

THESIS

POWER IN THE PASTURE:
ENERGY AND THE HISTORY OF RANCHING IN WESTERN SOUTH DAKOTA

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ABSTRACT

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Transitions in the use of energy transformed the landscape, labor, and domestic life of cattle ranching in western South Dakota from the late-nineteenth to the middle of the twentieth centuries. The introduction of new energy sources to the Black Hills spurred the expansion of European Americans into the region, while helping to displace native peoples like the Lakotas. Changing energy use also intensified ranch labor in the pastures and in the household, drawing individual ranches into new connections with their surroundings. Examining cattle ranching through the lens of energy provides new insights into the momentum of energetic systems in societies, affording historians a way to understand past energy use as they consider present and future environmental concerns.

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PREFACE

My Yesterdays: A Granddaughter on the Evans Ranch

It is surprising how much a scent clings to your memory, readily conjuring up associations when the slightest whiff crosses your nostrils. Scents are important things in all of our lives, but are especially so to those of us who have spent time in rural spaces, where taking in a scent connotes a particular moment in life and labor. Spending time during school vacations and summer breaks throughout my life at my grandparents' ranch just east of the Black Hills of South Dakota, I grew accustomed to deciphering a host of events based on the scents they produced. The fresh scent of alfalfa, warmed by the sun, produces thoughts of hot afternoons pulling weeds next to the hay pasture. Sweet notes of lilacs in the air conjure up images of watering plants in the yard, and a hot blast of dry-smelling air induces memories of driving a truck out to bring juice and cookies to the family members working in the pasture under the summer's mid-day sun. The scent of amassed manure and crisped animal hair drops me in the middle of giving a pile of ear tags to my grandfather while branding calves in the spring. A puff of exhaust-filled air connotes a ride on the tailgate of the pick-up truck, tipping gallon buckets of cattle feed onto the ground in a path, and the smell of grease reminds me of my father after he has spent a day working underneath a truck engine. The metallic scent of a heavy thunderstorm conjures up memories of rushing to finish repairing a fence before the rain comes, or even brings me back to the stormy evening where I got engaged on top of a hill in the North Pasture overlooking the Black Hills.

These scented experiences highlight a phenomenon beyond just memories. They suggest an awareness of the non-human world derived through experience. Spending much of my time

outside of school on my grandparents' ranch brought me into a landscape where human labor, family relations, tractors, soil, animals' bodies, and scent mixed and mingled. Like my grandparents, their five children, and their hired hands, living and working in a rural space such as the Evans Ranch attuned me to the intricacies of the seasons, the time of day, the weather, the climate, the animals' behavior, and my own responses. Through these interactions, I acquired what historian Richard White refers to as "knowledge of nature." In *The Organic Machine*, White states that, unlike much of human history, "there is little in our day-to-day life to preserve the connection" between ourselves and non-human nature. "Machines do most of our work; we disparage physical labor and laborers," he contends, and "the link between our work and nature's work has weakened. We no longer understand the world through labor."¹ Although this is the case of much of the modern, industrial world, there remain landscapes, such as my grandparents' ranch, where daily experiences result in people "knowing nature through labor," and find themselves in an interdependent relationship with it.

The Evans Ranch means a great deal to me because it is the home of my grandparents and the site of many family gatherings and celebrations. Along with that, however, it is significant to me because it has afforded me the kind of knowledge of nature that allows me to understand better the interactions between humans and non-human nature both in history and in the present day. Without my own experiences of this interconnectedness between environment and humans, I may never have developed this thesis.

In writing this thesis, therefore, I owe an enormous debt of gratitude to my grandparents, Irvin and Geraldine Evans, who not only afforded me my love of the rural places of the West by allowing me practically to grow up at their ranch during school breaks and vacations, but also

¹ Richard White, *The Organic Machine* (New York: Hill and Wang, 1995), 4.

provided me the personal stories that I have used in this thesis. They did this by playing a pivotal role in initiating, collecting, editing, and publishing the 920-page local history of eastern Custer County in 1970, *Our Yesterdays*, which contains invaluable insights into the nature of the labor and way of life of Black Hills ranching. Their efforts in creating this work, with Irvin as the chairman for the Eastern Custer County Historical Society and Geraldine as a key contributor, helped to perpetuate knowledge of Custer County's rural past that otherwise may have been lost forever. Ironically, in generating a list of suggested topics for the rural families to cover when writing their family histories for *Our Yesterdays*, Irvin, as chair of the project, anticipated many of the issues, connections, and arguments that I, a history graduate student fascinated with the American West, would generate after two years of graduate coursework. These included items such as the families' reasons for coming, Indians, stagecoaches, railroads, politics, machinery, cattle, irrigation projects, droughts, crops, teaching jobs, social life, dances, travel, school, merchants, and fires.² In addition to compiling the family histories of their fellow ranching and farming neighbors, Irvin and Geraldine provided me with their own personal memories as I interviewed them over the past two years. Although quite a bit of time has passed between today and the events they remembered, both did a remarkable job recalling history spanning from their overall impressions about large-scale phenomena to minute details about their daily comings-and-goings. Both are integral to historical accounts, and both served to make this history, *Power in the Pasture*, a personal and academic account of the Evans Ranch and cattle ranching in western South Dakota.

After moving off their ranch a few months before this thesis's completion after nearly sixty-six years of living there, Irvin and Geraldine can enjoy their retirement with full knowledge

² Irvin Evans, "Helpful Suggestions to Guide You," undated correspondence, in author's possession.

that their story, with all of its triumphs, struggles, and feats, will not be forgotten. Instead, it will provide readers with a compelling look into the realities of pursuing the ranching way of life in the Black Hills of South Dakota, one that requires perseverance, sacrifice, and a love of the land. In many ways, this thesis is a continuation of the legacy that Irvin and Geraldine began in *Our Yesterdays* and in connecting their family to a landscape rooted in meaning.

I would also like to recognize the contributions of another family member from the other side of my family: my late grandfather Raymond Howe. Although not directly a part of the writing of this thesis, he passed on to me his love of preserving and educating youth about history, thereby increasing my fascination with the past and recognition of its importance. His storytelling and recollections regarding his Lakota ancestors gave me a direct glimpse into a tale that is very much a part of my own past, just as it is a part of the story of the Great Plains and the Black Hills region. Like my French ancestors that arrived in the 1880s, my Lakota ancestors entered the region, responding to its environmental realities while drawing from it the resources that would sustain their settlement in and movements around the Hills and Great Plains. In many ways, I am a product of the history contained within this thesis; a story of interactions between these two groups and the way they imprinted their memory on the Black Hills.

Throughout the process of writing this thesis, I am fortunate to have been in the spheres of influence of many great and caring people, all of whom have contributed in important ways to the development of this thesis. A product of the same family history that compelled Irvin and Geraldine to create *Our Yesterdays*, my second cousin and Josephine and Theodore Hesnard's great-grandson, Douglas B. Hesnard, deserves recognition for his dedication to the discipline of history, as well as to his family. It is from his compilations of Hesnard family documents, spanning everything from letters to naturalization records, that I was able to include their story to

highlight a history beyond the memory of any of those alive today. He generously provided his assistance and made personal sacrifices to ensure the persistence of this historical memory, as well as expressed, yet again, his belief in the importance of family.

Central to the development this work are the contributions of those individuals at Colorado State University, where I studied as a graduate student. I would like to extend my gratitude to the Department of History for providing me a teaching assistantship that enabled me to work at the University while studying as a full-time student. I am incredibly indebted to my advisor Dr. Mark Fiege for his years of support of me as both an undergraduate and graduate student at CSU. His zeal for environmental history and ability to create cross-disciplinary connections drew me to the subject of this thesis, and his encouragement enabled me to take what I learned from his highly-engaging and challenging courses to produce my own work. I would also like to thank my thesis committee member and minor-field advisor Dr. Jared Orsi for his invaluable instruction about the process of writing history and his high expectations for his students. I am also grateful for his commitment to excellence in teaching, which has benefitted me as a student, but especially as a future educator. I am grateful to my thesis committee member, Dr. Robert W. Richburg, for his guidance and encouragement both with my thesis project and in preparation for my future profession in teaching. I would like to thank Dr. Robert Gudmestad for his advice that I take a leaf from his book and examine steamboats, which led me to important conclusions about energy and transportation to the Black Hills. Finally, my graduate cohort at CSU deserves a great deal of recognition for contributing to many of the ideas present in my thesis, both through class discussions and informal conversations. Specifically, I am exceedingly grateful for Nichelle Frank, Kelsey Matson, and Kayla Steele for their encouragement, assistance, and patience during our weekly meetings about writing. Together we

walked the various stages of crafting a thesis or research paper, and without them, my experience writing a thesis would have much less enjoyable and productive.

I am grateful to the staff at the South Dakota State Historical Society Archives in Pierre for their assistance during my research visit in August of 2012. With the aid of Research Room Administrator Ken Stewart and Pierre's first 3.4 magnitude earthquake in many years, the days I spent in the Archives proved both fruitful and exhilarating.

In addition to the aforementioned family members, my immediate family, John, Julie, and Jared Howe, also deserve recognition for their unconditional love and enduring patience. My parents had the wisdom to help me acquire my own love of learning and provided many opportunities for me to expand my education as I desired. I would also like to extend my appreciation to my fiancé, Zach Elliott, for paving the way for me as a graduate student and for always loving, supporting, and encouraging me in all that I undertake. I am also thankful that he thought to propose to me in the Evans Ranch's North Pasture, providing me yet another special link to that landscape. I am most grateful to God for all that He has done as my Savior and am hopeful that He is glorified in this endeavor and all that I do.

Introduction

Waking up on January 2, 1949, the rural residents who lived on the plains east of South Dakota's Black Hills were in awe. Most had never witnessed the amount of snow that fell that day and throughout the next month. Yet fall it did, quickly setting records for snowfall amounts, wind speeds, and icy temperatures. Losing heat to the air around them, water molecules suspended above the plains were solidifying and dropping to the ground, where the transfer of energy continued as differences in temperature between air masses caused a dramatic movement of air molecules, creating a violent wind.³ One of those witnessing the blizzard was Geraldine Hesnard Evans, a longtime resident of South Dakota ranches who had grown up in and around the Black Hills on ranches since she was a child. Now living with her husband, Irvin Evans, on their ranch fifteen miles east of the Black Hills, the shriek of frozen gusts of wind and the swirl of empty white reaching her eyes conjured up old memories of harsh winters of yore.⁴ Living in her family's claim shanty in the Hills in the 1920s and 1930s and hearing stories of her family members who had ranched in the Black Hills since the 1890s, Geraldine knew blizzards to mean a risky dance of ranchers withholding warmth from a force that would steal it away. In the decades following ranching's establishment in the Black Hills in the 1880s and 1890s, ranch families during extreme blizzards were often isolated from their neighbors, towns, and stores for days or even weeks. Biting cold and mountains of snow prevented the travel that most families undertook to secure food and supplies for themselves and their animals. When basement cellars

³ E. C. Pielou, *The Energy of Nature* (Chicago, IL: University of Chicago Press, 2001), 41-43.

⁴ Irvin Evans, "Irvin and Geraldine Evans," in *Our Yesterdays*, ed. Irvin Evans et. al (Hermosa, SD: Eastern Custer County Historical Society, 1970), 776.

ran low on preserved goods and dried meats, and all that remained of woodpiles were pieces of bark, ranch families had few options.

Most had prepared for this possibility by laboring year-round to stack and preserve the summer's bounty, hoping to generate a surplus of fuel and food to sustain them through the winter. When supplies dwindled, however, the families had to turn to local sources to squeeze out the margin they would need to survive a moment of extreme hazard. Ranchers like Geraldine's father, Theodore, did so by braving the raging winds and biting temperatures to hitch up a team of horses and chop wood from their nearby forest.⁵ Although they would return with enough to heat their home for several days, such a trip was not all gain. Ranchers and their horses expended their own metabolic energy by working with their muscles to chop and pull. Their energy expenditure created a deficit that required additional food intake that, if not met, could prove costly. Grateful when the team returned home, ranch families quickly burned the wood in their open hearths or cast iron stoves. And that was just to supply the home with fuel and food. Ranchers whose cattle traversed the open range freely, uninhibited by fences, could do little but hope that the animals had found protection in a canyon or stand of trees. Geraldine's family, which kept its cattle in pastures, was able to deliver hay to their animals. During extended blizzards, however, ranchers often ran out of hay, leaving the animals to scuff through the snow in a vain attempt to reach the ice-encased stems and leaves below. Geraldine remembered high cattle losses during blizzards, as the animals were unable to acquire enough energy to heat their bodies and keep their vital organs functioning.⁶

⁵ Geraldine Evans, interview by author, Windsor, Colorado, May 1, 2012.

⁶ Vaclav Smil, *Energy: A Beginner's Guide* (Oxford: Oneworld Publications, 2006), 45.

Yet the Blizzard of 1949, “the big blizzard,” as one local rancher remembered it, seemed different to Geraldine Hesnard.⁷ Geraldine found that this time around, surviving this blizzard was less of a struggle than before. Although the cold, wind, and snow still required that the family dance between energy inputs and outputs, she found that it now posed less of a risk for survival than during childhood and for her Black Hills ancestors. Although still kept from seeing any “outside” individuals for well over two weeks, complete isolation was no longer the norm. Although the family could not travel to Rapid City for two weeks to get food and fuel, it was able to survive by relying on its fifty-five gallon gasoline barrel and kerosene storage tank. The barrel, like the stacks of firewood and preserved foods that her ancestors stored for the winter, was an accumulation of energy that would enter the family’s household to ensure its survival. Unlike those food and wood substances, however, the gasoline within the tank held far greater potential for supplying heat and light than did the summer goods her family had stored years ago. Geraldine was perhaps not surprised when seventy-two mile per hour winds drove snow through the house’s north bedrooms, having awakened many a wintry morning in her childhood home to snow dusting her bedcovers. Irvin’s previous installation of a gasoline-powered generator, however, enabled them to heat the house and cook on the cast-iron stove without having to trek out to their woodpile or hitch the team to chop wood. The family felt fortunate that it could maintain light inside the house through the generator and lightbulb. Telephones helped the neighbors communicate with one another to coordinate community shopping trips and automobiles. The Evanses’ neighbors, the Lintz family, was an example of a nearby ranch that used an automobile, their 1947 Ford, to bring the family in touch with necessary supplies. With this technology, the Litntzes could also bring popular items like coffee and cigarettes to

⁷ Bill Lintz, “History of the Bill and Joan Lintz’s,” in Evans et. al., *Our Yesterdays*, 681.

neighbors who wanted them.⁸ As Geraldine knew, cattle and blizzards had never blended well, but in 1949, some losses were mitigated by Irvin driving his gasoline-powered truck through the fields, distributing hay stored from the previous summer, and at the Lintz place, a rubber hose borrowed from Lincoln Borglum, the son of Mount Rushmore’s sculptor Gutzom Borglum, helped the family pump a tank of water into pastures for the cattle.⁹



Figure 1. The Evanses’ Tractor in the 1949 Blizzard, 1949, in author’s possession.

Geraldine is not the only one who has wondered precisely *why* a blizzard looked so much different for Black Hills ranchers in the two eras. Historians of western ranching have examined changes to ranching culture, environment, and economy that have occurred since the arrival of cattle ranching to the American colonies and its diffusion north and westward throughout the nineteenth century. These historians have focused on issues of ranching politics, technologies,

⁸ Lintz, “Lintz’s,” and Evans, “Irv and Geraldine Evans,” in Evans, et al. *Our Yesterdays*, 776, 681.

⁹ *Ibid.*, 681.

economy, labor, and culture.¹⁰ Although their studies have shed much-needed light on the drastic changes that accompanied the rise of the modern industry from its preindustrial origins, most have yet to connect these different areas of study to the common thread of energy use.¹¹

Yet if we join Geraldine in questioning the startling contrast between her memories of surviving a blizzard on a ranch in the early 1900s and doing so less than half a century later, we recognize the importance of seeing energy as a useful interpretive tool in the history of ranching. Energy relates to the story of surviving a blizzard in the ways ranch families like Geraldine's obtained fuel for heating and cooking, had access to food sources, communicated with neighbors, and ensured the survival of their cattle during a blizzard. And it does not stop at a blizzard. We can also use energy to ask why cattle ranching developed in western South Dakota at the time that Geraldine's ancestors, the Hesnards, arrived in the Black Hills of South Dakota, or why it came to require fences, trains, and tractors, while still relying on the natural growth of grass in the pasture. Energy is fundamental to understanding the experience of ranching. The introduction of new energy sources enabled European-Americans to establish closed-range cattle ranching and displace native peoples, intensify ranch labor to make it more labor- and capital-intensive, and finally, draw the ranch family and household into connectivity with new places, altering women's labor and community identity. In this way, energy becomes not only a new tool to

¹⁰ Some important histories on the evolution of ranching and its development as a modern industry from its preindustrial roots include Terry G. Jordan, *North American Cattle-Ranching Frontiers: Origins, Diffusion, and Differentiation* (Albuquerque: University of New Mexico Press, 1993); Paul F. Starrs, *Let the Cowboy Ride: Cattle Ranching in the American West* (Baltimore: John Hopkins University Press, 1998); Richard L. Knight, Wendell C. Gilgert, and Ed Marston, eds. *Ranching West of the 100th Meridian: Culture, Ecology, and Economics* (Washington DC: Island Press, 2002); and Karen R. Merrill, *Public Lands and Political Meaning: Ranchers, the Government, and the Property between Them* (Berkeley: University of California Press, 2002).

¹¹ Abbott B. Sparks and James A. Young, *Cattle in the Cold Desert*, Expanded ed. (Reno: University of Nevada Press, 2002). In their work, *Cattle in the Cold Desert*, Abbott B. Sparks and James A. Young integrate an ecological perspective into their study of ranching politics and culture in late-nineteenth and early-twentieth-century Nevada, making their study a good example of the way historians can begin to understand the history of ranching in terms of the influence of non-human nature on humans and the reverse.

interpret the history of cattle ranching, but a lens for historians to question energy's use in the past as they respond to concerns about current and future environmental conditions.

Asking questions about the energy history of ranching aligns this thesis with a group of environmental historians who have asked similar questions about the interaction of human and non-human nature, of which energy is a part. Looking at the ways that humans shape their surroundings and that their surroundings shape them, environmental history understands environment, labor, technology, and society as interconnected, revealing the ways that the human story is closely bound to that of the non-human. In “Kennecott Journey: The Paths out of Town,” environmental historian William Cronon describes the relationship between humans, their non-human environment, and their quest for resources as interdependent, likening them to “paths” which connect humans to their resources. Cronon argues that after identifying a particular part of non-human nature as resources necessary for consumption, humans will choose actions that entail either “living upon the country or importing from Outside.”¹² In this way, people are connected to those resources they deem to be useful through various “paths.” As we will see, these “paths” to resources have everything to do with energy use.

Likewise, in *The Contested Plains: Indians, Goldseekers, and the Rush to Colorado*, historian Elliott West has identified the relationship between humans' different visions for resource use across the Great Plains and Colorado and the ensuing changes in population, landscape, and ecology. West argues that when these differences clashed on the trails leading to the Colorado gold fields, there were implications for human settlement, power, and environment

¹² William Cronon, “Kennecott Journey: The Paths out of Town,” in *Under an Open Sky: Rethinking America's Western Past*, eds. William Cronon, George Miles, and Jay Gitlin (New York: W. W. Norton & Co., 1992), 37.

that forever altered American Indian societies, Euro-American settlement, and the ecology of Colorado. Historian Thomas Andrews's *Killing For Coal: America's Deadliest Labor War* also reveals the ways that non-human nature, the built environment, labor, and society changed and were changed by one another in the coalfields of mid-nineteenth-century Colorado. He argues that the interaction between various elements of human and non-human nature resulted in the creation of mining "workscapes," which encompassed the labor done by miners or pack mules, the workers' knowledge, the earth's geological realities, and numerous other factors that shaped coal mining above and below ground. While searching for change and causation within these spaces, Andrews shows the importance of writing a history where "the boundaries between nature and culture melt away."¹³ The perspective each of these affords is that of the connectivity between human nature and non-human nature, whether that be goods from the "Outside," river bottoms of the Great Plains, or Colorado coal.

Just as environmental history has stretched our understanding of the past by collapsing the artificial "dualisms that separated 'man' and 'nature,'" as Andrews states, so too can drawing energy into the human and non-human story unearth a history of connectivity and a new chronology of causation with which to study the past.¹⁴ Examining ranching from an energetic standpoint allows us to search for the ways that access to and use of energy permitted new "paths" between humans and their surroundings, creating ranching "workscapes" not unlike Andrews' mines. Using the lens of energy to ask questions about the connectivity between human and non-human labor reveals a new story about the evolution of the cattle ranching industry from its preindustrial, open-range roots to a modern industry that still perpetuates

¹³ Thomas G. Andrews, *Killing for Coal: America's Deadliest Labor War* (Cambridge, MS: Harvard University Press, 2008), 125.

¹⁴ *Ibid.*, 125.

preindustrial labor and ways of life. Likewise, the answers to these questions span the human, and non-human, experience, revealing important new conclusions for the relationships between environment, labor, and life in the western United States.

Numerous historians and scientists have proven the omnipresence of energy in the past and present world, offering ways to understand the place of energy in everyday processes and global phenomena. Although interdisciplinary energy researcher Vaclav Smil and statistical ecologist E. C. Pielou both define energy as the “the capacity...to perform work,” they agree that the definition itself is complex and abstract, as “work requires the expenditure of energy, and energy spent performs work.”¹⁵ Despite this circularity, they contend that energy’s most commonly encountered forms are easily recognizable in life in the forms of heat (thermal energy), motion (kinetic or mechanical energy), light (electromagnetic energy) and “the chemical energy of fuels and foodstuffs.”¹⁶ Each of these forms is present in the elements of cattle ranching, and the conversions between them comprise what Smil calls the “very fundamentals of life.” These include the conversion of the sun’s electromagnetic energy to chemical energy in plants through photosynthesis, a process that continually repeats itself on the Great Plains and western lands in which much of the nation’s cattle ranching occurs. Additionally, these important conversions include the conversion of chemical energy from biomass sources, which include wood, charcoal, and straw, or fossil fuels, including coals, oils, and gasses, to thermal energy used for cooking and heating.¹⁷ Heterotrophs, including humans, dogs, cattle, and horses, convert plants’ chemical energy directly to fuel their metabolisms, or do so indirectly when they

¹⁵ Pielou, *Energy of Nature*, 5.

¹⁶ Smil, *Energy*, 9.

¹⁷ *Ibid.*

consume other animals.¹⁸ Therefore, they are another step in the chain of energetic transformations stemming from the sun.

Although we can see that energy pervades both human and non-human parts of the landscape, it is not yet clear how historians might use this knowledge to analyze change over time, the essential tenet of the discipline. To do that, we must turn to the work of energy historians like Edmund Burke III and E.A. Wrigley. Their studies regarding past energy use can help us frame a history based on the interaction between energy, humans, and environment, and apply that knowledge to the case of cattle ranching in the nineteenth and twentieth centuries. In “The Big Story: Human History, Energy regimes, and the Environment,” Burke suggests a reorganization of the traditional schema of history into one that understands human activity in terms of the flow, conversion, and storage of energy.¹⁹ He argues that the transition from the use of solar, biomass sources to fossil fuels around the time of the Industrial Revolution represented “an unprecedented break in human relations with nature and the environment.” Likewise, Wrigley affirms that the history of energy consumption could provide “a grammar whose use would clarify the meaning of the industrial revolution.”²⁰ Therefore, both Burke and Wrigley use energy use to frame important eras in human history.

Wrigley defines this energy transition as one between the “organic age,” when humans relied upon organic, or biomass, energy sources like wood, plants, and charcoal, and the “mineral age,” which included the concentrated stores of fossilized organic energies, such as coal and

¹⁸ Vaclav Smil, *Energy in Nature and Society: General Energetics of Complex Systems* (Cambridge, MS: The MIT Press, 2008), 89.

¹⁹ Edmund Burke III, “The Big Story: Human History, Energy Regimes, and the Environment,” in *The Environment and World History*, ed. Edmund Burke III and Kenneth Pomeranz (Berkeley: University of California Press, 2009), 35.

²⁰ Wrigley, *Continuity, Chance and Change*, 77.

petroleum.²¹ Burke defines these two eras similarly, arguing that there have only been two major energy regimes, or eras: the “solar-energy age” from the beginning of humanity to 1800 A.D. and the “fossil-fuel age” from 1800 to the present.²² Although Wrigley’s term “organic age” does include the most common ways that societies accessed the sun’s energy, which were through the consumption of organic materials, simply using “organic age” overlooks uses of the sun’s energy aside from organic materials. Energy historian David Nye has demonstrated that societies like those of the American colonies used not only animal and plant “organic” energies, but also depended upon the flows of energy imparted to wind and water through the sun.²³ Therefore, I will adopt Burke’s term “solar age” because it encompasses the scope of thermal, chemical, or gravitation energies converted directly from sun’s energy, rather than simply the chemical energy of organic conversions. Additionally, I will refer to the second era of human energy use as the “fossil-fuel age,” using Burke’s term, while recognizing that those energy sources are themselves organic material that have been heated and pressurized. The term “direct solar age” can also clarify the differences between the solar and fossil-fuel ages, as it highlights the solar age’s near-instantaneous conversion of solar energy from the sun, plants, and animals, rather than the fossil-fuel age’s extraction of accumulated solar capital “at rates that will exhaust it in a tiny fraction of the time that was needed to create it.”²⁴

Within these two eras, the solar age and the fossil-fuel age, are further subdivisions.

Within the direct solar age, early conversions occurred as humans acquired unpredictable and

²¹E.A. Wrigley, *Continuity, Chance and Change: The Character of the Industrial Revolution in England* (Cambridge: Cambridge University Press, 1988), 5-6.

²² Edmund Burke III, “The Big Story: Human History, Energy Regimes, and the Environment,” in *The Environment and World History*, ed. Edmund Burke III and Kenneth Pomeranz (Berkeley: University of California Press, 2009), 35.

²³ David E. Nye, *Consuming Power: A Social History of American Energies* (Cambridge, MS: The MIT Press, 1998), 15, 49.

²⁴ Smil, *Energy*, 88.

limited energy sources for heat and food through hunting and gathering, whereas later, sedentary farming afforded them a regular source of energy and enabled them to extract more energy from animal husbandry.²⁵ In this agrarian, solar-energy regime, humans directly captured the chemical energy converted from solar energy through photosynthesis, expending energy in their muscles and in those of their work animals to use tools and generate work to secure more food.

Maximizing energy conversions was essential for ensuring population survival and growth.

