Progress, Crisis, and Stability:
Making the Northwest Plains Agricultural Landscape

A Dissertation Submitted to the College of Graduate Studies and
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By Andrew Dunlop

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Canada

ABSTRACT

This research traces the nature and impetus of agricultural landscape change from 1910 to 1990, within the northwestern transboundary plains of southern Alberta and Saskatchewan and northern Montana. Using information gleaned from aerial photographs, field survey reports and maps, government staff personal correspondence, agricultural statistics, land settlement records, and local histories, this dissertation describes an evolutionary and regionally-contextual process of landscape transformation. The temporal pattern of landscape change in the northwestern plains region was not linear. The greatest landscape changes took place between 1910 and 1930 when mixed grass prairie was converted to an agricultural landscape over a relatively short breaking-in period that followed initial agricultural settlement. After 1930, landscape changes were more evolutionary. Incrementally, more land was tilled, with little alteration in basic field arrangement and farming systems.

Aerial photographic evidence suggests that a common declensionist historiographical narrative of Great Plains anthropogenic land degradation, culminating in the 1930s drought disaster, doesn't apply to the northwestern plains. Rather, the timing of settlement, coinciding with widespread adoption of farm-based mechanization, and a pre-existing understanding of environmental limits to agricultural viability, impelled northwestern plains farmers to independently adopt scale economy and efficiency principles promoted by government agricultural economists from the 1920s to the 1980s. Furthermore, farmers adapted specifically to regional land and weather conditions using locally-derived soil management innovations. Farmers and in-the-field federal government staff cooperated on research that led to the spread of innovative and successful dryland farming techniques. Government agents of both Canada and the United States played an important role in testing and publicizing the local adaptations.

This work establishes a new timeline for northern Great Plains history and reveals the importance of regional context in place history. In the northwestern plains region, the 1930s were not a turning point in the agricultural land use history, but rather a time marker coinciding with the maturing of a highly-mechanized, scaled-up, and responsive 'modern' agricultural system.

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Dedication

This dissertation is dedicated to Lynn; farmer, geographer, writer, best friend.

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CHAPTER 1

MAKING THE NORTHWEST PLAINS LANDSCAPE

The modification of ecosystems through agriculture creates *landscapes*. In his seminal work on landscape morphology, Carl Sauer described how human environments are built upon natural landscape media.[1] The basic foundations of an agricultural landscape are its underlying geology, climate, and natural vegetation. By definition, agriculture modifies natural systems. Humans pursue such modification to achieve greater predictability and reliability of food production than would be possible within a highly-variable natural system. Furthermore, agriculture, when practiced as the primary form of economic activity, requires permanent settlement, which in turn contributes many built additions to the landscape.

Agricultural landscape creation implies direct environmental modification. Landforms are reconstructed through tillage, land levelling, dam construction, and excavation for canals and dugouts. These actions change soil infiltration and runoff profiles, altering hydrologic systems. Local micro-climates are created through the planting of shelter trees and via tillage-induced modification of evaporative ground surfaces.[2] Over time, a built infrastructure arises, comprised of dwellings, farm buildings, grain storage structures, fences, roads, electrical transmission lines, and pipelines. Built features do not cover a large percentage of total farmland area, but they do appreciably change the look of the landscape making it identifiably agricultural. Crop fields are the most readily apparent elements of the agricultural landscape. Domestic plant and animal species, carefully selected for desirable traits, supplant the pre-

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[1] Carl Sauer, "The Morphology of Landscape." *University of California Publications in Geography* 2 no.2 (1925): 19-53.

[2] Comprehensive discussions of human modifications of natural environmental systems may be found in Andrew Goudie, *The Human Impact on the Natural Environment* (Cambridge: MIT Press, 1994); and J.R. McNeill, *Something New Under the Sun: An Environmental History of the Twentieth-Century World* (New York: W.W. Norton and Company, 2000).

existing natural ecology. On the northwestern plains, the uniform geometric nature of croplands makes the great majority of the region instantaneously recognizable as a human landscape (Fig. 1.1).

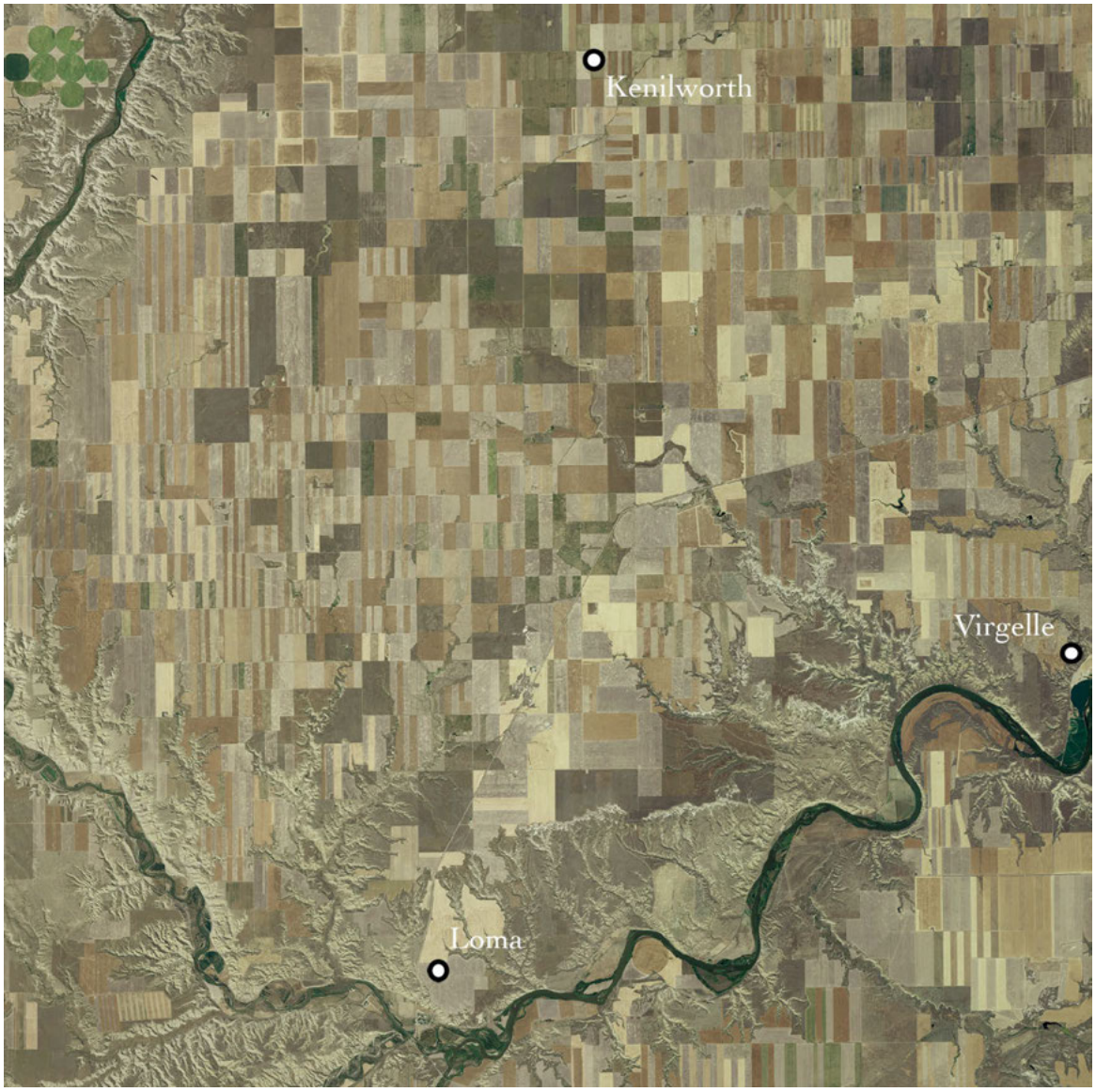

FIGURE 1.1 Aerial photograph of the characteristic Great Plains agricultural landscape in Chouteau County, Montana. Imagery courtesy of United States Geological Survey.

Ultimately, whether worked by an initial homesteader or a subsequent purchaser, agricultural settlers altered about one third of the transboundary northwestern plains from native grasses to crops.[3] Land that was flatter, better drained, or more easily worked was

[3] Geoff Cunfer, *On the Great Plains: Agriculture and Environment* (College Station: Texas A&M University Press, 2005).

ploughed, overturning the native grass, exposing centuries of accumulated soil to be reworked as seedbeds for barley, flax, tame hay grasses, and, especially, wheat. The introduction of a handful of cultivated species vastly simplified the original mixed-grassland ecosystem, replacing a myriad of grasses, graminids, forbs, and herbaceous plants that had comprised the pre-settlement plains.[4] Denounced as weeds, competing plants were eliminated by farmers at first sight. Also targeted were pest animals, including large and small predators, burrowing mammals, birds, and small grazers. Land was sectioned into organized fields and settlers quickly went about constructing their farmsteads, building houses, barns, and storage buildings, digging wells, planting trees, and grading roads.[5] The newcomers created not only a characteristic pattern of farms, ranches, and rural service centres, but also an impressive transportation and communication infrastructure.

In areas too dry, too wet, stony, or steep, or with poor soil development, federal agencies portioned the grassland into managed grazing lands stocked with cattle, or in rare cases, sheep.[6] In rangeland areas, the overall look of the visible landscape is little different from the pre-existing natural prairie. In the late-nineteenth century, the once-dominant plains bison were extinguished, replaced with cattle soon after. The grassland vegetation remained in a comparatively natural state. Many pre-agricultural fauna, pronghorn antelope and deer for example, remained or even thrived grazing on high protein grain residue.[7] Large predators perceived as threatening to livestock, such as wolves, bears, coyotes, and cougars, were virtually exterminated.

Ecological shifts in vegetation sequences were almost imperceptible, although if an area had been intensively grazed by livestock for any length of time, these shifts most certainly

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[4] For a general description of pre-settlement grassland ecology, see Phillip L. Sims, "Grasslands," in *North American Terrestrial Vegetation,* ed. Michael G. Barbour and William Dwight Billings (Cambridge: Cambridge University Press, 1988), 265-286.

[5] Numerous histories of the Great Plains describe human alteration of the landscape. See, for example, James C. Malin, *History and Ecology: Studies of the Grassland* ed. by Robert P. Swierenga (Lincoln: University of Nebraska Press, 1984); Gilbert C. Fite, *The Farmers' Frontier: 1865-1900* (New York: Holt, Rinehart and Winston, 1966); and John C. Lehr, John Everitt, and Simon Evans, "The Making of the Prairie Landscape," *Prairie Forum* 33, no.1 (2008): 1- 38.

[6] For ranching history on the northern Great Plains, see Simon M. Evans, "The Origins of Ranching in Western Canada," in L.A. Rosenvall and S.M. Evans ed., *Essays on the Historical Geography of the Canadian West* (Calgary: Department of Geography, University of Calgary,1987); D.H. Breen, *The Canadian Prairie West and Ranching Frontier, 1874-1924* (Toronto: University of Toronto Press, 1983); Warren M. Elofson, *Frontier Cattle Ranching in the Land and Times of Charlie Russell* (Montreal: McGill-Queen's University Press, 2004); and Matthew Ryan Todd, "Now May Be Heard a Discouraging Word: The Impact of Climate Fluctuation on Texas Ranching in the 1880s" (master's thesis, University of Saskatchewan, 2010).

[7] Jamie P. Selting and Lynn R. Irby, "Agricultural Land Use Patterns of Native Ungulates in Southeastern Montana," *Journal of Range Management* 50, no.4 (1997): 338-345.

occurred.[8] Fences divided and portioned the open grassland, adding an incongruent linearity to the rolling prairie and greatly restricting the movement of other mobile grazers, notably pronghorn antelope.[9] To overcome the unpredictability and seasonality of the dry climate,[10] cattle-watering dugouts were excavated and equipped with wind-driven pumps. Year-by-year, vehicles traversing the range left lasting track imprints.[11] The revised ecologies, combined with built infrastructure such as dugouts, corrals, and ranch buildings, became components of new anthropogenic landscapes in their own right.

Beginning in the 1960s, gas and oil well heads protruded through the grass in many locations, each a reminder that economically important elements of the natural environment also lay beneath the pastureland. Simply the fact that the range had been maintained and managed over decades, particularly through fire suppression, meant that the grassland landscape was very much a human one. Furthermore, many ranges had, at one time, been actively tilled or subject to other mechanical disturbance. Over time, these fields reverted to grass and visible indications of previous tillage faded. But even brief disturbances, tillage for only a few years following initial settlement perhaps, permanently altered soil and vegetation profiles (Fig. 1.2).

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[8] A common occurrence on cattle grazed land versus bison-grazed land is a characteristic transition to shorter grass species. This is due partly to the differences in the selective preferences of cattle and bison. See Allen Steuter and Lori Hidinger, "Comparative Ecology of Bison and Cattle on Mixed-Grass Prairie," *Great Plains Research* 9 (Fall, 1999): 329-42.

[9] Whereas ungulates such as whitetail and mule deer will jump modest height three-wire and page wire fences, pronghorn will not. Many pronghorn adapt to crawling through wire strand fences, if the wire is sufficiently slack, but page wire fences remain barriers to pronghorn migration. See Alison James and Bebe Crouse, "Built for Speed: Pronghorn Migration," *Montana Landmarks,* republished online by The Nature Conservancy in Montana, http://www.nature.org/ourinitiatives/regions/northamerica/unitedstates/montana/pronghorn.pdf

[10] In the summer months, evaporative potential exceeds precipitation. In places characterized by coarse, glacially-derived soil materials, the moisture rapidly drains, leaving all but the most deeply-rooted plants desiccated. See Canada, Alberta, Research Council of Alberta, *The Hydrologic Balance from a Large Prairie Drainage Basin in Central Alberta, Canada,* by D.R. Stevenson. Alberta Research Council Open File Report, (Edmonton, 1967).

[11] 'Event' erosional process are common on the glaciated Plains. Such events include infrequent summer rainstorms, fast spring melts, and large windstorms. Human impact events causing ground cover disturbance also lead to erosion. Even infrequent occasions of vehicles traversing the grass can cause deep permanent ruts to form, as vegetation is unable to reestablish between periodic runoff events. See Alberta, Agriculture and Rural Development, *Agricultural Soil Compaction: Causes and Management* (Edmonton), October, 2010. http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/agdex13331/$file/510-1.pdf?OpenElement

FIGURE 1.2 A pile of glacial erratics in an unmanaged prairie field near Alderson, Alberta provides evidence of previous land-breaking and tillage. Air photo evidence suggests that the land was reverted to grazing sometime prior to 1937. Also visible are an electrical transmission line and gas pipeline equipment. Photograph taken July, 2009.

Northern Great Plains agricultural history in the Euro-american period, spans little more than one hundred years. The physical underpinnings of the agricultural landscape were much longer in the making. While the eighty year study period is relatively short compared to that of many classical deep time analyses, *la Longue Dureé* [12] provides an appropriate frame of reference for explaining landscape histories that have been built upon a complex base of physical and human activity that spans thousands of years.

On the northern plains, almost all soils are derived from unconsolidated parent materials deposited by morainal, glacio-fluvial, glacio-lacustrine, or aeolian processes during and immediately after the geologically-recent Wisconsinan Glacial Stage approximately eleven to fourteen thousand years ago.[13] Although the northern plains surficial material was

[12] A term first used by Fernand Braudel. See Fernand Braudel, *On History*, trans. Sarah Matthews (Chicago: University of Chicago Press, 1980).

[13] Victor K. Prest, "Quaternary Geology of Canada" in Canada. Geological Survey of Canada, *Geology and Economic Minerals of Canada* 5th ed. R.J.W. Douglas, Economic Geology Series, No.1, (Ottawa, 1970).

deposited relatively recently in geologic terms, the rock which comprises these sediments is much older. Formed in the late-Cretaceous and early Tertiary periods, much of lithic material is derived from limestones laid down under the Western Interior Seaway, or sandstones, siltstones, shales and conglomerates deposited later. The oldest bedrock parent material in the underlying sediments is glacially-transported pre-Cambrian igneous rock that is almost two billion years old.

On the northwestern plains, the anthropogenic landscape long-predates agriculture.[14] Humans have occupied the region since the retreat of the Wisconsinan glacial ice approximately ten thousand years ago.[15] Before widespread agricultural settlement, human landscape alterations were visually subtle. Relatively few plants and animals were domesticated. One species of fauna, domestic dogs, was vital to nomadic, bison-hunting economies and was widely distributed.[16] The few domestic crop plants were spatially constrained to a small horticultural area situated along the Missouri River and its tributaries.[17] Even in that relatively favourable environment, agriculture existed only during the relatively warmer Neo-Atlantic period that began approximately 900 CE, and ended with the onset of the Little Ice Age around 1,500.[18]

The pre-European built landscape was also visually subtle, consisting of spatially dispersed small structures such burial mounds and medicine wheels.[19] Relatively few visible indications of human occupation persisted. Well-used camping areas were marked by tipi rings. Ruts were etched into the turf along routes repeatedly travelled over centuries. At the base of small cliffs along valley sides, deep bone beds built up at the foot of buffalo jumps.[20] In a few places, pictographs were etched into exposed rock surfaces. Ultimately, many of these

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[14] Many scholars recognize that vegetative profiles of the agricultural areas of North America at the time of settlement were not naturally-evolved, but had been modified, perhaps to a large extent, by aboriginal peoples. See Carl O. Sauer, "Environment and Culture during the last Deglaciation" *Proceedings of the American Philosophical Society,* 92 65-77, 1948; Shepard Krech, *The Ecological Indian: Myth and History* (New York: W.W. Norton, 1999); R. Cole Harris and John Warkentin, *Canada before Confederation: A Study in Historical Geography* (Ottawa: Carlton University Press, 1991).

[15] Liz Bryan, *The Buffalo People: Prehistoric Archaeology on the Canadian Plains* (Edmonton: University of Alberta Press, 1991).

[16] Ruth Callahan, "Domestication of Dogs and Their Use on the Great Plains," *Nebraska Anthropologist* 14 (1997): 1-11.

[17] Lynn Marie Alex, "Prehistoric and Early Historic Farming and Settlement Patterns," *South Dakota History* 13 (1983) 4-21.

[18] Bryan, *The Buffalo People*

[19] Ibid.

[20] Ibid.

landscape additions were largely buried as wind-blown soil built up around them or were obliterated by cultivation.[21]

A more lasting pre-European anthropogenic landscape change was the modification of the grassland ecology. When Euro-american ranchers first grazed their cattle on the fringes of the northwestern Plains in the 1870s, the natural grassland was already very much a human creation, altered by aboriginal peoples through the use and control of fire.[22] Fire was commonplace; traders and explorers referred to the Saskatchewan district as "Fire Country."[23] Likely, the natural grassland ecology owed as much to active human agency as it did to climatic restriction. Nevertheless, the 'wild' prairie grassland landscape that so impressed European explorers and traders upon their first encounter with it in the 1690s,[24] remains, for the most part, the natural one in many descriptive contexts.[25]

The arrival of agricultural settlers at the close of the nineteenth century brought about a rapid and unprecedented process of land conversion. It was also planned and anticipated. Nineteenth-century explorers and surveyors, specifically dispatched to assess the agricultural potential of the region, were well aware of the consequential impending land changes that would accompany mass settlement. At the dawn of the agricultural invasion, the noted geologist and archaeologist Warren Upham observed:

> "With the progress of agriculture, which is rapidly bringing all this lake bed into cultivation, certain features of the deserted shores that were very distinct at the time of my examination will doubtless be obscured or obliterated. Many of the groves here noticed as occurring along stream courses or elsewhere in the neighborhood of the old shore-lines will probably cease to exist within a century, or in some cases within a score of years. On the other hand, many artificial groves surrounding farmhouses, and lines of trees cultivated on the divisions of property or of adjacent fields, will probably more than replace such loss, making the country more beautiful and less liable to be swept heavily by winds. But the extensive views enjoyed by the writer and his assistant rodman as they advanced along the course of the beaches, mapping them and

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[21] Ibid.

[22] Elofson, *Frontier Cattle Ranchers*

[23] R. Cole Harris and John Warkentin, *Canada before Confederation,* 235.

[24] Henry Kelsey, the first European known to have observed the northern plains, was particularly struck by the visual difference between the northern forest and the open prairie. Having no appropriate word to describe the grasslands, he referred to them as "barrens." See Harris and Warkentin, *Canada before Confederation.*

[25] Despite evidence that the region has been altered by humans for centuries, there is an indisputable appeal of an imagined empty edenic grassland wilderness. See for example the descriptions given by environmental groups: Hinterland Who's Who, "Grasslands," http://www.hww.ca/en/where-they-live/grasslands.html; and The Nature Conservancy, "Places We Protect: Northern Montana Prairies," http://www.nature.org/ourinitiatives/regions/northamerica/unitedstates/montana/placesweprotect/montana-prairies.xml

determining their elevation, will be then hindered by the cultivated groves, tree rows, and hedges."[26]

Upham's observations were of the western beach areas of the glacial Lake Agassiz, a large glacial meltwater body that inundated much of what is now Manitoba and North Dakota for several thousand years. He could well have been describing any part of the northwestern plains. Uncharacteristically romantic in his description of the pre-agricultural landscape, Upham acknowledged the degree to which agricultural development would change the look of the land, lamenting the loss of the natural landscape while celebrating the aesthetics of permanent settlement.

The goal of this research is to identify cultural, economic, and political drivers of land use change, while recognizing the contextual environmental parameters that shape the range of possible human-land interaction. Cultural landscapes reflect these physical parameters. Relative to the rest of the continent, *flatness* and *aridity* define the North American Great Plains. But the continental interior is also characterized by considerable geomorphological and climatological variety, sufficient to produce quite-different agricultural regimes across its 3,200 kilometre span from Texas along the Gulf of Mexico, to the High Level - Peace River district of northern Alberta (Fig. 1.3).

The glaciated portion of the North American Great Plains, situated north of the Missouri River, which marks the study area's southern boundary, is characterized by a gently undulating landscape. Its mix of surficial materials and variety of slopes differs considerably in form from the unglaciated lands that comprise the bulk of the western Great Plains. Repeatedly through the Pleistocene Epoch, advancing and ablating continental glacial ice worked and reworked the land.[27] Bedrock was scoured and ground up within the ice, transported great distances, and eventually deposited when the ice melted approximately 10,000 years ago, creating a variety of landforms ranging from flat to hilly.[28]

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[26] Warren Upham, "Beaches and Deltas of the Herman Stages" *The Glacial Lake Agassiz*, United States, Department of the Interior, Monographs of the United States Geological Survey XXV, Washington, DC, Government Printing Office, 1896 6:278. http://library.ndsu.edu/exhibits/text/lakeagassiz/

[27] Arthur S. Dyke and Victor K. Prest, "Late Wisconsinan and Holocene History of the Laurentide Ice Sheet," *Géographie physique et Quaternaire* 41, no.2 (1987): 237-263.

[28] Virtually all landforms characterizing the northwest plains today are the legacy of the most recent glacial event, the Wisconsinan Stage. See R.W. Klassen, "Quaternary Geology of the Southern Canadian Interior Plains," in *Quaternary Geology of Canada and Greenland*, ed. R.J. Fulton, Canada, Geological Survey of Canada, Geology of Canada Series, no. 1, 1989 / Geological Society of America, *The Geology of North America*, vol. K-1 (1989): 138-174; and Prest, "Quaternary Geology of Canada."

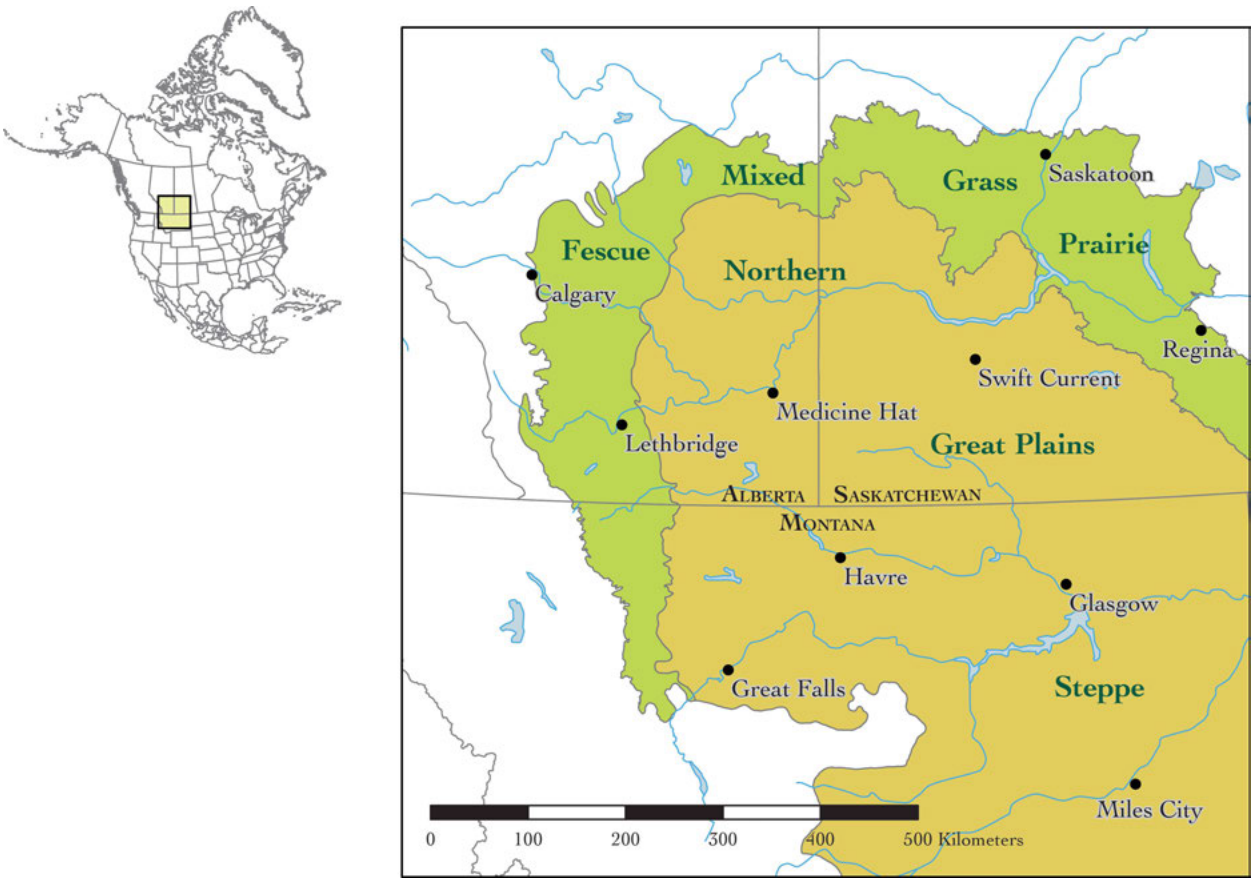

FIGURE 1.3 The northwestern transboundary plains. The study area lies largely within the Nothern Great Plains Steppe (or Mixed Grass) ecoregion. Ecoregion boundaries after Marshall and Schut.

The form of the land and the arrangement of its surficial materials influence agricultural systems through the relationships between slope and soil texture, and soil moisture availability, the latter of which is critical on the northwestern plains. The way in which water drains through glacial tills affects the speed of surficial runoff and the ground water chemistry.[29] Topographic features influence meso-climatic patterns, especially the directional aspects of sunlight available to plants and local evapo-transpiration.[30] Slope is a critical design and feasibility consideration for irrigation systems. Before the introduction of motor-driven pumps, early northern plains irrigation relied on gravity to distribute water

[29] G. Fortin, G. van der Kamp, and J.A. Cherry, "Hydrogeology and Hydrochemistry of an Aquifer-Aquitard System within Glacial Deposits, Saskatchewan, Canada," *Journal of Hydrology* 126 (1991): 265-292.

[30] P. G. Holland and D. G. Steyn, "Vegetational Responses to Latitudinal Variations in Slope Angle and Aspect," *Journal of Biogeography* 2, no.3 (1975): 179-183.

downslope and across flat fields. Additionally, surficial rock and sediments determine the soil minerals and, therefore, basic soil nutrient profiles.[31]

The glacial landscape is a complex one. At the time of glacial recession, large amounts of morainal debris were deposited, creating an undulating landscape of low hills and depressions. Long recessional morainal ridges, pushed into place by advancing ice, acted as natural dams. Outlets formed, allowing vast volumes of meltwater impounded between ice margins and the moraines to pour out onto surrounding areas in massive outburst floods.[32] The force of these immense discharges carved vast meltwater channels and carried great quantities of debris, ranging in size from boulders and cobbles, to gravel, sands, silts, and clays to be deposited differentially across the region. Where pre-glacial river channels existed, the meltwater followed their paths, greatly widening and deepening old valleys to form great spillways, the South Saskatchewan River Valley, for example.

While impounded in the large meltwater lakes, the water was relatively still, moved only by surface winds. The calmness of the water allowed the heavy load of fine-grained sediments to filter out and settle onto the lake bottom. Eventually, the lakes drained, leaving behind thick layers of clay and silt.[33] Beaches formed around the lake perimeters, where waves once ebbed and flowed along ancient shorelines. Larger grained sediments sorted out, gradually building up thick beds of sand and gravel. With little vegetation for protection, exposed lighter sands occasionally were lifted by the wind and carried far inland to collect in fields of rolling fine sandy dunes.[34] Behind the beaches, swampy backwaters gradually filled in with organically-rich mud and silt.[35]

The legacy of the recent glacial past is a richly-varied physical landscape, with a range of materials, textures, and landforms. The highly-localized surficial diversity, varying greatly across a few square kilometres or less, resulted in complex land use patterns.[36] On the whole, the glaciated plains are characterized by their *non*-uniformity. However, within the greater region, large areas, many hundreds of square kilometres in breadth, are more homogeneous. Large clay-silt plains associated with major glacio-lacustrine basins of eastern Saskatchewan,

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[31] Canada, Agriculture and Agri-food Canada, *The Canadian System of Soil Classification* (Ottawa, 1998). http://sis.agr.gc.ca/cansis/taxa/cssc3/index.html

[32] Alan E. Kehew and James T. Teller, "History of Late Glacial Runoff Along the Southwestern Margin of the Laurentide Ice Sheet," *Quaternary Science Reviews* 13 (1994): 859–877.

[33] Klassen, "Quaternary Geology."

[34] Stephen A. Wolfe, Jeff Ollerhead, and Olav B. Lian, "Holocene Eolian Activity in South-central Saskatchewan and the Southern Canadian Prairies," *Géographie physique et Quaternaire* 56, no.2-3 (2002): 191-202.

[35] Klassen, "Quaternary Geology."

[36] Relationships between surficial material and land use are described in Chapter 6.

Manitoba, and northern North Dakota[37] show conspicuously different patterns of land management. In these areas, the topographic and surficial uniformity allowed larger fields and more constancy in crop choice.[38] For this reason, the study area excludes lands east of the Missouri Coteau, a ridge of land trending north-west/south-east across North Dakota and Saskatchewan, rising approximately 100 metres higher than the low-lying lacustrine plains to the east. For obvious reasons, the Rocky Mountain Foothills present a very dissimilar landscape morphology and therefore mark the study area's western boundary.

The Red Deer-Saskatchewan River system that flows west to east across Alberta and Saskatchewan marks the study area's northern boundary. The physical landscape north of the Red Deer and Saskatchewan valleys is essentially the same as in the study area, but the rivers provide a useful arbitrary demarcation line. In a sense, the northern boundary is a climatic one. Climatic characterizations are commonly used to distinguish regions, including the Great Plains,[39] despite the fact that the flat, continental interior plains exhibit relatively continuous temperature and moisture gradation over the entire region, rather than the sharp climatic boundaries found in coastal or upland areas. The climate north of the Red Deer-Saskatchewan river system is not appreciably wetter or cooler than that of the study area, but, with the exception of the relatively dry Hanna district in Alberta, the varieties of crop and pasture plants sown, and patterns of land use, reflect the subtly different conditions of the plains-forest (parkland) transition zone.

The northwestern plains climates are less localized than are its landforms. Average temperatures vary little more than a few degrees across the region, although the southernmost portion is appreciably warmer at any given time of year.[40] Some localized exceptions occur, largely related to topographical slope aspect influence on surface temperatures. The mid-latitude low solar angle means south-facing slopes are consistently warmer, causing a considerable year-round north-south evaporative drying differential on hill slopes. Temperatures are slightly lower on north-facing slopes, or on plateau tops.[41] Precipitation is relatively low for the Great Plains, ranging from 325 to 375 millimetres annually for the study area (Fig. 1.4). Approximately one-half of annual precipitation falls within the spring and

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[37] The glacial Lake Agassiz, and the glacial Lake Regina are well known examples.

