the population of the county up to a total of forty for the entire assembly. As a consequence, the northern Nevada ranching counties more than dominated both houses of the legislature. In addition, the Producers Livestock Marketing Association of Salt Lake City solicited northern Nevada ranchers for membership in anticipation of the grazing district's organization. The association also included districts in Utah, Idaho, and Wyoming. If Nevada ranchers joined the association, they would have increased access to meat markets and credit lines. "Stockmen Ask East Central Grazing Area Be Established," *Ely Daily Times*, January 19, 1935; "Taylor Range Act Explained to Lions," *Ely Daily Times*, March 28, 1935; "Talyor Bill Brings Lincoln Group Here," *Ely Daily Times*, April 8, 1935; "Stockmen Hold Large Meeting Here Yesterday," *Tonopah Daily Times Bonanza*, April 16, 1935; "Stockmen Set Meeting in Ely," *Ely Daily Times*, April 22, 1935; "Producers Group Seek Interest of Nevada Stockmen," *Ely Daily Times*, April 26, 1935.
[61] "White Pine County Not in Taylor Grazing Bracket," *Ely Daily Times*, May 2, 1935; "Nevada Allotted Only 2 Districts Under Taylor Act," *Tonopah Daily Times Bonanza*, May 2, 1935; "2nd Taylor Area Created in State," *Ely Daily Times*, October 11, 1935; Agricultural Extension Assistant Director Thomas E. Buckman, Circular Letter No. 10, October 12, 1935, Richard Kirman Papers, Box 92, Folder 4, Nevada State Archives;"First Grazing Area Formed," *Salt Lake Telegram*, May 29, 1935; Agricultural Extension Assistant Director Thomas E. Buckman, Circular Letter No. 11, November 1, 1935, Richard Kirman Papers, Box 92, Folder 4, Nevada State Archives; Division of Grazing, Grazing Bulletin, March 1936, Richard Kirman Papers, Box 92, Folder 4, Nevada State Archives.
[62] Unlike the previous administration in which President Hoover was unable to convince states to take responsibility for the administration of the public domain within their boundaries, many states in the American West were eager for the bill amending the Taylor Grazing Act to pass. "Grazing Limit To Be Lifted," *Ely Daily Times*, May 9, 1935; "Letup on Taylor Restriction to Grazing Sought," *Ely Daily Times*, May 13, 1935; "Livestock Men Hold Meet in Elko Today," *Tonopah Daily Times Bonanza*, May 13, 1935; Harold L. Ickes, Memorandum, August 26, 1935, Richard Kirman Papers, Box 92, Folder 4, Nevada State Archives; Franklin D. Roosevelt, Memorandum, September 5, 1935, Richard Kirman Papers, Box 92, Folder 4, Nevada State Archives; E. Louise Peffer, *The Closing of the Public Domain: Disposal and Reservation Policies, 1900-1950* (New York: Arno Press, 1972), 222-231.
[63] According to Farrington Carpenter, he received the friendliest reception in Utah because "the Utah people through their religion are taught to cooperate, and they were willing to cooperate with the government." However, Carpenter stated ranchers in Wyoming and Nevada were particularly hostile. He remembered the "big operators felt it [control] should be put into the hands of their state public land people whom they control politically. "Cattle Grazing Permits Go to Small Owners," *Tonopah Daily Times Bonanza*, October 11, 1935; Division of Grazing, Grazing Bulletin, March 1936, Richard Kirman Papers, Box 92, Folder 4, Nevada State Archives; "Utah's Grazing Records Lead Western Area," *Garfield County News*, July 10, 1939; Jerry A. O'Callaghan, Historical Interview with Farrington, R. Carpenter, October 17, 1971, Public Land Foundation Archives.
[64] "White Pine County Not in Taylor Grazing Bracket," *Ely Daily Times*, May 2, 1935; "Nevada Allotted Only 2 Districts Under Taylor Act," *Tonopah Daily Times Bonanza*, May 2, 1935; White Pine County Farm Bureau to Senator Key Pittman, March 3, 1936, Richard Kirman Papers, Box 92, Folder 4, Nevada State Archives; Shane, *Taylor Grazing Act in Nevada*, 1-2.
[65] "Grazing Control Discussion at Pioche Oct. 23," *Tonopah Daily Times Bonanza*, October 19, 1935; "Grazing Control to Be Considered at Meeting in Ely," *Ely Daily Times*, October 21, 1935; Agricultural Extension Assistant Director Thomas E. Buckman, Circular Letter No. 10, October 12, 1935, Richard Kirman Papers, Box 92, Folder 4, Nevada State Archives; "Cattlemen Select Winnemucca as Convention

City," *Tonopah Daily Times Bonanza*, November 9, 1935; "Grazing Control Fight Looms at Coming Session," *Garfield County News*, November 29, 1935.

[66] Similar to the earlier proposed bill providing for an acreage increase to accommodate more grazing districts, the bill which passed Congress in 1936 made it easier for states to exchange isolated tracts or lands within grazing districts for those in more usable areas. But, the bill also clarified the importance of the Division of Grazing hiring employees under the auspices of the civil service. Congress made provisions for locals to serve on grazing advisory boards which worked with Division of Grazing employees on adjudicating the range but did not control the final decision-making process. Senator Key Pittman to Governor Richard Kirman, February 26, 1936, Richard Kirman Papers, Box 92, Folder 4, Nevada State Archives; White Pine County Farm Bureau to Senator Key Pittman, March 3, 1936, Richard Kirman Papers, Box 92, Folder 4, Nevada State Archives; "Utah's Grazing Records Lead Western Area," *Garfield County News*, July 10, 1936; Division of Grazing Deputy Director Archie D. Ryan to Governor Richard Kirman, July 17, 1936, Richard Kirman Papers, Box 92, Folder 4, Nevada State Archives; Agricultural Extension Assistant Director Thomas E. Buckman, Circular Letter No. 12, August 3, 1936; Richard Kirman Papers, Box 92, Folder 4, Nevada State Archives; "Nye Ranchers to Discuss Taylor District at Austin Meet Dec. 11," *Tonopah Daily Times (Bonanza)*, November 17, 1937; Carpenter, "Beginnings of the Division of Grazing: Part II," *Our Public Lands*: 16; Shane, *Taylor Grazing Act in Nevada*, 1-2.

[67] Most of the national forests surrounding the Great Basin had been established as forest reserves under the General Land Office in the 1890s and then consolidated into national forests soon after the establishment of the Forest Service. However, Nevada's national forests were not created until the late 1910s at the behest of local ranchers in the Ruby Mountains and other ranges overrun by an increasing number of new livestock operators. Swallowed by the new grazing districts in Nevada, the Forest Service worried for the health of the range and the Department of Interior's ability to actually implement new conservation practices. Forest Service permits were contingent on the forage resources and set the number of livestock which ranchers could operate on the range and determined when they could operate. Even the fees between the two agencies for grazing permits were different. Opposed to the Taylor Grazing Act for these reasons, Chief Forester Ferdinand A. Silcox cancelled all long-term grazing permits in 1935 pending reevaluation of the national forest ranges. Ranchers in the Great Basin at large looked to the new Division of Grazing as a better model for range regulation despite the successful management provided by the Forest Service. The major point of contention for most ranchers was the Forest Service's grazing fees and focus on watershed and timber management above grazing. For more information on the Forest Service and its grazing policy see William D. Rowley, *U.S. Forest Service Grazing and Rangelands: A History* (College Station: Texas A&M University Press, 1985). For more information on Nevada's national forests see Richa Wilson, *Privies, Pastures, and Portables: Administrative Facilities of the Humboldt-Toiyabe National Forest 1891-1950, Vol. I and II* (Washington, DC: Forest Service, 2001). "Nevada Livestock Growers will Discuss Range Problems," *Reno Evening Gazette*, December 9, 1926; "National Forest Policies Alleged to Be Unsuited to Conditions in Nevada," *Reno Evening Gazette*, July 9, 1927; "Nevada Livestock Owners to Talk on Problems," *Reno Evening Gazette*, October 10, 1927; "Nevada Stockmen Gather in Elko for Important Convention Next Friday," *Reno Evening Gazette*, November 16, 1927; "Forest Grazing Fee Fight to Continue," *Reno Evening Gazette*, November 21, 1927; "Stock Grazing Fees Increase," *Ely Daily Times*, February 26, 1935; "Grazing Permits Said Good for Only One Year," *Tonopah Daily Times and Bonanza*, March 13, 1935; ; "Livestock Men Hold Meet in Elko Today," *Tonopah Daily Times and Bonanza*, May 13, 1935; Merrill, *Public Lands and Political Meaning*, 141-142.

[68] Governor Richard Kirman to Senator Key Pittman, March 12, 1936, Richard Kirman Papers, Box 92, Folder 4, Nevada State Archives, "National Forest Policies Alleged to Be Unsuited to Conditions in Nevada," *Reno Evening Gazette*, July 9, 1927.

[69] "Nye Ranchers to Discuss Taylor District at Austin Meet Dec. 11," *Tonopah Daily Times (Bonanza)*, November 17, 1937.

[70] The Sharp family and the Fallini brothers are discussed in the previous chapter. The Locke and Titus family ran their livestock operations in the western portion of Railroad Valley, on the other side of the playa from the Sharps. Brothers Eugene and Elisha Locke arrived in Railroad Valley in the 1860s from West Virginia to work the charcoal ovens at Eureka then Belmont and later Tybo in 1876. After a brief residence at Currant Creek at the northern end of Railroad Valley in 1878, the two brothers purchased the W.H. Reynolds's ranch in 1883 on the west side of Railroad Valley opposite Blue Eagle Ranch. Eugene Locke and his wife Sara Ernst ran what became Lockes station, a ranch and store which supplied travelers

between Ely and Tonopah. Sara Ernst's father George Ernst had been one of the mine engineers who had surveyed the Sutro Tunnel in Virginia City, later working as the surveyor for Lincoln County in the Pahranagat Valley and serving in state legislature since 1880. In 1924, Eugene and his two children, Madison and Eleanor Eugenie (Genie), each filed on 160 acres under the Homestead Act to enlarge the ranch holdings to around 400 acres. The Lockes held water rights at Big Spring, North Spring, Locke's Spring, Hay Corral Spring, and Reynolds Spring on their homesteaded land. As part of the 1920s federal highway program, the government routed the Midland Trail connecting Baltimore and Los Angeles through Lockes to Tonopah. By the mid-1930s, the state paved the road and designated it Highway 6 which funneled truck traffic right by the ranch. The Lockes developed a gas station, café, and general store to serve hot and weary motorists, and business boomed. In the late 1930s, the Lockes bought Moore Station in Big Sandy Springs Valley to the west to further expand irrigable acreage and create greater range access. By 1948, Madison Locke was filing for additional water rights at Antelope Well to the south of the ranch, but the state engineer's office cancelled the rights when Locke failed to make the stated improvements by 1953. The Lockes also filed water rights at Tule Spring and Jack's Seep Wash with Harvey Titus (no relation to former Congressional representative Dina Titus), who married Genie, and Henry and Alfredo Bordoli, brothers who had homesteaded 160 acres each across the valley just south of Blue Eagle. But the 1950s paving of Highway 376 between Austin and Tonopah rerouted tourist traffic to Las Vegas from the north away from Railroad Valley and Lockes Station. In addition, the Lockes reported burns from exposure to radioactive fallout during atmospheric nuclear testing, an awkward condition for travelers to witness when they stopped by the general store. Before the off-road recreational industry took hold in the region, in 1963, the Locke family sold out their livestock operations, the gas station, and their café and moved to Beatty. General Land Office Patent Number 947522, November 5, 1924; General Land Office Patent Number 947523- 947524, November 5, 1924; Nevada State Vested Water Right V02533-V02537, January 17, 2001; Nevada Water Permit Application 12755, December 7, 1948; Robert D. McCracken, Interview with Sue Locke Holloway, June 8, 1988, Nye County Town History Project, Special Collections, University of Nevada, Las Vegas, Nevada (hereafter Special Collections, UNLV); McCracken and Howerton, *A History of Railroad Valley Nevada*, 156-161; White Pine County Farm Bureau to Senator Key Pittman, March 3, 1936, Richard Kirman Papers, Box 92, Folder 4, Nevada State Archives.

[71] The United Cattle and Packing Company, established in 1906, controlled more than three million acres between Tonopah, the Quinn Range, Belmont, and Pahute Mesa. Owned by brothers O.K. and Ed Reed, the operation ran range cattle year round across the same territory, which they controlled by owning the water rights, without providing any additional feed. Smaller ranching outfits such as those run by the Sharp and Fallini families ran their operations within this territory by controlling the any water rights not deeded to United Cattle. Much of these cattle mixed during the year and were only separated during the spring roundup according to their brand. This loosely run system of livestock operation made it impossible for either the state or federal government to collect the appropriate property taxes or permit fees necessary on an organized range. These ranchers resisted organization because it meant significantly increasing their overhead operating costs. McCracken and Howerton, *A History of Railroad Valley Nevada* , 119-198.

[72] Robert D. McCracken, Interview with Lina Sharp, August 14, 1992, Nye County Town History Project, Special Collections, UNLV, 40; McCracken and Howerton, *A History of Railroad Valley Nevada*, 174-178.

[73] "Livestock Group Holds Session at Ely," *Reno Evening Gazette*, November 19, 1932; "Grazing Meeting Concluded at Ely," *Reno Evening Gazette*, October 18, 1937; Senate Committee on Interior and Insular Affairs, *Administration and Use of Public Lands: Hearings on S. 241*, 77th Cong., 1st sess., June 25-25, 1941 and June 27-28, 1941.

[74] "Grazing Meeting Concluded at Ely," *Reno Evening Gazette*, October 18, 1937; "Butler to Head Nye County Ranchers," *Reno Evening Gazette*, November 20, 1940. The Whipple family set up their livestock operation in the White River Valley. The Whipples arrived in the central Great Basin in 1898. Sent by the Mormon leadership in Salt Lake City to manage the White River Land and Livestock Company, John Lytle Whipple managed the church's livestock operation for four years. In 1902, he and his wife Rose purchased the Horton Ranch at Sunnyside and in 1917, added the neighboring Lewis ranch. The Whipples, like Sharps, relied on mining as much as ranching for income. This was vastly different from most Mormon families in the Pahranagat Valley who were missionaries sent from Utah to establish settlements in the outlying regions of the Mormon frontier. In the mid-1860s, Mormon settlers claimed the Muddy and Meadow valleys in the southern Great Basin by cultivating any agricultural lands and claiming the corresponding water rights in order to prevent non-Mormon settlers from filing claims in the area. Their

efforts prompted a pattern of settlement replicated throughout the Great Basin in which Mormons used water rights to anchor range access and discourage other settlement. But the ore discoveries on Mount Irish located above the Pahranagat Valley challenged the Mormon hegemony in the area by drawing outsiders to the area who struck claims and populated the town of Hiko, just sixty miles to the east of the Mormon settlement Panaca, the main settlement in Meadow Valley. By the 1870s, the mining town Pioche, just twelve miles north of Panaca, became the next big boom town and drew many non-Mormons to the area. These explosions in population were problematic for the sheltered Mormon communities, but they also proved to be profitable. During the Mount Irish and Pioche mining frenzies, the Mormon leadership, which had issued a ban on mining activities for their members, looked the other way as Mormons guided, supported, and even participated in mining activities. Long after the majority of the claims had played out and most people had moved on to other, more lucrative possibilities, many Mormons took advantage of what ore was left. John Whipple benefitted from the lax enforcement of the mining ban; by 1905, he had located a large silver vein in the Bristol Range, thirty miles to the southeast of Sunnyside, and between 1925 and 1933, owned the Silver King mine which paid handsomely. The Whipple's ranch operations began growing in 1916, when John's wife Rose purchased an additional 200 acres to expand the Sunnyside ranch. In 1928, eldest son Murray Whipple patented 642 acres in Cave Valley under the Stock-Raising Homestead Act, purchased the Haggerty Ranch there as his summer range headquarters, and established his own winter range ranch at Hiko. By the early 1930s, John Whipple was the vice-president of the Sunnyside Livestock Association, a group of thirty livestock operators in eastern Nevada and western Utah who had organized to oppose sheep herders grazing flocks in their region. Harsh winter conditions and drought during the early 1930s was hard on the Whipple's livestock operations. In 1933, the ranches of Sunnyside were snowbound for more than a month and in the great drought of 1934, the summer ranges in the central and southern parts of the Great Basin were decimated. John retired from ranching in 1935, and leased the Sunnyside ranch to his youngest son Clair Whipple. The Whipple family, though they had trepidations about federal oversight, participated in organizing a grazing district and their area was the only part of Lincoln County organized in 1936. Despite his retirement, John served on the local grazing advisory board between 1936 and 1940. But the Whipple family watched their control of the range erode as the Bureau of Land Management replaced the Grazing Service and centralized grazing management. Murray, a dashing and skilled horseman, died prematurely in 1945. His son Keith, a well-respected rancher in his own right despite his youth, took over the ranch's operations in 1950. During the decade of atmospheric nuclear testing, Keith helped decontaminate cars at the local service station in Alamo. In the succeeding decades and because of his general frustration towards the federal government, he removed the Whipple's livestock operation from the public domain by securing underground water rights for irrigating pasture in between Alamo and Hiko in the 1980s. Keith also served as the local bishop of the Mormon Church beginning in 1977 and into the early 1980s. Clair, who was denied water rights which would have helped ease the feed problem for his herds, sold the Whipple's Sunnyside ranch in 1960 due to the constancy of crippling drought cycles which affected the quality of public rangeland, constantly decreasing grazing permits, and the increasing cost of grazing fees. "Opens Silver Mine at Bristol," *Reno Evening Gazette*, December 7, 1915; General Land Office Patent Number 543095, August 19, 1916; General Land Office Patent Number 1011813, February 3, 1928; "Livestock Group Holds Session at Ely," *Reno Evening Gazette*, November 9, 1932; "Ely Planes Drop Supplies to Cave Valley Ranchers," *Reno Evening Gazette*, February 23, 1933; "Ranges in Worst Shape on Record," *Nevada State Journal*, August 25, 1934; "Option Taken on Silver King," *Reno Evening Gazette*, December 26, 1936; James W. Hulse, *Lincoln County, Nevada: 1864-1909* (Reno: University of Nevada Press, 1971), 6-10, 13-15, 40; John M. Townley, *Conquered Provinces: Nevada Moves Southeast, 1864-1871* (Provo, UT: Brigham Young University Press, 1973), 7, 10-12, 30-31, 53; Nevada State Water Certificate 10688, June 21, 1983; Nevada State Water Certificate 10690, June 21, 1983; Nevada State Water Certificate 10691, June 21, 1983; Philip Fradkin, *Fallout: An American Nuclear Tragedy* (Boulder, CO: Johnson Books, 1989), 8-9; "Old Time Cowboying," Nevada Agricultural Foundation, March 30, 2004.

[75] "Grazing Protest Meeting Called," *Reno Evening Gazette*, April 21, 1949; "Grazing Board Named at Ely," *Reno Evening Gazette*, March 21, 1949; "Range Board Holds Ballot," *Nevada State Journal*, October 19, 1950.

[76] Senate Committee on Interior and Insular Affairs, *Administration and Use of Public Lands: Hearings on S. 241*, 79th Cong., 1st sess., May 23-25, 1945, 5028-5030. Madison Locke's involvement in the Central Nevada Livestock Association is somewhat ironic considering he did not particularly like ranching and

preferred working with several partners on mining claims. Robert D. McCracken, Interview with Sue Locke Holloway, June 8, 1988, Nye County Town History Project, Special Collections, UNLV, 9, 13;"Stockmen Oppose Federal Control," *Reno Evening Gazette*, September 16, 1947; "60 Ranchers Attend Meet," *Nevada State Journal*, March 5, 1948.

[77] "ACA Committee Names Officers," *Nevada State Journal*, November 15, 1944; "Central Nevada Stockmen Elect," *Nevada State Journal*, January 17, 1950; Senate Committee on Interior and Insular Affairs, *Administration and Use of Public Lands: Hearings on S. 241*, 79th Cong., 1st sess., May 23-25, 1945, 5030-5031. The Cliffords ran a livestock operation to the west of Railroad Valley along Stone Cabin Creek which emptied into Cactus Flat to the south. Edward Clifford, a Scottish immigrant, arrived in Austin in 1877 and worked his way south mining in Ophir Canyon, Belmont, and Tybo. His notoriety in Nye County came from being the second person to stake a claim at Tonopah and no miner was "so well known" in the region. After locating a mine in the Reveille Range at Bellehelen, Edward Clifford purchased the Stone Cabin Ranch, an established livestock operation in 1883 which had been originally homesteaded in the 1860s, purchasing it from its most recent owner Mary Reveal. Preferring mining over ranching, he continued to locate claims in the vicinity of his ranch operations, often finding rich veins of ore in the proximate mountain ranges until his death in 1916. His sons James, John, Thomas, and Joseph Clifford took over the ranching operations at Stone Cabin after the death of their father and continued to locate mining claims in the region. Besides the four brothers, the Cliffords also adopted a Native American child they named Cooney who had appeared on their doorstep in a snowstorm during the early 1890s. Cooney Clifford married a Western Shoshone woman and also ran a stock operation nearby. The family owned water rights at Stone Cabin Springs, Reveille Mill Springs, and developed several wells for stock watering. During the late 1920s, overgrazing and drought depleted the range in Stone Cabin Valley, and again in the 1930s; the torrential summer rains and hard winters in the 1940s did similar damage to the family's cattle herds. Hordes of rabbits ravaged the range in 1955 at the same time nuclear fallout. In the 1960s and 1970s, horses competed with the Clifford's cattle for range resources. The Cliffords protested the organization of their area into grazing districts, but were permitted across the entire valley in the Stone Cabin grazing allotment. But like the other ranchers in the region, Joe Clifford, who continued the family's ranching operations into the late twentieth century, remained frustrated with the erosion of his range access. "Mining Pioneer is Called By Death," *Nevada State Journal*, April 16, 1916; "Cattle Killing Charged for Waif," *Reno Evening Gazette*, October 25, 1921; "Range Depletion Causes Stock Sale," *Reno Evening Gazette*, July 9, 1927; "Rumors of Strike Cause Stampede to Stone Cabin," *Reno Evening Gazette*, November 5, 1929; "Treasure Hunt is Organized at Manhattan to Comb Hills for Strike Made by Clifford," *Reno Evening Gazette*, March 14, 1934; "Storm Does Heavy Damage to Crops Stone Cabin Ranch," *Tonopah Times-Bonanza*, August 10, 1945; "Central Nevada Stockmen Elect," *Nevada State Journal*, January 17, 1950; "Rabbits Threaten Ranges in Nye," *Reno Evening Gazette*, February 9, 1955; Nevada State Vested Water Right V02552, July 8, 1966; Nevada State Vested Water Right V02559, July 8, 1966; Bill Martin, "Long Awaited Nevada Wild Horse Roundup Under Way," *Nevada State Journal*, July 27, 1975; Brendan Riley, "Government Frees Captured Wild Horses," *Reno Evening Gazette*, August 6, 1975; Nevada State Water Certificate 10715, June 22, 1983; Guy Rocha, "Myth #119 – Nevada's Oldest Family-Owned, Working Ranches and Farms," Historical Myths of the Month, Nevada State Library and Archives, http://nsla.nevadaculture.org.

[78] "Stockmen Oppose Federal Control," *Reno Evening Gazette*, September 16, 1947; "Hearing Attended by Army Officials," *Nevada State Journal*, February 12, 1948.

[79] *Taylor Grazing Act of 1934*, Public Law 482, 73rd Cong., 2nd sess. (June 28, 1934); "New Federal Grazing District Seen For Nevada," *Tonopah Daily Times*, March 21, 1940; Oscar L. Chapman, "Public Notice, May 18, 1943," Folder 468, Public Lands Foundation Archive; Philip O. Foss, *Politics and Grass: The Administration of Grazing on the Public Domain* (Seattle: University of Washington Press, 1960), 180-181; James R. Skillen, *The Nation's Largest Landlord: The Bureau of Land Management in the American West* (Lawrence: University Press of Kansas, 2009), 15-16.

[80] "Grazing District Hearings in State Ordered Postponed," *Tonopah Times Bonanza*, June 19, 1943; Molly Flagg Knudsten, *Here is Our Valley* (Reno: University of Nevada, 1975), 29-31; Skillen, *The Nation's Largest Landlord*, 17.

[81] Letter to Byron Mock, May 2, 1947, Folder 76-06, Public Land Foundation Archive, ; Skillen, *The Nation's Largest Landlord*, 18-19.

[82] "Central Nevada Stockmen Study Grazing Ruling," *Reno Evening Gazette*, October 12, 1947; Skillen, *The Nation's Largest Landlord*, 17.
[83] "Cattlemen Take New Steps Toward Staving Off Federal Control," *Tonopah Times-Bonanza*, November 21, 1947; "Formation Taylor District at Tonopah Meeting Ends in Postponement," *Tonopah Times-Bonanza*, March 3, 1950; "United Stockmen Select Officers," *Reno Evening Gazette*, March 17, 1950.
[84] "Stockmen Vote to Organize Grazing District at 4-County Meeting Held in Tonopah," *Tonopah Times-Bonanza*, December 10, 1948; "Nevada's Livestock Men are Facing Losses of Millions," *Nevada State Journal*, January 21, 1949; "State Stockmen Lose Fight," *Reno Evening Gazette*, February10, 1951; Beltran Paris, *Beltran: Basque Sheepman of the American West* (Reno: University of Nevada Press, 1979), 157-169.
[85] "Secretary Chapman Announces Nevada Public Hearing on Grazing District," Bureau of Land Management News Release, February 13, 1950, File Folder 468, Public Lands Foundation Archive; "Interior Dept. Ready to Organize Six Taylor Grazing," *Tonopah Times-Bonanza*, February 17, 1950; "State Stockmen Lose Fight," *Reno Evening Gazette*, February10, 1951; Skillen, *The Nation's Largest Landlord*, 23.
[86] "Secretary Chapman Announces Formation of New Nevada Grazing District," Bureau of Land Management News Release, February 9, 1951, Folder 371, Public Land Foundation Archives; "State Stockmen Lose Fight," *Reno Evening Gazette*, February10, 1951; "New Grazing District Set Up in Nevada," *Reno Gazette-Journal*, February 11, 1951.
[87] "Nye, Lander, Eureka are Organized into Taylor Grazing District No. 6," *Tonopah Times-Bonanza*, February 16, 1951; "Delay in Grazing District is Urged," *Reno Evening Gazette*, February 23, 1951; "New Grazing District is Not Wanted," *Nevada State Journal*, February 24, 1951.
[88] "Nye Importance as Stock Region Given by Figures," *Tonopah Daily Times*, June 18, 1936; "Nye, Esmeralda, Lander, Eureka Ranch Owners Protest New Grazing District," *Tonopah Times-Bonanza*, March 2, 1951; "Postponing Taylor Grazing Act Turned Down by Chapman," *Tonopah Times-Bonanza*, March 23, 1951; "Election Planned in Grazing District," *Reno Evening Gazette*, May 1, 1951; Byrd Wall Sawyer, *Nevada Nomads: A Story of the Sheep Industry* (San Jose, CA: Harlan-Young Press, 1971), 78.
[89] According to Marion Clawson, the range livestock region consisted of North and South Dakota, Nebraska, Kansas, Montana, Wyoming, Colorado, Oklahoma, Texas, New Mexico, Arizona, Idaho, Utah, Nevada, Washington, Oregon, and California. Clawson, *The Western Range Livestock Industry*, 121.
[90] "Nye, Esmeralda, Lander, Eureka Ranch Owners Protest New Grazing District," *Tonopah Times-Bonanza*, March 2, 1951.
[91] "AEC Will Improve Atomic Test Grounds," *Tonopah Times-Bonanza*, February 23, 1951; "Warns of Danger in Using All Roads on Big Bombing Range," *Tonopah Times-Bonanza*, December 15, 1950; "Tonopah Base Still on Unactive List," *Tonopah Times-Bonanza*, January 15, 1951; "Nye Land Owners Urged File Claims," *Tonopah Times-Bonanza*, April 27, 1951; Terrence R. Fehner and F.G. Gosling, *Origins of the Nevada Test Site* (Washington, DC: Department of Energy, 2000). 20-21, 44-48.
[92] The first atomic test conducted at the Nevada Test Site occurred on January 27, 1951. "AEC Will control All Air Flights Over Bombing Range," *Tonopah Times-Bonanza*, January 26, 1951; "Atomic Energy Commission Warns of Trespassing on Bombing Range," *Tonopah Times-Bonanza*, January 26, 1951; "Postponing Taylor Grazing Act Turned Down by Chapman," *Tonopah Times-Bonanza*, March 23, 1951; "Taylor Grazing Meeting Set for Tonopah Next Thursday." *Tonopah Times-Bonanza*, May 4, 1951; "New Graze District Organized," *Tonopah Times-Bonanza*, May 18, 1951.
[93] C.P. Trussell, "Atom Bomb Testing Ground Will Be Created in Nevada," *New York Times*, January 12, 1951; Hansen W. Baldwin, "Peril of Atomic Strategy," *New York Times*, February 9, 1951; C.P. Trussell, "U.S. Atom Weapons Held Safeguarded," *New York Times*, February 9, 1951; "New Battle Bombs Hailed by Senator," *New York Times*, November 10, 1951; Terrence R. Fehner and F.G. Gosling, *Atmospheric Nuclear Weapons Testing, 1951-1963* (Washington, DC: Department of Energy, September 2006), 45-46; Barton C. Hacker, *Elements of Controversy: The Atomic Energy Commission and Radiation Safety in Nuclear Weapons Testing, 1947-1974* (Berkeley: University of California Press, 1994), 42-43.
[94] "Warns of Danger Using All Roads on Big Bombing Range," *Tonopah Times-Bonanza*, December 15, 1950; C.P. Trussell, "Atom Bomb Testing Ground Will Be Created in Nevada," *New York Times*, January 12, 1951; "Nevada's Bomb Range," *New York Times*, January 14, 1951; "Good Deal Secrecy Surrounds AEC Nye Development," *Tonopah Times-Bonanza*, January 19, 1951; "No Public Announcement Planned of Atom Blasts at Vegas Range," *Reno Evening Gazette*, January 25, 1951; "AEC Will Control All Air

Flights Over Bombing Range," *Tonopah Times-Bonanza*, January 26, 1951; "Atomic Energy Commission Warns of Trespassing on Bombing Range," *Tonopah Times-Bonanza*, January 26, 1951; Fehner and Gosling, *Atmospheric Nuclear Weapons Testing*, 46.

[95] "Chapman Turns Down Plea to Delay Grazing District," *Reno Evening Gazette*, March 16, 1951; "More Atomic Tests Planned," *Reno Evening Gazette*, March 16, 1951; "Taylor Grazing district Formed at Nye Session," *Reno Evening Gazette*, May 24, 1951; "Nevada's New Grazing District in Operation," *Nevada State Journal*, September 22, 1951; Department of Energy, *United States Nuclear Tests July 1945 through September1992* (Las Vegas: Nevada Operations Office, December 2000), 2-3.

[96] United States Senate, "Administration and Use of Public Lands Hearings, Part 14," Committee on Public Lands and Surveys, January 22-23, 1945, 6.

[97] Clawson, *The Western Range Livestock Industry*, 104-106; Marion Clawson, *The Bureau of Land Management* (New York: Praeger Publishers, 1917), 52-53, 76-78; Merrill, *Public Lands and Political Meaning*, 7-8.

[98] Robert D. McCracken, Interview with Lina Sharp, August 14, 1992, Nye County Town History Project, Special Collections, UNLV, 40; Robert D. McCracken, Interview with Helen Fallini, October 25-26, 1987, Nye County Town History Project, Special Collections, UNLV; 26; Paris, *Beltran*, 179-186.

CHAPTER 4

MUSHROOM CLOUD ON THE RANGE

> Of several available sites … the Frenchman Flat Area (including Yucca Flat) in the Tonopah Bombing Range comes closest to … being a location most suitable for this kind of an operation … This range—approximately 3.5 million acres in extent—consists of waste desert land and scattered small mountain ranges. Atomic Energy Commission Memorandum, November 22, 1950

The development of the defense industry in the Great Basin changed the dynamic between livestock operators and the federal government beginning with World War II. The Taylor Grazing Act in 1934 granted ranchers permits to graze herds on federally organized and managed public lands, making ranching a legitimate, though not the best, use of the Great Basin desert with the arrival of industrialized defense. The Grazing Service, and its successor agency the Bureau of Land Management (BLM), controlled ranchers' access to the grazing districts, but both agencies were woefully underfunded and were rarely present as advocates for livestock operators. Rather, between 1934 and 1951, the federal agency took a more custodial approach towards managing grazing districts, setting livestock numbers and providing some level of range improvements in cooperation with ranchers. The Grazing Service/BLM certainly tried to accommodate ranchers as much as was reasonable, but increasingly, public land managers directed range operations from a regional or state level and not from within the small communities within the region. As a result, regardless of what the grazing advisory boards recommended to the Grazing Service or BLM, many land management decisions tended to reflect the interests of the nation as a whole rather than the interests of each locality.[1]

But the advent of World War II caused land management agencies, especially the Grazing Service/BLM, to significantly alter their land planning programs to

accommodate military use. In order to train troops and develop weapons essential to negotiating the largest-scale war in which the United States had yet engaged, the War Department requested the federal government withdraw millions of acres of public land to facilitate wartime operations. This increased the amount of public land outside the scope of normal public land activities. Because of the secrecy involved in troop training and weapons development, and the dangerous nature of weapons themselves, the War Department desired that these acres be segregated from other public lands, which seemed to place management outside the scope of multiple-use, a land management approach prevalent in the Forest Service and increasingly popular with the BLM. The reservation of these lands also created a new hierarchy of use on the Great Basin's public domain and made national security a more important use of the land than grazing. However, as with other public land programs, because these federally-organized activities occurred on the federal domain, the discussion of military and scientific testing use falls within the broad framework of multiple-use in this conversation.

Ranchers were generally understanding and supportive in temporarily sacrificing access to their rangelands in the interest of the successful prosecution of World War II. However, after the end of the war and with the beginning of the economic and ideological conflict between the Soviet Union and the United States, ranchers faced losing access to their rangelands permanently. As part of the Cold War, the newly organized Department of Defense requested the continued, if not final, withdrawal of most of the public lands utilized during World War II. In the Great Basin, these included the Dugway Proving Grounds, Wendover Field, and the Las Vegas Bombing and Gunnery Range. In addition, the Atomic Energy Commission (AEC) requested the establishment of a continental

nuclear test site for the development of the nation's nuclear arsenal within the Las Vegas range. In the decade before the first nuclear test in Nevada, ranchers and military personnel arranged an informal system of integrated use of the area temporarily designated as an aerial bombing and pilot training range. But with the advent of nuclear testing, shared use of the region became fundamentally dangerous.

The nation's military leaders and atomic scientists chose the Great Basin because of its aridity, low vegetation and population, and predictable prevailing winds. Nevada's congressional delegation supported this decision because establishment of the test site would continue the revenue stream the defense industry had brought already to the region. While the military had bases in the Mojave, Chihuahuan, and California's Colorado Desert for bombing ranges, their proximity to population centers was too problematic for nuclear testing. The Great Basin contained a significantly smaller population than the other deserts. Once unsuitable for agricultural development and unsettled despite homesteading laws designed to encourage privatization, the Great Basin's public lands took on another type of value, that of assisting in maintaining the nation's military and nuclear security. Since the general perception of the region classified it as a wasteland, wrecking its geography and contaminating it seemed to have few consequences outside of disrupting sandy playas, destroying rocky hills and plateaus, and interfering with a few livestock operations which increasingly seemed not to be sustainable without significant support from the federal government. These large testing ranges provided important "outdoor laboratories" for weapons development and testing but were not closed systems. Surrounding all of these weapons ranges were public lands

utilized by livestock operators who often came into direct contact with the effects of the weapons testing programs.

Radioactive fallout proved to be the most problematic outgrowth of the atmospheric atomic testing program to residents living near the Nevada Test Site. The AEC understood the basic hazards of exposure to radioactivity and established reasonable levels of control to prevent injury or damage to human and animal life. However, on several key occasions, radioactive clouds canvassed much of the region, spreading low levels of radioactive particles on plants, animals, and people. The AEC consistently contested the results of this exposure, despite frequent complaints by Great Basin residents living in small towns such as Alamo and Tonopah, and on ranches across the region. Early on, the AEC noted the damages to livestock and offered compensation, but only if ranchers participated in a lengthy bureaucratic process that forced them to either claim a small amount of damage or take the AEC to court and sue for compensation. By the mid-1950s, the AEC blamed the region's environment and the bodies of its residents rather than delineating exposure to radioactive material as the source of an increasing number burns, hair loss, blindness, cancers, and death to both the Great Basin's human and animal population.

Weapons on the Rangeland

The American West contributed to the nation's ability to wage a two-front war during the 1940s through its public lands. Federal spending in most western states stimulated extractive industries such as mining and lumbering to meet the demands of constructing ships, tanks, and airplanes while an influx of population to work in these industries created urban growth in southern and northern California, the Pacific Northwest, and the

Rocky Mountain region. The Great Basin, already well-known for its wealth in mineral resources, provided magnesium, tungsten, and copper resources, and along its eastern edge where the Colorado Plateau's uplift intersected with the last of the Great Basin's mountain ranges, vital uranium stores. In addition to these physical resources, the Great Basin also provided vast tracts of open space to train pilots and troops in battlefield maneuvers and test important new weapons. The remaining amount of public land in the Great Basin proved less an economic and structural burden in this context than an incredible asset which attracted military development thereby increasing populations, improving the economies of rural areas, and transforming the region.[2]

However, unlike the multiple-use combination provided by the Taylor Grazing Act, the addition of military activities to the Great Basin proved more problematic. Initially, the military had requested only one bombing range in the region, but in the spring of 1940, President Franklin D. Roosevelt authorized the War Department to create two massive bombing ranges in the American West to train pilots in anticipation of the nation's participation in the ongoing European conflict. The areas selected for these two ranges consisted of 5800 square miles of dry lakebed near the town of Wendover in eastern Utah and 5400 square miles of public domain near Tonopah in central Nevada. Then in 1942, the War Department created an additional range in eastern Utah for chemical and biological weapons testing. The Department of the Interior reported to the War Department that this entire region in eastern Utah and central Nevada consisted of unallotted and unreserved public land that was more than ninety percent unpopulated and a virtual wasteland. Officers with the Army Air Corps's survey group were impressed by the area's "utter desolation and emptiness."[3]

The isolation of Wendover Bombing Range meant that pilots could practice bomb drops under a variety of conditions without severe restrictions. Only one hundred miles from Hill Air Base north of Salt Lake City, Utahans hoped that the bombing range would make their major military base "more valuable, giving added assurance of its permanence and full development as an important unit of the nation's air defense system." Similarly, Nevadans hoped for the same results out of the Tonopah Bombing Range. The state's congressional delegation promoted the selection of the site in Nye County based on its "economic and natural advantages." Senators Pat McCarran, Key Pittman, and Berkeley Bunker, and Representative James G. Scrugham outlined nine valuable assets of the site: the area was centrally located and in the "most sparsely populated" part of the country, there was an unlimited area for base construction, a good airport already used by the military was in close proximity, the federal government managed the land and it was "not usable for any other purpose," it posed no hazard to private property, and most importantly, there was no local opposition.[4]

Those residents in Nye County were deeply disappointed when the military initially preferred to establish a single bombing range in Utah rather than one in their state. Nevertheless, Nevada continued to lobby the military for a bombing range, which Nye County officials hoped would spark construction of a major airport in Tonopah, pumping important dollars into the local economy and stimulating the growing tourism industry in the area begun by improvements to the transcontinental Highway 6, which ran right through the center of town. Considering that Tonopah had only 2,449 residents and 3,562 resided in the entirety of Nye County, any influx of population and business would bring with it important tax dollars. The state's efforts paid off. The military determined that a

second bombing range at Tonopah allowed for advanced training for pilots and gunners coming from the Las Vegas base, slated for operation in early 1941. Instead of one bombing range in the Great Basin in 1940, the military got two before the nation even entered the war.[5]

Despite popular and political portrayal of these areas in the Great Basin as empty landscapes, livestock operators had active grazing permits in the region. Although the Grazing Service considered these permits temporary, pending final adjudication of the grazing range, they were nonetheless critical for ranchers in the area. Establishment of these bombing ranges required removal of livestock operations on several million acres in eastern Utah and central Nevada for ranchers' safety and to protect the more secretive aspects of weapons development. At the very least, the military sought to restrict ranchers' access on roads which traversed the bombing ranges and connected their various grazing allotments. But seventy-five livestock operators in Utah petitioned the Grazing Service to reduce the size of the military's Wendover bombing range to protect their winter grazing allocations.[6]

The commander of the Army Air Corps complained bitterly about these ranchers' opposition to the Salt Lake City Chamber of Commerce, stating the Wendover range's original area, critical to military operations, was "materially reduced due to concerted action of sheep grazers through the Grazing Service of the Department of the Interior," and that this was causing serious delay in the use of the range for pilot training. Further delaying the Wendover Bombing Range's operations, many of these ranchers with grazing rights also had private holdings within the reduced bombing range and the Department of the Interior required the War Department to acquire these holdings before

the range could become fully operational. The Salt Lake City Chamber of Commerce and the military petitioned Utah's congressional delegation to pressure the Department of Interior and the Grazing Service to cooperate with the War Department to approve the public lands withdrawal and get the Wendover range up and running. Representative James W. Robinson, recently appointed as Chairman of the House Public Lands Committee, assured the War Department and the anxious citizens of Utah that he would do everything in his power to resolve the dispute, but acknowledged that the seventy-five stockmen impeding the development of Wendover required attention as they "had grazed their sheep there for many years."[7]

James A. Hooper, Secretary of the Utah Woolgrowers Association, testified before Nevada's Senator Pat McCarran, the chairman of the Senate subcommittee investigating federal management of public lands in 1941, that the lands withdrawn by the military for the purposes of the bombing range worked "a definite hardship on the stockmen who have continuously used said areas or who may have been transferred to such areas by the Grazing Service," and advocated that the stockmen affected be granted licenses somewhere else as compensation. However, this was easier to accomplish on paper than in practice as it proved difficult to reduce other ranchers' livestock numbers and reorganize existing range use in the area to accommodate a greater number of users in a smaller territory. Hooper urged Utahans to protest the withdrawal of lands for a bombing range, arguing the measure of its importance as grazing range was not in its resident population, but in the numbers of livestock it supported.[8]

Establishing the Dugway Proving Ground to test chemical and biological weapons proved much easier. The military and Grazing Service stated that restricting the area for

Army operations would have “only a negligible effect on grazing operations.” Only a small number of livestock had grazed the dry reaches of the southern Great Salt Lake Desert. The Grazing Service assured these ranchers that their use would be absorbed into other grazing districts. The military activated the Wendover and Dugway ranges in March of 1942. In 1944, the isolation of the bombing ranges made Wendover the perfect choice to train the B-29 crews designated to drop the first atomic bomb on Japan and Dugway the ideal location to test incendiary and chemical weapons..[9]

In Nevada, the isolated central Great Basin offered a similarly isolated setting, especially the area around Tonopah. The creation of the Tonopah Bombing Range was an important economic asset to Nevada, but it also affected livestock operators in the area. These ranchers, similar those in Utah, turned to the Department of the Interior for protection, but the land management agency provided little defense.[10] Former Nevada Senator Key Pittman lobbied President Roosevelt about the matter before his death. Senators McCarran and Bunker, who replaced the deceased Pittman, and Representative Scrugham assured the military that the bombing range project in their state would not be held up and sent notice to ranchers that “satisfactory adjustments” to their grazing rights would be made. McCarran in particular looked to use the Great Basin’s wealth of public land to facilitate private development in his state using federal dollars and the rapidly expanding defense industry provided ample opportunity. Besides facilitating development of the Tonopah Bombing Range and the related growth of that community, the senator also constructed the nation’s largest magnesium plant just east of Las Vegas. No community or project was too small for McCarran’s attention, including lobbying for

federal funds to construct an airport in Ely halfway between the Wendover and Tonopah bombing ranges to facilitate military access.[11]

Ranchers in Nevada, like those in Utah, worried about the effects of range restrictions on their operations. Several livestock operators petitioned the government to exclude grazing areas from the bombing range. But the military could only shrink the size of the range so much and avoid placing targets in grazing areas. Eleven livestock operators had to give up their grazing rights to make room for the bombing range. In addition six other mining claimants faced condemnation procedures which terminated their mining patents, a result of reservation of the public lands near Tonopah for military purposes. Many livestock operators and miners had hoped to reach a cooperative agreement with the military which allowed shared use of the range, but the federal government considered the intersection of bombs and citizens potentially too dangerous.[12] The military and the Department of the Interior began condemnation proceedings on mining claims and grazing rights within the Tonopah range. Ranchers considered these grazing allotments to be their private property, but in the interest of national defense, a pressing matter after December 7, 1941, grazing rights became revocable privileges.[13]

In late 1942, one year after the Japanese bombed Pearl Harbor and the United States committed to a two-front war, McCarran and the Committee on Public Lands and Surveys held a public hearing in Tonopah to assess the persistent problem of miners and ranchers who refused to vacate their properties encompassed within the Tonopah Bombing Range. The military through the Department of the Interior was willing to pay these individuals compensation for their valid mining claims, but twenty-three claim owners in the area were unhappy with the federal government's valuation of their mines.

They felt they had been approached with a “take it or leave it” attitude and that they did not have much choice in determining the amount of compensation the War Department awarded them. In addition, the Department of the Interior had declared that some of the claims were non-mineral and therefore worth far less than the owners believed.[14]

Some of the individuals affected were livestock operators who ranched in the area and held both valid grazing permits and mining claims in the area now functioning as a bombing range. James (Jim) Butler, William, Joe and Ray Fallini, and Orville Knighton (OK) and Edward Reed were among this group. They had mining claims at the north end of the Kawich Range along Breen Creek, the southern end of the Quinn Canyon Range at Queen City Summit, at Cactus Springs in the Cactus Range near Urania Peak, and in the Trappman Hills northwest of Pahute Mesa. At the hearing, Jim Butler, a prominent Nye County rancher who served on agricultural committees with John Whipple and Jim Sharp, testified that with the war going on, he was unwilling to hold up the establishment of the bombing range and so signed the stipulation papers presented to him by the War Department. However, he was disappointed that his claim had been determined to be non-mineral and therefore essentially worth no more than the base amount of twenty-five dollars. He complained that unlike in previous years when mining claims changed hands, the buyer’s assessor had been present, but he was not in this case and the property was evaluated without him. Butler was unwilling to take the agency to court. Other claim owners had been out with the assessors, but remained unconvinced of their competence to evaluate the claim. Many were upset that their personal property in cabins and houses near their mining claims had been damaged or stolen. The War Department had worked quickly to close off the bombing range and many claim owners did not have enough time

to collect and transport their personal property (fig. 50). The delay between losing their property and receiving only minimal payment for that loss proved frustrating to them.[15]

For livestock operators who had grazing permits on the new bombing range, managing their herds proved equally frustrating. However, most residents in Nye County supported the establishment of the bombing range for both economic and patriotic reasons. Since the decline of the silver mines in Tonopah, the area had suffered severe decreases in population and revenue and many local and state officials hoped the military base would bring more of both to the region. Besides working several mining claims, Jim Butler ranged livestock during the winter thirty miles east of town in Cactus and Gold flats, an area now engulfed in the bombing range. Butler's cattle summered in Little Fish Lake Valley between the Monitor and Hot Creek ranges and drifted south during the cold months to the foot of Pahute Mesa. His water rights were just north of the bombing range boundary, but the range livestock grazed when in the area and used the water sources was on the bombing range. While Butler retained possession of his water resources, they were virtually useless without the adjacent range.[16]

The establishment of the bombing range had similarly affected the Fallini brothers who ranched on the other side of the Kawich Range. William Fallini testified at the hearings that although the family held no patented land inside the bombing range, their major winter grazing area was inside its boundaries. The northern boundary of the bombing range ran right through Cedar Pipeline, at the south end of the Reveille Valley where the Fallinis owned water rights critical to their operation. Between the two livestock outfits, several thousand cattle roamed the northern stretches of the Tonopah Bombing Range until its establishment. To the east, the Lamb family lost regular access

to their grazing range on the west side of the Pahranagat Range. In the lease between Floyd and Carleton Lamb's Willard Cattle Company and the Air Force at the Tonopah and Las Vegas bases, the Lambs agreed to remove themselves from the property and relinquish control of their assets to the military in exchange for a dollar a year. Both the military and the livestock operators in the area understood that no one actually owned any significant amount of land in the region. Most property was either mining claims, water rights and improvements, or personal property such as shelters or cabins, all located in the public domain. The Army considered these assets negligible while ranchers considered them essential components in the overall value of their livestock operations. However, ranchers were loath to have anyone accuse them of obstructing the war effort.[17]

For the military, this was the attraction of establishing a bombing range in the area and offered the path of least resistance to acquiring access to one of the largest blocks of land ever set aside for the Army's training. But for ranchers, the division of land into bombing range and grazing range via an impermeable boundary threatened to put them out of business. Both Butler and the Fallinis hoped that the Army would let them continue their livestock operations on the rangeland, and merely reduce their access to the herds to several times a year. Although Senator McCarran was sympathetic to the ranchers' difficulty, he reminded them that the bombing range was a boon to the community and that "the people of this section wanted the bombing range put in" and accused Butler in particular of retracting his support simply because he was the one the bombing range affected.[18]

Combined use of these public lands between livestock operators and the military was possible and planned for initially but difficult to implement and subject to the discretion

of military commanders. The Army had warned civilians near Muroc Army Air Base in California in the late 1930s to stay off the military's property and to leave unexploded ordinance alone. In 1939, the Army had asked for an expansion of the bombing range because some of their ordinance ended up too close to the surrounding civilian population. Several boys wandered onto the range and one had been killed by an unexploded bomb. The surviving boys testified at the subsequent inquest that they had not seen any signs indicating the boundary of the bombing range. Local residents had been outraged at the military's lax security and were protesting the base's expansion and the slowness of government compensation for the loss of their property. In 1941, to discourage any civilians from trespassing on Muroc either accidentally or out of curiosity, the military had Kern County pass an ordinance with stiff penalties for those who wandered onto the base.[19]

Nevertheless, both Butler and Fallini expressed willingness to continue their livestock operations on the bombing range at their own risk, especially considering the enormous effort it would take them to keep their livestock from drifting onto the restricted area. Without miles of fencing and a dramatic increase in costly man-power, their cattle simply would continue to forage in the area for feed until they met a natural barrier such as Pahute Mesa. Disheartened, Butler commented that ranchers had taken away the lands from the Native Americans and now the Army was taking it away from them. Fallini quipped that the Indians had starved and dryly stated "I guess we will too." The military activated the Tonopah Bombing Range in early 1942, much sooner than livestock operators expected and even the Army anticipated. In addition to the Tonopah range, the military operated a naval weapons depot at Hawthorne near Walker Lake and air bases

near Las Vegas and Reno, and was asking for additional acreage in the Black Rock Desert for another bombing range. In total, the military controlled nearly 5,500 square miles in Nevada.[20]

In New Mexico, the area between the Texas-New Mexico border north to Las Cruces and Socorro, and east as far as Carrizozo and Alamogordo along the Sacramento Mountains had also been converted into a bombing range. The Alamogordo Bombing Range in the Tularosa Basin at White Sands proved equally problematic for livestock operators. In late 1941, the military announced the establishment of a bombing range in the region and the required removal of all livestock from the area which was part of the White Sands Grazing District, one of seven in the state. The handful of ranchers affected in this region of New Mexico appealed to the state's land commissioner H.R. Rodgers, Senator Carl Hatch, and Representative Clinton Anderson for consideration of their important contribution to the war effort through livestock production or at the very least, payment for the improvements they had made developing water resources on public lands. Most ranchers supported the war effort, but those affected worried that the sacrifice their country asked of them would ruin their lives.[21]

Although many ranchers had their grazing permits cancelled and their private property condemned, the military and Grazing Service arranged for ranchers in Otero, Lincoln, and Socorro counties to continue to run their livestock on their permitted grazing allotments in an area designated for air-to-air combat missions. The military's vision of co-use amounted to allowing ranchers to monitor their livestock on weekends and holidays and while their units conducted bombing operations during the week. The commander at Alamogordo viewed this as an acceptable solution which met both the

military's and the rancher's requirements. But while this arrangement may have been amenable to the military, the livestock operators affected by this decision found it unsatisfactory. Ranchers in Otero County in particular complained to the Senate's committee at the public land hearings that their region had no water resources and without daily access to their well-pumps that supplied their livestock with the only water available, running their operations was impossible. One rancher quipped sarcastically that if the military figured out how to run a livestock operation by working only two days a week, they should let the ranchers know. In stark contrast, Richard H. Rutledge director of the Grazing Service, proudly announced "The need of public range areas for military uses resulted in the withdrawal of several millions of acres and the issuances of special use permits to the extent of twelve million acres in grazing district states." Rutledge said "the special uses included aviation training but provided for alternate use by livestock through cooperation between military organizations and the [G]razing [S]ervice."[22]

By 1945, the military had expanded the bombing range in New Mexico and most ranchers had either abandoned their livestock or sold out. The government paid some ranchers a small amount in compensation for the loss of the physical improvements they had made on the grazing range such as wells, pumps, stock tanks, and corrals, but others received nothing. Local communities did benefit in other ways; the Army awarded construction contracts to outfit military bases around the bombing range. The issue settled itself through environmental contamination. In July, with the advent of the first atomic test, the White Sands Bombing Range became too dangerous to inhabit. The radioactive contamination at Trinity's ground zero and beyond the boundaries of the experiment site were "disquietingly high" relative to scientists' initial expectations.

Ranchers in New Mexico, including the Cox, Lee, and McDonald families, lost land permanently to the war effort.[23]

This same scenario between livestock operators and the military occurred in southern Arizona between Phoenix and Tucson. Throughout the American West, but especially in the regions comprised of vast stretches of public land, the military established large bombing ranges at the expense of ranching operations. Where some livestock operators, such as in New Mexico, foresaw significant problems leaving their livestock unattended, others, such as in Nevada, had no such reservations. Ultimately, because of the imminent danger involved in meshing civilian and military operations on bombing ranges as illustrated by the incident in California, the pattern of public land use established during World War II between livestock operators and the military was really one of segregated activity. However, livestock drifted where they found forage regardless of politically drawn boundaries. Without miles of expensive fencing and a significant amount of personnel, neither the military nor ranchers could contain the animals. So the Army occasionally made allowances for ranchers to roundup their livestock as was done on the Tonopah Bombing Range.[24]

Livestock operators who lost their range access and personal property hoped that the withdrawal of public lands for military use would end with the war's conclusion in 1945. The original withdrawal orders had been for only five years and residents who held grazing rights or mining claims or both on the range were eager to resume their normal operations.[25] But in 1946, the military filed suit in federal court to continue its use of the bombing ranges in the Great Basin to test captured experimental weapons at Wendover and Tonopah.[26] The military briefly deactivated the bases in central Nevada only to

renew their withdrawal in 1948, combining the Las Vegas base with the Tonopah range as an Air Force pilot training center and bombing range in early 1948. Tonopah lost out to Las Vegas as the major base of operations for the bombing and gunnery range.[27] Neither ranchers in the Great Basin nor those in the Southwest received much official access to their ranges thereafter. The birth of the nation's nuclear testing program further complicated the situation and caused significant damage to Great Basin livestock operations.

The Manhattan Project, the Trinity test, the use of the atomic bombs on the Japanese cities of Hiroshima and Nagasaki, and the political tension with the Soviet Union fundamentally changed the nation's military establishment, reenergizing defense-related activities in 1948. According to a late 1945 Gallup Poll, most Americans believed that the nation needed a "peace-time army of fairly sizeable proportions," and 54% of those surveyed approved of the atomic research accomplished by the nation's top scientists.[28] Postwar leaders in the Allied countries firmly believed in maintaining a strong weapons program.[29] The immediate task of the nation's military and atomic scientists was to try to achieve a greater understanding of the effects of atomic weapons and then to determine how they would serve as the cornerstone of a new military strategy.[30] This burgeoning nuclear industry fundamentally tied the nation's military to atomic research and development to the extent that General Leslie Groves' initial testing program in the South Pacific in mid-1946 laid the foundation for future tests, the government appointed experienced former military personnel to the Atomic Energy Commission (AEC), the civilian group organized in the same year to oversee the nation's nuclear capabilities, particularly the testing program. The military also supplied the infrastructure and

necessary personnel utilized during test operations.[31] Despite emphasis on overt civilian control of atomic energy, the military provided the physical and mental framework for the nation's nuclear testing program. Even the land itself, formerly used as rangeland by the livestock industry, that had been transformed and degraded by bombs during World War II, was already segregated for conducting top secret nuclear testing.

In the summer of 1946, Los Alamos and the War Department conducted Operation Crossroads, detonating two devices identical to the bomb dropped on Nagasaki, obliterating a fleet of ships and severely irradiating Bikini Island in the Marshall Island chain, a strategic island group captured by United States forces in 1944. General Leslie Groves who had overseen the Manhattan Project wanted to better understand the effects of atomic weapons on naval targets and considered the islands adequately removed and depopulated enough to not pose a hazard to the international community. Two years later, in the spring of 1948, Los Alamos with the help of the newly-organized Department of Defense detonated three additional devices in Operation Sandstone at Enewetak Island, also in the Marshall Islands, under the auspices of the nascent AEC. The military's urgent need to stockpile viable weapons provided the impetus behind this second set of tests. The second series confirmed a more efficient bomb design that produced twice the blast yield of Trinity and provided reassurance that radioactive fallout could be contained to within the locality of the detonation. The Marshall Islands served as an ideal location for future weapons testing because of their existing military infrastructure, relative isolation, and low population.[32]

Designated the Pacific Proving Ground, the AEC conducted 106 atmospheric nuclear tests between 1946 and 1962 in the Marshall Islands, including the 15 megaton Bravo

test, the highest-yield thermonuclear test detonated by the United States. But the distance from the continent and the humid, tropical climate rendered tests in the Pacific difficult, time-consuming, and costly. By 1949, on the heels of the Soviet Union's detonation of their first atomic weapon, virtually identical to the design and yield of the device exploded on Nagasaki, President Harry S. Truman and the AEC decided a full-scale testing program was necessary to combat the increasing Soviet threat. In 1950, the escalation of conflict in Korea prompted President Truman and the faction of the AEC and Los Alamos that supported development of a thermonuclear weapon to accelerate the testing program and selection of a continental test site. Although Los Alamos scientists still preferred the Pacific Proving Ground in the Marshall Islands for the next series of tests called Operation Greenhouse, renewed conflict in the Pacific made the area too dangerous to maintain as the sole testing site. [33]

Between 1947 and 1950, the AEC quietly pursued establishment of a test site somewhere within the United States. Because of the radioactive fallout issue, the North Carolina coastline, the AEC's top site in the southeast, seemed a better choice until further investigation revealed that "almost all land which would be useful as a test site [was] inhabited and improved" and the only uninhabited areas consisted of "dunes or marshes." Other disadvantages included relocating equipment and personnel, and rerouting airplane, automobile, and waterway traffic. In contrast, several sites in the American West, especially the southwest, proved more attractive, considering the region's aridity and low population density. In New Mexico, Nevada, and Utah, in particular, there existed vast stretches of undeveloped desert already devoted to military weapons testing at White Sands, Tonopah, and Dugway. In its explorations of these

areas, the AEC noted that livestock operators had signed lease agreements turning their private property, water, and grazing rights over to the military for five years during the war and many had signed additional agreements lasting through 1951. For example, the Lamb family had signed a lease agreement with the military beginning in 1941 and renewed the contract after the war. Bringing the testing process closer to Los Alamos in New Mexico and key military bases there and in the Great Basin had distinct advantages in terms of facilitating the testing process.[34]

Not everyone, however, was convinced that a continental nuclear test site was a good idea. David Lilienthal, the AEC chairman, agreed that "the ease of access to a continental site would allow greater flexibility in the preparation for and conduct of these tests and would facilitate the participation of scientific and technical people." However, in his estimation and that of many others, the cost-savings was offset by the potential expenditures required to maintain appropriate "safety and security measures which would be required at a continental site." In addition, Lilienthal believed a continental site would likely create domestic and international relations problems, presumably because of the radioactive fallout problem. But, according to Lilienthal, "the magnitude of these problems could in time change, as in the event of a national emergency." That emergency had been provided by the Soviet's possession of atomic weaponry.[35]

In the interest of pursuing a continental testing site, the Armed Forces Special Weapons Project (AFSWP), the military's counterpart to the AEC's Military Liaison Committee, delineated the parameters such a test site would have to meet in a report that synthesized all the known environmental factors which influenced the testing process, including humidity, wind, likelihood of precipitation, and population. The investigation

narrowed the possibilities for a continental test site to two regions: the nation's southeast and southwest. The report stated that "for purposes of planning and logistics … the arid southwest is more favorable as a location for atomic test sites than the humid southeast," because of the greater percentage of days charted with favorable climactic and meteorological conditions and the low population density, particularly in the Great Basin. Of special concern was that "a certain amount of radioactive waste [would] fall out of the atmosphere to the eastward of continental sites following atomic tests," but that "after study of the fall out figures for the tropics, that such fall out will not harm the population, the economy nor the industry of the nation." Amongst the several choices in the West, the Nevada location was by far the most conducive to the AEC's needs. [36] Whereas in New Mexico and Utah, livestock operators protested the creation of bombing ranges and military bases, those in Nevada, along with the state's congressional delegation, had invited the military operations in the area around Tonopah.

In August 1950, a dozen of the leaders in the nation's atomic program, including Enrico Fermi, Alvin Graves, and Edward Teller, met at Los Alamos to discuss the primary obstacle in establishing a continental test site: the radiological hazards associated with a testing location. These men used the hazard factor, their description of the impact of testing on a region described by an equation that added the ratios of the population at a given distance from the detonation to the square of that distance, to illustrate the radioactive fallout problem on an area. Other effects of atomic detonations such as the force of blast effects and thermal radiation or heat had "much smaller danger radii" so that reduced test sizes, smaller than those conducted in the Marshall Islands, were relatively safe beyond twenty miles. Given that the prevailing winds in the Great Basin

and desert southwest blew predominately west to east and south to north, and that Salt Lake City, the largest urban area in the Great Basin was only 100 miles west of Dugway, the scientists felt the possible Utah site was infeasible. The Tonopah range in Nevada proved three times more favorable than even the New Mexico site at White Sands where Los Alamos had conducted the Trinity test.[37]

The Los Alamos scientists planned for meteorologists to determine the days which demonstrated the appropriate weather and wind conditions, avoiding rain at all costs, which they presumed to be "the only cause of fall-out." They believed smaller particles would remain suspended long enough to be rid of radioactivity greater than the supposed safe level. The Los Alamos lab had collected much of the meteorological and fallout monitoring data during the Pacific tests over the past five years. This data allowed Fermi, Graves, Teller, and the others to determine a conservative threshold for a rapidly administered integrated radiation dose, which they measured as half the maximum recorded at the Trinity site, a level from which the human body could recover. The scientists believed their estimation was reasonable considering that despite the Trinity site's higher hazard factor and the unfavorable meteorological conditions in which Los Alamos conducted the test, the detonation had resulted in "only unimportant radiological effects." In general, they assumed that radioactive doses up to that point were safe.[38]

Beyond the hazard factor, the population in Nevada factored into the scientists' recommendation another way. The distance between Las Vegas, the closest city to the potential ground zero at Frenchman Flat, and Tonopah, at the northern boundary of the consolidated Tonopah and Las Vegas bombing ranges, was roughly two hundred miles. Given that 180° boundary, the scientists determined that 90° from that line out to a

distance of 100 miles was the area in which radioactive fallout would occur, but they believed it could be safely managed if tests ranged between 25 and 50 kilotons. This is what the men called the "sector of safety." Very little human activity went on in this area since the military had already designated it a bombing range and had curtailed civilian activity. They considered Las Vegas to be outside this region, though it was within 100 miles, because Los Alamos anticipated conducting tests when winds were blowing away from the city. From Frenchman Flat, a distance of 100 miles stretched to Tonopah and Highway 6 in the north and St. George to the east. This sector of safety actually included the tiny communities of Carp, Elgin, Alamo, Hiko, Caliente, Adaven, and Moapa. But the AEC in general believed "the population density [wa]s so very small" that monitoring these small towns would require "very little logistic effort."[39]

At a distance of 100 miles from Frenchman Flat to 300 miles, an area covering roughly 40,000 square miles and including Tonopah and St. George, Enrico Fermi estimated that there was only a one percent probability that one percent of that area would likely receive a radiation dose up to the higher levels registered after the Trinity test. Assuming a population density of one person per square mile in this second area, Fermi determined that four hundred persons might receive a radioactive dose up to the maximum. This, according to Fermi, was "the size of the risk" of conducting a continental atomic testing program. In the opinion of the other scientists present at the meeting, Fermi's estimation of a one percent chance that 400 people would be exposed to an integrated radiation dose that was similar to the gastrointestinal examinations of that era was an overestimate. Most of the scientists thought that "this risk, as stated above, is

not a probability that anyone will be killed, or even hurt" in the area between Tonopah and St. George.[40]

By the end of the year, the AEC, Los Alamos, and the Department of Defense considered the Nevada site "so superior to any other under consideration as to render it unnecessary to go into detail on those other sites" (fig. 51). During World War II, General Leslie Groves had successfully commandeered a location on the Alamogordo Bombing and Gunnery Range for the first atomic test during the war. Similar to White Sands, the range in central Nevada was already allocated for weapons testing, but unlike the New Mexico range, it was far better in size and location. Given the necessity of nuclear weapons testing to the nation's national security, the AEC determined atomic testing in Nevada essential and began to set up operations immediately.[41]

Between late January and mid-February, the AEC detonated five small experimental devices on Frenchman Flat as part of Operation Ranger, dubbed the "Hurry-Up Operation" by the Los Alamos Test Activities Branch because of its short-order organization. The largest detonation amounted to 22 kilotons, well under the AEC's self-imposed 25 kiloton limit and all of the tests were dropped from airplanes and exploded above the ground (fig. 52).[42] The organization worked to ensure that the proper officials in Nevada's government were on board with the testing program and that planned tests would not produce any significant radioactive fallout beyond the immediate vicinity of ground zero and well within the planned 100 mile geographic limit.[43]

Governor Charles Russell's office in Carson City received only one complaint from a rattled Las Vegas resident who wrote that the shock wave nearly knocked the roof off her house and that "there [wa]s not sufficient data developed to actually prove what will

happen in a locality when atomic tests, even of a limited nature, are made from day to day, especially in a mountainous area like the country around Las Vegas, where the fissionable material could be drawn together between the mountain ranges, or sucked into a valley, such as the one in which Las Vegas is placed." The governor's office wrote the AEC that the receipt of only one complaint indicated that "the general public has accepted your testing program in the spirit in which they should." The governor took a skeptical view of the hazards associated with continental nuclear testing, believing the AEC would minimize any risks to the state's residents.[44]

Indeed, the AEC and Los Alamos scientists, after several years of successfully conducting nuclear tests, believed they understood the effects of radiation exposure and could minimize their impacts on a continental test site and its surrounding population. After the Ranger series, the AEC announced that routine checks on radiation levels surrounding the test site indicated that they were insufficient to injure human or animal life or to endanger the water supply. Scientists in Ohio, New York, Canada, and France reported increased radiation levels in snow falling in Cincinnati, Rochester, New Brunswick, Quebec City, and in southern France, but at levels the AEC determined harmless.[45] Dr. Thomas Shipman, Los Alamos's head of the nascent radiological safety group created to monitor radioactive fallout, even sent an amused letter to a doctor in California who had two patients claiming they received burns from radioactive fallout while hiking in the mountains near Sacramento. He wrote "the case was rather too absurd to dignify with further attention" as the fallout would have had to circumnavigate the earth before reaching them. "I am afraid," Dr. Shipman stated "that Mrs. Gipson and her

son-in-law either got a garden variety case of sunburn or possibly made the acquaintance of some poison oak or some similarly irritating plant."[46]

Some civilians expressed their concern to reporters, one Las Vegas housewife complaining, "What are they trying to do—make us click like Geiger counters?"[47] A spokesperson from the Federal Civil Defense Administration (FCDA) grimly stated that if the effects of the tests were not spent in the sixty miles between Frenchman Flats and Las Vegas, "then God help us all." But the AEC in general was satisfied with the lack of public concern and the nation's general support of an all-out defense program. Carroll L. Tyler, the AEC's Santa Fe Operations Office manager wrote Governor Russell that his "matter-of-fact acceptance of the tests, and a similar approach on the part of officials and of news media in southern Nevada, helped develop a calm and sane pubic attitude which contributed materially to the conduct of our operations. To those of us who know the West," Tyler stated, "such a reaction was not surprising, but it was nonetheless remarkable." Tyler indicated that the AEC was moving to "permanentize [sic] our Nevada site" since the site matched both the organization's physical and "human relations" requirements, to which Russell responded "I believe that you can rest assured that in your future program, the same co-operation will be forthcoming in every respect from the State of Nevada."[48]

The ease of the smaller tests allowed Los Alamos scientists to fine-tune their understanding of acceptable meteorological conditions, desirable elevation levels, and permissible radioactive doses. Rather than work more conservatively, Los Alamos scientists saw how to operate closer to the limiting conditions and work with larger-yield experiments. The AEC conducted a second series of tests in back-to-back operations in

late 1951 called Buster-Jangle about fifteen miles further north on Yucca Flat, a sufficient additional distance to prevent any recurring structural damage in Las Vegas. This operation featured four small detonations, one slightly bigger than the Trinity test, and a large 31 kiloton test designated Easy conducted on November 5, 1951. Several Nevada politicians were present to witness the tests, including Congressman Walter Baring and Senator Pat McCarran.[49]

Besides testing the perfected weapons design developed in the Ranger series, the second set of continental tests allowed the military to expose troops and equipment to the potential conditions of atomic warfare and utilized rats, dogs, and sheep to collect data on injuries resulting from blast and radiation exposure.[50] Again, the AEC reminded the American public, particularly Nevada residents, that radiation monitoring teams canvassed the local area, the most likely region to be affected if a sudden shift in wind or weather occurred, and warned the American public that slight increases in radiation levels could also occur in other sections of the country, but as with the first tests, was considered harmless. Similar to Operation Ranger, the AEC expected radioactive particles to concentrate within the 100 mile radius from ground zero.[51] The first series of continental tests had produced no radiological safety problems of any consequence; likewise the second series in 1951, which involved troops entering the ground zero area after detonation, had caused no hazard to public health. The first year of testing in Nevada was so successful, despite the hurried nature of the first series, and the national imperative to develop atomic weapons in order to remain internationally dominant so strong, the AEC worried less about the effects radioactive fallout had on the environment and instead began pushing the boundaries of the testing process. The AEC began creating

a large-scale testing operation on their new test site. Nevada state officials were delighted by the potential job opportunities this afforded Las Vegas and other communities. As part of constructing a full-time testing program in their "backyard workshop," the agency made their presence on the Nevada Tests Site (NTS) permanent.[52]

Nuclear Range Management

The success of the nuclear testing program in 1951 allowed AEC officials and Los Alamos scientists, who believed they had established a workable system in which to conduct atomic tests, to relax. Testing nuclear weapons in the Great Basin had produced no negative effects or public outcry. This seemingly secure position made it difficult for them to accept information which contradicted the standard narrative of nuclear testing, despite their acknowledgement that they still had much to learn regarding the effects of radioactivity. When testing began and evidence of exposure to fallout manifested in livestock surrounding the test site, it caused a rift between the scientific experts and livestock operators as to what exactly the effects of radioactive fallout were and who had the authority to determine those effects. Whereas the nation's atomic scientists believed they understood radiation and its effects, ranchers believed they understood the bodies of their animals and range management.

