TRANSFORMATION OF THE RED RIVER VALLEY OF THE NORTH:

AN ENVIRONMENTAL HISTORY

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ABSTRACT

This environmental history of the Red River Valley from the mid 1850s – 2000 encompasses those who lived in this tallgrass prairie region and asks how did they live within this environment? In addition, it seeks to understand how they utilized their surrounding natural world. Beyond this, with less than 1 percent of the tallgrass prairie remaining, this work showcases an important aspect of our region few know. Why is this important? The tallgrass helped create the fertile soil, which is the major reason for the high yields of wheat and other crops, and agriculture is the major industry in this region. Also, many of the native plants that once grew abundantly were eaten as food or used as medicine. A 'cornucopia' of food existed in this region. There is a loss in our Red River Valley that few know. This region was actually a complex environment, which looked remarkably simple to most who viewed the 'sea of waving grass.'

This environmental history researches the changes to the surrounding tallgrasses, wetlands, and rivers, as transitions occurred from Native American to Euro-American settlers who adjusted to this new prairie environment, changing the natural world in the process as well. Geology and geography help us to understand the issues of floods in this very young river valley. This research also addresses how changes since the early 1900s have dramatically altered our rivers and wetlands, which were a major part of this landscape, and how this has impacted our lives today. My original quest was to discover how this region appeared with its differing grasses and forbs, riparian forests along the rivers, and the thriving wildlife – bison, deer, elk, bears, wolves, and coyotes. In addition, I sought to understand how others had lived here before Euro-Americans settled in this Red River Valley.

All of this is important for us to better understand our environment and ourselves and to learn from our past for our present lives as well. This is a very unique environment and we are wealthy beyond measure in our residence upon it.

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CHAPTER 1: AN ENVIRONMENTAL HISTORY OF A YOUNG RIVER VALLEY

> "The Red River Valley is a flat plain resulting from sedimentation on the floor of Lake Agassiz; more than 95 percent of the area is gently sloping with local relief less than twenty-five feet in most places."[1]

On the eastern edge of the Northern Great Plains along the expanse of the Red River Valley basin, a hawk flies and circles overhead as it scans the landscape below for food. Over many centuries hawks continue to search in their timeless pattern of predator searching for prey, but much has changed in this tallgrass prairie region in the last 150 years. Before 1870, stretching along the Red River and its tributaries, the tall grass prairie landscape contained a myriad of forbs and grasses, some over six feet tall with roots seven feet deep into an even deeper dark loam topsoil. This was the region where a rider on a horse sometimes had to stand on the horse's back to look into the distant horizon. Multiple stands of hard and soft wood deciduous trees and fruit bearing shrubs grew along the river banks. Wildlife – bears – grizzly and black, bison, deer, elk, foxes, coyotes, bobcats, raccoons, beavers, and gray wolves, just to name a few, - thrived in the region as well.[2] Various Native American peoples, some who existed as far back as the Woodland culture of 1400 b.c., lived along the banks of the rivers. They subsisted on the fish, clams, crayfish, and turtles in the river, the wildlife on the grass-lands, the birds who nested in the grasses and marshlands, the differing native plants, and the fruit from trees and shrubs. Later, some Native American tribes, like the Cheyenne in the 1700s, cultivated gardens to supplement their diets, while others, like the Dakota, hunted the bison and added to

[1] John P. Bluemle, *The Face of North Dakota,* 3rd Edition (North Dakota Geological Survey: Educational Series 26, 2000), 4.

[2] Elwyn B. Robinson, *A History of North Dakota, An Outline for a College Course* (Grand Forks: University of North Dakota, 1952), 3.

their diets through trade and the harvest of native plants. They lived in a unique region. Now called the Red River Valley, this is the youngest river valley in the contiguous forty eight states.[3] The river serves as a watery boundary between western Minnesota and eastern North Dakota before it flows north into southern Manitoba, Canada. Though the river continues to flow north, few inhabitants foresaw a topographical transformation that began one hundred and fifty years ago on this tallgrass prairie landscape.

The Red River of the North and its tributaries might be conceived of as the skeleton of a human backbone with the major streams and rivers as its ribs.[4][See map – Figure A 1] Eight eastern North Dakota and eight western Minnesota rivers flow into the Red River. One of the longest tributaries, the Sheyenne River in North Dakota, begins in the midsection of the state, dips to the southeastern corner, and turns northward where it is joined by the Maple and the Rush Rivers before it meanders into the Red River ten miles north of Fargo. From the south to the north, the first tributary in North Dakota, the Wild Rice River, flows north nine miles above the South Dakota border in Sargent County into a large s-curve before it parallels the Red River north of Wahpeton, until it arches into the Red River sixteen miles south of Fargo. After the next tributary, the Sheyenne River, five shorter rivers, the Elm, Goose, Turtle, Forest, and Park, flow into the Red River. The last tributary, the Pembina River begins in Manitoba, flows south into North Dakota where the South Pembina River and the Tongue River flows into it before it empties into the Red River south of the Manitoba border.

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[3] Donald P. Schwert, 'A Geologist's Perspective on the Red River of the North: History, Geography, and Planning/Management Issues' (Moorhead, Minnesota: Proceedings 1st International Water Conference Red River Basin Institute, 2003), 2.

[4] Wayne Gunderson, Editor, *Common Waters, A Story of Life Along the Red River of the North* (Fargo, North Dakota: Institute for Regional Studies, 1997), 18.

In Minnesota, the Ottertail River, termed as the "main extension" and true source of the Red River's head waters by a few geographers, is the first southwestern river in Minnesota to flow into the Red River.[5] Others, however, state that the Bois de Sioux River from the south out of Lake Traverse and the Ottertail River from eastern Minnesota cojoin at Wahpeton, north Dakota, and Breckinridge, Minnesota, to create the Red River. This makes the first tributary into the Red River from Minnesota and about one third of the way along the North Dakota border, twenty miles north of Moorhead and Fargo, the Buffalo River, which enters the Red River at Georgetown. Originally constructed as the southernmost Hudson Bay fur trading post in the 1800s, this town was a hub of Red River cart and steamboat traffic up through the 1860s. As one travels north to the Manitoba border, one passes the Wild Rice, Marsh, and Sand Hill Rivers. Beyond these rivers, one encounters the Red Lake River where Grand Forks and East Grand Forks are now located. The Sheyenne River in North Dakota is the longest tributary of the Red River, but the Red Lake River surpasses the Sheyenne in the numerous branches which flow into the Red Lake River before it flows into the Red River.

The numerous subtributaries enter into the Red Lake River to surpass all other tributaries in amount of water discharged into the Red River. In fact, three rivers in Minnesota, the Red Lake River, the Roseau River, and the Otter Tail River easily double their annual discharge into the Red River as compared to other tributaries. The Red Lakes River has the highest flow of all three. It contributes five times as much water annually into the Red River as all other tributaries. While the Sheyenne River is impressive in its length, the Red Lake River in Minnesota is equally

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[5] Gene Krenze and Jay Leitch, *A River Runs North* ((C. I.): Red River Water Resources Council, 1998), 1.

impressive in its volume of water flow.[6] Both rivers, though, interconnect extensive territory and currently provide water for two of the three largest cities, Fargo and Grand Forks, in North Dakota, as well as Moorhead and East Grand Forks in Minnesota. The two tributary rivers flow near or into the cities. The Sheyenne River circles to the west around Fargo and West Fargo and enters the Red River ten miles north of Fargo and Moorhead. The Red Lake River runs into the Red River close to the downtown sector of East Grand Forks and Grand Forks. Other tributary rivers in Minnesota contain several streams before they join into one primary river. The Snake and Middle River join together and flow into the Red River north of the Red Lake River. The next northern river, the Tamarac River, flows singly into the Red River. The last northern river in Minnesota called the Two Rivers, has three forks, the North, the South, and a middle branch, which combine into a single tributary close to the Red River. The rivers in the Red River Valley basin along with the stands of trees and shrubs with miles of tall grass prairie in the horizon were at the heart of a region of luxuriant vegetative growth. Many Euro-American travelers thought of this landscape as ideal for agriculture with abundant water sources.

Now, many roads, fields, and city blocks form a geometric pattern of squares, triangles, and rectangles of urban communities and agricultural production. The geometric survey originated in Thomas Jefferson's proposal for the orderly division and sale of territorial land for agricultural and urban use.[7] On May 20, 1785, Congress passed a land ordinance which measured land for six mile square townships with right angles of lines, which ran north and south. This ordinance concerned the legal survey process which was designed to change

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[6] Ibid., 45.

[7] Andro Linklater, *Measuring America, How an Untamed Wilderness Shaped the United States and fulfilled the Promise of Democracy* (New York: Walker and Co., 2002), 70-72.

“wilderness” lands into “civilized” territories for Euro-American development.[8] Unacknowledged in this national grid of land development was the fact that the land had been utilized for centuries by differing Native American tribes. From setting spring prairie fires to green up the grass more quickly for animal enticement to cultivation of their own gardens. Indians subsisted on the land and within their environment. Two very different land use philosophies clashed, as the Euro-American settlers, sometimes slowly, while other times rapidly, claimed and changed land into an agricultural commodity for their livelihood. The transformation of the original tall grass prairie landscape was dramatic.

Though hawks still soar above the Red River Valley in their timeless search for food, less than one per cent of the original tallgrass prairie exists. Marshes and wetlands were drained for commercial agriculture and urban development. According to geographer Dr. W. J. Carlyle, “The [Red River] valley is one of the largest artificially drained landscapes in the world.”[9] Miles of principal drains, small laterals and channels for rural and urban areas numbered in the thousands.[10] Railroads and improved roads added to more changes in the tall grass landscape. Railroads diagonally cut the landscape and created some of the first drainage ditches. Trains furnished transportation for settlers and commercial goods into and out of the region. Numerous paved and gravel roads with ditches to streamline water run-off provided avenues for automotive transportation to fields, farms, cities, and markets and delineated commercial and residential property. Increased use of tractors during the 1900s altered the landscape, which contributed to

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[8] Ibid, 73.

[9] Dr. W.J. Carlyle, “Water in the Red River Valley of the North,” *Geographical Review* Vol. 74, No.3 (New York City, New York: The American Geographical Society of New York, l984), 344.

[10] Ibid.

more efficiency and productivity, plowing more land for agriculture, leveling the land, and creating more ditches and dikes.[11] Dams built after the mid l900s further changed the natural topography of the landscape. Many were constructed to forestall overland flooding or hold water for future droughts. In the process, prime river bottom land changed into water reservoirs or lakes for fish and recreational use. Other changes occurred on the tall grass prairie.

From the late l800s into the l930s, Euro-Americans planted trees for city and country beautification. The federal government initially encouraged settlers to plant ten acres of trees for an additional acquisition of 160 acres of land in the Timber Culture Act of l873. Originally in l862, the Homestead Act granted a homesteader 160 acres of land for cultivating part of the land and living on it for five years for a small entry fee.[12] In the early l900s, the land grant agricultural college in Fargo encouraged farmers to plant shelterbelts. In the l930s, the federal government provided land conservation programs for soil preservation of marginal land. Civilian Conservation Corps workers planted rows of trees across the Red River Valley for soil conservation. Once primarily located along streams and riverbanks, trees now bordered fields of wheat, potatoes, or sugar beets where miles of tall grass originally reigned. Prairie fires, which once inhibited trees from growing on the prairies, diminished as agricultural cultivation on the landscape increased. The original inhabitants of the tallgrass – animals, birds, butterflies, for example, decreased as their habitat did also. New inhabitants, Euro-American settlers and their domesticated poultry, livestock, and commercial crops displaced many of the original inhabitants

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[11] David B. Danbom, *Born in the Country, A History of Rural America* (Baltimore: John Hopkins Press, 1995), 236.

[12] Elwyn B. Robinson, *History of North Dakota* (Lincoln, London: University of Nebraska Press, 1966), 148, 149.

– Native American tribes - and herds of elk, buffalo, and deer and flocks of water fowl and native birds, which had flourished amongst the native grasses and forbs of a tall grass prairie; a prairie which had evolved over hundreds of years to form a distinct landscape.

The Red River Valley's history from l800s and onward is an environmental history of human interaction, construction, and transformation. This was once a landscape of endless curves and different heights of grasses and forbs, ribbons of trees and shrubs juxtaposed along the corkscrew river banks with marshes, ponds, and small streams throughout the river valley and prairie. Abundant wildlife occupied the region. While much has changed to the topography of the prairie, what has not changed is the former and current residents' love for this region as a distinct 'place.' Historian David R. Wroble in *Promised Lands* wrote about the juxtaposition of differing artifacts and people who identified themselves with a specific place. "The human need for self-validation," he wrote, "is a vital aspect of gaining a sense of place."[13] Wherever people lived, worked, or played in the tallgrass river valley basin, they claimed and loved this land for themselves and their families. Even periodic floods of a geologically young Red River that tries to create a true river valley of hills or return to its original Lake Agassiz does not deter those who live in this valley. Current residents are forming their own history as they live in this Red River Valley. What is required is a new environmental history in order to better understand ourselves, our environment, and our history of 'place.' In addition, historians, sociologists, anthropologists, archeologists, geographers, geologists, and journalists researched and wrote of the Red River Valley and its tributaries as a 'unique place' as well. Hence, this environmental history incorporates how former inhabitants – Native Americans and Euro-American settlers – lived and

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[13] David R. Wrobel, *Promised Lands, Promotion, Memory, and the Creation of the American West* (Lawrence: University of Kansas Press, 2002), 188.

adapted within this region, how they transformed the landscape, and how they interconnected within this Red River Valley tall grass environment.

A historian renowned for writing a history of the Great Plains as a distinct region in l931, Walter Prescott Webb, wrote that successful Euro-American settlement occurred on the Great Plains after numerous successful inventions helped them to adapt. The semi-arid continental climate characterized by its "monotony of grass" and few trees contrasted sharply from the forested, eastern United States.[14] Sociologist Carl Frederick Kraenzel's *The Great Plains in Transition,* published in l951, described an exploited hinterland wherein some progress had been made in technological, economic, and social-institutional adaptations. Though some adaptation occurred, he felt that few understood the grassland environment in which they lived. Most settlers who moved on to the Great Plains brought their humid environment, eastern farming methods with them.[15] While both Webb and Kraenzel concurred about the unique environment of the Great Plains, Kraenzel suggested that, as technology advanced into the l950s, few Euro-Americans understood or lived in proper relationship to their Great Plains environment. If this is true, an important issue in this dissertation concerns the adaptation of settlers to the Great Plains and, in particular, this part of the Great Plains, the Red River Valley. Another historian Elwyn B. Robinson noted Euro-American settlers reaction to their new prairie landscape:

> The semiarid climate intensified the feeling of having been uprooted from familiar surroundings and transplanted in a strange land. All the settlers except the German Russians came from humid regions and were awed by the vast, open, almost barren prairie.[16]

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[14] Walter Prescott Webb, *The Great Plains* (Lincoln: University of Nebraska Press, 1931), 32.

[15] Carl Frederick Kraenzel, *The Great Plains in Transition* (Norman: University of Oklahoma Press, l955), 6-7.

[16] Elwyn B.Robinson, *History of North Dakota,* 156.

What did Euro-American settlers view when they reached the Red River Valley? Though many Sheyenne River Valley residents lived surrounded by hills, the Red River Valley itself is a fairly level plain. Still geologically young, the Red River Valley differed from others with only a little definition of a rise from the river's banks. Like its tributary rivers, it was outlined by deciduous trees and shrubs and met by marshes and miles of tall grass prairie. Periodic prairie fires had kept many of the trees and shrubs from spreading into the prairie. Recurrent signs of floods were evident in tumbled timber and high bank erosion along the river's edge. Wide enough to once carry steamboats, the Red River impressed many with its sharp horseshoe curves and epic flood stories.

Twenty major and minor rivers and streams flow into the Red River, which flows north into Lake Winnipeg. As the 450 mile river flows north, the river falls about one-half foot per mile. Hence, near Wahpeton and Breckenridge, where the Red River begins, its elevation of 963 feet slowly lowers to an elevation of 755 feet at its mouth at Lake Winnipeg in Manitoba, Canada.[17] The spring overland flooding is a norm when too much water melts too fast in a river that flows north. The almost flat "former floor of glacial Lake Agassiz" of the Red River Valley, which gently slopes toward the Red River, increases the probabilities of overland flooding as well.[18] From Minnesota and North Dakota, many tributaries which flow into the Red River acerbate a flood if that tributary is heavily impacted with snow or if ice jams its channel. Urban and rural development with roads, tiled fields, and large culverts plus deep ditches, diversions, buildings, and large expanses of concrete for sidewalks and parking lots contribute to a rapid

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[17] Walter W. Augustadt, "Drainage in the Red River Valley of the North," *Water, The Yearbook of Agriculture, l955* (Washington, D.C.: United States Printing Office, l955), 569.

[18] John P. Bluemle, *The Face of North Dakota,* 4, 5.

run-off and increased velocity of floods. In *A River Runs North,* authors Gene Krenze and Jay Leitch observed that originally "the Red River Basin was an area searching for, but never reaching an elusive natural equilibrium. The river was ever so slowly cutting to grade, . . ."[19] Clearly, when the Red River floods, it continues to seek some form of equilibrium as the water overflows the land. Hence, settlers moved into a tall grass prairie which experienced periodic overland floods. In the 1860s and early l870s, homesteaders, bonanza farmers, and entrepreneurs viewed an agriculturalists' landscape dream. Yet few understood how dramatic shifts in climate along with prairie fires and other environmental risks caused constant challenges. This is why geography and geology provide important clues to how Euro-American settlers adjusted to their grassland environment and claimed their 'sense of place' in their new landscape. How did the landscape change Euro-American settlers and how did they change their surrounding landscape as they discovered what lived within their environment besides them?

In the l970s, a few historians began to incorporate more of the environment into their histories. A seminal and prolific environmental historian, Donald Worster published *Nature's Economy* in l977. He wrote a history of ecology and highlighted the importance of humankind's perception of nature and humans' place within it.[20] He explored how "different people for different reasons in different ways" defined the "economy of nature" through differing historical eras.[21] In another environmental history, the *Dust Bowl,* Worster described how Euro-American agriculture jeopardized the very landscape upon which it depended in the Great Plains. He

[19] Gene Krenze and Jay Leitch, *A River Runs North* ([C.I]: Red River Water Resources Council, 1993, 1998,) 15.

[20] Donald Worster, *Nature's Economy, A History of Ecological Ideas, Second Edition* (New York: Cambridge University Press, 1977, 1994), xiii.

[21] Ibid., x.

concluded that the impact of the drought on a lifeless land displayed how commercial farmers who utilized industrial agriculture "overran a fragile earth."[22] In other words, large scale technological and fossil fuel use conflicted with the ecological and environmental land use of former diversified farm operations to the detriment of all. The early l900s "culture and social system" of capitalism came at the cost of a high "environmental loss."[23] How much of this occurred in the Red River Valley's transformation?

For the Red River Valley, much of the landscape of tall grass prairie intermixed with river tributaries and wetlands changed rapidly from a complex prairie into an agricultural monoculture of wheat. Regional agricultural historians, Hiram Drache and Norman Stanley Murray, addressed this transformation in their histories. Hiram Drache in *The Day of the Bonanza* and the *Challenge of the Prairie,* along with other works, explored the development and problems of agricultural enterprise which settlers encountered. In his history of bonanza farms, Drache suggested that their mystique was "out of proportion to their number and acreage in the agriculture of the Red River Valley."[24] He described how bonanza farms epitomized industrialization. With large scale machinery, a manager supervised labor force, the most current methodology, and special contracts with grain companies and railroads, the bonanza farm were modeled upon other big businesses of the age like Andrew Carnegie's steel or John D.

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[22] Donald Worster, *Dust Bowl, The Southern Plains in the l930s* (New York: Oxford University Press, 1979), 243.

[23] Ibid., 242.

[24] Hiram M. Drache, *The Day of the Bonanza, A History of Bonanza Farming in the Red River Valley of the North* (Fargo: North Dakota Institute for Regional Studies, l964), 69.

Rockefeller's Standard Oil businesses.[25] Similarly, bonanza farms symbolized the innovative and technological expertise of the capitalistic mind.

Environmentally, the large scale cultivation overturned centuries of a perennial tallgrass prairie ecosystem into a profitable harvest of a monoculture of a new annual grass - wheat. Drache noted that the Red River Valley itself was called the "land of the sure crop" due to its fertile soil and the soil's high water holding capacity.[26] After several years, though, continued cultivation of an annual grass along with the accidental or a few purposeful introduction of invasive non native weeds and decreasing fertility in the soil reduced profitable yields. Eventually, bonanza farm owners sold or rented much of their land in smaller parcels to settlers. Many of the smaller farm owners, whom Drache explored more thoroughly in *Challenges of the Prairie*, utilized diversified farm methods. This benefited not only their agricultural enterprises but their surrounding environment as well.

Agricultural historian Norman Stanley Murray's analysis of bonanza farms concluded that farm operations changed from one crop large farms to smaller diversified farms between the l870s and middle l900s. Though the grasslands were readily turned into valuable crop land, wet land curtailed agricultural production. Murray explained that "only half of the Red River valley land was used for crop production up to l920."[27] Hence, once drainage seriously commenced in the early 1900s, the landscape of perennial tall grasses and forbs with deep roots intermixed in

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[25] Ibid.

[26] Hiram Drache, *Challenge of the Prairie* (Fargo: North Dakota Institute of Regional Studies, l970), xii.

[27] Norman Stanley Murray, *The Valley Comes of Age, A History of Agriculture in the Valley of the Red River of the North, l812-1920* (Fargo: North Dakota Institute for Regional Studies, l967), 175.

the soil lost much of its complexity and moisture. The insects, birds, and other wildlife dependent on their tallgrass environment diminished in numbers as well. Murray noted how scientists from the Agricultural College in Fargo helped farmers increase their production through the development and introduction of improved seeds, chemical weed sprays, crop rotation, and poultry and livestock education, just to name a few. Education also benefited farmers through farmer's institutes, the extension agency, and various publications.[28] How this benefited farmers in their adaptation to their surrounding landscape or helped or hindered their 'unique' environment is another question which needs to be addressed. Other questions apply as well. Was the Red River landscape damaged by industrial agriculture and massive 'plow ups' as noted by Worster in the *Dust Bowl* or did farmers who utilized diversified farming practices, as suggested by Murray, manage their land better for soil containment? Did the soil's capacity to hold water continue as farmers drained wetlands, as Drache maintained, or was the dramatic transformation of the landscape to the benefit or detriment of its residents? How has geology and geography influenced this area to become one of the premier agricultural sites in the United States or has it?

Another preeminent environmental historian, William Cronon, author of *Changes in the Land,* a pioneering study about Native Americans and colonists in New England, noted how the environment affected the people who lived within it and how people changed the environment.[29] Such interaction between cultures and ecology occurred in the Red River Valley long before Euro-American settlement. Thriving communities of differing Native American tribes, like the

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[28] Murray, *Valley Comes of Age,* 175-182.

[29] William Cronon, *Changes in the Land, Indians, Colonists, and the Ecology of New England* (New York: Hill and Wang, 1983), 162-167.

Cheyenne, Dakota, and Ojibway, lived, gardened, and hunted successfully in this region and took full advantage of the "cornucopia" of wildlife, birds, fish, native plants and fruit. Native Americans utilized natural resources for their food, medicine, clothing, and shelter. What appeared to Euro-Americans as a 'wild' environment of few inhabitants was, in reality, a careful managed natural garden and game resource for those numerous inhabitants who subsisted upon the tall grass environment. "The power of the Dakotas had always dwelt in the land," noted Wanbdi Wakiya, "Long before the white man ever dreamed of our existence, the Dakota roamed this land."[30] More change occurred after the establishment of fur trading posts, which created a higher demand for furs in exchange for Euro-American goods. Furs, buffalo skins, buffalo tongues, and pemmican were turned into commodities for trade. The Metis perfected the trade and initiated the market system in the mid l800s with their innovative Red River carts and various Red River trails between St. Paul, Minnesota, and Pembina, North Dakota. Pembina, once a thriving fur trading post and a part of Canada, now lies within the northern border of North Dakota. Steamboats in the mid l800s and railroads by the l870s improved and increased trade between Fort Garry in Canada, Pembina, Georgetown, Fort Abercrombie, and Fargo, besides other towns in the Red River Valley, and St. Paul, Minnesota.

During this same time, agricultural enterprise had not lain dormant. Though the Hudson Bay Company fought against any form of agriculture within its fur harvesting domain, Selkirk settlers near Pembina successfully planted and harvested crops in the early 1800s. Unfortunately, they were too far from any market to profit from their enterprise.[31] Once railroads established

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[30] Gwen Westerman and Bruce White, *Mni Sota Makoce, The Land of the Dakota* (St. Paul: Minnesota Historical Society Press, 2012), 13.

[31] Murray, *Valley Comes of Age,* 44.

more efficient and reliable transportation, agriculture became the Red River Valley's primary commodity enterprise.

More recent environmental histories, though not about the Red River Valley, are important to understand settlers' perceptions, interactions, and consequences as they transformed their environments and themselves where they lived. In *Larding the Lean Earth,* agricultural and environmental historian Steven Stoll broadens the environmental scope of history to include agriculture in how it shaped the physical and imagined landscape.[32] Environmental historian Philip J. Pauly, in *Fruits and Plains, The Horticultural Transformation of America,* adds an important dimension in horticulturists' introductions of hybridized or 'discovered' plants to the Great Plains.[33] An earlier history by agricultural historian David Danbom, *Our Purpose is to Serve,* which does focus on the Red River Valley, elaborates on Pauly's topic. Danbom describes how scientists at the Agricultural College in Fargo developed grain and vegetable seeds, cross bred livestock, and propagated fruit trees specifically for the Red River Valley in the late l880s to the mid 1900s.[34]

A horticulturalist, William H. Alderman, focused the topic further by analyzing scientists, nurserymen and women, and gardeners who focused on vegetable, fruit, and flower research and production in his *Development of Horticulture on the Northern Great Plains.*[35] His horticulture

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[32] Steven Stoll, *Larding the Lean Earth, Soil and Society in Nineteenth-Century America* (New York: Hill and Wang, 2002), 8.

[33] Philip J. Pauly, *Fruits and Plains, The Horticultural Transformation of America* (Cambridge, Massachusetts: Harvard University Press, 2007), 4.

[34] David B. Danbom, *Our Purpose is to Serve, The First Century of the North Dakota Experiment Station* (Fargo: North Dakota Institute for Regional Studies, 1990), IX.

.[35] W. H. Alderman, *Development of Horticulture on the Northern Great Plains* (St. Paul, Minnesota: Great Plains Region American Society for Horticultural Science, l962), 3, 4.

history blended in well with the later work of environmental historian, Ann Vileisis, whose recently published *Kitchen Literacy* noted settlers' knowledge of their food and how we have recently lost this knowledge. Their wisdom lay in the knowledge of food, its origin, its preparation, and its importance in everyone's diet.[36] In his history, Alderman showcased how scientists and settlers carefully propagated plants and saved the best seeds for quality vegetables and fruit to grow in their Red River environment. He also elaborated on the importance of scientists and settlers who attempted to save native plants for study and cross breed native fruit with other varieties to improve fruit production.

These environmental histories along with others provide important historical insights into humans' thoughts and actions as they worked within their environments. With primary research into diaries, letters, and journals plus these environmental histories and other secondary sources, this new environmental history of the Red River Valley will offer a close up view of how Native American and Euro-American settlers understood their environment and how the environment in turn transformed them. It will portray a rich history, which floats within and on this Red River, its tributaries, and its surrounding tall grass prairie of a deep, rich agricultural soil. For instance, "the Red River Valley . . .is the nation's third most productive area" in the United States for potatoes.[37] Centuries of tallgrass prairie and the floods created the rich, deep soil on a fairly

[36] Ann Vileisis, *Kitchen Literacy, How We Lost Knowledge of Where Food Comes from and Why We Need to Get It Back* (Washington: Island Press, 2008), 16, 17, 21.

[37] Gerry Gilmour, Editor, "Spud Love," *The Extra, Red River Valley's Weekly News Magazine,* 21-27 July 2011, Vol.10, Issue 29, Moorhead, Minnesota.

level, slightly rolling plain, which benefits agriculture today. The valley was often compared to the fertile valley of the Nile.[38] This is one reason for writing this dissertation.

Another reason for writing this dissertation is that much of the Red River Valley's history and environment prior to Euro-American settlement is almost unknown. In the history of the Red River, its tributaries, and this tall grass prairie region, there is a need to better understand this region and those who lived in it prior to Euro-American settlement.

The third rational to write this environmental history is to explore the tallgrass prairie - the flora and fauna - that once existed in the Red River Valley. A miniscule portion of it still exists. Marshes and ponds, which slowed agricultural settlement in the late 1800s and early l900s, were drained for more urban development and agricultural production. The huge herds of bison, large flocks of passenger pigeons, the immense variety in wildlife, birds, insects, butterflies, and the intricate plant life, which appeared to some settlers as "a sea of waving grass," compels us to understand the environmental history to understand our history of the tall grass prairie better.[39]

Recently, an even greater change in agriculture has occurred characterized by less diversification, increased loss of smaller size family farms for larger agricultural enterprises, and increased use of synthetic fertilizers, pesticides, herbicides, and genetically engineered seeds. A smaller group of organic farmers, who significantly utilize the prairie landscape for agricultural, are a rising element in commercial food production. From the late l880s to now, agricultural

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[38] Robert P. Wilkins and Wynona H. Wilkins, *North Dakota* (Nashville, Tennessee: American Association for State and Local History, l977), 7.

[39] Fannie Mahood Heath, "Flowers from Snow to Snow on the Dakota Great Plains," *Garden and Home Builder* (May l924), 223.

scientists, horticulturists, and others researched for better seed, livestock, and methodology for agricultural development on the grasslands. Innovations in technology and machinery created greater flexibility, reduced time, and increased efficiency in farm production. What was once subsistence agriculture changed dramatically to commercial agriculture in the l900s. As land use steadily increased in agriculture, diversification decreased the existence of wetland and prairie habitats. While landscape change has continued throughout Euro-American settlement to now, a logical set of questions arise: is there a sense of loss for those who claim the Red River Valley as their own 'sense of place' or is there a pride in this continuum of change?

Has there been an undercurrent of loss throughout the tall grass 'changing landscape' as Native Americans and Euro-Americans witnessed or created these changes? This is the final reason for writing this dissertation. What is the Red River Valley? How did inhabitants respond to their environment, how did they adapt to their surroundings, and what was their perception of this valley? Is there a lesson to be learned in what they themselves learned about the Red River Valley? And how does this valley affect the people whose 'sense of place' claim this land as their home in relation to other inhabitants who continue to live in this tall grass prairie environment as well?

CHAPTER 2: ABUNDANT LIFE IN THE DIVERSE, TALLGRASS RED RIVER VALLEY

"It was a region mysterious for its apparent simplicity."[1]

Out of the tallgrass prairie that once covered the Red River Valley, only a miniscule portion still exists. In North Dakota less than 2000 acres and in Minnesota between 75,000 and 150,000 acres from high quality to severely degraded native prairie prevail.[2] Once from southern Manitoba to the mid-eastern sector of Texas, the tall grass prairie region contained over 221,436 square miles.[3] In the Red River Valley, 17,000 square miles of prairie and parkland existed. By l997, only 500 to 700 square miles still remained.[4] Marshes and ponds with tall sedges, reeds, cattails, and other wetland plants used to be interspersed among the grasses and forbs of the tall grass region. So numerous were these wetland areas that it actually slowed Euro-American agricultural settlement in the late l800s and early l900s. For instance, a settler wrote in his journal of his family who homesteaded in the early l880s fifteen miles north of Fargo. Several years of overly wet conditions curtailed agriculture so much that they lost their first homestead. They refiled, though, for farm land which was north and farther west of the Red River on drier, less marshy land. This time they succeeded.[5] Ironically, while the deep loam topsoil of the rich

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[1] Louise Erdrich, 'Big Grass,' *The Tallgrass Prairie Reader*, Edited by John T. Price (Iowa City: University of Iowa Press, 2014), 227.

[2] Sylvan T. Runkel and Dean M. Roosa, *Wildflowers of the Tallgrass Prairie: the Upper Midwest* (Ames: Iowa State University Press, l989), 4.

[3] Ibid., 3.

[4] Kim Alan Chapman, Adelheid Fischer, Mary Kinsella Ziegehagen, *Valley of Grass, Tallgrass Prairie and Parkland of the Red River Region* (St. Cloud: North Star Press, 1998), ii.

[5] Ben H. Barrett, *Pioneer Days, North Dakota Prairies* (Unpublished manuscript: North Dakota State University Library, l960 (?), 1, 2. 3.

prairie promised homesteaders wealth in harvested grain, the pot holes, marshes and almost level landscape with slow drainage kept many from realizing their dreams. Though the landscape appeared an agriculturalist's dream, farmers learned that the land itself, the environment, were much more complex than it first appeared. In fact, as noted previously, many first witnessed the tall grass waving in the wind they compared it to an ocean or sea.

What was not understood by many was how diverse and deceptive like the imagery of a peaceful sea or ocean the tallgrass prairie was. Those with a history on the prairie – the Cheyenne, Dakota, Cree, Assiniboine, and Ojibway – understood and lived within the intricacies of their surrounding environment. Special areas on the grassland were reserved for annual hunts and meetings, celebrations, trading and living sites, and turned into debatable hunting and buffer zones among the Dakota and Ojibway.[6] They knew the land and what it contained intimately.[7] On the other hand, for many Euro-American settlers, the Red River Valley was a 'new world.'

A map of the Red River basin reveals how extensive an area of western Minnesota and eastern North Dakota the river and its tributaries influence. [Figure A 2] The basin contains over one third of the land area in North Dakota and almost one fourth of northwestern Minnesota's landscape. Like all other rivers, the Red River of the North and its tributaries furnished habitat for plants, wildlife, and humans. The rivers first attracted Native Americans and later Euro-Americans to settle along its banks. The trees and shrubs which grew along the river banks supplied inhabitants with shelter, shade, firewood, food, and housing. Green ash, *Fraxinus*

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[6] Harold Hickerson, *The Chippewa and Their Neighbors, A Study in Ethnohistory* (Prospect Heights, Illinois: Waveland Press, Inc., l988), 73.

[7] Gerald Friesen, *The Canadian Prairies, A History* (Toronto: University of Toronto Press, 1987), 14, 15.

pennsylvanica, American elm, *Ulmas americana,* boxelder, *Acer negundo,* bur oak, *Quercus macrocarpa,* and basswood, *Tilia americana,* and hackberry, *Celtis occidentalis,* were the primary trees found along the Red River.[8] Along the river's edge, cottonwoods, *Populus deltoides,* and peach-leaved willows, *Salix alba,* more water tolerant, grew as well. Out of 26 native shrubs and vines, wolfberry, *Symphoricarpos occidentalis,* Missouri gooseberry, *Ribes missourienses,* Virginia creeper, *Parthenocissus vitacea,* wild grape, *Vitis vulpine,* chokecherry, *Prunus virginiana,* and prickly ash, *Zanthoxylum americanum,* grew in abundance.[9] While these were the primary trees and shrubs found along the river, other varieties grew as well. Farther north, tree variety changed with differing plant zones, soil and climatic conditions among the varieties were elm, ash, oak and poplar.[10]

Prairie fires also affected the trees which grew along the river. While prairie fires were the "guardians of the tall-grass prairies," most forests were highly resistant to ground fires.[11] Oaks, *Quercus macrocarpa,* due to a "thicker bark," not only withstood fires best but sometimes formed oak savannas because of their high resistance to fires.[12] Floods afflicted river valley trees even more than prairie fires. Tree seedling mortality, ice damaged bark, which attracted disease or girdled trees, or complete mortality if floods continued for several successive years, all took their toll on individual trees and forests.[13] Fortunately, though, the variability of spring floods

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[8] Wallace James Wanek, "The Gallery Forest Vegetation of the Red River of the North" (Ph.D. Dissertation, North Dakota State University, August, l967), 33.

[9] Ibid., 81.

[10] Ibid., 103.

[11] Candace Savage, *Prairie, A Natural History* (Vancouver: Greystone Books, 2004), 85.

[12] Ibid., Wallace James Wanek, "The Gallery Forest," 42, 118.

[13] Ibid., 43.

seldom damaged an entire forest along the rivers. Sometimes, the mighty herds of thirsty bison proved much more damaging to trees and the riverbank than prairie fires or floods. Trampled younger trees or brush and rubbed-off bark on older trees by bison devastated some areas where bison passed.[14] While these forests benefited inhabitants, the rivers provided the trees with moisture for their growth. The rivers also supplied water to area residents for drinking, cooking, cleaning, and bathing.

When Anthropologist Mary Adair studied Central Plains Native American and Euro-American subsistence patterns, she found that large sedentary Native American populations restricted themselves to the river valley zones.[15] The river valley provided a variety of plentiful natural resources. Rainfall, sometimes inadequate on the semiarid prairie for farming, was supplemented by the water from the river. Abundant wildlife and fish also existed in the river valleys. Within Native American communities, the men provided the protein by hunting and the women supplemented the Native American diet with carbohydrates. They planted gardens, gathered native plants for various uses, harvested crops, cooked meals, and made pottery for various functions such as storage of plant material. From native plants, women decorated and dyed clothing, made herbal teas, helped heal minor illnesses, and fed their families and their communities. Both genders worked together for the betterment of their families and community.[16] This proved true for generations of Native American families and their

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[14] Gerald Friesen, *The Canadian Prairies, A History,* 8.

[15] Mary J. Adair, *Prehistoric Cultivation in the Central Plains: Its Development and* I*mportanc*e (PhD dissertation: University of Kansas, l984), 15.

[16] Sylvia Van Kirk, *"Many Tender Ties" Women in Fur-Trade Society, 1670-1870* (Winnipeg: Watson and Dwyer Publishing Ltd., 1980), 56-57.

communities in the Red River Valley and the Euro-American settlers who eventually replaced the original occupants.

Archeological sources clearly reveal that many Native American communities, some horticultural, existed along the Red River and its tributaries. In his archeological research, Robert Thompson researched in 1990 what is now called the "Dahnke-Reinke site" at the confluence of the Red and Sheyenne rivers. He discovered numerous artifacts and ecofacts in his excavations. He and his helpers unearthed bones of bison, dogs, beavers, muskrats, white-tailed deer, elk, and turkey. Other bones suggested that villagers at the site fished for catfish, bullhead and pike. Moreover, remains from starchy seeds, grass, legumes and squash plus nut shells and various plant seeds indicated that these villages collected native forbs and grew their own plants for their diet.[17] Another archeologist, Michael Michlovic, noted not only the "Danke-Reinke site" as an early Native American village but others in Cass County, North Dakota, and Clay County, Minnesota. A Shea site overlooked the Maple River south of Embden, North Dakota. At this site, evidence existed that the inhabitants cultivated maize besides their harvest of native plants. They also hunted the bison and other wild game.[18] The white-tail jack rabbits, striped or thirteen-lined ground squirrels, gray ground squirrels flickertail squirrels, wolves, coyotes, red foxes, weasels, badgers, masked shrews, minks, moose, elk, beavers, white-tailed deer, flying squirrels, gray squirrels, red squirrels, least chipmunks, eastern chipmunks, snowshoe hares, Canada lynx,

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[17] Robert G. Thompson, "The Archaeology of the Dahnke-Reinke Site," Unpublished Report submitted to North Dakota State Historical Society for North Dakota State Historical Society and the University of Iowa, North Dakota State Historical Society Library, Bismarck, North Dakota, July l990.

[18] Michael Michlovic, "Archaeological Sites in Cass County, N.D. and Clay County, Minn.," Unpublished Report, Minnesota State University, Moorhead, Minnesota, March 2001, 1, 2.

skunks, raccoons, muskrats, black bears, and grizzly bears were some of the mammals in the gallery forests, marshes, and prairie that existed in the Red River Valley to hunt. It all depended on where one located their village or hunted.[19] Other woodland village sites were discovered near the Maple River, another on the eastern edge of Kindred.[20] All sites furnished evidence of thriving Native American settlements, which dated back to the late Woodland era.

Archeologist Thompson hypothesized that during this period 380 B.C. to C.E. 239, the vegetation and climate were similar to what exists today:

> The vegetation . . . falls into two major communities. . . [Along] the Red River and its tributaries . . . [existed] a gallery forest. Cotton, elm, ash, boxelder, basswood, and oak are the dominant species. . . The . . . uplands are dominated by tall grass prairie. Big and little bluestem, cordgrass, switchgrass and Indiangrass are the dominant species.[21]

Archaeologists and anthropologists were not the only ones who discovered abundant evidence of other cultures who used the Red River environment for their livelihood. Accounts from Euro-American explorers, surveyors, soldiers, and settlers reported not only about Native American villages and people who they encountered but of burial mounds, village ruins, and stone artifacts. These reports and artifacts verified a rich history of Native American people in the Red River basin. Some indicated the existence of past horticultural communities along the Red River and its tributaries. Very visible were the burial mounds. These innumerable mounds along the western edge of the Red River Valley tributaries' hills, particularly the Sheyenne River, were interspersed throughout the valley. Archeologist C. L. Dill suggested that as far back

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[19] Dr. Richard H. Pemble, "The Natural History of the Red River Valley Region Before European Settlement," Published Lecture, March 8, 2005, Minnesota State University, 8-17.

[20] Ibid.

[21] Thompson, "The Archaeology of the Dahnke-Reinke Site," 48.

as 900 C. E. evidence existed of the eastern Woodland peoples in the valley.[22] They brought their agricultural practices with them. According to historian Felipe Fernandez-Armesto, "the confusingly named Jerusalem artichoke, *Helianthus tuberosa,* was first cultivated –or, at least "managed" – in its native eastern woodlands in the third millennium B. C.[23] He added:

> Other varieties of sunflower and sump weed were favored for their oily seed. goosefoot, knotweed, and maygrass could be pounded for flour. Gourds and squash, which were indigenous to the same region, are exceptionally easy to adapt for agriculture.[24]

These Woodland inhabitants planted and grew crops in their gardens for food and hunted as well. They differed from the Plains people in how they buried their dead. Instead of placing the wrapped body on a raised platform or under low piles of rocks, the woodland people buried their dead in the ground. They then built a round mound over the grave and placed the sitting body with various items for his or her afterlife use.

When Euro-Americans infiltrated the river valleys, some of the mounds were dug and explored. For instance, during General Henry H. Sibley's expedition in l863, Colonial William B. Marshall observed soldiers who dug into a mound near the south point of the Sheyenne River and "found bones in a sitting position."[25] He then hypothesized that the sepulcher dated from long before the occupation of the region of its current inhabitants. Mary Bounton Cowdrey in the *Early History of Valley City* reported instances of earth mounds near the city. In the bluffs south

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[22] C. L. Dill, *Early Peoples of North Dakota Before l858,* No. 5 State Historical Society of North Dakota, North Dakota Heritage Center, Bismarck, North Dakota, l983, 7.

[23] Felipe Fernandex-Armesto, *Civilizations, Culture, Ambition, and the Transformation of Nature* (New York: Simon and Schuster, 2001), 130.

[24] Ibid.

[25] Snorri M. Thorfinnson, *Ransom County History* (Lisbon: Ransom County Historical Society, l975), 30.

of the town, “three or four circular elevations, fifty feet in diameter at the base, their apexes twelve or fifteen feet above the elevation of the surrounding land,” she wrote, “were works of ancient mound builders.”[26] She described that one mound in l879 was explored by a party of Boston men who imperfectly opened a fifty foot mound. They left great quantities of human bones “strewn” around the site.[27] Both Cowdrey and Colonel William B. Marshall suggested the bones were Native American. The mounds also revealed a Native American community with a strong ‘sense of place’ existed in the Red River Valley prior to Euro-American settlement.

In their records, diaries, and journals, writers described other artifacts and sites besides the mounds and the actual Native American people they met. In l839, French scientist Joseph Nicollet, for example, as he surveyed eastern North Dakota and western Minnesota for the U.S. War Department, wrote in his journal about an abandoned Indian site along the Sheyenne River. Many years later, in 1919, the site was explored and mapped by historians O.G. Libby and A.B. Stout from the North Dakota Historical Society. In l938, archaeologist William B. Strong from Columbia University, New York, further excavated the site. Raymond Wood published a full report in l971. He identified and described the site as a Cheyenne horticultural village, similar to the plains earth lodge pattern of the Mandans, Hidatsas, and Arikaras on the Missouri River. The Cheyenne location on the banks of the Sheyenne River was named the Biesterfeldt site after the current owner of the property.

Anthropologist W. Raymond Wood described the Cheyenne village in the following fashion:

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[26] Mary Bounton Cowdrey, “Early History of Valley City and Barnes County,” *Valley City Times* (Valley City: Barnes County Museum, l879), 2.

[27] Ibid.

> The Cheyenne erected sixty-two structures within a fortified area.[28] Except for the side facing the Sheyenne River, an oval ditch encircled the village. House sizes ranged from seventeen to forty-two feet in diameter.[29]

Wood counted over 3,360 specimens of pottery shards and collars.[30] He attributed most of the samples to be like the ceramic traditions of the sedentary Missouri River Indians, particularly the Arikara. He saw little evidence of European trade goods. The Cheyenne still used stone and bone tools for their work and they found clams in the Sheyenne River and used the shells as scrapers. One house contained a grinding stone with residue of chokecherry or hack-berry stones, wild plums and thorn apples, which proved native fruit use in their diets. Maize, numerous seeds, and birch bark indicated horticultural endeavors. Wood noted how difficult seeds were to identify, but anthropologist Mary Adair suggested this was not unusual.[31] She explained:

> Many Woodland period sites are shallowly buried and therefore subject to various disturbances. These disturbances often destroy the upper portions of the occupations and make feature identification difficult.[32]

Wood more easily identified the animal bones. The Cheyenne ate bison, deer, bear, coyote, elk, swift fox, whooping crane, raccoon, mollusks, turtle, and fish. He suggested that dog and a few horse bones indicated domesticated animals in their midst.[33] While there was some doubt as to when the Cheyenne lived near the Sheyenne River, probably near the end of the

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[28] Raymond W. Wood, *Biesterfeldt: A Post-Contact Coalescent Site on the Northeastern Plain* No. 15m (Washington, D.C.: U.S. Government Printing Office, l971), 9.

[29] Ibid., (Will, 1914, 75).

[30] Ibid., 24, 69.

[31] Ibid.

[32] Adair, *Prehistoric,* 201.

[33] Wood, *Biesterfeldt,* 44.

1700s, there was no doubt of their horticultural activities. The Cheyenne grew more vegetables than they needed and they traded the surplus with the Ojibway. Economic anthropologist Joseph Jablow wrote about this trade with the Cheyenne in *The Cheyenne in Plains Trade Relations, l795-l840.* In his history, Jablow reported explorer David Thompson's conversation with Ojibway chief Shesheshepaskut in l898. The chief told Thompson of the Ojibways' ambivalent trade relationship with the Cheyenne. He explained, "Our people and the Cheyennes for several years had been doubtful friends; but as they had Corn and other Vegetables, which we had not and of which we were fond, . . . [we] traded with them. . . "[34]

Women raised the vegetables for trade. According to anthropologist Katherine M. Weist, women's primary role was in the formation and maintenance of the house- hold, the bearing and rearing of children, the gathering and preparation of vegetal foods, and - in horticultural societies - the planting and harvesting of crops.[35] Still a horticultural society along the Sheyenne River, the Cheyenne women planted and harvested their gardens for their own sustenance and trade. Anthropologist Robert Lowie identified maize, beans, squashes or pumpkins, and sunflowers as the principal crops. Maize provided two harvests. In the first week of August, the green corn was boiled or roasted to eat immediately or stored for future use. In a second harvest in September, they dried the corn and stored it in caches in their earth lodges.[36] Another anthropologist, Melvin R. Gilmore, hypothesized that the cultivated plant seeds of squashes, pumpkins, and gourds in the *Cucurbitaceae* family besides garden beans, *Phaseolus vulgaris,* corn, *Zea mays,* and

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[34] Joseph Jablow, *The Cheyenne in Plains Indian Trade Relations, 1795-1840* (Lincoln: University Of Nebraska Press, l994), 44.

[35] Katherine M.Weist, *Anthropology on the Great Plains,* Edited by W. Raymond Wood and Margot Liberty (Lincoln: University of Nebraska Press, l980), 257.

[36] Robert Lowie, *Indians of the Plains* (Lincoln: University of Nebraska Press, l982), 19, 20.

tobacco, *Nicotiana quadreivalvis,* originated from Mexico.[37] Anthropologist George Bird Grinnell suggested this might be true. He declared that Mexican traders, long before the French met the Cheyennes, traded with the Northern Indians.[38] Robert Lowie noted that the Cheyenne also grew their own tobacco. Later, after they moved to the plains and became nomadic traders, they relied on the Arikara and European traders for their tobacco.[39]

One way in which the Cheyenne and other Native Americans differed from the Euro-Americans was in their use of the surrounding native plants as their food source. While Euro-American settlers brought and planted cultivated seed for their gardens and agricultural use, the Cheyenne, Dakota, and Ojibway, like the former Woodland tribes, used the surrounding plant material in their environment as part of their livelihood. Beyond use as food, Ethnobotanist Kelly Kindscher listed twelve herbaceous plants utilized by the Ojibway, thirty-five native plants used by the Dakota, and thirty-three native plants consumed by the Cheyenne for medicine.[40] Woody plants also provided medicine and building materials. One important tool, the dibble or digging stick taken from native trees, enabled Cheyenne women to dig for vegetable plants or cultivate the soil for their gardens. Given to them by the Great Medicine Spirit, the dibble was a ritual part of the Sun Dance. To sharpen and harden its ends for digging roots, the stick was charred in fire. Hoebel described two types of dibbles. The short one had a knob at one end. Some dibble sticks

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[37] Melvin Gilmore, *Uses of Plants by the Indians of the Missouri River Region* (Lincoln: University of Nebraska Press, 1997), 7.

[38] George Bird Grinnell, *The Cheyenne Indians, History and Society* Vol. I (Lincoln: University of Nebraska Press, 1972), 35.

[39] Lowie, *Indians on the Plains,* 26.

[40] Kelly Kindscher, *Medicinal Wild Plants of the Prairie, An Ethnobotanical Guide* (Lawrence: University of Nebraska Press, l992), 319, 321.

were made from buffalo bones-the tibia or shoulder, while others were wood. When on her knees, a woman gatherer pressed on the knob with her stomach. This created an extra force against the root of the plant and unearthed it. The long dibble stick was used like a crow bar.[41] Anyone who has dug plants out of a sun hardened prairie knows it requires strength and dexterity to unearth the plants.

The long taproot of some plants and the cement-like soil challenged all diggers. Perhaps this was why, when returning from a day of digging the prairie turnip, *Psoralea lanceolata,* they sometimes enjoyed "a battle" over the turnip roots. On their return to their village, they arranged their turnip roots in piles and sat behind them. Then one woman rose and hollered a war whoop. Young men charged at them on old horses with imitation willow twigs for shields. As they shouted their war cry and raced at the women, the women threw sticks and chips of buffalo manure at them. Those who were 'hit' were `killed' and were out of the game. The object was to grab some roots. Amidst much hoopla and noise, the men retired only after they confiscated a few roots. As they ate their captured roots, they joked over who was wounded and who counted coup. Meanwhile, the women gathered what roots they had left and returned to their village.

Hoebel maintained that the pretense of battle not only provided fun for both sexes but also released sexual antagonisms. The women dared the men to attack them, ridiculed their attempts, and hurled buffalo chips at them. The men burlesqued their capabilities as warriors in their attack for the roots. The shouts and laughter reduced tensions between the men and women.

Other games also evolved around gathered plants or roots. The one who threw her stick the furthest could win someone else's roots. The throwing of the 'dice' or buffalo metacarpals

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[41] E. Adamson Hoebel, *The Cheyennes, Indians of the Great Plains* (New York: Holt, Rhinehart and Winston, Inc., l960), 60, 61.

garnered more roots for the winner.[42] This sometimes reduced the monotony in the individual plant gathering and made the act itself a form of celebration. Like other cultures who celebrated the harvest of their crops, this was a similar celebration. It also emphasized the communal spirit. While digging was individual, the games reinforced food sharing within a community. This supported their belief in maintaining the well-being of the tribe and their culture. Though all material goods were private property, they shared generously with others. This continually emphasized tribal unity which was crucial to survival as a community.

Besides the prairie turnip, Hoebel estimated that at least sixteen varieties of fruits, eight to ten roots, and up to fifteen vegetable stalks or buds were gathered for consumption and dried for winter storage. Either dried or freshly harvested, roots and vegetables were boiled individually or with meat for soups and stews. One, milkweed, *Asclepias incarnata,* was collected before the flower opened and boiled for a soup or stew. Chewing gum was made out of the white liquid of the milkweed. Even the much maligned thistle, *Arsium edule*, was used: its stems were peeled, eaten, and considered delicious – similar in taste to a banana.[43] As noted before, the chokecherry berry was pulverized, pit and pulp, and sundried into cakes. It became part of the renowned pemmican when mixed with dried meats.

In addition to gathering native plants for sustenance, Hoebel substantiated Kelly Kindscher's research into native plants that provided remedies for illnesses. He observed that the Cheyenne utilized parts of more than fifty native plants to cure illnesses, heal sprains and swellings, reduce pain, and tranquilize or stimulate the body. For headaches, dizziness,

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[42] Ibid.

[43] Ibid.

constipation, diarrhea, upset stomach, vomiting, kidney problems, hemorrhage of the lungs, nose bleeds, abscesses, poison ivy, snake bites, fevers, coughs, colds, paralysis, arthritis, sore gums, toothaches, earaches, and skin irritations, native plants helped cure or reduce the ailments. Some were given in the form of teas.[44]

As noted previously, Kelly Kindscher identified and described many other plant uses. For instance, the Cheyenne made a tea from lavender hyssop, *Agastache foeniculum or "mo e' – emohk' shin"(*elk mint)*,* leaves. For someone with a cough or a weak heart, he or she drank it when cooled. Hyssop also was one of ten ingredients used in medicinal preparations or perfumes.[45] Kindscher observed how prairie coneflower, *Ratibida columnifera* or "shi' shin o wuts' tsi i yo" (rattlesnake medicine), could be applied externally to rattlesnake bites after its leaves were boiled, yielding a yellow solution that both relieved the pain and drew out the poison. The same solution provided relief for poison ivy. Both of these native plants still grow today in the Red River Valley.

Besides food, health, and beauty products, native plants served another function for the Cheyennes. A few plants, like sweetgrass and sage, played an important role in sacred ceremonies.[46] Kindscher explained that sweetgrass, *Hierochloe odorata,* when burned in the Sacred Arrow ceremony, symbolized life's growth. In healing ceremonies, the smoke of burning sweetgrass purified the rattle used for curing the ill person.[47] He commented how another sacred herb, white sage, *Artemisia ludoviciana,* was used as medicine by all Native Americans. The

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[44] Ibid., 88.

[45] Kelly Kindscher, *Medicinal Wild Plants of the Prairie,* 224, 225.

[46] Ibid., 180, 181.

[47] 256.

Cheyennes also used white sage in their Sun Dance and Standing Against Thunder ceremonies. The crushed leaves in the form of snuff helped alleviate sinus attacks, nosebleeds, and headaches.[48]

Hence, up into the l900s and even now, Native American people utilized many of these plants as a food source and for pharmaceuticals, cosmetics, decorations, games, and as a sacred part in their ceremonies. [Appendix B] Euro-Americans knew few of these native plants. Earlier botanists like Charles Geyer and John Bradbury collected plant specimens in the l800s in North Dakota. But, it was not until l9l8 that botanist Orin E. Steven's *Handbook on North Dakota Plants* identified over nine hundred and sixty species of native plants collected statewide by various scientists and naturalists. Stevens wrote that much of their collection of native plants was used to identify weeds.[49] Left out of his publication of native plants were their constructive, viable uses for humankind. The Cheyenne and other Native American inhabitants understood and utilized the Red River Valley's rich, diverse prairie and river valley vegetation and wildlife for their daily sustenance. Their cultural education gave them the knowledge of which plants to utilize for their differing needs. "Nature was teacher . . . and companion to the native peoples of the Americas;" noted Gerald Friesen, "they derived important insights and benefits from the relationship."[50]

The Cheyenne were not the only Native Americans who utilized their surrounding environment for their livelihood. They were one of the few tribes who left evidence in the Red

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[48] 47-49.

[49] Orin Alva Stevens, *Handbook of North Dakota Plants* (Fargo: North Dakota Institute for Regional Studies, l963), 3.

[50] Freisen, *The Canadian Prairies,* 15.

River Valley basin of a permanent site in the late 1700s. Historians, archeologists, and anthropologists hypothesized that there were more sites in the valley. Even the Biesterfeldt site is a mystery. Evidence indicated a burned village, possibly ca l790, and that the Cheyenne survivors moved westward to live south of the Mandan and Hidatsa on the Missouri River. Wood identified two reasons why they may have moved. First, the Chippewa credited themselves for attacking and burning the village. Even though they enjoyed the corn and vegetables through trade, they suspected the Cheyenne were responsible for the disappearance of their hunters. They sought revenge and attacked the village after a major group of Cheyenne hunters left.

Another tribe, the Assiniboine, claimed that they caused the abandonment of the Cheyenne. They said the Cheyenne had lived in the village for thirty years. A group of Assiniboine waited until everyone left the village. They then entered an earth lodge where an older woman outwitted them. She ran to a bluff and threw a torch over the cliff. The deceived warriors tumbled over the cliff. The quickly returning Cheyenne killed the injured warriors. After this event, the Cheyenne decided it was best to leave for fear of reprisal.[51] Regardless of who attacked whom, it was highly likely that there were more Cheyenne villages than one in the Sheyenne River and Red River Valley.

Grinnell elaborated that Cheyenne tribal movements were by individual camps and not a tribal body. He thought it probable that scattered camps or villages of distinct bands moved westward, occupied an area for a several generations, until they settled at the Missouri River.[52] What is evident from the collective work of archeologists, anthropologists, and historians is the

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[51] Wood, *Biesterfeldt,* 55-57.

[52] Grinnell, *The Cheyenne Indians* 21, 22.

extent of many vibrant Native American communities which once inhabited the Sheyenne River Valley and other tributaries of the Red River long before Euro-American settlement.

To add to this evidence of Native American life within the Red River Valley, explorers' and surveyors' reports documented their thriving communities. For instance, commissioned to create a map the Red River Valley in l839, Joseph Nicollet with Charles Fremont described in their journals the existence of a complex Native American community in southeastern North Dakota. Fremont wrote in mid-July of the Sioux and the bison activity near river:

> For three days we were in their [bison] midst, traveling through them by day and surrounded by them at night. We could not avoid them. Pushing our way through the crowds of buffalo, we were met in the afternoon by two of the chiefs who escorted us to the village and pointed out the place of our camp. We found the encampment made up of about three hundred lodges of . . . – Yanktons, Yanton[ais], and Sissitons – making about two thousand Indians.[53]

He explained how the Indians met for their great summer hunt and made their bison surround. Liberal gifts were shared after the hunt with much feasting and dancing. After Nicollet and Fremont left, they discovered another camp site of the Sioux. Nicollet described the sun dance in Sioux - *wiwanyagwachipi* – the dance where one watches the sun - that had been held at the site. Left at site was the post with a crossarm.[54]

Of the Sioux or Dakota, another sacred site was one which Nicollet observed as a rock on top of a hill near the Sheyenne River. Now called Standing Rock, part of their reverence for the rock, Tunka, was as their oldest god.[55] In this belief, the rocks represented the earth and, also, the

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[53] John Charles Fremont, *Memoirs of My Life,* Vol.I (Chicago: Belford, Clark, & Company, l887), 47 - 49.

[54] Joseph N. Nicollet, *Joseph N. Nicollet on the Plains and Prairies,* Edited by Edmund C. Bray and Martha Coleman Bray (St. Paul, Minnesota: Minnesota Historical Society, l993), 180.

[55] Mary Crow Dog, *Lakota Women* (New York: Harper Perennial, l991), 202.

indestructible and everlasting nature of *Wakan Tanka.* If addressed with reflection or reverence, a person might feel part of the rock's power or indestructability within him or herself. The rock, therefore, was not a symbol but a living part of the universe in which the Indian was but a small part.[56] As their oldest god and indestructible being of nature, Standing Rock signified an important element of their beliefs.

In this belief lay a humility of a brotherhood with all forms of life. If there was a disconnection or unawareness of this centrality of belief, nature might ultimately show who in reality was the conqueror or who the conquered.[57] To lay a bundle of sage or tobacco before the Standing Rock was to acknowledge a reverence for all life. In this belief, the rock was sacred as an ancient god, a natural life form, and a powerful, permanent creation. The sacred rock and surrounding site where they met for their celebrations also represented their deep 'sense of place' within the Red River Valley.

A major population in the valley – the Dakota nation in the 1800s - was divided into three dialects and seven major bands. Of the four main groups in the eastern sector of what is now North Dakota, the Mdewakanton, the Wahpekute, the Wahpeton, and the Sisseton, the Wahpeton and Sisseton primarily traversed the plains near Standing Rock hill. Sometimes termed the "middle Sioux," the Yankton and Yanktonai lived on the eastern edge of the plains and conducted trade between the plains and woodland tribes.[58] Nicollet noted in his journal that he employed Sisseton guides and met the Yanktons, Yanktonai, and other Sissetons in the Sheyenne

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[56] Joseph Epes Brown, *The Spiritual Legacy of the American Indian* (Norman, Oklahoma: University of Oklahoma Press, l953), 23.

[57] Ibid., 19.

[58] Mary Jane Schneider, *North Dakota Indians* (Dubuque, Iowa: Kendall/Hunt Publishing Co, l986), 67.

River valley. They all hunted the bison as their primary food but also made extensive use of deer, other wild animals, wild rice, and native plants. Sixteen years earlier, geologist and historian William H. Keating, who was with Stephen H. Long and his expedition to establish the 49th parallel, noted how important the bison were to the Dakotas:

> The people have no other riches, (than the buffalo): they are unto them meat, drink apparel: their hides also yield them houses and ropes: their sinews and hair, thread; their horns, mawes, and bladders, vessels; their dung, fire; the calves skin budgets wherewith they draw and keep water.[59]

Even earlier, in l801, when Alexander Henry, the Younger, established fur trading posts and traveled along the northern Sheyenne River basin south of Devil's Lake, he wrote enviously in his journal of the abundant wildlife in the Dakota protected area:

> It [Sheyenne River] runs E. within a few miles of Lac du Diable [Devil's Lake] opposite which it begins to have well-wooded banks; and as it increases in size, the valley spreads and the banks are high. . . Beavers are more numerous than elsewhere; grizzly bears are to be seen in droves; and it may be called the nursery of buffalo and red deer [elk]. It is a delightful country, but seldom can our Saulteurs [Ojibway] kill a beaver there without falling in with their enemies, who are no great beaver hunters.[60]

Alexander Henry wished no boundaries existed between the Ojibways and the Dakotas for the extension of his fur trade. However, ". . . the Eastern Sioux or Santee, inhabited the lake country of Minnesota and Wisconsin" and hunted buffalo on the eastern edges of the plains.[61] Alexander Henry established his fur trading post at Park River, because the Ojibway refused to

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[59] William H. Keating, *Narration of an Expedition,* Vol. II (Minneapolis, Minnesota: Ross & Haines, Inc., 1959), 43.

[60] Elliott Coues, *New Light on the early history of the greater Northwest. The manuscript Journals of Alexander Henry*, Vol. 1 (New York: Francis P. Harper, l897), 145.

[61] Mary Jane Schneider, *Cultural Affiliations of Native American Groups Within North and South Dakota: An Ethnohistorical Overview* (Bismarck, North Dakota: U.S. Bureau of Reclamation, 2002), 26.

go any further south. They knew they were in dangerous territory, which the Sioux protected. The Sioux camped for long periods of time during the summer along the Roseau River, the middle branch of the Park River, Grand Forks, where the Red Lake River flows into the Red River, the Sheyenne River, Minnesota River, and Goose River, just to name a few sites, for their buffalo hunts. A map in Appendix A, Figure 3 shows the Dakota and Ojibway range in the late l700s to mid l800s.[62]

When surveyor David Thompson traveled on the Red River in 1798, he wrote that “the Red River and the country south with the upper Mississippi and the countries east plus Canada were the hunting ground of the Ojibways.”[63] Originally called the ‘Ojibway,’ the United States government designated the ‘Ojibway’ as ‘Chippewa’ in its treaties and negotiations, which sometimes caused confusion for travelers.[64] The Red River also created consternation in its various narrow curves. An Ojibway guide told Thompson that the river was similar to a spy who went “here and there and everywhere to see what was going on in the country.”[65] In other words, the river tripled in miles and time the distance a traveler could walk in a day further east or west of the river. The difference in the northern sector of North Dakota and Minnesota was more forest east or west. This provided better shelter and more large game such as moose and reindeer besides the bison and other wild animals.[66] In her reminiscences of her family’s settler

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[62] Ibid, vi, x, 27.

[63] David Thompson. *David Thompson: Travels in Western North America, 1784-l812,* Edited by Victor G. Hopwood (Toronto: John Deyell Limited, l971), 177.

[64] Frances Densmore, *Chippewa Customs* (Minneapolis, Minnesota: Ross & Hainses, Inc., l970,) 5.

[65] Ibid., 176.

[66] Ibid., 177.

experience in northern North Dakota, Edna Kroehn wrote much later about the Sioux and the Ojibway in the upper northeast of the Red River Valley. She described more about the Ojibway community life and their use of their surrounding environment for their diet. While the Ojibway women stewed, boiled, and roasted their meat, they cooked at least forty different plants, some resembled radishes and spinach, for their food. They dried wild plums and berries for winter. Some berries also went into the pemmican. The Ojibway used seasonings of pepper and ginger root, while some grew squash and pumpkins.[67] Though there were other large game for the Ojibway to hunt, they went in June and November for their larger harvest of bison. Kroehn noted that Cavalier County was the hunting ground and meeting place and not a dwelling place for either of the Dakota or Ojibway Indians. The Dakota and Ojibway many times created alliances and kept peace, particularly prior to 1700.[68] Sometimes, however, disputes and battles over territorial rights to hunting grounds ensued. One battle in northeast Cavalier County left evidence of a three foot embankment decades after the Ojibway, the Dakota, and the bison no longer inhabited the region.[69]

While a Euro-American child in Kentucky, John Tanner was captured by the Ottawa in Kentucky and adopted by his Ojibway mother, Net-no-kwa, in the 1780s. He later wrote an autobiography and provided a more thorough description of his Chippewa life along the northern tier of the Red River Valley where the fur trade already flourished in the late 1700s. In fact, when Alexander the Henry, Younger, established his fur trade in the same area and the same

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[67] Edna Koehn, *Pioneer Days,* Bulletin and memorial to Edna and Countrys' Bicentennial (Fargo, North Dakota Institute Regional Studies, 1976), 2.

[68] Gwen Westerman and Bruce White, *Mni Sota Makoce, The Land of the Dakota* (St. Paul: State Historical Society, 2012), 38.

[69] Edna Koehn, *Pioneer Days*, 2.

time period, he traded with many of the Indians who Tanner mentioned in his autobiography.[70] Tanner, along with the Ojibway and other tribes, obtained credit from fur traders for goods before they traveled to their winter sites. In the winter, they caught beaver and other animals for their furs for the spring trade. They successfully hunted elk, moose, deer, and bear for the hides, fur, and food. The deep snow in the woods helped hunters to track and catch their prey. The snow also slowed the animal's ability to run. Tanner wrote of the difficulty of an elk hunt. "[There are]. . . not many, men who can run down an elk on the smooth prairie, when there is neither snow or ice," Tanner explained, "The moose and the buffalo surpass the elk in fleetness, and can rarely be taken by fair running by a man on foot."[71] The moose appeared the most difficult of the three to hunt. Tanner wrote:

> The Indians consider the moose, shyer and more difficult to take than any other animal. He is more vigilant, and his senses more acute than those of the buffalo or caribou. He is fleeter than the elk . . . if a man. . . breaks the smallest dry limb in the forest, the moose will hear it. . . and is for many hours more vigilant than before.[72]

While winter provided an easier environment for hunters to kill the hibernating bear, as well, nothing guaranteed daily sustenance or prevention from starvation for the knowledgeable hunters. Over hunted or regions denuded of animals sometimes doomed Ojibway families. If families stored food for themselves, sometimes they themselves might face starvation if they generously shared their food with others. "Most food, whether individually or collectively secured," noted Anthropologist James H. Howard, "was distributed equally among all members

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[70] Elliott Coues, *New Light on the early history*, 96-97.