[38] Although still characterized by local variability, the former glacial lake beds are much more uniform in texture and topography. Fields tend to be regular in shape, and crop choice limitations are fewer in number.

[39] Alternate considerations for Great Plains regional demarcation are presented later in the text.

[40] Canada, Atmospheric Environment Service, Canadian Climate Program, *Climatic Atlas, Canada: A Series of Maps Portraying Canada's Climate* (Ottawa), 1984; and USA, National Oceanic and Atmospheric Administration, National Climatic Data Center, *Climate Atlas of the United States* (Washington) CD-ROM.

[41] Holland and Steyn, "Vegetational Responses."

early summer, aligning with the time of greatest crop moisture requirement.[42] One quarter of annual precipitation falls as snow, available to crops during the spring months. 'Chinooks' are characteristic weather events in the western parts of the study region. Chinooks are short term warming periods caused by westerly winds that adiabatically warm on descent onto the western plains.[43]

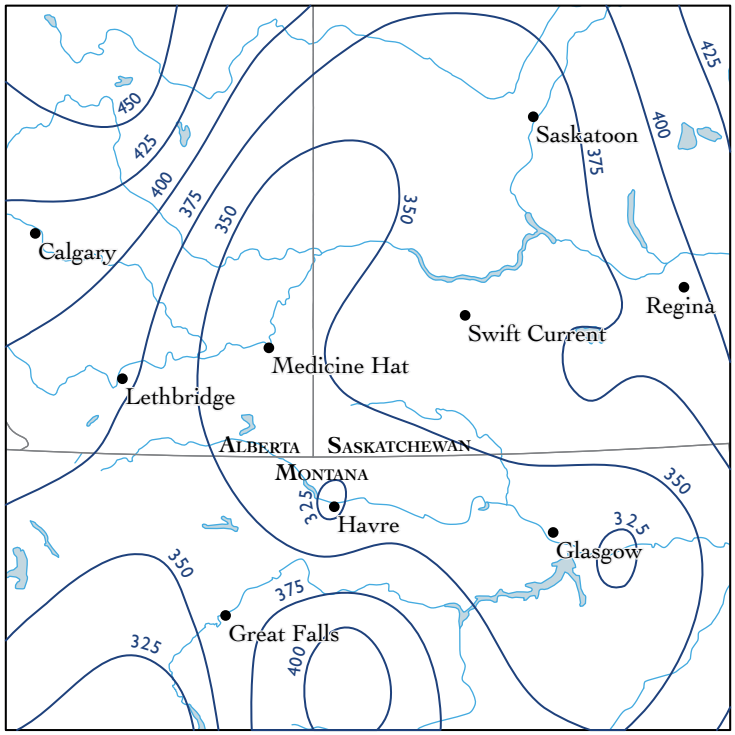

FIGURE 1.4 Average annual total precipitation isohyets (in millimetres) for the study region based on 1971 to 2000 values. Data from United States, NOAA-NCDD; and Environment Canada, NCDIA.

Ecoregional description, reflecting the combined influences of land, water, and weather, provides a rough guide to the study area's overall environmental setting. Generally aligning with climatic subregions, some ecoregion boundaries are more arbitrary than others.

[42] S. M. McGinn, "Weather and Climate Patterns in Canada's Prairie Grasslands," *Arthropods of Canadian Grasslands (Volume 1): Ecology and Interactions in Grassland Habitats*, ed. J. D. Shorthouse and K. D. Floate (Ottawa: Biological Survey of Canada, 2010) 105-119.

[43] Ibid.

Almost the entire study area lies within Bailey's "Northern Great Plains Steppe". A small portion within Alberta is classified by Bailey as "Fescue Mixed-Grass Prairie".[44]

This research studies land use history at multiple scales: *regional*, *sub-regional,* and *local*. Within the larger region, three mid-scale sub-regional study focus areas, each roughly equal in area, have been defined, one each in Alberta, Saskatchewan, and Montana (Fig. 1.5). These sub-regional focus areas are comprised of a number of census sub-divisions. In Canada, census sub-divisions are the smallest units for statistical aggregation and almost invariably follow existing municipal boundaries. In Saskatchewan, due to the nature of the municipal organization of that province, sub-divisions can be as small as nine townships (324 sections), equivalent to approximately 855 square kilometres, including road allowances. In the Alberta study area, the census subdivisions are considerably larger, ranging from 2,950 square kilometres for the County of Lethbridge, to 6,270 for the sparsely settled County of Newell. Agricultural census aggregation in the United States is similarly based on county-level units, which like the Canadian municipal divisions, varies greatly in size. In the Montana sub-regional study area, the areal range is 3,780 square kilometres (Liberty County) to Chouteau County's 10,205 square kilometres.

At the local scale, 'fields' are the basic spatial unit. Across the region's farms, individual fields vary in size, ranging from 10 acres for a small 1950s field strip, to as large as 320 acres[45] for a large 1990s Alberta unirrigated crop field. To account for the wide range of field size variability, twelve sub-regional blocks, each measuring three miles by three miles, equivalent to one quarter of a township, or thirty-six quarter sections, have been stratified-random[46] selected within each of the three focus areas for local field-scale mapping (Fig. 1.5).

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[44] Ecoregional description and terminology varies. American literature commonly refers to A.W. Küchler's system of potential natural vegetation which specifies 'tall', 'mid', and 'short' grass zones within the Great Plains. Küchler's map was never extended to Canada, therefore the newer R.G. Bailey ecoregion map has been used for this research. Bailey's map aligns closely with Canada's Ecological Framework system and has been completed for all of North America, making it ideal for transborder study. Bailey's system, in many areas can be considered equivalent to Küchler. Bailey's "Northern Great Plains Steppe" and "Fescue Mixed-Grass Prairie" are analogous to "Mixed Grassland" and "Moist-Mixed Grassland" respectively in the Canadian system. See R.G. Bailey and H.C. Hogg, "A World Ecoregions Map for Resource Reporting," *Environmental Conservation* 13, no. 3 (1986): 195-202.; and I.B. Marshall and P.H. Schut, "A National Ecological Framework for Canada: Overview," Canada. Environment Canada. Ecosystems Science Directorate and Agriculture and Agri-Food Canada. Research Branch, (Ottawa, 1999).

[45] Areas and distances for cultural features are generally expressed in acres and miles, reflecting their relationship to the base survey specifications of Canada's Dominion Land Survey (DLS) and the United States Public Land Survey System (PLSS).

[46] The sampling was influenced by aerial photo availability for each of the four time periods. A lack of usable photos, particularly from the 1930s in Alberta and Saskatchewan, greatly restricted the study area selection possibilities.

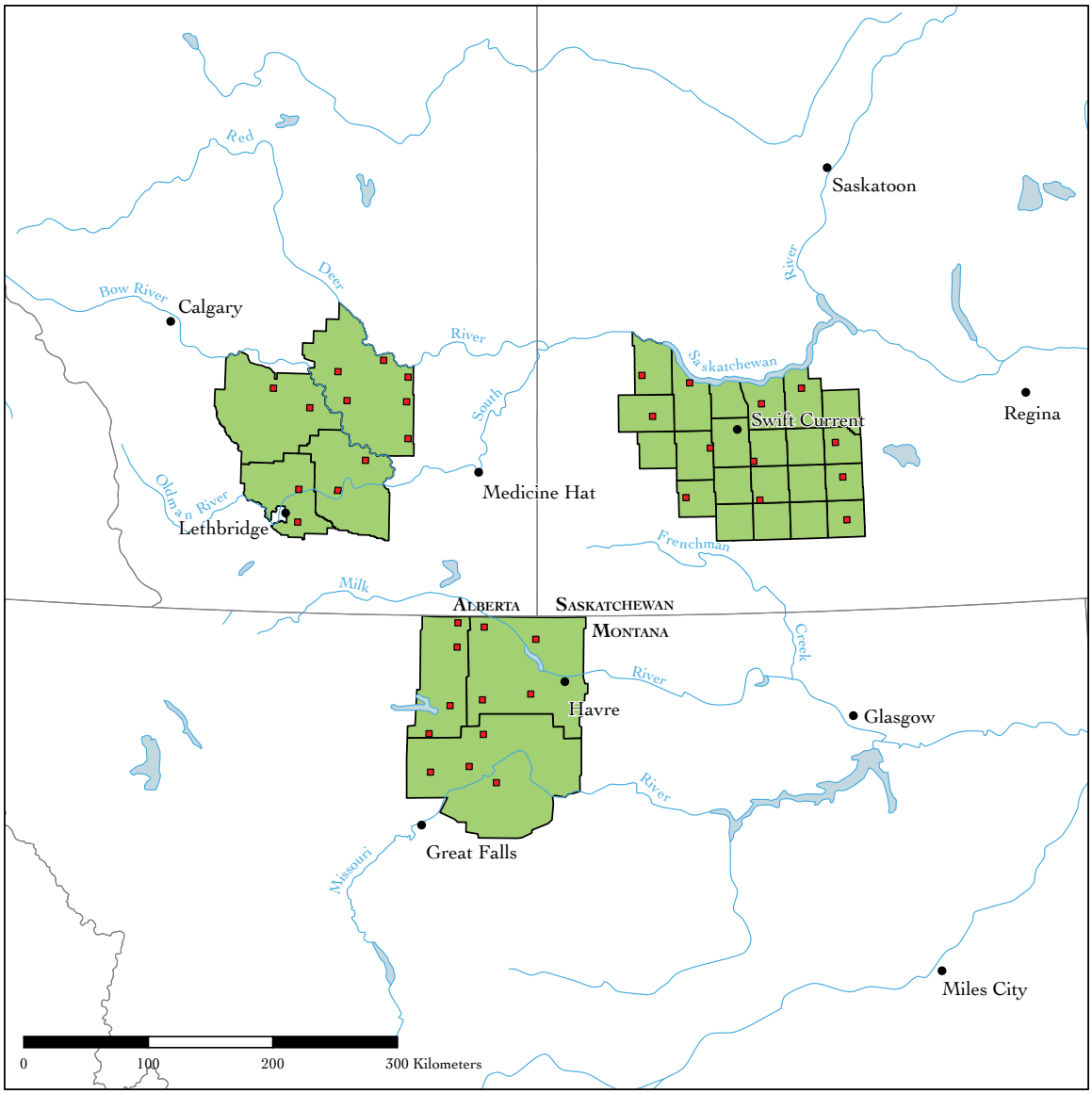

FIGURE 1.5 The study region, showing three sub-regional study areas defined by census sub-division (*in green*), and thirty-six 3 miles by 3 miles local sample blocks (*in red*).

A quarter-section is a standard unit of agricultural land measurement within Canada's Dominion Land Survey (DLS), and the United States' Public Land Survey System (PLSS). Measuring 640 acres (one square mile), sections were divided into quarters (160 acres) for distribution under land dispersal schemes described later in the text (Fig. 1.6).

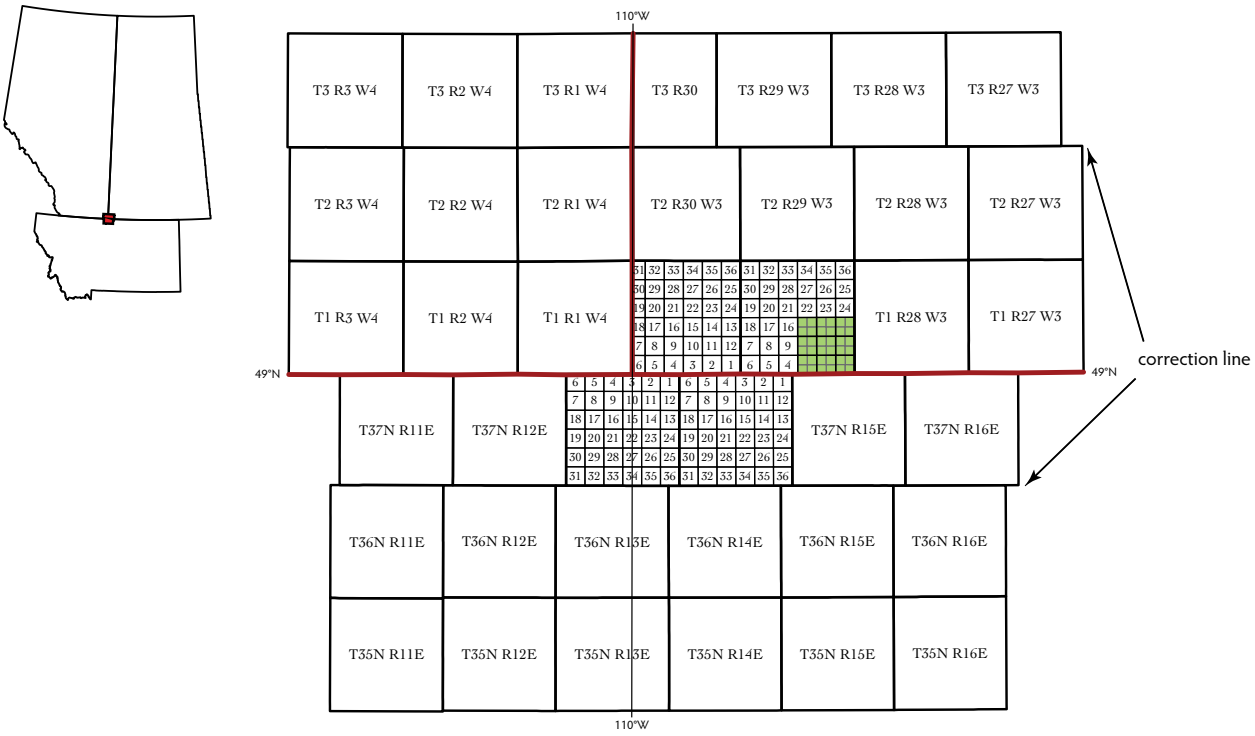

FIGURE 1.6 Systems of the Dominion Land Survey and Public Land Survey as used in the study area. Both systems order land using a sequence of townships and ranges. In Canada all townships are sequentially numbered north of the 49° parallel. United States townships are measured north from baseline parallels. Ranges in most of western Canada are measured west from longitudinal meridians. The 4th meridian west of the principal meridian falls on 110°W longitude (which also defines the Alberta-Saskatchewan border). In the United States, ranges are measured west and east of principal meridians. Townships are further divided into 36 sections (*smallest squares shown*), measured from the south-east corner in Canada, the north-east corner in the United States. Because ranges are measured off meridians, which converge northwards, in order to preserve a nearly uniform section width, ranges are remeasured along specified 'correction' lines. Sections are further divided into smaller divisions, the quarter section being the base land dispersement under the United States Homestead and Canadian Dominion Lands acts. Quarter-sections (*in green*) are simply described as 'north-east,' 'north-west,' ' south-east,' 'south-west.'

The three-mile by three-mile extent of the sub-regional study blocks is large enough to cover a sufficient range of farming land choices for any given place. The sample unit size was dictated by the fact that farms have changed greatly in size over the past seventy-five years. Based on the disbursement provisions of the United States Homestead and Canadian Dominion Lands acts, a given three-mile by three-mile area could theoretically contain over thirty individual farms, although this did not actually occur in practice. By the 1990s, a handful of isolated quarter-section farms and other small holdings persisted, but most farms were at least one or more sections in size. For example, the *average* farm size in the three

Montana counties studied ranged from 2,375 to 3,270 acres (3.7 to 5.1 sections) in 1997, the latter being twenty times the size of an original standard homestead grant.[47]

Of the thirty-six study blocks, three have been selected, one in each of the sub-regional areas, for detailed land use histories. The agricultural histories of Webb, Saskatchewan, Patricia, Alberta, and Fort Benton, Montana (Fig. 1.7) each developed within the larger environmental, economic, social, and cultural contexts that shaped the region as a whole. But the unique qualities of local-scale place history also have led to often subtle, but occasionally considerable variations within the overall pattern.

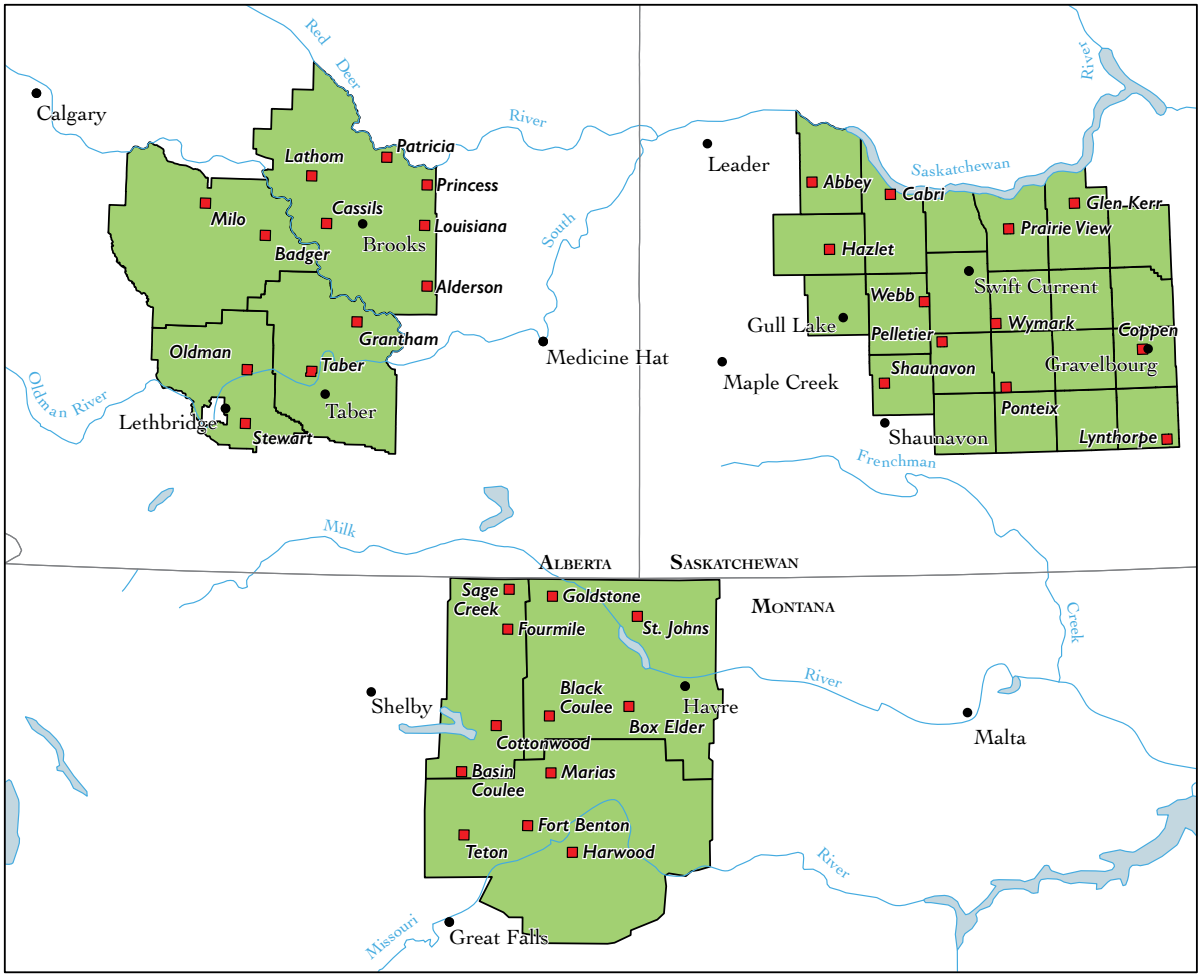

FIGURE 1.7 Thirty-six sub-regional study blocks. Block names are for reference, and relate to nearby settlements, or geographical features.

[47] United States, United States Department of Agriculture, *1997 Census of Agriculture*.

* * *

On September 2 and 3, 1938, a small aircraft crossed back and forth over south-west Saskatchewan, flying east-west along 20-mile transects laid out roughly between Shaunavon in the south and Webb in the north. It was unseasonably hot on each of those two days, with temperatures reaching 34°C and 33°C respectively.[48] As the aircraft droned over recently cut fields and dry grassy hills, approximately every mile, or about every twenty seconds, an onboard camera, loaded with a roll of 70 millimetre film, recorded the drought-desiccated landscape below.[49]

Had the aircraft been scheduled to overfly this part of Saskatchewan seven weeks earlier, a group of scientists on the ground may well have looked up and, observing the criss-cross flight path, would have recognized and understood the importance of the flight. Undoubtedly, they would have been pleased. On July 12, 1938, a large group of men from the Prairie Farm Rehabilitation Administration (PFRA) soil drifting committee departed by car from Swift Current. They travelled more than 200 miles round-trip on an inspection trip to visit drought-stricken farmlands to the south-east of the town.[50]

By 1938, Canadian federal officials were markedly optimistic about an impending turnaround for western prairie agriculture, which had suffered several consecutive years of drought. Crops were in notably better condition than they had been in 1937, and farmers had taken advantage of a "rather favourable season."[51] The observers, members of the PFRA soil drifting committee, were convinced that measures for reducing wind erosion, strongly advocated over the past few years, were now being widely implemented.[52] In their estimation, emergency procedures, such as the laying down of straw in the spring, had been sufficiently effective to allow the seedings to take hold and establish a tenuous grip on the soil. Furthermore, "large numbers" of producers had initiated strip farming. The writer of the report cautioned, though, that a large acreage remained "devoid of vegetation" and would remain a "constant menace" to surrounding farms unless "controlled," an outcome the report

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[48] Climate data for Aneroid, Saskatchewan from Environment Canada, National Climate Data and Information Archive.

[49] Canada, Department of Natural Resources, National Air Photo Library (NAPL) flightpath record for film roll A6305.

[50] "Inspection Trip, Soil Drifting Conference, July 12, 1938," *Report of the Meeting of the Regional Committee on Soil Drifting Held on the Dominion Experimental Station Swift Current, Sask, July 11 and 12, 1938.* unpublished report, (1938): 42.

[51] "Inspection Trip," 46.

[52] Ibid.

writer was optimistic could be achieved based on results of experiments undertaken at the Cadillac Reclamation Station located south of Swift Current.[53]

Aerial photography of the Great Plains is inextricably connected to agricultural concerns. The 1938 flights over southern Saskatchewan had been specifically launched to photograph prairie drought areas. Such was the scope and ambition of the photographic program, these flights represented the largest civil operation ever undertaken by the Royal Canadian Air Force (RCAF).[54] In the United States, aerial photography was already integral to the F.D. Roosevelt administration's Agricultural Adjustment Act (AAA). In an effort to "promote fairness" in the distribution of acreage-based crop reduction incentives, the US Department of Agriculture had begun using aerial photography to survey agricultural lands, at least on a trial basis, beginning in 1936.

When the the United States Supreme Court ruled the AAA unconstitutional in 1936, monetary incentives for 'soil conservation' purposes continued, bridging the support gap for photography until the renewed AAA's in 1938.[55] By the mid-1940s, the newly-created United States Production and Marketing Administration had been made responsible for aerial analysis of agricultural lands and aerial surveys supplemented field surveys for more accurately calculating program participation rates.[56] Subsequently established agencies, including the Commodity Stabilization Service, the Agricultural Stabilization and Conservation Service and later the Farm Service Agency, continued to fund extensive aerial-photographic programs for agricultural survey purposes.

Canada's agricultural aerial-photographic program had earlier origins. Canada had primarily been interested in surveying vast tracts of thinly settled land lying along the fringe areas of the northern boreal forest, with the primary aim of identifying potential areas for new settlement. Secondary goals were to identify geological resources, or for topographic mapping.[57] For the most part, established agricultural lands were considered to be already effectively surveyed, although specific localities in the southern prairies had been experimentally photographed as early as 1922.

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[53] Ibid., *47*.

[54] S. Bernard Shaw, *Photographing Canada from Flying Canoes* (Burnstown, Ontario: General Store Publishing, 2001).

[55] Mark Monmonier, "Aerial Photography at the Agricultural Adjustment Administration: Acreage Controls, Conservation Benefits, and Overhead Surveillance in the 1930s," *Photogrammetric Engineering and Remote Sensing* 68, no.12 (2002): 1257-1261.

[56] United States, Department of Agriculture, Farm Service Agency, "History of the Aerial Photography Field Office (APFO)," http://www.apfo.usda.gov/FSA/apfoapp?area=about&subject=landing&topic=his

[57] Shaw, *Photographing Canada.*

In 1922 and 1923, aerial surveys were conducted in southern Alberta with the intention of obtaining irrigation and water management information, as well as to contribute to the production of "improved maps of the prairies".[58] In 1926, two RCAF DH4b aircraft based near Calgary at High River, Alberta, photographed 2,550 square miles of southern Alberta and Saskatchewan, mostly in the parkland regions around North Battleford, Saskatoon, and Melfort, but including the Northern Irrigation District and the St. Mary's River area of Alberta.[59] Despite the promise shown by the early aerial photographic activity, the High River operations ended in 1928 and the program was placed into a "care and maintenance" status.[60]

Extensive aerial photography of Canadian prairie lands began anew in 1937. This time, the focus was *solely* on agricultural applications. The first flights of the new project were planned specifically to capture imagery of districts considered to be particularly "at risk" to the ongoing drought.[61] Unlike the United States, Canada had not enacted production control programs equivalent to the AAA. Much of the interest in aerial photography was instead directed towards PFRA land utilization and resettlement studies that began in 1935. By 1937, the PFRA recognized the potential value of reestablishing a federally funded aerial photography program as a method for surveying agricultural production, not just during the drought, which had reached its nadir that year, but also to map the recovery. Recovery had barely taken hold in 1939, when a planned comprehensive flight program was interrupted by the Second World War.

Following the War, Canada undertook an ambitious program to photograph the entire land mass of the Dominion, including all agricultural lands, many of which were re-flown specifically to provide better quality images for crop survey purposes (Fig. 1.8).[62] Later, much in the manner that the United States had done with the AAA and subsequent programs, Canada used aerial photography for program compliance surveillance. The most notable example of compliance survey was an ambitious schedule of high altitude photography, flown

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[58] Shaw, *Photographing Canada,* 32.

[59] Shaw, *Photographing Canada,* 86. The area photographed was limited because of persistent bad weather and smoke from northern fires. The following year flight schedule was similarly limited due to unusually wet weather.

[60] Shaw, *Photographing Canada,* 137.

[61] Canada, Department of Energy, Mines and Resources, *Skyview Canada: A Story of Aerial Photography in Canada*, by Don W. Thomson, (Ottawa, 1975).

[62] Canada, *Skyview Canada.*

and analyzed in the summer of 1970, to verify farmer-reported acreages under the 'Lower Inventory for Tomorrow' (LIFT) program.[63]

FIGURE 1.8 A Royal Canadian Air Force Mitchell aircraft of No. 1 Advanced Flying School, RCAF Station Saskatoon, on a photographic flight over southern Saskatchewan in the 1950s. The geometric land use patterns of Canadian prairie agriculture are clearly visible. Also of note, is the characteristic form of a Mennonite "strassendorf" (street village) observable in the lower right of the photo. Until the 1960s, the RCAF was responsible for most of Canada's aerial photography. Photograph courtesy of Canada Department of National Defence.

The photographs taken of the western agricultural lands of the United States and Canada have lasting value. They are an invaluable resource for studying the land use at critical junctures in the region's agricultural history. This research demonstrates the usefulness of using historical aerial photography, classified and analyzed within a Historical Geographic Information System (HGIS), to reveal land use change. The use of aerial photographs within this analysis provides evidence of land use change not obtainable from other sources. Careful analysis of photographs, using established photogrammetric and visual interpretative

[63] Canada, *Skyview Canada*, 176-177. LIFT was a one-year production and price control program which encouraged farmers to put land previously seeded to wheat into perennial forage or summerfallow. See Reitsma, "Agricultural Changes."

methods, made it possible to quantify attributes such as field dimensions, cropped and not-cropped land, field mechanization, occupancy, and access. Textual and other sources do not provide the same degree of verifiable detail.

A series of photo prints has been obtained, representing four distinct time periods: the late-1930s, the mid-1950s to early 1960s, the late-1970s, and the early to mid-1990s. One case study, Fort Benton, Montana, is described by an additional fifth photo series flown in 2006. The photographs were digitally scanned, orthorectified, and assembled (where necessary) into 1-metre resolution raster mosaics (Fig. 1.9). These were then used as reference images for classifying three-mile by three-mile sample blocks. Using common techniques of aerial photograph interpretation,[64] the land then could be classified into discrete units such as tilled crop land, seeded pasture, rough grazing (representing never-tilled or reverted lands), built-up areas, and so on. The land classification examples in this dissertation closely adhere to the techniques of land use mapping developed in Canada during the 1950s and 1960s under the direction of L.E. Philpotts. Those mapping experiments ultimately formed the basis of the Canada Land Inventory System (CLI). For the most part, land use classes and interpretive methods used in this dissertation are very similar to those used by the the CLI.[65] The classification units were created as vector polygons within a coded file geodatabase.[66]

The original photo print scale range of approximately 1:20,000 to 1:60,000 was large enough to identify relatively fine features such as shelterbelts, grain bins, and small dugouts. Once each of the time series was processed, the vector polygons comprising each of the sample area classifications were combined into intersected overlays used for spatial and descriptive analysis.

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[64] As specified in: American Society of Photogrammetry, *Manual of Photographic Interpretation* (Washington, DC: American Society of Photogrammetry, 1960).

[65] The CLI is widely acknowledged as being the first "GIS" and it is in the spirit of that remarkable work that this research is conducted. For examples, see Canada, Department of Agriculture, Economics Division, Marketing Service, *The Use of the Aerial Photo in the Change of Land Use in Southwestern Saskatchewan*, by L.E. Philpotts, (Ottawa, August, 1957); and Canada, Department of Agriculture, Economics Branch, *Farmers' Estimation of Acreage In Comparison with Measurements from Aerial Photographs, Manitoba, 1961*, by L.E. Philpotts, (Ottawa, December, 1965).

[66] Many of the processes used in this analysis, including the geodatabase model, sample unit size, and classification strategy, were developed by the ICPSR Great Plains Project. Although somewhat modified to suit the specific goals of this study, many analytical elements were kept similar so as to be compatible with the Great Plains Project methodology. Both the imagery mosaics and initial land classifications for the Montana example were supplied by ICPSR staff, with the classifications modified and converted to CLI terminology to match the Alberta and Saskatchewan samples. The Great Plains Population and Environment Project at the University of Michigan (Grant Number R01 HD 033554 from the Eunice Kennedy Shriver National Institute of Child Health and Human Development--NICHD) provided funding and data in support of this dissertation.

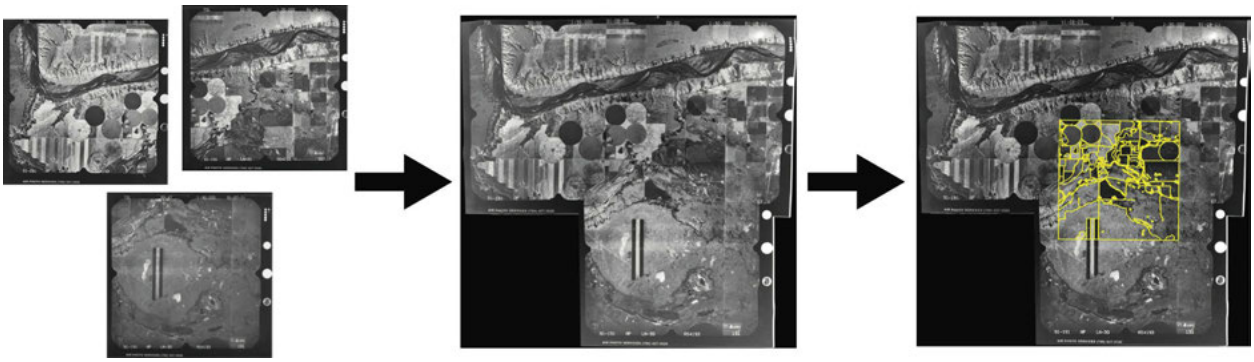

FIGURE 1.9 Aerial photograph processing steps. The photo-interpretive portion of a land use study goes through three steps: acquisition and digital scanning of prints *left*; orthorectification and mosaic construction *centre*; and visual interpretation and coded land unit classification *right*. This example is of the Patricia, Alberta case study, using photos flown in July, 1991. Original photographs courtesy of Alberta Sustainable Resource Development Ministry, Air Photo Distribution Office.