Despite efforts to remove livestock from the Tonopah and Las Vegas bombing ranges, cattle still grazed in the region, particularly on the area's northern and eastern edges. Testing in the Ranger series had actually proceeded without clarification of the status of property within the test site, including mining claims, water improvements, and grazing permits. The AEC had wanted to construct a 125-mile barbed-wire fence along the range's boundary, but the expense proved prohibitive. Local newspapers during the

1940s had warned residents to stay off the bombing range during periods of intense activity, though cattle often strayed onto the area and had to be collected regularly. “G.I. Cowboys” helped local livestock operators collect Jim Butler’s cattle and others off the bombing range in the late winter and early spring of 1945. Military officials and the AEC expressed concern for ranchers’ welfare and urged them to steer clear of the testing area unless otherwise notified regardless of the movements of their livestock. However, their concern emanated from their knowledge of blast effects of traditional and atomic weapons. In the Ranger series, residents of the southern Great Basin, especially around Las Vegas, filed 200 claims covering $15,000 worth of damage. The Buster-Jangle test series had only created 161 claims, amounting to proportionally less. These claims reported structural damage to windows and roofs, amounting to a grand total of $15,000. The AEC became practiced at verifying claims of this variety, not of that which involved radiation exposure.[53]

But radioactive fallout was present and potentially problematic in early tests. By the end of 1951 and the Buster-Jangle series, scientists measured radioactive snow in upstate New York where the Eastman Kodak film and camera company operated and where radiation contamination threatened to ruin their stored film.[54] In southern California, a monitoring station in Downey recorded increases in radiation over background readings after the second series of atomic tests in late November 1951. Radiation monitors working from a lab set up at the North American Aviation facility used Geiger counters to chart readings ranging from less than one milliroentgen per hour on a dog’s foot to ten milliroentgen per hour on vegetation. In addition, early research on the effects of radiation exposure prompted articles in national newspapers which read “Corn Freaks

Grow from Atomic Tests" and "Atom Bomb Tests Verify UCLA Research Finds." The first article reported that in a California Institute of Technology study, corn seeds subjected to radiation in the Marshall Islands during the 1946 tests in the Pacific that had been planted and harvested through five generations produced corn with "dwarfed, twisted, frail or partly sterile" characteristics. The second article addressed a study at the University of California at Los Angeles which determined that radiation exposure, in this case x-rays, caused ferritin, a protein which transported iron throughout mammal bodies, to be released in larger-than-normal quantities which caused internal hemorrhaging.[55] These studies and reports addressed potential problems in humans, but nothing compared to the damage atomic bombs produced at Hiroshima, Nagasaki, or even in the Marshall Islands.[56]

The first damage from exposure to radioactive fallout produced by the atomic tests in the Great Basin occurred with the first test series. As early as October 1951, eight months after the first continental testing series and just before the second series was set to begin, Floyd Lamb, a rancher in Alamo and a Lincoln County Commissioner, expressed some concern in a letter to the AEC about the "danger which might exist for his livestock on his range adjacent to the Nevada Test Site" since he had water rights and summer range rights very near Frenchman Flat. Floyd and his brother Carleton Lamb operated the Willard Cattle Company and had sub-leased some of their grazing range to the Air Force as part of the Tonopah and Las Vegas bombing ranges during the war, but their cattle still ranged into Kawich, Tickaboo, and Emmigrant valleys close to the boundaries of the new test site. Although Lamb was unspecific as to the damage, it is very likely that some inexplicable or previously unseen livestock injury occurred, prompting Lamb to write a

letter which expressed concern. A staff assistant for testing operations responded to Lamb's inquiry by reassuring his wife Eleanor Schofield Lamb via phone that the AEC "recognized the interests of people in areas adjacent to the test site," and that they were "taking every possible precaution for their welfare and for the protection of their property." The AEC official informed the Lambs that "if their cattle were on their own range and did not stray onto the test site area there should be no particular cause for concern in connection with the planned operations." This indicated that he thought the Lambs were concerned about accidentally straying onto the testing range during an active detonation.[57]

Radioactive fallout was not the major concern of the AEC official in the phone call, but it was probably the most important issue for the Lamb family. Floyd and Eleanor Lamb lacked the scientific vocabulary to discuss the phenomenon they witnessed after the Ranger series. In the phone call with the AEC official, Eleanor "expressed anxiety regarding the welfare of their livestock and of Mr. Lamb himself being on the range." The AEC official assured her that "prior to an operation the entire major area is checked by air, and operations are delayed if necessary to assure that any persons in hazardous areas are removed."[58] A few months later, in January 1952, Floyd Lamb notified the AEC that almost forty of his cattle had developed skin sores particularly on their legs and were losing hair. Lamb indicated he believed that the damage to his cattle had been caused by caused the atomic testing activities conducted at the test site. The AEC advised Lamb to seek a private veterinarian's opinion on the matter.[59] This singular message from one livestock operator in the south-central Great Basin had a small, but potentially powerful ripple effect on continental nuclear testing.

In the early part of 1952, Los Alamos and the AEC were largely concerned with the production of another test series, Tumbler-Snapper, scheduled for April and May of that year on the newly-named Nevada Proving Ground.[60] In the first two test series, detonations Fox, Dog, and Easy yielded 22 kilotons and distributed measurable radioactive fallout toward Las Vegas and Mount Charleston, the tallest peak in the Spring Mountains and in the southern Great Basin. But, the measured radiation levels were well below the permissible limits.[61] The off-site exposure standards adopted for the new test series were basically the same as with the earlier test series and the AEC reactivated the same monitoring system used previously. Besides monitoring the area from ground zero either on Frenchman or Yucca flats out to the 100 mile radius, monitors also canvassed the area between radius 100 and 200 miles from ground zero. Radiation monitoring in this second area was not as imperative since most tests were airdropped and exploded at least one thousand feet from the ground. Beyond radius 200 miles from ground zero was even less of a concern. In the case of tower, surface, or underground detonations—there had been a tower, surface, and underground detonation in the Buster-Jangle series in 1951—monitoring in these zones was more important. The AEC again scheduled these zones to be canvassed, but there was no expectation that there would be hazardous levels of fallout in the next test series which was comprised of airdrops and tower detonations only.[62] AEC officials worried that the public's "unfounded fear [of damage to humans, animals, crops, and property] from radiation exposure and testing activities might hinder testing, even threaten use of the Nevada Proving Ground." To assuage this fear, the AEC arranged for hundreds of civilians, congressional representatives, civil defense personnel, and the press, to witness one of the detonations in late April and see for themselves.[63]

Observers and troops were present at the largest of the Tumbler-Snapper series, a test named Charlie which yielded 31 kilotons (fig. 53). Gene Sherman, a *Los Angeles Times* reporter, described the event as "blazing atomic fury," the "searing sun, unshielded by clouds, was blacked out at the instant of the unworldly incandescence of the initial flash." So massive was Charlie's mushroom cloud, it could be seen by observers on Mount Wilson near Los Angeles. In total, the three continental test series had provided scientists with valuable information about atomic processes and had immeasurably facilitated the military's development of tactical nuclear weapons for the nation's defense, demonstrating the enormous value of the continental test site's desert laboratory. Civil defense officials had hoped that the eye-witness accounts of this latest series would shock a lethargic public out of its complacency about the very real possibility of nuclear war. Instead, Americans generally viewed the atomic tests as a curiosity and tourist attraction; seeing a nuclear explosion carried more appeal than the casinos of Las Vegas.[64] This spoke to the success of the AEC's national public relations campaign.

The AEC's Division of Biology and Medicine, however, expressed an undercurrent of concern after the third test series regarding events that foreshadowed the problems to come with radioactive fallout and the local population. In a draft press release that was not distributed, the commission indicated that the May 7th test, the 12 kiloton Easy shot, had caused some consternation because of reports generated by individuals who owned instruments capable of measuring radioactivity such as Geiger counters of "radioactive dust blowing through or falling in their home communities following tests." The AEC reiterated, if only to its staff, that "the movement and extent of this radioactive material" was "followed with utmost care by members of the test organization and other Atomic

Energy Commission representatives." The draft indicated that radioactive material had been distributed thousands of miles away from the test site and had caused problems at the Eastman-Kodak plant in Rochester, New York, exposing thousands of dollars worth of film. But the amounts were "so small as to be of no consequence as far as health and safety" were concerned. The author of the press release was fundamentally worried that the public did not understand the extent to which the commission worked to ensure that no harm came to "humans, crops, livestock, wildlife, or water supplies."[65]

The AEC walked a fine line in terms of public relations with locals. The eleven residents of nearby Groom Mine, only twenty miles northeast of ground zero at Yucca Flat, had been evacuated prior to the Easy test. Twenty-five miles further in the same direction, Thomas N. White, the radiation monitor assigned to the area, estimated radioactive fallout at the Lincoln Mine, a small community of about forty-five near Tempiute, close to the gamma radiation exposure limit after the detonation.[66] This fifth test in the Tumbler-Snapper series produced the greatest radioactive fallout readings, the highest recorded in Ely, since the Trinity test in 1945 at White Sands. The 11 kiloton Fox test on May 20th also produced heavy fallout to the northeast, again affecting Groom Mine and the Tempiute area. Daniel Sheahan, a resident of Groom Mine, expressed grave concern at the AEC's indication that "the mine area would receive contamination after each shot and operations would probably be interrupted weekly." He said the AEC led him to believe in the "strong possibility that heavy contamination in the mine area would result from test operations," and that "there would be a build-up of contamination which might necessitate evacuation for a considerable period of time."[67]

Residents in Salt Lake City also expressed their concern about the May tests. The Easy shot had spread radioactive "dust" throughout the Salt Lake area, though AEC monitors notified the state health commissioner George A. Spendlove that the levels were not dangerous and that by the following day the radiation levels had diminished significantly. However, one uneasy individual, who seemed affiliated with the scientific community, wrote the editor of the Salt Lake City paper that the AEC should have been more careful of the turbulent meteorological conditions which spread radioactive fallout over the city. The author of the piece stated "we don't know enough about radioactivity to be absolutely sure of its dangers." An AEC official from the New York Operations Office penned a response that defended the concept of safe doses of radiation arguing that the AEC allowed its personnel to receive a threshold dose of up to thirty times the radiation received by Salt Lake City residents after the May 7th test. In addition, the official pointed to the network of monitors deployed throughout the country tracking and measuring radioactive fallout and emphatically insisted "at no time has radioactivity from AEC test operations been harmful to any human, animal, or crop." The AEC official thanked the Utah press for "the level-headed way" they approached the "very difficult task of explaining in understandable terms just what the levels of radioactivity resulting from the May shot meant to persons residing in the area."[68]

Floyd Lamb's cattle, however, still posed a significant and persistent problem. For the first six months of 1952, the Lamb family followed the suggestion of the AEC and sought the opinion of a private veterinarian in the area while AEC officials distributed Lamb's allegation that his cattle had radioaction poisoning throughout the agency's hierarchy and requested advice on how to proceed with an investigation of the matter. In early August,

Thomas L. Shipman, now the head of Los Alamos's Health Division, wrote Alvin C. Graves, director of the lab's testing operations division, that "we are certainly not in a position to state categorically that these cattle might not have been damaged in this way [by exposure to radiation], and I feel that the implications of the situation are serious enough to warrant prompt and full-scale investigation." Shipman recommended that Los Alamos send a group to Alamo, Nevada, to investigate the situation that included the lab's veterinarians, Robert E. Thompsett and Harry O. Whipple, who were familiar with the cattle exposed to radioactive fallout at Trinity, radiation monitor Thomas N. White, and two others familiar with the area. Shipman warned that "if these cattle actually were injured by radiation, I see little choice except to tell the truth and shame the devil."[69]

The two part investigation of Lamb's cattle consisted of a local veterinarian determining if the damage to the livestock was from an "ordinary disease," which was determined not to be the case, and then a radiation expert ascertaining if the "distribution and intensity" of radioactivity could have caused the damage, which seemed likely because there had been some fallout in different locations in each of the test series to date.[70] The next step in the process was to verify that in fact, Lamb's cattle had been in the known fallout zone during one or more of the three test series. Shipman and other AEC officials seemed confused as to when exactly the cattle had been damaged. Floyd Lamb's herd had "developed skin sores particularly on [their] legs and [were] losing hair" between the first and second test series, but after the third test series, had experienced a "loss of hair and ulcerations down the middle of [their] backs."[71] Shipman acknowledged that Lamb's descriptions sounded "suspiciously like the descriptions of the Trinity cattle," but did not know if these were separate or related incidents.[72] Publically,

the AEC's official position on the matter was that Floyd Lamb had asked their help in determining the cause of his cattle's hair loss since the rancher's herd grazed close to Yucca Flat and because "on several occasions during the spring 1952 test series, range cattle were found inside Yucca Basin" and there were no fences between the grazing range and the firing range. There was, the AEC privately acknowledged, the "possibility that some of Mr. Lamb's cattle through proximity to our firing area were exposed to some degree of residual radiation."[73]

During the summer of 1952, the investigation of Lamb's cattle progressed. Upon inspection of the cattle on August 13th in the Kawich Valley, Thompsett, Whipple, and White reported that of the 150 animals observed, at least half exhibited sores on their backs. These lesions, similar to those seen in the Trinity cattle though with lesser intensity, looked very much like radiation burns. Since radioactive fallout from the June tests of that year had been measured in Kawich Valley, it was likely that radiation exposure had caused the damage to Floyd Lamb's cattle. However, no one could verify for certain that the cattle had been in the Kawich Valley at the time of exposure and this only explained the current damage, not the earlier damage. The investigators were fairly sure that the cattle had not suffered any permanent damage. Their primary objective focused on whether or not the value of these cattle at market would be impaired by perceived contamination by the public. Floyd Lamb was particularly concerned about this point and Los Alamos, though little additional information would be gained from further study of Lamb's cattle, supported a continued investigation to "convince the present owner and possible purchasers that careful studies were made of the cattle injured," presumably in order to settle the public's fears of radiation damage.[74]

The AEC issued a public announcement in Las Vegas about the entire incident in late August. The commission's statement indicated that Lamb's cattle had indeed been exposed to a small amount of "radioactive dust" and reminded the general public that the potential for radiation exposure within the test site and in areas surrounding it was great. The AEC said it had repeatedly made this danger known to the public, especially cattle grazers. The statement indicated that no human exposure would occur unless the members of the public disregarded the AEC's warnings and wandered in to prohibited areas.[75] As to handling the Lambs' claim, the AEC's assistant general counsel advised the Las Vegas office that Lamb could only make a damage claim if a more detailed investigation was made of the rancher's cattle and the results compared to the studies made of the Trinity cattle relative to the amount of radioactive fallout measured in the Kawich Valley. Lamb also had to verify that his cattle were in the area and that he could legally graze his cattle there.[76]

To this end, the general counsel's office requested the Air Force provide information on Floyd Lamb and the Willard Cattle Company's grazing rights. The lease agreement the Air Force delivered to the AEC's general counsel proved problematic for Lamb. The current lease, signed in 1946 and amended twice by 1951 to extend the lease period to 1967, indicated that Floyd and Carleton Lamb, doing business as the Willard Cattle Company, leased "all real property, water rights, whether acquired by vested right or appropriation, all interest … in grazing rights within the Tonopah Air Force Base and the Las Vegas Air Force Base" to the federal government for its "unrestricted use" as a "bombing and aerial gunnery range" for one dollar per year. The lease agreement indicated that the Air Force would have concurrent use with the Lambs but that before

entering their grazing ranges, the Lambs would obtain written permission from the Air Force. The Lambs assumed all risks of concurrent use of the range and waived any claims of damage against the government.[77]

So although Floyd Lamb's cattle were probably in the area and they were most likely damaged by exposure to radioactive fallout, none of that would result in payment on an actual claim if the lease agreement between the Lambs and the Air Force also extended to the AEC which had leased its land from the Air Force in order to test bombs. From Floyd Lamb's perspective, the AEC was liable for the financial loss he anticipated taking on the cattle when sold since the commission's investigation found and publically announced that radioactivity from the atomic tests had caused damage to more animals than even the original forty head. He notified the AEC that he intended to sell his herd in the fall and waited for their response. But according to the AEC, Lamb had to submit a formal claim form for damages before payment could be made and Seth R. Woodruff, the manager of Los Alamos's Las Vegas Field Office, emphasized to Carroll L. Tyler, the manager of the lab's Santa Fe Office, that they had given Lamb no assurances that the AEC would pay him for the "alleged loss in value of his cattle." Tyler corrected Woodruff that since the cattle had suffered only temporary damage which affected their skin and not the quality of their meat or reproduction capabilities, there was no need to delay Lamb's sale of the cattle. He directed Woodruff to remind the rancher of the temporary nature of the damages his cattle had suffered and to let the rancher make up his own mind about either selling his cattle or filing a claim.[78]

The letter Woodruff sent to Lamb emphasized the temporariness of the radiation damage, especially relative to the more severe damage suffered by the cattle exposed

during the Trinity test in 1945. Floyd Lamb responded in a hand-delivered letter reminding the AEC they admitted his cattle had been harmed by "atomic radiation" and verifying that his normal buyer, his wife's brother William U. Schofield, Jr. who owned a dairy in Alamo, would only purchase the cattle at half the going market price. Lamb wrote "I feel that I have suffered severe financial loss, therefore, I request a settlement should be made just as soon as possible." For Lamb, temporary or not, the radiation damage to his cattle caused his regular buyers, Schofield, and two other locals, J.A. Hail, and Wilson Stewart, to significantly drop their purchase price, costing him more than three thousand dollars.[79]

Lamb suggested the AEC conduct a joint investigation with him to determine the exact number of cattle under consideration in his claim. Joe B. Sanders, Woodruff's assistant in the Las Vegas Field Office, recommended to Tyler that they conduct the roundup with Lamb as it would save Los Alamos and the AEC "considerable expense." Sanders assumed that Floyd Lamb's claim, as a rancher and a Lincoln County commissioner, was valid, in its form as a letter and in its request, and asked Los Alamos for instructions as to how to proceed. In the AEC's general counsel office, however, Lamb's letter had caused a flurry of preventative action. They apprised the United States attorney in Reno, Miles Pike, that Floyd Lamb "may initiate an action in the United States District Court for damages resulting from the exposure of some of his cattle to radiation." They advised Pike that the AEC was authorized to settle claims of one thousand dollars or less administratively, but that amounts in excess of that limit would have to be filed with a federal district court. Since Lamb's claim indicated damages in

excess of three thousand dollars, the matter would "have to be pursued in the courts if more than twenty head of cattle [were] affected."[80]

The general counsel advised the Las Vegas Field Office of this situation. Woodruff wrote Floyd Lamb that "although I have no doubt that you intended by your letter to present a claim to the Commission for damages alleged to have been sustained by you as a result of the exposure of certain of your cattle to atomic radiation, your letter cannot be regarded by the Commission as constituting a claim for damages because it does not set out the specific amount of money claimed by you." He acknowledged that Lamb probably would not be able to determine the exact amount until the joint roundup Lamb had recommended was undertaken. Woodruff advised Lamb that the AEC was only authorized to settle claims of one thousand dollars or less and that claims in excess of that amount had to be filed in a federal court. He also sent the appropriate forms to Lamb if the rancher decided to file for an amount less than the three thousand dollars mentioned in his letter. Woodruff suggested Lamb hire an attorney to assist him in this matter.[81]

The roundup of Floyd Lamb's cattle occurred on October 25, 1952, more than one year after Lamb's initial letter of concern had reached the AEC. Of the four hundred animals on the grazing range in and around Kawich Valley, "it appeared that 102 head of cattle had been affected by radiation fallout resulting from atomic tests." Of that number Floyd Lamb owned fifty-three, his uncle and partner Carleton Lamb owned 30, and nineteen were owned by another member of the Lamb family. The inspectors organized the animals into four categories of damage: three-quarters of the cattle displayed scarring from radiation burns as white hair, a dozen had minor skin lesions, about ten exhibited denuded areas, and one cow was "an unsightly animal" with severe skin injuries. But

where the investigators delineated between less impacted animals and the more severely injured ones, the buyers of the cattle did not. At half the market price normally commanded by Lamb cattle, all three claims amounted to over one thousand dollars each. But Floyd Lamb and the others were reluctant to hire an attorney because of the expense involved. All three preferred to drop their claims to the thousand dollar limit and settle them administratively with the AEC. The Lambs asked those officials present at the roundup, Los Alamos veterinarians Robert E. Thompsett and Harry O. Whipple, Los Alamos personnel officer W.B. Creamer, and a federal attorney, what their course of action should be in finalizing their claim.[82]

The Lambs were looking for an informal settlement to a formal problem couched within a highly-bureaucratized system. But the AEC's general counsel deemed the lower claims inequitable because "three claimants would be claiming identical sums for damage to a different number of cattle in each instance." Additionally, a lower claim meant that "Floyd Lamb would be willing to settle for $1,000.00 without the advice of counsel" despite his assertion that his damages were larger than that amount. To the AEC's lawyers, this was an improper and unacceptable manner in which to file a claim. Finally, the Lambs had yet to prove monetary damage and locate liability with the AEC. The release of liability in the Lamb's lease with the federal government for damage to their property on the bombing range could exempt the government in the case of radioactive fallout caused by atomic testing. Federal attorney Mike N. Pike urged Lamb to engage an attorney and follow the proper course of action.[83]

In January of 1953, the Lambs retained a lawyer and "expressed the intention of suing the Government … for radiation injury to their cattle." Floyd Lamb had understood the

subtext of his multiple frustrating conversations with AEC officials; if he wanted to be successful in making a claim for damages, he had to participate in the formalized claims process as determined by the commission and the nation's legal structure. However, entering into a formal suit against the federal government did not ensure Floyd Lamb's success, rather it hurt his chances of a successful claim because it made the process more about responsibility and liability than about acknowledging the source of the damage and assigning a settlement amount. But the AEC would make no informal settlement, no matter how much such a measure might simplify the process and produce a fairer result for the claimants. In addition, the AEC also had the problem of setting precedent. Up to that point, the only claims of damage had been to structural property from the detonations' blast effects.[84]

Once Floyd Lamb agreed to participate in the formalized claim system, the standard legal process prohibited any informal exchange of information and assistance. The AEC refused to share the information contained in Robert E. Thompsett's report on the October 25th inspection, which clearly stated that "these ranchers have a very legitimate claim," but did not define the extent or dollar amount. Las Vegas Office field manager Seth R. Woodruff wrote Lamb's attorney that any information regarding the case had to be obtained from the United States attorney in Reno. At this point, Floyd Lamb's cattle case began to devolve. The adversarial nature of litigation made it impossible for the claim to remain independent of other issues, especially the release of liability clause in Lamb's lease with the federal government which the AEC's general counsel's office hoped to use against Lamb in court. As a result, the Lamb's sought other avenues of assistance to avoid suing in court.[85]

Floyd Lamb's claim actually involved Nevada Lieutenant Governor Cliff Jones, who owned an interest in the rancher's livestock operation. The rancher and state official sought the assistance of Senator Pat McCarran, who worked to help Lamb receive payment on his claim in 1953 through passage of a special Congressional bill, Senate Bill 3355. The AEC actively opposed passage of the measure as Lamb had "neither filed a claim with the Commission," nor "instituted action in the Federal Court under the Federal Tort Claims Act." In response to the bill, the AEC's general counsel stated "it is our belief that an undesirable precedent would be established if the Commission approved a bill for special relief where no effort has been made to obtain administrative settlement or to pursue available legal remedies." This forced Lamb back into the very situation he was trying to avoid. Unfortunately for Lamb, McCarran died in 1954 and the bill never passed. Meantime, Floyd Lamb sold some of his cattle; Francis Taylor of the Warm Springs ranch near Moapa purchased thirty head at the current market price with the provision that "Lamb would have to make them good if anything happened to them." Taylor expressed his interest to the AEC in studying the cattle himself.[86]

By March 1953 and the start of the new testing series Upshot-Knothole, Floyd Lamb's claim no longer was a major concern for the AEC. Nor was it the last time Lamb experienced the damaging effects of radioactive fallout. The entire situation became severely complicated. Los Alamos, the AEC, and the military conflicted over the purpose of testing and the use in particular of the continental test site in the Great Basin. At the same time all of these groups pushed for larger yield tests.[87] In addition, the AEC was fundamentally concerned about the public's perception of continental nuclear testing. When the commission's Division of Biology and Medicine requested permission to

purchase some of Floyd Lamb's cattle for further examination, both Carroll L. Tyler of Los Alamos's Santa Fe Office and Kenneth E. Fields of the military's AEC office refused because they felt "a serious public relations problem would be unavoidable were we to procure the cattle" while there was an ongoing investigation.[88]

Tyler was fundamentally concerned that the response of the radiation monitors deployed by Los Alamos's "Rad-safe" program who canvassed the area between the test site boundaries and a two hundred mile radius measuring fallout be uniform. Most of these personnel had been newly assigned to the test site by the Public Health Service and lacked knowledge gained in the previous tests by the predominately military monitors. To this end, the AEC planned an entire public education campaign concomitant with the new test series which blanketed scientific and medical publications, and national media with information demonstrating the understanding the AEC had of atomic testing and reassuring the public of their guardianship. The AEC hoped to "help achieve public understanding that continental tests have contributed materially to the total atomic defense position and that they are economical to manpower, time and money, so that the public will accept both the necessity for a continental site and the degree of inconvenience or hazard which may result." [89]

However, the Upshot-Knothole tests posed significant problems in terms of public relations from its beginning. Rather than the devices dropped from aircraft, the majority of the new tests were bombs detonated from towers which drafted radioactive ground particles into the fallout cloud. According to Los Alamos, there was a real possibility that in the 100 and 200 mile radius areas from ground zero "people living around NPG may receive a greater total dosage than that normally authorized for test personnel." Test

planners recommended that the number of radiation monitors be tripled and that they be stationed in populated areas such as Lincoln Mine, Tonopah, and Ely in order to advise residents to go indoors when fallout began.[90]

To preempt the problems posed by the Upshot-Knothole series, the AEC published a public report on continental weapons testing and safety. In it the commission reiterated important conclusions about atomic testing. "It is impossible to confine the effects of the explosions entirely to the proving ground." Radioactive particles "may fall back to earth virtually anywhere within the United States." Fallout had already "caused a degree of public concern in some communities." The expert use of instruments by radiation monitors and proper explanation of facts were key to dispelling fear. The AEC reiterated that "no person has been exposed to a harmful amount of radiation from fallout." Experience to date with continental testing indicated that atomic tests could be held at the Nevada test site "without serious hazard to persons, animals, crops, property, or industry." But the AEC also acknowledged that "the manner in which the particles descend through various layers of the atmosphere … is not well understood," and that residual radioactivity in the cloud produced by an atomic explosion "can present a safety hazard outside the proving ground under certain conditions."[91]

The first detonation called Annie on March 18th was "the most powerful single shot of its kind ever fired in either real or simulated warfare … a shot seen and heard by millions in all parts of the country over television and radio." The Annie test, called Operation Doorstep by the Federal Civil Defense Administration, produced the famous series of eight high-speed photographs showing the decimation of a typical American home by a nuclear bomb. Nearly eight million Americans watched the atomic detonation,

the first time the American public had ever seen an actual test, on their television sets courtesy of the nation's television networks.[92] As the series progressed throughout the remainder of March and into April, scientists conducting animal surveys noted radioactive contamination from ingesting plants in cottontail rabbits, mice, and kangaroo rats, but less than they expected, leading one radiation monitor to facetiously suggest "maybe the animals were too astonished to inhale following the shot." But by June, the rabbits had started dying.[93]

The late April test, the Simon shot detonated on April 25, was problematic.[94] At mid-morning the fallout cloud was headed southeast towards Mesquite over two major highways and the AEC ordered vehicles along state routes 91, the old highway into St. George, and 93 to stop for decontamination procedures. Very few cars required decontamination washes.[95] However, two trucks in Alamo, an empty cattle truck and a milk truck, demonstrated radiation readings which prompted a monitor to recommend thoroughly washing each truck before reuse. [96] In addition, the Utah State Highway Department's scale facility on Highway 91 near St. George showed readings high enough for the radiation monitor in the area to suggest that the state agency tell truckers coming north on the highway into St. George to "get their trucks washed inside and out at their earliest convenience." Almost all the vehicles headed north on the highway caused "the survey meter to register off-scale."[97]

This was the first time the AEC had recommended decontamination procedures for the public after a continental atomic test.[98] Monitors told the residents of Alamo, St. George, and the little towns in between that their vehicles had been exposed but that there was no danger to their health. More importantly, the Simon test and its aftermath

indicated the extent to which AEC officials were frustrated with the limitations on the size of tests and the level of acceptable radiation doses posed by the continental test site relative to minimizing exposure to populations living in the adjacent areas.[99] From the AEC's perspective, radioactive fallout happened as a natural result of the testing process. It affected offsite populations because of their imperfect knowledge about fallout patterns, cloud dispersal, and weather. Therefore, their efforts were better spent minimizing not the fallout, but the negative impact the fallout had on the public's perception of nuclear testing. Carroll L. Tyler, the test manager for the Upshot-Knothole series, stated, "it must be recognized that it is impracticable to conduct, with sound economy of effort and money and with maximum utilization of the proving ground toward expeditious forwarding of weapons development, a series of tests, conditioning each shot on weather, atmospheric and technical characteristics which insure no possible radiation or blast hazard to any persons or communities." Tyler argued that the set limit on radiation exposure imposed "a serious and perhaps unrealistic limitation upon an expensive, important, and onerous operation."[100]

After the Simon test, the AEC conducted four more throughout May and early June. Two tests, the airdropped Encore on May 8 and Climax on June 4, yielded 27 and 61 kilotons respectively.[101] The highly-publicized and eagerly-anticipated Grable experiment, designed to test the viability of an atomic cannon, yielded 15 kilotons on May 25.[102] But the test which caused the greatest uproar was the 32 kiloton tower-test designated Harry on May 19 (fig. 55). The Harry shot was smaller than Simon and while both were tower tests, the radioactive fallout produced by Simon should have been greater than that produced by Harry. But this was not the case; despite the best

meteorological predictions, the wind shifted just enough to cause a major fallout pattern east and north of the test site. The Harry test produced the most significant amount of radioactive fallout up to that point in the communities surrounding the test site.[103]

This was exactly the situation the AEC had hoped to avoid. As with the Simon test, the organization believed the situation was more a public relations problem than an actual radiation exposure problem. Regional and national newspapers carried stories of "closed" Nevada and Utah towns as residents stayed indoors per the AEC's advisory warnings.[104] Several southern Utah residents wrote the editor of the *Salt Lake Tribune* demanding to know why St. George residents were warned to stay inside if there was no hazard from radioactive fallout and what exactly the effects were if exposed. To make matters worse, Utah Congressman Douglas R. Stringfellow wrote the AEC "I am greatly disturbed over the reports which have reached me in recent weeks concerning the atomic tests being conducted at Yucca Flats in Nevada[.] . . . The explosion which occurred on Tuesday, May 19, especially aroused bitterness and anxiety among residents of St. George in southern Utah, who were ordered by the A.E.C. to remain indoors from 9:00 a.m. until after noon because of the danger from radioactive clouds which centered that area." Stringfellow explained "I am sympathetic to the need for atomic research but I cannot condone practices or policies which unduly threaten or cause harm to either our civilian populace or our men in uniform."[105]

AEC testing personnel faced sharp criticism from their superiors on the commission for a time, but in the absence of further evidence to the contrary, the problems produced by the Upshot-Knothole series seemed at an end.[106] However, despite the efforts of radiation monitors to track the path of radioactive fallout north and east across the Great

Basin, there were too few of them to check everywhere, especially in the spaces between the major highways (fig. 56). Monitors at Groom and Lincoln mines routinely evacuated residents, but they could not observe all the effects of exposure to radioactive fallout as they happened.[107] Thus radiation monitors and the AEC relied on the people injured to come forward and present their cases to the very institution which perpetuated those effects and were not entirely sympathetic to them. This put both the residents in areas adjacent to the test site and the AEC in an untenable situation. Injured persons lacked the scientific and medical language to articulate their symptoms and those of their animals, and the AEC lacked the proper objective perspective to judge their cases. The gap between locals suffering injuries and the AEC's ability to adequately investigate their claims became especially apparent after the Harry test when reports of damage from exposure to radioactive fallout dramatically increased.

In the days and months that followed Harry, a flood of accounts claiming damage from exposure to radioactive fallout reached the AEC. Reports of massive sheep deaths arrived around June 2nd about animals which had ranged in Lincoln County east of the test site before heading to their summer range in Utah. The dead sheep numbered more than one thousand ewes and two thousand lambs throughout eastern Nevada and western Utah. The herds belonged to Mormon families in Cedar City, including Lillian W. Clark, David Bulloch, Douglas Cory, A.C. Seegmiller, Nelson Webster, T. Randall Adams, the Lambeth Brothers, and the Higbees. Most of these individuals were related by blood or marriage to the Mormons in the Pahranagat Valley. The *Salt Lake Telegram* called the Santa Fe Operations office to check on the story as did other regional newspapers. All the animals exhibited scabs, lesions, and burns similar to those caused by radioactive fallout,

and would have been caused as early as the first test in the series. Within several days, a cadre of veterinarians, along with AEC personnel quietly examined the animals and began running extensive tests on tissue samples in order to determine if radioactive fallout had caused the deaths.[108] On June 14, the story broke nationally when the "NBC Evening News" featured the complaints of one Utah sheep rancher who stated his sheep had been ill since April. The AEC faced a snowballing public relations problem since "definitive findings" on the livestock deaths would not be available in the near future. To prevent too much public concern and control the flow of negative information, the AEC announced an abeyance in activity at the proving ground for twelve months and planned no public meetings until the release of the investigation's report.[109]

In the meantime, the AEC proceeded with its investigation of the problem. Paul B. Pearson, director of the Division of Biology and Medicine's Biology Branch, led the inquiry. Initially, the sheep's skin lesions and the wool they shed in clumps seemed to be produced by beta-burns from exposure to radioactive fallout. But by mid-summer, AEC personnel introduced another possible cause. The Nevada Operations Office distributed articles amongst their staff on a sheep-killing weed, complete with wrenching photos of sick and dead sheep and an abandoned ranch, which detailed the region's severe drought conditions in the early 1950s. These articles alluded to the possibility that the sheep had suffered from a fatal reaction caused by ingestion of a noxious weed prompted by malnutrition produced by poor range quality. The AEC brought in a second team to examine the sheep, including a plant toxicologist from the Department of Agriculture's Bureau of Animal Industries. The toxicologist determined there was no evidence of any "infectious disease or poisonous plants . . . the skin lesions on the face and back were

somewhat similar to those seen following photosensitization, but since black [faced] animals were reported to be similarly affected, this can be ruled out." However, he stated "the shedding of fleece is quite common in sheep that have been maintained at a low nutritional level," alluding to the region's ongoing drought.[110]

The weed AEC investigators was involved in the sheep deaths and which signified the poor range quality of the Great Basin was *halogeton glomeratus*, a variety of Russian thistle pervasive in overgrazed areas since 1935. The Bureau of Land Management had waged an ongoing war against the plant since 1950, which was particularly problematic during drought years as hungry livestock often ate abnormal amounts which proved fatal. Accounts of ranchers watching their entire herds die hours after eating halogeton worried livestock operators throughout the 1950s. Suppressing the noxious weed and reseeding rangeland to prevent its spread was a critical BLM program throughout the decade.[111] Compounding the problem, the early 1950s were very bad drought years, especially in Lincoln, Nye, and White Pine counties in Nevada. Floyd Lamb reported more than 200 cattle dead at mid-summer in 1953; he gathered his animals off the range as quickly as he could, but continued to experience losses despite improving their feed. Governor Charles Russell got President Dwight D. Eisenhower to declare a state of emergency for the area and provide federal funds to assist ranchers in supplementing their livestock feed.[112]

In the final stages of the investigation, Pearson had discredited the strongest evidence, presented by veterinarians Robert E. Thompsett and Robert H. Veenstra, that implicated radioactive fallout as the most likely source of the damage. Pearson insisted that Veenstra's opinion that the levels of I-131 in the sheep thyroid produced by exposure to radioactive fallout were abnormal falsely correlated any elevated level of I-131 with

damage. Experiments at Hanford, Pearson insisted, had shown that sheep could tolerate several times the calculated level of exposure without demonstrating any effects. Pearson also attacked Thompsett's opinion that the sheep's facial lesions were caused by grazing in radioactive brush by insisting that beta burns in laboratories had produced lesions which had not healed that were inconsistent with the healed lesions exhibited by some of the Utah sheep. Pearson's reliance on laboratory experiments to set a baseline of what constituted damage from radioactive fallout and what did not, conflated the laboratory with the environment. Damage produced by radioactive fallout in the environment could not be replicated in the laboratory because of the complex character of the natural system. But Veenstra and Thompsett continued to insist that radioactive fallout had contributed to the deaths of the sheep. By the spring of 1954, many Utah sheep still had unhealed lesions, much of the sheep's wool had grown back more like actual hair, and the lambs that had survived the year had not matured to a normal size and were faring poorly. [113]

Pearson preferred the other investigators' response which had not focused on the effects fallout had on the sheep, but rather on what ultimately caused the sheep to die, which alluded to noxious weed ingestion and malnutrition because of drought conditions. In August, AEC investigators, under pressure from the commission's leadership to resolve the sheep issue, held a conference on livestock losses in Salt Lake City so that the investigators could present their report to the public. The results presented in Salt Lake City reflected this particular path of investigation which did not directly implicate exposure to radioactive fallout as the cause of the sheep deaths.[114] After the conference, the ranchers, unhappy with the official report and suspicious of the AEC's treatment of Thompsett and Veenstra's evidence, filed suit in court against the commission. The sheep

operators believed the AEC blamed them for the deaths of their own animals, treating them as "mostly uneducated, and untrained, … not capable of detecting trouble until the actual deaths of the animals." Once again, the formal investigation was not actually about whether or not the damage to the sheep was caused by radioactive fallout. The sheep case instead focused on the expertise of witnesses and laboratory-determined effects of exposure to radioactive fallout.[115]

The AEC's focus on determining the cause of death instead of the effects of radioactive fallout affected other concurrent sheep, cattle, and horse investigations in Nevada. Besides the ranchers in Utah, the Stewart family, including brothers Cornell, Daniel, the Mormon bishop at Alamo, and his son Cordell (Dell), and their cousins who ran the Stewart Brothers Ranch contacted the AEC about damages they had incurred.[116] In early June, one of the Stewarts contacted officials about their horses suffering from lesions and blindness and cattle with similar symptoms, which had manifested within six months of the last test series. They also had several head of cattle which had died near Papoose Lake, about fifteen miles northeast of Yucca Flat.[117] The investigations into their reports produced similar results to the Utah sheep cases. Los Alamos said the Stewarts' cattle that died had demonstrated some damage from exposure, but had died from malnutrition due to the same poor range quality that had caused the demise of the Utah sheep.[118] The Stewarts were not convinced that their cattle had not been damaged by exposure to radioactive fallout, but further investigation produced the same outcome. Laboratory experiments could not replicate the damage to the cattle and the AEC believed the damage was related to uncontrolled growth of surface tissue, tick-borne fatal anemia, and low levels of magnesium from either ingestion of noxious weeds or bacteria.

Another seemingly related investigation of cattle deaths near Mesquite and Littlefield off Highway 91 between Las Vegas and St. George blamed redwater disease.[119]

Surprisingly, the AEC proved more amenable to damage claims for injury to horses. Investigators told the Stewarts that twenty of their Quarter Horses had received beta-burns and developed severe lesions, even blindness, from radiation exposure.[120] The ranchers were able to claim their horses for the difference in their current value, based their recent incapacity, and their previous value. Horses that had lesions on the backs and eyes could no longer be ridden which shorted the Stewarts valuable work animals. Payments for the horses did not cover the cost of replacing a well-trained, well-bred animal, but the funds did help the Stewarts develop a better relationship with the AEC.[121] Joe Sanders, who had an eye for horses himself, handled the Stewarts' claim, sending most of the damaged animals to "the chicken or dog food factories." He was glad, however, that one little black filly, three other little females, and a gray mare were going to be bred to prove the point "that radiation does not affect breeding qualities."[122]

Floyd Lamb continued to pursue his claim, despite the AEC's insistence that their office had not yet received a formal filing or a formally filed a suit in court and any attempt to get him compensation through other means set a problematic precedent. The AEC continued to point to his lease with the Air Force, stating that the release clause rendered any claim Lamb might have invalid anyway. But Lamb's cattle in the Kawich Valley continued to have problems, remaining over one hundred pounds smaller than their peers. After the Upshot-Knothole tests, many of his animals had died after drinking the water near the test site. Lamb became "very bitter" as a result. But similar to the Utah sheep investigation and the Stewarts' cattle investigation, the AEC was not able to

experimentally reproduce the damage to Lamb's cattle. Lamb tried to get other Nevada ranchers, including the Stewarts, to cooperate with him in a case against the AEC as the Utah ranchers had done. In 1955, he filed a form for the 1952 claim and contacted Nevada's Senator Alan Bible for assistance, but it was too late. The law did not cover claims more than two years old and the AEC did not believe Lamb had actually incurred any damages as a result of the exposure of his cattle to radioactive fallout. The commission believed that Floyd Lamb was deliberately agitating the local population against the test site and if not for his dissatisfaction, "the citizens of Lincoln County, including Alamo, as a whole would accept the tests . . . without complaints." The residents of Lincoln County had elected him to the state senate on the strength of this position. He finally did receive approval for compensation on one horse, a three-year-old stallion damaged in 1957, but Lamb was never home when the appraisers were available to review and finalize the claim and it was never paid.[123]

The AEC's final solution to the problem of ranchers running livestock adjacent to the test site was to buy up their herds and conduct future fallout studies. As part of the nation's atomic testing program, the AEC joined the livestock business. Ken Case, the famous Atomic Cowboy, and the AEC brand appeared on the Great Basin range in 1958 (fig. 56).[124] Livestock in the area downwind of ground zero mirrored the damage suffered by many people near the test site. As one rancher wrote "it is my considered opinion that not only livestock but people in this area have suffered from radioactivity.[125] University of Tennessee veterinarian Bernard F. Trum, who worked for the AEC beginning with the 1953 livestock investigations ominously stated after the incident, "we can certainly

anticipate a ‘chronic radiation’ claim sooner or later from people living near the Proving Ground.”[126]

And indeed, people living in that part of the Great Basin were concerned. A resident of Tempiute near Lincoln Mine reported that on March 26, two days after the Nancy shot in 1953, a “large feverish place began to raise with [a] blister in [the] center” on their nine-year-old daughter’s left cheek. The girl’s left eye “became bloodshot and swollen.” After a week of treatment, the blister dried up, but her eye remained irritated. Similarly, another Tempiute resident, a 36-year-old woman, reported skin and lung irritation, and bloodshot eyes during the Annie and Nancy tests. In mid-April, in conjunction with the Badger and Simon tests, her skin again became irritated and the entire left side of her body turned brown except where her bra straps covered her shoulders. Between the Harry and Grable tests, she again felt skin and lung irritation and suffered from scabbing blisters. She wrote that if she left Tempiute the evening after a detonation, her skin cleared up, but upon returning the next evening, her skin again became irritated. Others at Lincoln Mine suffered rashes and welts that did not heal and which doctors in Ely and Tonopah did not know how to treat. The residents of Lincoln Mine, approximately 200 persons, permanently relocated after continual evacuations every time the AEC conducted a test series. The town’s store, gas station, and café, all closed at the end of July 1957.[127]

In 1956, residents filed 638 administrative claims against the AEC, of which 608 were for “broken windows and cracked walls,” “damage to equipment and furnishings such as dishes and mirrors,” and “loss of operating time … and the uprooting of a palm tree.” Of that number, 386 were settled for a total of $45,478.18. Residents filed 16

claims for “biological injury to humans and livestock,” of which 9 were settled for $6,817.16. Most of those claims had been filed during the first two test series in 1951 and predominately consisted of claims resultant from blast damage. Of those claims filed for biological injury, the Stewarts’ claim was the largest at $5,900 for burn damage to their Quarter Horses. In addition, seven Utah sheep ranchers and the Sheahans of Groom Mine filed suit in court for a combined $750,000, but the federal courts in Utah and Nevada found in favor of the commission. The AEC had “paid no claims for human biological injures as a result of the tests … following full investigation of all such claims brought to its attention … no off-site human injuries have resulted directly from the tests.”[128]

Underscoring the damage to humans and animals caused by exposure to radioactive fallout again lay the perception the AEC and Los Alamos had about the Great Basin; similar to the organizers of the grazing districts and some of the region’s residents, they believed the region was a wasteland, a virtually ideal location in which to conduct continental nuclear tests because the environment was already less than desirable. This presumption allowed the AEC and Los Alamos to blame not just the bodies of residents and livestock for their damage, but most especially blame the environment itself. The Great Basin range was marginal at best and filled with noxious, toxic, invasive weed species which were often fatal to livestock when ingested. Great Basin ranchers were acutely aware of both the devastation halogeton could cause and the effects of drought on grazing livestock. When AEC officials passed around the memos and articles on a sheep-killing weed and the severe drought conditions, they referred to the nature of the Great Basin environment and suggested the range itself was problematic and that livestock suffered damage and died just from being in it and grazing.

Instead of investigating the effects of exposure to radioactive fallout, the AEC focused on why the livestock received damage or died because that was the major question the ranchers wanted answered, but that process obfuscated the actual problem. In addition, the investigations themselves, in attempting to replicate the damage to livestock from exposure to radioactive fallout in the laboratory, failed to take into account the very complex environmental system at work in obscuring the effects of that exposure. Used to thinking in terms of singularities and ordered events, no one in the scientific community was prepared to grapple with the intertwined complexities created by their backyard workshop. Investigators missed the alarm with which ranchers gave accounts that both they and their livestock seemed to suffer from the same strange symptoms at the same time after detonations and when the fallout cloud passed over them.

Although radiation monitors had been sent to towns such as St. George, Ely, Caliente, and Hiko, very little thought had been given to reaching ranchers and other residents who lived and ran their livestock in the vast spaces in between. The AEC was not even aware of where ranchers grazed their herds until the livestock investigations. There were no monitoring stations set up at the ranches and no one tracked the annual movements of grazing patterns in the valleys surrounding the test site until the early 1960s. Neither did the AEC give consideration to groups whose traditional lifestyles utilized the region's plant, animal, and water resources directly; the Western Shoshone hunted deer, rabbits and other game, and Basque sheep herders and other ranch hands out with herds of cattle collected rainwater and melted snow for drinking water. Deer, rabbits, and precipitation all potentially had been contaminated by radioactive fallout. The AEC had difficulty understanding that in the Great Basin, many residents lived directly off the region's

resources. Investigators had found rabbit herds dead and dying, blind and burned deer, and of course knew that precipitation after test series carried intense amounts of radiation, as this was what the organization feared most and worked to limit through accurate meteorological data and weather prediction. But the organization did not make the direct connection between the people and the land.[129]

Investigators' treatment of the livestock operators in general as uneducated non-experts, because residents' knowledge-base came from experience and tradition instead of formal educational processes, deeply undercut the trust this small group of people had with their government. The agency's approach, expressed by Alvin Graves from Los Alamos, was to reassure the ranchers that there was no danger from radioactive fallout and not explain the details of exposure for fear of alarming them. Graves wrote that it "might be exceedingly important to the future of the proving grounds" to establish "positive controls of public utterances" to "insure that the AEC's interests are safeguarded." In the livestock investigations, Graves felt that their dissemination of information about the possible effects of radioactive fallout on the sheep to the ranchers was counterproductive. Telling the sheep herders about the risk of radiation exposure undermined the AEC's message of safety because from the rancher's point of view, "any radiation may be considered undesirable, whereas the AEC might consider some radiation necessary."[130] In addition, the pressure on the organization and Los Alamos to make continental nuclear testing work was enormous. The same year the AEC conducted the livestock investigations, the Nevada Proving Ground program was under review. But the location in the Great Basin was still by far the most favorable for nuclear testing and the review committee ultimately found that the problems raised by the testing process

were outweighed by the benefits of knowledge gained and weapons developed; the test site had served the nation's national security interests well.[131] Thus the longevity of the test site operations depended upon maintaining good relations with the general public. The AEC therefore began a public relations campaign which educated the public as to the effects of radiation exposure.[132]

The official guide disseminated to off-site communities in the late 1950s "Atomic Test Effects in the Nevada Test Site Region," opened with a message for residents: "You are in a very real sense active participants in the Nation's atomic test program … Some of you have been inconvenienced by our test operations. At times some of you have been exposed to potential risks from flash, blast, or fall-out. You have accepted the inconvenience or the risk without fuss, without alarm, and without panic." Las Vegans in particular seemed pleased with the notoriety the test site brought the burgeoning town; some residents said it was "a boon to the city," and agreed that residents had "a reputation for being unconcerned about the effects of radiation fallout." The guide also provided simplified technical and scientific explanations of radioactive fallout clouds and insisted that "it does not constitute a serious hazard to any living thing outside the test site." The booklet gave the mushroom cloud of atomic tests a legitimate place on the range with the ranchers (fig. 57 and 58).[133] But some in the AEC worried that "this kind of luck," the kind that seemed to avoid potentially serious situations regarding radioactive fallout, would not "hold good indefinitely." By 1958, the nation as a whole recognized the effects of radioactive fallout were greater than initially imagined. As a result, the nuclear testing program continued predominately underground thereafter and the AEC hoped residents of the Great Basin would "no longer be apprehensive."[134] Ranchers

remained concerned about radioactive fallout throughout the succeeding decades, but a small cadre of radiation monitors in the region dealt with their concerns on a much more personal level. In a strange way, radiation monitors interacting with and demonstrating concern for residents ameliorated the problem of radiation exposure in the Great Basin.

Fig. 50 Remnants of Settlement on the Nevada Test Site. Top: The ruins of a stone cabin at Tippiah Spring. Bottom: The remains of an abandoned 1928 Buick. These are some of the remnants of previous residents on the Nevada Test Site. Others include corrals, water tanks, and stagecoach facilities. Photos courtesy of the National Nuclear Security Administration/Nevada Site Office.

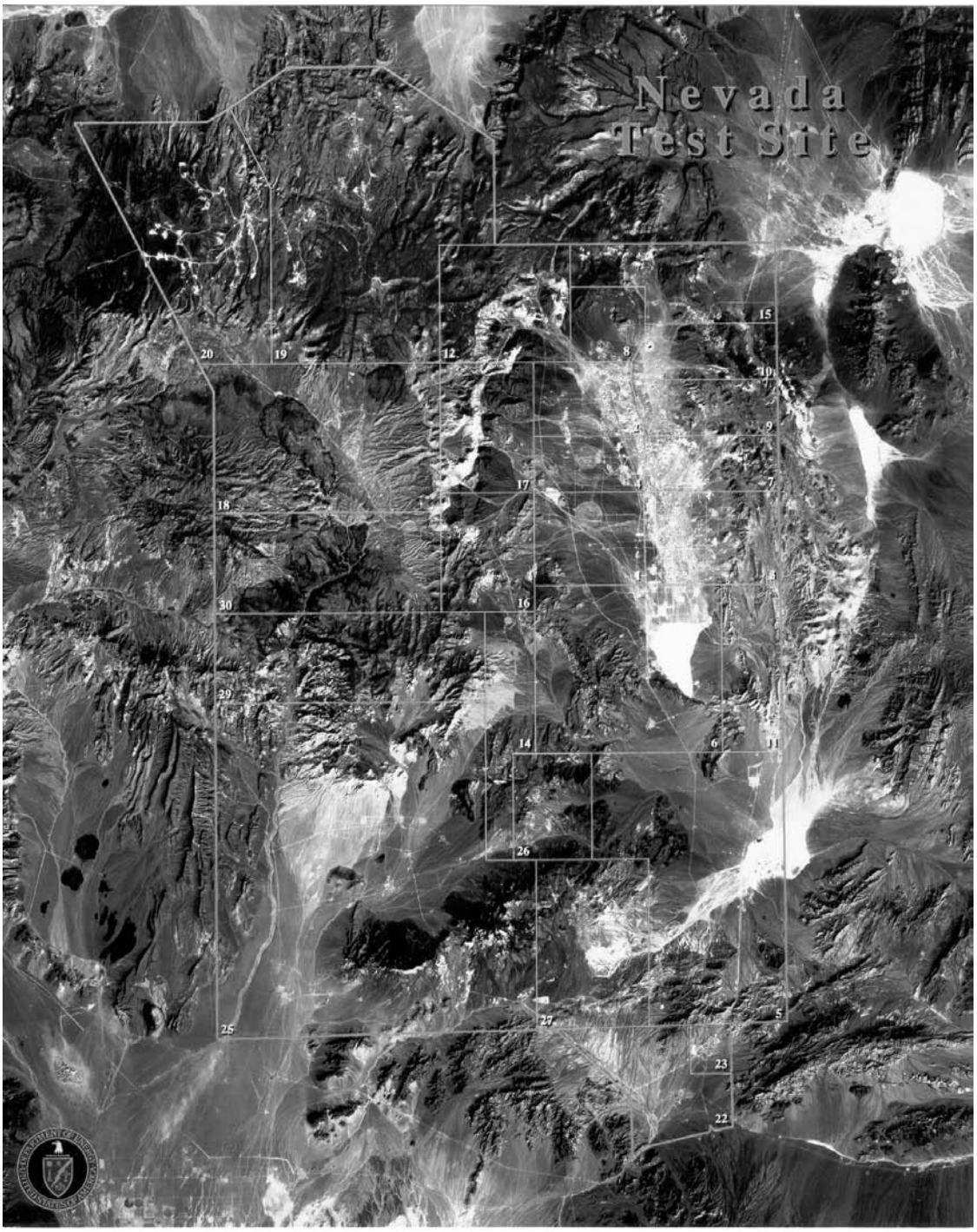


Fig. 51 Satellite view of the Nevada Test Site with Overlay of Testing Areas. Area 5 and the southern portion of Area 6 form Frenchman Flat. The dry lake featured in the northern section of Area 6 is Yucca Flat. The two valleys are separated by a ridgeline which acts as a natural dam. Yucca Flat includes this portion of Area 6, Areas 1-4 and Areas 7-11. To the northwest, Areas 12 and 18-20 encompass Rainier and Pahute Mesas respectively. Fortymile Canyon runs on the west side of Areas 29 and 30 into Jackass Flats at the center of Area 25. Yucca Mountain is the long ridgeline to the west. Skull Mountain is the volcanic peak at the lower middle of Area 25. Timber Mountain and the center of the caldera is at the intersection of Areas 18 and 30. Photo courtesy of the National Nuclear Security Administration/Nevada Site Office.

Fig. 52 The Fox Test 1951. Los Alamos scientists detonated Fox, the fifth test in the Ranger series, on February 6, 1951. Fox produced a yield of 22 KT, a yield slightly larger than that produced by the Trinity test and the bombs used on Hiroshima and Nagasaki, Japan. Photo courtesy of the National Nuclear Security Administration/Nevada Site Office.

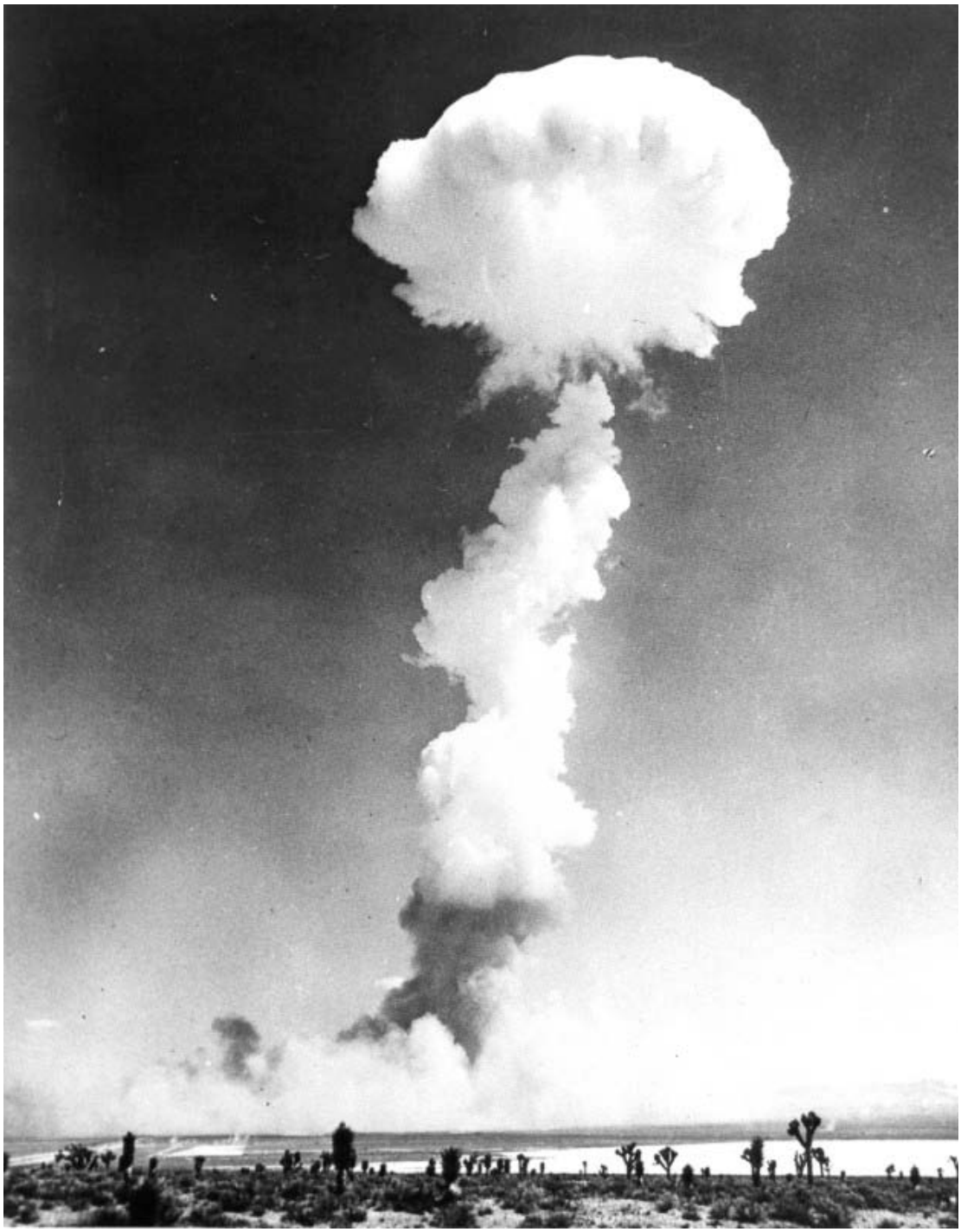
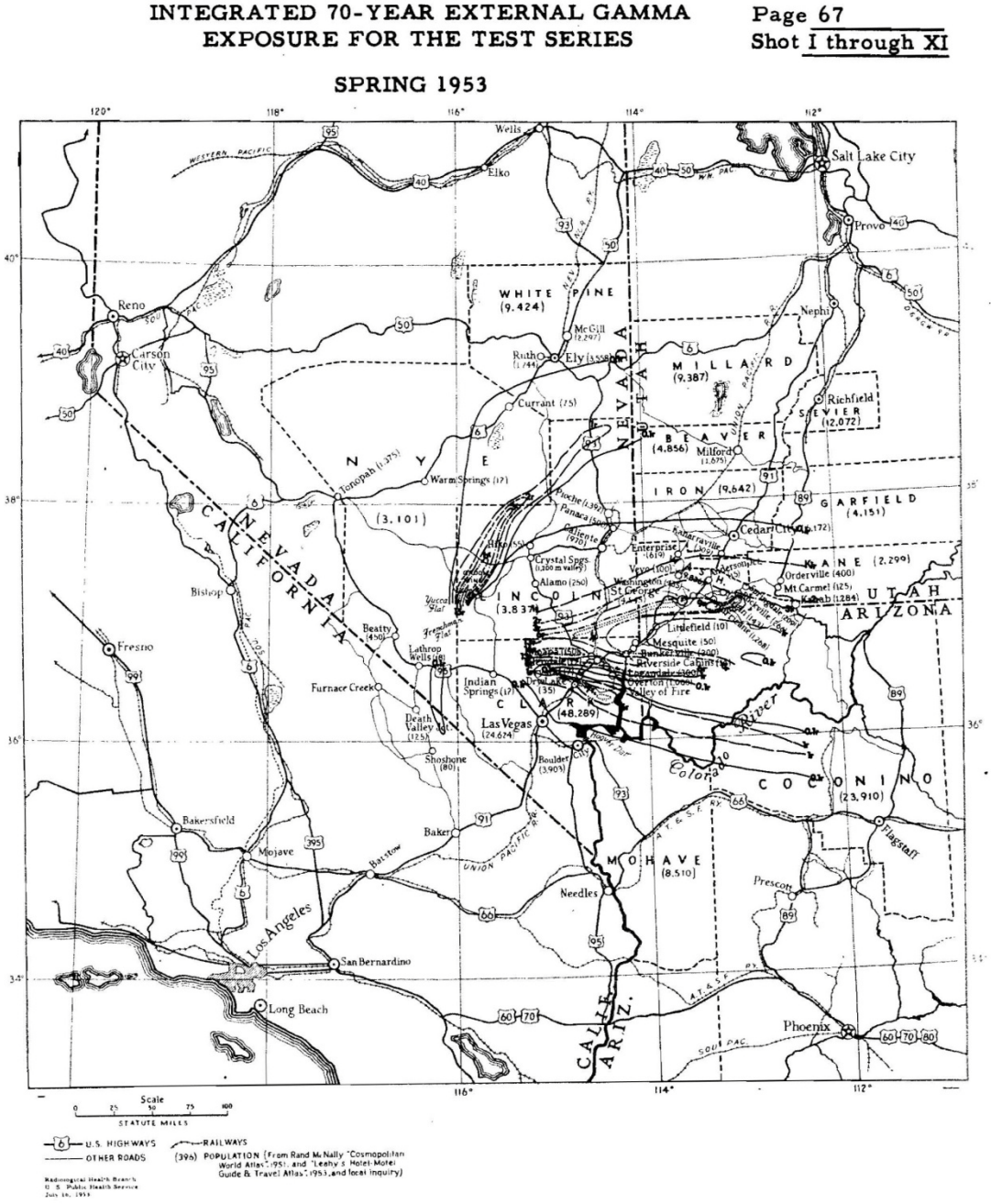


Fig. 53 The Charlie Test 1952. Los Alamos scientists detonated Charlie as part of the Tumbler-Snapper series on April 22, 1952. Unlike previous tests, hundreds of civilian observers witnessed Charlie, only the second test to reach 31 KT. Photo courtesy of the National Nuclear Security Administration/Nevada Site Office.

Fig. 54 The Harry Test 1953. The 32 kiloton Harry test on May 19, 1953, produced a problematic amount of radioactive fallout in the communities surrounding the test site, including Alamo and St. George. Photo courtesy of the National Nuclear Security Administration/Nevada Site Office.



Legend: Isodose lines in roentgens as indicated.

Fig. 55 Path of Radioactive Material During Upshot-Knothole. This map exhibits the combined fallout patterns from the Upshot-Knothole tests. The PHS produced this map as part of their "Report of Public Health Service Activities in the Off-Site Monitoring Program, Nevada Proving Ground – Spring 1953."

NTS NEWS

NEVADA TEST SITE MERCURY, NEVADA
Reynolds Electrical & Engineering Co., Inc.

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"Hottest Brand Going"

Fig. 56 Ken Case and the AEC Brand. This image is from the September 6, 1963 edition of the NTS News. Image from the Nevada Test Site Oral History Project collection.

Fig. 57 The View from Lookout Hill. The view from the lookout at Cherry Creek south towards the Nevada Test Site which lies just beyond the hills at center. Photograph by author.

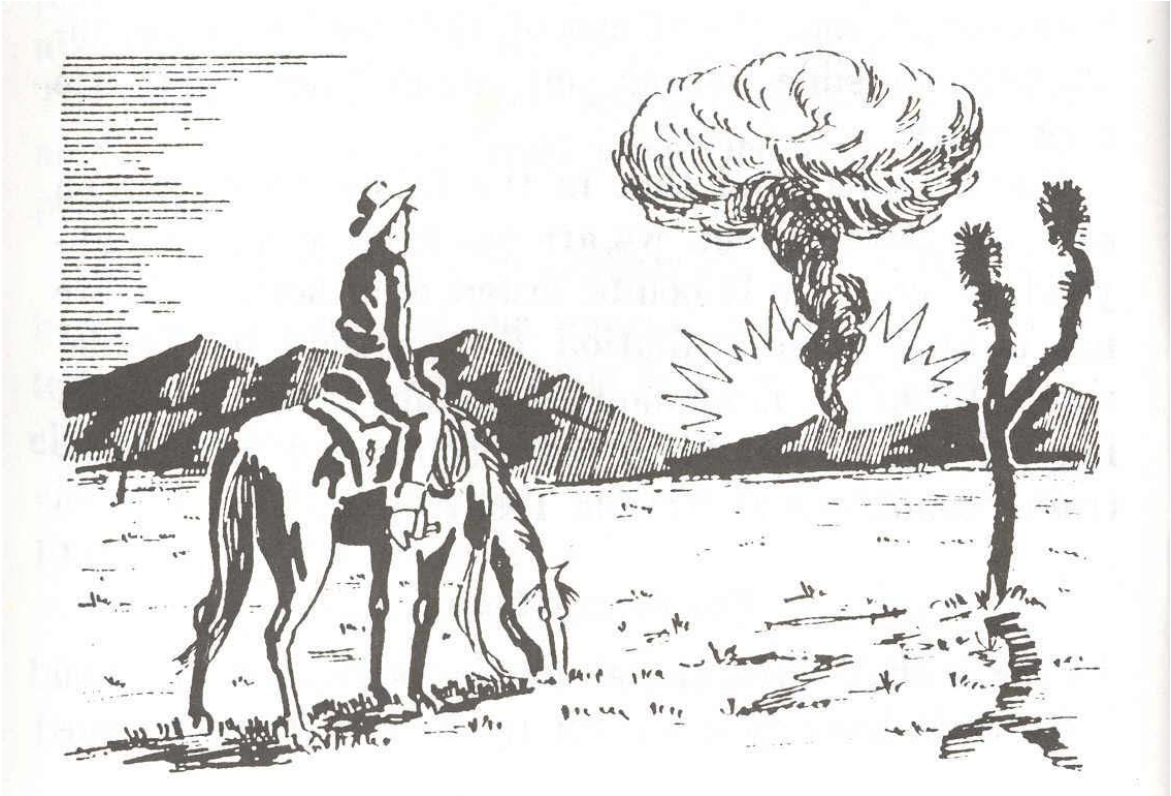

Fig. 58 The Mushroom Cloud on the Range. An illustration from the Atomic Test Effects in the Nevada Test Site Region, February 1955.

Notes

[1] Marion Clawson, *The Bureau of Land Management* (New York: Praeger Publishers, 1971), 19-23.
[2] Gerald D. Nash, *The American West Transformed: The Impact of the Second World War* (Lincoln: University of Nebraska Press, 1985), 17-36.
[3] The Army envisioned Wendover as a training area for B-17, B-24, and B-29 bombing crews. "Choosing of Utah Site for Bombing Range Said Blow to Local Chances," *Tonopah Daily Times and Bonanza*, April 4, 1940; "Utah Agrees to Land Exchange for Bombing Range," *Tonopah Daily Times and Bonanza*, April 5, 1940; "Desolation Pays for Utah," *Salt Lake Telegram*, April 8, 1940; "Air Corps May Expand Plans at Tonopah Field," *Tonopah Daily Times and Bonanza*, June 7, 1940; "Bomb Range Acquired Near Tonopah," *Reno Evening Gazette*, June 7, 1940; "Army Acquires Bombing Land," *Salt Lake Telegram*, June 7, 1940; "US Starts Action on Bombing Tract," *Salt Lake Tribune*, June 8, 1940; National Archive and Records Administration, "Executive Order 8578 on Withdrawal of Public Land for Use of the War Department as an Aerial Bombing and Gunnery Range; Nevada." *Federal Register* 5 (October 29, 1940); National Archives and Records Administration, "Executive Order 8579 on Withdrawal of Public Land for Use of the War Department as an Aerial Bombing and Gunnery Range; Utah." *Federal Register* 5 (October 29, 1940); "Tonopah Range is Official Name," *Tonopah Daily Times and Bonanza*, July 22, 1941; National Archive and Records Administration, "Executive Order 9053 on Withdrawal of Public Land for Use of the War Department as a Chemical Warfare Range; Utah." *Federal Register* 7 (February 6, 1942); "Comparison of Grazing District Acreages, Attachment 2: Miscellaneous Acreages of Withdrawn or Reserved Public Lands in Grazing Districts as of June 30, 1944," File Folder 468, Public Lands Foundation Archive, Phoenix, Arizona (hereafter Public Lands Foundation Archive); "Dugway Proving Ground History," Dugway Proving Ground, http://www.dugway.army.mil/index.php/; "Fact Sheet: Wendover Field," Hill Air Force Base, http://www.hill.af.mil/index.asp; "Factsheet: Nellis Air Force Base," Nellis Air Force Base, http://www.nellis.af.mil/index.asp.
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[5] "Choosing of Utah Site for Bombing Range Said Blow to Local Chances," *Tonopah Daily Times and Bonanza*, April 4, 1940; "McCarran Says Utah Bombing Range Site is Not Definite," *Tonopah Daily Times and Bonanza*, April 9, 1940; "Army Board Said Impressed by Nye Site for Bomb Range," *Tonopah Daily Times and Bonanza*, April 24, 1940; "Highway Department to Spend 4 Million in State in 1940," *Tonopah Daily Times and Bonanza*, April 15, 1940; "National Convention of U.S. Highway 6 May be Held Here," *Tonopah Daily Times and Bonanza*, April 29, 1940; "Tonopah Seen as Major Tourist Center of State," *Tonopah Daily Times and Bonanza*, May 3, 1940; "Bombing Gunnery Range Drive is Renewed by Group," *Tonopah Daily Times and Bonanza*, May 17, 1940; "Tonopah Township Population Set at 2449, County at 3562," *Tonopah Daily Times and Bonanza*, May 22, 1940; "Bombing Range Site Uncertain," *Tonopah Daily Times and Bonanza*, May 23, 1940; "Nye Bomb Range Said Approved by Army," *Reno Evening Gazette*, May 27, 1940; "Army Officers Select Local Bombing Site, Says McCarran," *Tonopah Daily Times and Bonanza*, May 27, 1940; "Southern Nye County Scenic Attraction Described Today," *Tonopah Daily Times and Bonanza*, June 3, 1940; "Air of Mystery Covers U.S. Action on West Bombing Range," *Tonopah Daily Times and Bonanza*, June 5, 1940; "War Department Says Nye Bomb Range Chosen," *Tonopah Daily Times and Bonanza*, June 6, 1940; "Air Corps May Expand Plans at Tonopah Field," *Tonopah Daily Times and Bonanza*, June 7, 1940; "Air Corps Chief Outlines Program for Bombing Range," *Tonopah Daily Times and Bonanza*, June 26, 1940; "$185,000 Airport Project Slated for Tonopah," *Tonopah Daily Times and Bonanza*, August 21, 1940; "No Conflict Seen for Air Corps on West Bomb Range," *Tonopah Daily Times and Bonanza*, August 23, 1940; "A Concise History of Nellis Air Force Base, Nevada" (Office of History, Headquarters, Air Warfare Center, March 15, 1997), 9-12; "McCarran Seeks Early Activity on Bombing Range," *Tonopah Daily Times and Bonanza*, February 6, 1941; "Bombing Range Funds Set Aside," *Tonopah Daily Times and Bonanza*, March 15, 1941; .

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[14] "Senators to Hold Land Hearing Here," *Tonopah Daily Times and Bonanza*, October 21, 1942; "Bomb Range Land Hearing Concluded," *Tonopah Daily Times and Bonanza*, October 29, 1942; Senate Committee on Interior and Insular Affairs, *Administration and Use of Public Lands: Hearings on S. 241*, 77th Cong., 2nd sess., October 28 and November 19-20, 1942, 1767-1776, 1820-1822.
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[16] Senate Committee on Interior and Insular Affairs, *Administration and Use of Public Lands: Hearings on S. 241*, 77th Cong., 2nd sess., October 28 and November 19-20, 1942, 1808-1810, 1826-1831.
[17] "Crews Survey Bombing Range," *Nevada State Journal*, September 26, 1941; Senate Committee on Interior and Insular Affairs, *Administration and Use of Public Lands: Hearings on S. 241*, 77th Cong., 2nd sess., October 28 and November 19-20, 1942, 1826-1835; NV0079087, Lease Between Willard Cattle Company and United States of America, April 18, 1949, Nevada Nuclear Testing Archive, Las Vegas, Nevada (hereafter Nevada Nuclear Testing Archive).
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[19] "Danger of 'Duds' on Range of Army's Bombers is Emphasized," *Bakersfield Californian*, September 3, 1937; "More Bomb Land at Muroc Asked," *Bakersfield Californian*, April 13, 1939; "Residents Assert They are Terrorized by Army Airplanes," *Bakersfield Californian*, April 17, 1939; "Plight of Muroc Citizens," *Bakersfield Californian*, April 18, 1939; "Measure Passed at Request of Army," *Bakersfield Californian*, October 20, 1941 Senate Committee on Interior and Insular Affairs, *Administration and Use of Public Lands: Hearings on S. 241*, 77th Cong., 2nd sess., October 28 and November 19-20, 1942, 1831; "Military Uses Public Lands," *Reno Evening Gazette*, December 24, 1942.
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[21] The seven grazing districts in New Mexico included the Southeast, Southwest, South Central, White Sands, Northwest, Taos, and Navajo districts now called the Carlsbad, Las Cruces, Socorro and Roswell, Rio Puerco, Taos, and Farmington districts. "Stockmen Prepare for Operation of New Grazing Setup," *Gallup Independent and Evening Herald*, January 19, 1935; "New Grazing District Near Navajo Reservation," *Albuquerque Journal*, September 13, 1939; "Last of Open Range in Grazing District," *Albuquerque Journal*, September 14, 1939; "Stock to be Moved from Bombing Range," *Gallup Independent*, October 28, 1941; "Higher Price Seen on Bombing Range," *Albuquerque Journal*, December 7, 1941; "Ranchers Move Livestock from Bombing Range," *Albuquerque Journal*, February 12, 1942; "Rodgers Seeks to Aid Stockmen," *Albuquerque Journal*, April 18, 1942; "Hatch Seeks Aid for Holders of Grazing Permits," *Clovis News Journal*, June 19, 1942; "Back Plans to Pay for Rights," *Gallup Independent*, June 19, 1942; "Rodgers Decries Range Seizure," *Albuquerque Journal*, June 19, 1942; Ryan H. Edgington, "Lines in the Sand: An Environmental History of Cold War New Mexico," (Doctoral Dissertation, Temple University, August 2008), xxvii, 8, 11-12,.33-36.
[22] "Grazing Region to be Protected," *Nevada State Journal*, September 23, 1941;"Grazing Lands Taken for Army," *Reno Evening* Gazette, December 30, 1943; Senate Committee on Interior and Insular Affairs,

Administration and Use of Public Lands: Hearings on S. 241, 78th Cong., 1st sess., September 7-9, 1943, 3298-3304.