[71] John Tanner, *The Falcon, A Narrative of the Captivity & Adventures of John Tanner During Thirty Years Residence Among the Indians in the Interior of North America* (New York: Penquin Books, 1994), 88.

[72] Ibid., 83.

of the camp group."[73] Sharing was a custom of survival in many tribes during the brutal, sometimes game depleted winter environment. For instance, when Tanner and his family spent a winter at Begwi-o-mush-ko river, which entered the Red River ten miles below Pembina, they chose an area abundant with game. He enjoyed a friendly rivalry with another young hunter. Between the two, they killed 36 moose, 101 beaver, and eight bears.[74] When another band of Ojibway, who were at the point of starvation, joined them, Tanner and his group shared their food and killed two more moose and four bears on their next hunt. It was not long after this hunt that they all eventually dispersed to new areas for they themselves began to starve from lack of game.[75]

Sometimes when conditions grew desperate owing to a lack of meat, the Ojibway decreased their hunger by eating a native wood vine called bittersweet, *Celastrus scandens.* After they cut the vines, the stems were cut into pieces and boiled. They peeled off the bark and ate the plant.[76] Sometimes they ate their leather moccasins. Rare occurrences of cannibalism happened. It was believed that the 'spirit of the *wihtigo* possessed a person who . . . killed and ate members of his or her family.'[77] As the fur trade diminished areas of fur bearing animals, the trade itself changed tribal Indian practices from the communal to an individual mercantile use. John Tanner wrote of his outrage when he met others of his tribe who chose to sell rather than share their

[73] James H. Howard, "The Plains-Ojibwa or Bungi, Hunters and Warriors of the Northern Prairies with special reference to the Turtle Mountain Band," *Reprints in Anthropology,* Vol. 7 (Lincoln: J & L Reprint Company, 1977), 34-35.

[74] Elliott Coues, *New Light on the early history,* 163.

[75] Ibid.

[76] Elliott Coues, *New Light on the early history,* 173.

[77] James H. Howard, "The Plains-Ojibwa or bungi," 83.

meat.[78] This blatant disregard to share food broke the long standing custom of communal survival.

Other than game, the Ojibway harvested wild rice in August, grew corn, which they stored when ripe, boiled syrup from Canadian maples, *Acer negundo,* for sugar, collected salt, fished, gathered eggs from nesting fowl in the Spring, and caught or shot birds for food. Wild rice was an important annual staple in their diet. Many Ojibway had designated rice plots, like their maple syrup trees, which they harvested annually. They never harvested all of the rice and even sometimes reseeded one-third of their rice crop in less than two feet of water.[79] This insured future harvests. They spread seed of other native plants, as well, near their villages for future food sources. Anthropologist Frances Densmore noted that they consumed a variety of native plants. "The flowers of the milkweed, the root of the bulrushes, the sap of the basswood, the outer bark of the woodbine, and the moss of the white pine," she wrote, "were eaten as vegetables along with fruits and berries."[80] A typical meal for them included meat or fish served with broth, rice with maple sugar, and berries – dried or fresh.[81]

The Ojibway also utilized native plants for their housing, sewing, cooking, cleaning, and traveling, besides other uses. For instance, out of birch bark they made small bowls, spoons, kettles, roof tops, and canoes.[82] Women wove common bulrush cords, *Scirpus validus,* into floor mats, removed basswood fiber under the bark of the tree and made twine, and gathered the fiber

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[78] Ibid., 35.

[79] R. Douglas Hurt, *Indian Agriculture in America, Prehistory to the Present* (Lawrence, Kansas: University Press of Kansas), 37.

[80] Frances Densmore, *Chippewa Customs,* 40.

[81] Ibid.

[82] Ibid., 41.

of wood nettle, *Laportea canadensis,* to weave into cloth or make into twine for fish nets, snares and traps.[83] Strips of cedar sometimes replaced bulrush cords, if bulrush was not plentiful. Women wove cattail reeds, *Typha latifolia,* into mats for the sides of their wigwams. They made baskets and bags from gathered, boiled, and woven inner bark of cedar, basswood, or slippery elm. When they stripped bark from the tree, which girdled the tree and caused its death, they later cut the tree for firewood.[84] They made drums, snowshoes, sleds, pack frames, snow shovels, paddles, troughs, balls, bows and arrows and the frame for wigwams from wood.[85] In order to weave mats, twine, containers, and other items, they constructed small huts for storage of their strips of bark and bundles of rushes. Not only the gathering and preparation of the native material but the dyeing, sewing, and weaving of the articles involved many hours of work. One can well imagine how welcome 'labor saving' articles like metal utensils, blankets, and cloth from fur traders were in the northern Red River Valley in the late 1700s. Historian Sylvia Van Kirk demonstrated how European goods revolutionized Native tribal women's lives. Metal replaced wood for kettles and cotton and wool saved women many hours of tanning extra hides for clothing.[86] Ojibway women also caught the smaller animals, like rabbits and martins, which were theirs to trade for whatever goods they needed.[87] "Matrilineal and matrilocal Ojibwan bands recognized women as the owners of the food and goods they processed," wrote George Colpitt, "[which] meant fur traders often dealt more with women than men when they sought

[83] Ibid., 153, 154.
[84] Ibid., 156, 157.
[85] Ibid., 170, 171.
[86] Sylvia Van Kirk, *"Many Tender Ties" Women in Fur-Trade Society, 1670-1870,* 76.
[87] Ibid., 72.

wild rice, meats, and other foodstuffs."[88] Very similar to how Euro-American settler women in agriculture bartered their butter and eggs for necessities in the farm household, Indian women exchanged their furs, dried fish, and harvested corn and berries for whatever they needed for their family and themselves.

But this caused a dramatic change from a subsistence livelihood to a market exchange of furs for Euro-American goods. The fur trade also changed the Red River environment and Native American cultures at first subtly and then dramatically. Though, humans have "a certain propensity . . .," wrote economist Adam Smith, "to truck, barter, and exchange one thing for another," many Native Americans traded for differing goods and to cement tribal relationships.[89] While they also "were canny consumers with a strong sense of their self-interest in their dealings with fur trade companies," the very nature of their trade with differing entities changed, as well.[90] Originally, ceremonies occurred before trade ensued. Once fur trade posts established permanent locations, trade changed into a capitalistic endeavor with credit given for future furs. Also, the very animals that were shot and trapped for the fur trade diminished and some disappeared. This increased hunger and a dependence upon the fur trading posts for sustenance.

Indian women who traded for their own 'labor saving' items also gained status and security if they married fur traders. An accepted social and economic custom among the Ojibway and Cree, the marriage 'cemented trade ties' and provided a form of security for the family, tribe,

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[88] George Colpitts, *Pemmican Empire, Food, Trade, and the Last Bison Hunts in the North American Plains, 1780 – 1882* (New York: Cambridge University Press, 2015), 81.

[89] Donald Worster, *Shrinking the Earth, The Rise and Decline of American Abundance* (New York: Oxford University Press, 2016), 43.

[90] Michael Payne, 'Fur Trade Historiography, Past Conditions, Present Circumstances and a Hint of Future Prospects,' *From Rupert's Land to Canada*, Edited by Theodore Binnema, Gerhard J. Ens & R. C. Macleod (Edmonton: University of Alberta Press, 2001), 7.

and fur trader.[91] The Northwest Company and, much later, the Hudson Bay Company encouraged the unions.[92] Once married, the wife helped in the fur trade as an interpreter, traded merchandise along with her husband and sometimes alone, and garnered prestige and sometimes even power as the wife of a fur trader.[93] Historians John E. Foster along with Sylvia Van Kirk urged 'caution in the supposition of the trading post as a superior environment for Indian women.'[94] Though in many cases Native American women enjoyed release from traditional work, their new life 'could have detrimental consequences' for they married into patriarchal relationships.[95] For instance, their children, particularly the sons who were in their mother's care until a certain age, were many times sent by their fathers to be educated in Europe at a young age.[96] Who one married and how one was treated also factored into positive or negative consequences for the woman. Regardless, a more secure, alternative life, which benefited herself and her family, was generally welcomed by them all.

Native American tribes moved west as animals disappeared and Euro-American settlers claimed previous Native American territory for agriculture and urban development. "Profound changes . . . [occurred due] to the creation of the fur trade."[97] The Ojibway moved west along the

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[91] Sylvia Van Kirk, "*Many Tender Ties*," 29.

[92] Ibid., 31.

[93] Ibid., 65.

[94] John E. Foster, 'Some questions and perspectives on the problem of metis roots,' *The New Peoples: Being and Becoming Metis in North America,* Edited by Jacqueline Peterson and Jennifer S. H. Brown (Canada: University of Manitoba Press, 1985), 84.

[95] Sylvia Van Kirk, *Many Tender Ties,* 85.

[96] Ibid., 87.

[97] Jan Grabowski and Nicole St-Onge, 'Montreal Iroquois *engages* in the Fur Trade, 1800-1821,' *From Rupert's Land to Canada,* Edited by Theodore Binnema, Gerhard J. Ens & R. C. Macleod, 48-49.

northern border between the United States and British territory. In the early 1800s the hunting and fishing Ojibway moved west into northern North Dakota and western Manitoba, Canada, plains near the Cree and Assiniboine. They hunted beaver for the fur trade and maintained their traditional harvest for maple sugar in the Spring and rice in midsummer.[98]

The Ojibway also fought the northern most Dakota, the original inhabitants, who warred against the Cree and Assiniboine who the Ojibwa eventually replaced as all continued to move farther west. They all fought for abundant game in the northern Red River Valley. William H. Keating wrote of the disputed area:

> Beyond this they never hunt without being prepared for war, as the prairies between this place [Assiniboine River] and the Wild Rice River to the east, and Turtle River to the west of Red River, form a sort of debatable land, which both Chippewas and Dacotas claim, and upon which both frequently hunt, but always in a state of preparation for hostilities.[99]

In the early 1800s, the fur trading posts turned into the gathering locations for the Ojibway, who roamed the area in small groups of two or three families. This, too, was a contrast from their original Ojibway practice of first establishing a permanent settlement before entire bands moved into a new area.[100] Major readjustment to their woodland diet of fish, wild rice, and maple sugar needed to occur to a primary bison diet. Eventually, the Bungi Ojibway who settled in the Turtle River Mountains adopted horses and hunted the bison by the 1830s.[101] Bison and pemmican derived from bison turned into their primary food.

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[98] James H. Howard, *The Plains-Ojibwa or Bungi*, 16-20.

[99] Harold Hickerson, *The Chippewa and Their Neighbors, A study in ethnohistory*, 96.

[100] James H. Howard, *The Plains-Ojibwa or Bungi*, 20.

[101] Ibid.

Before bison turned into the prime commodity to hunt in the l820s for the fur trade, the fur trading posts focused their trade upon a variety of animals with emphasis on the beaver. Fur trader Alexander Henry tabulated his collection of furs in the early l800s in his journal.

Table 1: Animal Furs, Grease, and Meat Volumes Recorded at the Park River Fur Trading Post Between 1800 and 1801. [102]

Product	Volume
Beaver skins	643
Black bear skins	177
Brown bear do	23
Grizzly bear do	2
Otter do	36
Fisher do	70
Marten do	36
Buffalo robes	31
Mink do	29
Badger skins	9
Wolverene	3
Packs of 90 lbs. each	34
Loup-cervier do	11
Kegs of grease	4
Muskrat do	26
Kegs of beef	7
Kitt do	7
Bales of dried meat	10
Raccoon do	160
Red Fox do	102
Shaved and parchment do	29
Bags of pemmican of 90 lbs. each.	57

These numbers increased with a subsequent increase in fur trade posts from l801 to l808. What is also note-worthy in the tabulation of the fur trade is the increase from l802 to l808 of kegs of beef, grease, buffalo tongues, and pemmican in 90 pound bags. [Appendix C]

[102] Elliott Coues, *New Light on the Early History*, Vol. I., 184.

Henry, as a partner in the Northwest Company, and others who were rivals - the Hudson Bay and X.Y. Companies'- created a major decline to animal populations with a subsequent Native American reliance on fur trade posts for goods and food. As diverse animal populations dwindled, hunters relied even more on the bison for food. Bison appeared so plentiful that many thought that they would never disappear.

Environmental historian Shephard Kreche noted that although most Native Americans understood their ecological relationship in their environment, their cultural knowledge sometimes refuted ecological reality.[103] For instance, the Cheyenne and Arapaho believed that bison went underground when they vanished for the season.[104] The Plains Ojibway always allowed the head bull to escape the hunt for the propagation of future herds.[105] Also, "in the Ojibwa worldview," wrote historian George Colpitts, "the downward spiral of game populations [meant] spirit hunters were punishing the hunters . . . for cruelty and waste."[106] However, with the large bison population in the early 1800s, few feared the bison's demise, even though many fought to preserve their territorial rights over their protection of their bison food source.

A common practice existed among the Ojibway, Dakota, and other groups of Native Americans. When they hunted the bison for their winter's harvest of meat and furs, a major part of their families and the village followed to cut the meat, prepare the hides, and make pemmican. Late fall skins were a softer fur and the meat a better quality. After bison shed their old winter

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[103] Shepherd Kreche III, *The Ecological Indian, Myth and History* (New York: W. W. Norton & Co., 1999), 212-213.

[104] Ibid., 148.

[105] Ibid.

[106] Heather Devine, 'Les Desjarlais, The Development and Dispersion of a Proto-Metis Hunting Band, 1785-1870, *From Rupert's Land to Canada*, 147.

coat, they grew a new, softer coat of fur.[107] The bison hunters always selected camp sites either near the tributaries of the Red River or other water sources for their use in the food preparation and harvest plus their need of everyday water for themselves and their horses. The bison skirted water sources to replenish their own thirst. Hence, tributary water was the necessary ingredient for all wildlife and humans in the Red River Valley basin.

What Joseph Nicollet, William Keating, Alexander Henry, the Younger, and John Tanner witnessed and wrote in their journals was a prelude to the changing landscape of the prairie. This transformation among the Cheyenne, Assiniboine, Dakota, and Ojibway was well underway in the early l800s. Environmental historian Dan Flores noted this change began in the early 1700s. He wrote that, when the Arapahos and Cheyenne once farmed, they occupied "villages along the Red and Sheyenne Rivers. [Here,] they first acquired horses."[108] Horses provided the mobility and efficiency to hunt more bison and settle near bison herds. Flores suggested that the women who originally farmed resisted but had little choice. They adapted to the nomadic way-of-life with their men. The Teton Sioux moved into their area and claimed the region for themselves.[109] As Native American inhabitants in the Red River Valley utilized its various resources, what is known through explorers, journeyers, and other Euro-American writers in their journals, diaries, and letters is the abundant wildlife in the region, the diversity of native plants with a variety of uses, and the numerous tribes who identified this area as their home. Euro-Americans discovered some of the native plants were used similarly among differing Native American tribes. Many

[107] Author unknown, "Buffalo Diaries," Edited by Gordon Keeney, Unpublished diary, North Dakota Historical Society Library, Bismarck, North Dakota, (?), 283, 284.

[108] Dan Flores, *The Natural West, Environmental History of the Great Plains and Rocky Mountains* (Norman: Oklahoma University Press, 2001), 60.

[109] Ibid.

Euro-Americans also received hospitality and help from the Native Americans they met. For instance, when a Scottish group from the original Selkirk colony traveled along the Red River to reach Fort Snelling in Minnesota in l821, they experienced some harassment from a group of Sioux. The harassment stopped when the chief intervened and gave them an escort for a safe journey.[110] Others were less fortunate. A few Euro-American travelers lost their lives as trespassers or due to a lack of understanding of their environment. What was portrayed in maps, journals, and archeological evidence was not only a unique region but a rich and visible life in the river valleys, which existed long before Euro-American explorers and settlers discovered the area for themselves. Some, like the Cheyenne and Ojibway, subsisted off the land with small gardens. All subsisted from the harvest of native plants, the hunting of a variety of wildlife, and trade among themselves. These early inhabitants of the Red River Valley knew their environment intimately and displayed not only a deep sense of 'place' but a reverence of their tall grass prairie environment. But, as more Native Americans traded furs for supplies or moved on to the prairie from their woodland habitat, which skirted the tallgrass, less relied on the gathering of native plants or harvesting of wild rice and more relied on the fur trade for their sustenance.

[110] Rhoda R. Gilman, Carolyn Gilman, and Deborah M. Stultz, *The Red River Trails, Oxcart Routes between St., Paul and the Selkirk Settlement* (St. Paul: Minnesota Historical Society Press, 1979), 6.

CHAPTER 3: BURGEONING EURO-AMERICAN INTEREST IN THE RED RIVER VALLEY

"New worlds to conquer."[1]

As short-lived forts were built in the Dakota Territory, soldiers, commanders, journalists, adventurers, squatters, and explorers described what they saw in diaries, journals, letters and newspapers. In what is now North Dakota, Fort Abercrombie on the Red River was built in 1857. Fort Rice in 1864 and Fort Buford in 1866 were constructed near the Missouri River. Fort Ransom on the southern part of the Sheyenne River and Fort Totten near Devils Lake, near the northern curve of the Sheyenne River, followed in 1867. In 1872, Fort Seward was erected near the James River. Fort Pembina was maintained from 1870 to 1895.[2] All forts were built near a water source, and three were built on the Red River and one of its tributaries, the Sheyenne River. Fort Abercrombie, one of the few forts protecting settlers from the Sioux uprising in 1862, and Fort Pembina were constructed on the Red River. Near the Sheyenne River, Fort Ransom was built for protection of settlers and travelers in their quest for gold and land on their way to Montana and Idaho. Many letters and reports came from the military men and visitors at these forts. Journalists, soldiers, fur traders, explorers, surveyors, and entrepreneurs reported to their curious families and the public what they saw and experienced.

Such descriptions by a variety of observers amazed the reading public, which assumed that the region was part of the 'The Great American Desert.' Journalists, soldiers, sport hunters,

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[1] D. N. Sprague, *Canada and the Metis, 1869-1885* (Waterloo: Wilfrid Laurier University Press, 1988), 19; Doug Owram, *Promise of Eden: The Canadian Expansionist Movement and the Idea of the West, 1856-1900* (Toronto: University of Toronto Press, 1980), 44.

[2] Erling Nicolai Rolfsrud, *The Story of North Dakota* (Long Prairie, Minnesota: Har Press, 1963), 140.

explorers, scientists, and entrepreneurs wrote of the many rivers and marshes that they encountered, and for good reason. The myriad tributaries to the Red River, small lakes, ponds, marshes, which eventually drained into the rivers, with an abundance of fish, besides plentiful waterfowl and wildlife in the timber and tallgrass along the rivers, proved to be the opposite of a desert. Scientist Lewis Henry Morgan, while in Georgetown in l861, wrote:

> There are numerous tributary streams flowing into it [Red River], . . . This river has been famous for elk and wild goose game. The elk and geese are yet abundant, and on the route to Georgetown they might find good duck, curlew and chicken shooting .with bear, sandhill crane and fox.[3]

What these scientists, explorers, military personnel, surveyors, and journalists, along with other travelers and settlers, wrote, played a role in spurring the later massive influx of agricultural settlers to the Red River Valley and dispelled part of the 'Great American Desert' myth. Their enthusiastic writings portrayed a positive, imaginative landscape available for agriculture. One only had to arrive, put the plow in the ground, and then throw seed into the rich, black earth. Some writers were paid for their articles in newspapers to attract settlement in the Red River Valley, but most letters, magazine articles, and reports described a vibrant new region for their family, friends, and official reports. While writers also witnessed the decline in loss of wild-life, which many hunted for their food, they wrote more about the excitement of a new frontier and the adventure of traveling in a landscape few Euro-Americans had visited. Their highly favorable reports and letters excited others to move to this 'promised land' for a new life.

In the 1860s, one enthusiastic Norwegian journalist, Paul Hjelm-Hansen, was employed as a special agent by Minnesota Governor William R. Marshall for the Minnesota Immigration

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[3] Lewis Henry Morgan, *The Indian Journals, l859*-62, Edited by Leslie A. White (Ann Arbor: University of Michigan, 1959), 118.

Bureau to "encourage Norwegian settlement" in their new state.[4] A recent immigrant himself, Hjelm-Hansen knew that merchants, fishermen and small farm owners struggled in Norway owing to a major economic collapse.[5] As he traveled, explored and wrote about land available in Minnesota and the Red River Valley, he focused on the Red River Valley as an agricultural oasis for his countrymen.[6] In direct contrast to desert imagery, he wrote in glowing detail of what he saw. His sixteen articles appeared in the *Nordic People's Paper, Nordisk Folkeblad,* and *The Fatherland and Emigrant, Faedrelandet og Emigranten,* in 1869. Norwegian historian Odd S. Lovoll noted that Hjelm-Hansen "is regarded as the one who opened both North Dakota and Minnesota to Norwegian settlement," particularly the Red River Valley.[7] Two other historians, Jon Gjerde and Carlton C. Qualey, concurred about Hjelm-Hansen's influence. With the advent of the St. Paul Pacific Railroad in the Red River Valley in the l870s and Hjelm-Hansen's encouragement, Norwegians chose the Red River Valley as their third major Minnesota settlement area.[8] Of course, many other immigrants sent letters to their families of the abundant, fertile new land. In his many articles, though, Hjelm-Hansen praised the landscape for agricultural potential and other commercial enterprises. Aware of his land poor constituents in Norway, he noted the deep loam soil in part of his description of the Red River Valley:

> The prairie, [as] . . . undulate or rising ground, is the most fertile land anyone could wish. It is composed of rich mold with a slight mixture of

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[4] Jon Gjerde & Carlton C. Qualey, *Norwegians in Minnesota* (St. Paul: Minnesota Historical Society Press, 2002), 18.

[5] Vera Kelsey, *Red River Runs North* (New York: Harper Brothers Publishers, 1951), 222.

[6] Ibid.

[7] Odd S. Lovoll, *The Promise of American, A History of the Norwegian-American People* (Minneapolis: University of Minnesota Press, l984), 92.

[8] Jon Gjerde & Carlton C. Qualey, *Norwegians in Minnesota*, 18.

> sand on the substratum of clay. On these prairies are places for many thousand farmers. The woods mostly exist of elm, ash, and oak.[9]

He encouraged Scandinavians to leave their country and immigrate to this region, for "it [the Red River Valley] will be one of the most wealthy tracts in America."[10] Part of that wealth he saw and described was the trade of furs and goods he witnessed from the Red River Valley. Ojibways, Metis, and others carried heavy loads of animal skins to St. Cloud and Ft. Snelling in Red River carts, which began in 1843 with four ox carts. By l854, fifteen hundred carts traveled between Pembina and St. Paul every year.[11] Another observer of these carts as they approached St. Anthony wrote to his daughter about the unique sight:

> I [saw] 4 to 6 to 8 [carts] with a driver to the front cart and the others with the ox tied to the tail of the next preceding cart so that the one driver manage all the string, the oxen being taught to travel well in that way – they make a very rough and uncouth looking train.[12]

While the sight of these carts provided onlookers a form of entertainment, the carts themselves were the important link of cargo and passengers between Fort Garry, Pembina, Georgetown, and Fort Abercrombie to St. Cloud and Fort Snelling. The traffic multiplied as trade grew, the military increased its presence, and settlers filtered into the Red River Valley. By l869, in fact, "2,500 carts carried 600 tons of freight for the Hudson's Bay Company" alone while other carts carried supplies to new built forts, towns, and farms in the quick transition of

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[9] Luth Jaeger, Red River Valley views [microform] (Fargo, N.D.: Hans Jervell Publishing, Co., l915), 5.

[10] Ibid., 4,5.

[11] Wallace James Wanek, "The Gallery Forest Vegetation of the Red River Valley of the North" (Ph.D. Dissertation, North Dakota State University, Fargo, August l967), 34, 35.

[12] J. Buckingham Letter to daughter, 23 June l868, Letter in Minnesota Historical Society's Manuscript Collection, St. Paul, Minnesota.

the Red River Valley to Euro-American settlements. This flourishing trade proved that others already thrived on the resources in the valley.[13] The trails the Red River oxcarts formed between points of destination provided roads for transportation and opened sites for future settlement. From Fort Garry, Manitoba, the trail diverged into three main routes. The 'North Dakota Trail' branched westward to Walhalla, thirty miles west of the Red River. The trail then paralleled the Red River and crossed six tributaries until it swerved east to Georgetown or seven tributaries before it reached Fort Abercrombie. A main artery of the oxcart trail, the 'Manitoba Trail,' closely followed the Red River on the west bank. When it reached Georgetown, it branched eastward to join two differing trails, the 'Link Trail' or the 'Woods Trail,' which reached the Crow Wing River before it flowed into the Mississippi River. The oxcarts then traveled along the east side of the Mississippi River into St. Cloud. If they went further south, they journeyed on the 'Metropolitan Trail' to Fort Snelling or St. Anthony, now called St. Paul. The third major trail, 'Woods Trail,' from Fort Garry forked east. This trail crossed all the tributaries to the Red River in Minnesota until it reached the Mississippi River and merged into the 'Metropolitan Trail.' A fourth major oxcart trail, 'Minnesota Valley Trail,' connected St. Paul to Fort Abercrombie. It skirted both sides of the Minnesota River in a southwest direction until it reached Big Stone Lake and then turned north to Fort Abercrombie. [See map – Figure A 4] Other trails broke from the main trails. One other major route, which separated into two trails, 'Stage Road' and 'Middle Trail,' furnished a quicker route to Fort Abercrombie and Georgetown from St. Cloud.[14] This route proved vital for steamboat traffic, which began in the early l860s. Once the steamboat

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[13] Rhoda R.Gilman, Carolyn Gilman, and Deborah M. Stultz, *Red River Trails, l820-l870* (St. Paul: Minnesota Historical Society Press, l979,) 24.

[14] Ibid., x.

Northrup sailed between Fort Abercrombie and Fort Garry in l859, traffic for goods and passengers increased dramatically.

These Red River Trails had been implemented by an enterprising group of merchants and settlers in Pembina and the Red River colony for trade between Fort Garry, Pembina, and St. Cloud or Fort Snelling. The Metis along with the Ojibwa, Assiniboine, and Cree and foes of the Dakota established their own successful businesses as middlemen in the fur trade. Sometimes called 'free men,' many of these fur traders married an Ojibwa or Cree daughter, established a kinship relationship with her family and hunted along with her father and brothers. The fur trade, while responsible for the decreasing wildlife and slowly building networks and routes for furs and transportation, entailed a deeply involved and complex history. Other historians have published extensive histories on the fur trade, the Ojibwa, Dakota, and Cree. This history is only a minute portion of the rise of the Metis, the continuation of the fur trade, and the importance of the bison – first pemmican and then robes in the rise and fall of the fur trade – as others grew more interested and aware of the Red River Valley's future potential for agricultural production.[15]

While the fur trade experienced and instigated the decline of fur and continually moved west for new hunting grounds, the Hudson Bay and the Northwest Company discovered a new source of protein, which helped them to expand and fortify their posts in the Red River Valley during the long winter months. What Native Americans long knew and utilized themselves for

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[15] For instance, for more history on the fur trade read Theodore Binnema, Gerhard J. Ens & R.C. Macleod, Editors, *From Rupert's Land to Canada* (Edmonton: University of Alberta Press, 2001), George Colpitts, *Pemmican Empire, Food, Trade, and the Last Bison Hunts in North America, 1780-1882* (New York: Cambridge University Press, 2014); Gerald J. Ens*, Homeland to Hinterland, The Changing Worlds of the Red River Metis* (Toronto: University of Toronto Press, 1996), and many others cited in this bibliography.

food - pemmican, the Europeans discovered, changed it into a commodity item, and sent it to England where it fueled its citizens and explorers across the continent to the West Coast and even Antarctica after the 1770s.[16] Companies competed so rigorously for the product that battles ensued between them for the pemmican. Here, again, pemmican, once utilized as a food among Native Americans or as an item to trade changed into a marketable item shipped throughout the world. It also began what was called the 'Pemmican Wars' in the early 1800s.[17]

The market of pemmican as an American and European food source even changed in its ingredients and, of course, focused on more bison hunts and harvests in the process. Native Americans who made pemmican for themselves, utilized the marrow of the bone, which they boiled, for its unsaturated fat and when mixed with powdered meat left 'no waxy, unpleasant aftertaste.'[18] A smaller, northern wood bison, *Bison bison athabascae,* contained this 'clean-burning, fat energy' and, once mixed with the pounded meat, solidified into '3,200 to 3,500 calories per pound.'[19] However, what became known as 'trade pemmican' contained 'different cuts of meat . . . and unsaturated fats,' which gave it a bland taste.[20] Like some currently sold processed foods, for instance the Twinkie bar, the trade pemmican, unless somehow moistened, lasted for a long time. Once it was discovered as a protein source, Europeans in the Northwest Territory switched from corn, rice, or wheat to the increased 'food energy '- pemmican. This

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[16] George Colpitts, *Pemmican Empire, Food, Trade, and the Last Bison Hunts in the North American Plains, 1780-1882* (New York: Cambridge University Press, 2014), 151.

[17] Ibid., 14.

[18] Ibid., 9.

[19] Ibid.

[20] Ibid., 99.

pemmican transformed and propagated into the survival food for the ever increasing fur trade.[21] As a 'secure source of food,' packaged pemmican carried well and enabled the fur trade to expand north and west even more.

The dynamics of the hunting, processing, and shipping of pemmican stimulated the fur trade into increasing its markets. For the Native Americans, however, pemmican eroded their cultural traditions among themselves, their relationship with the fur trading posts, and the bison. It also reduced the mighty bison into pounded, powdered flesh solidified with fat into blocks or poured into bison hide sacks to be shipped overseas. Fur trading posts established food factories for the production of pemmican. "Native and European labor joined by the native women to cut and sew bags from bulls' hides," wrote historian George Colpitt, "[for] pemmican were likely revolutionary in terms of commercial expansion."[22] The increased demand for the pemmican product, which now in the early 1800s utilized more bison – six instead of the original three - for a combination of meat and fat, necessitated the Ojibway, Metis, and other hunters to increase their ranges further to hunt bison. When Alexander Henry the Younger in l801 encouraged the Ojibway to hunt near Devils Lake or Joseph Nicollet in 1839 saw massive bison herds or evidence of the Metis hunt near the Red River in Sioux territory, the Ojibway and Metis had expanded their hunts into enemy territory for the fur and pemmican trade market.[23]

From the late 1700s up to 1860s, an entrepreneurial group of European men - merchants and buffalo hunters - joined with Ojibway, Cree, and Assiniboine to partake in the fur trade and opened new transportation overland roads in addition to the river and lake water routes as bison

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[21] 53.

[22] 46, 55.

[23] 60.

replaced beaver in the fur hunts.[24] Attracted by the freedom of the fur trade, they were called the Metis or, in the Cree language, *"Otipemsiwak,* the people who own themselves."[25] A "two step process . . . gave rise to the metis," noted historian John E. Foster, "with the first was the country marriage of the outsider to a prominent woman of an Indian band."[26] After the marriage, the husband cultivated a relationship with her father and brothers, learned their culture, and hunted with them. Foster elaborated further:

> Rarely of British origin, the *Canadien* or "eastern Indian" the freeman was a phenomenon of Montreal-based fur trade and its *en* droouine (itinerant peddling) system of trade. Physical prowess. . . , *generosity* and a penchant for an evocative song and a entertaining story. . . , [he] established himself as a man of consequence among his fellows. . . [he] sometimes ended his relations with the trading post as *engage's* and become *les hommes libres* or becoming free. . . the beginning of the second stage to the emergence of the Plains Metis.[27]

The fur trade posts and others hired *engages* to carry their goods into the 'interior and furs out to the market.'[28] When hired as voyageurs for the trade companies, "the cultivation of their farms is left to their wives and children," complained parishioner John Lambert. "When they return home, they seldom bring more than enough to support them during the winter."[29] As they evolved into the Metis, however, they "were able to carve out an entrepreneurial niche on

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[24] 71.

[25] Gerhard J. Ens, 'Metis Ethnicity, Personal Identity and the Development of Capitalism in the Western Interior, The Case of Johnny Grant,' *From Rupert's Land to Canada: Essays in Honour of John F. Foster*, Edited byTheodore Binnema, Gerhard J. Ens & R. C. Macleod (Edmonton: University of Alberta Press, 2001), 152.

[26] John E. Foster, 'Wintering, the Outsider Adult Male and the Ethnogenesis of the Western Plains,' *From Rupert's Land to Canada*, 181.

[27] Ibid.

[28] Ibid., 183.

[29] Michael Payne, 'Fur Trade Historiography,' *From Rupert's Land to Canada*, 29.

the northern plains" as the "middleman" for the fur trade and better their lives as hunters and merchants.[30] It was not until after the Hudson's Bay Company and the Northwest Company combined in the last week of March, 1821, however, that important transitions occurred for all engaged in the fur trade. Historian Gerhard J. Ens broadened the metis identity as "not defined by biology, blood, or religion, but rather by the economic and social niche they carved out for themselves in the fur trade."[31] The year of 1821 proved a pivotal year as many 'freemen' migrated to the Red River settlement due to the trading companies merger.[32] The 'freemen' were treated similarly as the Indians with their exchange of goods for furs. But with their familial relationships with local natives, the 'freemen' experienced eventual success. "The continued trade in pemmican and buffalo robes," wrote historian Heather Devine, "so essential to the survival of the HBC, soon brought economic prosperity for those freemen who chose to remain in Rupert's Land with their native wives and children."[33] In fact, for the 'Pembina Chippewa mixed bloods' who moved and settled between Pembina and the Turtle Mountains, where Metis Antoine Blanc Gingras established his own fur trading post, life improved for the middlemen, hunters, and haulers of pemmican and robes to St. Paul and returned with other supplies and marketable goods for their families and the fur trade posts. The trade of pemmican continued while a need for the buffalo hides increased. The fur traders and hunters accelerated the demise of their livelihood. The unlimited numbers of their resource – the bison – proved otherwise. First,

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[30] Gerhard J. Ens, "Metis Ethnicity," 152, 172.

[31] Gerhard J. Ens, *Homeland to Hinterland, The Changing Worlds of the Red River Metis in the Nineteenth Century* (Toronto: University of Toronto Press, 1996), 4.

[32] Ibid., 19.

[33] Heather Devine, "Les Desjarlais, The Development and Dispersion of a Proto-Metis Hunting Band, 1785-1870," *From Ruperts Land to Canada*, 151.

with the pemmican hunts, bison numbers dwindled. By 1830, the Hudson Bay Company experienced a saturation in pemmican from too much of it and refused excess purchases. What had once been a winter hunt of bison for meat, fur, and pemmican, summer group hunts began in the l820s and increased by over 1000 carts in the 1830s.[34] Besides doubling and sometimes tripling the amount of organized hunts, the militarized group hunts debilitated the herds. Traditionally, hunts of bison occurred in the winter for the fatter and pregnant cows and softer furs for a higher quality pemmican and hide. When hunts occurred in the summer, less quality meat, less fat, and the high probability of loss of meat and fat going rancid due to high temperatures sometimes occurred. Tremendous waste ensued for different reasons. Sometimes a quick temperature change, which impacted the meat, or the discovery of a different, fatter herd than the one already harvested caused the discard of what had been recently harvested. A famine in the upper Red River Valley in mid 1820s caused more to join those who went to hunt the bison. The increase in pemmican production after 1820 displayed the remarkable expansion of the bison as a marketable item from the HBC accounts:

> By 1827, the metis hunters produced and sold some 16,000 pounds of pemmican in summer. By 1831, they raised that to almost 23,000 lbs.; and by 1837 almost 90,000 lbs. . . in 1842/43 . . . the summer hunt produced some 417 bags of pemmican with another 795 bags . . . at the Red River post, representing more than 100,000 lbs. in pemmican.[35]

Add to this demand of bison the growing St. Paul trade wherein ‘buffalo robes, furs, pemmican, and leather goods’ continued to expand into the 1860s.[36] A new use for bison hides turned a life-breathing resource into the cogs and wheels of new machinery for the industrial era.

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[34] Gerhard J. Ens, *Homeland to Hinterland*, 29, 39.

[35] George Colpitts, *Pemmican Empire*, 170.

[36] Gerhard J. Ens, *Homeland Hinterland*, 80.

“The early American Industrial Revolution,” explained historian Nicholus C.P. Vrooman, “was in a very real way driven by the skins off the back of the buffalo, supplied by the Metis.”[37] Bison hides warmed human bodies in a cold winter or became the belts and pulleys for the new industrial machines.

Travelers, such as writer Manton Marble, who visited the Red River Valley and saw the lush vegetative landscape with the Metis carrying goods of furs to St. Paul on the Red River Valley, wrote of their experiences in the mid1800s. Interested in the American West and the Canadian Northwest where gold had been discovered on the Fraser River, Manton Marble, one of the editors of the *Post*, contracted with *Harper’s Monthly* to illustrate and write articles of his trip. He joined a group of gold-seekers and scientists who hoped to find a northern route from St. Paul to British Columbia.[38] [Figure A 5] Calling themselves the ‘Northwest Explorers’ Expedition,’ they left St. Paul on June 10, l859, to the Red River of the North, then traveled north to Pembina and as far west as Ft. Ellice in western Manitoba before Manton and one other member of the group returned back to Minnesota in October. Manton wrote articles about his trip and sketched beautiful lithographs, which added visual dimension to his writing.[39] A romanticist writer of nature, Marble compared a night on the prairie with a panorama of stars to Niagara Falls. The next morning he witnessed a huge Metis caravan of Red River carts pulled by oxen on

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[37] Nicholas CP Vrooman, ‘Rielization’ of the Greater Metis Traditional Historic Homeland,’ *Metis Legacy*, Edited by Lawrence J. Barkwell, Leah Dorion, Darren R. Prefontaine (Winnipeg: Pemmican Publications, 2001), 49.

[38] George T. McJimsey, *Genteel Partisan: Manton Marble, l834-1917* (Ames: Iowa State University Press, 1971), 13, 14.

[39] Ibid.

their way to St. Paul.[40] Marble described Metis Joseph Rolette as the ideal frontiersman – one who combined intelligence from his education in New York to his strength, skill, and generosity of frontier life.[41] At the initial stages of his adventure, the group held a conference and discussed the importance of the Red River Valley land for exploration.

While Marble wrote glowingly about the region's natural beauty, another gentleman exhorted over its commercial natural wealth. The unnamed gentleman announced that the license of the Hudson Bay Company had just expired. Besides this, the Red River reached close to the headwaters of the Mississippi and flowed into a two-hundred-mile long lake – Lake Winnipeg. He prophesied that "[the] Red River is the syphon [sic], and Minnesota is the reservoir that its wealth will always flow into."[42] Like the Red River, as the center of the northern tier of the United States, all commerce, manufactures, and industrial power flowed into Minnesota. The Red River, in other words, flowed for the capitalistic endeavors of its border state – Minnesota – the epicenter of the northern region's natural resources. He noted that recent history already verified his prediction. A major part of the Red River Valley fur trade slowly wended its way to St. Cloud and St. Paul. After the Hudson's Bay Company received permission to import English goods duty free from St. Paul in 1857, this increased the hundreds of tons of goods transported annually between Winnipeg and St. Paul. [See Appendix D] As noted earlier, the Metis had already begun their trek to Fort Snelling after Joseph Rolette in l840 and Norman Kittson in l843 arrived in Pembina. Interested in the fur and supplies trade, they helped develop the huge

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[40] Marton Marble, "Red River and Beyond," *Harper's New Monthly Magazine*, CXXIII, Vol. XXI, August l860, 305.

[41] McJimsey, *Genteel Partisan*, 15.

[42] Marble, "Red River and Beyond," 295.

commercial network.[43] The Metis developed this international trade and 'maintained their greatest numbers along the Red River of the North.'[44] While they profited from their capitalistic enterprise, they also created a colorful history of their joy in their particular way-of-life. Various journalists and officials wrote highly of the Metis.

Governor Isaac Stevens, who evaluated the northern tier of the United States for a transcontinental railroad from Duluth to the Pacific Ocean in l853, hired some of the Metis. In 19th Century wherein 'half-breed,' was the common terminology for the Metis, he wrote in his report to Congress:

> These men, being sometimes half-breeds, speak a jargon of patois French, Chippewa, and other Indian dialects. They are a hardy, willing, enduring class, inured to hardships, used to encounter all sorts of difficulties in their journeys between different posts of the fur companies.. . . [if treated with kindness] they are the most obedient and hard-working fellows in the world.[45]According to John Pope, who gathered information of the Red River Valley for the United States government in this same time period, "The… [Metis] at present number about eight thousand and . . . about nine hundred who are collected round the trading post."[46]

It must not have been a time of their annual hunt.

Explorer and mapmaker, Joseph Nicollet, after noting the deep wagon wheel ruts on the prairie near Devil's Lake, elaborated more on the Metis in his journal:

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[43] Pembina Centennial Committee, *A History of Pembina County* (Grafton, North Dakota: Record Printing, l967), 9.

[44] Verne Dusenberry, "Waiting for the day that never comes: The dispossessed metis of Montana," *The New Peoples: Being and Becoming Metis in North America* Edited by Jacqueline Peterson and Jennifer S. H. Brown (Lincoln: University of Nebraska Press, 1985), 120.

[45] Isaac Stevens, *Reports of Explorations and Economical Route*, 30.

[46] John Pope, Brevet Captain Topographical Engineer, *Report to the Secretary of War – Territory of Minnesota* 31st Congress, 1st Session, U. S. War Department (Washington: Beverly Tucker Printer, l850), 11.

> The metis call themselves "the free men." . . . Twice a year 600 to 800 of them come into the United States, where the buffalo are plentiful. . . Their first excursion takes place in early summer and the second in the autumn. They generally leave their establishments on the Red River and the Assiniboine [River] at the beginning of June and camp on the prairies for two months. . . The slaughter is considerable in each campaign. . . .The rule is that each wagon must return with a load of 10 buffalo.[47]

When the Metis went on their annual hunts, they generally carried their community with them on wheels and horseback. They left behind a very quiet village, which a few thought 'abandoned' when they visited the area. In their village, they lived in brightly painted houses. When they traveled, they camped in tents. Sometimes they built wood houses or 'way stations' from the area trees with a large fireplace along their long routes.[48] Because the Metis were gone for months, the entire family went, often accompanied by a priest. They loved singing and dancing - a favorite was the Red River Reel, adventure, and their families. Since they were gone for months from their homes near and in Pembina or southern Manitoba, they carried food supplies, hunted, and ate pemmican. The women 'did all the tanning of the buffalo hides, jerky meat making, pemmican and moccasin.'[49] Each robe took several days of having flesh scraped off the hide, a mix of grease from the animal's brain rubbed onto it, and left to soak and dry. Once dried, they beat or rubbed the hide with a stone to soften it into a blanket texture- a very difficult, back-breaking, but eventual rewarding end product.[50] The Metis ingenuous, all weather-wooden Red River cart with rawhide covered wheels, renowned for its high-pitched squeal, was the versatile carrier for their goods, hides, and pemmican. They simply took the

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[47] Nicollet, *Joseph Nicollet*, 188.

[48] Dusenberry, *The New Peoples*, 121.

[49] Ibid., 125.

[50] Gerhard J. Ens, *Homeland to Hinterland*, 75.

wheels off of the cart to float over any river or stream in the summer or utilized it as a sled in the winter.[51]

The well regimented Metis excursions always tried to camp near a water source and took turns with sentry duty at night. They chose a scout master to lead them to the bison and decide how the hunt would commence. If bison caught the scent of humans, they ran. Hence, strict rules applied for all in the group hunt. Once bison were spotted, the chief gave the signal and the hunt turned into a fulcrum of whirling dust, wheeling horses, firing gunshots, and running and falling bison to the ground if shot. An expert shot and horse rider, the Metis hunter rode "into the herd with their mouths full of shot and their pockets full of powder."[52] Historian Gerhard J. Ens described the hunt:

> The horses . . . would leap to the side to avoid stumbling over the falling animal. The Metis would immediately reload by pouring a handful of powder down the gun barrel, spitting a ball into the muzzle, and striking the gun-stock on his saddle to set the bullet. By this time, his horse. . . brought him alongside another buffalo. . .An experienced hunter with a fast horse could kill ten to twelve animals in a run.[53]

Similar to the Chippewa, Cree, and Dakota, who hunted the bison, the Metis knew which individual bison they had killed. When the hunt was over, the butchering immediately began and much of the meat cut in strips for the dried meat preparation of pemmican, which they sometimes mixed with native berries they had gathered as they traveled over the prairie and through the woodland landscape.

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[51] Lawrence Barkwell and Ed Swain, 'Contributions Made by Metis People,' *Metis Legacy*, 1.

[52] Gerhard J. Ens, *Homeland to Hinterland*, 41.

[53] Ibid., 41-42.

On their trips, they also gathered native plants for food. On an expedition to see if steamboat travel was possible on the Red River, Palliser and his men watched the Metis dig up plants from the prairie and ate a couple of their cooked plants. The Metis gathered *lysimachia, rudbekia, amorpha, lobelia, and lupinus* for their diet. With the *Lupinus tuberose*, the Metis sometimes crushed the root into a flour and made bread from it. Palliser's men were not impressed with the root when it was boiled. It never softened like cultivated root vegetables and, in fact, they labeled it an "insipid unnutritious trash" for a cooked vegetable.[54]

The Metis were always well armed. If attacked by the Sioux who saw them destroying their indispensable animal – the buffalo, it was by ambush or battle.[55] As noted before, the Dakota depended on the buffalo for food, their hides for shelter, clothing, and blankets, and their bones for tools. Concern of the Dakota, besides infringement on their land, was the proficiency of the Metis kill of the bison. By the l840s, the hide of the buffalo, their tongues, steaks, pemmican, and tallow became a desired American and European commodity. As the Metis proficiently established well-traveled routes throughout the Red River basin, they expanded their trade with American traders and ignored the Hudson Bay Company's restrictions regarding other fur traders. Demand for robes rose in both the United States and Canada.[56] All profited from the demand in various ways, but it was many of the Metis who revolved their lives and communities around the hunt, transportation, and sale of various parts of the bison in two expeditions – June

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[54] Irene M. Spry, Editor, *The Papers of the Palliser Expedition, l857-1860* (Toronto: The Champlain Society, l968), 96.

[55] Ibid.

[56] Gerhard J. Ens, *Homeland to Hinterland*, 75.

and August – to Pembina, St. Cloud, or St. Paul markets. In the fall buffalo hunt of l840, twelve hundred carts hauled 1,089,000 pounds of beef alone to Pembina.[57]

Accounts of the bison hunts and what Red River carts hauled to markets in St. Paul portrayed a highly resourced and harvested Red River basin, which provided a livelihood for many, particularly the Metis. Geologist William H. Keating, who traveled with Major Stephen H. Long up the Red River in l843, noted a protective bull and restless night on the tall grass prairie:

> We observed a fine buffalo bull, who seemed to challenge a combat with our party; he travelled for about two miles abrest of us. . . his eyes were intently bent on us. . . [At night] the lowings of the buffalo on the west bank of the Red River were then frequent and distinct; they contrasted strongly with the barkings of the wolf. . . . [58]

What he witnessed was a highly, diversified, mature ecological tallgrass environment, which had evolved over centuries. Historian Frederic Clement once termed this complex ecological environment as a 'state of climax.' Though the buffalo numbered in the thousands and possibly in the millions, the predators - wolves, coyotes, and other animals – flanked their herds, culled and killed the sick, the weak, and the old. The Dakota, Cheyenne, Ojibway, and others killed and subsisted on the bison, but most were careful to kill only what they needed for themselves and for some hides, tongue, and meat to trade. Their widely dispersed population or low numbers also kept bison slaughter numbers low in a form of 'carrying capacity' of the prairies. Also, an established buffer zone between the Red River and Sheyenne River allowed wildlife numbers to flourish into the mid l800s.

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[57] Vera Kelsey, *Red River Runs North* (New York: Harpers Brothers, l951), 125.

[58] William H. Keating, *Narrative of an Expedition* Vol. II (Minneapolis: Ross & Haines, Inc., l959), 17, 19.

However, many factors decreased the bison in the Red River Valley. As a commodity item, bison became a marketable desired product. Rifles replaced arrows, which increased the efficiency of the kill. Additionally, adventurers and travelers through the valley hunted the big game for meat and sport. Bison grazing land diminished with the increased traffic on the Red River Trails, steamboats on the Red River, and trains entering the Red River Valley. More settlers also added to the decrease in grazing land. If hunted for prime food, the young cows – bearers of the calves – were the desired meat. If killed, this decreased the herd's potential to multiply. Other factors, like floods and prairie fires, existed as well. The increased hunts, though, greatly diminished their numbers in the Red River Valley. Some herds moved farther west.

Environmental historian Dan Flores has noted how difficult it was to estimate the true numbers of bison on the plains and what quickened their demise. He identified a 'biocultural history' of 'events [which] were unique to their time and place.'[59] Flores explained that Native Americans and Euro-Americans were equally motivated in their methods of survival, in this case the hunting and later marketing of the bison. Instead, blame lay in the fault of the federal government that had no 'policy' in the conservation of the bison. No protective laws for the bison herds almost caused their extinction.[60] Many Euro-Americans espoused the 'laissez faire,' capitalistic American market in which the Great Plains grassland was a blank landscape perfect for agriculture. This left little room for the wandering bison or the Native Americans who subsisted on the animals. As to many Native American tribal beliefs, they believed in the continuance of an endless number of bison. This and the very short span – less than one's life

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[59] Dan Flores, *The Natural West, Environmental History in the Great Plains and Rocky Mountains* (Norman: University of Oklahoma Press, 2001), 53.

[60] Ibid., 52.

time – from a ‘wild’ tall grass prairie to a cultivated landscape of agriculture and domesticated animals caused many to marvel at how quickly the change occurred.[61] For instance, when Randolph Probstfield was asked when the last bison was seen in Clay County, he replied, “. . . only four different years from l859 to l868. . . The last one we killed [here was] in l859 during Christmas . . . all [five] old, big bulls, probably driven out of the herd.”[62] He mentioned that they saw a large herd, which moved west and north, near Georgetown – so many he speculated anywhere from 10,000 to 100,000 – in July l866. A year later, Probstfield and neighbors saw 25 in the same area. In l868, he saw, shot, and wounded the last bull near Georgetown. These were the last bison he saw in the Red River Valley.[63]

In many memoirs, letters, and diaries, soldiers, adventurers, explorers, surveyors, and early settlers wrote of their experiences, what they saw, and of their surprise in the abundance of wildlife and luxurious plant life in the Red River Valley. In l839 Nicollet noted the beauty and profuse life on the prairie. He observed:

> Indians. . . and the metis and whites refer to the prairies [Red River Valley basin] by only two expressions: large, beautiful prairie, and pretty, little prairie. . . The man of the prairies walks only on grass and flowers. . . herds of buffalo, antelope, and deer enliven the solitudes.[64]

He saw large herds of bison. Near the [McVille Coulee] and the Sheyenne River south of Devils Lake, he surmised, “These prairies are the favored haunts of ruminants.” He added, “We see here buffalo grazing so tranquilly that it is clear no hunting party has disturbed them for

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[61] 69.

[62] Randolph Probstfield letter to Hon. Alvin H. Wilcox, *A Pioneer History of Becker County*, Edited by Alvin A Wilcox (Wilcox, Minnesota: Pioneer Press Company, l907), 50.

[63] Ibid., 51.

[64] Nicollet, Joseph N. *Nicollet on the Plains and Prairies*, 197-200.

some time."[65] As word filtered out from reports of what fur traders already knew of a fertile vegetative region where wildlife thrived, the image of a 'Great American Desert' faded out and were replaced by future agricultural projections of crop and livestock enterprise. The increased market for bison meat, tongue, hide, sinew, and sport led to their hastened demise. Changes to the landscape began in spurts, particularly along the Red River and tributaries, and increased as more became aware of the basin's potential for agricultural and urban settlement.

Even the Metis, who were the most acclimated to Euro-American ways, experienced tremendous change and fought to retain their rights and property. This difficult but sudden transition from a tallgrass wilderness of the bison used as a marketable resource expanded into an agricultural boom of cultivated crops and domesticated animals. It occurred swiftly and impacted the natural world, the Native Americans, and the Metis, who implemented part of the transformation. The bison, like the passenger pigeons, symbolized a vanishing frontier. As the bison disappeared, the tall swaying grasses and forbs remained.

A variety of wildlife still lived in the tallgrass prairie, but with the larger mammals harvested, the healthy diversity of a complex ecosystem began to falter. National reports of a rich, fertile tallgrass region and visits by entrepreneurs and land seekers wrote of an open, level land available for agricultural enterprise. A concerted effort by bankers, railroad owners, visitors, journalists, and business men spread the news that the Red River Valley was no desert waste land. "We are all multi-dimensional beings," wrote Eric Hobsbawn, "who strive to provide basic needs of shelter, food, and security for ourselves, our families, and our community."[66] The hard

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[65] Ibid., 196.

[66] Gerhard J. Ens, 'Metis Ethnicity Personal Identity and the Development of Capitalism in the Western Interior,' *From Rupert's Land to Canada*, 162.

working, freemen Metis themselves moved westward as they continued to hunt bison or settled along the northern tier and the northern sector of the Red River Valley on land they had claimed. They inadvertently brought attention through their own exploits and long caravans of hides and furs to a region ripe for promise for future settlers. And, they had created many of the routes of travel and opened trading posts for many who followed in their future endeavors – only with a difference of creating farm enterprises of monoculture crops and domesticated animals. The abundant reports of wildlife and a rich, fertile soil gave promises of plenty and spurred action for settlers to homestead in the Red River Valley. The sea of waving grass began to change to golden wheat.

CHAPTER 4: EURO-AMERICAN SETTLERS

"The prairies sank into their hearts."[1]

Historian Frederick Jackson Turner wrote in his essay of the end of the American frontier that "the existence of an area of free land, its continuous recession, and the advance of American settlement westward, explains American development."[2] First, the fur traders, next the surveyors, entrepreneurs, and squatters, and, lastly, agricultural settlers, bonanza farmers, and urban developers infiltrated new territory for the drastic environmental landscape alteration for urban and agricultural development. Entrepreneurs for the railroad and other businesses advertised nationally and internationally of the 'free' agricultural land in the Red River Valley. Pioneer farmers, many with families, moved into the valley and implemented major changes to the overall landscape.

Of course, while this was new land in the second half of the 1800s for the Euro-American settlers, it had been the homescape for differing Native American tribes for centuries. The open, tall grass prairie landscape with the Red River as its main thoroughfare, abundant resources of wildlife, fowl, and fish besides a diverse native grass and flora – perennial and annual, shrubs, and trees along waterways had provided earlier residents a sustainable natural livelihood. As Euro-Americans moved into the river valley, they brought domesticated livestock and seeds for gardens, crops, and trees. They eventually transformed the diverse prairie into a more domesticated landscape – one which replicated their way-of-life. As more settlers moved into the

[1] Delle Wehe, "Reminiscences of the Early Eighties in Dakota," 4, Small Collections 718, Institute for Regional Studies, North Dakota State University, Fargo, North Dakota.

[2] Frederick Jackson Turner, *Selected Essays of Frederick Jackson Turner Frontier and Section* (EngleIwood Cliffs, N.J.: Prentice-Hall, Inc., l961), 37.

tall grass region and out on to the prairie, though, many faced a daunting task. The absence of timber, questionable water sources, different planting zones, variance in temperature and rainfall, sudden prairie fires, and limited funds, challenged most settlers. What has been forgotten in our Red River Valley history is not only how different this landscape was for many settlers but also the dangers many faced in their new lives on the tall grass prairie.

Environmental historian William Cronon in *Changes in the Land* wrote of how rapidly colonial settlers of New England transformed forested land into agricultural and urban communities. They not only profited from trees cut for lumber for sale or their own use and to clear forests for fields, but they also drastically changed their surroundings in an attempt to duplicate their former country.[3] For them, arriving from England where few forests remained and the pastoral setting of an open landscape bordered by a few trees was romanticized, the thick, dark forests appeared dangerous and foreboding. This wilderness was a direct contrast to civilization which they left and hoped in the new world to replicate. Hence, the livestock that they brought with them, their economic use of a market economy and natural resources as commodities plus their beliefs led to the rapid disposal of thousands of mature trees and the wildlife and fowl, which existed beneath its broad canopy.[4]

Another environmental historian, Alan Taylor, elaborated on earlier settlers' fear of the forests and the abundant wildlife in 17th Century New York as reasons to rapidly transform and

[3] William Cronon, *Changes in the Land, Indians, Colonists, and the Ecology of New England* (New York: Hill and Wang, 1983), 169.

[4] Ibid., 162.

domesticate the landscape into a civilization which they knew and felt they controlled.[5] According to Taylor, they reacted more to the danger they feared or experienced and eradicated wildlife and birds in large numbers to protect their crops, gardens, and selves.[6] Taylor emphasized how this need to protect families, crops, and livestock led to the quick demise of the forests and wildlife more than for their commodity use. No matter what the reasons, forests fell to the ax or were slashed and burned for urban and agricultural development and timber use and sale along the eastern coast and as settlers slowly moved westward.

Interestingly, by the mid to late l800s when settlers moved into the Red River Valley, they first settled along wooded rivers and streams. Here, also, wildlife and trees quickly diminished. However, by the late l800s, most chose to homestead near timber. Naturalist Victor E. Shelford noted how settlers now preferred timber near their homes for numerous uses besides shade and shelter.[7]

For now, though, in the early l870s, after most of the fairly level, forested river valleys were claimed, settlers homesteaded or bought land on the tall grass prairie. Northern European immigrants along with New England, central states, and eastern Canadian settlers moved to the Red River Valley for a variety of reasons. A promise of cheap, fertile land without stones and fairly level, watered landscape appealed to many.[8] However, the lack of trees, though praised in

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[5] Alan Taylor, "Wasty Ways," *American Environmental History,* Edited by Louis S. Warren (Oxford: Blackwell Publishing, 2003), 113.

[6] Ibid.

[7] Victor E. Shelford, "Deciduous Forest Man and the Grassland Fauna," *Science,* C (18 August 1944), 137-38.

[8] John Lee Coulter, "Industrial History of the Valley of the Red River of the North," *State Historical Society of North Dakota,* Vol., 3 (Bismarck: State Historical Society North Dakota, 1910), 558.

newspapers, letters, and speeches as the ideal agricultural environment, disconcerted many new settlers. This prairie environment differed in climate and topography for many Euro-American settlers. Historian Elwyn Robinson described settlers' reactions:

> The semiarid climate intensified the feeling of having been uprooted from familiar surroundings and transplanted in a strange land. All the settlers except the German Russians came from humid regions and were awed by the vast, open, almost barren prairie.[9]

Another author and poet, Bill Holm, who lived in southwestern Minnesota, described how one who lived on the prairie changed their perspective in how they viewed their surroundings. He called it the difference between the 'prairie eye' and the 'woods eye':

> There are two eyes in the human head – the eye of mystery, and the eye of harsh truth – the hidden and the open – the woods eye and the prairie eye. The prairie eye looks for distance, clarity, and light; the woods eye for closeness, complexity, and darkness.[10]

He elaborated further:

> Keep two facts in mind if you do not have a prairie eye: magnitude and delicacy. The prairie is endless! . . . Prairies, like mountains, stagger the imagination most not in detail, but size. As a mountain is high, a prairie is wide: horizontal grandeur, not vertical. . . [11]

This 'horizontal grandeur' of the tall grass prairie contained not only promises but dangers for the Euro-American settlers. As many envisioned miles of an annual grass of wheat in place of the endless horizon of diverse tall grasses and flowers, they also saw few trees for shelter, shade, or fuel. They witnessed a variety of game birds and wildlife, which helped many survive their first years. Eventually, settlers replaced the disappearing game with domesticated

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[9] Robinson, *History of North Dakota,* 156.

[10] Bill Holm, *The Music of Failure* (Berkeley, California: Milkweed Press, l986), 17.

[11] Ibid., 18.

livestock and poultry. They gathered and sold the scattered buffalo bones on the prairie for an additional income. However, settlers also encountered perils in their new prairie life. What they saw as an endless fertile landscape for agriculture contained combustible accelerates for prairie fires. Wind, storms – summer and winter, extreme variance in temperatures, rainfall, whether too much, too little, or not at the right time, a long winter, early or late frost, and water and fuel sources were just a few examples of settlers' concerns in how to survive on the prairie. It is hard now to visualize in modern homes with electricity, paved roads for transportation, and stores, which contain ready supplies, how 'alien' this tall grass region was when Euro-American settlers first moved into the Red River Valley. Many eventually adapted and changed themselves as they transformed the tall grass prairie into a monoculture of crops for agriculture. There were others who did not succeed and either moved to another region or tragically died. While the changes were dramatic to the natural prairie landscape for marketable commodities for agriculture, it was not without its challenges and changes for the pioneer settler, as well.

Various settlers wrote of their experiences and observations in their journals, letters, and reminiscences. William A. Marin, a young boy when he moved with his family in the northwestern part of Minnesota before the land was plowed, wrote eloquently later of what he saw. First, he described a 'limitless plain' upon which the mixed grasses swayed in the breeze. Far to the north, he saw what appeared as a blue line, which were woods along the Red Lake River. The horizontal landscape gave him a sense of standing in an 'immense saucer' of deep blue, almost infinite sky around and overhead him within a vast, circular horizon.[12] He described the variety of flowers amidst the tall grass change in color, 'a mass of blue at one time, of yellow

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[12] Marin, 'Papers,' 44.

at another, or again red, purple, white or pink, or a blended combination of all colors,' as the growing season progressed from spring to fall.[13] A profusion of wildlife, particularly birds, meadowlarks, bob-o-links, and blackbirds flew out of their way, while 'prairie chickens, plover, and snipe in such abundance' paid little attention to them. All birds hid or froze, though, if they noticed the large hawks, which soared or drifted high overhead.[14]

Another homesteader child, Della Wehe, whose family claimed land fifteen miles northwest of Larimore, west of the Red River and north of Turtle River, vividly remembered her first impressions of her new surroundings on the prairie landscape in the spring of l882:

> One could have all the space and sky that there was. . . An indelible impression of the vastness . . . [of] the prairies, where there was no water, were a bed of lovely purple crocuses, "ten thousand saw I at a glance." The many coulies [sic] and ponds were teeming with wild ducks. The grass, as we made our own road, was the home of the prairie chickens, as yet unafraid of their new neighbors. The gophers, not quite so confident, shot out and in their little burrows.[15]

Both Wehe and Marin witnessed a tallgrass prairie interspersed with wetlands and a variety of wildlife and fowl amidst its diversified native vegetation teeming with life. Their idyllic descriptions of their surroundings contrasted to other writers who wrote of the changes around them and hazards they experienced in the Red River Valley. Perils existed for those who knew little about the prairie, the climate, the rivers and marshes, and their surroundings.

Woodward mentioned dangers of prairie fires, blizzards, the new pests of rats, besides her views on land cultivation, wheat harvests, other settlers, and the implementation of barb wire

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[13] Ibid., 45.

[14] Ibid.

[15] Della Wehe, "Reminiscences of the Early Eighties in Dakota," 1.

fence in her diary. She noted various forms of loss for other settlers and the resultant sale of their claims. She mentioned former inhabitants, the Dakota and Ojibway, who traveled through her region. She also acutely discerned the environmental changes of the prairie landscape as native flowers and forbs disappeared, trees along the river valleys vanished, and wildlife diminished. About the buffalo who no longer roamed in the Red River Valley, she reported that a visitor from Fort Yates told her and her son of a large herd in western North Dakota. Someone hired hunters who killed four thousand of the herd. "No wonder that animal is rapidly disappearing," she proclaimed in her diary.[16]

Mary Dodge Woodward astutely observed the environmental changes in her diary in the mid l880s. In June 15, 1885, she noted that there were no fences on the prairie. Cattle owners either utilized someone in their family, hired a herder, picketed the animals, or allowed them to roam free.[17] Some whose cattle roamed free hired herders to ward off wolves, which still roamed throughout the landscape. A hired herder for the Helendale Farm, Oscar Bakke, rode two different ponies and carried a revolver to ward off the brush wolves. The wolves went after the calves of the cows who 'went wild when they smelled wolves near them.'[18] The cows, like the buffalo who preceded them, formed a circle around the calves within and faced outward with heads lowered in a defensive position. The wolves generally left or seldom attacked when they saw Bakke on his horse. Bakke mentioned that the wolves went after sheep in the daylight as

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[16] Mary Dodge Woodward, *Checkered Years*, *A Bonanza Farm Diary, 1884-88* (St. Paul: Minnesota Historical Society Press, 1989), 256.

[17] Ibid., 35,36.

[18] Oscar Bakke in an interview to Leonard Sackett, 31 July, l956, Small Collections 756, 1, Institute of Regional Studies, North Dakota State University, Fargo, North Dakota.

well. They even followed his father across a field one day, but his father scared them away when he waved a stick at them.[19] Dangers existed in the Red River Valley as the settlers moved into the valley and changed the landscape around them.

She also wrote ironically of the wheat bonanza in the fall of l885. The surplus caused lower prices for the harvested wheat. On the other hand, “Some men went down to the Sheyenne [River] and brought back nearly a bushel of plums, very nice ones too, large and red and sweet. They are sold for one dollar a bushel, while wheat is sixty cents.”[20] Another farmer near Valley City noted a similar irony, “Our potatoes yielded wonderfully good and the prices paid for them gave a better income than the whole fifty acres of wheat brought us.”[21]

Her diary entry and his memoir indicated a problem for farmers who relied on one crop. While some farmers grew primarily wheat, there were others who not only diversified in different crops, raised cattle, milk or beef, pigs, and chickens but grew large gardens for themselves and for market sales. As noted in the previous chapter, in the Red River Valley there was a historical precedent for this.

Before the l860s, Selkirk settlers and the Metis in the northern Red River Valley had already grown barley, corn, potatoes, tobacco, bearded wheat, and a variety of garden vegetables. Their primary problem, besides a few spring floods and several invasions of grasshoppers

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[19] Ibid.

[20] Ibid., 91.

[21] Nils Orre, ‘Fifteen Years in North Dakota,’Translated by Elsa Danielson Johnson, 19, Small Collections 572, Institute of Regional Studies, North Dakota State University, Fargo, North Dakota.

(actually the Rocky Mountain locust) was a lack of nearby markets for sales of their crops.[22] Even in l800, fur trader Alexander Henry planted large gardens of cabbage, carrots, onions, turnips, beets, parsnips, cucumbers and potatoes. Delighted in the rapid growth and massive width of his garden vegetables, he recorded the girth and quantity of his vegetables in his journals. For example, "one onion measured twenty-two inches in circumference, one turnip weighed twenty-five pounds."[23] Later he published a book of his experiences and descriptions of the northern landscape of the abundant natural resources and a rich soil, which grew enormous vegetables. Word of the region's vegetative vitality also spread through his and others' letters, newspaper accounts, magazine articles, advertisement, and word-of-mouth. Historian George N. Lamphere even suggested in his 'History of Wheat Raising in the Red River Valley' that originally it was actually a harvest of vegetables, which excited businessmen in the agricultural productivity in the Red River Valley. He wrote:

> In l871, while businessmen conversed in Moorhead about the sour, cold valley soil, a soldier from Fort Abercrombie carried a bulky grain sack into the bar. He opened the sack and poured out high quality vegetables on the bar. The amazed businessmen asked innumerable questions about where he obtained the vegetables. The soldier stated he grew them on the prairie.[24]

An economic historian, J. L. Coulter, verified Lamphere's suggestion that diversified farming preceded the bonanza farms. With 2,206 Euro-Americans in the Red River Valley south

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[22] Elwyn B. Robinson, *History of North Dakota* (Lincoln and London: University of Nebraska Press, l966), 63-69.

[23] Alexander Henry Younger, *Journal of Alexander Henry Younger, 1799-1804,* Edited by Barry M. Gough (Toronto: Champlain Society, l989), 35.