As useful as aerial photographs are for reconstructing landscape change, assembling landscape *histories* demands knowledge of the contexts and motivations of the visible changes captured in the photos. Additional information sources have been consulted to round out the milieu of northwestern plains landscape change. In Chapter 3, reassembly of homestead histories from Dominion homestead records, illustrates typical initial land settlement and conversion processes around 1910. The speeches and papers of prominent people like railway magnate James Hill and the eminent agricultural economist and political advisor M.L. Wilson reveal the commercial and governmental attitudes that drove 1920s land use expansion. 1930s American and Canadian government approaches to farmland issues, and the relationships between government staff and farmers, are interpreted from two main sources: correspondence, internal reports, and maps produced by Soil Conservation Service SCS staff over the decade from 1933 to 1943; and Canadian Department of Agriculture PFRA and Economics Branch reports and maps produced from 1935 to 1941. Written after the Second World War, the corporate reports of the British Columbia Sugar Refining Company provide insight into the fraught relationship between producers, global markets, corporate interests, and government regulation during the the 1950s and 1960s. Selected agricultural agricultural statistics round out the institutional data, adding quantitative evidence of crop and demographic change.

Government information sources reveal surprisingly varied and nuanced viewpoints, reflecting the experiences, beliefs, and biases of the individuals authoring the material. But they are institutional sources, constructed within relatively rigid scientific and ideological orders. The voices of people served by the agencies are present in the reports and correspondence, but the words are not their own. To better capture the attitudes, concerns,

and individual considerations that ultimately drove landscape change, community histories have been consulted. The first-hand perspectives provided by the residents of the northwestern plains give us a glimpse into the innumerable personal factors that drive land use decision-making.

This research covers a eighty-year time frame. It spans nearly the entirely of agricultural activity on the northwestern plains over two main periods. The first era begins with a prelude to settlement in 1910, moves through the 1920s period of rapid agricultural expansion, leading into the infamous 1930s economic depression and farm crisis. These first three decades were characterized by particular processes of land dispersement and settlement, specific government considerations of environment and farming method, and on-farm discovery and innovation. The second era covers the post-1930s decades of relative land use stability, and trends of farm consolidation, rural depopulation, and the role of world commodity markets. Mainly because the aerial photographs are inconsistently available after the 1990s, the study period ends at a more recent era of change marked by the adoption of direct seeding and reduced tillage, the emerging economic importance of sub-surface energy development, and the introduction of the Conservation Reserve Plan in the United States.

This dissertation analyses the making of the northwestern plains agricultural landscape. It reveals not only how producers developed and worked land, but how their techniques and approaches to farming evolved through a process of learning and adaptation,[67] often initiated by the farmers themselves, but also tested and disseminated by the staff of well-organized public agencies. The research reveals varied patterns of change, rapid in the initial decades, evolutionary in the latter ones. The HGIS analyses undertaken for this dissertation provide strong evidence both supporting and refuting common understandings of northwestern plains agriculture. For example, it is clear that mechanization was universal by the 1930s, and that farmed acreages did not decrease appreciably during the 1930s drought. The photographs also show that 1930s soil drifting, extensively referred to in many contemporary accounts, was indeed severe in a few areas, yet farms in many other places were unaffected by erosion.

In constructing a narrative of region and place-making on the northwestern plains, five themes have emerged: *Environment and Adaptation, Efficiency and Scale, Timing, The Role of Government,* and *Landscape and Place*. Farmers adapted to the land in order to cope with the varied soils, and the year to year weather variability that was the main determinant of success. Their farms were highly mechanized, growing ever-larger from first settlement to better balance a cost-efficiency equation that could provide defence against economic forces beyond

[67] The term "adaptation" in this dissertation is used in a cultural-ecological sense to imply adoption of process to better survive or adjust to a changeable environment. For a discussion on how cultural ecologists have applied the concept, see Lesley Head, "Cultural Ecology: Adaptation – Retrofitting a Concept?" *Progress in Human Geography* 34 no.2 (2010): 234–242.

producer control. The agricultural settlers arrived just as North American farming underwent a great technological shift from horse-drawn tillage to machine traction; the development of their farms coinciding with larger scale political and economic shifts of the 1920s and 30s. Through progressivist policies aimed at driving effective western settlement, the federal governments of both countries created the system within which the farms would operate, and ultimately saw for themselves, a central role in researching and disseminating agronomic innovation. Ultimately, the northwestern plains agricultural landscape was also a product local decision-making within distinct environmental and settlement contexts, different enough in process and history so as to define a discrete region and place within the greater North American Great Plains.

This narrative delves into the relationship between environmental limitation and human decision-making. It examines the ideological and pragmatic drive for efficiency and economic sustainability within a complex human-environment-system. The narrative tracks key events of politics, markets, and technological invention that influenced on-land choices, informed by the active direct involvement of government in an industry where, ultimately, most of the decisions were down to individual land-holders. At its heart, the research explores the subtleties of time, space and place-making, highlighting the importance of regionally-specific context.

CHAPTER 2

A COMMON AND DIVIDED REGIONAL HISTORY

North American landscape histories have largely ignored one important spatial aspect of the Great Plains. Except for a few works identifying larger-scale statistical patterns of production with little analysis below the county level, there is a dearth of research comparing American and Canadian land use.[1] Virtually every historical-agricultural study focusses on only one of the two countries. Landscapes are defined by both human and environmental criteria. Political boundaries such as the Canada-United States frontier become formal entities for a variety of reasons, but rarely in colonial countries do divisions align with natural features such as mountain ranges, watersheds, climate zones, or ecological realms. Nor have colonially imposed borders tended to reflect pre-colonial cultural, social, or economic divisions.

The western half of North America is cleaved by the forty-ninth parallel, an arbitrary line agreed upon as the international boundary by the 1818 Anglo-American Convention.[2] The selection of a straight latitudinal line was largely a matter of political expediency, but also approximated an earlier demarcation of British territory based on the divide between the watershed-defined territories of the Hudson's Bay Company (HBC) and the Louisiana Purchase. Except for a small area of present-day south-west Saskatchewan and southern Alberta, all northern plains water north of 49°N drains northwards through the Saskatchewan and Red river systems to Hudson Bay. Conversely, other than a small area of northern North Dakota and Minnesota, all plains water south of 49°N flows southwards

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[1] One example is Lawrence B. Lee, "The Canadian-American Irrigation Frontier, 1884-1914," *Agricultural History* 40, no. 4 (1966): 271-284. A more recent example is H.A. Reitsma, "Agricultural Changes in the American-Canadian Border Zone, 1954-1978." *Political Geography Quarterly 7* (January, 1988): 23-38.

[2] "Convention of Commerce between His Majesty and the United States of America: Article II." United Kingdom Treaty, signed 20 October, 1818. London.

though the Missouri-Mississippi system to the Gulf of Mexico.[3] Rather than precisely map and survey the north-south watershed divides, Britain and the United States agreed to simply extend a straight line west from Lake of the Woods to the Rocky Mountain continental divide. Aside from the drainage divide, on either side of the international boundary, underlying physical characteristics are identical. Geologic structures are continuous. Temperature and precipitation gradients trend regionally.

Many scholars studying social or cultural histories spanning international or sub-national political boundaries have turned to a borderlands approach.[4] A borderlands framework is especially appealing in agricultural history as it focusses on borderless cultural drivers of farm decision-making. By definition, a borderland is its own entity, distinct from its associated political territories. Political influence is necessarily subjugated, rendered by some borderlands scholars to be virtually immaterial.[5]

Some prominent Canadian writers have persistently opposed describing Canadian history and geography in the context of the international border.[6] In the 1980s, R. Cole Harris advanced the 'Canadian Archipelago' thesis. Based on a longstanding Canadian historiography, Harris reasserted that Canada experienced a regional territorial evolution, patently different from the process that had transformed the United States.[7] Harris, following an intellectual path first marked by Harold Innis,[8] described Canada's regions as "islands between an implacable north and the United States."[9] To Harris, a definitively Canadian

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[3] S. Anderson, "The North-American Boundary from the Lake of the Woods to the Rocky Mountains," *Journal of the Royal Geographical Society of London* 46 (1876): 228-262.

[4] For borderland study in the context of the northern Plains, see Sterling Evans, ed., *The Borderlands of the American and Canadian Wests: Essays on Regional History of the Forty-ninth Parallel* (Lincoln: University of Nebraska Press, 2006); Carol Highham and Robert Thacker, eds., *One West, Two Myths: A Comparative Reader* (Calgary: University of Calgary Press, 2004); Beth LaDow, *The Medicine Line: Life and Death on the North American Borderland* (New York: Routledge, 2002); and Theodore Binnema, *Common and Contested Ground: A Human and Environmental History of the Northwestern Plains* (Norman: University of Oklahoma Press, 2001).

[5] Randy Widdis cites in particular, Arjun Appadurai and Homi K. Bhabha as being two of the foremost advocates of borderlands scholarship. Furthermore, Widdis describes how a number of scholars believe that political boundaries have become increasingly irrelevant in an ever-more globalized world. See Randy William Widdis, "Crossing an Intellectual and Geographic Border: The Importance of Migration in Shaping the Canadian-American Borderlands at the Turn of the Twentieth Century," *Social Science History* 34, no.4 (2010): 445-497.

[6] Ibid.

[7] R. Cole Harris, "Regionalism and the Canadian Archipelago" in *Heartland and Hinterland: A Geography of Canada,* ed. L.D. McCann (Scarborough, Ontario: Prentice-Hall, 1982). Harris' observations follow in the tradition of Innis, Creighton, and Careless among others (see below).

[8] See Trevor J. Barnes, "A Geographical Appreciation of Harold Innis" *The Canadian Geographer* 37, no. 4 1993, 352-364.

[9] Harris, "Regionalism."

pattern of "movement, technology, markets, and memories of other places" shaped the Prairie West.[10] Similarly, Marcus Gräser described how American historians have strenuously maintained national narratives when writing about the United States.[11]

A borderlands approach is well-suited to ecoregional research. Many physical-environmental characteristics are uninterrupted by politically-imposed divisions. However, climates, bioregions, and even geological landscapes, tend to be studied nationally, rather than internationally. Such domestically-oriented research focus is partly understandable, considering the institutional level of inquiry that generates the data. Land surveys, census counts, production statistics, and weather data, are collected by governmental agencies that have little interest in funding research beyond their jurisdictional limits. However, trans-boundary environmental data, if reasonably compatible in format, can be amalgamated and there is an increasingly strong call for a transboundary bioregional basis of historical inquiry.[12]

Yet, the movement towards a strictly bioregionally based borderlands approach to environmental history ignores the obvious: *political boundaries matter*. This is certainly true in the context of the Great Plains. Arguably, few North American industries have received greater governmental attention than has agriculture. In Canada and the United States, a multitude of national and sub-national policies, directly and indirectly affecting agricultural production, have had tangible consequences on the agricultural landscape.

Perceptively, the Canada-USA border remains steadfast. To some historians, with Canada's acquisition of the Northwest Territories from Britain in 1870, the international boundary represented a firm demarcation between the aggressive or even immoral United States, and the morally-superior British Canada.[13] Canada's actions during well-publicized events such as the Cypress Hills Massacre and the 'Sioux Flight' from Little Big Horn were held up by the contemporary press and the Canadian government as demonstrations of a more upright British-Canadian order. British values were juxtaposed with the claimed lawlessness of the United States' response.[14] Americans saw the western international boundary quite differently. What Canada proffered as order, the United States saw as oppression. Proponents

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[10] Harris, "Regionalism."

[11] Marcus Gräser, "World History in a Nation-State: The Transnational Disposition in Historical Writing in the United States," *Journal of American History* 95 no.4, (2009) 1038-1052.

[12] Binnema, *Common and Contested Ground*.

[13] As represented in the Britannic School of Canadian history described by J.M.S. Careless. See J.M.S. Careless, "Frontierism, Metropolitanism, and Canadian History," *Canadian Historical Review* 35, no.1 (1954): 1-21.

[14] John Herd Thompson, *Forging the Prairie West* (Don Mills, Ontario: Oxford University Press, 1998); see also Waiser, *Saskatchewan*.

of Manifest Destiny had long viewed the British Northwest as inherently American territory, waiting to be freed from British subjugation.[15]

Retrospectively, Canadian and American attitudes towards the Aboriginal and settlement issues of the western territories seldom differed. Aboriginal peoples moved freely throughout the region long before the Medicine Line was marked in the mid-nineteenth century.[16] The expanding fur trade and, later, the fervent efforts of both Canada and the United States to consolidate western holdings, led to a complete reordering of Aboriginal political geographies. The protective asylum Canadian authorities offered to Sitting Bull and his Sioux followers at Fort Walsh in 1877 soon depreciated through negligence, starvation, and subjugation.[17] Sir William Butler, observing the circumstances of Aboriginal peoples in the trans-boundary West in the 1870s, saw no Canadian-United States distinction, writing:

> "But never at any time since first the white man was welcomed along the newly-discovered shores of the Western Continent by his red brother, never has such disaster and destruction overtaken these poor wild, wandering sons of nature as at the moment in which we write." He continued: "The American and Canadian are only names that hide beneath them the greed of united Europe."[18]

Prior to mass settlement, economic opportunism ensured that the western international boundary was not the impenetrable barrier British, Canadian, and American authorities intended it to be. After the boundary was formally designated in 1818, First Nations, Métis, and European traders and hunters saw little reason to heed it. The international border was not even *marked* until 1873/74. Over those two years, the International Boundary Commission surveyed the western portion of the border, only because impending settlement required land surveys that demanded a fixed baseline.[19]

As settlement neared completion, several factors ensured that the Canadian-American boundary in the West had not become impenetrable, rather it, in the words of one historian, "…proved to be part wall and part bridge."[20] Canada's economic and political heart lay in the East, separated from the prairie farmlands by two thousand kilometres of thinly-occupied boreal forest. The completion of the main and branch lines of the transcontinental Canadian

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[15] Paul F. Sharp, "Three Frontiers: Some Comparative Studies of Canadian, American, and Australian Settlement," *Pacific Historical Review* 24, no.4 (1955): 369-377.

[16] Binnema, *Common and Contested Ground.*

[17] Waiser, *Saskatchewan.*

[18] W.F. Butler, *The Great Lone Land: A Narrative of Travel and Adventure in the North-West of America* (London: Sampson Low, Marston, Low, & Searle, 1872), 240-241.

[19] Anderson, "The North-American Boundary."

[20] Lee, "The Canadian-American Irrigation Frontier."

Pacific Railway, Grand Trunk Pacific, and Canadian Northern Railway, by the outbreak of the First World War, provided vital connectivity between western producers and eastern markets. However, due to the distances involved, machinery, supplies, grain, and people could often be moved to western Canada more efficiently via the Great Plains edge cities of Minneapolis-St. Paul and Chicago. Only direct intervention in the form of trade restrictions and tariffs, in addition to federal subsidies for Canadian railways, stemmed the one-way flow and maintained the economic relevance of the international border.

Recently, there has been a determined call by historians, geographers, sociologists and anthropologists to consider cross-border regional histories of the Canadian and American Wests.[21] Paul F. Sharp was calling for such studies in the early 1950s, but few seemed to take up his challenge.[22] This dissertation answers that call. Through comparative study, this research describes the Canada-United Sates border as *both* opaque and transparent, qualities dependent on a diverse set of cultural, economic, and policy contexts (Fig. 2.1).

The transboundary northwestern plains is a geographical entity, existing within a definable space, characterized by measurable qualities and patterns of land, weather, economy, and culture. The transboundary plains have both a shared geography and a nearly common settlement history. Writing that history requires a spatial approach. Often, historians of the North American West have preferred to downplay the importance of the complex spatial concepts of region and place.[23]

James Malin recognized that the history of the North American Great Plains is indelibly tied to regionally specific, spatially variable environmental influences.[24] Malin forcefully argued for the integration of space and time in the construction of plains history, noting that Walter Prescott Webb's regional approach in his landmark 1931 treatise *The Great*

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[21] For examples, see Binnema, *Common and Contested Ground;* Evans, *Borderlands*; and Donald Worster, "New West, True West: Interpreting the Region's History," *The Western Historical Quarterly* 18 (1987): 141-156.

[22] Paul Sharp wrote extensively on transborder history. See, for example, Paul F, Sharp, "The Northern Great Plains: A Study in Canadian-American Regionalism," *The Mississippi Valley Historical Review* 39 no.1 (1952): 61-76.; and Paul F, Sharp, "The American Farmer and the "Last Best West," *Agricultural History* 21, no.2 (1947): 65-75.

[23] For discussions on the place of geography in history, and history in geography, see: Alan R.H. Baker, *Geography and History: Bridging the Divide* (Cambridge: Cambridge University Press, 2003); Braudel, *On History*; Robin A. Butlin, *Historical Geography Through the Gates of Space and Time* (London: Edward Arnold, 1993); and David Ward,ed., *Geographic Perspectives on America's Past: Readings on the Historical Geography of the United States* (New York: Oxford University Press, 1979).

[24] Malin *History and Ecology.*

Plains had admirably overcome the deficiencies of older Turnerian models.[25] Not surprisingly, Malin was highly interested in fully scrutinizing regional and even local, geographical influences in his studies of Kansas agricultural history. The distinctive bioregional method of Dan Flores is more recent example of a regional approach to environmental history.[26]

FIGURE 2.1 The international boundary represented by a narrow untilled strip of land between Montana *left* and Alberta *right*, and marked by an orange Dominion Survey stake. Occasionally, fields are cultivated right across the boundary strip. Photograph taken May, 2006, view to the west.

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[25] James C. Malin, "Webb and Regionalism," in *History and Ecology: Studies of the Grassland,* ed. Robert P. Swierenga (Lincoln: University of Nebraska Press, 1984); and Walter Prescott Webb *The Great Plains: A Study in Institutions and Environment* (Boston: Ginn and Company, 1931). Malin was reacting to the influential progressivism and expansionism of Frederick Jackson Turner's late nineteenth century 'Frontier Thesis,' put forth in: Frederick Jackson Turner, *The Significance of the Frontier in American History* (Charlottesville, VA: American Studies, University of Virginia), online reprint by M. Kidd, http://xroads.virginia.edu/~hyper/turner/

[26] Dan Flores, "Place: An Argument for Bioregional History," *Environmental History Review* 18, no. 4 (1994): 1-18. Flores' use of the term "bioregion" differs from that of some geographers and ecologists. In environmental history, the term is more nuanced and infers consideration of political, cultural, governance and other human factors in shaping ecosystems; cf. Kirkpatrick Sale, *Dwellers in the Land: The Bioregional Vision,* (1991; repr., Athens, Georgia: University of Georgia Press, 2000).

Not all scholars have taken Malin's regional point of view. Several prominent American historians, writing from a new western historiographical perspective, describe the United States West as a set of processes.[27] For the most part, this doctrine was a reactionary response to a perceived Turnerian influence prevailing in American Western historiography. On the other hand, Donald Worster, a staunch anti-Turnerian, described the West as a "region whose perimeter can be sensed on the ground and marked on a map."[28]

Despite claims by the new West historians that the American West was defined by *history* rather than *geography*, their analyses are irrefutably geographical. Their writings describe boundaries, migrations, and land transformations within restrictive environments. They also carefully establish connectivity between the West, eastern America, and the wider world. The notion of place over process, as commonly expounded by these writers, clearly demonstrates that much of North America's Western history has indeed been shaped by its geographical possibilities.[29]

Regions, especially those described in cultural-perceptive terms, are not as easily mapped as Worster claimed. Geographers and historians alike struggled with boundary placement. In reference to the West's relationship with the East, Webb described the regional division as being a "an institutional fault (comparable to a geological fault)."[30] Marking the exact location of that fault has been problematic. Boundary delimitations are subjective. The essentially regional approaches of the new American West historians were specifically adopted in order to demonstrate universal Western patterns within the context of the larger United States. Unfortunately, their regionalizations tended to consider the American West at scales too large to effectively address questions related to land use. One writer divided the American West, almost one half the United States land mass, into just three sub-regions: Great Plains, Rocky Mountain West, and Pacific Northwest.[31]

Geographers, on the other hand, were more likely to *over*-regionalize. Historical geographer D.W. Meinig complained that American geographers said "little about the West as

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[27] Most notably Richard White and Patricia Limerick. Richard White, *It's Your Misfortune and None of My Own: A History of the American West* (Norman, Oklahoma: University of Oklahoma Press, 1991); and Patricia Nelson Limerick, *The Legacy of Conquest: The Unbroken Past of the American West* (London: W.W. Norton, 1987).

[28] Although steadfastly anti-Turnerian in his rejection of the progressive narrative, Worster's writing nevertheless shares Turner and Webb's essentially regional method. Quote from: Donald Worster, "New West, True West."

[29] Works that have promoted place over process include White, *It's Your Misfortune*; Limerick, *Legacy of Conquest*; Donald Worster, *Under Western Skies: Nature and History in the American West* (Oxford: Oxford University Press, 1992); William Cronon, "A Place for Stories: Nature, History, and Narrative," *The Journal of American History* 78, no. 4 (1992): 1347-1376.; Dan Flores, *The Natural West: Environmental History in the Great Plains and Rocky Mountains* (Norman: University of Oklahoma Press, 2001).

[30] Webb, *The Great Plains*, 8.

[31] White, *It's Your Misfortune.*

a region, but a good deal about the West as a set of regions."[32] Furthermore, the geographers' sub-regions were rarely satisfactorily defined. Canadian spatial history has been similarly fraught with disappointing regionalization. Many historians and geographers, preoccupied with the place of the West within Canada, went to great lengths to distinguish the Canadian Prairie West from its neighbouring regions, but rarely delved into environmentally meaningful sub-regions. If sub-regional distinctions were made, they almost universally aligned with political boundaries.[33]

Agriculture is highly dependent on physical qualities of the land, traits that vary greatly across space. Although one can feasibly define an agricultural region based on aggregated climate, topographic, hydrographic, and soils data, such standardization makes it difficult to precisely explain drivers of landscape change. Beginning with the mid-nineteenth century reports of the Palliser and Hind expeditions, geographical depictions of the British North American West commonly divided the territory into sub-units based on agricultural *potential*.[34] Henry Youle Hind's famous notation of a "fertile belt" situated to the north of an infertile 'triangle' defined by John Palliser informed regional geographical and historical description of the Canadian prairies beginning with its first appearance on maps published in the 1860s (Fig. 2.2).[35]

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[32] D.W. Meinig, "American Wests: Preface to a Geographical Interpretation" in *Geographical Perspectives in America's Past: Readings on the Historical Geography of the United States* ed. David Ward (New York: Oxford University Press 1979) 227. Meinig, while not a Turnerian, did believe in the benefits of searching for "significant generalizations" in studying American historical geography where regional diversity fit within an common American national character. His model of regional analysis greatly informed North American geography beginning in the 1960s.

[33] See Gerald Friesen, *The Canadian Prairies: A History* (Toronto: University of Toronto Press, 1987); Thompson, *Forging the Prairie West*; and R. Douglas Francis and Howard Palmer (ed.) *The Prairie West: Historical Readings* (Edmonton: University of Alberta Press, 1992). Many Canadian geographical studies of the Prairie West have been similarly organized; cf. John Warkentin ed., *Canada: A Geographical Interpretation* (Toronto: Methuen, 1968); J. Lewis Robinson, *Concepts and Themes in the Regional Geography of Canada* (Vancouver: Talon Books, 1989). John H. Archer, W.L. Morton, Gerald Friesen and Bill Waiser have written works concentrating on provincial-level histories. They describe how identification with province informs a common history; cf. John H. Archer, *Saskatchewan: A History* (Saskatoon: Western Producer Prairie Books, 1980); W.L. Morton, *Manitoba: A History* (Toronto: University of Toronto Press, 1957); Friesen, *The Canadian Prairies*; and Waiser, *Saskatchewan*.

[34] The 'Palliser Expedition' refers to the British North American Exploring Expedition. The 'Hind Expedition' refers to the The Assiniboine and Saskatchewan Exploring Expedition of 1857-58. See Irene M. Spry, ed. *The Papers of the Palliser Expedition* (Toronto: Champlain Society, 1968); and H.Y. Hind, *Narrative of the Canadian Red River Exploring Expedition of 1857 and of the Assiniboine and Saskatchewan Exploring Expedition of 1858,* 2 vols. (London: Longman, Green, Longman, and Roberts, 1860).

[35] R. Douglas Francis, "Fertile Belt" in *Encyclopedia of the Great Plains*, ed. David J. Wishart (Lincoln, Nebraska: University of Nebraska Press, 2004).

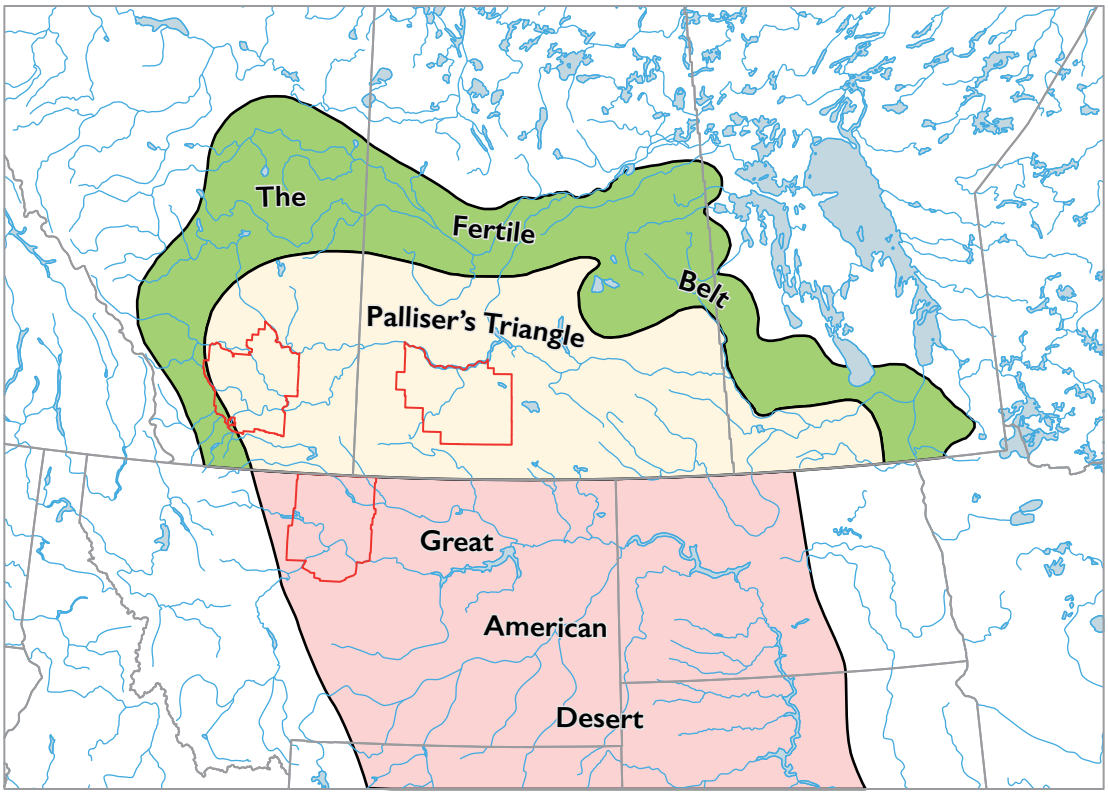

FIGURE 2.2 Palliser's triangle, conceived as a northern extension of the 'Great American Desert.' Outside Palliser's Triangle, Hind considered the land in his 'Fertile Belt' suitable for agriculture. Sub-regional study areas shown (*in red*) for reference. Palliser map after Cole and Warkentin.

Throughout the twentieth century, particularly in economic and historical-geographic writing, other sub-regional agro-climatic divisions were described. Western Canada was typically divided into 'black', 'dark brown', and 'brown' soil zones.[36] Climate-based sub-regional descriptions, such as those by Charles Warren Thornthwaite based on his 1930s SCS work, are still commonly used in the United States.[37] Recently, regional descriptive emphasis has shifted from developmental potential to ecological potential, and revised sub-regional descriptions are now commonly used, for example, Parkland', 'Moist-mixed Grassland', 'Mixed Grassland', and 'Fescue Grassland'.[38]

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[36] Canada's earliest soil classification systems were initiated in 1939 under the direction of E.S. Archibald, Director of the Dominion Experimental Farms Program. See Canada, Department of Agriculture, *The System of Soil Classification for Canada* (Ottawa, 1970).

[37] Thornthwaite was appointed to head the SCS Climatic and Physiographic Research Division in 1935. In this role, he wrote many influential papers and monographs on the role of climate on human activity in the Great Plains. See, for example Charles Warren Thornthwaite, "Climate and Settlement in the Great Plains" in United States, Department of Agriculture, *1941 Yearbook of Agriculture: Climate and Man*, H. Doc. 27, 77th U.S. Cong., 1st sess. (Washington, DC): 177-87.

[38] These terms are used in Canada's Ecological Framework. See Marshall and Schut, "A National Ecological Framework."

At the smallest scale, localities and places supplant regions as the main geographical units. *Place* is a complex concept with many connotations. Geographers Paul L. Knox and Sallie A. Marston describe places as being "dynamic, with changing properties and fluid boundaries that are the product of the interplay of a wide variety of environmental factors."[39] Historian Dan Flores describes places as being "superimposed" on environmental settings.[40] Geographers and historians alike look at places in terms of how they shape people's everyday lives and social interactions.

Being socio-cultural constructions, places are central to collective memory and identity. Places are also interdependent. Flores, a strong advocate of place historical study, argues that in the United States, the New Deal Works Progress Administration (WPA) encouraged a greater public awareness of place and region. These concepts only began to disappear from western-American consciousness following the Second World War, during a period marked by a renewed capitalistic outlook, and a widely-distributed mass media.[41] The New Deal era was a crucial period when much of the modern United States agricultural policy was formulated.

On the northern Plains, interpretations of place and region are open-ended. Cultural, economic, political, and other influences inform a perceptive sense of place with an inherent inclusivity/exclusivity dichotomy. To some degree, land use in the Canadian and the United States wests has been shaped by outside forces at both the place-local, and regional scales. Regional identification, though, tends to be inclusively determined at the scale of a local group or individual. Self-identification with a larger "bioregion" in the Flores sense may or may not occur, but an individual's personal interpretation of their own environment is clearly connected to larger cultural, economic, and political biases.

Whatever northern plains Aboriginal people might have thought of their homeland in a region-identity sense prior to Euro-american settlement, is a matter of conjecture. Eighteenth and nineteenth-century European explorers and surveyors clearly expressed perceptions of the Plains that emphasized its inhospitality. "…an ill-defined boundary of the bald plains from the gloomy woodlands of the circum-arctic forests" is how James Hector, one of Palliser's scientific men, described the more optimistically named 'fertile belt.'[42] Following in 1872, British traveller Captain W.F. Butler struck by the enormity and "emptiness" of the landscape remarked "There is no portion of the globe in which travel is possible where loneliness can be

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[39] Paul L. Knox and Sallie A. Marston, *Places and Regions in Global Context: Human Geography* 4th ed. (Upper Saddle River, New Jersey: Pearson Prentice Hall, 2007).

[40] Flores, *The Natural West.*

[41] Ibid.

[42] Spry, *Papers of the Palliser Expedition.*

said to dwell so thoroughly."[43] S. Anderson, Dominion Surveyor, upon ascending the Missouri Coteau in 1873 added, "The soil is unable to support vegetation and this rugged and desolate country, which somewhat resembles the wilderness of Judea, is called by the half-breed hunters "*Les manvaises Terres*."[44]

During the settlement period, literary and visual artistic references to the northern Plains most commonly emphasized the scale and magnitude of the space.[45] Letters and diaries written by newcomers from eastern North America and Europe referred to a defining vastness. "There was something so impersonal about this prairie, something that shattered any hope of feeling attached to it or even building a home on it," wrote one Saskatchewan settler.[46] Canadian prairie literature is rife with descriptions of the overpowering visual sense of the land's physical attributes. Saskatchewan-born novelist Sinclair Ross ultimately deferred to the visual artists: "Only a great artist could ever paint the prairie, the vacancy and stillness of it, the bare essentials of a landscape, sky and earth."[47] To the "prairie realists," as Ross, and other such writers and artists were called, "the landscape was a spare, indifferent, even menacing presence."[48]

Such stark perceptions, and associated imagery, were largely those of outsiders or those recently-arrived. They were also undoubtedly influential on how people would perceive the landscape later. The latter-day lament for the lost small family farm, heard, in fact, almost from the beginnings of settlement, is rooted in nineteenth-century understandings of civilization and order. For many people, the consolidated agricultural landscape of the post-war northwestern plains is a present-day reminder of Butler's Great Lone Land.