[23] New Mexico ranchers pressed for compensation for the loss of their property to the military throughout the next several decades. In 1982, David McDonald and other livestock operator's property still hoped the military would compensate them for their property. "Bars CC, Press at Hearing on Range Protest," *Las Cruces Sun-News*, April 20, 1945; "Ranchers Protest Army Bombing Range," *Gallup Independent*, April 21, 1945; "Ranchmen Hit by Bomb Range Suit Prepare to Appeal," *Las Cruces Sun-News*, April 22, 1945; "Valley C. of C. Opposes Organ Rocket Range," *Las Cruces Sun-News*, April 26, 1945; Senate Committee on Interior and Insular Affairs, *Administration and Use of Public Lands: Hearings on S. 241*, 79th Cong., 1st sess., May 14-15, 1945, 5216-5238; "Ranchers Vacate for Army's New Rocket Range," *Las Cruces Sun-News*, June 10, 1945; "L.C. Firm Given Water Contract, Plan Barracks," *Las Cruces Sun-News*, July 1, 1945; R.R. Hinkle to Howard Cannon, Letter, May 4, 1959, Howard Cannon Papers, 86th Congress, Box 1, Folder 28, Special Collections, University of Nevada, Las Vegas, Nevada (hereafter Special Collections UNLV); Barton C. Hacker, *Elements of Controversy: The Atomic Energy Commission and Radiation Safety in Nuclear Weapons Testing, 1947-1974* (Berkeley: University of California Press, 1994), 3-4; Edgington, "Lines in the Sand," 37-81.

[24] "Ranchers Protest Use of Land for Bombs," *Oakland Tribune*, September 25, 1941; Senate Committee on Interior and Insular Affairs, *Administration and Use of Public Lands: Hearings on S. 241*, 77th Cong., 1st sess., November 25-26, 28 and December 1-2, 1941, 1666-1674; "Grazing Permit Payments are sought in Bill," *Tucson Daily Citizen*, June 19, 1942; "Home on the Range—But a Bombing Range," *Reno Evening Gazette*, January 3, 1945.

[25] "Tonopah Bombing Land Suit is Drawn," *Reno Evening Gazette*, August 25, 1941; "Grazing Region to be Protected," *Nevada State Journal*, September 23, 1941; "TAAF to Be Reduced Temporary Inactive Status by War Dept.," *Tonopah Times-Bonanza*, August 24, 1945; "Fate of TAAF Not Definitely Decided," *Tonopah Times-Bonanza*, August 31, 1945; "Fate of TAAF Not Yet Determined," *Tonopah Times-Bonanza*, September 7, 1945; "Status TAAF Unchanged," *Tonopah Times-Bonanza*, September 14, 1945; "Hammer Field to Use Tonopah Army Air Field as Sub-Base," *Tonopah Times-Bonanza*, September 28, 1945; "Miners Advised to Keep Off Lands in Local Bombing Range," *Tonopah Times-Bonanza*, September 28, 1945.

[26] "War Department Asks Retention of Tonopah Air Field," *Tonopah Times-Bonanza*, October 19, 1945; "Future TAAF Still Rests with War Officials," *Tonopah Times-Bonanza*, October 26, 1945; "TAAF Largest Base Acreage in United States," *Tonopah Times-Bonanza*, November 9, 1945; "McCarran in Talk Here Tells of Outlook for Silver, Believes Tonopah Air Base Will Be Retained by War Department," *Tonopah Times-Bonanza*, November 16, 1945; "U.S. Continues Suit for Land," *Reno Evening Gazette*, December 30, 1946; "Fact Sheet: Wendover Field," Hill Air Force Base, http://www.hill.af.mil/index.asp.

[27] The relationship between the Tonopah range and the Las Vegas range was a close one from inception. The military utilized the Las Vegas base as a training facility and devoted the more remote Tonopah range to bombing practice. After the war, the Tonopah facilities became less active and the military transferred administrative personnel to Las Vegas. "Construction Work at Airport Starts Shortly," *Tonopah Daily Times and Bonanza*, August 1, 1941; "Tonopah Base Still on Unactive List," *Tonopah Times-Bonanza*, January 19, 1951; "Factsheet: Nellis Air Force Base," Nellis Air Force Base, http://www.nellis.af.mil/index.asp.

[28] According to A. Constandina Titus, the Gallup polls conducted during the postwar era indicated that most Americans feared a full-scale nuclear war with the Soviet Union, advocated the development of larger atomic weapons to deter that war and thus favored continued continental weapons testing, and did not express much concern over radiation exposure or its effects. "Public Favors Peacetime Army Larger than Pre-War Strength," *Nevada State Journal*, December 2, 1945; A. Constandina Titus, *Bombs in the Backyard: Atomic Testing and American Politics* (Reno: University of Nevada Press, 1986), 86.

[29] President Truman and a fairly cooperative Congress were already working towards establishing a national program to continue to develop and utilize atomic power for both military and civilian purposes. At the same time, President Truman had to navigate an extremely volatile international situation with the Soviet Union and the rest of the nations which now lacked access to a fundamentally powerful technology. Hacker, *Elements of Controversy*, 11; "Congress will Rush Truman's Plan for Commission to Study Use, Development of Atomic Power, Secret," *Nevada State Journal*, October 5, 1945; Titus, *Bombs in the Backyard*, 22.

[30] In late 1946, Congress authorized four oversight bodies to handle the nation's new nuclear industry: the Atomic Energy Commission (AEC) comprised of five civilians to manage research, production, and application of atomic energy; the General Advisory Committee comprised of nine atomic scientists to advise the commission, many of whom worked for Los Alamos Scientific Laboratory, the builders of the first bomb; the Joint Committee on Atomic Energy comprised of nine members of each house of Congress to handle legislative matters; and the Military Liaison Committee to oversee the weaponization of atomic technology. Terrence R. Fehner and F.G. Gosling, *Atmospheric Nuclear Weapons Testing, 1951-1963* (Washington, DC: United States Department of Energy, September 2006), 30; Titus, *Bombs in the Backyard*, 27-28.
[31] *Atomic Energy Act of 1946*, Public Law 79-585, August 1, 1946; Titus, *Bombs in the Backyard*, 26-28.
[32] Fehner and Gosling, *Atmospheric Nuclear Weapons Testing*, 30-34; Hacker, *Elements of Controversy*, 14-35; Titus, *Bombs in the Backyard*, 26.
[33] Fehner and Gosling, *Atmospheric Nuclear Weapons Testing*, 38-39; Department of Energy, *United States Nuclear Tests July 1945 Through September 1992* (Las Vegas: Nevada Operations Office, December 2000), xiii, 4; Hacker, *Elements of Controversy*, 36-40; Titus, *Bombs in the Backyard*, 30.
[34] NV0079087, Lease Between Willard Cattle Company and United States of America, April 18, 1949, Nevada Nuclear Testing Archive; NV0028599, Sumner T. Pike to Robert LeBaron, Letter March 8, 1949, Nevada Nuclear Testing Archive; Fehner and Gosling, *Atmospheric Nuclear Weapons Testing*, 35-36; Hacker, *Elements of Controversy*, 40.
[35] NV0079005, David Lilienthal to Robert LeBaron, Memorandum, September 24, 1948, Nevada Nuclear Testing Archive.
[36] At a meeting of key scientists at Los Alamos in August which included Enrico Fermi, Alvin Graves, William Ogle, and Edward Teller, discussed the primary obstacle in establishing a continental test site, the impact of radioactive fallout on populations surrounding the testing location. When the AEC investigated several possible places in the American West, the White Sands bombing range in New Mexico, the Dugway range in Utah, and Tonopah range in Nevada, their calculations of the hazard factor at each site made their decision clear. NV0411323, Howard B. Hutchinson, Project Nutmeg Report, 1947, Nevada Nuclear Testing Archive; NV0030434, "Discussion of Radiological Hazards Associated with a Continental Test Site for Atomic Bombs," Los Alamos Scientific Laboratory, September 1, 1950, Nevada Nuclear Testing Archive; Fehner and Gosling, *Atmospheric Nuclear Weapons Testing*, 36-37
[37] The equation used was surprisingly simple: where $H = \sum \underline{p(r_i)}/(r_i)^2$ and $p(r_i)$ is the population at distance r_i from ground zero. NV0030434, "Discussion of Radiological Hazards Associated with a Continental Test Site for Atomic Bombs," Los Alamos Scientific Laboratory, September 1, 1950, Nevada Nulcear Testing Archive.
[38] NV0030434, "Discussion of Radiological Hazards Associated with a Continental Test Site for Atomic Bombs," Los Alamos Scientific Laboratory, September 1, 1950, Nevada Nulcear Testing Archive; NV0028596, "Desirability of an Area in the Las Vegas Bombing Range to be Used as a Continental Proving Ground for Atomic Weapons," November 22, 1950, Nevada Nuclear Testing Archive; Ryan Edgington, "Fragmented Histories: Science, Environment and Monument Building at the Trinity Site, 1945-1995," in Chris Pearson, Peter Coates, and Tim Cole, editors, *Militarized Landscapes: From Gettysburg to Salisbury Plain* (New York: Continuum, 2010), 192-197.
[39] NV0030434, "Discussion of Radiological Hazards Associated with a Continental Test Site for Atomic Bombs," Los Alamos Scientific Laboratory, September 1, 1950, Nevada Nuclear Testing Archive; NV0028596, "Desirability of an Area in the Las Vegas Bombing Range to be Used as a Continental Proving Ground for Atomic Weapons," November 22, 1950, Nevada Nuclear Testing Archive.
[40] The one percent probability reflected the likelihood of unpredicted rain. At most, Fermi thought, only one percent of the area would be rained on if that occurred. NV0030434, "Discussion of Radiological Hazards Associated with a Continental Test Site for Atomic Bombs," Los Alamos Scientific Laboratory, September 1, 1950, Nevada Nuclear Testing Archive; NV0028596, "Desirability of an Area in the Las Vegas Bombing Range to be Used as a Continental Proving Ground for Atomic Weapons," November 22, 1950, Nevada Nuclear Testing Archive.
[41] NV0028596, "Desirability of an Area in the Las Vegas Bombing Range to be Used as a Continental Proving Ground for Atomic Weapons," November 22, 1950, Nevada Nuclear Testing Archive; NV0020595, Carroll Tyler to James McCormack, Memorandum, December 1, 1950, Nevada Nuclear Testing Archive; NV0102225, Marion W. Boyer to Frederick J. Lawton, Letter, June 14, 1951; Fehner and

Gosling, *Atmospheric Nuclear Weapons Testing*, 38-44; Mary Palevsky, *Atomic Fragments: A Daughter's Questions* (Berkeley: University of California Press, 2000), 113; Hacker, *Elements of Controversy*, 40-43..

[42] The AEC conducted 23 tests on Frenchman Flat, the dry lake bed designated areas 5 and 6. "Atomic Blast Shakes Las Vegas Fifty Miles Away," *New York Times*, January 28, 1951; Gladwin Hill, "Flash Seen in Four States," *New York Times*, January 28, 1951; Gladwin Hill, "2D Atomic Blast in 24 Hours Jolts Wide Nevada Area," *New York Times*, January 29, 1951; Gladwin Hill, "3D Atom Test Lights Nevada Dawn; Peaks Stand Out in Weird Glare," *New York Times*, February 2, 1951; Department of Energy, *United States Nuclear Tests*, xvii-xviii; Fehner and Gosling, *Atmospheric Nuclear Weapons Testing*, 45-46, 58-65; Richard Miller, *Under the Cloud: The Decades of Nuclear Testing* (New York: The Free Press, 1986), 83-106; Hacker, *Elements of Controversy*, 48-53.

[43] The AEC made a concerted effort to allow Nevada Governor Charles Russell access to information about the tests which was not distributed to the general public. Charles Russell's assistant Chester Smith and Shelby Thompson and Robert Tumbleson of the AEC's Public Information Service had a close relationship which included time at the roulette tables in Reno and Carson City. Chester Smith to Robert Tumbleson, Letter, January 22, 1951, Charles Russell Papers, Box 174, Folder 1, Nevada State Archives, Carson City, Nevada (hereafter Nevada State Archives); Shelby Thompson to Chester Smith, Letter, January 22, 1951, Charles Russell Papers, Box 174, Folder 1, Nevada State Archives; Chester Smith to Shelby Thompson, Letter, January 25, 1952, Charles Russell Papers, Box 174, Folder 1, Nevada State Archives; Fehner and Gosling, *Atmospheric Nuclear Weapons Testing*, 46-58; Hacker, *Elements of Controversy*, 44-48.

[44] Jeannette and Walter Theile to Charles H. Russell, Letter, January 27, 1951, Charles Russell Papers, Box 174, Folder 1, Nevada State Archives; Chester Smith to Shelby Thompson, Letter, January 31, 1951, Charles Russell Papers, Box 174, Folder 1, Nevada State Archives.

[45] "Vegas Calm Under 'Bombs'," *Nevada State Journal*, January 30, 1951; Gladwin Hill, "3D Atom Test Lights Nevada Dawn; Peaks Stand out in Weird Glare," *New York Times*, February 2, 1951; Robert K. Plumb, "Increased Radiation Levels Found in East; Laid to Atom Tests, Held Harmless," *New York Times*, February 3, 1951; "Gen. Collins Looks for Atomic Shells," *New York Times*, February 6, 1951; "Great Blast Ends Atom Test Series," *New York Times*, February 7, 1951; Fehner and Gosling, *Atmospheric Nuclear Weapons Testing*, 64-65; Hacker, *Elements of Controversy*, 50-53.

[46] NV0122310, Thomas L. Shipman to Francis M. Pottenger, Letter, May 5, 1951, Nevada Nuclear Testing Archive; NV0122311, Thomas L. Shipman to Officer-In-Charge, Station Hospital, Mather Air Force Base, Letter, March 9, 1951, Nevada Nuclear Testing Archive; NV0122312, "A-Radiated Rain Shower Burns 2," March 4, 1951, Nevada Nuclear Testing Archive.

[47] "A Kind of Flash," *Time Magazine*, February 5, 1951.

[48] Between July and October 1951, Gordon Dean, Chairman of the Atomic Energy Commission, and Oscar L. Chapman, Secretary of the Interior, worked to reserve the test site for the purposes of atomic testing which required a specific land withdrawal. Until the reservation was officially made, the AEC leased the land from the Air Force. According to the arrangement with Interior, the AEC would have to extinguish the existing mineral and grazing rights at a cost of nearly half a million dollars unless those rights were no longer valid. "Atomic Test Blast Shakes Las Vegas, Fifty Miles Away," *New York Times*, January 28, 1951; NV0072850, J. Keith Glermean to Brien McMahon, Letter, July 3, 1951, Nevada Nuclear Testing Archive; James McCormack to Roscoe C. Wilson, Letter, July 8, 1951, Nevada Nuclear Testing Archive; "Average Citizen Still Endorses All-Out Defense," *Nevada State Journal*, August 8, 1951; NV0072845 and NV0072848, Gordon Dean to Oscar Chapman, Letter, October 25, 1951, Nevada Nuclear Testing Archive; NV0072846 and NV0072847, Sumner T. Pike to Oscar Chapman, Letter, November 2, 1951, Nevada Nuclear Testing Archive; Carroll L. Tyler to Charles H. Russell, Letter, March 13, 1951, Charles Russell Papers, Box 174, Folder 1, Nevada State Archives; Charles H. Russell to Carroll L. Tyler, Letter, March 17, 1951, Charles Russell Papers, Box 174, Folder 5, Nevada State Archives; "More Atomic Tests Planned," *Reno Evening Gazette*, March 16, 1951.

[49] The AEC conducted 744 out of 928 nuclear tests at Yucca Flat, which officially includes Areas 1-4 and 7-11. The Los Alamos group J-Division, responsible for conducting the atomic tests in Nevada, agreed that only a zero concentration of radioactive particles was harmless. But since a zero concentration could not be guaranteed, ideal tests would produce small radioactive particles which would remain suspended indefinitely or until they were eventually disbursed widely and rained out in smaller quantities. NV006273, Alvin C. Graves and Gaelen Felt, "More Atomic Tests Planned," *Reno Evening Gazette*, March 16, 1951; "Jangle Fallout Problems," June 28, 1951; "New Atomic Tests Slated in Nevada," *New York Times*, August

29, 1951; Hanson W. Baldwin, "The Nevada Atom Tests," *New York Times*, September 21, 1951; "Secrecy to Blanket Coming Atom Games," *New York Times*, October 4, 1951; "New Atomic Tests Near," *New York Times*, October 9, 1951; "Little A-Bombs," *New York Times*, October 14, 1951; Department of Energy, *United States Nuclear Tests*, xvii-xviii, 6-7; Fehner and Gosling, *Atmospheric Nuclear Weapons Testing*, 66-72.

[50] NV0072850, J. Keith Glermean to Senator Brien McMahon, Letter, June 3, 1951, Nevada Nuclear Testing Archive; NV0102225, Marion W. Boyer to Frederick J. Lawton, Letter, June 14, 1951, Nevada Nuclear Testing Archive; NV0062743, Alvin C. Graves and Gaelen Felt, "Jangle Fallout Problems," June 28, 1951, Nevada Nuclear Testing Archive; "New Atomic Tests Slated in Nevada," *New York Times*, August 29, 1951; "5000 U.S. Fighting Men in Nevada for Instruction in Atomic Warfare," *Reno Evening Gazette*, September 18, 1951; Hanson W. Baldwin, "The Nevada Atom Tests," *New York Times*, September 21, 1951; "Secrecy to Blanket Coming Atom Games," *New York Times*, October 4, 1951; "New Atomic Tests Near," *New York Times*, October 9, 1951; "Little A-Bombs," *New York Times*, October 14, 1951; "Atomic Arms Set for G.I.'s in Nevada," *New York Times*, October 15, 1951; "Troops Arriving for Atomic Tests in Nevada," *New York Times*, October 17, 1951; Gladwin Hill, "Tactical Bomb Test 'Secrets' Open to Thousands but Not to Newsmen," *New York Times*, October 18, 1951; "Desert Atom Test will Use Animals," *New York Times*, October 19, 1951; "U.S. Touches Off Tiny Atom Charge," *Nevada State Journal*, October 23, 1951; "Desert Officials Report Only Flicker of Light—Officials Satisfied," *New York Times*, October 23, 1951; "The Nevada Atomic Tests," *New York Times*, October 28, 1951; Robert Bennyhoff, "A-Bomb Explodes; Tests Near Climax," *Nevada State Journal*, October 30, 1951; "Atom Observers Gather," *New York Times*, October 30, 1951; "Scientists Study Dual Action Blast," *Reno Evening Gazette*, October 31, 1951; Robert Bennyhoff, "First Atomic Combat Maneuvers Set to Go," *Nevada State Journal*, November 1, 1951; Gladwin Hill, "Huge Blast Marks First Atom Games Involving Troops," *New York Times*, November 2, 1951; "Evaluation of Blast –Effects Year-Long Job at Test Site," *Nevada State Journal*, November 2, 1951; "New Atomic Tests to Sift Bomb's Effect on Weapons," *New York Times*, November 3, 1951; Bill Becker, "Assorted Bombs Included in U.S. War Kit," *Reno Evening Gazette*, November 6, 1951; "Mighty Blast Ends Atom Test Series," *New York Times*, November 6, 1951; "Las Vegas Feels Blast," *New York Times*, November 14, 1951; "New Atom Tests Started in Nevada," *New York Times*, November 20, 1951; "Top Army Leaders Watch Atomic Test," *New York Times*, November 30, 1951; Fehner and Gosling, *Atmospheric Nuclear Weapons Testing*, 66-72; Miller, *Under the Cloud*, 119-134; Hacker, *Elements of Controversy*, 60-72.

[51] "New Atomic Tests Slated in Nevada," *New York Times*, August 29, 1951; NV0122308, Las Vegas Field Office, Press Release, October 5, 1951, Nevada Nuclear Testing Archive; "Radiation Detected on Coast," *New York Times*, November 1, 1951; "Radioactivity in Upstate Snow," *New York Times*, November 3, 1951; Bill Becker, "Assorted Bombs Included in U.S. War Kit," *Reno Evening Gazette*, November 6, 1951.

[52] Mary Palevsky, Interview with Leisl Carr Childers, October 6, 2010; NV0102225, Marion W. Boyer to Frederick J. Lawton, Letter, June 14, 1951, Nevada Nuclear Testing Archive; NV0072848, Gordon Dean to Oscar L. Chapman, Letter, October 25, 1951, Nevada Nuclear Testing Archive; NV0072847, Sumner T. Pike to Oscar L. Chapman, November 2, 1951, Nevada Nuclear Testing Archive; "Atom Chief Confirms Nevada Tests 'Vital'," *Reno Evening Gazette*, December 11, 1951; "Nevada A-Bomb Tests Produce 'Vital" Data," *Nevada State Journal*, December 12, 1951; Excerpts from Remarks by Carroll L. Tyler in Meeting with the Press at Las Vegas, March 31, 1952, Charles Russell Papers, Box 175, Folder 2, Nevada State Archives; Hacker, *Elements of Controversy*, 53, 71-72.

[53] "Home on the Range—But a Bombing Range," *Reno Evening Gazette*, January 3, 1945; "G.I. Cowboys Herd Cattle on Bombing Range," *Reno Evening Gazette*, May 25, 1945; "More Atom Blast Tests Indicated," *Nevada State Journal*, March 1, 1951; "Evaluation of Blast –Effects Year-Long Job at Test Site," *Nevada State Journal*, November 2, 1951; "A-Bomb Test Claims Processed," *Reno Evening Gazette*, May 8, 1951; NV0072849, James McCormack to Roscoe C. Wilson, Letter, July 9, 1951, Nevada Nuclear Testing Archive; "Damage Claims in Bomb Tests are Summarized," *Reno Evening Gazette*, November 30, 1951.

[54] After the Ranger series, the Dr. Shields Warren, a contractor with the AEC's Division of Biology and Medicine, the agency responsible for early monitoring programs, determined that "because of the Film Industry problem, as well as other potential problems," it was necessary to "have data on fall-out from the [radioactive] cloud at least to the Atlantic Ocean." NV0028510, Shields Warren to James McCormack, Memorandum, July 17, 1951, Nevada Nuclear Testing Archive; "Radiation Detected on Coast," *New York*

Times, November 1, 1951; "Radioactivity in Upstate Snow," *New York Times*, November 3, 1951; NV0001579 and NV0105396, Merril Eisenbud to Julian Webb, Letter, July 22, 1952, Nevada Nuclear Testing Archive; Miller, *Under the Cloud*, 90-91; Hacker, *Elements of Controversy*, 72.

[55] NV0000635, Stafford L. Warren to Fred A. Bryan, Letter, November 23, 1951, Nevada Nuclear Testing Archive; "Corn Freaks Grow From Atomic Tests," *New York Times*, December 16, 1951; "Atom Bomb Tests Verify UCLA Research Finds," *Los Angeles Times*, March 2, 1952. By the end of the Tumbler-Snapper test series in summer of 1952, the AEC had a long-term contract with Kermit Larson and the University of California, Los Angeles, the same group which had studied the Trinity Site, to conduct a fallout research project in conjunction with the AEC's Division of Biology and Medicine and Los Alamos's Radiation Safety (Rad-Safe) program for offsite monitoring. NV0001150, Walter D. Claus to Alvin Graves, Letter, August 1, 1952, Nevada Nuclear Testing Archives; Ferenc M. Szasz, "The Impact of World War II on the Land: Gruinard Island, Scotland, and Trinity Site, New Mexico, as Case Studies," *Environmental History* 19 (Winter 1995); 15-30.

[56] While the damage to the Great Basin and its residents during the nation's active nuclear testing program, especially during the atmospheric testing period, was extensive, it paled in comparison to that suffered by the Japanese in Hiroshima and Nagasaki, and by the Marshallese in the Pacific. For detailed personal accounts from scientists who witnessed and studied the damage to both groups see the oral histories with James Yamazaki and Roger Ray in the Nevada Test Site Oral History Project archive at http://digital.library.unlv.edu/ntsohp/. Titus, *Bombs in the Backyard*, 36-54.

[57] Floyd Lamb was the Lincoln County Commissioner from the Alamo area and was only one of five comprising the county commission. The letter Floyd Lamb wrote to the AEC, dated October 15, 1951, was not itself available, but was summarized in Milton Rex's note to his files. NV0033000 and NV0079110, Milton A. Rex to Files, "Letter from Floyd Lamb," October 18, 1951, Nevada Nuclear Testing Archive. NV0079087, Lease Between Willard Cattle Company and United States of America, April 18, 1949, Nevada Nuclear Testing Archive.

[58] NV0033000 and NV0079110, Milton A. Rex to Files, "Letter from Floyd Lamb," October 18, 1951, Nevada Nuclear Testing Archive.

[59] Carroll L. Tyler, the manager of the AEC's Santa Fe Operations office and the test director for the Buster-Jangle series, sent a brief but concerned teletypewriter exchange message to John C. Burgher, director of the AEC's Division of Biology and Medicine, which read "Floyd Lamb a rancher at Alamo Nevada has reported to field manager that about forty cattle have developed skin sores particularly on legs and are losing hair. He attributes to test activities. Claim has not been made but we feel investigation should be made to determine if tests activities are responsible. Has been advised to have private veterinary look at cattle. Request advice of your office as to possibility that these symptoms result from radioactive poisoning, and any suggestions as to course investigation should follow." NV0120811, Carroll L. Tyler to John C. Burgher, TWX, January 31, 1952, Nevada Nuclear Testing Archive.

[60] The name change from test site to Nevada Proving Ground, according to the AEC, conformed with the federal government's standard terminology for similar installations where military technologies, especially weapons were tested such as at the Dugway Proving Ground in Utah. "Fact Sheet on Nevada Proving Ground," March 31, 1952, Charles Russell Papers, Box 175, Folder 2, Nevada State Archives.

[61] It is worth noting that the Camp Desert Rock exercises, eight total, exposed more than a quarter of a million troops to radioactive fallout. For more information on the experiences of these individuals, see the Atomic Veterans. Hacker, *Elements of Controversy*, 70.

[62] NV0070298, Kenneth E. Fields to Carroll L. Tyler, Letter, February 27, 1952, Nevada Nuclear Testing Archive; Press Release, circa March 1952, Charles Russell Papers, Box 175, Folder 2, Nevada State Archives; Hacker, *Elements of Controversy*, 74.

[63] Previously, most press personnel and curious civilians sought views of the test site high on the overlook road that wound across the ridge separating Kyle Canyon from Lee Canyon, the two major watersheds to the east of Mount Charleston. Hacker, *Elements of Controversy*, 77-78.

[64] Gene Sherman, "Atomic Gains Told as New Test Nears," *Los Angeles Times*, April 1, 1952; Gene Sherman, "GIs Four Miles from Biggest A-Bomb Blast," *Los Angeles Times*, April 23, 1952; "Mushroom Clearly Seen at Mt. Wilson," *Los Angeles Times*, April 23, 1952; "Viewing the Atom Explosions," *New York Times*, April 27, 1952; Walter Millis, "Public Peek at A-Bomb Desired in Nevada Blast," *Los Angeles Times*, May 2, 1952; Gene Sherman, "Every Atom Blast Signifies a Tremendous Scientific Labor," *Los Angeles Times*, May 4, 1952; Miller, *Under the Cloud*, 137-156.

[65] NV0122307, Draft Press Release, May 8, 1952, Nevada Nuclear Testing Archive.
[66] "Atomic Bomb Lights Desert," *Reno Evening Gazette*, May 7, 1952; Robert Bennyhoff, "Atom Blast Brightest Ever Fired in Nevada," *Nevada State Journal*, May 8, 1952; "Mine Camp, Population 11, Evacuated for A-Bomb Test," *Nevada State Journal*, May 18, 1952; NV0018081, William R. Kennedy to Jerome Dummer, Memorandum, April 26, 1882, Nevada Nuclear Testing Archive. This document contains photocopies of radiation monitor Thomas N. White's notebook.
[67] For more on Daniel Sheahan, see note 107. NV0015574, Dan Sheahan to Seth Woodruff, Letter with Attachments, April 6, 1953, Nevada Nuclear Testing Archive; Hacker, *Elements of Controversy*, 78-80.
[68] "Winds Cover State with Atomic Dust," *Salt Lake Tribune*, May 8, 1952; "A-Blast's Dust 'Dying Out'," *Salt Lake Tribune*, May 9, 1952; "We Don't Know Enough," *Salt Lake Tribune*, May 9, 1952; Corbin Allardice, "Controls Make Atomic Tests Harmless," *Salt Lake Tribune*, May 29, 1952.
[69] NV0032991, James E. Reeves to George P. Kraker, TWX, July 31, 1952, Nevada Nuclear Testing Archive; NV0079109, Carroll L. Tyler to Kenneth E. Fields, TWX, July 31, 1952; NV0033001, Thomas L. Shipman to Alvin C. Graves, Letter, August 6, 1952, Nevada Nuclear Testing Archive.
[70] NV0079108, Walter D. Claus to Carroll L. Tyler, TWX, August 6, 1952, Nevada Nuclear Testing Archive; NV0033006 and NV0079102, John C. Burgher to Carroll L. Tyler, TWX, August 14, 1952, Nevada Nuclear Testing Archive.
[71] NV0120811, Carroll L. Tyler to John C. Burgher, TWX, January 31, 1952, Nevada Nuclear Testing Archive.; NV0079105, Thomas L. Shipman to Alvin C. Graves, Letter, August 8, 1952, Nevada Nuclear Testing Archive.
[72] Thomas L. Shipman to Alvin C. Graves, Letter, August 8, 1952, Nevada Nuclear Testing Archive; Cyril L. Comar, Report, November 11, 1952, Nevada Nuclear Testing Archive.
[73] NV0041578 and NV0079104, Richard G. Elliott to Kenneth E. Fields, TWX, August 12, 1952, Nevada Nuclear Testing Archive.
[74] NV0001102 and NV0079103, Robert E. Thompsett, Harry O. Whipple, and Thomas N. White to Carroll L. Tyler, Letter, August 18, 1952, Nevada Nuclear Testing Archive; NV0032992 and NV0079100 Thomas L. Shipman to Alvin C. Graves, Memorandum, August 23, 1952, Nevada Nuclear Testing Archive.
[75] NV0041579 and NV0079099, Press Release, August 28, 1952, Nevada Nuclear Testing Archive; "Cattle Survive Radiation from Atomic Blasts," *Nevada State Journal*, August 29, 1952.
[76] NV0079101, Leonard A. Jacobvitz to Chester G. Brinck, Letter, August 22, 1952, Nevada Nuclear Testing Archive.
[77] NV0041583 and NV0079094, John I. Munson to Seth R. Woodruff, TWX, September 10, 1952, Nevada Nuclear Testing Archive; NV0041587 and NV0079089, Seth R. Woodruff to John I. Munson, TWX, September 18, 1952, Nevada Nuclear Testing Archive; NV0041588 and NV0079086, Seth R. Woodruff to John I. Munson, Memorandum with Lease and Supplemental Agreement, September 24, 1952, Nevada Nuclear Testing Archive.
[78] NV0041582, Seth R. Woodruff to Carroll L. Tyler, Memorandum, September 9, 1952, Nevada Nuclear Testing Archive; NV0041584 and NV0079092, Carroll L. Tyler to Seth R. Woodruff, Memorandum, September 12, 1952, Nevada Nuclear Testing Archive.
[79] NV0041586 and NV079090, Seth R. Woodruff to Floyd Lamb, Letter, September 17, 1952, Nevada Nuclear Testing Archive; NV0079085, Floyd Lamb to the AEC, Letter, October 10, 1952, Nevada Nuclear Testing Archive; NV0079067, William U. Schofield, Jr., Affidavit, October 9, 1952, Nevada Nuclear Testing Archive; NV0079065, J.A. Hail Affidavit, October 10, 1952, Nevada Nuclear Testing Archive; NV0079066, Wilson Stewart Affidavit, October 20, 1952, Nevada Nuclear Testing Archive. Seth R. Woodruff forwarded these affidavits on to Chester G. Brinck at the general counsel's office. See NV0041593 and NV0079079, Seth R. Woodruff to Chester G. Brinck, Memorandum, October 28, 1952, Nevada Nuclear Testing Archive.
[80] NV0041589 and NV0079084, Joe B. Sanders to Carroll L. Tyler, Memorandum, October 13, 1952, Nevada Nuclear Testing Archive; NV0041590 and NV0079083, Chester G. Brinck to Miles N. Pike, Letter, October 17, 1952, Nevada Nuclear Testing Archive.
[81] NV0041591 and NV007982, Seth R. Woodruff to Floyd Lamb, Letter, October 20, 1952, Nevada Nuclear Testing Archive.
[82] NV0041592 and NV0079081, George P. Kraker to Frank C. DiLuzio, Memorandum, October 21, 1952, Nevada Nuclear Testing Archive ; NV0041594, Chester G. Brinck to Miles N. Pike, Letter, November 3,

1952, Nevada Nuclear Testing Archive; NV0000378 and NV0079074, Robert E. Thompsett to Frank C. DiLuzio, Letter, November 18, 1952, Nevada Nuclear Testing Archive.

[83] NV0041594 and NV0079078, Chester G. Brinck to Miles N. Pike, Letter, November 3, 1952, Nevada Nuclear Testing Archive; NV0079076 and NV0015591, Miles N. Pike to Floyd Lamb, November 17, 1952, Nevada Nuclear Testing Archive; NV0079075, Miles N. Pike to Chester G. Brinck, Letter, November 17, 1952, Nevada Nuclear Testing Archive.

[84] Hacker, *Elements of Controversy*, 80.

[85] NV0079069, Chester G. Brinck to Seth R. Woordruff, Memorandum, January 15, 1953, Nevada Nuclear Testing Archive; NV0041600, NV0015592 and NV0079068, Chester G. Brinck to Miles N. Pike, Letter, January 16, 1953, Nevada Nuclear Testing Archive; NV0079064, Seth R. Woodruff to David Goldwater, Letter, January 20, 1953, Nevada Nuclear Testing Archive; NV0041601 and NV0079063 Seth R. Woodruff to James W. Johnson, Letter, January 20, 1953, Nevada Nuclear Testing Archive; Hacker, *Elements of Controversy*, 80-81.

[86] NV0041503 and NV0079061, Joe B. Sanders to Seth R. Woodruff, Memorandum, March 3, 1953, Nevada Nuclear Testing Archive; NV0041604, Robert E. Cole to Files, Memorandum, June 24, 1953, Nevada Nuclear Testing Archive; NV0079058, Chester G. Brinck to James L. Morrison, Memorandum, May 13, 1954, Nevada Nuclear Testing Archive; NV00167198, Lewis L. Strauss to William Langer, Letter, July 9, 1954, Nevada Nuclear Testing Archive.

[87] The testing process had become packed with experimental procedures, military effects, civil defense projects, troop training, and public outreach. Scientists and military designers pushed the boundaries of test yields, making them larger and larger, more than 30 kilotons for tower tests and around 50 kilotons for detonations dropped by bombers. Even the name of the place changed from "test site" to "proving ground" which suggested an institutionalization of the developmental process. The original name of the continental test site was Mercury though in some literature it was called the test site. The AEC changed name of the site to proving ground in early 1952 much to the consternation of Los Alamos. Norris Bradbury in particular complained that the emphasis on the military aspects of continental tests threatened to take over the entire purpose of the test site. Several years later, Los Alamos pushed to officially designate the place the Nevada Test Site in late 1954. Rather than a small-scale site to conduct essential experiments in preparation for the larger, more developed operations in the Pacific, the Nevada Proving Ground was swiftly becoming an essential location for civil defense effects, troop indoctrination, and most importantly weapons development. As such, Los Alamos scientists struggled with the environmental and geographic constraints present at the continental test site, especially when developing the larger, more deadly thermonuclear weapons. Rather than the Pacific Proving Ground's open ocean and a very small, highly controllable population, the Nevada Proving Ground featured mountain ranges and narrow valleys which produced inconsistent and unpredictable wind patterns, and a dispersed population which had proven to be equally as unpredictable. NV0134952, Norris Bradbury to Carroll L. Tyler, Letter, January 5, 1953, Nevada Nuclear Testing Archive; NV0134953, Darol K. Froman to Reuben E. Cole, Memorandum, February 3, 1953, Nevada Nuclear Testing Archive; Hacker, *Elements of Controversy*, 90-91.

[88] Several months later the AEC's general counsel worked out a way to legally word a purchase agreement with Floyd Lamb which did not locate any liability for damages with the AEC, the Division of Biology and Medicine rescinded their request because of "the extended lapse of time involved since the cattle were exposed to radiation." NV0079098, Jack L. Armstrong to Carroll L. Tyler, Memorandum, September 2, 1952, Nevada Nuclear Testing Archive; NV0041580 and NV0079097, Thomas L. Shipman to Carroll L. Tyler, Memorandum, September 5, 1952, Nevada Nuclear Testing Archive; NV0041581, Alvin C. Graves to Thomas L. Shipman, Memorandum, September 6, 1952, Nevada Nuclear Testing Archive; NV0041585 and NV0079091, Carroll L. Tyler to Kenneth E. Fields, Memorandum, September 12, 1952, Nevada Nuclear Testing Archive; NV0079088, Jack L. Armstrong to Carroll L. Tyler, Memorandum, September 24, 1952, Nevada Nuclear Testing Archive; NV0041597 and NV0079072, William Gorvine to Files, December 19, 1952, Nevada Nuclear Testing Archive; NV0000379, NV0041598, and NV0079071, Carroll L. Tyler to Kenneth E. Fields, Memorandum, December 23, 1952, Nevada Nuclear Testing Archive; NV0041599 and NV0079070, Jack L. Armstrong to Carroll L. Tyler, Memorandum, January 8, 1953, Nevada Nuclear Testing Archive; NV0122148, Richard Elliott to Distribution, October 30, 1952, Nevada Nuclear Testing Archive.

[89] In addition to the more intensive participation by the PHS, the AEC's Division of Biology and Medicine collected the individual exposure records of the 1951 and 1952 tests from various groups at Los Alamos

and the Air Force Special Weapons Project (AFSWP) to process and store them in one location. To continue to improve their relationship with the general public, the AEC arranged for three hundred Federal Civil Defense Administration observers, two hundred reporters, and two scientists from the Eastman Kodak Company to observe the tests scheduled for the spring of 1953; NV0339445, Raymond P. Campbell to Kenneth E. Fields, Memorandum, September 15, 1952, Nevada Nuclear Testing Archive; NV0125429, William S. Johnson to Alvin Graves, Memorandum, September 29, 1952, Nevada Nuclear Testing Archive; NV0125428, John C. Clark to William S. Johnson, Memorandum, October 4, 1952, Nevada Nuclear Testing Archive; NV0029392, Carroll L. Tyler to Kenneth E. Fields, Memorandum, October 14, 1952, Nevada Nuclear Testing Archive; NV0125425, William S. Johnson to John C. Clark, Memorandum, October 21, 1952, Nevada Nuclear Testing Archive; NV0001156, Thomas N. White to David M. Stearns, Memorandum, November 10, 1952, Nevada Nuclear Testing Archive; NV0125422, John C. Clark to Distribution, Memorandum, November 29, 1952, Nevada Nuclear Testing Archive; NV0103703 and NV0125421, Carroll L. Tyler to Kenneth E. Fields, Memorandum, December 5, 1953, Nevada Nuclear Testing Archive; NV0103706, Carroll L. Tyler to Kenneth E. Fields, Memorandum, December 31, 1952, Nevada Nuclear Testing Archive; NV0103711, W.P. Dearing to Marion W. Boyer, Letter, January 7, 1953, Nevada Nuclear Testing Archive; NV0103709, Deputy Chief, Bureau of State Services to Duncan A. Holaday, Memorandum, January 19, 1953, Nevada Nuclear Testing Archive; NV0016449, Thomas Shipman to John Burgher, Letter, February 5, 1953, Nevada Nuclear Testing Archive; NV0102276, Merril Eisenbud to Potter Campbell, Memorandum, February 13, 1953, Nevada Nuclear Testing Archive.

[90] The normal ionizing radiation dose for test personnel was 3.9 roentgens per test operation; normal thermal radiation was 1 calorie per cm^2 and normal blast or force tolerance was set at 2 pounds per in^2. NV0125343, R.N. Isbell to Chief, Armed Forces Special Weapons Project, Memorandum, February 17, 1953, Nevada Nuclear Testing Archive.

[91] NV0317129, Atomic Energy Commission, "AEC Continental Weapons Tests … Public Safety," March 31, 1953, Nevada Nuclear Testing Archive.

[92] Not all Americans were impressed with the power of this particular atomic bomb. Veteran bomb reporter Robert Bennyhoff expressed disappointment in the blast, writing "it felt more like the gentle but determined roll of an earthquake than the jolt of nuclear fission. Nor was the atomic cloud anywhere near as beautiful as many other previous tests had been." Sidney Lohman, "News and Notes from the Studios," *New York Times*, March 15, 1953; William L. Laurence, "Millions on TV See Explosion that Rocks Desert Like Quake," *New York Times*, March 18, 1953; Robert Bennyhoff, "Bennyhoff Sees Blast, Finds it Disappointing," *Reno Evening Gazette*, March 18, 1953; Fehner and Gosling, *Atmospheric Nuclear Weapons Testing*, 93-98; Miller, *Under the Cloud*, 159-166; Hacker, *Elements of Controversy*, 101-102.

[93] AEC press releases indicate the main fallout clouds in the March and April tests passed either northeast over Groom and Lincoln mines, southeast over the desert between Las Vegas and Mercury, or southwest over Death Valley. They reported that the little amount of fallout was not at levels high enough to be considered hazardous. NV0033453, AEC Press Release, March 24, 1953, Nevada Nuclear Testing Archive; NV0033472, AEC Press Release, March 31, 1953, Nevada Nuclear Testing Archive; NV0033492, AEC Press Release, April 11, 1953, Nevada Nuclear Testing Archive; NV0014179, James C. Watson to Robert G. Lindberg, Letter, April 23, 1953, Nevada Nuclear Testing Archive; NV0041604, Robert E. Cole to Files, Memorandum, June 24, 1953, Nevada Nuclear Testing Archive.

[94] "Powerful Blast Lights Up Sky at Las Vegas," *Reno Evening Gazette*, April 25, 1953; "Scientists Plan Next Test Shot at Desert Rock," *Reno Evening Gazette*, May 14, 1953; Fehner and Gosling, *Atmospheric Nuclear Weapons Testing*, 103-104; Miller, *Under the Cloud*, 169-171; Hacker, *Elements of Controversy*, 102-103.

[95] NV0033512, AEC Press Release, April 25, 1953, Nevada Nuclear Testing Archive; NV0033513, AEC Press Release, April 25, 1953, Nevada Nuclear Testing Archive; NV0033514, AEC Press Release, April 25, 1953, Nevada Nuclear Testing Archive; NV0120751, Richard Elliott to Distribution, Memorandum, April 25, 1953, Nevada Nuclear Testing Archive.

[96] The radiation monitor, Otto Paganini mentioned to his supervisor William S. Johnson that he had encountered some difficulties in conducting contamination procedures. While the public was generally very cooperative and seemed satisfied with the little information Paganini was authorized to give them, the physical infrastructure needed to decontaminate people and equipment in the field was not in place. For instance, Paganini noted that car wash facilities were generally not available in towns such as Alamo and neither were vacuum cleaners which could be handheld. Paganini recommended mobile radiation

monitoring units bring water, roadblock signs, record books, and the right kind of vacuum cleaners. He also recommended further study in recommending decontamination procedures of personal effects and clothing to the public. NV0125401, Otto Paganini to William S. Johnson, Memorandum, April 28, 1953, Nevada Nuclear Testing Archive.

[97] The radiation monitor Richard Fetz reported to his supervisor William S. Johnson that the roadblock in St. George proved busier than anticipated. Fetz enlisted the help of three service stations to provide free car washes to the public and three Utah state troopers to man the roadblock, check the vehicles for radiation levels, and record the vehicle owners' information. In order to ensure every car would get washed, Fetz relieved each driver of their license until they returned from the car wash. Of the nearly three hundred vehicles which passed through the roadblock, Fetz noted one which they were unable to clean belonging to a Mr. Prisbey who was told to take his car to Las Vegas for further decontamination procedures. Fetz made similar recommendations to Johnson as his colleague Paganini in Alamo; rural towns had few if any car washing facilities or vacuum cleaners. Fetz also suggested that highways be shut down during the period right after test detonation until the radioactive cloud passed over and that vehicle occupants remain in their cars until they passed the contaminated area. NV0125400, Richard H. Fetz to William S. Johnson, Memorandum, April 30, 1953, Nevada Nuclear Testing Archive.

[98] "Radioactive Matter Falls on Nevada Roads," *Los Angeles Times*, April 26, 1953; "Atom Dust Falls on Autos, Bus," *Ogden Standard Examiner*, April 26, 1953; "Atom Blast Downs Drone Plane," *Provo Sunday Herald*, April 26, 1953; "Final Atomic Tests Planned," *Reno Evening Gazette*, April 27, 1953.

[99] The bulk of AEC expenditures on radiation monitoring, an every growing concern as the testing process became more expensive, occurred in conjunction with maintaining exposure levels for personnel and offsite residents below the maximum allowed. Decreasing the maximum exposure level would not only cost the AEC more money, it also would "effectively deny continued operation of the NTS." NV0010156, John C. Burgher to Kenneth E. Fields, Letter, April 15, 1953, Nevada Nuclear Testing Archive.

[100] In a discussion of radioactive fallout halfway through the test series, the AEC's Division of Military Application under Kenneth E. Fields expressed concern that the Annie, Nancy, and Simon tests had produced levels of radioactive fallout in several communities south and east of the test site higher than the set exposure limits. The DMA believed that the recorded levels did not reflect the real circumstances in which fallout occurred and under which the levels were measured, but were estimates too conservative to be useful. The DMA argued that the calculations assumed that persons exposed to fallout were assumed to stay in the radioactive area continuously as opposed entering and exiting the area, took no account of shielding effects from walls and buildings, and presumed that the fallout was evenly distributed. "These rather extreme general assumptions necessarily do not reflect actual conditions or individual behaviours [sic]," the DMA stated. "If persons were to stay indoors, for example, during about half the 24 hour day as is usual, this would reduce overall exposures about 25%." The group acknowledged that there were "so many unknowns about the biological effects of radiation no one can really say what the effects of this radiation are," meaning that "if fallout occurred in a populated area immediately adjacent to the Proving Ground, beta burns might be experienced. This would be a serious situation indeed since these burns cause hair to fall out and blisters or ulcers to form. This would probably arouse immediate public clamor for the closing of the Proving Ground." The DMA worried that the larger tests fired from towers, a procedure which produced more radioactive dust, would cause a fallout problem in a populated area such as Las Vegas. The group recommended that the AEC keep tower tests to 25 kilotons or below. The alternative the DMA said, would "almost certainly be ultimate over-exposure of nearby populations and conceivably the enforced closure of the Nevada Proving Ground." Thomas L. Shipman and Alvin C. Graves noted several errors in the report Raymond P. Campbell sent to Kenneth E. Fields, nonetheless, the principle of the conversation remained the same, fallout was the primary problem of maintaining a continental testing program. Shipman agreed with Campbell's recommendation that the AEC limit the size of tower tests to prevent fallout. Graves, however, disagreed stating that the yield of tests at that time was not something which scientists could accurately predict and that there was not a strong correlation between yield and fallout levels. Campbell responded to the entire conversation by looking for the one point of agreement, that the AEC allow the scientists and testing personnel complete freedom in directing its own operations, "subject to using 'all the means at its disposal to decrease fallout in communities surrounding the Nevada Proving Grounds'." Gaelen Felt had the final word on the subject in the course of this conversation. He favored few limitations on the size and manner of nuclear tests, arguing that only unfavorable or unpredictable weather patterns should determine tests. Tyler recommended that the exposure limit,

currently set at 3.9 roentgens over thirteen weeks, be raised and extended over a broader time period, a larger limit over twelve months, allowing more flexibility in the testing process. Both the AEC and Los Alamos hoped that over time and with further scientific study, the testing organization would knowledgably be able to set the range of acceptable radiation dosage, accurately predict test yields, safely increase the size of tests, and better understand the effects of radiation exposure in a manner that would not be too expensive, compromise the testing process, or cause the population adjacent to the test site to oppose their activities. NV102273, Carroll L. Tyler to George P. Kraker, TWX, May 8, 1953, Nevada Nuclear Testing Archive; NV0030143, NV0105792, and NV0125339, Raymond P. Campbell to Kenneth E. Fields, Memorandum, May 8, 1953, Nevada Nuclear Testing Archive; NV0122387, Thomas L. Shipman to Darol Froman, Memorandum, June 2, 1953, Nevada Nuclear Testing Archive; NV0125341, Alvin C. Graves to James E. Reeves, Memorandum, July 13, 1953, Nevada Nuclear Testing Archive; NV0031053, Raymond P. Campbell to William L. Guthrie, Memorandum, July 27, 1953, Nevada Nuclear Testing Archive; NV0062748, Gaelen Felt to Alvin C. Graves, Memorandum, August 31, 1953, Nevada Nuclear Testing Archive.

[101] NV0033536, AEC Press Release, May 8, 1953, Nevada Nuclear Testing Archive; Robert Bennyhoff, "Atomic Blast Equals 300,000 Tons of TNT," *Nevada State Journal*, May 9, 1953; AEC Press Release, June 4, 1953, Charles Russell Papers, Box 175, Folder 3, Nevada State Archives; Gene Sherman, "Atom Blast, Greatest of All, Set Off," *Los Angeles Times*, June 5, 1953; Fehner and Gosling, *Atmospheric Nuclear Weapons Testing*, 106-108; Miller, *Under the Cloud*, 171-173, 180-181; Hacker, *Elements of Controversy*, 103-104.

[102] "Plan to Move Cannon," *Reno Evening Gazette*, April 25, 1953; "Assemble Cannon for Atomic Test," *Reno Evening Gazette*, May 4, 1953; "Atomic Cannon in Nevada for Tests," *Reno Evening Gazette*, May 6, 1953; "Atomic Cannon Firing Planned," *Reno Evening Gazette*, May 9, 1953; "Atomic Cannon Moved To Nevada Test Site," *Los Angeles Times*, May 11, 1953; Marvin Miles, "Big Cannon Set Up for Atomic Test," *Los Angeles Times*, May 25, 1953; "Shot Ends Series of Nevada Tests," *Reno Evening Gazette*, May 25, 1953; NV0033554, AEC Press Release, Nevada Nuclear Testing Archive; AEC Press Release, May 25, 1953, Charles Russell Papers, Box 175, Folder 3, Nevada State Archives; Gladwin Hill, "Cannon Fires Atomic Shell," *New York Times*, May 26, 1953; "Atomic Cannon 'Shot Heard Around the World'," *Nevada State Journal*, May 26, 1953; Fehner and Gosling, *Atmospheric Nuclear Weapons Testing*, 102; Miller, *Under the Cloud*, 177-180; Hacker, *Elements of Controversy*, 105.

[103] Radiation monitors scrambled to establish checkpoints near Alamo on Highway 93, North Las Vegas and Glendale on Highway 91, and at St. George, and warn residents to stay inside their homes. The AEC issued a public warning that fallout could occur, but that it would not "exceed the non-hazardous levels experienced after the April 25 shot." By midday, monitors recorded problematic levels of radioactive fallout near Alamo and St. George, and ordered vehicles to car washes for decontamination. More than one hundred vehicles required washing and of them, one was a school from Middle Park High School in Granby, Colorado, carrying students home from their senior trip to Las Vegas. The bus had been stopped at the checkpoint on Highway 91 where men in white coats with Geiger counters told the bus driver and the small graduating class to stay inside the bus and keep the windows up, despite the warm weather, until they got to St. George, Utah. The owner of the hotel in Las Vegas where the students had stayed the night had told them that if they got up before five that morning they would see the glow from the atomic test. None of the students got up early enough to see it, but the picture of the men in white coats with Geiger counters telling them that there was no danger but to stay inside their vehicle until they were out of the path of the radioactive cloud frightened them. NV0033544, AEC Press Release, May 19, 1953; Nevada Nuclear Testing Archive; NV0033545, AEC Press Release, May 19, 1953; Nevada Nuclear Testing Archive; NV0033546, AEC Press Release, May 19, 1953, Nevada Nuclear Testing Archive; NV0028329, Richard G. Elliott to Distribution, May 19, 1953, Nevada Nuclear Testing Archive; NV0124351, John C. Clark to Kenneth E. Fields, TWX, May 20, 1953, Nevada Nuclear Testing Archive; Chester McQueary, "Meeting Dirty Harry in 1953," *Common Dreams.org*, May 25, 2003; Fehner and Gosling, *Atmospheric Nuclear Weapons Testing*, 105-106; Miller, *Under the Cloud*, 173-177; Hacker, *Elements of Controversy*, 103-105; Philip L. Fradkin, *Fallout: An American Nuclear Tragedy* (Boulder, CO: Johnson Books, 1989), 1-4.

[104] "Robot Plane Survives 9th Atomic Blast," *Provo Daily Herald*, May 19, 1953; "Nevada Atom Test Affects Utah Area," *New York Times*, May 20, 1953; "A-Blast Cloud Brings Closing of Utah Town," *Chicago Daily Tribune*, May 20, 1953; "Utah Clear of Harmful Cloud," *Ogden Standard Examiner*, May 20, 1953; "Atom Fallout Blocks Two Nevada Highways," *Nevada State Journal*, May 20, 1953; "AEC

Checks Utah Atomic Area, Denies Harm Done," *Ogden Standard Examiner*, May 21, 1953; "Nevada, Utah People Given Added Assurance They Will Not Be Injured by Fallout," *Nevada State Journal*, May 21, 1953.

[105] Representative Stringfellow sent several letters to the Atomic Energy Commission throughout 1953 and 1954 supporting the investigations into the sheep deaths which resulted from the Upshot-Knothole series. NV0030138, Douglas R. Stringfellow to Gordon Dean, Letter, May 20, 1953, Nevada Nuclear Testing Archive; NV0033547, AEC Press Release, May 20, 1953, Nevada Nuclear Testing Archive; "The Public Forum," *Salt Lake Tribune*, May 28, 1953NV0014175, Lewis L. Strauss to Douglas R. Stringfellow, Letter, August 5, 1953, Nevada Nuclear Testing Archive; NV0029439, Douglas R. Stringfellow to Lewis L. Strauss, Letter, September 16, 1953, Nevada Nuclear Testing Archive; NV0029436, Lewis L. Strauss to Douglas R. Stringfellow, Letter, September 25, 1953, Nevada Nuclear Testing Archive; Lewis L. Strauss to Douglas R. Stringfellow, Letter, January 11, 1954, Nevada Nuclear Testing Archive; Lewis L. Strauss to Douglas R. Stringfellow, Letter, March 9, 1954, Nevada Nuclear Testing Archive; Douglas R. Stringfellow to Lewis L. Strauss, Letter, April 20, 1954, Nevada Nuclear Testing Archive; Lewis L. Strauss to Douglas R. Stringfellow, Letter, May 4, 1954, Nevada Nuclear Testing Archive.

[106] Fehner and Gosling, *Atmospheric Nuclear Weapons Testing*, 106-107; Miller, *Under the Cloud*, 177; Hacker, *Elements of Controversy*, 104-105.

[107] Dan Sheahan, a resident of Groom Mine protested the regular evacuations and damages that occurred every time a nuclear test occurred. He filed a claim with the AEC in 1952, but the dollar amount was in excess of the limit allowed under administrative claims. After the Upshot-Knothole series, he wrote Nevada Senators Pat McCarran and Governor Charles Russell of the current damages to his property, his horses, and himself. When Sheahan tried to sell his operation at Groom Mine to the AEC or the Air Force and threatened a very public court battle, the AEC would not set a precedent by paying the Sheahan's for their property. Besides the AEC's tests, Sheahan was concerned about wayward Air Force pilots with 50-caliber guns which strafed his structures. The only compensation the Sheahan's received from the AEC was $1000 on a 1952 claim for losses incurred when shutting down the Groom Mine during the Tumbler-Snapper series and payment on his sixteen-year-old "nag" that had lesions caused by fallout. Thomas L. Shipman of Los Alamos's Health Division stated "it was probably more good luck than good management that the Groom Mine area itself did not receive a higher dose than it did," during the Upshot-Knothole series. But Kenneth E. Fields of the AEC's Division of Military Applications believed that Groom Mine was in danger due to its proximity to the Las Vegas Bombing and Gunnery Range because of "inaccuracies in air-to-ground firing." But, the Division of Military Application noted that "we do not believe the Atomic Energy Commission has subjected Groom Mine personnel to any real danger from fallout." For more information on Daniel Sheahan see NV0015574, Daniel Sheahan to Seth R. Woodruff, Letter, April 6, 1953, Nevada Nuclear Testing Archive; NV0015542, William W. Allaire, Note, circa June 1953, Nevada Nuclear Testing Archive; NV0015544 and NV0015575, Daniel Sheahan to Pat McCarran, Letter, June 16, 1953, Nevada Nuclear Testing Archive; NV0015561 and NV0079120, Daniel Sheahan to Pat McCarran, Letter, January 30, 1954, Nevada Nuclear Testing Archive; Daniel Sheahan to Charles H. Russell, Letter, July 7, 1954, Charles Russell Papers, Box 175, Folder 5, Nevada State Archives; Charles H. Russell to Daniel Sheahan, Letter, July 20, 1954, Charles Russell Papers, Box 175, Folder 5, Nevada State Archives; Daniel Sheahan to James E. Roberts, Letter, August 18, 1954, Charles Russell Papers, Box 175, Folder 5, Nevada State Archives; NV0015546, Joe B. Sanders to Files, Memorandum, June 24, 1953 , Nevada Nuclear Testing Archive; NV0102268, Carroll L. Tyler to Kenneth E. Fields, Memorandum, June 29, 1953, Nevada Nuclear Testing Archive; NV0102264, Thomas L. Shipman to Distribution, TWX, July 8, 1953, Nevada Nuclear Testing Archive; NV0030057 and NV0102262, Kenneth E. Fields to Thomas E. Murray, Memorandum, July 15, 1953, Nevada Nuclear Testing Archive; NV0102261, Gerard C. Smith to Thomas E. Murray, Memorandum, July 16, 1953, Nevada Nuclear Testing Archive; NV0102257, William L. Guthrie to Joe B. Sanders, Memorandum, July 29, 1953, Nevada Nuclear Testing Archive; NV0102253, A.L. Scott to Carroll L. Tyler, Letter, August 4, 1953, Nevada Nuclear Testing Archive; NV0102254, Carroll L. Tyler to A.L. Scott, Letter, August 10, 1953, Nevada Nuclear Testing Archive; NV0000370, NV0029443, and NV0105342, John C. Burgher to Carroll L. Tyler, Memorandum, August 7, 1953, Nevada Nuclear Testing Archive; NV0079140, Kenneth E. Fields to Carroll L. Tyler, TWX, August 18, 1953, Nevada Nuclear Testing Archive; NV0028541, James E. Reeves to Kenneth E. Fields, Memorandum, August 24, 1953, Nevada Nuclear Testing Archive; NV00141106, Joe B. Sanders to Bernard T. Trum, Letter, September 23, 1953, Nevada Nuclear Testing Archive; NV0079134, Carroll L. Tyler to A.L. Scott,

Letter, October 13, 1953, Nevada Nuclear Testing Archive; NV0079129, A.L. Scott to Carroll L. Tyler, Letter, October 19, 1953, Nevada Nuclear Testing Archive; NV0000441, NV0015520, and NV0079116, Joe B. Sanders to Files, January 6, 1954, Nevada Nuclear Testing Archive; NV0015562, George P. Kraker to N.D. Greenberg, memorandum, April 5, 1954, Nevada Nuclear Testing Archive; ; James E. Roberts to Charles H. Russell, Letter, July 28, 1954, Charles Russell Papers, Box 175, Folder 5, Nevada State Archives; Lewis L. Strauss to Charles H. Russell, Letter, August 16, 1954, Charles Russell Papers, Box 175, Folder 5, Nevada State Archives; NV0015565, Donald J. Leehey to Kenneth E. Fields, Memorandum, August 20, 1954, Nevada Nuclear Testing Archive; NV0015566, Seth R. Woodruff to Donald J. Leehey, Memorandum, April 23, 1955, Nevada Nuclear Testing Archive; Daniel Sheahan to Seth R. Woodruff, Letter, July 6, 1955, Charles Russell Papers, Box 175, Folder 5, Nevada State Archives; Daniel Sheahan to James E. Robert, Letter, July 6, 1955, Charles Russell Papers, Box 175, Folder 5, Nevada State Archives; Daniel Sheahan to Charles H. Russell, Letter, July 8, 1955, Charles Russell Papers, Box 175, Folder 5, Nevada State Archives; Charles H. Russell to Daniel Sheahan, Letter, July 11, 1955, Charles Russell Papers, Box 175, Folder 5, Nevada State Archives; NV0015569, Daniel Sheahan to James E. Reeves, August 5, 1955, Nevada Nuclear Testing Archive; NV0015570, Donald J. Leehey to Alfred D. Starbird, Memorandum, September 9, 1955, Nevada Nuclear Testing Archive; NV0015572, Kenner F. Hertford to Alfred D. Starbird, TWX, March 4, 1958, Nevada Nuclear Testing Archive; NV0032948, Chalmers C. King to Charles F. Eason, Memorandum, July 3, 1958, Nevada Nuclear Testing Archive; NV0061668, Henry G. Vermillion to Rodney L. Southwick, Memorandum, January 30, 1956, Nevada Nuclear Testing Archive; Rebecca Solnit, *Savage Dreams; A Journey into the Landscape Wars of the American West* (Berkeley: University of California Press, 1994), 33-35.

[108] The veterinarians included Robert E. Thompsett (Los Alamos Scientific Laboratory), Robert H. Veenstra (Naval Radiological Defense Laboratory), Arthur H. Wolff (Public Health Service), Monroe A. Holmes (Utah Department of Health Division of Disease Control), and A.C. Johnson (Cedar City). The other investigators were William J. Hadlow (Public Health Service pathologist), Joe Sanders (Las Vegas Operations office Deputy Manager) and Steve Brower (Iron County Agricultural Agent). Paul B. Pearson headed all the livestock investigations for the AEC's Division of Biology and Medicine. F.H. Melvin, Utah Department of Agriculture Bureau of Animal Industry, and John I. Curtis, Utah State Veterinarian's office, had examined the sheep two weeks earlier and noted that the afflicted sheep exhibited blisters on their faces and in their noses, carried high temperatures, shed wool in clumps, and aborted full-term still-born lambs. The state veterinarians were concerned this was a full-scale epidemic as these problems had never been seen by any sheep rancher in the area before. It was Curtis that notified George Spendlove in the Utah Department of Health. The ranchers notified the AEC. NV0000388, Notes on Alleged Radiation Effects on Cattle and Sheep in Nevada Area, December 31, 1953, Nevada Nuclear Testing Archive; NV0000389, Joe B. Sanders to Files, Memorandum, December 31, 1953, Nevada Nuclear Testing Archive; "Sheepmen Await Word on Atomic Blasts and Malady," *Ogden Standard Examiner*, June 7, 1953; "Mystery Disease Killing Ewes, Lambs in Utah," *Provo Sunday Herald*, June 7, 1953; NV0020403, F.H. Melvin to Bennett T. Simms, June 8, 1953, Nevada Nuclear Testing Archive; NV0033564 and NV0322449, Richard G. Elliott to Files, Memorandum, June 9, 1953, Nevada Nuclear Testing Archive; NV0025952, Gordon Dunning to Files, June 12, 1953, Nevada Nuclear Testing Archive; NV0000396, Data on Sheep Losses; Preliminary Investigation, June 17, 1953, Nevada Nuclear Testing Archive; Fehner and Gosling, *Atmospheric Nuclear Weapons Testing*, 109-110, 112; Miller, *Under the Cloud*, 182-186; Hacker, *Elements of Controversy*, 106-130; Fradkin, *Fallout*, 147-162.

[109] Apparently this segment developed out of Roger E. Sprague, NBC's Western Division Director of News and Special Events, and his personal interest in the effects of exposure to radioactive fallout. Sprague's sister had suffered from what he believed to be symptoms of radiation exposure. Sprague had contacted the AEC in 1952 for answers regarding the matter, but had not been satisfied with their response. NV0030158, Kenneth E. Fields to Carroll L. Tyler, TWX, June 16, 1953, Nevada Nuclear Testing Archive; NV0001143 and NV0122144, Richard G. Elliott to Distribution, Memorandum, July 15, 1953, Nevada Nuclear Testing Archive; NV0122305, Stafford L. Warren to John C. Burgher, Letter, July 17, 1952, Nevada Nuclear Testing Archive; NV0025950, B. M. Brundage to Stafford L. Warren, Memorandum, June 16, 1953, Nevada Nuclear Testing Archive.

[110] NV0120755, B.C. Lyon to Seth R. Woodruff, June 17, 1953, Nevada Nuclear Testing Archive; "Sheep-Killing Weed," *Life Magazine*, January 15, 1951, 55-56 NV0020399, Data on Sheep Losses; Second Prelimiary Investigation, June 17, 1953, Nevada Nuclear Testing Archive; NV0025523 W.T. Huffman to

H.W. Schoening, Letter June 23, 1953; Nevada Nuclear Testing Archive; NV0030060, NV0102265, Howard C. Brown, Note on TWX, July 8, 1953, Nevada Nuclear Testing Archive; NV0033567, Richard G. Elliott to Kenneth E. Fields, July 16, 1953, Nevada Nuclear Testing Archive; "Southeast Nevada Cattle Crisis Worsens; 1400 Animals Dead," *Las Vegas Review-Journal*, July 16, 1953; NV0025970, Report of Committee Investigating Drought Conditions – State of Nevada, July 21, 1953, Nevada Nuclear Testing Archive; NV0000373, John L. O'Harra to Joe B. Sanders, July 25, 1953, Nevada Nuclear Testing Archive; NV0025524, W.T. Huffman to H.W. Schoening, Letter, August 26, 1953, Nevada Nuclear Testing Archive; NV0025069, Karl E. Herde ot Lauren R. Donaldson, Letter, November 18, 1953, Nevada Nuclear Testing Archive; NV0070620, Bernard F. Trum, Report, March 31-April 20, 1953, Nevada Nuclear Testing Archive.

[111] "Cooperative Battle Against Weeds is Being Worked Out," *Nevada State Journal*, February 19, 1950; "Spread of Weed Worries Ranchers," *Nevada State Journal*, February 24, 1950; "Stock Toll Feared as Poison Weed Spreading in Utah," *Ogden Standard Examiner*, March 17, 1950; "Halogeton Livestock Threat Mounts in Western States," *Salt Lake Tribune*, November 26, 1950; "Russian Weed Threatening Livestock, Says Welling," *Ogden Standard Examiner*, November 27, 1950; Murray Moler, "Russian Weed is Threat to Western U.S.," *Nevada State Journal*, November 29, 1950; John Brosnan, "Farm Letter," *Salt Lake Tribune*, December 31, 1950; "Halogeton on the Western Range," circa 1950, Folder 236, Public Lands Foundation Archive, Phoenix, Arizona; "Halogeton," circa 1950, Folder 236, Public Lands Foundation Archive, Phoenix, Arizona; "Sheep-Killing Weed," *Life Magazine*, January 15, 1951, 55-56; "Improved Ranges to Halt Halogeton," *Reno Evening Gazette*, January 20, 1951; "Poison Weed Battle Asked by McCarran," *Nevada State Journal*, January 21, 1951; "Discussion Held on Rainmaking," *Nevada State Journal*, March 7, 1951; Kenneth B. Platt, "Halogeton: Recognize It! Fight It!," *Our Public Lands* (April 1951): 6; "Public Land Aid Draws Halogeton Battle Line," *Salt Lake Telegram*, July 26, 1951; "The Halogeton Problem in Utah," circa 1951, Folder 236, Public Lands Foundation Archive, Phoenix, Arizona; Fred Othman, "Weed Warfare," *Washington Daily News*, February 13, 1952; *Halogeton Glomeratus Control Act of 1952*. Public Law 529. 82nd Cong., 2nd sess. (July 14, 1952); John M. Fenley, Farrel Branson, and Karl Parker, et al., "With the Sections," *Journal of Range Management* 5 (November 1952), 430-432; "Halogeton in Nevada—Animal Poisoning and Control Studies," December 1952, Folder 236, Public Lands Foundation Archive, Phoenix, Arizona; NV0014150, L.A. Stoddart, Report on Livestock Conditions, June 23, 1953, Nevada Nuclear Testing Archive; C. Wayne Cook and L.A. Stoddart, "The Halogeton Problem in Utah," November 1953, Folder 236, Public Lands Foundation Archive, Phoenix, Arizona; Ernest J. Palmer, "Can We Control Halogeton?," *Our Public Lands* (January 1955): 4-5, 18-19, 22-23; "Killing Halogeton with Chemicals," March 1955, Folder 236, Public Lands Foundation Archive, Phoenix, Arizona; Laurence A. Stoddart and Arthur D. Smith, *Range Management* (New York: McGraw Hill Book Company, Inc., 1955), 234-257; George N. Swallow to Howard Cannon, Letter, April 18, 1959, Howard Cannon Papers, 86th Congress, Box 1, Folder 14, Special Collections UNLV; Howard Cannon to George N. Swallow, Letter, April 27, 1959, Howard Cannon Papers, 86th Congress, Box 1, Folder 14, Special Collections, UNLV; James A. Young and Charlie D. Clements, *Cheatgrass; Fire and Forage on the Range* (Reno: University of Nevada Press, 2009), 73-76, 153-160.

[112] Crawford Houston, "Writer Portrays Need for Control of Public Lands," *Garfield County News*, February 10, 1933; "$525,000,000 Asked for Quick Relief in Drought Areas," *New York Times*, June 5, 1934; "Wallace to Buy Cattle in Drought-Ridden Areas; Federal Control Planned," *New York Times*, July 3, 1936; "Ranges in South Hit by Drought," *Reno Evening Gazette*, April 3, 1946; "Drought Conditions Prevail in Sate, Report Reveals," *Nevada State Journal*, June 30, 1946; "Clear and Bright Weather Holds On," *Reno Evening Gazette*, February 21, 1947; "July Was Driest Month Since 1903," *Nevada State Journal*, August 13, 1947; "Shortage of Livestock Feed Forecast Because of Drought," *Nevada State Journal*, January 29, 1948; "Rain Benefits West," *Nevada State Journal*, June 25, 1948; "Drought Disaster Proclaimed by Ike," *Nevada State Journal*, July 2, 1953; "Cattlemen Split Over Value of Government Aid," *Reno Evening Gazette*, July 2, 1953; "Minutes of the Annual Meeting of the Central Nevada Livestock Association," July 18, 1953, Charles Russell Papers, Box 187, Folder 37, Nevada State Archives; "President Pledges Quick Drought Aid," *New York Times*, July 11, 1953; "Southeast Nevada Cattle Crisis Worsens; 1400 Animals Dead," *Las Vegas Review-Journal*, July 16, 1953; NV0001281, R.E. Lytle to Monroe A. Holmes, Letter, July 20, 1953, Nevada Nuclear Testing Archive; Ellis J. Folsom and Thomas Buckman to Charles Russell, Report, July 20, 1953, Charles Russell Papers, Box 187, Folder 38, Nevada State Archives; "Livestock Toll Mounts in State During Drought," *Reno Evening Gazette*, July 20, 1953;

"Report of Committee Investigating Drought Conditions, State of Nevada," July 21, 1953, Charles Russell Papers, Box 187, Folder 38, Nevada State Archives; "Governor Pursues Drought Aid Plea," *Nevada State Journal*, July 21, 1953; "Effort to Get Drought Fund Will Continue," *Reno Evening Gazette*, July 24, 1953; "Nevada Will Get No Drought Aid," *Nevada State Journal*, July 24, 1953; "Nevada Farm Bureau Joins Move to Secure Drought Relief Funds," *Reno Evening Gazette*, July 25, 1953; "Drought Area Ranchers Eligible for U.S. Aid," *Reno Evening Gazette*, July 29, 1953; "Drought Relief Loans Available," *Nevada State Journal*, July 30, 1953; "Nevada's Drought Conditions Worsen," *Reno Evening Gazette*, July 31, 1953; Clifford Young to Charles Russell, Telegram, August 3, 1953, Charles Russell Papers, Box 187, Folder 41, Nevada State Archives; "Drouth Emergency Declared in State," *Reno Evening Gazette*, August 3, 1953; "President Keeps Feed Moving to Drought Areas," *Nevada State Journal*, November 19, 1953; Report on Drought Situation in Lincoln County Nevada, November 22-23, 1954, Charles Russell Papers, Box 187, Folder 50, Nevada State Archives.

[113] NV0025968, Paul B. Pearson to John C. Burgher, Memorandum, August 13, 1953, Nevada Nuclear Testing Archive; NV0025973, Robert H. Veenstra to Paul B. Pearson, Letter, December 23, 1953, Nevada Nuclear Testing Archive; Robert E. Thompsett to Reuben E. Cole, Letter, circa August 1953, Nevada Nuclear Testing Archive; NV0000327, Monroe A. Holmes to S.C. Ingrahan, Letter, April 14, 1954, Nevada Nuclear Testing Archive.