[24] George N. Lamphere, "History of Wheat Raising in the Red River Valley," *Minnesota Historical Society,* Vol 10, Pt.1 (St. Paul, Minnesota: Minnesota Historical Society, l905), 8.

of Manitoba in 1870, most farmers who moved into the valley concentrated on crop, vegetable, and animal production until l876 when bonanza farming began.[25] Settler Della Wehe described her family's excitement over the vegetables grown in their garden. They were so impressed over the size of their vegetables that they sent some back with her uncle as an advertisement for other settlers to move to the Red River Valley. She wrote:

> There was a potato that weighed two pounds and a turnip which grew to the size of a dishpan. These were used in a display window in Lockport [New York] to advertise the new [fertile] West.[26]

Hence, not only the height of the tall grass on the prairie but also girth in vegetables proved soil and climate viability in plant growth. Many Euro-American settlers who poured into the valley after l870 planted wheat and grew large gardens as well. They carried their vegetable seed and brought their garden techniques with them to their new home. Sometimes similarities existed between Native American and Euro-American gardens of vegetables grown and singular methods. For instance, the "German-Russians planted rows of sunflowers for wind protection around the border of their gardens."[27] The Mandans had planted similarly but for a different reason. The sunflower rows identified each family's garden. Many settlers from Norway also grew most of their own food. When they shopped or bartered for other items in a store, they bought flour, sugar, salt, soda, and tobacco. The most expensive purchase was a barrel of apples.[28] Numerous settlers craved apples as their domesticated fruit. However, many, like their

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[25] L. D. H. Weld, *Social and Economic Survey Community Red River Valley* (St. Paul: Minnesota Historical Society, 1915), 3, 4.

[26] Wehe, "Reminiscences,' 1, 2.

[27] Bob and Diane Askew, 'One Hundred Years of Gardening in North Dakota,' *North Dakota Farm Research,* Vol. 46, No. 1 (Fargo, North Dakota: Agricultural Research Station, l990), 25.

[28] Ibid., 26.

former and current Native American residents, availed themselves of the fresh fruit they picked from chokecherry, sand cherry, Juneberry, wild plum, and gooseberry bushes and trees plus raspberries, strawberries and grapes found in the Red River Valley.

One pioneer family who filed a tree claim twenty miles west of the Red River in the mid sector of North Dakota availed themselves of the native fruit from the trees and shrubs. Their son, Ben Barrett, wrote of his family's fruit and garden use:

> Several rows of red currants supplied us with skads of jelly and sauce. . . There was a row of gooseberry bushes. . . the . . . berries made smacking good pies . . . long rows of peas, beans, carrots, beets, cabbages, onions, parsnips, and radishes were eaten and some stored in the cellar in the fall. . . A long row of asparagus provided food in the spring and another row of rhubarb was eaten fresh, generally in pies, or canned for winter.[29]

They also grew two acres of potatoes and 'Golden Bantam' corn for summer and winter food. After the potato plants grew, young Ben picked the potato bugs off of the plants and dropped them into a can with a little kerosene, which killed the bugs. The roasted corn when ripe, dried corn, later soaked and cooked with cream, or parched in a pan over a hot fire of melted lard, then salted to eat, catered to his and his family's taste of a crop they enjoyed in several different ways. They also stored seed to plant for the next spring.[30]

Another pioneer farmer Randolph Probstfield, who agricultural historian David Danbom called a 'modern farmer,'- one who utilized diversification - sold wild raspberries, timber, ice, fish, and vegetables besides other farm commodities to the burgeoning Moorhead and Fargo

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[29] Ben H. Barrett, *Pioneer Days North Dakota Prairies* (Unpublished Manuscript: North Dakota State University Library, l960 (?), 11.

[30] Ibid., 12.

communities.[31] Probstfield himself termed his farm operation as "diversified economics with diversified farming."[32] While he and his family exemplified many settlers who diversified their farm operations, he added another dimension to his enterprise. He enthusiastically grew and experimented with introducing many different vegetables, fruit trees, and flowers for a truck farm operation. While the Bureau of Agriculture sent him seeds and seedlings, he corresponded and received seeds and fruit tree scions from Minnesota extension agencies, the Minnesota Horticulture Society, founded in l868, and different seed catalogs.[33] Probstfield daily recorded climate, farm operations, sales, purchases, and visitors in his journal. For example:

> On April 11th, l871, "Sowed in boxes of hotbeds – Early Paris cauliflower, Keps incomparable dwarf cabbage, Burnells King of the dwarf cabbage, Tomato-golden Trophy . . . Egg Plant and double Petunia . . . Thermometer up to 52 degrees – a nice, warm drying day," [A day later he] "Sowed tomatoes in hotbed. General Grand, trophy, Peppers Galioh, Hathaways excelsior and early large red."[34]

He also championed his surrounding landscape for agricultural endeavors in a letter to a newspaper in l872 as more farm families moved into the area. He wrote: "[though] Spring comes late and frost earlier than in more southern latitudes . . . the growth of vegetation after spring commences is very rapid, the soil being of warm nature . . . the soil will stand, if properly tilled,

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[31] Melissa Anne Benson Evensen, "Triumph over Hardship: Randolf Michael and Catherine Probstfield in Clay County, Minnesota" (Masters thesis, North Dakota State University, 2009), 53.

[32] Florence, Danny, Juen, Dobenvick Probstfield; Evelyn Probstfield Gesell; and Raymond Gesell, 'Randolph M. Probstfield and Family Papers,' 8 December 1966, Unpublished papers, Livingston Lord Library, Moorhead State University, Moorhead, Minnesota.

[33] Ibid.

[34] Randolph M. Probstfield, Probstfield Diaries, 11, 13 April l871, Unpublished Diaries, Livingston Lord Library, Moorhead State University, Moorhead, Minnesota.

quite a severe drought . . . in a rainy season absorb an incredible amount of moisture without any detriment to the crops."[35]

While this encouraged families to settle in the Red River Valley, many understood that the environment for any farm and garden endeavor contained challenges as well. Their first lesson was the topography of the valley, which was actually "a flat plain resulting from sedimentation on the floor of an old glacial lake Agassiz."[36] The vision of a perfect landscape for agriculture proved deceptive. The surrounding landscape slowly descended towards the Red River, which was the lowest level. The river itself fell gradually about one-half foot per mile as it flowed north for 545 miles from Wahpeton to Winnipeg, Canada.[37] Twenty major and minor rivers and streams of North Dakota and Minnesota flowed into the Red River.[38] Massive spring floods periodically occurred. Fortunately for settlers who moved into the Red River Valley in the l870s and early l880s, "the main settlement period in the valley coincided with the early portion of this relatively flood-free era."[39]

Besides the possibility of floods, marshes and wetlands interspersed the Red River Valley. The issues of wetland problems increased during summer months with inundations of

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[35] Chas. A. Everett, Editor, *Star,* July, l872, Livingston Lord Library, Moorhead State University, Moorhead, Minnesota.

[36] John P. Bluemle, *The Face of North Dakota,* 3rd Edition (North Dakota Geological Survey: Educational Series 26, 2000), 4.

[37] Gene Krenze and Jay Leitch, *A River Runs North* ((?): Red River Water Resources Council, l998), 4.

[38] Walter W. Augustadt, "Drainage in the Red River Valley in the North," *Water The Yearbook of Agriculture* (Washington, D. C.: United States Printing Office, l955), 569.

[39] William J. Carlyle, "Water in the Red River Valley of the North," *Geographical Review*, Vol. 74, No. 3 (New York City: American Geographical Society of New York, l984), 334.

mosquitoes, besides other insect pests. Everyone, whether writing for a newspaper, in his or her diary or letter, or speaking to a neighbor or visitor, noted the ferociousness of the tiny insect, which even drove livestock to a maddened frenzy. About the problem of the mosquitoes, Probstfield wrote:

> When it was both wet and hot life was a weary burden. On the prairie and in the openings they were worse in the evening and early part of the night. . . but in heavy timber they were not as bad at night . . . the worst places of all on this earth, I think, were in the Red River and Missouri River bottoms the next summer after a spring overflow.[40]

Another settler who homesteaded near Goose River wrote about their difficulties with mosquitoes:

> Mosquitoes were so numerous that we had to use smudges both day and night. At times there was no use trying to milk a cow unless the smoke covered both cow and milker. When on the road with a team, we would have to drive zig zag in order to have a slight wind facing the team. One would have to hurry down because the horses would be covered instantly by the pests.[41]

A more devastating insect for crops or gardens, the locust or called by many grasshoppers, though generally not an annual problem, created not only loss of the crops but sometimes failure of the farm itself when they appeared in repetitive years. How could a farm survive, if grasshoppers ate the seed for farmers' next year's crops besides the income they hoped to derive from their harvest? Not only that, but the ravenous insects ate much of the garden vegetables and even clothing hanging on the clothesline. Grasshopper invasions in the

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[40] Alvin H. Wilcox, *A Pioneer History of Becker County, Minnesota* (St. Paul, Minnesota: Pioneer Press Company, 1907), 572.

[41] N. H. Berg, 'Early Days in Steele County, *Farmers Free Press*, 3 January 1935, Small Collections 880, Institute for Regional Studies, North Dakota State University, Fargo, North Dakota.

years of l856, l857, l864, and l865 caused extensive damage to crops, gardens, and any clothes, tools, and equipment, if left outdoors. The years from l873 to l877 were the worst of the grasshopper destruction in parts of the Red River Valley.[42] One settler west of the Red River wrote of the devastation and unbelievable numbers in his memoirs. He reported that what they had first thought to be an eclipse as the sky darkened the sun overhead was in fact similar to a snow storm of greedy Rocky Mountain locusts. The three day marauders devoured the blooming potato plants and 'were so numerous down at the stream that they bent the willows down to the water' where many drowned and perished.[43] Historian Annette Atkins noted how concurrent grasshopper invasions left behind a desperate situation for farm families. While some farmers and farm families wavered near disaster and starvation, others left unless they received some community, county, state, or federal government assistance.[44]

According to economic agriculturist John Lee Coulter, settlers who migrated from the southern part of the United States, chose to stay and battle the grasshoppers, because their problem of grasshoppers was less than a variety of problems they previously experienced:

> . . . farther south, blight and mildew, the chinch bug, army worm, hessian fly, weevil and other diseases and enemies had made similar ravages. These were not likely to come . . . north. . . the price of wheat was good and the land in old districts was failing as wheat land, [hence they stayed.][45]

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[42] Merrill E. Jarchow, *The Earth Brought Forth, A History of Minnesota Agriculture to 1885* (St. Paul: Minnesota Historical Society, 1949), 181,182.

[43] N. H. Berg, 'Early Days in Steele County,' 3 January l935.

[44] Annette Atkins, *Harvest of Grief: Grasshopper Plagues and Public Assistance in Minnesota, 1873-78* (St. Paul, Minnesota: Minnesota Historical Society Press, l984), 109-112.

[45] John Lee Coulter, "Industrial History of the Valley of the Red River of the North," 566.

On the east side of the Red River, Clay County's first homesteader Randolph Probstfield wrote about his disheartening loss due to the grasshopper havoc:

> July 17: "Grasshoppers flying thick clouds all day" . . . July 18: Tried to smoke and fight grasshoppers out of the garden and found a useless task . . . eating and damaging everything except peas." July 19: "Grasshoppers commenced leaving about 10 A.M. Many things completely cleaned out . . . Potatoes all eaten to coarse stocks. . . . Some onions eaten clear into the ground."[46]

He also fought the black potato beetle and cutworms that damaged 1300 tomato plants besides the cabbage crop.[47] He even planted cabbage four different times in l877. Hail on May 30th, cutworms on June 1st and the 18th, and grasshoppers on July 14th diminished his cabbage and other vegetable production. However, he persisted and sold cabbage at the market on November 26th.[48]

Probstfield described a good growing environment for plants, yet he knew along with other farmers and gardeners that plants could drown in heavy rain, die in a drought or frost, experience damage from marauding livestock when livestock still roamed free, suffer fruit damage from insects, birds, wildlife or disease, succumb to prairie fires, or not sell for profit when brought to the market. After one difficult year, he vented his frustration in his journal:

> Accounts against us are clamoring for settlement without being able to meet them. No butter, no coffee and tea in the house. . . Even hope is gradually dying to ever see better times for farmers. . . This is the soil and the weather for anarchy to grow and prosper on.[49]

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[46] Randolph M. Probstfield, Probstfield Diaries, 17-19 July l976.

[47] Annette Atkins, *Harvest of Grief*, 15, 26, 31.

[48] Randolph M. Probstfield, Probstfield Diaries, 30 May - 26 November, l977.

[49] Ibid., Dec. 10, 1888.

In spite of this low point, Probstfield and his family, like many other farm families, persevered and continued to farm the next year. In fact, his farm remained in the family until the l970s. They not only maintained their successful vegetable market but they even shipped produce to outlying cities and influenced other farmers to do likewise. Byl940, Clay County farmers utilized over 1,000 acres for commercial vegetable production. The Probstfields' themselves shipped over 8,000 bushels of onions to urban markets as far as Chicago.[50] Clearly, many farmers who diversified in crops and livestock discovered ways and means also to enlarge their gardens for a variety of markets.

Though the Red River Valley appeared highly suitable for agriculture due to its fairly level topography, location proved an important factor in the success of settlers' adaptations. Most early settlers who entered the Red River Valley claimed land along the rivers. Stands of old growth timber- several miles outward from the river - and fresh water provided fresh fish for food and encouraged quick settlement near the river banks. Care was needed in selecting land near the river.

Levi Thortveld wrote how his father chose their new farm near the Buffalo River and why they almost returned to their eastern Minnesota farm. Astute observers of the landscape, Ola Thortvedt, his brother Aanon Gjeitsta, and a friend, Targei Skrei, plus five other men observed the land west of the Red River for themselves and their families. They returned to the east side of the Red River and Randolph Probstfield asked them what was wrong with what they viewed. Thortveld informed him that they saw slough grass and drift wood. This indicated to them a low land, which was prone to floods. Probstfield then took them to higher land near the Buffalo

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[50] Randolph Probstfield, Probstfield Papers, 13 September l940.

River, where the Hudson Bay Company kept their cattle and horses during periodic floods. "If the land on the Buffalo River does not suit you, you can just as well drive back to where you came from, because you won't find land in the whole United States that will suit you!" Probstfield replied.[51] They quickly agreed and claimed this land for their farms.

Besides the benefit of a higher ground, the mature trees, which grew on it, gave them the lumber for buildings, fences, tools, firewood, and sales to other settlers who settled on the tall grass prairie. Levi Thortvedt noted 'plenty of timber of elm, oak, ash, boxelder, and basswood . . . [with] wild fruit trees of choke cherry (Hegber), plum, thorn apple, “Gris ber”[gooseberries], and grapes.'[52] He wrote how impressed he was with his surrounding landscape and the massive growth of trees:

> I was along with Father over in our big woods across the river . . . Father was cutting basswood to make boards from. The basswood is soft and nice to cut, but what awful big trees and high. So thick of big trees as I have ever seen. Bass-woods over two and one-half feet in diameter, tall and straight. It looked grand over there, nothing but big trees wherever you look.[53]

His father cut the logs for a 12 by 14 foot house with elm bark on the roof. On top of the bark they laid cut prairie sod, 14 by 14 inches, and packed tight with river mud. They built a long, low stable with a roof of 'willow, hay, sod,' and also plastered it with river mud.[54] The Thortveldts made a hay rack from ash poles with young elms bent into bows for wheels for the rack. They and other Red River Valley homesteaders constructed other equipment from area

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[51] Thortvedt, “Early History of the Red River Valley,” 13.

[52] Ibid., 16.

[53] Ibid., 27.

[54] Ibid., 26.

trees as well. While the Thortveldts split and squared oak to construct a drag after their purchase of iron rods, their neighbor, Skrei, made his drag entirely of wood.[55] Wood posts from area trees held wire to fence. They turned wood into handles for cradles, rakes, and even yokes for the oxen besides furniture for their homes.[56] Some even made brooms out of willows to brush dirt out of their houses.[57]

Common patterns also were evident among homesteaders in how they planted and harvested their first few crops of wheat. Many planted seed wheat by hand. Levi tried his best when the wheat headed to keep black birds away from the ripening wheat.[58] After the wheat ripened, a good harvester managed to cut four acres a wheat a day with his cradle. The Thortveldts waited for the wheat to dry once it was stacked. Then, they hauled it home, waited for the river to freeze, and threshed the wheat with a wooden flail on the river's ice. Next, they separated the wheat from the straw by throwing the wheat in the air and catching the kernels with a dust pan. The wind's action blew away the chaff.[59] The wheat was then stored as seed for next year. Some milled a portion of the wheat for flour, sold it for profit, paid bills, or traded it for other goods, like groceries, equipment, or livestock. Boiled wheat also provided sustenance as food, if settlers' ran low on food supplies.[60] During winter, many separated the wheat kernels

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[55] Ibid., 35.

[56] Ibid.

[57] Berg, 'Early Days in Steele County,' 21 February l935.

[58] Thortvedt, 'Early History of the Red River Valley,' 35.

[59] Ibid., 41-42.

[60] Frank Wisnewski, 'A Short Story of the Wisnewski Relationship from Great, Great, Great Grandfather, 9, Small Collections 1928, Institute for Regional Studies, North Dakota State University, Fargo, North Dakota.

from weed seeds for next spring's sowing. One family who settled on the west side of the Red River near Buffalo, North Dakota, spread a sheet on the table, put 'a small pile of grain on it,' and cleaned out the cockle and other weed seeds from the wheat for next spring's thirty acres.[61] This not only provided clean seed for next year's growth but gave them a positive image of spring as they worked their way through the cold, dormant months of winter.

In many farm families who lived along the Red River and its tributaries, children, as part of their farm work, caught fish or trapped and shot game for their family meals. Some even obtained an extra income from wildlife fur sales or hired out to help other farm families. For instance, Levi and his sister, Thone, provided fish for family meals. They used frog legs for bait. Levi enjoyed catching 16 and 17 pound catfish, his and his father's favorite fish when fried in its own fat, 4 to 6 pound pickerel, and pike. Plenty of prairie chickens, elk, red foxes, prairie wolves, and other animals provided food or furs. The Bruins and Finkle Store, a trading center in Moorhead, bought muskrat, mink, coon, and other furs from their young and older customers.[62] Historian Elliott West, who wrote *Growing up in the Country, Childhood on the Far Western Frontier,* noted that "children . . . [knew] they were an important part" of their family's new farm enterprise and the tradition to move west.[63] They not only helped tremendously with the farm operation but "out of the pull and tug" adapted into a "distinctive generation."[64] Fortunately for

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[61] P. B. Moum, 'Pioneer Experiences,' 1, Small Collections 966, Institute for Regional Studies, North Dakota State University, Fargo, North Dakota.

[62] Thortveldt, 'Early History of the Red River Valley,' 20, 43.

[63] Elliott West, *Growing up with the Country, Childhood on the Far Western Frontier* (Albuquerque: University of New Mexico Press, 1989), 8.

[64] Thortveldt, 'Early History of the Red River Valley,' 21.

us, some wrote diaries or memoirs of the 'newness' in their prairie environment and their experiences on it.

A year after the Thortveldts and their neighbors homesteaded near Buffalo River, the Northern Pacific constructed its tracks and a bridge over the river routed to Moorhead. Some settlers obtained additional revenue from their farms for their trees. The railroad bought and their crew cut old growth oak timber for the construction of their track and bridges. It cut more timber and built a depot and a warehouse in Moorhead, which was still primarily a 'tent city' in l871.[65] Within a few years, Moorhead quickly changed to framed wood buildings of businesses and resident houses. Entrepreneurs built sawmills to cut area logs into lumber. Lars Bernhardson, whose family homesteaded near Comstock, Minnesota, remembered cut logs floated down the Ottertail River to a saw mill, which was located in McCalleyville [sic], Minnesota, on the eastern banks of the Red River in l871-l874. Not only was the lumber used in the immediate region – they even built a small steamboat, Pluck – but many flatboats were built as well. The crew loaded the flatboats with goods and several men floated the boats as far as Winnipeg.[66] Purchasers used and sold the flatboat wood and the goods upon delivery. Settlers cut firewood for themselves and a few sold firewood to others and for steamboats, which sailed up and down the Red River. The original forest along the Red River and its tributaries decreased quickly even though settlers planted more trees near their homesteads and took advantage of the Timber Act of 160 acres for more agricultural land. Many who lived in or near the original forests thrived by

[65] Ibid., 40, 41.

[66] Lars Bernhardson, 'Pioneer Life of early settlement in the Red River Valley l869 and up,' 27-29, S.C. 625, Institute for Regional Studies, North Dakota State University, Fargo, North Dakota.

their use of the area's natural resources, which decreased as the years progressed. As they increased their acreage in domesticated crops and brought in more livestock, they created successful communities of farm families and small towns.

As more settlers streamed into the valley and fanned out on to the prairie, many experienced difficulty in their adjustment to the tallgrass prairie. Historian Wilmot H. Droze wrote about how settlers, like their fellow homesteaders near the rivers, needed timber for basic needs and of how many "preferred a forested region for psychological and physiological reasons."[67] In great contrast to early colonists of North America who felt threatened and quickly cut or 'slashed and burned' the trees for their safety and to open land to crop, prairie settlers of the mid 1800s felt the stark reality of a treeless landscape. Though many had heard or read of the open prairie landscape, the reality of a treeless landscape hit them hard once they stood on their claim and saw only the faraway horizon and clouds. Hence, when Euro-American settlers, whether from Ohio, Iowa, besides other states, or immigrants from Denmark, Norway, Sweden, or Russia, moved on to the tall grass prairie, some carried tree, vegetable, and crop seeds with them. The farmers who transplanted young native shrubs or trees or the immigrant who brought seeds from their former northern homes were more successful in shelterbelt planting than those who obtained seeds from the Eastern nurseries or travelling tree agents. Any variety of tree contained its own soil, water, and climate requirement. The best trees to grow were from seeds found from one's surrounding natural environment. But the new northern prairie landscape proved a difficult test for seeds or transplants and for the newcomers who planted them. Soil

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[67] Wilmot H. Droze, *Trees, Prairies, and People, Tree Planting in the Plains States* (Denton: Texas Women's University, l977), 5.

preparation and continual watering was no guarantee of successful tree growth. Even native tree seedlings dug out from along the rivers and streams might not survive in prairie soil which was alkaline, wetter, or drier than what the plant required. Moreover, wildlife, particularly rabbits, ate many transplanted seedlings, shrubs, or trees. Many new settlers discovered the difficulty of settling on an open prairie environment, which many hoped to change.[68]

The federal government recognized a need for timber on the open prairie when it passed the Timber Culture Act in l873. According to geographer David J. Wishart, part of the reason to pass this legislation lay in the "prevailing theories to enhance the climate."[69] The growth of trees on the prairie besides "Rain follows the Plow" were both widely touted in newspapers and "boomer literature." The United States Department of Agriculture printed in its 1869 report that "the policy of tree planting and forest culture. . . will doubtless be introduced into Dakota, increasing the fall of rain and otherwise enhancing the value of the soil."[70] Besides the Department of Agriculture, many settlers, journalists, and professionals believed that once the land was transformed - civilized by agriculture and planted with more trees - moisture would increase and the mosquitoes disappear on the prairie.[71] In the Timber Culture Act of l873, a settler received a quarter section of land - 160 acres, if he or she planted trees on forty acres of that land. After eight years, if 27,000 trees still grew, the settler owned the land. The Act also

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[68] Ibid., 18-19.

[69] David J. Wishart, *The Last Days of the Rainbelt* (Lincoln: University of Nebraska Press, 2013), 24.

[70] United States Department of Agriculture, 'Agricultural Capabilities of the Territories,' *Annual Report* (Washington, D.C.:U.S. Government Printing Office, 1869), 608.

[71] Robert P. Wilkins and Wynona H. Wilkins, *North Dakota, A History* (New York: W.W. Norton & Co., Inc., 1977), 94.

specified the variety of trees to plant.[72] Many "tree claimers" also filed in the Homestead Act of l862 for another 160 acres. The homesteader needed to live on the land for five years and cultivate part of the land for an initial cost of fourteen dollars. After five years and verification, he or she paid four dollars for the title.

The Timber Culture Act did not require one to live on the tree claim, but it was necessary for the trees to live and grow. This proved so difficult for many "tree claim" settlers besides the ambiguous wording as to who qualified, a new timber law shortly followed. According to Albert Wold, whose father filed for a tree claim and homestead in l878 fifty miles west of Georgetown and the Red River, strict requirements of the Timber Culture, even in four differing acts – 1873, 1874, 1876, and 1878 – proved difficult for most settlers to accomplish.[73] In recognition of this, the federal government reduced the forty acres of trees to ten acres in l878. Even then, problems continued. Many settlers, who wanted trees near their buildings, primarily utilized their time to plow the sod and plant their crops.[74] The enticement of fairly 'cheap' land rested more in the Homestead Act than the Timber Culture Act, especially if one planned to 'prove up' quickly to resell the land as an investment.

Another law, called the Pre-emption Law, allowed one to "buy 160 acres for $1.25 an acre or $2.50 if Northern Pacific land grant," as long as he or she did "not own 320 acres" elsewhere.[75] Here, again, one needed to improve the land and live on it for six months. With

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[72] Elwyn Robinson, *History of North Dakota* (Lincoln: University of Nebraska Press, l966), 149.

[73] Albert N. Wold, "My Father Was a "Tree-Claimer," *North Dakota History* 26 (Fall 1959), 171, 172, 175.

[74] Ibid., 173.

[75] Robinson, *History of North Dakota*, 148.

these three differing laws of 160 acres each, an ambitious settler eventually accrued 480 acres of land. Other means of land acquirement occurred in outright purchase from Northern Pacific grant land, soldier scrips, or from other settlers who held a title to their land.[76] Any form of original settlement on the tallgrass prairie wherein one plowed-up the deep rooted grasses was difficult, but the planting of trees proved the hardest of the three forms of governmental acts for many settlers to accomplish. In l891, because the federal government had its own difficulty in monitoring tree claims and settlers demanded more land for homesteading, Congress repealed the Timber Culture Act.[77] This was not the end, however, of governmental interaction to encourage farmers in growing trees on the prairie. Later, the Agricultural College in Fargo and the Federal Government joined forces to stimulate the planting of trees on the prairie.

Several settlers wrote about mixed emotions in their move to the Red River Valley prairie where few trees grew. Among them was seventeen year old Fannie Mahood Heath who saw her new homestead with her husband, Frank Heath, in northeast North Dakota in l881:

> When I first saw my new prairie home in June a few scattered haystacks and some freshly turned sod were the only breaks in the monotony of the prairie. There was no shade of any kind to break the merciless rays of the sun through the long, summer days. At their longest the sun rose about 4 a.m. and did not sink below the western horizon until nearly nine . . . With the single exception of Wild Roses there was scarcely a flower to break the monotony of the rank prairie grass which grew everywhere except on the slight rise of the ground where the house stood.[78]

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[76] Ibid., 148-149.

[77] Wold, *North Dakota History,* 176.

[78] Fannie Mahood Heath, "Gardening in North Dakota," *Autobiography* Edited by Pearl Heath Frazer. Unpublished Manuscript, #OGL 101, Elwyn B. Robinson, Department of Special Collections, University of North Dakota, Grand Forks, l955, 5.

In order to transform what first appeared to her as a barren landscape in l881, she and her husband returned to the banks of the Red River and dug young boxelder, ash, and elm trees along with chokecherry and plum bushes to plant around their farmstead. She discovered that her favorite tree was the boxelder because it grew so readily from seed:

> Although many criticize the Boxelders, we have found them very satisfactory as they hold their lower branches a long time, make a rapid growth, and scatter their seeds so freely the grove will keep itself replenished. The dead trees make excellent fuel. . . [besides their] splendid protection from winter winds and a resting place for hundreds of birds.[79]

On an outside row of their shelterbelt, they planted eight rows of cottonwoods and inward two rows of boxelder seedlings followed by rows of wild plum, chokecherry, blackcap raspberries, and American Black Currants. Heath hoped the fruit bearing trees would provide food for the birds and enough to keep them out of their extensive vegetable garden. On the south side of their property, the Heaths planted black walnut trees intermingled with hybrid plums, blackcap raspberries, crab apples, and a few cranberry bushes. They eventually enjoyed a mature shelterbelt around their buildings for a windbreak and shade. They were so successful with their grove of trees that neighbors met at their farm on Sunday afternoons to play croquet. Their shelterbelt was portrayed as a model in a North Dakota Agricultural College bulletin later in the l920s.[80] The bulletin promoted the planting of trees around farm buildings for farm beautification and shade as well as wind and snow protection. The Heaths were not alone in their need to restore familiarity from their former location into their new environment. In *Trees, People, and Prairie*, historian Wilmon Droze explained Dakota Territory settlers attempted to ‘remake [their

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[79] Ibid., 29

[80] 27 – 29.

prairie] environment by planting trees.'[81] Since most moved into the territory from Western Europe, United States, or Canada, they 'immediately sought to recreate their forested environment.'[82] They wanted trees not only for shade and as a wind break but as a symbol of what they had known in their former environment. One settler's son later wrote how they not only increased their acreage by 160 acres with the Timber Culture Act but how much his mother and father from Norway loved trees. "To them trees were a necessity, a part of life. . . ," he wrote, "[a] beauty; [and] a shelter against the howling blizzards."[83] It was also a connection for them to their homeland and his father's original profession in the lumber business, which had been in his family for generations.[84] A personal requirement for them to live on the prairie was to build their home and barn, plow their land, and quickly plant trees. So strong was this psychological or emotional need that several settlers wrote about a form of kinship they felt when they saw trees or a lone tree on the prairie.

One settler near Devils Lake, N. Johanna Kildahl, wrote about the conflict she felt between the beauty of the new prairie environment versus her former valley home:

> The virgin prairie was rich in water, grass, wild bird game, ducks, geese, prairie chickens, in beautiful sunsets, sunrises, mirages and glorious northern lights . . . [and yet] Coming originally from the picturesque southern part of the state of ten thousand lakes we missed the hills, woods, lakes, river and purling brooks, but we found new beauties in the far

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[81] Droze, *Trees, Prairies, and People*, 17.

[82] Ibid., 16,5.

[83] Ibid.

[84] Ibid.

> stretches of the virgin prairie with chasing shadows over undulating, billowing grass . . .[85]

Kildahl mentioned how her family transplanted their first trees – boxelder, oak, and cottonwood, as "home was not home without them."[86] Later, they planted plums, chokecherries, and Juneberry bushes besides native strawberries, which grew into a larger but still sweet fruit. Though warned about 'wasting time' planting trees, she later noted that others planted trees as well:

> . . . in a few years the prairie changed from an unbroken plain with sod shacks dotting it . . . [to] cosey [sic] homesteads, sheltered by friendly trees, which looked like homes.[87]

Hence, for some who adapted to the tallgrass prairie, the growth of trees around their homes and barns was an essential part of their adaptation. Since few trees originally grew on the prairie, this changed the topography of the landscape tremendously. What had once been a tallgrass prairie of various grasses and forbs now consisted of large fields of annual crops with several rows of trees and shrubs around farm buildings.

Many who were deeply rooted in their 'sense of place' with a variety of trees in their landscape sometimes befriended singular trees, which already existed on the prairie. Kindahl noted an old cottonwood near their farm, which many viewed with affection and as a landmark to guide them home. In winter, the tree, a stark sentinel in an all white, snow-covered landscape, even saved lives. One might easily lose their way in the drifting snow with gray skies where few

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[85] N. Johanna Kildahl, Ph.D., "Reminiscences," Unpublished essay for Golden Anniversary Towner County: Cando, 1936, 1. Elwyn B. Robinson, Department of Special Collections, Chester Fritz Library, University of North Dakota, Grand Forks.

[86] Ibid., 3.

[87] 3,4.

other landmarks – houses or roads- existed. Even worse, blizzards blinded one to any identifiable location, unless one bumped into a building, haystack, or tall cottonwood. Blizzards were feared and for good reason. Snow, high winds, and deep cold created tragedy for some settlers who never made it home. Another settler described the danger of a blizzard:

> It is almost impossible to face the storm and almost as difficult to go with it because the force of the wind gives the snow a whirling motion so that it is always striking the face with a smarting sting, blinding the eyes, and taking away the breath. One cannot see any distance ahead so that sense of direction is lost, and the victim staggers blindly forward traveling around and around in a large circle until he is exhausted. The force of the wind drives the cold through the heaviest clothing . . . The only safety is in getting to shelter as soon as possible.[88]

Though the tree might not be a shelter, it helped break the wind in a storm and welcomed travelers as a sentinel on the prairie to and from their farms in winter and summer. But, with the influx of settlers, the few trees on the prairie and the many along the riverbanks existed in jeopardy. Many viewed trees as a natural resource to utilize for their practical or profitable uses. Kildahl recorded her reactions to the fate of her and her neighbors' 'favored' cottonwood:

> Suddenly it disappeared; all wondered what happened to it; we could not reconcile ourselves to the loss of our much beloved friend . . . who served as a guiding star for many of a weary mile . . . some of the men went to find out [and] learned that a man, who had newly come in had cut it down for firewood. Righteous indignation nearly burst its bonds. The vandal barely escaped a coat of tar and feathers.[89]

Another writer decried the loss of trees in her region as well. Southeast of the Red River, Mary Dodge Woodward, who used coal for fuel, commented on her indignation in her diary about the wood cutters who ravaged the Sheyenne River Valley for wood to sell. A salesman stopped by their farm with "hoak, halder, hash, and hellum" for sale. Her son bought the end of a

[88] William A. Marin, Papers, 53.

[89] Kildahl, "Reminiscences," 4.

tree still covered in moss. She brought part of it into the house, sprinkled it with water, and recreated a beautiful, miniature forest. Though she loved her creation, she condemned the wood chopper and wrote, "Some folks would sell their souls for money." She thought that anyone who cut trees along the rivers deserved prosecution and jail.[90] For anyone, though, who lived on the tallgrass prairie, wood, coal, or some form of fuel was necessary for survival. All needed fuel for cooking meals, heating water, and warming a house. How did settlers cope on a tallgrass prairie without their familiar resource of trees?

As noted before, some settlers traveled and cut wood where they could find it. Arthur Overby's father made many trips to the Red River banks to cut trees with a cross cut and buck saw. Then he hauled the wood home. If the trips occurred in late fall, winter, or early spring, there was always danger of a snow storm. One winter Arthur's father returned to their farm in a blizzard with zero visibility and no roads, ditches, fence lines, or buildings to guide him. Also, the oxen's eyes were crusted over with ice. His father stopped and cleared their ice encrusted eyes and nostrils and walked in front of them the rest of the way home.[91] Homesteaders made trips to the river banks or tree stands for wood. Other settlers traded farm goods or labor in exchange for wood. Frank Wisnewski, who established a farm southwest of Wahpeton, bartered with John Lounge, a Native American who owned an area of wild timber land. For his first load of timber, Wisnewski received every third load of cut wood while he gave Lounge the other two loads. Wisnewski made another deal shortly after with four bushels of wheat for each load of

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[90] Woodward, *Checkered Years*, 72, 73.

[91] Arthur Overby, 'Sod House Days in the Red River Valley,' Small Collections 1058, Institute of Regional Studies, North Dakota State University, Fargo, North Dakota.

wood until a winter storm stopped the exchanges.[92] Besides wood and coal, settlers collected and burned buffalo chips, which dotted the landscape. Later, they used cow chips. If one ran out of firewood or coal during a blizzard, not only the hay racks and any article of wood but twisted bunches of hay burned for warmth helped to keep one alive.[93] Even the wood ashes served a necessary ingredient for settlers. They soaked the ashes for several days to make lye for their laundry soap.[94]

Absent of any trees to cut for timber for a house, sod houses and barns proved to be excellent adobes for the settlers and their animals in their first years on the tallgrass prairie. Besides the sod house earlier mentioned in northwest Minnesota, several varieties were built, such as dugouts in a hillside to all sod or a wood framework of walls and roofs with sod. Sod houses had packed earthen or wooden floors and some had framed windows, limed walls, or magazine or newspaper coated walls. Many were constructed airtight. Some placed rough boards covered by heavy tar paper on the roof and glued near the edges with tar. This sealed the roof from rain or dripping water. If the roof was not sealed, life might be miserable in a leaking, damp house. Some residents endured fleas or other insects brought in by the tallgrass habitat. One disadvantage of the sod house was the inability to catch rain water used as soft water for laundering because of the sod roofs. The hard water from streams made washing clothes difficult.[95] Most of the sod houses offered a place to live and sleep and provided warmth in the

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[92] Wisnewski, 'A Short Story,' 6.

[93] Overby, 'Sod House Days,' 14.

[94] Berg, 'Early Days in Steele County,' 22 February l935.

[95] Ibid.

winter and cool in the summer.[96] Arthur Overby noted that their sod house was cleaned every spring and the walls repapered from the "Youth's Companion" magazine.[97] He also mentioned that the first few years, house furniture was "simple but practical." [98] Most houses contained a table, chairs, stove, cupboard, butter churn, flour bin, and beds. Many settlers filled their mattresses yearly with straw after their field harvests. Some hung their clothes on pegs inserted in the wall.[99]

Water, an essential natural resource for all settlers and their livestock, proved a dilemma for some in where and how to procure. Some settlers lived close enough to a river to haul a barrel of water daily for their farm use until they dug a well.[100] Several questioned the quality of the Red River water. When a pail with Red River water in it sat for a half hour, a thick layer of yellow-white clay settled to the bottom of the pail.[101] Wells dug into underground springs might provide better water. Later, in l882, the Ole Olson family drilled an artesian well behind their barn, which tasted a little salty.[102] One inventive farmer, Lars Barnhardson, created a system of pipes out of the Red River and up steep banks for others to pump water out of the river. He extended his business and bought a well making outfit. His wells furnished water for others who

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[96] Overby, 'Sod House Days,' 1-3, Kilbourne, 'Reminiscences,' 1.

[97] Overby, 3.

[98] Ibid., 1-3.

[99] Ibid.

[100] Eva Hewitt, 'Ole Olson Hovde family: settlers on the Goose River,' 17, Small Collections 850, Institute for Regional Studies, North Dakota State University, Fargo, North Dakota.

[101] Levi Thortvedt, "Early History of the Red River Valley," 12.

[102] Ibid., 16.

needed or preferred wells near their farms.[103] Another enterprising farmer, Robert Webb, gave up farming for a well drilling business in the early 1880s. He spent two summers drilling deep wells in the Northern Red River Valley for the bonanza farms.[104] He bought his drilling outfit from R. W. Ranney, who had just drilled the first deep well in Glyndon, Minnesota. This well provided good drinking and cooking water, which was hauled in barrels by a drayman to the villagers.[105]

Further north in northwestern Minnesota near Crookston, Marin wrote of the difficulty of acquiring good water for the horses, stock, and family use. An ordinary well provided water in the spring only, as it dried up in a few weeks. They used surface water from buffalo wallows, which were a half mile from their farm buildings. His mother boiled the stagnant water for drinking as a tea. He credited her boiling of the water with saving them from typhoid fever – a common and sometimes deadly illness to all settlers. It occurred from a bacteria found in sewage contaminated water and typhoid struck many farm and urban families in the late l800s to early 1900s. The tea Marin's mother made with the boiling water also changed the taste of the water. As in Glyndon, they collected water in barrels and hauled it to the farm. The cold temperature in winter created a problem of water freezing in the barrel. Then, someone had to chop through the ice with a hatchet and retrieve the water underneath. During the winter, also, snow was brought in and melted for washing clothes, dishes, and bathing. If the buffalo wallows dried because of a dry summer, they received their water from a neighbor's well, which went deep into the blue

[103] Lars Bernhardson, 'Papers,' 25.

[104] Harbert L. Webb, 'Some Recollections of Harbert L. Webb,' 5, Small Collections 519, Institute for Regional Studies, North Dakota State University, Fargo, North Dakota.

[105] Ibid.

clay. Their neighbor's water was bluish in color, smelled terrible, and 'tasted worse.' This water they let sit for several days before they drank it.[106]

Some settlers moved to areas where they heard there was good water for home use. For example, two young men, Nils Orre and Per Theodore Danielson from Sweden, arrived in Fargo and Moorhead in 1883. They intended to homestead on 'cheap and fertile' land, which they saw advertised in their Swedish newspapers. They first stopped near Casselton, worked for a farmer to hoe weeds from potatoes, and drank alkali water. The alkali water sickened Theo so much that he lay ill the next day. They heard there was good drinking water in Valley City, the Sheyenne River Valley, and this turned into their destination. After they arrived at Valley City, they discovered much of the land was already claimed or bought by others. Undeterred, they worked in the area for several years before they purchased their own land nine miles southeast of Valley City.[107] A year later they dug a well down to forty-two feet before they struck water. By this time, they had slowly accumulated a few pigs, oxen, and chickens with a small granary. They constructed a barn in the side of a hill besides their small house.[108] One of the two worked outside of their small farm operation for wages, while the other worked on their farm. They represented many other settlers who worked not only on their farms but for other farmers, the railroad, and the lumber industry in Minnesota in order to add to their farm needs and growth.

Many, like Nils and Theo, slowly accumulated animals, poultry, buildings, equipment, and, for some, more land, as they established themselves on their farms and in their

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[106] William A. Marin, 'Papers,' 78.

[107] Nils Orre, 'Fifteen Years in North Dakota,' 2-4, 12.

[108] Ibid. 15 – 17.

communities. Every item, whether it was a new building, a well, animals, poultry, or equipment, marked a hard earned achievement, as many permanently established their farms. For instance, when Nils found five eggs in their chickens' nests after several years of no eggs or chickens, unless one bought or traded for eggs, he felt it was a real blessing. He wrote:

> . . . [five beautiful eggs]. This I felt was a real blessing and I've always remembered those five beautiful eggs. The contented poor who lives in hope of something better is happier than the rich who are never satisfied. Often it was such small things that gave color to life. A little branch or twig on a bush that we thought dead in our garden would one day appear green and lift our spirit from discouragement and cause a hopeful feeling for the rest of the day.[109]

Other memoirs echoed similar emotions. Daily work on their land familiarized them with their new environmental challenges.

While many were thankful for the basics of food, water, fire wood or coal for warmth, and shelter, they quickly learned to take nothing for granted. Possible perils existed in many forms. One could even get easily lost in the early years of the Red River Valley settlement. For example, one settler, Ole Rodningen, who went to visit a neighbor three miles away in l877, left at dusk to return to his own farm. As the dusk turned into night, he lost his path and never made it to his farm. He wandered for five days until he reached Valley City, sixty miles south of his home. Few farms existed between Valley City and the Goose River where he had homesteaded. He recounted the many wild animals besides a black bear he had seen. To return to his farm, he took the train east to Fargo and caught a ride north then west to where he lived.[110] His family

[109] Ibid.

[110] Berg, 'Early Days in Steele County,' 10 January 1935.

feared the worst until them saw him two weeks later. Other elements, besides an open, fairly level landscape caused most homesteaders to be cautious in their daily activities.

Tornados, strong winds, hail, too much or too little rain besides locusts might extinguish what most worked to harvest of their wheat, oats, or barley besides other crops or vegetables. This meant for some less food or even starvation during a long winter. Many learned how quickly a beautiful day might turn into near misfortune or disaster. Everyone in their diaries, memoirs, and letters wrote of what many feared the most – the dreaded prairie fire. No one wanted to see all that they had harvested, built, and accumulated in livestock, poultry, or household goods go up in smoke or worse – loss of lives. Most dug furrows around their haystacks and buildings to protect their property from fire. Many carried matches with them for a backfire, if they were out in the field or on the road, which in many places were still rutted paths in native grass. Sometimes lightning, an uncontrolled burn, or sparks from a train on the railroad tracks, a steam-fired threshing machine, or even smudges lit the prairie with a fire, which leaped and raced to engulf dried grass, grain, or stubble. In late July, when wheat or prairie grass ripened to a tan color, it was the beginning of a dangerous time for fires. Strong wind velocity increased fire danger and damage. Roaring sparks from a ferocious fire jumped fire breaks and small roads. Thick stubble in harvested fields burned as quickly as native grass.

Everyone in the early years of settlement helped fight prairie fires and knew of tragedies that occurred in their area. Nils Orre wrote about a tragedy which happened in their area on a hot, windy day in October in the early l880s. He first noticed ‘thick black smoke’ three miles south as the fire raced to where he lived. His fire break held and the fire increased in velocity as it leaped a mile further to the next farm of new homesteaders who had not yet plowed a furrow around their house. The farmer, who saw the fire rapidly advance, tried to plow a furrow but quickly realized the futility as the flames sped towards him and increased in height. He released the horses to run for their lives and ran to his wife and children. His only chance of survival was to get his family to the plowed field near them. His wife, who had started running, fell down as she choked on the thick smoke and died. The children and their father succeeded in saving their lives when they made it to the field. The fire also destroyed his horses, house, and haystacks as well. Later, after the tragedy, neighbors heard that a spark, which flew from a threshing machine, ignited the straw and caused the 'raging inferno.'[111] Eventually, as more tallgrass prairie was plowed for cultivation, Nils noticed the lessening of prairie fires.

Other serious tragedies happened as well in the early agricultural settlement of the Red River Valley. As noted before, many homesteaders who arrived to claim land to farm or resell once they established their ownership hoped to live off of the land for their food, water, and shelter. Sod houses gave them shelter. They collected water from streams, rivers, coulees, and wells. And they lived frugally on what food they grew or harvested or exchanged in trade with their neighbors or a grocer. As noted before, many were shocked when they saw an open prairie with few trees. Few also knew that some of the native plants in the tall grass prairie were edible. Many brought their Euro-American diet and culture with them. Wildlife, fish, and fowl provided sustenance for some, though some who wrote in their diaries or memoirs mentioned that they were too busy to hunt for food. For many, their diets provided them with the sustenance they needed to survive the winter. But, sometimes, survival of an overly long winter proved a test. If food supplies ran low, some families ate boiled wheat without any other food.[112] Neighbors

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[111] Nils Orre, 'Fifteen Years in North Dakota,' 15

[112] Wisnewski, 'A Short Story of the Wisnewski Relationship,' 9.

helped or sometimes supplied a family with a few staples, if they knew someone's food supplies ran out.[113] One settler ate frozen potatoes all winter, besides frozen bread and butter, because his family had no underground storage.[114] Another settler remembered fondly his 'simple diet of salt pork and whatever could be made of flour, bread, biscuits, and the like.'[115] If a homesteader acquired a cow or chickens, the diet included milk, cream, butter, eggs, and meat, which also supplied items to barter for staples in the general store. Most farm settlers believed that their farm should provide their own food, except for sugar, coffee, and dried fruits. Hence, vegetable gardens, a few livestock, and chickens helped them have a variable diet. Neighbors helped butcher and meat was stored in barrels. Ham, bacon and sausage were always smoked.[116] The real concern for food was the storage of plenty in root cellars, barrels, sheds or smoke houses for winter use. One never knew not only how long but how cold or how much snow each winter might be. Every winter varied in length, climate, and snow fall and every summer varied in length, climate, and rainfall. Each year was different, but hope always remained high for the upcoming planting year and a bountiful harvest.

What many did know was how different the Red River landscape was from others elsewhere. Some thought that the Red River Valley was a real valley. For those who traveled from the mountains of Norway and Sweden or even the river valleys of Minnesota and Wisconsin, to actually stand on a rolling landscape where one viewed miles of open land and

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[113] Ibid.

[114] Marin, 'Marin Papers,' 142.

[115] Ole Olson Hovde, 'Story of Ole Olson Hovde Family,' 9, Small Collections 850, Institute for Regional Studies, North Dakota State University, Fargo, North Dakota.

[116] Overby, 'Sod House Days,' 7-10.

differing heights of grass caused many to pause and wonder before they began their hard work in the establishment of their farms and towns. Marin Williams mentioned in his memoirs that even summer and winter storms seemed more intense than elsewhere. He speculated that because of the distance one saw in the open country with the 'great dome of the sky and the vast circle of the horizon' oncoming storms appeared worse. He described how settlers eventually understood what differing clouds portended for their crops and themselves:

> Down come the clouds with the speed of an express train. One in the path of a storm is somehow constrained or hypnotized into watching its approach, and the terrible magnificence of the clouds . . . the rapidity of its coming will put fear into almost anyone. . . If there is a mixture of green and white in the clouds it indicates hail. . . It becomes almost as dark as night.[117]

When one saw massive clouds of a particular color, one ran for cover or a root cellar. One knew how a tornado or hail devastated all it encountered. Temperatures also dramatically dropped after a fierce storm. The sultry heat of 101 degrees dropped to fifty degrees once the storm passed through William's area.[118] All who lived on the prairie scanned the skies more often. How could one not when the landscape – land and sky – appeared as one on the prairie? Besides, their crop's germination, growth, and harvest depended on when and how much it rained. The sky, clouds, climate, and landscape held their present and future.

The 'horizontal grandeur' is what settlers witnessed when they moved on to the tallgrass prairie of the Red River Valley. Many felt mixed emotions and motivations as they surveyed their new surroundings. One settler wrote of his excitement – some called it 'land fever' – in claiming new land for his agriculture enterprise:

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[117] Marin, 'Marin Papers,' 118.

[118] Ibid., 118-121.

> "It is funny with a new country! Tracts of land in its wild state . . . a delightful feeling when you see a lot of places that have never been trodden by white man before. A sublime feeling; every step you take is on virgin soil, and brilliantly decorated with wild flowers of many kinds and of lively colors. You get the idea that this is a brand new world newly created, but fully developed . . . however, my idea about the youngness of the earth has greatly changed later in my life . . . representative of old, old age. . . water channels and rivers have dug their channels themselves through ages of times."[119]

Thortveldt wrote for others who rushed onto the tallgrass prairie with dreams of a new home, farm, and urban communities on an open landscape. For some who speculated, it was land to claim and sell later for a quick profit. For many, though, the 'wild' land was an open slate to begin a new life full of promises and hopes. Some quickly planted tree seedlings in their attempt to recreate their former home setting besides for shade and shelter. Most began to overturn miles of prairie grasses and forbs for acres of differing domestic crops. The deep roots of the centuries old grass once plowed made way for shallow rooted annual cultivated crops. Some also wrote of a desolate landscape or one of miles upon miles of waving grass like an ocean or sea, but when they experienced life on the prairie they glimpsed a complex and interconnected life on a landscape many originally envisioned as a blank slate for agriculture.

Nils wrote of his epiphany when he rested on what he thought was a desolate prairie spot:

> [After I rested] I saw hundreds of thousands of wild geese that had rested on prairie sloughs while flying South. . . three different kinds of geese- the common big grey geese, the ones having black wing tips and also some that were all black. . . We called "preachers."[120]

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[119] Levi Thortvedt, "Early History of the Red River Valley," 36, Small Collections 332, Institute for Regional Studies, North Dakota State University, Fargo, North Dakota.

[120] Nils Orre, 'Fifteen Years in North Dakota,' 6.

As he lived longer on the prairie and more farmers and their families settled in the country, he wrote that the flocks of geese and ducks diminished until 'few were seen where he lived.'[121]

While wildlife, fowl, insects, the native grasses, forbs, and trees of the tallgrass declined as the centuries old environment underwent tremendous change, the new settlers themselves experienced challenges and adaptations to exist in their new environment. They needed to understand their environment not only to survive but to successfully establish their farms and towns. Many left after a few years of their homestead attempts. Some died in the initial transition of the prairie to agriculture. Others lived, stayed, and built an agricultural foundation for their future, and a few worked to save the essence of the prairie. Fannie Mahood Heath, for instance, wrote of the loss of native plants due to cattle and plows.[122] She and others who witnessed the rapid transformation upon the tallgrass prairie realized it was not too late to save it or, at least, the native plants that grew on it. Many, especially children who grew up on the prairie as it changed, saw and felt the loss of the natural world – plants and animals – acutely. Though pride exists in many memoirs of what they accomplished, there is also a deep wonder in their experience of the 'wild' tallgrass prairie world. Quite a few also utilized a fair amount of the natural resources in their first years of establishing their new home. Their kinship was to their land around them. Even though much of the prairie was losing its diversity in native plants, wildlife, and fowl to a domesticated environment, some of those who implemented the change

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[121] Ibid.

[122] Frazer, *Biography,* 15.

and changed themselves were the settlers who Delle Wehe felt that, 'The prairies sank into their hearts.'[123]

[123] Delle Wehe, 'Reminiscences,' 4.

CHAPTER 5: BONANZA FARMS

"I plowed for a solid week without striking a rock!"[1]

By the mid l870s, transformation of the tall grass prairie for agricultural enterprise accelerated. Not all in the United States were convinced that the Red River Valley was part of the 'Great American Desert.' Many established farmers already in the tall grass prairie knew differently. They cut into the deep prairie sod and saw amazing results in their first crops of wheat, oats, barley, rye, timothy, potatoes, and garden vegetables. A new form of farming, though, which entered the Red River Valley and matched the large scale scope of the prairie landscape, convinced any doubters as to the prairie's fertility. With fairly level land, few rocks, and adequate moisture – 19 ½ to 20 ½ twenty inches annually, mostly in the growing season – bonanza farm owners farmed thousands of acres yearly.[2] With industrial efficiency shallow-rooted wheat replaced deep-rooted prairie sod. Much of the prairie's native ecology ended wherever the plow dug. Introduced weeds increased on disturbed land. Drainage began from some of the wetlands. Soil fertility decreased after many years of one crop harvests. Immense change occurred on the tallgrass prairie on a grand scale. An amazing amount of plant and animal diversity disappeared when the tall grasses and forbs rolled up and over from the plow. So also, birds, reptiles, and insects dependent on the native plants for their very existence left or diminished in numbers. The gradual shift of change in the l860s accelerated in parts of the Red River Valley in the mid l870s when bonanza farms flourished.

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[1] John Beach, *Rural Cass County, The Land and People* (Cass County Historical Society: Taylor Publishing Co., 1976), 81.

[2] Elwyn B. Robinson, *History of North Dakota,* 9.

This other group of farmers and entrepreneurs viewed agricultural enterprise in the Red River Valley on a larger scale, which meant thousands of acres of land planted primarily in a monoculture of annual grass – wheat. According to agricultural historian Harold E. Briggs, "Throughout the period of westward expansion and the development of the Middle West, wheat has always been the chief frontier crop."[3] When the Northern Pacific received large land grants in the Red River Valley, Eastern stockholders of the Northern Pacific Railroad owned much of the railroad securities. It was in the interest of both to encourage settlers to move into the Red River Valley basin, which seemed ideal for agriculture. They deemed the treeless, stoneless, fairly flat area along the Red River and its surrounding area as perfect for large-scale agriculture. As noted earlier, they hired journalists to tour, write, and encourage settlers to move into the valley. In fact, historians Hiram Drache and Robert P. and Wynona Wilkens credited a railroad financier, James B. Power, as so instrumental in promoting settlement in the Red River Valley that he should be called the "Father of North Dakota agriculture."[4]

Originally from New York, Power joined the Northern Pacific Railroad in l871. In l875, the Northern Pacific appointed him as their commissioner and told him to populate the Red River Valley with farmers. Power discovered a perfect example for his sales pitch. Homesteader James Hole, who lived near the Sheyenne River, sold 1600 bushels of wheat for $1.25 a bushel for a total $1,900 in l874. Hole suddenly gained fame and Power immediately realized how to profit

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[3] Harold E. Briggs, "The Development of Agriculture in Territorial Dakota," *The Culver-Stockton Quarterly,* 7 (January 1931): 16.

[4] Hiram Drache, *The Day of the Bonanza* (Fargo: North Dakota Institute for Regional Studies, l964), 84: Robert P. Wilkins and Wynona H. Wilkins, *North Dakota History* (New York: W. W. Norton & Company, l977), 76.

from the farmer's success. He publicized the news of Hole's sudden wealth. He also encouraged Northern Pacific bond holders to exchange their bonds for the railroad land. Historian Harold Briggs noted how Hole illustrated how one farmer not only profited from wheat on the new prairie but continually increased his land holdings for more profit:

> The next year his acreage was about the same, but in l876 he broke one hundred sixty acres and in that spring of l877 he seeded 175 acres to wheat. He secured an average of 27.5 bushels per acre, which he sold for $1.00 per bushel. As the wheat was raised on land worth $5.00 per acre his profit was large. From l878 to l889 Hole increased his acreage of wheat until it reached 1,500 acres.[5]

Power immediately realized how to profit from the farmer's success and spread the news of Hole's sudden wealth. He also encouraged Northern Pacific officials to farm their large acreages for their own profit. For General George W. Cass, president of the railroad, and Benjamin P. Cheney, a director, Power chose 11,520 acres of land west of Fargo to plant in wheat. He asked Oliver Dalrymple to manage the giant farm. Dalrymple, who had planted and harvested a couple thousand acres in wheat on a farm in Minnesota for ten years, agreed to consider the proposition.[6] He traveled to Fargo, "pumped a handcar on rails . . . west of Fargo, dug underneath the deep snow for a sample of the soil, had it analyzed in St. Paul, Minnesota, and, then, founded the speedy opening of the Red River Valley," in his agreement to plant wheat for a share of the profit and land.[7] Others exchanged their Northern Pacific railway stocks for land and the land grab began. From l875 to l878, many businessmen, some called "suitcase

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[5] Harold E. Briggs, "The Development of Agriculture in Territorial Dakota," 17.

[6] John Lee Coulter, "Bonanza Farms and the One Crop System of Agriculture," *Collections of the State Historical Society of North Dakota* 3 (1910): 569.

[7] Mae Harris Anson, "Oliver Dalrymple, The Bonanza Farmer," *Northwestern Miller,* 4 November 1908.

farmers," bought large tracts of land to capitalize in the production of wheat. Power himself owned a bonanza farm, Helendale, in the southeast sector of Sheyenne River Valley where ancient glacial melt had created sandhill deposits. He acquired over 6,600 acres and chose the area for its timber growth, nearness to the Sheyenne River for water, and experimentation of livestock and crop production.[8] Power and James J. Hill, both railroad entrepreneurs besides land owners, utilized their farms for profit and to encourage others to diversify their farm operations. Like other farmers who owned timber stands, Power also sold an "enormous amount of wood," which was hauled to nearby towns.[9] Otherwise, he sold a "certain footage" of wood for customers to cut themselves.[10] Both Power and Hill, though, were different from most bonanza farm owners. While they derived profit from their farms, they also used their farms as demonstration farms for area farmers. Other bonanza farm owners focused on the cultivation of monoculture crops, primarily wheat, for profit.

According to agricultural historian Hiram Drache, after Eastern stockholders obtained large tracts of land, they applied the business practices of professional management and large-scale machinery to create the bonanza farms from the l870s into the early l900s.[11] Drache also suggested that the mystique of the bonanza farms was "out of proportion to their number and

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[8] Hiram Drache, *The Day of the Bonanza, A History of Bonanza Farming in the Red River Valley of the North* (Fargo: North Dakota Institute for Regional Studies, l964), 82-85.

[9] Frank Schroeder interview with Leonard Sackett, 30 August l954, Small Collections 691, Institute for Regional Studies, North Dakota State University, Fargo, North Dakota.

[10] Mrs. D. Radcliffe and Mrs. A. T. Johnson interview to Leonard Sackett, 16 June l955, Small Collections 623, Institute Regional Studies, North Dakota State University, Fargo, North Dakota.

[11] Hiram Drache, *The Day of the Bonanza*, 4.

acreage in the agriculture [enterprise] of the Red River Valley."[12] Other historians agreed. Agriculture historian Norman Stanley Murray concurred in his history of the Red River Valley. He found, "316 farmers with 1,000 acres or more in l890; . . . 890 farmers 500 -1000 acres; . . . [and] . . . more than 18,000 farm settlers with 263 acres with two-thirds . . . in crop . . . [by] 1890."[13] Another historian Elizabeth Jameson agreed in her introduction of *Checkered Years* – a bonanza farm diary. "By l890," Jameson noted, "only 1.4 percent of all farms in North Dakota were one thousand acres or larger."[14] Earlier, economic historian Harold E. Briggs wrote that "far more land was owned and farmed by small farmers than by large ones."[15] However, even though the bonanza farms never outnumbered smaller and many diversified farms, the publicity bonanza farms engendered sparked worldwide interest in the Red River Valley and its wheat growing potential. Both Bonanza entrepreneurs and others who bought land outright or claimed land through the public land laws rushed to farm or invest in land on the tallgrass prairie. Hiram Drache in *The Day of the Bonanza* described how bonanza farms epitomized industrialization. With large scale machinery, a manager supervised labor force, low income labor, the most current methodology, and special contracts with grain companies and railroads, the bonanza farm modeled other industrial big business like Andrew Carnegie's steel and John D. Rockefeller's

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[12] Ibid., 69.

[13] Norman Stanley Murray, *The Valley Comes of Age* (Fargo: North Dakota Institute for Regional Studies, 1967), 136-137.

[14] Mary Dodge Woodward, *The Checkered Years, A Bonanza Farm Diary, l884-l888* (St. Paul: Minnesota Historical Society, l989, xxii.

[15] Harold E. Briggs, "Bonanza Farming," *Collections of State Historical Society in North Dakota* 3 (1910): 580, 581.

Standard Oil.[16] Similarly, bonanza farms also symbolized the innovative and technological expertise of the capitalistic mind. Sweeping changes occurred as large scale cultivation on the landscape overturned centuries of a perennial tallgrass prairie ecosystem into a profitable harvest of a monoculture of a new annual grass of wheat. Not only was an entire diversified plant system uprooted in the tallgrass prairie environment, but deep roots of various grasses and forbs, some reaching over seven feet deep into the soil, were replaced by the shallow roots of an annual - wheat. Steel plows sliced into the ground and uprooted the native grass and forbs, intertwined "thick as a finger" roots of underground heavy growth into a foot to foot and one-fourth furrows. Second plowing occurred after the sod decayed that same summer or fall. This generally prepared the soil for the next year's spring planting.[17] For the first years in the deep, loam soil, almost any seed planted in the newly prepared, rich humus soil germinated and grew into a lush plant, if appropriate rain and sunshine occurred. Geologist Warren Upham noted that within five to ten miles of the Red River, alluvial clay silt composed the soil. The broad deltas of 'lacustrine and alluvial silt' contained clay as well with a porous sand, which contributed to the soil's ability to store moisture from summer rains.[18] "The smooth. . . flat areas and . . . few bowlders [sic] in the soil," maintained Upham, "are ideal conditions for the cultivation of single fields of grain occupying hundreds or thousands of acres."[19]

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[16] Hiram Drache, *The Day of the Bonanza*, 4.

[17] John Lee Coulter, "Bonanza Farms and the One Crop System of Agriculture," 569.

[18] Warren Upham, *The Glacial Lake Agassiz* (Washington: Government Printing Office, l895), 582-589.

[19] Ibid., 584.

According to historian Merrill Jarchow, low wheat prices and grasshopper invasions in the late l860s discouraged diversified homesteaders. Unsure of the outcome, they planted less acreage in wheat as they questioned their harvest and profit. However, railroad boosters and the construction of the Northern Pacific from Duluth to Moorhead in l871 encouraged many farmers to continue and increase yearly acreage for new crop harvests. To add fuel to their dreams with an emphasis on a one cash crop, in l876 Oliver Dalrymple planted wheat seed and harvested over 32,000 bushels of it on 1,280 acres of prime Red River Valley land. The publicity of the bonanza farm, the soil's fertility, and sudden wealth began. No longer was the Red River Valley called a desert. More importantly for the dramatic transition of miles of diversified tall grass, wheat turned into the new 'gold rush' on the tallgrass prairie. The new bonanza farmers plowed miles of land and planted seeds in the ground to replace the prairie sod with a monoculture of golden hued wheat. Many wheat farmers moved from Wisconsin and eastern Minnesota, like Dalrymple, besides other regions in the United States, Canada, and Western Europe, into the new lands west and east of the Red River.

Jarchow also credited a new milling process of wheat, which "revolutionized spring-wheat milling" for the focus to grow wheat.[20] The invention of the "middlings purifier" enabled spring wheat, which grew well in the new climate and soil of the Red River Valley, to command higher prices in the East and world markets. Another improvement of the "metallic rolling process" added to the rise in prices, a higher quality flour, and the lucrative trade of wheat. It

[20] Merrill E. Jarchow, *The Earth Brought Forth, A History of Minnesota Agriculture to l885* (St. Paul: Minnesota Historical Society, l949), 176-178.

also focused more and more trade in Minneapolis, where the process had been perfected.[21] According to Hiram Drache, the steel rollers 'cracked another layer of [kernel] skin' as they were 'placed closer together' while the bran was removed by the 'middlings purifier.'[22] Minneapolis grew as a major flour mill center, while the new inventions provided farmers with more innovations to transform the tallgrass prairie into the growth of more wheat. In fact, Merrill's figures provide a microcosmic view of Minneapolis's growing status for the wheat harvests from the Red River Valley:

> In 1876 Minneapolis wheat receipts passed 5,000,000 bushels; in l880 they reached 10,000,000; and by l898 the figure was 77,159,980. In 1881 Minneapolis ranked third among the primary wheat markets; by 1885 the city was first.[23]

Oliver Dalrymple's success on his first harvest of wheat for Cass, Cheney, and himself provided profit for their future investments and publicity in magazines and newspapers. As their experiment and enterprise continued, ads and articles spread the success story worldwide. The farm was created not only for profit but to model how other investors and farmers could turn a tallgrass prairie of limitless potential into a successful agricultural business.[24] The bonanza farm ideal shifted agricultural focus from mixed farming to a large monoculture of wheat. With the increased use of 'labor saving devices' and the increase in land prices in the East versus the low land prices in the Red River Valley. Dalrymple showcased growing and harvesting thousands of

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[21] Ibid., 179.

[22] Hiram Drache, *The Day of the Bonanza, 14.*

[23] Jarchow, *The Earth Brought Forth,* 179.

[24] Lee Coulter, "Bonanza Farms," 569.

acres of wheat.[25] He welcomed visitors and dignitaries, including President Rutherford B. Hayes and the McCormicks from Chicago, along with others from around the nation and world.[26] In l883 – the Northern Pacific's golden spike ceremony in Golden Creek, Montana, for its transcontinental completion provided dignitaries, newspapers, and magazines with a 'golden ad' moment of the valley's stunning productivity. As the train carried visitors to Bismarck and beyond, the bonanza farms displayed their wealth of grain by spewing No 1 hard wheat into bins from their threshing engines. The train stopped at the 'Crystal Knoll,' two miles west of Tower City, for a ceremony of champagne and speakers who praised the harvested bounty and fertile soil in the Red River Valley. It was an impressive sight and created great advertisement for bonanza farms and the railroad.[27] If there lingered any doubt as to the Red River's Valley fertility, the demonstration and publicity ended it.

Later, one visitor, Horace Goodhue, witnessed this transformation of the tallgrass prairie when he visited Cheney's and Dalrymple's bonanza farm in the early l880s. He wrote a letter about his visit to the Cheney farms and of his conversation with Dalrymple, who was by then half owner of the Cheney farm, all of the Alton farm, and half of the Grandin farm, and still managed one of the first bonanza farms in the state. Dalrymple told him:

> "I have an interest in 75000 acres of land – have 30000 acres in crop – have a 2/3 interest in the crop – employ 1000 men – have 800 mules and horses – use 200 self binders and 30 steam threshers. Put a Superintendent over 6000 acres who puts a foremen over every 2000 acres."[28]

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[25] John Harold E. Briggs, "Bonanza Farming," 549.

[26] Hiram Drache, *The Day of the Bonanza*, 87, ft. 1.

[27] Edna LaMoore Waldo, *Dakota, Informal Study of the Territorial Days,* 1932.

[28] Horace Goodhue, Letter to his family 26 August l884, 8, Minnesota Historical Society's Manuscript Collection, St. Paul. Minnesota.

Goodhue elaborated on the Cheney farm operation:

> They have 23 self binders on the Cheney farm – working in three crews of 13, 6, and 4 machines – each drawn by three mules or horses working abreast. I followed the 13 – they were working a field a mile long by half a mile wide – there is a cutting boss who rides on horseback to see that the men do their work – he is something of a machinist and helps the driver repair any break.[29]

Another boss oversaw the men who binded and shocked the grain. To the field from 6 a.m. until 7 p.m., they averaged twelve acres a day of cutting and shocking the grain. They lunched for an hour and half at noon and slept in the barn and machinery buildings at night. For other bonanza farms the operations of when to go out into the field, have lunch, or retire at night varied.