In the context of the western United States, the concept of region as a product of cultural perception, particularly on the part of outsiders, has been widely disseminated. Historical geographer Donald W. Meinig was confounded by attempts to separate the American West "as a place in the imagination," from the West "as a piece of the American continent." In the case of the latter, a highly variable set of geographies complicated the notion

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[43] Butler, *Great Lone Land*.

[44] Anderson, "North-American Boundary," 243.

[45] Ronald Rees, "Nostalgic Reaction And The Canadian Prairie Landscape," *Great Plains Quarterly* (1982): 157-167.; David M. Wrobel, *Promised Lands: Promotion, Memory, and the Creation of the American West* (Lawrence: University of Kansas Press, 2011); and Alison Calder and Robert Alexander Wardhaugh, eds., *History, Literature, and the Writing of the Canadian Prairies* (Winnipeg: University of Manitoba Press, 2005).

[46] Evan Davies and Aled Vaughan, *Beyond the Old Bone Trail* (London: Cassell, 1960), 35.

[47] Dick Harrison *Unnamed Country: The Struggle for a Canadian Prairie Fiction* (Edmonton: The University of Alberta Press, 1977), 13. Harrison refers specifically to Sinclair Ross and W.O. Mitchell. Quote is from Sinclair Ross, *As for Me and My House* (New York: Reynal & Hitchcock, 1941).

[48] Rees, "Nostalgic Reaction," 164.

of a uniform West. Meinig identified two dominant and competing American understandings of the West: "the West as the Frontier," and the West as being "the piece opposite the East."[49] To Meinig, the West was explicitly linked with the East, an undeniable fact plainly evident in quantifiable economic and governmental influences on land use.[50]

To much greater extent in the West than elsewhere in the United States, the United States federal government was involved in not only direct land ownership, but, particularly following the New Deal, the effective management of private lands as well. Patricia Limerick and Richard White go as far as to claim that the West was "colonized" by the United States which, through its self-defined administrative role, maintained a colonial form of control not dissimilar from that which the United States had originally rebelled against.[51]

In western Canada, a sense of subjugation to the East persisted from earliest settlement. In both countries, such sentiments led to an enduring perception of eastern governmental, economic, and social interference and imposition upon a presumed western independence. In both countries, such independence was largely imagined. The Wests of each depended on and, in fact, embraced, federal assistance and patronage.[52] In this respect, there is a continuity between the late-nineteenth century and modern Wests.

Many western economic enterprises, including farming and resource extraction, were prone to uncertainty. At all times, outright failure was entirely possible. Indisputably, in both Canada and the United States, the East politically and economically dominated the affairs of the West. Laws were passed reflecting the interests of eastern capital. But it was also the sense of western independence and subjugation that led to the emergence of new social and political entities, particularly with respect to social relations and governance. The rise of the Social Gospel and Social Credit political movements in Western Canada, and the adoption of cooperative commerce in North Dakota are well-known examples.[53] At the same time, the West also provided a refuge for people wishing to escape the social and political classism prevalent in the eastern cities.

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[49] Meinig, "American Wests," 227.

[50] Ibid, 243.

[51] White, *It's Your Misfortune;* Limerick, *Legacy of Conquest.*

[52] Limerick, *Legacy of Conquest.* Limerick in particular makes this argument for the United States.

[53] See Chapter 2.

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Agriculture, in its most basic definition, is a set of interactive connections between human and physical systems. What determines the manner in which land-related environmental processes are altered within such systems? In *The Morphology of Landscape*, Carl Sauer argued that *culture* influences many decisions.[54] To Sauer, farming method, crop selection, and land modification choices were primarily a matter of cultural context, shaped in part by the farmer's origins, experiences, and biases. However, Sauer also recognized that land use decision-making was, by necessity, constrained by spatially-variable environmental limitations.

In all forms of agriculture, humans have, over time, designed processes to produce food products within specific ecological constraints. Peter Haggett described these processes as "designs for an improved ecosystem."[55] All agricultural products have their origins in naturally-evolved plant and animal ancestors. For example, wheat, a crop ubiquitous across the entire Great Plains, is descended from a wild species of grass.[56] Through deliberate selection over several thousands of years, it has been modified to have the highest possible seed production, greatest nutritional quality, and ease of cultivation, within the widest possible range of climatic conditions.

The anthropogenically driven evolution of domestic wheat was, for most of its history, a slow process, initiated in the agricultural hearth areas of the Middle East more than 10,000 years ago, and continued in Europe through the Middle Ages.[57] During the late-Industrial Revolution, the evolution of wheat hastened. The range of physical environments favourable for wheat growing greatly expanded. By the end of the nineteenth century, plant science had produced a few varieties that could be propagated and harvested on an industrial scale in the short-season, open grassland environment of the North American Great Plains.[58] Efforts to make wheat better-suited to the northern Plains environment continued in research labs, and on test plots across the region throughout the twentieth century. In the United States and

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[54] Sauer, "The Morphology of Landscape."

[55] Peter Haggett, *Geography: A Global Synthesis* (Harlow: Pearson, 2001), 273.

[56] G. Kimber and E. R. Sears, "Evolution in the Genus *Triticum* and the Origin of Cultivated Wheat," in E. G. Heyne, ed. *Wheat and Wheat Improvement* (Madison, Wisconsin: American Society of Agronomy, Crop Science Society of America, Soil Science Society of America, 1987), 154-164.

[57] David Watts, *Principles of Biogeography: An Introduction to the Functional Mechanisms of Ecosystems* (London: McGraw-Hill, 1971).

[58] Alan L. Olmstead and Paul W. Rhode, "The Red Queen and the Hard Reds: Productivity Growth in American Wheat, 1800–1940" *Journal of Economic History* 62 iss.4 (2002): 929-966.

Canada, ongoing research programs continually developed new plant varieties that were more resistant to disease, had greater tolerance of chemical application, and were easier to harvest.[59]

Wheat farming was not the earliest form of large-scale husbandry on the northern Plains. In most places, the raising of domestic cattle preceded cultivation by several decades. A number of bovine breeds, originally developed in northern Europe and Eastern North American, were modified through artificial selection to be more feed-adaptable, winter-hardy, and self-caring.[60] As farming overtook ranching[61] early in the twentieth century, cattle were still maintained in places where there were climatic, topographic, or other environmental impediments to successful crop production. Occupying an ecological niche once held by the indigenous North American bison, cattle caused far less disruption of original grassland ecosystems than did farming.[62]

Wheat and cattle are examples of deliberate genetic manipulation, undertaken in response to specific environmental restrictions, primarily climactic. The northern plains climate is continental and mid-latitude. It is characterized by a warm, but relatively short growing season and a cold, non-productive season. At the outset of northwestern settlement, the wheat maturation period had to be shortened from what had been acceptable in eastern Canada and the United States Midwest.[63] Preferable cattle breeds were those that gained weight rapidly and possessed greater winter hardiness.

The aforementioned adaptations to environment within an agricultural economy can be understood in the context of cultural-ecological theory. In developing his discourse on human behaviour, environment, and landscape in the 1920s, Carl Sauer not only laid the foundations of twentieth century human ecology, but had answered the contemporary and persistent appeal of environmental determinism. Several late-nineteenth century European scholars, inspired by Charles Darwin's *On the Origin of Species*, and Charles Lyell's *Geology*, had turned to new interpretations of the dogmatic Man and Nature relationship. Paul Vidal de la Blache in France, Carl Ritter and Friedrich Ratzle in Germany, and Halford Mackinder in

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[59] Olmstead and Rhode, "The Red Queen."

[60] Ian MacLachlan, *The Historical Development of Cattle Production in Canada* (unpublished paper, University Of Lethbridge, 2006) https://www.uleth.ca/dspace/bitstream/handle/10133/303/Historical_cattle_Canada.pdf?sequence=3

[61] In northern plains parlance, "farming" generally refers to crop cultivation. Animal husbandry, particularly that of cattle and sheep, is described as "ranching."

[62] R.D.H. Cohen, "Cattle and Prairie Ecology: The Agricultural and Ecological Relevance of Cattle to the Prairies," in *Canadian Issues in Environmental Ethics,* ed. Alex Wellington, Allan Jacob Greenbaum, and Wesley Cragg (Peterborough, Ontario: Broadview Press, 1997), 174-188.

[63] The Marquis variety of wheat is often cited as an important adaptation that allowed viable cold climate wheat production. A.E. Slinkard and D.B. Fowler, ed., "Wheat Production in Canada: A Review," in *Proceedings of the Canadian Wheat Production Symposium*, (Saskatoon, Saskatchewan, March 3-5, 1986); and J.W. Morrison, "Marquis Wheat: A Triumph of Scientific Endeavor," Agricultural History 34, no.4 (1960): 182-188.

Great Britain, grappled with the relative influences of human behaviour versus environmental forces on human ecology.[64]

In Europe, at the close of the nineteenth century, a philosophical dichotomy emerged between possibilists, proponents of cultural determination, and environmental determinists, those arguing that human behaviour was *caused* by environmental mechanisms. It was at this very intellectual juncture that governments and business interests aggressively pursued expansionist settlement of the northwestern plains. In taking up a predominantly determinist viewpoint, the expansionists had presumed scientific proof to refute earlier claims of land unsuitability.

Prior to mid-nineteenth century expansionism, a North American collective fascination with a perceived frontier wilderness, and newness of the landscape, had inspired well-known romantic environmental works by George Perkins Marsh, Francis Parkman, George Bancroft, and Henry David Thoreau. Spurred by the stark social horrors of the American Civil War, American romanticism soon succumbed to a doggedly rational, empirical, and scientific analyses of human-environment relationships. At the dawn of the twentieth century, as the first agricultural settlers were moving onto the furthest northwestern reaches of the Great Plains, the determinist writings of Americans Frederick Jackson Turner, Ellsworth Huntington, and Ellen Churchill Semple greatly influenced societal environmental attitudes.[65] With determinism as their platform, university professors, government scientists, and an assortment of self-styled farm experts shaped theories on land use and farm practice.[66]

Turnerian expansionism lay at the heart of eastern government and business interests driving western settlement in both Canada and the United States at the beginning of the twentieth century. The farmer-settler's very purpose was, in the words of one writer, to "build in the West a patent-office model of the society they had known in the East."[67] The cattlemen, already in the region at the time of mass settlement, operated on grasslands largely unaltered from the wild. The farmer was to be a civilizing agent, steadfastly toiling to subdue the wild.

If the ranchers signalled the impending approach of the frontier, the farmers personified the frontier itself. Permanent settlement with its attendant infrastructure of towns,

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[64] For a thorough description of late-nineteenth and early-twentieth century human-environmental scholarship in Europe and North America, refer to Geoffrey J. Martin, *All Possible Worlds: A History of Geographical Ideas* (Oxford: Oxford University Press, 2005).

[65] Martin, *All Possible Worlds*.

[66] The scientific farming movement is discussed in the context of western Canada in David C. Jones, "The Canadian Prairie Dryland Disaster and the Reshaping of 'Expert' Farm Wisdom" *Journal of Rural Studies* 1, no.2 (1985), 135-146.

[67] Ray Allen Billington forward to Fite *The Farmers' Frontier*." Careless notes that celebrated Canadian historian F.H. Underhill was very much a frontierist, arguing as he did, on the conflict between western individualists and eastern institutions; cf. Careless, "Frontierism."

roads, and edifices, represented a higher social order. A 1908 speech, delivered by expansionist railway builder, James J. Hill, to eastern and mid-western American farmers, each a prospective migrant to the northwest Plains, had a decidedly progressivist tone. "Wheat bread and a high civilization go together," Hill extolled. He continued, "as labor conditions everywhere improve, more and more people who once lived on black bread or rice will have the white loaf."[68] Hill's newly-built Great Northern Railway was to be the conduit for the civilizing forces and the grain alike.

American historians writing about the settlement of the American West have tended to emphasize the link between Turner's frontier thesis and environmental determinism.[69] Their association of the two is based on the fact that frontierism remained at the forefront of Great Plains historiography well into the twentieth century. Walter Prescott Webb's Great Plains Thesis, although arguably more possibilist than determinist, was a notable example.[70] Arguing that the Great Plains' environment had "bent and molded Anglo-American life," Webb carefully distinguished between the forest-based Turnerian determinism, traditionally applied in contexts of the eastern United States and Canada, and the uniqueness of the dry, treeless Great Plains setting.[71] Webb maintained that the plains' harshness impelled Eastern-origin newcomers to create a rugged individualistic set of specialized innovations. Great Plains historian James Malin, who wrote most often from a possibilist perspective greatly informed by Sauer, heartily endorsed Webb's interpretations of Plains cultural adaptation.[72]

In Canadian historiography, the process of settlement and the role of the frontier, was approached with subtly different emphases. In a seminal essay published in the mid-1950s, J.M.S. Careless described the "powerful influence of 'frontierism'" that had characterized almost all Canadian historiography.[73] Inarguably, many early twentieth-century Canadian historians had described a Turnerian frontier-like progression in the creation of Canada, a country whose history was usually characterized in terms of wilderness and resource relationships.

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[68] James J. Hill, "Address delivered by Mr. James J. Hill before the Farmers' National Congress," speech, Madison, Wisconsin, 24 September, 1908, transcription, HD1765 1908.H5, University of Toronto Library. This was one of many similar addresses Hill delivered in 1908 in Washington, D.C, Crookston, Minnesota, and Kansas City, Missouri.

[69] Recent examples include White, *It's Your Misfortune;* Limerick *Legacy of Conquest*; Worster *Under Western Skies.*

[70] Webb, *The Great Plains*, 8.

[71] Ibid.

[72] Robert P. Swierenga introduction to "Webb & Regionalism," in James C. Malin *History and Ecology: Studies of the Grassland* ed. by Robert P. Swierenga (Lincoln: University of Nebraska Press, 1984).

[73] Careless, "Frontierism."

For Canadian historians, the main distinction between the Canadian frontier and that of the United States was the celebration of British values in place of Turner's American ones. However, Careless also maintained that Turner's thesis, although influential in Canada, had never been "dogmatically" adopted. Careless offered alternative approaches. One was a well-established "Britannic School" emphasizing the role of British institutions in shaping Canada. Although Britannic historians were more interested in pre-confederate history than western settlement,[74] they undoubtedly had swayed contemporary Eastern Canadian perceptions of the Prairie West during the expansion era.

Noting that the Britannic School tended to ignore the irrefutable role of "American forces" in shaping western Canadian history, Careless put forward the more satisfactory "Environmentalist School." Rising to prominence after the 1920s, certain aspects of Canadian environmentalist history were analogous to American cultural-ecological theory, particularly the emphasis on diverse newcomer origins and adaptation to environment. In this respect, Careless's Environmentalist School history was much more in line with what actually was the experience on the Canadian Prairies, settled as they were by a mix of Canadians, British, Americans, and people of other origins. The environmentalist narratives highlighted a distinctly Canadian political economy dominated by the export of commodities.[75]

Following the Second World War, American historiography openly challenged frontierism and environmental determinism. Echoing the geographers' cultural ecology movement, historians such as Henry Nash Smith used the words "failure" and "myth" to describe Turner's frontier.[76] Smith also described how, at the time the Homestead Act was passed in 1862, the notion of an interior desert had morphed into one of a Republican "agrarian Utopia."[77] Smith also strenuously believed that the Act had been entirely unsuccessful. Smith emphasized the role of mechanization, and the institutional advantage held by the railways and land speculators. Combining these factors with what he called the forces of "corporation finance, and the power of big business over Congress," Smith argued

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[74] Careless, "Frontierism."

[75] A.S Morton and H.A. Innis are two of Careless' 'environmentalists'. Morton is notable for his strong western bias. Harold Innis' staples thesis highly influenced later historical analyses of western Canadian expansion. Other environmentalist approaches include that of A.R.M. Lower, and Donald Creighton's Laurentian School. These writers tended to emphasize a more eastern basis of Canadian frontierism. Many of Careless's examples of environmentalism have strong traces of Turnerian frontierism and the distinction between competing schools is not always clear; cf. Trevor J. Barnes, "A Geographical Appreciation of Harold Innis."

[76] Henry Nash Smith, *Virgin Land: The American West as Symbol and Myth* (New York: Vintage Books, 1957) reprint of manuscript originally published by Harvard University Press, 1950.

[77] Ibid.

that Turner's romantic view of a civilizing force and a society of utopian small-scale freeholders was simply impossible.[78]

In Smith's view, Turner's agrarianism and Webb's 'adaptation thesis' both ignored the industrialization of the North American East and Europe, completely disconnecting Great Plains agricultural development from the markets and institutions upon which it depended. Writing not long after Smith, Gilbert C. Fite stressed that not only did western agriculture depend on the dominant eastern industrial economy to become established, but the sales of vast agricultural surpluses raised the foreign capital necessary to finance industrial agricultural growth.[79]

James Malin, like Webb, had noted the unique adaptations required in farming the treeless Plains. Malin, however, was fond of reminding his students and readers that technology, transportation, and a solid connection to the East were all necessary for the successful development of western agriculture. "The sod-house frontier myth must be rejected," Malin wrote in one essay. "With few exceptions, the prevailing house type would be more accurately described as the sawed house, rather than the sod house."[80]

During the middle third of the twentieth century, while Turner's followers, including American Walter Prescott Webb and Griffith Taylor in Canada, were forcefully advocating environmental determinism, others, Carl Sauer included, were vehemently defending cultural ecology.[81] Many Berkeley School scholars including Canadian Andrew Hill Clark and American Fred Kniffen, were particularly interested in cultural trait diffusion.[82] Trait diffusion suggested that rather than developing independently within new environments, cultural adaptations tended to spread from adjacent areas. Alternatively, such adaptations could be transported from a more remote place of origin, island-hopping much in the manner

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[78] Smith *Virgin Land*, 223.

[79] Fite *The Farmers' Frontier*.

[80] Malin *History and Ecology*, 95. Malin noted the necessity of considering the physical-geographic elements of the land system; cf. Allan G. Bogue, "Tilling History with Paul Wallace Gates and James C. Malin" *Agricultural History* 80, no.4 (Autumn, 2006): 436-460.

[81] Haggett, *Geography*.

[82] Born in western Canada, studying first under Harold Innes, a Canadian environmentalist historian, and later under Griffith Taylor, a staunch environmental determinist, and finally under the cultural ecologist Sauer, Andrew Hill Clark became one of North America's most influential cultural ecologists and historical geographers. See Preston E. James and Clarence F. Jones, ed., "Historical Geography," *American Geography: Inventory and Prospect* (Syracuse, New York: Syracuse University Press, 1954), 71-105.; Brian W. Blouet and Merlin P. Lawson "The Great Plains: Perception by Any Name," *Images of the Plains: The Role of Human Nature in Settlement*, ed. Brian W. Blouet and Merlin P. Lawson (Lincoln, Nebraska: University of Nebraska Press, 1975), ix-xiv. Kniffen wrote extensively on historical aspects of cultural diffusion; cf. Malcolm Comeaux, "Fred Kniffen's Contributions to Understanding French Louisiana," *Journal of Cultural Geography* 15, no.1 (1994), 59-66.

that plants or animals might from one isolated habitat to another. Crucially, to the cultural ecologists, cultural regions could be both *identified* and *mapped*.

Time-Space geographical theory helps explain the processes of culturally-driven landscape change on the north-western plains.[83] Essentially, time and space restrictions limit what cultural options are pragmatically available. Constraints may be climatic, determined by accessibility, or based on other external factors. Agricultural adaptations undertaken on the Great Plains exhibit aspects of both expansion and relocation diffusion, either separately or in combination. In the mid-1950s, Torsten Hägerstrand described the mechanisms of "innovation wave" diffusion. Hägerstrand and others were able to mathematically model and map the adoption and spatial diffusion of agricultural innovations in new or already-established environments.[84] Although this research does not employ Hägerstrand's mathematics, his theories of innovation diffusion help explain many of the examples of culturally based approaches to land use that are presented in later chapters.

Before the arrival of farmers, the northern plains, semi-arid and subject to great year-to-year weather fluctuation, almost invariably had been characterized as unsuited to farming.[85] Cultural diffusion theory suggests that settlers arriving from similar environments would have been better-prepared for the onerous conditions, and more capable of achieving farming success. Actual settler experience proved to be more complex. The astonishing number of migrant origins represented a wide range of environments, some similar to the northern plains, most not. A large number of newcomers had arrived from the semi-arid, central-northern Great Plains, but many had also come from climatically-dissimilar areas of eastern Canada, the eastern United States, Britain, Germany, Scandinavia, and Eastern Europe.[86] Within the first few decades, settler experience proved that the probability of farming success on the northwestern Plains was not entirely predicated on pre-existing suitability.

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[83] 'Time-Space Geography' is a term applied to concepts forwarded by the Lund School of human geography in the mid-1950s; see Haggett, *Geography*.

[84] Haggett, *Geography*.

[85] Spry, *The Palliser Expedition*; and H.Y. Hind, *Narrative*. Later assessors, including John Macoun, had come to more positive conclusions. The most optimistic assessments were made by surveyors employed by railway interests; see W. A. Waiser, *The Field Naturalist: John Macoun, the Geological Survey, and Natural Science,* (Toronto: University of Toronto Press, 1989).

[86] Many western settlement histories highlight settler origin diversity; see: Randy William Widdis, *With Scarcely a Ripple: Anglo-American Migration into the United States and Western Canada, 1880-1920* (Montreal and Kingston: McGill-Queens University Press, 1998); and John C. Hudson, "Migration to an American Frontier" in *Geographical Perspectives in America's Past: Readings on the Historical Geography of the United States* ed. David Ward (New York: Oxford University Press 1979).

In the 1880s and 1890s, based on the presumption of environmentally-determined "suitability," the Canadian Government had specified certain "desirable" settler origins.[87] Deemed "suitable" were Canadians, Americans from northern states, Britons, and northern and eastern Europeans. Southern Europeans and people from other warmer climates were presumed "unfit." In practice, suitability preconceptions simply reflected contemporary nativism. A well-known example was the Canadian Government's refusal to accept the majority of homestead applications made by American Blacks. Originating mainly in Oklahoma, Kansas, and Texas, virtually all of the hopeful African-American migrants possessed farming backgrounds. Although approximately 1,500 Blacks eventually migrated to Saskatchewan and Alberta, mostly between 1905 and 1910, many more applications had been rejected on the grounds that the applicants were "unsuitable to the climate."[88] Incongruously, almost all African-American migrants who were accepted into Canada were granted homesteads on the northernmost forest fringe-lands.

Familiarity with the Northern Plains environment did provide some migrants with a degree of pre-adaptation. Those who had previously farmed in broadly comparable environments in Manitoba, the Midwest, and the Dakotas were certainly knowledgeable about working within a restricted growing season. However, temperature was only one limiting factor. Insufficient moisture availability was the main reason for crop failure in the northwest. In this respect, people who had *dryland* farming experience had an advantage. For this very reason, both the Canadian Department of the Interior, and the Northwestern Coal and Navigation Company, a dominant land development company, specifically targeted Mormons to populate southern Alberta. William Pierce, a senior Department official, had observed Mormon irrigation practices in Utah and enthusiastically believed that Mormon dry-farming techniques could be replicated in Alberta.[89]

According to Gilbert C. Fite, "Success in western farming was closely associated with adjustment to the geography and climate...The successful frontiersman was one who could and did adapt to new conditions."[90] Ultimately, however, environmental preconditioning did not guarantee farming success. Many producers, possessing years of experience farming in

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[87] Harold Martin Troper, *Only Farmers Need Apply: Official Canadian Government Encouragement of Immigration from the United States, 1896-1911* (Toronto: Griffin House, 1972).

[88] Sheppard *Deemed Unsuitable*. Sheppard thoroughly analyses the institutional discrimination against American Blacks. A 1911 Canadian Order-in-Council prohibited "any immigrants belonging to the Negro race, which race is deemed unsuitable to the climate and requirements of Canada." (Canada, Order in Council, P.C. no.1324, (12 August, 1911). At the beginning of the twentieth century, the federal government and Canadian Pacific Railway had actively sought potential farmers in Oklahoma and had advertised widely in Black newspapers.

[89] Howard Palmer, "Polygamy and Progress: The Reaction to Mormons in Western Canada, 1887-1923," in *The Mormon Presence in Canada* ed Brigham Y. Card *et al*. (Edmonton: University of Alberta Press, 1990), 108-135.

[90] Fite, *Farmers' Frontier*, 222.

adverse climates, eventually gave up farming. Others, with little prior knowledge of any sort of farming, managed to build prosperous farms.

In most cases, *climatic* suitability turned out to be far less important than *financial* suitability. Farming in the newly opened western plains was a capital-intensive proposition. Newcomers who arrived with enough money and equipment to take over an established farm, or were able to absorb early-years losses while building up a homestead, had much better odds of succeeding. People arriving without the sums required for large-scale grain farming, including sufficient capital to acquire machinery, build infrastructure, and pay labour, were far more likely to be forced to migrate elsewhere or, as was often the case, take employment in the rapidly-growing service towns and cities.

Municipal histories offer innumerable examples of individuals, who for a wide range of family, monetary, or health reasons, were forced from farming. Environmental drivers, drought for example, were seldom mentioned as the *main* causes for giving up farming. Although poor returns during a drought year would certainly cause financial hardship, perhaps to the point of insolvency, farmers were reluctant to admit explicitly environmental causes for abandoning a farm.[91]

Carl Sauer's mid-twentieth century work on cultural diffusion greatly influenced many historians, anthropologists, geographers, and natural scientists. A landmark 1956 conference on the interconnections between humans and physical environments, was largely inspired by Sauer's theories.[92] In his introduction to the published proceedings, Sauer credited George Perkins Marsh and Alexander Ivanovich Woeikof with establishing the foundations of an emerging environmental-historical cultural doctrine.[93] Throughout the 1950s and 1960s, members of the Berkeley School of cultural ecology widely disseminated Sauer's

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[91] Webb History Book Committee, *Prairie Memories*, (Webb, Saskatchewan: Webb History Book Committee, 1982); Duchess and District Historical Society *Duchess and District Memories* (Brooks, Alberta: Nesbitt Publishing, 1982); Miry Creek Area History Book Committee *Bridging the Centuries*; Hill County Bicentennial Commission, *Grit, Guts, and Gusto: A History of Hill County* (Havre, Montana: Hill County Bicentennial Commission, 1976); and Liberty County Museum *Our Heritage in Liberty* (Chester, Montana: Liberty County Museum, 1976).

[92] The conference proceedings were published as W.L. Thomas, ed., *Man's Role in Changing the Face of the Earth* (Chicago: University of Chicago Press, 1956).

[93] The works of Marsh in particular, but also those of Russian geographer Woeikof, are early examples of what is now known as environmental history. George P. Marsh, *Man and Nature; or, Physical Geography as Modified by Human Action* (Cambridge: Harvard University Press, 1864) is an oft-cited classic.

reinterpretations of human-ecological and landscape theory, greatly informing latter twentieth century environmental history and cultural geography.[94]

Many historians writing more recently on the cultural histories of the American West, have taken an approach somewhat different from that of the Berkeley School geographers, the Turnerian frontierists, and the adaptation theories of Webb, Malin, Smith, and Fite. Revised interpretations of cultural ecology have since been forwarded by scholars such as Richard White, Patricia Limerick, and Donald Worster, who approach western and agricultural history from within the realm of American environmental history.[95] White, for example, concentrates on the socially-transformative nature of migration, suggesting that the migration experience brought together cultural groups that, in combination, came to characterize the West.[96] White observed that with the possible exception of Mormons, a group highly influential in the development of the southern Alberta agricultural landscape, most migrants, especially the Anglo-American ones, rather than forming a new society, had largely extended a *universal* American society westwards.[97] Conversely, Donald Worster was little interested in either the settlement processes or how migration affected land use change. Describing post-settlement development as a "ruthless assault on nature," leaving behind "death, depletion, and ruin," Worster decreed any discussion of landscape process to be unpalatably "Tunerian."[98] The systematic organization and dispersal of land ahead of settlement, and the degree of government involvement in the agricultural economy later, could be viewed as a clear example of anthropologist James C. Scott's "high-modern" statecraft.[99]

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[94] Cultural ecology examines how people, though cultural conditioning, view their environments. The term 'Human Ecology' was commonly used by geographers beginning in the 1960s to describe relationships between humans and physical environments. See Haggett, *Geography*; and S.R. Eyre and G.R.J. Jones, introduction to *Geography as Human Ecology: Methodology by Example* (London: Edward Arnold, 1966). For further discussion on the historiography of environmental history, see J.R. McNeil, "Observations on the Nature and Culture of Environmental History," *History and Theory* 42 (December 2003): 5-43; and James E. Sherow, ed., *A Sense of the American West: An Anthology of Environmental History* (Albuquerque: University of New Mexico Press, 1998).

[95] Sara M. Gregg notes that environmental history's emphasis on complex human-nature relationships has refocused historical debate around the intersections of ecology and economy. See Sara M. Gregg, "Cultivating an Agro-Environmental History," in *A Companion to American Environmental* History, ed. Douglas Cazaux Sackman (Chichester: Wiley-Blackwell, 2010).

[96] White *It's Your Misfortune.*

[97] Limerick, *Legacy of Conquest.* Limerick focuses on Western multiculturalism, but also develops ideas of an engendered West, a concept earlier raised by Henry Nash Smith; cf. Smith *Virgin Land,* 298.

[98] Worster, *Under Western Skies*, 13.

[99] Scott implies that authoritarian governments, acting as agents for capitalist interests to engineer a society. See James C. Scott, *Seeing Like a State: How Certain Schemes to Improve the Human Condition Have Failed* (New Haven: Yale University Press, 1998).

For the first half of the century, the narrative of land breaking, expansion, and improvement had fit well within an established "progressive" agricultural historiography. Following Frederick Jackson Turner's closing of the frontier in 1893, many historians continued a line of thinking that viewed agricultural settlement as a crucial step in the progress of civilization across the wests of Canada and the United States.[100] Following fur traders, missionaries, and ranchers, but antecedent to industrial urbanization, the arrival of the farmer in the empty wild lands was both necessary and good. Arriving at the end of the nineteenth century, the settlers made full use of the new machinery and methods that had become available at the zenith of North America's industrial age.[101]

In the progressive narrative, the arrival and settlement of the agriculturalists initiated a continual process of land improvement, facilitated by ever-advanced technology and the application of efficient management and organizational techniques. The rewards for the producers' ongoing efforts and, by extension, the efforts of the government and academic agronomic experts, were paid in the form of a constant rise in productive yields. The northwestern plains, previously barren, occupied only by the 'savage Indian' and, later, the unruly cattleman, had been permanently tamed.

In actuality, the much-celebrated progress was not absolute in any sense. Certainly, the federal governments had organized the land into efficient townships, sections, and quarter-sections, methodically dispersing homestead grants to thousands of eager applicants. The transcontinental railway companies had constructed the backbones of modern networks that would carry the settlers most of the way to their new allotments, and their soon to be forthcoming agricultural bounty back to eastern markets. New service towns sprang up, and a streamlined system of commodity trade was established.

Nevertheless, the settlement process was difficult for most. Barely breaking even during the initial years was considered a resounding success. Homesteads and farmers were isolated.[102] Communications were primitive. Many settlers had a difficult time simply meeting their respective obligations under the Dominion Lands Act and Homestead Act.[103] Even for those who, over time, were able to build up profitable farms, progress was measured

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[100] Turner, *Significance of the Frontier*.

[101] For comprehensive discussion on Turnerian 'frontier' history in the context of the American Great Plains see Richard White, "Western History," in *The New American History,* ed. Eric Foner (Philadelphia: Temple University Press, 1997). For a description of Canadian counterparts to the Turnerian frontier thesis, see Careless, "Frontierism"; and Doug Owram, *Promise of Eden: The Canadian Expansionist Movement and the Idea of the West, 1856-1900* (Toronto: University of Toronto Press, 1980).

[102] Lyle Dick describes characteristic social relationships and structures that resulted from isolation caused by ordered settlement in Saskatchewan. See Canada. Environment Canada. Canadian Parks Service. Studies in Archaeology, Architecture, and History, *Farmers "Making Good": The Development of Abernethy District, Saskatchewan, 1880-1920*, by Lyle Dick (Ottawa,1989).

[103] Land settlement histories are instructive. See examples in Chapter 2.

relatively. Ever-fluctuating commodity values, the vagaries of the northern plains climate, changes in agricultural technology, and not least in terms of influence, periodic shifts in public policy, all contributed to a rather uneven history of land development.