[114] The initial findings appeared in The AEC's fourteenth semiannual report to Congress which stated about five thousand sheep grazing on the Nevada-Utah border directly east of the test site suffered burns, blindness, and death—30% loss of lambs and 20% loss of mature sheep—during the same period as the 1953 tests. AEC personnel had investigated the causes of the burns and the sheep deaths ,but concluded that the timing of their injury and death was only coincidental with the test series. They said the sheep suffered from malnutrition because their grazing areas were particularly lean in the drought of that year. The AEC recommended further investigation. The final report on the sheep deaths in Utah stated that "the peculiar lesions observed in the sheep around Cedar City in the spring of 1953 and the abnormal losses suffered by the several sheepmen cannot be accounted for by radiation or attributed to the atomic tests conducted at the Nevada Proving Grounds." Atomic Energy Commission. *Fourteenth Semiannual Report of the Atomic Energy Commission – January 1953-June1953* (Washington, DC: Government Printing Office, 1953); NV0029441, Carroll L. Tyler to Kenneth E. Fields, TWX, August 19, 1953, Nevada Nuclear Testing Archive; NV0000386, M.A. Holmes, "Compiled Report on Cooperative Field Survey of Sheep Deaths in Southwest Utah," August 31, 1953, Nevada Nuclear Testing Archive; Atomic Energy Commission, *Progress Report to the Joint Committee on Atomic Energy, June-November 1953* (Washington, DC: Government Printing Office, 1953); NV0020422, Report on Sheep Losses Adjacent to the Nevada Proving Grounds, January 6, 1954, Nevada Nuclear Testing Archive; Report on Sheep Losses Adjacent to the Nevada Proving Grounds, January 6, 1954, Charles Russell Papers, Box 175, Folder 5, Nevada State Archives; NV0033569, AEC Press Release, January 8, 1954, Nevada Nuclear Testing Archive; "Atomic Blasts Didn't Kill Utah Sheep—AEC," *Ogden Standard Examiner*, January 12, 1954; "AEC Tests in Nevada Not Responsible for Mysterious Sheep Deaths in Utah," *Provo Daily Herald*, January 12, 1954; "What Caused Sheep to Die Still Unsolved," *Ogden Standard Examiner*, January 14, 1954; "AEC Denies Rays Killed Utah Sheep," *New York Times*, January 17, 1954; NV0020426, Monroe A. Holmes to Stephen Brower, Letter, April 15, 1954, Nevada Nuclear Testing Archive.

[115] NV0000386, Monroe A. Holmes, Report, August 31, 1953, Nevada Nuclear Testing Archive; NV0020467 and NV0025557, Meeting of Livestock Men and AEC Officials, January 13, 1954, Nevada Nuclear Testing Archive; NV00202421, Seth R. Woodruff to Donald J. Leehey, Memorandum, January 18, 1955, Nevada Nuclear Testing Archive; NV0025993, Warren E. Burger to AEC General Counsel, Letter, June 20, 1955, Nevada Nuclear Testing Archive; Fradkin, *Fallout*, 161-162.

[116] Their patriarch, William Thomas Stewart, had been born near Salt Lake City in 1856 and had served on the Utah Territorial Legislature as representative from Kanab. After several missions and relocations, he settled his family in the Pahranagat Valley in 1901 at the old Pearson Ranch which formed the core of Alamo. The Stewarts were initially polygamists, but when they reached the area, two of William's three wives, Tamar Hamblin and Fannie Little, had died relatively early, and only Mary Ann Udall made the move with him. Most of the twelve Stewart children had been born in Utah and moved with their father to Nevada as adults. The Stewarts intermarried with most of the prominent ranching families in the area; the Seegmillers, Higbees, and Lambs in particular. Oldest son William Thomas Stewart, Jr., continued the family's livestock operations in Alamo and his youngest brother Marion King Stewart purchased the

Gardner ranch further north near Hiko. Both men served as Mormon bishops for a decade each in the 1920s and 1930s. William's sons Daniel (Dan), Ronald, Cornell, Wilson, and Willard continued their father's operations in Alamo while their uncle, who only had daughters, sold his ranch to his nephews Gerald, Cyril, Alden, Neil, and Harold, the sons of David Stewart and Jessie Lamb, Floyd Lamb's sister. The collective Stewart cousins dominated the cattle industry in the Pahranagat Valley for several decades. They raised the region's first Quarter Horses, utilizing the wild herds that ranged through their valley and the adjacent mountains by culling mares from the herd and replacing the dominant stallions with pedigreed animals. Dan married Enid, Eleanor Schofield Lamb's sister, in 1933; their sons and grandsons, Daniel and Jeffrey, Charles, Darin, Cordell, and Lyndon, helped out at the ranch. Like his father and uncle, Dan served as bishop of the Mormon Church in Alamo between 1946 and 1955 during atmospheric nuclear testing and was followed by his cousin Gilbert, who served from 1955 to 1959. The Stewart clan lost cattle and horses during the first decade of nuclear testing, but maintained a cooperative attitude with the federal government throughout the process and developed a good relationship with one Atomic Energy Commission official in Las Vegas named Joe B. Sanders. In the 1964 election cycle, Dan ran an unsuccessful campaign against his brother-in-law Floyd Lamb for Lincoln County's state senate seat and served on the Nevada commission which tackled natural resource policy. Nevada State Water Certificate V01376, April 16, 1915; Nevada State Water Certificate 01535, January 13, 1918; "Four-Point Plan Listed on Resources," *Reno Evening Gazette*, March 3, 1964; "What a Nevada Legislative Situation," *Reno Evening Gazette*, November 4, 1964; Louise B. Stewart, *The History of Pahranagat Valley* (Provo, UT: J. Grant Stevenson, 1979), 5, 15-16, 18-20, 26-28, 31, 33, 51-53.

[117] Virtually the same personnel investigated all the incidents of livestock damage in 1953. In particular, Robert E. Thompsett, Los Alamos Scientific Laboratory's contract veterinarian, and Joe B. Sanders, the Assistant Field Manager of the Las Vegas Operations Office, worked most of the cases. The investigation also included Bernard F. Trum, a veterinarian at the University of Tennessee's AEC program, Seth R. Woodruff, the Field Manager of the Las Vegas Operations Office, Gordon Dunning of the Division of Biology and Medicine, Dee Broadbent at the Agricultural Experiment Station, L.A. Stoddart, Professor of Range Management and Botany at Utah State Agricultural College, J.L. O'Harra, a veterinarian at the University of Nevada, Las Vegas, Robert H. Clark, a Las Vegas veterinarian, William A. Allaire of the AEC's Santa Fe Operations Office, and several others. NV0017830, Joe B. Sanders to Files, Memorandum, June 1, 1953, Nevada Nuclear Testing Archive; NV0001052, August T. Rossano, Report, June 6, 1953, Nevada Nuclear Testing Archive; NV0001052, Joe B. Sanders to Files, Memorandum, June 6, 1953, Nevada Nuclear Testing Archive; NV0001335, NV0079115, and NV0014038, Bernard F. Trum to Paul B. Pearson, Letter, January 14, 1953, Nevada Nuclear Testing Archive; NV0079114, Seth R. Woodruff to Paul B. Pearson, Memorandum, January 25, 1954, Nevada Nuclear Testing Archive, NV0001335, NV0079115, and NV0014038, Bernard F. Trum to Paul B. Pearson, Letter, January 14, 1953, Nevada Nuclear Testing Archive.

[118] NV0030067 and NV0102271, Gordon M. Dunning to V.G. Huston, Memorandum, June 11, 1953, Nevada Nuclear Testing Archive; NV0079158, Chester G. Brinck to Files, June 11, 1953, Nevada Nuclear Testing Archive; NV0014132, J.H. Rust, B.F. Trum, and C.L. Comar, Report of Farm Animal Survey at Nevada Test Site, June 16, 1953, Nevada Nuclear Testing Archive; NV0001290, Paul B. Pearson to John C. Burgher, Memorandum, June 21, 1953, Nevada Nuclear Testing Archive; NV0000370, NV0029443, and NV0105342, John C. Burgher to Caroll L. Tyler, Memorandum, August 7, 1953, Nevada Nuclear Testing Archive; NV0029442, W. L. Guthrie to Kenneth E. Fields, Memorandum, August 11, 1953, Nevada Nuclear Testing Archive; NV0079142, Sterling F. Black to Files, August 12, 1953, Nevada Nuclear Testing Archive; NV0017577, James E. Reeves to Seth R. Woodruff, Memorandum, August 19, 1953, Nevada Nuclear Testing Archive; NV0079140, Kenneth E. Fields to Carroll L. Tyler, TWX, August 18, 1953, Nevada Nuclear Testing Archive; NV0079141, Paul B. Pearson to Carroll L. Tyler, Memorandum, August 18, 1953, Nevada Nuclear Testing Archive; NV0029441, Carroll L. Tyler to Kenneth E. Fields, TWX, August 19, 1953, Nevada Nuclear Testing Archive; NV0029440 and NV0025966, Kenneth E. Fields to Carroll L. Tyler, TWX, August 24, 1953, Nevada Nuclear Testing Archive; "Horses Found Injured in Nevada Atom Tests," *Los Angeles Times*, August 25, 1953; NV0000369 and NV0015518, John C. Burgher to Marion W. Boyer, Memorandum, August 26, 1953, Nevada Nuclear Testing Archive; NV00105347, Photos of Sample Damaged Horses and Cattle, Nevada Nuclear Testing Archive; NV0079126, NV0000368, Joe B. Sanders to Files, Memorandum, August 27, 1953, Nevada

Nuclear Testing Archive; Bernard F. Trum to Stewart Brothers, Letter, November 30, 1953, Nevada Nuclear Testing Archive; Hacker, *Elements of Controversy*, 106-107.

[119]Epithelioma is a condition in which the tissue that covers the surface of all the body's organs and other structures grows abnormally. Anaplasma marginale is a common tick-borne anaplasmosis which causes severe anemia. Grass tetany is a metabolic disorder characterized by low magnesium levels causing cattle to stagger, thrash around, and die suddenly. Bacillary Hemoglobinuria, or redwater disease, is produced by the bacteria Clostridium Hemolyticumis, found in poorly drained irrigated areas with alkali soil, which colonizes the liver and destroys the red blood cells. NV0030514, John C. Burgher to Marion W. Boyer, Memorandum, August 26, 1953, Nevada Nuclear Testing Archive; NV0001067, Joe B. Sanders to Files, Memorandum, October 30, 1953, Nevada Nuclear Testing Archive; NV0079123, Seth R. Woodruff to Carroll L. Tyler, Memorandum, December 10, 1953, Nevada Nuclear Testing Archive; NV0014183, John H. Rust, Pathology Report on Special AEC Problem, December 31, 1953, Nevada Nuclear Testing Archive; NV0001335, NV0014038, and NV0079115, Bernard F. Trum to Paul B. Pearson, January 14, 1954, Nevada Nuclear Testing Archive; NV0079114, Seth R. Woodruff to Paul B. Pearson, Memorandum, January 25, 1954, Nevada Nuclear Testing Archive; NV0000436, Paul B. Pearson to Seth R. Woodruff, Memorandum, January 29, 1954, Nevada Nuclear Testing Archive; NV0015522 and NV0079119, Seth R. Woodruff to Carroll L. Tyler, Memorandum, February 11, 1954, Nevada Nuclear Testing Archive; NV0000532, Donald J. Leehey to John C. Burgher, TWX, February 13, 1954, Nevada Nuclear Testing Archive; NV0000433 and NV0079118, William W. Allaire to Files, February 24, 1954, Nevada Nuclear Testing Archive; NV0001339, Paul B. Pearson to Donald J. Leehey, TWX, February 24, 1954, Nevada Nuclear Testing Archive; NV0000401 and NV0079113, Chester G. Brinck to Seth R. Woodruff, Memorandum, February 26, 1954, Nevada Nuclear Testing Archive; NV0015523, Seth R. Woodruff to Donald J. Leehey, Febraury 26, 1954, Nevada Nuclear Testing Archive; NV0001341 and NV0014209, Bernard F. Trum to Joe B. Sanders, February 27, 1954, Nevada Nuclear Testing Archive; NV0001342 and NV0079112, William W. Allaire to Files, March 2, 1954, Nevada Nuclear Testing Archive; NV0014210 and NV0025554, Joe B. Sanders to Bernard F. Trum, Letter, March 22, 1954, Nevada Nuclear Testing Archive; NV0014212, Roy B. Snapp to Distribution, Memorandum, May 6, 1954, Nevada Nuclear Testing Archive; NV0000302, James E. Reeves to Seth R. Woodruff, Memorandum, August 11, 1954, Nevada Nuclear Testing Archive; NV0001346 and NV0014214, Bernard F. Trum to Seth R. Woodruff, Letter, December 30, 1954, Nevada Nuclear Testing Archive; NV0001347, NV0014213, and NV0025549, Bernard F. Trum to Joe B. Sanders, Letter, December 30, 1954, Nevada Nuclear Testing Archive; NV0014215 and NV0025545, R.K. Somers to Bernard F. Trum, Letter, December 31, 1954, , Nevada Nuclear Testing Archive; NV0001510, G.R. Farmer to P. Stewart, Letter, October 18, 1958, Nevada Nuclear Testing Archive; NV0025560, G.R. Farmer to Files, Memorandum, May 11, 1959, Nevada Nuclear Testing Archive.

[120] NV0030067 and NV0102271, Gordon M. Dunning to V.G. Huston, Memorandum, June 11, 1953, Nevada Nuclear Testing Archive; NV0079158, Chester G. Brinck to Files, June 11, 1953, Nevada Nuclear Testing Archive; NV0014132, J.H. Rust, B.F. Trum, and C.L. Comar, Report of Farm Animal Survey at Nevada Test Site, June 16, 1953, Nevada Nuclear Testing Archive; NV0001290, Paul B. Pearson to John C. Burgher, Memorandum, June 21, 1953, Nevada Nuclear Testing Archive; NV0000370, NV0029443, and NV0105342, John C. Burgher to Caroll L. Tyler, Memorandum, August 7, 1953, Nevada Nuclear Testing Archive; NV0029442, W. L. Guthrie to Kenneth E. Fields, Memorandum, August 11, 1953, Nevada Nuclear Testing Archive; NV0079142, Sterling F. Black to Files, August 12, 1953, Nevada Nuclear Testing Archive; NV0017577, James E. Reeves to Seth R. Woodruff, Memorandum, August 19, 1953, Nevada Nuclear Testing Archive; NV0079140, Kenneth E. Fields to Carroll L. Tyler, TWX, August 18, 1953, Nevada Nuclear Testing Archive; NV0079141, Paul B. Pearson to Carroll L. Tyler, Memorandum, August 18, 1953, Nevada Nuclear Testing Archive; NV0029441, Carroll L. Tyler to Kenneth E. Fields, TWX, August 19, 1953, Nevada Nuclear Testing Archive; NV0029440 and NV0025966, Kenneth E. Fields to Carroll L. Tyler, TWX, August 24, 1953, Nevada Nuclear Testing Archive; "Horses Found Injured in Nevada Atom Tests," *Los Angeles Times*, August 25, 1953; NV0000369 and NV0015518, John C. Burgher to Marion W. Boyer, Memorandum, August 26, 1953, Nevada Nuclear Testing Archive; NV00105347, Photos of Sample Damaged Horses and Cattle, Nevada Nuclear Testing Archive; NV0079126, NV0000368, Joe B. Sanders to Files, Memorandum, August 27, 1953, Nevada Nuclear Testing Archive; Bernard F. Trum to Stewart Brothers, Letter, November 30, 1953, Nevada Nuclear Testing Archive; Hacker, *Elements of Controversy*, 106-107.

[121] The Stewarts filed six claims for 18 horses at $300 each, one claim for 2 horses at $250 each, and Sheahan filed 1 claim for 1 horse for $100. NV0079139, Joe B. Sanders to Files, Memorandum, August 28, 1953, Nevada Nuclear Testing Archive; NV0079137, Carroll L. Tyler to Seth R. Woodruff, Memorandum, September 4, 1953, Nevada Nuclear Testing Archive; NV0079135, Joe B. Sanders to Richard G. Elliott, Memorandum, October 9, 1953, Nevada Nuclear Testing Archive; NV0015563 and NV0079131, Jack Wollenzien, Horse Appraisal, October 13, 1953, Nevada Nuclear Testing Archive; NV0079132, Stanley Wells, Horse Appraisal, October 13, 1953, Nevada Nuclear Testing Archive; NV0079133, Seth R. Woodruff to Daniel Sheahan, Draft Letter, circa October 1953, Nevada Nuclear Testing Archive; NV0015563 and NV0079128, Seth R. Woodruff to Chester G. Brinck, Memorandum, October 16, 1953, Nevada Nuclear Testing Archive; NV0015563 and NV0079128, Chester G. Brinck to Seth R. Woodruff, Memorandum, October 23, 1953, Nevada Nuclear Testing Archive; NV0015560, George P. Kraker to Seth R. Woodruff, December 29, 1953, Nevada Nuclear Testing Archive.

[122] Joe B. Sanders and Bernard Trum shared an enjoyment of horses evidenced by their periodic exchanges about race tracks, jockeys, and fine animals. Bernard Trum met Eddie Arco, the jockey for Native Dancer, in 1953, the year the Grey Ghost won everything but the Kentucky Derby. NV0014100, Bernard F. Trum to Joe B. Sanders, Letter, August 28, 1953, Nevada Nuclear Testing Archive; NV0014106, Joe B. Sanders to Bernard F. Trum, September 23, 1953, Nevada Nuclear Testing Archive; Bernard F. Trum to Joe B. Sanders, Letter, October 14, 1953, Nevada Nuclear Testing Archive.

[123] In 1954, the proposed Senate Bill 3355 provided Floyd Lamb with compensation for his losses outside of court. However, as the bill set a bad precedent for future claims against the AEC, the organization fought against it and the measure was never passed. In 1955, Lamb filed the proper claim forms with the AEC. Woorduff said of the claim "this office is certain the claim is not a valid one and actually doubts that the claimant has experienced any damage." NV0079080 and NV0041577, Joe B. Sanders to Clifford A. Jones, Letter, October 21, 1953, Nevada Nuclear Testing Archive; NV0001338, NV0032979, NV0041576, and NV0079059, Madiosn B. Graves to Chester G. Brinck, Letter, February 9, 1954, Nevada Nuclear Testing Archive; NV0079058, Chester G. Brinck to James L. Morrison, Memorandum, May 14, 1954, Nevada Nuclear Testing Archive; NV0032977, Lewis L. Straus to William Langer, July 9, 1954, Nevada Nuclear Testing Archive; *Atomic Energy Act of 1954*. Public Law 703. 83rd Cong., 2nd sess. (August 30, 1954); NV0032974, Joe B. Sanders to Files, Memorandum, December 9, 1954, Nevada Nuclear Testing Archive; NV0029432, Donald J. Leehey to Kenneth E. Fields, Memorandum, December 23, 1954, Nevada Nuclear Testing Archive; NV0001069, NV0016444, and NV0032973, Paul B. Pearson to V.R. Bohman, December 30, 1954, Nevada Nuclear Testing Archive; NV0025546 and NV0025997, Bernard F. Trum to Seth R. Woodruff, Letter, December 30, 1954, Nevada Nuclear Testing Archive; NV0032967, Seth R. Woodruff to Floyd Lamb, Letter, January 29, 1955, Nevada Nuclear Testing Archive; NV0070617, Joe B. Sanders to Files, Memorandum, April 2, 1955; NV0032966, Clifford A. Jones to AEC, Letter, April 4, 1955, Nevada Nuclear Testing Archive; NV0032965, Seth R. Woodruff to Floyd Lamb, Letter, April 12, 1955, Nevada Nuclear Testing Archive; NV0025966, Donald J. Leehey to John C. Burgher, Memorandum, April 13, 1955, Nevada Nuclear Testing Archive; NV0032964, Seth R. Woodruff to Donald J. Leehey, Memorandum, April 14, 1955, Nevada Nuclear Testing Archive; NV0001456, Joe B. Sanders to Files, Memorandum, June 10, 1955, Nevada Nuclear Testing Archive; NV0001457, Ralph P. Johnson to Seth R. Woodruff, Memorandum, June 13, 1955, Nevada Nuclear Testing Archive; NV0014052, Alan Bible to Lewis L. Strauss, Letter, October 11, 1953, Nevada Nuclear Testing Archive; NV0001508 and NV0016426, Joe B. Sanders and Chalmers C. King to Files, Memorandum, October 6, 1955, Nevada Nuclear Testing Archive; NV0001507, Chalmers C. King to Floyd Lamb, November 23, 1955, Nevada Nuclear Testing Archive; NV0001509, Chalmers C. King to Carlton P. Lamb, November 23, 1955, Nevada Nuclear Testing Archive; NV0032956, Joe B. Sanders to Files, April 13, 1956, Nevada Nuclear Testing Archive; NV0001512, Joe B. Sanders to Chalmers C. King, Memorandum, July 9, 1956, Nevada Nuclear Testing Archive; NV0032955, Herbert E. Hoffman to Chalmers C. King, TWX, August 1, 1956, Nevada Nuclear Testing Archive; NV0001513, William W. Alliare to Rulon A. Earl, Letter, August 30, 1956, Nevada Nuclear Testing Archive; NV0015587, Edward L. Johnson to Max E. Smith, Memorandum, August 5, 1957, Nevada Nuclear Testing Archive; NV0015588, Sherman H. Sullivan to Files, Memorandum, September 9, 1957, Nevada Nuclear Testing Archive.

[124] NV0000307, Donald J. Leehey to John C. Burgher, Memorandum, February 11, 1955, Nevada Nuclear Testing Archive; NV0121722, James E. Reeves to Charles L. Dunahm, Memorandum, December 21, 1956, Nevada Nuclear Testing Archive; NV0121723, Edward L. Johnson to Kermit H. Larson, Letter, August 10,

1956, Nevada Nuclear Testing Archive; NV0121725, Robert L. Corsbie to Kermit H. Larson, Letter, August 24, 1956, Nevada Nuclear Testing Archive; NV0032953, Max E. Smith to Floyd Lamb, Letter, May 29, 1957, Nevada Nuclear Testing Archive; NV0000360, James E. Reeves to Alfred D. Starbird, Memorandum, June 4, 1957, Nevada Nuclear Testing Archive; NV0032950, Max E. Smith to L. J. Cotton, Memorandum, July 25, 1957, Nevada Nuclear Testing Archive; NV0000359, Alfred D. Starbird to James E. Reeves, TWX, July 11, 1957, Nevada Nuclear Testing Archive; NV0069638, Redacted to C.L. Weaver, Memorandum, January 8, 1959, Nevada Nuclear Testing Archive; NV0122124, Alvin C. Graves to James E. Reeves, Letter, March 2, 1961, Nevada Nuclear Testing Archive.

[125] NV0001283, Monroe A. Holmes to Sir, Form Letters with Responses," July 16, 1953, Nevada Nuclear Testing Archive; NV0001276 and NV0014039, Notes Taken at Meeting of Atomic Energy Commission, State Health Department, Public Health Department, Livestockmen and Others, August 9, 1953, Nevada Nuclear Testing Archive; NV00141113, Statements by Webster, Corry, Adams, Clark, Seegmiller, and Higbee, September 3-October 31, 1953, Nevada Nuclear Testing Archive; NVNV0025519, Statement by Adams, September 16, 1953, Nevada Nuclear Testing Archive; Barry Commoner, *The Closing Circle: Man, Nature and Technology* (New York: Alfred Knopf, 1971), 21-23, 49-65; Fradkin, *Fallout*, 147.

[126] NV0001347, NV0014213, and NV0025549, Bernard F. Trum to Joe B. Sanders, Letter, December 30, 1954, Nevada Nuclear Testing Archive;

[127] NV0105333, Handwritten Note (Redacted), May 25, 1953, Nevada Nuclear Testing Archive; NV0105335, Handwritten Chronology (Redacted), circa May 25, 1953, Nevada Nuclear Testing Archive; NV0105337, Additional Information on the Skin Burns at Lincoln Mine, June 6, 1953, Nevada Nuclear Testing Archive; NV0001090, Gordon Dunning to Files, Memorandum, June 12, 1953, Nevada Nuclear Testing Archive; NV0018006, E. van der Smissen to Roscoe Goeke, Letter, December 12, 1957, Nevada Nuclear Testing Archive; NV0018030, William W. Allaire to James E. Reeves, Memorandum, July 23, 1957, Nevada Nuclear Testing Archive;

[128] NV0061668, Henry G. Vermillion to Rodney L. Southwick, Memorandum, January 30, 1956, Nevada Nuclear Testing Archive.

[129] NV0014179, James C. Watson to Robert G. Lindberg, Letter, April 23, 1953, Nevada Nuclear Testing Archive; NV0041604, Robert E. Cole to Files, Memorandum, Nevada Nuclear Testing Archive; NV0017668, Edward L. Johnson to Joe B. Sanders, Memorandum, January 10, 1956, Nevada Nuclear Testing Archive.

[130] NV0121318, Alvin L. Graves to William Allaire, Letter, November 30, 1953, Nevada Nuclear Testing Archive.

[131] NV00124342, Norris E. Bradbury to Carroll L. Tyler, Letter, January 5, 1953, Nevada Nuclear Testing Archive; NV0134952, Norris E. Bradbury to Carroll L. Tyler, January 5, 1953, Nevada Nuclear Testing Archive; NV0128723, Report of Committee on Operational Future of Nevada Proving Grounds, May 11, 1953, Nevada Nuclear Testing Archive; NV0079205, Marcus F. Cooper to Carroll L. Tyler, Memorandum, July 7, 1953, Nevada Nuclear Testing Archive; NV0125356, Importance of the Nevada Proving Grounds to the Department of Defense, August 25, 1953, Nevada Nuclear Testing Archive; NV00128737, Carroll L. Tyler to Kenneth E. Fields, September 23, 1953, Nevada Nuclear Testing Archive; NV0134950, Report of Committee on Operational Future of Nevada Proving Grounds, December 31, 1953, Nevada Nuclear Testing Archive; Hacker, *Elements of Controversy*, 115-122, 129-130.

[132] In 1955, several national magazines and newspapers published articles on the radioactive fallout problem. These articles focused on the scientific investigation of the effects of exposure to radioactive fallout and the valuable knowledge produced by the atomic testing program. The AEC considered many of these articles "useful in public education to convey the general range of facts about fallout hazard from tests," and were good for "providing information to the lay public." They certainly provided public reassurance that the AEC carefully monitored the tests and took every possible precaution to "prevent inconvenience or danger to the public during nuclear tests." But by 1957, after the Plumbbob series, the articles changed tone and featured disturbing photographs of blind dogs, scarred livestock, and frustrated ranchers. Besides interviewing AEC officials and atomic scientists, these articles provided the perspective of residents living near the test site, including Dell and Cornell Stewart, Carleton Lamb, Joe Fallini, and Jack and Martha Bordoli. NV0125352, The Public Relations of Continental Tests, September 23, 1953, Nevada Nuclear Testing Archive; "Official Calms Utah Fears on '55 A-Blasts," *Salt Lake Tribune*, January 21, 1955; "West Reassured on Atomic Tests," *New York Times*, January 23, 1955; "Facing the Fallout Problem," *Life Magazine*, February 28, 1955, 24-26; "Science Tackles Radiation Peril," *Life Magazine*,

March 21, 1955, 32-39; "The Facts About A-Bomb 'Fall-Out'," *U.S. News & World Report*, March 25, 1955, 21-26; NV0032308, Morse Salisbury to Paul F. Foster, Memorandum, March 22, 1955, Nevada Nuclear Testing Archive; "Bomb Tests Seek to Stress Safety," *New York Times*, May 12, 1957; "AEC Sets New Precautions for Nevada Tests," *Los Angeles Times*, May 14, 1957; Gladwin Hill, "Atomic-Test area Calm on Fallout," *New York Times*, June 9, 1957; "A Searching Inquiry into Nuclear Perils," *Life Magazine*, June 10, 1957, 4-29; "Nevadans Charge Fallout Danger," *Los Angeles Times*, June 27, 1957.

[133] The AEC published this booklet in 1955 and again in 1957 under the title "Atomic Tests in Nevada." NV0122302, Atomic Test Effects in the Nevada Test Site Region, February 1955, Nevada Nuclear Testing Archive; Paul Ralli, *Viva Las Vegas* (Hollywood, CA: House-Warven Publishers, 1953), 28; Katharine Best and Katharine Hillyer, *Las Vegas: Playtown U.S.A.* (New York: David McKay Company, Inc., 1955), 162-164; NV0030051, Richard G. Elliott to Kenneth E. Fields, Memorandum, December 10, 1954, Nevada Nuclear Testing Archive.

[134] NV0122131, Thomas L. Shipman to Gordon M. Dunning, Letter, August 14, 1956, Nevada Nuclear Testing Archive; NV0122125, Thomas L. Shipman to Alvin C. Graves, Memorandum, February 15, 1961, Nevada Nuclear Testing Archive; Howard Simons, 'Nevada Test Radiation Greater Than Realized," *New York Times*, August 17, 1963.

CHAPTER 5

MULTIPLE ABUSERS

The post-war expansion of our population and of our commerce and industry has placed new demands on the use of public lands; so has the increased leisure time of our people and the resultant demands for recreation areas . . . we should dedicate our lands and the resources thereof to accomplish the maximum good for the maximum number for the longest period of time. Senator Wayne Aspinall, Chairman of the House Committee on Interior and Insular Affairs, 1963.

In the decades after the establishment of the Great Basin's grazing districts, at the same time the nation's nuclear testing program moved underground, public land management agencies responded to a sea change in nation's use of public lands. The eventual disposal of the public domain into private hands was once the primary goal of the federal government for the vast majority of the federal domain. Or failing that, land managers developed intermediary uses of the lands as grazing resource or troop training and weapons testing which made the land somewhat economically productive. But increased income and leisure time, access to automobiles for transportation, improved roads, and other technologies, facilitated the movement of vast numbers of outdoor recreationalists onto public lands in the post World War II era. Where once commercial interests dominated the use of these lands and their resources, noncommercial users interested in the value of the land for the outdoor recreational space it afforded took equal priority through the sheer presence of their numbers. This shift in the utility of public land and public land resources from having a monetary-based value to having an amenity or experiential value highlighted the importance of national parks and other protected areas in anchoring a region's outdoor recreational tourism. Outdoor recreation represented an important opportunity for use of public land in the Great Basin that could translate into recreational tourism dollars for the region's small towns.[1]

In addition, along with the postwar suburbanization trend, thousands of hopeful public land applicants staked their homestead claim on the remaining public domain. Although the level of homestead applications was nowhere near the record number filed in the years before World War I, nonetheless, there were an increased number of homestead hopefuls who filed under the agricultural land laws in order to acquire land. The Taylor Grazing Act had not actually precluded land applications, but had made it less likely potential landowners would file for areas already established as grazing allotments in which ranchers already controlled water rights. But many homestead applicants hoped for the same amenities suburban residents desired, including living on the periphery of an urban area in a low-density, relatively homogenous community, in a larger, more affordable home on a large, more affordable property. In addition, homesteading represented an important opportunity to own a large parcel of land instead of simply owning a home and yard. In rural communities, it also meant adding more property to county tax rolls. But homesteading, because of the agricultural imperative embedded in the land laws which governed the activity, represented an outdated and infeasible use of public land. The federal government preferred to sell small tracts of land for a fair market value rather than have large ones patented and only a small fee per acre paid. The national trend in the era after World War II had much to do with outdoor recreation, but very little to do with increasing agricultural settlement on public land. As a result, outdoor recreation and the renewal of homesteading in the Great Basin were oppositional forces mutually exclusive on public land. Ranchers in the region disliked both trends because they stood to lose access to their grazing range either way.[2]

Competition for access to and use of public land and natural resources intensified during the 1960s, in particular on the lands administered by the Bureau of Land Management (BLM). These public lands, once part of the unreserved and unappropriated public domain, constituted the last remaining territory in the continental United States in which Americans could homestead land, file mineral claims, utilize forage resources at a nominal cost, and participate in unrestricted and unmitigated outdoor recreation.[3] Because most remaining public land had outdoor recreational value for activities such as hiking, hunting, and fishing, the BLM began facilitating these programs equally with older grazing programs. In addition, the agency, guided by Department of the Interior Secretary Stewart L. Udall, responded to a new wave of environmental literature that called for sounder ecological management. As BLM managers balanced livestock along with deer, antelope, and big horn sheep and required water rights for wildlife protection, ranchers grew deeply dissatisfied with their newly-reduced permits and water allocations. When nature enthusiasts and outdoor recreationalists throughout the region began lobbying for a national park within the Great Basin, ranchers in the central part of the region affected by potential permanent withdrawal of thousands of prime grazing acres voiced loud protests. But these livestock operators faced stiff opposition from within their small towns which hoped that the creation of a national park in the Great Basin would bring tourists and revenue to their cash-starved communities. The question for Great Basin residents was whether or not to embrace the broad and unrestricted multiple-use concept as their preferred framework for public land management or to add protected places such as national parks which gave priority to outdoor recreationalists as a means of attracting tourist income.

For the BLM this change in the focus of public lands management also marked the end of large-acreage land disposal and the official retention of the public domain in federal management through the 1964 Classification and Multiple-Use Act (CMUA). Passed by a cooperative effort by both political parties and enacted between 1961 and 1968 during Udall's tenure as Secretary of the Interior, the act ushered in a new period of public land management within the BLM. Rather than the old pattern of custodial management in which federal land management officials worked closely with the local users, predominately livestock operators, to work out grazing policy and wildlife management, the BLM engaged in an intensive management program driven by the overt acknowledgement that much of the public domain would remain in federal possession in perpetuity. Through the process of classification, differentiating land according to its different characteristics, the BLM assigned public land multiple identities such as grazing range, wildlife habitat, or having recreational, timber, mineral, oil, gas, agricultural or other private economic value in order to determine the highest and best use of the land.[4] The BLM only classified a small amount of the remaining public domain as having agricultural or private economic value and as a result, the agency ceased approving applications under the old land disposal acts, officially ending the homesteading process. The BLM instead meant to retain these lands because of their outdoor recreational value.

The Failure of Organized Recreation and Protected Nature

Outdoor recreation functioned much like livestock grazing on public lands in the region, even to the extent that recreationalists sometimes paid fees to use public lands. However, outdoor recreationalists gravitated towards magnificent landscapes and scenic tree-lined places rather than large grassy plains and sagebrush seas. They also preferred

designated recreational areas with facilities rather than unimproved public lands. During the 1950s, greater population in increasingly urban concentrations, a higher standard of living, more leisure time, and better outdoor equipment technology, especially tools and clothing designed to ameliorate inclement weather, strengthened the people's ability to participate in outdoor recreation and "created an increase in the cultural value associated with time spent in the outdoors as people found in the mountains and forests a panacea for the pressures of urban life."[5]

This demand outstripped the nation's recreational infrastructure available to provide for the needs of campers, hikers, hunters, anglers, and other recreationalists. In particular, the Forest Service and National Park Service, the federal agencies managing the most popular recreational landscapes, struggled to keep up with the nation's outdoor recreational needs. In 1956, the national parks had over 55 million visitors, a ten percent increase from the previous year. To handle the projected increase over the next several years, the park service launched its ten-year Mission 66 program "to put the parks in shape to take care of the 80 million people who are expected to visit them in 1966." The National Park Service constructed new visitor centers, museums, and improved camp sites to host the dramatically increasing numbers of visitors. Similarly, in 1957 the Forest Service launched its Operation Outdoors program to accommodate the 53 million visitors and the dramatic increase in national forest visitation. State parks experienced an increase in visitors from 92 million to 216 million in ten years, but had no such federal revenues to support the expansion of their infrastructure.[6]

Congress facilitated this growth by funding Mission 66, Operation Outdoors, and most importantly, by creating the Outdoor Recreation Resources Review Commission

(ORRRC), a study group set to inventory the nation's outdoor recreational resource opportunities. Headed by Conservation Foundation architect Laurance S. Rockefeller, who considered outdoor recreation a "healthy, satisfying, and often creative use of leisure time" which had evolved "from luxury of the few to a necessity of the many," the ORRRC submitted their study to President Kennedy and the nation in 1962. The commission reported that "90 per cent of Americans engage in some form of outdoor recreation" and the first task in developing future recreational resources was to "provide recreation for the metropolitan regions which have the biggest population and the least space for it." The greatest problem to developing outdoor recreational options had little to do with money or infrastructure. It had to do with access. While there was plenty of "land and water acreage for recreation," most if it was not proximate to the population. The ORRRC found that of the 250 million acres already designated for outdoor recreation, most of the land was not available for day-use activities such as picnicking and walking. A quarter of the nation's population lived in the northeastern states which had very little space for recreation, but only fifteen percent of the population lived in the western states, a third of the land area of the entire nation, which contained nearly three-quarters of the recreational acreage.[7]

Developing recreational areas was costly, but it could also be profitable; according to the ORRRC's report, federal, state, and local governments spent about $1 billion annually "maintaining and developing outdoor recreation resources" and the market "for goods and services generated by America's recreation seekers" amounted to $20 billion per year. The ORRRC recommended five broad courses of action to help facilitate the nation's outdoor recreational development, the creation of a recreation bureau in the

Department of the Interior, a national recreation plan, expansion and adaptation of existing outdoor recreation programs, federal aid to states for additional development, and most importantly, a classification system for recreational resources. While the ORRRC focused predominantly on better land-use planning as part of outdoor recreational development, especially near urban areas, and the expansion of existing recreational systems including national parks, seashores, and wildlife refuges, a fundamental part of this process was giving land a recreational identity. All public lands under the multiple-use concept had a recreational capacity, but national parks, monuments, forests, and wildlife refuges, had stronger recreational identities and were under permanent federal reservation. The enjoyment of nature was a central tenant in outdoor recreation and these were lands that protected nature in an aesthetic manner against commercial extraction of natural resources. To facilitate the growth of this identity, President Kennedy announced in his 1962 conservation message the expansion of the national park and wildlife refuge system, and a program to preserve wilderness.[8]

The Great Basin's public lands lacked such strong "protected nature" identity. The region had some national forest, several wildlife refuges, and a handful of lakes and reservoirs. The Humboldt-Toiyabe National Forest, the largest forest complex in the region, offered camping and hiking in the Great Basin's pinyon-juniper covered sky-islands. Walker and Pyramid lakes, and the Lahontan reservoir provided opportunities to swim, water ski, and motor boat. The region's wildlife refuges provided hunting, fishing, and plenty of bird watching. The rest of the public lands contained a few BLM campsites, trails, and several areas for motorized vehicles. But there was no equivalent of Yosemite or Yellowstone, Grand Canyon or Bryce Canyon, no Great Smokey Mountains or Mount

Rainier national park to provide an icon of protected nature and an anchor for the recreational activities in the region.[9]

The BLM managed most of the region's federal domain which gave it an identity devoted to the economic production of livestock and potential mining opportunities. Cattle, sheep, and open-pit mines were not particularly attractive to outdoor recreationalists and yet some still came to the region to camp, hike, drive, and enjoy the herds of pronghorn antelope, bighorn sheep, mule deer and other wildlife. The agency worked with state and local authorities to "provide more recreation sites" through the 1926 Recreation and Public Purposes Act which allowed state, county, and municipal governments to purchase or lease public land for recreational use. But until the mid-1960s, the BLM did not even have the authority to "construct public toilets or even set up a litter barrel on public lands which it found people were using extensively for a recreation area." Gene Peterson, the agency's first recreational specialist struggled to get the BLM up to speed with even the basics of the Forest Service and National Park Service outdoor recreational programs. BLM state offices in Nevada, Utah, Idaho, Oregon, and three other states devoted one employee each to facilitate outdoor recreation. This meager staff tried to count visitation numbers to public lands and began developing outdoor recreational amenities.[10]

The identity of the Great Basin, barely transformed from wasteland to productive rangeland and littered with mining and military detritus, was a tough sell as charismatic wild land. As use of the region's open space for outdoor recreation increased with its population, the Great Basin was also littered with the trash of vague numbers of visitors lacking garbage cans, toilets, and proper campsites. The BLM's recreation development

program in the 1960s mainly consisted of constructing basic facilities to accommodate the ever-growing numbers of outdoor enthusiasts. There were, however, a few parts of the region that attracted recreational tourists and warranted greater development. For example, Congress designated the spectacular Lehman Caves in the Snake Range on the spine of the Great Basin a national monument in 1922. The Forest Service managed the new monument and its development as a tourist attraction for outdoor recreationalists was important to the region, especially to the community of Ely. In addition, the region's basin and range environment, the former *terra incognita* and perpetual wasteland, lacked representation in the nation's natural parks panorama. The tall peaks of the Snake Range and the beautiful Lehman Caves provided the area's best opportunity to attract support for creating a Great Basin national park.[11]

In the American West, national parks anchored outdoor recreational opportunities and provided the basis of its tourist economy. The eleven western states contained the nation's most iconic parks such as the snowy peaks of Olympic and Rainier and the deep blue waters of Crater Lake national parks in the Pacific Northwest, the incomparable Glacier, Yellowstone, Grand Teton, and Rocky Mountain national parks in the northern mountain states, Mesa Verde, Bryce Canyon, Zion, and the immense Grand Canyon in the Colorado Plateau region, the stunning Carlsbad Caverns in the desert Southwest, and the wondrous Yosemite, Sequoia, Kings Canyon, and Lassen in California. Railroads and highways funneled an ever-increasing number of visitors to each of these places and the national forests surrounding them. Most had lovely scenic drives which had attractive names such as Going-to-the-Sun Highway, Trail Ridge Road, Tioga Pass, or Highway by the Sea. These spectacular parks were the nation's most popular outdoor recreation

destinations, containing the classic national park features such as mountains, coastlines, and colorfully banded sandstone.[12] In its shades of silver-green and brown, the Great Basin offered no such obvious natural beauty or scenic attraction. Instead, it offered the opportunity for visitors to enjoy the unique basin and range ecological system.

In the late 1950s, the Department of the Interior's advisory board on the national parks recommended that the National Park Service create eight new park areas to protect parts of the national coastline and natural ecologies unrepresented in the system such as the tall grass prairie and the Great Basin desert. The 1963 Leopold Report eventually codified the idea that national parks should protect the nation's diverse ecologies in its famous statement that "A national park should represent a vignette of primitive America." While preserving the Great Basin's peculiar natural environment was important, that position took second place to the economic needs of its rural residents. Because the federal lands did not provide property tax income to either the state or the county, to some residents in the Great Basin, growth in the recreational tourist industry promised to be a healthy replacement. This planned growth in the National Park Service system accomplished three goals at once; new parks provided further outlets for outdoor recreation and protected a greater degree of the nation's ecological diversity while at the same time giving rural communities close to the new parks the precious opportunity to develop outdoor recreational tourism.[13]

The proposal for a Great Basin National Park began in the 1920s when the federal government designated the Lehman Caves a national monument. Prospector and farmer Absalom S. Lehman stumbled across the cave system, located near his ranch in 1885. For nearly forty years, several private owners controlled access to the caves, including

Charles W. Rowland and P.M. (Doc) Baker, son of former Confederate sympathizer and settler George W. Baker. The Bakers were the largest land-owners in Snake Valley to the east of the Snake Range where the caves were located. The Lehman ranch became part of the Rowland ranch, the Baker ranch, the Saval ranch, and eventually became the Meeks Brothers dude ranch which offered outdoor recreational opportunities such as cowboying and exploration of the Lehman Caves to guests. In 1912, the Forest Service had added the Snake Range to its operations in Nevada, but did not operate the caves, which were by then an important tourist attraction, because private owners still controlled access. When the eastern Nevada portion of Highway 50 opened in 1920, the Lehman Caves became a convenient and popular attraction so the Forest Service and White Pine County developed a viable road off the main highway to the attraction (fig. 59). As the caves were located within the Nevada National Forest, the Forest Service made the caves a national monument in 1922 under their jurisdiction in order to assure their adequate development and management for outdoor recreation.[14]

At the same time, Governor James E. Scrugham, a former state engineer and professor, worked with the Forest Service to begin developing the state's outdoor recreational attractions and targeted the Lehman Caves for further development, potentially as a national park. Governor Scrugham and Nevada's Senator Key Pittman introduced a bill to Congress in 1924 that would have created a Lehman Caves national park, but the Nevada Livestock Association protested the severe limitation a park would put on grazing. The last private family to provide access to the caves, Clarence T. and Beatrice Rhodes, continued to offer visitor services to the new monument. However, the Forest Service personnel devoted no special time or attention to the caves' care which

placed the entire burden of operation on the Rhodes who had constructed a small resort for tourists. In 1928, Beatrice had a nervous breakdown and Clarence had to find other work in the winter months when visitation decreased. Beatrice wrote park service director Stephen Mather for assistance in finding a buyer for their resort as federal funds for improving the caves never applied to their private property within the national monument and their health had deteriorated from the stress of owning the place. But the park service had no authority over the matter.[15]

In 1933, White Pine County, after much trouble issuing bonds, purchased the Rhodes' resort and transferred it to the Forest Service at the same time Executive Order 6166 gave the National Parks Service oversight over all national monuments. Both White Pine County and the Forest Service were unhappy with this designation and accused the National Park Service of ruining the Lehman Caves, bringing the matter to the attention of Senator Pittman. The Forest Service's believed its developmental plans for the Snake Range in its entirety were more ambitious and more focused on making the region a major outdoor recreation destination than the park service's plans. Lehman Caves were fine examples of underground geologic wonders, but they were too small of a unit and too far away for the park service to pay much attention. Despite public pressure, Lehman Caves remained under National Park Service administration, lacking adequate improvements or funding throughout the 1930s and 1940s to meet visitor demands.[16]

The White Pine County Chamber of Commerce embraced the idea of making an area around Lehman Caves a national park in 1955. The chamber saw an opportunity to diversify the county's economy in the growing park visitation numbers throughout the country. Mining had dominated the region's economy with livestock production close

behind; further diversification would help abate the often severe fluctuations in county income, especially after the recent copper mine closures. At the same time, the rediscovery of an ice-field in the northern cirque on Wheeler Peak, the tallest peak in the Snake Range as well as in the Great Basin, sparked renewed interest in preserving a unique portion of the region as a national park (fig. 60). The White Pine County Chamber of Commerce joined the Sierra Club, Wilderness Society, and the National Parks Association in launching a campaign to bring public and federal attention to the project. Nevada's congressional delegation, Senators George Malone and Alan Bible, and Representative Clifford Young, requested the National Park Service conduct an investigation to evaluate the possibility of a Great Basin National Park in 1956.[17]

At the end of their examination, the National Park Service concluded that the area was the best example of a Great Basin sky-island, representing the layered ecologies rising above the dusty playa below to the rocky peaks above tree line, but warned that if designated a national park, all mining claims, grazing rights, and private property would be subject to acquisition or extinguishment the same as other parks throughout the country. Nevertheless, interested parties formed the Great Basin Range National Park Association to pursue the designation and all three of Nevada's congressional delegation introduced bills to Congress that required the Secretary of the Interior to pursue the matter in 1958. One Nevada newspaper editorial happily stated that this attention proved the Great Basin was more than the "gravel and sagebrush" outsiders thought. State promoters were anxious to overcome Nevada's status as a wasteland and "bridge state," where visitors only travelled through the area on their way to other, more conducive recreational experiences. Besides Wheeler Peak and the Lehman Caves, the Snake Range

also contained twisted and ancient bristlecone pines, a six-story limestone arch, several small lakes, and a desert-bound glacier.[18]

However, the Forest Service had a vested interest in the investigation of the area as its designation as a national park would significantly diminish their administration of the surrounding national forest. The agency insisted on participating in a second investigation in such a manner that would allow comparison of the multiple-use capacity provided by existing national forest management to the potential recreational development of the area as a national park. At the same time the National Park Service recommended the creation of the Great Basin area as a park, the Forest Service had announced its intention to expand recreational development of the range as the Wheeler Peak Scenic Area under Operation Outdoors. This recreation area would protect some places from mining and grazing, but by and large, those activities, as well as hunting and fishing, would not be restricted. The Forest Service agreed with the National Park Service as to the unique merits of the Snake Range, from Lehman Caves, Wheeler Peak, and the Matthes Glacier to the two natural arches, many small alpine lakes, several of the most ancient bristlecone pines, and the world's tallest mountain mahogany tree.[19]

The BLM stood to lose acreage which provided grazing range for five livestock operations (fig. 61). There were also forty-seven outstanding land applications of various types in the area and six mining districts within the proposed boundaries which contained about twenty patented claims and 230 unpatented claims. Despite these in holdings, the excitement surrounding the park idea propelled Great Basin National Park forward. In 1959, the National Park Service recommended the establishment of a 147,000-acre park which would protect and showcase the region's distinctive ecology in addition to the

unique features of Lehman Caves and the geologic features such as Wheeler Peak. No single feature alone provided enough justification for establishing a national park, but taken together, they formed an outstanding example of the Great Basin's environment. The park designation also held great recreational potential for the area. The former director of the Nevada's Department of Economic Development Peter T. Kelley headed the Nevada Foundation for a National Park, an organization comprised of leading residents including former governors Vail Pittman and Charles H. Russell, and casino entrepreneur William Harrah, which solicited support and funds for a park. On September 9, 1959, Senators Alan Bible and Howard W. Cannon, and Representative Walter S. Baring introduced legislation to create Great Basin National Park.[20]

The arguments supporting and opposing the creation of a national park in the Great Basin came from a variety of groups and reflected current sentiments towards grazing on the public range and the multiple-use concept, embodied the desperate need of rural White Pine County, like others in the region, to diversify and grow their economy, and highlighted the place of the Great Basin environment in the range of the nation's natural wonders. Everyone seemed to have a vested interest in the process. The question posed in newspapers across the nation was "Should Mount Wheeler and its environs continue, under the United States Forest Service [and Bureau of Land Management], to be open to mining, grazing and lumbering, as well as recreation? Or should they be preserved as a national park, under the National Park system, in which case 'multiple use,' in other words, use for commercial purposes, would be banned, leaving recreation as the sole purpose?" The controversy surrounding the establishment of the park primarily consisted in part of the National Park Service and the National Forest Service territorializing their

different land-bases. The Forest Service believed the move to make the area a national park represented a "threat toward dismemberment of the national-forest system." In the Northern Cascades of Washington, Sawtooth Mountains of Idaho, and other locations throughout the American West, the two agencies had conducted a turf war that polarized land management between the Forest Service and its economically-based multiple-use concept and the National Park Service and its recreation and preservation mandate.[21]

Conservation columnist for the *New York Times* John B. Oakes, who served on the Department of the Interior's advisory board on national parks, pleaded with President John F. Kennedy to bring the competing land management agencies "into line and see to it that bureaucratic rivalries shall not damage the long-range national interest." Oakes thought "the greatest enemy to the creation of new national parks in the West is the United States Forest Service," which advocated multiple-use management of public lands to balance timber, grazing, mining, and organized recreation. The National Park Service protected nature to a greater degree, permanently guarding the scenic beauty of a place and the "remnants of the tranquil wilderness." Where the Forest Service aimed at "the controlled exploitation of the public lands under its jurisdiction," the National Park Service aimed at "the permanent protection and careful preservation *unimpaired* of selected areas of irreplaceable beauty or special significance."[22]

But in the Great Basin, the land management argument, beyond the territorial fights between agencies, its conception as preservation versus multiple-use, had an important economic aspect for the residents of White Pine County and other rural counties surrounding the proposed park. Both the Forest Service and the National Park Service had dedicated programs to developing recreational facilities that would facilitate outdoor

recreation for visitors. The question was whether recreation in the area should be a use balanced with grazing and mining, or whether recreation should be a dominant use in an area where once grazing and mining had filled that role. It was also a question of which interests were to be served and according to what scale; a well-preserved national park certainly addressed national interests and would draw national attention if not prestige, but multiple-use management for local livestock operators, miners, and recreationalists offered more benefit on a regional scale. The rhetoric about national parks and the Great Basin environment that different groups used to support their positions divulged where they placed outdoor recreation in the hierarchy of land use. Beyond the commercial versus preservation interests, the dialogue addressed the role of outdoor recreation.

Senator Bible conducted hearings in early December in Ely to gauge local, regional, and national response to the Great Basin National Park proposal. Opponents of the park generally took the position that Wheeler Peak and its environs was "'just another mountain,' far more useful for grazing, mining and hunting, than for 'locking up as a park'." Floyd Iverson, the regional forester in charge of the Intermountain Region based near Salt Lake City, believed that the area was "typical of many other western mountain ranges" and did "not have the unique and spectacular features that characterize our national parks," despite the agency's list of the area's unique features which had warranted a scenic area designation. The Carlin Sportsmen's Club, an affiliate of the larger Nevada Federated Sportsmen organization, argued that they did "not feel that the Wheeler park area in eastern Nevada would do justice to the State of Nevada as a National Park." But not all sportsmen agreed; Roy Torpey, owner of the Silver State Motel in Ely and a member of the Nevada Fish and Game Association, who had always

gotten his buck every fall said he would "much rather see these same deer in a park where we could all see and enjoy them."[23]

Louis D. Gordon of the Nevada Mining Association cautioned that "further land withdrawals, except those vitally necessary to National defense, are … inadvisable and not in the best interests of our State, or its economy … the economy and welfare of our State can best be served by the orderly and proper development of its natural and basic industries—rather than by withdrawing excessive areas of land within our State Boundaries in order to afford playground for residents of other States, whose economy is not affected by land withdrawals in Nevada." The mines in the Snake Range had produced about $6 million in gold, $4 million in tungsten, and the recently discovered beryllium ore, a mineral widely used by the defense industry as a hardener, could also be potentially profitable. Joseph Williams of the Nevada Farm Bureau argued that creating parks "for the sole purpose of recreation" disregarded "conservation and wise harvesting of the nation's natural resources." He wanted Congress to wait until the report of the ORRRC was released to determine if indeed this particular park was even needed.[24]

Fred B. Harris of the Nevada State Cattle Association warned that the organization was "seriously concerned about the growing tendency toward the creation of more and more areas for the <u>sole</u> purpose recreation." John E. Humphrey of the Nevada Wool Growers Association stated that "the Wheeler Peak Area in Eastern Nevada does not meet National Park qualifications," and "such area contributes more to the public through regular use of all its resources." George N. Swallow, whose ranch properties near Shoshone included the Swallow Ranch and the C-B Ranch, was one of the several ranchers set to lose both BLM and Forest Service grazing rights if the park were created.

Swallow was increasingly protective of his ranching operation. During the 1953 atomic testing series Swallow had contacted the Atomic Energy Commission (AEC) about damages to his livestock. His sheep herds on the east side of Mt. Wheeler had suffered the same effects as the Utah sheep. When the AEC investigated Swallow's animals, they determined that his herds had not suffered from exposure to radioactive fallout, but stomatitis or common mouth ulcers. He lost more than a quarter of his livestock. He argued that his grazing allotment on the northwest side of the potential park was the most important annual forage to their organization. Swallow additionally worried that a national park would also adversely affect the ranch's water rights. However, Swallow was not expressly adverse to recreational development. His C-B Land and Cattle Company owned the area around the old Ward mining district's charcoal ovens located about fifteen miles south of Ely. In 1956, Swallow leased eighty acres and adequate water to the state's park commission so that they could develop it as a state park with commensurate outdoor recreational facilities including campsites. In addition, Swallow also supplied deer hunters based in Ely with pack horses and wranglers to facilitate their experience for a fee.[25]

Proponents of the national park generally "declared the lands involved contain little commercially viable timber, are no more nor less pockmarked with dubious mining claims than other Nevada ranges and have scanty livestock carrying capacity." Whereas, they argued, the Snake Range had unique ecological and geological qualities, and that "the preservation of the ancient bristlecone pines and lofty Matthes Glacier alone" was reason enough to make the area a national park.[26] N.E. Broadbent, the mayor of Ely, argued that the land withdrawal for the park was actually taking the area out of private

use by a very small number of ranchers and miners and placing it into the public domain "to be used by millions of people as a place to enjoy."[27] The White Pine County Chamber of Commerce and Mines noted that the "establishment of the park is one of great economic importance to the whole State of Nevada." Because of its facilitation of the recreational tourist industry, a national park would potentially bring in more revenue than ranching and mining combined. White Pine Tourist Enterprises, a committee comprised of fifty members of the county's business community, agreed as did the Ely Lions Club and several other chambers of commerce throughout the state, including Las Vegas and Tonopah. They argued that "national parks are just about the greatest tourist magnet in the world."[28]

In addition, the Nevada Department of Economic Development also supported the park's creation because of the national prestige the designation brought to the state in addition to the potential economic benefits. Designating the area a national park, they hoped, would "launch a new era of respect for Nevada scenery, a new, solid phase of large-scale tourist business founded on the basic attractions of the state." The state department believed that Great Basin National Park would attract the same kind of visitation as Zion National Park and the other Utah parks within a day's drive, bringing in "tourists by the thousands." The Ely Riding Club felt that the establishment of Great Basin National Park was critical because there were "really few places to which to direct them [tourists] that [we]re scenic, and contain recreational attraction, with facilities for their convenience." The pamphlet on the proposed park featured colored photos of mountainscapes, visitors enjoying the scenery, and a map which placed the park at the crossroads of the American West (fig. 62 and 63).[29]

The national park, according to the Great Basin Range National Park Association, was not meant to hurt the local economy, but to help it. Darwin Lambert, the president of the association and the owner of the *Ely Daily Times* hoped that "ways might be found to secure the park and hurt no one in the process." Nevada's Governor Grant Sawyer agreed, commenting that he supported the creation of the national park provided satisfactory compensation was given to those holding water rights and grazing rights.[30] Despite the diversity of opinion, opponents and proponents of the park alike advocated better use of the Great Basin environment and improved economic conditions as a result of that better usage. Those representing extractive industries looked to the multiple-use concept for justification and those representing preservation or outdoor recreational groups looked to the success of protected nature in the national park system for their justification.

Between 1960 and 1962, the debate over creating Great Basin National Park created intense discussion about the appropriate size of a national park in the region and the role it would play in creating jobs and facilitating local economics. In May of 1960, Senators Alan Bible and Howard Cannon introduced a park bill that attempted to "reconcile divergent views of conservationists and local mining and grazing interests." The proposal reduced the acreage to 124,540 acres and provided that "prospecting and mining as well as grazing [would] be permitted in the area." As the bill worked its way through committee, the Senate added a hunting provision. The compromises in the bill, however, only served to call into question what characteristics comprised national parks. Should they contain hunting, grazing, and mining opportunities? Rancher George N. Swallow expressed concern that while the legislation allowed for existing grazing rights, the bill

made it “impossible for a permittee to transfer or dispose of grazing privileges to another party” which would “greatly reduce the value of all base property of any permittee using grazing lands within the boundaries of the proposed Great Basin National Park.”[31]

The Nevada Bureau of Mines believed the bill did not “protect adequately the development of mineral resources for the economic strength and military security of the United States” because it located decision-making power over mining with the Secretary of the Interior instead of the traditionally permissive BLM. The Department of the Interior planned to eventually eliminate grazing in the national park to “promote restoration of the natural ecology of the region” and determine the mining and mineral leasing activities on a restricted basis as had been done at Glacier Bay National Monument in Alaska in order to assure the “protection of the scenic, scientific, and recreational and other natural values of the lands containing them.” The Nevada Federated Sportsmen continued to oppose the park on the basis that it “would have no wildlife management,” just a lot of wildlife that could not be hunted.[32] Secretary of the Interior Stewart L. Udall believed the concessions to the livestock and mining industries reasonable, but ranchers, miners, and hunters thought otherwise. These interests ultimately preferred to interpret multiple-use consistent with the traditional commercial user hierarchy long established in the Great Basin in which mining took precedence along with homesteading, and public lands grazing filled the spaces in between.

But national parks typically did not have provisions for grazing and mining, and did not allow hunting activities within park boundaries. National parks offered protected nature reserves along with service amenities to outdoor recreationalists to facilitate their enjoyment of nature. Conservation groups such as the Sierra Club thought these

concessions were necessary, but temporary, measures to help secure the park. Richard C. Sill, chair of the organization's Toiyabe Chapter warned the White Pine County Chamber of Commerce and Mines that if the proposed park was "not a true national park because of certain dubious provisions in the law," the county's ability to secure increased revenue from park visitors could be impeded. Sill reminded them that "tourists do not come to a national park to see cattle or sheep or an overgrazed remnant of meadows or forest" or the "highly unsavory destruction of scenic values when big mining concerns get into operation." He thought Great Basin National Park in the fall would draw "a large number of non-hunting tourists during hunting season" which would make "tourists fear their children may be potted [shot] by careless hunters."[33]

In the new wave of national park expansion, the Department of the Interior focused attention on creating new outdoor recreational spaces and preserving key ecologies representative of Starker Leopold's vignettes of primitive America. But in the absence of iconic landscape such as was found in the early parks, those "superlative examples of natural beauty, altered as little as possible from their natural state," new parks were difficult to justify, especially in isolated regions such as the Great Basin. Some national park advocates criticized this expansion program, arguing that several new parks were "below the standards of grandeur and public interest of the national park ideal," citing examples that included the proposed Great Basin National Park which was a "multiple-use hybrid." Nevertheless, the National Park Service could not be said to compromise on their recreational ideal for long. At Capitol Reef National Monument, a magnificent geologic swell in the center of Utah with a strong Mormon cultural history, the agency began upgrading the area to "more rigid national park standards." This process included

eliminating private holdings and off road vehicle traffic, rerouting roads, and closing trails for rehabilitation.[34]

However, by mid-1962, the proposed concessions had reached an unacceptable level. Whereas the Senate's version of the park retained the vast majority of the original proposed acreage, when the bill arrived at the House of Representative, the new version significantly reduced the size of the park to about 53,000 acres, almost a quarter of its originally proposed size, having stripped off potential mining areas and grazing ranges. Secretary of the Interior Stewart Udall wrote Representative Wayne N. Aspinall, chair of the House Committee on Interior and Insular Affairs, of his dissatisfaction. Udall warned that the remaining acreage would not allow the area to qualify as a national park. Among the areas removed were the Lexington Arch, Mount Washington, Big Wash and Willard Creek, and a big forest of bristlecone pines, all of which were important tourist attractions. Udall accused the mining and grazing interests that met a month earlier of stripping the park of its essential value. Nevada Representative Walter S. Baring had called the meeting in early June after Senators Alan Bible and Walter Cannon accused him of "dragging his feet" in pushing the bill in the House of Representatives. Besides the White Pine County Chamber of Commerce and Mines, George N. Swallow, representing the livestock interests, James D. Williams, representing those interested in the beryllium claims, and a representative of the giant mining magnate the Anaconda Company met to hash out their differences which resulted in a recommendation for a smaller park. They argued a larger park would hurt the state's industrial development and that a smaller park, though not what the community and chamber of commerce had originally wanted was nevertheless "a beautiful start."[35] This seemed to be the central

issue blocking the creation of Great Basin National Park. A national park designation would preclude industrial development, actual current development, and future potential development.

George N. Swallow represented the perspective of most ranchers in the Great Basin, albeit he was more ambitious, diverse, and entrepreneurial in his endeavors. Between his positions in the livestock industry, as president of the Eastern Nevada Telephone Company, and his place in the White Pine County community in general, Swallow was in a very influential position and his opinion about the national park carried much weight locally. In 1961, Swallow and twenty other businessmen had accompanied Nevada's governor Grant Sawyer to Detroit to solicit interest in bringing industry to the state. Previous trips for the same purpose had included New York, Chicago, Cleveland, and Dallas where the governor drew attention to the state's transportation potential, favorable tax structure, amount of land available for industrial development, and the relaxed attitude of Nevadans in general.[36] That same year, Swallow served on the national grazing advisory board as it transitioned to the new multiple-use advisory board, a step which broadened the membership to include timber, recreation, wilderness, and "other non-livestock groups" and severely decreased the influence of the livestock industry in managing public lands. At the annual meeting of the state's chapter of the American Society of Range Management, Swallow presented a paper entitled "The Place of the Nevada Rancher and His Place on the Public Lands," which outlined the fundamental role and benefit he believed livestock production to have on the public domain. Swallow fundamentally believed that the livestock industry was important to Nevada, and was a higher use, if not the highest use, of the region's public lands as indicated by the Taylor

Grazing Act. Recreation was important, but supplementary especially considering outdoor recreation relied on an influx of outsiders to sustain. Swallow and other ranchers in the area were not necessarily prepared to trade the known income of ranching and mining for the devil's bargain of tourism. Swallow opposed the park if it interfered with the region's commercial and industrial prospects.[37]

Swallow also wrote a long letter to Representative Wayne N. Aspinall in response to Udall's public remarks about the compromise bill in the House, making his frustration over the creation of Great Basin National Park and his dislike of Secretary of the Interior Stewart L. Udall abundantly clear. Swallow wrote on behalf of the "life long citizens of the area in question" that the Department of the Interior under Secretary Udall had "ridden over rough shod" the "duly elected park committee" which had clearly decided to reduce the proposed park's size to exclude potential mining resources and existing grazing rights. He pleaded "Nevada needs industry, and to create industry we must to a major extent, encourage the development of mineral resources." Including the beryllium deposits in the park would "spell death to a new industry for Eastern Nevada plus the loss of payroll for an already shrinking local economy." Swallow accused Udall of being "no friend of agriculture or business," citing that current Department of the Interior policies were "adverse to the continuity or peace of mind of the livestock operator." Swallow believed Udall's "refusal to consider any compensation for the removal of valuable grazing rights in the face of the vast amounts of money that will be spent for other purposes in the park, show[ed] his gross unamerican [sic] attitude toward a moral concept of all americans [sic]; namely 'look to the welfare of our minorities.'"[38]

Swallow took issue with the importance Udall placed on such "vague and dull subjects as ecological and biological study areas" and challenged Udall to "show the people of Nevada why anyone would be interested in wasting vacation time in this and many other areas of the [proposed] park area." He did not understand the value placed on the park's attributes such as the bristlecone pine or the Lexington Arch. He wrote the bristlecone pine had "no peculiar beauty," but was "homely, stunted, [and] gnarled," and that the arch could not compare to those on the Colorado Plateau in Utah. The Forest Service had not seen fit to develop the area for recreation in its several decades of management and Swallow did not understand what justified their recreational development in his time. He believed that any recreational improvement "might open the area to transient travel, thereby opening this area to souvenir hunters and tourist who would not treat the area with the respect that our native population does." He concluded with a warning, writing "we see a dark cloud rising ominously between ourselves and the public lands offices" because of the Department of the Interior and Secretary Udall's "socialistic, land grabbing policies."[39]

This letter echoed a similar letter written by James D. Williams of Wheeler Mines, Inc., the mining company set to develop the beryllium deposits in conjunction with the Anaconda Company, to Nevada Representative Walter S. Baring. Williams stated that the reduction in proposed park acreage was the only way to ensure the protection of mining and grazing interests so that they were not subjected to the oversight of the Department of the Interior. He complained that "the Secretary [of the Interior] has no basic right to ride roughshod over all private interests in this area, most of which having been established long prior to any thought of a national park." Even the Nevada Wildlife Federation

opposed the creation of a national park. The organization preferred designating the area a national scenic or national recreation area to protect multiple-use practices in the region.[40]

The struggle between Swallow, Williams, the White Pine Chamber of Commerce and Mines, and the Department of the Interior under Secretary Udall represented the larger struggle between private commercial and industrial interests and national environmental and recreational interests. Udall and the National Park Service could not compromise the fundamental natural principles embedded in the national park ideal in the establishment of Great Basin National Park and many local interests could not bet on the park replacing the economic income they were certain would be generated from mining, grazing, and even hunting. Udall had no intention of ramming a park "down anybody's throat" and no one locally doubted that outdoor recreation could coexist under the multiple-use concept. The National Park Service was willing to compromise on allowing mining and grazing temporarily and indeed had made similar provisions in other park bills during the same time. The agency could not, however, buy out the grazing privileges as Swallow suggested because, as Senator Howard Cannon stated "grazing has always been considered a privilege extended by the Government rather than a right inherent in the permittee." Cannon noted that similar suggestions in the past had been "violently opposed" by Congress. But the interests in White Pine County could not in the end justify elevating outdoor recreation to an equal or higher level with commercial interests. To do so would be "socialistic," serving the greater good of the nation by providing for recreation to the eventual exclusion of local private mining and grazing interests.[41]

Asking Swallow, Williams, and most of White Pine County to accommodate the Department of the Interior without a guarantee of economic benefit ran counter to their sense of self-preservation, especially since the major supporters of Great Basin National Park were from urban areas such as Reno and Las Vegas and included the likes of academics, activists, and some supporters from outside the state. Swallow believed that Great Basin residents lived on a federal reservation, shut out from normal economic progress and unable to reap the economic benefits associated with private property. Representative Walter Baring agreed, declaring that the "people," meaning the local residents that lived near the park, comprised the "public" that owned the park land. He accused Secretary Udall of trying to override the desires of these local residents. All the state's Department of Economic Development wanted was some kind of national park, as did the White Pine County Chamber of Commerce and Mines. They embraced the multiple-use concept even for national parks. But the Department of the Interior could only relax the standards for national parks so far. As a result, the entire endeavor fell apart at the end of 1966. Succeeding bills to create Great Basin National Park continued to fail in Congress until Senators Alan Bible and Howard Cannon, and Representative Walter Baring eventually ceased introducing them.[42]

Canyonlands National Park on Utah's Colorado Plateau had similar issues related to its creation, including opposition from mining and grazing interests, lost access to natural resources for commercial and private development, and the discovery of a potentially profitable oil reserve. But unlike Great Basin National Park, it received the approval of Congress on September 12, 1964. The Canyonlands park proposal succeeded in large part because of the general acceptance of Utahans of the benefits of outdoor recreation to their

state. Between Zion and Bryce Canyon national parks, as well as Arches and Natural Bridges national monuments, residents of the state already benefitted from protected nature designations that attracted outdoor recreationalists to its scenic wonders. Nevada had no such experience in the early 1960s. Some Utahans questioned the qualifications of Canyonlands as a national park, but the scenic value of the Needles and the importance of the confluence of the Green and Colorado rivers was difficult for critics to deny. Nevadans, however, decried the scenic value and natural worth of Wheeler Peak, the Lexington Arch, and even Lehman Caves. In addition, the biggest promoter of the park in Utah, Senator Frank E. Moss, who had pushed the park idea and the mining and grazing protections from the beginning, was willing to make compromises rather than lose the park altogether. Where the Utah congressional delegation was able to hammer out their differences on park boundaries and temporary mining and grazing access, the Nevada delegation was miserably stuck in their polarized positions. When it came down to retaining mining access or losing the park, Senator Moss opted to compromise in favor of retaining grazing and securing an important land exchange. The architects of the final Canyonlands National Park bill believed they had "done the best thing for Utah and the right thing for the country."[43]

The national park idea proved a failure in the Great Basin, but that was not the only category of protected nature denied the region. The area also did not more than one wilderness designation. Residents of the region had not embraced a national park except as a token landscape that did not contain most of the natural features the Department of the Interior viewed as park-worthy. When the Wilderness Act passed in 1964, Congress deliberately excluded BLM lands, thereby eliminating any wilderness on the vast

majority of the Great Basin's public lands. Only the token Jarbidge Wilderness, a 65,000 acre area in a remote corner of the Humboldt National Forest in the Jarbidge Mountains on the Nevada-Idaho state line, received a legal designation. The absence of a national park and multiple charismatic wilderness areas was telling. Without a national park and wilderness areas, the two public land designations most closely associated with outdoor recreation, the Great Basin had only unorganized and vaguely delineated recreational opportunities. Its environment was still perceived as a wasteland and suitable only for extractive commercial industry as opposed to protection and preservation.[44]

White Pine County residents themselves preferred the authority of the multiple-use concept practiced by the Forest Service and the BLM, especially as stated in the 1960 Multiple Use Sustained Yield Act (MUSY) and the 1964 Classification and Multiple Use Act (CMUA). These acts, while they clearly allowed for outdoor recreation on an equivalent basis, did not elevate recreation to the level that would attract the numbers of visitors as did national parks. Yet Ely and the surrounding region suffered economically because the movement to create the national park failed. The major employer in the area, Kennecott Copper Mines closed within a decade of the park's demise, severely affecting the area's economic state. In the Great Basin, outdoor recreation actually ended up subordinate to commercial and industrial interests through the failure of Great Basin National Park.[45] Of the eleven western states, Nevada had the most recreational potential because of its vast area of public lands, but had the least amount of outdoor recreational visitation (fig. 64-67). In part, this was due to the popularity of national forests for outdoor recreation, as was clearly demonstrated by California's national forest visitation numbers, but it was also due to the lack of specific area that had a recreational identity in

the region. The unregulated and undeveloped public land in the Great Basin attracted recreationalists, but not to the same degree national forests, national parks, wilderness and recreational areas did.

But what Swallow, Williams, and the White Pine County Chamber of Commerce and Mines did not understand was that without a focused place to engage in outdoor recreation, the growing number of outdoor recreationalists in the Great Basin would simply go where they wanted and impose themselves on rural residents in other ways. With no designated facilities and emergency services readily available, recreationalists often relied on the nearest residents to provide gas, water, and even fix the occasional flat tire or provide other forms of assistance. The Uhaldes, Sharps, Fallinis, and other ranchers complained about motorists who scared the livestock and crashed carelessly into the sides of barns and trailers as they careened around blind corners.[46] The BLM did not regularly track the numbers of visitors to unregulated public lands and land mangers rarely provided supervision and rule enforcement. Yet with the numbers of recreationalists increasing in regulated areas, it was reasonable for land managers to assume that use also increased in unregulated areas. Outdoor recreation visitation throughout the 1960s increased consistently in national parks, national forests, and even on BLM lands (fig. 68). The passage of the Federal Land Policy Management Act (FLPMA) in 1976 only served to further increase the ability of the BLM to facilitate outdoor recreation, elevating it to a dominant use in some areas. The multiple-use framework preferred by Great Basin residents and national pressures to facilitate outdoor recreation also had an additional effect. In order to make room for recreation on the nation's public lands, the Department of the Interior had to finally end the land disposal

process through the old agricultural land laws. The growth of outdoor recreation caused the homesteading process to end.