As to the capabilities of the machines on the Cheney farm land, Goodhue noted that one machine cut 180 acres while one thrasher handled 1000 acres. Farmers considered eighteen bushels a wheat a standard harvest. This was, in fact, what the crew harvested during Goodhue's visit. Wagons carried 100 to 125 bushels of grain to the farm-owned elevator. From their Grandin farm, they hauled grain to a 'small elevator and warehouse' on the Red River's west bank, which the railroad allowed them to build on railroad land rent free.[30] They shipped this wheat through Duluth to Buffalo where it was stored until it sold.[31]

After harvest, laborers prepared the soil for the next growing season. They plowed five or six acres a day with sulky plows, which they rode instead of walked behind, with four horses to each plow. Sometimes they used steam plows, which ran a little faster than a horse. Most,

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[29] Ibid., 9.

[30] H.E. Sargeant letter to Oliver Dalrymple, 20 October 1879, Small Collections 125, Institute for Regional Studies, North Dakota State University, Fargo, North Dakota.

[31] Ibid.

however, used horses. Together, the crew tried to plow eighteen miles within their day. If they did, it was a good day.[32] Goodhue wrote also of two primary benefits bonanza farmers enjoyed. Because of their large scale operation, they purchased everything wholesale. Also, as the years progressed, land prices rose. Land sales themselves provided a lucrative market for owners, if owners decided to sell their land.[33] For instance, in the early 1900s when James Hill's Humboldt land in northwestern Minnesota went up for sale, a young man bought a small parcel – 240 acres, which he planned to hold for several years and resell at a profit as his father had done before him in Dallas County, Iowa. He improved and farmed the property. After several years, he purchased more land in the area and stayed.[34] What was unusual in his case is that he remained on land he purchased to resell at a profit. Just as there were many who planned to live on their farms, there were many others who purchased or homesteaded on land which they sold later for a profit.

Other bonanza farms followed Dalrymple's lead. In Minnesota, east of the Red River, historian Murray calculated a number of bonanza farm owners who bought their land from the St. Paul and Manitoba Railroad in each county. Bonanza farms of over 1,000 acres numbered 16 in Wilkin County, 21 in Clay County, 7 in Norman County, 21 in Polk County, 17 in Marshal County, and 17 in Kittson County.[35] In a reminiscence by pioneer William Marin in northwest Minnesota near Crookston, bonanza farm owners in his area purchased large tracts of railroad land. They named their farms either after the owner or manager with Childs, Corser, Keystone,

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[32] Ibid., 10.

[33] Ibid., 11.

[34] C. C. Morrison, 'Humboldt and Northcote Farms,' Small Collections 126, Institute for Regional Studies, North Dakota State University, Fargo, North Dakota.

[35] Norman Stanley Murray, *The Valley Comes of Age,* 133.

Lockhart, and Irish names, for example, which comprised from five to fifteen thousand acres. A major influx of Euro-American settlement occurred in the Crookston region after l879 where large crews of primarily Norwegian homesteaders worked on the larger farms to supplement their incomes.[36] One of the largest bonanza farms in northeastern Minnesota was the 'Donaldson/Ryan' operation of 33,000 acres in Kittson County. Civil War veteran Captain H. W. Donaldson harvested '250,000 bushels of wheat on 11,000 acres of land with a net profit of $80,000.' He also oversaw parts of James J. Hill's bonanza farm in Kittson County.[37]

On the west side of the Red River, Cass County was the epicenter of the bonanza farms. The Cass/Chenny operation with Oliver Dalrymple's 32,000 acres in crop by 1885 was well known.[38] However, another bonanza business incorporated its land holdings into a town besides a tenant form of operation. According to Drache, the Amenia and Sharon Land Company, under the guidance of Eben W. Chaffee, bought over 27,831.66 acres of Cass County land for '$104,009.81 or . . . $3.75 an acre.[39] Their original intent had been to exchange their Northern pacific Railroad bonds for land, which they planned to sell. However, Chaffee encouraged the forty owners in Connecticut to hire a crew of men and plant wheat. Within three years, they cultivated 25,000 acres to wheat and brought their company to solvency. Now the official director of the land company, Chaffee acquired nine and a quarter more sections of land within the next three years. The price of wheat remained high enough for a continued profit to justify

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[36] William A. Marin, 'William A. Marin Papers, June l931,' Minnesota Historical Society Manuscript Collection, St. Paul, Minnesota.

[37] Murray, *The Valley Comes of Age*, 133.

[38] Ibid., 131

[39] Drache, *The Day of the Bonanza,* 142.

his expansion into the ownership of more land. By l880, the company evolved into a village after it constructed a depot. The next year it built an elevator and a store on the other side of the railroad tracks for a combined office and supply center. By 1885, residents built houses around the store and elevator.[40]

Eventually, the Amenia and Sharon Land Company owned 58,530 acres of land with two towns of 'elevators, livestock, banks, and a short-line railroad' as part of its thirty businesses.[41] Until l892, E. W. Chaffee directed a bonanza farm operation of land and equipment ownership and laborer employment to do the work. After he died in l892, his son Herbert managed part of the acreages and subdivided sections to be leased by tenant farmers. The company provided the pure seed varieties to be grown.[42] By l908, the company went into direct sales to area farmers of 'Number 169' wheat, 'Premost' flax, hybrid Northwestern Dent, Triumph Flint, or Cass County Yellow Dent corn, 'Medium Red, June, Mammoth Red, Alsyke or Swedish, White or Dutch' clover, alfalfa, timothy, and differing grass seeds.[43] After 1911, the Amenia and Sharon Land Company reorganized successfully and continued reshaping itself as a land company and seed operation in the early 1900s.[44] By this time, timothy, alfalfa, and clover had been introduced as crops to grow to enrich the soil's fertility. Clearly, the original fertility of the soil needed organic

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[40] W. C. Hunter, 'Brief Biography of Eben W. Chaffee,' Small Collections 134, Institute for Regional Studies, North Dakota State University, Fargo, North Dakota.

[41] Harold E. Briggs, *Frontiers of the Northwest,* 78.

[42] Lisa Duckstad, 'The History of My Family in North Dakota,' Small Collections 134, 2, Institute for Regional Studies, North Dakota State University, Fargo, North Dakota.

[43] Fred Meier, 'Amenia & Sharon Land Company' (St. Paul: Buckbee-Mears Co., 1908), 6-14.

[44] Lisa Duckstad, 'The History of My Family in North Dakota, 5.

matter with nitrogen-fixing legumes of alfalfa and clover. Several years of research, exploration, and hybridization occurred before cold-hardy alfalfa and clover varieties were planted and grew in the Red River Valley. The sales of timothy, alfalfa, and clover along with corn and flax seeds indicated a shift in agriculture to enrich the soil with alfalfa and clover and diversify more with corn and flax.

Near the Cass County border, slightly north in Traill County, the Grandin operation of 40,000 acres was split into three managed farms – one near Mayville, one at Grandin, and one five miles north of Blanchard. A manager operated each farm with a living quarters for the family. An example of one – the Blanchard farm – managed by David McCulloch, in 1887, seeded seven sections in wheat yearly and planted oats and barley for stock feed besides timothy for hay. Draft horses in teams of four pulled the equipment. They derived their water from an artesian well for everyone and the livestock. Like other bonanza farms, there were buildings for the horses – one for the draft and another for the driving horses. Other buildings included one to hold oats and barley, one for a blacksmith, one for machinery, a large one for the cook and fifty temporary men, a storehouse for wholesale 'flour, sugar, meats and other staple' groceries, a dairy barn and poultry coop, and an ice house for two loads of ice from Alexandria, Minnesota.[45]

Mary McCulloch managed their living quarters besides making milk into butter and taking care of the poultry and geese. They sold excess eggs and butter in Portland. She cooked her family's meal, sometimes with the help of a maid, while a male cook provided food for the crew. The farm's elevator stood near a spur of the Great Northern Railroad, a quarter of a mile

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[45] Blanchard Farm, 'Blanchard Farm Collection,' Small Collections 455, Institute for Regional Studies, North Dakota State University, Fargo, North Dakota.

east of their buildings. The Grandins, who had acquired their wealth in anthracite at Antoona, Pennsylvania, and bought the land as an investment, visited the farm and hunted in late summer.[46] Morris Bummer, the first settler at Grandin's Mayville site in l871, who first lived in a dugout when he claimed his 160 acres, which he sold to J. L. Grandin for $1.25 an acre, claimed Grandin was responsible for the railroad veering towards Mayville instead of its original north destination.[47] Towards the end of the Grandin farm operation in 1909, they raised 300 Hereford cattle – an indication of a need to change their original focus of their monoculture of wheat.[48]

These were but a few of the examples of bonanza farms west of the Red River. There were over 21 large farms in Richland County, 98 in Cass County, 52 in Traill County, 22 in Grand Forks County, 22 in Walsh County and 10 in Pembina County by l890.[49] Many of the farms were constructed for business operations with little embellishment. Several, though, were built to support a well-to-do 'Country Gentleman's,' patrician style image and entertain visitors, even if the owner visited the farm only once a year in the summer. James B. Power, for instance, drained an area too swampy for pasture, which was fed by springs from a hill west of the house. He gave the marshy lake an outlet and created a recreation area for neighbors and company, 'still known as Power bottoms.'[50] The neighborhood children enjoyed the Power farm as a playground

[46] Ibid.

[47] Morris Gummer, Small Collection 280, Institute for Regional Studies, North Dakota State University, Fargo, North Dakota.

[48] Ibid., Small Collections 455.

[49] Murray, *The Valley Comes of Age*, 135.

[50] Mr. Frank Schroeder interview to Leonard Sackett, 30 August l954, Small Collections 691, Institute for Regional Studies, North Dakota State University, Fargo, North Dakota.

with flat bottomed boats to float on the lake and yellow water lilies to decorate their festivities.[51] James J. Hill had a large brick, two story house, landscaping, with a complete water system from a constructed storage dam in Two Rivers built for his Northcote farm improvements. The two-story barns for the horses, cattle, and calves were automated. Other buildings included grain, machine, carriage, automobile, a large hog and brooder, plus a poultry house. The 100 by 125 foot cattle feeding barn contained a cement floor, feeding bunks with water cups and an automatic tram. While all of the buildings were part of an innovative livestock business, it was also for demonstration to farmers and extension agents as to the latest methodology in dairy, beef, hog, horse, and poultry production.[52] Unfortunately, Hill died in early 1916. He never saw the fruition of his plans and the farms in Northern Minnesota were sold in smaller units after his death.[53]

Many who experienced this revolution on the tallgrass prairie described their work and perceptions about their new environment. In her diary, Mary Dodge Woodward, who prepared the meals for her nephew, who managed a bonanza farm southwest of Fargo, noted environmental conditions, the spring rush to seed, and a forsaken appearance of the open prairie. April 3, she observed a difficulty in the new 'gumbo' soil:

> Everything is mud, . . . black and heavy and sticky, like glue! . . . Nobody can imagine what Dakota mud is like until he gets into it and tries to lift

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[51] Ibid., Small Collections 623.

[52] C.C. Morrison, 'Humboldt & Northcote Farms,' Small Collections 126, 2, Institute for Regional Studies, North Dakota State University, Fargo, North Dakota.

[53] C. C. Morrison, letter to Leonard Sackett, Agricultural College Station, 21 September l953, Institute for Regional Studies, North Dakota State University, Fargo, North Dakota.

> his feet. It sticks to the wheels until they are immense, yet the boys made eighteen miles in it today.[54]

As planters struggled in their preparation of the soil, two weeks later they rushed to plant their seed:

> The country is alive with teams, seeding and dragging. All the seeding must be done at once as there is no hope of securing a good crop unless the seed is in early. Today the boys made nineteen miles each with their seeders. Twenty miles is considered a good days work with a team of horses. Dakota farmers seem more energetic than the farmers down home. . . The farms are very large and perhaps men work better in gangs.[55]

Many of the men who worked in these 'gangs' were hired on a temporary basis for the spring seeding and fall harvest. Some returned every year to the same farm for work. Others might work a few days and leave. Some farm owners sold their land to the bonanza owner, like S.S. Blanchard from Boston, who owned a section 3 ½ miles north of the town Grandin. After he sold his farm, he worked as a full time foreman for Grandin's bonanza farm.[56] Others worked as superintendents, cooks, equipment operators, just to name a few, besides general laborers. All signed contracts, many of which were on a day to day or month by month basis. These laborers were an important part of the success of bonanza farms. Cheap available fertile land and cheap labor accounted for success in the bonanza farm operation. Many homestead, timberculture, and pre-emption farmers and family members hired as seasonal labor on the bonanza farms to supplement their own income. Some farmers even worked on railroad construction or cut timber in Northern Minnesota during the winter months to add to their incomes. Generally, if this

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[54] Mary Dodge Woodward, *The Checkered Years,* 35.

[55] Ibid., 35, 36.

[56] 'Grandin Farm Collection,' Small Collections, 125, Institute for Regional Studies, North Dakota State University, Fargo, North Dakota.

happened and the farmer was married, his wife managed the farm and family while he was gone. A few farmers even contracted their horses to work in the woods during the winter months to haul timber.

In the early seventies and through the next thirty years, Minnesota experienced a 'boom' in the timber industry, which, at first, primarily occurred in the winter. Cut timber moved more easily on ice and snow and floated down the rivers in the spring. 'Rich ore deposits had also been discovered in northern Minnesota.'[57] Many "lumber-jacks" and some miners worked on farms or railroads during the summer months. They exchanged work situations from bonanza farms to the forests as seasonal laborers.[58] As the tallgrass prairie diminished and gave way to agricultural crops, Minnesota experienced a similar transformation through the timber industry cutting of its forests. The loss of diversity in animal and plant life was immeasurable. For instance, Pine Point timber in Becker County floated down the Ottertail River after it was cut into logs. There was so much timber in this northern part of Minnesota that it took fifteen years to clear cut the forest. After the forest was leveled, J. W. Nunn described how streams, fish, and wildlife disappeared along with the forests.[59] Some settlers in their memoirs displayed remorse after they realized what they and the companies who hired them had done to differing ecosystems. Many others, however, recorded their seasonal work with pride yet were astonished at the amount of work and what it had entailed each day.

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[57] Nils Orre, 'Fifteen Years in North Dakota,' Translated by Elsa Danielson Johnson, 6, Small Collections 572, Institute of Regional Studies, North Dakota State University, Fargo, North Dakota.

[58] John Lee Coulter, "Bonanza Farms," 578.

[59] J. W. Nunn, 'Logging Around Ponsford,' *The Ponsfordian, l880-1930* Compiled by Rev. Benno Watrin, O.S.B. (Park Rapids: Park Rapids Enterprise, 1930), 16-18.

For instance, newly arrived Nils Orre from Sweden first worked in railroad building and gravel loading in May and June. In July, he hoed potatoes on a farm near Casselton. At night, he slept in the haymow. Later, he found work on a large farm north of Valley City and plowed furrows 'a mile long and twenty miles a day.'[60] When he relocated with his cousin, Per, farther north with the same farmer, he mentioned that they ate bread, potatoes, pork, and prairie chicken, which a fellow Norwegian laborer wondered, 'what sort of "Lutfisk" [sic]' it was. Mosquitoes and lice made sleep difficult at night. Nils slept outside on a haystack to rid himself of the lice. After a harvest wherein the thick straw cut bare hands and threshing, which lasted a month, Nils and Per hired as 'provision drivers' of a farmer's horses on their train ride to Duluth, Minnesota. Once in Duluth, they delivered the horses to the contractor and rode a steamer to the lumber camps. Nils earned $20 a month until March before he returned to the Red River Valley.[61] With their earnings and laborer jobs, they bought 160 acres from a young sailor who had grown tired of his homestead prairie adventure.[62]

Another hired man who worked on a bonanza farm in Cass County north of the Woodwards' farm described his experience as a farm laborer:

> The sun was brutal. We went about in nothing but a hat, shirt, trousers, and shoes; and it was impossible to wear less . . . We worked a sixteen-hour day during the wheat harvest . . . and high on his horse, with a revolver in his pocket and his eye on every man, the foreman sat and watched us. No buildings could be seen and there were no holidays . . . unless it rained.[63]

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[60] Nils Orre, 'Fifteen Years in North Dakota,' 3.

[61] Ibid., 2-10.

[62] Ibid., 11.

[63] Knut Hamsun, "On the Prairie A Sketch of the Red River Valley," Translated by John Christianson, *Minnesota History,* 37 (September 1961): 266, 267.

About the transformed tallgrass prairie landscape upon which he worked, he wrote:

> The prairie lay golden-green and endless as a sea. Not a tree, not a bush grew there – only wheat and grass, wheat and grass, as far as the eye could see. Nor were there any flowers although now and then one might come across . . . Only the yellow tassels of wild mustard . . . forbidden by law, so we destroyed the prairie's only blossom . . . No birds flew overhead: there was no sound but the swaying of the heat in the wind.[64]

Another worker wrote more bluntly about his work experience for the Grandin farm. Some days they rose at 4 a.m. and prepared 'four kicking' mules for work. "It meant long days and much walking and more mule-cussing," wrote Knut Semling, "with hard work and poor living conditions, such as would not be tolerated now anywhere in the country."[65]

A young 12 year old Oscar Bakke, whose father worked year round on Power's Helendale farm, noticed a slightly different landscape in the Sheyenne River Valley of timber stands and a meandering river. He herded 350 cattle for $12 a month. After he worked for a full year "like a bugger," he concentrated more on hunting and trapping in the Sheyenne River Valley and less on full time work for the bonanza farm. He successfully supplemented a major part of their income through the furs he acquired and sold. He also noted a change in the surrounding environment as more areas were farmed. When he first started hunting he caught plenty of skunks, minks, and wolves. Ten years later, he witnessed differing predators, which replaced the wolves and minks, as more foxes and raccoons entered into the area. In fact, he had never seen a raccoon, caught it, brought it home, and a neighbor told him what it was.[66]

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[64] Ibid.

[65] Knut Semling, *Clay and Norman Counties, Minnesota* (Detroit Lakes: Semling and Turners, (?)), 541.

[66] Oscar Bakke interviewed by Leonard Sackett, 31 July 1956, Small Collections 756, Institute for Regional Studies, North Dakota State University, Fargo, North Dakota.

Men and women both worked long and sometimes grueling hours as hired hands. Men generally cooked meals for the hired temporary labor on bonanza farms. Women who were hired as cooks primarily cooked for the manager or bonanza farm owner. There were always exceptions, though. Tilde Juve Skrei, who cooked for the Loring farm in Clay County Minnesota, "got up at 4 a.m., worked till 11 p.m., for $18 a month as assistant cook. . . for sixty hired men."[67] Another worker, Sigri Nora hands swelled from the everyday hard work at the same farm.[68] Days were long and conditions – climate, insects, like lice, flies, and mosquitoes, and expectations – were many times difficult for those who worked on some of the bonanza farms. This was why many contracts were signed for daily work. Workers sometimes walked off their jobs at the end of a day of hard labor.

Other problems, besides the need for continual cheap laborers, increased for the bonanza farm owners who planted monoculture crops. A problem Goodhue addressed after he visited with Dalrymple was everyone's awareness of the slow reduction of yields per acre as years continued with wheat production on the same land. He mentioned summer fallow partially restored some of the land's fertility.[69] Dalrymple circumvented this problem for several years. He plowed an inch deeper every year, which brought up decomposed plant food from the

[67] Orabel Thortvedt, 'Report, February 1955,' Small Collections 332, Institute for Regional Studies, North Dakota State University, Fargo, North Dakota.

[68] Ibid.

[69] Horace Goodhue, Letter to his family 26 August l884, 9, Minnesota Historical Society's Collections of Letters, St. Paul, Minnesota.

original tall grass prairie sod.[70] Everyone questioned how long the land fertility would last without the addition of soil amendments and fertilizer to replenish the soil.

Another problem, though, quickly surfaced and was too obvious to ignore. After several years of continued cultivation of an annual grass of wheat, invasive nonnative and native weeds infiltrated and increased in the fields. When a Scotsman, Finley Dun, visited the Dalrymple farm in 1879, he saw fields still clean of 'twitch, thistle, and docks.'[71] The twitch or couch grass, *Triticum repens,* was native to Europe and Asia. The thistle, natives, *Cirsium vulgare, C. altissimum, C. undulatum, C. muticum, C. arvense, Carduus crispus, Carduusnutans,* or non-native Russian thistle, *Salsola pestifer,* thought to be introduced in l873 in contaminated flax seeds, and the docks, the cotton burdock, *Arctium tomentosum,* or *A. minus or Xanthium strumarium,* were invasive weeds in any disturbed rural or urban landscape.[72] Though he saw fields still clean from these weeds, he noticed other weeds of wild cotton, barn grass, sorrel and Michaelmas daisies.[73] The wild cotton and barn grass were both introduced annual weeds. The sorrel, *Rumex acetosa*, originated from Europe and Michaelmas daisies, whether from Europe or North America out of 600 aster species, was questionable. Without Dunn's use of Latin nomenclature or scientific terminology, many weeds he mentioned with common names might be a number of differing weeds, which makes their identity difficult. However, his statement of

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[70] Finley Dun, "Finley Dun, "A British Agricultural Expert in the Red River Valley, l879," *North Dakota Historical Quarterly,* 7 (January – April 1933): 106.

[71] Ibid.

[72] Orin A Stevens, *Handbook of North Dakota Plants* (Fargo: North Dakota Institute for Regional Studies, 1963), 293-294; F. R. Vance, J.R. Jowsey, J.S. McLean, Editors, *Wildflowers of the Northern Great Plains* (Minneapolis: University of Minnesota Press, 1984,) 278; www.tsusinvasives.org/database/russian-thistle.html#sthash.ILUjvXig.d:puf.

[73] Finley Dun, "A British Agriculture in Red River Valley, l879," 106.

which weeds he saw or noticed not yet in Dalrymple's fields indicated how weeds were now a common sight in disturbed, plowed ground and in many farmers' fields. Another farmer reported how weeds began to infiltrate area fields. For instance, a 3,000 acre farm near Finley was 'farmed and farmed to wheat till it was full of rose bushes, [*Rosa arkansana*], and didn't produce much wheat in later years.'[74]

By the late l880s, annual and perennial weeds infiltrated many fields. Environmental historian Mark Fiege noted similar problems after settlers moved into Montana for agriculture and ranching. The problem of weeds proved more difficult for many farmers because weeds knew "no boundaries," thrived in disturbed soil, and, if introduced, had few enemies and little competition.[75] Weeds spread voraciously. If allowed to seed, weeds subverted "controlled, privatized agricultural production" and required neighbors to join forces in their war on weeds.[76] Weeds also proliferated when cultivated land was left idle, either from an abandoned farm or acreage not planted for the season. For instance, before they sold James J. Hill 'Humboldt's Farm' in northwestern Minnesota, they needed to clean the fields of invasive weeds of quack grass, sow thistle, fan weed, wild oats, and yellow mustard. Wild oats and yellow mustard prevailed in many of the cultivated fields in northwestern Minnesota.[77] As settlers moved into new areas, many of the weed seeds intentionally or accidentally traveled with them. Quack grass,

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[74] Orabel Thortvedt, "Small Collections 332," Institute for Regional Studies, North Dakota State University Fargo, North Dakota.

[75] Mark Fiege, "Weedy West: Mobile Nature, Boundaries and Common Space in Montana" *Western Historical Quarterly* 36 (Spring 2005): 24.

[76] Ibid.

[77] C. C. Morrison, 'Humboldt and Northcote Farms,' Small Collections 126, 1, Institute for Regional Studies, North Dakota State University, Fargo, North Dakota.

Agropyron repens, native in Europe and originally planted in New England by colonists for forage in 1672, traveled later with farmers who carried seed intermixed in their crop seeds or bought it mixed in with impure crop seed. The quack grass grew aggressively in plowed fields from seeds intermixed in the crop seeds, from seeds in manure fertilizer spread on the fields, or from underground rhizomes as a perennial plant.[78] By the early 1900s, scientist Abert C. Arny warned farmers that quackgrass was the most 'serious weed pest' in their fields.[79] He noted how the plant flourished in the heavy, black soil of the Red River Valley in an all "grains system of farming."[80] Consequently, this prompted him and other agricultural scientists to study how to eradicate it and other weeds from infested fields. Another introduced weed, an annual which grows by seed yearly, Sow thistle, *Sonchus oleraceus L.,* scattered throughout the Red River Valley fields and into gardens and streets, particularly in Richland and Cass County.[81] The Department of Agriculture warned that this weed gained impressive 'footholds,' particularly in Traill County, with serious implications for agriculture unless immediately eliminated.[82]

Other invasive weeds, fan weed, called field pennycress, *Thlaspi arvense L.,* wild oats, *Avena fatua,* and yellow mustard, *Brassica arvensis,* besides others, filled open patches in fields, ditches, gardens, and disturbed grounds after plows and shovels uprooted the tall grasses and

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[78] Northeast Experiment Station, *Ohio Perennial and Biennial Weed Guide* Ohio State University, www.oardc.ohio-state.edu/weedguide/singlerecord.asp?id=20.

[79] Abert C. Arny, 'Minnesota's Most Serious Weed Pest,' *Bulletin 151* (St. Paul: University Farm,1915), 7.

[80] Ibid.

[81] O. A. Stevens, *North Dakota Plants*, 298.

[82] Earl Nichols, U.S.D.A., and Earl Nichols, N.D.A.S., 'Soil Survey Trail County, N.D.,' *Bulletin 189* (Fargo: North Dakota Experiment Station, 1918), 16.

forbs in the Red River Valley basin. All three annual weeds rapidly reproduced from seed. Field pennycress, which 'taints milk and cream' in grazing dairy cattle, originated from Europe.[83] Wild oats in the 'Poaceae' family was native to Eurasia.[84] The problem with wild oats besides its replacement of seeded grass grains was that it hosted virus diseases which adversely affected the cereals and alfalfa crops. It also expelled a chemical from its roots and inhibited the growth of other plants.[85] Livestock injury sometimes occurred when the animals ate and choked on the bristle part of the seed.[86] The last weed mentioned by Morrison in his attempts to clear a bonanza farm land for sale was the pervasive yellow mustard. While there are over thirty herbs in the mustard family, the yellow mustard 'weed,' *Brassica kaber* or *Sinapis arvensis,* originated from middle Asia, northern Africa, and the Mediterranean regions of the world.[87] It flowered in June and many weeded it out their fields before flowers changed to thousands of tiny seeds. One mustard plant produced over 10,000 seeds, while a wild oat plant dispersed over 200 seeds.[88] Like other introduced plant species with few, if any, enemies, mustard quickly spread if allowed to seed. No one wanted a bright yellow field of mustard in June versus the golden hue of bearded wheat in late July in the late 1800s.[89]

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[83] F.R. Vance, J.R. Jowsey, and J. S. Mclean, *Wildflowers of the Northern Great Plains,* 95.

[84] 'Wild Oats,' www.britannica.com/EBchecked/topic/643568/wild-oat.

[85] 'Avena fatuua,' Wild Oats, www.agf.gov.bc.ca/weedsbc/avena_descrp.wild-oats.html.

[86] Ibid.

[87] F. R. Vance, J.R. Jowsey, and J.S.McLean, *Wildflowers of the Northern Great Plains,* 92; www.outsidepride.com/seed/herb-seed/Mustard/mustard-yellow.html.

[88] Graeme Quick and Wesley Buchele, *The Grain Harvesters* (St. Joseph, Michigan: American Society of Agricultural Engineers, 1978), 52.

[89] F.R. Vance, J.R. Jowsey, and J.S. McLean, *Wildflowers of the Northern Plains*, 92.

Surveyor and pioneer historian, Alvin Wilcox noted later how many new weeds infiltrated the valley east of the Red River in the southern part of the Red River Valley. Besides the "mullein, the dandelion, the plantain, the purslane, the ragweed, and the yellow daisy," he wrote, . . . "a positive nuisance are the burdock, the cocklebur, the sweet clover, the white daisy, the wild mustard, the bull thistle, the Russian thistle, and . . . the Canada thistle."[90] He spotted the Russian thistle along the Northern Pacific Railroad tracts, which grew originally in small patches but now spread throughout the county. He affirmed, though, that the worst weed and thistle was the Canadian thistle – a tough perennial with a long taproot, 'never known to die.'[91] He also mentioned two native plants that he saw rapidly disappearing. The dried roots from both were valued for the market. Ginseng, *Panax quinquefolius,* which grew in timbered areas, was dug to sell for its medicinal properties almost to the point of extinction. Found in the brush regions of the tallgrass area, the Seneca snakeroot, *Polygala senega*, provided medicinal uses besides as a flavor in candy, medicines, and drinks. The Ojibway and the early Euro-American settlers with their children dug its roots for ready cash. Otherwise, the snakeroot grew abundantly on the prairie where plows quickly extinguished its growth.[92]

It was not only through plowed prairie sod or harvest and sales that some species of native plants and small shrubs vanished. Where cattle, horses, mules, sheep, oxen, and pigs grazed, native flora, shrubs, and young trees quickly disappeared. One settler who had transplanted Highbush cranberry bushes, *Viburnum triloba,* from a neighbor's pasture mentioned

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[90] Alvin H. Wilcox, *A Pioneer History of Becker County Minnesota* (St. Paul, Minnesota: Pioneer Press Company, l907), 36.

[91] Ibid., 37.

[92] 38, Vance, Jowsey, McLean, *Wildflowers of the Northern Great Plains,* 61.

their disappearance. “Today,” she wrote, “because cattle were herded in these woods, not a trace of these bushes can be found in their original location.”[93] Cattle, sheep, and horses, if pastured where a small pond existed, trampled various wetland plants like cattails, arrowheads, sedges and others. If the pond dried out from the livestock in a small fenced area, native wetland plants and wildlife – birds, animals, reptiles, and other inhabitants – disappeared as well. Ducks disappeared along with the duckweed. Botanist David Costella mentioned other losses:

> . . .the algae, the microscopic hydras, the tadpoles, frogs, the garter snakes, the dragonflies, and the nesting redwing blackbirds. . . with the cattails, . . . the tiny cattail moths, *lymnaecia phragnitella,* . . . the homes of the cattail-miner moths, *Arzama obliqua,* . . . and . . . [dried] mud, . . . [wet] mud used by the cliff swallows [and other birds] to build nests.[94]

While hundreds of bison created the same devastation to ponds and riverbanks, a permanent environmental impact occurred with the enclosed livestock. Ecologist Charles Elton noted how ‘millions of bison . . . [were replaced] by millions of sheep and cattle.’[95] “Some of the profoundest changes in food-chains,” he maintained, “have come about through the introduction and spread of domestic grazing animals”[96] Like the bison, cattle originally ranged freely, as more Euro-Americans moved into the Red River Valley for agriculture. Many farmers constructed fences to enclose their livestock. The difference between an enclosed pasture versus an open range devastated fragile ecosystems. In “ponds, moving streams, and stagnant water,” . . .

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[93] Fannie Mahood Heath, ‘Gardening in North Dakota,’ Compiled by Pearl Heath Frazer, Unpublished manuscript, #OGL 101, Elwyn B. Robinson, Department of Special Collections, Chester Fritz Library, University of North Dakota, Grand Forks, North Dakota, l955, 16.

[94] David F. Costello, *The Prairie World, Plants and Animals of the Grassland Sea* (New York: Thomas Y. Crowell Company, 1969), 87.

[95] Charles S. Elton, *The Ecology of Invasions by Animals and Plants* (Chicago: University of Chicago Press, 2000), 128.

[96] Ibid., 127.

"tadpoles and underwater insects eaten by frogs, fish, and snakes" might recover after bison continued onward, whereas repetitive use lowered the possibility of a complete recovery of a pond, riverbank, or grassland ecosystem.[97] Though primarily a wheat production operation, many bonanza farms maintained large herds of ox, horses, mules, and cattle for their farm operations. For instance, the Grandin Farming Company utilized and kept over 280 horses and mules for spring planting, summer field maintenance and plowing, crop harvests, and everyday transportation.[98] This exchange of bison for the domesticated cow, sheep, goat, or horse symbolized a complete disruption in the ecology of the Red River Valley and the Great Plains. Though the 'Buffalo Bird,' *Molothrus ater,* now called cow bird, survived as they shifted to cattle for the insects larger animals attracted, the trees, shrubs, grasses, and forbs diminished rapidly due to 'overgrazing or mismanaged pastures.'[99] Soil eroded after plants disappeared, which severely damaged the complex, biodiverse tall grass landscape.

In general, habitat diminished for the wildlife rapidly in the Red River Valley. In *Discovering the Unknown Landscape,* environmental historian Ann Vileisis reported how the "drainage of the prairie potholes. . . decimated waterfowl populations that less than two centuries ago were said to "blacken" the skies."[100] A few species of animals flourished, while many more others almost disappeared. Bakke, who lived in the southeastern Red River Valley, noticed an increase in foxes and the introduction of the raccoon, which he had never seen in his area

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[97] David F. Costello, *The Prairie World*, 30.

[98] Warren Upham, *The Glacial Lake Agassiz* (Washington: Government Printing Office, l895), 614.

[99] Charles S. Elton, *The Ecology of Invasions by Animals and Plants*, 128.

[100] Ann Vileisis, *Discovering the Unknown Landscape, A History of America's Wetlands* (Washington, D.C.: Island Press, 1997), 4.

before.[101] A major number of predators – coyotes, wolves, skunks, badgers, weasels and even hawks – decreased, while their prey – gophers, mice, and introduced rats - increased. Rats soon travelled west after Euro-American settlers or bonanza farmers moved into the region.[102] At the same time, differing gopher species shifted in territorial ranges. By the late 1800s, the *Richardson's richardsoni,* normally along the northern tier of the Red River Valley and commonly known as the 'flickertail' gopher, replaced many, *Spermophilus franklini,* gophers, which had lived in the lower half of the Red River Valley. First discovered near Mayville in 1886, the *S. richardsoni* heavily damaged grain besides 'corn, peas, and garden crops' in the months of June and July.[103] "Of the differing gophers," C. B. Waldron reported, "[the flickertail] is harder to contend with than any other species of this genus, the damage done by it being more and more each year."[104] While several farmers wrote of the loss of crops due to gopher damage, one farmer's letter highlighted the extensive damage of this gopher species:

> . . . the entire community is discouraged by the destructiveness of the gophers . . .[once] the snow melts. . . they come in great numbers . . . [and] will eat anything; grass, grain, meat, potatoes, onions, horse manure. . . in spring they are all over the fields and eat the seed wheat from the time it has sprouted until 2 inches high; then they eat the blades. . . in some places have destroyed 60 per cent of the crop.[105]

Dr. Coues, who researched the gopher when it still lived only along the northern tier, noted the large numbers of flickertails. "It is one of the most abundant animals of our country . . .millions

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[101] Oscar Bakke, Small Collections, 31 July 1956.

[102] Alvin H. Wilcox, *A Pioneer History,* 148-150.

[103] C. B. Waldron, 'Problems with Gophers,' *Biological Survey Bulletin* (Washington, D.C.: Government Printing Office, l893), 61.

[104] Ibid., 66.

[105] 64, 65.

of acres of animals – not even buffalo – in such numbers."[106] While many settlers saw a huge increase in population, a few scientists speculated that their numbers appeared higher due to a loss in their surrounding habitat. No longer able to burrow in plowed fields, gophers now burrowed in the ground along the edges of fields.[107] A highly adaptable mammal, gophers quickly changed their diet of a variety of tall grass and forb native seeds to the grains grown in the fields. What farmers now witnessed was a more damaging flickertail gopher who wrecked havoc to their fields and gardens. In l887 and 1888, all farmers experienced a lower harvest in wheat due to little rainfall. In 1889, a large drop in wheat production occurred due the continued drought. An economic depression in 1888-1890 lowered wheat prices by 20%, which hurt large and small scale farmers who borrowed capital for their production of wheat. The Panic of l893 actually encouraged some farmers to sell land, as the price of land increased from $20 to $25 an acre. Also, while wheat and corn prices declined, the prices for 'dairy products remained steady.'[108] Many realized that farm diversification – 'modern farming' – was the new agricultural methodology on the tallgrass prairie. Some bonanza farmers began to sell parcels of their land or rent sections to other farmers. A few bonanza farm owners, like James J. Hill and James Power, demonstrated with their own farms how diversified farms were better for the 'health of the land' and business. They along with many agricultural scientists promoted the traditional, diversified form of agriculture of crop rotation, animal production, and revitalization of fields with organic soil amendments like aged manure and relabeled it as 'modern.'

[106] 61.
[107] 65.
[108] Briggs, 'Bonanza Farming,' 549.

As the popularity and profit of bonanza farms declined, no one questioned the importance of bonanza farms in the transformation of the tallgrass prairie besides the publicity they engendered about a productive land. Their impact in the Red River Valley was immeasurable in ending the 'desert image' myth plus the actual demise of a tall grass prairie transformed and planted into a landscape of wheat. Photographs of several plows or threshing machines with teams of horses on a level landscape gave the viewer the impression of human and industrial strength, power, even ingenuity on a passive landscape. After they first broke the sod and later back turned it, the rich soil rewarded their seeding endeavors with an abundant harvest of wheat. Shortly after, weeds – native and introduced – infiltrated the large acreages. Large areas of prairie and some timber habitat quickly disappeared as land overturned for agricultural production on a massive scale. Domesticated livestock, particularly oxen, horses, mules, and cattle, replaced the bison and diminished the natural landscape – grasslands and wetlands - with enclosed pastures. As predators decreased, a few animal species increased with new introduced animals, which proved more damaging for the grains grown on the open prairie. Wetlands also began to be drained for more crop production. And, the soil itself began to lose its original fertility.

The large scale operation of the bonanza farms in many cases managed by overseers and backed by capital from wealthy owners as a profitable investment also brought in a different mindset of agricultural ownership. Emphasis of a one cash crop – wheat – as the only crop to plant and harvest with the more land planted in wheat and the greater the profit contrasted with the original intent of the Homestead Act and the Jeffersonian philosophy of a nation of small farmers.

In the late l880s meadowlarks still sang on different perches on top of machine sheds and large flocks of little brown birds with silver breasts still flew over the prairie at one bonanza farm. Bright yellow wildflowers and yellow, *Viola nuttallii,* white, *Viola Canadensis,* pink, *Viola datifda,* and lilac, *Viola adunca,* flowered in May in the ditches along the fields. ‘Hundreds of wild hops, *Humulus lupulus,*’ grew among the trees near the river, which settlers gathered for its ‘yeast-making’ ability.[109] In June, the prairie roses, *Rosa setigera,* dotted parts of the landscape with pink and spiderlilies, *Tradescantia ohiensis,* intermixed the color with purple, pink, and white. Yellow-petaled daisies with scarlet centers, *gallardia,* and small white, lilac-like fragrance, [bedstraw, *gallium boreale,*] bloomed in the ditches around the fields.[110] But the gold, reddish, even purple hues of the tallgrass in autumn seed with differing flourishes of yellow goldenrod, *Solidago speciosa, Solidago nemoralis, S. missouriensis, S.* canadensis*, S. rigida, S. riddellii, and S. gramminifolia* besides others, and purple and white asters, *Aster umbellatus, A. ptarmicoides, A. sagittifolius, A. laevis, A. ericoides* [Heath aster], *A. simplex, A. pilosus, A. junciformis, A. puniceus, A. novaeangliae, A. linariifolius,* and others existed only in either one’s memory or in scattered segments along the fields. After the beauty of miles of golden wheat, Woodward commented on the freshly, plowed miles of black earth. “It gives the world a funereal [sic] look,” she wrote in the fall of 1886.[111]

The funeral appearance was only the beginning of an immense change of the tallgrass prairie. Many marshes and wetlands still existed. More valuable land for crops could be acquired

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[109] Mary Dodge Woodward, *The Checkered Years,* 75, 81, 82.

[110] Ibid., 131.

[111] Ibid., 145.

by drainage. Agriculture land owners viewed this as a problem until the l890s when ditching for roads and along fields began. The eight to nine feet prairie grass roots and forbs gave way to shallower rooted crops, which invited the infiltration of weed seed growth and wind erosion. A Minnesota Department of Natural Resources pamphlet recently illustrated the differing roots of introduced grasses versus native grasses, sideoats grama and big bluestem.[112] The change to the tallgrass prairie was dramatic. Bonanza farmers brought an intense, efficient land use technology to produce a monoculture cash crop on as much land as possible. They benefited from the highly diverse tallgrass prairie, which had maintained a complex, evolved ecosystem. Once plowed, the roots and vegetation of the grasses and forbs decomposed into valuable compost for the growth of crops. Similar to the discovery of gold and the following excitement of the gold rush in the Black Hills, journalists wrote and praised the sudden wealth achievable by finding gold in wheat once the prairie sod was overturned and seeded. The news spread nationally and internationally, partly fueled by eastern bankers, railroad owners, and others who held shares in the land or railroads. Journalists and even President Hayes visited and highly praised the bonanza owners, as well.

The bonanza farms proved without a doubt that the Red River Valley was not a desert landscape. Most who visited the Red River Valley saw and wrote of the unbelievable landscape, which many viewed ideal for agriculture. A difference existed, though, with what the bonanza owners represented in agriculture as compared to the Jeffersonian ideal of a nation of agrarian,

[112] Minnesota Department of Natural Resources, 'Native Grasses: Why all the fuss?' Pamphlet produced by Minnesota Department of Transportation Erosion Control and Turf Establishment Unit and Minnesota Department of Natural Resources Roadsides for Wildlife Program, (?).

small landowner farmers. Bonanza farms utilized large acreage, similar to the South in tobacco and cotton, for one cash crop – wheat. The efficiency and methods employed to plow as much land as possible for one crop worked for several years, but it also opened large areas of landscape to invasive weeds and mined the soil of its nutrients. Also, the loss of thousands of acres of tallgrass and wetlands along with the diverse natural world for the monoculture of wheat was immense. When difficulties occurred after years of one crop harvest and profits fell, some bonanza farm owners began to divide their land to sell or sharecrop. However, international and national newspapers had spotlighted the quick wealth acquired by bonanza owners, the valley's pliable, fertile soil, and encouraged others to move to the Red River Valley. More settlers, many who diversified part of their farm operations, moved into the Red River Valley, bought parcels of bonanza farms or homesteaded, and transformed even more land for agricultural and urban development.

CHAPTER 6: SCIENCE ENTERS THE RED RIVER VALLEY

"It's not a home until it's planted."[1]

By the l890s, the Red River Valley continued its transformation from its original tall grass prairie landscape of trees skirting rivers, wetlands interspersed among the prairie, and miles of tall grasses and forbs inhabited by abundant wildlife into a more 'civilized' appearance. This transformation, which began with the fur trade economy and increased with the bonanza wheat farms in the l870s, culminated with science in research and education. The scientists, a few nursery operators, and other planters combined forces with the agricultural colleges, horticulture societies, and the federal government to discover, hybridize, and bring in more adaptable plant products for profit, personal pleasure, and home beautification. The combined forces, their plant introductions, new methods in agriculture, industrial inventions, and drain-age techniques accelerated the process of change considerably above that which individual settlers and bonanza farmers had accomplished. While this created a more livable environment for Euro-American residents, the tallgrass prairie lost a major part of its natural diversity. What had once been a prairie of native plants, animals, and birds was rapidly transformed into a structured, controlled environment of monoculture crops, domesticated livestock and fowl, and hybridized plants for gardens, flowerbeds, and the surrounding landscape. This shift occurred in the late l800s and early 1900s as agricultural colleges with their extension agencies, the federal, state, and county governments, and state horticulture societies helped rural and urban residents adapt to their surroundings and profit from whatever they grew. With these united forces focused on

[1] A. F. Yeager, "North Dakota State Horticulture Society," *National Horticulture Magazine* Vol. II, No. 4, Fall and Winter, 1923, 29.

domesticated, commercial change for the tallgrass prairie, the early 1900s proved to be a pivotal time in the environmental history of the Red River Valley.

Agricultural scientists associated with land grant colleges were an important influence throughout this period. Minnesota had been a state since l858. After the passage of the Morrill Act in 1862, which gave "public lands to state colleges for . . . instruction in agriculture and mechanical arts," Minnesota established an agricultural college with the University of Minnesota.[2] In 1889, North Dakota and South Dakota entered into statehood. Two years before this Congress passed the Hatch Act, which provided federal funds in every state for agricultural experiment stations. Fargo, North Dakota, and Brookings, South Dakota, quickly established experiment stations with their agricultural colleges to help farmers and their families raise crops more adaptable to the prairie climate. The legislation also stipulated that 'each station . . . publish at least four bulletins per year.'[3] Scientists at land grant colleges, experiment stations, and the Department of Agriculture researched better crop and vegetable seeds and differing forms of eradication for weeds, diseases, insects, animals, and birds, which reduced crop yields. Scientists, farmers, and gardeners understood that the different environment called for different varieties of crops, vegetables, fruits, and even trees to grow into a mature and harvestable form. Horticulturist William H. Alderman explained the differences from the Eastern states that settlers now experienced in the northern Red River Valley tall grass prairie:

> The growing season was shorter. . . Periods of intense heat with hot, drying winds often occurred during the summer. . . In the winter, the

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[2] W. H. Alderman, *Development of Horticulture on the Northern Great Plains* (St. Paul, Minnesota: Great Plains Region American Society for Horticultural Science, 1962), 70.

[3] David B. Danbom, *"Our Purpose is to Serve," The First Century of the North Dakota Agriculture Experiment Station* (Fargo: North Dakota Institute of Regional Studies, 1990), 7.

> extreme cold was often accompanied by drying winds. Relatively light snowfall encouraged deep freezing and low soil temperature. Sudden and violent temperature changes often occurred during the winter . . . the annual precipitation was low on the eastern prairies. . . Fortunately the periods of greatest precipitation usually came in late spring and early summer. . . Humidity was relatively low both winter and summer. . . high alkaline content of much of the soil [complicate] many trees, shrubs, and particularly fruit trees and plants which prefer [neutral or slightly acid] soil. . . yellow foliage characteristic of alkali chlorosis is a common sight on the prairies.[4]

Aware of these difficulties, a few scientists searched and experimented with native plants for a variety of uses, especially fruit trees.

Another major concern was what many saw as a loss of good agricultural land due to lack of drainage and the abundance of wetlands. ". . . in 1895, nearly one-half of the valley area was still not being used for crops," wrote agricultural historian Stanley Norman Murray, "Only after another twenty-five years had men reclaimed the wet sections of the valley. . . "[5] As the use of the land in the Red River Valley changed for agriculture, a major shift occurred in the acceleration of the change of the landscape to domestication with a decrease of the native wildlife, flora, and grasses.

As noted in chapter five, many settlers who moved to the Red River Valley planted their own vegetable and crop seeds and transplanted tree seedlings dug from nearby or ordered from traveling tree salesmen. While many of their seedlings died, several also survived, which proved that they could change their prairie environment into one with trees. Recent research had refuted the prairie treeless imagery, particularly of the Red River tallgrass prairie. U.S. Fish and Wildlife

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[4] W. H. Alderman, *Development of Horticulture on the Northern Great Plains*, 2.

[5] Stanley Norman Murray, *The Valley Comes of Age, A History of Agriculture in the Valley of the Red River of the North, 1812-1920* (Fargo: North Dakota Institute for Regional Studies, 1967), vii.

Kenneth Higgins wrote that "historical evidence . . . clarifies the occurrence of woody plants in the northern grasslands."[6] In l892, Zoologist Robert Christy noted:

> Another fact, familiar to everyone that knows the prairies . . . is that nearly all the streams crossing the prairies are fringed with a narrow belt of trees on both sides, . . . This is the case even on absolutely treeless prairies. . .[7]

Trees and shrubs existed within wetlands and on rolling grasslands prone to deep snowdrifts, which protected them from spring prairie fires. "Observers came from forested eastern states," Higgins elaborated, "and perhaps exaggerated their perception of treelessness."[8] Many, though, who settled on the open prairie, craved trees around their buildings and farms for shelter from the wind, as shade for coolness in the summer, for remembrance and a form of comfort of their former homes, and for the wood. Some tried to grow hybridized fruit trees but experienced failure due to climatic extremes and alkaline soil. Horticulturists, particularly Dr. Niel E. Hansen, South Dakota Agricultural College, Dr. Frank Leith Skinner, Dropmore, Manitoba, Dr. Clare B. Waldron and later, Dr. Albert F. Yeager, both at the North Dakota Agricultural Station, worked tirelessly to find vegetables and fruits acclimated to the Red River Valley. They chose native fruits, shrubs, and trees to cross with less hardy cultivars for a hybridized plum, sand cherry, pin cherry, current, strawberry, blueberry, cranberry, crab apple, and grape.[9] Besides their experimentation with native fruit bearing trees and shrubs, a few

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[6] Kenneth Higgins, "Interfaces Between Grasslands and Woodlands," *The Prairie: Past, Present, and Future, Proceedings of the Ninth North American Conference,* Edited by Gary K. Clambey and Richard H. Pemble (Fargo: Tri-College University Center for Environmental Studies, 1986), 115.

[7] Ibid., 116.

[8] Ibid., 117.

[9] Sharon Clancy, 'Pioneer Horticulturists of the Northern Great Plains,' *North Dakota Horticulture Newsletter* (Fargo: North Dakota Horticulture Society, 1996), 2.

travelled to northern Europe and Asia to collect plants growing in 'similar climatic conditions.'[10] After returning home, they tested the plants for their suitability on the prairie or cross bred them into adaptable, commercial or decorative prairie plants. Many of the commercial crops, vegetables, and flowers grew annually, which seeded, grew, and harvested in one summer, while others like the fruit trees, shrubs, and range grasses grew during the summer, went dormant in the winter, and flourished again the next year for perennial growth.

As noted in Chapter II and IV, some settlers and a few scientists partly carried on the traditional use of native plants, which earlier Cheyenne, Assiniboine, Dakota, Ojibway, and Metis peoples had utilized for food and medicine. Of all of the native plants, besides wild rice, Euro-American settlers gathered and enjoyed the wild fruits. Native American inhabitants, though, enjoyed their native fruit harvest more extensively, often planting groves of differing fruit trees near their villages for their annual harvest. They ate the wild plum, *Prunus americana,* 'fresh, as sauce, or dried for winter use.'[11] Another tasty fruit eaten fresh or dried for their winter's diet was the Saskatoon or Juneberry, *Amelanchier arborea,* and the buffalo berry, *Shepherdia argentea.* They made sandcherries, *Prunus besseyi,* into a sauce and ate pincherries, *Prunus pensylvanica,* as a dessert. While chokecherries, *Prunus virginiana,* were pounded into buffalo meat for pemmican, much of it was also made into sun-dried, flat cakes. Rose hips, at least five species in the Red River Valley, *Rosa acicularlis, R. blanda, R. arkansana, R. oodsia, and R. X dulcissima,* high in Vitamin C, and fruits of the hawthorn, *Crataegus mollis,* helped stave off hunger. All enjoyed fresh strawberries, *Fragaria virginiana*, and elderberries,

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[10] Ibid.

[11] W. H. Alderman, *Development of Horticulture on the Northern Plains*, 6.

Sambucus canadensis, while they ate raspberries, *Rubus parviflorus,* gooseberries, *Ribes cynosbati,* and currants, *Ribes glandulosum,* fresh or dried for later use. The Highbush cranberry, *Viburnum trilobum,* which grew near ponds, creeks, or wetlands with long, lasting fruit, was eaten fresh or cooked or dried for later use. The wild grape, *Vitis spp.,* grew along river banks and among the trees. Roasted acorns from the red oak, *Quercus rubra*, and bur oak, *Quercus macrocarpa*, and hackberry, *Celtis occidentalis,* fruits in stew provided additional taste and fiber in their diet, while the boxelder's, *Acer negundo*, boiled sap provided sugar for all who lived in the Red River Valley.[12] Clearly, fruit in the Red River Valley grew for residents to eat fresh or harvest for winter's use. After Euro-American settlers moved on to the tallgrass prairie and after agricultural colleges were established in the region, research increased on cultivated plants or crops to grow for personal and market use. Scientists and a few settlers experimented with hardier varieties of fruits, vegetables, and grains more similar to their Euro-American tastes, either by grafting or cross pollinating with other cultivated varieties or by natural selection of larger bearing fruit. A few growers, though, declared that the wild varieties of plums, strawberries, and raspberries were just as good as the cultivated fruit.[13] A few even found differing varieties in the native raspberries.[14]

One successful scientist, N. E. Hanson, spent his entire career in hybridization of fruit and plum trees as well as roses and other shrubs and exploration of forage grasses for the

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[12] Ibid., [Latin nomenclature from Michel A. Dirr, *Manual of Weedy Landscape Plants* (Champaign, Illinois: Stipes Publishing Company, 1983), 46, 232, 588, 596, 638, 749.

[13] William Wheeler, *History of Horticulture in Minnesota* (St. Paul: St. Paul Press Company, 1873), 33, 34.

[14] Ibid., 34.

northern Great Plains. The South Dakota Agricultural College in Brookings hired him in l895 to build a horticulture department and conduct research into cultivated plants for the prairie environment. Two years later, the United States Department of Agriculture hired Hansen to travel to northern Europe and Asia 'as its first plant explorer.'[15] Though he returned with crested wheat grass, alfalfa, and brome grass and a few other plants, which are considered invasive today, (for example, smooth brome grass, *Bromise inermis,* is now labeled an invasive grass in Minnesota) he recognized the value in the native fruit trees and shrubs. These he explored for their potential for cross breeding with other 'winter-hardy species . . . [which he] found on the Steppes of Russia and Siberia' in the 'subarctic regions of the Old World.'[16] During his six trips overseas, Hansen filled five boxcars with samples of grains, grasses, and plants every time he went.[17] After he returned, he utilized the hardiness of the native fruit trees crossed with a larger size and quality Asiatic fruit, which gave Red River Valley residents the Waneta, Tokata, and Hanska plum trees. He paired the wild grape, *Vitus spp.,* with an eastern grape for thirty-three hardy grape varieties. He struggled to find a hardy apple tree and finally succeeded with 'Anoka,' which was a Midwest native crabapple, *Malus iowensis,* tree crossbred with an European apple tree.[18] Like many astute Native American and Euro-American farmers and gardeners before him, Hanson also selected top native sand cherries, plums, golden currants, and raspberries for propagation. From his extensive research, he introduced over 412 plant varieties

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[15] A. F. Yeager, "Niels Ebbesen Hansen – Pioneer Fruit Breeder," *Fruit Varieties and Horticulture Digest,* Vol. 13, No. 2, Article 1, 1958, 18.

[16] W. H. Alderman, *Development of Horticulture on the Northern Plains,* 31.

[17] Dana Hess, 'N. E. Hansen,' http://state.sdstateconnect.org/n-e-hansen.

[18] A. F. Yeager, "Niels Ebbesen Hansen," 19.

with the majority focused on fruit production – 113 apple and crabapples, 72 varieties of plums, cherries, and sandcherries, and 35 varieties of grapes.[19] Hansen exemplified other scientists who explored overseas. They all saw their mission as the transformation of the northern Great Plains with hybrid and hardy plants for commercialization, gardening, and landscaping.

Similarly, in l890, the North Dakota Agricultural College and Experiment Station at Fargo hired Clare B. Waldron, a botanist and former student of Lyberty Hyde Bailey, to create a horticulture and forestry department and teach as an arboriculturist and entomologist in the experiment station.[20] He also experimented on and researched native fruits, trees, and shrubs for over twenty-five years and advocated and sought hardy trees and shrubs for windbreaks and shelterbelts for area farms. By 1900, Waldron recognized the importance of experimentation and adjustment to the new region for people as well as plants. "With the settlement . . . from regions where trees and fruits are common . . .," he wrote, "information . . . must be furnished from our own experience."[21] After several severe winters from 1902 to 1904 and 1907 to 1908, which greatly damaged his tree test plots, Waldron championed windbreaks even more as a protection for farmsteads, gardens, and orchards.[22] As a Fargo Park Board member, which he helped organize in 1910, he landscaped over '500 acres of parks in Fargo' and other parks in 'Wahpeton, Williston, Mandan, Park River, Lisbon, and others.'[23] In his designs, he saved and

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[19] Dana Hess, 'N. E. Hansen,' http://state.sdstateconnect.org/n-e-hansen.

[20] Ibid.

[20] W. H. Alderman, *Development of Horticulture on the Northern Plains*, 106.

[21] Ibid., 107.

[22] Ibid., 108.

[23] Erling Nicolai Rolfsrud, *Lanterns Over the Prairies* (Brainard, Minnesota: Lakeland Press, 1950), 93.

included many established woodlands as part of his urban parks. He field tested many varieties of melons, sweet corn, and tomatoes for the Red River Valley gardens and fields. His introduced 'Hibernal' apple tree, 'Desota' plum tree, and 'Dunlap' strawberry later provided growers with a desired, hardy fruit.[24] Others grew and propagated fruit, vegetable, crop, and floral seeds and plants for adaptation to the tallgrass prairie. Waldron expanded experimentation of garden, fruit and shade trees after he organized the first North Dakota Horticulture Society in 1904.[25]

Scientists, nursery garden owners, and avid garden members met annually in different towns throughout the state to showcase fruit and flowers and to discuss new varieties tested in extension or in member's own garden plots. One successful nursery garden owner and active member of the North Dakota Horticulture Society, Oscar H. Will, collected and saved Mandan, Hidatsa, and Arikara bean and corn seeds, which he sold to gardeners to plant throughout the state in their own gardens. "Perhaps most important of his achievements," wrote anthropologist Fred Schneider, "was Will's innovative work in acquiring, researching, and offering Native American garden vegetables that were native and hardy to the region."[26] In 1896, Will introduced the 'Great Northern Bean,' which he had propagated from beans given to him by a 'Son of a Star' Hidatsa man ten years earlier.[27] Will and neighboring farmers experimented with Native American corn varieties. While he seed selected and sold pure seed, he also cross pollinated differing varieties, such as 'Pioneer White Dent Corn, Early Dakota Sweet Corn,

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[24] Sharon Clancy, 'Pioneers of the Northern Great Plains,' 4.

[25] Ibid.

[26] Fred Schneider, "Oscar H. Will: North Dakota's Pioneer Seedman," *North Dakota History Journal of the Northern Plains* Vol. 68, No. 1 (Bismarck: State Historical Society of North Dakota, 2001), 3.

[27] Ibid., 6.

Burleigh Mixed Flint Corn, Yellow Dent Corn, and Will's Square Deal Dent Corn,' which continued to sell into 1959.[28] Also, many members learned how to better waylay diseases from their garden plants, insects from their vegetables, fruits, and flowers, and animals and birds who enjoyed their 'fruits of labor' as much as the gardeners.

Scientists at the University of Minnesota started even earlier in their experimentation of grains, vegetables, and fruit trees for the northern climate. Though they experimented on plants for a less harsh plant zone, they undertook a similar quest to discover plants and particularly fruit trees for the entire region. It was not until 1927 that horticulturist Alfred Rehder at the Arnold Arboretum "established the first system of isothermic zones" . . . that displayed "how the severity of winter correlated with the hardiness of plants."[29] Alfred Rehder calculated minimum temperatures, numbered hardiness zones from 1 to 8, and started with number 1 as the coldest. Later, based on average temperatures, the Arnold Arboretum in 1935 and the Department of Agriculture in 1960 published maps of temperature hardiness ranges for plants in the United States.[30] [Figure A 6] The Department of Agriculture zoned areas in ten degree increments and "further divided [zones] into 'a' (colder) and 'b' (warmer) sub-zones.[31] The 1976 *Hortus Third* displayed the southern half of Minnesota where the Minnesota State Horticulture Society held its office in Minneapolis and arboretum southwest of Minneapolis near Chanhassen as Zone 4, from -30 to -20 degrees average minimum temperature, while the Red River Valley appeared in Zone

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[28] Ibid.

[29] "Alfred Rehder" www.doaks.org/library/garden-archives and http://arboretum.harvard edu/wp- content/upload/11_A_2_AR_2012.pdf.

[30] Marilyn Odneal, "El Dorado Springs Sun newspaper," 13 February 2014.

[31] Ibid.

3 with -40 to -30 degrees.[32] In l868, the Minnesota Agricultural College bought 126 acres of land but eventually discovered that it was unsuitable for fruit tree and vegetable cultivation and testing.

Ten years later, the Minnesota state legislature helped in the establishment of an experiment station in Hennepin to 'test apple and other fruit trees . . . suitable to this climate.'[33] On the new site, Superintendent Peter M. Gideon planted 'Wealthy' apple seedlings he had introduced in l868. By 1899, the 'Wealthy' apple turned into a 'leading apple in America' and gave Gideon the title as, 'father of fruit breeding on the prairies.'[34] Though still a marginal apple tree for the Red River Valley, the 'Wealthy' was later crossed pollinated with Malinda for a more hardy 'Haralson,' which was introduced and planted in the Red River Valley after 1913.[35] Of course, apple trees were not the only plant researched, but research for them created excitement and funding for their development and discovery. The research also created greater awareness of the differing environmental conditions for plants in local and regional areas of the state. As the years progressed, up to 230 more acres in differing parts of Minnesota were added for more research and development of hardy fruits, crops, and vegetables. The 'Latham raspberry, Red Lake currant, Underwood plum, and Fireside and Beacon apples besides the Haralson' proved hardy for the Red River Valley growers.[36]

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[32] Staff of the Liberty Hyde Bailey Hortorium, *Hortus Third* (New York: MacMillan Publishing Company, 1976), i.

[33] W. H. Alderman, *Development of Horticulture on the Northern Plains,* 71.

[34] Ibid., 72.

[35] http://www.extension.umn.edu/Haralson, University of Minnesota extension educational website.

[36] W. H. Alderman, *Development of Horticulture on the Northern Plains,* 75.

Later, the University of Minnesota found a Zone 3 plant site for an agricultural college and extension agency in the northwest sector of Minnesota, twenty miles east of the Red River. In l895, railroad magnate James J. Hill donated 476.61 acres of land slightly north of Crookston, which had been incorporated in l879.[37] Though an excellent area of Minnesota to test more northern and western plants, the site, which area residents called "duck land," proved to be a 'beware of free gift' challenge.[38] After the Minnesota legislature approved funds for equipment and a barn, the experimental research farm began. Several years of environmental challenges slowed the site's progress. This actually showcased problems many farmers and other residents experienced throughout the Red River Valley. In the first year, a night of rain displayed the reason for the site's attraction to waterfowl. By the next morning, only one or two spots of land existed above water.[39] Historian Ruth Anne Stymiest chronicled the new experiment station's difficulty:

> The Spring of l896 was wet. In 1897, a flood occurred before harvest and the barn was destroyed by lightning. In l899, a late Spring induced a late planting with hail right before a [promising] harvest, while 1905 was another wet year.[40]

With new knowledge of the site, the Minnesota state legislature allocated money specifically for drainage, which began in 1903 and continued through 1908. Workers dug a one and a half mile open ditch and placed 50,000 feet of tile in the ground for quick run-off of rain or melted snow. After completion, they constructed buildings for the experiment station, which

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[37] Ruth Anne Stymiest, *Cycle, A Chronicle of the Northwest School of Agriculture and Experiment Station, l895-1968* (Crookston: University of Minnesota Technical College, l988), 4.

[38] Ibid.

[39] Ruth Stymiest, *Cycle,* 4.

[40] Ibid.

provided the foundation for a new teaching and 'hands-on' agricultural school. Agricultural scientists researched black stem rust of wheat, 'Grimm' alfalfa adaptability, and livestock production.[41]

By 1912, they introduced yellow sweet clover for improvement of alkali soil and as a honey crop.[42] Though the U.S.D.A. had originally published a bulletin on the 'Renovation of Soils' and the use of green manures – crimson clover, vetches, rye, and cow-peas – in l906, the Northwest Experiment Station recommended a pure seed of yellow sweet clover particularly adapted to the northern Red River Valley.[43] The implementation of this as a crop besides others like alfalfa later led to the 'North Dakota Beekeepers Association,' whose members met annually for their commercial and hobby bee keeping enterprises.[44] The Northwest Agricultural scientists also promoted sweet clover as a preparation of the land for sugar beets and a cleanser of the land from weeds.[45] They conducted potato trials for a variety of tests like planting depth, new varieties, treatment of seed, and disease susceptibility, which ensued throughout the years. The '*Northwest School News'* reported that over '400 apple trees of eleven varieties, 350 crab apples of nine varieties, and 75 plums of eleven varieties were planted during the period of 1910-1917.'[46] In addition, they transplanted new hybrid seedling apples and plums plus hardy currants,

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[41] Ibid., 4-6.

[42] "Northwest School News," Vol 29, No. 8, 5 November 1945, 6.

[43] W. J. Spillman, 'Renovation of Worn-Out Soils,' *Farmers' Bulletin No. 245* (Washington: Government Printing Office, 1906), 12 – 15.

[44] 'North Dakota Beekeepers Association,' Newsletter 17, 1 April 1924, Small Collections 584, Institute for Regional Studies, North Dakota State University, Fargo, North Dakota.

[45] "Northwest School News," Vol 29, No. 8, 5 November 1945, 6.

[46] Ibid.

gooseberries, raspberries, strawberries and grapes. Here again, they discovered that the 'old standard varieties of fruit were not hardy in the Red River Valley.'[47] The strawberries, raspberries, and plums survived much better and proved to be indicators of too much alkali in the soil. Few fruit-bearing plants survived in soil of excessive alkali. Like the other agricultural colleges, the Northwest Experiment Station involved research in livestock. Now called the University of Minnesota-Crookston, the Northwest Experiment Station proved to be a valuable 'hands-on' teaching and research facility for Minnesota and North Dakota residents in the Red River Valley.

These scientists within the agencies of colleges, states, and federal government dedicated years of research and traveled worldwide to find cultivated plants for the Northern Great Plains for marketable crops, vegetables, and fruits. In addition to Niel Hansen, Henry Luke Bolley travelled to Central Europe in 1903 to find a wilt resistant flax. After seven years of experimentation at the North Dakota Agricultural College, he released a flax resistant variety called 'North Dakota Resistant No. 26' and in 1926 his best flax 'Bison' seed.[48] Another scientist, Lawrence Root Waldron, a botanist and zoologist hired at the North Dakota Agriculture College in 1899, specialized in spring wheat experimentation. In 1926, he presented Ceres wheat – a cross between a Russian wheat and Marquis – known for its stem rust resistance. [49] All these new plant introductions for the Red River Valley emphasized an acceleration of a cultural, capitalistic transformation which altered a natural, diverse habitat of tallgrass prairie into a

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[47] Ibid.

[48] Erling Nicolai Rolfsrud, *Lanterns Over the Prairies,* 107, 108.

[49] Ibid., 99, 100.

domesticated environment for marketable plant and animal products. "All the wild fruits are being bull dozed to make farm land," wrote pioneer Emily Lund, "we appear to have lost our taste for these wild fruits that were in abundance."[50] Scientists and others experienced failure more often than success with the 'trial' of new plant and animal introductions. Too much rain or not enough, frost too late in the spring or too early in the fall, diseases, insects, fungus, soil conditions, predators, hail, wind, sudden changes in the weather, extreme cold or hot weather, and soil chemistry were but a few of the myriad of environmental conditions scientists and planters battled. Thousands of trees and herbaceous plants succumbed to defeat only to be replaced the next year by a new variety with continued hopes for success. Once a new variety was discovered, propagated, or hybridized, the one plant multiplied into thousands for a singular variety or monoculture of wheat, for example, which replaced the myriad complexity of native plants within the tall grass prairie.

Farmers were and had always been at the forefront of this change. A few farmers themselves experimented with differing cash crops, as cyclical planting of wheat wore out the soil. "By 1905," historian Terry Shoptaugh wrote, "some farmers were switching to potatoes for their primary cash crop."[51] Nine years later, newly appointed horticulturist Harvey O. Werner at Fargo's Agricultural College expanded potato, tomato, strawberry, and other vegetable research. In a 1918 bulletin, he reported that the Ohio and Cobbler were the best variety of potatoes to plants in North Dakota.[52] By the early l920s, the *Fargo Forum* heralded Clay County as the

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[50] Emily Lunde, "Uff da" (Grand Forks: ?, 1974), 14.

[51] Terry L. Shoptaugh, *Roots of Success, History of Red River Valley Sugarbeet Growers* (Institute for Regional Studies: North Dakota State University, 1997), 14.

[52] W. H. Alderman, *Development of Horticulture on the Great Plains,* 109.