Therefore, as Burke explains, agricultural societies turned to animals like the horse, which “generates roughly six times the power of a man and has much greater endurance.” As agrarian societies invented advanced tools like pulleys, levers, and plows, which improved energy yields, these solar-age societies were able to generate a surplus of fuel and food, a development that would enable further innovation.²⁶ Despite the addition of these modest tools and energy-converting animals, energy use reached an upper limit until knowledge of these basic tools, the widespread application of wind energy for navigation, and the adoption of more powerful gunpowder weapons all enabled a new age of improved energy extraction, one that historian E.A. Wrigley calls “the advanced organic economy.”²⁷ Although this age of intensified consumption of biomass supplies for heating and clearing of land for agriculture allowed for population growth, this, in turn, meant that “increasingly well-tuned systems of exploitation” yielded an energy crisis that economies could not overcome with solar-age resources. As a result, the year 1800 saw ecological degradation that would further limit the size of the populations that could be sustained.²⁸

²⁵ Burke, “The Big Story,” *The Environment*, 35.

²⁶ *Ibid.*, 37.

²⁷ Wrigley, *Continuity, Chance and Change*, 36.

²⁸ Burke, “The Big Story,” *The Environment*, 41.

Yet, as Burke suggests, the year 1800 also held great potential for change. Around that time, wood shortages and overpopulation in Britain spurred a demand for new energy sources. People developed new technologies to use the nation's abundant coal, transitioning from wood and charcoal solar sources to fossil fuels. Whereas work in the solar age remained closely dependent on the sun's rays for energy, the fossil fuel age relied on energy further removed from the sun's electromagnetic energy. In the fossil-fuel age, energy stemmed from sources like coal, petroleum, and natural gas, which form through the heating and pressurization of the accumulated biomass created directly by the sun's energy.²⁹ Unlike organic raw materials such as wood, fossil fuels provided a concentrated energy source that could be used in large quantities, but could not be replenished as quickly as direct solar sources.³⁰ However, with the transition from wood and charcoal to coal around 1800, then petroleum and natural gas around 1880, Britain was able to stave off the limits of the solar age which had limited population growth and agricultural productivity.³¹ The transition to fossil fuels ushered in a new era of agriculture, transportation, and civilization, including politics and culture.

The effects of this transition varied as different regions adapted the new energy source, but with Britain leading the way around 1800, many nearby countries would soon follow. Aided by the energy latent in these concentrated and easily-transportable fossil-fuels, countries like Great Britain and the United States generated new technologies and machines to further increase food production and mineral extraction. These included the steam engine, which was a more efficient converter of coal than of wood, as well as an increase in steel production, as coal created higher temperatures and more energy for blast furnaces than did the region's dwindling

²⁹ Smil, *Energy*, 85.

³⁰ Wrigley, *Continuity*, 16.

³¹ Burke, "The Big Story," *The Environment*, 42.

wood supplies. A greater supply of steel helped industries to create new machines with which to produce goods like plows that would radically increase agricultural yields, as well as decrease the number of workers required for their manual labor by replacing them with mechanized implements.³² The use of fossil fuels also generated electricity, as coal-fired steam generators enabled societies to realize the possibilities latent in electrical power. Just as the solar age held both the early- and late-agrarian stages, so too would the age of coal transition to one of petroleum use around 1900, when improvements in refining oil joined with the creation of the internal combustion engine to secure petroleum as the leading energy source of the fossil-fuel regime.³³

This chronology of energetic transition offers answers not only to questions regarding changes to Geraldine's experiences, but also to cattle ranching in the American West, specifically western South Dakota. It was not only in Great Britain that society intensified its use of solar energy and eventually transitioned to the fossil-fuel age. As David Nye has shown, the establishment of the United States and its expansion westward coincided with the transition to new energy sources, as colonists and Americans capitalized on their technologies and knowledge of advanced-solar-age means for harnessing energy. They did this by using what Nye calls the "energies of conquest," capturing the energy of the wind for movement through the sailboat and the gravitational energy of flowing water through the watermill to produce movement and work.³⁴ As these technologies of the advanced solar age expanded throughout the eastern United States and helped people to increase their productivity on the lands, the nation generated the surplus wealth that helped to push it to develop new technologies rooted in the fossil-fuel age.

³² Andrews, *Killing for Coal*, 111.

³³ Burke, "The Big Story," *The Environment*, 45.

³⁴ Nye, *Consuming Power*, 15.

Much of this transition did not occur until the middle of the nineteenth century or later, as previous means of using solar energy continued. One of the main reasons that this transition occurred at least fifty years after Great Britain was the sheer prevalence of biomass resources still unused in the United States, especially wood, as well as water power, such as the Mississippi River. However, wood had its limits, as did other solar energy sources. Bulky to transport and quicker burning than coal, wood was less efficient in powering new technologies in energetic transportation and industry. Along with the energetic qualities of wood, deforestation eventually dwindled the once-vast woodlands and played a role in ushering in the fossil fuel age, as farmers cleared more land in the tree-covered east as improved agricultural implements allowed them to expand production. Finally, the transition to fossil fuels required assistance from the old solar regime itself. Improvements in transportation using the wood-fired steam engine helped the expansion of railroad and mining technologies which would aid in the extraction and transportation of coal from distant mining centers, an activity that would have been too costly using only the muscle power of the horse.

Nevertheless, the horse itself remained a prevalent source of muscle power for work and transportation well into the fossil-fuel age of steamboats, railroads, and automobiles. Vaclav Smil shows that horse numbers peaked on U.S. farms in 1918 at 26.7 million, when there were already 85,000 tractors and 89,000 trucks.³⁵ Likewise, In *The Horse and the City: Living Machines in the Nineteenth Century*, historians Clay McShane and Joel Tarr describe the persistence of labor based on older forms of muscle and solar power. They examined the ways that American society continued to use horses for labor in the midst of nineteenth-century

³⁵ Smil, *Energy in Nature and Society*, 159.

urbanization, describing them as “living machines.”³⁶ Furthermore, as environmental historian Mark Fiege has demonstrated in *The Republic of Nature: An Environmental History of the United States*, the construction of railroads required greater inputs of muscle energy, both from humans and draft animals, and organic resources, like timber, thereby expanding the use of “organic economy technologies, processes, materials, and fuels to build the new.”³⁷ Their findings indicated that a form of energy use rooted in the sun’s rays and horses’ muscles continued and even expanded during the coal-driven industrialization of American cities and rural landscapes, highlighting the uneven nature of the transition from the old solar age to the new age of fossil fuels. This overlap between the old and the new regimes’ sources occurred not only with horses and motors, but with a host of other sources of energy in ranch life and labor.

This is the world in which our story of the Evans Ranch in the Black Hills of South Dakota occurs; from the second half of the nineteenth century with the early establishment of ranching in the region to the middle of the twentieth century with a flowering of changes to the industry following the Second World War. This span of years coincided not only with the origins of the Evans Ranch, but also with the nation’s transition from the solar to the fossil-fuel age. From this story of a particular cattle ranch in the Black Hills region, we can unearth a new approach for other western and American histories as well, seeing them as dependent upon and shapers of their energy use.

³⁶ Clay McShane and Joel Tarr, *The Horse and the City: Living Machines in the Twentieth Century* (Baltimore: John Hopkins University Press, 2007), 2.

³⁷ Mark Fiege, *Republic of Nature: An Environmental History of the United States* (Seattle: University of Washington Press, 2012), 245.

First, the introduction of new energy sources enabled European-Americans to establish closed-range cattle ranching in the region and displace the native peoples living therein. As the nation's visions for westward expansion coincided with the opportunities for easier transportation made possible by fossil-fuel powered steamboats and locomotives, native peoples living in the Great Plains found themselves in competition for the energy sources upon which they depended. Although they themselves had expanded their energy extraction by participating in the advanced-solar regime, the coming of vast numbers of European-Americans threatened their ability to secure enough resources to perpetuate their traditional economies and political autonomy.³⁸ As their British neighbors had done earlier in the century, these American immigrants brought with them new systems of energy use that surpassed many of the constraints of the solar age, enabling them to sustain themselves in new regions in the West, including the Black Hills region of South Dakota. Central to sustaining the movement to and supplying of the Black Hills were the fossil fuels used in the steamboat and locomotive, both of which aided the United States in asserting its dominance over new areas by establishing military forts to protect and supply overland migrants. With these forts and their soldiers securing the passage of people and goods into western South Dakota, the region flourished as a gold mining center until ranchers realized the potential for grazing that existed in the grasslands in and surrounding the Hills. Although the expansion of Euro-Americans stemmed partly from the transition to fossil fuels, these mineral-based technologies often worked in tandem with the previous regime's solar sources. As ranching took root in the Black Hills region in subsequent decades, the labor of ranchers like the Evanses and their ancestors continued to perpetuate old forms of solar-energy

³⁸ Elliott West, *The Contested Plains: Indians, Goldseekers, and the Rush to Colorado*. (Lawrence: University Press of Kansas, 1998), 88-91.

labor well into the nineteenth century, highlighting the uneven nature of the transition between energy sources.

Second, fossil fuel energy intensified ranch labor to make it a more labor-and capital-intensive livelihood. Although ranching had occurred in and around the Black Hills since the Gold Rush of 1876, which brought new peoples to the land, the earliest form of ranching was adopted from the Southern Plains. This southern system, which allowed cattle to graze freely across great swaths of land without shelter or supplemental food, worked well in warm climates with mild winters. However, ranchers in the Black Hills soon discovered that cattle, especially the new specialty breeds making their way to the region, would not be able to survive with so little care. Throughout the 1880s and 1890s, a series of harsh winters, not unlike the Blizzard of 1949, proved the limits of the region's grasslands in supplying sufficient nutrients to ensure these animals' survival through the winter on the open range. However, a new system requiring fossil fuels replaced that southern system, around the time that the Hesnard family first arrived in the region. Much like earlier forms of agriculture and manufacturing in Britain and the eastern United States, this system exchanged the dispersed energy sources of the direct solar-energy regime with concentrated energy sources found in fossil fuels. Although fossil fuels had already made important inroads earlier in the century, the final decades of the nineteenth century saw a transition from the open-range to a more labor- and capital-intensive form of closed-range cattle ranching. As government allotments afforded ranchers private property on which to labor to ensure their cattle's survival, the extension of the railroad connected the Black Hills to a larger market, bringing in new breeds of cattle and machinery needed to ensure the cattle's survival through harsh winters and droughts. To do so required more labor and capital, as ranchers purchased machines to produce hay to be fed to the cattle throughout the winter. These machines

drew energy not from the muscles of ranchers or their horses, but from fossil fuels, which provided a concentrated and transportable energy source that enabled the cultivation and feeding of hay. The consequences of this transition breeched the supposed divide between human aspects of ranch labor and culture, and non-human aspects of energy and environment, as fossil fuels altered the very meaning of ranch life and landscape.³⁹

Finally, the acquisition and use of new sources of fossil fuel energy in the ranch home drew the ranch family and household into connectivity with new places, altering women's labor and community identity. Just as the transition from the advanced-solar-energy age to the fossil-fuel age intensified ranch labor in the pastures, so too did the energy transition alter women's labor in the household, drawing it into connection with new technological systems of energy use. As more and more ranch housework became dependent on these new technological systems, including rural electrification, rural households formed new connections with their surroundings, altering labor and relations within the family and home. Furthermore, rural communities also changed to reflect the new realities present in fossil-fuel technologies. Yet despite the many consequences that unfolded as mineral-based machines replaced some of the labor done by muscle-power, the transition itself was incomplete for much of the nineteenth century. In fact, as in the pasture, ranch labor in the home continued to rely on the dispersed sources of energy from the solar regime, representing the uneven nature of the energy transition. Although available, some rural families chose not to incorporate all of the latest fossil-fuel technologies into their households, continuing to rely upon solar-age sources like muscle labor. Families made choices whether to adhere to the practices they knew or whether to embrace the new possibilities present in fossil fuel technologies.

³⁹ Andrews, *Killing for Coal*, 125.

This overlap between the old and new energy use in the ranch household represents an essential principle of energy history: technological momentum. Avoiding the determinist viewpoints that contend that energy and its related technologies dictated human choice, or that human choice dictated available energy and technologies, technological momentum considers both the cultural aspect of human choice and the environmental aspect of available energy. Historians like David Nye and Thomas Hughes understand technological momentum as a process whereby energy and technologies gain momentum when human societies begin to use them in systems.⁴⁰ As societies desire to produce more work by integrating these energy sources into technological systems, these systems' repeated use ingrain them in everyday life so that people come to depend upon them, and cease seeking other means of doing work. In this sense, as Nye puts it, past energy use based on cultural choices set the parameters for future energy use.⁴¹ Although the Black Hills region began to incorporate fossil-fuel energy in the nineteenth century, the transition from the old, solar age to the new age of fossil fuels was not a single event of predetermined change. Therefore, when we observe the combination of muscle power working alongside petroleum products or coal, we can apply our understanding of technological momentum to understand what factors perpetuated solar-age energy use and the ways that societies transitioned to new sources of energy.

At the same time that technological momentum frames a discussion of the uneven, often messy, transition between biomass and fossil-fuel energies, so can technological momentum frame an understanding of the consolidation and proliferation of the fossil-fuel regime. Nye argues that when societies choose to invest in a new technological system, such as fossil-fuel-

⁴⁰ Thomas P. Hughes, "Technological Momentum," in *Does Technology Drive History? The Dilemma of Technological Determinism*, eds. Merritt Roe Smith and Leo Marx (Cambridge, MS: The MIT Press, 1994), 112.

⁴¹ Nye, *Consuming Power*, 10.

powered electricity that extended into rural areas, people begin to rely upon that system's work-producing abilities. Soon, a series of political, economic, and cultural relationships enmesh these technologies into further systems which acquire their own momentum, thereby limiting the array of choices for future energy use. Although individuals within society may choose to break from the obvious options to pursue an alternative energy or technological system, they may have a difficult time advancing that option. Therefore, recognizing the momentum of a society's past choices about energy and their visions for new opportunity will help historians as they seek to understand the complexity of historic resource use, as well as provide a framework to respond to contemporary concerns about the sustainability of our present system of fossil-fuel resource dependency.

A study of the Evans ranch illuminates the energy transition that extended across the nation. As historians study the energy transition that gave rise to profound changes to ranching in the late-nineteenth and early-twentieth centuries, they can also use these questions to examine change over time in other western landscapes. Doing so will allow them to understand labor, landscape, and technology in the history of the Great Plains and West as interrelated processes in a larger shift in energy use. This understanding will help them to forge new conclusions about the place of the West in not only American history, but in the history of the world itself.

Although Geraldine would not have labeled it explicitly as an energy transition, she may have realized that separating her childhood experiences of surviving a blizzard and those of her adulthood in 1949 was a fundamental shift in how ranchers such as herself and her family survived a blizzard. She was, in fact, in the interstice of the energy transition, specifically from

Wrigley's "advanced organic economy" or Burke's "solar regime" to the age of fossil fuels, or "the mineral age." In many ways, her childhood experiences surviving a blizzard aligned precisely with Wrigley's assessment of advanced organic economies dependent upon capturing the sun's energy. This required that they "preserve a favourable balance between the energy spent in this pursuit and the energy made available by it," much as Geraldine's father did in burning the calories supplied by his food in pursuit of wood, which would ensure further access to consumable energy.⁴² During the '49 Blizzard, however, her family had a completely new relationship with its surroundings. Instead of traipsing out to the wood pile or forest to obtain heat for cooking and warming themselves, the Evanses looked to their gasoline-powered generator. When the fifty-five gallon barrel supplying the gasoline ran out a few weeks into the storm, Geraldine felt a familiar sense of dread as she recalled running out of food, light, and heat in her childhood. However, that feeling quickly turned to one of relief when gasoline-powered snowplow trucks arrived from Rapid City, enabling Irvin to take his own truck to a nearby town where he purchased food and fuel. Nevertheless, Geraldine was left wondering what would have happened if the town and snowplows themselves had run out of the energy sources that everyone was beginning to take for granted.

⁴² Wrigley, *Continuity, Chance, and Change*, 50.

Chapter 1

From Trails and Trains: Energy and Movement to the Hills

Arriving at her new home east of the Black Hills in 1946, Geraldine was eager to begin her life with her new husband and on the land that she co-owned with her brother, Donald. The couple had lived for a few years on the East Coast as her husband worked as a mechanical engineer designing defense technologies during World War II, but returned to begin their own cattle ranch in 1946, hoping to combine Irvin's knack for engineering with the knowledge that Geraldine had gleaned from growing up most of her life on a ranch twenty miles to the west in the Hills. Although she had never before been the co-owner of an operating ranch, the story of ranching was a part of who she was. Testament to that fact was the item that Geraldine placed on display upon first arriving at her new home: a porcelain Madonna figurine.⁴³ This treasured keepsake placed in the Evanses' humble ranch house was a tangible link not only to Geraldine's ancestors, but to the story of their travels from Europe, settlement in the Black Hills, and experiences in ranching.

Those ancestors included Theodore Hesnard and his son Emil, the first members of the family to enter the Black Hills and begin cattle ranching. A year after her husband and eldest son had arrived in the United States to begin a new life in 1882, Josephine de'Auney Hesnard and her three young children followed the same path westward. She journeyed to a new world while carrying a precious token from her French past: the porcelain Madonna figurine. The item would remain with her from her departure in Fleurs, France and on the journey westward that would

⁴³ Geraldine Evans, interview, May 1, 2012.

make her and her family one of the many migrant families from the eastern United States, Europe, or elsewhere in the world that relocated themselves westward during the second half of the nineteenth century.⁴⁴ The family's arrival and subsequent pursuit of new economic ventures, including mining, banking, tourism, and cattle ranching, mirrored the activities of other like-minded settlers bent on utilizing new spaces cleared of American Indian populations and wrought with government-sponsored land distributions to establish the black Hills cattle ranching industry, of which the Evans Ranch was a product. Josephine's daughter, Tillie, wrote her own memoir of the "Little White Statue," recalling that to her, the statue symbolized "a message of love from our French ancestors to us- for us to pass on to future generations."⁴⁵ And pass it along they did; not only did the Hesnard family give the Madonna statue to Josephine's granddaughter Geraldine, but in settling the Black Hills region, the family paved the way for the industry that its descendents, Geraldine and her husband, would perpetuate for the next century.

The Black Hills into which the "Little White Statue" entered with its owners in 1883 was a landscape rooted in the pre-industrial era of intensified solar energy use, beginning with the Plains Indians and extending into European-American settlement. Yet an important transition was underway. The new use of fossil fuels would provide Euro-Americans with a powerful means of colonizing the lands of the Black Hills region, opening the door for the establishment of the ranching industry for the first time, while also displacing the native peoples who lived there. The transition in uses of energy brought two distinct cultures into contact and competition with one another over access to them. Each equipped with a particular vision of land use and method for acquiring energy, they nevertheless found themselves connected by overlapping

⁴⁴ "Hesnard History," in Evans et al., *Our Yesterdays*, 758.

⁴⁵ Tillie Hesnard, "The Little White Statue," personal essay, "An American Family," in author's possession.

energy needs.⁴⁶ Although both took part in the energy transition, Euro-Americans' vision for the landscape differed and they would incorporate new sources of energy to a greater extent, creating new technological systems upon which their survival would depend. Yet this process, which involved changes in land use, transportation, and settlement, was neither a singular movement nor was it complete by the time Euro-American settlers had made the region their home for several years. Instead, this was one moment in the continuum of events precipitated by changing energy sources that had been intensifying in the second half of the nineteenth century in the American West and would continue to transform well into the twentieth.

Beginning with news of the discoveries of gold made by General George Custer, the Black Hills were the site of much interest, both by Americans and foreigners alike. Having circumvented his orders and the agreements set forth in the Fort Laramie Treaty of 1868, Custer moved into the Hills in the summer of 1874, following rumors of gold and under the auspices of searching out a new location for a military fort. He and his troops traveled throughout the area, surveying hills and streams in search of the precious metal that had set off a series of rapid migrations in recent decades, first in California, then Colorado, and then throughout the West. While there, they noted the riches of the country's grasslands, predicting their importance as sites for grazing. Despite a series of guarantees that assured the Lakotas rights to the Hills within their Great Sioux Reservation, Custer and his troops moved forward, opening the path for further settlement and setting off a wave of gold delirium throughout the world.

⁴⁶ Elliott West, *The Contested Plains: Indians, Goldseekers, and the Rush to Colorado* (Lawrence: University Press of Kansas, 1998), 86-93.

Present within General Custer's mission into the Hills and the subsequent flurry of media endorsement was a subtext of expansionist ideology that had pervaded earlier movements of Euro-American westward in the nineteenth century. As they had in other places in the West, Euro-Americans would envision the Black Hills region as space upon which they could write their own futures, albeit with some modifications to the settlement of native peoples living therein.⁴⁷ Theodore Hesnard and his family first heard about the possibility of immigrating to the Black Hills of South Dakota in terms of the gold and land rushes. For this family of factory workers and orchard owners, the lure of land and opportunity held real sway.⁴⁸

Much of this expansionist ideology stemmed from a concept of the frontier as a distant wilderness, empty of humans and their influence and ready for conquest by an industrious settler population. News of the Lakota reaction against Euro-American development in areas such as the Power River region to the west of the Black Hills and the formation of the Great Sioux Reservation made the nation aware of the presence of substantial native populations. Nevertheless, many early explorers and settlement boosters envisioned the Black Hills as others had done for decades in the West: as the site for a quest to transform an unimproved wilderness land that existed beyond the reaches of civilization. In *Dispossessing the Wilderness: Indian Removal and the Making of the National Parks*, Mark Spence argues that visions of many western spaces as being untouched landscapes free from the influence of humans led to the creation of Yellowstone, Yosemite, and Glacier national parks as havens of supposedly undefiled wilderness, while in the process ignoring the reality of a long-time American Indian presence. Upon discovering a disconnect between their expectations for a pristine wilderness and the

⁴⁷ Mark Spence, *Dispossessing the Wilderness: Indian Removal and the Making of the National Parks* (New York: Oxford University Press, 1999), 3-5, 86-87.

⁴⁸ "Hesnard History," in Evans et. al., *Our Yesterdays*, 758.

reality of a long history of Indian land use, early advocates of the national parks had to create policies and arrangements to align this reality to their expectations. Having acted upon their vision for the landscape, native peoples found themselves outside of that picture, their former way of life distorted by their displacement at the hands of officials bent on creating a “perfect Eden.”⁴⁹

Just as in these early national parks, the reality of the Black Hills was a far cry from an empty wilderness free from human inhabitation and influence. Instead, the mountains and surrounding plains had a long history of interaction with, and transformation by, Plains Indians, including the bands of western Lakota, who considered the region to be sacred and dominated its hunting and raiding in the decades leading up to Euro-American settlement . Although in ways less familiar to the European Americans who first interacted with them, Plains Indians like the Lakota had developed migration, trade, and subsistence patterns that drew upon the resources around them to survive. However, the arrival of contrasting visions for the landscape, including the use of new energy sources, brought native peoples face to face with a new reality on the landscape, where survival depended upon a different system of resource use.

Plains Indians’ supply of energy, rooted in processes that converted and stored energy from the sun, placed them in an era, or regime, of energy use that was not unlike other civilizations of preindustrial Europe or elsewhere around the world, called the mineral or solar age by energy historians. Despite the absence of technologies widespread in Europe, such as the plow, that would appear to improve the landscape by European-American standards, Plains Indians nevertheless operated within the solar-energy regime to draw resources from non-human

⁴⁹ Spence, *Dispossessing the Wilderness*, 70.

nature to sustain their existence.⁵⁰ Plains Indians were a part of a system in which organic materials stored solar energy and stored this energy as chemical energy and biomass for human consumption. Humans also gained access to this solar energy indirectly by eating the flesh of animals that have consumed plants themselves. In either case, Indians had limited access to the sun's energy through gathering and cultivating plants or using domesticated dogs to store energy for transporting materials. Although dogs could store energy and transport goods, they required similar energetic inputs of proteins as did humans. At times of scarce resources, dogs subtracted from the available energy, in the form of meat, for human consumption, and therefore were not always beneficial to maintaining a precarious balance of survival.⁵¹ Plains Indians who chose not to remain as sedentary farmers could only obtain much-needed carbohydrates through trade or by gathering them during specific windows of the year. Furthermore, hunting on foot took a great deal of time to cross long distances to get to the bison herds, and could only be done when the season permitted.

The advent of another means to access solar energy, however, led the Plains Indians to develop a new vision for the landscape, one that would allow them to intensify their solar-energy acquisition and avoid some of the limits of their previous system. The tool that enabled them to do so was the horse, which arrived in the northern plains through trading and raiding with southern tribes, where proximity to Spanish herds and a warmer climate permitted their circulation and successful dispersion.⁵² Despite the harsher winters and cold climate of the Northern Plains above the Platte River, the possibilities of securing goods from Euro-Americans by hunting trade goods on horseback motivated northern Plains Indians to incorporate the horse

⁵⁰ West, *The Contested Plains*, 84.

⁵¹ *Ibid.*, 50-52.

⁵² Pekka Hämmäläinen, "The Rise and Fall of Plains Indian Horse Culture," *Journal of American History* 90 (December 2003): 836.

into their hunting economy, which they did by the 1750s.⁵³ This animal opened the door for new systems for acquiring energy from the land and circumventing the natural limits of the solar regime. The acquisition of the horse afforded the Lakotas a better means of harnessing the sun's energy stored in the region's grasses, which were abundant but inaccessible to humans.⁵⁴ They provided what Elliott West described as "a fabulous shortcut" to the wealth of solar energy stored in the prairie's grasses. The horse's ability to convert the herbaceous material into muscle power provided the Lakotas with a new mode of transportation, allowing them to be radically more efficient at extracting the energy stored in the bison's flesh than they had been on foot.⁵⁵ Now retrieving an unprecedented amount of energy from biomass sources, horse-mounted Plains Indians were at the edge of perfecting the solar energy regime.⁵⁶

The horse changed the Plains Indians' understanding of the landscape and drew them further into a system of raiding, hunting, and trading upon which they would grow dependent. As the horse increased their hunting ability greatly, they could move beyond subsistence production and onto providing a surplus of bison hides and goods for market exchange. Trade with Euro-Americans, at newly-created forts along the Missouri River and other overland posts opened up a new way of accessing energy for the Lakotas and other Plains Indians, connecting them to

⁵³ Hämäläinen, "Plains Indian Horse Culture," 845.

⁵⁴ *Ibid.*, 836.

⁵⁵ Elliott West, *The Contest Plains*, 50-52.