The End of Homesteading and Rise of Multiple-Use

Marion Clawson, the second director of the BLM and the first administrator to provide the agency any kind of cohesive direction, commented in the late 1950s on shifting public perception of the nation's public domain: "Only a few decades ago most of these lands were submarginal for use under the circumstances of that time," he wrote, "today most such lands are in heavy demand." Clawson predicted that under such conditions, in which public land users increased in number and variety and the amount of public land available for use decreased, "problems of administration, especially of multiple use administration will become greater." Clawson believed the "range and complexity of policy and management decisions" would increase as more and varied groups sought additional uses which were incompatible with other groups. But, he wrote "at the same time, the public support for a continuation of federal landownership may well rise above the present level, which we have judged to be great enough to prevent any move for major disposal of federal lands." For Clawson, this meant entering a new era of federal land management which required intensive planning and larger investments, and which would produce greater revenues through permitting, leasing, and land sales. Clawson believed each public land user group would turn to the federal government to balance their varied interests since compromise agreements were better than exclusionary ones, especially if exclusion meant the elimination of particular public land uses.[47]

By the end of the decade, outdoor recreation had increased above all other land uses, and at the same time more land applications were filed than in any other period since the

1910s. This increase corresponded with the postwar suburbanization trend and boom in western migration. But instead of the detached single-family home, Americans applied for parcels of public lands just beyond the suburban edge of town. The suburbanization process in the post World War II era, had three important characteristics: the avoidance of city-centered living, the desire for a house, and the high quality of life available in nice residential areas The difference between suburban living and filing for a homestead was in how some people defined a high quality of life. Most suburban-dwellers defined it as a living in a nice neighborhood. Public land applicants defined it as owning acres of property. Both groups looked for inexpensive options in order to create their desired quality of life.[48]

In addition, a wave of environmental literature advocating better wildlife management roused public opinion against technologies and commercial interests which had caused enormous losses in wildlife species and severe degradation to their habitats. Aldo Leopold's *A Sand County Almanac* (1949), biologist Rachel Carson's *Silent Spring* (1962), Secretary of the Interior Stewart L. Udall's *The Quiet Crisis* (1963), and the Advisory Board on Wildlife Management's report "Wildlife Management in the National Parks" (1963) known as the Leopold Report, popularized a new vision of public lands management which reconfigured the public's conception of the multiple-use concept relative to the newly-embraced belief in the scarcity of public lands and their natural resources and wildlife. Rather than view natural resources in terms of economic gain and scenic places as worth preserving for their view-shed quality, this literature embraced the environment itself. It also effectively placed humans within ecological systems by discussing human impact on the environment. These works frightened many readers,

reminding them that the outcomes of technology such as pesticides, automobiles, nuclear testing, and modern medicine had both positive and negative impacts. The authors believed that the environmental and bodily degradation of using these technologies ought to make Americans think twice about the costs association with the nation's progress.[49]

However, accommodating a greater number of public land users with more careful ecological management of public lands proved nearly impossible. The multiple-use concept was predicated on the belief that federal land management agencies acted to provide the greatest good for the greatest number of public land users, which qualified as the highest use of the land. Public lands management had always been accomplished through a human-centric view of natural resources; timber, forage, and even wildlife were ascribed a utility value in so far as they facilitated human economic and technological progress. The Great Basin's wasteland had little value in this way except for a small group of livestock operators, a few fortunate mining corporations and prospectors, and the nation's military. Ascribing an innate value to the Great Basin's public lands and protecting the region's wildlife, watersheds, and vegetation for their existence value and the public's enjoyment through outdoor recreation shifted the focus of public lands management to an environment-centric view of natural resources. Making these two views compatible proved frustrating for commercially-oriented public land users, outdoor recreationalists, and land managers alike.

Under Marion Clawson, a native Nevadan whose parents ran a small livestock operation near Elko, the BLM had focused on managing grazing resources in conjunction with ranchers using public lands, oil and gas leasing, timber resources on the former Oregon and California Railroad lands in Oregon, and processing land and mineral

applications. Clawson, with the smallest budget of the major land management agencies, worked to attain efficient, professional, scientifically-based, decentralized land management and increase the agency's Congressional budget allocation and its revenues from federal lands uses. Clawson emphasized the multiple-use concept in decision making, a framework of management he derived from the language of the Taylor Grazing Act and the precedent set by the Forest Service. For example, grazing advisory boards throughout the American West included one wildlife representative by the 1950s. But multiple-use was not a clear mandate for the BLM.[50]

The remaining public lands managed by the agency in the American West, especially in the Great Basin, were really meant for agricultural production or for resource extraction. As previous public land commissions had declared, the region's remaining public land had to be put to some economical purpose or it went to waste. Critics of the BLM, such as writer Bernard DeVoto, accused the agency of succumbing to commercial interests that exploited and degraded the nation's public lands.[51] More accurately, the agency reflected the public's will through Congress and the executive towards the nation's remaining unclaimed domain by serving commercial interests, which served the national interest, by placing the land into some kind of economic production. Commercial interests, whether individual or corporate, dominated public land policy until the mid-twentieth century and continued to remain a powerful voice in land planning, representing one aspect of the national will. But by 1960, another strand of the public's interest redefined what the greatest good for the greatest number meant in public land management. Non-commercial agendas such as recreation, wildlife, and preservation of

open space promoted a more cooperative view of land management which emphasized the value of public lands as the last remaining unsettled places to recreate in and enjoy.

Bernard DeVoto's vision of public lands and their natural resources, as owned by the nation to be managed in the public interest, finally took hold with the Kennedy administration and the president's newly-appointed Department of the Interior staff. Like DeVoto, the new Secretary of the Interior Stewart L. Udall, a native Arizonan, believed the American West needed the federal government to both protect the region from colonial exploitation and internal abuse. In a speech to the Conference on the History of Western America in Santa Fe October 13, 1961, Assistant Secretary of the Interior John A. Carver, filling in for his boss at the last minute, expressed the new secretary's vision of land and natural resource management. Both Carver and Udall had been profoundly affected by the writings of western historians and their new conservation policies reflected the scholars' increasing criticism of the exploitation of the western environment. Carver stated that DeVoto's essays in *Harper's Magazine*, such as "The West: A Plundered Province" and "The West Against Itself," had a profound effect on his vision of public land management. Carver embraced historian Walter Prescott Webb's premise that the heart of the American West was a desert and that the region's aridness created fundamental "deficiencies" which limited its development. Webb's essay on the subject in the May 1957 issue of *Harper's Magazine*, "The American West: Perpetual Mirage," stirred public outcry in several western states after Senator Michael J. Mansfield of Montana had the article printed in the Congressional Record.[52]

Several outraged senators, namely Wallace F. Bennett of Utah and Arizona's Barry M. Goldwater, objected to Webb's use of the word deficient, which they interpreted as

describing the region's value to the nation. However, many Great Basin residents and some in the Southwest saw things differently; as the center of Webb's western desert, attempts to conform development in these regions to national standards of prosperity had left its minimal water resources depleted and its society second-class. Carver declared, on behalf of Udall, that the old pattern of land and natural resource management driven by a "Neanderthal morality" and "the luxury of frontier wastefulness" was at an end. Besides these western historians, Carver praised several Congressmen elected in the late 1950s who were more than happy to help facilitate this shift; senators Clinton P. Anderson of New Mexico, Alan H. Bible and Howard W. Cannon of Nevada, Idaho's Frank F. Church, Michael J. Mansfield and Lee W. Metcalf of Montana, Washington's Henry M. Jackson, John A. Carroll of Colorado, Alaska's Edward L. Bartlett, California's Clair Engle, Gale W. McGee and John J. Hickey of Wyoming, and Utah's Frank "Ted" Moss demonstrated "fierce devotion to the public interest and the conservation and management of the public's resources."[53] This sea change in public land management began with the BLM's land applications moratorium in 1961, which profoundly affected the Great Basin, making its preponderance of public land permanent.

In 1961, almost three-quarters of Great Basin lands were still open to settlement. Contrary to traditional scholarly accounts, the "public land frontier" did not close with the Taylor Grazing Act, which merely created an interim state of use for public lands forage resources pending their final disposal.[54] During the 1950s, land applications under a variety of disposal authorities increased dramatically. Besides a single-family home, Americans in the post-war period also wanted land. Alaska provided the best opportunity to file for land public land titles under the old Homestead Act, but the Great Basin and

Southwestern states offered similar opportunities in the in the continental United States under the Desert Land Act (fig. 69). Applications under this land disposal law nearly tripled between the late 1940s and the late 1950s. Of those applications filed, the BLM approved less than one-third (fig. 70). In addition, the Small Tract Act, under which Americans could buy or lease five acres or less and which did not have the same agricultural development requirements as earlier land disposal laws, fueled the possibilities of owning land and building a home on the outskirts of cities and rural towns which abutted public lands. Originally created to facilitate and control settlement in Alaska but easily applied to public lands elsewhere in the country, Congress amended the act in 1954 to allow corporations, associations, local government, as well as individuals to buy or lease land for residential, commercial, recreational, and community purposes. In 1953 alone, Americans filed more than 40,000 land applications total and by the next year that number had increased to 60,000.[55]

Clawson's successor at the BLM, Edward Woozley, described the situation as "unprecedented"; though the number of applications alone were less than during the famous nineteenth-century land booms, increased affluence and technological advances had made lands once considered barren potentially productive. The Eisenhower administration, reacting against the perceived public lands lock-down created by former Secretary of the Interior Harold Ickes during the war, had encouraged the sale and privatization of public lands. This caused a veritable land-rush. But the BLM had to approach the problem through selectively granting land patents after careful research, rather than through summary disposal, because much of the land under application remained unsurveyed, the necessary water resources unknown, and often multiple

applicants filed for the same lands. In addition, applicants were often unaware that increasingly the land for which they made application was subject to competing applications for other purposes. The same parcel of land could be simultaneously under Desert Land Act application, Small Tract Act application, the mining laws, and were usually also part of grazing districts. Under the temporary withdrawal of the Taylor Grazing Act, these lands continued "to be available for the filing of applications and for disposition under the nonmineral public land laws" because not all public land had yet been specifically surveyed and classified. The agency warned potential homesteaders in their informational pamphlet on the subject that although the homesteading laws still existed, "much of the land that would be good for a farm homestead is now already in private ownership." But the demand for land, similar to the demand for houses in the post-war years, caused many hopeful owners to ignore the agency's cautions. This produced a terrible backlog of paperwork and frustrated land applicants. The BLM closed on less than half their land applications annually.[56]

To address the overwhelming amount of paperwork generated by increased numbers of applications, on February 14, 1961, Secretary of the Interior Stewart L. Udall announced an 18-month land moratorium on the filing of non-mineral land applications. Udall stated "many earnest citizens have manifested the great American ambition to own a piece of land by filing types of applications which the Government could not efficiently handle." He indicated the "temporary suspension of the privilege of filing applications and petitions under the public land laws" would allow the Department of the Interior "to review the entire land management picture, eliminate work backlogs, and develop long-term land management policies and programs."[57] This was not an unprecedented

decision. During the previous administration, BLM Director Edward Woozley, at the request of the House Government Operations Committee, ordered a 60-day suspension of "all public land sales and transactions" involving land appraisals pending a review of the land appraisal process which clarified the price of small tract sales and leases in particular. During that time, the BLM worked to enact a program that attempted to end land speculation practices under the agricultural settlement acts and all other land acts.[58]

However, Udall's language indicated an important shift in the Kennedy administration's view of land disposal. According to the new Secretary of the Interior, unscrupulous Americans had abused their privilege of acquiring public lands; their unrestricted filing of applications had "seriously impeded both the orderly and expeditious disposal of public lands," wasting taxpayer dollars. The moratorium brought the entire previous land disposal process to a screeching halt, for at the end of the moratorium, the Department of the Interior planned to have a new set of policies in place, putting "public land development on a much more sensible programmed basis." In addition, while the moratorium was in effect, the BLM hoped to "undertake a large-scale land inventory program" to "classify, open and make appropriate lands available for transfer to States, local governments, individuals and business firms."[59]

The same day Udall announced the moratorium on land applications, the new Secretary of the Interior also explained the BLM's new public lands conservation policy which established a "public interest test" for requests to transfer land out of the public domain. The BLM had been defining the public interest as "that which will benefit the most people for the longest period of time, or that which will do the greatest good for the greatest number of people over the long haul." Udall reinterpreted this principle to mean

that careful use of public land and its natural resources would result in the longest term of use and the most beneficial use. The agency planned to retain lands which could not be properly developed under existing land laws and were inadequate for agricultural development, requiring "a full return" for its property monetarily and in terms of other benefits.[60] The federal government only a decade before had loosely regulated the land disposal process and preferred volume of disposal over quality of disposal. This situation which had invited rampant land speculation instead of careful disposition because the basic assumption of the federal government had been that the best use for land was to place it into private hands and onto the county tax rolls. Under Udall, the BLM thereafter only reluctantly privatized acres in the public domain.

The moratorium solicited an immediate public outcry from four western senators; Wallace F. Bennett from Utah, Henry C. Dworshak of Idaho, Gordon Allott in Colorado, and Arizona's Barry Goldwater protested Udall's unilateral suspension of most of the nation's public land laws. They accused the Secretary of the Interior of usurping Congress's authority to manage the public lands and using a guillotine instead of a scalpel to solve the problem of unethical land disposal. Udall responded that the moratorium would actually prevent the unnecessary rejection of most of the applications and reminded the senators that it had originated out of a study conducted by the House of Representatives' Committee on Interior and Insular Affairs under Clair Engle of California and Wayne N. Aspinall of Colorado. Rather than stifle development in the American West, Udall reminded the senators that cleaning up the land application process would create a more appropriate pattern of land use which would "stabilize tenure status and provide for conservation."[61]

In the Great Basin, Nevada's two senators, Alan Bible and Howard W. Cannon, assured their constituents that the moratorium would speed up the approval process by dealing with the backlog of applications before allowing new ones to be filed. Next to Alaska, the Great Basin had attracted more land applications than anywhere else in the country. In Nevada, the BLM struggled withover 15,000 land application cases in the late 1950s, and by the time the land application moratorium took effect, the BLM had already reduced the number of applications to 6,300. Of those, 1,300 were pending Desert Land applications, many of which the state BLM office suspected arose out of land speculation and promotion activities ongoing in Texas. Most of the other applications consisted of Small Tract filings around Las Vegas and Reno, though a few were Pittman Underground Water Act entries, a land law specifically designed in 1919 to encourage settlement in Nevada.[62]

The moratorium did not affect BLM public land sales near cities such as Reno and Las Vegas which met the demands of an increasingly urban state. Where rural Nevada counties preferred to privatize public lands and bring them into the tax rolls, it was much more important to facilitate the growth of Reno and the burgeoning Las Vegas Valley, the two economic drivers of the state. This was also true in Utah. The State Land Board eagerly sought to take advantage of booming land prices driven by high demand by selling even arid state lands to fund public schools and bring more land into the county tax rolls. These lands were important to the growing state, but did not fuel the metropolitan expansion of the Wasatch Front. Rather, the sale of land to private individuals fulfilled the state's ideological mission of supporting small farmers and

privatized public land to help fund counties.[63] On the surface, the land moratorium seemed good for the Great Basin.

But in Lincoln County, Nevada, the Rural Development Committee (RDC) based in Caliente, reacted immediately against the Department of the Interior's land application moratorium and the new public lands conservation policy. The RDC, which included local business owners as well as ranchers such as Floyd Lamb, wrote Senator Howard Cannon that the county's severe unemployment conditions due to mine closures and railroad reorganizations had decreased the area's population as many residents left for Las Vegas to look for work. This had left the county and its remaining residents in dire financial straits (fig. 71 and 72). In 1956, the federal government had enrolled the county in its pilot rural development program which prompted the creation of the RDC, a local group tasked with investigating ways to improve the local economy. The RDC worked closely with the BLM, Soil Conservation Service, Nevada State Engineer's office, and the University of Nevada to locate public land parcels that could be developed for agricultural use which would put residents to work and increase the county's tax base. Several individuals applied for agricultural acres under the Desert Land and Pittman acts in Penoyer, Coal, Garden, and Lake valleys, totaling about seventy-five applications. All of the applicants, a few land developers from Las Vegas and some local residents, fronted the funds necessary for locating and acquiring underground water resources which would be used to irrigate hay fields and grow alfalfa, vegetable, and other seed crops, potentially doubling the agricultural income in the county. Until the shift in public land policy, the BLM had slated more than half of these applications for approval.[64]

The land moratorium bought time for the BLM to evaluate the region's land applications and determine if releasing grazing range to agricultural development was the best use of the land. The delay in land applications stabilized the status of the Whipple and Uhalde grazing allotments. In Coal Valley, the nine Pittman Act proposals covered nearly 6000 acres and if approved, would have reduce the Whipple and Uhalde livestock operations on their respective grazing allotments by 6% each. The applicants for the land in Coal Valley encouraged the Whipples and Uhaldes to sign a form waiving their right to protest the proposals in order to benefit the larger economy of Lincoln County. However, by mid-1961, approval on these and the other applications were delayed as BLM officials reviewed their validity relative to the new conservation policy. Secretary Udall adamantly discouraged approval of land applications which allowed agriculture on barely productive lands, especially those which appeared to rely on unknown or already appropriated water resources, as was the case for applications in Coal, Garden, and Lake valleys. Applicants in those areas had not received water rights from the State Engineer's office nor had they adequately located and developed new underground water resources. Without secure water resources and with the land unsuited for agriculture, the BLM had no choice but to deny most applications for agricultural land in Lincoln County. By April 1961, the BLM had approved fourteen of thirty Desert Land entries in the Penoyer Valley, two of thirteen applications for Desert Land entries in Lake Valley, and none of the thirty Pittman entries in Coal and Garden valleys. This severely disappointed Lincoln County's RDC; one resident of Caliente complained "the Udall policy has certainly put a halt to any hope of Western progress."[65]

By the end of 1961, Secretary Udall announced that the BLM had made significant progress in dealing with the backlog of applications. In particular, Udall highlighted the thousands of small tracts available in states such as Arizona and California and stated the moratorium would expire as expected in September 1962. However, under Udall's new land conservation policy, the BLM no longer allowed agricultural entries which would deplete existing water table levels in the desert Southwest and the Great Basin to "give strong protection for farmers and water users on or near public lands and assure that the programs of the Department of the Interior encourage water conservation, and do not contribute to the unnecessary depletion of underground water reserves." This measure eliminated homesteading in the driest parts of the American West.[66]

Arizona was the first state to feel the brunt of the new policy; Udall turned down all 300 homestead applications in the state. The same pattern was repeated in other arid areas to the frustration of applicants. In the Great Basin, hundreds of disappointed potential land owners, some existing landowners looking to expand their current livestock or farming operations, expressed their frustration to their congressional delegates. Pittman Act applicant Edward E. Willhoyt of Yerrington, Nevada, complained that after spending fifteen thousand dollars drilling for water, the BLM denied his land application and those of his brother and partner for an area east of Yerrington because "some big ranchers protested" their use of underground water resources. Desert Land applicant Margaret Barber from Winnemucca believed that the BLM unfairly denied her application for 320 acres to enlarge her original homestead, but approved "real estate promoters and big-money operators." But the Nevada State Supervisor stated Barber's application was denied because "there was insufficient water available for the irrigation of the land on a

sustained basis … the available water supply in the Quinn River Valley Basin [was] already allocated to existing agricultural developments."[67]

The vast amount of public land in the Great Basin and other public land states, was deceiving and the number of applications reflected both the public's demand for land and the perception of its availability. But the BLM told potential homesteaders in the Great Basin that "misuse of the land, wasting it on purposes for which it was never intended, is a luxury of long-dead years when land was our cheapest commodity." Land suited for agriculture under the old laws, the agency told homestead hopefuls, was "severely limited." The BLM redirected applicants' interests, recommending purchase or lease of small tracts in urban or suburban areas for "homes, businesses, or community sites" that abutted public lands away from other federal lands, such as national forests, national parks, and the new wilderness areas.[68]

But the issue of land applications in the Great Basin had not yet been resolved. On June 4, 1964, the Department of the Interior announced the closure of agricultural land filings in Nevada, especially Desert Land Act entries, pending groundwater and soil studies that would determine what lands, if any in the state were suitable for agriculture under the new land conservation policies. In the state's seventeen counties, most of the so-called vacant public lands existed within grazing districts; only Esmeralda County, a fifth of Nye County, and a fraction of Washoe, Clark, and Pershing counties contained land outside the public lands grazing system. All of that land was the most marginal desert, with very few water resources. The BLM only allowed one-sixth of the applications examined during the first six months of the ban to even continue towards

patent. Secretary of the Interior Stewart Udall warned that farming these unsuitable lands was "futile and destructive."[69]

The root of the problem with most land applications in the Great Basin lay with potential land owners trying to bend the old agricultural land laws to new suburban purposes. Most Homestead, Desert Land, and Pittman applicants in Nevada relied on income from a full-time job in urban areas such as Reno or Las Vegas and sought to use these land laws to acquire property at minimal cost further out from the urban centers in which they worked. But these settlement laws could not facilitate suburban development as they were specifically designed to encourage agricultural development, mainly farming, an expensive and time-consuming endeavor in the Great Basin. The other available land laws, such as the Small Tract Act, offered smaller parcels at fair market value for the land which steadily increased the price with rising demand. The BLM and Department of the Interior recognized the importance of releasing public land into private ownership to meet the growing demand for cheap land for inexpensive homes and to facilitate growth of the region's tax rolls. This was especially important in Nevada, a state reliant on property taxes and sales taxes for income. However, there was no feasible way to accomplish this under the existing land laws. In addition, under Secretary Udall's land conservation policy, the BLM questioned whether these agricultural land laws had ever been good for the Great Basin. In lieu of changing or repealing the actual land laws, the Department of the Interior and BLM interpreted the agricultural requirements more strictly and worked to clearly classify Great Basin land as unsuitable for agricultural filings thus eliminating the ability to apply under the old land laws (fig. 73). As a result, most land public land transactions hereafter occurred around existing urban areas.[70]

However, the Department of the Interior's deliberate exclusion of most Nevada land for agricultural settlement outraged the state's residents. Alvin May, a potential land-owner in the Carson Valley near Reno, served as a very public example of what happened when local residents used the agricultural laws to acquire cheap land and the BLM was forced to deny their land applications. May filed for a 160-acre homestead under the 1862 law near Gardnerville in 1957. He built a home for his family of nine children, but lacked the funds to develop the irrigation structures necessary to provide water, grow, and harvest crops for commercial sale on the 20 acres the law required him to bring under cultivation. By 1962, May's five years to make the required improvements on the land had run out and the BLM faced turning a hard-working man and his family out of their home. The agency struggled to find alternative measures that would allow May to purchase the land on which his home sat under the Small Tract and Public Land Sale acts, but May lacked the funds to make the purchase. In addition, he also lacked the priority for the purchase since other land owners adjacent to his potential property had first rights if the public land came up for sale. Both the BLM and the Mays were caught in an untenable situation. The land management agency could not allow the Mays legal title to the lands under their application because they were not suitable for agriculture, the acres already existed in a grazing district anyway, and May did not have water rights and was certainly not farming as his primary source of income. The Mays had the sympathy of the region's residents, many of whom felt the "worthless grazing land" was better used in private hands as even a hobbyist's farm and that the BLM was just the "tapeworm of the livestock industry."[71]

Worse, the Mays and other denied land applicants believed that they had been unfairly denied because earlier applicants were allowed patents to their land without adequate water for irrigation and suitable crop production. George N. Swallow, a prominent White Pine County sheep rancher, owner of Eastern Nevada Realty, and member of the state's Public Lands Committee, accused the Department of the Interior of failing to carry out the actual intent of the agricultural land laws and therefore the intent of Congress in disposing of the public domain.[72] Senator Cannon agreed stating "the various laws governing the disposition of public lands were enacted for the explicit purpose of putting these lands insofar as possible into the private ownership and thus on to the state and county tax rolls." Nevada's Governor Paul Laxalt emphasized that the nation's land laws had conveyed very little land in the Great Basin, and especially in Nevada, into public ownership. He said the BLM was obligated to "specifically and energetically" facilitate the movement of "appropriate Federal lands into private ownership at realistic prices." But other livestock operators in White Pine County disagreed with Swallow. Ranchers from Cherry Creek and McGill just north of Ely wrote Nevada's Senator Cannon and Nevada's BLM state director James R. Penny that new land entries would entail further underground water pumping, causing the water table to lower and cause "hardship on the old permanent ranches."[73]

Most of the nation's congressional delegation agreed with the ranchers in White Pine County, although for different reasons. Wayne Aspinall, chairman of the House Interior and Insular Affairs Committee, stated "We have, subject to isolated exceptions, for all intents and purposes run out of compact areas of 160, 320 and 640 acres of land that can be utilized economically for agricultural purposes. At the same time, we have become an

urban-suburban-industrialized country in which the overall need for additional agricultural production has diminished." With the public domain concentrated in the Great Basin and the value of agricultural development and its economic contribution to state and national economies in decline, the homesteading process was at an end (fig. 74). In 1966, potential homesteaders were warned "even though there is still plenty of land in the public domain and the Homestead Act of 1862 is still in effect, you'd better think twice before you pull up stakes and rush out to claim your 160 acres … although there is roughly 460 million acres of land—about one fifth of the total area of the United states—in the public domain, practically none of it is suitable for homesteading." Even when the moratorium on Desert Land agricultural entries ended in January 1979, the prohibitive cost of underground water development and the inadequate return on even the most profitable desert crops such as potatoes and alfalfa meant that despite the several thousand applications filed, none could be approved (fig. 75).[74] Combined with the general reluctance of the Nevada State Engineer's office to approve new water applications, most of the remaining public land in Nevada was slated to remain out of private lands. The exception to this process were the entries filed by existing ranchers such as the Fallinis and Sharps who received BLM approval to add several hundred acres to their existing ranches during this time, presumably because they already controlled the water rights in their areas.

Concomitant with ending homesteading, Udall also announced the reformation of the old grazing advisory boards as multiple-use advisory boards whose membership reflected the "many varied interests" of public land users. This change reflected the "multiple use interests in the national land reserve," the new name for the nation's public lands which

redefined the "vacant, unappropriated, and unreserved public domain" as reserved by the Taylor Grazing Act in 1934 in the same way as the Forest Reserve Act of 1891 reserved national forests for their current productive use and maintenance for future generations. In addition to including representatives of livestock and wildlife interests, the multiple use boards included timber, mining, soil conservation, and recreation interests, urban and suburban planners, and state and county officials.[75]

Multiple-use was a flexible management concept articulated by public land administrators like Marion Clawson during the 1940s and well-established two decades later. Federal land managers thought of multiple land use as a management system in which "no one use and no one user is granted exclusive use of any single area," though a user "may be granted the exclusive practice of one use on an area," such as established by grazing allotments. But in the American economic system, which encouraged maximization of profit through maximum use of natural resources at the lowest cost, livestock operators using the public range, timber companies logging forests and mining companies extracting minerals on public lands conflicted with the non-commercial uses of those lands such as outdoor recreation, watershed and wildlife protection because each non-commercial use infringed in numbers and dollars on the commercial uses. According to Clawson, it was up to the land manager's discretion to "balance one use against another" in order to achieve the most desirable combination.[76]

The Forest Service's Multiple Use Sustained Yield Act of 1960, a powerful mandate coveted by the BLM, clarified multiple-use as "the management of all the variable renewable surface resources … so that they are utilized in the combination that will best meet the needs of the American people." Coupled with the idea of sustained yield, the

"achievement and maintenance in perpetuity of a high-level annual or regular periodic output of the various renewable resources . . . without impairment of the productivity of the land," multiple-use amounted to the most important public land management philosophy in the twentieth century. Under multiple-use management, the Forest Service did not presume to equalize uses, but instead to give all the land's uses equal consideration when making land-use decisions. Depending upon the nature of the environment itself, one use or another could predominate. Udall's vision of multiple-use essentially incorporated balanced use of natural resources among a broad array of users; his multiple-use boards effectively placed non-commercial and extractive use on par with commercial use.[77]

Without a presumption of hierarchy among users, this philosophy meant restrictions on livestock grazing numbers, lumbering, and mineral development in the finite system of natural resources. Livestock operators in the Great Basin expressed some concern about this transformative land policy. John Marvel, the chair of the Nevada State Cattle Association's Public Lands Committee noted the "attitude of resource users in the Western States" after a March conference in 1963 on the subject. Attendees at the meeting expressed concern about the "increasing threat to the continued enjoyment and use of Federal Lands on a <u>customary</u> multiple use basis by all citizens."[78] The end of homesteading protected livestock operators in the Great Basin, but the growth of multiple-use ensured that grazing would no longer be the dominant use for the remaining public domain, even in the arid Great Basin.

The remaining public land was not suitable for agricultural development, but it was suitable for multiple-use classification which meant a greater emphasis on outdoor

recreation. To this end, the BLM secured passage of the agency's first real mandate, the Classification and Multiple Use Act (CMUA) in 1964, which allowed the agency to classify land for either disposition or retention, intensifying multiple-use management on those acres retained in federal possession. The classification process proceeded in preparation for the final report of the Public Land Law Review Commission expected at the end of the decade which would determine the future of the federal domain. This balanced the agency's attention in putting land into economic production through grazing, agricultural, mineral, timber, or industrial development, and putting land to other uses, including fish and wildlife development, outdoor recreation, watershed protection, and wilderness preservation The BLM had used land classification, a process of water, soil, vegetation, and wildlife analysis and cadastral surveying, to determine the best purpose for public land on a piece-meal basis for decades. But what made this act different was that the classification for retention could be made permanent, although the BLM assured the American public that "classifications must be dynamic and have assumed that the Congress, the Secretary of the Interior, and other responsible officials will continue to exercise their authority in the public interest."[79]

Along with the Forest Service's Multiple Use Sustained Yield Act (MUSY) and the Wilderness Act, which passed in the same year but did not apply to BLM lands, the new legislation provided "the first clear congressional directive" for managing the remaining public lands and indicated the permanency of the federal domain. It also marked the BLM's commitment to assisting local development through the sale of public lands that facilitated the growth of communities surrounded by the public domain. But it was unclear as to the definition of multiple-use. Some residents of the Great Basin and

elsewhere in the American West hoped that multiple-use meant bringing all public land natural resources under private development. Livestock operators hoped it meant their use of grazing range would remain atop the multiple use hierarchy as the best and highest economic use of the land. Such was the "customary" vision of multiple-use. But, the BLM under the new director Charles H. Stoddard, his boss Stewart L. Udall, and the 88th Congress meant multiple-use to mean the proper development and use of public land resources, not necessarily the "combination of uses that will give the greatest dollar return or the greatest unit output," relative to the land conservation policy. Where ranching might have been the highest economic use of the land, wildlife management and outdoor recreation had achieved equal importance.[80]

The Department of the Interior used the Classification and Multiple Use Act to determine the realistic extent of the permanent public domain. This presumably was to support the interests of wildlife and outdoor recreation. As part of achieving maximum benefit to the public interest, the Department of the Interior had to take the nation's new outdoor recreation policy into consideration, that "all American people of present and future generations be assured adequate outdoor recreation resources and such resources be conserved, developed, and utilized for benefit and enjoyment." But this potentially conflicted with another way of looking at maximum benefit in which public lands provided the "natural resource base for the expansion of our national and regional economies and well-being." Both of these definitions of maximum benefit to the public interest conflicted with a third which declared that "recognition of the public significance of land endowed with superlative attributes has led to the dedication of land for the preservation of scenic beauty, wilderness, nature wildlife, indigenous plant life, and areas

of scientific significance or antiquity." Put bluntly, the problem for the Department of the Interior and the BLM was that "the present and future needs and objectives of a mature nation [were] complex, ranging from national defense to assuring adequate quality of life to all citizens." Udall's Department of the Interior worked to achieve maximum public benefit on public lands by attempting to understand and grapple with all the factors involved, a tall order in the shifting economic and social climate of the 1960s. Nevertheless, the public land management agencies tried to maximize land management for those desiring economic benefits, outdoor recreational benefits, and the benefit of protecting nature.[81]

The land classification process left livestock operators dependent upon public lands grazing in a tough spot. Where the Taylor Grazing Act codified their presence on the public domain and legitimized public lands grazing as the most reasonable economic use of the remaining public lands, the Classification and Multiple Use Act did the same for wildlife management and outdoor recreation. According to the Department of the Interior, there was no requirement that all uses of public land be "universally intermingled in common." Peter E. Marble, a rancher from Deeth, Nevada, and a member of Nevada's Public Lands Committee, thought there was room on public lands for both ranchers and outdoor recreationalists, especially hunters and anglers. However, Marble believed that public lands ought to be remanded to the states and that state management of the lands would "do no violence to the concept of multiple use" because the state government maintained greater sensitivity to the needs of local communities. The Nevada State Cattle Association wanted the BLM to consider grazing permitees' interests, as users with historical priority, when classifying land for retention or disposal. The state's

livestock organization, along with the Nevada Woolgrowers Association, represented most of the ranchers in the Great Basin. They argued that local interests, such as the state government and themselves, were best suited to decide which lands were suitable for parks, recreation and wildlife, and grazing. If the federal government transferred any public lands into private hands, ranchers wanted the option to purchase those lands traditionally used as grazing range or, in lieu of purchase, ranchers wanted to be able to secure tenure on that range. The organization thought that livestock operators should be compensated monetarily for public lands designated for outdoor recreation and wildlife to the exclusion of grazing. Otherwise, ranchers embraced a multiple-use management concept which ensured their presence as economic users of public lands.[82]

What also worried ranchers in the Great Basin was the issue of water and its allocation to other multiple-use purposes. Ranchers in the region had worked very hard to secure their livestock operations and range access by developing water rights. For the first time, federal agencies were allowed under the new BLM law to acquire water rights on public lands to facilitate outdoor recreation and wildlife development. This was not exactly a new problem. The Winters Doctrine, a legal precedent established in 1908, allowed the federal government to control enough water resources on reserved public lands to ensure fulfillment of the purposes of any federal withdrawal, especially in the case of establishing reservations for Native American tribes. Federal land management agencies and the military expanded the principle, however, to apply to national forests, national parks, and military bases. Livestock operators using public grazing lands, particularly in the Great Basin, relied fundamentally on their water rights. If the federal government classified land for multiple-uses which required water resources, the federal

agency reserving the land could also reserve the water rights and deprive existing water users, potentially without compensation.[83]

Whether through land use or water use, livestock operators and outdoor recreationalists were set to conflict over occupancy of the Great Basin's public lands as had the homesteaders and ranchers. Ranchers wanted their access to remain unrestricted and recreationalists wanted attractions with amenities and no livestock. Local Great Basin communities such as Ely argued for both the economic benefits of improved outdoor recreational attractions and the value of maintaining the existing benefits created by the region's ranchers. But it was impossible for residents, ranchers, and outdoor recreationalists to create the access and the amenities they desired despite the flexibility of the multiple-use concept. The potential for conflict eventually became actual conflict over the issue of off-road vehicle use, a popular, but high-impact, use of public land in the 1970s.

Fig. 59 Lehman Caves Cypress Swamp Chamber. Photo courtesy Great Basin National Park.

Fig. 60 Wheeler Peak. The tallest peak in the Great Basin at 13,063 feet, Wheeler Peak is located in the Snake Range. Photo courtesy of Great Basin National Park.

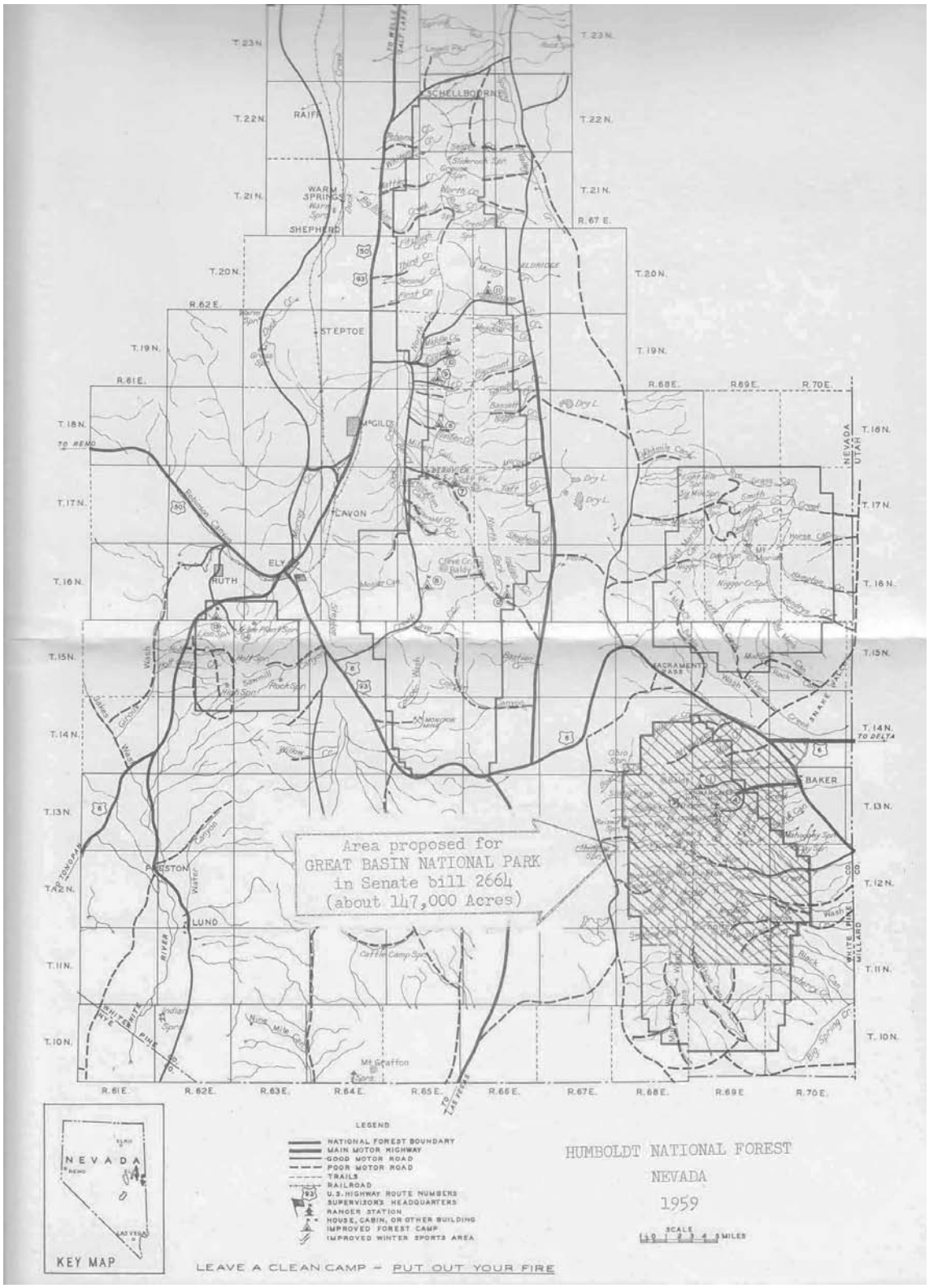

Fig. 61 Proposed Boundaries of Great Basin National Park. The proposed boundaries of Great Basin National Park and its relative distance to Ely, Nevada. Map from the Howard Cannon Papers, 86th Congress, Special Collections, University of Nevada, Las Vegas, Nevada.

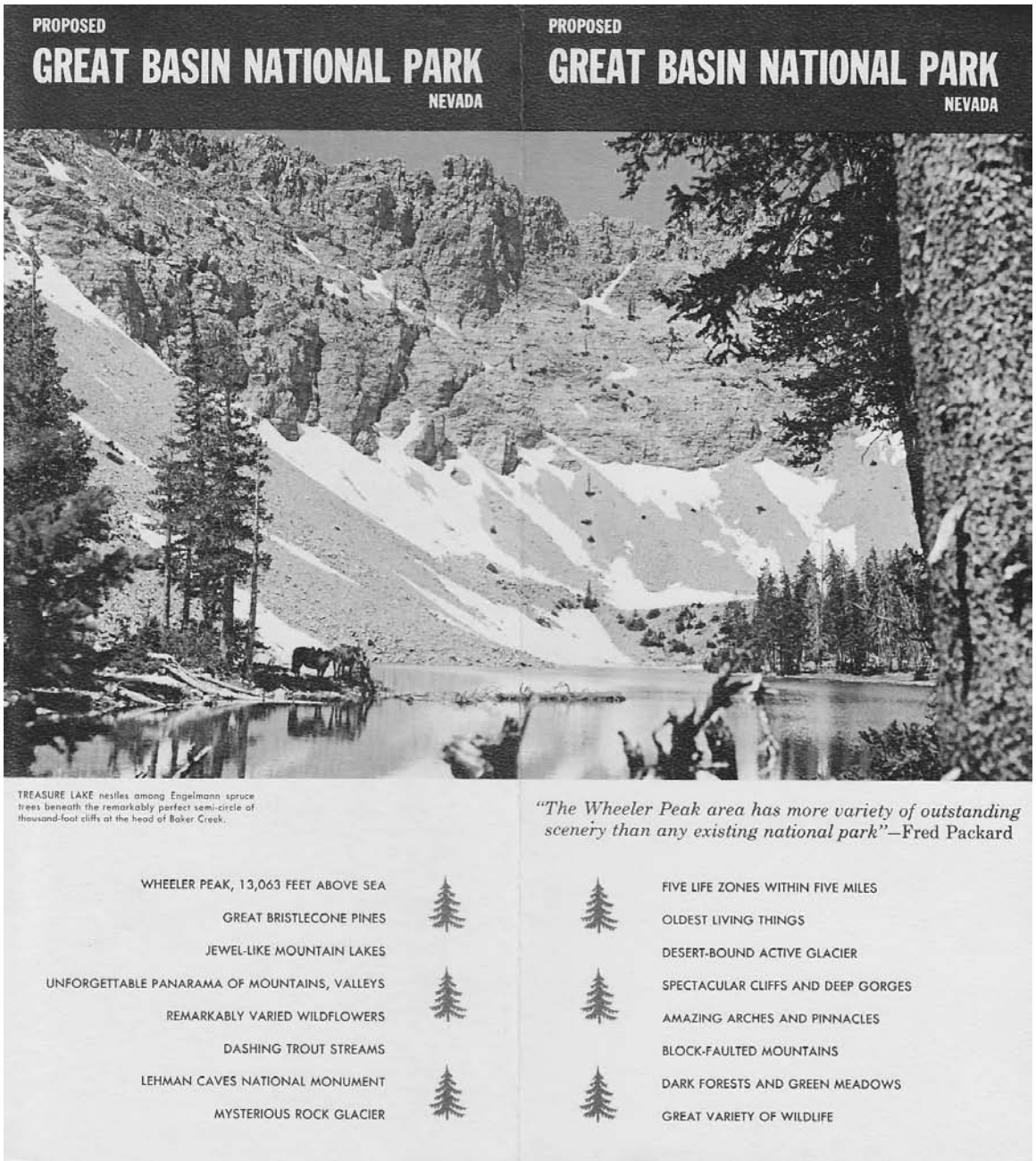

Fig. 62 Cover of "Proposed Great Basin Naitonal Park Nevada," circa 1959. Pamphlet from the Howard Cannon Papers, 86th Congress, Special Collections, University of Nevada, Las Vegas, Nevada.

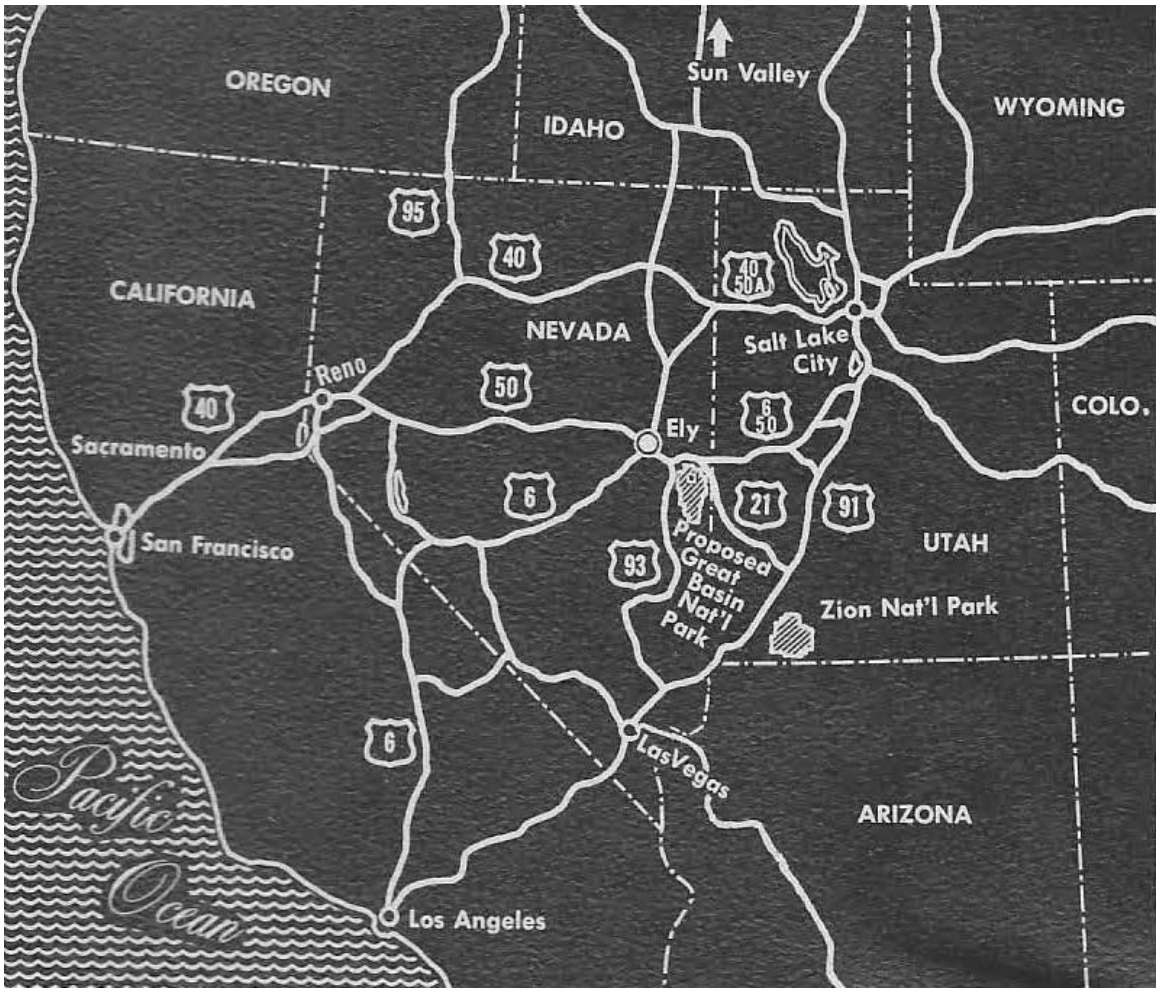

Fig. 63 Map from "Proposed Great Basin Naitonal Park Nevada," circa 1959. This is how the promoters of Great Basin National Park envisioned Ely relative to the larger Great Basin population centers. Ely sat at the crossroads of almost all travel through the region. Pamphlet from the Howard Cannon Papers, 86th Congress, Special Collections, University of Nevada, Las Vegas, Nevada.

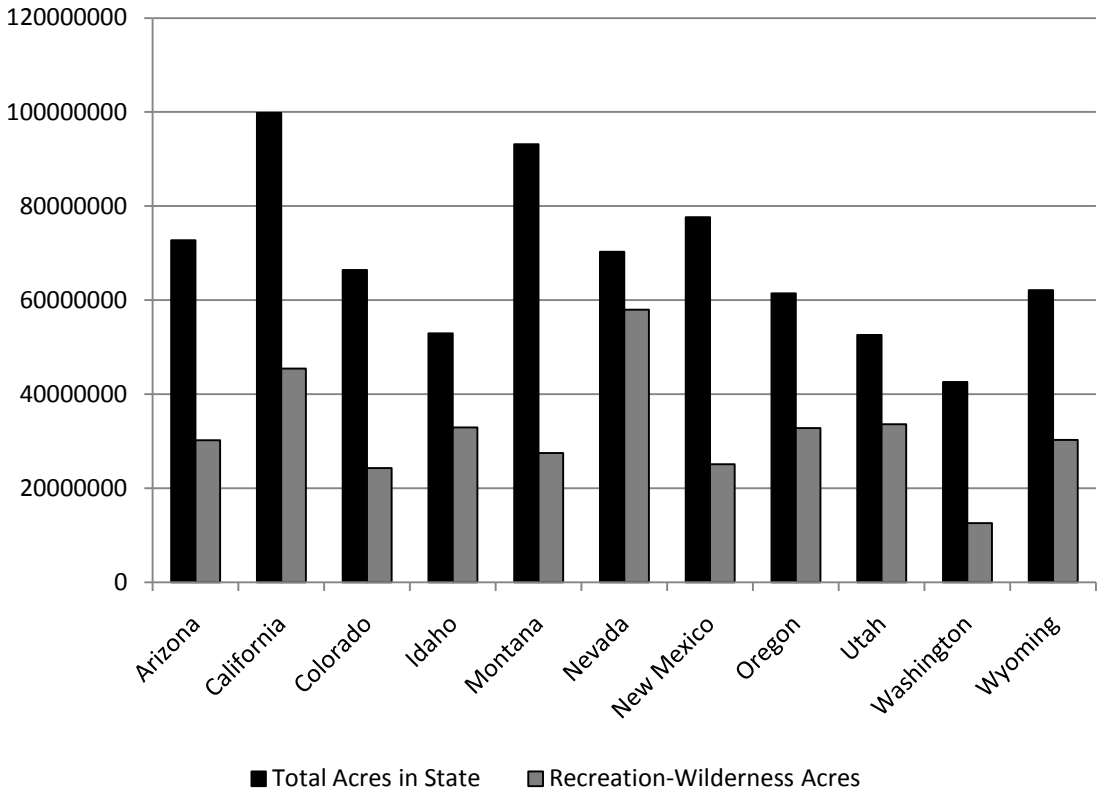

Fig. 64 Acres Available for Recreation by State. The total number of acres in each of the eleven western states compared to the number of acres of BLM lands in national forest, national parks, wild life reguges, and other state recreation areas. Chart by author from Charles I. Zinser, *Outdoor Recreation: United States National Parks, Forests, and Public Lands* (New York: John Wiley and Sons, Inc., 1995).

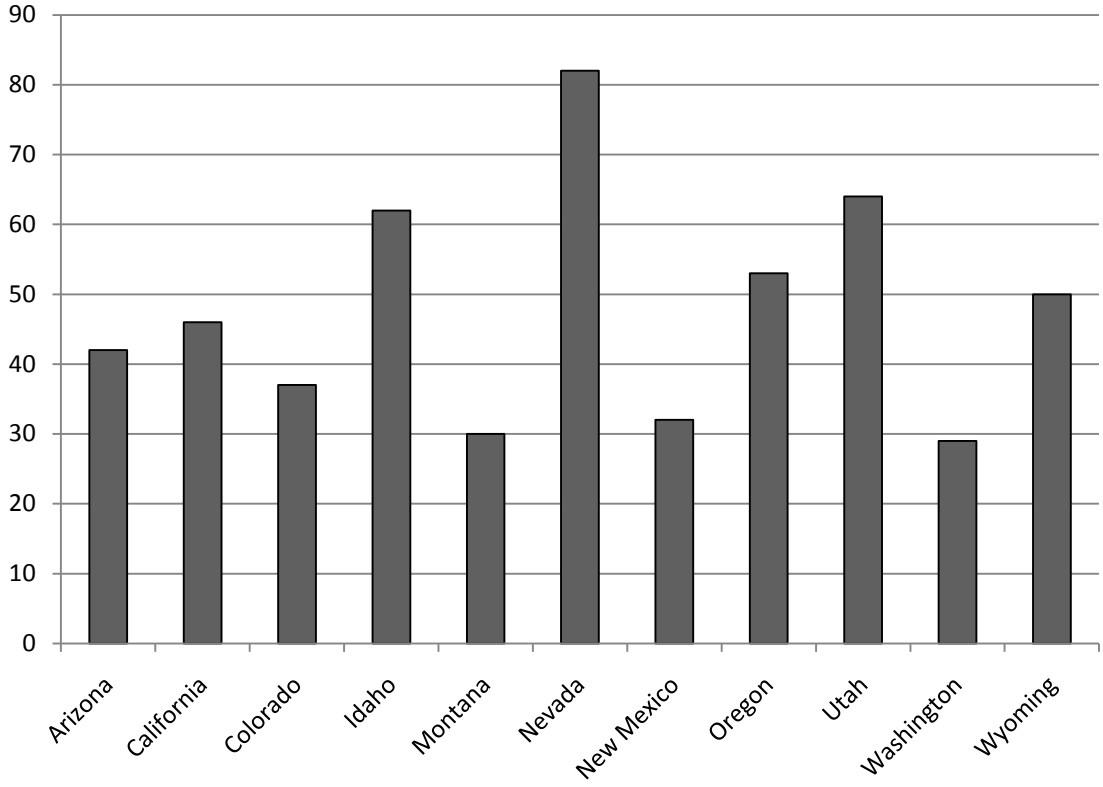

Fig. 65 Percentage of Land Available for Recreation by State. The percentage of land available in each western state for recreational development. Chart by author from Charles I. Zinser, *Outdoor Recreation: United States National Parks, Forests, and Public Lands* (New York: John Wiley and Sons, Inc., 1995).

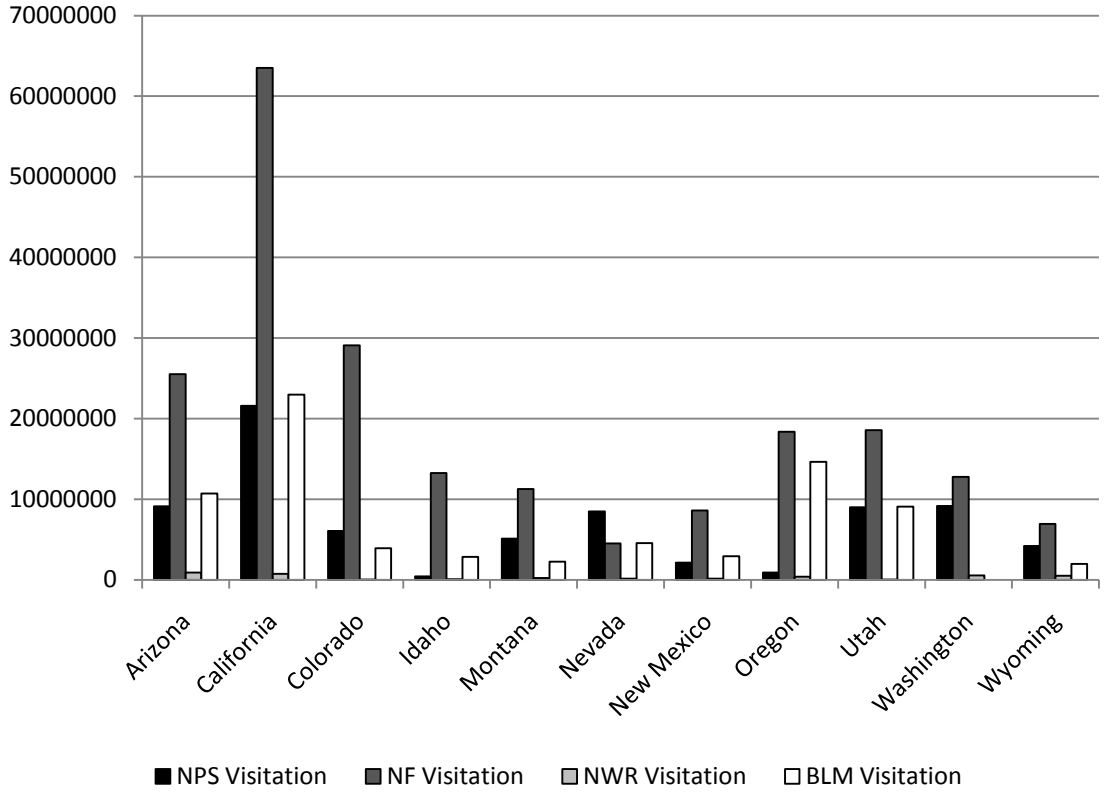

Fig. 66 Recreation Visitation Numbers Per Agency by State. The visitation numbers for the eleven western states of each federal agency. Chart by author from Charles I. Zinser, *Outdoor Recreation: United States National Parks, Forests, and Public Lands* (New York: John Wiley and Sons, Inc., 1995).

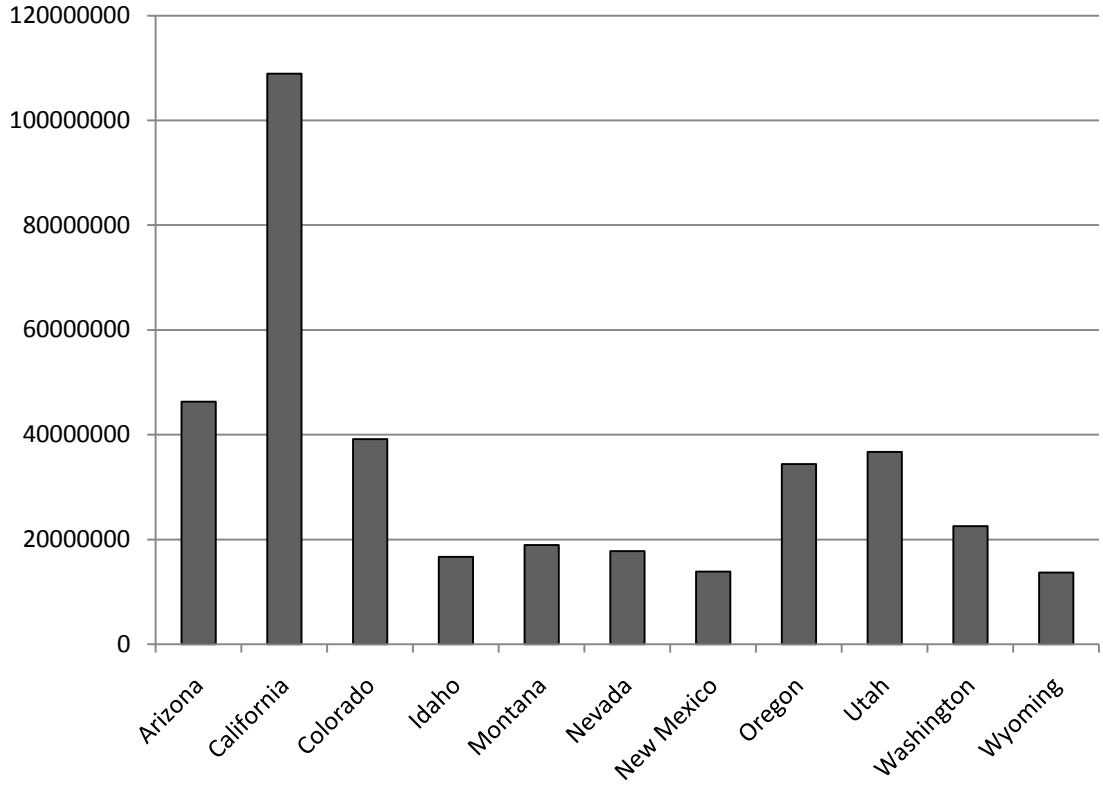

Fig. 67 Recreation Visitation Numbers by State. The total number of outdoor recreational visitation in each of the eleven western states. Chart by author from Charles I. Zinser, *Outdoor Recreation: United States National Parks, Forests, and Public Lands* (New York: John Wiley and Sons, Inc., 1995).

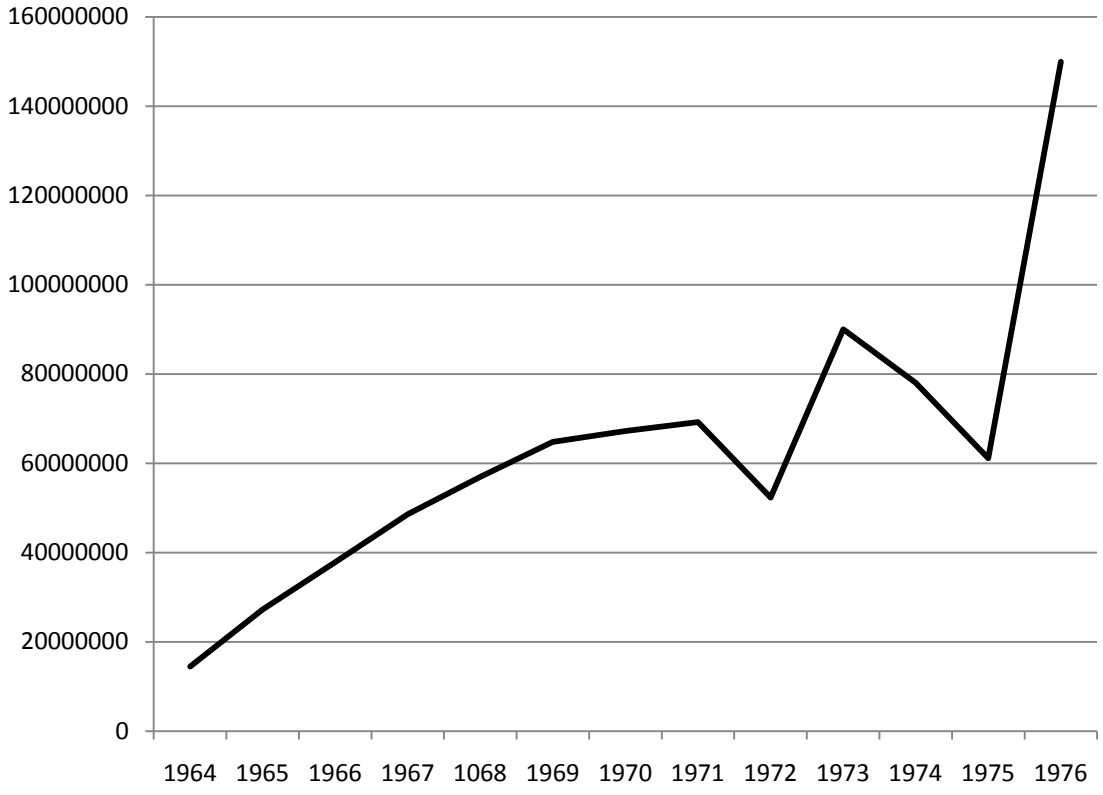

Fig. 68 Visitation Increase on BLM Lands 1964-1976. Chart by Author. Chart by author from the *Public Land Statistics*.

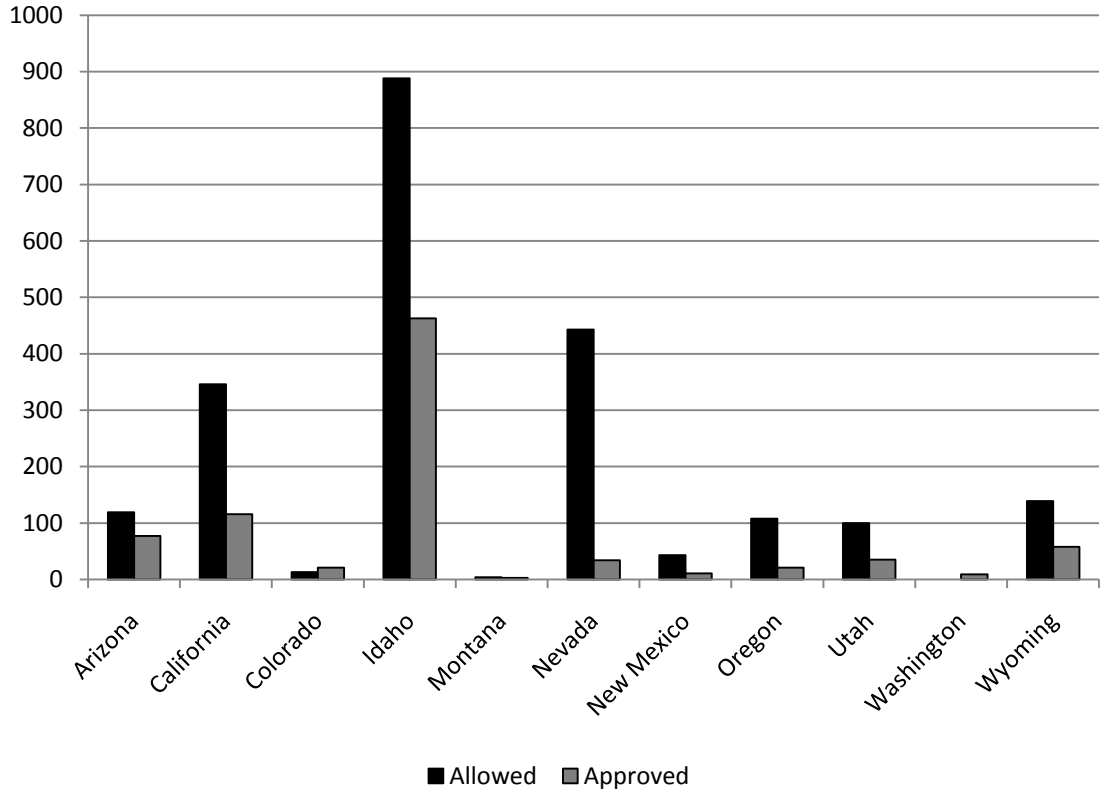

Fig.69 Desert Land Applications 1954-1959 by State. Desert Land applications allowed and approved in the eleven western states between 1954 and 1959. Under the Desert Land Act, entries were not approved for three to five years, causing a delay between year of application and year of approval. The BLM usually approved a smaller acreage size than the applicants originally requested. In the Great Basin, most applications were made in Idaho and Nevada, but most approved applications were in Idaho in the Snake River Basin. Figure by author from the Public Lands Foundation Archives, Phoenix, Arizona.

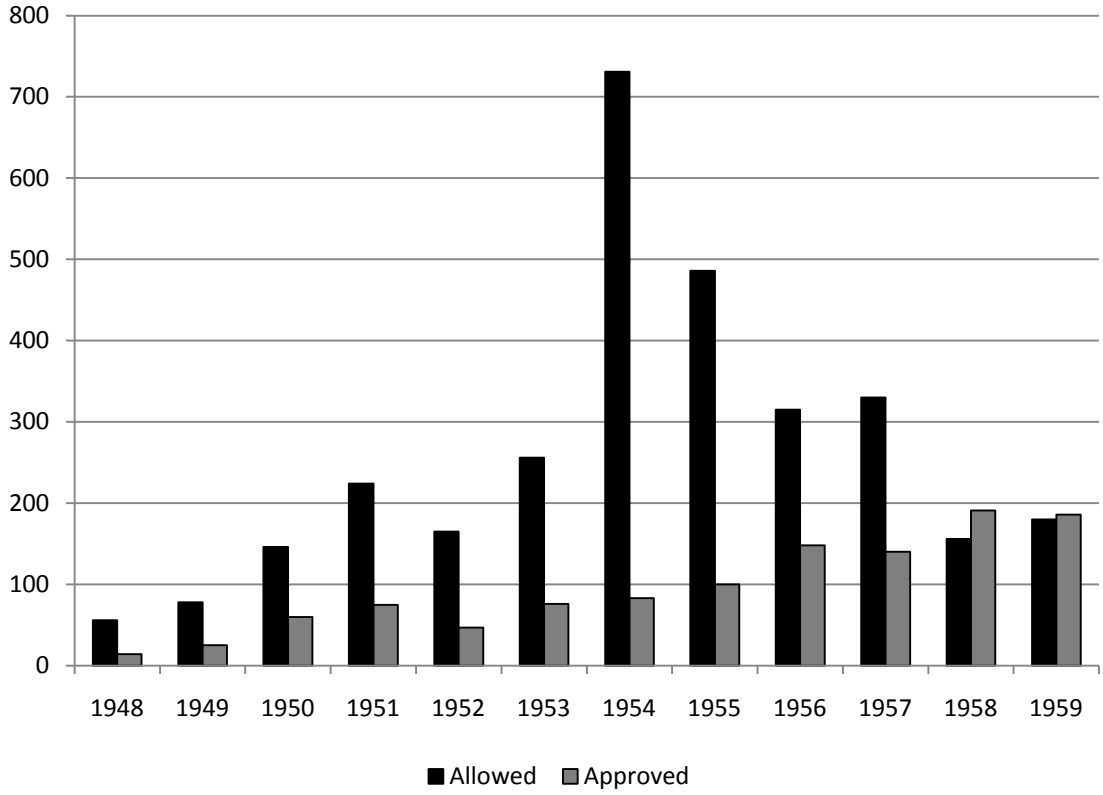

Fig. 70 Desert Land Applications 1948-1959 by Year. Allowed and approved Desert Land applications between 1948 and 1959. Figure by author from the Public Lands Foundation Archives, Phoenix, Arizona.

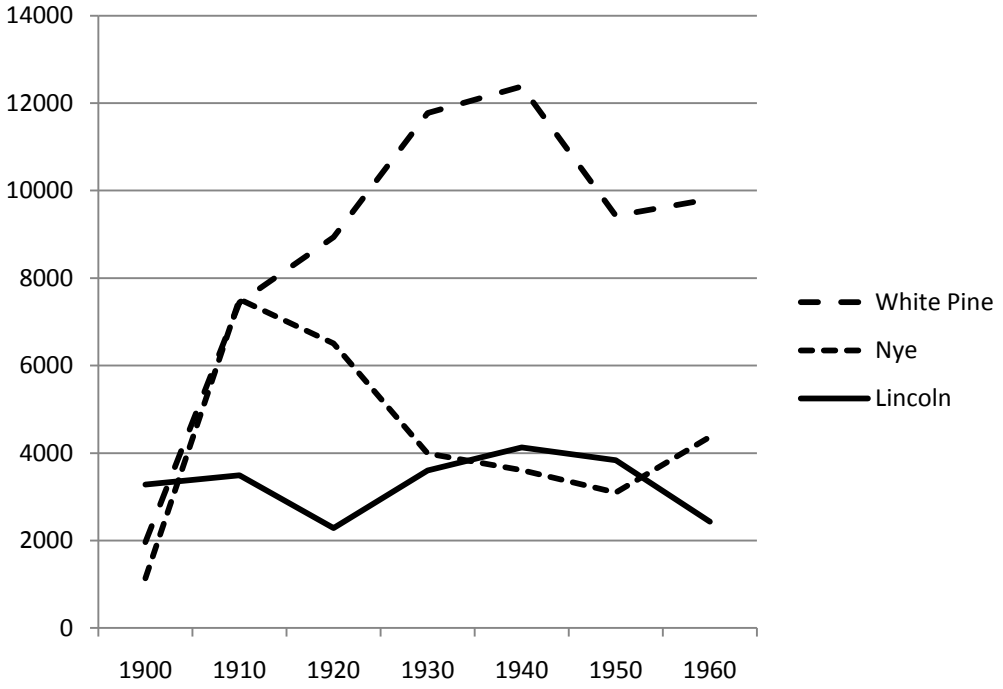

Fig. 71 Population Growth for White Pine, Nye, and Lincoln Counties 1900-1960. Figure by author from the U.S. Census Bureau.

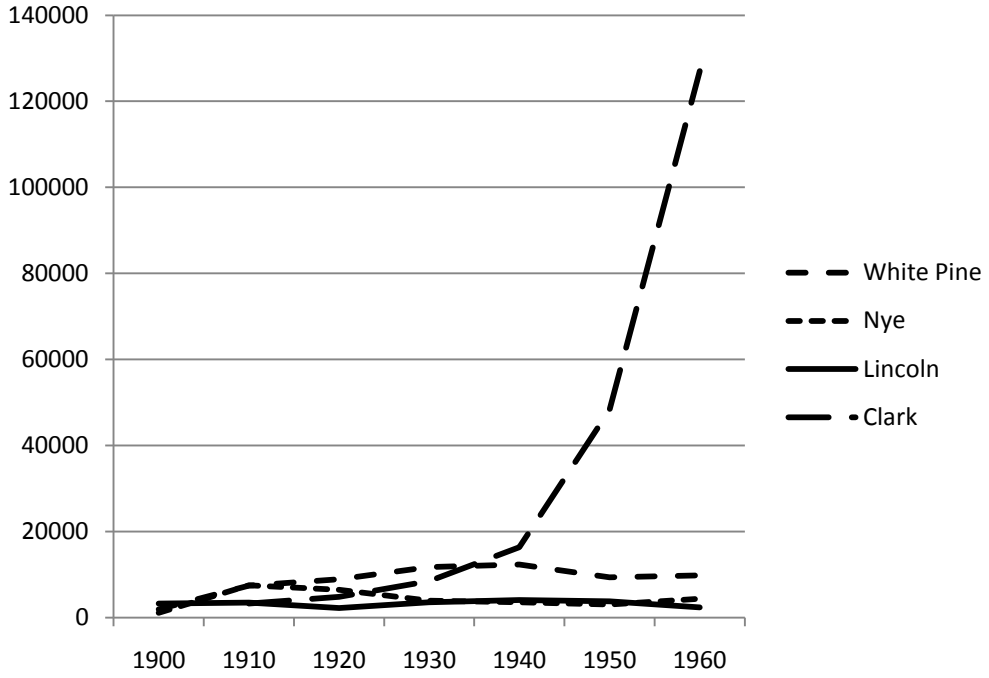

Fig. 72 Population Growth for White Pine, Nye, Lincoln, and Clark Counties 1900-1960. Figure by author from the U.S. Census Bureau.