'largest potato acreage of any county in the state' of Minnesota with over 64,000 acres of potatoes.[53] Two other Red River Valley counties came in second and third. Polk County grew over 46,000 acres in potatoes, while Norman County followed with over 30,000 acres.[54]

Even earlier than this, pioneer farmer and entrepreneur Randolph M. Probstfield grew a monster sugarbeet reported by the *Moorhead Star* in 1872.[55] In addition to sugarbeets, Probstfield experimented with new plants, which he requested yearly from the University of Minnesota agricultural college with fruit trees on top of his list. He also planted tobacco and cabbage besides numerous varieties of vegetables to sell in Moorhead.[56] Other farm gardeners planted a myriad of vegetables for home use and to sell. In one farm garden, vegetables grown included asparagus, onions, peas, wax beans, tomatoes, lettuce, sweet corn, beets, radishes, carrots, parsnips, salsify, squash, pumpkins, cucumbers, musk and watermelons, citrons, celery, peppers, navy beans, Swiss chard, rutabagas, and kohlrabi.[57] Some farmers also experimented in the development of their own crop seed. For example, John Heath, who homesteaded in 1881 near Minto, North Dakota, developed a 'pure seed of superior quality.' [58] Later in the early 1900s

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[53] 'Clay Again has Largest Potato Acreage of any County in the State,' *Fargo Forum* 25 January 1923, p. 2.

[54] Ibid.

[55] Terry L. Shoptaugh, *Roots of Success,* 13.

[56] Randolph M. Probstfield, 'Probstfield Diaries,' 26, 27, 29 June 1876, Collections, Livingston Lord Library, Moorhead State University, Moorhead, Minnesota.

[57] Fannie Mahood Heath, "Gardening in the Northern Climate," Unpublished Manuscript, #OGL 101 (Elwyn B. Robinson, Department of Special Collections, University of North Dakota, Grand Forks, North Dakota, 1955), 29.

[58] Helen Brooks, 'The Heath Family,' *North Dakota Historical Quarterly,* Vol. 3-4 (Bismarck: State Historical Society of North Dakota, 1928), 113, 114.

at the Lewis and Clark Exposition, he was awarded a 'gold medal for superior seed wheat.'[59] Other innovative farmers saw a specific need in agriculture, such as the lowering of fertility in the soil, they experimented with a specific crop which they knew benefited the soil and turned it into a cash crop for themselves. One foresighted farmer, Datus C. Smith, who farmed 2,240 acres southwest of Fargo, planted clover seed from southern Minnesota and Wisconsin in l904. After seven years of trial and error of planting sweet clover, he slowly increased his acreage in clover with his own seed. Eventually, he sold his red clover seed to area farmers and steadily increased his business over a wider area with different varieties of clover seed. By 1911, the North Dakota Experiment Station selected his Cloverlea farm as an experiment of clover use versus other commercial fertilizers. The scientists declared that there was no economical place for commercial fertilizers versus sweet clover.[60] Smith did warn of yellow sweet clover's invasive tendency and difficulty in eradication. He highly recommended white and red sweet clover as the more manageable clover to use for soil fertility, hay, and pastures.[61]

As the years progressed into the 1900s, farmers and gardeners received increased help from agricultural colleges, farmer's institutes, extension agencies, demonstration farms, and horticulture societies which formed to encourage fruit tree and shrub growth where they lived. Minnesota and Iowa Horticulture Societies both started in 1866. Wisconsin organized a year earlier.[62] When North Dakota and South Dakota were part of the Dakota Territory in 1884, the

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[59] Ibid.

[60] Datus C. Smith, "19 Years Clover Growing in North Dakota," 7, 9, 13, Small Collections 159, 1916, Institute for Regional Studies, North Dakota State University, Fargo, North Dakota.

[61] Datus Smith, 'White vs. Yellow,' *NonPartison Leader,* 21 March 1921.

[62] W. H. Alderman, *Development of Horticulture on the Great Plains,* 33.

'Dakota Horticultural and Forestry Association was organized in Huron.'[63] Part of the horticulture societies' mission was to send out new plant material to its members for trial where they lived. This was a winning part of the program for members and the society itself. It broadened the experimentation of new plants throughout the horticulture society's region. And, since the horticulture society had close ties with the agriculture experiment station from where the plants originated, the agriculture station received additional data on their introduced plants. Nursery garden owners, like Oscar H. Will, joined with scientists to discover adaptable plant material for the northern Great Plains and the tall grass prairie.

The federal government directed, partnered, and funded many farm programs. Besides monetary aids for education and research, the agriculture department published annual bulletins in yearbooks of agricultural methods and innovations in agricultural practices. It also advocated farm diversification with livestock, dairy, poultry, and crops besides education in better methods of farm practices. Farmers and gardeners received and tested free seeds from the horticulture societies, extension agencies, and the United States Department of Agriculture. By 1906, in the fervent belief of scientific education as a betterment for the agricultural way-of- life, the federal government through the Adams Act further supported the agricultural experiment stations with an annual fund of $30,000. Two years later, President Theodore Roosevelt appointed a Commission to 'examine how the farm could garner greater profit while at the same time better the home environment' for farm families.[64] Though the study was conducted nationwide, the

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[63] Ibid., 113.

[64] Liberty Hyde Bailey, *Report of the Commission on Country Life with an introduction by Theodore Roosevelt* (New York: Sturgis & Walton, Co., 1911), 53.

foundation of the study was to bring the new scientific age, efficiency, and professionalism to agriculture. The consensus among the commissioners was that science was the solution for a variety of land use problems as soil fertility declined everywhere while weed infestations and other farm problems increased.

Two important members of the Country Life Commission, "Uncle" Henry Wallace, editor of *Wallaces' Farmer* in Iowa and Gifford Pinchot, Roosevelt's personal friend and chief of the United States Forest Service in the Department of Agriculture, were dedicated conservationists:

> Uncle Henry Wallace, surveying in his time the waste and decimation of farm land and forest, of streams, and wildlife, of oil and minerals, used to speak sadly of 'voiceless land.' In him, in Gifford Pinchot, in Harry Slattery, and other younger men of Theodore Roosevelt's following, including Harry Wallace, the plundered land found voices of defense. They coined or adapted the word 'conservation' to express their purpose, and practically everything that they did together at that time centered around the fighting standards of Gifford Pinchot's Forest Service.[65]

Two other important members, Liberty Hyde Bailey, Director of New York State College of Agriculture at Ithaca, New York, and Kenyon Butterfield, a rural sociologist and President of the Massachusetts State College of Agriculture, believed strongly in agricultural economics, horticulture, 'hands-on' agriculture, and nature studies in colleges for 'modern agriculture.' Bailey, who initiated extension work in horticulture and later agriculture, urged, " . . . the teaching of agriculture. . . should be given partly in class-work, partly in actual laboratory practice. . . to demonstrate the value of the methods as farm operations, and partly upon farms

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[65] Russell Lord, *Wallaces of Iowa* (Cambridge, Massachusetts: Riverside Press, 1947), 225.

and in gardens in various parts of the State."[66] Earlier in 1905, Bailey had written about the importance of nature studies for all individuals, especially children, and believed farmers and their families, who interacted directly with the natural world, benefited the most by their surroundings through questions, observations, and finding answers. He believed that everyone needed nature studies 'to actually see . . . and understand' their natural world.[67] "In the 1880s, nature study courses originated in elementary schools," Liberty Hyde Bailey wrote, "[as] a reaction from the dry-as-dust science teaching."[68] The "Nature-Study" term appeared officially in l891 when Wilbur S. Jackman published his bi-monthly pamphlets for nature study in book form, "Nature Study for Common Schools."[69] Frank Owen Payne brought the concept of nature studies to Minnesota in his lectures from l886 – 1889.[70] Ironically, this occurred while settlers continued to 'civilize' the last of the American frontier in the northern Great Plains and the Red River Valley. Bailey recognized this and, later, as chair of the Country Life Commission, he included 'nature-study' recommendations for farmers and their families. He visited every state to view the difficulties farm families encountered. After touring with A. F. Yeager and Waldron

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[66] Andrew Denny Rodgers III, *Liberty Hyde Bailey, A Story of American Plant Sciences* (Princeton, New Jersey: Princeton University Press, l949), 194.

[67] Liberty Hyde Bailey, "*Essential Agrarian and Environmental Writings*," Edited by Zachary Michael Jack (Ithaca: Cornell University Press, 2008), 115-125.

[68] Liberty Hyde Bailey, The *Nature Study Idea* (New York: Doubleday, Page & Company, 1903), 7.

[69] Ibid., 10-11.

[70] Ibid., 12-13.

and viewing the miles of wheat still planted throughout the Red River Valley in the early 1900s, Bailey spoke for the need of farm diversification in crops and animal husbandry.[71]

After the Country Life Commission wrote its report and Congress accepted part of its recommendations, an outgrowth of the committee – the Second National Conservation Congress – met in 1910 in St. Paul, Minnesota. A newspaper reported on what its chief organizer, Gifford Pinchot, and next president of the conference, Henry Wallace, hoped to promote and implement:

> The scope of the [Conservation] movement has widened to include public transportation [more roads]. . . soil resources, their preservation and restoration. . . crop production, education, agricultural schools, the betterment of rural homes, sanitation and . . . The making of the state, county and federal government directly . . . responsible to the will of the whole people.[72]

They espoused farm diversification with the rotation of differing crops and the production of dairy, egg, and meat products from livestock and poultry as the answer to 'modern' farm practices with more profit due to improved methods of seeding, fertilizing, plowing, and harvesting, just to name a few. The Agricultural Colleges, extension agencies, and federal government advocated more education for farmers to recognize plant and livestock diseases, implement weed control, eradicate pests, and plant new varieties of crops. Domestic science added farm women's education of labor saving devices for home use, sanitation within the home, and efficiency with safety in meal preparation and food preservation.[73] All committee members

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[71] A. F. Yeager, 'My Trip with Liberty Hyde Bailey,' *North and South Dakota Horticulture* Vol. XVIII (May 1945): 79.

[72] Mary Allen Whedon, 'The Conservation Congress,' *Farmer's Wife Journal* XV #6 (October 1910):140. Elwyn B. Robinson, Department of Special Collections, Chester Fritz Library, University of North Dakota, Grand Forks, North Dakota.

[73] Mary Allen Whedon, 'Domestic Science,' *Farmer's Wife Journal* XV #6 (October 1910): 140. Elwyn B. Robinson, Department of Special Collections, University of North Dakota.

believed science and education were the key tools in the improvement of farm families. This involved agriculture and nature study education in the rural schools, as well. For instance, when North Dakota Agricultural College in Fargo convened its first Country Life Conference in 1913, organizers formed their program around the ‘Country School, Country Church, and Country Home.’[74]

The Department of Agriculture continued to evolve in its study and outreach programs. While a new Bureau of Plant Industry had been organized in 1900 to introduce the newly discovered plants from around the world for United States cultivation, by 1913 the Bureau focused more on the ‘hybridization, selection, disease control, and cultivation methods’ for agriculture.[75] Then in 1914, a new bill, the Smith-Lever Act, granted additional funds for more research and education. It provided for “extension work in agriculture and home economics to be carried on by the State agricultural colleges in cooperation with the Department of Agriculture.”[76] Part of this research involved eradication of pests, which reduced harvests and profit.

With the loss of wildlife predators in the Red River Valley and the transformation to large acres of monoculture crop, animal ‘pests’ multiplied and ate into the profits of agriculture. Among them were field mice, pocket gophers, ground squirrels, and jack rabbits. Agricultural extension agents and the Department of Agriculture estimated damage to crops and range land

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[74] A. G. Arnold, ‘Social Aspect of Farm Life Studied,’ *Farmer’s Wife Journal* XV #12 (April 1913); 361.Microfilm, Elwyn B. Robinson, Department of Special Collections, University of North Dakota, Grand Forks, North Dakota.

[75] Nelson Klose, *America’s Crop Heritage* (Ames, Iowa: The Iowa State College Press, 1950), 120.

[76] A. C. True, *Education and Research in Agriculture and Home Economics in the United States* (Washington, D. C.: United States Department of Agriculture, 1922), 8.

throughout the Red River Valley and other states as reaching an epidemic by 1917. Agricultural extension state directors calculated the 1917 monetary value of the losses in the millions:

> Montana: $15,000,000 to $20,000
> North Dakota: $ 6,000,000 to $9,000, 000
> Kansas: $12,000,000
> Colorado: $ 2,000,000
> California: $20,000,000
> Wyoming: 15 percent of all crops
> Nevada: 10 to 15 percent of all crops or $1,000,000
> New Mexico: $1,200,000 loss to crops and double this amount to range[77]

Before this, the Department of Biological Survey tested government lands with strychnine-laced grain. In 1916, they baited over 1,300,000 acres and retreated over 160,000 acres of land to eradicate the rodents.[78] In seven counties in North Dakota, the experiment station and extension service joined with the Biological Survey and farmers to apply over 5/8ths of a ton of poisoned grain to their land. State experts estimated the state saved over 6 million dollars at a cost of 1 to 2 cents an acre.[79] With the desired results over a control of pests through the poisoned grain, the Department of Agriculture joined with 15 western states besides North and South Dakota to save more crop and range land with the poisoned bait. The application of strychnine grain occurred in eight states from 1916 to 1920, while an additional nine states utilized less annual applications. They treated acreages with poisoned baits for the eradication of prairie dogs and ground squirrels in Federal and State cooperative campaigns.[80]

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[77] W. B. Bell, 'Death to the Rodents,' *United States Department of Agriculture Yearbook 1920* (Washington: Government Printing Office, 1921), 422.

[78] Ibid., 427.

[79] 429-430.

[80] Ibid.

In these five years, North Dakota applied the highest amount of strychnine bait. As compared to other states within this program, North Dakota utilized poisoned grain four times as much as California and twelve times as much as Montana. Although this was not a new form of 'pest' eradication, the massive dosage in a county and state-wide effort radically diminished the rodent population and altered how to eradicate 'pests.' For instance, John W. Slee reported inserting strychnine in raw potatoes, which he then buried near his apple trees in his orchard, to kill pocket gophers.[81] He relied on other methods for pest control with traps for rabbits and mice that killed apple trees after they ate the bark and girdled the tree. He also admonished everyone to never 'kill a weasel' – the enemy of the rodents.[82] This was in l878. By 1917, after counties had annually placed premiums for gopher tails and churches accepted gopher tails in their collection plates as a source of revenue, the state and national government joined in the fight.[83] A huge difference now occurred with the focus on one primary method of eradication in the use of a high quantity of poisoned grain. It worked, but no mention was made of the non-targeted wildlife that also ate grain or predators who ate the dead, poisoned animals. This came at a time when the federal government with the U.S.D.A. and agriculture extension agencies encouraged all farmers to raise and produce as much as they could for the World War I effort. More land, in some cases marginal, was 'plowed up for farmland.'[84] And, an increased staff of extension and

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[81] John W. Slee, 'Report from John W. Slee,' Letter to Minnesota Horticulture Society, 5 January 1878, *History of Minnesota Horticulture Society* (St. Paul: Office St. Paul Press, 1878), 141.

[82] Ibid., 141-142.

[83] Carol Mahnke, 'Prairie Religion,' *The Forum* Tuesday 1 November 1988.

[84] Kim Alan Chapman, Adelheid Fischer, Mary Kinsella Ziegenhagen, *Valley of Grass, Tallgrass Prairie and Parkland of the Red River Region* (St. Cloud: North Star Press, l998), 80.

domestic science agents educated women and men on the 'preservation and storage of food for home consumption.'[85] The patriotic language of war permeated farm newspapers:

> In time of war as in time of peace it is not only important, but essential, that the people be well fed . . . The war must be won in the kitchens and on the dining tables of America as well as in the trenches. The Department of Agriculture stands ready to supply information to help the housewife do her bit toward winning the war.[86]

This same language infiltrated the war on insects, rodents, and birds that damaged and reduced the harvestable crops. "Pest controllers and writers used the war in Europe," wrote environmental historian Edmund Russell, "to increase public awareness of the insect menace, promote stronger attacks on insects, and elevate the stature of entomology."[87] While scientists increased their research into eradications of 'pests' to crops and livestock, their stature and influence increased throughout the federal government. They utilized science for an efficiency in insect and rodent kill. The war on the gophers was one example of the new use of a chemical efficiently employed in a massive eradication.

Ironically, while the article focused on the massive rabbit, gopher, and mice rodent kill, another article in the Yearbook examined 'Conserving our Wild Animals and Birds' by the same Bureau of Biological Survey. "Wild game especially is often of direct economic value to the inhabitants of a region," Edward A. Goldman wrote, "not only as food but also because of the

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[85] Francis J. Parker, *Home Economics, an Introduction to a Dynamic Profession* (New York: MacMillan Publishing Co., 1987), 36.

[86] Carl Vrooman, 'In Time of War,' *Farmers Wife Journal,* XX #4 (September 1917), 70. Microfilm, Elwyn B. Robinson, Department of Special Collections, University of North Dakota, Grand Forks, North Dakota.

[87] Edmund Russell, *War and Nature, Fighting Humans and Insects with Chemicals* (New York: Cambridge University Press, 2001), 36.

expenditures of hunters . . . and the recreational and educational advantages from an abundance of wild life."[88] Forty years before when wildlife still proliferated on the prairie, even the renowned hunter Theodore Roosevelt and his brother, Edward, had hunted in the Red River Valley. They 'killed 404 animals' in a two week hunting excursion in Clay County.[89] Settler Ben Barrett wrote of how abundant prairie chickens and cottontail rabbits provided his family with plenty of meat during the winter in the late l880s.[90] During this same time, market hunting of game and birds proliferated for food, sport, and millinery fashion. Women's "hats sported eagle feathers, whole hummingbirds, and sparrows," and, with the invention of the refrigerated railroad car, the hunted wild birds transported quickly to eastern coast markets.[91] The railroad also brought the sports hunters from the east coast to the Red River Valley. Frederic Remington and his party of hunters hopped on a train in Chicago and arrived in Valley City in l895. Three wagon teams carried them north between miles of "shocked wheat fields" to shoot prairie chickens and water fowl. "The air was now full of flying birds – mallards, spoon-bills, pintails, red-heads, butter-balls, gadwalls, widgeon, and canvasbacks – and the shooting was fast and furious," he wrote, "It was a perfect revelry of slaughter."[92]

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[88] Edward A. Goldman, 'Conserving our Wild Animals and Birds,' *United States Department of Agriculture Yearbook 1920* (Washington: Government Printing Office, 1921), 159.

[89] Mark Peihl, 'Space for Chickens,' *Clay County Historical Society Newsletter* September/October, 1992; *Valley of Grass,* Edited by Chapman, Fisher, Ziegenhagen, 6.

[90] Ben H. Barrett, *Pioneer Days North Dakota Prairies,* 14.

[91] Jennifer Price, *Flight Maps, Adventures with Nature in Modern America* (New York: Basic Books, 1999), 59.

[92] Frederic Remington, "Stubble and Slough in Dakota," *Harper's New Monthly Magazine*, Vol 89; Issue 531, August 1894, 452, 453,456.

As wildlife species dwindled, it became apparent that legislation – state and federal – was needed to curtail any more near extinctions, like the bison, or the extinction of the passenger pigeon. The Biological Survey itself had originated from the formation of the American Ornithologists' Union which `studied bird migration and distribution' in l883.[93] "In l886, . . . the new Division of Economic Ornithology and Mammalogy, . . . later renamed the Bureau of Biological Survey, and then the Fish and Wildlife Service," environmental historian Kurkpatrick Dorsey wrote, "focused on the economic importance of birds to agriculture."[94] In differing states, Audubon societies organized in the early 1890s. Ten years later, Congress passed the Lacey Act – "the first federal conservation measure, which prohibits the interstate shipment of wild species killed in violation of state laws."[95] It also created the "first national wildlife refuges."[96] On April 19, 1920, the Supreme Court declared the constitutionality of the 'Migratory-Bird Treaty,' which protected migratory birds in the United States and Canada. It was now illegal to hunt birds in the Spring or sell migratory birds anywhere in the state.[97] Another Biological Survey task was to protect big-game reservations in Montana, Wyoming, South Dakota, North Dakota, and Nebraska. The Survey understood its mission as 'conserving beneficial and harmless species' in the 'conservation of wildlife.'[98]

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[93] Kurkpatrick Dorsey, *The Dawn of Conservation Diplomacy* (Seattle: University of Washington Press, 1998), 174.

[94] Ibid., 176.

[95] Virginia Price, *Flight Maps,* 61.

[96] Ibid.

[97] Edward A. Goldman, 'Conserving our Wild Animals and Birds,' 163.

[98] 160, 167.

During this same time, as hundreds of acres of prairie now supported the growth of annual crops in place of what had once been a myriad of tall grass and forbs, the loss of habitat diminished the complexity of mammals, birds, and insects dependent on its ecosystem. Birds, mammals, butterflies, like the Dakota skipper, dependent on a grassland or wetland ecosystem to survive moved elsewhere or disappeared. The wildlife population encountered other threats to their survival as well. Besides domesticated livestock and poultry, other introduced species competed for food sources in the Red River Valley. For instance, the English sparrow was originally brought into the United States in l850 to New York for biological control of 'pestiferous worms and insects.'[99] It was not until several years later that scientists engaged in serious research of native birds and their benefits in insect eradication. Over twenty years later, in 1877, when the agriculture commission investigated insect predators, particularly birds, it discovered that the English sparrow proved to be more of an enemy to fruits and grains than to the insects.[100] Unfortunately, by the l870s and into the 1890s, the English sparrow acclimated so well, its population expanded into the Red River Valley, a midsection of the Great Plains, and over ninety percent of the eastern part of the United States.[101] [Figure A 7]

By the time biologist T. S. Palmer wrote an article in l898 on 'The Danger of Introducing Noxious Animals and Birds' into the United States, a few of the birds, animals, and insects he mentioned already posed serious problems. Settlers in the Dakota Territory recognized this as a

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[99] Jenks Cameron, *The Bureau of Biological Survey, its History, Activities and Organization* (Baltimore, Maryland: Johns Hopkins Press, 1929), 12.

[100] Ibid., 15.

[101] T.S. Palmer, "The Danger of Introducing Noxious Animals and Birds," *Yearbook of the Department of Agriculture, 1898* (Washington: Government Printing Office, l898), 99.

problem several years earlier. In 1887, Mary Dodge Woodward saw her first rat in the Dakota Territory in October. "The first one was seen only a day or two ago," she wrote, "but they have been overrunning Fargo for some time. They will be a terrible pest in the wheat fields."[102] Eleven years later Palmer warned about the common brown rat, *Mus decumanus* (originally from western China), the black house rat, *Mus rattus* (native to Asia), the white-bellied rat, *Mus alexandrines*(Egypt), the house mouse, *Mus musculutus* (Europe and Central Asia), the starling, *Sturnus vulgaris* (Europe and Western Asia), the skylark, *Alauda arvensis*(Europe), and the black bird, *Turdus merula* (Europe), besides the English sparrow, which destroyed fruit and grain and drove away native birds, already infiltrated a major part of the North American continent and 'usurped the places of native species.'[103] A few of these species, like the sparrow and starling, were brought to the United States for specific purposes. Also, some settlers missed their homeland and hoped to recreate their environment from what they knew. This included wild birds. It was not until many years later, however, that scientists, farmers, and gardeners realized how destructive starling and English sparrow flocks were to orchards, gardens, and beneficial native birds. Other alien species that were not carried to the American continent for beneficial purposes found ways to enter the new American country and adapted readily to the new environment.[104]

In this same year, l898, the Biological Survey studied birds as weed seed eaters for the benefits of agriculture. Besides birds in the sparrow family, including the introduced English

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[102] Mary Dodge Woodward, *The Checkered Years,* 192.

[103] Ibid., 87 – 106.

[104] Jenks Cameron, *The Bureau of Biological Survey,* 79.

sparrow, the survey found fifty different birds, particularly the blackbirds, the bobolinks, and the doves consumed vast numbers of weed seed. The goldfinches focused on the 'Compositae' family of weeds not touched by many of the other birds. The meadowlarks proved their merit, while a variety of differing, migrating native sparrows ate the most in ragweed, pigeon grass, crab grass, bindweed, purslane, smartweed, and pigweed seeds before the seeds fell off of the plant, down to the ground, and germinated. The native sparrows were heralded for their 'efficiency' as 'gregarious and terrestrial. . . seldom noted' little weeders.[105] These were the very birds the English sparrow and European starling flocks 'crowded out.'

As settlers homesteaded in the Red River Valley, many contributed to specie changes by what they planted. For instance, when they planted shelterbelts around prairie farm buildings, settlers provided a woodland habitat for birds and some mammals. Pearl Frazer wrote about her childhood farm, which was three miles west of Grand Forks and the Red River in northeastern North Dakota:

> One of the most interesting and attractive features on the Heath farm was the number of birds. No one was allowed to kill or disturb them and they became tame. Some of them would allow visitors to pass within a few feet of the nest while the bird was sitting on it, without flying away. In the vine covered summer house a robin would have a nest inside, a dove's nest would be on the roof, and wrens had their nest for many years in an old, pewter teapot only a few feet away.[106]

Pearl's mother, Fannie Mahood Heath, and father, Frank, represented many of the original settlers who homesteaded on the prairie. Both worked to 'civilize' and 'commercialize'

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[105] Sylvester D. Judd, Ph.D., 'Bird as Weed Destroyers,' *Yearbook of the United States Department of Agriculture* (Washington: Government Printing Office, l898), 232.

[106] Pearl Heath Frazer, 'Prairie Flowers for Your Garden,' Unpublished manuscript by Fannie Mahood Heath, #OGL 101, Elwyn B. Robinson, Department of Special Collections, Chester Fritz Library, University of North Dakota, Grand Forks, North Dakota, 1955, 12.

their surroundings on their homestead farm after l881. Fannie Heath quickly planted lilacs, which grew, and pine seedlings, which withered and died, on her farm. She planted more lilacs. She noticed later that the lilacs were the first to leaf out in the Spring and the last to shed their leaves in the fall.[107] When they discovered their soil contained high alkaline, they intermixed 'aged manure,' grass clippings, and other organic material to amend the soil for vegetables, flowers, shrubs, and trees that they wanted to grow. Their determination and her plant experimentation led to success and eventual international renown of their farm as the 'oasis on the prairie.' In the early 1900s, she recorded and sent an annual list of birds she saw to the Biological Survey. [Appendix E] As her knowledge of plants increased, she wrote gardening articles in various magazines and corresponded with the scientists at Fargo's Agricultural College. By the l920s, a photo of their farm's mature trees appeared on a Fargo Agricultural College's bulletin which promoted shelterbelts and she coauthored a bulletin with horticulturist Albert F. Yeager, 'Perennial Flowers for North Dakota Homes.'[108] The bulletin was the first perennial flower publication by any agricultural extension agency in the United States. All of the flowers described in the bulletin grew in the Heath garden with much of its information from her diary and research from the horticulture department at the North Dakota Agricultural College.[109]

By this time, she herself had evolved to love the beauty of the prairie, advocated the value of native plants in domestic landscapes in her articles and speeches, and sold and shipped

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[107] Ibid., 7.

[108] A. F. Yeager, Horticulturist, and Fannie Mahood Heath, 'Perennial Flowers for North Dakota Homes,' *Bulletin 170* (Fargo: Agriculture Experiment Station, North Dakota Agricultural College, 1923), 3, 4.

[109] A.F. Yeager, Horticulturist, and Fannie Mahood Heath, 'Perennial Flowers for North Dakota Homes,' *Special Circular* (Fargo: North Dakota Agricultural College, 1941), 4, 5.

seedlings to plant enthusiasts in other countries and within the United States. "I became fascinated with [native plants]," wrote Fannie Mahood Heath, "Also, the encroachment of man and his plows on the wild flower domain made me realize that these rare and beautiful plants must be moved to private grounds."[110] As the first vice-president of the National Horticulture Society in l924, she wrote articles about the beauty of tallgrass prairie upon which the Heaths lived. She also helped organize the first Grand Forks Horticulture Society on April 9, 1923, for 'future meetings of seed exchanges, to encourage school gardening, hold special flower shows, and invite well known horticulturalists to address' them.[111] A year later, the horticulture club changed its name to the Grand Forks Garden Club and continued to meet bimonthly in the spring and summer months.[112] Heath espoused the growth of native plants at various meetings, in her writings, and in tours of her yard during summer months. She displayed native flowers, ferns, and grasses in arrangements for public view. For instance, the *Devils Lake World* newspaper announced a "collection of 61 varieties of North Dakota flowers and ferns is on display . . . this week in the window of Merchants National Bank."[113] Though she encouraged others to plant native plants, none were listed in the Grand Forks Garden Club's list of recommended plants for the Red River Valley in 1924. The club advised gardeners to plant cosmos, sweet peas, asters,

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[110] Fannie Mahood Heath, 'Prairie Flowers for Your Garden,' Compiled by Pearl Heath Frazer, Unpublished manuscript, #OGL 101, Elwyn B. Robinson, Department of Special Collections, Chester Fritz Library, University of North Dakota, Grand Forks, North Dakota, l955.

[111] Mrs. J. M. Gillette, Secretary, 'Minutes of the Grand Forks Horticulture Society,' 9 April 1923, 'Secretary's Report,' Kathleen Brokke's Library, Argusville, North Dakota.

[112] A. D. Keator, Secretary, 'Minutes of the Grand Forks Garden Club,' 21 April 1925, Secretary's Report, Kathleen Brokke's Library, Argusville, North Dakota.

[113] `Horticulture in State Indicates Fertility of Soil,' *Devils Lake World,* 27 July 1927.

nasturtiums, pansies, gladiolus, zinnias, phlox, and snapdragons for annuals. For perennials, peonies, hollyhocks, German irises, phlox, columbines, baby's breath, delphiniums, Shasta daisies, tulips, and lily-of-the-valley survived well in their northern climate.[114] Heath, who grew a combination of hybridized and native plants in her yard, advised others to grow native plants for their beauty, hardiness, and low cost. In one of her articles on how to landscape, she urged, "get acquainted with every tree, shrub and flower growing in your neighborhood. Plant them about your home; tell others about them and you will soon find people in this state and others that will gladly exchange many of the plants you have been longing for, for them."[115]

She wrote from experience. By the mid1920s, she maintained in her own yard over '500 or more varieties of wild and cultivated plants' . . . from 'India, China, and Japan, Africa, Iceland, and many from the European continent.'[116] She sent native plants all over the world. Some she sold while others she exchanged. A good friend of hers wrote to her of how desirable native plants were to plant enthusiasts who lived elsewhere. A Hyde garden superintendent in London who collected and grew plants for the Royal gardens, T. Hay wrote of his visit to another English garden planted in North American native plants:

> I went a few days ago to see Lady Byng's garden: you may remember her husband, General Byng, was governor of Canada; she is very keen and has brought home a fine collection of Canadian plants, including a lovely Sphaeralcea,[mallow?][117] also Pentstemon grandiflora and many other

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[114] E. A. Baird, Secretary, 'Grand Forks Horticulture Society Minutes of the Meeting,' 15 April 1924, Kathleen Brokke's Library, Argusville, North Dakota.

[115] Fannie Mahood Heath, 'Horticulture in State Indicates Fertility in the Soil,' *Devils Lake World,* 27 July l927.

[116] Ibid.

[117] Orin A. Stevens, *Handbook of North Dakota Plants* (Fargo: North Dakota Institute for Regional Studies, 1963), 202, 205.

> shrubby things. There seems to be lots of new things on your continent yet.[118]

He continued in his letter about American nursery owners who had just visited England to order European plants to sell in America. "It looks as if they were ashamed of their native flowers," he puzzled, "I cannot make out why they take up everything raised out of their own country, which are the most beautiful, the most desired, and the greatest in number of any country on this earth."[119] In their letters to each other, they both questioned the lack of interest of most Americans in their native plants which grew in their own environment. Undeterred, Fannie Heath continued to champion native plants for urban landscapes. She displayed their value as domesticated plants when she landscaped the Theodore Roosevelt cabin entirely with native plants in the early l920s at Bismarck, North Dakota, the state's capital.[120]

Several others, who ordered from her catalog or exchanged plants for native plants with Heath, shared her interest in the use of Red River Valley plants for commercial and landscape development. Stephen Hamblin, director of the Botanic Garden in Cambridge, Massachusetts, requested any native *Senecios, Petalostemons,* and other native species she might regard unique.[121] Cornelia Bryce Pinchot, Harrisburg, Pennsylvania, thanked Heath for the plants she

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[118] T. Hay, Royal Park Superintendent, Royal Gardens, London, England, to Fannie Mahood Heath, 24 July l928, #OGL 101, Elwyn B. Robinson, Department of Special Collections, Chester Fritz Library, University of North Dakota, Grand Forks, North Dakota.

[119] Ibid., 2.

[120] Russell Reid, photographer, 'Flower Woman of North Dakota,' *North Dakota Outdoors,* 8 April 1946, 3.

[121] Stephen F. Hamblin, Director Harvard University Botanic Garden, to Fannie Mahood Heath, 6 March 1926, #OGL 101, Elwyn B. Robinson, Department of Special Collections, Chester Fritz Library, University of North Dakota, Grand Forks, North Dakota.

sent, marveled over the *Malvastrum*, *Gentians*, and *Penstemons*, and requested other varieties.[122] Mr. A. P. Balfour, Royal Seed Establishment, Reading, England, requested *Verbena bracteosa,* (bracteata, bracted Vervain), *Viola papilionacea,* (blue violet), *Viola pedatifida,* (prairie violet), *Viola adunca,*(small blue violet), *Rosa pratincola,*(prairie wild rose), and *Rosa blanda* (smooth wild rose) from her native plant catalog.[123] [Appendix F] E. B. Anderson, Hemyock, Devon, sent an order for a variety of native plant seeds from Heath's native plant list his friend, Mrs. Neva C. Belew, Harmon, Oklahoma, sent him.[124] Mrs. P. S. DuPont, Longwood, Kennett Square, Pennsylvania, ordered fifty *Anemone patens,* pasque flowers, in l929.[125] California landscape architect, Carl Purdy, an iris, phlox, delphiniums, and rock garden plants specialist, ordered native plants for spring tests. "Each year sees from fifty to two hundred new plants under trial here," he wrote. "The North Dakota test is a valuable one in my work."[126] To agronomist and Dean of Agriculture College Dr. Harlow Walster and his wife, Ada, Heath wrote:

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[122] Cornelia Bryce Pinchot, Harrisburg, Pennsylvania, to Fannie M. Heath, Grand Forks, North Dakota, 26 September 1926, #OGL 101, Elwyn B. Robinson, Department of Special Collections, University of North Dakota, Grand Forks, North Dakota.

[123] Mr. A. P. Balfour, Reading, England, to Fannie M. Heath, Grand Forks, North Dakota, 18 February 1932, #OGL 101, Elwyn B. Robinson, Department of Special Collections, Chester Fritz Library, University of North Dakota, Fargo, North Dakota; Orin E. Stevens, *Handbook of North Dakota Plants,* 239, 208, 209, 174.

[124] E. B. Anderson, Hemyock, Devon, to Fannie M. Heath, Grand Forks, North Dakota, 1 May l929, #OGL 101, Elwyn B. Robinson, Department of Special Collections, Chester Fritz Library, University of North Dakota, Grand Forks, North Dakota.

[125] Mrs. P. S. DuPont, Longwood, Kennett Square, Pennsylvania, to Fannie M. Heath, Grand Forks, North Dakota, 11 March 1929, #OGL 101, Elwyn B. Robinson, Department of Special Collections, Chester Fritz Library, University of North Dakota, Grand Forks, North Dakota.

[126] Carl Purdy, Landscape Architect, Ukiah, California, to Fannie M. Heath, Grand Forks, North Dakota, 26 November 1922, #OGL 101, Elwyn B. Robinson, Department of Special Collections, Chester Fritz Library, University of North Dakota, Grand Forks, North Dakota.

> If you wish your gardens to be beautiful, you can have it so with our native plants. . . Louise Beebe Wilder [well-known garden author] writes me that no plant in her famous gardens gave more pleasure than did the dainty little *Malvastrums* and Mr. Lown ordered 150 more of them and I had already sent him near a hundred before this . . . I want to call your special attention to the *Oenothera caespitosa* [Butte primrose][127] as it is simply glorious - give it a warm, sunny place in very sandy soil . . . [128]

Another agriculture scientist, botanist Dr. Orin A. Stevens, answered her queries about native plants that she had sent him. In the same letter, he welcomed any herbarium specimens and requested her to find a *Chamaerhodos,* [Little Rose], which had been collected east of Grand Forks.[129] Since Heath lived west of Grand Forks, it was highly probable she might find it.[130] This was just a sample of correspondence from her to other gardeners, collectors, and scientists interested in Red River Valley native plants for research, decorative, and commercial use.

Her interests in native plants included fruit research with other horticulturists, as well. By 1925, a regional group who called themselves the Northern Great Plains Horticulture Society met in Bismarck, North Dakota, at the same time in August that the North Dakota Horticulture Society held their meeting. The Northern Great Plains horticulturists began their annual meetings in 1918 in Mandan, North Dakota, and met in other states during the following years. From Minnesota, South Dakota, North Dakota, Manitoba, and Northern Ontario, the scientists determined to 'erase state, provincial, and national political boundaries' for a collaboration on

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[127] Orin E. Stevens, *Handbook of North Dakota Plants,* 215.

[128] Fannie Mahood Heath, Vice President National Horticulture Society, to Dr. and Mrs. Walster, 4th October 1928, Institute for Regional Studies, North Dakota State University, Fargo, North Dakota.

[129] Orin E. Stevens, *Handbook of North Dakota Plants*, 171.

[130] O. A. Stevens, North Dakota Agriculture College, to Fannie M. Heath, 28 March 1922, #OGL 101, Elwyn B. Robinson, Department of Special Collections, Chester Fritz Library, University of North Dakota, Grand Forks, North Dakota.

fruits, vegetables, and ornamentals research for the ‘benefit of all’.[131] At their 1925 Bismarck meeting, one scientist disparaged fruit growth in the Northern Great Plains. Fannie Heath, at the same meeting, disagreed and mentioned that many native fruits already grew on the prairie. Other scientists at the meeting, Albert F. Yeager, Fargo Agricultural College, N. E. Hanson, South Dakota Experiment Station, and Frank Skinner, Morden, Manitoba, concurred with her.[132] Heath’s gardening experience and experimentation with the scientists’ introductions also verified her statement. In addition to red raspberries, highbush cranberries, chokecherries, and other native fruits, the Heaths grew many of the experimental cross bred fruits, like the ‘Tom Thumb, Champa, Oka cherries; the Redwing, Underwood and Hansen tame plums; Sapa and Opata cherries from N. E. Hansen’s collection; the Minnetonka apples; crabapples; and a Harbin pear from China.’[133] Her black raspberries, originally from Minnesota, were the first commercial raspberry crop in North Dakota.[134] They sold the fruit annually and in 1889 sold over 1000 quarts. She gave the Northwest Nursery Company in Valley City raspberry canes in the early 1900s to propagate and sell to others. [135] After she died in l931, her raspberry was renamed ‘the

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[131] W. H. Alderman, *Development of Horticulture on the Northern Great Plains,* 10.

[132] ‘Conventions Program Had Speakers,’ *Bismarck Tribune,* 28 August 1925.

[133] W. G. Arnold, ‘Blazing the trail for North Dakota flower growers!’ *The Dakota Farmer* 1 March, 1929.

[134] A. F. Yeager, North Dakota Agricultural College, to Fannie Mahood Heath, 23 June, l922, Letter in #OGL 101, Elwyn B. Robinson, Department of Special Collections, Chester Fritz Library, University of North Dakota, Grand Forks, North Dakota.

[135] Fannie Mahood Heath, Grand Forks, to M. R. Newman, United States Department of Agriculture, 11 December 1930, Letter in #OGL 101, Elwyn B. Robinson, Department of Special Collections, Chester Fritz Library University of North Dakota, Grand Forks, North Dakota.

Fannie Heath Raspberry'.[136] Her discovery of a native white aster which flourished in domesticated yards was also given her name.[137] But many who now lived in the Red River Valley, even as interest in native plants grew, wanted to grow familiar cultivars of flowers, vegetables, roses, fruit bearing shrubs and trees, or highly productive root and grain crops for themselves and, for many, commercialization. The Heaths themselves grew introduced and native plants in their yard as a welcome combination of both. Though Heath championed native plant use, she herself enjoyed the challenge of what other cultivated plants might grow in the Red River Valley. From a treeless, tallgrass landscape in 1881 to a shelterbelt around their farm buildings and 3 acres of gardens and flowerbeds in the 1920s, the Heath farm portrayed how drastically the environment of the tallgrass prairie changed due to her avid gardener's work.

While several scientists and other native plant advocates began a serious collection of native plants before they disappeared, another organization, probably the first conservation organization in the state, saw a similar need to preserve parts of North Dakota's history and original landscape. The North Dakota Historical Society – 'reorganized from the 1889 Ladies Historical Society' - in 1903 was authorized by the state government to 'acquire historic sites and relics by contribution or purchase.'[138] The committee in charge of the state parks – Professor Clare B. Waldron, Fargo, Curator Melvin R. Gilmore, Bismarck, and Secretary Orin G. Libby, Grand Forks - advocated the preservation of park settings as 'living museums . . . of live plants

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[136] Mary Margaret McBride, 'My American Cookbook,' *Women's Home Companion* September 1956, 95.

[137] Erling N. Rolfsrud, *Lanterns over the Prairies*, II (Brainard, Minnesota: Lakeland Press, 1950), 74.

[138] Gerald G. Newborg, Editor, *1991-1992, Historic Sites Plan* (Bismarck: State Historical Society of North Dakota, l991), 5.

and animals in their natural environment.'[139] Native animals that once populated the state were to be 'protected and allowed to multiply, . . . the beaver, prairie dog, antelope, deer, elk, and buffalo' in their natural habitat.[140] Seven state parks, which already existed, were to be used as community centers for education of the surrounding environment and for recreation. Four of the seven state parks - Walhalla State Park, Fort Abercrombie State Park, Pembina State Park, and Cavalier County State Park – existed in the Red River basin, while Fort Abraham Lincoln State Park, Fort Rice State Park, and the Arikara Indian Village with Fort Rice resided in western North Dakota.[141] Gilmore's, Waldron's, and Libby's intent to showcase the historical sites with original native flora and fauna indicated their awareness of how rapidly the landscape around them had changed to urban and rural development. They were the first to try to preserve a part of the state's natural history.

As tremendous change continued on the landscape of the Red River Valley after the l880s, dedicated individuals and institutions researched and created the means and methods. "Horticulturists, as a rule, are the most persistent, indomitable class engaged in the struggle of developing the hidden resources of nature," wrote president of the Minnesota State Horticulture Society J. M. Underwood, "Reverses act as a stimulus to them, quickening their efforts and strengthening their determination to persevere until success is achieved."[142] This certainly proved true for the horticulturists who focused on propagation of cultivated plants and crops in the Red

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[139] O. G. Libby, Editor, 'The State Park System of North Dakota,' *North Dakota Historical Collections,* Vol. 6 (Bismarck: State Historical Society of North Dakota, l920), 214.

[140] Ibid.

[141] Ibid., 215, 216, 219, 221, 217, 218, 219.

[142] Lynne M. Steiner, '125 Years of Horticulture in Minnesota,' *Minnesota Horticulturist* August/September 1991, 20.

River Valley. Environmental historian Philip J. Pauly addressed how horticulturists on the Great Plains transformed America. By “bringing ‘new’ species and varieties, naturalizing foreign plant lines, identifying hidden potentials in native plants, and ‘excluding, exterminating, and suppressing undesirables,” horticulturists, other scientists, gardeners, farmers, and nursery owners “shaped the identity of the United States.”[143] He wrote his history of *Fruits and Plains* because of horticulturalists historical invisibility in how they had helped reshape and commercialize the Great Plains. Few knew or understood how important and dedicated these scientists and their plant introductions were to the development of agriculture and pioneer settlement on the immense prairie.

Another historian emphasized Pauly’s thesis of the historical importance of the horticulturists and horticulture on the Great Plains and High Plains in *High Plains Horticulture*. “The history of their horticultural endeavors,” wrote historian John F. Freeman, “lends credence to the thesis that, slowly but surely, we have been learning to accommodate ourselves to the limit of our land.”[144] Freeman contributed a full chapter in his history about N. E. Hanson’s accomplishments as a ‘plant inventor’ for the ‘gardener, the farmer, and farmer’s family.’[145] As one of many horticulturists who diagnosed plant requirements for its growth on the Great Plains, Hanson represented many scientists and growers who researched and experimented with plant adaptations to the Great Plains environment. Like Lyberty Hyde Bailey, who valued ‘nature

[143] Philip J. Pauly, *Fruits and Plains, The Horticultural Transformation of America* (Cambridge, Massachusetts: Harvard University Press, 2007), 1, 3, 4.

[144] John F. Freeman, *High Plains Horticulture, A History* (Boulder: University Press of Colorado, 2008), 4.

[145] Ibid., 166.

studies' to understand one's surroundings, or Fannie Mahood Heath, who encouraged others to educate themselves about their surroundings, Hanson and other horticulturists learned plant requirements through experimentation and a study of the plant's needs. In this process, he or she acclimated closely with the plants in their growing environment and their own environment. While Freeman wrote his history to champion horticulturists' contributions, he also hoped to reacquaint residents who now 'have lost touch with the soil' with their region's history and natural world in 2008.[146] Freeman suggested they plant a small garden or flowerbed in order to reconnect with the land and rebuild their communities.[147] Fifty years earlier, sociologist Carl Frederick Kraenzel echoed similarly in *Transitions on the Great Plains* how few understood the region in which they lived:

> Distinctive soil and plant life, which interact and are both the products of climate, also assist in defining the region as separate and different. . . Native animals, like the soil and plant life, are unique.[148]

Like Kraenzel who wrote about the Great Plains, both Freeman and Pauly wrote their histories of horticulture for readers to better understand their 'unique' environment. They both felt that a neglected part of history – how settlers adapted to the land with the help of plant scientists and how their own plant experimentation – actually assisted settlement on the Great Plains. This occurred in the Red River Valley as well. If it had not been for the accomplishments of the horticulturists with adapted and introduced plant materials, the Great Plains might have remained range land, as historian Freeman suggested in his history. Though less harsh for plant

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[146] Ibid., ix.

[147] 246, 247.

[148] Carl Frederick Kraenzel, *The Great Plains in Transition* (Norman: University of Oklahoma Press, 1955), 41.

growth in the Red River Valley, horticulturists in this region developed and introduced marketable, garden, and landscape plants for domestic use. Their achievements and history are important as a major transition from a ‘wild’ tallgrass prairie to a domesticated, commercial landscape.

Although there is a celebration in what horticulturists accomplished, there is also an acknowledgement of the immense loss in the natural biosphere in the Red River Valley due to their introductions. As a researcher, writer, historian, and horticulturist, I find myself conflicted between the domesticated introductions of plants, animals, birds, and insects, just to name a few, which now thrive in the place of the tallgrasses, flowers, forbs, and wildlife, which no longer coexist. I understand how triumphant horticulturists felt after many years of research to succeed in an introduction of an apple tree, for example, which survived and produced good apples to eat. I know the excitement gardeners feel when they watch a plant’s continued perennial growth in a questionable plant zone. And, I see as well the beauty of the black dirt in the Red River Valley of a freshly plowed agricultural field. I applaud as well science, horticulturists, and settlers who persevered to transform the land for their own livelihood. However, I am saddened as well that little remains of what had been a dynamic ecosystem of tallgrass flowers and forbs, native trees bordering river and stream banks, and abundant wildlife with the former residents who interacted daily on the natural landscape of the Red River Valley. My hope in this history of the Red River Valley, like Pauly’s, Freeman’s, and Kraenzel’s hopes in their histories to educate readers about their regional, unique environment, besides reintroducing horticulturists who helped transform the landscape, will help us understand our own unique environment and its history. As environmental historian, William Cronon, who wrote about the ‘Changes in the Land’ when colonists first settled on the North American coast, later wrote:

> We must always consider. . . the part of nature. . . whether we can use it again and again and again – sustainably – without its being diminished in the process. . . [and] live rightly with the world – not just in the garden, not just in the wilderness, but in the home that encompasses them both.[149]

[149]William Cronon, ‘The Trouble with Wilderness: Or, Getting Back to the Wrong Nature," *Out of the Woods, Essays in Environmental History,* Edited by Char Miller and Hal Rothman (Pittsburgh: University of Pittsburgh Press, 1997), 50.

CHAPTER 7: A DIFFICULT DECADE – DUST, DROUGHT, AND DEPRESSION

> "The problem is reversed from one of getting water off the land," Walter Augustadt pointed out, "to trying get water on the land."[1]

The first half of the early 1900s illustrated Walter Augustad's statement of either too much or too little water in the Red River Valley. Climate – rain, temperature, frost, hail, or drought – always proved a high variable for business or subsistence in agriculture in the Red River Valley. After settlers celebrated agricultural profits during the "golden years of agriculture" up to the 1920s, the next two decades challenged them in several different ways. Over abundant harvests with low prices for their crops created hardships for many farmers and their families. Environmental conditions during the 'Dust Bowl Thirties' with little rain, extreme temperatures, and the return of grasshoppers, to name a few, changed many farm and urban families' lives from comfortable or subsistence earnings to marginal or little income for daily survival. The problems of too much water turned into desperate attempts to find water for crops, gardens, and everyday home use in the 1930s. State conservation engineer Augustadt wrote of how the history of floods from 1881 to 1920 caused requests from citizens to the state for methods to curtail damage or control the water. After floods, plans were created, but limited funds due to dry weather, less farm income, and fewer requests prevented the construction of an overall drainage system.[2] Conversely, during the l930s, concerns focused on the need of water sources when there was not enough water for rural and urban residents, businesses, and farm

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[1] Howard Wilkins, N.D.S.U. Extension Agronomist, *Fargo Forum*, 29 June 1975, Small Collections 802, Institute for Regional Studies, North Dakota State University, Fargo, North Dakota.

[2] Walter W. Augustadt, 'Drainage in the Red River Valley of the North,' *Yearbook of Agriculture* (Washington, D.C.: United States Printing Office, l955), 571.

operations with livestock. During these years, settlers endured tremendous changes in their lives due to a parched landscape and some died or left. Those who stayed continued to transform the Red River Valley into a more controlled, civilized environment with the construction of dams, reservoirs, and more drainage ditches to insure better control of water for dry and wet years for themselves – their sense of place, their livelihoods and their communities. For an agricultural state, the Depression of the 1930s began in the 1920s in North Dakota. Historian Gerald Tweton in *Years of Despair* wrote about the rapid change in fortunes for farmers who relied on a single crop of wheat. Wheat supplied the farmer with a profitable income of $2.96 a bushel at the end of World War I. During the 1920s wheat prices fell and vacillated between $.92 and $1.20 a bushel.[3] "In 1920," Tweton wrote, "70 percent of North Dakotans who worked their own farm had mortgage debts."[4] He continued, "By 1933, 575 of the 898 banks that had been in business in 1920 had closed, and depositors had lost$50,000,000."[5] Entire communities – urban and rural - suffered from the collapse of the banks and the loss of credit and their deposits.

The drought of the 1930s compounded and fueled the monetary and livelihood crisis. Prices for crops and livestock decreased even more in the 1930s. One farmer wrote a letter to his brother in Wisconsin about the dire conditions in Cass County in l931:

> We are all done seeding. . . This is a dry spring and dry is right. Wind or dust most every day and cold all the time [May] . . . There will be no hay this year, very little. Everything was killed last summer and fall. . . We

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[3] D. Jerome Tweton and Daniel R. Rylance, *Years of Despair* (Grand Forks: Oxcart Press, 1973), 4.

[4] Ibid.

[5] Ibid., 5.

> didn't sell one bushel of grain except our wheat last fall at 69 cents and 72 cents."[6]

His brother noted that the years that followed were much worse.[7] Another one who experienced the daunting years of the drought and depression wrote about the challenge to survive with little water. "It just happened that nine years of drought," penned Louis Hudson, " . . . the treason of [an empty] well had exhausted our capacity to exist any longer in an environment which offered no semblance of cosmic hospitality."[8] By the mid l930s, as heat scorched and withered the plants on the earth in the summer months, lack of water in rain, rivers, streams, and the receding underground water table created a crisis for plants, wildlife, livestock, and people. Wells dried up after underground water disappeared. Some rivers and streams were so low that one could walk across them. In fact, "During the drought of the 1930s," historians Dr. David Danbom and Dr. Claire Strom noted, "the [Red] river stopped flowing nearly every year – for over 200 days in 1936."[9] Some neighbors, who generally shared what they had with each other, stopped their generosity if they had a well with water. As the water table receded, no one knew how long water in their own well would last. "None dared to ask for more than enough to water their animals and themselves." Hudson wrote, "Their winter's vegetables begun in the hopeful boxes of earth propped against kitchen windows . . . faded into yellow strings lying in the dust of their

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[6] Michael Nilles, letter to Albert Nilles in Wauwatosa, Wisconsin, 23 May 1931, *Rural Cass County, The Land and People* (West Fargo: Cass County Historical Society, 1976), 332.

[7] Ibid.

[8] Lois Phillips Hudson, *Reapers of the Dust* (St. Paul: Minnesota Historical Society, 1984), 81.

[9] David Danbom and Claire Strom, *Images of America*, *Fargo, North Dakota* (Chicago: Arcadia Publishing, 2002,) 60.

gardens."[10] One fortunate farmer who lived in the northwest sector of the Red River Valley, wrote that after their well went dry, they hauled water from a spring-fed pond.[11] Many others, not so fortunate, conserved limited water for their livestock and themselves and hauled water after their own wells dried. Hudson's father drove his team of horses to town with four empty barrels and returned with three barrels full of water.[12] The town rationed water for good reasons. No one knew the length of the pervasive drought although all hoped for a restorative rain to cleanse the dusty air, refill wells, ponds, and rivers, and green-up the gray landscape.

The vacillation of extreme temperatures – heat in the summer and cold in the winter – added to the difficulty of survival in the depression and drought. Days of heat seemed longer and hotter, which in some years it was, during the drought. Fargo and Moorhead maintained temperatures between '95 and 114 degrees' for half of July of 1936 in the 'worst heat wave' ever recorded there.[13] Wildlife, domesticated livestock, and poultry fared the worst in a prolonged spell of over hundred degree heat. Hudson mentioned the loss of eleven hens when the temperature stayed over 112 degrees for three days in 1936. [They] "drew their last breaths through beaks straining away from their hard dry tongues," she observed, "and slumped into the hollows they had made while dusting themselves, as though they had dug their own grave."[14] She noticed later that a whole generation of differing bird nestlings, except for the mourning doves, expired as well and wrote ironically about a torrential thunderstorm with a destructive

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[10] Lois Phillips Hudson, *Reapers of the Dust*, 78.

[11] Enoch Thorsgard, *Enoch's Saga* (Fargo: Knight Printing Company, 2008), 39.

[12] Hudson, *Reapers of the Dust*, 80.

[13] John Wheeler, 'F-M area saw its worst heat wave in July 1936,' *Forum,* 14 July 2015.

[14] Hudson, *Reapers of the Dust*, 80.

tornado two days later, which drenched the earth and flooded the last remnants of their vegetable garden.[15] The heat did not discriminate in its ability to kill. Ann Marie Lowe noted its deadly toll in her diary of June 30th, 1931, at the beginning of the decade of the ‘Great Depression’s’ onslaught:

> The heat deaths in the country total 1,231. I mean humans. Lord only knows how many animals have died. . . Cattle are starving all over the state, and there is no market for them. Horses drop dead in the fields from the heat. . . People pasture their grain fields and then plow them up to conserve moisture for next year – if moisture comes. This is our third year of drouth [sic], and in a severe depression.[16]

The heat impacted many seriously for there were not yet many cooling mechanisms for home owners to purchase. Fans had been invented in the 1880s, but few either had fans on farms or electricity for the fan. Inexpensive air-conditioning units for windows were not sold until the early 1950s.[17] Here, again, it was a moot issue, since few farms had electricity in the 1930s. It wasn’t until the 1940s, when ‘only one in ten North Dakota farms was connected to a central power station’ that fans cooled some houses and farms during the summer months.[18]

Besides heat and the drought, the intensity of the wind, which picked up ash-like soil and carried it across neighbors’ fields, added the insult of no rain to the loss of precious topsoil. “Because there was no vegetation,” remembered Thorsgard, “the wind would blow the black soil

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[15] 80, 81

[16] Ann Marie Low, *Dust Bowl Diary* (Lincoln: University of Nebraska Press, 1984), 49.

[17] Ann Vileisis, *Discovering the Unknown Landscape: A History of America’s Wetlands* (Washington, D.C.: Island Press, 1997), 207.

[18] David Danbom, “*Our Purpose is to Serve,” The First Century of the North Dakota Agricultural Experiment Station* (Fargo: North Dakota Institute for Regional Studies, 1990), 132.

into drifts like the drifts of blowing snow flakes."[19] The fierce wind blew out the newly planted seeds, newly germinated seedlings, or shallow rooted crops with it. A farmer in southeastern North Dakota, Ted Roy, planted his crop, which blew out. Undeterred, he planted again, and it blew out. He gave up and went fishing.[20] One plant, which thrived in the drought – the tap rooted thistle, was what farmers mowed and fed as hay for their cattle and horses. "The cows could give very little milk because the nutrition was lacking," Norma Gilmore remembered. "They were fed thistle hay."[21] But, because of the thistle's deep roots, it was a plant that endured little rain besides the brutal winds.

The tenacious winds tossed and drove the swirls of dust and newly planted seeds into piles of fine dirt along fence posts, in the edges of ditches and buildings, and into every crevice of buildings and houses leaving a fine film of dirt over furniture, clothing, and food. Sometimes it blew so strongly it pelted against one's face and body, like a million miniscule b.b.s. Home owners stuffed damp rags around cracks of the window and door frames, but dust filtered into houses, blackened the rags, darkened areas with a soft film of soil, and seasoned meals with a grainy, bland taste. The unceasing ferociousness of the wind – its continual sound – created problems for those who lived in it and heard it on a daily basis. Besides the unending cleaning, its very noise made people nervous, fragmented, and irritable. For those who endured its continual blast, humor helped. Lowe's father told her mother that there was nothing to stop the wind from the North Pole to where they lived. "It's the reason I put up a barb wired fence," he

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[19] Thorsgard, *Enoch's Saga*, 39.

[20] Ann Marie Low, *Dust Bowl Diary*, 38.

[21] Norma Gilmore, 'Personal Memoir,' *Stories and Recipes of the Great Depression of the l930's,* Edited by Rita Van Amber (Menomie, WI: Van Amber Publishers, 1986), i.

sardonically said.[22] Her laugh helped break the tension of the winds as the dust continued to sift into their house and blow out crops from their fields.

Dirt blew and darkened both the outdoors and inside the buildings. "In the barn, one can't see clearly," Ann Marie Lowe commented in her diary, "Dad's oats have already blown out, and . . . my baby chickens are blowing to death."[23] The few livestock still on the farms escaped their pastures when a bad wind storm blew so much dirt it piled into small banks of soil along the fence. The animals simply walked up and over the fence, which was now covered by a hill of dirt.[24] The blowing wind, which no longer had vegetation to hold it, proved deadly if any living being inhaled too much of it. According to Danbom:

> Animals sometimes suffocated, the insides of their lungs literally coated with mud. People wore surgical masks, . . . Children and the elderly contracted pneumonia, and some of the weaker ones died. It was a situation of cruel and exquisite irony. North Dakota was literally choking to death on the means of its livelihood.[25]

Those in the Red River Valley were not alone in their fight to survive the Depression and the Dust Bowl era. Many on the Great Plains suffered from the economic adversity and environmental travesty of gusty winds, lack of rain, extreme temperatures, and loss of topsoil during the 1930s. Environmental historian Donald Worster wrote that the Dust Bowl was the worst environmental disaster of the Great Plains. During the 1920s, farmers continually struggled to profit from their wheat harvests. They plowed, planted more grasslands in wheat, and hoped the additional harvest produced their needed profit. ". . . a capitalist-based society . . . the "dirty

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[22] Low, *Dust Bowl Diary*, 39.

[23] Ibid., 38.

[24] Hudson, *Reapers of the Dust,* 9, 10, 11.

[25] David Danbom, "*Our Purpose is to Serve,*" 96.

thirties," . . . were primarily the work of man, not nature," Donald Worster asserted, "The [dust] storms were mainly the result of stripping the landscape of its natural vegetation to such an extent that there was no defense against the dry winds."[26] Historian Douglas Hurt concurred but maintained that it was the continual drought and inability to control their environment which brought catastrophe to the entire Great Plains. After the breaking-up of marginal grasslands and continued cultivating of the grasslands in the early 1900s, the perennial prairie grasses no longer existed. Annual grasses and crops barely held the soil in place. "Had a similar amount of forest been cut down," Hurt noted, "the threat to soil erosion would have been obvious."[27] "[It wasn't] until November 1933, when a dust storm swept beyond the Great Plains and deposited soil as far east as Lake Superior . . . or over the eastern half of the nation," he continued, that the entire country realized the seriousness of the dust storms.[28] He concluded that "nature, not man, primarily created and ended the Dust Bowl."[29] Once rain returned to the Great Plains and some marginal land was returned to grasslands through the federal land utilization project, much of the Great Plains returned to agriculture and ranching.[30]

Two other environmental historians added more research of the Great Plains during the Great Depression. Sarah T. Phillips focused on New Deal policies, which were enacted for conservation of the land and to benefit the rural communities where one-third of the nation

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[26] Donald Worster, *Dust Bowl: The Southern Plains in the 1930s* (New York: Oxford University Press, 1979), 6-13.

[27] R. Douglas Hurt, *The Big Empty: The Great Plains in the Twentieth Century* (Tucson: University of Arizona Press, 2011), 86.

[28] Ibid., 93.

[29] 114.

[30] 115.

lived.[31] From the promptings of the Country Life Commission and differing viewpoints of conservation and preservation, the Federal Government instituted important programs, which were crucial for many farm families survival. “For the first time,” contended Phillips, “national administrators linked conservation with agricultural programs, and considered environmental planning vital to the nation’s economic renewal and long-term vitality.”[32] Though some programs promoted “farm out-migration, urbanization, and industrialization,” others maintained and helped enlarge farm operations with the benefits of education, “water engineering schemes, commodity price supports, soil conservation districts, and rural economic diversification.”[33] Geoff Cunfer in his book, *On the Great Plains, Agriculture and Environment*, described differing “disruptions – change of horses to tractors, the Dust Bowl era, and use of synthetic chemicals in place of manure after 1915” – but maintained that the agricultural use of the landscape remained the same.[34] The natural world and the people who lived within it continued to evolve in relationship to their environment. In addition, plant diversity continued on the Great Plains due to half of the land used for pasture instead of crop production.[35] “People and the rest of nature engage in routine interactions.” Cunfer explained, “. . . which makes it necessary to address farming in all its intricacies.”[36] With his additional research in GIS – Geographic Information

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[31] Sarah T. Philips, *This Land, This Nation: Conservation, Rural America, and the New Deal* (Cambridge: Cambridge University Press, 2007), 2.

[32] Ibid., 3.

[33] 18.

[34] Geoff Cunfer, *On the Great Plains: Agriculture and Environment* (College Station: Texas A & M University Press, 2005), 6.

[35] Ibid., 10.

[36] Ibid., 14.

Systems, - The Great Plains Population and Environment Database, and agricultural censuses, Cunfer added greatly to our understanding of the Dust Bowl in the 1930s. But, he maintained only half of the agriculture land was degraded due to the other half in pasture. Hence, there was less loss of native plants from the pastures. However, there was considerable disruption from introduced plant species, which replaced native grasses and forbs. This altered the Great Plains considerably. Also, overgrazed pastures accelerated the loss of native plants. The dust storms caused extreme damage with wind erosion. The continual cultivation of the land with even marginal land plowed for profit, according to Worster, brought about the worst environmental disaster on the Great Plains. I agree. However, the conservation lessons learned from the Dust Bowl era should help us forestall another environmental tragedy on the Great Plains. My research focuses on how residents and their environment within the Red River Valley basin changed during this difficult time of the 1930s.

Adding to the environmental distresses of this difficult decade was a reappearance of grasshopper invasions. Colorado potato beetles, *Leptinotarsa decemlineata* (Say), flourished as well but concentrated primarily on potatoes, eggplants, tomatoes, peppers, and plants in the nightshade – Solanaciae – family.[37] Grasshoppers, less fickle, invaded and wiped out entire crops and gardens. Farmers asked for and welcomed any form of assistance to control the small but destructive four-legged marauders. One farmer was able to 'bug the potatoes twice a day but [he had] to kick the grasshoppers out of the way first' in southeast North Dakota.[38] "The Bakers," he

[37] Dave Rogsdale, Edward B. Radcliff, Suzanne Burkness, and Jeffrey Hahn, 'Colorado potato beetles in the home garden,' http://www.extension.umn/garden/insects/find/Colorado-beetle.

[38] Lowe, *Dust Bowl Diary,* 67.

noted, "have lost 100 acres of corn to the grasshopper and have quit cultivating because they are tired of giving the hoppers a ride around the field."[39]

By the 1930s, grasshopper control and eradication had been seriously studied and tested by scientists at the Fargo Agriculture College for almost fifty years. In fact, Dr. Clare B. Waldron's first assignment in 1892 was to help farmers protect their crops from the migratory grasshopper, *Melanoplus mexicanus,* and the two-striped grasshopper, *Melanoplus bivittatus.*[40] Their infestations lasted into the year of l898. Waldron recommended several ways to control grasshoppers: Plow the egg infested stubble fields and adjoining sod land to a depth of at least 5 inches to prevent the emergence of . . . hatching; harrowing and other cultivation to expose the eggs to the drying effect of sun and wind; scattering straw over the hatching areas to attract the insects for shelter . . . and [then] burning the straw; use hopperdozers and the application of a moistened bran bait containing paris green as the poison.[41] The hopper dozer – a large, rectangular scoop, which dragged along the soil and collected grasshoppers – amassed large quantities of young grasshoppers before they matured into the more damaging adults. "We succeeded in catching over one hundred bushels of half grown grasshoppers along side of one field," Waldron wrote in 1911 when he praised the hopper dozer's success.[42]

In 1931, however, when grasshoppers invaded fields in Pembina, Cavalier, Walsh, and Adams counties, the other form of eradication – bran bait – along with plowing were methods of

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[39] Ibid.

[40] J. A. Munro, PhD, 'Grasshopper Outbreaks in North Dakota, 1808-1948,' *North Dakota History,* Vol.16, No.3 (July 1949), 153.

[41] Ibid., 148.

[42] Ibid.

choice. The state of North Dakota had no funds to help the farmers, while Minnesota had an emergency fund for their farmers for the bait. Counties in North Dakota helped to fund the program for poison bait. By the 1930s the poison bran, sugar beet pulp, oat hulls, or sawdust, which turned into the best base, were mixed with molasses and arsenic. Before this, a copper ethanoato – arsenic called 'paris green' had been used as the poison.[43] With assistance of the counties, farmers fought destructive grasshoppers that only seemed to multiply and reappear. "During 1935 Walsh County farmers used 680 tons of grasshopper poison . . . and Cavalier County almost 2,000 tons were placed in the fields during 1933," Tweton wrote, "but still the grasshoppers ravaged the state."[44]

A larger consortium of help gathered to find scientific answers and address the annual biological catastrophe, which seemed to be spreading like a dreaded prairie fire throughout the Red River Valley in Minnesota, North Dakota, and Canada. Aided with the knowledge that there were over 75 species of grasshoppers of which five were actually destructive, the Greater North Dakota Association held an international conference in Fargo to explore the problem in November, 1933. Scientists, farmers, and business owners from seven states and three Canadian provinces attended the two day meeting. They developed a State Grasshopper Control Committee to explore the problem and requested funds from Congress for the affected states. From 1936 to 1948 an established Federal-State control program assisted with funding and advice on the control of grasshoppers. They estimated over $700,000,000 in crops was saved

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[43] 150 – 151; http://thesciencedictionary.org/paris-green.