With the challenges to successful farming in mind, particularly in light of the infamous 1930s drought and depression, many latter twentieth century historians expressed a revised, declensionist narrative. Beginning with the writings of Henry Nash Smith in the 1950s, a new story of the 'myth' of progress described a range of deleterious outcomes resulting from an unsustainable expansion of land under the plough, coupled with an ever-increasing adoption of field mechanization from the time of initial settlement.[104]

The declensionist narrative suggested that the wide-scale embracing of technology, within the context of specific capitalist economic and political institutional mechanisms, allowed crop agriculture to expand unchecked until the early 1930s. At that time, a resultant *human-made* drought with accompanying severe soil erosion, caused great social and economic hardship, ultimately forcing producers to acknowledge the environmental limits to their production capability.[105] By 1940, the drought ended, war-time commodity prices rose, and, to the declensionists, in a sorry case of farmers not heeding the lessons of the previous decades, the pre-drought pattern of expansion resumed. Future repeated misery was all but assured unless steps were taken to reorganize the structure of North American farming.[106]

The argument that technology and profit motive together caused an unsustainable rise in production is too simplistic. On the northern Great Plains, during the seven decades following first settlement, several factors contributed to agricultural landscape change. Indisputably, episodic weather events, for example the droughts of the 1920s, 1930s, and 1980s caused short term production declines. It is similarly true that many good years were celebrated with impressive crop returns. Land change in the environmental sense was gradual. Over the long term, the development of advanced tillage equipment, the almost revolutionary introduction of chemical fertilizers, herbicides, and pesticides, the under-appreciated impact of rural electrification, and the emergence of new tillage and cropping techniques, all contributed to new patterns of production.

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[104] Smith, *Virgin Land*.

[105] Many scholars write declensionist western history. See Canada. Department of Agriculture. Research Branch. Historical Series No.8, *A History of Soil Erosion by Wind in the Palliser Triangle of Western Canada,* by C.H. Anderson. (Ottawa, 1975); David C. Jones, *Empire of Dust: Settling and Abandoning the Prairie Dry Belt* (Calgary: University of Calgary Press, 2002); Hargreaves, *Dry Farming: : Years of Readjustment*; Curtis R. McManus, *Happyland: A History of the "Dirty Thirties" in Saskatchewan, 1914-1937* (Calgary: University of Calgary Press, 2011); and Donald Worster, "Transformations of the Earth: Toward an Agroecological Perspective in History," *Journal of American History 76* (1990): 1087-1110.

[106] A similar argument has been made to explain earlier agricultural expansion in western Canada following the First World War; cf. Jones, *Empire of Dust;* and John Herd Thompson, *The Harvests of War: The Prairie West, 1914-1918* (Toronto: McClelland and Stewart, 1978).

Each of the aforementioned innovations was a deliberate response, designed to lessen the risk of agricultural loss inherent with the economic and environmental variability that characterizes western plains agriculture. Reducing the potential for loss and creating a stable and reliable production milieu, was more important to the majority of producers than was the presumed short-term profit motive expressed by the declensionists.

Following the Second World War, production and technological advances caused a continual climb in long-term average yields. Crop land was worked with ever greater efficiency by fewer people. However, farm consolidation, rural depopulation, and decline of small towns, were also directly attributable to the increased production efficiencies. Few saw the social-cultural impacts resulting from these demographic changes in a positive light and, partly for this reason, the declensionist narrative still holds great appeal.

Other considerations of Great Plains agricultural history suggest that agricultural landscape change did not happen in a strictly declensionist way. Reconsidering earlier work on the 1930s depression that suggested the drought was a purely natural disaster,[107] popular Canadian writer James H. Gray saw the drought response efforts of engineers, researchers, soil scientists, and biologists as "one of the great Canadian success stories of all time."[108] Historian Mary Hargreaves, author of one of few comprehensive analyses of Great Plains agricultural history, also took a progressive position.[109] Recognizing the efforts of individual farmers, Hargreaves also put most of the responsibility for farming success on higher-level political forces, particularly policy response to market fluctuation. Espousing a generally progressive narrative of agricultural development and adjustment, Hargreaves maintained that policy interventions, not to remedy the environmental forces that most declensionists identify, but rather, to counter vulnerability to competitive world markets. More recently, Geoff Cunfer's research has demonstrated that in many areas of the United States portion of the Great Plains, land in a given area periodically shifted between grazing and crops. Instead of an ever-expanding amount of land entering production, the absolute number of acres seeded remained remarkably stable after initial land-breaking.[110]

Of course, no narrative of land change will be strictly unidirectional. In the most progressive of accounts, setbacks do occur, and in the most declensionist, human efforts can bring about some measure of good. In the early 1990s, William Cronon undertook a heartfelt

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[107] James H. Gray, *The Winter Years* (Toronto: MacMillan, 1966).

[108] James H. Gray, *Men Against the Desert* (Saskatoon: Western Producer Prairie Books, 1967), viii.

[109] Mary W.M. Hargreaves, *Dry Farming in the Northern Great Plains, 1900-1925* (Harvard, Massachusetts: Harvard University Press, 1957); and Mary W.M. Hargreaves, *Dry Farming in the Northern Great Plains: Years of Readjustment, 1920-1990* (Lawrence, Kansas: University of Kansas Press, 1993).

[110] Cunfer, *On the Great Plains*.

reconsideration of his contemporaries' largely declensionist 'new' western histories.[111] Pondering the merits of both Worster's declensionist and Malin's progressive narratives of Great Plains human-environmental interaction, Cronon astutely noted that in either case, *landscapes change*, and whichever moral direction is implied, historical narratives are, by necessity, bounded by evidence.[112] This dissertation describes an *evolutionary* process of landscape formation. Although drawn out over nearly a century, the temporal pattern of landscape change was not linear. Much of the region was *very* rapidly settled over a brief period beginning in approximately 1900. This first phase abruptly ended, particularly in Canada, with the outbreak of the First World War in 1914.[113] In the United States, more land was claimed under the Homestead Act between 1898 and 1917, than during the years 1868 to 1897.[114] The speed with which agricultural lands were claimed and occupied was directly attributable to regulations governing homestead allotment and the coinciding expansion of trans-continental railway networks.

A sod-breaking period of ten to twenty years, during which farms developed into stable enterprises, followed the initial settlement boom. Although farm allotments were areally small, even by contemporary standards, the limited supply of labour, coupled with the high cost of mechanized equipment, meant that a minimum amount of time, often many years, was required to reach a basic level of sustainable production.[115] Compared to the very slow rate of change during the pre-agricultural period, the landscape transformation in the agricultural era was extraordinary. After about ten to twenty years, depending on available capital and labour, but also on quality of the land itself, farms reached a stage of maturity where land operators could settle into a routine of slower, at times almost imperceptible, land modification.

As Cronon came to accept, a progressive narrative can be quite plausible in the context of the western plains.[116] In many areas, there was indeed long-term, if incremental, development. Over time, new crop fields were broken and infrastructure was added.

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[111] Cronon, "A Place for Stories."

[112] Ibid.

[113] Settlement was largely spurred by the loosening of many immigration restrictions in 1896 under Clifford Sifton, Minister of the Interior form 1896-1905. David J. Hall, *Clifford Sifton, Volume 1: The Young Napoleon, 1861-1900* and *Clifford Sifton, Volume 2: A Lonely Eminence, 1901-1929* (Vancouver: UBC Press,1981).

[114] Fite, *Farmers' Frontier*. Fite acknowledges that much of the land taken in this period consisted of marginal plots within the western rangeland.

[115] Most farms were one-quarter to one-half section (160 or 320 acres) in size. When Canada was considering the terms of the proposed Dominion Lands Act of 1872, it was acknowledged that 160 acre grants, as had been specified in the 1862 United States Homestead Act, would likely be inadequate. The minimum farm size in Ontario, the origin of many migrants was already 200 acres by the 1870s. See Harris and Warkentin, *Canada before Confederation*.

[116] Cronon, "A Place for Stories."

However, as agriculture expanded, rural populations declined. A portion of the increase in field acres happened at the expense of smaller farms. Small operations were sold and quickly absorbed into larger entities. Farmsteads, many established at the beginning of settlement, disappeared along with the people who had lived on them. Furthermore, the changes were not temporally linear. While total seeded acreages increased modestly over the long-term, detailed land use maps reveal that, on a decadal basis, field-to-field land use fluctuated. In many places, an inherent cyclicality informed the patterns of production reflected in the landscape.

The narrative that forms from this history is progressive, but it is also one of long-term cyclical evolution. Economic and environmental factors did negatively affect production in some years, but also allowed great success in others. Widespread catastrophic land decline simply did not happen. Analyses of production statistics demonstrate that average yields and total seeded acres continually climbed, due largely to readily adopted mechanical and chemical technology. Specific lands were irreversibly degraded by human activity, much of the loss occurring soon after the initial breaking period. However, such degradation was quickly recognized within the first few years following settlement, and was offset by voluntary individual and institutionally-supported, conservation practices.

On the transboundary northwestern plains, the 1930s drought, as is often surmised, did not initiate producer responses, but rather, farmers had recognized the limitations of the land almost immediately upon settling it. Events early in the productive history, particularly the droughts of 1919 to 1921, were more important, impelling people such as M.L. Wilson, the highly influential United States New Deal policy formulator, to undertake a program of research that formed the foundation for land use practice and policy for the next century. The New Deal style responses of both the Canadian and United States governments, enacted across North America in the 1930s, had their origins in an embryonic agricultural approach germinated on drylands of the northwestern plains.

In both Canada and the United States, within a common environmental setting, over the seventy-year study period, patterns of agricultural land use change have been very similar. Although some notable exceptions in land use have been observed, related to nationally important policy and economic determinants, producers irrespective of national origin, adapted to their local environments and modified their land use systems to cope with changeable conditions. This involved a cross-border cooperative sharing of land management innovations on the part of individual producers, and government agencies. Together, they created a long-term stable and viable agricultural economy.

CHAPTER 3

LAND MANAGEMENT IN THE INTEREST OF THE PUBLIC GOOD

The settlement narrative of the Great Plains generally follows a set pattern.[1] Pioneering farmers, individually driven by an extraordinary sense of the value of hard work and Turnerian progress, arrived upon a virgin prairie landscape. With much individual effort, fields were broken, crops seeded, livestock herds grown, and an infrastructure built. Slowly, but incessantly, a vast grassland was transformed into a tamed, ordered, and productive mosaic of farms, each of them emblematic of the pioneers' high moral purpose and personal perseverance.

The preceding narrative is, of course, a myth. Actual newcomer experience was nuanced and varied. The agricultural settlement of the northwestern plains, virtually the last portion of the Great Plains to be farmed, was the pinnacle of centrally-organized, engineered, and purposeful territorial conquest. Prairie sod was indeed converted to farmland by a great swath of men and women working individual plots of land, but each of these people was also enticed, encouraged, and supported by a vast machine of government officials, railway companies, grain marketers, and thousands of other business and service providers.

Ahead of the settlers by almost forty years for the westernmost reaches of the region, governments had carefully formulated plans and preparations for the settlers' eventual arrival. Beginning in the 1850s, government and railway surveyors meticulously measured, mapped, and described the territory's agricultural potential. In the following decades, treaties were signed with Aboriginal inhabitants, while simultaneously, surveyors divided the territory into a massive grid of half-mile by half-mile squares. By the late 1870s, extensive transportation

[1] Discussed in Chapter 2.

and commodity distribution networks were planned.[2] Enthusiastic promotional and recruiting efforts were approved and research programs were granted generous public funding. The "Last Best West," carefully prepared and groomed, lay waiting for the pioneering farmers.[3]

North American agriculture is indisputably a commercial pursuit. Farms produce commodities on the expectation of a reasonable profit. Because readily available and affordable food was deemed vital to the security of all citizens, agricultural productive success was closely tied to a sense of 'public good' from the time of initial European colonization.[4] Few industries demanded, or received, the same degree of attention from government policy architects as did agriculture. Nationalized agrarianism was the dominant understanding of American rural life in the neo-independent United States.[5] More broadly described as "Jeffersonianism" in American discourse, agrarianism was, in the words of one historian, "close to being a national secular faith."[6]

Nineteenth-century American romanticists and, later, Turner and other 'frontier' theorists, proffered generous sentiment towards agriculture, and those who practiced it. By the dawn of the twentieth century, agrarianism lay at the heart of the progressive movement[7] and had been adopted by the progressives' philosophical counterparts, the modernists. Early in the twentieth century, expansionist railway builder James J. Hill, echoing American agrarianist gospel, emphatically stated that the farmer's "...occupation is the first to exist in a civilized state. It is the basis of all other industry."[8] In moral terms, farming was the highest-valued occupation and rural people were celebrated for being better connected to nature than their urban counterparts. Individual farm property ownership was perceived as desirable and

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[2] In the 1870s, the Canadian Pacific Railway undertook an extensive survey program, in western Canada, not only to determine the best transcontinental route, but also potential branch line routes. See Sandford Fleming, *Report on Surveys and Preliminary Operations on the Canadian Pacific Railway up to January, 1877* (Ottawa: MacLean, Roger & Co., 1877).

[3] "Last Best West" refers to a marketing term used by Canada in advertising material primarily directed at potential out-of-country migrants to Saskatchewan and Alberta. It attracted over one million American migrants to western Canada. See Paul F, Sharp, "The American Farmer and the "Last Best West," *Agricultural History* 21, no.2, (1947): 65-75.

[4] David B. Danbom, "Publicly Sponsored Agricultural Research in the United Sates from a Historical Perspective," in *New Directions for Agriculture and Agricultural Research: Neglected Dimensions and Emerging Alternatives*, ed. Kenneth A. Dahlberg (Totowa, NJ: Rowman and Allanhead, 1986): 107-131.

[5] Ibid.

[6] Danbom, "Publicly Sponsored Agricultural Research," 107.

[7] Walter Nugent, *Progressivism: A Very Short Introduction* (New York: Oxford University Press, 2010).

[8] James J. Hill, Address delivered, 2. This was just one of many similar addresses delivered in 1908 in places including Washington, D.C, Crookston, Minnesota, and Kansas City, Missouri.

images of the farmer toiling upon *his* land was unquestionably the epitome of loyal republicanism.[9]

American agrarianism is most often strongly associated with American exceptionalism.[10] Although arguably rooted more in eighteenth-century European romanticism, essentially agrarianist sentiments also persisted in contemporary western Canada.[11] H.V. Nelles noted that the Canadian "philosophical foundations" for agrarianism were comparatively weaker than those of the United States, and that in Canada, "Like democracy itself, [agrarianism] was more a condition and less of a theory than in the United States."[12]

If American-styled agrarianism was not clearly entrenched in Canada during latter nineteenth century westward expansion, it very quickly became so by the early twentieth century era of westernmost settlement. Even in the midst of rapid modernization, agrarian progressivism gripped Canadian prairie farmers as strongly as it did their American counterparts.[13] Farmers believed they answered to a "higher moral standard," particularly during and immediately after the First World War.[14] This morality, expressed and celebrated in the attributes of rural life, would "not only improve democracy, but make for a better Canada."[15] Not surprisingly, American and Canadian governments reflected this deep-rooted sentiment. They had no choice. The rise of the progressive movement required a strong government response to a direct political challenge.

In the United States, government involvement in agriculture had intensified from the onset of the Civil War. In 1862, The Union's fundamental "Whig-Republican" idea that government must be directly involved in economic development[16] impelled the passing of two important legislative acts in 1862, the creation of the United States Department of

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[9] Danbom, "Publicly Sponsored Agricultural Research."

[10] Ibid.

[11] Paul F. Sharp, *The Agrarian Revolt in Western Canada: A Survey Showing American Parallels* (Regina: Canadian Plains Research Centre, 1997). 1997 reprint originally published by University of Minnesota Press, 1948.

[12] H.V. Nelles, *The Politics of Development: Forest, Mines and Hydroelectric Power in Ontario, 1849-1941* (Montreal: McGill-Queens University Press), 44. In an introduction to a reprint of Sharp's book, William C. Pratt highlights the disagreement between Sharp and Canadian historians, the latter rejecting the idea that essentially American agrarianism progressivism existed in Canada; cf. William C. Pratt "Introduction to the 1997 Reprint of Sharp, *Agrarian Revolt*.

[13] Sharp, *Agrarian Revolt*; also W. L. Morton, "The Social Philosophy of Henry Wise Wood, the Canadian Agrarian Leader," *Agricultural History* 22, no.2 (1948): 114-123.

[14] Waiser, *Saskatchewan,* 236.

[15] Ibid.

[16] Danbom, "Publicly Sponsored Agricultural Research."

Agriculture, and the passing of the Morrill Land-Grant College Act.[17] These foundational policies established a solid institutional framework to oversee agricultural research and administration.[18] In the first few decades following the Civil War, there is little evidence that agriculture was at the forefront of American domestic policy interests. Nineteenth century agricultural policy amounted to little more than "care-taking"[19] as governments in both countries avoided direct involvement in field-level agricultural matters. Field husbandry and agronomic choices remained those of the farmer's own designs. Crop successes were celebrated and failures borne, solely by those working the land.

Towards the close of the nineteenth century, policy makers began approaching agricultural matters with the same progressive ideals that were increasingly changing other industries. Progressive governments were charged with a natural responsibility to take up the role of scientific advisor to producers.[20] In the late-nineteenth century, Canada and the United States each passed legislation establishing well-funded federal experimental farms, including large Canadian federal ones at Lethbridge and Swift Current, and the Montana State University Northern Agricultural Research Center at Havre. The policies creating these facilities were intended to spur ground-breaking research in field and animal management.[21] Increased production efficiency was the driving goal of governments and the agricultural colleges alike.

Inevitably, older agrarianist ideals of rural life proved incompatible with the modern principles of practical and efficient agricultural production based on 'Fordist' industrial practice. In 1908, James Hill opined that agriculture recently had come to be recognized as an "exact science" and was no longer merely a "scratching of the earth, a hit-or-miss scattering of seed and a harvesting of such yield as the soil and weather would permit."[22] Modern agricultural thinking embraced principles of efficiency, expansion, and science. However,

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[17] "An Act to Establish a Department of Agriculture," 37th Cong., 2nd sess. (May 15, 1862); and "An Act donating Public Lands to the several States and Territories which may provide Colleges for the Benefit of Agriculture and the Mechanic Arts," 37th Cong., 2nd sess. (July 2, 1862).

[18] Danbom, "Publicly Sponsored Agricultural Research."

[19] Ibid., 109

[20] Danbom, "Publicly Sponsored Agricultural Research"; and T.H. Anstey, *One Hundred Harvests: Research Branch Agriculture Canada, 1886-1986* Canada, Agriculture Canada (Ottawa, 1986).

[21] "An act to establish agricultural experiment stations in connection with the colleges established in the several States under the provisions of an act approved July second, eighteen hundred and sixty-two, and of the acts supplementary thereto," 49th Cong., (March 2, 1887); also "The Experimental Farm Station Act," S.C, 1886, 49 V., c23.

[22] Hill, "Address delivered," 2.

well-entrenched agrarianist sentimentality continued to exert measurable influence on American and Canadian views of rural life and farming throughout the twentieth century.[23]

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Although Canadian and American federal authorities had not asserted much *direct* control over agricultural practices on individual farms, federal land distribution policies greatly influenced larger scale farm organization and, ultimately, field and production patterns. The United States and Canada each pursued agricultural settlement primarily as a land occupation strategy. The 1862 United States 'Homestead Act' and Canada 1872 Dominion Lands Act specified similar land dispersal policies that ensured that western occupation would be marked by the rigid geographic uniformity of the Public Land Survey System (PLSS) and the Dominion Land Survey (DLS).[24]

In 1891, after surveying had largely been completed in western Canada, W.F. King, Canada's Department of the Interior Chief Astronomer, described the advantages of the DLS employing the PLSS-style township survey system; many having more to do with expedient completion of the surveys, rather than rational organization of agricultural land. King observed that employing a simple grid of surveyors' transit lines "simplifies the original survey and facilitates resurvey," concluding, almost as an afterthought and without any qualification, "The parcels of land are also square, or nearly so -- the shape most suitable, on the whole, for farms."[25]

Despite the United States and Canadian federal governments' intention that the PLSS and the DLS be uniformly and rigidly followed; in application, they were not.[26] Surveys in both countries were characterized by variation in survey design, and adherence to prescribed survey specifications. The western transboundary landscape posed many geographical

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[23] Danbom, "Publicly Sponsored Agricultural Research." Danbom argues that a latent agrarianism still lingers in North American rural philosophy and policy. For perspectives on Canadian agrarianism, cf. Kenneth Murray Knuttila and Bob Stirling, ed., *The Prairie Agrarian Movement Revisited* (Regina: Canadian Plains Research Centre), 2007.

[24] For implications of land settlement policy see: James M. Richtik, "The Policy Framework for Settling the Canadian West 1870-1880," *Agricultural History* 49, no.4 (1979): 613-628; and Paul Wallace Gates, *History of Public Land Law Development*, (Washington: Government. Printing Office, 1968). The United States Homestead Act refers to "An Act to secure Homesteads to actual Settlers on the Public Domain," 37th Cong., 2nd sess. (May 20, 1862). The Canadian analogue is the "Dominion Lands Act," R.S.C. 1927, c. 113, s. 3.

[25] W. F. King, "Theory of the System of Survey of Dominion Lands with Geodetic Tables and Notes on their Use," in *Manual of Instructions for the Survey of Dominion Lands* (Ottawa, 1891): 203. http://clss-satc.nrcan-rncan.gc.ca/standards-normes/data/TheoryDLSsystem1891.djvu

[26] John Langton Tyman, *By Section, Township and Range: Studies in Prairie Settlement* (Brandon: Assiniboine Historical Society, 1972). Tyman describes the variations in the Canadian survey.

challenges to survey parties. Whereas the Red River country to the east is almost uniformly flat, morainal areas to the west of the glacial Lake Agassiz are more hilly. Furthermore, the surveys had been completed with great haste in order to expedite settlement. In Canada, this resulted in nearly continual amendment to the DLS specifications.[27] In the United States, the rush to keep survey parties ahead of rapidly-expanding railways led to many section boundaries being rather poorly surveyed.[28]

Ultimately, both the PLSS and the DLS proved restrictive in the context of north-western trans-boundary agriculture. In a region characterized by a restrictive environment, any hopes of universal farm success on plots of only 160 acres were highly optimistic. Even before the details of the proposed DLS had been finalized in 1872, Canadian authorities had observed that many of Ontario's 200 acre farms, situated as they were in a more amenable climate, were already proving to be too small to be profitable.[29] The Canadian answer to this issue was to allow, at a nominal charge at the time of taking a homestead grant, the option of 'pre-emption' of an additional 160 acres.

South of the forty-ninth parallel, the United States had also been forced to modify the Homestead Act to allow for larger grants on lands considered to be "poor" or unirrigable. The 1909 Enlarged Homestead Act allowed grants of 320 acres, twice the usual 160 acres in marginal areas.[30] Virtually all of north-central Montana qualified under the Act. Chouteau County, an important military and trade hub since the mid-nineteenth century remained uncultivated until 1910, despite James Hill building the Montana Central Railroad between Havre and Great Falls two decades earlier.[31] Hill's Great Northern Railway (GNR) vigorously promoted the new 320 acre grant, quickly attracting a large number of settlers to the county.[32]

On the northwestern plains, to presume success for farms of even 320 acres, double the size of the normal grant, was to be overly optimistic. The report of a 1930s comprehensive 'state of farms' survey conducted in the Lomond area of southern Alberta by W.N. Watson, a federal Economics Branch Agricultural Assistant, noted the relationship of farm size to

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[27] Canada, *Manual of Instructions for the Survey of Dominion Lands,* 1st to 10th Editions (Ottawa, 1871-1946).

[28] See visual examples in Chapter 4.

[29] Harris and Warkentin, *Canada before Confederation.*

[30] "Enlarged Homestead Act," 61st Cong., 2nd sess. (Feb 19, 1909).

[31] Michael P. Malone, *James J. Hill: Empire Builder of the Northwest* (Norman: University of Oklahoma Press, 1996). Western Montana mining expansion had been Hill's original motivation for building the Montana Central Railroad.

[32] The GNR efforts to promote dryland farming in Montana are documented in Clair Strom, *Profiting from the Plains: The Great Northern Railway and Corporate Development of the American West* (Seattle: University of Washington Press, 2003).

abandonment.[33] Most farms in the study area near Lomond were initially 160 or 320 acres at the time of first settlement in 1910 and 1911. A characteristic pattern of successive settlement and "farm failure" followed. As farms were abandoned, more successful operators acquired the land. The relationship was clear: the longest-lasting farms also tended to be the larger ones.

Watson, a firm believer in Palliser's notion of an infertile area along the northwest transboundary region, took a critical view of farm "failures."[34] The Lomond area, for example, opened for settlement in 1906. Of the farms surveyed, nearly seventy percent had been claimed by 1910, well before the period of high wheat prices brought about by the 1914 to 1918 Great War. A mere six percent had been brought into cultivation after 1925. Watson attributed the rapidity of settlement to Canada's "open immigration policy, free land, and the fact that most of the better lands in western Canada had already been homesteaded".[35] Notably, when the majority of lands had been first claimed between 1903 and 1910, the weather had been "considerably drier" than normal and few fields had been seeded that first decade. Not until 1911 to 1917, when rainfall was greater, were many of these lands finally broken and seeded, often too late for the first settler to gain title.

Land settlement and development histories in the northwest plains were often very complex. The record of one half-section near Lomond, comprised of the northeast and northwest quarter-sections of Section 34, Township 17, Range 19, west of the 4th meridian, is illustrative.[36] The northwest quarter-section was first granted under the DLS in April, 1908 to thirty-two year old Paul Francis Hipp, a single man from Grano, North Dakota. Hipp failed to reappear in Alberta and the grant was soon cancelled and returned to the pool. In June, 1909, the quarter was granted to William George Miller. A twenty-three year old unmarried farmer from Ireland, Miller had emigrated first to Ontario, soon afterwards moving on to Lethbridge, located about ninety kilometres southwest of Lomond. Miller also failed to develop the land in any measurable way and, in 1911, the quarter was once again revoked and subsequently granted to twenty-two year old Olaf Johnson, a Minnesota-born carpenter who, along with his twenty-four year old wife, had previously settled in Saskatchewan.

There is no evidence that Olaf Johnson ever permanently moved to Alberta and in May, 1912, the land was once again reassigned, this time to William Arend, a Prussian immigrant to the United States, who had last resided in Spokane, Washington. At the time of

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[33] W.N. Watson, "A Study of 126 Abandoned Farms in the Lomond Area of Southern Alberta," *The Economic Annalist* 6, no.3 (June 1936): 38-44.

[34] Watson, "Study of 126 Abandoned Farms," 38.

[35] Watson, "Study of 126 Abandoned Farms," 39.

[36] Land settlement histories from "Homestead Records," Provincial Archives of Alberta, Accession 1970.313; Microfilm reels 1658277,1658322, 1760552, 1771711, 1795315, and 1796860.

the grant, forty-three year old Arend, along with his thirty-three year old wife and their three children, had also taken pre-emption on the neighbouring quarter. Ignoring their homestead plot, Arend and his family managed to break ten acres of the northeast quarter over their first summer. It was the only land Arend would ever break at Lomond.

That autumn, Arend's home quarter was surrendered and reassigned to Leon Belisle, a single man originally from Ontario, but like Arend, most recently-arrived via Washington State. The fifth person to take over the quarter in five years, Belisle made steady farming progress. Seventy-five dollars were invested in a ten-foot by twelve-foot wood frame house. A further $25 was spent on one quarter mile of fencing and another $65 went towards digging a well. By 1914, Belisle had only broken twenty acres and seeded ten. However, an additional ten acres were broken in each of 1915 and 1916. By the time the land assessors arrived in 1920, Belisle's investments were sufficient for him to be granted title to the northwest quarter-section.

The history of the northeast quarter-section settlement was similarly complex. This quarter was first claimed in 1908 by Ophia Lagran Daniels of Carpio, North Dakota. Daniels never appeared on the land and by June the following year, the quarter had been quickly reassigned as a pre-emption to William George Miller. Miller, having given up on his homestead, also failed to meet conditions of his pre-emption and, in March, 1911, the northeast quarter was once again re-granted, this time as a homestead to Nils Noren, a Swedish-born resident of Saskatchewan. Upon inspection three years later, a land agent found little evidence of improvement. Taking over from Noren, William Arend had managed to break ten acres on the northeast quarter, following his rapid abandonment of the northwest one. Soon after, Arend and his family surrendered all claims near Lomond. Finally in 1915, Leon Belise, the fifth person to take the northeast quarter in seven years and the comparatively successful developer of the northwest section, took over Arend's former pre-emption, and began establishing it alongside his homestead quarter.

By 1917, Belisle had broken another fifteen acres on the northeast quarter for a total seeded area of fifty-five acres. Over the following three years, Belisle slowly continued to develop the land; five additional acres broken and forty-two seeded in 1918, twenty-seven acres broken, but only twenty seeded in 1919, and finally, another five acres broken and fifty-five seeded in 1920. The culmination of Leon Belisle's efforts on both quarters, ninety acres broken over nine years, was sufficient for the granting of his second title in 1921 (Fig. 3.1).

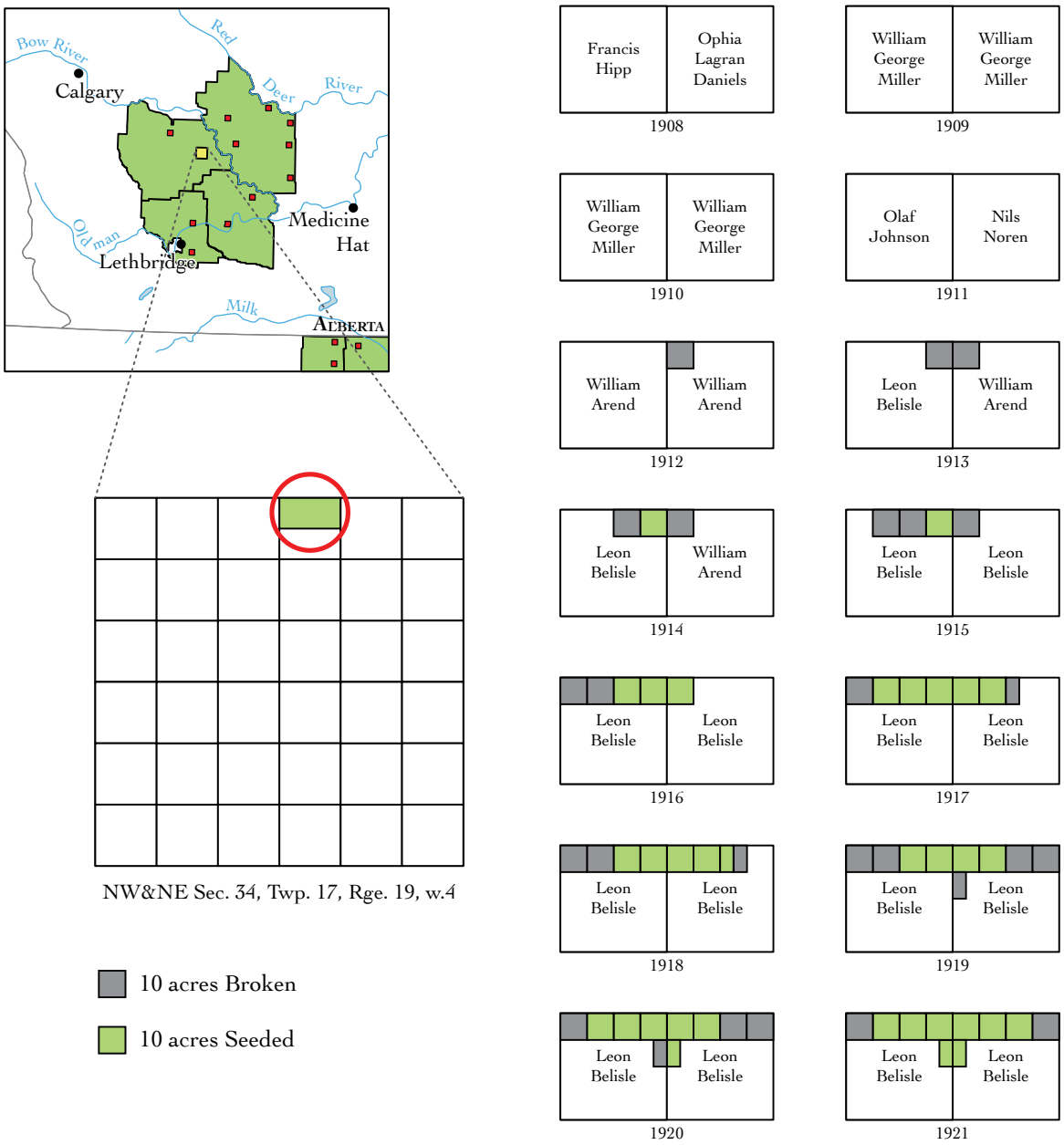

FIGURE 3.1 Settlement and land development history of the Northeast and Northwest quarter-sections of Section 34, Township 17, Range 19, west of the 4th meridian, near Lomond, Alberta, 1908-21. Broken and seeded acreage blocks are representative of relative quantity, not actual field location.