⁵⁶ Although this ecological- and energy-based assessment holds that horses efficiently converted solar energy to muscle power for human use and therefore provided their riders with unprecedented means of accessing bison, Pekka Hämäläinen has also offered a valuable caution against seeing the acquisition of the horse as singularly beneficial. Hämäläinen recognizes the new possibilities present in the horse for Plains societies like the Lakota, while also offering a nuanced explanation of their effect, which included also the ways that horses "disrupted subsistence economies, wrecked grassland and bison ecologies, created new social inequalities, unhinged gender relations, undermined traditional political hierarchies, and intensified resource competition and warfare." Hämäläinen, "Plains Indian Horse Cultures," 860. Below, this paper also provides evidence for the transformative power of new sources of energy, including many of the results that Hämäläinen points out, which affected not only humans' search for food and transportation, but had social, economic, and ecological implications as well. It advances Hämäläinen's thesis by recognizing the complexity surrounding humans' changing understanding of and relationship with their environment.

external energy through what William Cronon has called “new paths into and out of town.”⁵⁷ Along with changing gender roles and social statuses, the coming of the horse and the trade it inspired offered the possibility of securing the goods and resources that the Lakotas’ migratory hunting economy did not provide.⁵⁸ In this way, trade and horses functioned as “paths” linking the Lakota to external resources that, for a time, allowed them to circumvent some of the constraints of a solar-energy regime. Through trade, for example, Elliott West argued that Plains Indians such as the “Cheyennes, Arapahoes, Comanches, Lakotas and Kiowas had fashioned a brilliant scheme of living by taking some of what Europe offered and using it to push outward the ancient limits of one of the world’s great grasslands.”⁵⁹ It provided a “path” by which they could secure much-needed carbohydrates and guns, linking them to outside economies of Euro-Americans where those goods were produced and allowing them push the limits of their solar-age economy in order to persist with their bison-hunting economy.

As the Euro-Americans who preceded the Hesnards acted upon their vision and expanded westward from the beginning of the nineteenth century onward, they altered the energy patterns of Plains Indians, drawing them into new systems of energy use and eventually diminishing their ability to survive strictly in this regime of intensified solar energy use. One of the most radical ways that this happened was with the acquisition of firearms by native peoples. Just as the horse imparted a new “path” by which the Lakotas could reach the sun’s energy, so too would the guns allow the Lakotas to have access to supplemental energy with which to hunt bison or fight enemies.⁶⁰ Whereas bows and axes relied upon an individual’s own muscle power to supply the necessary energy, guns connected their users with materials from Cronon’s “Outside,” including

⁵⁷ Cronon, William. “Kennecott Journey,” 32-33.

⁵⁸ Hämäläinen, “The Rise and Fall of Plains Indian Horse Culture,” 849.

⁵⁹ West, *Contested Plains*, 228.

⁶⁰ *Ibid.*, 49.

the precise measurements of chemicals needed for gunpowder and the metal of the gun itself, generated with the heat of fossil fuels by industrial production. Instead of his own muscle power, a hunter with a gun accessed a sudden release of kinetic energy or heat that was greater than he could have produced with his own energy alone.⁶¹ Together with the horse, this technology, dependent upon the “immigrated energy” of gunpowder, gave the Lakotas and other mounted Plains tribes unprecedented access to new forms of transportation and bison. It simultaneously drew them even more closely to the trade network that sustained those systems.

Equipped with the newfound energy in guns and horses, the western Lakota expanded onto the prairies to seek trade in beaver and bison hides that would secure them supplies with traders along the Missouri River. Although their successful integration of the horse as a tool for subsistence and trade remained uneven through the mid-eighteenth century, it would become tremendously important as they moved from their depleted hunting grounds east of the Missouri River and onto the western Plains in the second half of the century in search of resources for trade.⁶²

Continued access to energy sources spurred further Lakota expansion into the region of the Black Hills and positioned the tribe for later contact with the lands upon which the Hesnards would settle. With the coming of Euro-American traders and hunters came an increased pressure on the region’s bison. Both from pressure to secure trade goods and hunt the animal for the market, as well as Euro-American destruction for pleasure, bison herds by the 1840s were diminishing along the popular hunting grounds of the Missouri. The Lakotas, whose economy was now very much based on their ability to hunt the bison to secure other European goods, now

⁶¹ Smil, *Energy in Nature and Society*, 352.

⁶² Richard White, “The Winning of the West: The Expansion of the Western Sioux in the Eighteenth and Nineteenth Centuries,” *Journal of American History* 65 (Sept. 1978): 322-4.

oriented their expansion and warfare to secure access to the herds, which had moved north and west towards the mountains. The result of this pursuit was raids and warfare both to secure access to the migrating bison, as well as raids to replenish the horse supply. The latter was a function of their environment; compared to the southern Plains where Indian horse cultures first flourished, adaption on the northern Great Plains above the Platte River was more difficult, with shorter growing seasons and harsh winters which “reduced the quantity, quality, and availability of forage.”⁶³ This growing utilization of the horse aided them in expanding beyond the Missouri and into the mountains inhabited by the Kiowas, Arapahoes, Crows, and Cheyennes. In 1775-1776, these incursions included the Black Hills under Oglala Lakota Standing Bull, a land that they would come to consider sacred.⁶⁴

Just as it had at the Missouri River trading centers, access to energy drew the Lakota and Euro-Americans into contact once again with the advent of the Oregon, California, and Utah migrations in the 1840s.⁶⁵ Guided by the vision of conquest and improving the wilderness of the Great Plains and the West, these settlers brought with them new patterns of using the landscape. Elliott West argues that the westward movement of Euro-American settlers ushered in systems of intensified solar energy use, resulting in ecological effects that ricocheted throughout the Great Plains. Overland freights and emigrants wrought tremendous changes to fragile riparian and grassland environments, bringing thousands of head of cattle and heavy wagons frequently across these trails and building new road ranches and towns along the way. Both newly-arriving settlers and Plains Indians relied upon the limited areas of river bottoms along the Platte and

⁶³ Hämäläinen, “The Rise and Fall of Plains Indian Horse Culture,” *JAH*, 846.

⁶⁴ White, “The Winning of the West,” 327.

⁶⁵ *Ibid.*, 338.

Laramie Rivers for forage for bison populations, their horses and livestock.⁶⁶ This intensified competition for resources became evident to Plains Indians like the Pawnees, Crows, Arikaras, and Cheyenne who found themselves in a struggle for diminishing resources along the routes of Euro-American migration. With a reliance on riparian landscapes for their hunting and agricultural survival, and especially for supplying their trade goods, these landscapes' destruction weakened the Indians' ability to survive newly-arrived epidemic diseases that would ravage their bodies and continue hunting for trade and subsistence.

Faced with these ecological and political threats to the solar-energy sources that sustained them, the Lakota expanded their campaigns for hunting grounds, bringing them on a crash course with the United States government. Due to this movement, Plains tribes between the Platte and Arkansas rivers, all of whom experienced a similar loss of resources, faced increasing attacks at the hand of the Lakotas. The sweeping epidemic disease that accompanied overland routes to the south affected the Lakotas less than other Plains tribes, enabling the former to continue mounted hunts and thus their hunting-trading economy. As a result, they proved victorious in many of these raids. The colder climate and shorter growing seasons for the grasslands in the Lakotas' present homeland between the Platte and the Missouri rivers had always presented a challenge to the Lakotas' ability to maintain large horse herds. Therefore, these incursions into the more-temperate southern Plains intensified beyond the Platte, as the Lakotas sought to benefit from the weakened state of their southern neighbors. Between the 1830s and the 1850s, the Lakotas raided the Crows for horses, captured wild horses in the North Platte River, and used them to attack the semi-sedentary Pawnee.⁶⁷ Pursuing bison for subsistence and trade had guided the Lakotas since their initial move onto the plains of Minnesota, but their quest for new hunting grounds and

⁶⁶ West, *The Contested Plains*, 88-89.

⁶⁷ Hämäläinen, "Plains Indian Horse Cultures," 860.

horses in the Platte River Valley directed their warfare precisely into the areas that the American government hoped to keep safe for its citizens' migration and settlement in the middle of the century.⁶⁸ In attacks on the Pawnee and Crows in the middle part of the century, the Lakotas highlighted themselves as a principal threat to the region's stability for American expansion.

On one hand, the American settlers and government were poised to dominate access to resources along migratory routes and in newly-settled areas such as the Front Range of Colorado, endowed with a strong military and expanding agricultural settlements. On the other hand, the Lakotas remained a potent competitor for these energy sources, asserting their dominance over a wide arc of land through continual raiding and trade. The fact that their homelands southwest of the Missouri River had harsher winters and shorter growing seasons than the lands to the south had not only kept the Lakotas in a persistent quest for a fresh horse supply, thereby spurring their frequent raids, but also kept their herd sizes smaller. Consequently, these smaller herds never seriously threatened the life-sustaining river valleys and pressured bison herds in the way of the southern horse economies. This permitted the Lakotas to enjoy relatively stable numbers of bison in their home territory into the 1850s and 60s, in comparison to the turn of the century declines in the southern Plains.⁶⁹ The result was less pressure on river valleys and bison herds on the northern plains than in the south, which helped the Lakota maintain their trading ability with Euro-Americans.

Despite their ability to continue hunting and raiding more so than other tribes, the Lakotas' pursuit of bison for subsistence and trade put them in the path of American expansion, particularly in the region between the Missouri River in the east and the edges of the Rocky

⁶⁸ White, "The Winning of the West," 340.

⁶⁹ Hämäläinen, "The Rise and Fall," 861.

Mountains in the west. As the discovery of gold in present-day Montana and the construction of military outposts increased the number of American settlers in the region, the Lakotas found themselves increasingly at odds with the government and its vision for the west. Yet, their displacement from the hunting grounds north of the Platte and around the Black Hills following the wars of the 1860s and 70s was not inevitable, and neither was their decline as one of the major power players on the late-nineteenth century Plains. The expansion of steamboats, railroads, and cattle ranching that would occur by the time the Hesnards moved west in the 1880s was not a predetermined outcome. The Laramie Peace Conference of 1851 proved as much; the Lakotas' refusal to stay within the confines delineated by the agreement proved the treaty's power to be nominal at best. As the majority of Indian represented at the conference, the Lakotas continued to demand the right to pursue the resources that had compelled their movement for centuries. In the decades that followed, however, a growing American presence, enabled by new energy use and technologies, threatened the Lakotas' ability to persist in this way of living, culminating with their loss of lands with the influx of settlers, like the Hesnard family, in the Black Hills region.

The new "paths" of energy sources which directed the Lakotas' expansion past the Minnesota plains to the Black Hills followed routes similar to those used by the mid-century overland migrations by Euro-Americans such as Theodore and Josephine's family. The latter group, however, began to incorporate different types of energy sources as they continued to expand westward, derived less from intensified use of the sun's energy in biomass sources like wood and grass and more from its millennia-old reserves of coal and petroleum found underground. This disparity of energy uses would have far-reaching implications for the future

settlement of both groups. Explaining the defeat of Cheyenne Indians to the south, West argues that “whites and Native Americans were trying to live out irreconcilable images of what the plains were to be, which was like trying to pour sand into a bucket full of water without losing any of either.”⁷⁰

Likewise, the government officials who established forts and the settlers who arrived in Dakota Territory and the Black Hills pursued a different vision for the land, a vision they realized with the help of highly-concentrated and easily-transportable energetic materials, namely coal. Using these fossil fuels, these colonists recreated the landscape of the northern Great Plains by building military outposts, mining gold, and raising livestock, activities that would bring them into further conflict and competition with native peoples like the Lakota. A transition in the use of energy sources enabled the United States government and settlers like the Hesnard family to gain access to and transform the region into mines, towns, and ranches. The new technologies that accompanied the energy transition operated as tools of conquest that severed the Lakotas’ grasp on the region. Guided by their understandings of the possibilities in the Black Hills and adjacent plains, and equipped with technologies like the steamboat and railroad, these newcomers paved the way for radical changes in the landscape, which would eventually include closed-range cattle ranching.

The Euro-Americans individuals and families who traveled to the Hills were themselves the products of the energy transition, as well as investors in it. Although historical sociology has pointed out the differences between the English and French industrialization and rise of capitalism, the late-nineteenth-century France that the Hesnards left for the New World was invariably experiencing the effects of the energy transition, as had England earlier in the

⁷⁰ West, *The Contested Plains*, 312.

century.⁷¹ Whereas agriculture in the solar age required a great deal of peasant muscle power to maintain “a favourable balance between the quantity of energy derived from farming operations and the quantity expended in carrying them out,” the introduction of fossil fuels and their related technologies had allowed landowners across Europe to overcome the restraints of this energy balance by drawing from a more concentrated and efficient source of power than human muscle power.⁷² Rather than pay and feed horses and peasant laborers so that they could turn their caloric intake into work, landowners began to replace these solar-age workers with fossil-fuel machines, which required fuel and capital but generated more horsepower and increased the energetic yields of the land. As a result, these displaced workers often turned to the factory jobs that fossil-fuel mechanization had produced, as did some in the Hesnard family prior to leaving for the United States.⁷³ Those who dreamed for their own land or life outside the factory walls, however, knew that they had little chance for change unless they migrated to places like the United States, where it seemed that land was free for the taking. As Thomas Andrews has shown with the arrival of coal miners in Colorado from all around the world, migrants often learned of opportunities in the United States for mining by word of mouth, letters, or advertisements.⁷⁴ The last of these compelled the Hesnards; on the walls of the woolen factory in which they worked for wages, they saw a sign advertising free land and gold discoveries in the Black Hills.⁷⁵ They would join thousands others in pursuing this new land and opportunity in the United States West,

⁷¹ Wrigley, *Continuity, Chance and Change*, 73-76. For historical sociology regarding the economic and political restructuring of England and France in the time of the shift to the advanced-solar and fossil-fuel regimes, see Robert Brenner, “The Agrarian Roots of European Capitalism,” *Past & Present*, No. 97 (November 1982); and Barrington Moore, *Social Origins of Dictatorship and Democracy: Lord and Peasant in the Making of the Modern World* (Boston, MS: Beacon Press, 1967).

⁷² Wrigley, *Continuity, Chance, and Change*, 70-72.

⁷³ Andrews, *Killing for Coal*, 111.

⁷⁴ *Ibid.*, 117-118.

⁷⁵ “Hesnard History,” Evans et. al., *Our Yesterdays*, 758.

and in doing so, strengthened the momentum that fossil fuels had begun to develop in that region.

And develop they had. By the second half of the nineteenth century, derivatives of the fossil-fuel age, such as the telegraph, barbed wire, the steamboat, and the locomotive were making inroads into the seemingly-remote places of the Great Plains and American West. Observing the benefits offered to them in transportation, mining, and agriculture, these new arrivals would use fossil fuels in such a way as to not only displace the native peoples living there already, but to give more strength to the entire system of fossil-fuel use. This occurred first in the transportation of migrants into the West. Increasingly, options for westward migration had begun to center on maximizing speed and overcoming obstacles of lack of fuel and provisions along the routes, requirements that fossil-fuel transport met. As more and more people pursued these options for overland transport, they helped to concretize those mineral-based technologies into a larger system of exchange for people and goods across the nation, giving the fossil-fuel regime more momentum. In doing so, their movement would usher in unprecedented transformations to the land.

Tillie Hesnard remembered her family's "long, hard journey" across the Atlantic and eastern United States to meet their father at the Missouri River town of Pierre. Crossing the river at a time "when the Missouri was covered with masses of floating ice," the Hesnards likely joined their father after being transported aboard a steamboat making its way from a port town like Sioux City or Saint Louis. Coming before the construction of the Chicago & Northwestern Railroad Bridge in 1907, the family had to cross the freezing river by means of a small boat, rowed by Theodore and a Mr. LaPlant, which pushed past "the cakes of ice that grated on the side of the boat as they floated past." So desperate was the situation that Tillie recalled her father

telling the children in French that “the first one to make a noise or move, goes into the river.” Surviving that obstacle, the family still had to travel another three weeks, likely by coach or wagon, to get from Pierre to Rapid City. Upon the Hesnards’ arrival in Rapid, Tillie wrote that she remembered nothing but arriving at their cabin and praying around “the big fireplace full of burning logs,” which served as a reminder that Thanksgiving of 1883 of the blessings of “so complete a reunion of the family.”⁷⁶



Figure 2. Missouri River Forts and the Black Hills.⁷⁷

The path by which the Hesnards arrived in the Black Hills in the early 1880s was similar to the ways other Euro-Americans would move westward, drawing from fossil fuels to fuel their

⁷⁶ Tillie Hesnard, personal essay, in “An American Family,” ed. Douglas B. Hesnard, in author’s possession.

⁷⁷ Based off of Lass, *Navigating the Missouri*.

transportation, while also requiring sections of solar-age travel. One of the first transportation technologies employing extensive use of fossil fuels to enter into the landscape was the steamboat. Coexisting for many years alongside the Indians' muscle-powered dugout canoes, hide canoes, and circular bullboats, as well as the Euro-American's muscle-powered keelboats and pirogues, the steamboat was a product of fossil-fuel industrialization. Rather than being constructed from large logs or buffalo hides, as were earlier modes of travel along the Missouri, the steamboat's main component, the steam engine, was produced in distant factories where fossil fuels like coal helped to heat metal hot enough to produce multiple engines.⁷⁸ One of the principal advantages of the steam engine was that it allowed "unprecedented freedom of location," offering a moveable solution to producing work, in this case transportation of goods and passengers.⁷⁹ Although produced with industrial technologies, steamboats traveling on the Missouri in the mid-nineteenth century often relied upon solar-age energy sources to fuel their movement, namely wood. Despite being less prevalent north of the Platte River than in the riverine areas below, wood was a local source of fuel that steamboats obtained from timbered areas along the river's bank. Burning wood, however, was a costly endeavor; early high-pressure engines consumed about 1.25 cords of wood per hour, with a cord of cottonwood ranging from 2,160 pounds while very dry and 4,400 pounds for green cuts from the growing season. The space used to store those heavy stacks of wood cost the steamboat valuable space for passengers and cargo, while adding weight that would increase the boat's draft.⁸⁰ It was little wonder, then, that a steamboat captain observed the consequences of this consumption while refueling in 1841 near present-day Chamberlain, South Dakota: "During the ten years that the boats have been

⁷⁸ William Lass, *Navigating the Missouri: Steamboating on Nature's Highway, 1819-1935* (Norman, OK: The Arthur H. Clark Company, 2008), 24-25.

⁷⁹ Smil, *Energy in Nature and Society*, 228.

⁸⁰ Lass, *Navigating the Missouri*, 23.

coming to this country,” he stated, “all the wood near at hand has been depleted and, unless one takes measures to replenish in advance, I would not be surprised if, in the future, the boats will fail to make their trip.”⁸¹

In his lifetime, however, the captain would witness a way to reach beyond the constraints of bulky wood and declining timber stands with the use of fossil fuels in the boat’s steam engines. Examinations of nineteenth-century steamboats’ fuel sources makes it clear that the vessels continued to rely on both old- and new-regime energy sources throughout the nineteenth century. In the second half of the 1800s, however, the steamboat transitioned to become an important consumer of the fossil fuel coal as it dominated northern plains transportation and shipping. Able to harness the concentrated energy stored in coal, a steamboat’s boiler consumed the fossil fuel and converted its stored potential energy into work-producing kinetic energy.⁸²

Steamboats could then navigate rivers like the Missouri by using an energy source which was more concentrated and easier to transport than the solar age’s wood. The alternatives to the fossil-fuel-driven steam engines aboard these steamers were wood-fired steamboats, which quickly depleted the woodlands adjacent to the river and required frequent refueling, and animal muscle power from the solar regime pulling wagons or coaches. The latter possibility, which remained in use in the overland trails extending west to the Black Hills, was less efficient in several ways. Just as the horse outperformed dog and human muscle power by efficiently using the abundant grasses, thereby aiding humans to tap into solar energy, so too did the steamboat’s steam engine draw from solar energy to an intensified degree. Able to use the region’s wood, steam engines consumed a biomass sources that humans had only used otherwise for heat and

⁸¹ Lass, *Navigating the Missouri*, 24.

⁸² Smil, *Energy in Nature and Society*, 228.

cooking, not for transportation. Additionally, the fact that the engine could operate on water was another advantage over a horse or oxen. Even preindustrial society's like the Romans recognized that overland transport faced the obstacle of fueling work animals for movement to overcome the friction of roads and the ground. By contrast, fossil fuels formed an intensified energy source to do more work than could a horse or oxen in its conversion of solar energy. Steam engines joined steamboats to create a technological system whereby less friction impeded travel than did the wheels and hooves of an overland freighter.⁸³

However, the transition to fueling steam engines with coal was not a rapid one. Instead, transportation of goods and passengers to western Dakota Territory combined energy regimes, as steamboats continued to draw from both wood and coal, even after large quantities of coal were present from increases in western mining. The log of the captain of a long-running steamboat along the Missouri demonstrates clearly the uneven nature of the transition between fuels of the old regime and the new. In April of 1881, Captain Townsend described the high water that threatened the journey of the steamboat the *Benton* upriver. On April 22, he recorded that the steamer "Lay all day at Omaha trying to get coal. Finally get [sic] one car..." and on April 23 "took on forty tons of coal..." Having left Omaha, the *Benton* continued up the Missouri, stopping on April 29th to buy six cords of wood from the Indians."⁸⁴ Although coal proved to be a more-efficient energy source for steamboats with limited storage for wood and comprised a part of these steamers' fuels supplies, many, like the *Benton*, continued to purchase wood from Indians and professional woodhawks, combing the two sources. The purchase of wood from

⁸³ Smil, *Energy in Nature and Society*, 197.

⁸⁴ John G. Lepley, "'Old Reliable': The Steamboat Benton on the Upper Missouri," *Montana: The Magazine of Western History* 30:3 (Summer 1980): 50.

Indians also pointed to the degree to which native societies became dependent upon trade with Euro-Americans after losing access to their traditional resources.

The steamboat's efficiency and power replaced the keelboat as the primary mode of transportation upriver.⁸⁵ Relying on muscle power of the solar age, the keelboat averaged only twelve miles a day upstream, and at best made eighteen miles a day. In comparison, the steamboat covered the 1,760 miles from St. Louis up to Fort Union in about eighty days, with the fastest trip recorded in 1847 at forty days. This surpassed the keelboat by traveling the two distances over 22 days and 44 days.⁸⁶ Travelers, trappers, and traders witnessing the disparity between keelboat and steamboat transportation times increasingly chose to adopt the newer technology, thereby helping the fossil-fuel-powered steamboat to gain momentum as the technology of choice.

Yet passage to the West aboard these shiny new rigs was not without problems. Even a new industrial technology like the steam engine still had to contend with the realities of the riverine landscape. As Robert Gudmestad has argued in his book, *Steamboats and the Rise of the Cotton Kingdom*, steamboats on major rivers like the Mississippi and Missouri faced numerous environmental realities that threatened their movement. These included snags, which were trees left in the river when the water charted a new course and washed beneath the water's surface in a fixed position or bobbing with the current.⁸⁷ In either case, these snags could wreak havoc on a steamboat's passengers and supplies, sending "cargo like cotton, boxes, casks, or even live hogs

⁸⁵ Smil, *Energy in Nature and Society*, 197. Smil cites Diocletian's fourth-century *edictum de pretiis rerum venalium* which explained that it cost more to move 120 km of grain on roads than to ship it across the Mediterranean.

⁸⁶ Herbert S. Schnell, *History of South Dakota*, third ed. rev. (Lincoln: University of Nebraska Press, 1975), 55.

⁸⁷ Robert Gudmestad, *Steamboats and the Rise of the Cotton Kingdom* (Baton Rouge: Louisiana State University Press, 2011), 117.

into the river,” causing irreversible damage.⁸⁸ If murky waters were not an issue on some of the upper Missouri’s sections, then the natural cycle of the seasons were. Navigation season for steamboats depended not so much on human timelines but the energy of the sun’s rays and the river’s water. When frozen, ice blockades dictated travel of the steamboats, often preventing steamboats from traveling in upper river portions between mid-November and late March.⁸⁹ As they had along the Mississippi in the decades prior to the Civil War, government officials and steamboat owners on the Missouri advocated technical solutions to remove these natural impediments. They employed engineers and inventors to generate ““machine boats,”” with which to pull snags from the muck.⁹⁰ Despite the hope that human-engineered mechanization would solve these kinds of impediments to American industry, transportation to the West would continue to find itself face-to-face with the forces of non-human nature. Although the railroad would later overcome the problems of snags and low tides, other environmental factors presented themselves as obstacles for the trains, including geological impediments like mountains, cloudbursts that washed away railroad bridges, ““snow blockages”” and fire in the engine.⁹¹

Despite these physical impediments, early-nineteenth-century Americans began to imagine the use of technologies like the steam engine and the steamboat as a means to enact their vision for westward expansion. Although the steamboat would play this role alongside horses and especially the railroad in the 1870s and 1880s rush to the Black Hills, earlier uses of wood and coal in steam engines paved the way for settlement in the Hills. In doing so, steamboats established the kinds of “paths” upon which the Hesnards’ homesteading and pursuit of cattle ranching would come to depend. First, however, entrepreneurs, migrants, and the government

⁸⁸ Gudmestad, *Steamboats*, 121.

⁸⁹ Lass, *Navigating the Missouri*, 20.

⁹⁰ *Ibid.*, 79; Gudmestad, *Steamboats*, 126.

⁹¹ Rick Mills, *North Western Rails: A Pictorial Essay of the C&NW’s Western Divisions 1869-1988*, 1988, 10, 20.

would use steamboats to transport troops, establish outposts, and displace native peoples, all in order to consolidate American holdings in the northern plains and West.

Following the territorial disputes of the War of 1812, the United States promoted steamboats along the Missouri River, the nearest major river system to the Hills, as a way to protect its expansionist interests and secure American control over the lands demarcated by the Treaty of Ghent in 1814, which ended the War of 1812.⁹² In charge of the planning of some of these American forts along the Missouri River was Secretary of War and congressional leader of the nationalistic War Hawks John C. Calhoun. Speaking of the plan to establish a fort in 1818 at the mouth of the Yellowstone River, which flowed into the Missouri from Wyoming and Montana, Calhoun explained ““the glory of planting the American flag at a point so distant on so noble a river, will not be unfelt. The world will behold in it, the mighty growth of our republic...is ready to push its civilization and laws to the western confines of the continent.””⁹³ This nationalistic sentiment of taming the wilderness not only spurred the establishment of forts along the upper Missouri River and its tributaries, but also led to the adoption of the steamboat as a means to sustain these locations as outposts supporting further westward expansion. Thus, steamboats helped found and supply the Missouri’s Fort Pierre in the 1855, located about 100 miles north of the Oregon-California Trail.⁹⁴ When Prince Maximillian of Austria visited Fort Pierre in 1833 along his journey to American Fur Company posts he observed that “the situation of the settlement is agreeable; the verdant prairie is extensive, animated by herds of cattle and horses; of the latter Fort Pierre possessed 150, and of the former, 36.”⁹⁵ His writing provides some early evidence that Missouri River forts like Pierre would become important sites for

⁹² Lass, *Navigating the Missouri*, 33.

⁹³ *Ibid.*, 35.

⁹⁴ *Ibid.*, 17.

⁹⁵ Bob Lee and Dick Williams, *Last Grass Frontier: The South Dakota Stock Grower Heritage*. (Sturgis, SD: Black Hills Publishers, 1964), 10.

communication with and monitoring Plains Indians and establishing an American presence that would ultimately aid in the nation's expansion into the Black Hills.