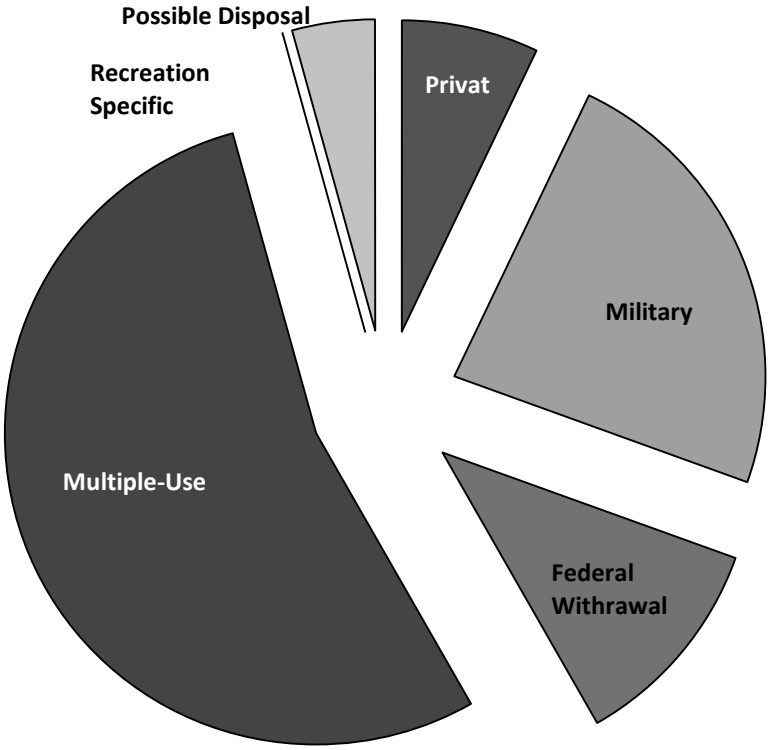

Fig.73 Proposed Land Use in Nye County Under the Classification and Multiple Use Act. The BLM believed the majority of the county was best classified as multiple use and not for possible disposal. But because Nye County had the greatest proportion of public land in the Great Basin, this outcome utterly dissapointed potential homesteaders. Figure by author from the Howard Cannon Papers, 90th Congress, Special Collections, University of Nevada, Las Vegas, Nevada.

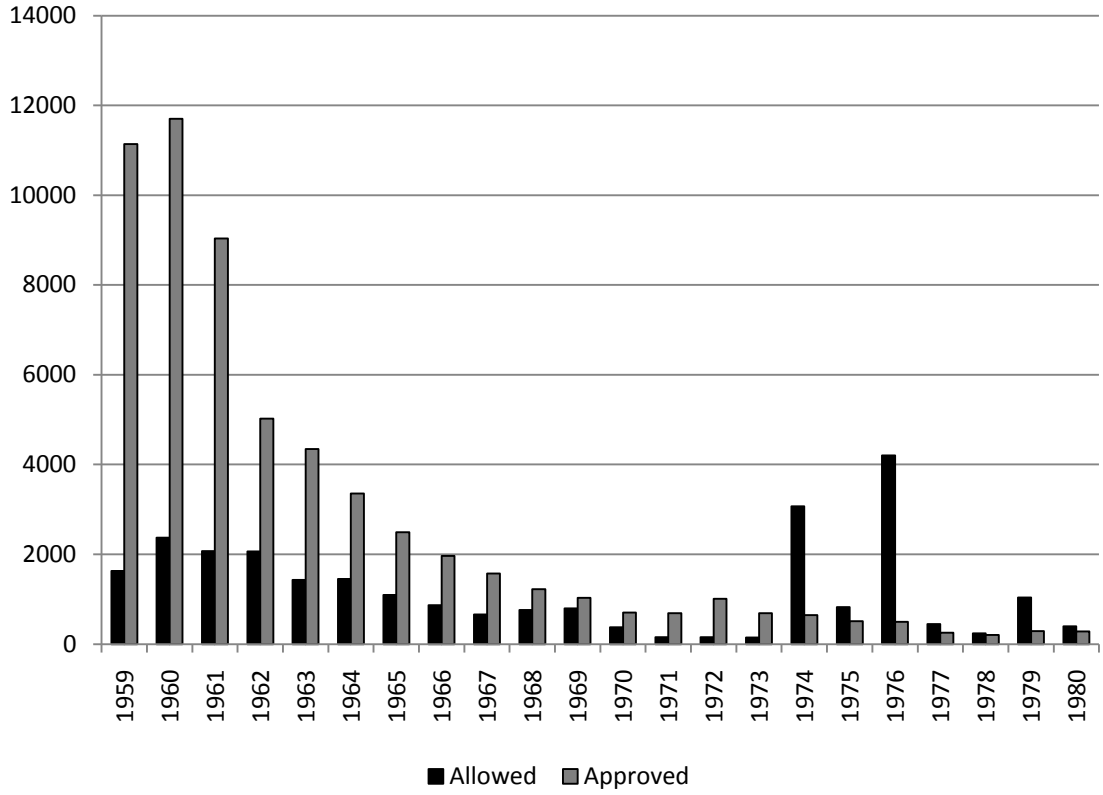

Fig. 74 Homestead and Desert Land Applications 1959-1980 by Year. The increase in allowed land applications in 1974 and 1976 occurred in Alaska and not in the continental United States. Chart by author from the *Public Land Statistics*.

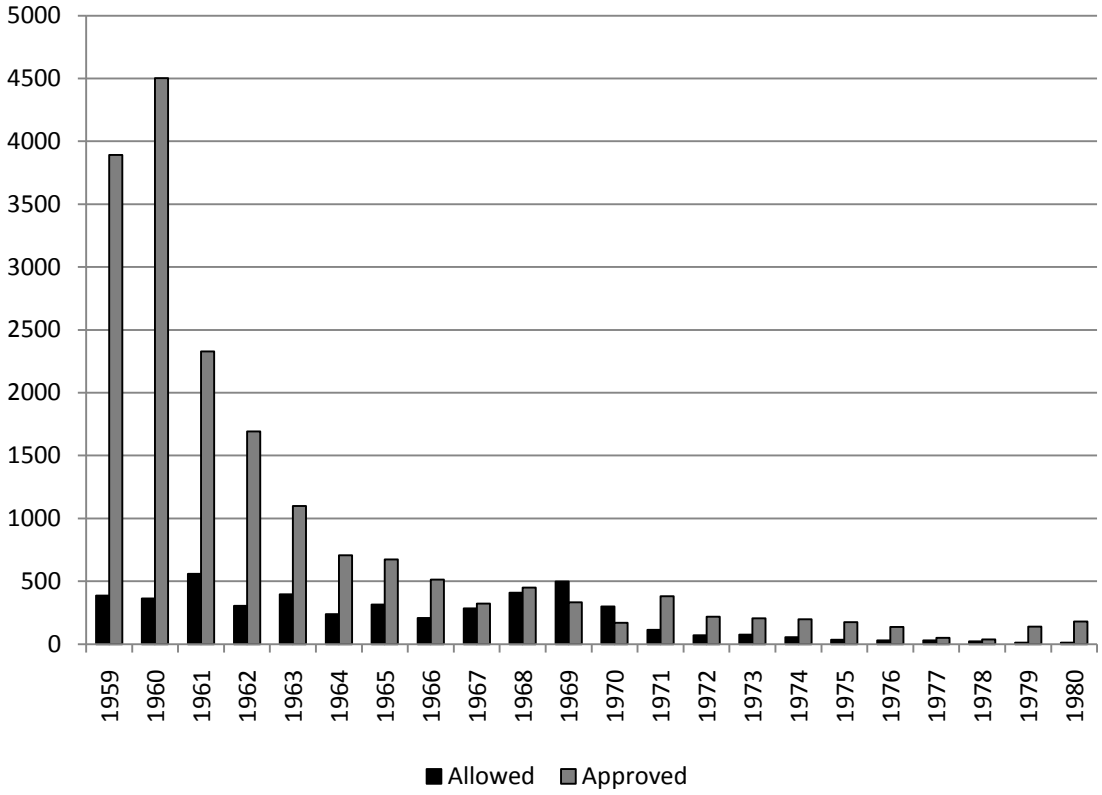

Fig. 75 Homestead and Desert Land Applications in the Great Basin 1959-1980 by Year. Chart by author from the *Pulblic Land Statistics*.

Notes

[1] For the history of recreation in the National Park Service and how railroad and automobile companies shaped the ways in which the relationship between parks and transportation facilitated the experiences of the American public in national parks see Marguerite S. Shaffer, *See America First: Tourism and National Identity, 1880-1940* (Washington, DC: Smithsonian Institution Press, 2001) and David Louter, *Windshield Wilderness: Cars, Roads, and Nature in Washington's National Parks* (Seattle: University of Washington Press, 2006). For a similar history of the national forests and the ways in which the American public interacted with them through activities such as skiing, hiking, and camping see Paul S. Sutter, *Driven Wild: How the Fight Against Automobiles Launched the Modern Wilderness Movement* (Seattle: University of Washington Press, 2002), Tom Wolf, *Arthur Carhart: Wilderness Prophet* (Boulder: University Press of Colorado, 2008), and Michael W. Childers, "Fire on the Mountain: Growth and Conflict in Colorado Ski Country," Dissertation, University of Nevada, Las Vegas, May 2010. Marion Clawson and Burnell Held, *The Federal Lands: Their Use and Management* (Baltimore: Resources for the Future, Inc., 1957), 341; Hal K. Rothman, *Devil's Bargains: Tourism in the Twentieth Century American West* (Lawrence: University Press of Kansas, 1998), 23-25.

[2] For a history of homesteading see E. Louise Peffer, *The Closing of the Public Domain: Disposal and Reservation Policies, 1900-1950* (New York: Arno Press, 1972). Kenneth Jackson, *Crabgrass Frontier: The Suburbanization of the United States* (New York: Oxford University Press, 1985), 231-245; Walter Nugent, *Into the West: The Story of Its People* (New York: Vintage Books, 1999), 182, Brian Q. Cannon, *Reopening the Frontier: Homesteading in the Modern West* (Lawrence: University Press of Kansas, 2009), 1-10.

[3] Alaska's public lands have a different history than those of the lower 48 states. The land disposal process began much later and still continues under the auspices of the Bureau of Land Management. For more information on Alaska's history see Roxanne Willis, *Alaska's Place in the West: From the Last Frontier to the Last Great Wilderness* (Lawrence: University Press of Kansas, 2010) and John S. Whitehead, *Completing the Union: Alaska, Hawai'i and the Battle for Statehood* (Albuquerque: University of New Mexico Press, 2004).

[4] For a brief explanation of the land classification process, see Robert A. Jones, "Land Classification—Key to Land Use," *Our Public Lands* (July 1960): 3-5, 12.

[5] Sylvia Porter, "Your Money's Worth," *Reno Evening Gazette*, July 23, 1958; Emerson Chapin, "Satisfactions of an Out-Of-Doors Vacation," *New York Times*, May 3, 1959; Brent A. Olson, "Paper Trails: The Outdoor Recreation Resource Review Commission and the Rationalization of Recreational Resources," *Geoforum* (doi:10.1016/j.geoforum.2009.11.014): 4.

[6] "Public Lands Program Urged at Coast Meet," *Reno Evening Gazette*, March 22, 1955; "Reno Pushes Public Land Development," *Reno Evening Gazette*, March 22, 1955; "Forest Plans are Developed," *Reno Evening Gazette*, February 21, 1958; Sylvia Porter, "Your Money's Worth," *Reno Evening Gazette*, July 23, 1958; Edward Woozley, "Intensified Public Resource Management," *Our Public Lands* (October 1958), 6-7, 14; Conrad L. Wirth, "Conservation: The Future," *New York Times*, October 4, 1959; Alfred Runte, *National Parks: The American Experience* (Lincoln: University of Nebraska Press, 1979), 173- 176; Paul W. Hirt, *A Conspiracy of Optimism: Management of the National Forests Since World War II* (Lincoln: University of Nebraska Press, 1994), 151-170.

[7] The Outdoor Recreation Resource Review Commission (ORRRC) was also comprised of members of the University of Michigan Forestry School, the American Forestry Association, the Weyerhaeuser Lumber Corporation, the Izaak Walton League, the Vice President of the Prudential Life Insurance Company, and a former Minnesota Conservation Commissioner. Later members of the ORRRC included Senator Clinton P. Anderson of New Mexico, Idaho's Senator Henry C. Dworshak and Representative Gracie Pfost, Washington's Senator Henry M. Jackson, Senator Jack Miller and Representative John H. Kyl of Iowa, Representative John P. Saylor of Pennsylvania, and Alaskan Representative Ralph J. Rivers. Of the twenty-five member advisory council comprised of ordinary citizens, only one person was from a Great Basin state—Mrs. Harold Christensen of Springville, Utah, just south of Salt Lake City. The majority of the council were from urban areas on the east coast, Chicago, and Sacramento. Several others were from the Midwest and the South. House Committee on Interior and Insular Affairs, *Establishment of a National Outdoor Recreation Resources Review Commission: Hearings on HR4819, 3592, 3593, 3594, 3596,4819, 4822,5238, 6884, 7230*,. 85th Cong., 1st sess. (May 13-14, 1957); Senate Committee on Interior and Insular

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[11] The trash on public lands got so bad, the BLM created a specific anti-litter program to deal with the problem. Johnny Horizon was the BLM's anti-litter mascot between 1968 and 1976. Though not as memorable as the Forest Service's Woodsy the Owl, whose slogan "Give a hoot, don't pollute" was embedded in the minds of an entire generation of American children, Johnny Horizon spearheaded an important clean-up program on the nation's public lands. Joe Midmore, "Efforts Made to Develop Nevada Land for Citizens," *Reno Evening Gazette*, June 4, 1964; "Lehman Caves in Nevada Established as Monument," *Salt Lake Tribune*, February 1, 1922; Harlan D. Unrau, *Basin and Range: A History of Great Basin National Park* (Washington, DC: Department of the Interior National Park Service, 1990); John Mattoon, "How the Johnny Horizon Program Came to Be," in Gene Peterson, *Pioneering Outdoor Recreation for the Bureau of Land Management* (McLean, VA: Public Lands Foundation, 1996), 60-62.

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[45] Elliott, *Senator Alan Bible and the Politics of the New West*, 167.

[46] Helen Fallini, Interview by Robert McCracken, October 25-26, 1987, Nye County History Project, Special Collections, UNLV; Robert D. McCracken, Interview with Lina Sharp, August 14, 1992, Nye County Town History Project, Special Collections, UNLV; Gracian Uhalde, Interview with Leisl Carr, December 1, 2006, Nevada Test Site Oral History Project, Special Collections, UNLV.

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[69] Charles H. Stoddard to Howard Cannon, Letter, January 24, 1964, Howard Cannon Papers, 88th Congress, Box 18, Folder 202, Special Collections, UNLV; Stewart L. Udall, "Nevada's Future and Uncle Sam," *Reno Evening Gazette*, February 1, 1964; Stewart L. Udall to Howard Cannon, Letter, June 2, 1964, Howard Cannon Papers, 88th Congress, Box 18, Folder 204, Special Collections, UNLV; Department of the Interior Information Services, Press Release, June 4, 1964, Howard Cannon Papers, 88th Congress, Box 18, Folder 204, Special Collections, UNLV; "Homestead Land Applications Unaffected—Bible," *Reno Evening Gazette*, June 8, 1964; J. R. Penny to Howard Cannon, Letter, June 29, 1964, Howard Cannon Papers, 88th Congress, Box 18, Folder 202, Special Collections, UNLV; "Land Entries Win Approval," *Nevada State Journal*, October 21, 1964.

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[77] "'Multiple Use'," *New York Times*, June 27, 1960; Karl S. Landstrom to Robert Sykes, Letter, March 29, 1962, Folder 453, Public Lands Foundation Archive; Karl S. Landstrom to Legislative Counsel, Memorandum, August 3, 1962, Folder 453, Public Lands Foundation Archive; *Multiple Use and Sustained Yield Act of 1960*. Public Law 517. 86th Cong., 2nd sess. (June 12, 1960); Skillen, *The Nation's Largest Landlord*, 42-43.
[78] John Marvel to Howard Cannon, Letter, March 27, 1963, Howard Cannon Papers, 88th Congress, Box 18, Folder 206, Special Collections, UNLV; Public Lands Council, "The Western Livestock Industry and the Public Lands," 1968, Paul Laxalt Papers, Box 355, Folder 14, Nevada State Archives (hereafter Nevada State Archives).
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CHAPTER 6

A MATTER OF MUSTANGS

> In the beginning, my purpose was to try to stop the brutal, inhumane manner in which the horses were treated during and after their capture … In view of the speed with which their mass annihilation is threatened, I now feel that the few remaining herds should be given protection, and not until some very future day should any steps be taken to reduce their numbers. However, I also think that a plan should be worked out very thoroughly for the control of their numbers, so that never again will there be an excuse for such an extermination program as has been permitted in the past few years. Velma Johnston, 1957.

The wild horse issue was, and continues to be, an incredibly contentious public land management problem because it highlighted the emotionally-charged issue of animal cruelty and the historic relationship humans have had with the horse. Before people inhabited the Great Basin, there was *Equus* of one variety or another. The animals belong to the *Perissodactyla* order of odd-toed ungulates along with the more exotic rhinoceroses and tapirs. The earliest fossil evidence of the several-toed Dawn Horse, or *Eohippus* (*Hyracotherium*), of the *Paleotheriidae* family indicates the animal roamed across the North American continent in the Eocene epoch of the Tertiary period some fifty million years ago. This small ancestor of the *Equidae* family developed in the northern hemisphere over several epochs from a browser to a grazer until the Pliocene. Of the once-great diversity of this family, only the *Equus* genus has survived and fossil records indicate that the fleet one-toed grazer originated on the North American continent about four million years ago.[1]

At various times during the Pleistocene, *Equus* species migrated from North America across Beringia, the land bridge then connecting the continent with Eurasia, and into the southern hemisphere. Multiplying, adapting to its relative environment, and diversifying prolifically across several continents, *Equus* evolved into several species including the

extant *Equus ferus*, *Equus africanus*, *Equus hemionus*, *Equus kiang*, *Equus grevyi*, *Equus quagga*, and *Equus zebra*, representing the horse, wild ass, and zebra respectively. In the meantime, by the late Pleistocene twenty thousand years ago, *Homo sapien*, whose *Hominidae* family had differentiated from other primates during the Miocene fifteen to twenty million years ago, began migrating in the opposite direction across the land bridge to the Americas. The two species thus began a long history of interaction. *Homo sapien* hunted and ate *Equus ferus* for thousands of years. Paleolithic hunting sites in Europe, such as at Roche de Solutre which was used for hunting horses for up to twenty thousand years during the late Pleistocene, indicate the fundamental importance of horse to the diet of early humans during the animals' seasonal migrations. As a result, between human pressures on *Equus ferus* populations and a general loss in habitat as the global climate warmed in the early Holocene, *Equus ferus* numbers, like the other *Equus* species, were significantly reduced as they were pushed onto the semi-arid steppes of central Asia. At relatively the same time in North America and for reasons still unclear to scientists, all the *Equus* species disappeared from the continent. Over-hunting, environmental disaster, and disease seem the most likely culprits in the animals' demise.[2]

Absent from North America for nearly ten thousand years, the *Equus* genus returned with the arrival of the Spanish Conquistadores in the early 1500s as Spain's veritable "atom bomb." The Spanish brought horses first to fight and then to breed, establishing ranches across Mexico and the Southwest. Some of these animals got loose or "escaped" in expeditions and journeys, but most of the feral herds were simply too difficult to round back up after being set out to pasture in an age well before barbed wire fences. Two hundred years later, the horse proliferated across the grasslands of the continent at a

surprising rate, and Americans called them wild horses, mustangs, broomtails, and Cayuses, and several other names that reflected their origins and geographic location.[3]

These animals fundamentally altered the lifestyles and cultures of native tribes. Many Native American groups who were nomadic had used dogs and travois to haul their possessions, others had developed stationary horticultural communities. The horse, as it had to previous cultures throughout the rest of the world, brought increased mobility to the Americas, improving transportation for both the nomads and villagers. The animal also made hunting buffalo easier and travelling distances less difficult. Native tribes such as the Sioux, Nez Perce, Navajo, Apache, Kiowa, and the Comanche constructed their society around the horse, their possession bestowing wealth and prosperity upon the owner.[4] This transformation reflected the impact the horse had on Eurasian cultures millennia ago. The Spanish had brought hot-blooded Andalusians, Arabians, Barbs, and other Mediterranean breeds to the Americas because of their society's dependence upon the animals. Likewise, the English, Dutch, German, and French migrants who came centuries later imported their cold-blooded draft horses such as Belgians, Shires, and Percherons, and the warm-blooded crosses, including the Thoroughbred. Horses transported vast numbers of Americans into the unsettled areas of the continent and provided the energy which turned the land into an agricultural landscape. Even more importantly, they also provided the power to create the nation's urban metropolises. In rural areas, a farming family had several horses to pull plows and wagons, but there were roughly twenty animals for each urban resident in the nation's cities.[5]

As human populations expanded and converted the grassy plains into farmland or city throughout the nineteenth century, they pushed these wild horse herds further into the

continent's interior. Similar to the prehistoric *Equus ferus* in Eurasia, eventually these wild horses ended up in the nation's last unsettled region, the arid Great Basin. Livestock operators considered them a hazard to the grazing range in large numbers, but beneficial in smaller, locally maintained herds that they could utilize for maintaining their own stock. With the proliferation of the automobile, mechanized farming equipment, and the use of trucks and tanks in warfare, the national demand for horses decreased. By the end of World War II, the wild horses were more valuable as pet food than as work animals.

At the same time, middle-class families, especially those with little girls, increasingly valued horses as pets instead of working livestock. The plastic miniature horse manufacturer Breyer Molding Company created its first model, the Western Horse, in 1950. This little replica equine, complete with a western saddle, changed the entire focus of the plastics company to meet the demand of horse enthusiasts.[6] In addition, small-winged aircraft made finding and rounding up the animals an easier, but more brutal process, sparking public outcries of animal cruelty. Ranchers maintained the wild horses required strict controls, but most preferred to manage the animals themselves. Each of these groups differed as to the role of the animals and what ought to be done with them. Because of their greater numbers in the region, at one point there were more wild horses than residents in Nevada, the movement to give wild horses a new status on public lands originated in the Great Basin (fig. 76).[7] Beginning in 1955, the Nevada state legislature granted wild horses their first protective statute. But twenty years later, many of the region's ranchers wondered if they were not the ones who needed protection from the horses. The initial measure to ensure the safety of the animals during capture evolved into a series of laws that made controlling wild horse populations difficult.

The Last Refuge of Wild Horses

In the nineteenth century, several million wild horses roamed Texas, the Great Plains, California, and the rest of the American West, migrating north from the provinces of New Spain and later Mexico and west from the eastern colonies. When Europeans reintroduced *Equus* to the Americas, the animals underwent a veritable "ecological explosion," proliferating across the continent. But as settlement, farming, and the livestock industry expanded, farmers and ranchers considered the ever-growing wild horse herds a menace. The roaming bands depleted crops and forage resources, drank up water holes, "raided" ranch herds for mares, and generally provided no commercial economic benefit. The earliest report of trouble over wild horse herds occurred in 1820s California when the Mexican government took drastic measures to eradicate the animals, rounding up and slaughtering thousands of horses. Similar efforts took place in succeeding decades in other states, particularly those dependent upon livestock production such as Texas. Wild horses were economically detrimental and culturally considered unsightly pests, with their short legs, hammer heads, and scruffy coats. However, they did provide bored and unemployed cowboys with an adrenalized sport and a little extra cash in bucking competitions. Wild horse populations therefore typically decreased in rough economic times when pressures to eradicate them increased.[8]

The animals had their admirers though, and did develop a fundamental niche in the nation's military. Some cavalry officers coveted their attributes, having "never met with any thing of the horse kind that possessed strength, action, and wind equal to the 'mustang' horses, (as they are called by the Spaniards,) or any that could endure fatigue and hunger equal to them, or subsist upon as little, and retain their strength." Their

numbers provided a large profitable pool of animals for the military to draw from for use in wars. Horse breeders used wild horse herds to supply mares that exhibited good conformation and stamina. They hired professional mustangers, the slang name given to those who chased wild horses, to shoot the herds' stallions in order to round up the mares and bring them to the breeders. When bred to blooded stallions, these mares produced hardy, long-winded, sensible stock animals that supplied many of the nation's equines. Breeders released some of these cross-bred animals back into the wild herds in order to continue to improve their conformation at very little expense. The infusion of new genetics into the wild horse herd populations, which tended towards inbreeding, was fundamentally important for their survival as it rejuvenated the vitality of the animals. Likewise, domestic horse breeds benefitted from the hardy characteristics the arid environment bred into the mustang.[9]

Beginning in the 1880s with drought and range degradation well underway in many parts of the country, state and territorial governments, encouraged by livestock operators, began eradicating wild horse herds in earnest this time with federal assistance. The nation's newspapers reported a veritable "war" against the wild horses. On the Great Plains, as had already happened in California and Texas, ranchers organized "hunting parties," shot the stallions, and rounded up as many of the animals they could. The ferocity with which ranchers pursued wild horses mirrored their feelings towards wolves. These were animals that violated property laws; wolves killed livestock and wild horses stole grass, water, and other horses. In some ways, stallions were worse than wolves because they would take not just one or two animals, but an entire corral filled with horses. But unlike the legendary predators, wild horses did not engender fear. Mustangs

could become personal assets and provide monetary gain if they were tamed and broken to the saddle. The wild horse hunts were replicated in Nebraska, Wyoming, Arizona, Washington, and other western states. The animals even became an international problem. Australians in Queensland and New South Wales coped with growing numbers of "Brumbies" and took similar measures towards their eradication.[10]

In the Great Basin, the same phenomenon occurred. Wild horse herds in the region had developed concomitant with the Great Basin's livestock industry. Ranches along the Humboldt River produced horses for freight hauling, hay making, and working cattle in support of the mining industry. These operations' equines were turned lose every winter during the off-season to fend for themselves and then rounded up for work the next spring. In warmer areas and during the warmer seasons, ranchers turned their horses out with the cattle when they were not needed for work. Between the constant influx of local horses and general reproduction rates, a ten to twenty percent rate of increase, the region developed a substantial wild horse population. The trouble, said one Nevadan, was that wild horses were "eating the grass off, and making it hard picking in places for cattle and sheep."[11]

Ranchers in the central Great Basin, where 200,000 or more animals roamed, began removing what they considered to be the excess. The Nevada state legislature consistently supported this endeavor in the 1890s by allowing anyone to kill "wild, unbranded horses." Wild horse runs, roundups, and shoot-outs had become so popular, that eager and inexperienced mustangers, often mistook branded and shod horses on the range for the wild bands. Similar problems played out in Utah, Idaho, and Oregon. Wild horses regularly fetched reasonable prices as working or breeding stock, for their hides,

as an ingredient in chicken feed, and even as canned meat shipped to Europe. Twenty years later, Nevada enacted a law which required permits for the destruction of herds to slow down and regulate the destruction, especially since eager mustangers often captured or shot privately owned horses. The permitting process identified the mustangers and required them to put up a bond in case they killed privately owned animals. Similar to hunting licenses, the state produced some income from the sale of permits. This became particularly important with the beginning of range regulation under the Forest Service, when wild horse eradication escalated. The agency wanted all unpermitted livestock removed from the national forests. The temptation of adventure drew the attention of the American public through national newspaper articles for the great adventure mustanging offered and because of the cruel methods used in the capture of wild horses. Some enthusiastic men even offered to help.[12]

Will C. Barnes, a native Arizonan, cowboy, and Forest Service employee in the nascent state, participated in several wild horse captures in the Great Basin and Southwest and wrote about his experiences in *McClure's Magazine* in 1909 to address the increasing public attention devoted to the matter of America's wild horses. For those who excitedly offered to participate in the roundup, capture, or shooting of the animals, Barnes wrote "Forest officers got boundless amusement from these letters. They were all Western men who had lived for years on the open range. They knew from actual experience that these men, with their plans of capture and their certainty of success, knew absolutely nothing, or at best very little, of the subject on which they wrote." Mustangers, he wrote, used safer, more practical methods than those suggested or even those which had been used in the nineteenth century. The old practice of "creasing" or shooting a

horse at a dead run just above his shoulder in the fleshy withers to stun the animal had resulted in one successful capture for every fifty attempts. Most times, as was the case with artist George Catlin when he attempted to crease a mustang, the cowboy shot the horse and killed it, which defeated the purpose of the animal's capture.[13]

Barnes explained that contemporary mustangers, the professionals at least, tracked wild horse herds to their water holes and monitored their movements for several days. Three riders or so staged themselves along the horses' regular route to and from the area to run the herd in a relay until they tired and could be turned and several desirable individuals could be selected. Or the riders would trail the herd and haze them until they tired and could be driven into a corral. It was fast and dangerous riding; mustangers rode bareback, without saddles and extra clothing to save weight, not something anyone but an exceptional rider could handle. More often than not, the herds would not turn or pass through the gate of the corral and escape back onto the sagebrush sea, taking the nice saddle horses that accompanied the mustangers with them. When a round-up was successful, horses and riders alike were often injured or killed. Barnes said, "more good horses have been killed outright in this work than ever were captured" because of the addiction to the intensity and thrill of chasing wild horses. He challenged those who thought they knew a "sure method" or a better one to present it as the population of wild horses still posed "a difficult and decidedly knotty problem."[14]

Barnes's contemporary Rufus Steele, a popular writer of the American West, featured the famous mustanger Charles "Pete" Barnum of Nevada in a *McClure' Magazine* article later the same year. Steele called wild horse capturing "the most exciting outdoor trade in the West to-day" and featured a photo of a young, rugged-looking Barnum and a series of

pictures that illustrated Barnum's work. The mustanger innovated additional methods of capturing wild horse herds which included constructing hidden corrals with wide brush wings to funnel the animals into the opening and building a portable canvas corral that could be quickly set up and easily set up in rough terrain. Steele noted that Barnum believed the wild horse herds had grown wise to the ways of mustangers and were increasingly difficult to catch. Of those successfully captured, about one-quarter of the horses caught died in the process of becoming harness or saddle ready. The act of "breaking" the horses relied on bucking them out until they tired and accepted the rider or driver. This activity became good sport for cowboys and was incorporated into rodeos across the region which featured authentic wild horses. But the wild horse industry took a lot of effort and investment for not much return. Nevertheless, Steele wrote, wild horses made "wonderful saddle-animals, sometimes racehorses." "Many thousands of them," he said, "are to-day drawing farm-wagons, buggies, and delivery-wagons in the States of the Middle West."[15]

Mustangers shipped thousands of animals each year to the Midwest for various purposes, some of which required their slaughter. Pete Barnum alone had shipped seven thousand animals in six years, a good "two thousand less than he has caught" if losses during breaking and shipping were included. Those numbers suggested that there had been ten thousand animals in Nevada, where Barnum conducted his operations during the 1900s. Steele estimated that there were "not less than fifty thousand wild horses" in Nevada in 1909. Even if herds' reproductive rates were low, at around ten percent annually, Barnum's impact on wild horse herds in the state did not actually cut their overall numbers, but simply slowed down their rate of growth. This was the case for wild

horse herds in other western states. But beginning with Steele's article, a general sense that wild horse populations were declining crept into the nation's popular consciousness. Steele began his article by writing "Upon the eastern slope of the Sierra Nevadas, in a harsh region embracing parts of Eureka, Nye, Lander, White Pine, and Elko counties, Nevada, lies the last wild-horse pasture in America … In this barren and nearly inaccessible territory, the wild horse has made his last stand against captivity." No one was certain how many wild horses actually roamed the country, but increasingly, some sympathetic admirers were concerned about the degree and nature of their demise.[16]

Only a handful of years after Steele's article, a Reno newspaper commented on the disappearing wild horse herds in an article that praised Nevada's natural resources and natural wonders. The state hoped to attract agricultural and industrial businesses to grow its economic base. Wild horse herds posed a hazard to this growth, especially to the region's expanding livestock industry, which had recovered after the hard winter of the late nineteenth century. Mustangs roamed the central and eastern sections of the state where broad areas rose above the ancient Lahontan sinks into high desert and grassy mountain meadows. Near Sunnyside, where the Whipple family owned and operated livestock, employees from the neighboring Riordan ranch had succeeded in killing 200 horses that competed with cattle in the area for feed. That same year, reports that the wild horse herds to the east of Carson City in the Pine Nut Mountains had virtually disappeared meant that stock operators of the area would be spared the future expense and effort of their eradication.[17]

But in the 1920s, the wild horse herd populations again increased, especially in the northern parts of the region in Nevada, Idaho, and Oregon. The livestock market was

booming and the Great Basin's range was crowded with cattle and sheep operations vying for control of the region's forage and water resources. Livestock operators and the Forest Service struggled to remove animals from the regulated national forest ranges. In addition, the increased use of the automobile decreased the need for horses throughout the country. The temporary boom in horse prices created by increased demand during World War I had barely and only temporarily made mustangers' activities profitable. Economically, the animals were swiftly becoming the nation's surplus equine population. As hides and chicken feed, however, they were valuable, fetching three times the price they had in previous years. The result of their improved monetary worth was an increase in legal, permitted roundups or hunts to remove wild horses and an increase in illegal shootings. These hunts often involved privately owned horses who had been turned loose on the range because they were no longer useful, but were not necessarily part of the wild herds. Their population soon declined, but within ten years, wild horses were again a menace to the range in the Great Basin with the economic devastation brought by the drought and Great Depression. But by the end of the decade, their numbers once more had been thinned.[18]

This was the typical cycle of wild horse management, not just in the Great Basin, but throughout the country. Montana, New Mexico, even Arkansas, Florida, and North Carolina, periodically conducted wild horse roundups and hunts. Mustang herds competed with livestock for forage resources, including grass and water, which mattered most in times of drought and when demand for beef and wool was high. When there was also demand for work horses, chicken feed, canned meat, and hides in conjunction with demand for beef and wool and when forage resources were scarce, mustangers vigorously

culled wild horse populations. Drought and hard winters also contributed to their losses. When demand for these products decreased and when forage resources were fairly plentiful, wild horse populations were allowed to increase unchecked. The scenario which produced massive increases in wild horse populations occurred when demand for work horses decreased, such as happened after the automobile came into widespread use, and ranchers no longer needed or could no longer afford their privately owned animals. Ranchers turned these horses loose on the range, expanding wild horse herds beyond even their reproductive capacity.[19]

With the establishment of the Forest Service and the beginnings of federal grazing regulation, wild horses faced yet another pressure, the federal the grazing permitting process. Livestock operators paid grazing fees for the use of national forest range and resented the Forest Service reducing the size of their grazing permits because wild horses, similar in this case to the nomadic sheep herds, had decimated the available forage resources. Efforts at their eradication intensified even further after the implementation of the Taylor Grazing Act in 1934, which legitimized and stabilized ranching on public lands, and the establishment of the primary federal grazing range. By 1943, Secretary of the Interior Harold Ickes ordered the removal of unowned, excess animals, especially wild horses.[20]

When public rangelands provided free grazing, there was a place for wild horses between the herds of cattle and sheep, especially considering livestock operators ran their own horses on the range in a manner which sustained the mustang herds. Free grass meant free horses. But when the Forest Service and the Grazing Service, later the Bureau of Land Management (BLM), organized the public land range resources and permitted

livestock operators certain numbers of cattle, sheep, and privately owned horses based on range surveys and fee schedules, every wild horse became an unnecessary and directly economically damaging mouth to feed. Each blade of grass had an economic value that was translated to every permitted animal. The public land management agencies were obliged to remove unpermitted livestock in order to legitimately regulate the range. Even wildlife numbers were closely monitored, though deer and antelope were also important range animals and produced their own revenues through the sale of hunting licenses. Yet wild horses had added some small economic value to individuals that could afford the effort to round up herds as did the mustangers. In the Great Basin, grazing districts canvassed the entire region, indicating the importance of public land to the area's livestock industry. It also indicated the vast territory that wild horses continued to roam in conjunction with that industry. As Rufus Steele noted nearly thirty years before, Nevada, and the Great Basin at large, was the last refuge of wild horses in the country because its entirety was public rangeland. In addition, the central Great Basin was not organized into a grazing district until the early 1950s. The ranchers there worked out the means by which they could foster wild horse herds at minimal expense and reap the small, but important, economic benefits.[21]

Great Basin ranchers treated wild horses as a normal part of the region's environment. The sons and grandsons of John Uhalde of Thirty Mile Ranch near Ely and the Uhalde Ranch at Adaven grew up chasing mustangs. The livestock operators in those areas whose operations folded just turned their horses loose. These animals joined the wild herds comprised of other animals that had arrived there the same way. Locals called them mustangs and they were often well-bred horses. Ranchers who raised horses often turned

out good mares and stallions to infuse new genetics into wild horse herds which tended towards inbreeding. Young Gracian Michael chased wild horses in Butte Valley at every opportunity with his brother Alfred and cousins Bertrand and Peter Paris, relaying the animals on a series of mounts until the horses tired and they had the herd turned towards the corrals. The boys made extra money on the ones they sold to the Army, but they kept some horses for their own use. When the Grazing Service issued grazing permits in White Pine County, the Uhaldes and Parises pooled their numbers and continued to raise horses on the range. The Uhaldes, like other ranchers, kept the herds in their area in check. The Lamb and Stewart families turned their horses loose in the Pahranagat Valley and they mingled with the wild herds. They culled out horses they wanted to train and sell, and turn good stallions out to improve the herds, gathering the animals regularly to prevent herds from overrunning the area. The Stewart horses damaged during the early days of the atomic testing program in the region were of this variety and had been highly-regarded by Atomic Energy Officials.[22]

But during the 1930s, two factors emerged which severely impacted wild horse populations throughout the country beyond previous levels and made their eradication imminent. The airplane made wild horse gathering much easier than chasing the animals on horseback. In 1925, *Popular Science* ran an article on cowboy-aviator Chance Parry, a native Utahan who had worked as a mustanger until World War I. During the war, he joined the Army's Air Service and learned to fly. Chasing the animals by plane seemed a better solution to the wild horse population problem than exhausting good saddle horses for very little success. The plane could spot wild horse herds and chase the animals until they became exhausted, herding them towards riders on the ground that could then turn

them towards corrals. Parry first used his plane technique on the North Rim of the Grand Canyon to roundup a band in a race of "cunning and speed of unbridled horseflesh against the marvel of modern science—the airplane." The idea took hold immediately in other parts of the country.[23]

In 1930, pilot W.C. Dibble of Burns, Oregon, chased wild horses in Humboldt County, Nevada, from deep within the area's mountainous terrain with great success. Two years later, North Dakota pilot Dortha Canfield and her husband successfully organized an aerial pursuit business rounding up wild horses and shooting coyotes. Chasing horses by air was tricky, however. Charlie Hahn of Lakeview, Oregon, drove 750 head of wild horses out of the canyons of northwestern Nevada towards a group of cowboys who were entirely unprepared for the vast numbers headed their way. The running horses overwhelmed the cowboys, pushing past them with the sheer weight of their numbers and energy. All but fifteen wild horses escaped. By 1938, the airplane was an effective means of finding and pushing wild horse herds towards their eventual capture. It required more cowboys to help corral the animals because the plane pushed hundreds of horses in front of it and required the pilot to fly slow enough so as not to overfly the herd and scatter it back in the opposite direction. Moving horses by airplane took time and practice to master and their capture was never certain or perfect. It was also incredibly dangerous for the pilots, some of whom crashed into mountainsides and ravines when engines failed or the aircraft caught sudden down-drafts. Nevertheless, it was the most important tool in rounding up wild horses. The Civilian Conservation Corps built corrals near Lovelock, Nevada, to facilitate herd captures as part of their range

improvement work. Even the famed actor Gary Cooper had spent time in the saddle as a mustanger in Montana rounding up wild horses for dog food.[24]

The other important shift occurred in the canned meat industry. Besides selling for chicken feed, wild horses formed the basis of the nascent pet food industry. The end of the First World War produced a surplus of horses in the Eastern states to which Americans' increasing use of the automobile in urban areas contributed. Using horse flesh in pet food provided a cheap source of meat for an expanding commercial market, and nowhere was the supply of horses more plentiful or undesirable in excessive numbers than in the western states. Early pet food manufacturer Ken-L-Ration introduced canned horse meat for dogs, a popular item for an increasingly advertising-driven, consumer-conscious public. Rather than feed their favorite pets table scraps, middle class families fed their canine family members meals of their own. Dog food factories in Los Angeles processed railroad carloads of wild horses from throughout the American West for pet food. Canned horse meat as dog food became so popular, that in 1934, Allan Alexander "Scotty" Allan, the famous Alaskan dog-trainer and musher, and the Reno Chamber of Commerce tried to work out a deal to establish a dog food cannery in the area to take advantage of the abundant supply of wild horses.[25] Throughout the 1930s, the portion of wild horses captured that did not end up sold as potential saddle or harness animals or as canned meat for sale in Europe, ended up as canned meat for pets and as chicken feed. The pet food market, however, outstripped even the supply of wild horses. "So extensive has the use of canned cat food and dog food become among the owners of carnivorous pets," stated one newspaper article in 1939, "that every type of cheap meat is being used in their production." The pet food industry had found such success in using "certain types

of scrub stock," that wild horses were becoming scarce on western ranges. But mustangs did not provide a consistent source of meat for America's pets and companies, although they accepted wild horses for slaughter, their main supplies came from older or surplus farm animals.[26]

This broadened market for horse flesh put continued pressure on wild horse populations, and combined with the increased efficiency of rounding up the animals produced by using airplanes, mustang herds suffered a severe decline. Yet the wild herds had a small reprieve during World War II when metal for canned dog food was in short supply and mustangers became soldiers for a while; though they still provided hides and chicken feed. However, as in previous wars, some of their number were rounded up and sent overseas for military use and others even found their way into butcher shops that specialized in horse meat at a time when the government rationed other types of meat and its market price skyrocketed. A butcher from Oakland, California, argued that "in times of meat shortage like this, we're putting that waste [the unwanted wild horses] to some good. We're bringing the meat to the public at half the price of beef, and we're selling the hides to the government to make shoes for soldiers."[27]

After the war, wild horse populations increased and the Forest Service, the newly-created BLM, and many livestock operators began once again to actively pursue the herds. The BLM in particular vigorously pursued wild horses as part of director Marion Clawson's efforts to organize and efficiently manage the grazing range. Mustangs were not the only ones who had proliferated during the war; antelope and deer herds had also swelled and required several times the number of hunting permits previously issued by wildlife departments to control. But wild horses were not wildlife and had no hunting tag

limit on their taking. Besides the usual hide, chicken feed, and pet food markets, wild horses also provided meat to the United Nations Relief and Rehabilitation Administration as part of assisting war-torn Europe during the last year of the organization's existence. Americans also sent live animals to help replace lost European stock. In addition, because of the potential easy money to be made, an increasing number of mustangers were not livestock operators, but professionals contracted by the BLM or Forest Service who specialized in aerial roundups. Some were also fly-by-night operations looking to make a quick dollar. Pilots had become more skilled at hazing wild horses out of their mountains and canyons and placing the corrals for their final capture. Depending upon the purpose of the roundup, however, the condition of the horses could vary from exhausted and unhurt to bloodied and injured to dead. In the northern and central Great Basin, pilots began using helicopters, in addition to fixed-wing aircraft, which flew lower, slower, and were much more maneuverable.[28]

At the same time federal and private efforts worked during the interwar years to remove wild horse herds from the nation's remaining public lands, concerned individuals publicly protested their eradication. Their objections became vehement about the issue of animal cruelty. In 1931, along with applications for horse hunting positions, Idaho's Bureau of Animal Industry stated they had received letters "protesting the wholesale slaughter [of the horses] as inhumane and unnecessary." Similarly, after World War II, the protests continued. In 1947, Los Angeles City Councilman Lloyd G. Davis "charged that wild horses on the plains of western states are being killed from airplanes with machine guns and then used for dog food or for human consumption in foreign countries." While doubtful that wild horse herds were being machine-gunned from

aircraft, Davis was really responding to the wholesale capture of the animals using aircraft and the cruelty often involved with that process.[29]

At the same time, the Alexander Tilley, the head of Los Angeles's American Society for the Prevention of Cruelty to Animals (ASPCA), protested the outright extermination of the wild horse in the American West and his office in Los Angeles had received numerous complaints about the matter. The ASPCA, an organization that had cut its teeth on protecting urban cart horses from abusive drivers, had been deeply involved protesting the use of bucking horses, which in the first two decades of the sport were actually wild horses, in the emerging rodeo industry since the 1920s. No one actually knew how many wild horses existed throughout the country, but the ASPCA claimed that earlier wild horse gathering had kept up with reproduction rates but current gathering techniques and the increased demand of the pet food industry and federal contracts for supplying meat to Europe had brought wild horse populations to the brink of extinction.[30] The American Humane Association also protested the "inhuman treatment in capturing wild horses." By 1952, the organization had written several pieces that showcased the terrible conditions wild horse herds faced when water and feed ran short and the brutality often involved in rounding them up.[31]

This was the issue that caught the attention of the American public and made saving the wild horses an urgent matter of life and death. Capturing wild horses using aircraft, for the purpose of killing them to supply a commercialized pet food industry, to the extent that it eradicated their entire was beyond acceptable limits. One Nevadan stated "I certainly don't mind seeing the scrub stock, the mustangs, the wild horses with bad feet and other deformities, removed from the range, but when it comes to turning good horses

into chicken feed, it just makes me sick." More than simply livestock, horses were partners and companions for ranchers. Their eradication in the name of greed and human progress also engendered the same feelings of loss as had the buffalo fifty years earlier. As part of the subjugation of the country's Native American population, the federal government authorized the complete destruction of wild buffalo. Buffalo hunters made fortunes slaughtering entire herds to clear the Great Plains of unwanted animals and unwanted Native populations to make way for maximum settlement and agricultural production. Likewise, the federal government had encouraged the removal of wild horses from the regulated range to make way for efficient livestock production. The self-indulgence and cruelty involved in the destruction of the buffalo had prompted George Bird Grinnell to launch a decade-long public campaign to preserve the last of the nation's animals. In the same way, a handful of Nevadan's launched a national campaign to save the wild horse.[32]

The day Velma Johnston decided to follow a livestock truck dripping blood on the dirt road she took into Reno from her Double Lazy Heart Ranch, she witnessed the worst of the wild horse capture process. Many interviewers have quoted and paraphrased her descriptions yet nevertheless, they are still difficult to reiterate. Inside the truck "she saw a horrifying tableau of mutilated horses, some barely alive. She saw a foal, or what was left of a young horse, lying trampled, bones crushed and coat blood-soaked. A number of horses had bloody stumps instead of legs. Others had sections of their hooves torn off and hides shredded by buckshot. A stallion stood with his head bowed, blood seeping from empty eye sockets. He had been blinded to subdue him. It was only the tight quarters that kept many of the horses upright." Soon after her encounter with the bloodied mustangs,

Johnston and her husband Charles ran a clandestine campaign of direct action against wild horse captures. They sabotaged corrals, gathered evidence, and released horses back into the wild. A victim of childhood polio and disfigured from the disease, Johnston took on the wild horse cause because she adored horses and identified with the unwanted animals, she has served as the historic whistle-blower of mustanging. Johnston publicized the terrible practices used in wild horse capture including hamstringing, blinding, stitching their nostrils shut, and depriving animals of feed and water. Bounty hunters cut the ears off the horses, dead or alive, to demonstrate the volume of their cull. One angry mustanger facetiously dubbed her "Wild Horse Annie."[33]

Like others who had become concerned about the brutality that could be involved in rounding up wild horses, Johnston read through the current literature available on mustangs. J. Frank Dobie's work provided a sweeping cultural history of the wild horse in North America. She read about mustangers and different kinds of wild horse capture techniques. But most importantly, she read historian Walker D. Wyman's work *The Wild Horse of the American West.* In 1945, Wyman published an account of the growth and decline of wild horses region which highlighted two important aspects of their history. Wyman began his account with the statement that "the true wild horse, the remote ancestor of the domesticated and feral horse of our era, was indigenous to the American continent." The second was a lament in his final chapter, "Save the Wild Horse!," to the end of the mustang, that very definite western horse whose blood ranchers had diluted and whose herds mustangers had destroyed until there were only "degenerate estrays left." Johnston did not agree with Wyman on this point; she and other ranchers in the Great Basin owned mustangs they had bought or gathered themselves off the range and

trained to work as saddle horses. Johnston believed mustangs were beautiful, sturdy animals with incredible endurance and great intelligence. In her estimation, the herds left in the region were definitely worth saving.[34]

Johnston helped launch a crusade to create some legal protections for wild horses in the United States. But rather than bring the issue to the attention of the American public for the first time, as was suggested by the media of the time and most of the literature about her, she tapped into a growing tide of public discontent over the mechanized methods used in wild horse captures and their commercial sale as meat. The focus of this first effort to protect wild horses was to ban the use of airplanes, trucks, and other mechanized equipment which had increased the efficiency of wild horse gathers over their reproductive rates. In 1952, a group of concerned citizens in Storey County, Nevada, which included Velma Johnston, the county's postmaster Edward "Tex" Gladding, Virginia City businessman Jack Murray, and the Nevada Humane Society, protested the permitting of an upcoming mechanized roundup in their county. The protestors reasoned that aircraft and the use of other mechanized equipment in rounding up wild horses such as trucks needlessly stressed the animals to the point of extreme panic which caused them physical damage. Horses chased by aircraft and trucks moved faster and exhausted quicker than those chased by mustangers on horseback. Denying mustangers the ability to use aircraft in particular prevented that severe level of panic and damage and also restricted the number of horses mustangers could take in a single gather. The county commissioners denied the permit and a week later, banned the use of airplanes, helicopters, and any other aircraft in rounding up wild horse herds. The Storey

County Commissioners passed the resolution unanimously, however, the limitation only applied to state and county land, not to public land.[35]

This small victory emphasized the contrasting positions Americans took on wild horses. Livestock operators continued to believe that unregulated wild horse herds were a menace and reduced range resources for their cattle and sheep. They exempted the herds kept by ranchers for their own purposes—for either saddle horses or to provide some extra income as meat supplies—from this stance. Humane society members, suburban horse owners, and some old-timers who bred the animals thought that "the horses should be left alone to wander as they please." According to the BLM, there were around 4,000 wild horses left in the state, not many considering their numbers were three times that only a decade before. To make the ban statewide, the county's state representatives took the issue to the Nevada State Legislature. James Slatterly, the state senator from Storey County and Richard Hardenbrook, the state assemblyman from the area, proposed a bill to ban aerial pursuit of wild horses in the 1955 legislative session. Hardenbrook reasoned wild horses herds should "be preserved as one of the last remnants of the old west." The statewide ban on aerial pursuit also applied to deer and other wildlife; hunters had used aircraft to drive game animals into areas where they would be easier to shoot and went into effect that summer.[36]

Velma Johnston, pleased with the results of their efforts, said the law was designed to "obtain as complete protection as possible for the horses, so that a man—if he wanted to—could ride into the hills and get himself a mustang now and then; and to make it economically impractical to continue the exploitation of the horses to proved the canneries with cheap meat for pet food." However, enforcement of the new law proved

problematic because state land only comprised one-fifth of the territory wild horses roamed, an area regulated by the Forest Service and the BLM under the authority of the Taylor Grazing Act to improve the grazing range. Though Colorado, Arizona, and New Mexico followed the precedent set by Nevada, only a national law would solve the problem of mechanized roundup. Like George Bird Grinnell and the campaign to save the buffalo, she launched a national movement through popular public media to save the nation's wild horses.[37]

The drive behind securing a national ban on aerial and mechanized wild horse capture, which wild horse advocates widely considered to be the source of the inhumane treatment of the animals and the immediate cause of their demise, grew out of the widespread publication of a series of photographs which detailed the problem. The photos, combined with the general sentiment that wild horses were nearly gone from the western range, propelled the issue of their protection from a local and regional level to a national level where it produced a massive public response. Gus Bundy, owner of a guest/divorce ranch near Reno, had snapped some photographs of a wild horse roundup while driving a client, *Life Magazine* photographer Bud Gourley, around to investigate the event in 1951. The mustangers took Gourley's camera, but Bundy managed to snap a few pictures, something no one, not even Velma Johnston, had been able to accomplish thus far. Copies of those photographs ended up in the hands of Reno lawyer Charles L. Richards who passed them on to Velma Johnston in 1953. The photos had played a small role in securing the passage of Nevada's 1955 law, but when Johnston secured Bundy's permission to use them in *True, The Man's Magazine* to accompany her article on the cruelty of wild horse gathering practices in 1958, they made a national impact on the

American public. They featured horses running in terror of aerial pursuit down a steep hillside onto a dusty playa where trucks continued to pursue them (fig. 77). On the playa, cowboys hazed the animals in the trucks until ropers tied to the bed had lassoed each with a rope attached to a tire (fig. 78-80). The horses drug the tires across the dried lake bed until exhausted (fig. 81-82). The mustangers roped and tied down each animal, chained its legs, and dragged it up onto the back of a truck where they stood it upright again with its companions (fig. 83-88).[38]

Those photos appeared, often without Bundy's permission, in successive articles published in the popular national periodicals, and regional newspapers such as *Time* and *Sierra* magazines, the *Sacramento Bee*, and in the academic journal *Geographical Review* (fig. 89). The ASPCA even obtained some of the Bundy photos for distribution in their own publications which contained an article entitled "Mustang Murder." These publications vilified the individuals who used airplanes and trucks to capture wild horses. They labeled mustangers, BLM employees, and even ranchers, terrible torturers and murderers. The flood of support based on those images was overwhelming. The ASPCA, the American Humane Association, and the Humane Society of the United States all assured Johnston of their support in obtaining protective legislation preventing the use of mechanized methods in capturing wild horses. The National Wildlife Federation, an organization that believed horses were "the hardest users of grassland ranges," supported federal legislation to prevent the "inhumane treatment of animals because of excesses in their numbers." The wildlife advocate group believed control of herd numbers "should be handled with experienced and especially trained personnel," not by those looking to profit. The Sioux tribe also responded to the campaign, one leader writing to Johnston,

"Oh, girl, if I could have been there with a good band of Sioux warriors, armed with .30-.30 rifles, we would have killed us some two-legged skunks." The Great Basin wild horse problem now became a national issue focused on the issue of animal cruelty.[39]

In 1959, Nevada's Congressman Walter S. Baring, Senator Howard W. Cannon, and Montana's Senator Michael J. Mansfield introduced bills that extended the ban of the use of aircraft and mechanized equipment in rounding wild horses to the nation's public lands. The BLM publicly tried to correct the popular perception of the agency's cruelty towards the horses and its desire to eradicate the animals altogether. The agency argued that it was not their policy to "eliminate these wild bands, even if that could be done" and that it did not tolerate cruelty towards animals of any kind. Even so, the condemning photographs demonstrated the panic, hurt, and resignation of the animals captured in such a humiliating manner. This sentiment was magnified by the fact that the BLM continued to insist upon the necessity of using aircraft and trucks in their roundups. The hearings on the House bill featured a passionate and articulate Velma Johnston and other wild horse advocates from various animal protection and humane associations. Johnston had Representative Baring distribute a report containing the Bundy photographs to many members who were as shaken by the images as the rest of the country. She described the bloody capture of a recent legally-permitted wild horse capture in which a colt suffered a massive chest wound and never received any veterinary care, pointing to the pictures of the animal in her report. Her testimony and the crush of letters sent by interested parties to nearly every congressional delegate at the capitol was evidence of the strength of public opinion against mechanized roundups (fig. 90).[40]

The only voice counter to Johnston's and the wild horse advocates was the BLM's range management specialist from Nevada. Neither the land management agency nor the ranching community in the Great Basin had a charismatic figure to counter Wild Horse Annie. Gerald M. Kerr expressed the opinion of both the agency and the livestock operators it served. Neither the BLM nor ranchers in general condoned cruel methods of wild horse capture. The use of chains, tires, and poison for the "indiscriminate slaughter" of the animals were associated with the "gathering operation[s] of 'bootleg' horse runners which are not sanctioned or controlled by law enforcement agencies of the states," the BLM stated. It was impossible, given the BLM's funding and staff restrictions, for the agency to supervise all wild horse captures on federal land. As the animals were considered estrays and fell under state jurisdiction, states needed to enforce the proper use of roundup permits. The agency argued that "under proper supervision, rounding up horses and burros by plane is the most humane method," because "the animals are gathered quickly and corralled before they are exhausted from the constant running by relays of riders on horseback." The land management agency and ranchers believed the use of airplanes and trucks were vital range management tools and their use should not be restricted just because a handful of private individuals acting outside the jurisdiction of the BLM abused the technology. In addition, the BLM argued that between the inevitable escape or release of some privately-owned animals into the wild and the natural reproduction rates of wild herds, wild horses were not in any danger of extermination.[41]

Throughout the Congressional hearings, wild horse advocate groups made an important differentiation between the ranchers who rounded up mustangs on horseback the old-fashioned way and the out-of-state livestock operators who blamed the wild

horses for damaging the range and were just out to make a quick dollar. The Humane Affiliates said "the old-time cattlemen, who lived close to the land and understand the true conditions and take the long view," and "hold instead that wild horses benefit the range … they are said to graze only the land that will not support cattle … the mustangs help to reseed the open range … they save cattle on the winter range by breaking the ice with their hoofs at the water-holes." Profit-driven livestock operators bent on total wild horse eradication and over-zealous BLM range managers received the brunt of their blame. The symbols that divided the good ranchers from the murderous ones, the good land managers from the careless ones were the mechanized tools used in roundups. Wild horse advocates had publically branded anyone advocating the continued use of airplanes and trucks in wild horse captures propagators of suffering and death. Public pressure and the emotional strength of the advocates' testimony made the bill a popular political tool. With very little delay, both houses of Congress passed the bill to President Dwight D. Eisenhower for signature.[42]

Rounding Up Some Common Sense

The "Wild Horse Annie" law, because it only addressed the method of wild horse capture, spawned a decade of debate as to the place of wild horses on the nation's public lands. Wild horse advocates correctly supposed that removing the mechanized aspects of rounding up the animals took away the ability of mustangers to make enough money to undergo the effort and expense involved in their capture. The despised commercial operations that exploited wild horses and removed the animals in large numbers, as well as the amateur mustangers just looking to make a quick dollar, could no longer hope that wild horse roundups would produce a profit. The livestock operators that had

traditionally culled herds on a smaller scale on horseback, a group with which Velma Johnston was both familiar and fond, were thus not affected. The law presupposed that wild horses would have a place on public lands because its intent was to eliminate the means of their eradication. It did not, however, make the mustangs' relationship to the range any more understandable or clarify which agency or group was responsible for their management, and it did not define exactly what constituted a wild horse.

Velma Johnston presaged this issue with Nevada Representative Walter S. Baring when consulted about the proposed legislation. Johnston was initially unhappy with the wording in the bill's draft, especially regarding the use of the term "wild horse." "From past experience," she wrote, "I really feel that there is going to be a lot of controversy over what is and what is not a wild horse, and there will be those who will contend that there are no longer any true wild horses in existence … and will try to put the burden of proof upon those trying to protect the mustangs." Johnston preferred the description "wild, unbranded horse, mare, colt or burro running at large on any of the public land or ranges," in order to "avoid future controversy, and also protect the burros which are being brutally killed." She also was interested in clarifying which agency was responsible for their management, the BLM or the state within which the animals resided. Typically, states managed wildlife populations and estrays, domestic animals which got loose and became feral. Johnston agreed with the position of Mark A. Shipley, a former range manager from northeastern Nevada, that states should strictly control and manage the wild horse populations, culling herds and introducing well-bred horses to improve their blood-lines. Shipley rationalized that wild horses could be raised like timber stands and that in time "a magnificent specimen of horse" would result. Such a position placed wild

horses closer to the position of wildlife in terms of placing the animals under state jurisdiction and managing them actively in a manner similar to wildlife.[43]

But this position conflicted strongly with the BLM and Forest Service mandates and authority to regulate the public grazing range and conduct range improvements. Federal and state land management agencies generally considered wild horses, and their less charismatic counterparts the wild burros, the most destructive of all grazing and foraging animals in their eating habits, causing erosion, directly competing against cattle, sheep, and a variety of wildlife for food, but providing no economic return. Under the Department of the Interior's understanding of the multiple-use concept, permitted livestock, wildlife, and unbranded horses all had a place on the federal range, "but no one interest should be allowed to interfere with the rights of the others." Ernest J. Palmer, the BLM's state director in Nevada, stated that the 20,000 wild horses ranging throughout the American West, most of which roamed the Great Basin, had a place on the public rangeland so long as they did not exceed the current "reasonable numbers." He reiterated that the BLM "has never advocated complete elimination of unclaimed horses from the Federal range" and there was "no danger at this time that they will become extinct." The Nevada Wool Growers argued that wild horses were "just one class of livestock … and usually unlicensed and trespassing animals at that" and limiting federal land management agencies' authority to control their population effectively preferred horses over other animals on the public lands. None of these groups condoned the inhumane treatment of the animals and especially condemned the use of trucks, tires, chains, and other means which harmed wild horses upon capture. All of them believed that aircraft were essential

to humanely removing the animals and federal agencies, particularly the BLM, ought to be responsible for wild horse management as part of their range regulation.[44]

Added to this general conversation about what constituted a wild horse, which agency should manage them, and how the animals ought to be managed was another dialogue about what they represented historically to the nation. Velma Johnston and many of her supporters maintained that wild horses were not simply "unclaimed and abandoned" individuals. "We who are fighting the big fight," she argued, "are of the opinion that many of the horses are the mustangs and wild ones which are being caught in these indiscriminate commercial roundups." Johnston said their numbers were small, but "the genuine old-time mustang does exist—cross-bred, of course, through the years, with domestic stock that has strayed, but nevertheless retaining the qualities that have made the mustang strain the desirable one that it is." Geographer Tom L. McKnight, using the work of historians Will C. Barnes, J. F. Dobie, Wyman D. Walker, and Robert M. Denhardt, established that mustangs were loose horses of Spanish origin and formed North America's first feral bands. As settlement grew, more horses got loose and joined these bands, eventually comprising the "native western stock." Those who had supported the Wild Horse Annie Law thought "the mustang played an important part in the history of the West."[45]

Where some saw wild horses as one of the last remaining remnants and symbol of a bygone era in the American West, others viewed them as the degraded leftovers of an earlier period, serving no purpose but obstructing good land management. The BLM, Forest Service, and livestock operators generally considered wild horses to be a persistent and recurring problem when their numbers reached above certain levels. Nevada's

Department of Conservation and Natural Resources assistant director George Hardman thought "the wild horse is not a native to our western ranges but was introduced" by the Spanish and similar to "many introduced species, the horse found few enemies in the territory he occupied and hence multiplied rapidly." The "original wild horse was from highly selected Arabian stock," but, said Hardman, "over the years inbreeding, introduction of other blood strains, overgrazing of their ranges, and consequent poor nutrition have taken their toll. The present wild horse in Nevada is far from the splendid animal that once roamed the ranges of this State." But believing there were more or less wild horses, in Johnston's opinion, depended upon "which side of the fence the source of the count is obtained. It would make it much easier for the forces opposing protectionist measures to discredit the qualities of the horses captured, and present the numbers of horses as being large, in order to emphasize the potential danger to the grazing lands of the West." For wild horses, it came down to the question of why and for whom the range resources existed.[46]

For the time being, in the several years after the passage of the Wild Horse Annie Law, these were merely rhetorical positions because the wild horse population had reached what public land management agencies and most ranchers considered a reasonable low. According to McKnight's research, at the end of the 1950s, there were between 17,330 and 33,660 mustangs left in the American West, more than half of which lived in the Great Basin. But the matter of the wild horses did not disappear from the public forum. In 1961, Arthur Miller's critically acclaimed movie *The Misfits* reiterated the brutal and inhumane aspects of mechanized wild horse capture. Starring Clark Gable and the ever-engaging Marilyn Monroe, the movie reconstructed in a live-action

sequence the Gus Bundy photographs. Miller based the film on his short-story, published in *Esquire* in 1957, about three would-be mustangers out to make some quick cash. Miller had based his story on real-life cowboys he had met while in Reno awaiting his divorce papers. The money the mustangers figured they earned in rounding up the animals amounted to one hundred dollars, demonstrating how much effort and pain the horses endured for such little monetary return for the men. The movie ended with a compassionate Monroe begging Gable and the other men to set the horses free. Popular entertainment columnist Hedda Hopper wondered in her short review of the film "where was the humane society when they were stampeding wild horses from an airplane, roping and throwing them?"[47]

In addition, the University of Nevada, Reno campus opened two successive art exhibits between 1964 and 1965 featuring the Gus Bundy photographs. Curators intended to highlight Bundy's contributions as a local photographer and artist, but display of the photos indelibly connected the images of wild horses with the Nevada landscape. One advertisement said "the photographs show the hunting of wild horses in Nevada by plane and automobile" and reminded viewers that "this type of hunting is now outlawed by the federal government." Nevada's public image seemed tarnished. The following year, Marguerite Henry's new novel *Mustang: Wild Spirit of the West*, a children's book telling Wild Horse Annie's "relentless campaign to save mustangs and other wild horses from capture for an eventual fate as pet food," educated an entire generation of children about the wild horse issue. The book was so well-received the National Cowboy Hall of Fame in Oklahoma City awarded the novel the Western Heritage Award for juvenile literature

in 1967 and created a permanent exhibit featuring the book's original manuscript and illustrations, and the Gus Bundy photographs.[48]

Two organizations also emerged in the Great Basin during these years which broadened and solidified support for the protection of wild horses. The first was John and Helen Reilley's International Mustang Club, later called the International Society for the Protection of Mustangs and Burros (ISPMB), which formed in 1960 and handled mailing Velma Johnston's information bulletins. Johnston described the organization as "devoted to the preservation of the wild mustangs and burros," whose purpose was to have a refuge set aside in which wild horses would be protected and managed. To this end Secretary of the Interior Stewart L. Udall established a 435,000-acre refuge for wild horses on the north end of the Nellis Bombing and Gunnery Range. The National Wild Horse Refuge, the nation's first for wild horses, was not "a showplace for the animals," but rather a "permanent refuge … the first step to assure that at least one wild herd will be preserved." Originally, wild horse advocates thought a preserve would be established in Utah or Wyoming, but the concentration of wild horses in Nevada was greater and the seclusion of the military range ensured contact would be limited to the BLM and the Nevada Fish and Game Commission. Along with the newly-expanded Desert Game Refuge, originally established in 1937 to the east of the Nellis range, the military base was swiftly becoming a haven for wildlife. To ensure their protection, the commander of Nellis Air Force Base "agreed not to fire rockets or guns into the refuge."[49]

The refuge on a military base solved the immediate problem of wild horses competing with permitted livestock for grazing forage. In addition, early ranchers had developed much of the region's water resources and some of those structures remained

intact for use by the horses. Writing on International Mustang Club letterhead, Johnston thanked one of the refuge's major supporters, Senator Howard W. Cannon, stating "I am happy that the first step has been taken to establish sanctuaries for them. I am hopeful that it will be continued in other areas of the United States, and that a permanent and workable control and rehabilitation program can be put into operation." So popular was the idea of this first refuge, Australian Senator J.A. Mulvihill, from New South Wales, wrote Senator Cannon for advice on how to go about setting aside a large tract of their federal land for a wildlife preserve. Senator Mulvihill had the kangaroo and the Brumby in mind when he wrote Cannon, and was intrigued as to how a large refuge could be carved out of Australia's western coast. Senator Cannon sent Secretary Udall's description of the process and Senator Mulvihill read a copy of Udall's *The Quiet Crisis*, confident that thanks to Cannon's assistance he would be able to secure "suitable action" by the Australian government.[50]

The second organization to emerge was the National Mustang Association (NMA) in Utah formed by Tom Holland and John McCormack in 1965. The NMA described itself as "organized by a small group of horse-lovers who are also patriotic Americans, and who are interested in keeping the tradition of our American heritage for their children and their children's children." The group's first objective was to "PRESERVE and PROTECT this rapidly disappearing part of early America—the gallant Mustang—the horse that did so much in the making of our country." The NMA was fundamentally disappointed that the first wild horse refuge precluded public access because of its location on a military bombing range. The organization was content to abide by the regulations set by the Department of the Interior concerning wild horses and offered

themselves up as a “large force of skilled ‘mustangers’,” whose services were “available to ranchers on private land and to the Bureau of Land Management on public land.” They hoped to purchase a wild horse refuge near Caliente, Nevada, which would allow the public to “still see Mustangs (born free).” Besides maintaining an interest in wild horse, the group also explained they were outdoor recreationalists who enjoyed trail riding and motorized sports.[51]

The language used by the NMA in describing its objectives differed subtly from the ISPMB in that although both groups sought protection for wild horses, the NMA believed the public should be able to see the horses whereas ISPMB was content to know they lived in a highly secluded refuge on a military reservation. Both groups believed wild horses represented the last remnants of the nation’s western heritage, but where the ISPMB avoided participation in wild horse captures, the NMA saw the ban on mechanized roundups as an opportunity to play cowboy. In addition, despite Holland’s support of protective measures for wild horses, his conception of wild horse management proved fundamentally inconsistent. In 1966, Holland, several local residents of Beryl Valley in Utah and eighty mounted cowboys used an airplane, trucks, and several other off-road vehicles to round up a small herd of mustangs on a bet. They were trying to substantiate the existence of a very old mule, the legendary Old Whitey who was purported to be over fifty years old. He was originally used as a pack mule for the Union Pacific Railroad and his last known owner had turned him loose in the 1910s. Old Whitey’s coat was long and his teeth were worn, but he outran all the horses in the roundup. Holland and his crew got the mule and verified his brand, then let him loose.[52]

By the mid-1960s, the BLM began wild horse roundups once again across the Great Basin. National events of the period overshadowed much of the wild horse issue; concerns over the anti-war protests in Washington, D.C., protests in the South, the Watts Riots in Los Angeles, and the assassinations of civil rights leader Reverend Martin Luther King, Jr. and presidential candidate Robert F. Kennedy far outweighed public fears that wild horses were being slaughtered. Nevertheless, as part of a burgeoning national consciousness about environmental concerns and animal welfare, wild horses continued to have a presence in the public mind. Regional and national newspapers covered the increasing number of incidents and roundups. Livestock operator Gordon Zumwalt secured a permit from Churchill County to round up forty "unclaimed and unbranded mustangs" for use as brood mares in Dixie Valley in Nevada, without using mechanized equipment. On the Nevada Test Site, a small herd roamed south of the wild horse refuge and the Atomic Energy Commission's Nevada Operation Office planned to remove the horses north outside its territory. Test site employees had mixed reactions to the presences of the herd. An unsubstantiated rumor indicated that a few men had some "sport" with the animals and a foal ended up in the trunk of someone's car and died. Upon investigation, Nye County sheriffs found some evidence of harassment. They also found evidence that test site employees had been developing water resources for the horses in their spare time which was what had attracted them south of the refuge.[53]

The BLM was careful to improve their public relations image during this time. The agency dutifully registered ranchers' protests against the ban on mechanized roundups and began developing regulations for new wild horse captures without using aircraft or motor vehicles. Under Secretary of the Interior Stewart Udall and BLM Director Karl

Landstrom, the agency also developed a friendlier demeanor with the public. In an agency-wide memo, Landstrom encouraged BLM employees to "be courteous and to give factual, straightforward answers." He said "our responsibility is to provide facts and not advice," reminding employees to "avoid advising or influencing any member of the public with respect to applying for any right, use, or title to lands or resources administered by the Bureau." Much of this instruction came about because of the controversy over the land application moratorium, but combined with the wild horse issue, the BLM had suffered a public relations disaster despite its ongoing attempts at cultivating a new image that reflected greater concerns about conservation and even preservation practices. The agency's image, however, only got worse as the wild horse population continued to rise and it struggled with understanding how to manage the animals along with its other duties.[54]

The BLM reported the Challis herd in southern Idaho had increased to about 100 head from the few that were left after a roundup of 570 in 1952 and now had to be monitored closely. More problematically, the herd at the north end of the Big Horn Basin which straddled the Wyoming-Montana state line had also increased by a similar amount. This herd in the Pryor Mountains was at the root of a power struggle between the Tillett family, who had run livestock in the region since before the Taylor Grazing Act and on whose grazing range the horses roamed, the community of Lovell, Wyoming, and the BLM district office in Billings. For several years, the Tillets and the district office manager, Dante Solari, had fought over the place of the Pryor Mountain wild horses on the public rangelands. The community valued the Pryor Mountain herd as a cultural heritage attraction, but the BLM manager warned the Tillett family, whose grazing

permits did not include more than twenty horses, to either remove the animals or pay trespass fees for them. Solar preferred to simply have them rounded up and slaughtered. Inflammatory headlines about the conflict read “BLM Ultimatum to Kill Wild Horses” and “Wild Mustangs May End Up as Dog Food.” In letters to newspaper editors, Velma Johnston wrote that “It would appear that the BLM, in its slavish service to the monopolistic demands of the cattle barons and sheep moguls for use of the public domain to the exclusion of everything not commercially profitable to themselves, have gone a bit overboard in making an issue of 140 head of horses.”[55]

Stepping into the controversy, Harold McCracken, director of the Buffalo Bill Historical Center in nearby Cody, Wyoming, stated the BLM’s kill-order was “one of the greatest disgraces to conservation and our heritage since the slaughter of the buffalo.” The problem of the Pryor Mountain horses was not that the BLM was held hostage by livestock interests, but that its general conservation practices only balanced livestock operations with wildlife. The agency classified wild horses as livestock and thus subject to permitting restrictions. Many BLM district managers were fairly generous in requiring ranchers to have permits for wild horses and did not enforce the numbers quite so strictly. The personality conflicts between the Tillets and the BLM office personnel informed the land management agency’s strict enforcement of the Tillets’ grazing permits. By April 1966, the agency’s Washington office warned Solari to back off and resolve the issue before further bad press embarrassed the BLM.[56]

Waves of letters from animal protection organizations and children had inundated the offices of Montana Governor Tim Babcock and Wyoming Governor Cliff Hansen. Solari and the Tillletts agreed to leave the Pryor Mountain herd alone until an official range

survey could be completed which would then determine if the range itself could adequately support the animals without decreasing any livestock grazing permits or causing increased erosion patterns. The following year, BLM director Boyd L. Rasmussen announced a formal BLM policy towards wild horses. “Where it is determined the aesthetic value of wild horses or burros on bureau-administered land is a public asset,” he stated, “a planned management program shall be initiated to accommodate a reasonable number of animals.” In other situations, “where wild horses or burros compete with livestock or wildlife for limited forage or water, BLM will work with interested groups, livestock men and wildlife agencies to assure good management of all.” But, Rasmussen’s statements implied removal of wild horses when necessary, a position borne out by the final verdict on the Pryor Mountain herd whose numbers would drop to one-sixth the herd’s original size. After a damaging ABC documentary on the wild horses which generated further protest, Secretary of the Interior Stewart L. Udall created a second wild horse refuge at the end of 1968 in the Pryor Mountains and a committee to decide how to manage the animals.[57]

The crisis over the Pryor Mountain herd combined with increased wild horse numbers in the late 1960s highlighted a shift in public thinking about wild horses. Whereas previous rhetoric focused on the inhumane treatment of the animals during mechanized roundups, the new language indicated concern about generally removing and killing wild horses. This general sentiment created a growing desire to create an explicit place for wild horses on the public range lands. Added to this were an increasing number of problems with the 1959 law itself. The Wild Horse Annie Law prohibited mechanized roundup of wild horses, but if the herd contained branded horses, then privately owned

animals could be captured using whatever means available. Some unscrupulous mustangers and livestock operators deliberately released branded animals into wild herds throughout the Great Basin and applied for permits to round up the horses, branded and wild alike.