W.N Watson's main criticism of Alberta settlers had been that they had not understood the requirements of farming. He had noted that twenty-four percent of farms had been abandoned after fewer than five years and barely more than twenty-five percent had only one operator from since settlement.[37] The homestead records suggest that rather than being

[37] Watson, "Study of 126 Abandoned Farms," 39.

chased from the land by poor conditions or inexperience, in many cases, no attempt had even been made by homesteaders to develop farms. In the previous example from Lomond, a single settler, Leon Belisle, persisted, while six others had moved onto other opportunities.

Some settlers did find eventual success near Lomand. George Arthur Sweetman, an Ontario-born farmer from Pincher Creek, moved to the area in 1910.[38] Sweetman had abandoned a Pincher Creek farm to take homestead on another previously-granted, but never-developed quarter near Lomond. Sweetman broke and seeded sixty acres over the following four years. Having arrived from Pincher Creek with capital, Sweetman was able to build an $800 house and construct a sizeable barn and several sheds, totalling another $500. Sweetman also spent $200 on a well, and another $200 erecting one and one-half miles of fencing. In four years, he had accumulated thirty-two horses, two cattle, and thirty-two hogs. Having achieved measurable development on the southeast quarter of Section 21, Township 17, Range 19, Sweetman took pre-emption on the neighbouring northeast quarter. In 1914 he managed to break another seventy-five acres, cropping ninety acres in total across the two sections. In 1919 Sweetman died; the homestead record did not list the cause.

There were other barriers to settler success. Even some successful settlers were hardly 'settled.' Despite the pervasive popular image of steadfast pioneers moving out to an empty west, meagre possessions in hand, slowly building up homesteads and nurturing new cropland, a number of newcomers were mobile, forced to take off-season employment in towns and cities. One Lomond area settler, Justus Sweetman, forty-five years old, presumed to be a relative of George Sweetman, applied for a quarter-section (NW21-17-19-W4)[39] in 1910 adjacent to George Sweetman's two quarters (NE21-17-19-W4 and SE21-17-19-W4), claimed the same year.[40] Like George and Richard Luxton, the previous applicants for the northwest quarter, Justus was from Pincher Creek. Unlike George, who was unmarried, Justus, was married to a woman, also forty-five, who continued to maintain residence in Pincher Creek, nearly 200 kilometres away. In 1912, Justus Sweetman built a house on his quarter section, but the homestead record notes Justus returned to his family and winter employment in Pincher Creek each autumn. Justus did not built the same farm infrastructure as George, but he (or perhaps George) was able to work enough land to obtain patent in 1918.

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[38] "Homestead Records," Provincial Archives of Alberta.

[39] Canadian land locations are abbreviated as follows: *Quarter-Section - Section - Township - Range - Meridian*. In this example, NW21-17-19-W4 refers to the northwest quarter of Section 21, Township 17, Range 19, west of the 4th meridian.

[40] "Homestead Records," Provincial Archives of Alberta.

By 1931, the average Alberta farm size was 400 acres; in Lomond it was only 273 acres. More than half of the Lomond area farms were the minimum 160 acres.[41] The smaller farms were abandoned, larger farms survived. Through the first three decades of farming near Lomond, no farm of 640 acres in size or greater had ever been abandoned. In Canada at least, if "efficient and effective *land settlement*" was the primary goal of the federal land organizational policy,[42] the Lomond case proves that efficient and effective *agricultural production* would sort itself out later.

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The majority of northwestern plains farms were established in a milieu of early twentieth century modernization and 'new' agricultural thinking. The timing of westward expansion was coincidental; modernization had not caused it, rather an ever-increasing demand for land had. By 1900, the fertile farmlands of the trans-Mississippi region and the Red River district were all in mature production. Territory west of the one-hundredth meridian, the line John Wesley Powell had famously proclaimed as demarcating the limit of 'conventional' agriculture, remained largely unsettled.[43]

Many histories argue that westward expansion only occurred following adoption of the 'rain follows the plough' doctrine.[44] A more pragmatic reason for the relatively late settlement was simply that access was a barrier. Functional railways were required to move successful effective settlement forward.[45] Success came slowly. Railway companies had received extensive land grants in the 1860s and 1870s, but had abysmally failed to live up to promised

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[41] Watson, "Study of 126 Abandoned Farms," 44.

[42] Johnny Malciw, "Settling and 'Selling' Canada's West: The Role of Immigration," (master's thesis, Ryerson University, 2009), 18, (emphasis added).

[43] Wallace Stegner, *Beyond the Hundredth Meridian: John Wesley Powell and the Second Opening of the West* (1953) (New York: Penguin, 1992), reprint.

[44] The concept is attributed to Charles Dana Wilber, *The Great Valleys and Prairies of Nebraska and the Northwest* (Omaha: Daily Republican Printing Company, 1881), adopted by the Hayden Survey; Ferdinand Hayden, "Preliminary Report of the United States Geological Survey of Montana and Portions of Adjacent Territories; Being a Fifth Annual Report of Progress. See also Henry Nash Smith, "Rain Follows the Plow: The Notion of Increased Rainfall for the Great Plains, 1844-1880," *Huntington Library Quarterly* 10, no.2 (1947), 169-193; and Gary D. Libecap and Zeynep Kocabiyik Hansen, "'Rain Follows the Plow' and Dryland Farming Doctrine: The Climate Information Problem and Homestead Failure in the Upper Great Plains, 1890-1925," *Journal of Economic History* 62, no.1 (2002): 86-120.

[45] P.L. McCormick, "Transportation and Settlement: Problems in the Expansion of the Frontier of Saskatchewan and Assiniboia in 1904," in Gregory P. Marchildon, ed. *Immigration and Settlement, 1870-1939* (Regina: Canadian Plains Research Centre, 2009), 81-102.

completion dates.[46] In the northern United States, the Northern Pacific Railway (NP) was a clear example of failed promise. By the 1890s, not only were no trains running through the bulk of potential homestead lands, thousands of acres of public land had been tied up awaiting track completion.[47] At the same time a growing number of landless mid-westerners created an ever-rising need for new space.[48]

In Canada, eastern industry-connected expansionists had pressed for effective occupation of the Northwest Territories since the 1830s.[49] Seeking new markets for eastern industry and compelled by the ongoing trend of American western expansion, the Conservative government of the newly independent Dominion of Canada sought rapid completion of the Canadian Pacific Railway (CPR).[50] Railway building was the impetus for settlement, but people did not automatically accompany the new track. Despite the legislative efforts directed through the Dominion Lands Act and the railway programs, mass migration to Alberta and Saskatchewan simply did not happen until the century-end. Nativist restrictions on the eligibility of foreign-born migrants, a general disinterest on the part of Quebecois to move west, and the lure of newly-available land in the United States were some of the reasons why Canadian settlement had barely moved beyond Manitoba by the end of the nineteenth century.[51]

The United States was faced with the dubious prospect of trying to persuade settlers to take up farming in a region that had been repeatedly referred to as semi-desert. In the Dakota and Montana Territories, the Northern Pacific Railway (NP) had hurriedly laid claim to a transcontinental route its directors thought would most easily connect the Mid-West with the Pacific. To the company's profound detriment, the architects of the NP had neglected to adequately consider the potential for future agricultural viability along their proposed route.[52]

Virtually all of the NP's grant lands along the chosen route across south-western North Dakota and southern Montana were essentially unfarmable. To the west of Bismarck, located at exactly 100.8° west longitude, lay vast stretches of arid badlands and rocky uplands. Along the NP route, only small patches of land situated along the Yellowstone River valley were

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[46] Carlos A. Schwantes and James P. Ronda, *The West the Railroads Made* (Seattle: Washington State Historical Society, 2008).

[47] White, *It's Your Misfortune.*

[48] Ibid.

[49] Owram, *Promise of Eden.*

[50] Ibid.

[51] For a survey of western Canada settlement, see Gregory P. Marchildon ed. *Immigration and Settlement, 1870-1939* (Regina: Canadian Plains Research Centre, 2009).

[52] Schwantes and Ronda, *The West the Railroads Made.*

arable. A partial explanation for the NP routing choice was the distraction posed by incipient mining activity in the Black Hills and western Montana.[53] Although the presumption of potential mining traffic ultimately proved well-founded and did provide some modest revenue to the NP, the variable nature of the mineral economy and the lack of arable land made permanent settlement along much of the NP route largely impossible.

Other railway companies, including the CPR, also soon realized that operating a railway across vast non-arable territory, without the traffic afforded by a stable agriculturally-productive population base, was an expensive proposition. Political interference had greatly influenced the CPR's western route choice. Based on agricultural potential, as well as a relative ease of track-building and train operation, a more northerly route across Palliser's and Hind's fertile belt would have been ideal.[54] Furthermore, west of Edmonton, the Yellowhead Pass provided the lowest elevation crossing through the Rocky Mountains. However, domestic political pressure and Canada's uneasy relationship with the post-Civil War United States, made the northerly option politically unpalatable.[55]

Concluding that the agriculturally attractive northern route would be too far from the international boundary to dissuade potential American aggression and that track located too close to the boundary would be vulnerable to attack, the federal government and the CPR compromised. A route was plotted west from Winnipeg to Regina, then across 750 kilometres of open semi-arid grasslands, the entire width of Palliser's arid triangle, to Calgary. Like the NP, the CPR was forced to operate across hundreds miles of track laid over land destined to remain unoccupied for decades following construction (Fig. 3.2).

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[53] Carlos A. Schwantes and James P. Ronda *The West the Railroads Made.*

[54] Fleming, *Report on Surveys.*

[55] Owram, *Promise of Eden.* Eventually, *two* transcontinental railways were built in parallel across the Winnipeg-Edmonton fertile belt. The Canadian Northern Railway opened as far as Edmonton in 1905. The Grand Trunk Pacific Railway was completed across Alberta by 1909. For an overview of western prairie rail development, see Geoff Lester, *Atlas of Alberta Railways Digitalization Project* (Edmonton: Univeristy of Alberta Press, 2014) http://railways.library.ualberta.ca

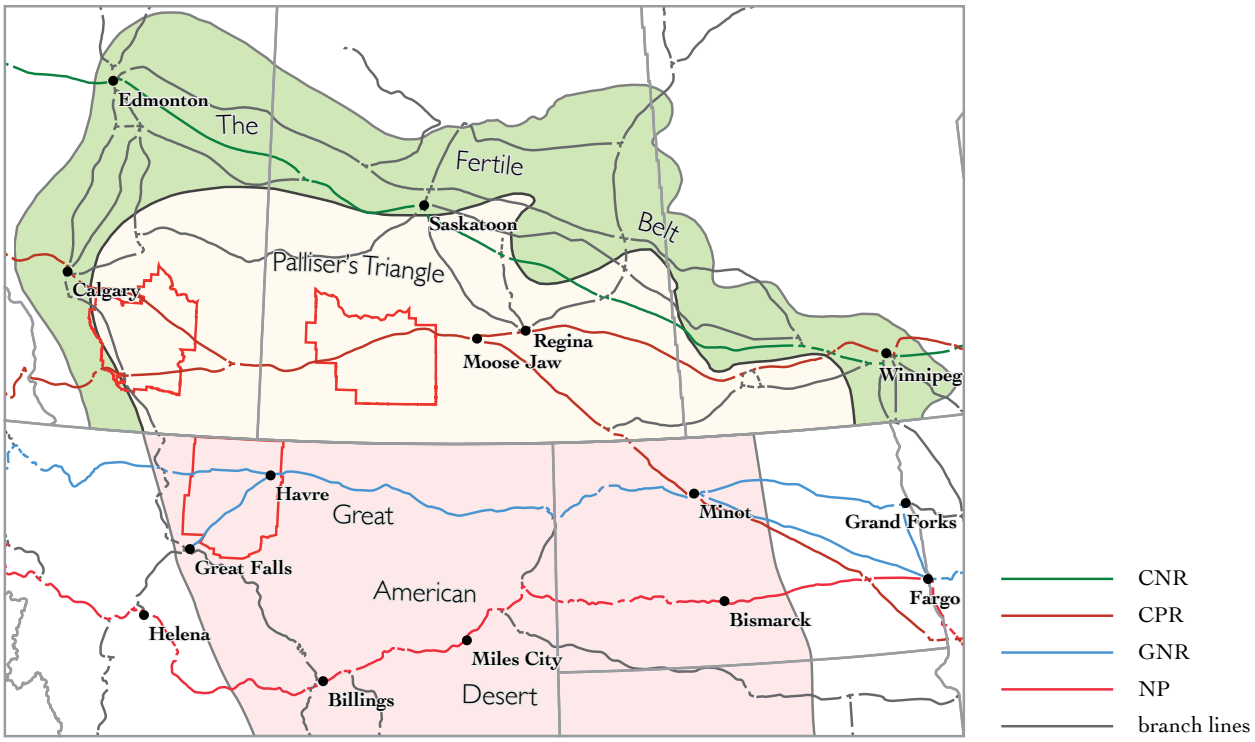

FIGURE 3.2 Railways of the Northwestern Plains. Transcontinental main lines are shown in colour.

Ultimately, railway expansion decided agricultural settlement outcomes on *both* sides of the northwestern plains border. The Great Northern Railway (GNR), built from St. Paul to Seattle at the end of the nineteenth century railway boom without the benefits of land grant patronage, was forced to follow the 'Hi-Line' route paralleling the Canadian boundary.[56] This restriction proved fortuitous. The land near the Canada-USA boundary was less interrupted by badlands and included substantial areas of viable, if somewhat arid, farmland. In Montana, one area, located at the state's longitudinal midpoint including the counties of Toole, Liberty, Chouteau, Hill, and Blaine, was largely flat and uninterrupted. A more discontinuous area encompassed Daniels, Sheridan, and Roosevelt counties in the extreme northeast of the state. The GNR vigorously advertised the farming opportunities of the Hi-line country, attracting not only Americans from the eastern plains, Midwest, and the East, but a large number of Canadians as well.[57]

[56] Strom, *Profiting from the Plains*.

[57] Hill County Bicentennial Commission, *Grit, Guts, and Gusto*; Liberty County Museum, *Our Heritage in Liberty*; and Widdis, *With Scarcely a Ripple*.

* * *

Pre-settlement land organization and railway building were two of the policy building blocks of the western agricultural landscape. Publicly funded research on productive, sustainable farming practice was the third. The federal governments of both countries used agricultural policy as a multi-pronged tool to attempt to alter the basic input-output-profit farm economic equation. Government agencies exerted influence in virtually every aspect of agricultural economic development through land and settlement policies, research, development, and dissemination of farm practices and technology, constructing social and physical infrastructure and commodity marketing regulation.[58]

All twentieth century agricultural policy had one clearly-directed set of goals: reduction of potential losses, competitive price control, and profit maximization. Profitable farms would not only ensure a stable and sustainable domestic food supply, but would also enable individual land owners to take on the bulk of responsibility for effective land use. For much of the twentieth century, Canada and United States agricultural policies were categorically economic in focus. By the 1920s, *efficiency* was the theme of farm policy in both Canada and the United States. Along with increased funding for land management, soils, and agronomic research during the 1930s, the primary policy instruments for agricultural change were aimed at reducing production costs, securing markets, and stabilizing prices. Successive governments held up Fordist approaches to agricultural production efficiency, including a strong push for greater mechanization and 'scientific' field management, as the blueprints for long-term farm sustainability.

The champions of efficiency were politically influential professional agriculturalists, federal scientists, and regional agricultural college professors, many of whom came to hold prominent roles in government. In the United States, Montana agricultural experts became disproportionately influential in national United States agricultural policy.[59] M.L. Wilson was one such formidable policy architect. Born, educated, and having farmed in Iowa before homesteading in Montana in 1909, Wilson took great interest in what he saw as 'farm income problems.'[60] Upon receiving an Master of Arts in Agricultural Economics and Rural Sociology from the University of Wisconsin in 1920, Wilson returned to Montana to head

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[58] Willard W. Cochrane, *The Development of American Agriculture, A Historical Analysis* (Minneapolis: University of Minnesota Press, 1993), 307.

[59] Roy E. Huffman, "Montana's Contributions to New Deal Farm Policy," *Agricultural History* 33, no.4 (1959): 164-167.

[60] Montana State University, College of Agriculture, Department of Agricultural Economics and Economics, "M. L. Wilson Lecture." http://www.montana.edu/econ/seminar/mlwilson/index.html

Montana State College's new Department of Agricultural Economics.[61] Wilson, steeped in the early twentieth century Iowa-Wisconsin tradition of 'modern' agricultural economics[62] was motivated by his own failure to successfully homestead in southeast Montana.

By 1922, M.L. Wilson called for more consideration of dryland farming economics.[63] Wilson noted the relative success of farms situated in an inverse 'triangle' of north-central Montana extending east-west along the Hi-Line between Shelby and Havre and from Great Falls, north to the Canadian border. Curiosity about 'Triangle' farmers' relative success drove Wilson to undertake an inventory of what he deemed to be 'adaptive' practices (Fig. 3.3).[64] Based on his observations in the Triangle, Wilson was convinced that farm success was proportional to scale of production. Labour and machine power were the primary variables of Wilson's calculation. Wilson had observed, for example, that steam tractors (Fig 3.4), while certainly efficient in land management, were excessively expensive, even for owners of large farms. As an alternative, Wilson advocated large horse teams of twelve or more animals, an approach he had earlier observed in Canada.[65]

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[61] Biographical information from M.L. Wilson, *Biographical Data,* self-written biography. Montana State University, Merrill G. Burlingame Special Collections, Accession 3, M. L. Wilson Collection, 1935-1960.

[62] Sara M. Gregg describes an influential cohort of agricultural economists originating from the University of Wisconsin that included Wilson, Richard Ely, John R. Commons, and Henry C. Taylor. See Sara M. Gregg, *Managing the Mountains: Land Use Planning, the New Deal, and the Creation of a Federal Landscape in Appalachia* (New Haven: Yale University Press, 2010).

[63] Merrill G. Burlingame, "National Contributions of the Montana Extension Service," *Agricultural History* 51 no. 1 (1977): 229-243.

[64] M.L. Wilson, *Dry Farming in the North Central Montana "Triangle,"* Montana Extension Service in Agriculture and Home Economics Bulletin, June, 1923.

[65] Several examples of Canadian-origin 'adaptive' practices are cited in various Wilson writings. See Wilson *Dry Farming.*

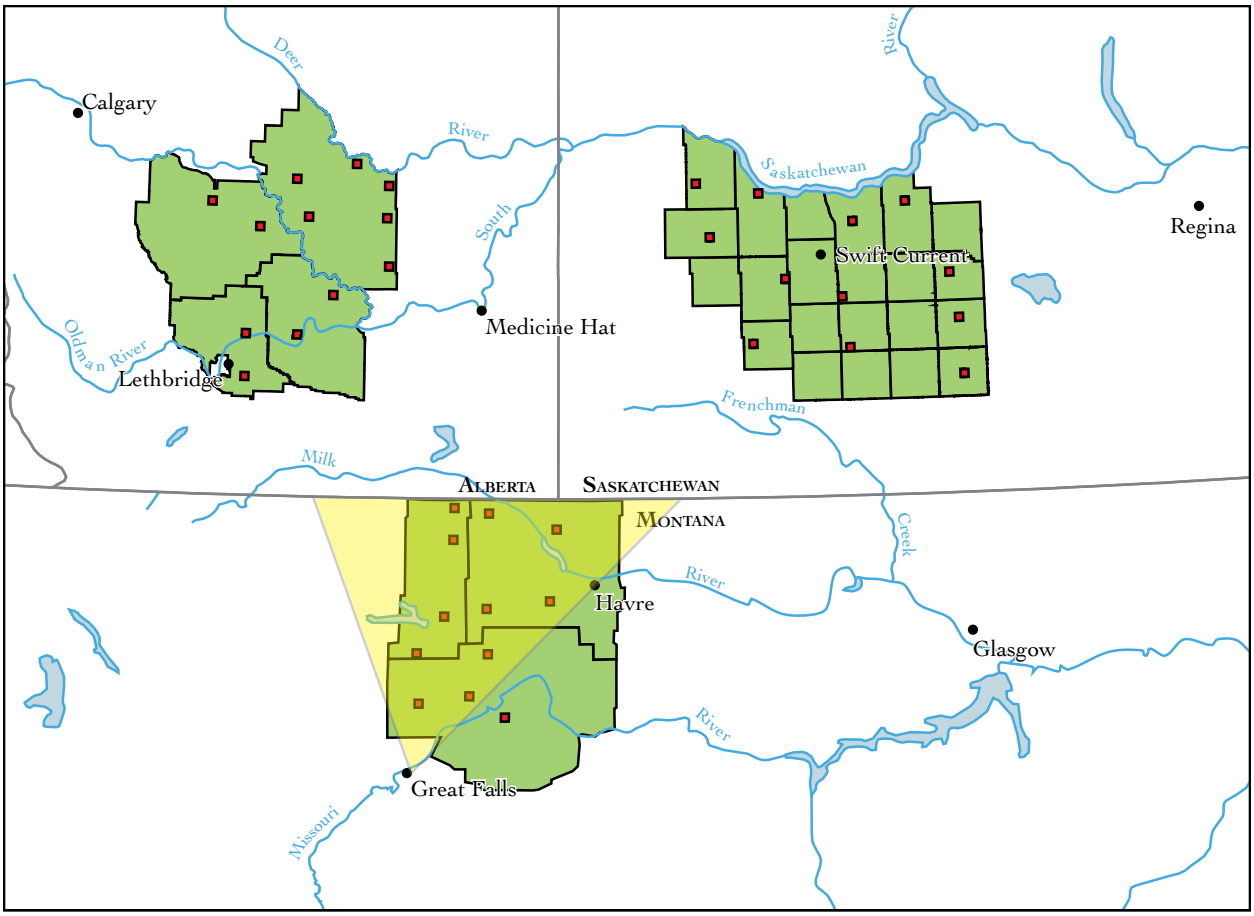

FIGURE 3.3 M.L. Wilson's 'Montana Triangle' (*in yellow*). Map after Wilson, *Dry Farming*.

Ultimately, the widespread adoption of small, reliable gasoline-fueled tractors in the mid-1920s provided the power efficiency Wilson sought, although the cost of operating such machines still necessitated continued use of horses on many farms. Importantly, Wilson declared that he was not nearly as interested in informing producers on 'how to farm', but rather, how to do cost calculations. In a 1924 Montana State College bulletin, Wilson wrote:

> "This bulletin is not presented as a harvesting text book, for there are few if any recommendations of a direct nature. Rather it is an offering to the Montana dry land farmer of the various systems that some farmers have used in solving the problem of harvesting costs."[66]

[66] M.L. Wilson and H.E. Murdock *Reducing the Cost of Montana's Dry Land Wheat Harvest* Bulletin No.71 Montana Extension Service in Agriculture and Home Economics, June 1924.

FIGURE 3.4 "Steam Plowing Lethbridge, Alberta." Steam tractor pulling a mouldboard gang plough linked to a disc harrow. Photograph courtesy of Library and Archives Canada.

M.L. Wilson's scale and efficiency ideology had, in part, been shaped through his experience with the ambitious Fairway Farms Corporation, a large-scale demonstration project established by Wilson in northeastern Montana in 1924. Wilson saw the Fairway project as a natural continuation of the research underway in the Montana 'Triangle.'[67] Based on these projects, the policy solution Wilson and others eventually settled on was the AAA Soil Conservation and Domestic Allotment Plan.[68] While much of the government research effort had been related to various field trials, the resultant policies were fundamentally economic. Informed by his Montana research, Wilson concluded that an agreeable level of rural social condition was only achievable through efficiency, scale, and adequate household income. These conditions, in Wilson's opinion, could only be guaranteed through comprehensive national agricultural-economic policy.[69]

Wilson's views proved politically influential. At the end of the 1920s, Wilson became "the main architect, advocate, and organizer" of Roosevelt's New Deal agricultural policy, a

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[67] M. L. Wilson, "The Fairway Farms Project" *The Journal of Land & Public Utility Economics* 2 No. 2 (April, 1926: 156-171).

[68] Burlingame, "National Contributions."

[69] Mont H. Saunderson, "M.L. Wilson: A Man to Remember," *Montana: The Magazine of Western History* 34, no.4 (1984): 60-63. The article is a memoir of Saunderson, an employee of Wilson in 1920s Montana.

cornerstone of the 1932 Democrat election platform.[70] Many details of what would become the AAA had been outlined by Wilson as early as 1927 in Montana State University Extension Service publications. Wilson's Extension summaries were based on information and recommendations gathered from farmers, businessmen, stockmen and orchardists, invited to speak at district agricultural conferences held in Spring, 1927.[71] In 1933, Wilson left Montana to serve as chief economist in the new Agricultural Adjustment Administration, joining Chester Davis, most recently the Montana State Commissioner of Agriculture, now appointed AAA director.[72] Soon-after, Wilson was summoned to be Assistant and Under Secretary of Agriculture, his term lasting from 1934 to 1940.[73]

While the work of key individuals like M.L. Wilson proved highly influential in American policy development, federal agricultural policy in both countries was usually preceded by extensive research conducted by a mélange of university, government, and local people. A large number of the studies examined farm-levels economics. Often, this research was influenced by contemporary land management investigations. For example, one study conducted in Alberta attempted to relate the degree of farmer indebtedness to soil type and topography, concluding, perhaps unexpectedly, that level land equated to higher indebtedness than did rolling land![74] Another Alberta investigation sought to determine the value of life insurance carried by farmers, the researcher relating the volume and value of insurance to land factors such as soil type.[75] One of the author's less surprising findings was that operators of failing farms were more likely to lapse on their premium payments. A similar study conducted in Saskatchewan by the same researcher reached the same conclusions.[76]

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[70] Saunderson "M.L. Wilson." Illustrating the degree of M.L. Wilson's influence on the Roosevelt Administration, historian David E. Hamilton credited Wilson with coining the term "New Deal." For general discussions on Wilson and 1930s U.S. agricultural policy, see David E. Hamilton, *From New Day to New Deal: American Farm Policy from Hoover to Roosevelt, 1928-1933* (Chapel Hill: University of North Carolina Press, 1991); David M. Kennedy, *Freedom from Fear: The American People in Freedom and War, 1929-1945* (New York: Oxford University Press, 2005); and William D. Rowley, "M.L. Wilson: "Believer" in the Domestic Allotment," *Agricultural History* 43, no.2 (1969): 277-288.

[71] M.L. Wilson, *An Agricultural Program for Montana,* John Dexter, ed., (Bozeman: Montana State University Extension Service, Agriculture and Home Economics Bulletin, 1927).

[72] Burlingame,1 "National Contributions."

[73] Saunderson suggests that Wilson was offered the job of Agriculture Secretary, but instead promoted Henry Wallace for the job. Saunderson "M.L. Wilson."

[74] G.C Elliot, "Real Estate Indebtedness in Southwest Central Saskatchewan," *The Economic Annalist" 7*, no.1 (February, 1937): 8-14.

[75] W.J Hansen and J. Proskie, "Life Insurance Carried by farmers in the Lomond and Vulcan Districts, Alberta," *The Economic Annalist" 4*, no.5 (October, 1934): 76-79.

[76] W.J. Hansen, "Some Facts Concerning Life Insurance in South-western Saskatchewan," *The Economic Annalist" 4*, no.1 (February, 1936): 6-10.

In the spirit of Wilson's 1920s efficiency mantra, machinery field tests were forefront in government sponsored economic research. In a 1924 bulletin, M.L Wilson referred repeatedly to combine harvesters as cost saving machines, noting that by that year, 175 machines were in use in Montana. Wilson also referred to a "New Way Harvester," a prototype combine-like harvester, developed by a South Dakota farmer, but first tested in Manitoba and Saskatchewan in 1923.[77] By 1931, a full year into the severe economic depression, the Economics Branch of the Canadian Department of Agriculture tested recently-developed combine harvesters in southern Alberta and Saskatchewan.[78] At a time when few farmers were contemplating large capital outlays, government agencies hoped to convince them of the economic advantages of larger-scale mechanized production.

In one machinery cost-benefit analysis, Canadian Department of Agriculture Field Assistant E.G. Grest concluded that there was, local topography depending, solid evidence for the potential success of combine harvesters. Grest admitted, however, that a "complicating" factor in his enthusiastic efficiency analysis of combines in comparison to traditional binders, was the larger capital costs associated with purchase and depreciation of the new and complex machines, not to mention the added costs of the larger tractors needed to pull them.[79]

Combines were a good example of how the drivers of on-farm choice were more complex than simply the adopting of a new technology. For the first decade after settlement, a sizeable custom contract threshing industry quickly came to dominate harvesting.[80] The threshing gangs' efficiency allowed under-financed new farmers to harvest their small acreages at minimal cost, even after combines became available. As farmers brought more of their land into production, the appeal of combine ownership grew, especially as the machines were found more efficient in harvesting short stalk drylands wheat.[81]

Tellingly, on *most* farms, when factoring in the 1930s general wage depreciation, Grest's calculations showed that the added costs of purchasing and operating a combine did not offset the small labour savings gain at a time when labour was plentiful.[82] Not unexpectedly, the greater the farm acreage (farms between 900 to 1,340 acres fell into the largest of Grest's size categories), the greater the cost effectiveness of state-of-the-art machinery. Already by 1931, farms of up to two sections (1,280 acres) were common.

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[77] M.L.Wilson and H.E. Murdock, "Reducing the Cost of Montana's Dry Land Wheat Harvest," Agriculture and Home Economics Bulletin No.71. Montana State University Extension Service, 1924.

[78] E.G. Grest, "The Combine Harvester," *The Economic Annalist* 4 no.4 (December, 1934): 52-54.

[79] Ibid.

[80] Ernest B. Ingles, "The Custom Threshermen in Western Canada, 1890-1925," In *Building Beyond the Homestead*, edited by David C. Jones and Ian MacPherson (Calgary: University of Calgary Press, 1988): 135-162.

[81] Ibid.

[82] Ibid.

American agricultural economists, obsessed with scale production efficiencies, continued similar farm economic research activities in parallel.[83] Grest's enthusiasm for the efficiency mantra did not go unnoticed. In 1941, Grest moved to the United States, lured into the position of Chief of the Soil Conservation Service's Division of Land Management.[84]

By the 1930s, most northwestern plains farms were highly mechanized and had been virtually from first establishment.[85] The North American implement industry had matured by the early 1920s to the point at which machinery costs had come into the realm of possibility for individual farmers, rather than being the reserve of specialized land-breaking and threshing companies. Post First World War engineering advances had greatly improved the efficiency and capability of machines, especially of small engines, and 1920s Fordist[86] factory production efficiencies made tractors not only more affordable, but also more easily owner-maintained owing to the availability of standardized parts. High farm profitability and falling machinery costs allowed many 1920s farmers to substitute mechanization for increasingly expensive labour. At the same time, farm experts on both sides of the Canada-United States border strongly advocated the adoption and refinement of machine-intensive tillage.

The use of tractors in the 1920s and 1930s allowed for rapid, intensive, and efficient tillage. Although some historians later accused the pervasive use of tractors of contributing to the soil drifting prevalent during the 1930s drought,[87] machine tillage was an indisputable part of the farm economy equation. Research conducted in the 1920s reported widespread machinery deployment, along with locally derived innovations in its use. Each of the studies strongly advocated further efficiency-focussed technological development.[88]

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[83] The Montana State Extension Service had conducted numerous machinery studies in the 1920s. See Wilson and Murdock, "Reducing the Cost."

[84] Listed in the Directory of Organization and Field Activities of the Department of Agriculture: 1941 USDA Miscellaneous Publication Number 431, (Washington: United States Government Printing Office, March 1941).

[85] "Drouth and the Situation on Montana Farms: Report of a Survey of 2461 Farms, Fall of 1930," unpublished report, Montana State University, Merrill G. Burlingame Special Collections Accession 3, M. L. Wilson Collection, 1935-1960.