[44] Tweton and Rylance, *Years of Despair,* 8.

after they spent over $27,000,000 for the control in the 12 year program. Below is an itemization of costs expended per state from 1936 to 1948.[45]

Table 2: Government Dollars Spent to Control Grasshoppers Between 1936 and 1948*:*

North Dakota	$3,608,156	Montana	3,348,973
South Dakota	3,252,959	Nebraska	2,577,347
Colorado	2,483,459	Texas	1,924,760
Minnesota	1,897,907	Kansas	1,522,671
Wyoming	1,061,488	New Mexico	933,012
California	725,769	Wisconsin	704,426
Oklahoma	652,893	Arizona	608,017
Iowa	390,516	Missouri	353,382
Utah	342,772	Michigan	305,461
Illinois	175,286	Arkansas	158,938
Oregon	95,768	Idaho	84,316
Nevada	65,582	Washington	63,950

Like the poisoned bait used for gophers in the early 1900s, North Dakota ranked first for the highest expenditure of any state that utilized poison – this time for grasshoppers - ten years later. Nonetheless from 1931 – 1941, the northeast and eastern part of the state experienced severe infestations. Entomologist Munro hypothesized that “grasshoppers [increased] because of the greatly increased acreage of crops.”[46] In other words, grasshoppers flourished more in disturbed, cultivated crop soil than the original diverse, deeply rooted tall grass prairie sod. Once

[45] J. A. Munro, ‘Grasshopper Outbreaks in North Dakota, 1808-1948, 162.

[46] Ibid.

the intricate, deep roots of the tall grass overturned into bare, loose soil for agriculture, grasshoppers welcomed the hospitable environment and laid eggs in sod next to the cultivated fields. Though settlers and Native Americans certainly experienced grasshopper invasions in their gardens and fields, the increased acreage of land for crops multiplied grasshopper numbers and their destruction of crops. The public was assured of the harmless nature of the poisoned bait, though how it affected other wildlife or groundwater and wells was never addressed.[47] Occasional loss of livestock, however, occurred where poisoned bait was placed for the grasshoppers. One dairy farmer lost sixty head of cattle. He had just moved his cattle to a new pasture in northwest Minnesota. A neighboring farmer had scattered the poisoned bait along the sides of his field near the pasture. The relocated cattle grazed under the fence and into the neighbor's field, ate the scattered poisoned bait, and died.[48]

Some farm families advocated turkeys as a good method for grasshopper control but entomologist Munro claimed turkeys were not the answer. Ann Marie Low, who raised turkeys to help supplement the family income and pay for her schooling, provided a different viewpoint in her diary. "[Turkeys] were worth five dollars apiece in the fall," she noted. "A lot of their feed is grasshoppers they catch in the fields and meadows." It was not an easy profit. She added, "Turkeys are a lot of darned work . . . as dumb as sheep and must be constantly watched lest they commit suicide in some stupid way."[49] Once federal programs began to help the states during the Depression, the mixing of the poison with sawdust was taken out of the hands of the farmers and

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[47] David Danbom, *'Our Purpose is to Serve,'* 96.

[48] Margaret Brokke, East Grand Forks, to Kathleen Brokke, Argusville, 10 July 2015, letter, Kathleen Brokke papers, Argusville, North Dakota.

[49] Ann Marie Low, *Dust Bowl Diary*, 46.

county workers. Instead, crews in the Works Progress Administration, who were urban and rural workers, mixed the poison. Later, with the rise of chemical use during and after World War II, sodium fluosicate, a different poison used to kill crickets, replaced the arsenic. Its use in the eradication of harmful insects, like grasshoppers, continued and increased.[50]

Though the Red River Valley suffered less than the rest of North Dakota from the ravages of drought and depression as compared to the central and western part of the state, many still experienced hardships and lost their farms for various reasons. "Even the productive Red River Valley," noted Justin A. Dowell, University of Minnesota extension superintendent, "felt the sting of drought, harsh winters, lack of windbreaks, and decrease in earning and buying power."[51] While the valley generally received more rainfall during summer months than the central and western part of North Dakota, it experienced dust storms as well. Residents saw their own loss of topsoil for differing reasons. The abundant humus in the original tall grass sod absorbed much of the rainfall in the soil. After being plowed for more than fifty years for crop production, a considerable amount of organic matter no longer existed in the soil, now less able to absorb rain with greater run-off of water. This increased water stream run-off in flow and intensity with additional soil erosion damage.[52]

The drought during the 1930s in the Great Plains was so wide spread that the federal government established several programs to help the states and counties aid and assist their residents. From his own experience as a governor of New York and on his private property

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[50] Munro, 'Grasshopper Outbreaks in North Dakota,' 156-157.

[51] Justin A. Dowell, *Northwest Gleanings, 75 Anniversary,* 12.

[52] *Symphony of the Soil* Directed by Deborah Koons Garcia. 104 minutes. Lily films, 2014, dvd.

where he planted trees, President Franklin Roosevelt knew the value of trees for conservation. After a visit to Montana where he saw a treeless, dusty landscape, he suggested that the Forest Service explore the viability of tree planting on the Great Plains.[53] After research, which proved positive, the CCC and 'Shelterbelt Project' was created to plant trees throughout a midsection of the Great Plains. The trees were to 'reduce the destructive effects of the wind . . . [with] prevention of soil blowing and the conservation of moisture'.[54] They hoped to 'reduce wind erosion, protect crops, save the soil, and provide employment' for states in serious need of help.[55]

State extension agencies saw the need for more trees as windbreaks, also. The Northwest extension agency of the University of Minnesota-Crookston began its own windbreak campaign in 1934 on the east side of the Red River. Across the Red River in the upper northwest region, Walsh and Grand Forks counties asked for federal assistance a year later in regard to soil erosion.[56] Federal surveyors acquiesced, conducted three soil surveys in 1935, and titled it the 'Elk River Project.' Within this area, many Elk River farmers chiefly grew potatoes and harvested 'wheat, flax, barley, oats, sweet clover, alfalfa, and corn' in a crop rotation pattern.[57] Like many others, though, they watched their topsoil blow out of their fields, gather dirt from

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[53] Susan Pommering Reynolds, "Shelterbelts in the Red River Valley of the North: Patterns in the Landscape" (PhD. Dissertation: University of Oregon, 1983), 36.

[54] Prairie States Forestry Project, *Forestry for the Great Plains* (Lincoln, Nebraska: United States Forestry Service, 1937), 3.

[55] Http://www.archives/gov/research/records RG 119.10.9, Northwest Region.

[56] Ruth Ann Stymiest, *Cycle*, 12; Melvin E. Kazeck, *North Dakota, A Human and Economic Geography* (Fargo: North Dakota Institute of Regional Studies, 1956), 199.

[57] Ibid., 199.

neighboring fields, and whirl or roll over the land to other regions. The survey found that, while 25 percent of the topsoil left close to 60 percent of the region, up to 75 percent of it disappeared off of the land and caused wind erosion in the fields. The surveyors concluded that 92 percent of the land experienced erosion due to the wind's force on the dry land. The Soil Conservation Service instructed them to leave crop remnants in the fields, utilize and alter strip-cropping, and plant shelterbelts.[58] Within this northeastern region, "the area just north of Larimore," geographer Melvin E. Kazeck discovered, "boasts of having the greatest concentration of protective shelterbelts in the world." He continued, "Besides reducing wind erosion in adjacent fields, these shelterbelts act as a permanent snow fence in the winter to provide adequate moisture for spring planting."[59] [See Figure A 8 for U.S.D.A. map of estimated soil loss for the Red River basin.]While this project proved a success in the Red River Valley, there was much research, establishment of tree nurseries, and contention from private nurseries and a few farmers before the plan was implemented. A precedent of the Great Northern Railway tree plantings in the early 1900s for living snow fences along the railroad tracks had already established tree growth as a viable barrier. Also, agricultural colleges within the Red River Valley continually endorsed and encouraged shelterbelt plantings around farms and urban tree plantings. They tabulated that in the 1920s over '8 million trees, [were planted as shelterbelts in mid and eastern North Dakota and] 60 percent have survived the drought [by 1935].'[60] However, some land

[58] Ibid., 199-200.

[59] 200.

[60] John H. Hatton 'A Review of Early Tree-Planting Activities in the Plains Region,' *Possibilities of Shelterbelt Planting in the Plains Regions* (United States Forest Service: Government Printing Office, 1935), 53.

owners considered trees as valueless since planted trees took up acreage meant for harvested crops. Who paid for the trees, which trees were hardy for the area, and who did the planting? Who watered and weeded the rows of trees as they matured? How did one protect the trees from damage from rodents, deer, rabbits, grasshoppers, and livestock? How was the plan to be implemented? Many questions needed to be answered before the program turned into a success. A final recommendation for the shelterbelt planting resembled Waldron's shelterbelt bulletin, which originally protected and beautified farmsteads instead of rows of trees in fields to stabilize soil from wind erosion. By 1938, over 85 million trees were planted in North Dakota, South Dakota, Nebraska, Kansas, Oklahoma, and northwestern Texas east of the one-hundredth meridian. Almost 14,000 farms cooperated in the planting of 7,000 miles of shelterbelts on more than 100,000 acres.[61]

Plans for the shelterbelts changed as implementation began and revisions continued throughout the planting years until the program ended in 1942. Originally, proposed shelterbelts were to be 132 feet wide and one mile long with trees fenced in strips of 20 acres. Research continued throughout these years on the soils, trees, native vegetation, and insect and animal controls along with less trees in shelterbelts for maximum crop growth with minimal wind and soil erosion.[62] By 1936, a 'hip-roof design' turned into the primary pattern for the shelterbelts with the tallest tree in the middle – at least 60 feet tall to reduce wind velocity over half, the medium height tree in the middle, and the shorter trees or shrubs on the exterior rows. The Soil

[61] Prairie States Forestry Project, *Tree Planting on the Prairie States Forestry Project*, 7.

[62] Wilmon H. Droze, *Trees, Prairies, and People: Tree Planting in the Plains States* (Denton: Texas Women's University, l977), 118.

Conservation Service, Bureau of Agriculture economics, Farm Security Administration, Agricultural Adjustment Administration, and agricultural colleges' personnel coordinated the shelterbelt project.[63] Under the direction of the USDA and the Forest Service, WPA and CCC laborers planted the trees in east to west rows over a half mile long for the "best protection from 'wind whipping' around the ends of the tree lines."[64] [Figure A 10] Trees found to grow well and planted in North Dakota were the "Russian olive, caragana, cedar, pine, green ash, spruce, American elm, Chinese elm, and cottonwood [with] lilac, honey-suckle, wild plum, bur oak, and hackberry."[65] About half of these trees are native to the eastern part of the state. The Russian olive, *Elaeangus angustifolia*; caragana, *Caragana arbor-escens,* (Siberian peashrub); cedar, pine, spruce, and Chinese elm, *Ulmis pumila* (rapid grower) were introduced species. A range in knowledge of specific tree growth rates, differing heights and widths, water needs, like drought tolerance, hardiness, lifespan, and immunity to diseases needed to be analyzed for arrangement and viability within the shelterbelt. Another consideration involved protection from animal and rodent damage or total destruction. Vulnerable tree and shrub seedlings were prime targets for hungry wildlife – deer, rabbits, gophers, mice, moles, just to name a few. How did one protect an invitation to all wildlife that viewed the lone green sprigs of young trees and shrubs in arranged rows on a gray or black prairie as an invitation to a banquet? Fences were cost prohibitive for some farmers. Poisoned bait, hunting, trapping, the use of gas in holes, and even rabbit drives

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[63] Ibid., 188.

[64] 136, 137, 139, 140.

[65] U. S. Forest Service, *North Dakota Shelterbelts* (Jamestown, North Dakota: United States Department of Agriculture, 1940), 3.

lessened damage from rabbits, deer, moles, pocket gophers, and mice. A minimum annual budget was set aside for the preparation and sharing the poison.[66]

After the seven year program with the U. S. Forest Service ended in 1942, the next year the Soil Conservation Service acquired the shelterbelt project and randomly sampled its success. North Dakota College of Agriculture Dean and Station Director, H. L. Walster reported that slightly over fifty percent of the planted shelterbelts were in excellent condition. He provided the graph below.

Table 3: The Number of Shelterbelts Planted and Their Distribution by Rating of Classes in Various North Dakota Counties.[67]

Counties	**Ave. Ann. Rainfall**	**Site**	**No. Belts**	**Belts by Rating Classes**
Walsh, Grand Forks	20-22 inches	A	62	81 11 6 2 0 92
Cass				
Benson, *Ramsey,*	16-20 inches	C	46	26 33 30 11 0 59
Nelson				
Barnes, Stutsman,	16-20 inches	B	77	54 23 12 8 3 77
LaMoure, *Ransom*				
Sargent, Dickey				
Bottineau, Ward,	14-16 inches	B	18	55 17 17 11 0 72
McHenry, Pierce				

The italicized counties resided in the Red River Valley basin and the different sites were listed as Site A for favorable for trees, Site B mostly favorable for trees, and Site C as moderately difficult for tree growth, which entailed rain and soil suitability.[68] The Forest Service discovered:.

[66] Droze, Trees, Prairies, and People, 187.

[67] H. L. Walster, "How Are the Great Plains Shelterbelts," *North Dakota Agriculture Experiment Station Bimonthly Bulletin,* Vol. 9, No. 1 (Fargo: North Dakota Agriculture Station, 1946), 19

. . row crop farmers usually take better care of their belts than wheat farmers. . . those who practice diversified cropping are generally among the more progressive and ambitious farmers who do a good job . . . whether [it is] livestock management, crop rotations or shelterbelt cultivation.[69]

As the drought displayed how crucial climate and rain were to everyone's welfare, Americans learned the importance of their environment and implemented conservation programs, also. Environmental historian Neil M. Maher described this era as the 'key emergence of modern environmentalism.' [when] " Americans did more in the 1930s . . . than read and write about the CCC and conservation of natural resources" he explained, "they replicated such work on their own as well."[70] Nationwide advertisements and articles about the CCC programs inspired citizenry to enact their own tree-planting endeavors. Organizations, many composed of women, enthusiastically promoted and involved themselves in conservation, particularly tree planting. For instance, the General Federation of Women's Clubs in 1933 paired with the CCC to plant a "Federation of Forests" in every state. The CCC joined with the U.S. Forest Service and helped the American Legion Auxiliary and the Daughters of the American Revolution in their efforts to plant trees throughout the cities. Schools and their teachers throughout the United States joined in the enthusiasm, taught classes of conservation, and utilized 'hands-on' tree plantings with "the land is the text" rather than books.[71] The public picked up the conservation cheer as well. Many volunteered to help organizations and planted gardens, bushes, and trees in

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[68] Ibid., 18.

[69] 19, A map of where shelterbelts were planted and how many at the end of December 1940 in eastern North Dakota with 2/3s of the planting in the Red River Valley basin is in Figure 11, while the Figure A 9 map displays the range of shelterbelts planted in the Great Plains.

[70] Neil M. Maher, *Nature's New Deal: the Civilian Conservation Corps and the Roots of the American Environmental Movement* (New York: Oxford University Press, 2008), 39.

[71] Ibid., 159, 160.

their own yards.[72] Those who worked in government conservation programs learned conservation measures which they continued to employ after their federal work finished. Many, for instance, wrote Mayer, "entered graduate programs at state universities in the "land sciences" and found employment in state conservation corps or federal conservation districts.[73] States began conservation programs, which imitated the federal program. Much later, in 1965 the Job Corps, in 1971 the Youth Conservation Corps, in 1977 the Young Adult Conservation Corps, and in 1993, the AmericCorp drew on the basic concepts of the CCC in their conservation programs for education with labor among the youth.[74] This community effort to educate others in the importance of trees as part of the conservation dialogue opened a debate on the crisis of the Great Plains. It also helped the agricultural colleges that propagated hybrid trees for public and private gardens to draw attention to their own dire circumstances and garner respect for what they had already done.

The importance of trees for the shelterbelts to harness the wind erosion lessened as a primary conservation measure once the Soil Conservation Service acquired the Shelterbelt Project as part of its mission. While it still advocated shelterbelts, it reverted to the original 'smaller windbreaks to protect farmsteads and livestock.'[75] World War II and a return of rain directed attention more to the planting and raising of crops and less to the planting of the trees across the Great Plains. As the years passed, many of the original trees in shelterbelts

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[72] Ibid.

[73] Ibid., 214.

[74] Ibid., 215.

[75] R. Douglas Hurt, *The Big Empty,* 111.

experienced herbicide damage and disease. Still, many shelterbelts thrived as a living testament to an ambitious federal conservation program that reduced soil erosion and provided a wildlife habitat.

However, many of the original shelterbelts are undergoing elimination for several reasons. Different land use with larger agricultural machines, increased land values for crops, expanded urbanization, new no-till methods, which utilized less soil disruption, the trees harvested for timber, and a less wide shelterbelt planting of several rows instead of the original seven imply less need of the 1930s shelterbelts. In recent years, reports of destruction note an 'alarming rate of shelter-belt trees' have disappeared with little or no replacement.[76] One does not, however, need to read about the demise of CCC planted shelterbelts. One can also drive on roadways, particularly between Fargo and Grand Forks, and see the destruction in process. There are county conservation programs for new plantings of shelterbelts to use as windbreaks, living snow fences, shade for livestock or farm buildings, pollution controls, or wildlife refuges. For instance, in the 1970s, the Cass County Conservation Service noted that they successfully planted over 3747 acres of farmstead windbreak and 4,666,881 feet of windbreak within the last forty years.[77] But when land prices are high for agriculture use and urbanization increases, fewer land owners see a need in shelterbelts to prevent soil erosion control.[78] However, "over two feet

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[76] See Heidi Marttila-Losure, *Dakotafire Media,* 4 February 2013, http://dakotafire.net/newspapers/shelterbelts-one-measure-of-the-1930s-are-being-removed/33471; Ryan C. Christianson, *Fargo Forum,* 6 June 2014; and Marilyn Hagerty, 'Miles of shelterbelts have origins in 1940s,' *Grand Forks Herald*, 30 March 2015.

[77] Ordean Jacobson, 'Soil Conservation Service 40th Anniversary,' *Rural Cass County, The Land and People* (Cass County Historical Society: Taylor Publishing Company, 1976), 924.

[78] Heidi Marttila-Losure, Dakotafire Media, 4 February 2014.

of soil in the southern Red River Valley to over five feet of soil loss in the rest of the Red River Valley," estimated soil scientist Dave Franzen, "continues as a loss due to wind erosion in the last 60 years."[79]

Throughout the 1930s – 1940s, scientists and horticulturalists never wavered in their desire to discover or hybridize plants, whether for decorative, garden, crop, or pasture use, adaptable for the northern Great Plains environment. They were hampered in the 1930s, however, not only by extreme environmental conditions but also by a lack of funds as budgets were slashed for research. Demand increased for help from the agriculture colleges when limited funds and a reduction in staff created a struggle for a college to survive. "Nine out of the eleven years between 1929 and 1939 were dry," wrote David Danbom, "some desperately so."[80] In an agricultural state, little rain translated into little or no income for farmers, which meant less money for merchants, the few remaining banks, government entities, colleges – just to name a few, throughout the entire state. When President Franklin Roosevelt established federal working programs in the New Deal to help jump start destitute state economies and recharge communities with projects besides the shelterbelts, he saved many lives as well. "The federal government became the state's main business during the Thirties," explained historian Jerome Tweton, "Federal programs expended $266,000,000 in the state between 1933 and 1940 [and citizens] realized that federal money alone meant survival."[81]

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[79] Dave Franzen, 'Soil Erosion and Drought Conditions,' 22 April 2015, valleynewslive.com/home/headlines/Soil-Erosion-Drought-Conditions-301016351.html.

[80] David Danbom, "*Our Purpose is to Serve*," 95, 98.

[81] Jerome Tweton, *Years of Despair,* 16.

Federal programs addressed primary needs, like food staples and ways to earn an income, for many residents. The programs also altered the landscape in several different ways. The first act passed to help farmers – the Agriculture Adjustment Act – allocated money to farmers who cut their crop production. When the Supreme Court declared the act unconstitutional, the new Soil Conservation and Domestic Allotment Act in 1936 allotted money to farmers 'who reduced acreage of soil-depleting crops and took steps to rebuild their land.'[82] Another program, the Federal Emergency Relief Act, was from 1933 to 1935 and employed citizens as builders, landscapers, and construction workers. It transformed the North Dakota landscape with '2,300 miles of road, 114 dams, 60 bridges, 30 wells, . . . 14 swimming pools, 11 playgrounds, 88 tennis courts, 32 golf courses, 108 skating rinks, 40 baseball fields, 36 airports, and 23 parks.'[83] After this program, called FERA, ended in 1935, the Works Progress Administration – WPA – continued similar projects with the addition of sewer systems, public buildings, and sidewalks.[84] Fargo was one of many towns along a river that discharged sewage into it. During the 1930s, the Federal Public Works Administration aided Fargo in the construction of its first 'sewage disposal plant.'[85] These New Deal programs along with the Civil Conservation Corps, the Civil Works Program, and later the Soil Conservation Service implemented more changes to the Red River Valley.

The CCC not only planted shelterbelts but worked on other important numerous projects sometimes in cooperation with FERA/WPA throughout the Red River Valley. State park

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[82] Ibid., 9.

[83] 11.

[84] 14.

[85] Danbom and Strom, *Images of America, Fargo, North Dakota,* 97.

renovations, which proved necessary with more automobile owners and improved roads, benefited from federal assistance. West of the Red River in northeastern North Dakota, the CCC built Turtle River State Park from 1935 to 1940. The CCC constructed 'bridges, roads, parking areas, foot paths, . . . stone and log buildings, . . . [and a] fieldstone dam, swimming hole and bathhouse' in 784 acres of Turtle River Valley land.[86] In the Woodland Lodge, camp personnel entertained and fed campers and sold concessions. The lodge also housed the caretaker.[87] In addition to Turtle River State Park, the CCC and the WPA improved and established two other recreational parks - near the northern border, Lake Metigoshe and, in the lower part of the state, Beaver Lake State Parks – in the middle sector of North Dakota.[88] ". . . the development of North Dakota state parks and historic sites really commenced, "according to State Superintendent of the North Dakota Historical Society Russell Reid in 1967, "with the establishment of the first CCC park camp assigned to the state."[89]

The federal government helped another region in the Red River Valley basin, which experienced devastation and change from the drought due to a more sandy soil. The Sheyenne Delta in the southeastern sector of North Dakota contained over 700 square miles of tallgrass prairie in wetlands and prairie – flora and grasses, shrubs and trees. The Depression and drought impacted agriculture and the landscape so dramatically that the Resettlement Administration bought many of the farms from their owners. Once the federal government acquired a major

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[86] 'Turtle River State Park,' http://parkrec.nd.gov/parks/trsp history.html; 'North Dakota State Parks Guide,' (Bismarck: North Dakota Parks and Recreation Department, 2015), 15.

[87] Ibid.

[88] Ray H. Mattison, 'The State Historical Society of North Dakota: A Short History,' 308, *History Parks in North Dakota Overview,* www.parkrec.nd.gov/50th/depthistory.html.

[89] Ibid., 310; www.history.nd.gov/archives/manuscript/inventory/10149.html.

portion of the delta, it 'established the Sheyenne River Land Utilization Project, . . . managed the land under the 1937 Bankhead-Jones Farm Tenant Act, and . . . put the Soil Conservation Service in charge' of the damaged land.[90] The SCS hoped to restore the grasslands with major renovation to the land and conservation education for the rural community for a more viable rural economy. Farmers who remained organized a Sheyenne Valley Grazing Association in the early 1940s to help in establishing a productive landscape not only for themselves but for wildlife as well. Once restored by the early 1950s, the U.S. Forest Service was given the oversight of these lands. The federal government designated 'in 1960, 135,000 acres of the grasslands . . . in the sandy western portion of the delta, . . . as the Sheyenne National Grassland.'[91] By the late 1980s, over 80 families grazed cattle on the grasslands by permission of the federal government and the Lake Agassiz Resource Conservation and Development Council helped the U.S. Forest Service manage the grasslands.[92] Over 70,180 acres - the only National Grassland in the tallgrass prairie region of the United States - is designated as federal grasslands while 64,769 acres are owned by farmers and their families.[93]

The Sheyenne Grasslands is one of the few fragments of the tallgrass prairie with over 1200 plant species. It contains several rare native plants, like the western prairie fringed orchid and many butterflies including the rare Dakota skipper and regal fritillary. The larger prairie chicken also resides in the prairie. Unfortunately, an invasive nonnative leafy spurge, *Euphorbia*

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[90] Kim Alan Chapman, Adelheid Fischer, Mary Kinsella Ziegenhagen, *Valley of Grass, Tallgrass Prairie and Parkland of the Red River Region* (Nature Conservancy: North Star Press of St. Cloud, 1998), 55-57.

[91] Ibid.

[92] Ibid., 57-58.

[93] http:''www.fs.usda.gov/recarea/dpg/recarea/?recid=79470.

esulam, invasive species, infiltrates the area, which was once all native habitat.[94] Other introduced weed species thrive as well, but leafy spurge is the worst. It was first discovered in Fargo, North Dakota, in 1909. Though some attribute the invasive weed's introduction in oats brought from Russia, others suggest its arrival happened from ship ballasts, impure seed, cereal seed introductions and even in the brome grass seed that Dr. N. E. Hanson brought from Russia to the Great Plains.[95] However the invasive plant arrived, it flourished. By 1979 with no known enemies, a prolific seeder, which shoots out its seeds to a distance of 4.6 meters, and an aggressive root system with dense and deep roots as long as eight feet and more, leafy spurge grew and spread throughout the northern half of the United States.[96] "In 2005," Forest Service Corey L. Gucker wrote, "leafy spurge occupied an estimated 4.6 million acres in the United States, of which half or more was rangeland in the northern Great Plains."[97] The peculiarities of this perennial plant increased its monoculture capabilities. Cattle and horses generally ignore the plant, which is toxic and can even cause death, and prefer to graze on grasses. The uneaten spurge is one of the first to grow in the Spring and competes successfully for the space of other

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[94] www.ransomcountynd.com/index.asp?%7805B67B83-EC24-4A5B-1855F.

[95] P. H. Dunn, 'Origins of leafy spurge in North American,' reprinted from *Leafy Spurge, Monograph series of the Weed Science Society of American,* Edited by Alan K. Watson, 1985, Chapter 2 (3):7-13. Published by Weed Science of American. https://library.ndsu.edu/. . . /127Dun85.pdf?. . P.H.Dunn.

[96] R. W. Pemberton, 'Native plant considerations in the biological control of leafy spurge,' *Proceedings of the VI International Symposium for the Biological of Weeds*, 19 – 26 August 1984 (Vancouver: Agriculture Canada, 1984), 365-390; Native plant considerations in the biological control of leafy . . . https://library.ndsu.edu/.../543em84.pdf.

[97] Corey L. Gucker, 'Euphorbia ersul, In Fire Effects Information Service,' U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, 2010, http://www.fs.fed.us/database/feis.html.

plants.[98] The plant also increases underground through buds on its vigorous root system. The roots themselves contain a "large nutrient reserve," P. H. Dunn noted, "that sustains the plant for years."[99] Researchers have discovered several ways to reduce the spread of the aggressive plant with Integrated Pest Management, which incorporates several different control methods. Chemical spray in June and the middle of September will kill or curtail plant growth. Sheep and goats graze readily on the leafy spurge, which slows the plant's development and lessens its competition with other plants. Host specific flea beetles from Asia will eat the leafy plant and flowers while their larva eat the roots.[100] Of course, herbicide sprays and grazing sheep and goats can damage native plants as well. In addition, the use of prescribed burns as a natural control and stimulate for native grasses and forbs has been found to increase production in leafy spurge as well. [101] But, the use of chemicals, flea beetles, and sheep and goats has curtailed the invasive weed's growth in the Sheyenne Grassland and elsewhere. While the battle continues over the spread of leafy spurge, there is no doubt that this plant has transformed a diversified prairie, hillsides, ditches, and pastures into pockets of a monoculture, golden-green landscape.

Another example of a good portion of land bought in the early thirties by the federal government lay in the northwestern Red River Valley basin. President Franklin D. Roosevelt designated it the Kellys Slough National Wildlife Refuge in l936. The 1270 acres of land contained a mixture of prairie and wetlands. Adjacent lands of 876 acres were bought and added

[98] P. H. Dunn, 'Origins of leafy spurge in North America, https://library.ndsu.edu/.../127Dun85.pdf?..P.H.Dunn.

[99] Ibid.

[100] Ibid.

[101] Corey L. Gucker, 'Euphorbia ersul, In Fire effects Information Service,' http://www.fs.fed.us/database/feis.html.

through the Federal Duck Stamp program for Waterfowl Production Areas (WPA). By maintaining ponds of different depths of water, the WPA added more nesting and breeding sites for a variety of waterfowl – 12 species of ducks, the Giant Canadian Geese, and numerous shorebirds.[102] This program and area turned into a major success for waterfowl habitat. When a study and count occurred over a three year period and ended in 2003, the U. S. Wildlife and Fish Service estimated an 'annual population of 36,000 shorebirds of 29 species.'[103]

For the worst environmental disaster to happen in the Red River Valley due to a ten year drought with high wind erosion, those who remained saw positive changes for marginal set aside land like the Sheyenne Grasslands and the Kellys Slough wetlands with federal government help. Better conservation practices, particularly the shelterbelt project, provided less soil erosion from the wind. Lesser disruption of the soil in no till cultivation besides education in conservation measures provided better land use practices. The difficult decade ended with a return of rain – sometimes normal and other times too much – in the early 1940s. Focus on water issues, which arose during the 1930s when rivers and wells ran dry, to returning flood concerns in the next decade, continued to change the tall grass prairie with dams, levees, and drainage projects. Several dams were completed during the 1930s by the federal government for work projects and water storage. Their perceived success accelerated dam construction and drainage for fields and wetlands. Armed with financial and technological help from the federal government of more efficient machinery for both construction and drainage, the state and county governments with

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[102] http://www.stateparks.com/kellys_slough_national_wildlife_refuge_in_north_dakota.html
[103] Ibid.

positive reinforcement of its citizenry implemented a transformation to the Red River Valley, which attempted to control the Red River and its tributaries and eradicate marshes and wetlands.

CHAPTER 8: THE TROUBLE WITH TOO MUCH OR TOO LITTLE WATER

> "The trouble is you can stand on a beer can and see from one end of the Red River Valley to the other," noted Howard Wilkins, N.D.S.U. Extension Agronomist, "There's just no place for that water to go."[1]

The Red River Valley vacillated in differing years from sometimes 'too much water to other years of too little water.' Even in 2012, "It's always been a question of, do we have too much water or not enough?" said Pat Zavoral, Fargo city administrator. "We have to give equal time to not only our flood protection but also what happens if we don't have adequate water."[2] The drought conditions of the 1930s accentuated the concerns of little water over a prolonged period of time. Conversely, in the early 1900s many drained and ditched areas of overly wet prairies. "Only after 25 years after 1895," claimed Norman Stanley Murray, "men reclaimed the wet sections of the valley."[3] After the 1930s, those who stayed continued to transform the Red River Valley into a more controlled, civilized environment with the construction of dams, reservoirs, underground tiling, and more drainage ditches to insure better control of water for dry and wet years for themselves – their sense of place, their livelihoods, and their community. Even earlier, though, in 1905, individuals, the counties, and some states realized they needed to combine forces for federal help with their water issues. An important part of road and railroad construction entailed ditches for quick drainage from rains or heavy snow melts. After these

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[1] Howard Wilkins, N.D.S.U. Extension Agronomist, *Fargo Forum,* 29 June 1975, Small Collections 802, Institute for Regional Studies, North Dakota State University, Fargo, North Dakota.

[2] Marino Eccher and Pat Springer, "When the Red runs dry," 12 February 2012, 5, Http://water.area voices.com/2012/02/12/when-red-runs-dry/#sthash.QcAaTLGJ.dpuf.

[3] Norman Stanley Murray, *The Valley Comes of Age, A History of Agriculture in the Valley of the Red River of the North, 1812-1920* (Fargo: North Dakota Institute for Regional Studies, 1967), vii.

settlers experienced periodic floods in the low lying river valley, particularly wetland areas, they sought and welcomed answers to flood issues, which reduced agricultural profits and caused property damage. Many who viewed wetlands as wastelands and a cause of sickness espoused eradication of marshes, wetlands, and ponds throughout the early twentieth century.[4] Earlier in the mid1800s with the Swamp Land Acts, the 'Federal Government promoted wetland drainage and reclamation for settlement and development.'[5]

In North Dakota, the state, the agriculture college, and various individuals collectively asked the Department of Agriculture in 1906 for assistance in drainage. Drainage actually has a long history, which dates back to when agriculture began with the use of hand labor to dig ditches or bury clay tiles in ditches underneath the soil. The use of tiles for drainage goes back to 1 A. D.[6] Engineer John T. Stewart, reported on the reasons for a need of drainage in Cass, Traill, Grand Forks, Walsh, and Pembina counties. In his report, Stewart estimated losses from farmers in the Red River Valley in 1905, which included over 3,000,000 acres:

Acres that could not be seeded	89,234
Acres that could not be summer-fallowed	70,187
Acres seeded and not worth harvesting	87,035
Acres too wet to be plowed in the fall	166,625
Acres which grew a crop but too wet to harvest	171,493[7]

He added how the benefits of drainage outweighed the costs of its implementation:

[4] Ann Vileisis, *Discovering the Unknown Landscape: A History of America's Wetlands* (Washington, D.C.: Island Press, 1997), 113.

[5] Walter W. Augustadt, 'Drainage in the Red River Valley of the North,' *Yearbook of Agriculture* (Washington, D.C.: United States Printing Office, 1955), 571.

[6] http://umn.edu/umn_drainage_history_pdf.

[7] John T. Stewart, 'Drainage of the Eastern Parts of Cass, Traill, Grand Forks, Walsh, and Pembina Counties, North Dakota, *Bulletin 189* (Washington: Government Printing Office, 1907), 9.

-A greater certainty of a full crop
-Increase in acreage and also in the yield per acre
-A permanent increase in the market value of the land
-Benefits to the public roads
-Benefits to railroads because of increased tonnage of freight
-Benefits to nearby towns because of increased business
-Benefits to public health and general welfare[8]

The federal government concurred. North Dakota provided an engineer and the five Eastern counties that were to be surveyed along the Red River donated the finances for a topographic map of proposed ditches. Construction began for deep drainage ditches between 1907 and 1916 and ceased when dry years reappeared in early l920s. The North Dakota Agricultural College also drained a big pond, called "Long Lake," from its own land west of its campus.[9] However, not all proposed drainage ditches on the map were dug and those that were dug had specifications for upkeep. Hence, any vegetation - grass, flowers, shrubs, or tree seedlings – was banned from the ditch. The gusty winds of the prairie might also fill a ditch with loose dirt. The accumulation of dirt slowed or even stopped run-off water flow. To be effective, the ditches must be kept clean from vegetation and dirt.[10] This negated the growth of any plant material for food and shelter for wildlife, birds, butterflies, and a myriad of insects. On the eastern side of the Red River, Minnesota addressed the issue of drainage much earlier. "The

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[8] Ibid.

[9] David B. Danbom and Claire Strom, *Images of America, Fargo, North Dakota, 1870-1940* (Chicago: Arcadia Publishing, 2002), 62.

[10] Walter W. Augustadt, 'Drainage in the Red River Valley of the North,' 572.

Minnesota side of the Red River Valley is composed of three planes," political scientist Ben Palmer wrote, "[which] slope towards the north, like the bed of the river."[11] He continued:

> The planes to the west and east have a sufficient incline to be tolerably well drained by natural watercourse, but the middle plane, which is ten miles wide and about two hundred and twenty-five miles long, has very little slope, . . . [few] small streams. . . [while] large ones . . . so winding as to be incapable of carrying off storm water. Red River lands are. . . the richest wheat-producing lands in the world . . .[and] lack of proper drainage [is] a serious handicap.[12]

In the l870s, the Great Northern railroad president James J. Hill and others dug long ditches to deal with the drainage problem. Hill employed laborers who dug over fifteen ditches - 'three feet wide at the bottom' - of differing depths for quicker run-off of storm water from the railroad tracks.[13] Large farm land owners also constructed their own drainage ditches, but many eventually filled with dirt and provided growth for 'flags, rushes, arrow-wort and other aquatic plants.'[14] With their heavy machinery and cultivation of large land surfaces, bonanza farmers, though, had already reduced wetlands in the areas they cultivated. By 1880, drainage technology improved from hand labor to steam power with the increase of factories for drainage tile production.[15]

However, as the years progressed, farmers and urban residents realized the necessity for county, state, or federal help with drainage. In July 1886, a committee met in Crookston,

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[11] Ben Palmer, *Swampland Drainage with Special Reference to Minnesota* (Minneapolis: Bulletin of the University of Minnesota, March 1915), 64.

[12] Ibid.

[13] Ezra G. Valentine, 'Minnesota State Drainage Commission, Report for the Biennial Period ending Feb. 1st, 1899' (Minneapolis: University Press of Minnesota, 1890), 10-11.

[14] Ibid., 10.

[15] Ibid.

formulated a drainage plan, and hired C.C. Elliott to survey Marshall, Polk, Norman, Clay, and Wilkin counties. The real earth altering work occurred after the Minnesota legislature created the Red River Drainage Commission and funded its work with $100,000 in l893.[16] By 1899, 125 miles of drainage ditches, joint property of the state and county, were dug and utilized for flood control and the slow drainage of swamp lands near the ditches. Farmers then changed the dried swamp lands into fields for agricultural use. One farmer sent the commissioner a letter of testimony and thanks for the benefits wrought by the new drainage ditch near his field:

> I have seen whole sections of marsh land at once upon the completion of the ditch converted into splendid hay land, the cutting privilege on which, for a single season, selling as high as $150 per section.[17]

A few settlers even preferred to claim wet open areas instead of the timbered areas of Minnesota. After the settler drained the land, he immediately was able to cultivate the soil.[18] Hence, drainage due to the preference of the wetland and earlier settlement in Minnesota than North Dakota happened more rapidly. This was why a coordinated county and state drainage of main ditches was important in Minnesota. The main ditches were not the complete system for drainage, but they framed the ditching network. The plan prescribed that all highway side ditches connect to the main ditches. Thus, the ditches along the roads served as drainage ditches along

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[16] Ibid., 11.

[17] George Roberts, `Letter to W. R. Hoag, Secretary State Drainage Commission,' 15 January l899.

[18] K. Elton King, *A History of Drainage Law in Minnesota with Special Emphasis on the Legal Status of Wet Lands* (Minneapolis, Minnesota: Water Resources Research Center, 1980), 3.

with the main ditches and provided a clear channel for water run-off to its final river or lake destination.[19]

In North Dakota on the west side of the Red River, work on run-off ditches ceased from the 1920s and through the 1930s due to the lengthy, serious drought. Plans to resume construction of new ditches – primary and secondary – occurred after the formation of soil conservation districts in both North Dakota and Minnesota in the Red River Valley after 1943, which were prompted again by serious floods in l942 and l943.[20]

The Red River itself had been mechanically cleaned in the 1879 and 1880 winters for river transportation in the summer. The boat dredged over '65,000 cubic yards in l879' and '55,000 in l880' of wet earth to clear and deepen the channel.[21] The article further proposed the importance of future dredges of the river and the construction of a lock and dam at Goose Rapids. Bonanza farm owner, John L. Grandin was in Washington for several weeks for the express purpose of acquiring federal government aid and authorization for the lock and dam.[22] This was a moot issue after railroads added lateral branches to its tracks to haul grain and replaced the need of steamboats. [Figure A 12] Most steamboat travel ended in the early 1880s.[23] However, the final death knell for steamboats occurred in the drought years of 1911 and 1912.

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[19] W. R. Hoag, Secretary, 'Biennual Report,' *Minnesota State Drainage Commission, Report for the Biennial Period ending Feb. 1st, l899* (Minneapolis: University of Minnesota, l890), 16.

[20] Walter W. Augustadt, 'Drainage in the Red River Valley of the North,' 573.

[21] Henry C. Mackall, 'Good Results from two Seasons Work Greater Facilities and Larger,' Copy of a clipping in Henry C. Mackall Small Collections 472, Institute for Regional Studies, North Dakota State University, Fargo, North Dakota.

[22] Ibid., 2.

[23] Captain Bill, 'Early Red River Navigation and Obstacles,' *Fargo Forum,* 1 March, 1924, Small Collections 429, Institute for Regional Studies, North Dakota State University, Fargo, North Dakota.

Little water flowed in the Red River for any steamboats to even float. "This ended the use of the two steamboats, the Fram and The Grand Forks," explained H. T. Alsop, "and the barges."[24] After steamboats no longer sailed the Red River in the early 1900s, the city of Fargo built a low dam, called the "South Dam," for water storage and recreation.[25] Later, after the Depression of the l930s and the early floods of the 1940s, the Red River Valley changed again with improved construction of deeper ditches and the development of larger dams across tributary rivers to the Red River for water storage during the dry years and flood control for the wet years.

The central issue throughout the 1930s was lack of water. Again, residents and the state asked the federal government for help in assistance with water issues for Red River Valley. How does one insure available water for residents in a ten year drought? The serious matter of water – this time too little instead of too much – turned into an earnest endeavor to store water with dams, which began in the 1930s and continued throughout the rest of the 1900s. The federal government provided major assistance through its many programs, like the CCC, WPA, and CSC, to provide funds, work, and services for the construction of dams and drainage projects. The implementation of dams along tributaries of the Red River tremendously altered the surrounding terrain for water storage. Some farm families lives changed and they moved after their land was claimed for use as a large pond or lake for a dam. Several dams also provided park settings for recreation, fish, and wildlife. The following is a list of dams built in the 1930s by the Works Project Administration or W.P.A. west of the Red River in North Dakota:

> Blabon Dam, SWC #1323, earth filled construction and repaired by Steele County and State Water Commission in 1963;

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[24] H. T. Alsop, 'Red River of the North,' Small Collections #341, Institute for Regional Studies, North Dakota State University, Fargo, North Dakota.

[25] Danbom and Strom, *Images of America, Fargo, North Dakota*, 98.

Hillsboro Dam, SWC#482, rubble masonry structure built in the late 1930s and repaired in 1963 for fish, wildlife and recreational use;

Logan Center, SWC#265, earth filled structure built in the 1930s and reconstructed in the late 1950s for fish, wildlife, and recreation;

Tobiason Lake, SWC #670, built first by the WPA in the 1930s and now a summer camp for the North Dakota Farmer's Union with reconstruction of the site possible due to inadequate control.[26]

The North Dakota Game and Fish Department also constructed earth filled dams. In 1932 it built one at Finley, which was fed by numerous springs.[27]

Before any more dams were constructed by the end of the l930s, the North Dakota legislature established the State Water Commission in 1937. The Commission was given broad oversight of water issues in the state. It had the power to 'acquire dam sites and reservoir sites, to acquire easements and right-of-way for diversions and distribution canals, and . . . deal with individuals, cities, counties, the United States government and any department.'[28] The department implemented studies in ground water, rivers, and streams for construction of dams, reservoirs, and ditches. Below is a list of a few of their implementations and one in cooperation with the State Game and Fish Department:

Fuller Lake Dam – SWC #273 – earthfill structure for wildlife use plus some flood control with raise of embankment on county roadway;

Golden Lake, North Golden Lake and Rush Lake - SWC #475 – a diversion dam constructed on Beaver Creek provides water for 278 acre wildlife on Rush Lake – a 330 water based recreation at Golden Lake, and 313 acre recreation North Golden Lake. Project began in mid1950s and completed in the 1960s. State Water Commission and State Game and Fish Department.

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[26] Vern Fahey, Engineer-Secretary, *Goose River Basin Plan for Water and Related Land Resources Development,* SWC Project 235, #28 (Bismarck: North Dakota State Water Commission, 1973), 10.

[27] Ibid.

[28] M. T. Connolly, 'Brief Water Development Plans,' *Development Irrigation Municipal Water Supplies* (Bismarck: State Water Conservation Commission, 1948), 23.

> Mayville Dam – SWC 625 – Steel sheet piling channel dam in Mayville, completed in l959, under the State Water Commission for water for the city.
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> Portland Dam – SWC #409 – reinforced concrete buttress built by the Water Commission in 1957 and located in the city park for water for Portland.[29]

The Baldhill Dam on the Sheyenne River was the largest Red River Valley basin dam built in 1951 with funds from the federal government of $810,000.00. Local funds from the Eastern North Dakota Water Development Association comprised of Valley City, Lisbon, Fargo, and other groups contributed $208,000.00 for water storage and flood control. "Drought conditions were the original reasons for considering the dam," noted reporter A. M. Paulson.[30] An initial meeting had been held July 16, 1936, of Griggs, Ransom, Cass, and Barnes County representatives to "provide work relief" for residents and the "conservation of water and avoidance [of] disastrous floods."[31] They called the reservoir, which had the capability to hold 69,000 acre feet of water, Lake Ashtabula. Five years later, the State Water Conservation Commission in Bismarck allocated Fargo slightly over 50% of the water, Grand Forks almost 30%, Valley City close to 10 %, West Fargo less than 1 ½%, and Lisbon almost 3%.[32] Another major flood occurred in 1950, as a wet rain cycle returned in the late 1940s and early 1950s.The Army Corp of Engineers built dams and reservoirs on Lake Traverse in 1948 on the Bois de Sioux River, the Orwell Dam in 1951 on the Otter Tail River, and another dam on the Red Lake

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[29] Fahey, *Goose River Basin Plan*, 10.

[30] A. M. Paulson, 'Dedication of Bald Hill Dam Crowns 16 Years of Effort,' *Valley City Times Record*, 16 September 1952.

[31] Ibid.

[32] 'Fargo Apportioned 52% of Baldhill Reservoir Waters,' *Sunday Fargo Forum*, 17 February 1957.

River to hold water in case of drought and control floods. This turned into a dual purpose of the Baldhill Dam – water storage for future droughts and flood control for heavy rains or rapid Spring snow melts.[33] In North Dakota, "The U.S. Soil Conservation Service . . . [built] smaller dams [on tributaries]," wrote Gene Krenz and Jay Leitch, "for the purpose of reducing flooding."[34] Minnesota, on the other hand, built barriers to hold back water, which held excess water. As the water slowly discharged through the barrier, it created habitats for wildlife.[35] Periodic floods throughout the 1960s and 1970s caused more construction of dams, dikes, and levees around cities, small towns, and farms. Twelve towns built earthen dikes and many farms constructed their own dikes and levees.[36] [See Figure A 13] After the 1979 flood, North Dakota and Minnesota filed lawsuits about the heights and improperly built levees on either side of the river. There were international disagreements along the Canadian border, as well. Minnesota and North Dakota resolved their differences by agreeing upon a 'criteria for building agricultural levees.'[37] "A key provision in the agreement," explained geographer William Carlyle, "is not to allow these levees to increase the 1-in-100-year flood stage by more than one-half foot."[38] In the heart of these discussions, lawsuits, and construction of levees and dams were attempts to protect property, towns, and cities from floods.

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[33] Gene Krenz and Jay Leitch, *A River Runs North,* 60 (This is the best source for understanding water issues – drainage, flooding, consumption, and history about the Red River.); William J. Carlyle, 'Water in the Red River Valley of the North,' *Geographic Review* Vol 73, No. 4 (New York: American Geographical Society, 1984), 341.

[34] Krenz and Leitch, *A River Runs North,* 63.

[35] Ibid.

[36] William Carlyle, 'Red River Valley of the North,' 336-338.

[37] Ibid, 339.

[38] Ibid.

When they discovered a dam was to be built near their homes on their river, sometimes area residents promoted a campaign against the recommended dam and actually won. After a major flood in the Spring of 1976, the U.S. Army Corps of Engineers studied and proposed nine different sites for a dam on the Sheyenne River. The favored dam was closest to protect West Fargo, five miles southwest of Kindred, and called the Kindred dam. Many alarmed area land owners and Kindred residents viewed the dam as a potential loss of 47,000 acres of crop land, 4,400 acres of woodlands, 600 acres of wetlands, and 2,000 acres of grasslands. Their 52 homes and farmsteads were in jeopardy, while the dam was estimated to eliminate all but 5% of future flood damage to West Fargo. Other dams were considered on the Sheyenne River besides the Kindred dam, but the Kindred dam site was favored as West Fargo's best flood protection by the Army of Corps Engineers. One objector pointed to the loss of a favored wildlife habitat and how the unprecedented rainfall was the true culprit of the latest flood. Recent overland flooding of urban and rural land had occurred more rapidly than the water draining into the rivers. If a dam had already existed, it would have proven worthless. No dam was ever built on the proposed site.[39]

Instead, the Army Corps of Engineers later introduced a Sheyenne River diversion plan around West Fargo and Horace for flood protection. After several years of meetings and proposals, the diversion expenses were inserted into a federal Water Bill, which President Ronald Reagan signed in 1986. In 1990, the construction of the diversion began and was

[39] Bill Turkula, 'Sheyenne Dam Proposals Under Study,' *The Sunday Forum,* 27 November 1977, Small Collections 1422, Institute of Regional Studies, North Dakota State University, Fargo, North Dakota.

completed two years later in time to carry flood waters around the two cities.[40] Residents to the south and north of the diversion claimed greater flooding in their areas from more overland flooding of the Sheyenne River. Many either sand bagged or made dirt levees for their dikes. Inside their dikes, they turned into single or community island subdivisions surrounded by water when floods occurred.[41] West Fargo and Horace, however, reaped other benefits than flood protection from the diversion. New residents moved into their cities and a population and building explosion occurred. "By the year 2,000," West Fargo Mayor Rich Mattern noted, "[our city] has doubled in size and [this is] the fastest period of growth the city has ever seen."[42] While West Fargo and Horace mayors beamed, a few who witnessed the burgeoning growth felt alarm. What had been rich, river bottom agricultural Sheyenne and Red River Valley land was now more residential and business property. In 2011, one land owner whose grandparents homesteaded in 1891 west of West Fargo was in the direct path of rampant housing development. She saw prime agricultural land swallowed into West Fargo and Horace and pledged to continue to farm her land. "Too much farmland is going to be eaten up," declared Nancy Loberg adamently, "and this is the best farmland there is."[43] In addition, the gallery forest along the river's bank and shelterbelts with sparse native habitat diminished in the building boom. The suburban sprawl and rapid housing development that happened after World War II leaped into

[40] Kristen M. Daum, 'Front Line Defense, West Fargo Won Protection from Sheyenne River,' *The Forum*, 26 February, 2012, http://water.areavoices.com/2012/02/26/.

[41] Ibid.

[42] Kristen Daum, 'Rapid Growth leaves West Fargo with fewer options,' *The Forum,* 13 March 2011; ://bismarcktribune.com/news/state-and-regional/rapid-growth-leaves-west-fargo-with-fewer-options/article_8ee98abc-4c2b-11e0-a815-001cc4c03286.huml

[43] Ibid.

another burst of development after 1990 in West Fargo and Horace. Once again, `thousands of homes in environmentally sensitive areas, including wetlands,' [though now flood protected] were being built.[44]

Environmental historian Adam Rome in his history *Bulldozer in the Countryside, Suburban Sprawl and the Rise of American Environmentalism* described how rapidly cities expanded from the 1950s to the 1970s. The creation of suburbs with new housing provided many returning soldiers from World War II and their spouses the option of home ownership. Ownership of one's home was the 'American dream' of many in the 1950s and continues today. Along with this dream came the reality of land swallowed up into residential and business lots. Drainage continued and marshes were filled in with clay and dirt for more residential and business development. Trees were bull-dozed and a few federal agencies came together to discuss the new urban dilemma, as flood issues, improper drainage, few regulations, and loss of rural land caused concern. Rome explained how the importance of the "Soil, Water, and Suburbia" conference in 1967 created studies of the problems and possible solutions in rampant residential growth. The research also provided information and an impetus for environmentalists to address environmental issues. "The Geological Survey, the Soil Conservation Service, and the Fish and Wildlife Service," Adam Rome concluded, "made the greatest contributions . . . [for they] saw the postwar growth of cities and suburbs as a challenge" and brought attention its dilemmas.[45] The expansion of cities and suburbs also made many aware of the diminishment of natural wilderness and the need for more public recreation areas.

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[44] Adam Rome, *The Bulldozer in the Countryside, Suburban Sprawl and the Rise of American Environmentalism* (Cambridge: Cambridge University Press, 2001), 3.

[45] Ibid., 190.

Outdoor recreation was part of the reason in the 1970s that another earthen dam was built for flood storage further northwest of the Red River. With minimal opposition, construction on the Larimore Dam began in 1977 and it was completed two years later. The 66 foot tall dam for flood storage holds up to 4,911 acre-feet of water and stores annually 823 acre-feet of water. The site provides places to camp, swim, canoe, fish, and ride bicycles on 3 ½ miles of groomed trails. Built by the Grand Forks County Water Resource Board, the Soil Conservation Service, and the U.S.D.A., the Upper Turtle Watershed Project dam drains 43 square miles.[46] East of the camp site is a nine hole golf course. West of the dam and next to the picnic area, a twenty-six acre, deer fenced arboretum showcases over 500 planted and labeled trees and shrubs.[47] Sidewalks throughout the entire arboretum with an overlook provide excellent walking or roller blading surfaces. While the purpose of the arboretum displays which trees and shrubs grow best on the prairie environment, it also furnishes a quiet, educational retreat for visitors. Partly due to expanding industry and housing but also with improved methods and heavier equipment, the drainage of wetlands, ditching, and tiling continued and increased in the 1950s. A young observer who saw a neighboring marsh emptied of water from dredging witnessed the aftermath. The geese continued to fly over land where they had once rested. All was not lost when he discovered wildlife in the dredged ditch where frogs, snakes, turtles, and even minnows continued their life cycles. But, complete change happened several years later. A dragline cleaned out all vegetation, deepened the ditch, cleared out of it any form of vegetation and

[46] Ibid.

[46] http://gfcounty.nd.gov/node/51.

[47] Ibid.

wildlife and 'left a wasteland' of no visible life.[48] This drainage of ditches and of wetlands occurred throughout the Red River Valley and the entire states of Minnesota and North Dakota. In a geological survey of the wetlands prior to Euro-American development in 1780 to what still existed by the 1980s, the federal government surveyors discovered that over 1.2 million acres of marshes, swamps, and prairie potholes were drained primarily for agriculture in the Red River Valley of North Dakota.[49] In Minnesota, which actually has more wetlands than lakes, the surveyors estimated over half of the wetlands disappeared with over two-thirds of the prairie soils drained for agriculture. The loss of broad-leaved sedges, grasses, and bulrushes, besides other wetland plants, compounded into the loss of wildlife that had thrived or rested during migration in its moist habitat.[50]

In 1997, environmental historian Ann Vileisis wrote extensively about the importance of wetlands as 'filter pollutants; [which] reduce flooding; . . . buffer coasts; . . . and provide habitat for fish, waterfowl, and wildlife.'[51] Her history about Americans' cultural attitudes, dismissal of an important ecological habitat and eradication of wetlands since colonists first arrived on the North American continent and continue to this day, highlighted a valuable disappearing ecosystem and the reasons behind its demise. [Figure A 14] Even after laws were passed in the 1950s to protect remaining wetlands, government agencies clashed in their response. For

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[48] Kent Meyers, *The Witness of Combines* (Minneapolis: University of Minnesota Press, 1998), 110-114.

[49] Judy D. Fretwell, John S. Williams, and Phillip J. Redman, *National Water Summary on Wetland Resources* (Washington, D.C.: United States Geological Survey, 1996), 306.

[50] Ibid., 237-240.

[51] Ann Vileisis, *Discovering the Unknown Landscape* (Washington, D.C.: Island Press, 1997), xi.

instance, within the Department of Agriculture, the Soil Conservation Service worked with farmers to improve their land for agriculture, while the Army Corps of Engineers focused on clearing outlets along tributaries. For its part, the SCS helped farmers implement draining of prairie potholes and creating ditches or tiling for quick water run-off from fields after a sudden rain storm. Furthermore, "the Federal Watershed Protection and Flood Prevention Act of 1954," noted Vileisis, "authorized U.S.D.A. . . . to help state and local governments . . . to reduce large floods by damming streams high in watersheds."[52]

Conversely, the Fish and Wildlife Service surveyed and inventoried wetlands and sounded the alarm of the rapidly disappearing wetland prairie. Congress enacted a new law in 1958 to help remaining wetlands exist with money from duck stamp sales.[53] Even though all federal departments were encouraged to salvage what wetlands were left, drainage projects continued with the assistance of the Soil Conservation Service and the County Agricultural Stabilization and Conservation Citizenry. By the early 1960s, as the Fish and Wildlife Service continued to monitor the dwindling wetlands, the federal government implemented the 1962 Drainage Referral Act which explicitly prohibited the U.S.D.A. from helping farmers drain their land. By this time, the "ACPS helped 2,886 Minnesota farms to permanently drain 141,908 acres with open ditches and 26,747 acres with tile drainage."[54] A conundrum existed within the federal government in its original directives to its departments. Part of the original policy of the SCS and the USDA was to drain wetlands, install ditches, or tiles for conservation of farm land.[55] These

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[52] Ibid., 200-201.

[53] 203.

[54] 203, 204.

[55] Fretwell, Williams, and Redman, *National Water Summary*, 24.

policies actually continued into the 1970s. For instance, Cass County noted in its 40th celebration of their Soil Conservation Service how much the SCS had helped rectify poor drainage 'on much of the flat heavy land.'[56] The SCS constructed:

> . . . over 6,554,393 feet of drainage field ditches. Also, 2,340,175 feet of large main and outlet drains . . . to carry water from lateral ditches of the draining area. . . [For Flood prevention] Three retarding dams, floodway construction and channel improvement were all part of the [Swan-Buffalo Watershed] . . . with help from the Maple River Water Management Board.[57]

Further drainage for rapid water run-off or to extinguish wet prairie and marshes occurred even more after World War II with the outward sprawl of urbanization or suburbs and more industrial development. The loss of wetlands continued by over 550,000 acres in the United States every year. Over a million acres of wet prairie were drained in the Lake Agassiz Plain Region by l982.[58] "Draining in the prairies," observed geographer Hugh Prince, "produced a remarkable uniformity of landscape and land use."[59] This was exactly the intent of agriculture and industry. It wasn't until a new public awareness of the value of wetlands and new federal legislation took hold in the 1970s that this began to change. The Swampbuster provisions in the Food Security Act of 1985 and the Emergency Wetland Resources Act of l986, wherein wetland

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[56] Ordean C. Jacobson, 'Soil Conservation Service 40th Anniversary,' *Rural Cass County, The Land and People* (West Fargo: Cass County Historical Society, 1976), 924.

[57] Ibid.

[58] Judy D. Fretwell John S. Williams, and Phillip J. Redman, Compilers *National Water Summary on Wetland Resources* (Washington, D.C.: United States Geological Survey, 1996), 306.

[59] Hugh Prince, *Wetland of the American Midwest, A Historical Geography of Changing Attitudes* (Chicago: University of Chicago Press, 1997), 231.

losses were cut in half, each signaled change.[60] In the 1985 provision, if farmers conserved their land and left it unplanted, they could apply for grants and convert the land to wetlands.[61] However, even with the dawning awareness of the value of wetlands and legislation to protect remaining wetlands, Vileisis noted that 'an insidious momentum to keep draining, dredging, damming, and developing [continued along with] traditional attitudes that still held wetlands to be wastelands.'[62] Many farmers were in the business to grow and harvest crops or raise livestock in pastures to later sell. With more production, the better the land and "the only good wetland is a drained one."[63]

In 1950, after many wetlands were drained, ditching continued, and cities expanded with efficient drainage, floods began to occur. "Loss Heavy in the Valley Flood," the *Grand Forks Herald* declared April 28, 1950. Ice jams and overland waters flooded many areas. A flash flood surprised Crookston and Oslo, north of Grand Forks, went under water. 7,875people evacuated until dryness returned while livestock loss measured in the millions of dollars.[64]

A 1979 flood of 49 feet raised havoc in southwestern Grand Forks, Riverside Park, and the northern Red River Valley. The rapid snow melt and two inches of rain on April 24 after an elusive expected crest elongated the flood fight for all. The docile English coulee, several miles west of the Red River, surged outwardly and damaged 300 houses with collapsed basements and

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[60] Thomas E. Dahl and Gregory J. Allord, 'History of Wetlands in the Conterminous United States,' *National Water Summary on Wetland Resources*, 24.

[61] Hugh Prince, *Wetlands of the American Midwest,* 328.

[62] Vileisis, *Discovering the Unknown Landscape*, 252.

[63] Prince, *Wetlands in the Midwest*, 316.

[64] 'Loss Heavy in Valley Flood,' *Grand Forks Herald*, M. M. Oppegard, Editor, 28 April 1950.

water on the first floors. The Point in East Grand Forks turned into an island, which residents saved from disaster. The 'Flood of the Century' was still bested by the April 10th, 1897, flood but it boosted the record of worst floods to six since 1950 out of ten.[65]

In 1997, disaster traumatized rural and urban areas, particularly Grand Forks and East Grand Forks, in what was later called the real 'the Flood the Century.' Many who fought the flood waters with their water pumps, dikes, and levees worried about drainage and wondered if the Red River was returning to its original Lake Agassiz. The valley's natural topography with the Red River as the lowest level of surrounding land barely higher which sloped towards the river and a sluggish river that slowly flowed north on a graduated riverbed is the valley's primary basis for floods. In the fall of 1996, heavy precipitation saturated the ground, a deep frost froze the ground, and eight blizzards added a record snowfall above the ground. Nineteen inches of wet snow in the last blizzard on April 5 – 6 fell in much of the valley.[66] After the last blizzard, temperatures dropped, electricity went off for several days, and the National Weather Service struggled to gather data for an April 14th forecast, which had been 49 feet with normal precipitation.[67]

Other factors contributed to the disaster as well. Dikes built in the late 1950s were aging. Grand Forks residents along Lincoln Drive notified the city about cracks in their dikes the summer before the flood but little was done. In 1979 the flood had reached 48.88 feet, which

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[65] Darrel Koehler, 'Who Expected the '79 Flood?' *Grand Forks Herald,* 8 May 1979.

[66] Rawson, Bruce, and Crist, Charles E., Co-Directors, *Living with the Red, A Report to the Governments of Canada and the United States on Reducing Flood Impacts in the Red River Basin* (Ontario, Canada and Washington, D.C.: International Joint Commission, 2000), 7-9.

[67] Ashley Shelby, *Red River Rising, The Anatomy of a Flood and the Survival of the American City* (St. Paul: Borealis Books, 2003), 46-47.

Grand Forks and East Grand Forks survived with extra layers of sandbags on top of the dikes and levees. The limit for dike height with sandbags was 52 feet.[68] As Grand Forks and East Grand Forks prepared for the flood, the National Weather Service predicted on February 28, March 28, and April 5th a flood crest of 49 feet. On April 7th, over half of Ada's residents evacuated as water overflowed the Wild Rice and Marsh Rivers – tributaries to the Red River in Minnesota. On April 15, Warren, Minnesota, flooded from 'ice jams and overland flooding.'[69] On April 11, the National Weather Service predicted that between April 20 and 27 the Red River would crest for Grand Forks and East Grand Forks. On the 16th, while residents in Grand Forks were warned they might have to evacuate, the river rose above 48.88 feet – the height of the 1979 flood. The next day, sirens blared in Grand Forks for Lincoln Drive residents to evacuate from fear of a dike break. It was repaired. Early the next morning, friday the 18th, bubbles surfaced in the Lincoln Drive dike. Besides them, Grand Forks ordered Riverside and Central Park residents to leave. Only a little later that morning, residents of Belmont Road unbelievably watched water flow down Reeves Drive and Belmont Road. The river had topped the Lincoln Drive golf course and simply flowed down the streets. Neighbors called neighbors who were sand bagging along the English coulee near the University of North Dakota to return to their home and move their cars. By noon, the National Weather Service changed the Red River's crest prediction to 53 feet. Belmont road residents stood in utter disbelief as they watched gravel trucks attempt to dike the alleys, but it was too late. By this time, much of the Lincoln Drive neighborhood was under water and Grand Forks ran out of equipment and supplies. Also, an East Grand Forks dike

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[68] Ashley Shelby, *Red River Rising,* 10.

[69] Ryan Bakken, *Come Hell and High Water, The Incredible Story of the 1997 Red River Flood*, Edited by Mike Jacobs (Grand Forks: Grand Forks Herald, Inc., 1997), 25-29.

experienced its first break. It was repaired but by midafternoon the dike near Murray Bridge broke. Sirens sounded again for the East Grand Forks Point area residents to evacuate. Others in East Grand Forks evacuated as well. Later that evening the National Weather Service updated their flood crest to 54 feet, while Central Park filled in with water from the Lincoln Drive spillover. An hour before midnight, an East Grand Forks dike burst near Sherlock Park and filled the area with cold, turbid water. The force from the water burst basement foundations, moved houses, and floated parts of decks, vehicles, and sheds down differing streets. Surrounded by water from the north and south, the downtown of East Grand Forks succumbed to watery silence by early Saturday morning.[70] The next morning, residents in Belmont Road woke to sewage water in their basements. A few managed to plug plumbing leaks and kept their houses dry, but others were not so fortunate. Actually, it made little difference for water found new ways to infiltrate the city and buildings. Storm sewer back-ups and manhole covers had burst in the air with geysers of underground water pressure spread more water in the streets and up into lawns. Most discouraged neighbors left that morning in National Guard Humvees that drove up to their doors on waterlogged lawns. Neighborhoods grew eerily quiet, though helicopters buzzed the air as they circled overhead and sirens periodically blared. The hold-outs left later that evening after they sandbagged their basement windows with water filled plastic bags. By this time, two National Guard soldiers who wore chest waders arrived at porches with a boat and picked up those who had continued to fight 'to keep houses dry.' Few realized the floods' impact until they boated out of the area and saw water everywhere. By this time, 90 % of East Grand Forks had evacuated and all who lived east of Washington Street were supposed to evacuate. Some who

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[70] Ibid., 33-38.

waited until the flood embraced their homes saw water seep into their basement from the saturated ground around the house. If there were any low lying window or doorframes on a house, water seeped into an opening and filled the indoor open cavity of their basements. There were those who stayed and saved their homes by pumping the water out. Also, by midmorning Saturday, neighbors on Belmont Road watched the street water lower and thought the worst of the flood was over. A few hours later, though, water again began to rise in the streets and on to the lawns. Later, they learned that the water had reached Washington Street, a north to south primary road in Grand Forks, and served as a dike, as it stopped the river's flow west. The river continued along side of the road until it reached the railroad underpass and then spread west and south into the city. Those who watched felt a slight reprieve of hope, which diminished when river water slowly rose again in the streets and reached all of the houses. By this time, the English coulee, which flows through the University of North Dakota's campus in the western part of the city, overflowed its banks.

The Red River crested and overtopped the dikes at 54.11 feet on Monday at 11 a.m. While Fargo and Moorhead saved major parts of their cities, Grand Forks and East Grand Forks, besides many other towns and farmsteads lost a major portion of their property to water and fire. Flood and fire damaged both evacuated cities and neared $3.6 billion.[71] The timing of the tributaries flowing into the Red River when the river peaked, the sudden melting of the snow, the incorrect prediction of the height of the flood, the westward movement of water to the east across the prairie, and the release of water from a full Lake Traverse reservoir contributed to the water

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[71] *The Next Flood: Getting Prepared* Final Report of the International Joint Commission, April 2000, 38.

rampage of a Red River on steroids.[72] The cities of East Grand Forks and Grand Forks and its citizens attempted to return to a form of normalcy after the evacuees returned to their cities. Several neighborhoods battled the city and the Army Corps of Engineers for their future to remain in their damaged homes. Due to the flood's devastation, besides the need for higher dikes and a river's wider channel, many lost their battle a second time. Third generation families lived in close connection to their extended families within these damaged areas. So connected were they to their surrounding environment, many felt that the loss of their neighborhoods was worse than the river's destruction of their homes. Everyone understood the river demanded more room. Water had spread 25 miles wide and widened to fifty miles near the Canadian border as the river expanded north.[73] Because the water flowed outward and expanded, the towns north never experienced the devastation similar to Ada, Breckinridge, Grand Forks, and East Grand Forks. The brutal lesson learned by flood traumatized residents was that the former narrow channeled dikes, which had once held the Red River, needed to be enlarged. Five years later, Grand Forks and East Grand Forks contained permanent dike protection of 63 feet for future floods. Both cities utilized their dikes successfully twelve years later when floods once again impacted the Red River Valley.

Many hoped the 1997 flood was the last of the worst of Red River Valley floods. It was until another major cycle of flooding struck the Red River Valley basin beginning in 2009 when the Red River and its tributaries reminded residents that the rivers needed more room for a Spring fling. In 2009, the 40.84 feet crest of the Red River in Fargo/Moorhead topped its 1997

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[72] Ashley Shelby, *Red River Rising*, 51.