One such individual was Julian Goicoechea, a Basque descendant, who ran cattle and sheep in the Newark Valley in White Pine County. Goicoechea had filed for several hundred acres in the mid-1960s, during the land application moratorium, to establish a land base, but failed to secure water rights in the area. Without a land-base, Goicoechea relied on access to grazing range via other ranchers' permits and made extra money harvesting wild horses. Nevada Bureau of Livestock Identification supervisor Stanley F. Routson charged Goicoechea and two other men, Art Cook and Ted Barber, with violating the law against mechanized roundup in 1967. In federal court, Goicoechea argued that the horses he captured were branded and therefore could be taken in such a manner. Goicoechea's position reflected a common perception that wild horses were not actually wild per say, but domestic strays turned feral. Velma Johnston, who testified at the trial, countered that feral horses were all wild. Horses only "one generation removed from a domestic stray" were born wild. But there was no way, except through the presence of brands, to tell the difference. The jury failed to convict Goicoechea because the prosecution could not prove the horses were in fact wild. The outcome of the trial motivated wild horse advocates to begin campaigning for a federal law that clearly established the definition of a wild horse and delineated an explicit place for them on the public range land. To accomplish this, wild horse advocates polarized the issue far more than before. During the trial, they portrayed Goicoechea as "one of Nevada's wealthiest

cattlemen" out to eradicate the animals for his own greedy purposes. Similar to demonizing the BLM and mustangers in the previous decade for murdering the animals for pet food, wild horse advocates developed a very powerful emotional appeal for their position by attacking entire livestock industry.[58]

Velma Johnston and other wild horse advocates believed that without adequate standing under federal law, wild horses would consistently remain subject to livestock and wildlife management, range improvement, watershed protection, and military testing. Illustrating the lack of protection for animals and a general dearth of concern about environmental contamination, in March 1968 the BLM feared wild horses had suffered some exposure to a dangerous nerve gas because six thousand sheep had been found dead in nearby Skull Valley from the "errant cloud of nerve gas" the military admitted had been accidentally released. Toole County and the BLM had created a wild horse herd area in the Cedar Mountains west of the military's chemical and biological weapons testing area at the Dugway Proving Ground. Though no wild horses died in the incident, the accidental distribution of poisonous gas across the boundaries of the military reservation called into question the wisdom of wildlife and wild horse refuges on or near military installations. In Nevada, even though nuclear testing had moved underground, the Sedan test in 1962 and subsequent accidental releases made exposure to radioactive fallout a concern as well; a problem with which Great Basin residents were all too familiar. In addition, wild horses strayed south from their allocated range to the Nevada Test Site, wandering over the very areas contaminated by ongoing nuclear tests. Reports occasionally surfaced that wild horses and other wildlife suffered from unusual deformities such as crooked feet, shortened legs, and small hearts.[59]

The problem, as Johnston put it, was the difference between the terms “preserve” and “permit to exist.” Where the permitting concept allowed a certain amount of horses relative to livestock and wildlife, preservation elevated wild horses above the commercial production of cattle and sheep and placed them on par with wildlife. In writing Secretary of the Interior Stewart L. Udall and Ernest F. Swift of the National Wildlife Federation, Johnston suggested that the BLM and other public land management agencies had only examined possibilities which balanced their numbers against livestock and wildlife such as deer, antelope, and big horn sheep, on a sliding scale. This was, of course, in keeping with the multiple-use mandate of the period in which all user groups maintained some kind of access to public lands. As had been established with the proposed Great Basin National Park, livestock operators in the region supported the multiple-use approach, but preferred the older hierarchy which prioritized commercial use over other uses such as recreation. Their rejection of Great Basin National Park emphasized their rejection of limited-use landscapes. Johnston and other wild horse advocates increasingly emphasized the creation of limited-use landscapes specifically for wild horses at minimum. While the National Wild Horse Refuge sufficed in the early 1960s, wild horse advocates hoped to create more refuges along the lines of the Pryor Mountain model which was “a showplace for the wild horse heritage.” Johnston believed wild horses would only be safe from “poachers” in designated areas, but excluded private sanctuaries as they would not guarantee protection for the animals in perpetuity. The better option was to classify the animals as endangered species.[60]

The American Horse Protection Association (AHPA), organized in 1966 on a wave of animal welfare protection codified in that year’s Animal Welfare Act, along with Velma

Johnston and the Great Basin organizations mounted a campaign to reclassify wild horses as endangered wildlife, similar to the buffalo, such that the animals would fall under the nation's emerging endangered species program and be managed by the federal government. Johnston even asked the advice of the National Park Service's Starker A. Leopold, author of the 1963 report on wildlife management in the national parks, "on the matter of semantics insofar as the status of the wild horses and burros." However, Leopold carefully stated that not much was known as to the ecological value of *Equus*. Undeterred, Johnston argued that "over the years, the wild horses have become important to the American people as a symbol outranked only by Old Glory and the American Eagle," that they "represent the very symbol of the freedom that is our heritage." Wild horse advocate groups and horse protection organizations sent out provocative mailers to raise public support for a federal law proposed by Senator Frank E. Moss which gave wild horses protected status.[61]

Pearl Twyne and Joan Blue, the women involved in organizing the AHPA in Washington, D.C., had been working diligently to secure passage of the Horse Protection Act in 1970 which banned the practice of soring horses' feet to make them step higher in the show ring. Between the AHPA, ISPMB, NMA, the Humane Society, and other animal advocacy and protection groups provided a broad base of support. Letters from constituents poured into congressional offices with statements that echoed the emotionally-charged mailers. "I feel this bill will put the matter of protection of wild mustangs and burros where it can be adequately enforced," wrote one Las Vegas resident, "the wanton slaughter for personal profit of these wild species by poachers must be stopped now if they are to be saved from extinction." The daughter of a military service

man wrote "the mustang, like the Indian, could be called 'the first American'," and "wouldn't it be wonderful if these courageous animals could be preserved for our future children and ancestors to admire?" The language of these letters suggested that attempts to round up wild horses amounted to their general extermination and those sent by school children became the most powerful voices. One child wrote "I like horses alot [sic] especially mustangs and colts are my favorite. I wish there were some way that they could be saved."[62]

Reaffirming this view, journalist Hope Ryden, who had worked closely with the Tillett family on behalf of the Pryor Mountain wild horses while filming the 1968 ABC documentary on the subject, published an expose on wild horses in October 1970 which included the Gus Bundy photographs. Entitled *America's Last Wild Horses*, she portrayed wild horses as "victims," "scapegoats," the "prey of profiteers," "tormented" and "trapped," "stalked" by poachers, and generally "the object of widespread prejudice." Ryden opened her book with a chapter that asserted "the horse … is a native of North America," emphasizing the innate place wild horses had once had in the continent's ecological system. Ryden also emphasized the Spanish heritage of the animals, placing importance on the term mustang which indicated their historic connection to well-bred Spanish equines. Ryden believed that "since the public-domain lands were wild horses are still found had little economic value, and since this land in any case belongs to all of us equally, whether stockmen, hunter, or city dweller, it was the plea of the horse lovers that more refuges be quickly established for the wild horse whose long centuries of service to man had earned it the right and the privilege to return to the wild."[63] Ryden's work publicized the most provocative aspects of wild horse advocates' argument for their

place on the public rangeland. Rather than relegate wild horses to refuges, where as feral animals they would continue to be regarded as "interloper[s] and illegitimate," Ryden supported a federal agency such as the BLM "granting permanent status and place to the last bands of horses living like hunted fugitives in the West they helped build." Her book was widely popular, informing perceptions of the American public, including the nation's congressional delegation.[64]

Where wild horse advocates had a tremendous impact in the public's perception of wild horses and even the BLM managed to prevent too much damage to the agency's reputation, livestock operators, especially in the Great Basin, often fulfilled the negative role in which advocates portrayed them. Joseph Fallini, Jr., son of the elder Joseph Fallini, had a rough time grappling with his wild horse problem in the late 1960s. The family had always run horses on the grazing range with their cattle, a common practice especially in the drier areas such as the Kawich and Railroad valleys. Some of these animals drifted onto the bombing range to the south during the 1940s, but the Fallinis periodically rounded them up when the military allowed it. Beginning in 1951, the BLM required the family to keep their livestock to the permitted numbers, but wild horse herds, developed from their early release of horses onto the open range, continued to roam the same areas. Each season, the Fallinis transferred their cattle and horses from summer to winter ranges and shut off their stock watering systems when they moved the livestock to discourage use of the area. Wild horse herds migrated with the Fallini animals following the water. In addition, wild horses from the Nellis refuge drifted north onto the Fallinis' grazing district, the Reveille allotment. Fallini customarily rounded up what he considered excess wild horse populations and sold the animals to slaughter houses.

Fallini once offered to sell the National Mustang Association the horses he had rounded up, preferring to see them go to the NMA rather than the slaughterhouse. However, this outraged NMA members. Kent Gregersen, the organization's secretary wrote Velma Johnston "the ranchers pay no grazing fees on these horses in almost all cases. Now they hear of a bill in Congress which may stop their operations in Nevada they are going all out to get all the horses they can, while they can, before a law can prohibit them." Gregerson believed local ranchers in the area deliberately diluted the "Mustang" blood with larger domestic horses "in order to get more pounds and dollars."[65]

Compounding matters, the distasteful figure of the mustanger lingered in the public consciousness. One case in particular confirmed the public's fears that mechanized roundups still occurred, that they were terribly cruel, and that wild horses were still being sold and slaughtered for pet food. John Casey and his son-in-law James A. Williams of Gerlach, north of Pyramid Lake in Nevada, were ranchers only in the loosest sense of the term. Casey owned a slaughterhouse and was known to rustle cattle. In July of 1969, Casey and known mustanger pilot Jerry "Chug" Utter rounded up 150 horses using an airplane and shotguns. State brand inspector Stanely Rouston and local law enforcement proceeded with securing arrest warrants, but the state did not file a criminal complaint and the horses went to the slaughterhouse. The following year, one of Johnston's informants caught Utter illegally constructing a trap for capturing wild horses near Virginia City and introducing branded horses into the wild herds. When Utter disappeared, Johnston and University of Nevada biology professor Michael Pontrelli, who had worked to help the Pryor Mountain horses along with his graduate student Steven Pelligrini, planned to dismantle the trap for the media to illustrate the problem of

wild horse poaching practices. But, before they could arrange the event, a group of concerned Virginia City residents dismantled the trap in angry protest. Utter filed a civil suit for property damage against those "responsible," specifically Dr. Pontrelli, who was notified by the university that his contract would not be renewed. The university eventually acquiesced and the judge dismissed the case at the end of 1971. The media attention the incident received more than confirmed that the wild horse was indeed still in danger of extinction.[66]

The final blow to resistance for a federal law protecting wild horses beyond just prohibiting their mechanized roundup came when California enacted a ban on using "Nevada mustang flesh," or "free-roaming wild horses," in pet food at the end of 1970. Along with alligator shoes and leopard- or tiger-skin coats, wild horse meat could no longer be processed or sold in the state. The new law hoped to help save "a number of dwindling species from extinction at the hands of professional hunters and poachers." Riding on a tidal wave of public support and under pressure from his young son, Representative Gilbert Gude of Maryland proposed placing wild horses under the protection of the Department of the Interior, with the BLM acting as custodian, and potentially setting aside more special ranges for their preservation. On public lands, the BLM intended to manage wild horses under the multiple-use concept and on their designated preserves they would have a higher level of priority. The BLM was making a similar arrangement for the designation of special off-road vehicle areas, managing them under multiple-use policies on most public lands, and even prohibiting them from special protected areas. Even Chug Utter declared his support to preserve wild horse herds stating he was in favor of establishing preserves for a limited number of animals in areas

where they would not “interfere” with livestock; he did not think “the entire West should be a preserve for wild horses.” Utter reminded lawmakers that someone would have to cover their expenses because “water will have to be developed and grass grown to support these wild horses,” and that ranchers considered horses a threat when their numbers are not properly controlled and they are not confined to specific areas. Members of both congressional chambers introduced so many bills to protect wild horses in the first few months of 1971 Velma Johnston stated she had to figure out “which ones we should support.”[67]

At the same time, a parallel proposal surfaced in Nevada over whether or not the state, home to the majority of the nation’s wild horse herds, should take over the protection and care of the animals. The debate on the Nevada measure highlighted the tensions at the national level. The first problem surrounded the issue of whether the wild horses slated for protection were in fact remnants of the Spanish horses of the sixteenth century, a justification used by the NMA to confirm their place in the nation’s heritage. Kent Gregerson went a step further advocating Hope Ryden’s position that the horse was once native to North America. The general feeling among ranchers, because many of them had once actively managed these herds and because of early literature on the disappearing mustang, was that current wild horses bore little resemblance to the legendary Spanish horses and were what William Hicks of the Nevada Agricultural Livestock Council called “a bunch of discards.” State Senator Floyd Lamb of Las Vegas agreed, arguing “you’re barking up the wrong tree when you try to protect this type of an animal.” Lamb accused Velma Johnston and his fellow senator Cliff Young from Reno of “brain-washing the children.” Lander County rancher and Sheriff George Schwin agreed,

stating the horses around his area were just plain old wild horses. But biology professor and wild horse expert Michael Pontrelli said the amount of so-called mustang blood did not matter and all wild horses symbolically represented a part of the nation's heritage. This was the same argument made by Velma Johnston. He did agree on the issue of controlling wild horse populations if they proliferated and creating special preserves for them. To many critics and supporters alike, the connection of contemporary wild horses with those of the Spanish explorers legitimized the animals' place in the American West and on the public range land.[68]

The second issue had to do with cost, both that which would be required to adequately manage the animals and that which would be incurred if wild horses were allowed to displace livestock. Most Nevadans, like Pontrelli, Johnston, and Utter agreed that wild horse numbers ought to be actively managed since the animals did proliferate over time if left unchecked and did do damage to the public range lands. But no one knew exactly what that rate of proliferation was, nor did anyone understand the impact wild horses actually had on the range as a separate species. In addition, no single group had the funding available to create and staff a management program for their preservation.[69] The Nevada Fish and Game Department was the agency which would manage the horses if the state accepted responsibility for them, but the agency required increased staff and funding to carry out any protective measures enacted by the state. Nevada lacked a state income tax program and relied on the inevitable fluctuations of sales tax to fund its programs. The Fish and Game Department sold hunting and fishing licenses to help fund their wildlife mandates. Without an income, presumably generated by issuing permits to roundup wild horses for commercial use which was the very activity wild horse

advocates worked to prevent, the state could not bear the cost burden of wild horse management. The Nevada legislature preferred to let the federal government pick up the tab for managing the state's wild horses. Ranchers remained fundamentally concerned that the animals would wreck decades of range improvements on the state's public lands as they had in earlier decades. Floyd Lamb reminded Nevadans "we should consider the ranchers a people who have to endure these animals … they developed the land and dug the wells." Lamb remained convinced of the livestock operators' priority on the public grazing range. In any case, as Chug Utter put it, "there's only one end to being a horse, whether he's a champion race horse or a plug: dog food."[70]

Congress, motivated by a massive letter-writing campaign by school children and excellent television coverage, seemed willing to place wild horses under federal administration. Nevada's Representative Walter S. Baring and Washington's Senator Henry M. Jackson introduced identical bills in their two respective chambers of Congress to accomplish this. Colorado Representative Wayne Aspinall, who opposed the measure along with Arizona's Representative Sam Steiger, and Idaho Senator Frank Church conducted hearings on the Baring and Jackson bills and supporters of the measures included nearly the entire Great Basin delegation, particularly Nevada senators Alan Bible and Howard W. Cannon, Oregon's Senator Mark Hatfield, Utah's Senator Frank E. Moss and Representative Gunn McKay. The federal government essentially proposed creating a new categorical description of wild horses; neither domestic strays nor wildlife, wild horses were designated a national heritage species based on their cultural meaning to the country as the last remnants of the American West. In large part, this was done to avoid the problematic terms "feral" and "wildlife," which was language already

established in state and federal laws in ways that clearly did not appeal to either wild horse advocates or their opponents. Instead the bills used the term "free-roaming" to describe their state of being.[71]

The Congressional hearings on the bills proved no less emotionally charged than those held a decade before. Proponents of the wild horse legislation asserted the animals' place in the nation's history and the American public's demand for their preservation on public land. Velma Johnston again testified, declaring livestock operators "must realize that the years of dominant use of the public lands are over." She argued "We, the people, recognize we have a right, too, to this rapidly diminishing resource for purposes other than to provide forage for privately owned cattle and sheep, or to provide forage for target animals to oblige the hunters." Michael Pontrelli reiterated that "wild horses have been extremely important to our American heritage, as there is account after account of using a wild horse as breeding stock with a more popular breed to instill ruggedness, stamina and a better ability to perform in the harsh western environment." Hope Ryden testified as to the public support for wild horse protection evidenced by the popularity of her documentaries, book, and recent article in *National Geographic.* In addition, a fourth-grade teacher sponsored by the AHPA pleaded with the Congressmen to save the wild horse because it served as a "symbol of that tenacious will to survive in the face of encroaching civilization and man's rapacious greed."[72]

Karl Weikel of Searchlight, Nevada, represented both the National Cattleman's Association and the National Wool Growers Association at the hearings. Speaking for the majority of livestock operators in the country, Weikel expressed the frustration of ranchers with wild horses. He argued "that from the beginning, the wild horse issue had

been “clouded by controversy, accusations, counteraccusations and recriminations based mostly upon misunderstanding of, and impatience with, past mistakes, abuses, misuses and poor management decisions resulting from mistaken policy and too little factual information.” Commending wild horse advocates on their efforts to protect the animals from human-induced suffering, he reminded them that “we of the western range livestock industry live with and respect these animals and have done so for many years.” No one knew the horses better, Weikel argued, but “we take a more practical and less emotional approach to the very same objective.” That pragmatism included active management of herd sizes, culling excess animals, the humane destruction of aged or sick horses, and the sale of viable stock. Weikel also reminded Congressmen that it was not so long ago that Americans condoned eating horsemeat and that “we have gotten pretty finicky in this country in the last several years.”[73]

Weikel’s common sense approach, echoed by the BLM’s range managers, did not help either group’s position. Their language made them sound old and out of touch with the nation’s shifting environmental values. By October, the two bills, passed by both congressional houses were in the process of being reconciled. Both measures made harassing, killing, and selling the remnants of wild horses a federal offense and recognized the cultural importance of the wild horse to the American public. The controversial measures would have exempted the BLM from removing wild horses on public lands when they conflicted with rancher’s regular livestock activities and created a number of permanent refuges. In the process of reconciliation, the compromise bill did not mention creating any preserves or offer protection to herds on state lands, and mandated the Secretary of the Interior and Secretary of Agriculture to protect them

wherever they roamed on public lands, but did not provide any direction as to how, except to ban the use of aircraft in wild horse roundups. [74]

This vague but symbolic gesture provided a place for wild horses on the public lands, but did make not clear any of the specific details such as how, exactly where, and to what level wild horses would be managed. The Free-Roaming Wild Horses and Burros Act of 1971 satisfied the American public's most important criteria: it protected wild horses from being rounded up and then sold for commercial use such as in pet food. But even as the act passed Congress, the burgeoning animal rights movement rejected roundups and sales altogether and supported minimal interference with the herds. Wild horse advocates increasingly resisted any form of management to the utter frustration of the BLM and the livestock industry.[75] Throughout the next decade, the law became a source of stress and controversy. Public land management agencies, especially the BLM, livestock operators, recreationalists and wildlife advocates, the military, and the horses struggled as herd numbers increased once again in the Great Basin and there was no longer an avenue for their disposal. The shadow land wild horses occupied, between feral and wild, native and introduced, had no legal precedent to support the presence of a national heritage species on public land, preserved for their cultural and symbolic value. Nevertheless, wild horses in the Great Basin have a persistent presence in the region, appearing on license plates, postcards, in art exhibits, and even on the Nevada state quarter.

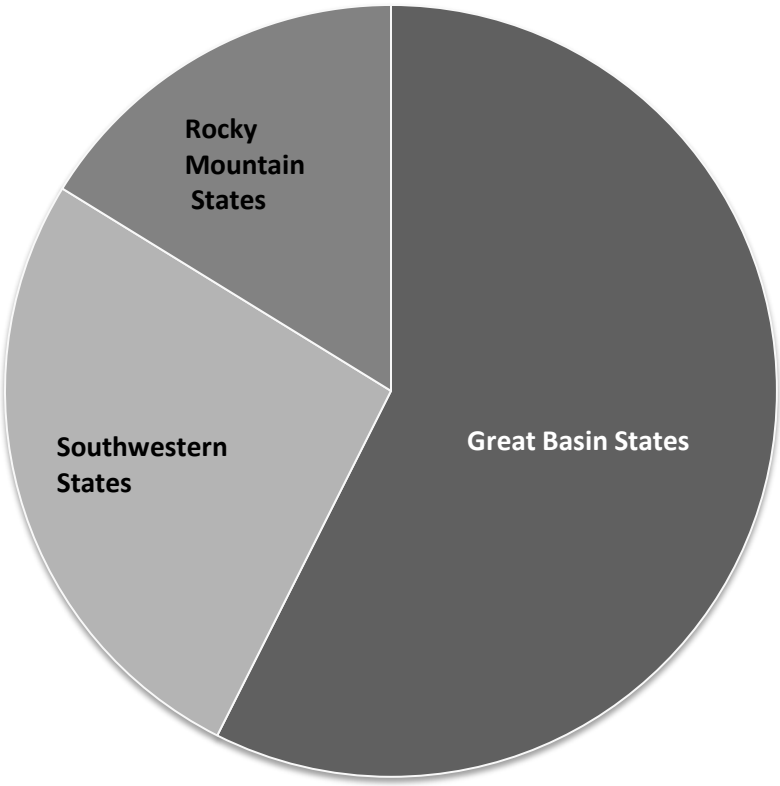


Fig. 76 Wild Horses by Percentage in Three Regions 1959. Although the numbers of wild horses fluctuated by several thousand in the early twentieth century, the proportion of animals in each region remained similar relative to the other regions. The Great Basin consistently contained at least half the total wild horse population in the United States. If the numbers in Canada were included, the proportion residing in the Great Basin would still be over 50%. Data for this chart came from Tom L. McKnight, "The Feral Horse in Anglo-America," *Geographical Review* 49 (October 1959): 506-525. Chart by author.

Fig. 77 Wild Horses Running across the Playa. Courtesy Gus Bundy Collection, Special Collections, University of Nevada, Reno.

Fig. 78 Truck Chasing Wild Horses. Courtesy Gus Bundy Collection, Special Collections, University of Nevada, Reno.

Fig. 79 Cowboy Roping Wild Horse from Truck. Courtesy Gus Bundy Collection, Special Collections, University of Nevada, Reno.

Fig. 80 Wild Horse Dragging Tire across Playa. Courtesy Gus Bundy Collection, Special Collections, University of Nevada, Reno.

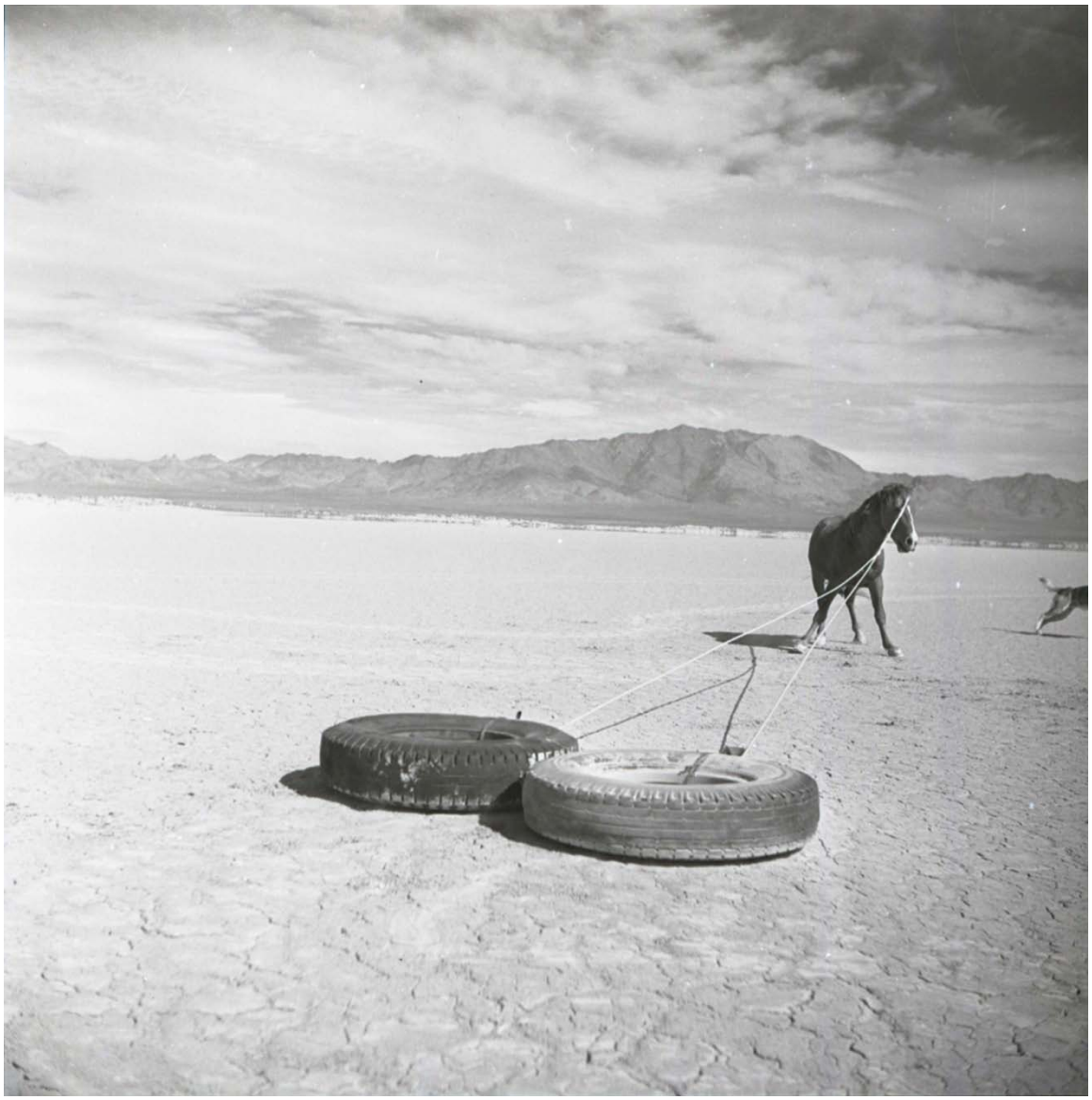


Fig. 81 Exhausted Wild Horse. Courtesy Gus Bundy Collection, Special Collections, University of Nevada, Reno.

Fig. 82 Wild Horse Rearing in Protest. Courtesy Gus Bundy Collection, Special Collections, University of Nevada, Reno.

Fig. 83 Cowboy Fighting a Wild Horse. Courtesy Gus Bundy Collection, Special Collections, University of Nevada, Reno.

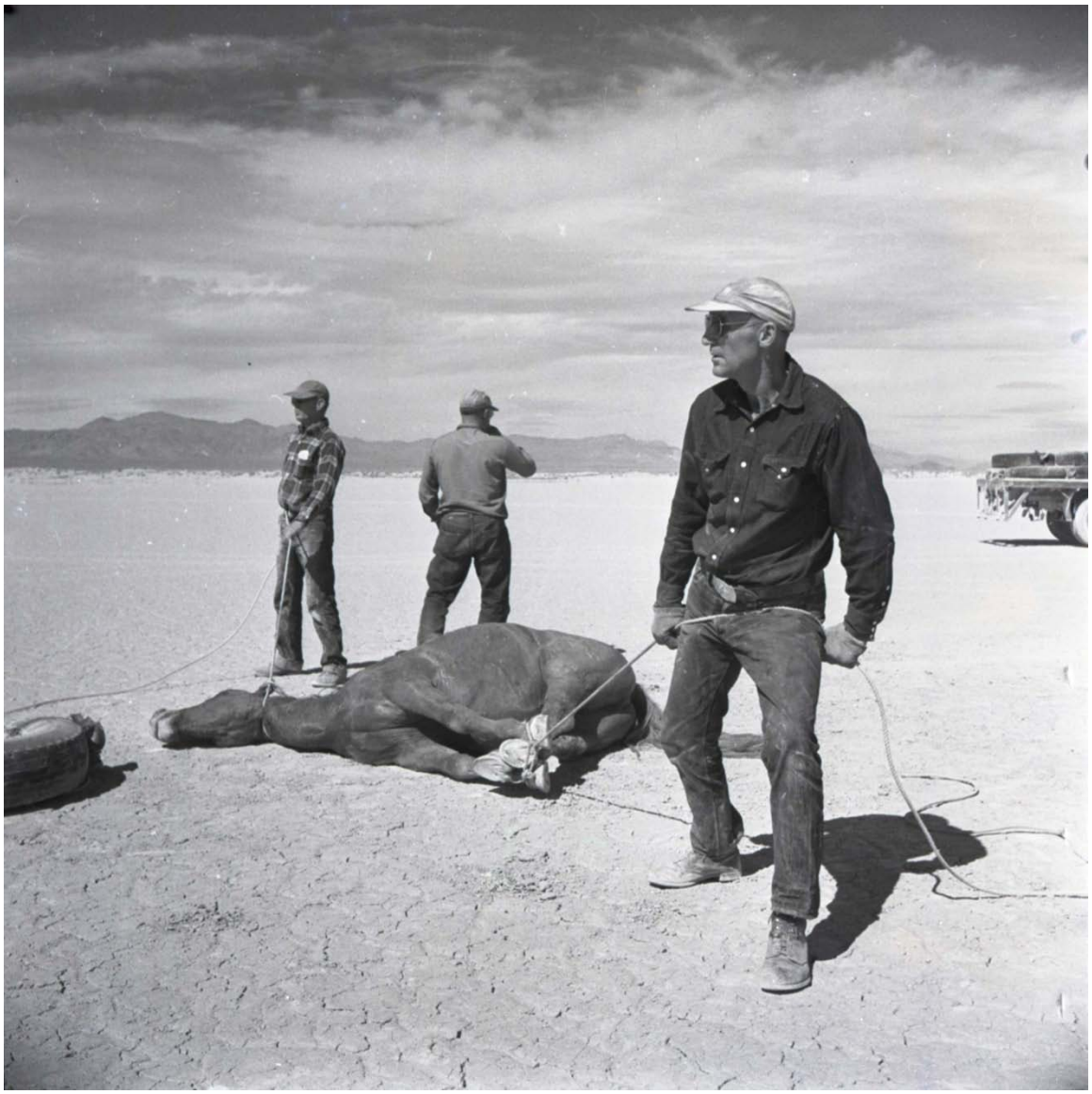


Fig. 84 A Tied Wild Horse. Courtesy Gus Bundy Collection, Special Collections, University of Nevada, Reno.

Fig. 85 Wild Horse Waiting to be Loaded onto a Hauling Truck. Courtesy Gus Bundy Collection, Special Collections, University of Nevada, Reno.

Fig. 86Dragging a Wild Horses up the Loading Ramp. Courtesy Gus Bundy Collection, Special Collections, University of Nevada, Reno.

Fig. 87 Closing the Truck Gate after Loading. Courtesy Gus Bundy Collection, Special Collections, University of Nevada, Reno.

Fig. 88 The Wild Horse Capture Crew. Courtesy Gus Bundy Collection, Special Collections, University of Nevada, Reno. (Gus Bundy Photo 32789)

Courtesy of 'Our Dumb Animals" November, 1958

Mustang Murder

Hopeless battle against man's inhumanity, as mustang roars and plunges in an attempt to free himself.

Final defeat, as tire-anchored horse, exhausted and bleeding from the nostrils, gives up the fight.

Re-roped, the mustang fights a second losing battle until he is finally overwhelmed, thrown to the ground and tied.

Dragged into truck, these once proud beasts begin their waterless trip to the rendering plant and ignominious slaughter.

IF it be true that one picture worth a thousand words, then there are on these two pages ight thousand anguished words of torture, cruelty, inhumanity, gony, crass commercialism and outright murder.

The photographer has caught ll of the nuances of the callous hunting down by airplane and truc k and eventual extermination of the wild mustangs of the west, on of the natural heritages of our country like the herds of bison, which luckily, now, are protected by federal law.

Since we last publicized thes cruel practices, something has been done, but not nearly enou gh. In 1952 more than 50 Nevadans protested so vigorously hese air roundups that an application of a group of horsemeat h ers was denied. New Mexico, Arizona and Colorado have tak n some steps to protect these creatures, but the state of Idaho s done nothing along this line. In Utah, any animal not brande after eighteen months of age are the property of the counties they roam and it is a simple matter for livestock interests to ob tain permission to remove these animals by outright killing or sh pping to canning centers.

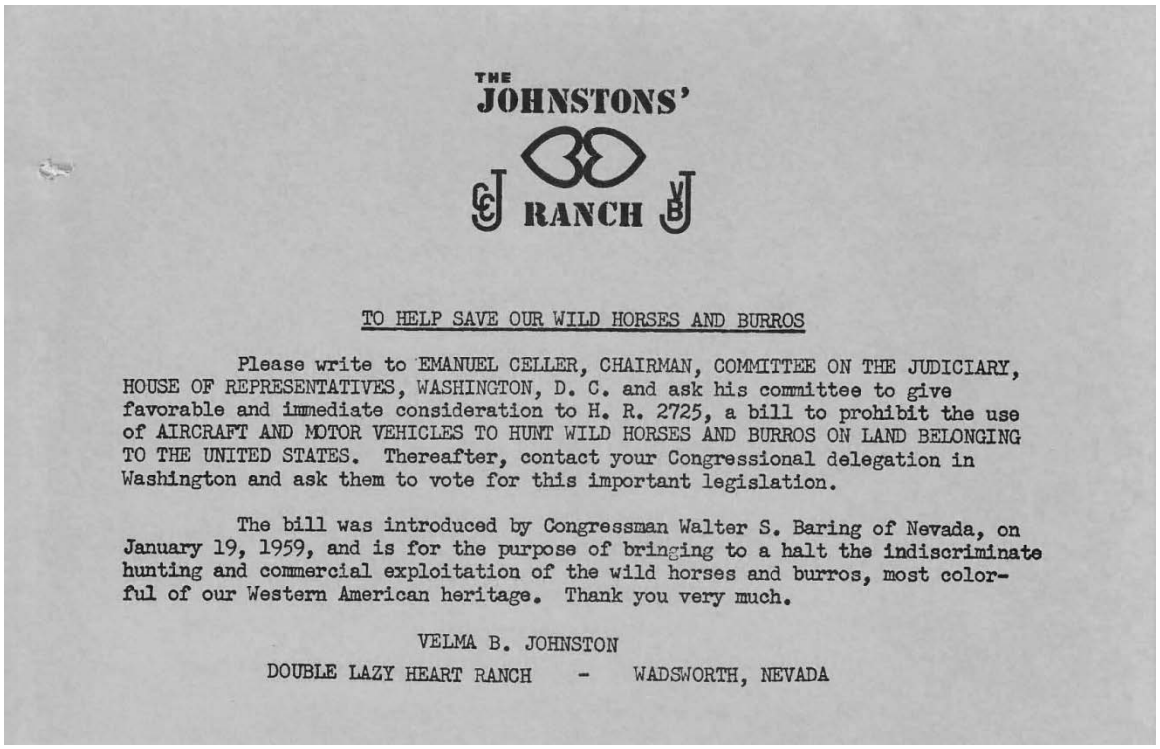
It also seems odd that the ederal government, controlling much of these lands makes absol ely no provision for the protection of wild horses which roam g vernment preserves.

These pictures show the start tragedy of one such hunt—of the waiting men with trucks an equipment, of the herding by plane and running down by truc of the lassoing of a mustang, of the dragging of the helpless c ature into a truck and waterless transporation to the rendering p nt.

Only new legislation enacted n both state and federal levels can save the mustang—otherwise they will become extinct. Your voice must be heard in the halls f Congress.

Photographs by GUS BUNDY

Fig. 89 Mustang Murder. The layout of the *True, The Man's Magazine* article "Mustang Murder" from their June 1958 issue as featured in the November 1958 issue of *Our Dumb Animals*. Image from the Howard Cannon Papers, 86th Congress, Leid Library Special Collections, University of Nevada, Las Vegas, Nevada.



THE JOHNSTONS' DLH RANCH

TO HELP SAVE OUR WILD HORSES AND BURROS

Please write to EMANUEL CELLER, CHAIRMAN, COMMITTEE ON THE JUDICIARY, HOUSE OF REPRESENTATIVES, WASHINGTON, D. C. and ask his committee to give favorable and immediate consideration to H. R. 2725, a bill to prohibit the use of AIRCRAFT AND MOTOR VEHICLES TO HUNT WILD HORSES AND BURROS ON LAND BELONGING TO THE UNITED STATES. Thereafter, contact your Congressional delegation in Washington and ask them to vote for this important legislation.

The bill was introduced by Congressman Walter S. Baring of Nevada, on January 19, 1959, and is for the purpose of bringing to a halt the indiscriminate hunting and commercial exploitation of the wild horses and burros, most colorful of our Western American heritage. Thank you very much.

VELMA B. JOHNSTON
DOUBLE LAZY HEART RANCH - WADSWORTH, NEVADA

Fig. 90 Wild Horse Mailer 1959. Velma B. Johnston sent out numerous flyers, information letters, and cards, including this one, to potential supporters of the Wild Horse Annie Law. Her mail campaign successfully pressured both Congress and the President to pass the law. Image from the Howard Cannon Papers, 86th Congress, Box 34, Folder 529, Leid Library Special Collections, University of Nevada, Las Vegas, Nevada.

Notes

[1] Juliet Clutton-Brock, *Horse Power: A History of the Horse and the Donkey in Human Societies* (Cambrigdge, MA: Harvard University Press, 1992), 17-25.

[2] There is still some debate as to whether or not *Equus ferus* or *Equus ferus caballus* did or did not develop on the North American continent and the outcome of this debate could potentially have legal ramifications. This issue, however, is not as relevant if a broader approach to the subject is taken. Rather than differentiate according to different equine species, it is enough to acknowledge that the genus *Equus* and the majority of its different forms originated in North America. The taxonomic nomenclature used in this section reflects a recent decision by the International Commission on Zoological Nomenclature which recognizes that *Equus ferus* is the parent species from which *Equus ferus caballus*, the domestic horse, was derived. Rather than using the truncated name *Equus caballus*, use of the full species and subspecies name retains that important connection. Jay F. Kirkpatrick and Patricia M. Fazio, "Ecce Equus," *Natural History Magazine*, (May 2008): 30; Clutton-Brock, *Horse Power*, 17-25; Joel Burger, *Wild Horses of the Great Basin: Social Competition and Population Size* (Chicago: University of Chicago Press, 1986), 18-21; James A. Young and B. Abbott Sparks, *Cattle in the Cold Desert* (Reno: University of Nevada Press, 1985), 212-214;Walker D. Wyman, *The Wild Horse of the West* (Lincoln: University of Nebraska Press, 1945), 17-25.

[3] It was from this vast population, originally those horses that escaped or were released in the Spanish, British, or French provinces of North America, that individual animals and groups migrated, collected, and populated the country. There has been much debate as to whether or not to call these animals wild or feral, native or introduced. In this context, they are wild because they are loose, which is to say they are not completely controlled and that is how Americans typically approached them until recent decades. Regional differences in calling them mustangs, broncos, Cayuses, or Western ponies does not convey any specific lineage, but are regional slang terms for wild horses. A specific herd's lineage is fascinating, though difficult to map. Young and Sparks, *Cattle in the Cold Desert*, 214-216; J. Frank Dobie, *The Mustangs* (New York: Bantam Books, 1954), 15-33; Wyman, *The Wild Horse of the West*, 29-43.

[4] There are some researchers of varying disciplines who purport the rate of expansion in the horse population was greater than could be reasonably produced by the horses brought by the Spanish that had escaped. Even if other animals are taken into account, such as escaped horses from the early Spanish ranches and those came from the Anglo settlements along the east coast in the 1600s, the reproduction rate is still unreasonably high. Nevertheless, there is currently no archaeological evidence that an *Equus* population of any kind had been continuously maintained in the Americas. Clutton-Brock, *Horse Power*, 141-148; Dobie, *The Mustangs*, 33-58; Richard White, *'It's Your Misfortune and None of My Own': A New History of the American West* (Norman: University of Oklahoma Press, 1991), 18-26; Wyman, *The Wild Horse of the West*, 47-88; Emil Her Many Horses and George Horse Capture, *Song for the Horse Nation: Horses in Native American Culture* (Washington, DC: National Museum of the American Indian, 2006); LaVerne Harrell Clark, *They Sang for Horses: The Impact of the Horse on Navajo and Apache Folklore* (Boulder: University Press of Colorado, 2001); Pekka Hamalainen, *The Comanche Empire* (New Haven, CT: Yale University Press, 2008).

[5] *Equus ferus* evolved to move and especially to run, a characteristic above all others that facilitated its attraction to *Homo sapien*. The horse was the last of the common livestock species to be domesticated; humans tamed and bred the dog in the late Paleolithic age to hunt, and adapted sheep, goats, pigs, and cattle for meat, milk, and clothing during the Neolithic Revolution. But humans, although some had kept the animals for food, adapted the domestication process for food production with the horse because of the mobility the animal offered. Horse transportation entirely transformed human society and it was this relationship that caused *Equus ferus* to once again diversify and multiply as humans bred the animals to facilitate human needs, creating the subspecies *Equus ferus caballus*. Evidence for the earliest domestication of the horse is found among the Botai culture in the north Kazakh region near the Iman-Burluk River, although there is also indications among the Sredni Stog culture north of the Black Sea at Dereivka of the same from a later era. Around 3500 BCE, the Botai placed a bit in a horse's mouth and a fundamental relationship formed. As domesticated horse numbers increased and spread rapidly throughout Eurasia, wild horses continued to be relegated to the unsettled regions in ever-decreasing numbers. By 2000 BCE, the horse pulled carts across the Middle East and Europe and a thousand years after that, warriors on horseback appeared throughout the world in the archeological record astride. Whether or not *Equus ferus caballus* descended from one or several wild ancestors remains unclear. Nevertheless, the horse's variety

and build ranged from the stocky and heavy to the light and lithe and over time, variety in their build and size has only increased based on both adaptation to their environment and the purpose for which they were bred. From prehistoric times to the present, *Homo sapien* has developed a cultural connection with *Equus ferus* which has been good for both animals, each species helping the other survive, and this connection has bonded them closely together. Wyman, *The Wild Horse of the West*, 29-43; White, *'It's Your Misfortune and None of My Own'*, 181-297; Clutton-Brock, *Horse Power*, 54-62; Roger A. Caras, *A Perfect Harmony: The Intertwining Lives of Animals and Humans Throughout History* (New York: Simon and Schuster, 1996), 140-150; Juliet Clutton-Brock, *A Natural History of Domesticated Mammals* (Cambridge, UK: Cambridge University Press, 1999), 100-113; Adrian M. Lister, et al., "Tales from the DNA of Domestic Horses," *Science* (April 13, 2001): 218-219; Clay McShane and Joel A. Tarr, *The Horse in the City: Living Machines in the Nineteenth Century* (Baltimore: Johns Hopkins University Press, 2007); Alan K. Outram, et al., "The Earliest Horse Harnessing and Milking," *Science* (March 6, 2009): 1332-1335.

[6] "Company History," Breyer Animal Creations, http://www.breyerhorses.com/.

[7] Wyman, *The Wild Horse of the West*, 138; Tom L. McKnight, "The Feral Horse in Anglo-America," *Geographical Review* 49 (October 1959): 519.

[8] Robert M. Denhardt, "The Role of the Horse in the Social History of Early California," *Agricultural History* 14 (January 1940): 13-22; Wyman, *The Wild Horse of the West*, 91-109; Young and Sparks, *Cattle in the Cold Desert*, 216-232; Dan Flores, *Horizontal Yellow: Nature and History in the Near Southwest* (Albuquerque: University of New Mexico Press, 1999), 97-100.

[9] Henry C. Brisch, "On the Wild Horses of the Far South-West," *American Turf Register and Sporting Magazine* (May 1834): 463-464; James B. Bailey, "The Wild Horses of America," *Forest and Stream*, May 25, 1876; "Western Range Horses," *Massachusetts Ploughman and New England Journal of Agriculture*, June 30, 1900; Young and Sparks, *Cattle in the Cold Desert*, 216-232; Wyman, *The Wild Horse of the West*, 91-109; Robert Moorman Denhardt, *Quarter Horses: A Story of Two Centuries* (Norman: University of Oklahoma Press, 1967), 3-6.

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Journal, December 28, 1890; State of Nevada, Nevada Statute 3957, "Stallion Running at Large," February 17, 1893, *Nevada Compiled Laws 1929* (San Francisco: Bender-Moss Company, 1930), 1170; "A Good Law," *Weekly Gazette and Stockman*, February 23, 1893; "Nevada Surprises Them All," *Reno Evening Gazette*, September 2, 1893; "The Mustang Nuisance," *Daily Nevada State Journal*, September 11, 1893; "The Wild Horses of Nevada," *New York Times*, November 30, 1894; "Brevities," *Daily Nevada State Journal*, December 9, 1896; "The Legislature," *Weekly Gazette and Stockman*, February 25, 1897; "Legislative Enactments," *Daily Nevada State Journal*, March 16, 1897; "Hunting Wild Horses," *Daily Nevada State Journal*, April 29, 1897; "Illegal Shooting of Wild Horses," *Daily Nevada State Journal*, April 7, 1900; "All Around the State," *Daily Nevada State Journal*, October 10, 1901; "Wild Horse Hunt Begins," *Chicago Daily Tribune*, October 11, 1901; "All Around the State," *Daily Nevada State Journal*, October 22, 1901; "All Around the State," *Daily Nevada State Journal*, February 14, 1902; "All Around the State," *Daily Nevada State Journal*, February 22, 1902; "All Around the State," *Daily Nevada State Journal*, April 26, 1902; "State News," *Daily Nevada State Journal*, August 19, 1902; "Wild Horses," *Reno Evening Gazette*, August 27, 1902; "Fleet Little Broomtails, Wild Horses of the Breaks," *New York Times*, April 17, 1904; "May Shoot Wild Horses," *Reno Evening Gazette*, January 10, 1906; "Horse Hunter Has Confessed," *Reno Evening Gazette*, January 31, 1906; "Starving Band of Wild Horses," *Reno Evening Gazette*, February 6, 1906; "Will Slaughter Wild Horses," *Reno Evening Gazette*, March 6, 1906; "The Horse," *Massachusetts Ploughman and New England Journal of Agriculture*, June 16, 1906; "Gossip Heard Around Town," *Reno Evening Gazette*, July 26, 1906; "To Slaughter Wild Horses," *Reno Evening Gazette*, February 8, 1908; "Capture Many Wild Horses," *Reno Evening Gazette*, July 6, 1909; "Capturing Wild Horses," *Reno Evening Gazette*, August 30, 1909; "Wild Horses Doomed," *Reno Evening Gazette*, March 18, 1911; Nevada Statutes 3958-3961, "Destruction of Wild Horses and Burros" (March 13, 1913) in in Curtis Hillyer, *Nevada Compiled Laws 1929* (San Francisco: Bender-Moss Company, 1930), 1170-1171; "Killing Many Wild Horses," *Reno Evening Gazette*, June 6, 1913.

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[14] Barnes, "Wild Horses," *McClure's Magazine*, 285-294; Wyman, *The Wild Horse of the West*, 142-142.

[15] Rufus Steele taught writing at the University of Miami, Florida. His most popular work on horses was the posthumously published *Mustangs of the Mesas: A Saga of the Wild Horse* (Hollywood: Press of Murray and Gee, 1941). Rufus Steele, "Trapping Wild Horses in Nevada," *McClure's Magazine* (December 1909): 198-209; Wyman, *The Wild Horse of the West*, 237-238; Amaral, *Mustang*, 34-54.

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[69] "Management, Control Called Keys to Nevada's Wild Horse Problem," *Reno Evening Gazette*, March 25, 1971; "Wild Horse Management Advocated," *Nevada State Journal*, March 26, 1971.

[70] In contrast, Utah announced that it would rather its Division of Fish and Game manage the animals and not have the federal government "stepping in and telling it what to do where wild horses are concerned." Ranchers and range managers had always considered horses and cattle equivalent in their feeding capacity; under the BLM's grazing permit system, for every horse, someone would lose a cow and therefore income. "Management, Control Called Keys to Nevada's Wild Horse Problem," *Reno Evening Gazette*, March 25, 1971; "Wild Horse Management Advocated," *Nevada State Journal*, March 26, 1971; "Mustang Protection Sought," *Reno Evening Gazette*, March 31, 1971; "Mustang Fails to Get Help in the Senate," *Reno Evening Gazette*, April 14, 1971; "Hits Lawmakers," *Reno Evening Gazette*, April 21, 1971; "Utah F&G Board Taps Chairman," *Salt Lake Tribune*, April 29, 1971; "Environment: The Fight to save Wild Horses," *Time Magazine*, July 12, 1971; "Case for Mustang Brings Mixed Feelings," *Nevada State Journal*, August 8, 1971.

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[73] House Committee on Interior and Insular Affairs, *Protection of Wild Horses and Burros on Public Lands: Hearings on HR795, 5375*, 92nd Cong., 1st sess. (April 19-20, 1971), 117-134; Senate Committee on Interior and Insular Affairs, *Protection of Wild Horses and Burros on Public Lands: Hearings on S862, 1090, 1116, 1119*, 92nd Cong., 1st sess. (April 20, 1971).

[74] *Free-Roaming Wild Horses and Burros Act of 1971*, Public Law 195, 92nd Cong., 1st sess. (December 15, 1971); Terry Newfarmer, "Is the Mustang Just Fit for Dog Food?," *Salt Lake Tribune*, October 31, 1971; Anthony Ripley, "Woman Has Worked for 20 Years to Save America's Vanishing Wild Horse," *New York Times*, November 11, 1971; "Help is Pressed for Wild Horses," *New York Times*, November 12, 1971; "Wild Horse Bill Passes," *Nevada State Journal*, December 4, 1971; "Bill to Protect Wild Horses Off to President," *Salt Lake Tribune*, December 4, 1971; "A Week of Successes for Wild Horse Buffs," *Nevada State Journal*, December 5, 1971; "Bill to Protect Wild Horses Goes to President," *Provo Daily Herald*, December 5, 1971; "Group Opposes Bill for Wild Horse Protection," *Provo Daily Herald*, December 6, 1971; "Horse Group Flays Bill; Up to Nixon," *Salt Lake Tribune*, December 6, 1971; "Nixon Signs Bill Protecting Wild Horses," *Reno Evening Gazette*, December 17, 1971; James M. Naughton, "President Signs Bill to Protect Wild Horses on Federal Lands," *New York Times*, December 18, 1971; "Fourth Graders in Oregon Backed Wild Horse Bill," *Reno Evening Gazette*, December 18, 1971; "With a Nod to Kids, Nixon Signs Mustang Bill," *Salt Lake Tribune*, December 18, 1971; "Nixon Signs Bill Protecting Nation's Wild Horses, Burros," *Provo Daily Herald*, December 19, 1971; Cruise and Griffiths, *Wild Horse Annie and the Last of the Mustangs*, 239-251.

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CHAPTER 7

THE SIZE OF THE RISK

Efficiency and cooperation may have served humans well. But they have done so under conditions unique to the resource and waste-sink availabilities of the last 300 years. Under other conditions—namely, environmental criticality—a different set of principles are needed . . . *Sufficiency* is a class of principles, sensitive to critical environmental risks, to the needs of management and self-management, when it is otherwise all to easy to evade responsibility for such risks. Sufficiency is an idea, a principle, indeed an ethic for sustainability. Thomas Princen, 2005

Driving through the Great Basin, evidence of the conflicts between the four landscapes is subtle, scattered, and very difficult to see. Nevertheless, the physical evidence is there: historic highway signs, barbed wire fences, cattle guards, radioactive hazard warnings, bombing range markers, national forest and Bureau of Land Management (BLM) recreation signs, and the occasional wild horse roundup featured in local papers. It is easy to gloss over land use in the Great Basin because so few Americans are directly affected by the public land policies. Measuring the effects of the conflicts between the four landscapes is also difficult because the evidence is scattered, the dialogue is polarized and often politically inflammatory, and the federal government enacted every land-use law or program for important, if not fundamentally necessary reasons, and usually in response to public pressure.

The Taylor Grazing Act of 1934 put an end to unregulated use of public lands for grazing livestock and legitimized ranching as an acceptable, though somewhat less desirable, economic activity. The nation's military reservations and early atomic testing program in the 1950s secured the United States' position as a world leader and ensured the country remained on the cutting edge of weapons technology. The Department of the Interior, responding to the overwhelming desire for better conservation practices and

public lands facilitate to outdoor recreational experiences, proposed new national parks that would benefit local communities through outdoor recreation-based tourism. The agency also ended homesteading through the 1964 Classification and Multiple Use Act to achieve this purpose. And in 1971, the public outcry for the humane treatment and preservation of wild horses, as a last remnant of the nineteenth-century American West and a symbol of freedom itself, spurred passage of the Free-Roaming Wild Horses and Burros Act. The hybrid landscapes each of these public land programs created codified some important program on public lands that had an important utility value to the nation. Nevertheless, their creation established a layered, confusing, and conflicting pattern of multiple land use that remains unresolved and has damaged the region's human and natural environment. This was size of the risk of enacting these public land programs.

The Codification of Conflict

In 1970, the Public Land Law Review Commission (PLLRC), the last of public land commissions conducted by the federal government, released their long-awaited recommendations for planning the rest of the twentieth century's public land use. Spearheaded in 1964 by Colorado Senator Wayne N. Aspinall, who served as its chairman, the PLLRC addressed what he believed was a serious lack of Congressional initiative and attention to public land administration. Senator Aspinall believed this shortcoming had allowed environmental and other seemingly non-commercial land-use interests to affect public land policy-making. Despite the PLLRC being the most expensive and intensive public land commission to date, Aspinall secured his review program by granting reluctant support the Wilderness Act passed that same year. Commission members included Nevada's Senator Alan Bible and Representative Walter

S. Baring, Senator Len B. Jordan of Idaho, Representative Laurence J. Burton of Utah, Arizona's Senator Paul J. Fannin and Representative Morris K. Udall, New Mexico Senator Clinton P. Anderson, Washington Senator Henry M. Jackson, Colorado Senator Gordon L. Allott, representative from the eastern, southern, and Midwestern states respectively, several attorneys, a county commissioner from San Bernardino, California, and Laurance S. Rockefeller, a former member of the Outdoor Recreation Resources Review Commission (ORRRC). Public land management agencies collectively hoped the PLLRC's investigations, hearings, and discussions would clarify the increasingly problematic public land management laws which created conflicting, if not downright contradictory, mandates, policies, and programs. In addition, public land management agencies, the Bureau of Land Management (BLM) in particular, argued for greater administrative discretion in making the multiple-use concept work relative to increasingly varied public land users. However, rather than address the problems inherent in these overlapping geographies, the PLLRC's report entitled *One Third of the Nation's Land* amounted to a comprehensive list of Americans' "values and interests" that affected public lands decision-making.[1]

The report asserted that "of the 2.2 billion acres of land within the United States, the Federal Government own[ed] 775.3 million acres," a little over thirty-five percent, of which 724.4 million acres existed in the "public domain." The federal government administered the entire federal domain in one way or another using the multiple-use concept for the simple reason that multiple programs intersected on the same geography; military ranges, for example, included wildlife management. Unlike the three previous public land commissions, the PLLRC recommended that this public domain be retained

and managed by the federal government. In small ways, land would be made available to growing urban areas surrounded by the public domain to accommodate their expanding populations, but no longer did the federal government entertain any ideas of giving even the surface rights on public lands to the states.[2]

The PLLRC treated "all the resources and uses of the public lands" as commodities such that "in addition to the traditional resources of minerals, timber, forage, intensive agriculture, water, and fish and wildlife," they included "the various spatial uses such as for residential, commercial, and industrial purposes." Considering the military used a share of the federal domain for industrial production of troops and weapons, those activities were included as well. The commission considered the impact of each commodity on the other commodities and "to what extent, if any, the commodity would affect the environment." All the identified commodities the PLLRC analyzed included the purpose they served, the cost of maintaining the commodity, the resources needed to produce it, a price tag or fee structure to be charged for the commodity, distribution of the commodity, and identification of what group, either private parties, local, state, or federal governments, could best manage the lands utilized by the commodity.[3]

Several important assumptions about public land use were implicit in these statements. The first assumption was that because the federal government had embraced its responsibility for these lands, it would therefore provide regulations for their use, a concept that articulated what had already happened in a piecemeal way on public lands. Throughout the twentieth century, the federal government had embraced the multiple-use concept as the framework for public land administration. The guiding principle of allocating access to public lands through the multiple-use concept was fair and equitable

access among individual users such that no one user-group would be preferred over another. In addition, public land uses had to provide a fair return to the American public. Finally, public land managers were accountable to the public through Congress for their land management decisions. But this process made land and place a commodity. Unlike many other types of goods that can be purchased and consumed, place is not substitutable. Many of these uses could not occur in other locations and many public land users could not exchange one place of use for another. This constriction meant that each part of the multiple-use construct existed in tension with the other parts.[4]

This conceptual structure of public lands management sounded fair-minded and democratic based on the vague multiple-use concept, guided by rational decision-making and fortified by reasonable accountability mechanisms to ensure the public will was exercised on public lands. *One Third of the Nation's Land* called the public lands "a vast storehouse of potential resource benefit," which included mineral, timber, grazing, and wildlife resources, as well as physical space, beautiful scenery, and the nation's heritage. This was both the political and social economy of public lands in the United States. The PLLRC's construction of public land uses as commodities reflected the role the nation expected the public domain to serve, that of facilitating economic benefit by creating income for private individuals and the federal government through natural resource development, by providing physical areas for grazing, mineral extraction, lumbering, military use, nuclear testing, and recreation at no or low cost, and by fostering physical manifestations of the nation's heritage such as through wilderness and wild horses. Some of these categories produced economic benefits directly through jobs, manufacturing, and

personal income, others produced them indirectly, translating into sales of photographs, art work, backpacks, hiking boots, and other gear.[5]

In addition, the use of the term "commodity" problematically subjected all public land uses to the nation's economic mechanisms, particularly the forces of maximization and profiteering. It also oriented public lands management around consumption. Indeed, the PLLRC's mandate purported to manage the nation's public lands in such a manner as "to provide the maximum benefit for the general public," determined by the "highest and best use of particular areas of land." This was the same historic language used in the late nineteenth century that insisted all land be put into some kind of economic production. It was the same language embedded in the Taylor Grazing Act and the way Marion Clawson described multiple-use in the early twentieth century. It was the justification the nation's military and atomic scientists used to create bombing ranges and test sites which served and fortified the entire defense industry. And it was the same language Stewart L. Udall used to describe his conservation program and what wild horse advocates used to argue for the place of wild herds on public lands. No one believed that public lands would put large amounts of cash into the federal coffers, but instead argued on the basis of indirect economic benefit through supporting activities that accomplished some greater good such as putting wasted land into marginal economic production, increasing national security, providing a playground for outdoor recreation, and a creating a haven for wild horses. Rather than establishing a new set of criteria on which to base public land management decisions, the PLLRC, because of its commodity-based orientation, expected land management agencies to use a primarily economic evaluation. The best use for the nation's public lands would be determined by cost-benefit analyses of public land

uses, relative to maximum use considerations, and the political consequences of those decisions.[6]

But in the Great Basin, the nation's great desert wasteland where Americans had relegated unwanted activities such as ranching, military and nuclear testing, unorganized recreation, and wild horses, this economic and cultural construction fractured at the reality of the region's environment. The region's scarcity of surface resources such as water, forage, timber, charismatic wildlife, and mountain ranges made the economic-oriented decision making process virtually impossible. The Great Basin's vast quantity of unsettled land belied its actual environmental capabilities. The amount of territory managed by the Bureau of Land Management provided direct evidence of this. These lands were the leftovers of the disposal era, reserved only for grazing, military, and testing purposes pending other, more economically viable needs. On these lands, the multiple-use concept provided an ambiguous management authority grounded in technological advances, scientific natural resource management, and the desires of the American public, to address any and all public land use conflicts. On these lands the lofty principles of equitable access, balanced use, and fair return applied in fundamentally contradictory ways which frustrated both user groups and land managers alike.

Driving this problem was maximization, a core tenant of the nation's economic system and a corollary to utility. Maximization of public land use meant both maximum utilization of resources and maximum returns, measured in personal income, livestock, water use, bombing runs, nuclear tests, camping trips and other recreational activities, and wild horses. This concept drove conflicts between user groups because maximization set different uses and different resources in tension with each other, causing them to

overlap both physically and conceptually as the proponents of each pushed for a greater presence. The nineteenth-century neoclassical concept of utility that underpinned public land programs contained the tacit assumption that societies ought to progress through maximizing opportunities for individuals. Embodied in the concept of the greatest good for the greatest number of citizens, maximization incorporates both economic and cultural components. Economically, maximization is efficiency, the meeting of supply with demand such that both are optimized which achieves the greatest economic good for the greatest number of individuals. Culturally, maximization is liberty, where individual capability meets social opportunity to produce optimal personal accomplishment, benefit, and happiness. This framework was reasonable in many areas of the American West where natural resources such as timber, forage, water, and charismatic scenery and wildlife, were more than marginal. But this model of public land management failed in the region's wasteland. Maximization, through the economic and cultural constructs of efficiency and liberty, has been the dynamic force facilitating public land conflicts. The conflicts created by land having multiple utilities, codified in the multiple use land management concept, combined with the wasteland status of the region and the desire for public land users to maximize their access has deeply damaged the Great Basin's human and natural environment.[7]

Paying for Public Land Forage

Evidence of this is manifest in the impacts of the PLLRC's report on the Great Basin. Although the report supported livestock production on public lands, it also codified alterations to the framework in which ranchers operated. Increasingly throughout the twentieth century, social critics, environmental groups, animal welfare advocates, and

urban residents had vilified ranchers as pillagers of the public domain, people who did not pay their way and took advantage of public land resources and abusers of the environment who overstocked and overgrazed the range land. The PLLRC subtly embedded much of this criticism in the report. But, livestock operators in the region felt that annual range restrictions for wildlife and recreation, mandated reductions in herd sizes, and most particularly, higher grazing fees increasingly inhibited their ability to earn a living and infringed upon their right to fully achieve economic and personal success. Ranchers' resistance to grazing fees and the larger public discussion about what a fair fee constituted expresses this dichotomy.[8]

In 1934, the Taylor Grazing Act instituted grazing fees for the purposes of funding range management and improvement but not for the purposes of compensating the federal government for use of the national grazing range. Secretary of the Interior Harold Ickes had indicated prior passage of the act that the measure was not meant to be a money-making venture, the fees collected would merely pay for the federal oversight of the range. Because of this, "western stockmen came to understand that grazing fees were to be fixed according to the cost of administering the program—and the cost of administration would be negligible."[9] But, tying grazing fees to the cost of range administration alone proved problematic. In the nation's economic and political system, forage had a dollar value. The constant pressure to increase grazing fees combined with encroachment of an ever-increasing number of range users created an untenable situation causing ranchers to pay more for less access over time.

In the Great Basin, livestock operators had contested grazing fees from the very beginning. In 1936 at the first hearings discussing the Taylor Grazing Act, one Great

Basin rancher argued that "we feel that we have a legitimate basis for asking that the fees in Nevada be not set at the same rate as those set in the better grazing areas of some other states. It takes two years to raise one lamb and twelve pounds of wool in our state. We feel that we have a legitimate argument and that these fees should be set up by states, rather than by the country as a whole." Livestock operators in much of Utah felt the same and pushed for lower fees. Ranchers in the region believed that at the very least, if grazing fees had to be charged, that the environmental conditions in the region be taken into consideration and that the Grazing Service create a reduction option that took into consideration the quality of local ranges and local operating costs.[10]

The Grazing Service originally levied five cents per head of cattle and one cent per sheep in range fees in 1936 (fig. 91). At the same time, ranchers who held Forest Service grazing permits paid a little over thirteen cents per head of cattle and a nearly three and a half cents per sheep in most areas. The agency kept a flexible fee structure higher than the Grazing Services' which reflected the cost of feed and the market value of livestock. Since the forage resources in national forests were greater because of the available water, ranchers in the Great Basin complained about the fees to the Forest Service, but paid them nevertheless. However, ranchers had a different opinion about fees in the Taylor Grazing districts.[11]

While not disputing the ability of the Grazing Service to collect fees, livestock operators believed they should only be charged enough to cover range administration and improvement in their locality and for a permit issued long-term. Great Basin ranchers argued that fees set too high would bankrupt their operations and that a uniform grazing fee was simply unfair because not all range quality on public lands was the same. As

many stockmen in the Great Basin had constructed their entire livestock operations on free access to public lands grazing on marginal grazing range, any alteration to their economic system could indeed financially ruin them. They also believed that the property taxes they paid on their capitalized income from their livestock operations had to date amounted to a tax on public lands. In order to block collection of fees on grazing allotments, these Great Basin livestock operators took their argument to court.[12]

Ranchers' battle over grazing fees ended in the United State Supreme Court an appeal after both the Nevada State District Court and Supreme Court's delivered favorable rulings for the ranchers, much to the consternation of the Grazing Service. The nation's highest court reversed all the previous decisions regarding grazing fees on the Taylor Grazing Districts and allowed a uniform charge for use of forage resources. However, Nevada livestock operators continued to protest the fees as "burdensome and unfair." Between 1941 and 1945, Nevada's Senator Pat McCarran, chairman of a subcommittee of the Committee on Public Lands, conducted hearings addressing the grazing fee issue and the impact of military withdrawals of public lands. Many of these hearings featured Nevada and Utah ranchers testifying that increased grazing fees would drive them out of business. These ranchers advocated a flexible fee structure which could be adjusted according to the quality of the range being used, not the market value of the forage resources or the value of the livestock produced, and the approval of the local grazing district advisory boards in raising fees. Fortunately for Great Basin ranchers and other livestock operators using public lands, the increased demand for beef and wool during World War II for wartime production required them to remain operational for the good of the nation and so grazing fees remained static.[13]

But the issue of charging livestock operators a grazing fee commensurate with the market value of forage and the livestock the produced remained. In the postwar period, livestock operators in the Great Basin, with the help of the Nevada's entire congressional delegation, fought every effort to raise grazing fees. In 1944, a "startling and unjustified" Grazing Service proposal by Grazing Service Director Clarence Forsling to triple grazing fees met with stiff protest. Forsling argued that the costs of administering public rangelands had risen significantly in the decade since passage of the Taylor Grazing Act. Since the measure had succeeded in stabilizing the livestock industry and ranchers received higher prices for their livestock at market, Forsling argued livestock operators were better able to afford the increased costs of proper range conservation and should be charged a reasonable fee. The Grazing Service based the proposed fee increase on the increased market value of beef and lamb to help bolster the agency's revenue. Livestock operators throughout the Taylor Grazing district system, but especially in the Great Basin, viewed the rising administrative costs as an unnecessary increase in federal bureaucracy needlessly passed on to them.[14]

At the same time, Forsling was investigating "how rights of water may affect future allocations on the public range." The Grazing Service director believed that water rights should not be "held in such a way that it snarls up the administration of the range." While the agency was not explicitly seeking to acquire water rights, ranchers feared the Grazing Service was using them as the basis for increasing grazing fees because they required constant development and maintenance. Ranchers believed that their ownership of water rights allowed them to make their own improvements on the grazing range which they believed promoted better local range management. But Forsling wanted to centralize

range administration throughout the grazing districts in the Grazing Service to make management more efficient and maximize range production. To do this, Forsling needed to increase fees to cover the agency's costs. Higher fees to fund proper Grazing Service range management were fundamental to Forsling's program, which had been critically underfunded from the beginning thanks to Nevada's Senator Pat McCarran. By 1946 and the creation of the BLM, the first controversy about raising grazing fees had been decided in favor of the federal government and Great Basin livestock operators accepted a system-wide three cent increase per head of cattle and a half cent increase per sheep. Unfortunately for Great Basin ranchers, while livestock prices had remained high in most other grazing districts, dry range conditions in the Great Basin made a fee increase in the region far less tolerable.[15]

In 1951, grazing fees increased again. This time, Secretary of the Interior Oscar Chapman reported that livestock operators, through their district and state grazing advisory boards, had accepted a fee increase, recognizing "the need for conservation and improvement of public ranges." Faced with a process of progressively increasing grazing fees, livestock operators in the central Great Basin's sixth grazing district, ranching on the most marginal of the region's rangeland, appealed to the BLM to consider issuing individual grazing fees. Another severe drought, the third successive severe dry spell since passage of the Taylor Grazing Act, plagued ranchers and decimated herds. Livestock operators in this area had made virtually no use of the grazing range during this period and resented paying grazing fees for rangeland they barely used. BLM Director Edward Woolzey stated he was willing to grant livestock operators in the drought-

stricken regions a reprieve from their grazing fees for the 1953-1954 grazing year, but on the basis of individual application and verification of need.[16]

The BLM considered itself a business manager of the public domain, and as such expected "to earn the maximum amount of revenues consistent with sound conservation practices." "We believe," wrote the soon-to-be BLM director Karl S. Landstrom, "that the full worth of the valuable resources on public lands may be realized with a minimum expense to the taxpayer." By 1955, on the heels of the latest drought, the BLM implemented a new fee structure which raised grazing fees once again to fifteen cents. The agency also adopted a new fee structure based on each year's average livestock prices which was implemented in 1958 at nineteen cents, rose to twenty-one cents in 1960, and dropped to nineteen again in 1961. The new fee structure indicated the agency had finally abandoned the cost of range administration as the basis for setting grazing fees and instead began relying upon prices as set by the livestock market which would fund better range conservation and rehabilitation. This new fee structure more closely matched the American public's vision of public lands producing revenue for the federal government to recoup the use of resources on the public domain.[17]

Under Stewart L. Udall's Department of the Interior, Great Basin livestock operators again underwent a grazing fee crisis. Udall's conservation program included charging a fair market value for public land sales and use of public land resources. Livestock operators secured a delay in any immediate increase in the 1960s, lobbying successfully for a temporary stave until range studies and hearings examining the public grazing lands and the economics of ranching concluded. But in 1963, the new BLM director Karl Landstrom announced both a fifty percent fee increase and a reduction in the numbers of

permitted livestock in response to the American public's criticism that public land ranchers were not paying their fair share for their use of the public grazing range. The Izaak Walton League, a 1920s conservation and outdoor recreation group founded in Chicago, consistently complained that livestock operators using public lands received special privileges which gave them an unfair advantage in the livestock industry and allowed them inequitable use of the public's land. Writer Bernard DeVoto on several occasions had suggested that the American taxpayer require livestock operators to "get their hands out of your pocket and pay the market rate for grazing," or at least require them to "bid competitively for the privilege of using your ranges."[18]

The new thirty-cent fee was really the lowest of any grazing fee; the Forest Service charged twice that on most national forests and the use of private land incurred three dollars or more per head of cattle per month. The BLM's studies had not demonstrated that livestock operators in the American West would be unduly impacted by the increased grazing fee, the smallest cost overall in livestock operations. The forage provided on public lands comprised less than three percent of the industry's total feed requirements. On the surface of the debate over what constituted a fair grazing fee, the BLM had a point—according to reasonable economic principles, ranchers using the public range should pay a fair fee for that usage. Not even Nevada's governor Grant Sawyer was willing to tangle too much with Secretary of the Interior Udall over the matter, despite pressure from the state's legislature. Throughout the rest of the decade, grazing fees steadily increased from thirty cents to forty-four cents.[19]

But livestock operators in the Great Basin did not understand the issue from this perspective. The Sharp family in Nye County, who had "made all necessary

improvements on the range" before being "forced into a grazing district." stated the increased grazing fees "would be very injurious to the sheep and cattle industry" and that "the livestock industry has been trying to survive without subsidies and therefore feel that we cannot pay any larger grazing fees." Clair Whipple in Lincoln County declared that a fee increase would "ruin our economy." William U. Schofield argued that increasing grazing fees was fundamentally inconsistent with the ongoing drought conditions of the central Great Basin and grant of federal aid to assist in drought relief. George Swallow of White Pine County challenged that "any increase in grazing fees would amount to confiscation" of their property.[20]

Great Basin ranchers in general felt that their ability to earn a living by running livestock on the public rangeland becoming increasingly difficult. The argued that making a living off the livestock industry, because of "increasing competition for the use of the land, as a result of population growth and industrial demands, and frequent withdrawal of large tracts with public use," "cancelled or restricted grazing," and increased grazing fees, was becoming more and more difficult. To them, the BLM's intent to maximize compensation for their use of public land grazing resources interfered with their ability to maximize their livelihood. The region's congressional delegation understood the importance of the grazing fee issue to their ranching constituents and asked the Department of the Interior to freeze the fee structure until the results of the studies being done for the PLLRC arrived. Other than making small adjustments, for the time being, grazing fees only increased from thirty cents to forty-four cents. But when the PLLRC's report released its determination that grazing fees be based on a fair market system, livestock operators in the Great Basin were fundamentally disappointed.[21]

The PLLRC recognized that while "the public lands are relatively unimportant to the national livestock economy," they were "often crucial to individual ranch operations," which would be forced out of business if they had to consistently substitute costlier sources of feed. Sensitive to the needs of the livestock industry, the report recommended clarifying the parameters and procedures of administering grazing permits to include precise conditions under which livestock reductions, changes in improvement responsibilities, and cancellations might occur. It even suggested that these grazing ranges might be better managed in private ownership. But in the Great Basin wasteland, ranchers raised livestock in the most marginal of all range conditions and had little room to maneuver financially. PLLRC's recommendation that fair market value, "the value that ordinarily would be established by operation of the open market," protected the "interest of the public as landlord." Though it recognized that the livestock operators deserved some consideration as to the "variances in operating and economic situations or differences in the quality of public range land and forage yield," the PLLRC accepted a uniform base fee for all lands, allowing for only minor adjustments according to the quality of the forage. After the PLLRCs report, grazing fees increased from the previous decade's forty-four cent to $1.89, the highest fee in the BLM's history which set the agency on par with the prices charged by the Forest Service.[22]

In addition, because "pressures on public lands for non-grazing use have inevitably led to conflicts between permittees and other users," the PLLRC expected public land users to accommodate each other such that "a balance between competing uses of public lands which is fair to all users" would be achieved. But, the commission noted that "resolution of the conflict between grazing and other use will be largely dependent upon

public understanding and acceptance of reasonable ground rules governing use." This gave livestock operators little consolation, however, as the power for making balanced use work resided with the very public that offered the western range livestock industry so much criticism. Once ranchers had been the primary user group on public lands, but after 1970, livestock operators had to submit to an increased number of restrictions and regulations to accommodate other users.[23]

This situation was only further codified in the Federal Land Policy Management Act (FLPMA) of 1976 which officially mandated what the BLM had been doing throughout the previous decade, managing public lands according to the multiple-use concept. The trouble, however, was that the BLM no longer officially served any one particular interest as had the Grazing Service. Ranchers still believed that the Taylor Grazing Act had "established grazing as the highest use of certain lands and gave to permittees, an exclusive right as to all other users (excepting hunters and fishermen)." They firmly believed that "although the U.S. retained title to the lands, the [Taylor] Act gave ranchers all of the other normal attributes of property rights, i.e., full use and benefit and the exclusion of all competing users."[24]

The resulting Sagebrush Rebellion, not the larger national political movement, but the smaller movement originating in the Great Basin that sought to remove the region's public lands from federal management, expressed the frustration of livestock operators. Seen from the perspective of ranchers in the Great Basin, constantly increasing grazing fees did not stabilize their livestock operations nor did reductions or cancellations in their grazing permits facilitate security. While all of these activities seemed logical and appropriately efficient in terms of public land management practices, Great Basin

ranchers lived on the very margins of public lands grazing and most could not survive without cheap forage resources in conjunction with rising costs of other resources such as fuel, electricity, and food. This was a situation not directly reflected in the BLM's reports, but one with which the region's ranchers constantly struggled.[25]

Not long after the passage of FLPMA, Great Basin ranchers found political allies with the region's conservative politicians who sought to privatize the nation's natural resources. The BLM abruptly cancelled Nevada state senator Floyd Lamb's grazing permits in 1977, for "continued failure to live up to the permit conditions and requirements," infuriating the rancher who was now a state senator. In the mid-1960s, the federal government had withdrawn the allotment as part of the Pahranagat National Wildlife Refuge, but with the caveat that Lamb could continue to graze his livestock and use his water rights. Lamb had a tense relationship with the federal government generally because his cattle and horses had been affected by radioactive fallout from atmospheric nuclear testing and federal officials had submitted him to a bureaucratic nightmare which resulted in zero compensation. Floyd Lamb, whose family had become a powerful one in Clark County, proved a vigorous supporter of Sagebrush Rebellion in the state in succeeding years as the ranking state senator.[26]

In the 1979 hearings on Nevada's proposals to transfer administration of the public domain to the state, the public land resources committees met to hear the testimony of Nevada residents as to what they thought should be done to better manage the state's public lands. Bertrand Paris of White Pine County strongly urged passage of the measures "which would create the Nevada Land Commission to manage the public lands of Nevada and take them out of the hands of the Federal Government and return them to

the state and people of Nevada." Joseph Fallini of Nye County explained that from 1946 when the BLM was formed to its Organic Act of 1976, "the BLM has acquired 1/3 of the land mass of Europe, yet that agency was formed for the purpose of being a disposal agency." However, Edgar I. Rowland, the BLM state director in Nevada, said "the Sagebrush Rebellion wasn't rancher instigated in my estimation. I think most of the ranchers would prefer at least at the time not to own the land," because they got "a better deal from BLM." Rowland believed the movement to gain control over public lands that began in the Great Basin "was instigated by some people that just wanted to get rid of all federal control in Nevada. And really the ranchers, level-headed ranchers [at least] didn't want this kind of thing. They knew they were better off with the BLM operating it than when it was all free and open and everybody was fighting for it." Even the Sierra Club weighed in to support "the continuance of family-based ranching as an integral and desirable component of public lands." But as one Idaho rancher put it, "there's no way we can control our destiny while Washington controls the land."[27]

Living with Radioactive Fallout

If grappling with the BLM over control of the grazing range and setting grazing fees had been the only source of public land conflict in the Great Basin, the situation would have been complex enough. But the BLM was not the only land management agency involved. The Atomic Energy Commission (AEC) also managed land in the region as part of its nuclear testing program. The Nevada Test Site and the military's Nellis Bombing and Gunnery Range that surrounded it abutted livestock operations on the north and eastern boundaries. The highly problematic atmospheric testing program ended in the early 1960s, but nuclear testing itself did not end, it expanded underground (fig. 92).