This system of army outposts and the steamboats that supplied them formed an essential link in maintaining the nation's grasp on its newly-acquired territories by providing a conduit through which energy could be "imported from the Outside," and funneled into the West, including the Black Hills. This network came into use in the mid-nineteenth century as the forts supplied the resources that troops would need to monitor native populations and ensure the safety of American migration routes. Lass explains that following the 1862 Montana gold rush, migrants "had to import virtually all of their groceries, hardware, clothing, drugs, liquor, and mining equipment," and did so by taking these commodities to Fort Benton first with the steamboat, then to the mining towns by freight wagon.⁹⁶ Along the Oregon-California Trail, Fort Laramie, located on the confluence of the Laramie and North Platte rivers, served as a popular army outpost and support for overland migrants. Fears for the safe passage of these American travelers and anxiety over Indian hostilities came to a head at the fort in 1854, following several violent exchanges and misunderstandings between the Lakotas and troops. To deter the Lakotas from mounting an attack on the fort, Brevet Brigadier General William S. Harney set forth to punish them, attacking in 1855 at the Battle of Blue Water (also called the Battle of Ash Hollow). Although Fort Laramie itself was far from the Missouri River's steamboats, Harney transported his prisoners and soldiers back towards the river, using forts Pierre and Randall to resupply their energetic needs. When he found Fort Pierre in short supply after a harsh winter, he established Fort Randall and Fort Lookout after contacting several steamboat captains to assist in the importation of "troops, equipment, ordnance, and provision." With steamboats supplying the

⁹⁶ William E. Lass, "Dakota Resources: Trader Edward T. Latta's 'List of Wood Sold to Boats,' 1866-1867," *South Dakota History* 35:2 (Summer 2005): 157.

soldiers' basic energy needs for food, warmth, and weapons, Fort Randall functioned as an outpost from which to monitor Indian movement and bolster the American military presence into the northern plains.⁹⁷

The presence of steamboats did not always overcome obstacles that soldiers encountered while attempting to stake a claim in the West. Historian James E. Potter has shown that during the Civil War, Nebraska soldiers often lacked suitable numbers of horses with which to defend the region's freighting, stagecoach, and telegraph routes from Indian raids. Clearly, steamboats could not overcome all of the limits of supplying the frontier with necessary tools for conquest, especially at a time when the majority of resources went to supplying Union troops further east.⁹⁸ Although steamboats could not provide the mode of transportation across the grasslands that the Union soldiers in Nebraska required, they did extend the flow of external energy sources further than had the horse, enabling those troops to replace the energy their horses consumed with the power of fossil fuels.

The establishment of Missouri River forts using steamboats also permitted the displacement of native peoples, opening the land for future settlement. Forts Pierre and Randall facilitated the movement of annuities, or provisions paid by the federal government to Indian tribes for the taking of their land, into the northern plains. This was important as Dakota tribes such as the Yankton signed treaties ceding their lands between the Big Sioux and Missouri rivers and moved onto the Yankton Reservation, cementing their dependency on government annuities. Steamboats traveled up the Missouri, delivering annuities and enforcing the reservation boundaries, while also bolstering the energetic needs of American agriculturalists who moved

⁹⁷ Lass, *Navigating the Missouri*, 173-174.

⁹⁸ James E. Potter, "Horses: The Army's Achilles' Heel in the Civil War Plains Campaigns of 1864-65," *Nebraska History* 92 (Winter 2011).

onto these newly-vacated lands upon the creation of Dakota Territory in 1861.⁹⁹ With the passage of the Homestead Act in 1862, settlers, many of whom included veterans of the Civil War, traveled to the eastern part of Dakota Territory which had been opened by the arrival of the steamboat and the construction of American forts along the Missouri.¹⁰⁰ The New York Colony, the largest community to settle in the region under the Homestead Act, arrived in Dakota Territory aboard both the railroad and covered wagon. Although they opted not to travel by steamboat, the land into which they entered had already benefitted from the forts, troops, and provisions that steamboat navigation had supplied.¹⁰¹ Many of these settlers would continue their westward migration in the upcoming decades, bringing with them the herds of cattle that would make them some of the first Euro-American settlers in the Hills and help to establish ranching in the region.

After the Dakota Conflict of 1862, which saw a violent backlash of Dakotas against Euro-American settlement following food shortages, late annuity payments, and a loss of land, bands of Dakotas were removed from Minnesota and joined their Yanktonai and Teton neighbors in Dakota Territory. Realizing that the Yanktonais and Tetons had experienced a similar loss of land and lack of annuities as had the Dakotas, Americans living in Dakota Territory feared the same backlash in their region. Knowing that such conflict would threaten the security of American settlement and Missouri River navigation, the Lincoln administration decided trap the Indians by marching one army overland from Minnesota and bringing another north on the Missouri aboard steamboats to intercept them. Following the grand strategy, the armies loaded

⁹⁹ Lass, *Navigating the Missouri*, 183.

¹⁰⁰ Lee and Williams, *Last Grass Frontier*, 18-19.

¹⁰¹ Schell, *History of South Dakota*, 79.

up the captured people on steamboats, where they continued to their new reservation homes.¹⁰² Although native peoples in eastern Dakota Territory would continue to resist harsh assimilation attempts, the steamboat had already done its deed in containing the tribes in the confined spaces of the reservation, keeping the door open for further settlement.

The advent of the steamboat and its support of army forts along the Missouri affected not only the Lakotas' eastern relatives, but also spurred American expansion and Indian displacement further to the west, especially in the region north of the Platte River where Lakota tribes continued to hunt and seek annuities at Fort Laramie. The Fort Laramie of 1868 guaranteed the Lakotas the right to a Great Sioux Reservation, which extended through Dakota Territory west of the Missouri River and beyond into the Big Horn Mountains. However, the discovery of gold in the Black Hills in 1874 quickly spurred the revocation of this measure, opening the door to non-Indian settlement and displacing the Lakota. Just as they had done in their expansion beyond the Black Hills area and into the Platte River valley, the Lakota sought access to the remaining bison herds in the Powder and Bighorn basins, despite the government's goals to push them onto a reservation in northern Nebraska by a Black Hills fort.¹⁰³ In response, the army embarked on what would come to be known as the Great Sioux War of 1876-77, moving against the Indians but suffering a crucial defeat of Lieutenant Colonel George Armstrong Custer on June 25, 1876. Throughout these campaigns, army leaders depended upon steamboats to transport troops to the battle sites, as well as to carry wounded soldiers back to settlements like Bismarck.¹⁰⁴

¹⁰² Lass, *Navigating the Missouri*, 211-213.

¹⁰³ *Ibid.*, 318.

¹⁰⁴ *Ibid.*, 304-305.

In addition to supplying soldiers, supplies, and protection for war against the Lakota in the Power River country, the presence of steamboats and their associated forts aided American settlers in accessing the Black Hills upon the discovery of gold in 1874, leading to the cession of the lands by the Lakota. In that year, Custer led an expedition in search of a location for a new post, while also pursuing the rumors telling of gold hidden within the Black Hills.¹⁰⁵ When his entourage made a discovery of the precious metal along French Creek, it set off a wave of pressure for the government to permit access to the region, which the Lakota had yet to cede. On August 27, 1874, the single-word headline of “GOLD” appeared on in *Chicago Inter-Ocean* and shortly thereafter, *Harper’s Weekly* ran a story reporting the findings alongside engravings from the expedition.¹⁰⁶ These publications spread rapidly throughout the world, increasing pressure on the government to reverse its enforcement of the treaty obligations and instead facilitate American expansion into the area.¹⁰⁷ Despite refusals to sell by Lakota chiefs at the White River in northwestern Nebraska on September 20, 1874, the government moved to open the land for settlement following the shocking defeat of Custer by the Lakotas in the Power River region. This event precipitated a Lakota appropriation bill, which stipulated that the United States would not make any further appropriations for the Lakotas until they ceded the Black Hills. After a commission met with individual leaders and arranged for the new boundaries of the reservations, the Indians signed the treaty in October 1876, and Congress ratified it in 1877.¹⁰⁸

That these soldiers and the ensuing stream of gold miners following the 1876 opening of the Hills were able to reach the mountains and begin mining operations stemmed from the access to resources that the steamboats and associated forts provided. Just as steamboats carried troops

¹⁰⁵ Schnell, *History of South Dakota*, 126.

¹⁰⁶ Lee and Morris, *Last Grass Frontier*, 36.

¹⁰⁷ Andrews, *Killing for Coal*, 117-118.

¹⁰⁸ Schnell, *History of South Dakota*, 139.

to and from these army outposts to supply troops' needs and eventually displace tribes like the Lakota, so too did these steam-powered vessels sustain the Hills, which depended upon resources brought in from the outside to supplement a few, locally-produced necessities. Steamboats, which had sustained Missouri River outposts like Yankton and Fort Pierre for decades, continued to transport the goods necessary for activities ranging from quartz mining to livestock raising to grocery-store owning. Rather than attempting to haul these goods from manufacturing centers in Chicago and St. Louis using old-regime sources of horse or mule muscle power, a process which may have been impossible at times, the transition to use of coal in steam engines opened a much more efficient system of overland transport. Goods could now move from various points along the Missouri River until they were unloaded and freighted westward overland. In this way, the wood- and coal-powered steam engine engaged the Black Hills in new "paths into and out of town." Coal power provided the settlers access to the kinds of food, mining equipment, livestock, and fuel sources that their vision of settlement entailed, helping families the Hesnards to establish their own ranch in the region a few years later.¹⁰⁹

Wood- and coal-powered steam engines would soon drive another technology into the west, working alongside and eventually replacing the steamboat as an efficient new way to establish "paths" with and encourage development in the Black Hills. This was the railroad. With the arrival of the railroad at various points along the Missouri River in the 1860s onward, the two technologies worked in tandem, forming a technological system of energy use that picked up where one mode left off. For example, the arrival of the Dakota Southern Railroad to the Missouri River town of Yankton brought supplies from economic centers such as Chicago to the rail yards, where steamboats waited to transfer it to Fort Pierre and freighted it westward. One

¹⁰⁹ Cronon, "Kennecott Journey," 32-33.

freighting company, the Evans Line, joined its steamboat partners to transfer nearly fifty tons along this journey upriver via steamboat and westward overland to the Hills in 1878, making it one of the largest one-day shipments made from any point to the Hills, and used about 200 wagons the next year to transport around 5,000 tons.¹¹⁰

The transition to technologies that used the fossil fuel coal in westward movement was not a consistent process, nor was it completed in the decades following its inception. Rather, the ways that steam engines and transportation to the Black Hills combined both old-regime solar sources and new-regime fossil fuels demonstrates the messy nature of the energy transition. The significance of the town of Yankton in westward movement illustrates this point. Connected to the fuel-driven Union Pacific Railroad by the Dakota Southern Line, Yankton became a popular option for migrants hoping to access the Hills. Coal-powered steamers then brought people upriver to Fort Pierre, where a traveler could complete his journey by the solar-age means of the stage or wagon.¹¹¹ On a larger scale, the entire system of technologies that brought supplies by railroad from Chicago to river towns like Yankton, Fort Pierre, and Bismarck, used steamers to transport them to more convenient places along the river, and brought them to the Black Hills through horse- or mule-drawn overland freighting demonstrates the uneven nature of the transition. Even though railroads were in use in one area, former systems of energy use, such as the wagon or steamboat, would continue for years, even decades, in other areas. Furthermore, the very construction of railroads necessitated energy from the solar regime, as Mark Fiege has proven in *Republic of Nature: an Environmental History of the United States*. Fiege argues that the railroad constituted a technology involving not only industrial production of metal and use of

¹¹⁰ Lass, *Navigating*, 320-321. Fred T. Evans, who became an important freighter on the overland trails to the Hills, was no known relation to Irvin Evans of the Evans Ranch.

¹¹¹ Watson Parker, *Gold in the Black Hills* (Norman: University of Oklahoma Press, 1966), 42-48.

the fossil fuel coal, but depended upon a “massed mammalian effort” employed in “bovine, equine, and human forms.” In this way, these ““iron horses,”” were actually facets of both human’s technological ingenuity as well as non-human nature, including the draft animals and timber that made the railroad project possible.¹¹² The railroad was not a technology that simply broke instantly away from older systems of biomass energy once fossil-fuels were made available.

Nevertheless, that this combination grew increasingly reliant on the steamboat and the railroad above the overland option demonstrates the kinds of efficiency that would cause society to choose fossil fuels over solar-age muscle power and biomass fuels like wood. The deficiencies of the overland routes became clear as freighters and migrants favored paths to the Black Hills with the shortest overland trails and preferred the speed and efficiency of those combinations with longer railroad lines. Although railroads still had to contend with blizzards leaving mounds of snow covering their tracks or fires in their engines, they traveled faster than the overland alternatives, and connected the Black Hills despite the absence of a water passage for steamboats. When the Milwaukee Road established its rail line to Chamberlain in 1881, a town south of Fort Pierre along the Missouri, the overland road extending westward to the Black Hills did well for only one year after the Fort Pierre route, which had a shorter overland component, outcompeted it. The Chicago and North Western Railway had reached Pierre only the year before, just as the Milwaukee Road line connected to Chamberlain, but the overland route to Fort Pierre was 40 miles shorter than the one from Chamberlain, and did not entail the summer water shortages that plagued the Chamberlain route in the Badlands section.¹¹³

¹¹² Fiege, *Republic of Nature*, 232, 245.

¹¹³ Lass, *Navigating the Missouri*, 326.



Figure 3. “Map of Chicago & North-Western Railway Lines to Dakota,” 1880. The Chicago and North Western Railroad was one of several railroads that would create new “paths” between important markets in Chicago and the Black Hills.¹¹⁴

The limits of solar-age transportation showed themselves not only in the east-west routes between the hills and Missouri river, but also in the stagecoaches and freighters that ran in the north-south direction. The completion of the Union Pacific Railroad through Cheyenne, Wyoming and Sidney, Nebraska opened the door to another combination of rail-overland transport to the Hills, especially during the first few years after the 1875 gold rush when placer mining took place primarily in the southern parts of the hills¹¹⁵ A local history of Battle Creek Valley, located south of Rapid City and adjacent to the Hesnards’ future ranch, recalls the many “horse drawn conveyances” and “bull trains” that traversed through as settlers and miners continued on the Sidney Trail using solar-age energy sources.¹¹⁶ On March 16, 1878, the Black Hills Weekly Journal reported that the “Pratt & Ferris mule train of eighteen wagons, arrived from the south Thursday afternoon. They were 24 days out of Sidney [Nebraska].”¹¹⁷ The

¹¹⁴ Chicago and North Western Railway Company, “Map of Chicago & North-Western Railway Lines (To) Dakota,” 1880, David Ramsey Historical Map Collection, <http://www.davidrumsey.com/>.

¹¹⁵ Lass, *Navigating the Missouri*, 318.

¹¹⁶ Anna Lindsay, “The Sidney Trail,” in Evans et al., *Our Yesterdays*, 808.

¹¹⁷ *Black Hills Weekly Journal*, March 16 1878. Historic Newspaper Collection. South Dakota State Historical Society Archives, Pierre, SD.

overland distances from both Sidney and Cheyenne to the southern mining town of Custer were about 170 miles long, but as miners migrated to the northern hills near Deadwood Gulch by 1876, the overland routes from Yankton and Bismarck offered the closest means, at about 200 miles, which was seventy miles less than the options from Cheyenne and Sidney.¹¹⁸

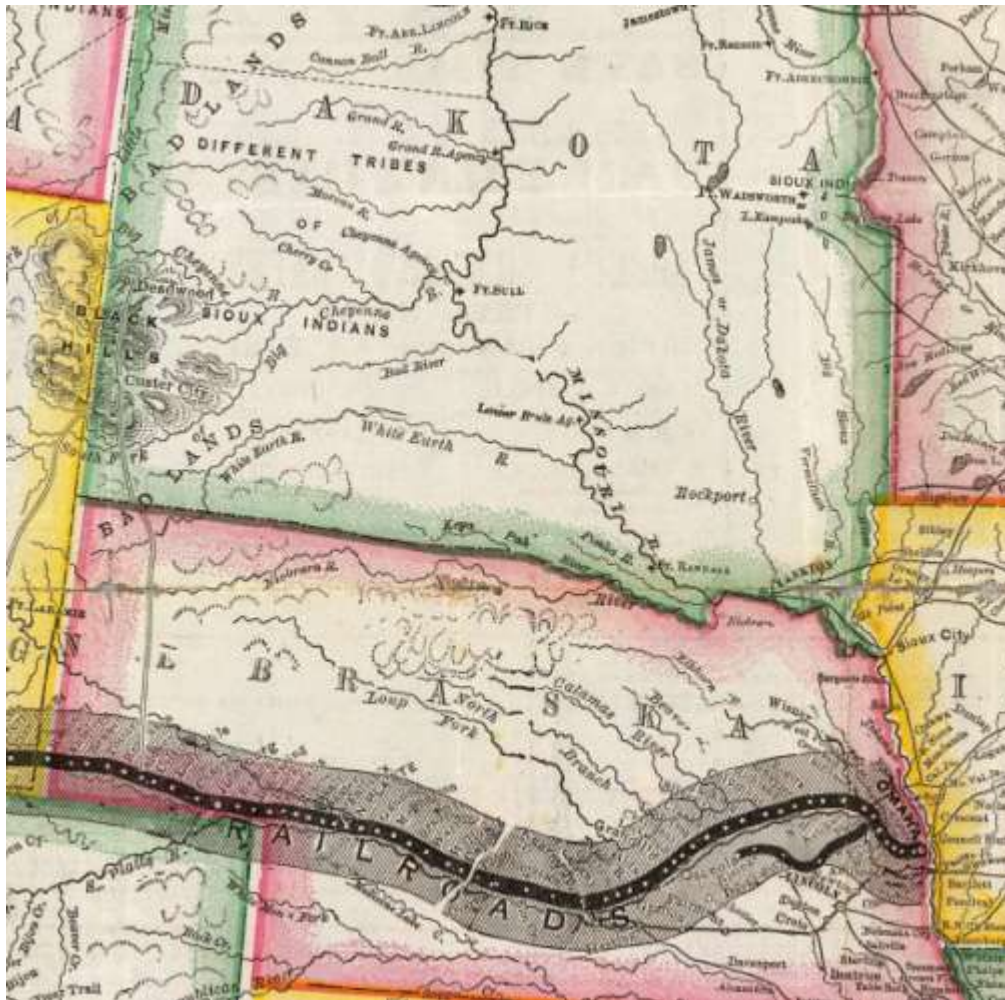


Figure 4. “New map of the American Overland Route,” 1879. Together with steamboats traveling up the Missouri River and the extension of other rail lines directly to the Black Hills, the Union Pacific Railroad passed through Nebraska, providing an important means for migrants and supplies to reach western Dakota Territory.¹¹⁹

¹¹⁸ Lass, *Navigating the Missouri*, 319-320.

¹¹⁹ Central Pacific Railroad Company; Union Pacific Railroad Company, “New map of the American Overland Route,” 1879, David Rumsey Historical Map Collection. www.davidrumsey.com

As railroad lines proved their superiority over steamboats, transportation to the Hills shifted away from combinations using both steamboat and railroad, moving instead toward the railroad alone. Seeking to benefit from the extension of railroads to Missouri-river towns like Bismarck and Chamberlain, freighter Fred T. Evans continued to plan overland trips with his Missouri River Transportation Line once these goods reached Fort Pierre via steamboat.¹²⁰ However, the completion of the Fremont, Elkhorn, and Missouri Valley Railroad from Chadron, Nebraska to Buffalo Gap, which was located about 45 miles south of the major Black Hills town Rapid City, disrupted this plan. Rail transport directly into Rapid City, which occurred in 1886, was just one example of the process by which the railroads' efficient use of fossil fuels began to undercut previous technologies like steamboats, and replacing especially overland routes like the Cheyenne-Deadwood Route. That this transition was underway would have been increasingly apparent to Missouri River freighters like the Benton Line, which was contracted to transport 2,100 tons of coal in 1886 to four army posts and supply coal to the new rail lines at Running Water, Pierre, and Chamberlain.¹²¹ The greater speed with which the railroad could travel and different natural impediments to its transport than the many snags, sinkers, and freezes that plagued the steamboat, ushered in a new era in the means by which goods and people reached the Black Hills.

The advent of fossil-fuel energy use in steamboats and railroads and the growing constraints of the solar-energy age affected a wide array of environmental, social, and economic changes across the northern Plains and into the Black Hills. The experience of a wealthy railroad and steamboat owner, Amherst H. Wilder, demonstrates the kinds of new realities that accompanied the arrival of European Americans, the displacement of native peoples, and the

¹²⁰ Lass, *Navigating the Missouri*, 341.

¹²¹ *Ibid.*, 342.

advent of agricultural industries. In 1873, he “held the Indian transportation contract for all the agencies above Yankton, a contract for the overland delivery of annuities for the Brule Agency in northwestern Nebraska from Fort Randall, and three beef contracts for the delivery of some ten thousand head of Texas cattle to the upper river agencies.”¹²²

Wilder’s steamboat and overland contracts highlight the kinds of new connections between people and their landscape that developed with the advent of the fossil-fuel-energy age. Having successfully restricted the movement of the Dakota along the upper Missouri and ensured their dependency on government annuities, as had happened further west with the Lakota, technologies like the steamboat and railroad joined migrants’ visions of a divinely-sponsored conquest of frontier spaces to produce real change to their surroundings. These technologies and the energy sources that maintained them supplied settlers with the necessary “paths” through which they could live out that vision on the landscape, transforming it to meet their expectations.

Therefore, the vision of conquering and improving the wilderness of the Great Plains and West that guided settlers to the Hills would mean not simply an influx of more people. Instead, it meant the arrival of new systems of energy use and the application of new technologies that posited humans in a different relationship with non-human nature than in earlier times. Just as the Lakotas utilized new energy converters like the horse and firearms to access energy in different ways through transportation and trade, so too had Euro-Americans expanded onto the northern plains drawing from new energy sources and investing in new technological systems.

¹²² Lass, *Navigating the Missouri*, 290.

Yet the combination of energy sources that transported Wilder's loads from railroads to steamboat to overland trails also highlights another aspect of the energy transition: its uneven nature in the second half of the nineteenth century and beyond. Although 'transition' connotes a sense of finality or abruptness, the shift from human and muscle power of the old regime's solar age did not occur overnight. Instead, new technologies like the coal-powered steam engine began to incorporate the newly-available energy source as societies responded to their increased productivity, speed, and efficiency. However, this process was not inevitable or obvious, but rather was slow and uneven, reflecting the momentum that previous technologies acquire, which maintain a grasp of societies even when more efficient technologies are present. The future of the region after its initial settlement by Euro-Americans reflects this messy transition, as cattle ranching took root as an industry increasingly dependent upon fossil fuels, while continuing to depend upon inputs of solar energy. When Geraldine placed her great grandmother's marble Madonna on the tallest shelf of her new house on the Evans Ranch, it symbolized this carryover of the old into the new; a precious family heirloom in the midst of ranch life and labor that would undergo tremendous change in the coming decades.

Chapter 2

Cattle in the Closed Range: Ranch Labor in the Fossil Fuel Age

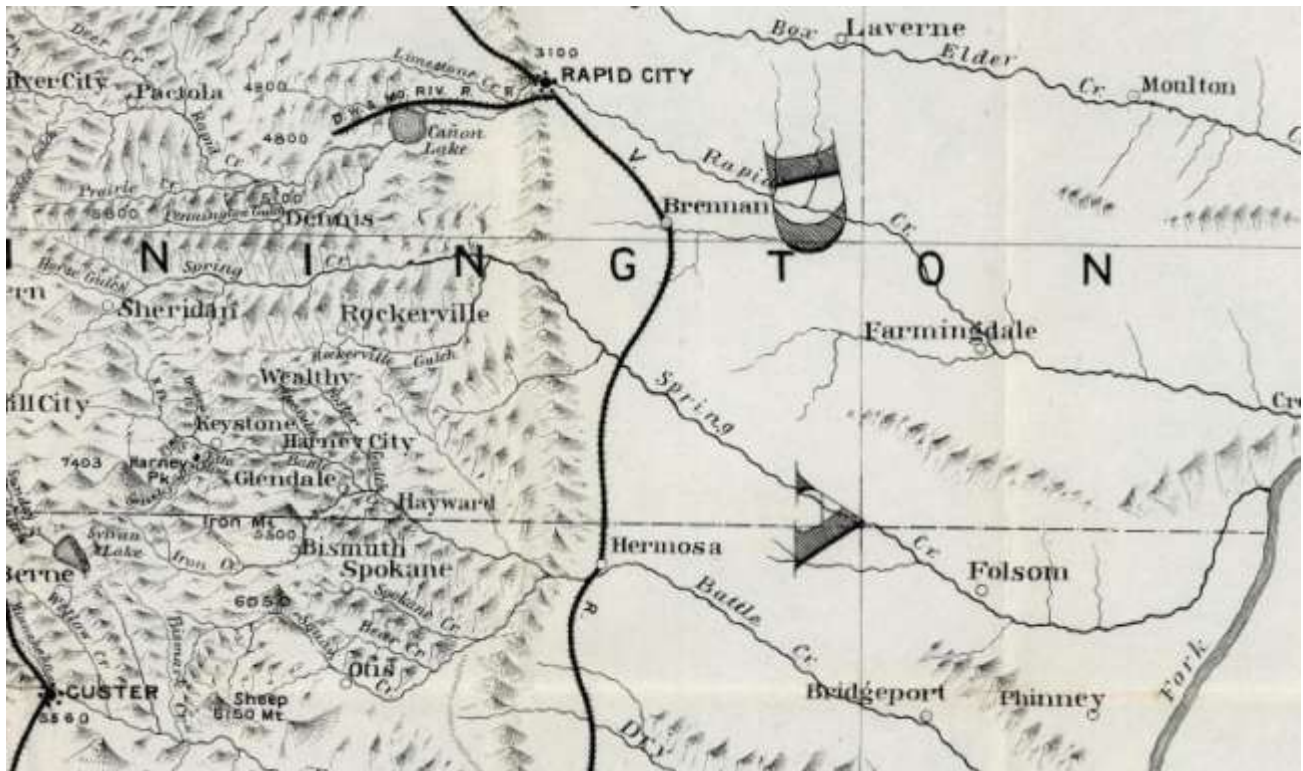


Figure 5. Mid-Black Hills and Adjacent Plains, 1897. The Hesnards settled just inside the Black Hills along Battle Creek, southeast of Hayward. The future site of the Evans Ranch would be located on the top of the inverted “A” written on the map, along Spring Creek.¹²³

In 1891, Theodore Hesnard earned his American citizenship, and by 1904, South Dakota State Historian Doane Robinson included the French-American in his *History of South Dakota: Together With Personal Mention of Citizens of South Dakota*.¹²⁴ Having arrived three years earlier than their families, the father and son had left their native France with visions of gold

¹²³ Samuel Scott, “Black Hills of South Dakota and Wyoming,” 1897, David Rumsey Historical Map Collection.