[73] Lyle Halvorson, Editor, 'The Great Flood of '97,' *North Dakota Horizons,* Vol. 27, No. 4, Fall Issue (Bismarck: Greater North Dakota Association, 1997), 29.

flood of 39.72 feet. In 2010, the Red River crested at almost 38 feet, while in 2011 the river's crest in Fargo reached 38.85 feet.[74] In those three years, Fargo and Moorhead citizens, volunteers, the National Guard, and the Army Corp of Engineers successfully sandbagged and built levees to save their cities. The Sheyenne River was once even mightier than the Red River when Lake Agassiz originally spread across this region.[75] This river and other tributaries threatened area residents as well as the rivers spread over farm land, around farmstead dikes, and through city dikes and sand-bagged channels. "Nineteen years of wet weather," noted meteorologist John Wheeler in 2012, ". . . is inherently unpredictable."[76] What was predictable was a saturated build-up of water in the soil and a continuing February to April snowfall made many nervous in 2009 about a flood. The timing of snow or rainfall, the melting of ice in the Red River and its tributaries, the flow of water in drainage ditches, and the release of water from the reservoirs into the rivers were watched carefully. When the Red River spreads out in a flood, it will spread up its own tributaries and overland. One hopes the tributary crests differently than the Red River. What saved many who lived near the Sheyenne River in 2009 was the Sheyenne flood crested a week later. The worst flood scenario is when the Red River and its tributary crest at the same time. For those in the community who fought the floods, the fight strengthened many of their 'sense of place' for their families and their community as well. Many felt intimate with the landscape – the river, their surrounding topography, and the natural world – and their neighbors, as they battled to keep the rising water out of their homes, towns, and farm buildings.

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[74] "Red River of the North at Fargo, N.D., "North Dakota Water Science Center, April 2011, 1, http://nd.water.usgs.gov/gov/floodtraking/charts/05054000.html.

[75] William M. Wemett, 'Sheyenne River Was Great Stream in Glacial Days,' *Fargo Forum*, 15 April l952.

[76] John Wheeler, 'Why, oh why so wet," *The Forum,* 8 February 2012.

Since then, a new battle in land rights emerged over an answer to Fargo and Moorhead's flood weary issue. The Army Corp of Engineers proposed a diversion around the entire city of Fargo. While this diversion will protect the cities of Fargo, Moorhead, Horace, and West Fargo, those to the south, north, and west might experience more overflow. Also, a major loss of agricultural and residential Red River Valley land will undergo tremendous changes in the construction and design of the diversion. This "36 mile long diversion channel with 32,500 acres of upstream staging has a channel width of 1500 to 1600 feet of a bottom width of 300 to 400 feet."[77] Almost 7,000 acres of tallgrass Red River agriculture land will convert into the channel, while other farm land will be used for water storage.[78] The diversion if constructed is projected to protect over 200,000 current residents of Fargo, Moorhead, Harwood, and Horace. The towns of Harwood, Argusville, and Georgetown, the original fur trading post in Minnesota near the northern outlet of the diversion, are in less protected positions. The diversion will displace 400 homes, dam 54,000 acres, and intersect five rivers – the Wild Rice, Sheyenne, Maple, Rush, and Lower Rush Rivers.[79] Two aqueducts and seven hydraulic structures are planned to control the flood flow.[80] While Fargo, Moorhead, Cass County, North Dakota, Clay County, Minnesota, the Joint Cass Water Resource District, and the Buffalo-Red River Watershed District approved this

[77] www.fmdiversion.org; https://www.casscountynd.gov/announcements/Page/FM-Diversion- Launches-Website.aspx.

[78] Kristen M. Daum, 'F-M diversion project a work in progress,' *The Forum*, 26 February 2012.

[79] www.mndakupstreamcoalition.com and www.stopthefargodam.com.

[80] Army Corp of Engineer, 'Fargo-Moorhead Metro Map Study,' St. Paul: U.S. Army Corp of Engineers, 2011, mvp-netapp2/shares/Shares2/projects/SA/AA_Fargo-Moorhead_Metro_Metro_FDR-1538066/GIS/MXD/1March2011 110302Upstream100year.mxd9March2011 BGW.

plan, another group opposed it. Many who will be displaced by the diversion in addition to upstream interests have fought unsuccessfully to stop the diversion. Under U.S. Congress authorization in 2014, the Army Corps of Engineers waits for DNR permits but is close to implementation of a dam and diversion of the Red River.[81]

The problems of too much water impacted another area, which is sometimes not considered as part of the Red River basin. A land-locked lake, Devil's Lake, is a '3,810 square-mile sub-basin of the Red River of the North.'[82] When Joseph Nicollet camped near it in 1839, he described an increased habitat of trees and hills along the east shore. On a 300 feet summit, he wrote about the area's beauty and the Sioux reasons the Sioux named the hill and lake:

> The Sioux believe that from a certain direction they see in it the shape of a heart, *chante*, and because it is close to the lake that they call *Mini Wakan* – the supernatural water – they give it the above name. The Indians . . . always give preference to the form an object resembles. When this is lacking, they name it for the locality, or for accidents or events that happened there.[83]

After he left the hilly, timbered area and rode seven miles south, he reached the Sheyenne River. There, he saw huge, dry coulees and noted their connection to Devil's Lake in times of overflow.[84]

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[81] Flood Diversion Board of Authority, 'Corps Commanding General committed to F-M Area Diversion Project,' *North Dakota Water*, Vol 23, Issue 8 (Bismarck: North Dakota Water Education Foundation, 2015), 23.

[82] North Dakota State Water Commission, 'Devils Lake Flood Facts' (Bismarck, N.D.: North Dakota State Water Commission, 2014), 1.

[83] Joseph Nicollet, *Joseph N. Nicollet on the Plains and Prairie*, Translated and edited by Edmund C. Bray and Martha Coleman Bray (St. Paul: Minnesota Historical Society Press, 1993), 187.

[84] Ibid., 195.

Now, after 175 years from Nicollet's journey, Devil's Lake has greatly changed. Four years of above average precipitation in 1996 and a winter of in 1997 of record snowfall stopped with a foot of snow in an April blizzard added to the Devil's Lake rise of over fifty feet since 1940.[85] The *Devil's Lake Flood Facts* shows how water levels increased after the 1940s:[86] A graph reveals a perceptual increase of wet over dry years after the dusty 1930s. The two lakes Joseph Nicollet saw in 1839 – Devils Lake and Stump Lake – were now one huge lake. When Devils Lake reaches 1446.50 feet, it overflows into Stump Lake, which will eventually flow into the Sheyenne River at 1458 feet.[87] The obvious solution to the Devils Lake problem, which flooded farmland, buildings along the lake, roads, and several towns as the lake increased, was to drain water from the lake into the Sheyenne River. This solution, though, created another set of problems. The biota within the lake was different than what the Sheyenne River water held. In addition, Canadians expressed concern about Devils Lake flowing into the Sheyenne River, which flows into the Red River. Minnesota also questioned the introduction of different biota into the Sheyenne River. Many who lived along the Sheyenne River voiced their opposition. They worried over the water quality and increased current from the added volume of water into the Sheyenne River. Many worried, too, about erosion of the fragile river banks with the increased, higher river flow. The river normally slows and decreases in volume by fall. How would the river water change besides affect the river banks with increased velocity and water? Several studies and meetings ensued over the creation of differing outlets on the Devils Lake,

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[85] North Dakota Studies Project, 'Water – Too Much – Too Little' (Bismarck, N.D.: State Historical Society of North Dakota, (?), 6, 13.

[86] North Dakota State Water Commission, *Devils Lake Flood Facts,* 1.

[87] http://swc.nd.gov/4link9/4dcgi/.../Mitigation %20Plan.pdf.

which continued to rise over the next few years. The State Water Commission funded two studies about the Sheyenne River and the International Red River Board of the Joint Commission studied and eventually arrived at a plan on how to deal with the differing biota and nutrients found in Devils Lake.[88] In 2005, the State of North Dakota constructed its first outlet. On the west end of Devils Lake the outlet originally pumped 100 cubic feet per second and in 2010 doubled with an extra 50 cfs to 250 cfs of water flow out of the lake and into the Sheyenne River. Two years later, another outlet on the east portion of Devils Lake pumped 350 cfs of water out of the lake.[89] Studies continued on the Devil's Lake drainage and the state will construct more outlets for an increased water flow of 400 cfs. Minnesota is 'monitoring water quality' and Manitoba is testing the Red River water to analyze 'nutrient control technology and practices.'[90]

A biologist expressed one area of alarm, though, in the mix of Devils Lake water into the Sheyenne River. Andre Delorme researched the Sheyenne River's healthy mussel population. Director of the Prairie Waters Education and Research Center in Kathryn, Delorme warned of erosion in the river bed where the mussels thrive and possible contamination in the river water from the sulfates in the Devils Lake water. He has found disturbed evidence of deterioration within the Sheyenne River from recent floods and annual releases from Devils Lake, which increases the velocity of the river's current. His research found that eleven out of fifteen mussel

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[88] Kevin Bonham, 'New Development offer hope for concerns in Regions Basin,' *Grand Forks Herald*, 19 February 2012; http://water.areavoices.com/page/4/#sthash.ePAbL2lz.dpuf.

[89] North Dakota State Water Commission, *Devils Lake Flood Facts,* 2.

[90] Kevin Bonham, *Grand Forks Herald,* 19 February 2012.

species live in the Sheyenne River and it has the 'best mussel population in the state.'[91] Few besides the biologists, the Game and Fish and Natural Resources Departments, people who fish, and the raccoons were aware of a healthy community of mussels, crayfish, fish, and insects in the river. However, the state implemented a 'cease and desist law' after it was discovered truckloads of harvested mussel left the state for Japan's pearl business industry in 1990. In 1992, clam harvests were banned from the state until more information was gathered of the value of the mussel's population in the rivers. And what does the clam do? "It filters and clarifies water that passes through it, straining out suspended materials and converting tiny organisms to tissue," explained C D. Grondahl, "that can be used, in turn, by such higher forms as fish, otters, muskrats, waterfowl, and crawdads." [92]

Meanwhile, on the Maple River, the Sheyenne River's tributary, the Cass County Joint Water Resources District, the Red River Joint Water Resource District, and several state agencies built a dry dam for flood retention. Construction started on the earthen dam in 2004 and was completed in 2007. It was located in southeast North Dakota, 8 miles northeast of Enderlin, for the reduction of flood waters in the lower Sheyenne River basin and eventually the Red River. The 70 foot high earthen dry dam holds 60,000 acre-foot of flood water.[93] More recently, another "dry dam," which was proposed in 1996, will be constructed on the northern portion of

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[91] Kristen M. Daum, 'High water levels pose a threat to Sheyenne River,' *The Forum*, 19 February 2012.

[92] C. D. Grondahl, 'North Dakota Three Ridge, Pig toe, Pocket Book, White Heel Splitter, Black Sandshell,' www.npwrc.usgs.gov/resource/inverts/ndclam.html.

[93] www.redrivergoingtwrd.org.

Maple River to hold '9,950 acre-feet of water in a 925-acre pool.'[94] The plans for this dam contained an important difference to many of the earlier constructed dams. In the 35 feet high by 20 feet wide dam, a pipe placed in its base allows fish to "go all the way upstream . . .," noted Jurgen Suhr.[95] Though it will be built to protect surrounding agriculture land and roads in case of excess rain or melting snow, the dam does not block fish movement as most dams had previously done. Other dam projects by 2015 began to modify previous river controls, which ended fish travel upstream to spawn. In northwest Minnesota the Sandhill River had been straightened for the reduction of floods in its lower watershed in 1950. Four drop structures were constructed in the channel of the river for better drainage. Recreational fishing ended after the upper fish in the channel died due to a drought in 1988. With a corrected channel, fish could again swim upstream and spawn. Residents could once more fish in their river and thank the federal government for three-fourths of the funds and the other fourth from a Lesard-Sams Outdoor Heritage Council grant.[96] Added protection with regulations for recreational fishing emerged when the International Red River Fishers Management Steering Committee met in 1990. This group urged that North Dakota and Minnesota limit channel catfish caught in number and size and reintroduce lake sturgeon, *Acipenser fulvescens*, into the Red River. Like 'channel catfish, *ictalurus punctatus,* walleye, *Sander vitreum,* northern pike, *Esox luscious,* sauger, *Sander Canadensis,'* and goldeneyes, *Hiodon alosoides*, the sturgeon appeared numerous in Red River

[94] Patrick Springer, "Forum News Service, http://www.prairiebizmag.com/event/article/id/19972#sthash.dSLS3g#0.dpuf.

[95] Ibid.

[96] Kevin Bonham, 'Sand Hill Passage project a go, could bring back fish,' *Grand Forks Herald*, 11 October 2015.

basin until 1900.[97] The decrease in fish populations occurred throughout the Red River basin with rural and urban development throughout the decades in addition to increased fishing and water pollution. Dumpage of garbage, sewage, and industrial wastes occurred. Livestock wandered in low lying streams and rivers as well. Agricultural and industrial chemicals eventually dissolved in the streams by water run-off or into the underground water table. The sturgeon disappeared by the mid1900s.[98] Pollution proved a paramount problem when researchers discovered in 1970 that the lower Sheyenne River and upper Red River were one of the most polluted rivers in the nation.[99] Commercial fertilizers, fecal matter, and chemicals DDT near the Canadian border with Lindane present in the water near the mouth of the Sheyenne River, which flows into the Red River, were found in differing river surveys.[100] The surveys conducted by federal, state, and private agencies explored how polluted streams and rivers were. Though the federal government created a Federal Water Pollution Control Act in 1948 to establish controls on discharges into rivers, the 'Act was significantly reorganized and expanded in 1972 into the Clean Water Act.'[101] In this stricter act, laws were enforced and permits required for discharges of wastes for the amount of discharge in streams, rivers, and lakes from cities and industries. Otherwise, it was against the law for pollutant disposal in surface waters. In addition,

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[97] 'Red River of the North Fisheries Management Plan,' www.files.dnr.state.mn.us/areas/fisheries/…/redriver_mangement_plan_2008.p.

[98] Ibid.

[99] James J. Geraghty, David W. Miller, Frits van der Leeden, and Fred L. Troise, *Water Atlas of the United States* (Port Washington, N.Y.: A Water Information Center Publication, 1973), 51.

[100] Ibid., Plate 54, Plate 60, and Plate 61.

[101] http://www2.epa.gov/laws-regulations/summary-clean-water-act.

the federal government set minimum standards as to how much chemical or industrial waste could be dispersed into natural water systems.[102]

More recently, the dams which acted as barriers to fish migration for spawning were scrutinized also. In 2008, a Red River of the North Fisheries Management Plan noted that several dams had been modified for the fish:

Other dams were removed or modified for renewal of undisturbed miles of rivers and streams for the fish. The modifications also improved safer environments for residents. The 'low-head dams. . . produced powerful pockets of current,' which had trapped and drowned swimmers.[103] The dams modified were the Roseau City dam, the Lion's Park Club dam on the Otter Tail River, East Grand Forks dam, Crookston dam, and the Heiberg dam (Wild Rice River, Twin Valley, Minn.). The dams removed were the Old Mill State Park dam, the Buffalo River State Park dam, the diversion dam fish by-pass project (Fergus Falls, Minnesota, Otter Tail River), the Argyle Dam in Minnesota, and the Lake Breckenridge dam on the Ottertail River. All these dam modifications and removals occurred between 2001 and 2007. Other ongoing projects for a healthy river environment were in motion for planting vegetation along the river banks, restore wetlands wherever possible, and improve conservation through 'hands-on' activities and education with the River Keepers in Fargo-Moorhead development of a master plan in 2002. [104]

In these last 150 years of Euro-American settlement and development in the Red River Valley basin, so much has changed on the landscape, in the river systems, and even in the underground aquifers and water table that this chapter barely touches the transformations. Flood

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[102] Ibid.

[103] Marino Eccher, 'The Red: A young and restless river,' *The Forum,* 29 January 2012.

[104] Ibid.

and drainage issues continue as the struggle and control over water manifests the predicaments only when droughts and floods occur. Even the recent surge in tiling in the Red River Valley is in debate as to whether tiling damages the streams or not. One study from Ohio State University pointed out that tiling underneath soils for better drainage saved wetlands from being drained for additional agriculture. By improvement of agricultural land there was no need to drain wetlands further for agriculture.[105] Another study in 1993 through 1995 in the Red River basin discovered high levels of nitrate nitrogen in the Sheyenne, Pembina, and Turtle Rivers, which were not considered health hazards to humans.[106] Purdue University discovered negative and positive aspects of subsurface drainage. While nitrates flow readily into the soil, the tiles, and to the rivers and streams, pesticides barely diffuse through the soil and into the tiles. It flows more readily on the surface.[107] More research questioned the negatives or positives of tile drainage and more research continues at a time when tile drainage is in a drainage boom. Several recent heavy late spring rains have caused more farmland to undergo tile drainage for quicker water run-off. "No doubt tile drainage is good for agriculture," surmised Chuck Fritz, director for the International Water Institute, "but what it means for the watershed as a whole has yet to be determined."[108] What is known is out of the "15,000 new chemical compounds identified in

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[105]'Agriculture Drainage,' *Bulletin 871-98* Ohio State University, http://ohioline.osu.edu.

[106] L. H. Tornes, M.E. Brigham, and D. L. Lorenz, *Nutrients suspended sediment, and Pesticide in Streams in the Red River of the North Basin, Minnesota, North Dakota, and South Dakota, 1993-95* (Mounds View, Minnesota: U.S. Geological Survey, Water-Resources Investigations Report 97-4053, 1997), 20-24.

[107] Purdue University, *www.purdueuniversity.edu/drainage_tiles_positive_and*_negatives.pdf.

[108] 'Agriculture Tile Drainage – North Dakota Natural Resources,' www.ndnrt.com/image/cach/Prairie_Ponderings_Sept_2011.pdf.

patents and academic literature added to the federal database of the American Chemical Society daily," wrote Jerald L. Schnoor, "the EPA simply cannot keep pace."[109]

Urban development with impermeable cement parking lots and streets in addition to buildings designed for quick rain run-off into gutters and storm sewers efficiently carry rain or flood water to the rivers. This heightens the fast rise of river waters in some recent floods. Chemical run-off from lawns, industrial sites, and other urban pollutions flow to the rivers as well. In our history of water issues, the diminishment of fish in the rivers, the loss of habitat in new urban and industrial developments, and how floods continue to question our ability to control water, we have learned the truth of Chief Seattle's remark: "Man did not weave the web of life, he is merely a strand in it. Whatever he does to the web he does to himself."[110]

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[109] http://www.hcn.org/articles/rural-rivers-get-cleaner-urban-streams-are-full-of pesticides/pr...;http://pobs.acs.org/doi/abs/10.1021/es504256j.

[110] Chief Seattle, Suquamish Chief Sealth, 'Speech 1854,' translated by Dr. Henry Smith, *Seattle Sunday Star*, 29 October 1887; Nancy Zussy, State Librarian, Washington State Library, *Seattle Weekly*, 17 July 1991, wrote of the historical debate as to whether Chief Seattle actually said these words. Dr. Henry Smith made clear his words were not an exact copy. In the 1960s, Poet William Arrowsmith added text to the original speech, and later Dr. Ted Perry wrote a film script, which changed the speech even more, which 'appeared in an exhibit at Expo '74 in Spoken, Washington, and has been widely repeated.

CHAPTER 9: THE WINDS OF CHANGE

> "The wind that makes music in November corn is in a hurry. The stalks hum, the loose husks whisk skyward in half-playing swirls, and the wind hurries on . . . A tree tries to argue, bare limbs waving, but there is no detaining the wind, "Aldo Leopold.[1]

The winds of change occurred rapidly in the tall grass prairie of the Red River Valley after Euro-American settlement in the l870s. The complex ecosystem of the prairie, wetlands, riparian woods, and rivers appeared deceptively simple to homesteaders when they moved on to the prairie. They discovered quickly how difficult change was for themselves and the land upon which they claimed their new livelihoods. When Edmund C. Bray and Martha Coleman Bray translated and edited the journals of French mapper and explorer Joseph N. Nicollet, who traversed this region in l839, they wrote:

> This is the country of the Indians, and no expeditions have preserved it for us as well as Nicollet's. Today the streams and river he was at such pains to follow have been ditched and run small and muddy from plowed fields. We are reminded that they were once, a surprisingly short time ago, the only reliable landmarks. . .[2]

Once labeled as the 'Great American Desert' on maps, few knew that a rich soil lay underneath the sod of tall grass and contained its own vibrant community of deep, intermingled roots with millions of micro-organisms. An abundance of diversified life existed in the soil as well as on the prairie. Slowly ground into gravels, sand, clay, and particles of dirt from glaciers, the topsoil of the Red River Valley over centuries of seasons of vegetative growth and decay developed a humus thick soil, which 'provided an almost inexhaustible supply of food for soil

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[1] Aldo Leopold, *A Sand County Almanac with Essays on Conservation from the Round River* (New York: Ballantine Books, 1949), 70.

[2] Joseph N. Nicollet, *Joseph N. Nicollet on the Plains and Prairies,* Translated and edited by Edmund C. Bray and Martha Coleman Bray (St. Paul: Minnesota Historical Society, 1976), 41.

organisms.`[3] Prairie fires fed the soils with the grasses and forbs ashes and fueled vegetation in the next spring's growth spurt. Over 83 species of ants – the true 'aerators of the topsoil,' – four species of earthworms, fly and beetle larva, over 100 species of dung beetles besides a multitude of other insects and rodents worked incessantly to digest soil into black humus.[4] The bison, deer, and elk, to name a few, as they grazed on the forbs and grasses dropped fresh manure on the land, which slowly decomposed, filtered, and was carried underground by insects to enrich the soil. This highly complex soil environment turned into the black gold underneath a "prairyerth" sod that settlers plowed and planted with their crop seeds for agriculture.[5]

When fur traders, explorers, soldiers and Euro-American settlers arrived in the Red River Valley, few realized how the Woodland, Cheyenne, Dakota, Cree, and Ojibway who lived here highly utilized this tallgrass prairie. They also did not understand how Native American cultural practices of the landscape insured continual reciprocity of native plant harvests for future generations. For instance, a few Euro-American settlers wrote of the unharvested plentitude that they viewed around them. In wild rice harvests, "[Ojibway] will harvest dawn till dusk for the prescribed four days," explained Robin Wall Kimmerer, "and then stop, often leaving much rice to stand unreaped."[6] The Dakota harvested similarly. Many Euro-Americans viewed the unharvested grain as unfathomable and indications of a less industrious group of people.[7] While a few settlers learned the value of their surrounding landscape in the use of native plants, most

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[3] Candace Savage, *Prairie, A Natural History* (Vancouver: Greystone Books, 2004), 96 - 97.

[4] Ibid., 104 - 108.

[5] 98.

[6] Robin Wall Kimmerer, *Braiding Sweetgrass, Indigenous Wisdom, Scientific Knowledge, and the Teachings of Plants* (Minneapolis: Milkweed Press, 2013), 181.

[7] Ibid.

Euro-Americans brought their own cultural practices with them and transformed their surroundings for an agricultural and urban livelihood. Joseph N. Nicollet foretold how the forests around Devils Lake and the river tributaries would help settlers adjust in their first few years on the prairie through the use of the timber. "While the excellent soil and healthful climate would assure success to various agricultural efforts," he wrote, "destruction is unhappily too often a prelude to settlement."[8]

While the Ojibway and Dakota viewed the quick transformation of the tallgrass to agriculture as destruction and a loss of life as they knew it, Euro-American settlers saw this new region as the perfect landscape for agriculture and urban development. After the discovery of the direct opposite of a desert-like land, settlers' excitement in an open, expanse of land for settlement and agriculture spurred them in what they saw as positive change in an agricultural, receptive soil. Many who first settled along the rivers admired the lush growth of vegetation and staked their claims near or in tree stands. "Predominantly oak, although also poplar, willow, elm, ash, native plums, cranberries, June berries, and fruit shrubs," wrote Peter J. Smith in 1882, "were in abundance, [and] mainly caused the selection."[9] While others moved out onto the prairie landscape, many planted trees for shade, a windbreak, and to replicate their original farms and urban settings. For many, the tallgrass prairie was a foreign, level landscape but ripe with promise of a successful future for themselves, their families, and their community.

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[8] Joseph N. Nicollet, *Joseph N. Nicollet on the Plains and Prairies*, 195.

[9] Peter J. Smith, "Dakota Days of Years Ago," Unpublished Peter J. Smith Papers, Small Collections 1723, Institute for Regional Studies, North Dakota State University, Fargo, North Dakota.

All who lived in the Red River Valley, whether Native American or Euro-American, learned how the simple appearance of this landscape proved difficult and sometimes fatal. “It was a region mysterious for its apparent simplicity,” Louise Erdrich explained, “Grass and sky were two canvases into which rich details painted. . . A prairie burned over one year blazes out, redeemed in the absolving mist of green the next.”[10] Prairie fires, temperature extremes, storms of blizzards, hail, and sudden rains, floods, droughts, insects of mosquitoes and grasshoppers, and even hunger caused havoc in people’s lives and sometimes death. As settlers moved on to the tallgrass, they changed the perennial grasses and forbs into annual crops and garden vegetables and they changed the ecosystem of the prairie. The animals, birds, reptiles, and insects besides butterflies, bees, and moths that lived in this region diminished dramatically through loss of habitat and hunting. A few farmers brought more efficient forms of control for the marauders of their gardens and crops. After Smith described the flush prairie chickens and ducks and the wild artichokes everywhere in the still young, agricultural Red River Valley, he noted how some farmers kept predators off their wheat. “To protect wheat [from crows],” he wrote, “farmers enclose fields with a furrow sown thickly with grain steeped in strychnine. Next turn of sod covers their bodies.”[11]

The use of strychnine poison turned into one answer in the eradication of undesirable animals and birds who destroyed crops and livestock. “Strychnine, first manufactured domestically in the 1830s,” explained environmental historian Dan Flores, “had by the 1850s

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[10] Louise Erdrich, “Big Grass,” *The Tallgrass Prairie Reader,* Edited by John T. Price (Iowa City: University of Iowa Press, 2014), 227.

[11] Vera Kelsey, ‘Vera Kelsey Papers notes,’ Mss11B3F16 folder, #2633 Collection, Institute for Regional Studies, North Dakota State University, Fargo, North Dakota.

become a regular commodity at Western trading posts."[12] Strychnine killed wolves and coyotes, which most Euro-Americans considered dangerous, evil, and unnecessary. Bounties on predators were another form of eradication. Northwest of the Red River, Peter Smith in Cavalier County received $1 whereas Pembina County offered $2.50 for coyote pelts in the 1880s.[13] It was not until the early 1930s when Aldo Leopold, who nationally surveyed wildlife conditions, and Olaus Murie, who researched elk herds for the Biological Survey, that the assault on predators was studied and refuted.[14] Into the mid1900s throughout the United States, wolves and coyotes were hunted, poisoned, and killed because they were predators. In 1930, Leopold, Murie, and others discovered in their studies that once many of the predators were killed the ungulates or prey, like deer and elk, flourished. As their populations increased, the animals began dying from starvation and disease after they stripped major areas of vegetation.[15] Similar to the gopher and rabbit population explosion in the 1880s through the 1900s in the Red River Valley, once the predators were eradicated, their prey thrived and multiplied. In Aldo Leopold's book *Game Management*, he wrote a need for a new conservation to 'prevent the deterioration of the environment.'[16] "The real end," Leopold observed, "is a universal symbiosis with land, economic and ethical, public and private."[17] In the early 1960s, North Dakota ended bounty payments and there were only a few counties in Minnesota that still offered bounties. Recently, Game and Fish

[12] Dan Flores, 'Wrangler Coyote, An American Original,' http://www.historynet.com/coyote-an-american-original.htm; originally published in *Wild West,* April 2013.

[13] Peter J. Smith, 'Dakota Days of Years Ago,' 21.

[14] Curt Meine, *Aldo Leopold, His Life and Work* (Madison: University of Wisconsin Press, 1988), 256-257, 287.

[15] Ibid., 287.

[16] 304.

[17] Ibid.

biologist Stephanie Tucker noted the importance of predators in the natural symbiosis of wildlife control. "Where wolves are present, they help control the coyotes," Tuck explained, "and where coyotes are present, they help control fox numbers."[18] While loss occurred in duck and deer populations due to predation, a greater loss in wildlife population existed because of loss of habitat.[19] Communities of wildlife within the natural world disappeared as urban and agricultural development increased.

Agricultural and urban growth greatly reduced the diverse, profuse tallgrasses and forbs--now a minute portion of what it once was. Fragments of less than one per cent now exist. The plowed tallgrass served as a valuable compost for the rich soil which produced a monoculture of acres of wheat, oats, rye, and barley, with additional acres in potatoes, corn, and sugarbeets in later years. A Nature Conservancy published a graph of the tallgrass disappearance after Euro-American settlement and development which showed the changes.[20] Even the length of the growing season for cool-season crops changed to accommodate different warm-season crops, like corn and soybeans. "Between 1900 and 2010," reported Elizabeth Weise, "the growing season . . . of Langdon [in northern North Dakota] had lengthened by 21 days."[21] A few years ago, a major portion of the Red River Valley basin changed from a plant hardiness zone of 3b to

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[18] Brian Gehring, *Bismarck Tribune,* 29 December 2011, http://bismarcktribune.com/lifestyles/outdoors/coyote-bounties-do-they-work/article-52c920b0-31a4-11el-8124-001871e3ce6c.html; http://tomcherverny.areavoices.com/2014/01/09/counties-lose-interest-in coyote-bounties-as-hunter-trapper-interest-grows.

[19] Ibid., http://tomcherverny.areavoices.com/2014/01/09.

[20] Kim Alan Chapman, Adelheid Fischer, and Mary Kinsella Ziegenhagen, *Valley of Grass, Tallgrass Prairie and Parkland of the Red River Region* (St. Cloud: Nature Conservancy, 1998), iii.

[21] Elizabeth Weise, "North Dakota Climate Change able to produce corn crops," *USA Today*, 17 September 2013; http://www.usatoday.com/search/%22climate%change%22/.

a plant hardiness zone 4a.[22][Figure A 15] Now, "more than 90 percent of the world's food is supplied by fifteen plant species," observed Yvonne Baskin, "and nearly two-thirds of that total comes from just three grains: rice, corn, and wheat."[23]

Other changes in agriculture occurred, which even amazed some farmers who experienced the transformation. Scientists continued to research disease resistant crop varieties and more efficient ways to reduce weeds and predators that damaged crops. After World War II, new wheat durum crops, corn, hard red spring wheat, and other grains with more disease resistance produced high yields for farmers.[24] Scientists continued to research how to control damaging weeds and insects. The use of chemicals for weed and insect control in addition to synthetic fertilizers for crop growth burgeoned. "The chemical revolution initiated during the war was joined eagerly by the North Dakota Agriculture Experiment Station," wrote David Danbom, "[and] DDT was the magic bullet. . . to eradicate pests."[25] Like the poisons utilized earlier for grasshopper, gopher, and crow control, herbicides, fungicides, and synthetic fertilizers were spread in both rural and urban communities with the sanction and backing of the agriculture agents, the U.S.D.A., and other agencies in the federal government. Within ten years, citizens began to recognize problems, particularly with DDT. Like the poisons before it, DDT killed all

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[22] Clark Patterson and Karklis Laris, 'Plant Hardiness Zones 1990 with New Change in 2012,' *The Washington Post,* 25 January 2011; 2012, http://www.washingtonpost.com/wp-srv/special/local/planthardinesszones/index.html.

[23] Yvonne Baskin, *The Work of Nature, How Diversity of Life Sustains Us* (Washington, D.C.: Island Press, 1997), 137.

[24] Elwyn B. Robinson, *History of North Dakota* (Lincoln: University of Nebraska Press, 1982), 448.

[25] David B. Danbom, *"Our Purpose is to Serve, The First Century of the North Dakota Agricultural Experiment Station"* (Fargo: North Dakota Institute for Regional Studies,1990), 133.

insects, birds, and even animals who came in contact with it. When Rachel Carson wrote *Silent Spring* in 1962, she explained the detriments of chemical use to the natural world and humankind:

> Arsenic. . . still the basic ingredient in a variety of weed and insect killers. . . is a highly toxic mineral . . . and a recognized carcinogen. . . Modern insecticides are more deadly. . . DDT, discovered in 1939. . . pass from one to another in the food chain.[26]

Scientists and those who used the chemicals discovered another problem as well. Insects and weeds developed immunities to the chemicals used to destroy them. This meant either a stronger dosage or a stronger mixture of chemicals needed to be created for eradication of the pests and weeds.

Aldo Leopold explored the issue of weed control and observed a nonchemical solution for weeds. "Most weed problems arise from overgrazing, soil exhaustion, and needless disturbance of more advanced successional stages," he surmised, 'and that prevention of these misuses is the core of the problem."[27] He thought it ironic how 'weeds,' like the ragweed and horseweed, actually function as a preparation in the soil for future 'high-yielding' crops.[28] Ten years later, Carson urged more discernment in the use of chemicals with the need to reduce their rampant use, particularly DDT. DDT eradicated insects but it also sickened and killed birds and other animals. If applied too liberally, the soil absorbed DDT. The chemical went into the underground water table. DDT also flowed into streams, rivers, and lakes. Fish and the birds and

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[26] Rachel Carson, *Silent Spring* (Boston: Houghton Mifflin Company, 1962), 16-23.

[27] Aldo Leopold, *For the Health of the Land, Previously Unpublished Essays and Other Writings*, Edited by J. Baird Callicott and Eric T. Freyfogle (Washington, D.C.: Island Press, 1999), 210.

[28] Ibid., 211.

animals who ate the fish died as well. Her important research and writing of the immensity of the problem with the liberal use of chemicals in the 1950s created public and government awareness about it. *Silent Spring* was published in 1962, widely read, and discussed. A federal inquiry eventually led to the establishment of the Environmental Protection Agency in 1970, placed 'pesticide oversight and Food Safety Inspection from the U.S.D.A. into the E.P.A.,' raised environmental awareness, and helped implement the Endangered Species Act in 1973.[29] The E.P.A. also banned DDT on June 14, 1972. The agency noted that over the previous 30 years 675,000 tons of DDT were applied in the U.S. 1959 was the highest year of application when home owners, farmers, foresters, cities, and other 'industrial and commercial purposes' applied over 80 million pounds to their gardens, crops, forests, and neighborhoods nationwide.[30] During the war, DDT had helped reduce malaria and typhus, which gave it a high rating as a new pesticide. Unfortunately, little was known of how long it remained in the environment or of its highly mobile, deadly capabilities.

As scientists continued to hybridize and search for productive, disease resistant varieties of crops, a new field of study developed in the 1980s. Biotechnology research for the development to improve plants and animals as marketable products evolved rapidly. Now called genetic engineering, the 'American Association for the Advancement of Science . . . [considered it as] one of the four major scientific revolutions of this century.'[31] The Supreme Court granted

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[29] Edwin O. Wilson, 'On Silent Spring,' *Courage for the Earth, Writers, Scientists, and Activists Celebrate the Life and Writing of Rachel Carson,* Edited by Peter Matthiessen (Boston: Houghton Mifflin Company, 2007), 33.

[30] 'DDT Ban Takes Effect,' http://www2.epa.gov/aboutepa/ddt-ban-takes-effect.

[31] Hiram Drache, *History of U.S. Agriculture and Its Relevance to Today* (Danville: Interstate Publishers, 1996), 378.

patent rights on genetically modified seeds, which opened the acceleration of research and production of biotechnology seeds. This encouraged an international market in which over a thousand traditional seed companies were purchased.[32] If one has no problem with plant modification to carry its own insect and disease resistance or resist weed killer applications, then this turned into a highly efficient form of crop production. By 2000, "more than a hundred million acres of farmland," wrote Ann Vileisis, "were planted in GE crops."[33] In addition to the increased acres in GE crops, more than seventy percent of the food sold in 'supermarkets contained genetically engineered ingredients with no mention on its label.'[34]

However, even though GMO seeds have multiplied over forty years of sales and growth, detractors pointed to several reasons why these seeds should not be used. One researcher discovered that 'reduced plant growth, lower nutrient density, increased disease, greater stress susceptibility of GMO crops, and a need for more pesticides were well documented.'[35] Problems existed for organic or traditional crop growers, who utilized different seed for their crops. GMO crops readily cross pollinated with non GMO plants of the same species.[36] More recent evidence indicated a larger problem in the use of genetically modified corn. Butterflies and bees population diminished, as *Bacillus thuringiensis* in the corn pollen came into contact with the

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[32] Ibid.

[33] Ann Vileisis, *Kitchen Literacy, How We Lost Knowledge of Where Food Comes from and Why We Need to Get It Back* (Washington: Island Press, 2008), 228.

[34] Ibid.

[35] Dr. Don M. Huber, 'GMO, Failed Promises; Flawed Science: A Serious Health and Safety Issue,' Unpublished paper, Purdue University, www.responsibletechnology.org.

[36] David Blackbourn, *The Conquest of Nature, Water, Landscape and the Making of Modern Germany* (New York: W.W. Norton, 2006), 358.

pollinators or were eaten by caterpillars as the pollen rested on other plants.[37] To add to the diminishment of diversity in the natural world, GMO crops by their very nature as patented products allow few independent scientists to research their product or verify their data. Recent evidence of carcinogenic factors in the glysophate to eliminate weed growth have been announced by the World Health Organization, which implemented its own tests. The concern continued in how GMO and pesticide residue interacted within human tissue once the plant or animal has been eaten by the consumer or absorbed in the natural environment.[38] In addition, weeds and harmful insects have developed immunities to glysophate and a few of the GMO crops. The battle for a more receptive environment for monoculture crops opened the door for other nonnative plants and insects, which GMO proponents utilized as an argument for their genetically armed, battle ready plant.

When Alfred Crosby wrote about the Old World and New World exchange in plants, animals, and diseases in 1492, he explored the 'biological and cultural consequences' of how Europeans and Native Americans experienced both positive and negative aspects in the interchange. "That trend toward biological homogeneity," he noted, "is one of the most important aspects of the history of life on this planet since the retreat of the continental glaciers."[39] As the fur traders, settlers, and bonanza farmers moved into the Red River Valley, they dramatically altered the landscape with domesticated crops and animals. However, seeds of invasive plants like leafy spurge, quack grass, and Russian thistle introduced from other

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[37] Ibid.

[38] Dr. Don M. Huber, `GMO,' Unpublished paper.

[39] Alfred W. Crosby, Jr., *The Columbian Exchange, Biological and Cultural Consequences of 1492* (Westport: Greenwood Press, 1972), 3.

countries either by scientists who researched for adaptable crops and grasses or by settlers who accidentally carried weed seeds in their grain created immense problems for themselves and their environment. With few natural enemies, the invasive weeds thrived. Birds, like the English sparrow, were brought into the United States to eat weed seeds. They in turn crowded out the native birds that ate weed seeds, also. Damaging insects arrived as well. When the European bark beetles arrived in infected elm logs from Europe in the 1930s, the American elm trees began to die in droves. The native elms, *Ulmus americana,* contained no resistance to the marauding beetles, which spread out from Cleveland, Ohio, in the early 1930s.[40] These beautiful over fifty year old elm trees lined many urban boulevards and shaded many buildings from the summer's hot sun. Minneapolis trees felt the beetles bite in the 1970s and the Red River Valley experienced the devastation in the 1980s.[41] This ended the planting of a singular species of a tree on boulevards, but it also led to more plantings of the ash tree, *Fraximus americana,* which now has a similar problem with the Emerald ash borer.[42] "Variety is key. . . for those who want the hardiest trees," advised horticulturist Roger Wagner, "Plant a bur oak, *Quercus macrocarpa,* a Spring Snow flowering crab, *Malus sp.,* or an American Linden, *Celtus occidentalis,"* which are hardy trees for the Red River Valley.[43]

The Red River and its tributaries changed in differing ways, as well. When Nicollet traversed the northwestern Red River basin along the Sheyenne River, he described the river and

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[40] 'Dutch Elm Disease,' http://www.cutchelmdisease.ca/history/#sthash.VhroweTQH.dpuf.

[41] 'The Battle Between Foresters and the Dutch Elm Disease Continues,' WDAY News, 22 July 2012.

[42] Ibid.

[43] Ibid.

the surroundings. “The left bank is well wooded up to the height of the plateau,” he wrote, “The river is without obstructions other than boulders. The bed is gravel and the water is good, clear, and full of fish.”[44] The clearness of the water eventually changed to a muddy appearance. Differing drainage systems, now an increased water flow from the Devils Lake run-off into the Sheyenne River, differing land use methods of urban and agricultural development along the river, dams and holding ponds have changed the flow and mixture of the water. Devils Lake shut down its outlet valves on November 10, 2015. The 165,836 acre-feet of water released into the Sheyenne River during the summer months nearly lowered the lake by a foot.[45] The water plant in Valley City, which uses Sheyenne River water for its water source, is currently under renovation to handle the additional sulfates added to the water. In the early 1900s Geologist Howard Simpson observed about the Devils Lake, “its future . . . may be only read from the past . . . fluctuations in response to variations in rainfall may be repeated in the future as in the past . . . Periods of rise will follow periods of fall.”[46] This is the only continuity about Devils Lake and the Red River and its tributaries, which will rise and fall from too much or too little rain or melting snow. A Nature Conservancy graph of droughts and floods from 1900 to 2000 illustrates the droughts and floods in the Red River Valley.[47] Floods occurred in Fargo at 39.72 feet in 1997; 40.82 feet in 2009; 37.34 feet in March 21, 2010; 38.81 feet in April 9, 2011; and 33.27

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[44] Nicollet, ‘Joseph Nicollet,’ 178.

[45] Keven Bonham, ‘Devils Lake outlets set for shutdown,’ *The Forum*, 10 November 2015.

[46] Ed Murphy, ‘The Relentless Closed System of Devils Lake,’ *The Forum*, 29 January 2012.

[47] Chapman, Fischer, and Ziegenhagen, *Valley of Grass,* iii.

feet in May 2, 2013.[48] Fargo designed their dikes for 44 feet of flood water.[49] Up to 2014 and according to the graph, a major part of the Red River Valley has been in a wet pattern. During these last two years, summer rain up to August and then a major dry spell until Spring has concerned some about low level droughts. Given the extensive tributaries within the Red River basin, the height and timing of floods are difficult to predict.

Sometimes sudden, heavy rainfall makes floods just as difficult to fight. Overflow tributaries spread their rampage into the Red River, which flows north. Flood levees, generally an earth created dike, or sandbags temporarily protects property and constricts or sends the water elsewhere. A diversion channels water around the protected property. Both constructions are never fool proof and water sometimes impacts other areas. Floods are actually nature's form of cleansing the landscape – a natural occurrence of too much water, which for the Red River searches and spreads its watery flow to reach Lake Winnipeg and then the Hudson's Bay. "In a sense, there is no such thing as a flood in the natural world," wrote environmental historian Daniel McCool, "all rivers vary dramatically in volume and breadth, depending on season and precipitation."[50] It turns into a flood and sometimes heart ache and disaster when property – houses, towns, cities, and farms – are in its path.

Conversely, there are times when not enough water reaches our rivers through snow melts or rainfalls. Aquifers, which are underground lakes, are utilized from wells for individual residents or cities for water use. For instance, Buffalo and Wahpeton obtain water from their

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[48] https://www.ndsu.edu/fargo_geology/floodgeography.htm.

[49] Ibid.

[50] Daniel McCool, *River Republic, the Fall and Rise of America's Rivers* (New York: Columbia University Press, 2012), 167.

aquifers for 'municipal, industry, agriculture, and domestic use' in the southern Red River Valley.[51] Pumping from the aquifers began in 1948 and increased by 1974. By 1980-93, pumping increased to a constant use, which drew concerns as the withdrawals increased to the point that long-term recharges were negligent.[52]

What happens when a period of drought reduces the water level of the rivers and the underground aquifers? The answer, besides water use from the Baldhill Dam for various cities, lay in western North Dakota. In the original federal and state agreement of the Garrison Dam was the proposal of water to be diverted to the Red River Valley as a secure source of water. The Water Topics Overview Committee and the State Water Commission met on November 4, 2015, and discussed the implementation of the long overdue project. They decided a pipeline along either Interstate 94 or Interstate 200, which carries Missouri River water from Washburn, North Dakota, was the viable solution for permanent water use in Central and Eastern North Dakota.[53] However, again the question of water quality or differing biota from the Missouri River eventually into the Sheyenne or Red River caused grave concern with Canada. Until the issue is addressed to the satisfaction of Canada and Minnesota, the issue is at a stalemate. In addition, the

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[51] M. E. Schoenberg, *Hydrogeology and Sources of Recharge to the Buffalo and Wa2peton Aquifers in the Southern part of the red River of the North Drainage Basin*, Water Resources Investigations Report 97-4084; Minnesota Department of Natural Resources and Moorhead Public Service; U. S. Department of the Interior, U.S. Geological Survey, Denver, Colorado, 1998, 33.

[52] Ibid., 32, 33.

[53] Nick Smith, 'RRV water project prepares for design phase,' *The Forum*, 5 November 2015.

slowdown in the recent oil industry and the taxes which fund the project has lessened its immediate construction.[54]

The problem of water for urban, industrial, and agricultural use has recently surfaced with the population expansion in urban communities. Fargo, Moorhead, West Fargo, and Horace recently experienced a population surge, which increased water demands. Fargo projected its growth in 2007:[55] "[If a drought occurred], the city could meet only 32 percent of its needs," estimated Dean Karsky, "while the Red River Valley's communities could fulfill about 55 percent of their water needs."[56]

Other cities were growing in population and industry as well in the Red River Valley. In 2007, the U. S. Bureau of Reclamation assessed the water system throughout the Red River Valley in communities of over 500 people. [Appendix G] The assessment analyzed water quality, groundwater or surface water (rivers) capability, and future capabilities to receive water from its current source. All met National Primary Drinking Water Regulations, NPDWR. In the future, a few will have problems with the lower arsenic standards and most have levels that exceed total dissolved solids (TDS), pH, and sulfates.[57] Grand Forks and Fargo expressed interest as future water treatment centers for the region, while several communities showed future problems of water quality or lack of water from groundwater sources. Some of the largest industry users of water on the western side of the Red River were Minn-Dak Farmers Coop and

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[54] http://www.prairiebizmag.com/event/article/id/23137/#sthash.rqO1akmm.dpuf.

[55] http://www.cityoffargo.com/.../Fargo%20Growth%20Plan%202007 App.

[56] Ibid.

[57] Report on Red River Valley Water Supply Project Needs and Options, Water System Assessment Executive Summary, U. S. Bureau of Reclamation, 2007: https://www.usbr.gov/.../executive_summary_system_assessments.

Cargill north of Wahpeton, Hankinson Renewal Energy Ethanol Plant, ADM Sunflower Processing in Enderlin, Cargill and Tharaldson Ethanol in Fargo, and American Crystal Sugar.[58]A large aquifer of good water, which almost touches Maple River, stretches to the south underneath the Sheyenne River and Wild Rice River, and extends into South Dakota, exists in the southeast corner of North Dakota and is another possible source for water in the future.[59][See Figure A 16]

As population grew in the Red River Valley, interest returned to restoring a few areas of grasslands to tallgrass prairie. From the southern portion of North Dakota up into western Minnesota Agassiz beach ridges and into southern Manitoba areas were bought for the express purpose of providing wildlife and bird habitat in natural prairie.[60] While the Buffalo River State Park southeast of Moorhead was established in 1937 by the Moorhead Rod and Gun Club for community recreation, in the late 1970s a restoration of more land with a prairie habitat began in earnest.[61] The Nature Conservancy added to the prairie ecology as it obtained '1,000 acres south of the Buffalo River in 1975.'[62] Besides prescribed burns, the Conservancy maintains the native prairie with spot spraying, particularly for leafy spurge, mowing, and cutting by hand. Birds like the bobolink, phoebes, differing warblers, vireos, orioles, flycatchers, and at least four species of woodpeckers utilize the grassland and provide recreation for bird watchers who walk on the trails

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[58] North Dakota Studies Project, 'Water; Too Much – Too Little' (Bismarck: State Historical Society of North Dakota, (?), 2; www.NDStudies.org.

[59] Ibid.

[60] Chapman, Fischer, and Ziegenhagen, *Valley of Grass,* 36, 39.

[61] http://www.dnr.state.mn.us/state_parks/buffalo_river/narrative.html.

[62] http://www.nature.org/ourinitiatives/regions/northamerica/unitedstates/minnesota/placesweprotect/bluestem-prairie-scientific-and-natural-area.xml.

through the area. The personnel have counted of '200 species of birds and 40 species of mammals' in addition to over '250 wildflowers and grasses.'[63] Bird watching, hiking, and photographing have gained in recreational popularity in the late 1900s, which helps more fragments of grasslands and some woodlands to be preserved and provides habitat for the diminishing species of the grasslands.

Recent improvements in agriculture in land use practices partly reduced damage to the soil. The discovery that soil is a living organism with micro-organisms, which enable plant uptake of nutrients occurred in the 1980s. While phosphorus, nitrogen, and potassium were primary nutrients necessary for plant development, now research proved micronutrients as well are important. Both industrial and organic farming now incorporate additional micronutrients in their soil. "The discovery of the 20th Century," noted Larry Rasmussen, "is that the earth is a community."[64] The recent rise in organic farming and local food movements recognized the importance of how soil health is equated with healthy plants and consumers. The U.S.D.A. and other farmers realized this as well. Just recently Cass County held a well attended 'Soil Health Workshop' in 2010 in Casselton, North Dakota. Speakers addressed the issues of 'Interseeding Cover Crops into Corn and Soybeans, 'Saline Soils,' 'Vegetative Management,' and 'Using the Soil Survey Website.'[65] Organic farmers and industrial farmers began dialogues about the differing practices in farming for the positive benefit of all. Just recently, a conference for all

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[63] www.dnr.state.mn.us.

[64] Frederick Kirschenmann and David Gould, 'Tame and Wild,' *Farming and the Fate of Wild Nature, Essays in Conservation-Based Agriculture*, Edited by Daniel Imhoff and Jo Ann Baumgartner (Healdsburg, California: Watershed Media, 2006), 15.

[65] Cass County Soil Conservation District and Natural Resources Conservation, 'Cass County Soil Health Workshop,' 4 February 2010, Casselton, North Dakota.

farmers was held in Manhattan with Jeff Moyer, Executive Director of the Rodale Institute, on how to decrease both tillage and the use of herbicides for soil health.[66] Plato witnessed the desertification of his home land and wrote, "What now remains of the formerly rich land is like the skeleton of a sick man."[67] To deter the Red River Valley land from similar serious degradation, serious research continues into agriculture improvements for less land disruption with soil improvements. Increased precision technology on farm machinery for seeding, fertilizing, and herbicides reduces damages to the soil as well. One forerunner of a movement called 'farmscaping' integrated ground cover, plant strips, and even hedgerows of native plants to attract a diversity of insects for the health of the crops and pollination.[68] Minnesota Governor Mark Dayton initiated legislation for vegetation buffer strips along the edges of fields, so less chemical agricultural run-off flows into the waterways. Education and research in agricultural colleges continues to improve land use methods as well.

"The great discovery of the 20th century," wrote Aldo Leopold, "was not television or radio but the complexity of the land organism."[69] The interconnective relationship among plants, animals, soil, water, and air is why biodiversity is so important. It is a holistic community with humans as a part of it. This is the community Native Americans and the first Euro-American settlers witnessed when they lived in the vibrant tallgrass prairie of the Red River Valley. They saw what many of us will never see – life in full accordance with the natural world. We can have glimpses of that natural world and many of us can help partially restore what has disappeared.

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[66] http://kansasagnetwork.com/2015/kansas-ag-issues-podcast-11112015/

[67] Richard Manning, 'The Oil We Eat,' *Farming and the Fate of Nature*, 31.

[68] Daniel Imhoff, 'A Plea for the Bees,' *Farming and the Fate of Nature,* 101.

[69] Aldo Leopold, 'Biotic View of the Land,' *Farming and the Fate of Nature,* 118.

But, much of it is gone. “Knowledge is Power,” Francis Bacon wrote in the 1500s. We have the knowledge that a biodiverse environment is a healthy environment for all of us. We now have seen ‘for every action there is a reaction,’ whether positive or negative depending on one’s viewpoint. Our tallgrass community, which once flourished throughout the Red River Valley, flourishes again in small set-aside pockets of parks and conservatory land. Dams are now in the process of renovation for fish to spawn and repeat their patterns of life in the river systems. In our tallgrass community, we are part of the “soils, waters, plants, and animals, or collectively: the land.”[70] Our community extends beyond our houses, family, and friends for ‘our sense of place’ represents our love of this land. And many who live here have a deep love for this Red River Valley. Though there have been tremendous changes to this land and the loss in biodiversity in the natural world, there can be positive transformations back to a more biodiverse landscape. This – in green spaces along the river’s corridor, set aside natural reserves, and even the planting of more shelterbelts - some have already begun. As we learn more of the rich history of this tallgrass prairie environment and reintroduce native plants into urban landscapes, we reconnect not only the past with the present but add more biodiversity into this highly transformed agricultural and urban Red River Valley .This is important, for we are all interconnected within our natural tallgrass Red River Valley, which is the mystery and beauty of life.

[70] Aldo Leopold, *The Sandhill Almanac,* 239.

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APPENDIX A: MAPS

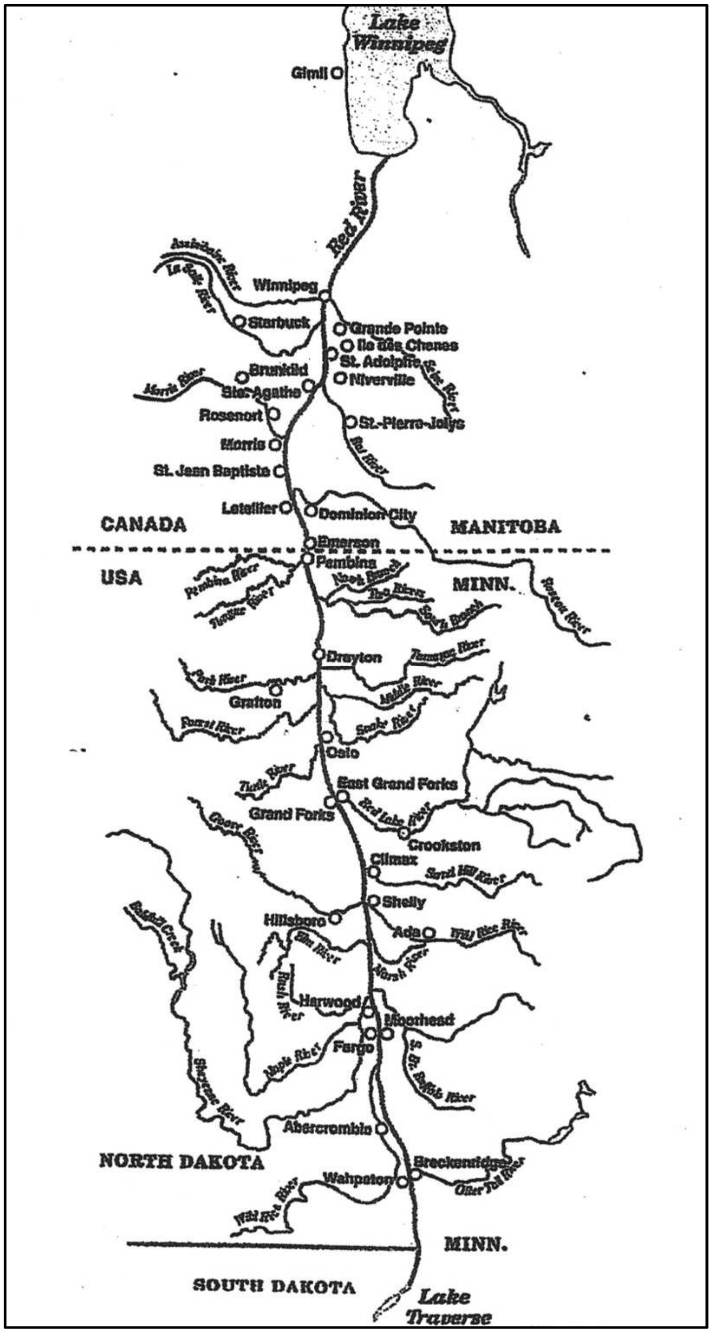


Figure A 1: Tributaries of the Red River of the North

Wayne Gunderson, Editor, *Common Waters, A Story of Life Along the Red River of the North* (Fargo: North Dakota Institute for Regional Studies, 1997), 18. Map image used with permission of North Dakota State University Press.

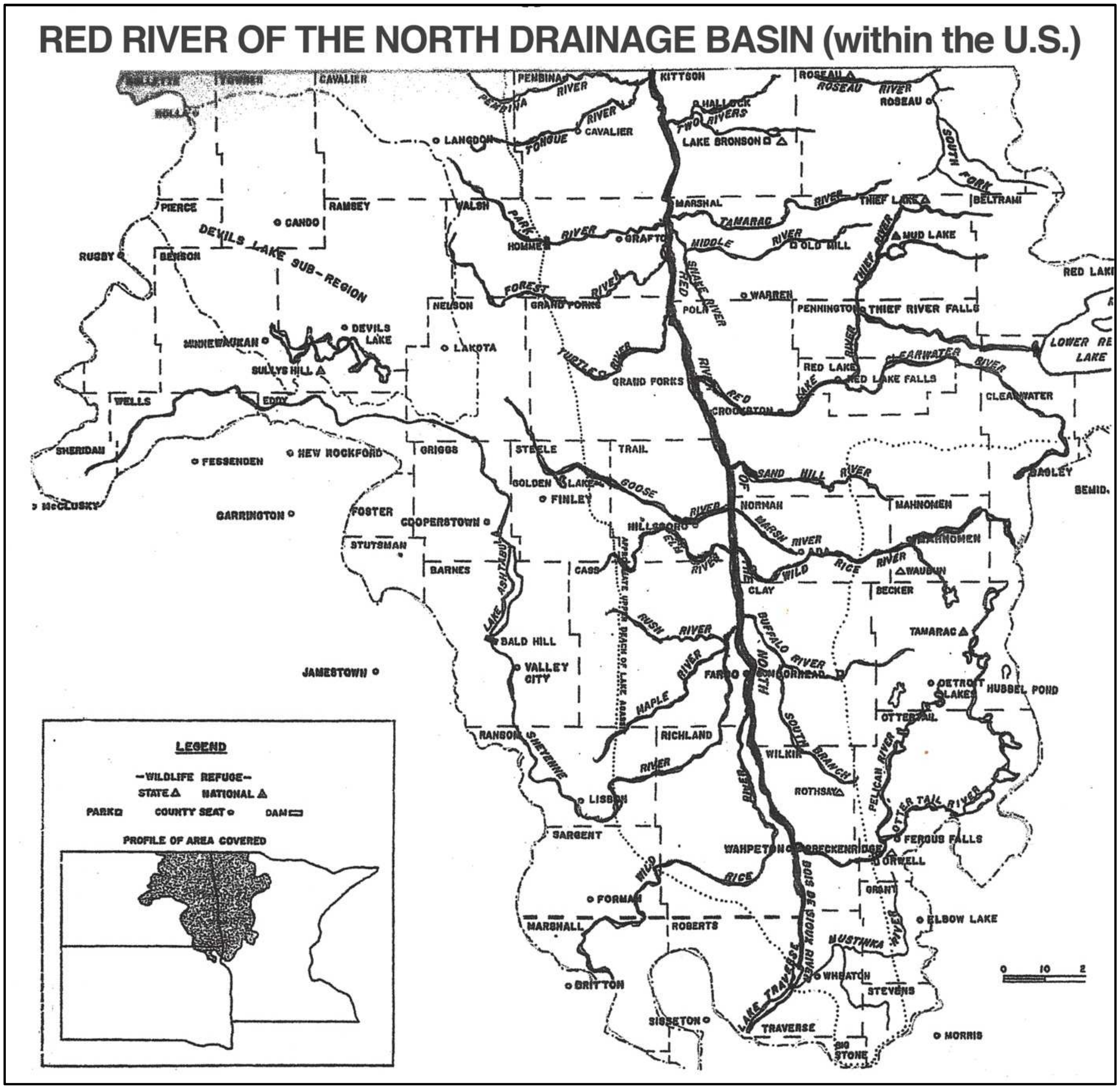
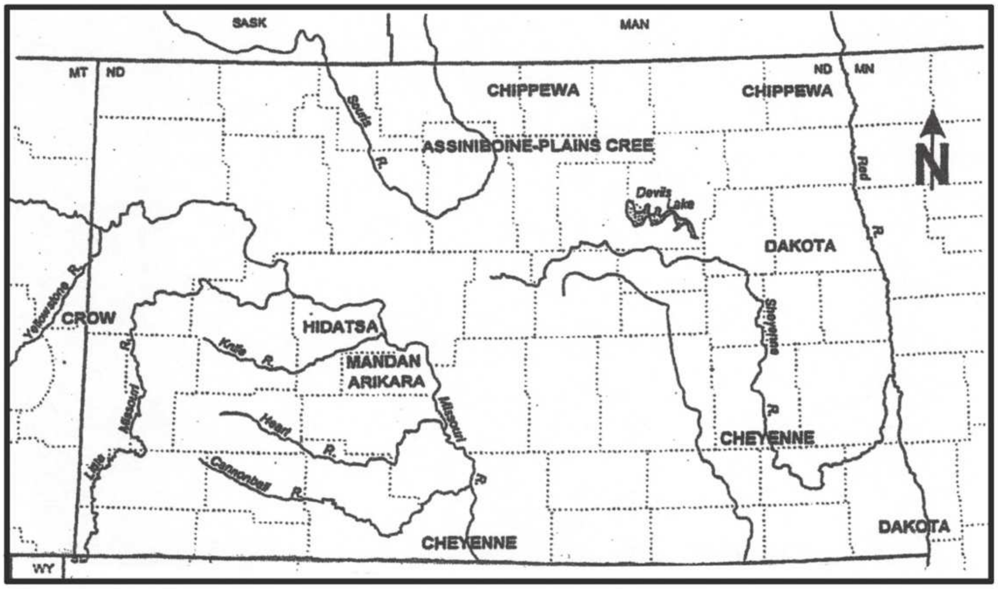
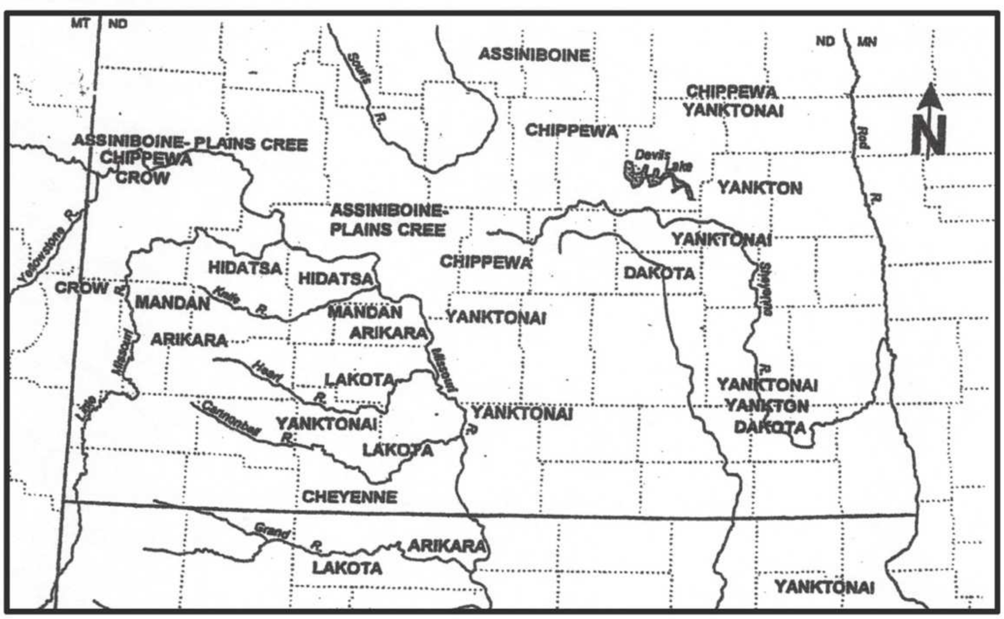


Figure A 2: Red River of the North Drainage Basin

'Red River of the North Drainage Basin (Within the U.S.),' Red River Basin Committee, League of Women Voters of Minnesota and North Dakota, *Red River of the North* (Fergus Falls, Minnesota: Secretarial Service, 1959), i. Map created by Geographer Eugene Kohlman and printed by permission of the Department of Geography, University of North Dakota, Grand Forks, North Dakota.



Map 1. Locations of tribes in the late 1700s



Locations of tribes in the 1830s and 1840s

Figure A 3: Cultural Affiliations of Native American Groups

Mary Jane Schneider, *Cultural Affiliations of the Native American Groups within North and South Dakota; an Ethnohistorical Overview* (Bismarck: U.S. Bureau of Reclamation, 2001), vi, ix.