[86] Literally! Ford was a major farm equipment manufacturer from the 1920s onwards, and is credited with introducing the first mass-produced inexpensive tractor in 1917. See Norm Swinford, *A Century of Ford and New Holland Farm Equipment* (St. Joseph, Michigan: American Society of Agricultural and Biological Engineers, 2000).

[87] For example, Jones, "Canadian Prairie Dryland Disaster."

[88] Numerous examples are mentioned in reports and correspondence of the PFRA and SCS. See for example, Canada, Department of Agriculture, Prairie Farm Rehabilitation Administration, *Regional Soil Drifting Committee Meetings, 1935-1942*, PFRA Reports, vol.I-IV c.1940; and United States, Department of Agriculture Soil Conservation Service, "Analysis and Evaluation Survey: Power-Dutton Demonstration Project, Dutton, Montana." 11 Jan, 1941, RG114. Box 308A. Folder 101.6. "Bozeman."

The field research had also determined there were both 'good' and 'bad' tillage methods, whether machines were used or not.[89] Deep tillage, for example, advocated at the turn of the century in the drylands, even after onset of the 1920s droughts,[90] had been discouraged by field management experts by the 1930s.[91] The effects of tillage on soil erosion were certainly known, both from field observation and from experimental trials. However, at no time in the 1930s and 1940s, was the widespread use of tractors viewed as detrimental to land condition. Rather, tractors were perceived as being highly useful, efficient, and necessary tools for undertaking *modified* tillage. Land under threat of erosion could quickly be worked into emergency contours or furrows, even in winter.[92] Tractors also made longer-term tillage-dependent erosion management feasible. In places where soil drifting was not a serious threat, tractors allowed for efficient regular weed control to conserve scarce moisture and helped to ensure timely seeding and harvest.

By the 1930s, tractor-drawn tillage was ubiquitous. Despite popular contemporary accounts of 'Bennett Buggies' and 'Hoover Wagons' as examples of de-mechanization,[93] late-1930s aerial photographic evidence shows that tractor-drawn tillage had not only been nearly universally adopted in the northwestern plains, but had also been maintained throughout the drought. Across the three Canadian Prairie Provinces, over 50,000 tractors were in use in 1926. By 1931, there were 81,659. In 1936, at the height of the drought and depression, only *two* fewer tractors (81,657) were reported than five years earlier.[94] Of the thirty-six sample areas surveyed for this dissertation, only one, located near the Mennonite community of Wymark, Saskatchewan, showed lingering evidence of horse-drawn field equipment into the 1930s (Fig. 3.5).

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[89] Ibid.

[90] Jones, *Empire of Dust.*

[91] PFRA, SCS studies

[92] Ibid.

[93] Respectively named for the contemporary Canadian Prime Minister and United States President, each in turn blamed for the 1930s economic disaster, Bennett Buggies and Hoover Wagons were automobiles stripped of their engines, windows, and other heavy equipment, thus allowing them to be pulled by horses. Presumably, the prohibitive cost of fuel and repairs had forced owners to the supposedly cheaper alternative of 'real' horsepower. Possibly more political stunt than sweeping phenomenon, the number of such conversions is debatable, but it is clear from aerial photographs that de-mechanization did not extend to field traction.

[94] Robert, E. Ankli, H. Dan Helsberg, and John Herd Thompson, "The Adoption of the Gasoline Tractor in Western Canada," *Canadian Papers in Rural History* 2, 9-39.

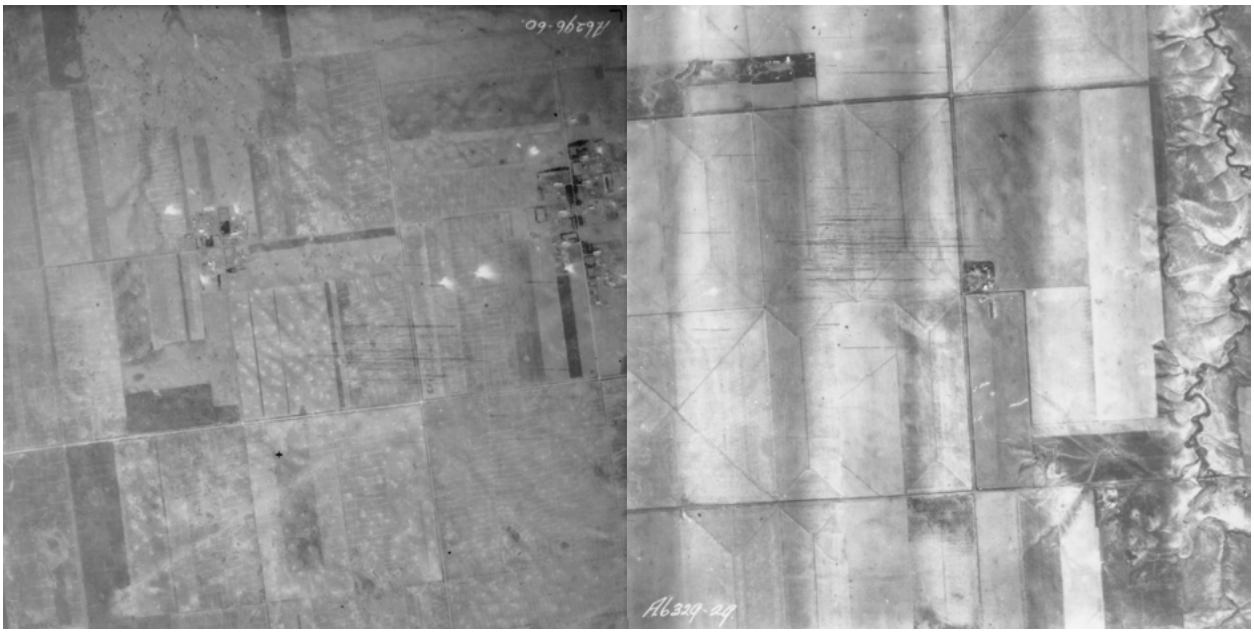

FIGURE 3.5 Horse drawn tillage near Wymark, Saskatchewan (left) (2 September, 1938) versus tractor pulled tillage (14 September, 1938) near Cabri, Saskatchewan. Distinctive patterns are clearly seen, with the tractor-worked fields being much more uniform and without telltale short furrow tracks. The Cabri image is at a larger scale. Images courtesy of Natural Resources Canada, National Air Photo Library.

Eventually, as if echoing the agricultural economists' farm-level scale obsession, United States federal agricultural intervention grew greatly in scope and in scale. Land reclamation projects were approached from engineering, economic, and *social* perspectives.[95] In northern Montana, the Bureau of Reclamation pursued ambitious and expensive engineering projects such as the Milk River Irrigation Project under the 'Pick-Sloan Plan.'[96] At the same time, the Resettlement Administration (RA) agency drew up plans for large-scale rural land use change and population resettlement, drafting schemes to forcibly create large, sustainable farms.[97] As insidious as these plans might appear to present-day observers, they were hardly radical for a region (Montana) that had already lost as many as four-fifths of its farms between 1917 and 1925.[98]

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[95] Ray P. Teele, *The Economics of Land Reclamation in the United States* (Chicago: A.W Shaw, 1927).

[96] United States, Department of the Interior, Bureau of Reclamation, "Pick Sloan Missouri Basin Program" http://www.usbr.gov/projects/Project.jsp?proj_Name=Pick+Sloan+Missouri+Basin+Program

[97] Resettlement Administration activity is outlined by H. H. Wooten in United States, Department of Agriculture, Economic Research Service *The Land Utilization Program, 1934-1964: Origin, Development, and Present Status* (Washington, 1964), Agriculture Economic Report No.85. Foreword by M.L. Wilson.

[98] Burlingame, "National Contributions."

In Montana, the RA identified large areas for "adjustment," not of farming practices, but of the generalized land use itself. One draft RA map divided northern Montana farmland into one of two categories. One was predominately grazing land, "…in which much of the land would be most economically operated as grazing commons and in which public ownership of a considerable part would facilitate stable use." The other category identified lands as "…farming areas in which most of the land will be economically used in individual operation but in which larger units are needed to provide adequate family living." (Fig. 3.6)[99]

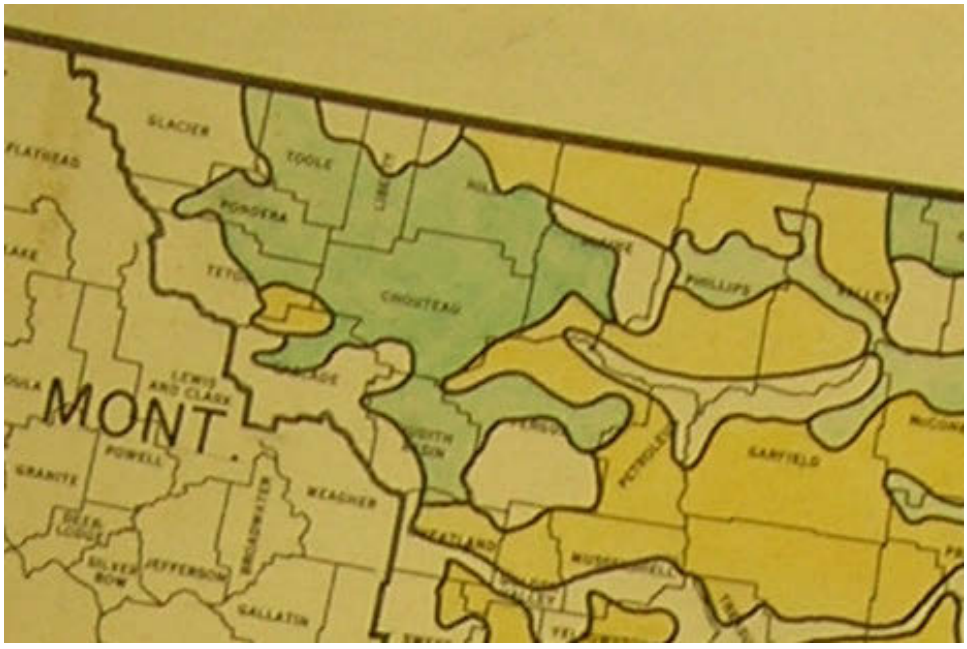

FIGURE 3.6 Draft Resettlement Administration 'Land Use Adjustment Areas' map, c.1936, northern Montana portion. Yellow areas were lands recommended to be used as grazing commons, possibly under public ownership and management. Green areas were recommended to be farmed and managed as individual units, but at much larger scale. Most of the study area (Chouteau, Liberty, and Hill counties) falls into either one of the two categories. Map excerpt from manuscript maps prepared under the direction of C.P. Gardell, Chief of the Cartographic Section, NARA Cartographic Records of the Soil Conservation Service. NARA, Maryland. RG114. Folder 20.

[99] United States, Resettlement Administration, Land Utilization Division, *Land Use Adjustment Areas of the Great Plains,* map, c.1936 Manuscript maps prepared under the direction of C.P. Gardell, Chief of the Cartographic Section, Resettlement Administration. Maps held by NARA Maryland, "Cartographic Records of the Soil Conservation Service," RG114, Folder 20.

A second RA 'adjustment' map divided the land into three categories, again referring to farm scale in the descriptions (Fig. 3.7):

1. "areas in which some of the crop farms should be replaced by stock ranches, grazing districts, forests, or other conservational use"
2. "areas in which 20% of the farms should be larger in order to provide adequate family living and permit soil maintenance"
3. "combination of 1 & 2"[100]

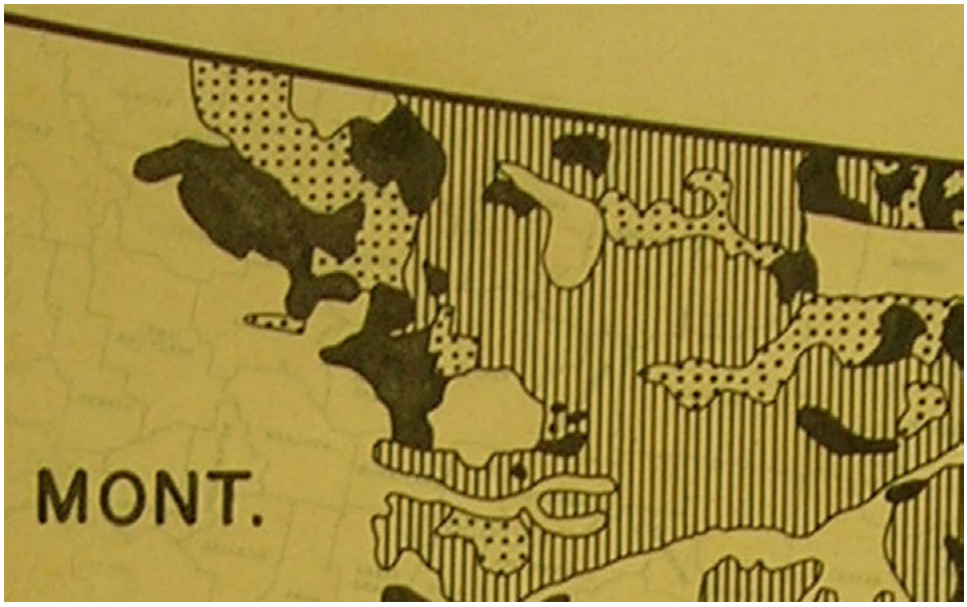

FIGURE 3.7 Draft Resettlement Administration 'Generalized Adjustment Areas' map, c.1935, northern Montana portion. Hatched areas were farmlands recommended to be replaced by ranches, grazing districts, forests, or other conservational use. Black areas represent farmland where 20% of farms should be larger. Dotted areas were to be a combination of the two adjustments. Map excerpt from NARA Cartographic Records of the Soil Conservation Service. NARA, Maryland. RG114.

A third map went as far as to identify where farmers removed under the RA schemes might be resettled. Seeking to reverse the original goals of western settlement, the RA proposed widespread farm-upscaling and public land management. The plan would force large numbers of people to give up their land. The RA proposed that they could move to new irrigated lands or resettle in wetter areas of the eastern Dakotas, Nebraska, Kansas, Oklahoma, and Texas (Fig. 3.8).

[100] United States, Resettlement Administration, *Generalized Adjustment Areas of the Great Plains States* map, c.1935

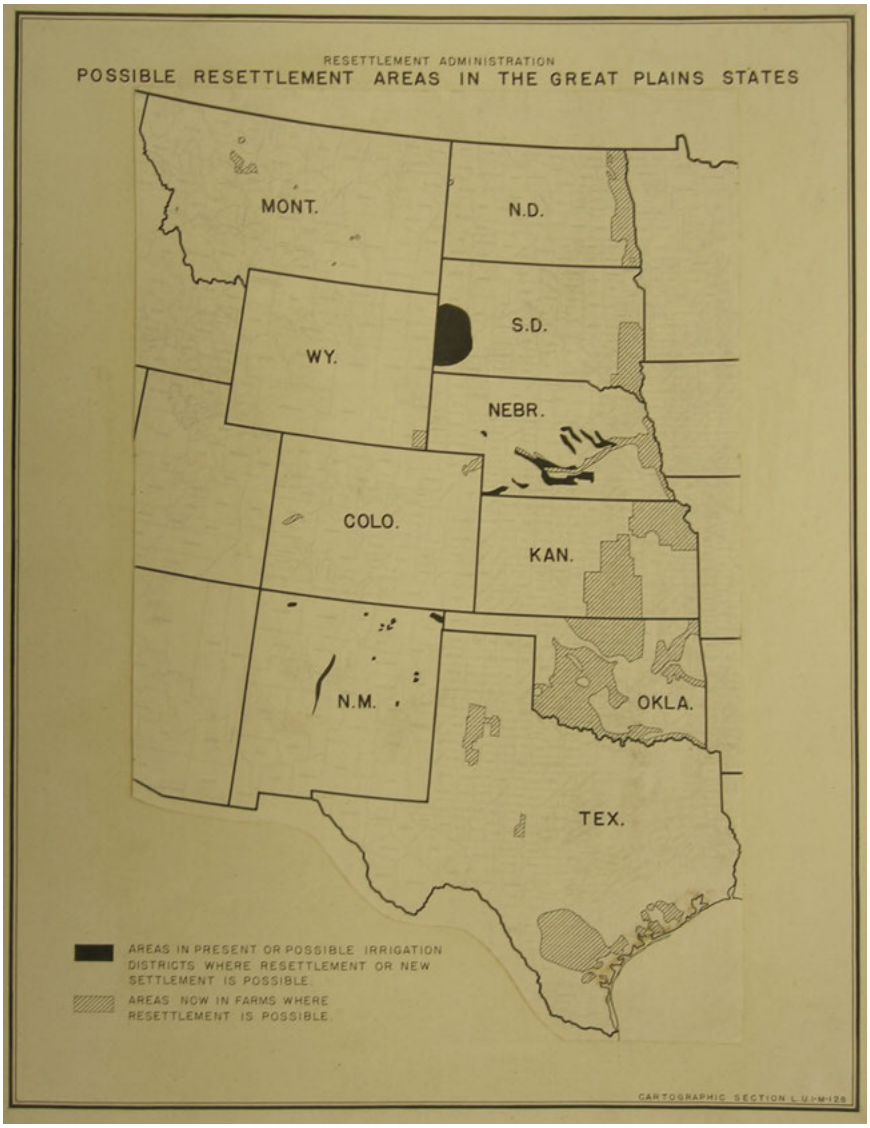

FIGURE 3.8 Draft Resettlement Administration map for population relocation. Map from manuscript maps prepared under the direction of C.P. Gardell, Chief of the Cartographic Section, NARA Cartographic Records of the Soil Conservation Service. NARA, Maryland. RG114. Folder 20.

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For the first three decades of the twentieth century, government policy was integral to the building of the northwestern plains agricultural landscape. Over ten to fifteen years, farm settlers had gained valuable experience in the western environment. Noting recurring farm-level economic and land management issues, federal economists and scientists undertook an impressive number of research studies in the 1920s and 1930s. Many of these investigations

relied on surveys, observations, and statistical summation, leading to strong-worded conclusions on the most 'efficient' ways to farm.

Some federal agents charged with solving agricultural problems engaged directly with farmers to create and share land management and agronomic knowledge. However, government agencies were not the sole instigators of agricultural adaptation. Producers, who had gained much detailed knowledge of the land and economy, worked with each other, both locally, in informal neighbour-to-neighbour fashion, as well as collectively, through organized cooperative bodies.[101] Farmer-managed grain marketing cooperatives emerged in the 1920s.[102] In the 1930s, retail cooperatives and credit unions became mainstays of the rural economic fabric.[103]

The locally managed cooperative retail associations allowed farmers to collectively purchase and market farm supplies, realizing savings by purchasing at wholesale prices. By the 1930s, provincial governments, perhaps realizing the limits of their ability to directly intervene in farm economics, were generally supportive of the concept of cooperative association, for commodity marketing and handling purposes, but also for supplies purchasing and credit financing. "...the existence of the co-operative is a safeguard for the farmer and has exercised a regulatory influence on the activities of outside agencies." opined one Canadian federal official.[104] In Canada, particularly in Saskatchewan, cooperative associations had long enjoyed government support at the provincial level, largely spurred by the passing of the provincial Co-operative Associations Act in 1914.[105] By 1935, nationwide, 757 associations

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[101] Ian MacPherson, "Missionaries of Rural Development: The Fieldman of the Saskatchewan Wheat Pool, 1925-1965," *Agricultural History* 60, no. 2 (1986): 73-96.

[102] Ian MacPherson, "The Co-operative Movement on the Prairies, 1900-1955." Canadian Historical Association Booklet (Ottawa, 1979).

[103] Brett Fairbairn, "A Century of Prairie and Saskatchewan Farm Cooperatives: Philosophy, Organization, and History," in Kenneth Murray Knuttila and Bob Stirling ed. *The Prairie Agrarian Movement Revisited* (Regina: Canadian Plains Research Centre), 2007.

[104] A.E. Richards, "Co-operative Values," *The Economic Annalist"* 10 no.1 (February, 1940: 8-9) A.E. Richards, a Canadian federal economist, strongly advocated for farmer-organized cooperative enterprise. See also A.E. Richards, *Agricultural Co-operation in Canada* Dominion of Canada, Department of Agriculture, Marketing Service, Economics Division, 1938.

[105] W.J. Hansen and W.F. Chown, "Co-operative Purchasing and Servicing Associations, Saskatchewan - 1914-38," *The Economic Annalist"* 10 no.2 (April, 1940: 25-28).

representing over 3,000 places of business had been incorporated in Canada under various provincial legislation.[106]

Cooperation in the northern transboundary plains became institutionalized at a level well beyond that of local retail associations. Referring to the national American Cooperative Extension Service, one historian noted that the basic structure for cooperation had been set at the local and state level long before federal creation of the Extension Service.[107] Before becoming enshrined in federal policy, cooperative agricultural development in Montana had relied heavily on the institutional authority of the Montana State College to facilitate local cooperative organization. Prior to his appointment as professor at the college, M.L Wilson greatly influenced local organization efforts through his role as 'County Agriculturalist.' Very soon after receiving his first public appointment in 1913, Wilson had assembled a "Better Farming Committee" to plan local programs in the Miles City area, where he had first homesteaded upon arrival from Iowa.[108] Wilson adamantly rejected the notion of the 'rugged individualist' as having any place in the northern plains, stating on one occasion, "We all had to pull together if we were to farm there successfully."[109]

If the cooperative movement in Montana had been spurred and organized by politically influential individuals such as M.L. Wilson, in other places, it had risen from more populist origins. The North Dakota-origin Nonpartisan League (NPL), founded in 1915, was perhaps the most well-known example of the growth of the populist and cooperative movement in the United States.[110] Similar populist political initiatives took hold in western Canada, represented on the national stage by the Cooperative Commonwealth Federation (CCF),[111] and provincially by the United Farmers of Alberta (UFA).[112]

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[106] Four acts applied in Alberta and Saskatchewan: "The Alberta Co-operative Marketing Associations Act," R.S.A, 1924; "The Alberta Co-operative Associations Act," R.S.A, 1922; "The Saskatchewan Co-operative Marketing Associations Act," R.S.S, 1930; and "The Saskatchewan Co-operative Associations Act," R.S.S, 1930. See A.E. Richards, "Acts of Incorporation of Co-operative Associations in Canada," *The Economic Annalist"* 5 no.1 (March, 1935: 3-8).

[107] Burlingame, "National Contributions."

[108] Ibid.

[109] Harry C. McDean, "M.L. Wilson and the Origins of Federal Farm Policy in the Great Plains, 1909-1914," *Montana: The Magazine of Western History* 34, no.4 (1984) 50-59.

[110] For an overview of how populism intersected across the western plains border, see Mildred A. Schwartz, "Cross-Border Ties Among Protest Movements: The Great Plains Connection," *Great Plains Quarterly* 17, no.2, (1997), 119-30.; and Robert C. McMath, "Populism in Two Countries: Agrarian Protest in the Great Plains and Prairie Provinces," Agricultural History 69, no.4 (1995), 516-546.

[111] McMath, "Populism in Two Countries."

[112] Schwartz, "Cross-Border Ties."; and William Kirby Rolph, *Henry Wise Wood of Alberta* (Toronto: University of Toronto Press, 1950).

The NPL and CCF were primarily political movements advocating state control of a variety of industries, including agriculture. The values of these political entities were not always compatible with either local cooperative land management ideals, nor the efficiency mantra of the cooperation-advocating agricultural economists. In neighbouring North Dakota, the prominence of the populist movement embodied in the NPL, and its strong political influence on the post-First World War state legislature, had directly resulted in the enacting of legislation leading to the creation of the state-controlled Bank of North Dakota, and the State Crop Insurance scheme.[113]

Upon reclaiming the state legislature in 1932, the NPL quickly passed Anti-Corporate Farming legislation.[114] The Act was clearly intended to prevent corporations from "engaging in the business of farming or ranching" thus retaining control of farms within individual families.[115] Notably, specific exemptions were provided within the Anti-Corporate Farming Act for "cooperative" corporate ownership. These provisions specified that an ownership group must among other conditions, have no fewer than seventy-five percent "actual" farmers, and the farming itself was to be carried out solely by the members. The anti-corporate cooperative legacy is still held with some reverence in North Dakota.[116]

Canadian rural agrarianist populism had also led to the formation of the 'elevator cooperatives' and 'wheat pools' in the early 1920s. Prairie farmers objecting to the control large commercial grain companies, railways, and financial institutions exerted over grain marketing and farm finance, created systems for cooperatively managed grain trade.[117] Large farmer-owned, government-backed grain elevator cooperatives, such as the United Grain Growers (UGG), and the Saskatchewan Co-op Elevators, formed.[118] The provincially organized 'wheat pools,' soon followed, providing farmers collective marketing power.[119] Both the Alberta Wheat Pool and the Saskatchewan Wheat Pool exerted considerable political and financial power, challenging the model of the earlier cooperatives from which they had

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[113] The North Dakota Democratic-Nonpartisan League Party "History" http://demnpl.com/about-us/the-north-dakota-democratic-npl/

[114] ND Cent. Code §§ 10-06.1 (2001).

[115] Ibid.

[116] N.D. Cent. Code 10-06.1. Many elements of the populist agenda still exist in North Dakota law.

[117] Allan Levine, "Open Market or 'Orderly Marketing': The Winnipeg Grain Exchange and the Wheat Pools, 1923 1929," *Agricultural History*, 61, no.2 (1987).

[118] MacPherson, "The Co-operative Movement." UFA political strength had led to the founding of the Alberta Farmers' Co-operative Elevator Company in 1913, merging with the Grain Growers' Grain Company Limited in 1917 to form the UGG.

[119] MacPherson, "The Co-operative Movement."

emerged. Both forms of organizations also became highly influential in farm management evolution.[120]

With the onset of widespread drought in the early 1930s, newly-elected progressive governments in both the United States and Canada moved swiftly to directly attack the 'farming problem.' In some cases, extraordinary outcomes were the result, as was the case of Alberta's Eastern Irrigation District, where a commercial enterprise was taken over by the provincial government, which, in turn, handed over land management control to farmers to be collectively governed. At the federal level, along with the enacting of a myriad of economic programs, specialized agencies, primarily Canada's Prairie Farm Rehabilitation Administration (PFRA) and the United States Soil Conservation Service (SCS), were given wide mandates to aggressively investigate and correct perceived land mismanagement. A.E. Palmer, Assistant Superintendent of the Lethbridge Experimental Station, summed up the 1930s paternalistic government attitude:

> "If a desert condition ever prevails it is due to inefficient leadership in our agricultural development or to the failure of farmers to accept such leadership. Undoubtedly, the greatest limitation in the control of soil drifting is the farmer himself."[121]

However, as the 1930s drought wore on, SCS and PFRA scientists, although generally following prevailing 'expert' farming doctrine, also began calling upon years of invaluable experience gained at northern experimental stations. More importantly, through deliberate interaction with innovative landowners, the federal experts had observed first hand many inventive local solutions to moisture, soils, erosion, and pest problems. Experience, observations, and discoveries, whether by government scientists, academics, or individual farmers, were shared, not only within a local area, but also across a wider region, including across the Canada-United States border.

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[120] MacPherson, "Missionaries of Rural Development."

[121] A.E. Palmer "Limitations of Soil Drifting control" Regional Soil Drifting Committee Meetings, 1935-1942, Prairie Farm Rehabilitation Administration Reports, vol.IV c.1940.

CHAPTER 4

THE LIMITS OF EXPANSION: CRISIS AND RESPONSE

Late in the afternoon of November 23, 1935, a telegram arrived at the Great Falls, Montana office of the US Department of Agriculture's Soil Conservation Service (SCS). The message was an invitation, addressed to Edward H. Aicher, Montana's Senior Soil Conservationist, to attend a hastily convened meeting of Canada's Dominion Prairie Farm Rehabilitation Committees.[1] Canadian agricultural authorities planned to meet in Regina, Saskatchewan in just over a week's time to propose solutions to the 'farm problem'. Asael E. Palmer, Assistant Superintendent of the Lethbridge Experimental Station in Alberta was the telegram's author. By inviting Aicher, Palmer was relaying the sentiments of his superior, Dr. E.S. Archibald, Director of the Dominion Experimental Farms Program. In a follow-up letter, posted that same afternoon, Palmer coaxed his American counterpart to attend, reminding Aicher that "our activities have much in common and that each of us can help the other." Furthermore, the Canadians would be "very pleased" to include Mr. Aicher and his associates in the discussions.[2] With barely a week to prepare for a winter trip to Regina, Aicher immediately and enthusiastically confirmed his willingness to attend.

Two days after Aicher received the telegram, Palmer's follow-up letter arrived formally inviting his counterpart to visit Canada and outlining a few draft details of the meeting program. Keeping in mind the short notice, Palmer ensured that the soil erosion and reclamation meetings, discussions he knew the Americans would be especially interested in, were set first on the agenda. Palmer apologized that as the program was only just being

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[1] A.E. Palmer to E.H. Aicher, telegram, 23 November, 1935, RG114, Box 386, Folder "Dominion Exp. Alberta," National Archives and Records Administration (NARA), Kansas City.

[2] Palmer to Aicher, 25 November, 1935, RG114, Box 386, Folder "Dominion Exp. Alberta."

drafted, beyond the reclamation meetings, he could only speculate as to the substance of the balance of the conference.

Palmer's letter also suggested travel arrangements. Aicher, and accompanying SCS staff, some of whom were still in the field, would assemble at Great Falls on the morning of December 1. They would embark by train to the Canadian border, transferring there to a bus on to Lethbridge. Arriving at Lethbridge at 3:45 pm, Aicher would then board a Canadian Pacific train, arriving in Regina at 9:20 the morning of December 2, just in time for the first meeting of the day.[3]

Aicher's decision to journey to Regina, although immediate, would not have been taken lightly. Travel at that time of year was always subject to the vagaries of western prairie weather. In 1935, with the northwestern plains in the depths of the 'dirty thirties' drought, the early winter weather was abnormally cold. Daily temperatures fell as much as 10°C below normal for much of November.[4] Cold as it was, prairie farmers would have more closely watched the precipitation. To their relief, snowfall during the last few months of 1935 was about average in southern Alberta and northern Montana, and well above normal in southern Saskatchewan.

Lamentably for all involved, on November 29, just as Palmer readied himself to leave Lethbridge for Regina, a telegram arrived from Aicher. Regretfully, Aicher informed his Canadian counterpart that Washington had refused the Great Falls group its authorization to attend the Regina meeting. In a follow-up letter, Aicher apologized to Palmer, claiming he did not know why authority was not forthcoming. He asked Palmer to forward copies of meeting transcripts to Great Falls, certain that the findings would greatly benefit American reclamation efforts.[5]

In actuality, Washington's reason for refusing to cooperate with the Great Falls office was both known, and all too familiar, to SCS administrators. Aicher had proceeded to make arrangements to meet with the Canadians without paying due consideration to the bureaucratic requirements of the United States federal government. Although Aicher, by telegram, notified his regional superior in Huron, South Dakota of his intention to go to Regina, he neglected to file a "written" request for "international" travel.[6] A few weeks later,

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[3] Palmer to Aicher 25 November, 1935.

[4] Daily weather data and long-term normals from Canada, Environment Canada, National Climate Data and Information Archive, "Canadian Daily Climate Data," CD-ROM.

[5] Aicher to Palmer, telegram, 29 November, 1935; and Aicher to Palmer, letter, 30 November, 1935, RG114, Box 386, Folder "Dominion Exp. Alberta."

[6] A.D. Ellison to Aicher, 2 December, 1935; and Aicher to Palmer, 11 Dec. 1935 , RG114, Box 386, Folder "Dominion Exp. Alberta."

Aicher sardonically told his friend in Lethbridge that, "It seems this [the written request] was very essential in order to go through the routine steps incidental to obtaining authority."

In his time at Great Falls, there were many instances of E.H. Aicher's immediate superiors gently admonishing him for not forwarding necessary paperwork, meeting Washington-imposed schedules, or adhering to set US Department of Agriculture (USDA) procedures.[7] Aicher, although greatly respected within the USDA as a scientist and continually promoted throughout his career, had little patience for the mundane officiousness that came with public service. His superiors, recognizing Aicher's skill as a project manager and scientist, were sympathetic. A.D. Ellison, Aicher's direct superior, upon forwarding Washington's refusal to Great Falls, apologized that "all in the regional office were "exceedingly sorry", knowing that "Much good could have been secured by having representatives from this region present."[8] Upon hearing of the cancellation, Palmer lamented to Aicher that "we are keenly disappointed...as we were quite anxious to get your point of view and experience."[9]

Why were the Canadian and American scientists, including the highly-ranked Archibald and Ellison, so disappointed at the circumstantial failure of an unsanctioned American contingent to attend a single hastily-planned *Canadian* meeting in winter-bound Saskatchewan? After all, each country had well-established, innovative, and highly organized agricultural research programs. In answer, it was simply that each of these men 'in the field' were resolutely committed to solving the 'soil problems' that, in their minds, were plaguing the northwestern plains. They believed strongly in both the agricultural potential of the region and in the inventiveness, adaptability, and perseverance of the region's farmers. Neither Palmer nor Aicher gave any thought to the international 'border' when it came to identifying agricultural problems or finding the scientific means to solving them. Each man saw the farmlands of southern Alberta, Saskatchewan, and the Montana Triangle as one region, with identical weather, soils, and production methods.