¹²⁴ South Dakota Naturalization Records, Second Papers, South Dakota State Historical Society Archives, Pierre, SD,

mining, only to find themselves purchasing seven thousand acres of land in the Black Hills and along Battle and Spring Creek, which ran east onto the foothills and adjacent plains. Doane Robinson explained that while Theodore was working in the woolen mills in France, he “became quite proficient in this line of work...and by industry and thrift...succeeded in laying up a surplus by means of which he was afterward enabled to emigrate to a country of greater advantages and larger opportunities than obtained in the land of his birth.”¹²⁵ Fossil fuels had enabled Theodore to hold a job as a wage laborer in an industrial woolen mill, thereby supplying him with “surplus” capital he could use to purchase ranch lands in the Black Hills. With this land, he and his family would join others in making the Black Hills region an important site of cattle ranching in western Dakota Territory. The type of enclosed ranches that developed with the coming of homesteaders like the Hesnards and many of their neighbors reflected a new use for the land. Besides providing an important hunting ground for Lakota and other tribes, the lush valleys of the hills and adjacent plains had been home from the earliest days of the gold rush to the open-range grazing of large cattle companies, many of which had connections with the famed ranches of the southern plains.

A fundamental shift made this possible. The crucial transition in energy sources that had led to the opening of the Black Hills and adjacent plains for American settlement would also stimulate the industry of cattle ranching in the region. As it took root in the region, ranching became increasingly dependent upon fossil fuels for its more labor- and capital-intensive form, resulting in new patterns of ranch labor and a new relationship of the practice to the environment. The examples of the Hesnards’ initial ranching operations in the Hills and the expansion of the family’s operation on the Evans Ranch demonstrate the transition in ranch labor

¹²⁵ Doane Robinson, “Theodore Hesnard,” in *History of South Dakota*, vol. II (B.F. Bowen & Co.) 1904, 1553, Doane Robinson Collection, South Dakota State Historical Society Archives, Pierre, SD.

that would continue to shape the Black Hills region from its settlement by Euro-Americans through the Second World War.

Arriving in the Hills in 1882, Theodore Ferdinand Hesnard and his eldest son, Emil, followed a familiar path to those seeking to benefit from the opening of the Hills with the Black Hills Gold Rush. Expressing a desire for greater opportunity for land and freedom of religion Theodore had left his native France after hearing of free land and gold from advertisements on the factory walls of the woolen mill in which he worked.¹²⁶ The father and son came to the well-known steamboat and freighting town of Pierre, traveling by stage to the Hills and arriving at the site of present-day Hermosa, located several miles south of Rapid City.¹²⁷ At Hermosa, they awaited the arrival of the remainder of the family, which included three other children and their mother, Josephine D'Aunay Hesnard. Taking up residence east of Hermosa along lower Battle Creek, the family moved to the Ed Stenger Ranch, where it acquired a homestead of 160 acres, built a cabin and began a new life. The necessity of surviving in this new foothills environment required the Hesnards to take on a variety of economic activities, including growing orchards in the Hills as they had in France and panning for gold on their claims in the Hills on the upper Battle Creek. Like many other gold seekers to arrive in the Hills in the years following the gold rush, the promise of a fortune in gold mining never came into fruition, causing Ferdinand to tell his son, Arsene, “Come, my boy, we will get more land and raise the cattle. With gold we are rich one day and poor the next.”¹²⁸ Fossil fuels had already enabled the family to engage in business in the region; Emil Hesnard, “market gardener and fruit grower,” owned Hermosa’s grocery store,

¹²⁶ “Hesnard History,” in *Our Yesterdays*, ed. Evans, et al., 758.

¹²⁷ Robinson, “Theodore Hesnard,” Doane Robinson Collection, 1553, South Dakota State Historical Society Archives.

¹²⁸ “Hesnard History,” in Evans, et al., *Our Yesterdays*, 758.

providing local produce alongside goods “imported from the Outside” of the Hawks Nursery Company, located in Milwaukee Wisconsin. In 1902, one of the years that the two were in business with one another, fossil fuels were employed in transportation in both railroads and automobiles along the “paths” between Milwaukee and Hermosa.¹²⁹ Now, the energy source would assist the Hesnards in securing energy not only to humans, but to the cattle that they purchased. Their investment in the ranching industry continued to subsequent generations, including the Evans family.

In starting their own cattle ranch, the Hesnards joined countless others who had arrived in the Hills in the 1870s and 1880s to pursue gold mining but soon discovered the possibilities latent in the opening of the Hills as a site for a future in livestock raising. As early as 1883, Black Hills boosters recognized the diversity of economic pursuits that could be had in the region, eagerly proclaiming that “all those of our eastern readers who think of coming to Dakota to locate and invest in either mercantile, mining, agriculture or stock-raising pursuits can do no better than to camp in Custer county or city.”¹³⁰ Although these early boosters were correct in assuming that ranching interests would find their way into the Hills after its opening in 1876, the system of open-range grazing that first developed did not last long, given the realities of harsh winters and frequent droughts on the cold northern Plains. Instead, this system, which relied solely upon the dispersed energy sources provided by the direct solar energy regime, gave way to the concentrated closed-range system, one which required different uses of energy obtained through fossil fuels alongside solar energy. The climatic realities proved that cattle would require more care and supplemental food if they were to survive in the region, and to do so would take more

¹²⁹ A.C. Hanson, the Haws Nursery Co. to Emil Hesnard, May 8, 1902, in author’s possession.

¹³⁰ “The Black Hills,” *Custer Chronicle*, Custer City, Dakota, April 7, 1883, vol. III, no. 31, Historic Newspaper Collection, South Dakota State Historical Society Archives.

than the energy made available through solar-age sources. Instead, ranching in western South Dakota was able to thrive because of the use of fossil fuels in a system of greater inputs of capital and labor.

By the time of the rest of the family's arrival in 1887, ranching had already made important inroads into the economy and culture of the Black Hills for over a decade. Cattle reached the Hills in 1874 with General Custer's expedition into the Hills, and continued during the gold rush as southern cattle barons extended their operations northward, trailing their cattle on long drives that entered the Hills through western Nebraska, skirting lands that still belonged to the Lakota as a part of the Great Sioux Reservation. Comprising a part of the approximately five million Texas cattle driven northward between 1866 to 1885, these herds joined the freight from the Missouri River in supplying the region with the cattle necessary for the region's early mining and settlement needs.¹³¹ Although the Fort Laramie Treaty of 1868 permitted cattle drives, primarily from Texas, to extend northward into eastern Wyoming between Cheyenne and the North Platte using the Goodnight-Loving trail, it was not until the opening of the Hills with the 1870s gold rush that substantial numbers entered to graze in the mountain valleys and nearby hills. The result of this opening and the cattle baron's quest for new grazing grounds was around sixty ranches and 25,000 cattle in the half decade following the rush.¹³²

The open-range system developed in the southern plains of Texas and adjacent regions as an activity dependent upon the solar energy available in the region's abundant grasses and warm climate. A visitor observing the open range in the northern Black Hills explained "we spend the next three or four days riding over the range..." observing that the "bottom lands of the Belle

¹³¹ Terry Jordan, *North American Cattle Ranching Frontiers*, 222.

¹³² *Ibid.*, 226.

Fourche had grass three feet high, although it was November...The divides were an ocean of surging grass, cropped only by a few cattle and countless number of antelope.”¹³³ By letting the cattle graze freely upon these great swaths of grass to fatten themselves for market, early ranching operations in western Dakota Territory required minimal capital and labor for improvements upon the land or production of supplementary feeding beyond naturally-occurring grass. The practice of purchasing cattle and letting them roam freely across the hills and plains for most of the year, which many “big outfits” practiced by the 1880s, required little capital input beyond the initial purchase of the herd. The principal labor in maintaining the herd involved “driving it to the public domain where the animals remained virtually unattended during the winter months, hiring cowboys to round up and brand the increase in the spring, and trailing the herds to the shipping points in the fall.”¹³⁴ As a result, cowboys generally left cows to sustain themselves, waiting until the roundups when they had to drive the cattle to market.

Although this open-range system thrived on the northern Plains in the later part of the century, several factors related to energy needs converged upon it to threaten the future of ranching in the Black Hills region. Ranchers first discovered the limits of this open-range system as the mild-weathered decades towards the middle of the century gave rise to the cold decades towards the end, when a series of harsh winters and droughts culminated in the loss of thousands of head of cattle. Minimal inputs of capital for improving the herds and few permanent structures on the land had permitted ranchers on the open range to accumulate large herds without large overhead costs, allowing them to roam freely and only needing to round them up to transfer them to market a few times a year. As a result, their increasing numbers posed a threat to the land’s

¹³³ Louis Pelzer, *The Cattlemen’s Frontier: A Record of the Trans-Mississippi Cattle Industry from Oxen Trains to Pooling Companies, 1850-1890* (Glendale, CA: The Arthur H. Clark Company, 1936), 200.

¹³⁴ Lee and Morris, *Last Grass Frontier*, 102.

ability to support the animal population. Without supplementary food sources like hay, produced through the systematic capture of the solar energy stored in plants like alfalfa, these cattle depended solely on sustenance from the region's grasses, linking their survival directly to the solar-energy regime. Doing so placed these open-range outfits in line with Liebeg's Law, which states that the size of a population of organisms that a region can support is dependent on the minimum, rather than the maximum, amount of resources that the land produces.¹³⁵ Theodore Roosevelt, who owned a ranch in western South Dakota predicted the consequences of these large herds, thereby affirming Liebeg's Law. He wrote "overstocking may cause little or no harm for two or three years...but sooner or later there comes a winter which means ruin to the ranchers that have too many cattle on them...it is merely a question of time as to when a winter will come that will undertake the ranges by the summary process of killing off about half of all the cattle throughout the Northwest."¹³⁶

That winter came in 1886 - 1887. After local newspapers gave ominous predictions of winterkill, snow began in early November of 1886, continuing with little break until the end of February of the next year.¹³⁷ Accounts from across the Northern Plains describe more astounding losses due to the freezing temperatures and raging blizzards of the 1886-1887 winter, which came to be known as "the Great Die Up."¹³⁸ Ranchers had been lured the previous summer of 1886 into overstocking the range because of droughts.¹³⁹ However, when winter struck full force the following winter, these densely-populated spaces incurred staggering losses, especially on Wyoming and Montana ranges. Although losses were lighter in western South Dakota than these

¹³⁵ West, *Contested Plains*, 91.

¹³⁶ Roosevelt, Theodore, *Hunting Trips of a Ranchman: Sketches of Sport on the Northern Cattle Plains*. New York: G.P. Putnam's Sons, 1900, 290.

¹³⁷ Pelzer, *The Cattlemen's Frontier*, 213-214.

¹³⁸ Lee and Williams, *Last Grass Frontier*, 154-155.

¹³⁹ Pelzer, *The Cattlemen's Frontier*, 213.

adjacent states, the Black Hills region nevertheless reeled from the harsh winter. One ranch in the Hills, the E6 Ranch, numbered 18,000 head before the winter, but rounded up only 1,900 head the following spring. Another, the Hash Knife, reported only 9,000 head left out of a herd of 80,000.¹⁴⁰ Recalling the cattle empire that developed in the 1880s, an article in the 1943 *Daily Argus Leader* described how the winter “leveled a crushing blow at the cattlemen as their beef...huddled bleakly in wind-swept coulees and dug vainly at brown and buried grass. Thousands died, cleaning out many small operators and leaving bigger outfits grasping for financial breath...Losses had run as high as 90 per cent.”¹⁴¹ In 1905, a blizzard struck on the Crawley Ranch in Custer County, which was among the last of those using the open range. Living on his family’s ranch at the time, Royal Crawley noted that the animals were “southern cattle” that had just been shipped in via train. “Those cattle were not acclimated,” he recalled “since in those days sheds and barns for range cattle were not considered essential,” the family’s losses were extremely heavy, reaching nearly four hundred in three days that the blizzard raged.¹⁴² During the spring thaws, a group of four or five hundred men from the “E6” Ranch and several others searched for their cattle, which had been left to graze the open range themselves, covering “the country up to the Missouri river down to Fort Yates and up the Grand River,” only to find “about a dozen steers.”¹⁴³

Wholly dependent upon the range’s ability to provide sufficient biomass resources to sustain their operations, ranchers began to question their system of open-range grazing, one which would surely bring them face to face with more harsh winters and summer droughts in the future. This climatic reality joined changing settlement patterns to bring about a decline of the

¹⁴⁰ Lee and Williams, *Last Grass Frontier*, 155.

¹⁴¹ Johnson, Alex, “Cattle Made History in State Empire Established by 1880,” *Daily Argus Leader*, December 8, 1943. “Ranching” General Subject File, South Dakota State Historical Society Archives.

¹⁴² Royal C. Crawley, “George W. Crawley Family,” in Evans, et al., *Our Yesterdays*, 579.

¹⁴³ Pelzer, *The Cattlemen’s Frontier*, 214.

open-range system in the Hills region from the 1880s onward. In an observation supplied by the lens of hindsight, the 1943 article of the *Daily Argus Leader* reported that by 1908, the “free range was wiped out,” with the ““old days”” of free roaming cattle on the open public range “fast passing.”¹⁴⁴

With cattle’s inability to get sufficient energy from the solar-age regime alone, especially given the possibility of other harsh winters offering only “brown and buried grass,” ranching in western South Dakota faced the grim prospects of major cattle losses during the harsh northern winters and drought, as well as a decrease in forage land with the coming of homesteaders who tilled and fenced the public domain. Prompted by the arrival of settlers onto the public range in 1885, many open-range grazers were forced to stay and contend with the fences settlers erected, which blocked their animals from prime grazing areas and watering spots, or move onto new lands. On July 10, 1885, the *Rapid City Journal* commented on this movement, stating “this is a commencement of the inevitable exodus of range stock from the vicinity of the Hills. The land is being so rapidly settled that the only really valuable range in this region for large bunches of stock is on the Sioux reservation.”¹⁴⁵ Although open-range ranchers would continue to struggle for access to additional grazing lands on the reservation, the coming of a new system of ranching sealed their plight. With this system, ranchers utilized a new energy source, reorganizing the type of labor that they did and their use of the land.

As the Hesnards took up residence east of the town of Hermosa, which lay several miles east of the Black Hills along Battle Creek, taking a homestead of 160 acres and building a cabin, they

¹⁴⁴ Johnson, “Cattle Made History,” *Daily Argus Leader*.

¹⁴⁵ *Rapid City Journal*, July 10, 1885, quoted in Lee and Williams, *Last Grass Frontier*, 148.

were among the settlers who would participate in a new use for the land: closed-range ranching using fossil fuels. As small homesteaders, their land use marked a threat to the open range, as the large establishments that stemmed from the long drives found their herds restricted by these settlers' fences and blocked from important watering spots by their private-property ownership. On March 28, 1889, the *Black Hills Journal* quoted ““a well-known cattle dealer,”” who said ““the vast herds of beef cattle which have been roaming for years around the Black Hills country will be very much reduced in size and number if not entirely gone by next fall. The reason or this, of course, is the rapid settling up and development of the lands and the stretching of thousands of miles of wire fencing.””¹⁴⁶

The stretching of these miles of fencing into rectilinear plots of privately-owned homesteads was a visual representation of the reordering of ranch labor and the landscape itself that the new system of closed-range ranching would ensure. Having recognized the limits to cattle's ability to survive on the closed-range with little care, ranchers adopted a new labor system, the Anglo-Celtic or Midwest system.¹⁴⁷ With this new system would come a rise in imported British breeds of cattle, the practice of upgrading bloodlines, more care of cattle, fenced pastures, and feed during the winter. To help them realize this new system, which required unprecedented amounts of maintenance and expenditures on the part of the ranch owner, were fossil fuels. Seeing the possibilities offered by steamboats and railroads, ranchers soon adopted fossil-fuel-driven technologies on their ranches to make possible this new labor- and capital-intensive system. In turn, fossil fuels would transform ranch labor, intersecting with the decline of the closed range to usher in a new relationship of ranches and their labor to the land on which they worked.

¹⁴⁶ *Black Hills Journal*, March 28, 1889, quoted in Lee and Williams, *Last Grass Frontier*, 164.

¹⁴⁷ Terry Jordan, *North American Cattle Ranching*, 267.

The railroad was one of the first technological systems depending on fossil fuels that entered the region to sustain cattle ranching. As it had in getting settlers to the Hills, the coal-powered railroad would play an essential role in bringing cattle to the Black Hills to graze on the open range, as well as in promoting the shift to a new closed-range system. Before 1866, railroads reached only as far as the forts along the Missouri River or along the Union Pacific Railroad, leaving ranches that had developed along the overland stage trails between the Hills and the Missouri with limited access to supplies and markets, faced with driving their cattle to railheads and steamboat depots. Driving cattle across the land using only the animals' muscle power meant a loss of time and flesh. Cattle outfits like the Holcomb Ranch, established sixteen miles east of Rapid City in 1879, trailed "thousands of head of stock across the plains to the Missouri River," relying on solar-regime muscle power to transport them the distance and driving them "across a pontoon bridge" where there were "as many as 15 outfits waiting to cross, and if a herd stampeded during the night it was a week's worth to regather [sic] it," not to mention the danger of the animals "being dumped into the river."¹⁴⁸

Rather than depend upon the vagaries of the open range or the long overland drives to transport cattle to railheads on the Missouri and via the Black Hills and Canadian trail to Ogallala, Nebraska, railroads extending directly into the Black Hills region enabled ranchers to reduce cattle's loss of flesh and quickly transport their cattle to feedlots and markets in the east. As the first line to reach the Black Hills from an outside location, the Fremont, Elkhorn and Missouri Valley railroad played an important role in developing Rapid City and the Hesnards' hometown of Hermosa as sites of cattle production. An account by prominent Black Hills pioneer John R. Brennan explains the celebration that accompanied the arrival of the Elkhorn in

¹⁴⁸ "Holcomb Ranch Story Colorful," General Subject File "Ranching," South Dakota State Historical Society Archives.

Rapid City on the morning of July 4th, 1886. Describing the routes that brought settlers to the hills in the years prior to that morning's events, he wrote "the record says that there were various means of transportation...from Chicago to Sioux City by 'North Western [Railroad] – from Sioux City to Yankton by Dakota Southern Railroad- from Yankton to Fort Pierre by steamboat on the river and by North Western Stage Company's Concord coaches from Fort Pierre to the Black Hills.'" Although these routes brought migrants "from the edge of civilization out to the Black Hills" by various means, he observed that the arrival of the Elkhorn, which replaced the last, solar-energy leg of the journey, "made a substantial contribution to the development of the Black Hills region in general and Rapid City in particular."¹⁴⁹ Likewise, French nobleman, Baron E. Mandat-Grancey, who visited Dakota Territory in the 1880s, wrote of the future of Rapid City in terms of its increasing fortunes, concluding that "it is the coming of the railroad which has given impetus to this movement...And Rapid City, head of the line, of the railroad, absorbing all the traffic of the Black Hills, has soon enjoyed extraordinary prosperity."¹⁵⁰

These observations would prove correct, as railroads like the Elkhorn became the means by which the Black Hills achieved a more direct link to outside markets and overcame problems in shipping cattle. Driving cattle to distant railheads required that the animals expend energy, leading to a net loss of flesh from the time they left their grazing lands to when they received a per-pound price at the market. However, fossil-fuel railroads like the Western Stable Car, new to western Dakota railroads in 1888, reduced cattle's loss of flesh, known as shrinkage, by transporting them to Chicago in just forty-eight hours by feeding and watering them as they

¹⁴⁹ Rick Mills, *North Western Rails*, 3-4.

¹⁵⁰ Baron E. Mandat-Grancey, *Buffalo Gap, A French Ranch in Dakota*, September 25, 1887, in *Black Hills Hay Camp: Images and Perspectives of Early Rapid City*, by David F. Strain. Rapid City, SD: Dakota West Books & Fenske Printing Inc, 22.

went. By transitioning to the easily-transportable, efficient and concentrated source of fossil fuels with railroads, Rapid City and surrounding towns acquired the “paths” essential for the support of their systems of open-range ranching, connecting “this island in the sea of prairie grass,” to distant markets.¹⁵¹

As it extended to Rapid City, the Elkhorn hired surveying companies like the Pioneer Townsite Company, to develop towns for the railroad to pass through, including the town of Hermosa.¹⁵² This town, situated in the foothills south of Rapid City and several miles east of the Hills, would become an important point of connection supporting the Hesnard and Evans ranches, providing them access to the supplies and information of the railroad that would support their ranches.

By establishing new points, like Hermosa and Rapid City, that connected ranchers to outside markets, these fossil-fuel powered railroads were among the first technologies that would facilitate a new use of the land in the practice of closed-range ranching. One of the main ways that they helped to replace the Texas system was by replacing the animals upon which that southern system was based: the Texas Longhorn.¹⁵³ In their history of ranching in Nevada, *Cattle in the Cold Desert*, James A. Young and Abbott B. Sparks explain that “when the Texas Longhorns were driven to the open grasslands of the plains and prevented from drifting south with the winter storms, they could not adapt and could not survive without the aid of man.”¹⁵⁴ Although railroads had joined overland drives in bringing Longhorns to supply early open-range ranches on the northern plains, this technology would ultimately aid in the popularity and

¹⁵¹ Mills, *North Western Rails*, 3.

¹⁵² Rick W. Mills, *Making the Grade: A Century of Black Hills Railroading*, Rapid City, SD: 1985, 28.

¹⁵³ Terry Jordan, *North American Cattle Ranching Frontiers*, 239.

¹⁵⁴ Young and Sparks, *Cattle in the Cold Desert*, 120.

introduction of improved breeds of cattle, which necessitated the care and capital that only closed-range ranches could provide.

The first way that the railroad paved the way for new breeds and the closed-range was by permitting the spread of knowledge about the improved breeds, which included British shorthorn and Hereford cattle. Following the Civil War, the expansion of railroads throughout the eastern United States spread cattle throughout regional livestock shows, spreading the word and increasingly the popularity of improved breeds of cattle.¹⁵⁵ With the dispersal of these cattle came new information about their superior ability to store grain and grass as fat over the Longhorn. Railroads then helped to transport these cattle to the pasture lands of the Hills, where ranchers acquired private property, enclosed their lands with fences, and refashioned the kind of labor they did to ensure their cattle's survival. In doing this, they adopted what historian Terry Jordan calls the British or Midwest system, which required greater inputs of capital and labor.¹⁵⁶ Railroads did not only bring cattle like Herefords to western South Dakota to gain flesh on grass and hay, but transported them back to market to be fattened again and slaughtered. Railroads eased the movement of cattle to reduce the cattle's loss of flesh that would have occurred on the long, overland drives, and also increased the quantity of fresh meat available in the market. As Frieda Knobloch argues in *The Culture of Wilderness: Agriculture as Colonization in the American West*, the type of meat reaching these consumers met a new ideal taking shape, one that matured fast and reflected its "good breeding," which was supposed to ensure its reproductive ability and quality.¹⁵⁷ Breeders importing these desirable breeds placed greater importance on uniformity, undergoing extensive breeding routines to ensure the animals' flesh

¹⁵⁵ Young and Sparks, *Cattle in the Cold Desert*, 195.

¹⁵⁶ Jordan, *North American Cattle Ranching Frontiers*, 267.

¹⁵⁷ Frieda Knobloch, *The Culture of Wilderness: Agriculture as Colonization in the American West* (Chapel Hill: University of North Carolina Press, 1996).

was more than just useful for consumption, but that it lived up to consumers' increasingly selective expectations.¹⁵⁸

Given these market demands and local access to railheads to transport their cattle, Black Hills ranchers began adopt a style of ranching requiring them to work harder for their cattle's well-being than they had in the days of the open range. The Hesnards joined other families in the region in taking part in the growing demand for improved breeds of cattle. In a letter in 1914, Arsene Hesnard wrote to his sister-in-law, Winnie, discussing the family's experience with this change to ranching labor:

“Ed and I will soon have 8 more fine registered cows and heifers...Pa [Theodore Ferdinand] says they must be about like other cattle, having only...four legs two ears and a tail- The price seems exorbitant [sic] to him, but Ed and I look ahead to the time when we will have nothing but pure bred stuff, then run a smaller number, take better care of them and get better prices.”¹⁵⁹

The letter continued to describe the sale of “a little pure bred calf,” which sold for \$100, a price “that completely staggered dad.” For an “imported Scotch heifer,” someone offered \$200, but Arsene did not sell, hoping to keep the animal to improve the bloodlines of the herd. After paying “big money” for a calf and his mother, Arsene explained “He should make something extra good as he has the blood lines from both parents, and shows a fine conformation already.”¹⁶⁰ These writings indicate the importance of purchasing cattle with registered bloodlines in order to ensure their greater success as a breed. The white-faced breed of Hereford cattle became the choice on the Hesnard and Evans ranches, as well as throughout much of the

¹⁵⁸ Young and Sparks, *Cattle in the Cold Desert*, 210.

¹⁵⁹ Arsene Hesnard, to Mrs. E. E. Hesnard, October 7th, 1914, in Hesnard, ed., “An American Family.”

¹⁶⁰ Ibid.

region. Switching to these breeds made sense on the closed range of the Black Hills region, because “the Hereford’s great abilities to adjust to any climate, utilize the available roughage, and to wean a higher number of calves” made them ideal candidates on a land of harsh winters and moderate precipitation.¹⁶¹

In addition to requiring additional capital to improve the herds’ bloodlines, the closed-range changed ranch labor by requiring that ranchers secure enough private land allotments to supply their herds. William G. Robbins in *Land in the American West: Private Claims and the Common Good* that the capitalist property relations that accompanied the closed range’s “exclusive ownership of specific parcels of land,” reflects the federal government’s traditional role as adjudicator of public lands into private property.¹⁶² In order to assure that they could sustain their newly-imported herds, ranchers like the Hesnards had to acquire sufficient amounts of enclosed land through government land allotments.

In settling and building a cabin on 160 acres along Battle Creek in the mid-1880s, located several miles east of the Hills’ mining operations at Keystone and west of soon-to-be-established town of Hermosa, the Hesnard family represented some of the early homesteaders whose acquisition of public land through various government land distributions differed from the large spreads of the open-range ranches.¹⁶³ Although the Hesnards also devoted part of their time to growing orchards and farming on their lands, they were nevertheless part of a transition in land use from free-roaming cattle to established pastures of grazing with clear boundaries of ownership.

¹⁶¹ Dewey Rounds, “Hereford Influence Spreads,” *Tri-State Livestock News*, Sturgis, SD: Black Hills Publishers, Inc: 1982-83, General Subject File “Ranching,” South Dakota State Historical Society Archives.

¹⁶² William G. Robbins, “In Search of Western Lands,” in *Land in the American West: Private Claims and the Common Good*, ed. William G. Robbins and James C. Foster, 3-20 (Seattle: University of Washington Press, 2000), 9.

¹⁶³ “Hesnard History,” in Evans, et al., *Our Yesterdays*, 758.