The AEC maximized use of the test site as an outdoor laboratory to both increase the number of tests conducted each year, thereby increasing scientists' understanding of nuclear effects and weapons technology, and increase the nation's dominance in the Cold War. The lessons learned during the previous decade in dealing with atmospheric tests, local populations, and the consequences of radioactive fallout, led the AEC to create a program of containing nuclear tests underground and a radiation monitoring program that minimized problematic disruption to the lives of both local residents and the testing process. The AEC had originally contracted with the Public Health Service (PHS) for assistance in gathering data on radioactive fallout beginning in 1949. While the AEC was responsible for the "protection of health during research and production activities related to atomic energy," the PHS was given the task of investigating the physical and mental diseases and impairments of man with reference to atomic testing and the "health aspects" and "environmental contamination" produced by radiation exposure. The agencies collective goal was to assure the "greatest health benefit of atomic energy and its by-products to the general public and at the same time the greatest protection to the public health." PHS personnel had worked with the AEC since the Manhattan Project and on testing in the Pacific, but were not as readily available in the early testing period as military personnel and AEC staff, nor did any of the PHS personnel have the appropriate security clearances to work on the test site. Gaining top secret clearances took time and often the AEC simply did not have the staff to process the paperwork.[28]

When AEC staff, military radiation monitors, and the occasional PHS monitor showed up on the doorsteps of these ranches in their uniforms and with their documents and instruments, they were utter strangers unfamiliar with either the land or its residents.

From clothes to vocabularies, the government men and ranchers lived in two separate worlds, but both believed they were experts in the intersecting worlds of livestock operations and the effects of nuclear testing on human and animal bodies respectively. This problematic overlap in expertise rooted in two different frameworks, one based on laboratory science and the other based on experience and tradition, fostered suspicion and frustration for both groups.

Ranchers affected by nuclear testing had harsh criticism for the AEC and its monitors. Helen Fallini, Joseph (Joe) Fallini's wife from Twin Springs ranch, only 35 miles north of the test site, said the AEC monitors told her that radioactive fallout "wasn't supposed to hurt us in any way, shape or form and yet we got that fallout so heavily that it was unbelievable." Helen suffered from eye trouble she attributed to radiation exposure and wondered "Why is fallout harmful if it goes over Las Vegas and not harmful if it comes over here?" Her father-in-law remarked that "If fallout isn't harmful … let it go wherever it wants to go." Helen and her family regularly witnessed fallout clouds rising from Yucca Flat. She watched her neighbors Minnie Sharp loose her hair and Madison Locke receive significant radiation burns. Joe said the fallout cloud would often completely engulf everything, burning people and animals, and killing birds.[29]

Helen's neighbor Gracian Neil Uhalde, the son of Gracian Michael at the Adaven ranch, just across the Grant Range and only 60 miles north of the test site was the same age as Martin Bordoli, Jack and Martha Bordoli's little boy, and Helen's nephew, who died of leukemia in 1956. During atmospheric testing, Gracian's parents took him and his sisters to a hill overlooking both the ranch and the northern end of the test site to watch the detonations. Gracian's father bought a Geiger counter and scintillator during the

1950s to measure the radioactive fallout himself. While the AEC monitors told him there was nothing to worry about, the measurements on his Geiger counter indicated that often after tests, his hay was heavily irradiated. Gracian was ten when the cloud from the Sedan test in 1962 passed over his home; the fallout rained like snow and his mother refused to let him play outside for three or four days afterward. These incidents with families, and especially children, as well as the damage to cattle, sheep, horses, and dogs made ranchers want the testing stopped. Many wondered why tests were postponed if the fallout cloud might head south over Las Vegas, but not over them.[30]

Radiation monitors after 1957 faced difficult circumstances in communities around the test site, despite the testing moratorium beginning in 1958 and enactment of the Limited Test Ban Treaty in 1963 which banned atmospheric testing and moved detonations underground. The PHS had established 17 monitoring zones around the test site administered by teams of radiation monitors, established automatic measuring stations in 29 communities, and provided contingency plans to support existing systems. But residents remembered previous interactions and experiences, such as what Floyd Lamb had endured, and those were difficult to get past.[31]

Lina Sharp, James Sharp's wife at the Blue Eagle ranch thought the field monitors were snotty, young kids who looked down on ranchers who lived in the vast openness of the Great Basin. She said "We didn't want to cooperate with them because we didn't like their attitudes and we weren't going to do anything with them," "they were just young kids who were not very smart, intelligent, or anything." Gracian Uhalde remarked that most of the radiation monitors, especially during atmospheric testing, were "barely able to get around" in the vast spaces between ranches. He said "they came and took our milk

cows because they wanted to test the iodine[-131], and the strontium-90 gets in the milk first thing and all that whole baloney." His father was "just livid because he didn't think they knew any more than we did about what the hell they were doing. He knew that they were being so secretive and so stupid about it that it could only mean something bad." The AEC did not even placed any permanent monitoring equipment at any of these ranches until after 1957. Helen Fallini said "just the fact that when we started squawking about letting so much of that fallout come up over us this way," the government finally allocated monitoring equipment for the ranches, but "kept saying it wasn't hurting us."[32]

After the Soviets broke the nuclear testing moratorium in 1961, the AEC initiated a year-round testing program and the PHS set up a permanent, full-time monitoring program. The government hired radiation monitors on a full-time basis and unlike previous monitors, they became Nevada residents, living and working in the same places as the ranchers. By 1964, PHS monitors conducted routine sampling and monitoring within a 300-mile radius around the test site and extended coverage as needed to track radioactive fallout. Ground monitoring consisted of mobile teams of two radiation monitors deployed to offsite areas prior a test detonation. They tracked radioactive fallout with the assistance of the test Control Point and a two-way radio. Armed with four varieties of radioactive tracking devices, an Eberline, a scintillator, a Beckman, and a Tracerlab, monitors chased radioactive particles across the Great Basin, collected vegetation samples, milk samples, and passed out film badges to residents both routinely and when an event produced radioactive fallout. Frequent contacts with residents "provided the opportunity to explain the role of the Public Health Service with respect to the programs of the Atomic Energy Commission," and "as a result of favorable public

relations, a number of off-site residents took part in the environmental sampling program."[33]

A 1968 article on radiation monitors in Hiko for the 1966 Pin Stripe event venting which released radioactive fallout remarked that monitoring "crews are assigned fixed routes and most of them are personally acquainted with every man, woman, and child in their area, as well as every cowpath." Monitors maintained "personal contact with everyone in the off-site areas who might be affected by a nuclear mischance." This allowed the nuclear testing program to expand even beyond the boundaries of the test site to the central Great Basin near Fallon and Warm Springs, to Colorado near Rulison and Rio Blanco, to New Mexico near Farmington and Carlsbad, and to Mississippi near Hattisburg between 1964 and 1973 (fig. 93). The consistent presence of monitors reassured residents more than any other previous effort. The personal relationships established between monitors and the communities they served transcended individual views of the contested effects of radiation exposure. Regardless of whether or not radiation monitors thought radioactive fallout was damaging, many managed to convey sympathy and understanding to residents simply by being there and providing what information they could.[34]

Successful interaction between radiation monitors and the community they served as well as building the public's confidence in atomic testing was not predicated on the assumptions of safety and no danger. Instead it was determined by the dissemination of accurate information by a small group of well-regarded radiation monitors. The informal relationships Bruce Church, Kenny Giles, Charles Costa, Donald James, and just a few other men developed with the Uhaldes, Fallinis, Sharps, and other ranching families

served to reestablish a basis of trust previously lost between the government and the public. Through these informal relationships, information and mutual respect were exchanged and the time the monitors took with the ranchers and the services they rendered were effective and appreciated inside the ranching communities.

Lina Sharp remarked that in 1962, the PHS sent Charles Costa to her ranch. "He was from Massachusetts and he had such an easy manner and such a friendly way that we talked to him. He spent lots of time in this area as a field man…He was easygoing and we liked him, so we cooperated with the government then." Gracian Uhalde said that "whoever the first people who came around were, and I don't remember faces and names until Don James." He said "everybody liked Don James because … he didn't have all the answers and he didn't really care. He was just here basically to have a good time and to do whatever he could do. He was a real human being, you know. These other guys that came around in these monkey suits and stuff, you'd just as well shoot them as look at them." Residents adopted a handful of radiation monitors and through consistent contact, established good working relationships which relaxed tensions over atomic testing and its impact on the communities surrounding the test site.[35]

These relationships seemed to develop irrespective of what individual monitors thought about the nature of radioactive fallout damage. Bruce Church, a native of St. George, Utah began as a radiation monitor for the PHS in 1961. Church did not consider fallout dangerous; according to him, the idea of danger implied health effects observable in the larger population. He believed radioactive fallout could not have caused the cancers in offsite populations because there was no proven direct connection and no consistent observable effects. As a monitor himself, Church wore his letterman's jacket

from Dixie College anytime he went out in the field to signify himself as a local. Similarly, Kenneth Giles, who had come to Las Vegas in 1964, grew up on a Nebraska farm and related well to the Great Basin's rural residents. Giles believed "none of these people had degrees but they all were experts in their particular field," an attitude which allowed him to express respect for the same people many in the AEC deemed uneducated. Giles believed that the people in areas adjacent to the test site probably received more exposure than the Downwinders of Utah, but were less vocal about their afflictions and did not blame radiation exposure. Many of them lost their hair, developed skin conditions, and even cancers, but believed Giles when he told them their conditions were probably not due to exposure to fallout.[36]

Charles Costa, a native of Massachusetts, was an unlikely addition to the PHS monitoring staff. Trained as a civil engineer, Costa enlisted in the PHS in lieu of serving in the military to fulfill his draft obligations. Not long after arriving at Mercury for orientation in 1962, the AEC sent Costa out to Currant at the north end of Railroad Valley. At the sight of the huge valley, he had serious misgivings about negotiating the vast open territory he was supposed to monitor. He thought, "What kind of weird people would live in Railroad Valley?" He stopped at the school in Currant and met Lina Sharp, the only teacher for miles, and ended up reading stories to the children in his east-coast accent. Costa was not used to "seeing large open spaces, and [the desert's] ninety-seven varieties of brown," but quickly learned to appreciate both the Great Basin's beautiful environment and its residents, especially in the area between Ely and the test site.[37]

Costa got lost a lot in the first few years driving the route between Mercury and Ely. He would radio the monitoring coordinator at the test site's Control Point asking where

he was and the coordinator would ask him what he could see around him that might help determine his location, but the "hills and mountains" description applied to just about everywhere. Once he got lost at the south end of Garden Valley and nearly ran out of gas. He happened to run into Helen Uhalde who had a flat tire. He changed her tire and she gave him some fuel and directions to get back to Mercury. Costa became a fixture in the lives of the Sharps, Fallinis, Uhaldes, and Manzonies, a family that lived near Currant (fig. 94). The ranchers fed him, talked with him, and let him drive their children around in the government truck for fun. He said the families "had their concerns about the test site, but as long as they as they saw you out there, as long as they believed that we were sincere, they accepted everything that we did at the test site." Cost believed it was not the monitors' job to tell residents who believed they had been affected by radioactive fallout that they were wrong, it was their job to listen, to provide whatever information they could, and to demonstrate care for the well-being of residents near the test site.[38]

The most popular monitor among residents was Donald James, a Coloradan who had grown up on a farm and worked at Rocky Flats producing detonators until 1961 when he moved to Las Vegas to work for the PHS. James' job entailed everything from monitoring fallout in an assigned location the morning of a test or chasing a cloud cross-country to the Mexican or Canadian border—in 1964, James followed the Pike cloud all the way to Mexico—to taking readings from permanent monitoring stations and getting to know the locals. He developed relationships with the Fallinis, Sharps, Uhaldes, and many other ranching families north of the test site and knew every mountain and valley between Las Vegas and the Idaho border (fig. 95-97). He found that many of the ranchers were bitter about the way the AEC had treated them in the past. He remembered Joseph

Fallini showing him pictures of his burned livestock and saying testing had to be done and the government did it, and to heck with everybody. The government told Fallini that the burns were ringworm but James said that "you can't fool those people, they're pretty smart you know." He said people were exposed offsite and there were visible effects of radiation exposure and all the AEC did by lying to residents was create distrust.[39]

When the PHS monitors came arrived, and the later monitors from the Environmental Protection Agency in the 1970s and the Desert Research Institute monitors in the 1980s, they were liked because they told the truth. He and the other monitors gave talks, showed films, and demonstrated equipment so that the ranchers would understand where measurements came from and what they meant. "We'd tell them everything, we never held back on anything. You know, of course, the DOE [Department of Energy] says you don't say this, don't say that, or anything. When we were asked, we'd tell them … that's what they liked … they didn't appreciate [the previous] people…because they wouldn't say anything, and then when they did answer the people, they'd lie to them, and that just doesn't work." On the days he would have to pick up milk samples, James would buy gallon containers of milk in Las Vegas or Ely and exchange that milk for the samples so that the children would not have to drink contaminated milk. He would stay with ranchers outside during a test if they were too busy to make it inside and often when ranchers saw him sitting outside in his truck waiting for a test to go off, they invited him in for a meal. He went to their funerals and weddings, and generally immersed himself in the communities surrounding the test site.[40]

But by 1979, the American public expressed deep concern as to the effects of exposure to radioactive fallout. On March 28, a new nuclear power plant on Three Mile

Island in southeastern Pennsylvania "released above-normal levels of radiation." Just twelve days earlier, the new film *The China Syndrome*, starring Michael Douglas, Jane Fonda, and Jack Lemmon, about a near meltdown at a nuclear power plant debuted in the nation's theaters. In a bizarre parallel to fiction, nuclear power plant officials at Three Mile Island struggled to control the increasing temperatures within one of the plant's two nuclear cores and the system suffered a partial meltdown. Within several days, officials had the problem contained, but the safety systems at the plant had released an unclear amount of radioactive material into the environment. Radiation monitors from the test site, including Donald James and Charles Costa who since 1970 had worked under the Environmental Protection Agency (EPA), arrived to detect and mitigate the radioactive materials. Residents of Harrisburg and Middleton, Pennsylvania, experienced a problem Great Basin residents had already learned to live with, that of decontamination. Some residents embraced the official story that the released radioactive materials posed no danger to nearby residents, but others believed more happened than the official story revealed.[41]

Concomitant with the Three Mile Island accident, Congress conducted hearings on the effects of low-level radiation exposure. Martha Bordoli, who believed her son had developed leukemia as a result of exposure to radioactive fallout, testified that more than seventy residents in Railroad Valley and area north and east of the Nevada Test Site petitioned their congressional delegation to stop the nuclear tests in 1957. The petition declared it "both undemocratic and un-American to subject one group of citizens to hazards which others are not called upon to face." AEC Commissioner Lewis L. Strauss responded stating, "I believe the conclusion one must inevitably reach after balancing all

factors is this—we have the choice of running a very small risk from testing or a risk of catastrophe which might result from a surrender of our leadership in nuclear armament which has been, we believe, the deterrent to aggression since 1945." Rather than gauge the safety of nuclear testing on specific impacts to humans and the environment on a case by case basis, the AEC chose instead to use the more efficient model that utilized the general behavior of average populations as a gauge. This practice essentially excluded the rural and fairly isolated populations of the Great Basin. As such, maximizing the country's national security devastated the lives of residents who had received no acknowledgement, compensation, or apology by 1979. The proposal of a high-level nuclear waste repository on the test site in the subsequent decade only exacerbated this perception. Gracian Uhalde argued "right down here at the Nevada Test Site, they created Frankenstein and now they want to bring the son of Frankenstein home."[42]

The nation's nuclear testing program had damaged the lives of many residents in the Great Basin, but none more so than Native Americans in the Great Basin. None of the early radiation monitors came to the Shoshone Duckwater Reservation just north of Currant in Railroad Valley where they monitored the school. Bennie Reilly grew up at Duckwater and used to listen for the AEC to announce the tests on the radio. He and others children at Duckwater got up before dawn to watch the denotation, "because we could see the big orange flame go up and later on you could see the big old white cloud just go straight up in the air, then watch it break up." Reilly and many Duckwater children, similar to other ranching families in the area, grew up eating rabbit, deer, antelope, and pine nuts harvested from the nearby mountains and valleys, vegetables grown in their garden, and beef and milk gotten from their cattle herds. Exposure to radioactive fallout caused many Duckwater residents thyroid problems and cancers which manifested as they grew up. Doug

George, who worked at the state highway station at Currant Summit off Highway 6 on the way to Ely, lost his hair during the atmospheric testing period similar to Howard Sharp's wife Minnie. Both Bennie Reilly developed esophageal cancer and Gracian N. Uhalde suffered from bladder cancer as adults. Reilly's uncle, who worked at Twin Springs for Joseph Fallini, developed prostate and stomach cancer. But the testing program provided jobs for many Great Basin residents, especially those in Nye, Lincoln, and Clark counties in Nevada. Reilly worked for the AEC as a security guard for the Shoal test near Fallon and the Faultless test near Warm Springs throughout the 1960s.[43]

The damage from exposure to radioactive fallout left many Duckwater Shoshone frustrated, but as Virginia Sanchez noted, "knowing how people lived in the fifties, Indian people were not quite always thought of as human." Ned Blackhawk argued that "of all North America's indigenous people, few have received as much intellectual disdain as Nevada's Shoshones. Not only have traders, travelers, and state officials questioned Shoshone humanity; they have also become the definitive 'primitive' peoples of the world." For the Western Shoshone tribes, the issue of nuclear testing went well beyond protests of environmental contamination. They had not actually ceded any of their territory to the federal government in the 1863 treaty. Recognition of this prompted the beginnings of a cultural resurgence with the national civil rights movement in which the Battle Mountain Shoshone organized the Western Shoshone Sacred Lands Association, Mary and Carrie Dann resisted paying grazing fees for use of public land forage resources, the Duckwater Shoshone founded a native school to educate their own children, the Timbisha Shoshone spiritual leader Corbin Harney led protests against nuclear testing and development of the MX missile, and collectively organized in the Western Shoshone National Council. However, the region's native population remained outside the AEC's new monitoring program.[44]

Trading Wilderness and ORVs

Historically vilified as a wasteland in the nineteenth century and contaminated with the residue of chemical, biological, and nuclear weapons testing in the twentieth, the Great Basin did not qualify for inclusion in the strong environmental protection under the Wilderness Act in 1964. The legislation creating wilderness areas had been specifically contingent upon a bargain struck between Representative Wayne Aspinall and a group of senators that had passed several wilderness bills in successive congressional sessions in the late 1950s and early 1960s only to have them disappear in the House of Representatives in Aspinall's public lands committee. This bargain did not include BLM lands, but was affected by public support to protect more organized outdoor recreational landscapes. Cecil Garland, a young hardware and sporting goods store owner in Lincoln, Montana, near the Lincoln-Scapegoat National Forest, helped spark popular pressure for the new bill in the Senate when he learned the Forest Service in that region had plans to build roads and log the beautiful primitive area. He said "I decided then and there that this was one of the last pieces of beautiful country left intact, and God damn it, they weren't going to tear it up … they weren't going to tear up that piece of country with their damn bulldozers."[45]

Garland incited a grass-roots movement in Montana that helped propel the wilderness legislation forward. But while in Washington, D.C., meeting with the Montana congressional delegation, Garland ran into Aspinall and pressed him about the wilderness legislation. Aspinall told Garland he would either kill the wilderness bill in committee or on the floor of the House of Representatives. Upset, Garland went to see Montana Senator Michael J. Mansfield who told him to tell the people in Montana that they would get their wilderness because someday, Aspinall was going to want something and that

something would leverage the wilderness legislation. That moment arrived in 1964 when the Senate wanted wilderness legislation and Aspinall wanted the Public Land Law Review Commission. The legislation did not, however, include any lands managed by the BLM, which clearly delineated that their utility did not include protected nature and organized outdoor recreation.[46]

Mining and grazing interests in particular had opposed the protective measure which would potentially exclude public lands from mining, grazing, and other commercial developments. The problem, as stated by the Nevada Mining Association, was that wilderness as created in the legislation ensured that "minerals in these areas will remain unproven and locked up forever." As a result, the only wilderness designated in 1964 in the Great Basin was in the beautiful Jarbidge Mountains, a "hard-to-reach country with peaks more than 10,000 feet high." The debate over Great Basin National Park in the mid-1960s highlighted the general perception that most of the region's residents considered the basin and range geography far less charismatic than the lofty peaks in the Sierra Nevada or the Rocky Mountains. As George Swallow, a livestock operator using the grazing lands to the west of the southern Snake Range, had indicated, the area did not have any particular uniqueness comparable to other national parks. Wheeler Peak and the Lehman Caves, although interesting, were simply not out of the ordinary in the Great Basin. Swallow believed that using the area for forage and mining provided a more valuable contribution to the local economy of Ely than would be provided by the few tourists who came to see the new national park. Similarly, the residents of Elko near the new Jarbidge Wilderness expressed their disapproval of the wilderness area and its possible future expansion. At a public hearing in 1972, residents indicated their

opposition and disappointment, arguing the Forest Service was more concerned about protecting the mountains than it was "preserving the freedoms of the American people." Wilderness, they believed, embodied restraints and regulations, whereas multiple-use allowed them to express their liberties on public lands.[47]

The Great Basin was a usable region, but not one that warranted preserving. After all, no landscape artist had included the Great Basin in their powerful representations of natural beauty and the region paled in comparison to Yosemite, Yellowstone, and the Grand Canyon. But the PLLRC's report indicated the shifting emphasis in natural preservation from focusing on the high forested alpine summits to areas of particular interest because of their representation of the unique ecological diversity contained within North America. In *One Third of the Nation's Land*, the PLLRC stated that not all the areas which could meet "existing standards for national parks, monuments, historic sites, wilderness areas, scenic and wild rivers, and national trails" have been "inventoried or formally identified and proposed for designation." The group generally agreed that "a comprehensive inventory of these public lands, to identify all such areas, should be conducted as soon as possible, and they should be assigned a priority for protection pending designation under established procedures." This inventory included lands managed by the BLM. In addition, the PLLRC recommended that the "standards that qualify an area for a national park or a wilderness area should be refined" such that it included a clearer definition of wilderness and the concept of uniqueness. A fundamentally vague recommendation to be certain, it nonetheless included ecological diversity in addition to natural beauty and representative ecosystems in addition to those supposedly untouched by humans.[48]

Much of the drive to classify some of even the Great Basin as wilderness came from the Nevada Outdoor Recreation Association (NORA), a non-profit group headquartered in Carson City that had provided survey results of "scenic, natural, historical, and recreational resources on the public lands in Nevada." A decade prior, founders of the association, including Charles Watson and Thomas H. Watkins, had examined 350 sites throughout Nevada on BLM lands, many of which they argued contained "little-known or previously unknown phenomena" and deserved environmental protections equal with that of national parks and primitive areas in national forests. Originally named the Nevada Public Domain Survey (NPDS), the organization worked diligently to repackage the state's public lands in the nation's popular perception. Instead of wasteland waiting transfer into the private ownership or potential areas for natural resource exploitation, NPDS described the leftover, unallocated and unallotted public domain as collective ecological commons belonging to and managed for the American public.[49]

Watson, Watkins, and the other members of NPDS were often at odds with the Sierra Club over the preservation of the desert, lowland, and wetland areas in the public domain. The Toiyabe Chapter in Las Vegas constantly frustrated leading wetlands conservationist Norma Cox during this time because "they were primarily interested in mountain issues" and "could see no value of the wetlands." Playas, pinion-juniper forest, sagebrush flats, and sinks held little interest for Sierra Club members because they did not comprise unique areas, just the average ones in the Great Basin. The NPDS's "Big Book," the resulting publication from their survey, singled out the Black Rock Desert in the northeastern part of the state and Red Rock Canyon near Las Vegas as places of singular beauty and recreational opportunity.[50]

In 1964, NPDS and the Nevada Conservation Society consolidated their operations as NORA. The association's influence on the BLM's public land management policies throughout the next decade helped create Red Rock Canyons Recreation Lands, a scenic sandstone geologic upthrust the Sierra Club had agreed warranted protection, which became the first unit within the BLM system devoted to recreational activities. By the mid 1970s, NORA members Watson and Watkins published *The Lands No One Knows*, a study of the evolution of the public domain containing a larger survey of potential wilderness areas throughout the United States. It was this publication that influenced the mandate that the BLM include wilderness as part of their multiple-use mandate in their organic act, the Federal Land Policy Management Act (FLPMA).[51]

Wilderness did not stand alone in the PLLRC's report, however. Coupled with the mandate to create wilderness was a discussion of how to expand outdoor recreational opportunities. Unique areas of national significance always provided the major draw for recreational tourism, but the PLLRC argued that land management agencies should also emphasize the remaining public lands for recreational development of "dispersed types of outdoor recreation requiring only minimum land development and supervision, and few facilities." This specifically applied to BLM lands in the Mojave Desert and the Great Basin where off-road vehicle (ORV) use had become increasingly popular throughout the 1960s. Motorcycles, dune buggies, and four-wheel drive vehicles chewed up desert land in large concentrations. They also disrupted existing public land users. But in terms of equitable access, the BLM was obligated to make room for ORVs on public land. In 1972, President Richard M. Nixon signed executive order 11644, which declared that because "an estimated 5 million off-road recreational vehicles—motorcycles, minibikes,

trial bikes, snowmobiles, dune-buggies, all-terrain vehicles, and others—are in use in the United States today, and their popularity continues to increase rapidly," policies and procedures were needed to "ensure that the use of off-road vehicles on public lands will be controlled and directed so as to protect the resources of those lands, to promote the safety of all users of those lands, and to minimize conflicts among the various uses of those lands."[52]

However, Nevada Governor Michael O'Callaghan balked at the restrictions this measure implied. He reminded Secretary of the Interior Rogers C. B. Morton that "the people of Nevada have historically enjoyed the great open spaces," and before prescribing any regulations for ORV use, the "needs and desires of the local people" should be given proper consideration. Mining and ranching operations feared that ORV regulations would prohibit them from using four-wheel drive vehicles to reach their claims and herds as much of the Great Basin was accessible only via barely maintained dirt roads. However, the industries expressed interest in the BLM creating special areas for snowmobiles, dune buggies, and motorcycles because they did "do a lot of damage by not staying on well traveled roads." The new ORV regulations reflected the same beliefs residents of the Great Basin had about wilderness.[53]

The BLM notified Governor O'Callaghan that "unless specifically restricted or closed, all BLM land in Nevada is open." Since only Red Rock Canyon near Las Vegas had been closed to ORV use, the entirety of the state remained open to motor vehicle use. Further regulations allowed mining and livestock operators to use ORVs to prospect and access their livestock. Other public land management agencies, including the Forest Service adopted similar regulations which included requiring spark arrestors on ORVs,

permits for groups of 25 or more vehicles, and insisting children to be accompanied by an adult to ameliorate some of the damage done to the environment and prevent needless injuries. Most of the lands in the Great Basin remained unencumbered by either wilderness or ORV restrictions until the late 1970s.[54]

The 1976 FLMPA act fundamentally reconfigured public land management in the Great Basin. Designed to provide the BLM with a clear management mandate, FLPMA incorporated many of the PLLRC's recommendations, including retaining in federal ownership the remaining public lands, mandating the BLM conduct wilderness evaluations, emphasizing recreation as a viable public land commodity, and embracing the inherent contradictions in the multiple-use concept. Providing the BLM with its first explicit mission, the act declared that the BLM manage public lands "in a manner that will protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resources, and archeological values." FLPMA explicitly recognized the value of wilderness on the remaining public domain and mandated the BLM study areas throughout their system that met wilderness criteria. This posed a significant problem to the use of ORVs. Wilderness designations and ORV use, similar to mining and lumbering activities, were fundamentally at odds within the framework of the National Wilderness Preservation System and banned in wilderness areas. Mining interests believed the very prospect of wilderness designations damaged the mining industry in Nevada.[55]

Grazing, however, could be maintained, just not be expanded in wilderness areas according to the precedents set by the 1964 designations. But livestock operators felt the increased government regulations, such as what applied to wilderness designations, were

collectively forcing more and more ranchers out of business. As Helen Fallini noted, "wilderness area[s] and all that kind of stuff has been a big pain in the rear." The Forest Service took the brunt of their criticism in pursuing wilderness area inventories and studies. In Nevada, the agency looked to expand the Jarbidge Wilderness and create several others including in the Ruby Mountains, and in Utah, both a power company and wilderness advocates remained frustrated by the Forest Service's refusal to either declare or deny the High Uinta area as wilderness. The Lone Peak area near Salt Lake City received only a scenic area designation so that it could be managed to preserve its watershed and scenic value as well as provide recreational opportunities. Wilderness areas offered opportunities to backpack, camp, and trail ride on horseback, but they lacked toilets, parking lots, access roads, and all the amenities that facilitated access which attracted the average outdoor recreationalist. Residents living in proximity to wilderness study areas also expressed unease at the increased federal regulations near their homes. The Nevada State Legislature, led by Floyd Lamb, asked the BLM to cease consideration of Nevada public lands for wilderness designations. In Utah, the state protested the emergency withdrawal of Deep Creek, an area on the Utah-Nevada border, from mining operations and use of ORVs in mineral exploration to Congress.[56]

At the same time, the BLM passed stricter regulations on ORV use by designating lands open, closed, or limited with reference to motorized vehicles. Recreationalists who did not utilize ORVs had increasingly insisted on "freedom from the noise and other effects of the vehicles." Backpackers who hiked miles to their destination resented ORVs passing them on their way to the same place in a cloud of exhaust. But ORVs provided "important social and recreational value for 25% of the population" and their users

supported an entire commercial industry. The High Uinta area in Utah failed to receive a wilderness designation in part because ORV enthusiasts protested the Forest Service's proposed vehicle restrictions. The popularity of ORV recreation in the Great Basin was a fundamental aspect of the region's outdoor recreational attractions. From the sand dunes of Sand Mountain and Little Sahara to the ghost towns such as Tybo and Troy scattered throughout the region's mountain ranges, ORVs provided access to places in the Great Basin not typically used or seen. In addition, the sale and repair of motorcycles, dune buggies, all-terrain and four-wheel drive vehicles fueled local economies.[57]

But the interaction between ORVs and other outdoor recreational activities was fundamentally problematic because of their speed, noise, and pollution. Riders on horseback fought to keep their animals under control when roaring engine motors and fast-moving objects startled their animals. Motorists often frightened hikers by careening down narrow roads or over steep sand dunes around blind corners. In addition, unmitigated ORV use damaged terrain, tearing up vegetation and creating bare sandy tracks across desert landscapes (fig. 98). California's Mojave Desert suffered the worst impacts because of its proximity to metropolitan populations in the southern part of the state. The area around Blythe in particular had circles of wheel-tracks wrapped around ancient Native American desert drawings. Despite increased regulations, ORV users continued to leave designated roads and areas to "travel cross-country with impunity," to the frustration of the BLM. By 1979, ORV users were major opponents to increasing environmental protection, especially designating more wilderness areas.[58]

The threat of wilderness on BLM lands and their desire to maximize ORV recreation as part of the multiple-use construct was enough to spark ORV users' interest in the

Sagebrush Rebellion (fig. 99). At the same time, wilderness advocates sought to maximize environmental protection throughout the national forest system and expand that protection to lands managed by the BLM. This produced a veritable stalemate between wilderness advocates and ORV users, mining and livestock interests, and other groups who resisted any form of federal regulation in the Great Basin, rendering any decision-making process fraught with controversy and polarized rhetoric. Frustrated BLM employees remained caught in the middle. Nevada state director Edgar I. Rowland argued "the strain to balance all the interests, environmentalists, recreationalists, and prevent damage by commercial uses" put the "BLM always in the middle of the fight—no matter what side we were on, we were wrong." Because of this managerial nightmare, the Jarbidge Wilderness remained the only designated wilderness area in the entire region until the late 1980s and ORV use continues to remain relatively unregulated (fig. 100).[59]

Finding a Home for Wild Horses

Recreationalists and wilderness advocates were not the only public land users frustrated with the land-management stalemate. Wild horse advocates remained skeptical about the reality of providing protection for wild herds, ranchers remained unconvinced that wild horse herds could be properly managed, and the BLM had no funding to create a proper program. The PLLRC had mentioned little about wild horses in their report, indicating only that "feral animals, like the wild burro and wild horse, should be given some form of statutory protection on the public lands." The 1971 Free-Roaming Wild Horse and Burro Act had fulfilled that recommendation, but not to the satisfaction of either wild horse advocates or the BLM.[60]

Between passage of the law and its enactment in 1974, the BLM required ranchers to remove any animals privately owned in order to sort out which horses qualified for federal protection. For ranchers and the land management agency, this loomed as an ominous task. Velma Johnston, a Nevada resident and one of the leaders from the growing community of wild horse advocates who helped secure protective legislation, founded Wild Horse Organized Assistance (WHOA) and served on the Department of the Interior's national advisory committee on wild horses to work with the BLM and ranchers in enforcing the new law. Johnston and the BLM, however, faced an uphill battle with Great Basin ranchers, who had been nationally vilified and embarrassed in the campaign to pressure Congress to create federal protection for the animals. Leslie Stewart, a livestock operator from Paradise Valley in Nevada, complained unregulated horse herds threatened his family's livelihood and that if "the people want the wild horses as a national heritage, they [wild horses] should be where they could see them." Stewart suggested zoos as a possible alternative and called the public's perception of wild horses a distorted emotional image. Johnston furthered this public polarization by accusing ranchers of creating an "unfavorable image of the wild horses" in order to downplay their importance, but was personally sympathetic with the stresses faced by smaller livestock operators.[61]

Even the BLM, the agency charged with managing most of the existing herds, seemed willing but unsure how to enforce the new regulations. The agency had not allocated any funds specifically for that purpose in the first few years after the law's passage. The political bifurcation might have lessened and the various groups might have achieved a more balanced and cooperative position had BLM officials not found a dozen horses dead

at the base of a cliff near Howe, Idaho, in what appeared to be an illegal roundup gone horribly wrong. After WHOA's investigation traced the Howe Massacre to several BLM employees, who had employed mustangers who used snowmobiles and a helicopter, and found the rest of the herd at a slaughterhouse in Nebraska, the American Horse Protection Association (AHPA) and Humane Society filed a civil suit that implicated ranchers, Idaho state officials, and the agency's employees in the area. By the following year, when the BLM once again began rounding up excess wild horse populations, the wild horse advocates feared and advertised that the animals once again would be made into pet food. In addition, all the gains wild horse advocates had made in the previous decade seemed to disappear when in 1976, the new FLPMA legislation allowed the BLM to use helicopters in wild horse gathers.[62]

The Howe massacre and FLPMA's authorization of mechanized roundups highlighted the underlying and unresolved issue in wild horse preservation. Neither BLM officials nor wild horse advocates knew exactly what to do with the excess wild population once they were captured if the animals were not sent to slaughter. Ranchers, the BLM, and even Velma Johnston understood that at some point, wild horse herds grew too big for their range and someone had to make adjustments. But once the BLM captured them, no one was quite sure who was responsible for their welfare. The BLM's adoption program created in 1973 made horses available to for private ownership, but wild horse advocates contested purchasers' ability to actually secure title to the animal fearing slaughterhouses and commercial processors would use the program to continue purchasing horse flesh for use in pet food. To date, most wild horse adopters lived in Reno, the closest locality to the holding pens for the bureau's adoption program. Wild

horses captured in the Great Basin ended up in the Palomino Valley holding facility living in close quarters under terrible conditions which ruined their feet and made them ill. Visitors to the BLM facility wretched at the site of manure-filled corrals and filthy and frightened animals; such scenes did not facilitate adoptions. One California woman came to Palomino Valley with her children only to watch an employee shoot a sick horse in the head and drag the carcass pouring blood through the snow and mud. Angry, she wrote President Jimmy Carter. Not all horses could be adopted and the BLM struggled with how to dispose of the excess animals without producing a severe public outcry. Ranchers cared little where the animals went after their capture, they just wanted the majority of the animals off the public range.[63]

But wild horse advocates cared deeply about the survival of each animal. The Great Basin's wild herds became the focus of intense public debate in the late 1970s as a result. Much of the rhetoric focused on ranchers portraying the economic aspects of public land resources and wild horse advocates arguing that public lands were the nation's wild lands which should be filled with abundant wildlife and left undisturbed and barely managed. Every announced BLM roundup generated a storm of public protest. State agencies often did not cooperate with the BLM because of the lingering issue of federal jurisdiction over what had once been a state issue. The BLM cancelled many roundups because of differing interpretations as to how captures ought to be conducted with veterinarians, state officials, BLM personnel, livestock operators, and wild horse advocates all vying for control over or at least influence on the program and their own interests. In addition, the AHPA and other humane organizations made it their policy to file lawsuits for inhumane treatment and illegal procedure against the Department of the Interior every

time the BLM announced a roundup. They polarized the wild horse issue so badly, that when writer Heather Smith Thomas attempted to write a balanced analysis of the management problem, the AHPA threatened her publisher with a lawsuit because she argued that "extremists in the horse protection movement" were "pushing so hard for no controls or management of these horses that they are actually working to the detriment of a lot of other values out there that also enrich our lives … they are working to the detriment of the horses themselves."[64]

Great Basin ranchers had a tough time negotiating through the mire of public opinion and their own self interest, lacking the effective public presence of the wild horse advocates. Joseph Clifford in Stone Cabin Valley, Nevada, watched disheartened in 1975 as the BLM released seventy captured horses after the Nevada agriculture department refused to recognize the bureau's authority to sell the captured animals. Clifford had hoped that the BLM would be able to complete their plans to take 400 of the 1000 estimated wild horses in the valley off the range. Joseph Fallini, who served with Floyd Lamb on Nevada's wild horse committee and was Clifford's neighbor just south of the valley at Twin Springs, had toured Velma Johnston around the southern Battle Mountain district, trying to explain their problem with increased wild horse numbers. Johnston proved unsympathetic. Both Fallini and Lamb had advocated using the land bequest of a notable Nevadan to the state, for a wild horse refuge, for commercial development instead.[65]

But unknown to Clifford and Joseph Fallini, Nevada Senator Paul Laxalt was working with Governor Michael O'Callaghan and the BLM to solve the state's wild horse problem from another angle by expanding the National Wild Horse Range on the

military's bombing area north into the Stone Cabin and Reveille valleys, making it into a recreation area. BLM state director Edgar I. Rowland believed "establishment of wild horse and burro ranges and removal of the animals from the balance of the State is the only practical solution to the horse problem." Both ranchers owned property and held water and grazing rights in the area and stood to have their livestock operations seriously reduced, and in the case of the Fallinis, eliminated altogether, if the BLM's proposed wild horse refuge and recreation area was created in that location. The Fallinis had not kept up their property at Eden Creek just north of the bombing range because so little water had been available in the past decade, giving the impression that the southern portion of their Reveille allotment was unused.[66]

At a meeting with BLM officials in the Battle Mountain district in which they discussed the development of this park and wild horse refuge, the BLM rolled out a map of the recreation area which included the Fallini's Eden Creek property. Helen Fallini said "we jumped up and told them like hell" the BLM was going to take the Eden ranch for a new recreation area and expanded wild horse range. The BLM advised the Fallinis that the agency would allocate them some other land in exchange. "We had quite a battle over that that night," said Helen Fallini, "and they were telling all the other people around who were sitting in there how they were going to take it over and it was going to be a historical site and all that." The Fallinis, however, were deeply offended and resisted the BLM's efforts to create what would have been a one million acre wild horse refuge and recreation area. By summer of 1976, the BLM finally managed to cull the 400 wild horses out of Stone Cabin Valley.[67]

The wild horse herds on military ranges, however, were not as safe as wild horse advocates hoped. The same year the BLM thinned the Stone Cabin herd, a strange mass death of wild horses occurred at Dugway in July. The 1968 sheep deaths in the same area, caused by exposure to chemical agents, prompted public concern that a similar incident had occurred. A military pilot had spotted nearly one hundred animals around Orr Springs near the Cedar Mountains, many of which were dead, their carcasses contaminating the water hole. Military and BLM officials examined the situation carefully with veterinarians who determined that "elevated environmental temperatures forced exertion and increased water consumption, leading to heat exhaustion, associated with water intoxication" caused the deaths of more than twenty animals. The Humane Society of Utah thought otherwise and conducted their own investigation, determining that increased military activities had agitated the animals and kept them from using the waterhole. The AHPA believed the horses exhibited signs of the rare African horse sickness, a nearly always fatal respiratory disease transmitted by insects which decimated horse populations in sub-Saharan Africa. For a while, the military and BLM had thought that the toxic rat poison 1080 had contaminated the water. The final verdict on the deaths seemed to be a combination of heat exhaustion and inadequate access to regular water resources. The military had increased their activities on the range the previous year and planned to reduce the herd numbers significantly because the animals were causing sanitation problems on the base.[68]

But the suspicion with which the American public approached the incident was laden with the experiences of decades of exposure to chemical and nuclear contaminants laced throughout the Great Basin from both the nation's mining industry and the weapons

industry. Indeed, a decade later, more than sixty horses died on the Tonopah bombing range from drinking water contaminated with ammonia from a de-icing chemical. The contractor to the military and AEC on the range, Reynolds Electrical and Engineering Company (REECO) had made a practice of rinsing the chemical of trucks and other equipment onto the ground and letting the water dilute the ammonia. With so little rain in the region, the chemical stayed pooled on the surface in varying concentrations. In 2007, more than seventy horses died on the range from a similar phenomenon. Concentrated nitrates contaminated another waterhole. The great open areas of the military ranges seemed wonderful spaces to harbor wildlife, protected from human intrusion by national security interests, but those same interests had severely contaminated the environment.[69]

Whether on the grazing range or the military and testing range, wild horses still did not really have a physical place in the Great Basin except through the sheer presence of their numbers. When herds reached the point they became noticeable, the BLM reduced their size (fig. 101). But wild horse advocates wanted them to be noticeable and resented any reductions, pointing to ranchers' livestock, which were many times greater, that could be reduced instead. Wild horses occupied an important cultural space in the nation's heritage and a cherished conceptual space in the American psyche, but struggled for traction in the actual environment. In the Pryor Mountain range on the Wyoming-Montana state line and the Book Cliffs of Colorado, a refuge established in 1973, wild horses had designated refuges where they occupied a dominant place in the multiple-use hierarchy. But in the Great Basin, the animals had only the refuge on the military range which naturally spilled out onto the public land grazing allotments in Reveille, Stone Cabin, Railroad Valley where livestock operators resented their presence.

Wild horse advocates spoke about the right of wild horses to be on the public rangeland at the same time ranchers defended their right to the same and BLM officials struggled to balance additional requirements such as wildlife and recreation. The Great Basin had become a crowded place. The subject of wild horses proved bring out the less cooperative side of all groups involved, each claiming they were protecting their various freedoms and their right to maximize their desires and interests. The public face of wild horses groups in large part were women like Velma Johnston, Helen Reilly, Hope Ryden, Pearl Twyne, and Joan Blue, giving the movement a gendered appearance, hence ranchers' criticism of the "emotional" nature of the endeavor.[70]

However, these women were far from similar in their backgrounds which informed their views on how wild horses ought to be managed. The one thing they had agreed upon is that the federal government ought to take responsibility for them. The AHPA argued for minimal management, allowing "cyclical population trends to which all wild animals are subject" to apply to wild horses. The organization believed the 1971 law gave wild horses "a preferred status in the multiple-use policy for the public lands," but complained the BLM did not even ascribe equitable status and equal out the numbers. The AHPA, WHOA, and other groups actively opposed roundups, sterilization procedures, or any active management program. Their desire was to manage wild herds humanely and carefully, keeping herd families together, and letting the animals self-regulate their own populations. Their single-minded contempt for the BLM and ranchers have inhibited their ability to facilitate good wild horse management. In essence wild horse advocates ascribed the same human principles of maximum efficiency and liberty to the animals.[71]

Livestock operators, wildlife advocates, and BLM officials took a different perspective on wild horse management. A very small number of them wanted the animals off the land altogether, but most really did enjoy seeing free-roaming horses on the range. Robert Wright, president of the Nevada Cattlemen's Association, maintained "the wild horse is part of our American heritage and certainly needs to be preserved for future generations." Instead, these groups advocated a more active approach to wild horse management. The Sierra Club argued for controlling herds in a manner that protected "native fauna, flora and soils." Notably, the organization opposed the protection of feral burros in delicate desert environments, arguing for the preservation of the "natural" environment itself exclusive of wild horses, livestock, and human habitation.[72]

In the Great Basin, the Sierra Club supported "retention of wild horses … in such numbers that are consistent with the importance of the Great Basin habitat to their continued wild and free-roaming existence." They also supported cooperation with ranchers in developing water resources for both wild horses and wildlife. Tina Nappe of the Toiyabe Chapter in Nevada worked "to keep Nevada lands open and to see the ranching way of life retained" to accomplish this. But Nappe argued the "continued intransigence" of livestock operators in the region "has prevented any meaningful resolution" on the wild horse issue, demonstrating "Nevada's hostility" and providing "grist for the mill for the wild horse organizations." Nappe increasingly turned to wild horse advocates as potential allies against the livestock industry, stating "traditional conservation groups can no longer afford to ride the fence on the wild horse issue. Feelings about the present wild horse law are spilling over into other conservation issues and are definitely contributing to the 'sagebrush rebellion'."[73]

By 1979 the wild horse controversy had helped polarize public land management issues and encapsulated all the changes and complications in public land management since the early twentieth century. Along with grazing fees, the continued burden of nuclear testing, and increasing pressure for ORV regulation and wilderness designations, no public land use could be managed without attention to the other uses. Increasing federal regulations, many of them designed to protect some aspect of the environment, seemed to inhibit ranchers, the military, nuclear testing, outdoor recreationalists, and wild horse advocates alike. Federal land management agencies, the very organizations created to look after the interests of the American public on the federal domain took the brunt of public land users' criticism. Helen Fallini complained "the Bureau of Land Management has been nothing but a pain in the butt. No matter what you do, it's wrong to them … you can get everything to where you think you're pretty well settled, and all of a sudden, here they come with some other daggone thing."[74]

Conclusion

The public land programs created throughout the twentieth century to prevent the Great Basin land from going to waste created a competitive and unsatisfying situation in which ranchers, the military, scientists, outdoor recreationalists, and wild horse advocates constantly struggled to maximize their preferred land use, or at the very least, defend its utility and maintain the status quo. In this way, ranching, military exercises, nuclear testing, outdoor recreation, wilderness designations, and wild horse management has exacted a cost from the region's environment. Critics of public lands ranching have vilified livestock operators as greedy free-loaders who profit off the degradation of the public range lands and ranchers themselves have contributed to this perspective by

resisting changes in public land management that demoted ranching from a primary use to one use among multiple uses. Instead many ranchers have lived up to much of the criticism by pushing range resources beyond reasonable rates of recovery in order to maximize their income. The four hundred Great Basin residents the AEC estimated to be the size of the risk of the continental nuclear testing program suffered damage to their livestock and their own bodies in the name of national security. The Nevada Test Site and the greater military range that surrounds it has become a toxic wasteland. Despite its beautifully preserved open space, the area is unusable for anything except storage for nuclear waste and continued weapons testing.

The vast basin and range region offered multiple recreational opportunities for off-road vehicles, hikers, horseback riders, and campers, but was not beautiful enough to preserve either as a national park or as wilderness. Great Basin residents and many recreationalists, especially ORV users, resented federal restrictions imposed on their outdoor recreation to protect the desert environment, believing public lands to be their own personal playgrounds. Small rural Great Basin communities looked to recreational tourism to boost their local economies while wilderness advocates preferred to sacrifice the region's public lands in order to protect more charismatic places. Hunted and eradicated, wild horse herds negotiated the space in between livestock and wildlife. Wild horse advocates and a large cohort of nation's school children believed wild horses represented the nation's frontier heritage, embodying freedom, strength, and beauty in their unfettered state, but their actual existence in unmitigated numbers plagued range managers and livestock operators alike. Great Basin residents both admired and hated the animals, emblazoning them on license plates and postcards at the same time resisting

measures to fund the very programs that managed them. Complicated, frustrating, and even debilitating situations have resulted from these conflicts, and the polarizing rhetoric surrounding them only got worse at the end of the twentieth century.

The Great Basin is a perceptive hole on the nation's mental map where seemingly inconsequential populations grapple with national interests and pressures. The region is the last place where livestock operators can raise cattle and sheep on a vast public range. It is the place sacrificed for the development of the nation's nuclear arsenal. It is where wilderness was once subordinated to unregulated recreation and the last place wild horses were able to roam. The size of the risk to accomplish the greatest good for the greatest number is measured here through the intersection of and conflicts between the Great Basin's landscapes in terms of human lives and the environment through untangling and understanding the costs of the multiple and varied public land management programs. The multiple-use concept, undergirded by the theory of utility and its maximization corollary which embraced efficiency and liberty in order to provide equitable access to public land users encapsulates the scope and scale of the problem. It is an inadequate public lands management framework because it does not allow land management agencies to properly tailor public land programs to the variety of the nation's human and natural environments. Rather than embracing a region's particular ecological system, multiple-use demands the environment fulfill the entire nation's land-use desires.

This complex and problematic public lands pattern contains rigidly patterned and deeply embedded beliefs about maximizing wealth, power, security, access, and natural resources. Pursuing these goals has certainly served the greater good and has led to a stable, more productive nation, and most Americans have benefitted from the endeavor.

However, the nation's progress has occurred at the expense of certain factors that have been overlooked because they are uncomfortable, inconvenient, and can impede desired outcomes such as efficiency and freedom. Individuals, their families, and integrity of the environment matter even in the face of economic growth, national security, and personal freedom. In the Great Basin they matter more because the region and its residents are the measure of the nation's actual wealth, power, security, its population's access, and stability of natural resources. Knowing the frustrations and failures, motivations and mistakes of Great Basin residents, their relationship to the land and the nation, developing an intimate awareness of the region itself and the nation's perception of the Great Basin requires a recalculation of the size of the risk. Otherwise we callously continue to agree to sacrifice the region's population and its environment for the greater good of the nation. Instead of being buried at the bottom on the sliding scale of progress in which the concept of utility encompasses most, but not all Americans, most of the environment, but not all of it, the size of the risk here is qualified in the names and images of families and places. As Gracian Uhalde argued, "we're at a crossroads where, you know, this way of life, I guess I see it fading out, to a certain extent. I think if you want to and you're hungry enough to hang onto it, there may be a chance."[75]

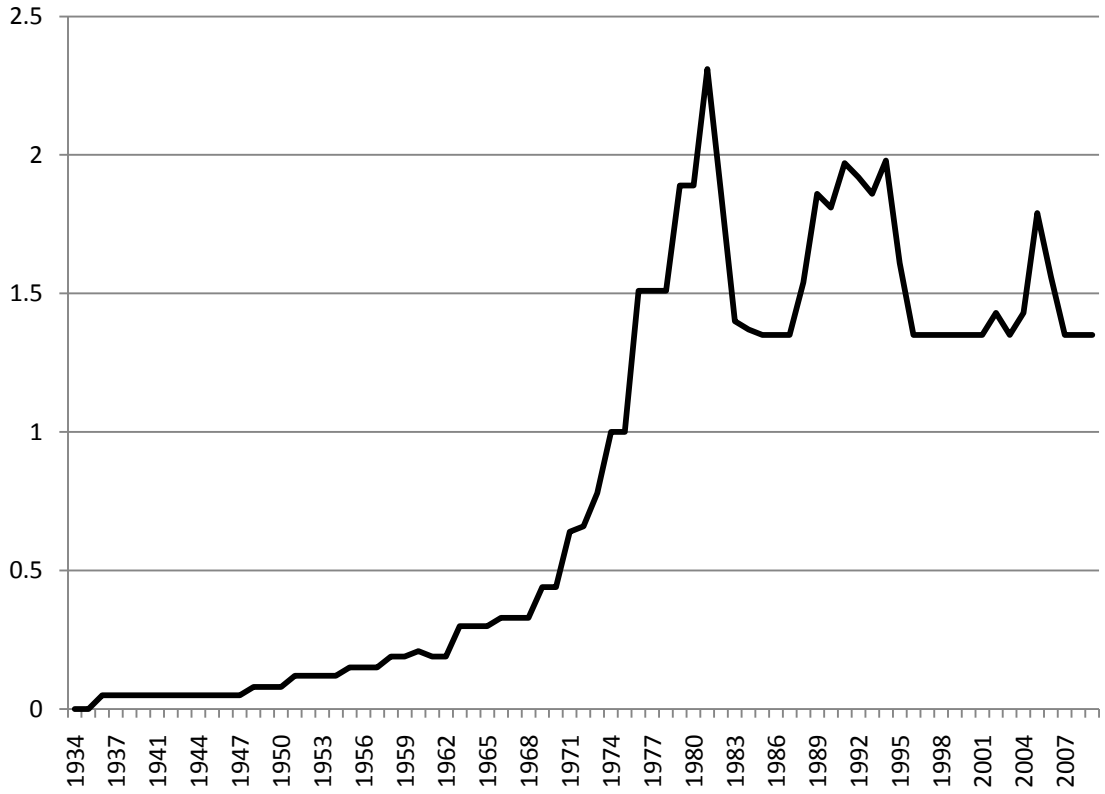

Fig. 91 Grazing Fees in Dollars 1936-2009. Because the grazing fee formula has changed over the years, ranging from a static fee structure to one based on market values of livestock, this chart reflects the tension between ranchers' desires for a stable fee structure and the nation's desire for fees based on some type of fair market prices relative to livestock and forage values. Chart by author.

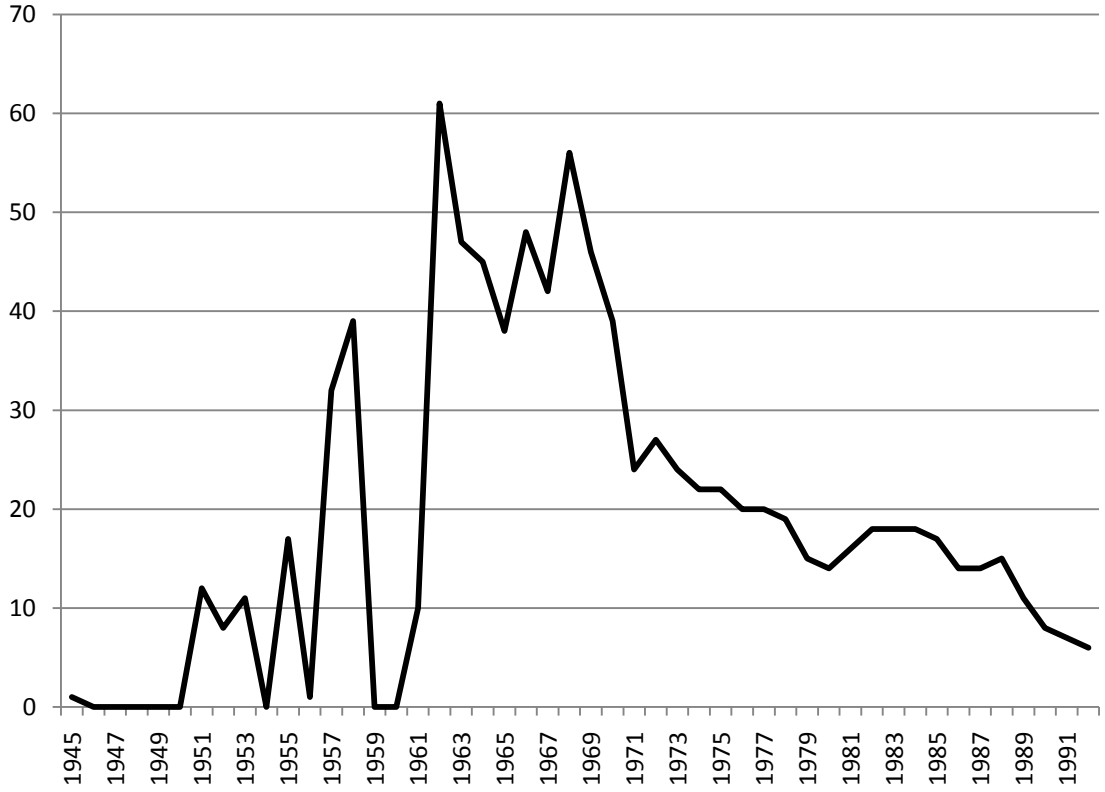

Fig. 92 Continental Nuclear Tests 1945-1992. Atmospheric testing lasted from 1945 to 1963. Nuclear testing moved underground until the second nulcear testing moratorium. The largest volume of nuclear tests occurred during the underground testing program. Chart by author.

Fig. 93 Ground Zero at the Fautless Test. The Hot Creek Range is featured in the background. Photo courtesty Donald James.

Fig. 94 Charles Costa Giving a Tour of the Fallini Ranch at Twin Springs circa 1990. Photo courtesy Donald James.

Fig. 95 Donald James at Ash Springs Near Alamo Collecting Water Samples circa 1967. Photo courtesy Donald James.

Fig. 96 Donald James at the Monitoring Station in Hiko circa 1970. Photo courtesy Donald James.

Fig. 97 Gerald Sharp and Donald James at Nyala circa 1988. Photo courtesy Donald James.

Fig. 98 ORV tracks at Jawbone Canyon near Ridgecrest, Califonria. Photo by author.

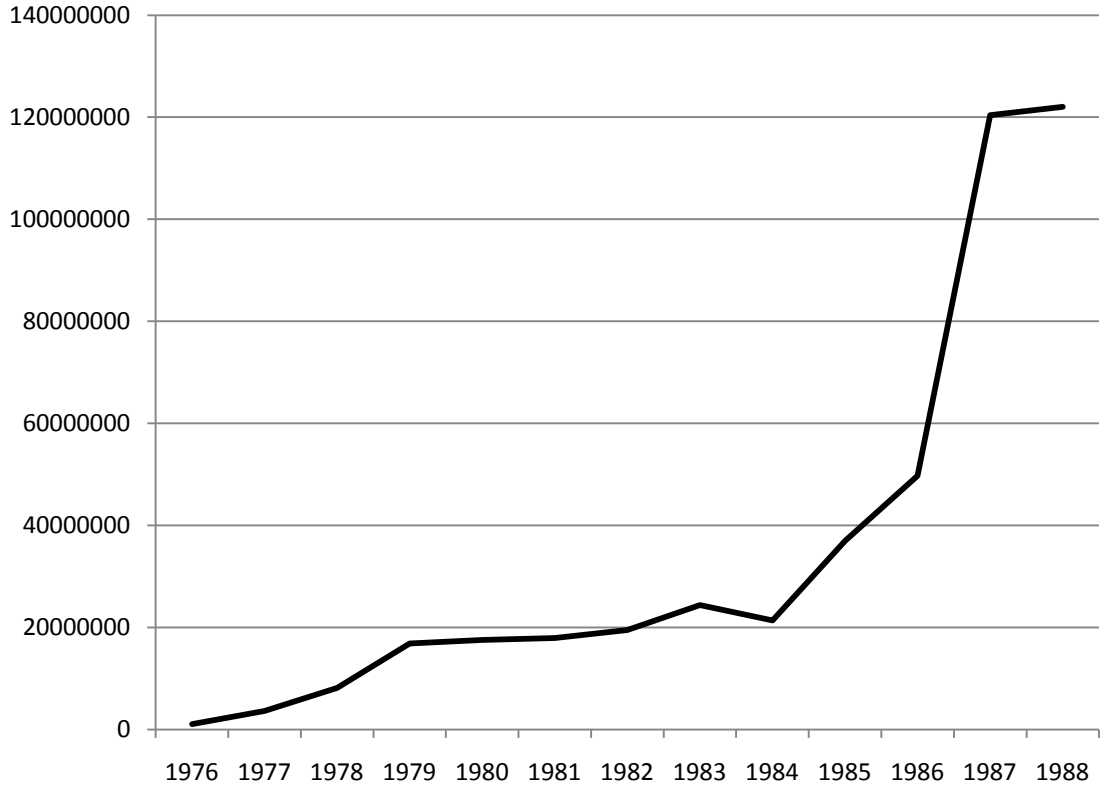

Fig. 99 ORV User Numbers 1976-1988. The BLM did not begin counting ORV use until 1976. After 1988, the agency counted visitor days and visitor hours instead of numbers of users. Regardless of how the BLM counted ORV use, the activity increased throughout the rest of the twentieth century. Chart by author.

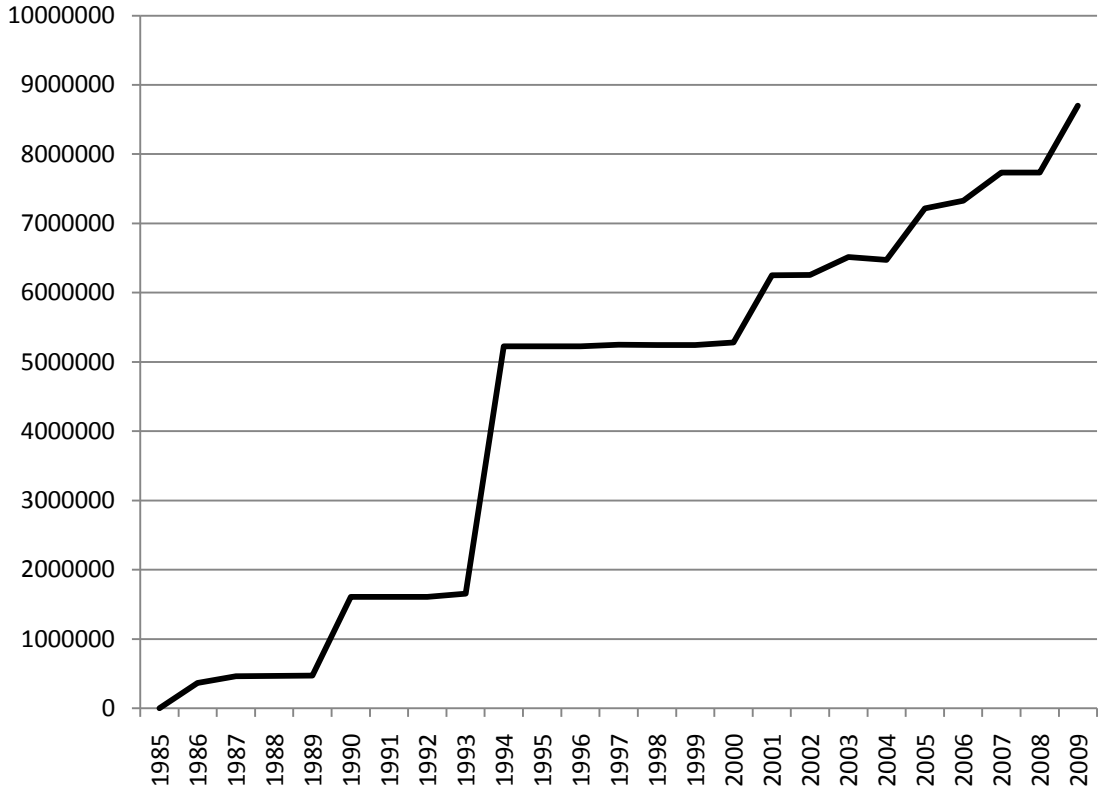

Fig. 100 Acres in the BLM Wilderness System 1986-2009. The BLM created its first wilderness area almost twenty-five years afterr passage fo the Wilderness Act. Most of the agency's wilderness areas are less than five thousand acres. These numbers do not include acres in wilderenss study areas. Chart by author.

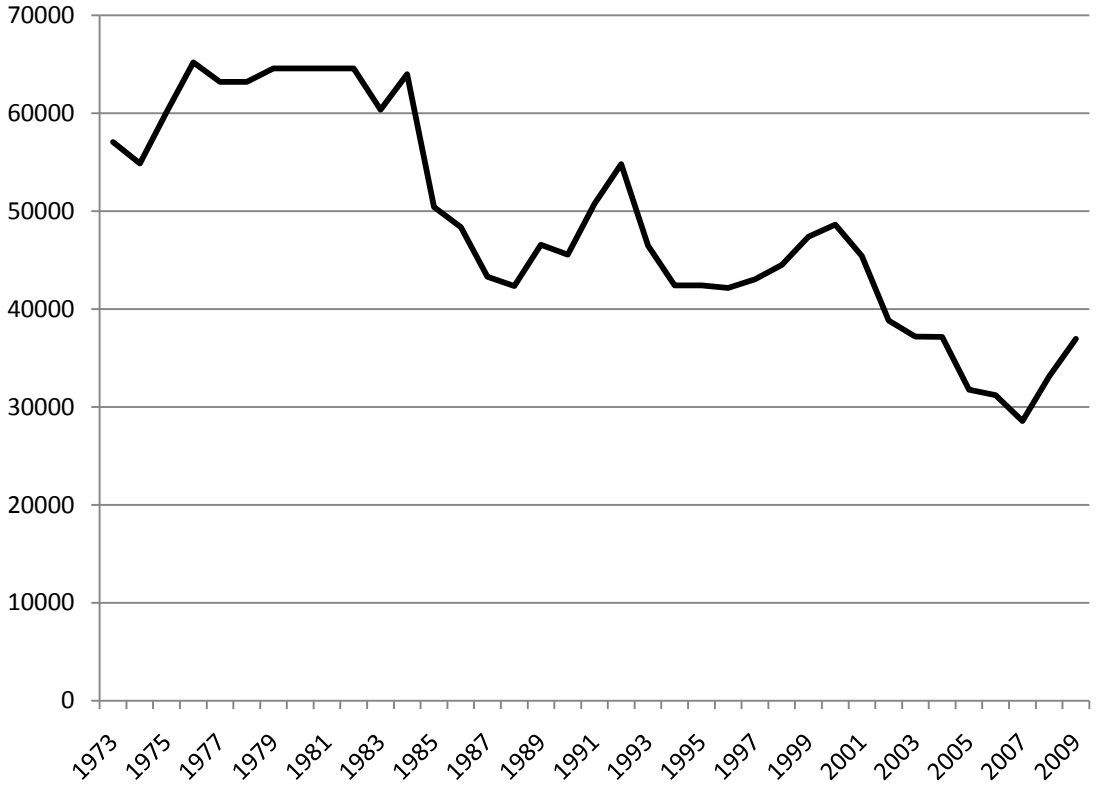

Fig. 101 Wild Horses and Burros Population 1973-2009. Since the passage of the Free-Roaming Wild Horses and Burros Act in 1971, wild horse advocates and the BLM have fought over the minimum number of wild *Equus* species authorized on public lands. The BLM has consistently reduced the aggregate numbers of the animals on public lands. Wild horse advocates point to the overall declining numbers of the animals as evidence the BLM is attempting to erradicate them. However, the BLM's reductions reflect changing range conditions and the reductions are parralleled in the number of animal unit months (AUMs) allocated to ranchers. Overall, the BLM is reducing the number of wild horses, burros, sheep, cattle, and goats on public lands. Chart by author.

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[3] Public Land Law Review Commission, *One Third of the Nation's Land*, 1-7; Gladwin Hill, "Revised Policy for U.S. Lands Asked in Study," *New York Times*, June 24, 1970; "State Farm Bureau Officers Study Public Land Report," *Salt Lake Tribune*, July 20, 1970.
[4] Public Land Law Review Commission, *One Third of the Nation's Land*, 1-7 John R. Logan and Harvey L. Molotch, *Urban Fortunes: The Political Economoy of Place* (Berkeley: University of California Press, 1987), 17-20.
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[6] Public Land Law Review Commission, *One Third of the Nation's Land*, x, 9, 41-65; Lizabeth Cohen, *A Consumers' Republic: The Politics of Mass Consumption in Postwar America* (New York: Vintage Books, 2003).
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