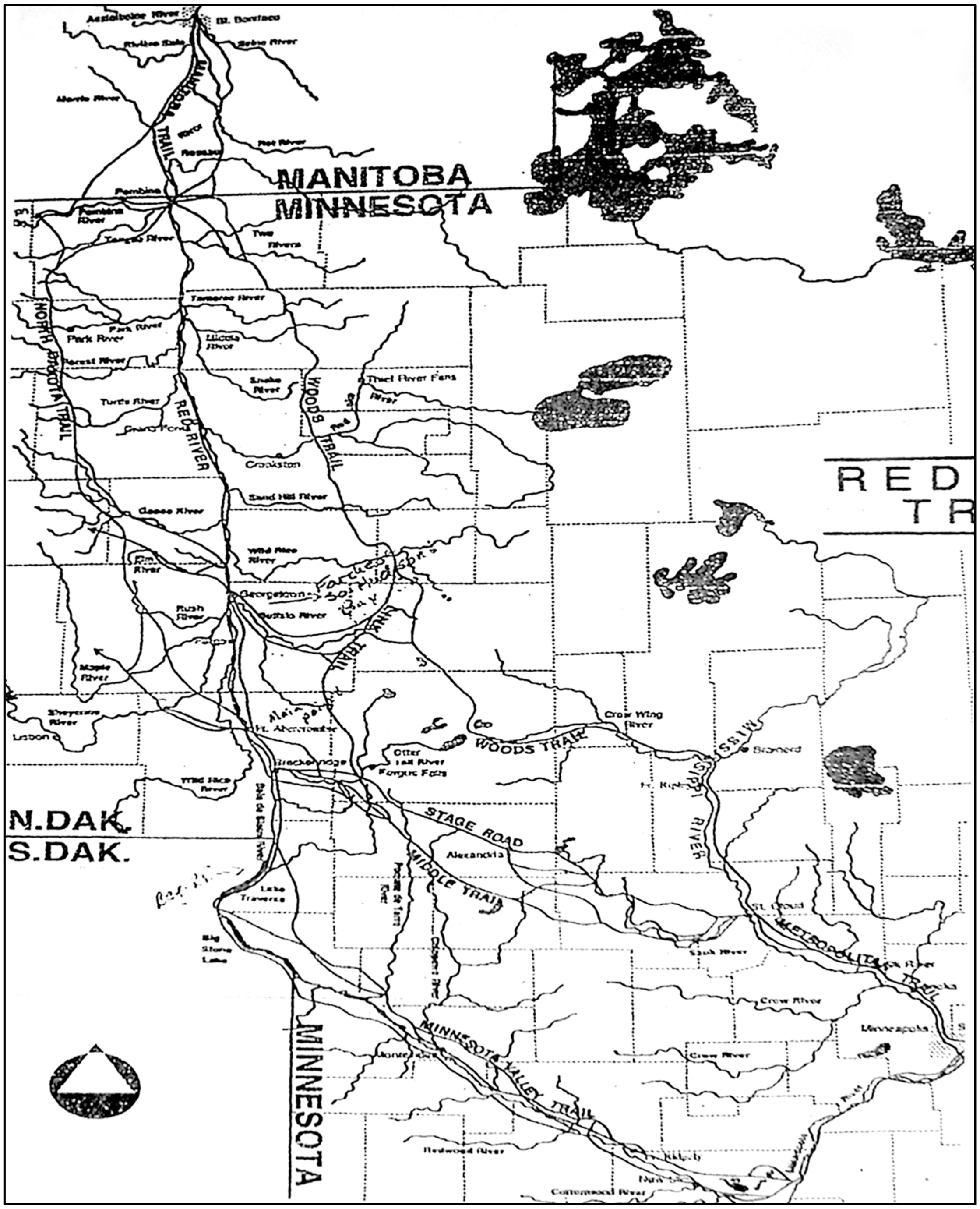
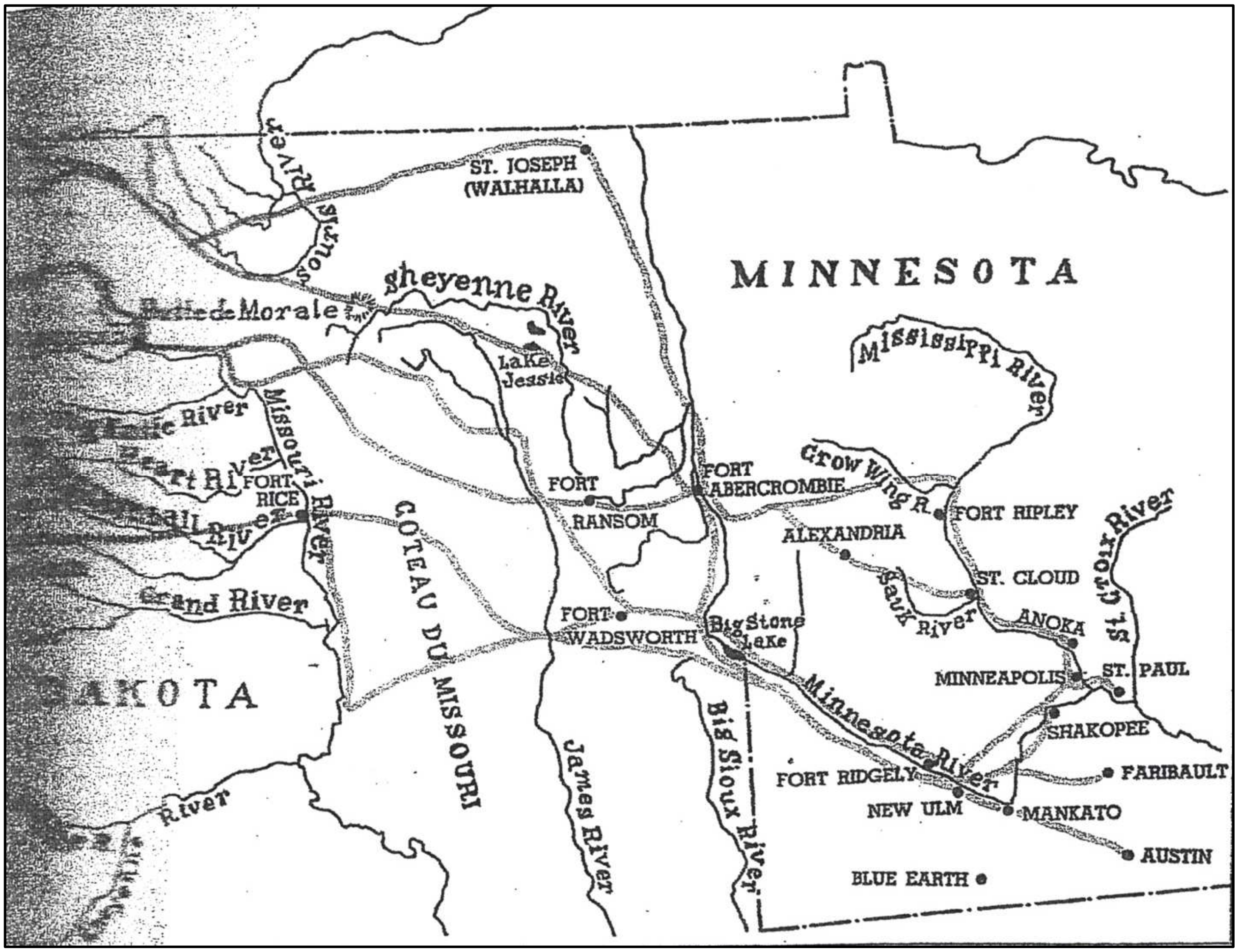


Figure A 4: Red River Oxcarts, 1820-1870

Rhoda R. Gilman, Carolyn Gilman, and Deborah M. Stultz, *The Red River Trails, 1820-1870, Oxcart Routes between St. Paul and the Selkirk Settlements* (St. Paul: Minnesota Historical Society Press, 1979), x. Map printed by permission of the Minnesota Historical Society Press.



The Years 1862-1867

Figure A 5: Wagon Trails s of the 1860

Helen McCann White, Editor, *Ho! For the Gold Fields, Northern Overland Wagon Trains of the 1860s* (St. Paul: Minnesota Historical Society Press, 1966), cover insert map and printed with permission of the Minnesota Historical Society Press.

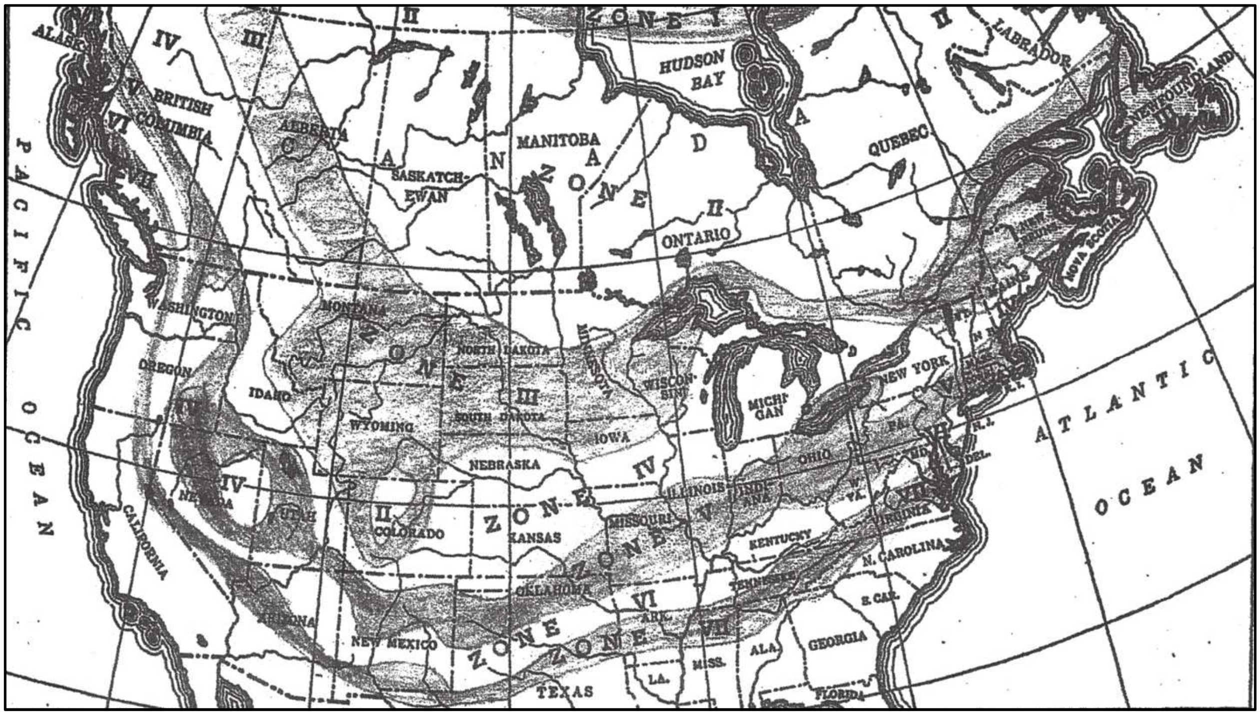


Figure A 6: Climate Zone Map

Michael A. Dirr, *Manual of Woody Landscape Plants* (Champaign: Stipes Publishing Company, 1983), 4: Map reprinted with permission of National Arboretum and United States Department of Agriculture.

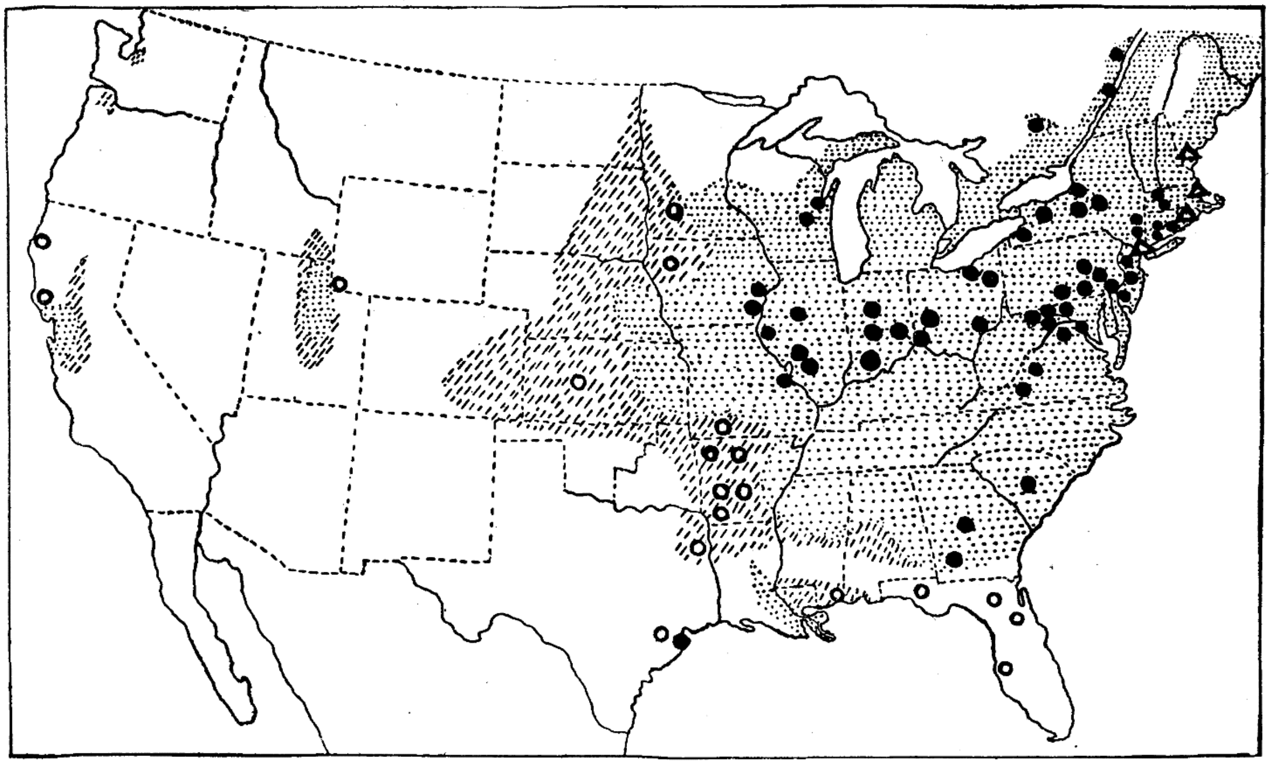


Figure A 7: Spread of English Sparrow in United States

This map shows the spread of English sparrow in the United States. The entire shaded area represents approximately the present day distribution of the sparrow [1898]; triangles indicate colonies in 1860; black spots, colonies in 1870; circles, isolated colonies in 1886; dotted area, range in 1886; lined area, extension of range up to end of l898.

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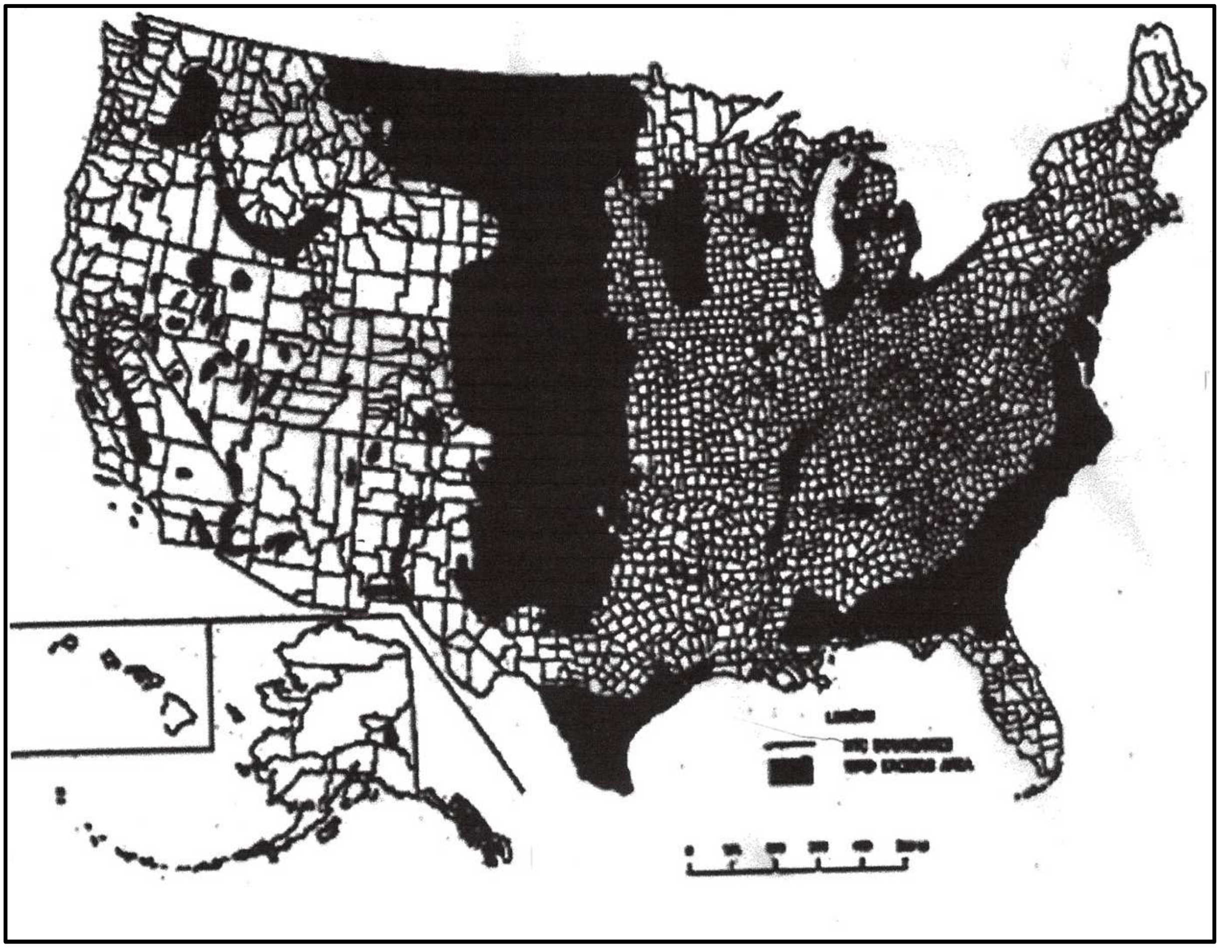

Figure A 8: Wind Erosion Susceptibility Map

Franzen Hagen, ‘Wind Erosion Susceptibility in the U.S.A. courtesy U.S.D.A. map,’ https:// www.extension.umn.edu/.../soil-erosion-history.

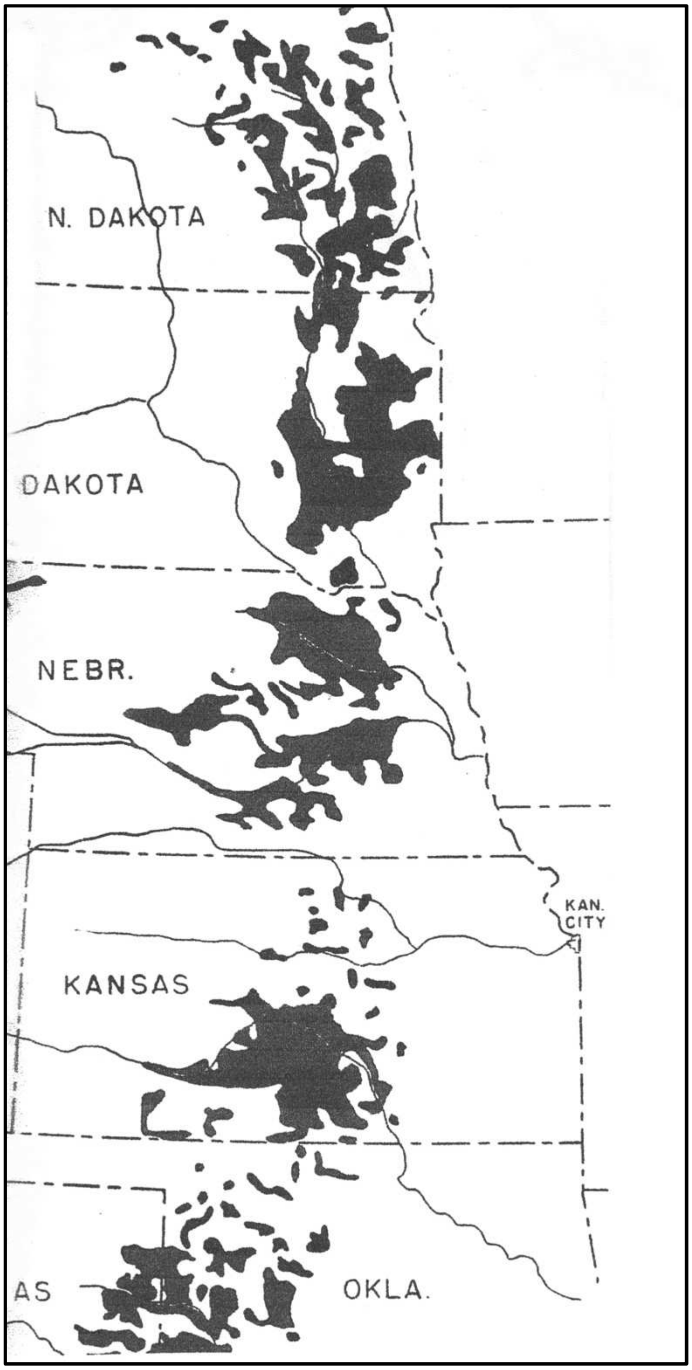

Figure A 9: Major Planting Areas

'Major Planting areas of Prairie States Forestry Project,' 1935-1942, Courtesy of United States Forestry Service,' William H. Droze, *Trees, Prairies, and People, Tree Planting in the Plains States* (Denton: Texas Women's University, 1977), 123.

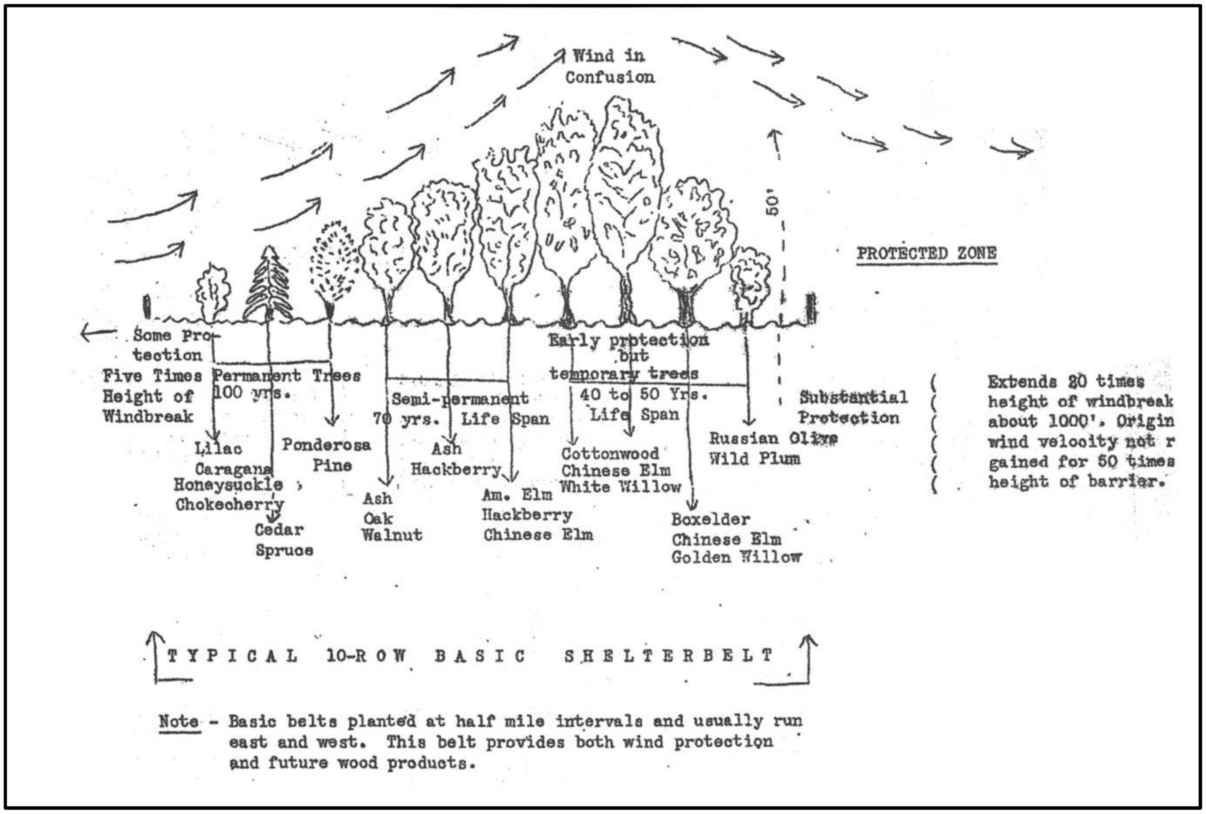

Figure A 10: Shelterbelts

North Dakota Shelterbelts, Forest Service, 'Prairie States Forestry Project, Jamestown, North Dakota, United States Department of Agriculture, 1940, 11.

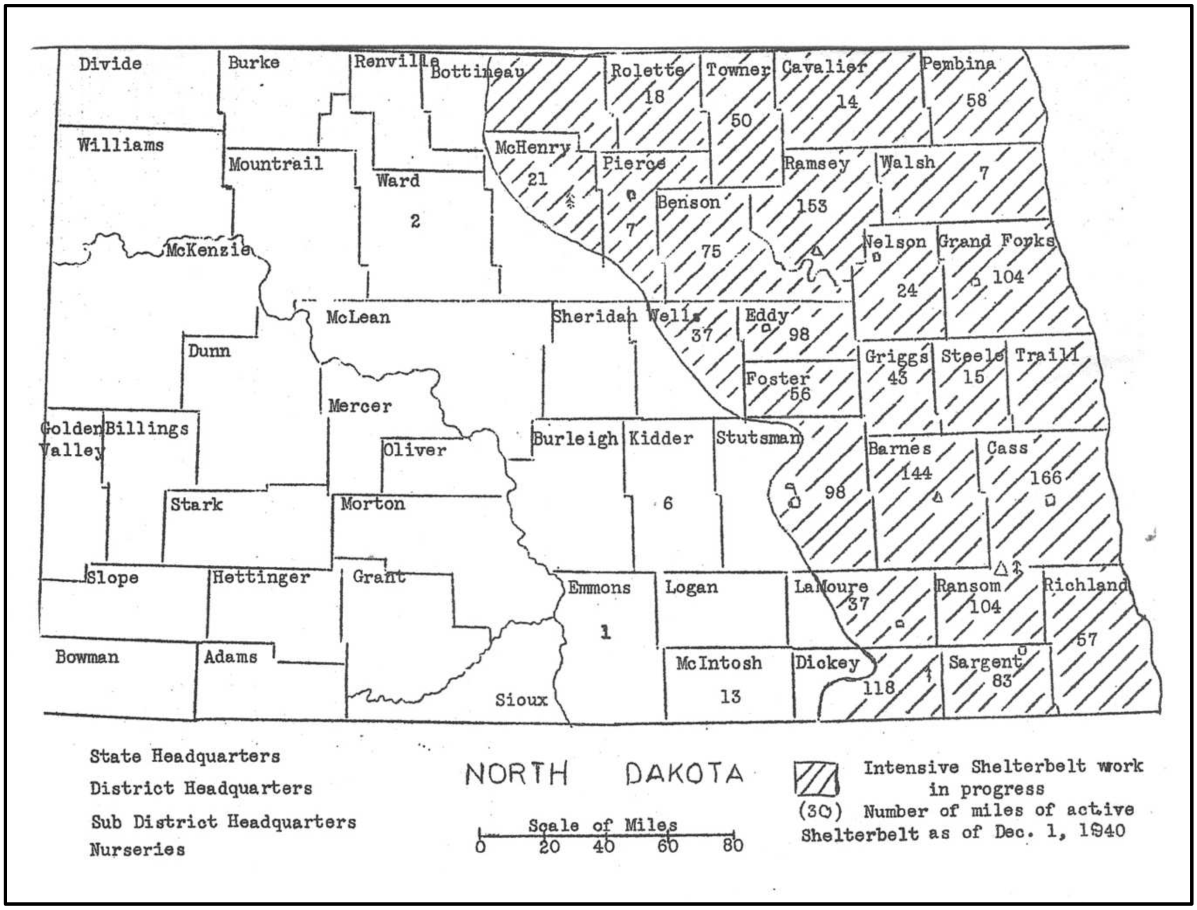

Figure A 11: North Dakota Shelterbelts

North Dakota Shelterbelts, Forest Service, 'Prairie States forestry Project, Jamestown, North Dakota, United States Department of Agriculture, 1940, 1.

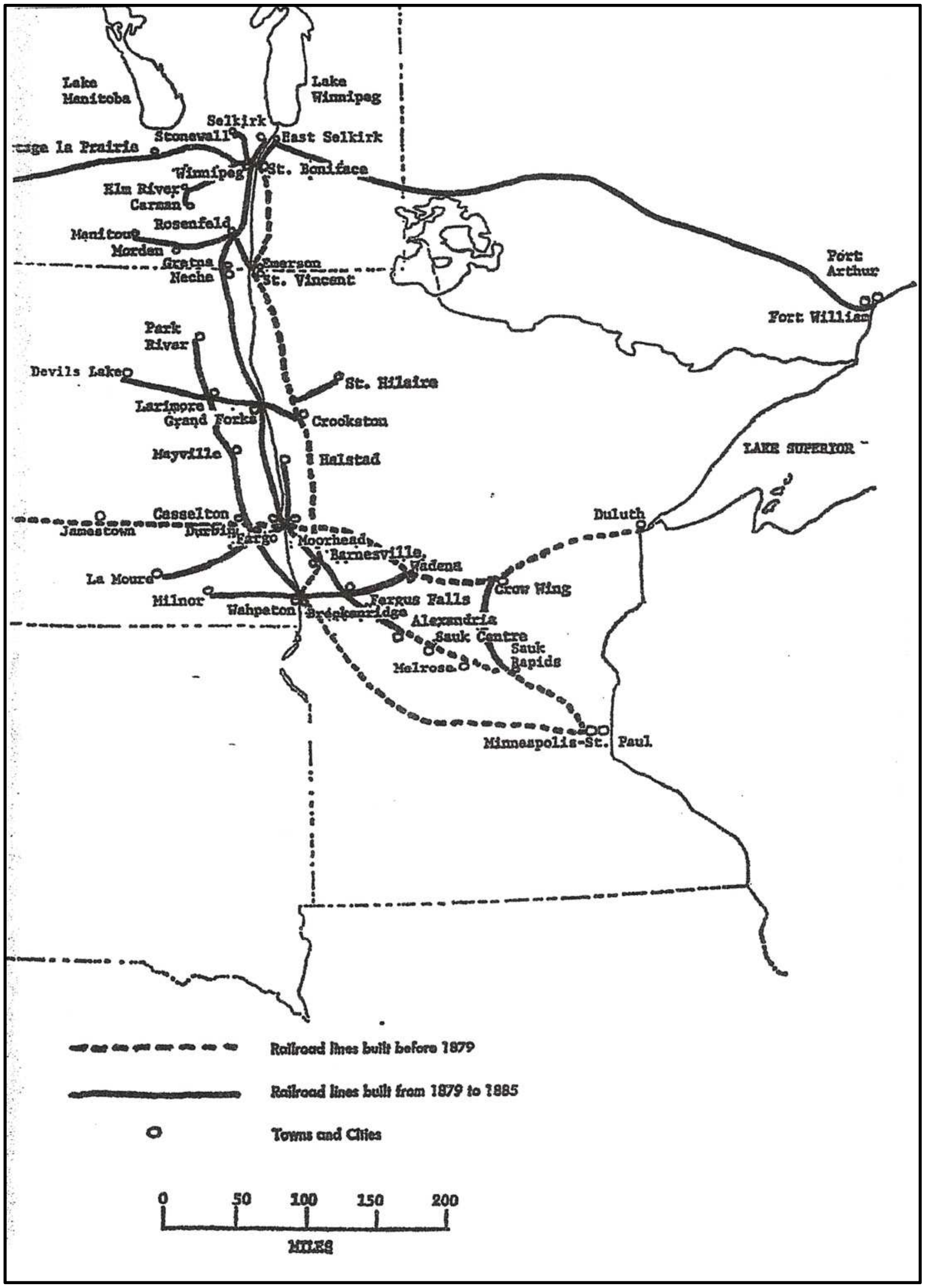

Figure A 12: Railroad Building in the Red River Valley

‘Railroad Building in the Red River Valley, 1879 – 1885,’ Norman Stanley Murray, *The Valley Comes of Age, A History of Agriculture in the Valley of the Red River of the North, 1812-1920* (Fargo: North Dakota Institute for Regional Studies, 1967), 125. Map image used with permission of North Dakota State University Press.

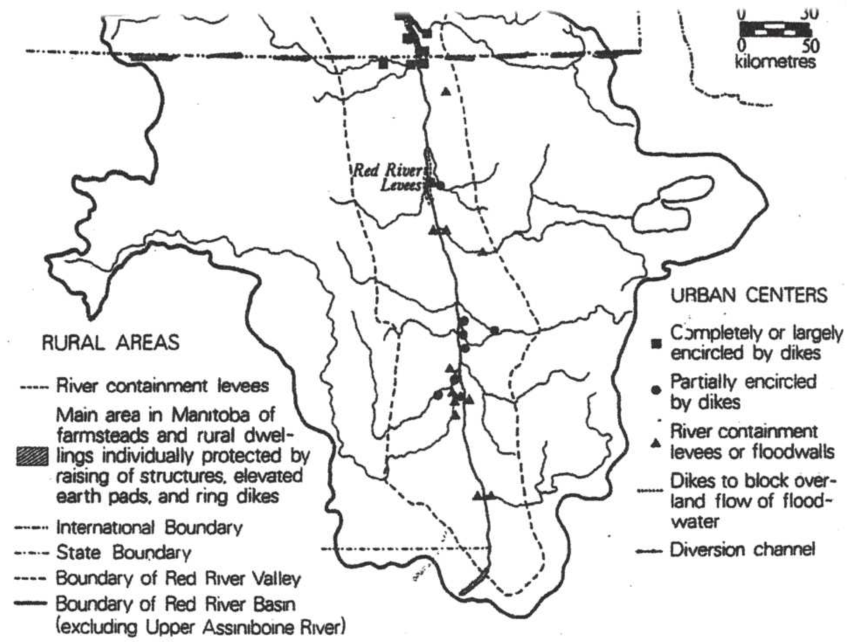

FIG. 4—Flood-control structures: dikes, levees, and diversions.

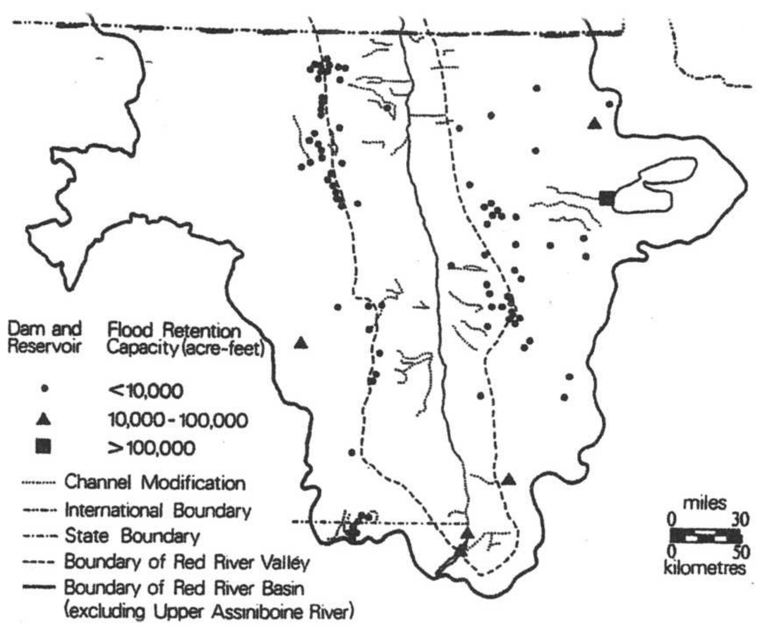

Figure A 13: Flood Control Structures

William J. Carlyle, 'Flood Control Structures . . . Dike, Levees, and Diversions and Reservoirs and Channel Modifications,' *Geographical Review,* Vol. 73, #4 (New York: American Geographic Society, l984), 337, 341. Map printed with permission of the *Geological Review.*

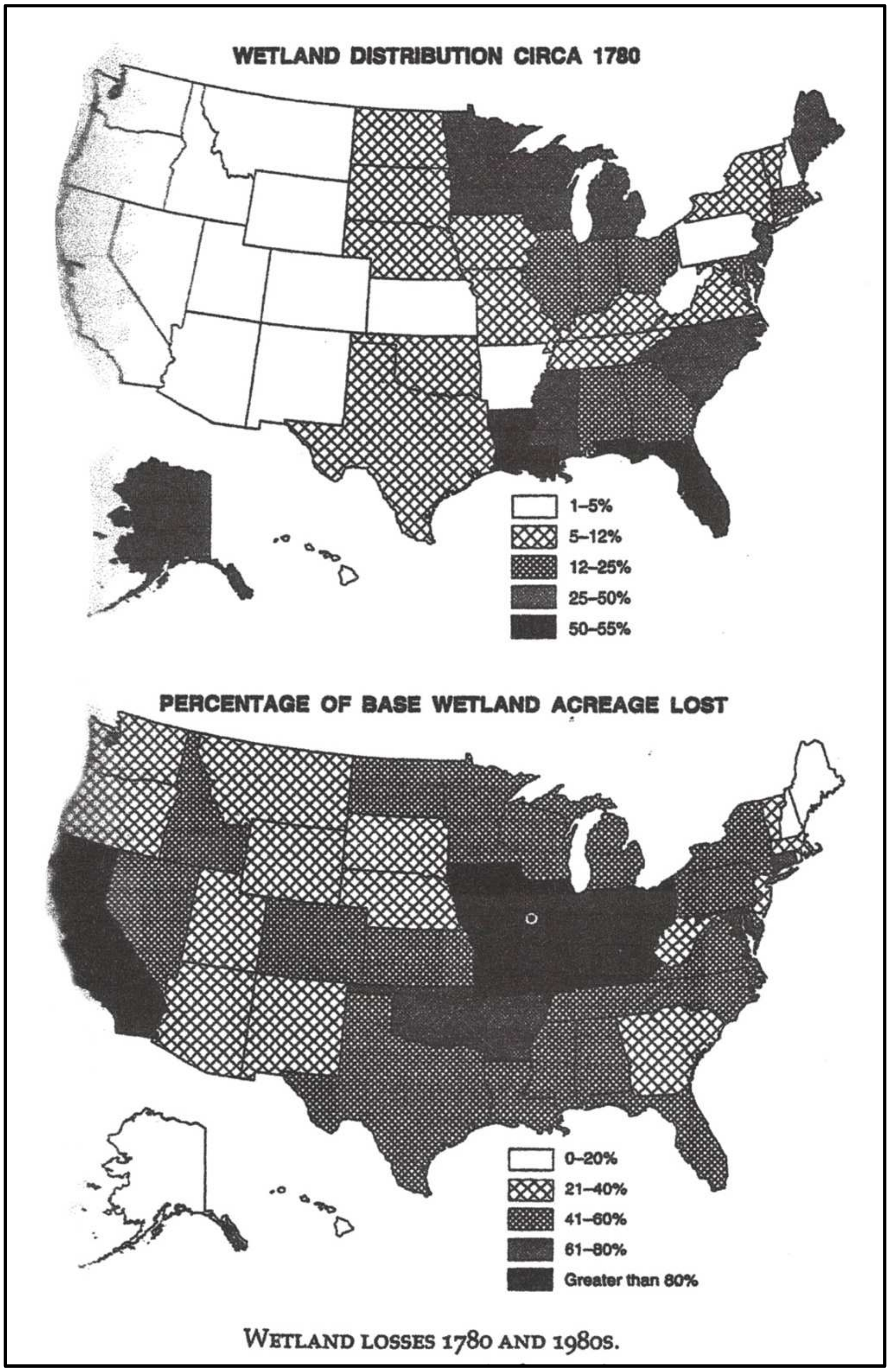

Figure A 14: Wetlands

Ann Vileisis, *Discovering the Unknown Landscape, A History of America's Wetlands* (Washington, D. C. Island Press, 1997), 3; Courtesy of National Wetlands Inventory and permission by author Ann Vileisis.

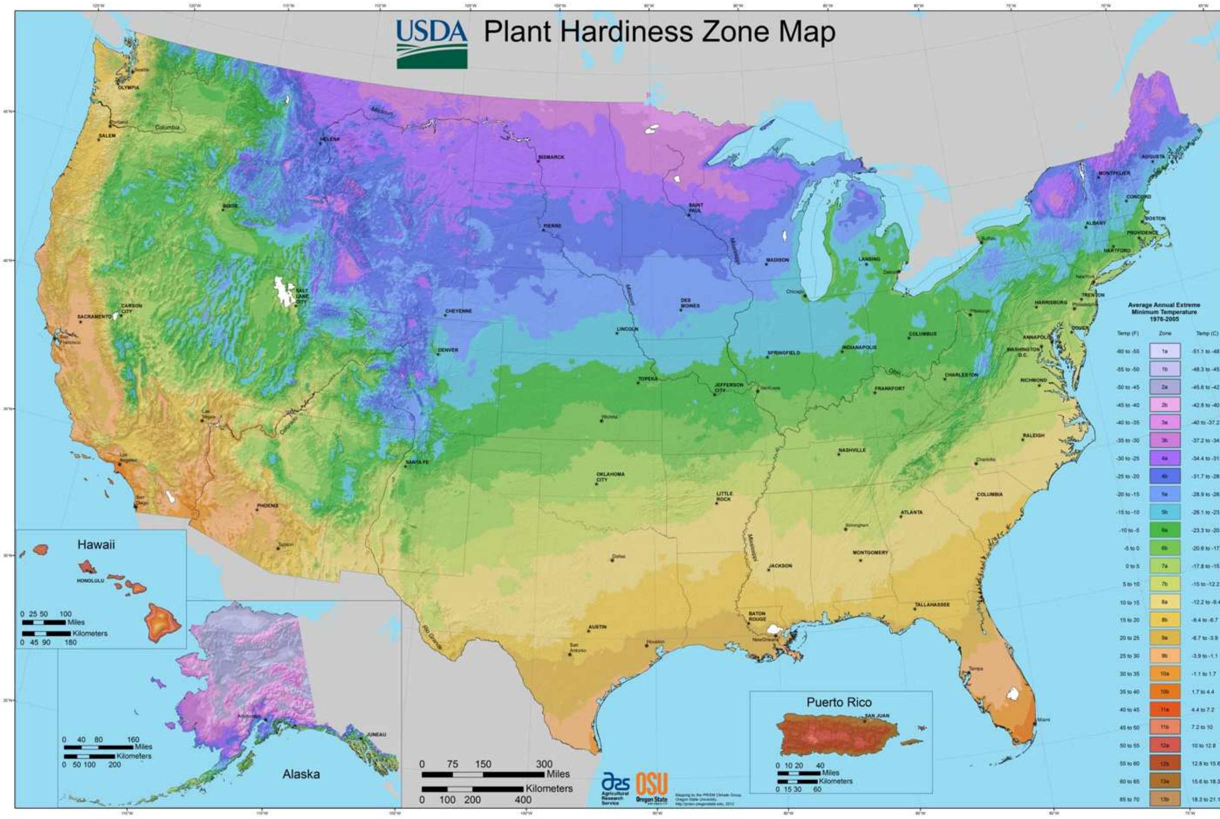

Figure A 15: 2012 Climate Zone Map

2012 USDA-ARS and Oregon State University (OSU) - http://planthardiness.ars.usda.gov/PHZMWeb/Downloads.aspx

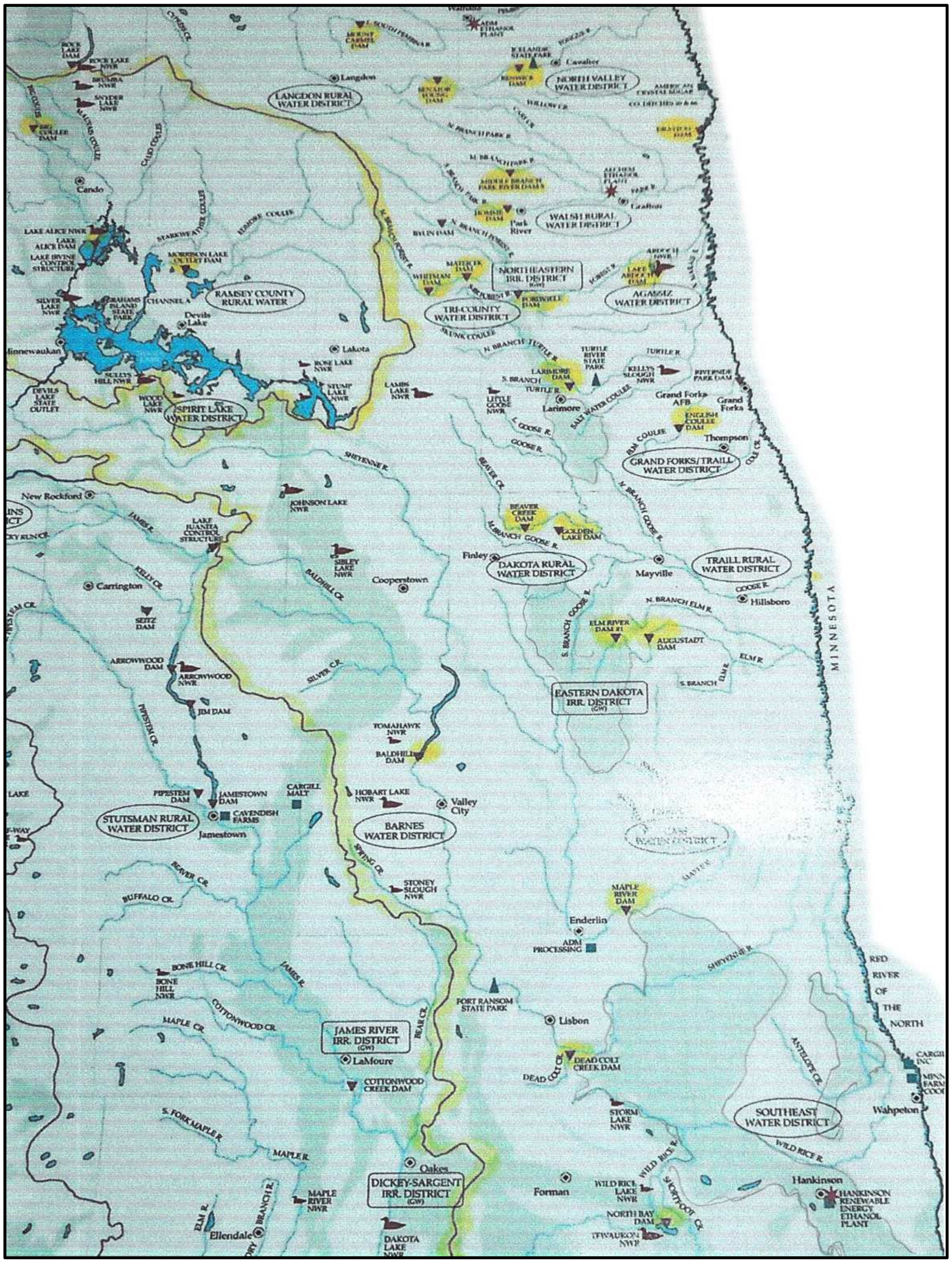

Figure A 16: Water: Too much or Too Little?

North Dakota Studies Project, 'Water – Too Much – Too Little,' (Bismarck: State Historical Society of North Dakota, (?), www.NDStudies.org; map courtesy and with permission by North Dakota State Water Commission.

APPENDIX B: LIST OF MEDICINAL WILD PLANTS OF THE PRAIRIE

Cheyenne

Alum root:(124) (*Heuchera richardsonii)* roots for rheumatism or sore muscles; top for tea.

American licorice: (114-5) (*Glycyrrhiza lepidota)* roots and leaves as a tea for diarrhea and upset stomach; roots chewed in sweat lodge and Sun Dance to cool off.

Aromatic sumac:(185) (*Rhus glaba)* leaves mixed with tobacco, red willow dogwood, and bearberry for smoking, leaves boiled for head cold or diuretic tea; stop bleeding, fruits chewed for toothache, horse medicine.

Aster: (62) (*Aster novae-angliae)* "a tea from dry stems and dropping some in the ear."

Buffalo berry:(281) (*Shepherdia argentea)* "fruits dried after first freeze and eaten or ground for medicine."

Calamus:(25) (*Acorus calamus)* "bitter medicine" diabetes; tea from root for bowel pain and chewed root to rub on ill part of skin; keep away child night spirits (ancient history).

Curly-top gumweed:(120) (*Grindelia squarrosa)* flowers boiled for external skin diseases, scabs, and sores; rubbed gum residue over eyelids for snow blindness.

False gromwell:(265) (*Lithospermum canascence*) hoary puccoon; pulverized leaves and stems, mixed with grease, and rubbed on skin to restore numb area to feeling.

Golden aster: (233) (*Chrysopsis villosa)* Chickadees and titmice eat its seeds (Grinnell, l962, 187); from the tops and stems tea to sooth or sleep, incense rids house of evil spirits.

Lavender hyssop: (225) (*Agastache foeniculum)* a tea from leaves for chest pains, coughs, weak heart; powdered leaves rubbed on body to cool for fever; leaves help sweat in a sweat lodge; one of 10 ingredients in medicine or perfume.

Milkvetch: (66) (*Astralagus adsurgens)* ground leaves and stems place on inflamed skin.

Mint: (153) (*Mentha arvensis*) tea from leaves prevent vomiting, strengthen heart, and stimulate organs plus used as deodorizer, perfume, hair oil, and flavor beverages. Chewed leaves improve one's love life.

Prairie coneflower: (181) (*Ratibida columnifera)* Boiled leaves and stems for yellow solution to apply rattlesnake poison or quick relief for poison ivy.

Puccoon: (143) (*Lithospermum incisum*) Rub leaves and stem on paralyzed limb; tea to help stay awake; salve for rheumatism.

Purple coneflower:(86) (*Rudbeckia purpurem)* Widely used for colds and sore throat.

Sand lily: (263) (*Mentzelia nuda*) oldest medicine for fevers and complicated illnesses mixed with other plants; also used treat earache, rheumatism, arthritis; as a root tea, for mumps, measles, and smallpox.

Scarlet globe mallow: (209) *(Malvastrum coccineum)* Chewed plant on inflamed sores and wounds; sweet tea mixed with bad tasting medicine for taste.

Shrubby cinquefoil: (271-2) (*Potentilla futicosa)* Ground leaves protect body from heat; tea from leaves protection enemy; deadly arrow poison.

Silver-leafed scurfpea: (176) (*Psoralea argophylla)* tea from leaves and stems for high fever, as a powder mix with grease rubbed on body, use as a febrifuge.

Prairie turnip (*Psoralea esculenta)* Prairie turnip, root chewed for earaches, sore throat.

Sweetgrass: (256) (*Hierochloe odorata)* ceremonial in Sun Dance and Sacred Arrow for life's growth.

Western ragweed:(34) (*Ambrosia psilostochya)* tea for bowel cramps, bloody, stools, colds, constipation.

White sage: (48, 49) (*Artemisia ludoviciana)* ceremonial drive away evil besides ill dreams; for purification, Sun Dance and Standing Against Thunder; crushed leaves as snuff for sinus attacks, nosebleed,headache.

Wild begonia: (278) (*Rumex venosus)* use dye from leaves to color feathers, quills, hair.

Wild onion: (29) (*Allium canadense*) poultice of ground roots and stems on carbuncles.

Wild plum: (274) (*Prunus americana*) crushed fruits mixed with salt for mouth disease; crushed and boiled small roots and bark with roots of scarlet thorn for diarrhea.

Wild rose: (191) (*Rosa arkansana*) boiled inner bark or root for tea for diarrhea and stomach trouble; boiled petals, stem bark, or root bark for snow blindness.

Willow: (196) (*Salix species)* chew sticks to clean teeth, tea for diarrhea; stop bleeding with strip of willow bark; in Sun Dance, wrapped stems around parts of bodies to help thirsty dancers.

Yarrow: (18) (*Achillea millifoilum)* tea for cough, throat, stop bleeding, colds, nausea,respiratory illness, heart trouble and chest pains; chew leaves rub on body afflictions.

Ojibway

Big bluestem:(227) (*Andropogen gerardii)* boiled bluestem root in quart of water for tea for stomachache and indigestion.

Blue vervain:(212) (*Verbena hastata)* dried, powdered flowers for snuff to end nosebleeds.

Cinquefoil:(272) (*Potentilla fruticosa)* (*P. palustris)* ½ root qt. water for tea for dysentery.

Culver's root(216) (*Veronicastrum virginicum)* roots for tea for purge and blood cleaner.

Lobelia:(148) (*Lobelia inflata)* used with sumac for gonorrhea and syphilis[Will,l959, 293].

Mint:(153) (*Mentha arvensis)* deodorant*,* as a tea, relieve gas or drink as a beverage.

New Jersey Tea(232) (*Ceanothus americanus*) root tea for chest colds.

Puccoon, Hoary:(143) (*Lithospermum incisum)* red dye.

Rattlesnake Root (273) (*Prenanthes aspera)* broth from root for milk flow for nursing.

Seneca snakeroot (166) (*Polygala senega)* mix with sage, milkvetch and wild rose tonic and stimulant to be drunk four times a day. Listed in "U.S. Pharmacopoeia" in l820-1936; "National Formulary" l936 to l960; "Drug Plants under Cultivation," 1915, USDA.

Wild Rose(191) (*Rosa arkansana)* tea; berries for food and diseases of eye; inner bark of roots for cataracts.

Wild Strawberry(245, 46) (*Fragaria virginiana)* medicine in Smith, l928, 384; Densmore, l974, 347.

Dakota

American Licorice(115) (*Glycyrrhiza lepidota)* roots for flu, leaves boiling water for earache; tea to reduce fever; root chewed for toothache (Gilmore, 1977, 40).

Beardtongue(267) (*Penstemon gradiflorus)* boiled root for pains in the chest: (*P. gracilis)* Lakota: snakebite treatment from roots.

Beebalm(157) (*Monard fistulosa)* Lakotas-tea from flowers for colds and fevers, from leaves – coughing and fainting; relief for sore eyes, leaves on wounds to stop blood flow; Dakota-same as Lakota, tea from leaves and flowers for abdominal ain plus as a stimulant and for Asiatic cholera.

Blue vervain:(211) Teton Dakotas boiled the leaves for a drink for stomachaches.

Butterfly milkweed:(55) (*Asclepias tuberose)* emetic; Lakota: Swamp milkweed (*A. incarnata)* swollen glands; (56) dwarf milkweed(*A. pumila)* diarrhea; narrow leaved milkweed (*A. stenophylla)* root to regain appetite; green milkweed (*A. viridiflora)* diarrhea, tea of whole plant for mothers to produce milk as well as whorled milkweed (*A. verticillata).*

Calamus:(24,25) (*Acorus calamus)* root chewed for diabetes, very valued plant of Dakotas.

Canada Milkvetch(66) (*Astralagus Canadensis)* "febrifuge for children," Lakota-chewed roots for coughs, loss of appetite, mixed with alkali milkvetch (*A. racemosa*) chest and back pains. Slender milkvetch (*A. gracilis*) "promote milk production." Unidentified *Astralagus* a tea for heart trouble and stomach pains.

Compass plant:(200) (*Silphium laciniatum)* tea from root to rid horses of worms.

Cup plant (*S. perfoliatum)* (202) All *Silphium* used by doctors up to early 1900s for antipyretic, diuretic, emetic, expectorant, tonic, styptic, antispasmodic, stimulant, and diaphoretic properties.

Culver's root (216) (*Veronicastrum virginicum)* treat snakebite; Euro-American doctors used it for purgative, emetic, alterative, cholalogue, liver disease, bilious fever, pleurisy, and venereal diseases. toics in the plant kingdom,"(Moore, 1979, 79).

New Jersey tea (232) (*Ceanothus americanus)* Leaf for tea as a beverage and remedy.

Nine-anther prairie clover:(82) (*Dalea condida)* tea for stomachaches and dysentery; Lakota, silky prairie clover, *(Dalea villosa)* for purge and swollen throat.

Prairie coneflower: (181) (*Ratibida columnifera)* flowers used for chest pains; wound remedy; or tea; Lakota, tea for stomachache or side pain; stop external wounds or internal hemorrhage.

Purple coneflower:(86) (*Rudbeckia angustifolia)* Most widely used medicinal plant; root for hydrophobia and snakebite; putrefied wounds, to cool for burning sensation; Lakota, root and fruit for thirst, toothache painkiller, tonsillitis, stomachache, and inner pain.

Purple poppy mallow:(230) (*Callirhoe involucrate)* root boiled for tea for inner pains or bathe body aches; with Lakotas smoked for head colds.

Ragweed:(34) (*Ambrosia artemisifolia)* tea for bloody flux and vomiting; Lakota, tea to reduce swelling.

Red cedar:(131) (*Juniperus virginiana)* fruits and leaves boiled for coughs, smoke from twigs for a cold. Lakotas, tea for cholera.

Sand lily:(263) (*Mentzelia nuda*) stems pounded for juice to boil, strain, and apply outer body for a fever.

Scarlet globe mallow:(208-209) (*Sphaeralcea coccinea)* as a paste rubbed over hands and arms to waylay burn from hot water; applied as a salve on sores and wounds.

Seneca snakeroot:(165) (*Polygala senega)* antidote for snakebite, insect stings, other poisons. One of the first plants colonists learned of medicinal value from Indians.

Sweetgrass:(256) (*Hierochloe odorata)* used to purify ceremonies.

Western snowberry:(283) (*Symphoricarpos occidentalis)* leaves in a tea for sore eyes.

White sage:(48) (*Artemisia ludoviciana)* "drive away evil influences"(Gilmore, l913, 69), (*A. campestris)* Lakota: tea for constipation, urinate, and difficult childbirth; (A. *frigida)* regularize menstrual cycle.

Wild alfalfa:(177) (*Psoralea tenuiflora)* boiled roots for tuberculosis; protect head from sunburn with garland from plant tops; Lakota: tea for headaches, smoke repellant for mosquitoes; silver-leafed scurfpea (*P. argophylla)* horse medicine; prairie turnip (*P. esculenta)* premier native plant food for Plains Indians.(Current research or psoriasis, leukemia, and immune diseases, like AIDS, 178).

Wild four-o'clock:(264) (*mirabilis nyctaginea)* tea of boiled root for fever; Lakota, grated roots externally applied for broken bones; with *Echinacea angustifolia* rid body of intestinal worms, reduce swelling.

Wild lily:(258) (*Lilium philadelphicum)* "pulverized or chewed flowers as a brown spider antidote.

Willow:(197) (*Salix* species) drank as a tea for physical and mental restoration.

Kelly Kindscher, Medicinal Wild Plants of the Prairie (Lawrence: University Kansas Press, 1992), (page number noted in parenthesis along plant name and printed with author Kelly Kindscher's permission.).

APPENDIX C: ANIMAL PRODUCTS DERIVED FROM THE RED RIVER VALLEY

"Returns for the Northwest Fur Trading Company of Lower Red River Department, l801 – l802, Pembina River, one of four Trading Posts in l801, one of 8 in l802, one of 8 in l803, one of 8 in l804, one of 5 in l805, one of four in l806, one of four in l807."

Table C 1: Animal Products Derived from the Red River Valley

Animal	1801-02	1802-03	1803-04	1804-5	1805-6	1806-7	1807-8
Beavers	629	550	211	829	776	565	339
Black bears	28	30	21	30	51	122	48
Brown bears	4	8	8	4	20	28	7
Grizzly bears				2	3		
Wolves	58		37	102	533	97	43
Foxes	16	23	12	31	256	3	28
Kitts			3				
Raccoons	39	25	15	36	63		19
Fishers	67	69	21	25	140	78	29
Otters	24	30	9	64	102	64	53
Martens	6	9	5	3	271	75	69
Mink	26	39	2	44	141	21	63
Wolverines		4	2	5	10		
Loup-cerviers	51						1
Lynxes		11	6	11			
Dressed moose		5	25	1	179		

Table C 2: Animal Products Derived from the Red River Valley (Continued*)*

Animal	**1801-02**	**1802-03**	**1803-04**	**1804-5**	**1805-6**	**1806-7**	**1807-8**
Shaved/biches	38	18	51	95	54	21	
Muskrats	8	46		177	109		
Buffalo Robes	2	.	7	18	68		4
Badgers		1					
Packs 90#sea.	25½	22	20	26		(85#s.)37	23
Bags Pemmican,	33	20	26	44	188	(85#s.)60	171
Kegs of beef	16		30	14	24	5	
Kegs of grease		12	6	7	10	18	48
Kegs of sugar		6	12	10	3	6	6
Kegs of gum			15	3	5	4	
Kegs of salt			2		1		
Kegs of tongues					6	2	
Kegs of small					2	4	
Packs					53		
Packs					5		
Packs					58		

Elliott Coues, *New light on the early history of the greater Northwest. The Manuscript Journals of Alexander Henry*, Vol. 1 (New York: Francis P. Harper, 1897), 198, 221, 245 259, 281, 422.

APPENDIX D: NORTHWEST TERRITORY SALES EARNINGS

Table D 1: Sales Statistics in St. Paul Press, 29 August 1863, of Burgeoning Northwest Territory trade.

Year	Sales ($)
1844	1,400
1845	3,000
1846	5,000
1850	15,000
1855	40,000
1856	97,253
1857	182,491
1858	161,022
1859	150,000
1860	185,165
1861	198,000
1862	200,000
1863	250,000

Alvin C. Gluek, *Minnesota and the Manifest Destiny of the Canadian Northwest* (Toronto: University of Toronto Press, 1965), 152.

APPENDIX E: BIRD INVENTORY OF NORTHERN RRV, 1902-1928

Table E 1: Birds Reported to the Bureau of Biological Survey, Washington, D.C., 1902-1928.

Blackbird, Rusty	3/28	Blackbird, Brewer	3/21
Blackbird, Redwinged	3/28	Bobolink	4/10
Bunting	2/15	Catbird	5/15
Chickadee	1/ 4	Crane	4/12
Creeper, Brown		Crow, American	2/27
Cuckoo	5/18	Curlew	4/19
Dove, Mourning	4/1	Ducks	3/31
Eagle, Bald	4/1	Flycatcher, Least	4/18
Geese	3/16	Grackle	4/ 7
Grosbeak, Rose-breasted	5/14	Hawk, Red-tailed	3/24
Hawk, Sparrow		Others of Unknown Variety...	
Hummingbird, Ruby-throated	5/15	Jay, Blue	4/17
Junco, Slate-colored	3/22	Killdeer	4/3
Kingbird, Arkansas	5/25	Kingbird, Common	4/9
Kingfisher	4/26	Kinglet, Golden-crowned	4/7
Kinglet, Ruby-crowned	4/7	Lark, Horned	2/21
Lark, Meadow	3/21	Lark, Meadow	3/
Nuthatch, white-breasted	4/16	Oriole, Baltimore	5/21
Oriole, Orchard	5/31	Oven bird	5/ 7
Owl, Screech and others		Phoebe	
Redstart, American	5/15	Robin	3/23
Sapsucker, Yellow-bellied	4/14	Shrike, Northern	3/28
Sparrow, Fox	4/20	Sparrow, Harris	5/6
Sparrow, Intermediate	4/21	Sparrow, Lark	5/29
Sparrow, Song (Dakota	4/12	Sparrow, Tree	3/21
Sparrow, White-crowned	5/6	Swallow, Barn	
Swallow, White-bellied	4/22	Thrasher, Brown	
Thrush, Hermit	4/8	Thrush, Olive-backed	5/12
Thrush, Wood and others		Towhee	5/11
Vireo, Red-eyed	6/6	Warbler, Black and white	5/19
Warbler, Black-poll	5/16	Warbler, Black-throated green	5/5
Warbler, Magnolia	5/29	Warbler, Myrtle	4/26
Warbler, Yellow	5/17	Waxwing, Bohemian	3/6
Whip-poor-will	5/14	Wren, House	4/21

Fannie Mahood Heath Papers, OGL #101, Elwyn B. Robinson, Department of Special Collections, Chester Fritz Library, University of North Dakota, Grand Forks, North Dakota.

APPENDIX F: FANNIE MAHOOD HEATH'S LIST OF HARDY FLOWERS OF THE PRAIRIELAND"

Table F 1: Fannie Mahood Heath's List of Hardy Flowers and Shrubs of the Prairieland.

Anemone patens, Pasque Flower.
Oxytropis lambertii, loco.

Anemone pennsylvanica, Prairie Snowdrop.
Oxalice violacea, Pink sorrel.

Allium stellatum, Pink wild onion.
Petalostemon purpurea, Purple Prairie Clover.

Allium reticulatum, Dwarf wild onion.
Phlox divaricata, Wild Sweet William.

Antennarias parvifolia. Cats foot.
Rudbeckia hirta, Brown eyed Susan.

Artemisia gnaphalodes, Wide leaved sage.
Ranunculus ovalis, April Buttercup.

Artemisia longifolia, Narrow leaved white sage.
Solidago nemoralis, *S.missouriensis,* goldenrods

Artemisia frigida, Silvery sage.
Steironemia ciliatum, Fringed Loosestrife.

Aster laevis, Smooth aster.
Hieroclholo odorata, Sweet Grass or Holy Grass

Aster oblongifolia, Narrow leaved aster.
Smilacina stellata, Star Flowered Solomon's Seal.

Aster, variety unknown.
Thalictrum dioicum, Dwarf Meadow Rue.

Astragalus hypoglottis, Dwarf-like clover.
Viola ruguloss, White Wood Violet.

Campanula rotundifolia, Harebell.
Viola pedata, Prairie Birdfoot Violet.

Chrysopsis villosa, Golden aster.
Viola adunca, Midget Violet.

Galium boreale, Bedstraw.
Viola tricolor, Pansy violet or Johnnie Jump up.

Gaura coccinea, Waving butterfly.
Monarda Fistulosa, Wild Bergamot.

Gentian andrewaii, Closed gentian.
Zygadenus elegans, Camas.

Geum triflorum, Three flowered avens.
Malvastrum coccineum, False mallow.

Heuchera hispida, Alum root.
Penstemon albidus, White early beardtongue.

Helianthus maximiliani, Prairie sunflower.
Amorpha canescens, Lead plant.

Lepachy columnaris, Thimble flower.
Eleagnus argenica, Silver Berry bush.

Liatris scariosa, Blazing star.
Prunus melnocarp, Western Chokecherry shrub.

Liatris punctata, Dwarf gayfeather.
Ribes americanum, Wild Black Currant shrub.

Lilium philadelphicum, Flame or orange lily.
Rosa pratincola, dwarf prairie rose shrub.

Lithospermum canescens, Orange puccoon.
Spiraea salicifolia, Wild Spiraea shrub.

Lithospermum linearifolium, Lemon puccoon.
Symphoricarpos occidentalis, Wolf Berry shrub.

List of 'Hardy Wild Flowers of Prairieland' in Fannie M. Heath catalogue, 1927, #OGL 101, Elwyn B. Robinson, Department of Special Collections, Chester Fritz Library, University of North Dakota, Grand Forks, North Dakota.

APPENDIX G: RED RIVER VALLEY WATER SUPPLY

Table G1: Water Supply Needs and Options.

Water System	Water Service	Primary Water Source	Comments
Grand Forks-Traill Water District	Grand Forks Traill	Groundwater	Grand Forks-Traill Water District would consider the Red River Valley Water Supply Project as a supplemental water supply alternative if additional appropriations for the Elk River Aquifer are not granted to them. The Red River Project as a backup water supply is also a possibility for the Grand Forks-Traill Water District.
Gwinner	Gwinner	Groundwater	No water quality or quantity issues were identified.
Hankinson	Hankinson	Groundwater	Arsenic level exceeds NPDWR.
Harwood	Harwood	Groundwater	TDS and Iron exceed NSDWR.
Hillsboro	Hillsboro	Groundwater	TDS, manganese, and sulfate levels exceed NSDWR. Hillsboro would consider the Red River Valley Water Supply Project as a backup potable water supply or as a long-term water supply alternative to the Page/Galesburg Aquifer. If a regional system is not possible, Hillsboro could consider the Red River Valley Water Supply Project as a water supply replacement option.

Table G2: Water Supply Needs and Options. (Continued)

Water System	Water Service	Primary Water Source	Comments
Horace	Horace	Groundwater	Water quality, aesthetically, is marginal. Chloride, iron, manganese, sulfate and TDS are exceed NSDWR.
Lakota	Lakota	Groundwater	Arsenic levels may become a problem if the standard is lowered to 0.005mg/L
Breckenridge	Breckenridge	Groundwater	No water quality or quantity issues were listed.
East Grand Forks	East Grand Forks	Surface Water	East Grand Forks Water Treatment Plant expects that capital improvements will be required to meet future drinking water standards.
Moorhead	Moorhead	Surface and groundwater	Future surface water standards are expected to make compliance with drinking water standards more difficult to achieve.
American Crystal Sugar Company, Moorhead	Moorhead	Surface and groundwater	No information on water treatment, quality, or quantity was provided.
Drayton Company	Water Traill RWS—potable		Quality, or quantity was provided.

Table G3: Water Supply Needs and Options. (Continued)

Water System	Water Service	Primary Water Source	Comments
ADM Corn Processing — Walhalla	Water is pumped to reservoir tank – no treatment is needed	Groundwater	No treatment is performed. Water is only used in cooling towers.
Cargill Corn Processing Plant	Cargill, Inc.	Surface water	Water treatment is performed. Water is only used in cooling towers.
Cargill, Inc. of West Fargo	West Fargo	Groundwater	No information on water treatment, quality, or quantity was provided.
Agassiz Water Users	Agassiz Water Users	Groundwater	No water quality or quantity issues were listed.
Barnes Rural Water District	Barnes Rural Water	Groundwater	TDS exceeds NSDWR
Cass Rural Water – Phase I, II, & III	Cass RWS – Phase I, II, & III	Groundwater	Phase II pH level is lower than the recommended level for NSDWR. Current permitted water withdrawal would be exceeded in 15 years if population continues to increase.
Cooperstown	Cooperstown	Groundwater	TDS exceeds NSDWR
Dakota Water Users	Dakota Water Users	Groundwater	Arsenic in the northern system exceeds NPDWR.
Fargo	Fargo	Surface water	The pH level is lower than the recommended level for NSDWR. Fargo favors the Red River Valley Water Supply Project as a primary water source and is interested in being a regional water treatment provider.

Table G4: Water Supply Needs and Options. (Continued*)*

Water System	Water Service	Primary Water Source	Comments
Grafton	Grafton	Surface water	Current pH levels exceed NSDWR. The current water source has seasonal aesthetic problems. Grafton future demands may exceed the available water supply during a drought and would consider the Red River Valley Water Supply Project as a backup water source. Grafton would consider the Red River Valley Water Supply Project for a primary source, depending on feasibility.
Grand Forks	Grand Forks	Surface water	Current pH levels exceed NSDWR. Grand Forks would like to receive water from the Red River Valle Water Supply Project because of current water quality issues. Grand Forks has expressed an interest in being considered as a water treatment provided for the surrounding region.

Report on Red River Valley Water Supply Needs and Options, Water System Assessment Executive Summary, United States Bureau of Reclamation; 2007; https://www.usbr.gov/.../executive_summary_system_assessments.