Fossil fuels joined Americans' understanding of private property to reorder the ranching landscape of the Hills. The large-scale production of barbed wire, which required the concentrated energy of fossil fuels, became the means by which these new, enclosed ranches took shape in the later decades of the century. In *Barbed Wire: An Ecology of Modernity*, Reviel Netz demonstrates that the ability of this fencing system to reorder open spaces into rectilinear plots whereby ranchers could better restrict their cattle's movement.¹⁶⁴ If letting cattle roam freely had proved disastrous and costly, then ranchers hoping to sustain them with vaccinations, supplemental feed, water, and shelter would require that they remain confined within the bounds of barbed-wire fences. The effect of this reorganization of space was not only the construction of new fences across a landscape that previously had known no bounds, but also deforestation, as the increase in fences required an intensification of timber used to support the strands of barbed wire.¹⁶⁵ Thus, like the steamboat and railroad, the diffusion of this new fossil-fuel technologies necessitated the use of solar-age sources like timber, highlighting the uneven nature of energy transitions.

The possibility of acquiring an allotment of the public domain through various government land grants combined with the ease of railroad travel to increase the number of settlers hoping to produce on small-scale ranch and farm operations, as opposed to the transitory practice of large-scale operations, many of whom grazed their cattle on land far from their direct supervision. However, as more and more of the public domain transitioned to private ownership through these acts, open-range ranchers found themselves unable to acquire enough land to sustain their present herd sizes, which often numbered from a few hundred to several thousand

¹⁶⁴ Reviel Netz, *Barbed Wire: An Ecology of Modernity* (Middletown, CT: Wesleyan University Press, 2004), 22-24.

¹⁶⁵ *Ibid.*, 29.

head.¹⁶⁶ In a technical bulletin entitled “A Study of Ranch Organization and Methods of Range-Cattle Production in the Northern Great Plains Region,” published by the Department of Agriculture in 1928, the farm-economist authors recognized this dilemma, one in which small divisions of the land into individual homesteads “have made it difficult for many of the remaining ranchmen to acquire control of a large enough acreage of land and over a long enough period of time to establish a definite production that has any guaranty of permanence.”¹⁶⁷ This statement applied not only to large-scale ranchers, who were indeed losing their pasturage on the public domain, but also applied to families like the Hesnards who sought land for cattle ranching.

The size of the allotments from government land grants available to Dakota settlers had been based on the productive capacities of the east and Midwest, rather than recognizing the needs of agriculturalists in the semi-arid nature of the Hills region. The Homestead Act offered settlers 160 acres, which made up the Hesnards’ first land holdings along Battle Creek upon their initial arrival. The Pre-Emption Act required only six days of actual residence upon the land within a six-month period, compared to the five years necessitated under the Homestead. Under both acts, settlers could file for two additional quarter sections, and another quarter section on top of that under the Timber Culture Act. The latter required growing at least 675 trees on a maximum of 10 acres and producing proof of growth within eight to fourteen years.¹⁶⁸

Although the Hesnards acquired this 160-acre homestead in the 1880s, they, like the large-scale ranchers seeing their open-range sectioned off, began to realize that additional land

¹⁶⁶ Lee and Williams, *Last Grass*, 126

¹⁶⁷ U.S. Department of Agriculture, *A Study of Ranch Organization and Methods of Range-Cattle Production in the Northern Great Plains Region*, Technical Bulletin 45, M.L. Wilson et al. (Washington DC, March 1928): 21.

¹⁶⁸ Lee and Williams, *Last Grass*, 126.

was necessary in order to support their herds in a climate that was colder and drier than the eastern part of the state. Therefore, even a family who began as small-scale operators on the closed-range would discover the need for additional lands on which to meet the forage needs of its cattle. An undated letter from Arsene Hesnard, Theodore Ferdinand and Josephine's third child, to his younger brother, Theodore Gustavous, reveals the desire of ranchers to expand their holdings to ensure greater success at ranching. Cautioning his brother against paying "above \$2 ½ per acre," for one plot of land, he reminds him that there "are thousands and thousands of acres that can be bought for \$1 to \$5 per acre." One location that was "something worth while" to Arsene was "the Charles land," which already had "a \$10000 home on it, and other improvements, 800 of irrigated land, 1000 acres of good bottom land not subject to irrigation, and 2000 good pasture that can be had for quite a little less than \$10 per acre."¹⁶⁹ In 1915, Arsene wrote to his sister-in-law Winnie, wife of Emile Hesnard, of his father's application for an additional 160 acres of homestead lands, noting that "the rest of us can not qualify under the new act as we have no vacant land contiguous to our homesteads." Later that month, he noted, "father has a tract coming up for sale under the Isolated Tract application," explaining "it is priced at \$2 and we will bid it in at that providing no one overbids us."¹⁷⁰ Arsene and his family's quest for additional lands points to the growing need for close-range operators, once they succeeded in settling in the land, to acquire sufficient lands to sustain their herds given the relatively dry and cold climate of western Dakota.

Seeking lands through the Homestead and Pre-Exemption Acts, the Hesnards were among many western ranchers who discovered the disconnect between government estimations

¹⁶⁹ Arsene Hesnard to Theodore G. Hesnard, undated correspondence, in "An American Family."

¹⁷⁰ Arsene Hesnard to Mrs. E. E. Hesnard, March 24, 1915, in "An American Family."

of the productivity of the land and ranchers' own energy needs from solar sources.¹⁷¹ They, like John Wesley Powell had in his *Report on the Arid Regions of the United States*, recognized the necessity of larger tracts of pasturage land that would be required to ensure that cattle could obtain sufficient nutrients from the solar energy conversions of the grasslands.¹⁷² Although the region never abolished the rectilinear survey system of private property and formally adopted Powell's plan to keep the plains as unfenced common lands, the closed-range in the Black Hills region did require modifications to ensure that cattle could receive enough nutrients, given the limits of a dry climate and harsh winters. As a result, from the turn of the century onwards, ranching in western Dakota depended increasingly upon the production of supplementary feed to maintain herds and various improvements upon the land to ease cattle production. This required an increase in capital and labor in comparison to the open-range grazing system. A transition in energy sources aided this process, providing the necessary energy to make feed production and other labor-intensive activities, effective means of sustaining the industry.

In 1910, Arsene Hesnard, one of the Hesnard children born in France and active in Hermosa's banking and real estate industries, purchased roughly seven thousand acres of ranch land along the Spring Creek, the waterway which flows out of Sheridan Lake in the Black Hills and onto the foothills to the east, cutting between the towns of Hermosa and Rapid City. After having passed through the hands of several ranchers and homesteaders, including a man named William Charles, Arsene purchased the land after speculating that "there is something worth while" on "the Charles land."¹⁷³ This statement would prove correct, as the land not only

¹⁷¹ Starrs, *Let the Cowboy Ride*, xv.

¹⁷² Young and Sparks, *Cattle in the Cold Desert*, 94.

¹⁷³ Arsene Hesnard to Theodore G. Hesnard, in "An American Family."

comprised an extension to the Hesnard Hereford Ranch, which originated in the Hills along Battle Creek, but also because he passed it down to establish the Evans Ranch, a continuation of the Hesnard Ranch that extended into the twenty-first century. It was on this land, which Arsene willed to his nephew and niece, Donald and Geraldine, that the incorporation of fossil fuels would significantly transform ranching labor. The Evans Ranch, which grew out of a marriage between Geraldine Hesnard, who had co-inherited the land from Arsene, and Irvin Evans, utilized fossil fuel energy sources in the labor of producing supplemental feeds to permit ranching operations.

Hay production on the plains bordering the Black Hills stemmed from the energy needs of the cattle, and thus, the ranchers hoping to make a profit from the animals' reserves of solar energy. Producing supplementary feed aligned with the development of a more labor-and capital-intensive form of ranching, one which emphasized efficiency "measured by pounds of calf produced per cow in relationship to the available feed, labor and land."¹⁷⁴ According to a study of ranch organization and production in the northern Great Plains region by the Department of Agriculture in 1928, the ability of ranchers to provide additional sustenance through feed crops and grain production was an essential part of the industry in the region. Without "a safe margin between feed production and normal requirements for wintering," ranchers would have a year like 1919, which was "extremely lean" and "distinctively remembered by the cattlemen who faced it."¹⁷⁵ What the ranchers of the 1880s had to learn the hard way after deadly winters and crippling droughts, ranchers a few decades later had taken to heart. "In this region ranching is a combination enterprise in which feed production, either in the form of cultivated crops or native

¹⁷⁴ Rounds, "Hereford Influence Spreads," South Dakota State Historical Society.

¹⁷⁵ U.S. Department of Agriculture, *Study of Ranch Organization*, Wilson et al., 27.

hay, must be practiced in connection with the use of grazing land” the report advise.¹⁷⁶ Writing a year later, Ernest S. Osgood described the lesson that ranchers had learned from these losses: “The winter of 1886 and 1887 had demonstrated to large and small cattlemen alike that to depend solely on the grass crop of the open ranges had been a fatal mistake. The future safety of the industry lay in the production of hay sufficient to carry the herds through the winter at least.”¹⁷⁷

The limited ability of cattle to find the energy stored in plants in dry environments and during the winter helped to replace the Texas system with the more labor- and capital-intensive techniques of the Anglo-Celtic system. This British development ensured that ranchers could make a profit by supplementing the meager energy sources of the winter with additional sustenance, primarily hay. On the Evans Ranch, hay production were important means of supplying their Herefords with year-round energy as the winter decreased the cattle’s ability to find it on their own. The result of the advent of the closed-range system was intensification and reorganization of ranch labor throughout the year. As James A. Young and Abbott B. Sparks state, “with the advent of hay production, it was irrigation and haying in the summer, and feeding the darn stuff in the winter. All the old riding, roping, and branding was sandwiched into the spring and fall and as time permitted during the rest of the year.”¹⁷⁸

Labor on the Evans Ranch followed this course, requiring that the family spend part of its year as farmers to extract life-sustaining and flesh-producing hay as supplemental feed for its Hereford cattle. The way that the Evanses accomplished this task before the aid of several fossil-fuel technologies was markedly different than it would be in later years, when fossil-fuel-

¹⁷⁶U.S. Department of Agriculture, *Study of Ranch Organization*, Wilson et al., 21.

¹⁷⁷ Ernest S. Osgood, *The Day of the Cattleman*, (Minneapolis: The University of Minnesota Press, 1929), 226.

¹⁷⁸ Young and Sparks, *Cattle in the Cold Desert*, 155.

powered tractors and automobiles revolutionized the practice. When Irvin, Geraldine, and their hired hands cultivated hay in order to sustain their Hereford herds in the 1940s, they began utilizing solar-age sources of animal muscle power. Having worked alongside Donald Hesnard and a team of hired hands on the Hesnard's operations in the Hills along Battle Creek and down at Spring Creek during 1946, the first year of their arrival, the couple learned much about the process of haying, feeding, and wintering. Although "the first fall was a hard breaking-in for 'city boy' Irv," he had gleaned knowledge about growing and feeding hay during this time studying and learning from other ranchers. When the couple moved to the land along Spring Creek, which Geraldine owned, in the summer of 1947, they worked to produce the hay necessary for the survival of their Hereford herds in the upcoming winter.¹⁷⁹

The Evanses, as well as many others in the region, cultivated a special type of plant as this supplementary source of energy: alfalfa. As a non-native plant, alfalfa had a long history of use by farmers and ranchers hoping to maximize the productivity of a plot of farm land.¹⁸⁰ Although all plants converted the sun's energy into chemical energy through the photosynthetic processes in their chlorophyll, cultivated strains of alfalfa surpassed native plants like western wheatgrass in their conversion of solar energy into biomass, making it more nutritious for cattle's consumption.¹⁸¹ It also helped ranchers to continue their cultivation year after year, as it stored nitrogen from the air and "fixed" it into the ground when plowed, ensuring that soils removed from grazing would be a profitable sacrifice of land over time.¹⁸²

¹⁷⁹ Evans, "Irv and Geraldine Evans," in Evans, et al., *Our Yesterdays*, 776.

¹⁸⁰ Knobloch, *The Culture of Wilderness*, 97-98.

¹⁸¹ Pielou, *Energy of Nature*, 116-120; Mark Fiege, *Irrigated Eden: The Making of an Agricultural Landscape in the American West* (Seattle: University of Washington Press, 1999), 52.

¹⁸² Fiege, *Irrigated Eden*, 52-53; Vaclav Smil, Vaclav Smil, *Cycles of Life: Civilization and the Biosphere* (New York: Scientific American Library, 1997), 32.

In order to ensure the cattle's production of flesh throughout the winter, after the warmer months of the plants' growth, ranchers could not simply let their cattle rummage through their alfalfa fields, but had to extract and store the plants' energy for later use. To do so, ranch labor in the direct solar age relied on the muscle power of humans and draft animals. In *Energy: A Beginner's Guide*, Vaclav Smil explains that the metabolic conversions by which animal muscles capture and use energy depend upon the stored solar energy of plants or other animals. These direct solar sources, however, contain a lesser concentration of energy than that stored in fossil fuels. Therefore, ranchers able to use fossil fuel technologies that could capitalize on these high concentration of the sun's stored energy could improve "the typical efficiencies of nearly all the principal energy conversions."¹⁸³ Hay production on the Evans Ranch from the 1940s to the 1960s transitioned from a reliance on direct solar sources to fossil fuels, and therefore provides an example of the way energy and labor interacted to ensure cattle's survival and growth.

Although the Black Hills began to incorporate fossil-fuel-energy technologies in the nineteenth century, the persistence of the types of labor and technologies that define earlier forms of solar-energy economies continued well beyond this benchmark. Rural families in South Dakota continued to use draft animals and wagons in their labor, even after automobiles became available in the region. In his letter to his brother Emil Hesnard in 1926, Arsene Hesnard explained that he had found a huge felled tree that he hoped Emil could cut up and sell, but that it "would take a stout 'Log-wagon' to haul" the pieces out.¹⁸⁴ This carry-over of older energy sources is also evident in the early ways the Evans produced hay on their land in the late 1940s. This was especially true of ranching in general, which remained, at bottom, dependent upon the ability of cattle to consume the sun's energy captured in plant material and convert it into flesh

¹⁸³ Smil, *Energy*, 85-88.

¹⁸⁴ Arsene Hesnard to Emil Hesnard, May 26, 1926, in "An American Family."

for sale on the market. As Clay McShane and Joel Tarr argue in *The Horse and the City: Living Machines in the Nineteenth Century*, the use and diffusion of fossil-fuel technologies did not occur overnight, but increased alongside an intensification of those older forms of power rooted in the direct solar age.¹⁸⁵ Although the adoption of fossil fuels intensified throughout the world at the time it did at the Evans Ranch, interdisciplinary energy researcher Vaclav Smil contends that it was “only at the very end of the nineteenth century that the global out of coal and crude oil,” the primary fossil fuels used in the settling and growth of the Hills, “surpassed the annual combustion of biomass fuels in terms of total gross energy content.”¹⁸⁶

This recognition does much to explain the vestiges of the solar energy regime that continued on the Evans Ranch well into the twentieth century, as well as to highlight the ways that fossil-fuel energy interacted with old patterns to create new labor practices on the ranch, especially in the important process of haymaking. During the early years of their ranching operations along the Spring Creek, the Evanses and Geraldine’s brother, Donald Hesnard, continued to use workhorses in a variety of ways around the ranch, including hay production and feeding. Just as Irvin hitched up his team of workhorses that wintry morning for his feeding routine, so too did he and Donald harness the Evanses’ two workhorses, Mandy and Mable, to make hay in the first few years of the ranch. Although some of the steel equipment they pulled had been made using fossil fuels at industrial factories, the haymaking process in its early stage continued to rely a great deal on human and horse muscle power, and by extension, solar energy.¹⁸⁷

¹⁸⁵ McShane and Tarr, *The Horse and the City*, 2.

¹⁸⁶ Smil, *Cycles of Life*, 89.

¹⁸⁷ See Young and Sparks, *Cattle in the Cold Desert*, 168

After learning the growing seasons of western South Dakota, these ranchers usually started the process the second week of June, when the alfalfa was ready, and began by attaching the team to a mower. Due to the region's dry climate, they had limited success with irrigation, but attempted a series of culverts and dykes in the hay pastures. They also grew hay near the homeplace, in the slough-bottom next to Spring Creek. Lacking a self-propelling engine, the mower had cleats on its wheels, which engaged the ground to generate force to operate the oscillating sickle. The sickle's teeth cut the grass in five-foot sections at a time, which constituted the length of the bar. The next step involved a horse-driven dump rake, on which Irvin, Donald, or Geraldine sat and pulled the rope that kept the rake in position to carry the alfalfa along and released it to create long windrows, or furrows of hay. After creating these rows, the team pulled a twelve-foot-long sweep that collected the windrows in its teeth, forming a large mound. Someone then drove the team to align the sweep with the wooden stacker. The stacker's platform contained long arms extending upward and a pulley attached to the horses. Geraldine would stand alongside the team, guiding it slowly as the horses pulled the stacker's platform vertically before releasing the hay forward to create a mound. Irvin and Geraldine wrote that "the stacker-team driver had to be an expert; especially if the team was nervous."¹⁸⁸ Driving the team too fast or slow meant the hay could slip down the platform and miss the stack, requiring the workers to shovel the load by hand on top of the mound. Young and Sparks also show the importance of experiential knowledge in this process in describing the "buck rake teamsers," who stood on the seat and carefully instruction the team where to go in the field and while stacking. "Buck rake teamsters were skilled operators and commanded a better-than-average wage in the hayfields. An unskilled operator might drive the wooden teeth into the rough

¹⁸⁸ Evans, "Irv and Geraldine Evans," in Evans et al., *Our Yesterdays*, 776.

surface of the hay meadows or fail to pick up the hay.” Grandma told me the same thing, that driving the stacker team took knowledge and precision, and it was often her job. 173

This process of stacking involved several trips from the field in order to create a large haystack, which remained in that pasture until the rancher needed it for winter feeding. Throughout this process, which extended through the summer into late August, elements of the solar-energy regime continued. The muscles of the team of horses, as well as the human muscle power needed to guide the stacking team, operate the rope of the dump rake, and drive the mower required access to nutritional energy found in the plants and animals the horses and humans consumed. However, these direct solar sources were interspersed with products of fossil-fuel-drive production; David Nye states that along with “the barbed wire that fenced his cattle,” “the steel plow the farmer used to break the plains...and his metal tools were industrial products.”¹⁸⁹ Just as the Evanses’ cast iron stove and electrical appliances connected them to distant manufacturing centers, so too did these agricultural implements prove the Evanses’ connection to fossil-fuel technologies, even in the midst of hitching up a team of horses and pulling levers with their own muscles.

Just as the coal-powered railroad changed the labor required for freighters to haul supplies overland to the Hills and for ranchers to transport their cattle to distant markets, so too would fossil-fuel-driven engines in tractors and other ranch technologies transform the labor of generating and feeding hay. Tractors often entered western agricultural lands by means of an earlier fossil-fuel technology; the railroad. In 1911, for example, the Chicago and North Western Railroad delivered a steam tractor to the town of Fairburn, located just twelve miles south of

¹⁸⁹ Nye, *Consuming Power*, 103.

Hermosa.¹⁹⁰ Rather than depending upon the muscle power of their horses, tractors transformed the process of haying by increasing efficiency and changing those who could perform the labor. These tractors, themselves the product of industrial assemblage enabled by the fossil-fuel-powered machines, relied upon fossil fuels to power their engines, and were accessible for use because of earlier technological advances. These included several kinds of gasoline-powered internal combustion engines developed in the mid-nineteenth century, the diesel-powered internal combustion engine of 1892, and the additive of tetraethyl lead to gasoline to prevent engine “knocking” and increasing performance.¹⁹¹ The fact that the Evans established their ranch in the years immediately following World War II also meant that their labor coincided with a series of additional methods for acquiring and distilling petroleum that had developed as wartime technology. Improvements in the process of oil refining and new means of drilling took place during the war, combining to create a post-war society increasingly able to acquire and integrate fossil fuels within technological systems.¹⁹²

Therefore, these accessible and concentrated forms of mineral energy permitted greater extraction of alfalfa for the haymaking process through farm machinery. The Evanses’ first tractor, a 1946 International Harvester, could pull their six-foot mower at a faster rate and when they bought a second tractor, a Massey Ferguson, a few years later, the two could operate together to cover the field nearly twice as fast. These early tractors also pulled a side-delivery rake, which had five wheels that rotated to push the mown hay into windrows (see Figure 3). Attaching a car engine to the original sweep, another gasoline-powered device eased the next step, which swept the windrows up and onto the stacker.

¹⁹⁰ Mills, *North Western Rails*, 17.

¹⁹¹ Smil, *Cycles of Life*, 91.

¹⁹² Smil, *Energy*, 105-108.



Figure 6. Self-propelled tractor and muscle-powered side-delivery rake, ca. 1950. Windrowing the hay involved power from solar- and fossil-fuel age energy sources for much of the Evans Ranch's existence. In author's possession.

The gasoline-powered tractor added several other machinery appendages to the process of haying that changed the length and productivity, and thus labor, of haymaking. The windrower, which attached to the tractor, cut the alfalfa and windrowed all in one operation, readying the alfalfa for the sweep to come around and collect it to create a stack. Compared to the length of the mower's sickles, which cut a six-foot swath of alfalfa at a time, this twelve-foot-wide windrower could process the field in much less time. In 1952 the Evanses purchased a 'square baler' which, combined with the tractor, made significant contributions to the speed and efficiency of haying on the ranch (see Figure 1). This piece of machinery attached to the tractor and processed the alfalfa into bales tied with wire, depositing them back on the field as it went. Although these were rectangular rather than cubic, at two feet wide and approximately three feet long, these bales provided versatility for feeding, placement, and transportation.



Figure 7. Irvin, a tractor, and a square-baler, 1952. The tractor pulled a square baler along the windrows, creating bales of hay that were easy to transport to various pastures. In author's possession.

For the family and their hired hands, the square baler not only sped up production when combined with the windrower, it also altered the labor involved in the final steps of haymaking and subsequent months of feeding. As we saw with Irvin's horse-driven feeding routine, haystacks on the ranch necessitated Irvin or Geraldine to drive out to whichever pasture contained the mound of hay they wanted to feed, shovel it by hand using a pitchfork onto the horse-drawn hay rack, then shovel the mound back out onto the ground in the next pasture of cattle. This process took most of the morning, if not the entire day in winter storms, and required a great deal of human and animal muscle power.



Figure 8. Feeding cattle with a square bale, ca. 1952. Fossil-fuels powered the tractor, enabling the Evanses to haul their square bales to different pastures. However, once inside the gates, Irvin still had to use his muscle power to lift the bales and empty them onto the ground. In author’s possession.

With the petroleum-powered technologies of the tractor in haymaking, the final steps of haymaking still required a great deal of muscle power, but in a different way. Whereas the horse-drawn stacker tipped the hay into a mound, which remained in that spot in the pasture until they loaded it up to feed, the tractor-led square baler left a field spotted with more transportable hay bales. When stacking the bales, Irvin and the hired hands had to use muscle power to throw the bales up to a person standing on the stack, who then alternated them like bricks to create an approximately fifteen-foot-tall stack (see Figure 2). During the subsequent winter of haying, the size and versatility of these bales enabled Geraldine to join Irvin in feeding the cattle. With the aid of a curved metal hook that she and Irvin grasped with their hands, they could more easily lift the bale, push the hay through its wire confines, and feed the cattle. Geraldine explained “I

worked out in the pastures haying or feeding, even after I had the children.”¹⁹³ Often the family labored as a team, with one person driving the truck slowly along through the field and the other pushing the hay out onto the ground from the truck’s bed. Even their first child, “Max (ten years old) was great help. He drove a Ferguson tractor by himself.”¹⁹⁴ Although the ease of using the tractor to release round hay bales came not until 1980 on the ranch, these earlier tractor and baler technologies represented a series of steps, enabled by fossil fuels, which aided ranching operations in speed and efficiency. Additionally, Geraldine and her older daughters operated the tractors during mowing, and were better able to participate in feeding with the versatile square bales rather than shoveling hay from the hayrack each day. Although muscle power continued to be an important part of feeding beyond the late-nineteenth century invention of petroleum-driven farm products, new energy sources enabled women and sometimes the children to participate in new ways in these ranching operations

Much like it had in the winter of the ‘Big Die Up’ of 1887-1888, the winter of 1949 included weeks of sustained winds and record snowfall. Writing of the “’49 Blizzard,” which raged for two weeks with winds measured as high as seventy-two miles an hour and blowing drifts across the road for months following, Irvin recorded “cattle loss was heavy- 12 cows and 10 unweaned calves- buried in drifts in the Pasche draw.”¹⁹⁵ Clearly, neither the train, the truck, nor the tractor could prevent ranches from losing cattle to the harsh realities of winter on the northern Plains. Yet there was a marked different between these two winters, set nearly seventy-five years apart from one another. Despite these losses, the efficiency of the tractor had enabled a

¹⁹³ Irvin and Geraldine Evans, interview by author, Windsor, Colorado, February 27, 2011.

¹⁹⁴ Evans, “Irv and Geraldine Evans,” in Evans, et al., *Our Yesterdays*, 778.

¹⁹⁵ *Ibid.*, 776.

hay surplus on the ranch, allowing Irvin to distribute supplemental feed to the cattle when the grass lay inches below the cattle's hooves. Furthermore, Irvin was able to drive his truck into Rapid City after snow plows cleared several miles of the country road to town in order to purchase additional hay and feed.

In these ways, fossil fuels changed the way ranching labor could continue in the midst of these environmental obstacles, enabling "paths" that connected the pastures to an outside city for its support. Whereas ranching in the Black Hills initially developed with the southern cattle barons' long drives and free ranges on the public domain, the coming of different breeds on the railroad and the carving up of common grazing lands for private property ownership of families like the Hesnards challenged that system. Presented with limiting factors, such as drought and blizzards, and dependent upon the cattle's ability to access solar-energy forage without human labor, ranchers on the open-range soon found they could not continue in the same way of they had. The type of ranching which persisted, that of the closed range, was a more labor- and capital-intensive system which integrated new energy sources to sustain it. Central to this system was the acquisition of land upon which people could labor to provide their cattle with access to solar energy sources. Therefore, although ranch labor changed to depend upon petroleum-powered machines and access to outside energy sources, ranching remained at bottom an exploit dependent upon plant's conversion of solar energy, albeit to an intensified degree. This blending of energy sources, biomass and mineral, proves the uneven nature of the energy transition. Although individual ranchers chose the efficiencies of tractors and trucks over the horse and plow, changes to their labor were slow in coming, and sometimes, incomplete. In many ways, ranching would continue to rely upon solar-age energy as cattle and ranchers alike remained dependent upon the conversion of solar energy into biomass fuel for their cattle's consumption,

making it a unique industry at a time when, by 1950, “less than a quarter of the world’s useful energy came from wood and crop residues.”¹⁹⁶

The effects of the energy transition did not stop at labor done in the pastures. Just as the Hesnards and Evanses made decisions about energy use that would transform the landscape and their ranch labor, so too would changing energy sources alter life and labor at the ranch’s homeplace, the source of energy for human labor in the fields. As it was in other rural households in the region and state, the energy transition reached into the Evans household through their use of new technologies and input of new knowledge about their use, acquiring the momentum that would change the family’s domestic labor and connection to the community.

¹⁹⁶ Smil, *Cycles of Life*, 89.

Chapter 3

Electricity and Angel Food Cake: Domestic Life and Labor on the Evans Ranch

Glancing briefly to the east, Irvin saw a cloud of dust rising in a line he knew to be Geraldine or one of the children flying down the road in the family truck. He finished the section of alfalfa, turned off the engine, and sat waiting on the seat of the mower as the truck entered the pasture. Walking to the truck, he saw Geraldine reaching across the seat to pull out a familiar red crate, filled with cookies and homemade lemonade. He felt that the intensity of his work and the heat of the sun had robbed his body of all of its moisture, so he eagerly gulped the lemonade with all its refreshing tartness and crunched a few oatmeal cookies before thanking Geraldine. His wife's snacks restored him for awhile, but as the afternoon wore on, he could feel the fatigue come over him, and he checked his watch to see how long it would be before he could return to the ranch house, eat dinner, and restore his energy for another day of work.

Delivering lemonade and cookies to Irvin or the hired hands in the pastures was only one of the ways that Geraldine Evans and her family used the automobile in their daily work on their ranch east of the Black Hills. Likewise, it represents only one of the means by which fossil-fuel energy extended into the realm of domestic labor and rural life on the Evans Ranch. This mineral energy played a part in altering labor not only out in the pastures among the cattle and hay, but also at the site that produced those satisfying refreshments: the ranch house. Inside this space, Geraldine and the family carried out essential tasks for keeping the ranch and its participants in working order. Within this built environment, homemaking labor underwent great changes with the coming of household technologies and the connection of the household to new sources of

power. Just as the availability of a square-baling attachment onto the tractor enabled the Evanses to easily transport their hay from field to field and complete the process much quicker, technologies and systems utilizing fossil fuel energy rather than solar power led to new possibilities for ranch labor within the home and life among ranches in the community. This ranching landscape reveals much about energy transitions and human history. In the same way that changing forms of energy facilitated the establishment of ranching in the Black Hills region and altered the experience of ranching labor, these also transformed domestic life on the ranch. Energy enabled the Evanses to extract their resources from new locations, connecting them to their surroundings in new ways to alter labor and relations within the family and home. The very flour and sugar that Geraldine used to bake Irvin's cookies came not from her own land, as did the butter and eggs, but required her to use her gasoline-powered automobile to go to Rapid City to purchase them. Therefore, the introduction of new technologies within the home and community and the ensuing changes in women's labor, in the built environment, and rural communities highlights the transformative power of the availability of new energy sources on the Evans Ranch. Having burned in a horse's muscle, puffed from a steamboat stack, and chugged in a train engine, the energy transition would now make its way into the intimate and underestimated realm of the ranch home and community.

If Geraldine was able to bring lemonade to Irvin and countless other hired hands over the years, it was because her labor back at the ranch house gave her lemons on a consistent basis. After living with relatives for two years, the Evanses moved to the ranch at Spring Creek to live year-round in 1948. Coming into a small house that had been built decades prior by a settler named Smith, the young wife encountered a variety of circumstances that posed a challenge to

homemaking. Having grown up in both a claim shanty and a newly-built house as a child while living in the Black Hills, she was used to rural living and the challenges that such a life brought. Although her parents had built their new home with modern improvements later in her childhood, she lived her early years in a three-room cabin, complete with spaces between the walls' wooden planks that meant she awakened many a wintry morning to a dusting of snow on her covers. Having spent her first year of marriage living in Maryland and Connecticut, however, where she enjoyed sailing trips, fresh seafood, and city life, Geraldine was in for an abrupt reminder of the realities of rural living on the plains of western South Dakota. Upon arriving with her husband on the ranch lands that she had inherited from her uncle, Arsene Hesnard, realization dawned on her that homemaking on her new ranch would require some adjusting. She recalled observing the thinly-planked walls and rickety outhouse of her new home, which was really "the Old Smith place," new home, and thinking "I'm married! I'm supposed to get something a *little* better than what I had before!" She beheld the weeds and hard-packed earth that surrounded her new home, and noted that the present sources of water included an often-stagnant slough and a shallow well. Upon entering the house, she might have guessed that the space between the old wooden floorboards and the dirt below would be home to a plethora of plains wildlife, each of which would lend their own particular scuffle and scurry to the rural cacophony of nighttime noises. She would have known that making a home on this dry land with a new husband and the probability of children would require much hard work.¹⁹⁷

In the years to come, however, Geraldine would witness the energy transition in progress as it continually reshaped a domestic environment combining hand- and thus muscle-powered tools like a butter churner and cheese cloth for making homemade cottage cheese with electric

¹⁹⁷ Irvin and Geraldine Evans, interview by author, Windsor, Colorado, February 27, 2011.

light bulbs, running water, and a motorized washing machine. Even the nineteenth-century wooden walls hid electrical wires behind their antiquated façade. These surroundings would help a visitor to anticipate the fact that Geraldine's labor within the first few years of their arrival was neither completely oriented towards labor-reducing electrical devices, nor was it totally dependent upon the vagaries of the season or the availability of biomass fuels like wood. Geraldine's work fell in the interstices of the clothesline-drying, outhouse-visiting, butter-churning days of the solar regime and the fuel-oil-heated, vacuum-cleaning, and telephone-calling days of the fossil fuel regime. Although fossil- and solar-age technologies characterized farms and ranches, a family's willingness to embrace change, and a host of other decisions, determined the mix.

From the day of her initial observations in the 1940s to a time decades later when the couple had grandchildren visiting, the Evanses' ranch house changed in many ways, transforming the work done throughout it and the family that grew inside it. Although hard work and dedication remained a necessity for her role as woman of the house, Geraldine's labor and surroundings would undergo dramatic transformations in the years that carried her from being a newlywed to a young mother, a mother of five, a teacher, and eventually, a grandmother. Many of these changes to Geraldine's homemaking labor corresponded with the availability of new energy sources and related technologies, as well as a changing regional and national perception about rural living and homemaking. As Irvin and Geraldine worked to incorporate new technologies into this small house and eventually built a new house altogether, their experiences in labor and life inside the home drew them into dependence on resources from the "Outside," rather than operating in relative isolation. With the coming of new household technologies came a plethora of additional expectations and responsibilities that required rural women like

Geraldine to at once intensify their performance as homemakers, as well as assume new roles in the additional time supposedly afforded to them by so-called ‘labor saving devices.’ As did ranch labor in the field, fossil fuels helped to engage domestic labor in a process of intensification, which would change family relations and gender roles.



Figure 9. The Evans Ranch along Spring Creek, ca. 1955. The Evanses’ moved into the “Old Smith House” (beneath trees on far right) in 1949, but built a new ranch house in the 1950s (large white building on bottom right). In author’s possession.

The physical attributes of what the family later deemed to be the “old house” as well as the timing of their arrival spoke of big changes to rural living in the years following World War II. Like the rest of the nation, which participated in a rising consumer economy following the gains of wartime production, farmers and ranchers in the American West reinvested their capital

profits to become consumers of farm machinery, much of them based on fossil fuels. They had also learned a lesson from the sharp price-drop following the First World War, and anticipated that reinvesting in equipment would allow them to compete in an increasingly-productive industry.¹⁹⁸ This consumerism and expansion of mechanization entered rural households as well, changing the daily experiences of the farm and ranch wives who lived and worked within them.

Geraldine was well aware of the changes entering rural households in the years immediately following the war. Studying home economics education at Yankton College and Iowa State University, her education exposed her to the kinds of household appliances that involved fossil-fuel-powered technologies, as well as the changing expectations in homemaking as these technologies altered labor within the home. She also knew of the technical advances in her husband's studies in mechanical engineering. Having studied mechanical engineering at Yankton College and Iowa State University, as well as worked at Aberdeen Proving Grounds developing defense weaponry during the war, Irvin represented a new generation of rural laborers with the knowledge and expertise of technological systems, most of which involved fossil fuels in some way.¹⁹⁹ Their experiences at Iowa State also meant that they learned from a university intended to promote the nation's agricultural productivity, as established under the Morrill Act in 1862, something that they would spend the rest of their lives doing. With this training in hand, both he and Geraldine worked to integrate the technologies of the day into their home, altering the circumstances of their domestic labor.

The changes that the family made to the original ranch house in the late 1940s and the construction of a new house, built next door in 1952, provide opportunities to compare the effect

¹⁹⁸ David B. Danbom, *Born in the Country: A History of Rural America*, 2nd ed. (Baltimore: Johns Hopkins University Press, 2006), 232.

¹⁹⁹ Evans, "Irv and Geraldine Evans," in Evans et al., *Our Yesterdays*, 775-776.

of fossil-fuel technologies on domestic labor in the home, particular that of women. A comparison of Geraldine's years of homemaking labor on the ranch and that of rural women on South Dakota farms and ranches in 1930 illustrates this point. In a study done by South Dakota State College's Agricultural Experiment Station, Home Economics Research Department, and the United States Department of Agriculture entitled "Use of time by South Dakota Farm Homemakers," researchers polled one hundred rural households spread across various counties in the state to determine the time and type of duties conducted by rural women.²⁰⁰ Although most of the categories of labor remained the same between 1930 and 1950, the time spent and type of labor done within them transformed a great deal. Dividing the women's time into several categories that would likely have seemed artificially separate to the farm women themselves, the report broke women's time into homemaking activities, farm work, other work, personal activities and miscellaneous activities.

Much like the Lakotas who had traversed the Black Hills and plains a little over fifty years earlier, securing resources for their family's nutritional energy needs comprised the largest percentage of the South Dakota women's time, as well as Geraldine's labor. Within the broad category of homemaking activities, which comprised nearly one-third of the women's twenty-four-hour days, food preparation made up the largest percentage of time spent.²⁰¹ Neither Geraldine nor the women logging their daily work for the 1930's report would have found this surprising. Like many the interviewees, Geraldine not only aided her husband in securing water, pasturage, and hay for the cattle, but devoted much of her day to providing sustenance for her husband, her children, and the hired hands. Within the general steps of food preparation, the

²⁰⁰Grace E. Wasson, "The Use of Time by South Dakota Farm Homemakers" South Dakota State College of Agriculture and Mechanic Arts Department of Home Economics and Agricultural Experiment Station Bulletin, no. 247 (March 1930).

²⁰¹ Ibid., 12.

energy transition trickled down to transform the essential processes of providing energy for the family's life and labor.

Just as access to the important river bottoms influenced much of the Plains Indians' and later settlers' movements across the northern Great Plains, getting water was a basic step in women's provision of their family nutrition. Rural South Dakota homemakers required water for cooking, drinking, and washing dishes, but their means of securing it changed with the coming of the fossil-fuel age. In the "Use of time by South Dakota Farm Homemakers" report, thirty-eight households out of the one hundred surveyed had running water or an electric pump in the kitchen. Three had a cistern pump inside the house and a well outside, but the majority, fifty-nine, still had a well outside the house.²⁰² Although many rural families would transition from pumping their own water in an outside well to indoor pumps and running water in the first half of the century, many rural households did in fact still lack running water until much later. In their annual report for the year 1947, county and home agricultural extension agents from Pennington County, which bordered the Evans Ranch's northern boundary, reported assisting eighteen families in "installing water systems" for their work within "the House, Furnishings, and Surroundings."²⁰³ A 1951 bulletin issued by the United States Department of Agriculture, "Your Farmhouse...Planning the Kitchen and Workroom," encouraged rural homemakers to install pipes to supply running water to the house in order to "eliminate unnecessary activities." Although they listed electricity as an option for an energy supply, the authors also recognize that some rural households still chose to rely on windmills or various types of fuel to drive water

²⁰² Wasson, "The Use of Time," *Bulletin*, 18.

²⁰³ U.S. Department of Agriculture, Extension Service of South Dakota State College, *Annual Report of Kirk T. Mears, County Extension Agent in Pennington County and Donna Ballard, Home Extension Agent in Pennington County*, Donna Ballard and Kirk T. Mears, 1946, Pennington County Extension Office Files.

pumps, “modern labor savers.”²⁰⁴ Therefore, many rural households may have been just converting their households to running water by the 1950s.

For such households, rural homemakers labored in much the same way as the twentieth-century farm woman described by Katherine Jellison in *Entitled to Power: Farm Women and Technology, 1913-1963*. Jellison captures one woman’s description of the human muscle power required when the nearest water source was one hundred or more yards away: ““Oh, the weary arms that pump water, carry it down step[s]...then the water must be carried out...its weight enhanced with floating peelings and kitchen refuse.””²⁰⁵ Women needing water for their families relied upon their own or their children’s muscle power. Geraldine, however, like most of the women who had either running water or pumps inside their houses, relied not solely upon the labor of her own muscles to draw up water and carry the slopping bucket into the house. Instead, a system of pumps and pipes connected her to the fossil-fuel age, as she used the gasoline-powered pumpjack that Irvin had installed in the attic of the old house. Drawing up water from a well and storing it in a pressure tank in the attic, pipes carried it down into the kitchen, where another pump under the sink forced it up through the faucet and a kerosene water heated the water for cooking and dishwashing. Rather than having to haul the used water outside, laden with ““floating peelings and kitchen refuse,”” Irvin installed a pipe at the bottom of the sink that carried it through the wall and out to the bank of the slough.²⁰⁶

Just as a plow will not pull itself when a rancher unhitches the horse, decreasing the energy from Geraldine’s muscles in drawing water meant a comparable requirement of energy

²⁰⁴ U.S. Department of Agriculture, “Your Farmhouse...Planning the Kitchen and Workroom,” *Home and Garden Bulletin* no.12 (Washington DC: December 1951).

²⁰⁵ Katherine Jellison, *Entitled to Power: Farm Women and Technology, 1913-1963* (Chapel Hill: University of North Carolina Press, 1993), 12.

²⁰⁶ Irvin and Geraldine Evans, interview by author, Windsor, Colorado, February 26, 2011.

from another source. In this case, that energy source was petroleum, fueling a one-thousand-watt generator that electrified a pump. While this technology certainly saved Geraldine the labor required to transport and heat water and allowed her to cook and clean with greater ease, it also changed the power source upon which the family was dependent for its domestic needs. This generator connected the family to a larger system of energy use; on one end, it afforded the family power for its water pump, refrigerator, and a single light bulb, and at the other end, the generator's fifty-five gallon barrel of gasoline required regular refueling by a visiting tanker that arrived from Rapid City.²⁰⁷ Rather than relying upon immediate sources of muscle power, utilizing gasoline within the generator and for the pump drew the family's needs outside its immediate surroundings to an outside point, in this case the oil fields of Wyoming. Each month, from the 1940s onward, Geraldine left room on her ledger of household finances for "fuel," physically writing energy into the list of necessities that included "household furnishings, food, clothes, laundry, transportation, and medical" needs.²⁰⁸ Thus, the introduction of fossil fuels had implications not only for the daily chores of pumping water for cooking, but resulted in change with regards to the family's relationship to its surroundings, connecting the home to new places, and establishing new lines joining family members to their community, the northern plains, and the larger world in new ways. "Paths" of energy use, which helped to link European American immigrants to the Black Hills, once again connected residents of the northern Great Plains to resources aiding their movement and survival.²⁰⁹

Although the use of the gasoline-powered generator connected Geraldine to petroleum production in distant places when the oil tanker came, the coming of central-system electricity on

²⁰⁷ Irvin and Geraldine Evans, interview by author, Windsor, Colorado, February 26, 2011

²⁰⁸ Geraldine Evans, "Journal," in author's possession.

²⁰⁹ Cronon, "Kennecott Journey," 32.

the ranch would transform even more of Geraldine's labor within the household, including new ways of securing food for the family. Yet even before the old house was connected to electricity, Geraldine and Irvin had already incorporated fossil-fuel use to some degree into the old house and had witnessed changes to homemaking labor. While not absolutely vital to the nutritive needs of ranchers, the production of an angel food cake in relation to different types of energy sources illustrates the new possibilities in household labor latent in the energy transition. Always her cake of choice for birthdays, Geraldine had experienced numerous ways of making the cake throughout her lifetime.

The new house that Geraldine's family built in 1937 on the Hesnard's land in the Hills contained a stove with a propane burner on one side and a wood stove on the other. Thus, the Hesnards used fossil fuels to cook by renting pressurized propane tanks from a local propane company on one side of their stove, while continuing to make the trek into their forest to cut wood using a cross cut saw and a team of horses to fuel the other. In this cast-iron combination of energy regimes, Geraldine first witnessed the tangible, and tasty, implications for new energy sources. Baking an angel food cake required a moderate, steady temperature, meaning that wood could not burn quickly and an extremely high temperature or it would scorch the cake. To obtain the right kind of wood that would afford the correct temperature, the Hesnards had to have knowledge of which wood to select in the forest and how to arrange it inside the stove. Richard White demonstrated in *The Organic Machine* that humans who worked to retrieve energy from their surroundings, rather than importing them through complex systems, accumulated reserves of knowledge about how best to capture energy in non-human nature. White argues that humans who spent time navigating the Columbia River in the nineteenth century gained knowledge of the river's nature, understanding how "the complexities of the energy system of the river could be

made to work for as well as against” them.²¹⁰ In the same way, Geraldine’s family members came to know “nature through labor” not because of Department of Agriculture publications or university courses, but from the experiential knowledge that years of traipsing around for firewood and cooking meals afforded them.²¹¹ Having lived all of their lives in pursuit of the right kind of wood with which to fuel their hearths and stoves, Geraldine learned about choosing firewood from her mother and aunts. From them she learned that you could not cook an angel food cake on pinewood alone, as it burned hot and fast, and was volatile in comparison to the heat supplied by the more even-burning hardwoods. Stoking the wood side the Hesnards’ fire, then, required not only different materials, but experiential knowledge of the properties of nature; how to select the right wood and temper it properly to allow for uniform baking of the cake’s sponge-like consistency. Although ranch life was unique in its dependence upon ranchers’ knowledge of the intricacies of their land and environment, the coming of regularized and concentrated fossil-fuel sources would alter rural people’s knowledge of their surroundings.

Although the other side of the stove utilized propane, which eliminated the need to discern types of wood and the temperature they were producing inside the stove, Geraldine found the technology to be far from perfect. Although Geraldine did not know this at the time, the kind of propane burners that she had in her childhood house, as well as the “old Smith house,” was a kind of intermediary in the development of cooking technologies. The couple’s stove had a propane burner over which Geraldine could set an isinglass encasement that served as a makeshift oven. Although the stove did not require wood, the propane burner could not supply enough heat evenly to cook an angel food cake, and Geraldine had to cook dishes that were not “persnickety.” However, new stoves began to use fossil fuels more efficiently. When Geraldine

²¹⁰ White, *Organic Machine*, 8-9.

²¹¹ *Ibid.*, 5.

acquired her grandmother's 1920s electric stove and later another electric stove in the 1950s, she realized that electricity could provide an even more constant source of heat for an angel food cake. Especially on the 1950s stove, producing an angel food cake became simpler, as electricity heated the oven quickly and provided a steady fuel source.²¹²

As her favored birthday cake for years to come, Geraldine certainly appreciated the changes to her labor that her 1950s stove provided. However, angel food cake was not the only dish made easier by the coming of fossil fuels into the kitchen. Homemakers soon discovered that cooking became easier in some ways, and difficult in others, as these technologies changed the volume and kind of housework that they could do. The transition to fossil-fuel stoves intensified women's domestic labor, tying them to distant sites of industrial production. In *More Work for Mother: The Ironies of Household Technology from the Open Hearth to the Microwave*, Ruth Schwartz Cowan demonstrates that cast-iron stoves, even those like the Hesnards' which used solar-age sources like wood or charcoal, were the product of coal use in iron and steel production.²¹³ With the greater efficiency of coal over wood in refining iron, corporations during the 1835 to 1860 "boom period for the manufacture of cast iron stoves" could produce larger quantities of cast iron for stoves. This industrial production also generated the iron and steel needed for railroad tracks and steam engines.²¹⁴ Thus, when Geraldine baked a cake in the oven atop her cast iron stove, her labor continued a fossil-fuel chain of production that had helped her family to move westward in the previous century.

Fossil fuels not only helped to advance iron stove production and spread its use, but enabled new patterns of labor for women and their families. Cowan argues that before the

²¹² Geraldine Evans, Interview by Author, May 1, 2012.

²¹³ Ruth Schwartz Cowan, *More Work for Mother: The Ironies of Household Technology from the Open Hearth to the Microwave* (New York: Basic Books, 1983), 60.

²¹⁴ Nye, *Consuming Power*, 108-110.

coming of stoves, which had an enclosed shape and were more efficient consumers of all kinds of fuels, men were more closely involved in the process of cooking the food by providing the frequent labor of “cutting, hauling, and splitting wood.” With the widespread use of iron stoves, which utilized less wood fuel, men did not contribute as much labor to food production.²¹⁵

Geraldine’s father, Theodore Hesnard, continued to work as the provider of wood for the family’s stove and heater in the house they built in 1937 on the Hesnard Ranch, but likely had less to bring than for an open hearth, because of the efficiencies of a closed, cast iron stove. Nevertheless, he did drive a team of horses into the woods on their land in the Hills and used his muscle power to fell trees with a cross-cut saw. Theodore then delivered the wood to his wife, and used his own knowledge of nature to communicate with her about the types of fuel she needed in her stove, thereby linking him to her labor in cooking. Unlike Geraldine’s father, Irvin did not have to provide wood regularly as fuel for cooking. Whereas Theodore might have needed to chop wood at least each week to supply his wife’s cooking, Irvin’s labor with the stove occurred only upon its initial installation, during repairs, and in coordinating fuel delivery from Rapid City. This created a disconnect between Irvin and the domestic work of cooking that he may otherwise have had if he lived a few decades earlier.

For women, these devices offering efficient heating of food permitted changes in domestic labor. Although “labor-saving” technologies might reduce the homemaker’s labor in one category, using these tools created higher expectations for complex dishes and cleanliness that would actually increase the time spent in domestic work. In *Entitled to Power: Farm Women and Technology, 1913-1963*, Katherine Jellison cites an author in the agricultural publication *Wallaces’ Farmer* who recognized that higher housekeeping standards did not necessarily

²¹⁵ Cowan, *More Work for Mother*, 62.

alleviate women's labor. Instead, the author wrote, "What does the 'little woman' do with her time now that she has a clean-fuel stove and cake mixes have come on the market?" His answer was that women were still expected to maintain a high level of domestic productivity, but also labor in the fields and pastures: "And then somebody- guess who- has to take time to make the good rolls, and the angel food cakes..."²¹⁶

After incorporating fossil-fuel-powered technologies in her kitchen, Geraldine experienced new patterns of domestic labor, especially within the kitchen. Although the old house's stovetop oven was too small to fit a Thanksgiving turkey inside of it, she nevertheless could bake more complicated dishes with this technology than would have been possible over an open hearth. These "persnickety" dishes, such as angel food cake, required even temperatures in an enclosed space. She could accomplish both of these things with the fossil fuels that heated her stovetop oven in the old house. Cowan noted the same in the transition from the open hearth to the stove: "different kinds of cooking (say, fast boiling, slow simmering, and baking) could be accomplished with the same fire; the skilled cook needed to know how to regulate the dampers of her stove and how to move her pots at various distances from the firebox; but once she had conquered this art, it was possible for her to boil potatoes, simmer a soup, and bake an apple pie for dinner all at the same time."²¹⁷ With five children born by 1958 and a host of hired hands joining the family's table, Geraldine did all of those things in one meal, and more. Although she no longer had to haul water in from an outside well or stoke a wood-burning stove or hearth, her labor was far from simplified. When an electric refrigerator, microwave oven, and vacuum cleaner joined the electric stove in her repertoire of homemaking technologies, Geraldine's labor

²¹⁶ "What Does She Do with Her Time?" *Wallaces' Farmer* (21 March 1953): 51, quoted in Jellison, *Entitled to Power*, 164.

²¹⁷ Cowan, *More Work for Mother*, 62.

would become more complicated while less dependent on brute strength. Electricity would transform household labor and the household itself, connecting rural communities even further out and drawing households into new spaces.

That these changes to Geraldine's labor routine occurred when she and Irvin chose to install a gasoline-powered generator and propane to run their stove demonstrated only the first in series of changes that would come with the Evanses' deeper integration into the fossil-fuel age. The arrival of electricity in the rural spaces of the nation, like the Evans Ranch, created a new "path" to fossil fuels for rural households, and in doing so, intensified their energy use. Just as the transcontinental telegraph sparked a wave of communications and movement of Euro-American people into the far reaches of the nation in 1861, the web of electric lines that filled the West in the middle decades of the twentieth century would extend into individual households in the West, drawing them into dependence on, and cooperation with, their community, region, and nation and connecting them to sources of power that surpassed their own labor.²¹⁸ Once connected, ranch life and communities would never be the same. The technologies and "paths" enabled by electricity gained momentum on the Evans Ranch and in rural communities, linking them in numerous ways to the fossil fuel age.

The 1935 Rural Electrification Act set the precedent for extending the civilizing power of electricity into American farms, eleven percent of which had electricity in 1935, but discussions about electricity and rural life preceded even the official creation of this act. A study conducted by the Agricultural Engineering Department at South Dakota State College of Agriculture and

²¹⁸ Nye, *Consuming Power*, 111.

Mechanic Arts in 1929, “Cost and Uses of Electricity on South Dakota Farms,” intended to make farmers aware of the benefits, as well as the expenses, of using electricity on their farms. Despite the small percentage of rural families who would have access to electric service before 1935, the South Dakota State College study clearly had experience using electricity in various agricultural activities, including “pumping water with an electric motor,” washing clothes, “cooking with an electric range,” and using electric curling irons.²¹⁹

Despite the passage of the Rural Electricity Act seventeen years earlier, the Evanses did not gain access to central-station electric service until 1952. Just as ranches like the Evanses’ continued to use horses to make hay years after the invention of the tractor, the adoption of electricity and electrical technologies did not occur overnight. The 1930s Home Economics report on farm women’s working hours on one hundred farms found that eighty-five percent of households had indoor bathrooms, which required electricity, and that had changed little since the Evans lived in the old house, where their “two-seater” outhouse made them seem “rich” to a visiting child.²²⁰ Instead, rural electricity made inroads into communities at an uneven rate. That many direct solar-energy sources continued in the years of rural electrification proves that previous systems of energy use had acquired technological momentum in society, meaning that many rural households in the Great Plains chose not to adopt pumps, running water, generators, or indoor plumbing. For some, their physical isolation kept the system of power poles and lines from reaching their farms. For others, fears that electrification would cost more than it would produce, a desire to act independently, or a strict adherence to what was comfortable may all

²¹⁹ “Costs and Uses for Electricity on South Dakota Farms,” (Brookings, SD: Agricultural Engineering Department, Agricultural Experiment Station, South Dakota State College of Agriculture and Mechanic Arts, June 1929). Pennington County Extension Office Files.

²²⁰ Irvin and Geraldine Evans, interview by author, Windsor, CO, February 26, 2011.

have played a role in producing the “skepticism” that prevented some farmers and ranchers from immediately incorporating the technology onto their land.²²¹

Yet despite structural and ideological obstacles, the passage of the Rural Electrification Act, the dissemination of bureaucratic publications, and agricultural extension work helped to enlarge fossil-fuel opportunities for rural families, including the Evanses. Although the Evanses already had decided to incorporate some fossil-fuel technologies onto the ranch and into the house, the arrival of central-service rural electrification in 1952 presented them with an array of possibilities, all of which would change labor and life within the home. The spread of government publications and extension work relating to rural electrification informed the Evanses’ decisions to incorporate electrical systems into the new home they built in 1952 adjacent to the old house. Likewise, U.S. Department of Agriculture publications, in conjunction with land-grant colleges and universities, played an important role in alerting rural families to the possibilities latent in this new system of fossil fuel use.

A 1950 publication from the Department of Agriculture entitled “Electricity Comes to Rural America” encouraged farmers and ranchers to consider the efficiencies of the electrical system, which could obviate many of the monotonous forms of muscle labor. Under a section entitled “Dad Catches On,” the authors wrote that “gradually the farmer lost some of his skepticism about the new-fangled electricity, as he had about the tractor a score of years before. He began to wonder how he could put it to work for him, as his wife was doing in the house.” This brochure not only highlighted farm and ranch labor done in the fields and pastures themselves, but also noted that the rural homemaker could expect to have her work in cleaning,

²²¹ Fite, Gilbert C. “The Transformation of South Dakota Agriculture,” *South Dakota History* 19 (Fall 1989): 288; Rural Electrification Administration, *Electricity Comes to Rural America* (Washington D.C: Rural Electrification Administration, U.S. Department of Agriculture, June 1950), 15.

cooking, washing, and other tasks simplified.²²² Furthermore, the authors suggest that in some instances, fossil-fuel technologies first entered into the rural household, where they then spread to the farm at large, making women the vanguards of the energy transition.

Other publications helped to connect electricity directly to the daily tasks of rural homemakers. The 1930's Home Economics report, "The Use of Time by Farm Homemakers" in South Dakota, informed readers that when the one hundred women in the survey were asked what they would do if they "had a thousand dollars to spend as you liked in making your homemaking easier," "practically all of the homemakers not having running water in the kitchen or bathroom, and electricity, mentioned one or both of these." Consequently, the author continued to advise her rural audience, which would have included many homemakers, that "many a housewife in her effort to save money, forgets that time has commercial value; hence she works with inferior tools and inadequate equipment, wasting time and energy." A rural South Dakotan woman reading the study might understandably question her own use of time and energy, which until this point had relied upon much of her own muscle power in hauling water, scrubbing clothes, and washing dishes. Running water, bathrooms, and electricity, she was told, would enable her to becoming like the "progressive business man," who "checks on his system for leaks, for waste in time, for useless expenditure of energy."²²³

Urban Americans' perceptions that the rural United States lacked modern technologies and was lapsing further behind their industrial neighbors prompted a movement to reinvigorate the countryside. The impetus for this action also came from concern that declining agricultural productivity would threaten the nation's ability to make payments to its foreign lenders. In

²²² US Department of Agriculture, *Electricity Comes to Rural America*, 18.

²²³ Wasson, "The Use of Time" Bulletin, 27-28.

response to this sentiment by urban educators, religious leaders, social scientists, and others, President Theodore Roosevelt created a commission in 1907 that would eventually form the Country Life Movement. This commission, which included the chief forester of the United States Gifford Pinchot and editor Henry Wallace of *Wallaces' Farmer*, sought reform that would extend not only into the fields and pastures of agriculturalists, but into the rural home itself, hoping to make it more modern and convenient like its urban neighbors.²²⁴ Out of this movement also came efforts to reform by educating rural people with the new knowledge that the commission believed would make them more efficient and modern. The result was the passage of the Smith-Lever Act in 1914, which allocated federal funds for county farm agents and home agents, known as extension agents, who would make farmers and ranchers technologically capable, a move these urban reformers felt would keep them producing happily and efficiently.²²⁵

Although rural people did not always agree with the assumptions and methods of these technical advisers, agricultural extension agents reached into rural communities by distributing information regarding the advantages of electricity to farmers, ranchers, and homemakers.²²⁶ The Evanses established many connections with extension agents, including the longtime Pennington county agent Wendell Peterson. In Peterson's collection of extension documents are reports issued by various extension agents working in and around Pennington County, the county adjacent to the Evans Ranch, including the Annual Report by the county and home extension agents in 1946. In this, these agents recorded the assistance they gave to farmers and ranchers in numerous categories corresponding to fossil fuel technologies and electricity. In 1947, the agents

²²⁴ Danbom, *Born in the Country*, 168-171.

²²⁵ *Ibid.*, 172-174.

²²⁶ *Ibid.*, 173.

reported conducting work on rural electrification in twelve communities and assisting thirty-six “voluntary local leaders or committeemen” in rural electrification. They also aided three associations in obtaining electricity, as well as forty-two families, and assisted sixty families in the “selection or use of electric lights or home electrical equipment,” in the Pennington County area. Along with helping families to obtain rural electrification in general, these agents proceeded to assist families in establishing new technological systems that depended upon rural electrification. They reported assisting six families in installing heating systems, eighteen in water systems, and eighteen in sewage systems, nearly all of which involved homemaking and would have required access to some sort of fossil fuel energy sources, especially electrification.²²⁷ Extension agents hoping to improve the functioning of rural households led how-to sessions using pamphlets like “Your Farmhouse...Planning the Kitchen and Workroom,” “Planning the Bathroom,” and “How to Plan Remodeling,” all of which were published titles distributed by the U.S. Department of Agriculture and Extension Offices between 1951 and 1954.²²⁸

Together, all of these reports and publications exemplify the way that governmental and university agencies served as sources of information aiding farmers and ranchers in connecting rural homes to a larger system of energy use. In doing so, they represented the growing importance of the technical knowledge that historian Kate Brown has used in her analysis of the “gridded” spaces of the American West. She contends that it was in the West that engineers, land agents, and railroad executives applied their expertise knowledge to the landscape to divide “time, space, and materials into discrete units,” thereby allowing them greater control of

²²⁷ U.S. Department of Agriculture, *Annual Report*, 1946.

²²⁸ U.S. Department of Agriculture, “Your Farmhouse...How to Plan Remodeling,” *Home and Garden Bulletin* no.42 (Washington DC: August 1954); “Your Farmhouse...Planning the Bathroom,” *Bulletin* no.19 (Washington DC: October 1952); “Planning the Kitchen” *Bulletin* no.12, 1951.

productivity and extraction of the region's resources.²²⁹ Likewise, the importation of the specialized knowledge of county extension agents, most of whom earned degrees in agricultural science or business, into rural communities connected landscapes like the Evans Ranch to modern technologies. As the installation of electric circuits and household technologies required more than the experiential knowledge typically sufficient for managing ranches and rural households, agricultural production came to depend upon these government experts to reach the desired levels of production and connect them to their surroundings. Furthermore, Irvin's degree in mechanical engineering and Geraldine's in home economics made them among a new generation of ranchers and farmers with formal training in the technical knowledge that they would use to incorporate mechanization and electricity into their agriculture and homemaking in an age that required it.

With the coming of extension agents and electricity, to live on a ranch or a farm, especially as a homemaker, was no longer to be isolated from modern technologies and set apart drastically from city living. Rather than comprising a "vague dream" where one "snapped switches to move wheels and get light, or do the wash, or bake a cake, or make elevators move," technologies once meant only for "urban folks" now spread into rural spaces.²³⁰ As an option, electricity still required that individual families choose to attend their extension agent's demonstration on pumping running water into their new house, speak to their neighbors about creating a rural electrification cooperative in their area, or trade in their wood stoves for electric ovens. Nevertheless, observation and experience with the accoutrements of electrification began to make sense. As Department of Agriculture circulars ended up on breakfast tables and parents

²²⁹ Kate Brown, "Gridded Lives: Why Kazakhstan and Montana Are Nearly the Same Place," *American Historical Review* 106 (February 2001): 44.

²³⁰ US Department of Agriculture, *Electricity Comes to Rural America*, 1-2.

attended their county extension agent's demonstration on housekeeping methods with electric appliances, farmers and ranchers like the Evanses increasingly chose to pursue many of the new "paths" of resources use that their communities, universities, and governments had helped to start.

A report conducted by South Dakota State College on the "Costs and Use for Electricity on South Dakota Farms" shows an example of electricity use making sense to rural people. In 1924, the College's experiment station helped dairy and livestock farmers install "electric lights, power, and appliances for the farm," for the first time to determine how much electricity the agriculturalists would use. The rural patrons had to buy their own equipment and pay for their electricity use, thus attempting to align the study as closely to real life as possible. Over four years, the farms on the test line went from using around 14,000 kilowatt-hours in 1924 to 38,000 kilowatt-hours in 1928, a 171 percent increase.²³¹ According to the report, written a year later in 1929, most of these patrons were "saving enough money, owing to the displacement of other kinds of power, to pay the cost of the electricity for lights and home appliances," thus helping them to justify their electricity expenditure. Along with that savings, the 171 percent increase in electricity also brought running water to the homes that did not have it and a small decrease in the number of hired men.²³²

When rural electrification extended down Spring Creek in 1952, the Evanses went from a single light bulb, small icebox, and water pump running off of the electricity created by a one-thousand-watt generator to having electricity for a plethora of household devices. Electricity enabled them to use two new stoves, a larger refrigerator, a vacuum cleaner, and more indoor

²³¹ "Costs and Uses for Electricity," Agricultural Engineering Department, June 1929, 26-27.

²³² *Ibid.*, 26, 28.

lighting in the house, as well as electric water pumps, yard lights, and electric grinders for grain outside of it. Subsequent years found the Evanses' use of electricity increasing as they purchased more and more household technologies. In 1955, a family friend at the lumber yard witnessed Geraldine's discomfort while pregnant during one very hot summer and sold the family an air conditioner for the wholesale price. With an air conditioner pumping a cool breeze throughout the house to temper the stifling summer heat, and the smell of dinner wafting from the electric stove, electricity had certainly extended its reach into the pores of the family.

Nor were they the only ones in the area. In the Custer County Historical Society's local history, *Our Yesterdays*, many families along Spring Creek and on ranches near the Evans Ranch recount the coming of electricity in terms of the beginning of new systems of work and life around their homes and within the community. The Crawley family, like the Evanses, had multiple mouths to feed on its ranch, including numerous children and several hired hands. Thus, keeping a large supply of food on hand was a necessary, but challenging, activity before electric appliances, as well as other fossil-fuel technologies, made their way into the home. A lack of refrigeration and a distance of thirty-six miles to a market at Rapid City posed a challenge to keeping food on hand, especially when the family's only means of transportation was 'a four horse team and a sturdy ranch wagon.' Thus, the family took a "shopping expedition" to purchase flour, dried fruit, lard, and cured meat for the household only twice a year.²³³ Although an automobile eventually enabled them to make more frequent trips to town, the Crawleys also gained a better means of storing and preparing food when electricity supplied them with a refrigerator, oven, running water, and other appliances. The Daughenbaughs, who lived along Spring Creek, explained that with the coming of electricity, the family gained "several new

²³³ Royal C. Crawley, "George W. Crawley Family," in Evans et al., *Our Yesterdays*, 580.

things,” including a bathroom and utility room, and water and heating system.²³⁴ The Hanlons, who lived near Hermosa, described the “normal ups and downs,” of ranch living, including dry years and blizzards. “Then,” they explained in their entry, “when the R.E.A. came through it meant much easier work. No more filling lamps, they threw the water pail out, no more pumping water for stock with a stubborn gas motor, and produce and meats could go in a freezer.” Like countless others in the region, and nation, they also made sure to note that “a TV was wonderful, too.”²³⁵

Having reached rural homes around Custer County, fossil fuels and electricity would transform the community’s social activities and identity. In their article “U.S. Prairie and Plains Women in the 1920s: A Comparison of Women, Family and Environment,” Dorothy Schwieder and Deborah Fink argue that rural women living in communities west of the Missouri River in South Dakota from the turn of the century to the 1920s were more isolated from social and community life than were women living on farms further east in Iowa. Their location further north brought more extreme weather such as blizzards that kept them from going to town often, and their farms were often situated further from neighbors and towns, meaning they traveled to social events infrequently, especially those families with basic means of transportation. South Dakota women in the 1920s, they argue, took part in few social organizations and lived without the benefit of “school activities...picnics and box socials...being active in the nearby...church,” and “4-H clubs.”²³⁶

²³⁴ “The Donald Daughenbaugh Family,” in Evans, et al., *Our Yesterdays*, 647.

²³⁵ “Bill Hanlon Story,” in Evans et al., *Our Yesterdays*, 652.

²³⁶ Dorothy Schwieder and Deborah Fink, “U.S. Prairie and Plains Women in the 1920s: A Comparison of Women, Family, and Environment,” *Agricultural History* 73 (Spring 1999): 194-195.

Although residents of Custer County like the Hesnards did take part in community events prior to the use of electricity in homes and public buildings, most of those events took place closer to their immediate surroundings. Josephine and Theodore's granddaughter, also named Josephine, recalled that in their area of Custer County "in little country schools, plays, dancing, and gathering of people from near and far gave the social life and friends needed to help one another." The Hesnards were involved in local politics, starting the Hermosa Bank, and school social events.²³⁷ Clearly the Hesnards were not without access to a community, and perhaps the proximity of their ranches along the French Creek made their experience different from that of rural families further east on the plains. Nevertheless, these social events required time-consuming labor to hitch a team of horses to a wagon, as well as required time in driving teams to the event after a long day of work. Geraldine also remembered walking to many evening events along the Battle Creek in Custer County, carrying a lantern to light the way.²³⁸ Once inside the darkened school or church, the collection of each family's lantern provided light enough for the evening's events. The time involved in traveling to evening events, either by wagon or on foot, and the limited lighting played a role in limiting the frequency and scope of community events.

Changing transportation technologies affected the Hesnards' and Evanses' connection to their communities in Custer County. Most of Geraldine's memories regarding social life while living on the Hesnards' land along Battle Creek centered on the community of Hayward. Hayward residents did engage in the social events of Hermosa, but these events would have taken place less frequently because of the time required for travel. Closer to the Hesnards and many of their ranching neighbors along Battle Creek than Hermosa, Hayward had developed as

²³⁷ "Hesnard History," in Evans et al., *Our Yesterdays*, 759.

²³⁸ Geraldine Evans, interview by author, Windsor, Colorado, May 1, 2012.

the second mining town in the region in 1876 and local histories of the community mention the arrival of the “French Hesnards” to its folds in 1882 as “a wonderful addition.”²³⁹ Once a burgeoning community with a sawmill, mining camps, stage roads, and a schoolhouse, Hayward lost much of its significance as a community center when local ranch families acquired faster means to travel to Hermosa. When the coming of the Fremont, Elkhorn, and Missouri Railroad in 1886 made Hermosa the nearest major railroad terminus for Hayward residents, the railroad town acquired a greater importance as a commercial and communication hub. This, in turn, drew industry away from Hayward, connecting families like the Hesnards to the social and community events of the new railroad town of Hermosa.²⁴⁰

Furthermore, the arrival of another fossil-fuel technology, the automobile, allowed the Hesnards and Evanses to increase their connectivity to the community of Hermosa, affording them a faster way than using a wagon or their own feet to attending evening gatherings or social events. The same changes in energy shaped the Evanses’ community experiences in the middle part of the century. Replacing the wagons that would have made travel seven miles to Hermosa a difficult activity to do very often, the automobile helped the Evanses take part in the community events of Hermosa. In this way, the Hesnard and Evans families would use their fossil-fuel-powered automobiles to concretize new paths that would alter the shape of rural communities.

In addition to fossil-fuels in automobiles, their use in generating electricity also drew rural Custer County communities together, changing the social activities done therein. The “History of Hermosa,” entry in Custer County’s *Our Yesterday* counted “the coming of rural electrification” as “one of the big benefits to living,” as “kerosene and gas lamps were discarded,

²³⁹ Martha Linde, *Rushmore’s Golden Valleys* (Keystone, SD and Darien, CT: Permelia Publishing, 1988), 31-32.

²⁴⁰ *Ibid.*, 33.

wood stoves were put away and a more modern way of life was enjoyed over the town and countryside.”²⁴¹ The history of the “Folsom Ladies Aid and Mission Society,” organized in 1914 in the small Custer County town of Folsom, just miles away from the Evans Ranch, experienced the excitement and change that was to accompany electrification. In 1948, the authors explained “this energetic group had envisioned the certain possibility of having the luxury of electricity,” which was a “long looked for advancement” and would enabled the church to be “completely wired. Thus...we stored our gas lanterns and Ray-o-kerosene lamps for all time...R.E.A. had at last arrived!” As they had done in their homes for their immediate families, women could provide sustenance and provision for their church congregations when fossil-fuel-based technologies permitted their churches to have better kitchen appliances and lighting. Members surely would be grateful for central-service electricity, given their previous lighting which came from a small generator, which was mounted on a plank, and jacked up to the hind wheel of a parishoner’s “old Model T car,” to provide lights for a moving picture showing. Although somewhat less creative, central-service electric lights carried less risk of ruining a perfectly good outing when the bulbs burned out because someone sped up the motor.²⁴²

For the rural residents in the Custer County area, more and more homes and public spaces could be equipped with dependable lighting with the arrival of electricity in the 1950s. For the Evans family, this meant new social events and stronger connections to the community. Gatherings during Geraldine’s childhood frequently involved lighting a kerosene lantern and walking with one’s family to a church concert or a neighbor’s barn dance, which would also require lanterns as well.²⁴³ However, as more and more families linked themselves to the power

²⁴¹ “The History of Hermosa,” in Evans, et al., *Our Yesterdays*, 623.

²⁴² “Folsom Ladies Aid,” in Evans et al., *Our Yesterdays*, 604-605.

²⁴³ Geraldine Evans, interview by author, Windsor, Colorado, May 1, 2012.

of electric lighting, the flip of a switch could more easily light nighttime functions. Thus, rather than spending their evenings in their individual homes, communities could hold gatherings in the evening that they had not before.

Beyond social events and community life, fossil fuels altered the family's connection to resources, a change that had implications for the gender relations and roles. In the same way that self-propelled tractors gave ranchers new "paths" to secure resources for haying and feeding their cattle, so too would the automobile generate new "paths" for rural women to sustain their families and their ranches. In addition to using the vehicle to attend a church meeting, bring Irvin and the hired hands lemonade and cookies on warm summer afternoons, and go shopping for food and supplies, Geraldine utilized the automobile to reinvent her role as caregiver and homemaker to capital-provider and home-sustainer. She, like many other rural women in the middle part of the century, did this by taking an off-farm job to procure the necessary capital to sustain ranching operations. An article entitled from 1950 "Farm Brides Who Work in Town" from *Wallaces' Farmer* suggested that "the labor-saving devices which the farm wife now shares with her city cousin, together with better roads and more dependable automobiles...make it possible today for farm women to hold part-time jobs...."²⁴⁴ Furthermore, the authors of *Wallaces'* wrote that "it isn't for a TV set or a home freezer that...[the farm woman] is spending her salary. It's for school clothing, groceries, tractor fuel and farm payments...it seems that mom has come to town so dad and the kids can stay on the farm."²⁴⁵ Although the diffusion of fossil fuel-driven machines decreased the human muscle power requirements in ranch labor, it simultaneously created a demand for capital inputs for those technologies, both for initial

²⁴⁴ "Farm Brides Who Work in Town," *Wallaces' Farmer* (21 October 1950): 52, quoted in Jellison, *Entitled to Power*, 166.

²⁴⁵ John Clayton, "Farm Wife Turns Wage Eager," *Wallaces' Farmer* (20 October 1956): 60, quoted in Jellison, *Entitled to Power*, 166-167.

purchase and maintenance. As the number of farmers and ranchers shrank while agricultural productivity on their former lands increased following World War II, those hoping to persist in agriculture had to generate enough capital to keep up with the many purchases needed to keep productivity at high levels.²⁴⁶

Although Irvin did work for a time as an engineer in Rapid City, the expectation that the man would run the ranch left Geraldine with the role of securing a cash income for the family's, and the ranch's, needs. In a pattern that would not have been feasible with the constraints of time and fuel in the direct solar age, Geraldine managed to continue her job as wife, mother, and ranch laborer while also accepting a full-time position teaching home economics and special education at a Rapid City high school. Carrying her on the literal path to new resources was a gasoline-powered automobile, which allowed her to commute twenty-five miles each morning. Eventually, however, Irvin and Geraldine faced the grim prospect of keeping their ranch in operation or keeping the family together on the ranch all week long. The necessity of sending the children to school and Geraldine's needs to be closer to her job motivated the Evanses to make the hard choice of buying a home in Rapid City, where Geraldine and the children would live during the week.

²⁴⁶ Danbom, *Born in the Country*, 247.



Figure 10. Geraldine as a school teacher. ca. 1945, in author's possession.

This literal “path out of town” generated a new cycle of labor and emotions for the entire family. Geraldine recalled that the couple’s youngest daughter, Julie, missed her home at the ranch so much that she chose the bedroom in their “city home” that was the physically closest to the ranch. Brought closer by a matter of yards, Julie and the other children eagerly awaited the week’s end, when returning to the ranch meant the reunion with their father, their bedrooms, and the normalcy they had always known.²⁴⁷ For Geraldine, however, the week’s end meant attempting to cram an entire week’s worth of house labor into two days. After teaching an entire week of school and keeping a house in Rapid City with her children, Geraldine packed them, the

²⁴⁷ Irvin and Geraldine Evans, interview by author, Brighton, Colorado, March 17, 2011.

groceries, the week's laundry, and several hired-hands into the car every Friday afternoon to return to the ranch. Although glad to be reunited with her husband and back to the place she considered her true home, additional labor in the form of food preparation for the family and hired hands confronted her upon her arrival. In addition to these domestic duties, she also spent much of Saturday and Sunday aiding in the work in the pastures, and occasionally, driving back into Rapid City yet again for spare machine parts. Although the Evanses occasionally employed a hired hand year-round, the majority of the years that Geraldine and the children lived in town, Irvin labored by himself on the ranch, cooking his own meals and living alone. During that time, Geraldine still used electricity to contact Irvin during the week by telephone, knowing that if he did not answer the phone, she would drive twenty-five miles to make sure he had safely returned from work.²⁴⁸ This reflects the kind of anxieties and situations that surrounded the family's existence as energy enabled new "paths" for the Evans Ranch. If rural homemakers who worked another job in schools, hospitals, banks, stores and government offices preferred not to manage two households, most did so anyway, recognizing the sacrifices that seemed to accompany survival and progress.

It may not be as persnickety as angel food cake, but baking four batches of oatmeal cookies before breakfast is no easy task, Geraldine thought as she bent to pull the last of the trays from the sweltering oven. On a morning that held the promise of record-setting temperatures, she already felt a sense of relief as she removed a pitcher of orange juice from the refrigerator and poured glasses of the chilled beverage alongside morning snacks for herself and her family. After filling the sink with steaming, soapy water to wash the dishes, dressing the younger children, and

²⁴⁸ Irvin and Geraldine Evans, interview by author, Brighton, Colorado, March 17, 2011.

instructing the older ones to begin vacuuming their rooms, Geraldine hurried to squeeze six lemons into her sugar water and place the pitcher into her red plastic crate alongside the morning's cookies and several empty glasses. Checking that her oldest daughter could keep an eye on the other three children, she carried the crate to the pick-up truck waiting outside. Gauging her timing on the intensity of the sun through the open window, she flew over the gravel road towards the North Pasture, where Irvin and two hired hands toiled beneath the pressing heat. As they stopped their work and joined her at the truck, they updated her on the status of the work. *Can you run into Rapid City for a part for the Massey-Ferguson tractor?* Irvin asked. Assuring him that she would, she hopped back into the cab and hurried home, mentally planning how long it would take to purchase the part in Rapid City and return in time to heat the leftovers for lunch. She knew that both tasks, heading to Rapid for a tractor part and cooking lunch, were integral to the success of the work done at the ranch today, and that both tasks depended upon her labor.

A typical morning for Geraldine in the 1960s had her oscillating between duties as a rancher, a mother, a wife, homemaker, and tractor consumer, but running throughout all of these roles was the presence of labor involving fossil-fuel technologies. From the electricity used to bake the cookies to the gasoline used to drive into town, fossil-fuel-age energy sources entered Geraldine's labor in obtaining resources for her family. As she entered various spaces to do so, she practiced both "living upon the country" and "importing from Outside," descriptions that William Cronon uses alongside his concept of "paths" to decipher people's choices about resource availability and use.²⁴⁹ If sending her daughters to milk the cows each morning until the 1970s entailed "living upon the country," then paying their monthly electric bill in order to bake

²⁴⁹ Cronon, "Kennecott Journey," 37.

cookies and angel food cake meant “importing from the Outside.” Although Geraldine’s father had literally imported from the outside when he drove his team into his forest to chop wood for the family’s wood-burning stove, that process remained a relatively local way of supplying heat when compared to shipping in petroleum from Wyoming and cooking on a stove built in Ohio.

As more and more rural households and communities pursued technologies that had them “importing from the Outside,” their choices enmeshed them in new systems of mineral energy use, firmly rooting them in historian Edmund Burke’s fossil-fuel age.²⁵⁰ Although alfalfa continues to convert solar energy through photosynthesis to this day on the Evans Ranch, and cattle still depend upon herbaceous production to gain flesh year-round, much of ranch life and labor now reflects a deeper dependency on energy sources far distanced from the Evanses’ pastures of the Charles Draw, South Stars, the North Pasture, and the School Section. As rural homemakers increasingly traveled to off-ranch jobs and families in rural communities like Hermosa grew to expect evening gatherings in well-lighted public facilities or to talk on the telephone to their neighbors, rural individuals and families integrated themselves further into a system that had already started to gain momentum when the first steam engine utilized coal to navigate upstream and the first railroad chugged uphill. Their migration, their ranches, and their homes had become more labor-intensive as ranchers in South Dakota chose to engage the available fossil-fuel-age technologies alongside their solar-age predecessors. No longer did these people see themselves as living on an isolated island, separated by the rest of the ‘civilized world’ by the expanse of the northern Great Plains. Instead, their choices had helped them to imagine, and contrive, new “paths” according to their vision for making a living upon the land. What remained was the decision of what to take from the past and how to continue in the future.

²⁵⁰ Cronon, “Kennecott Journey,” 37; Burke III, “The Big Story,” 42.

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