More importantly, federal agencies on both sides of the international divide pursued a shared goal of bettering farm success. What Aicher neglected in his impulsive agreement to meet Palmer and the Canadian contingent in Regina in November, 1935, was that his masters in Washington, although not insensitive to what could be learned outside the borders of the United States, were first and foremost concerned with a larger 'American' farm problem. In

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[7] Numerous examples can be found in SCS correspondence records archived in NARA Record Group 114. In one case, Aicher, belatedly responding to a much repeated request to send copies of a Montana State Soil Conservation Program report for forwarding on to Washington, testily noted in pencil at the bottom of the typed cover letter to the SCS Regional Director that "It would be just too bad if these get lost." Aicher to Clemmer, 29 October, 1936. See RG114, Box 2 general records Folder 102, NARA, Kansas City.

[8] Ellison to Aicher, 2 December, 1935, RG114, Box 386, Folder "Dominion Exp. Alberta."

[9] Palmer to Aicher, 9 December, 1935, RG114, Box 386, Folder "Dominion Exp. Alberta."

Washington's view, the northern Montana 'soil problem' was a relatively minor 'regional' issue, a secondary aggravation within the expansive scope of the national-scale New Deal agricultural program.[10]

In context, Aicher's failure to attend the Regina meeting had little consequence on either the SCS's efforts in Montana or on Canadian work in Alberta. Only a few months earlier, Lethbridge Experimental Station staff had escorted Aicher on a comprehensive tour of the station and several southern Alberta farms. Aicher had observed first-hand, the efforts of the Dominion Prairie Farm Rehabilitation Administration (PFRA) and area farmers, to co-develop locally applicable erosion control and reclamation programs. Upon returning to Great Falls from Alberta in early October, 1935, Aicher thanked the Lethbridge Station staff for their "splendid assistance."[11] Such exchanges had become commonplace. Aicher's early autumn visit to Alberta was a reciprocal of one made by Palmer to Montana that summer. Over the intervening and following months, Aicher and Palmer maintained an ongoing exchange of reports and photographs, each documenting the research activities of their respective organizations.

Not long after the SCS established operations in Montana in the early 1930s, the agency realized that Canada, conducting soil conservation research in Lethbridge since 1906, had learned much that could benefit comparative American efforts. Many of the Canadian researchers, Palmer included, originally had immigrated from the United States or had attended American universities. Upon taking research positions in Canada, they adapted existing American research to the western Canadian environment. The desire on the part of Palmer and Aicher to coordinate their research activities and share their findings was indicative of the concerted efforts of people on both sides of the border, farmers and government officials alike, to solve what they viewed as a common problem affecting a common people. There was a strong will on the part of the people 'on the ground', if perhaps not reflected as willingly by their superiors in Washington or Ottawa, to work together on the 'farm' problem.

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[10] The archived records of federal rehabilitation activities in Montana are not nearly as extensive as those documenting activity in the central Plains, Midwest, and South. Montana was generally thought to be 'holding its own' during the drought years. See United States, National Archives and Records Administration, *Preliminary Inventory of the Cartographic Records of the Soil Conservation Service*, by William J. Heynen. Preliminary Inventory 195, Washington, 1981.

[11] Aicher to H. Chester, October 12, 1935, RG114, Box 386, Folder "Dominion Exp. Alberta." Chester was supervisor of the Lethbridge Dominion Experimental Farm.

"An adequate knowledge of the past uses of land and organization of agriculture is the first step in re-adjusting the farming system of any region". This was the opening line by G.H. Craig, an Ottawa-based field assistant with Canada's Department of Agriculture, in his 1936 report on the ongoing effort to survey the most severely drought-affected farmland of southern Alberta.[12] By the 1920s, especially in Alberta, soil erosion was recognized as a serious threat to sustainable production.[13] By 1935, with most parts of southern Alberta barely twenty years removed from first sod-breaking, both federal and provincial governments decided to re-evaluate agricultural progress.[14] Four years into the 1930s drought, narratives of crop disaster, farm abandonment, and an increasing reliance on relief payouts, were reaching senior officials in Edmonton and Ottawa. The the tone of field assistant Craig's statement was not unusual. Government officials on both sides of the border quickly adopted a 'take-charge' New Deal language.

The paternalistic tone of many government agents, a holdover from expansionist language of the initial settlement period, came with the persistent 'expert' culture. Following a spate of western plains farming failures in the 1920s, many due to localized short-term drought, instructions on 'new' dryland farming approaches appeared in newspapers and farming magazines.[15] A veritable army of 'experts' from government agencies, universities, railways, grain companies, and farm organizations freely proffered wisdom on the 'correct' ways of farming the drylands.[16] That much of the expertise was based on research conducted in Eastern Canada, the Eastern and Mid-west United States, Britain, or Europe did not dissuade the publishing of innumerable advice pamphlets and article, many of which were of limited usefulness in the West.[17] In the latter half of the 1930s, the 'expert' approach was balanced by a recognition on the part of many PFRA and SCS in-the-field agents that farmers knew the land management and farm-level economic system situation better than anyone from outside possibly could. What remained outside producer control, however, was the unpredictability of world grain markets.

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[12] G.H. Craig, "Objectives in the Alberta Land Utilization Survey," *The Economic Annalist* 6, no.5 (October 1936): 70-71.

[13] Anderson, *History of Soil Erosion.*

[14] Anderson, *History of Soil Erosion;* and Jones *Empire of Dust.*

[15] Jones, *Empire of Dust.*

[16] See, for example, John Bracken, *Dry Farming in Western Canada* (Winnipeg: The Grain Growers Guide, 1921); E.R. Parsons, *Parsons on Dry Farming* (Aberdeen, SD: The Dakota Farmer, 1913); and Thomas Shaw. *Dry Land Farming* (St. Paul, MN: The Pioneer Company, 1911).

[17] Jones, *Empire of Dust.*

Throughout the summers of 1935 and 1936, the federal and provincial governments embarked on a cooperative series of land use and economic studies in southern Alberta.[18] The Alberta Land Utilization Survey was designed to comprehensively define the regions of the province experiencing the greatest agricultural losses. The principal survey objective was to first determine the causes of crop failure and then prescribe "adjustments" which would "fit best the conditions of the area".[19] According to Craig, "natural forces" were already instigating necessary changes in farm practice, but only after a prolonged period of poor farm and living conditions. In his summary report, Craig identified three main factors in the problems faced by southern Alberta farmers. The foremost cause was continual and wide fluctuation in commodity prices. The second factor was producer "unfamiliarity" with the characteristics of the Alberta environment and its agricultural hazards, specifically soil, frost, hail, wind erosion, and insect pests. Craig's third factor was "farm management," more specifically changes in farming techniques and practices brought about by the introduction of new machinery and credit facilities.[20]

The author of the Alberta report believed that over-specialization of production, specifically of wheat and livestock, was to blame for the 'farm problem.' This argument was made not on a land systems basis, but rather on the simple fact that those two products were the ones that had been most prone to "violent" price variability.[21] The economic argument, which was to be repeated for decades afterwards,[22] was that *abnormally* high wheat prices had encouraged expansion into areas where only *consistently* high prices could ensure profitability. Average prices would never provide a sustainable return, and low prices would be catastrophic.

The Alberta Survey investigators had recognized that a sizable amount of money had been put into infrastructure, machinery, and land improvements in the decade preceding the drought. Most of these improvements and purchases had been made with large credit undertakings. Fixed interest terms and a rapid depreciation of machinery values were not being met by the scale increases that these investments had been intended to produce.[23] Importantly, Craig considered the commodity price fluctuation to be the key factor. The lack of rain only compounded an already-untenable situation.

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[18] The agencies involved included the PFRA, Dominion Department of Agriculture Economics Branch, Alberta Department of Agriculture, and the University of Alberta. See Craig, "Objectives in the Alberta Land Utilization Survey."

[19] Craig, "Objectives" 70.

[20] Craig, "Objectives," 71.

[21] Ibid.

[22] Jones, *Empire of Dust.*

[23] Craig, "Objectives."

In pursuing economic policies that would solve the social crisis occurring on the rural northern plains in the 1930s, governments were ultimately beholden to commodity prices that were largely beyond their direct control. The twentieth century agricultural market was very much a global one. In the United States at least, commodity price 'booms', particularly that occurring as a result of the First World War, had invariably been followed by price depressions.

TABLE 4.1 General economic downturn periods and the effects on the US agricultural economy. After Gardner, 2002.

Period of Downturn	Annual percentage change in farm prices	Annual percentage change in net farm income
1914-15	-1.2	7.4
1921	-34.4	-52
1924	0	-4.2
1930-33	-10.4	-12.8
1938	-19.8	-26.4
1946-47	3.8	0.3
1949	-12.7	-27.2
1954	-4.4	-6.1
1958	3.9	15.8
1974-75	-7	-20.8
1980	-4.5	-46.1
1982	-11.5	-16.5
1991	-7.5	-16.9

The prolonged period of low prices in the 1930s had persuaded many agricultural economists that a solution was required to address producer vulnerability to what was euphemistically termed the "business cycle".[24] One economic historian noted that although food demands tended to be less "cyclically sensitive" than other products, agricultural demand and supply were also less responsive to market price and, often, particularly during general

[24] Bruce L. Gardner, *American Agriculture in the Twentieth Century: How It Flourished and What It Cost* (Cambridge: Harvard University Press, 2002).

recessions, farm prices and, therefore, incomes declined at a higher rate than did the overall gross domestic product.[25]

In the United States, the notion of a national policy for price controls gained favour. Farmers advocated an 'Equality for Agriculture' plan,[26] a goal almost realized with the 1924-1928 McNary–Haugen Farm Relief Bill. The bill, prodded by economist George Peek following earlier efforts of Secretary of Agriculture Henry Cantwell Wallace, father of New Deal Secretary of Agriculture Henry Agard Wallace, was essentially a subsidy where the government would buy wheat from producers at an artificial rate.[27] The bill was introduced in Congress five times, vetoed by the president on three occasions, and ultimately failed, largely due to opposition from business groups.[28]

Only with the passing of the Agricultural Adjustment Act (AAA) in 1933, did producers receive a comprehensive set of agro-economic policies entrenched in law.[29] The intent of the AAA was price control through reduced production, which would lead to increased farm purchasing power, providing a measure of protection from economic variability.[30] The AAA was part of a suite of legislation which included the Commodity Credit Corporation, intended to administer commodity loan programs, mostly on products not grown in the northern plains. The Soil Conservation and Domestic Allotment Act, enacted in 1936 when the Supreme Court declared the AAA unconstitutional, provided specific incentives for soil conservation, primarily incentives for seeded depleted fields to legumes and grasses.[31] The Allotment Act was bolstered in 1938 by a revised AAA which made participation mandatory for certain crops including wheat, with rye and barley falling under permissive support.

Ultimately, a central objective of the AAA, increased purchasing power, proved counter to the goal of reduced production. The income support allowed farmers to purchase the equipment needed to increase efficiency, as had been advocated by 1920s farm experts. In turn, increased efficiency resulted in increased production, offsetting the AAA acreage reduction. In Montana, where farms had been up-scaling since the 1920s, with large

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[25] Gardner, *American Agriculture,* 133.

[26] John Philip Gleason, "The Attitude of the Business Community Toward Agriculture During the McNary–Haugen Period," *Agricultural History* 32, no.2 (1958): 127-138.

[27] Ibid.

[28] Ibid.

[29] "An Act to relieve the existing national economic emergency by increasing agricultural purchasing power, to raise revenue for extraordinary expenses incurred by reason of such emergency, to provide emergency relief with respect to agricultural indebtedness, to provide for the orderly liquidation of joint-stock land banks, and for other purposes," 73rd Cong. (May 12, 1933), PL 73-10.

[30] Frank J. House, *Agricultural Programs, Terms and Laws* (New York: Nova Science Publishers, 2006).

[31] House, *Agricultural Programs.*

investments made in machinery and field efficiency, the effects of the New Deal policies are debatable.

From 1928 to 1932, annual harvested wheat acreage in Montana had averaged 3.9 million acres. In 1933, it was still 3 million acres, dropping to 2.7 million acres the following year, but rebounding to 3.4 million acres in 1935, or 87% of the pre-drought average. By 1938, wheat acreage in Montana *exceeded* the pre-drought average by 15%, rising to 4.5 million total acres. Total production that had averaged 45.1 million bushels from 1928 to 1932, fell by nearly half to 26.5 in 1933, rising back to 35 million bushels by 1935, or 78% of the pre-drought average.[32] By 1938, the year the new AAA was enacted, wheat production was up to 72.3 million bushels, two-thirds *more* than the 1928-32 average. Hay seeded acreage remained within 98% of the pre-drought average of 1.5 million acres through 1935, although total tonnage production was generally 75% of the 1928-32 average. By 1938, after the enacting of the conservation-minded Allotment Plan, seeded hay acreage *decreased* by 250,000 acres in Montana.

Canadian officials, however, took note of the compensatory aspects of Wilson's Allotment Act, with one describing it as "by far the most important activity" of the AAA.[33] The Act made provision for two types of payments: Class I (compensation for loss of potential return on crops converted to soil conserving crops); and Class II (compensation to offset the costs associated with growing soil conserving crops - largely legumes and perennial grasses).[34] Canada, rather than enacting a Canadianized version of the Allotment Plan, instead passed the Farmers' Creditors Arrangement Act in 1934. This act provided a mechanism whereby farmers could avoid bankruptcy by modifying their credit terms.[35] In 1935, the original 1927 Canadian Farm Loan Act was radically amended in an attempt to address a growing farm credit crisis.[36] Crucially, the amendment eliminated the duality of legislation that had existed between Canada and the provinces, and placed control entirely with the Canadian Farm Loan Board.[37] Whereas the United States had pursued production control as the main price driver, Canada re-established the Canadian Wheat Board (CWB) in 1935 to control prices though

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[32] United States, Department of Agriculture, *Agricultural Statistics* (Washington, 1936; 1939).

[33] "Notes." The Economic Annalist 4, no.5. October, 1934: 80.

[34] "Soil Conservation and Domestic Allotment Act," Pub.L. 74–461, February 29, 1936.

[35] "Farm Credit Legislation in Canada, 1934" *The Economic Annalist* 4 no.4 (December, 1934: 43-45).

[36] "Amendments to the Canadian Farm Loan Act, 1935" *The Economic Annalist* 5 no.1 (March, 1935: 28-30).

[37] "Amendments to the Canadian Farm Loan Act, 1935"

mandatory collective marketing.[38] The 'single-desk' approach, which provided prairie farmers with a large collective marketing power, was both successful in offsetting global price influences and, more importantly, was highly favoured by producers who received a government-guaranteed upfront percentage. An attempt by Canada to dissolve the CWB in 1939 quickly met with strenuous farmer opposition and the government almost immediately capitulated.[39]

Similar changes had also occurred in the United States, as the 1923 Intermediate Credit Act was followed by the passing of several replacement credit acts in 1933, including the Farm Credit Administration, the Emergency Farm Mortgage Act, and the Farm Credit Act.[40] Little modified, United States federal credit policies have continued to benefit American producers, particularly larger ones. The legacy of the political embrace of interventionist price and production controls and incentives, and the resultant special consideration given by the United States government in the 1930s to the place of agricultural production within the market economy, greatly influenced American farm policy the next forty years.[41] The so-called "get big or get out" policies of Nixon Administration Agricultural Secretary Earl Butz, designed to buffer the agricultural sector from 1970s market fluctuation, were really just latter-day descendants of M.L. Wilson's New Deal 'cost calculations.'

By the 1940s, the United States production control programs became irrelevant with the large rise in commodity prices due to the outbreak of war.[42] With the drought ended, farmers had little incentive to suppress production. In Canada, where production controls were never pursued, at least in a direct way, a good wheat crop in 1938, and record large crop returns in 1939 left Canada with a large grain surplus at the outbreak of war.[43] As easy as it might be to make a simplistic connection between rising commodity demand and production, and the end of the pre-war 'farm crisis,' it is also worth remembering that at the outbreak of the Second World War, the large returns of 1939 were vastly insufficient to offset the very large losses sustained through the preceding depression and drought years or to cover

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[38] G.E. Britnell and V.C. Fowke, *Canadian Agriculture in War and Peace 1935-50* (Stanford: Stanford University Press 1962). The CWB was the successor to an intermittent set of programs first enacted during the First World War, which provided collective marketing mainly for wheat, but, at times, for other grains as well.

[39] Britnell and Fowke, *Canadian Agriculture.*

[40] House, *Agricultural Programs.*

[41] Gardner, *American Agriculture.*

[42] Cochrane, *The Development of American Agriculture.*

[43] Britnell and Fowke, *Canadian Agriculture.*

accumulated debts. Seven years of accumulated neglect of land and machinery alike would require time for rehabilitation.[44] Social capital was in no better condition.[45]

While some government economists had approached the crisis from an price-cost perspective, other experts held firm in their belief that poor land management, within a prevailing economic context, was the main cause of farm failure. A divide on the merits of mixed-farming persisted. Some economists such as Field Assistant Craig, and others from the old Ontario agricultural tradition, including J.G. Gardiner, premier of Saskatchewan and later federal agriculture minister, were steadfast in their belief that diversification was the answer.[46] Near Vulcan, fifty kilometres west of Lomond, some farmers eventually succumbed to a continual barrage of publicity for the presumed benefits of mixed farming.[47] Public pressure to diversify was strong. Often, farmers who had themselves long ago abandoned mixed farming remained vigorous proponents of it.

Despite pronouncements on over-specialization of production, at no time through the 1930s did the soil scientists advocate a move to mixed farming. One prominent professor, J.H. Ellis of the University of Manitoba, laid blame firmly at the feet of the producers. To Ellis, a shift to mixed farming was not the answer, either for land-ecological reasons, or for any potential economic benefits. Mixed farming was "some mystic ritual," Ellis proclaimed. It was "not the type of farming, but the type of soil management that [was] important."[48] SCS staff were more pragmatic in their opposition to mixed farming. "A mixed type of farm economy which would include some livestock does not seem practical or feasible because of the water situation and availability of markets for produce," noted a 1941 SCS analysis and evaluation survey.[49] Vulcan farmers faced the same limitations to mixed farming as their Montana counterparts: lack of market, limited stock water, disease, and bad weather. To attempt mixed farming at a commercial scale was to virtually guarantee a loss. According to one historian,

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[44] Britnell and Fowke, *Canadian Agriculture.*

[45] Ibid.

[46] Gregory P. Marchildon, "The Prairie Farm Rehabilitation Administration: Climate Crisis and Federal–Provincial Relations during the Great Depression," *Canadian Historical Review* 90, no.2, (2009): 275-301.

[47] Paul Voisey, "A Mix-Up Over Mixed Farming: The Curious History of the Agricultural Diversification Movement in a Single Crop Area of Southern Alberta," in *Building Beyond the Homestead* by David C. Jones and Ian MacPherson (Calgary: University ofCalgary Press, 1988): 179-205. Voisey claims anyone anyone who dared question the value of mixed farming were subject to savage rebuttal.

[48] J.H. Ellis, *The Land for Thine Inheritance* pamphlet, Department of Soils, Winnipeg: University of Manitoba, 1947, p.40.

[49] United States, Department of Agriculture, Soil Conservation Service, "Analysis and Evaluation Survey: Power-Dutton Demonstration Project, Dutton, Montana," unpublished report, 11 Jan, 1941, RG114 Box 308A Folder 101.6 'Bozeman.'

"Vulcan could supply Liverpool with wheat more efficiently than it could deliver mixed farming products to Calgary."[50]

The report of the 1930s Alberta Surveys were revealing in their assessment of producer approaches to soils management. The initial Alberta farm settlers had been attracted to the lightest sandy soils, those most porous, most erodible, and therefore least bio-productive, presumably because they had found them easier to work and develop.[51] The uniformity of land dispersal under the Dominion Lands Act had the effect of giving all lands, fair or poor, the same dollar value at the time of first settlement. Initial farm production, if not outstanding, was at least profitable in the early years owing to relatively high prices. Because lands that actually had less productive capacity had been settled first, by 1930, more development investment had been made. Accordingly, up until the 1930s, when poor land was sold, its dollar value tended to be relatively high. As production declined due to unfavourable weather conditions, sale values plummeted. Not unexpectedly, lands with heavier soils, initially rejected due to the difficulty of working them, were now the most valued for their resistance to erosion.[52]

Intently following the reports of the experts, the Canadian and Alberta governments set out to determine geographical patterns of land production and also sought to evaluate social and political costs. A set of highly detailed surveys, initiated in the Vulcan-Lomond area in 1935, collected data on taxation, local government services, and municipal relief.[53] The following year, surveying continued in the Hanna district north of the Red Deer River, an area which had been ravaged by drought since 1928.[54] Over the following three years, maps were produced charting assessed farm value, farm residency and ownership, the condition of farm buildings, as well as the state of cultivation, its overall suitability for agriculture, as well as providing basic soils and topographical information.[55]

One of the maps produced for the Alberta surveys, a 1936 dwelling analysis produced by W.N. Watson, an Economics Branch Agricultural Assistant, revealed the sorry history of farming in southern portion of the province.[56] Documenting 126 abandoned farms in the

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[50] Voisey, "Mix-Up Over Mixed Farming," 188.

[51] Craig, "Objectives."

[52] Craig, "Objectives."

[53] Ibid.

[54] Ibid.

[55] Canada, Department of Agriculture, Marketing Service, Economics Division and University of Alberta, Department of Political Economy, "Land Use Classification in the Special Areas of Alberta and in Rosenheim and Acadia Valley by A. Stewart and W.D. Porter. pub no.731, technical bulletin no.39 (Ottawa, 1942).

[56] Ibid.

Lomond area, Watson noted that similar to what had taken place in other dry areas of western Canada,[57] the population of the Lomond district had been a "non-permanent one since the very beginning of settlement."[58] In Watson's assessment, many settlers initially unfamiliar with the local environmental risks, had developed, through trial and error, dry farming techniques that suited the local environment. Nevertheless, a large number of abandonments still occurred. Successive settlers assuming abandoned land were often no more successful; "largely through lack of knowledge of the problems," Watson maintained.[59] Seeking to eliminate factors unrelated to farm management when drawing his conclusions, Watson noted that over three-quarters of farms were within ten miles of a grain shipping point, a recognized limit to wheat farming expansion, and that roads were deemed to be "reasonably good." Availability of schools was not a factor, although Watson did admit that there were large distances between neighbours.[60]

Contemporary maps produced from the survey data starkly illustrated the abandonment history. The maps (Fig. 4.1) illustrated five categories of farm buildings: Occupied-Good, Occupied-Fair, Occupied-Poor, Unoccupied-Usable, and Unoccupied-Useless.[61] Watson antipathetically described the Lomand area housing stock: "Forty-five dwellings were left on these farms, only twenty-one of which were worthy of the name of house."[62] Of those that had been removed, "shacks" Watson had called them, most had been turned into granaries or sheds or had been moved elsewhere to be reused as dwellings. "Only three windbreaks were present, indicating that almost no attempt had ever been made to make a permanent home," was Watson's description of one farm,[63] evidently ignoring the difficulty in establishing trees on a treeless plain at a time when moisture was in short supply. Only twenty-seven of the 126 had a water supply "which in general was poor, both as to quantity and quality."[64]

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[57] Similar studies conducted on seven rural municipalities in southern Saskatchewan. See C.C. Spence, "Land Utilization in Southwest Central Saskatchewan," *The Economic Annalist" 4*, no.6 (1934): 84-88.

[58] Watson, "Study of 126 Abandoned Farms."

[59] Ibid., 38.

[60] Ibid., 40.

[61] Canada, "Land Use Classification."

[62] Watson, "Study of 126 Abandoned Farms," 42.

[63] Ibid.

[64] Ibid.

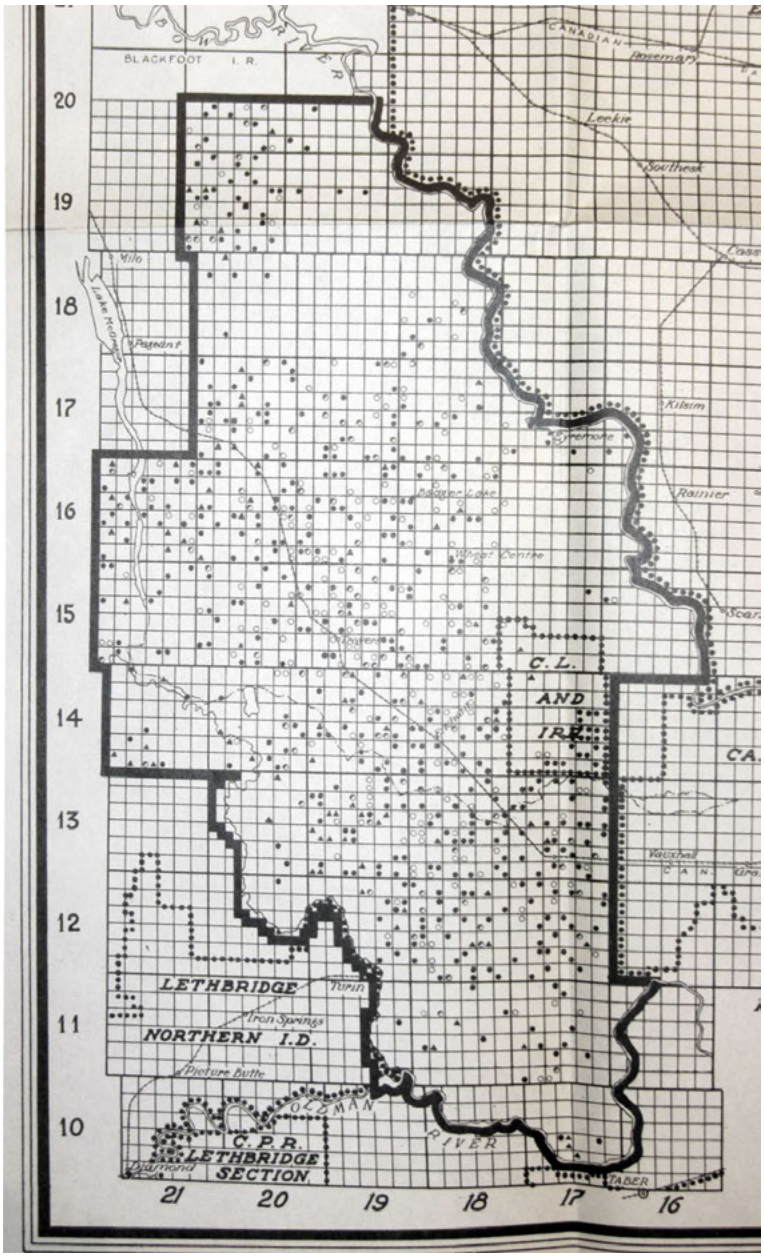

FIGURE 4.1 Alberta Survey "Farm Buildings" map. The maps were based on 1934-38 surveys, but were released after the passing of the amended Special Areas Act in 1938. The example shown, covering the Lomond area, is from a farm building condition map. Dark squares are Occupied-Good. Dark triangles are Occupied-Fair. Dark circles are Occupied-Poor. Half-open circles are Abandoned-Useable. Open circles are Abandoned-Unusable. Map from Canada, *Land Use Classification in the Special Areas of Alberta and in Rosenheim and Acadia Valley.*

When questioned as to why they had left their farms, Watson cited three-fifths of the farmers having responded that "drought and soil drifting" were the reasons. Emphasizing the environmental-land management cause, Watson noted that farms situated on sandy or clay loam soils showed the highest rates of abandonment. Only eight percent of respondents had

admitted that abandonment had been due to personal reasons such as death or illness. Within the Alberta provincial government, the economic argument prevailed.[65] Echoing the economist Craig, Watson concluded:

> "Exceptional drought, therefore, would not appear to be the chief reason for abandonment, but rather the inability to make farming pay in a normally dry climate. As long as wheat was being grown on virgin soil obtained for homestead fees only, under conditions of better than average rainfall and sold at high prices, farmers were in most cases successful."[66]

Watson ended his report with a warning. In his estimation, few of the abandoned farms would ever be capable of supporting wheat. However, because wheat growers had been successful in the past, during the "exceptional" years, it was inevitable that new grain producers eventually would be once again attracted to the area should unusually good conditions return. To prepare for this eventuality Watson insisted "some permanent policy of management of these abandoned lands would seem advisable."[67]

In 1938, Alberta passed the amended Special Areas Act. The Alberta Special Areas designated several municipal districts totalling 3.2 million hectares throughout much of east-central Alberta. This extraordinarily interventionist action, reminiscent of the United States Resettlement Administration plans, deemed a large swath of the province

> "…by reason of insufficient rainfall, inferior quality of soil and other causes, cannot by the use of ordinary methods of agriculture be made to yield over a period of years produce in sufficient amount to provide the persons farming such land with a means of livelihood."[68]

Municipal governments were dissolved and local affairs, including land administration, were taken over by the Province.[69] The Province, seeking to "…promote and encourage the development and conservation of all natural resources common…" to the designated lands so that "…greater stability of income may be enjoyed by those settles remaining…" secured for

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[65] "Notes," *The Economic Annalist* 4, no.5 (1934): 80.

[66] Watson, "Study of 126 Abandoned Farms," 43.

[67] Ibid., 44.

[68] "Special Areas Act," S.A, 1937; R.S.A, 1938.

[69] "Special Areas Act."

the Crown, sweeping authority over almost all aspects of local land management and governance.[70]

* * *

For some northwest plains producers, the final outcome of the 1930s drought experience was to abandon farming altogether. The complex settlement history of southern Alberta demonstrates that farm ownership spans were often very short from the time of first settlement.[71] For those who had persisted through to the 1930s, poor economic conditions forced a further number to eventually give up farming altogether or to try anew in other areas.[72] For farmers remaining on the land, scale-based production efficiencies and possession of a liquid capital cushion, allowed farming to continue. Postwar farmers, many working significantly enlarged farms, had to decide how to best to manage the land in an economically sustainable way. Experience gained in the 1920s and 1930s starkly revealed land areas not suited to crop tillage. Many of these poor lands had been mapped as such *prior* to settlement, but had been farmed anyway. Furthermore, in some districts, severe erosion had destroyed the growing capacity of substantial cropland acreage and landowners had little choice but to abandon cultivation and reseed fields to grass. In eastern Alberta, land abandonment had been governmentally-imposed upon a large number of landowners through the Special Areas Act.[73]

Particularly in Alberta, abandonment had preceded the worst of the 1930s drought. For one sample site located near the site of the no-longer-existing town of Alderson, Alberta (Fig. 4.2), 1938 aerial photos show only the faintest hint of previous cultivation, despite the area having a well-documented settlement record.[74] By 1955, the land had been completely reverted to natural grass, with only the centre section showing signs of pasture management. Near Badger, Alberta, located within the 1930s Lomond survey and very near the Sweetman homesteads, eight fields totalling 699 acres of previously cultivated land within the nine-square mile sample area, had been reverted to grass by 1938 (Fig. 4.3). Between 1938 and 1962, farmers attempted to rework a portion of the reverted land and, even broke 549 acres of surrounding never-cropped land; however, these fields were once again out of production by

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[70] For discussion of the Special Areas Act, see Gregory P. Marchildon, "Institutional Adaptation to Drought and the Special Areas of Alberta, 1909-1939," *Prairie Forum* 32, no.2 (2007): 251-272.

[71] Described in Chapter 2.

[72] A number of works reference farm abandonment and resettlement. For example, see Jones, *Empire of Dust.; or* Merle Massie, *Forest Prairie Edge: Place History in Saskatchewan* (Winnipeg: University of Manitoba Press).

[73] Special Areas Act, 1938.

[74] Jones, *Empire of Dust.*

1979. Aerial photos of other sample areas, throughout the study region, but particularly in Alberta, variously show evidence of permanent field abandonment, or reversion to grass.

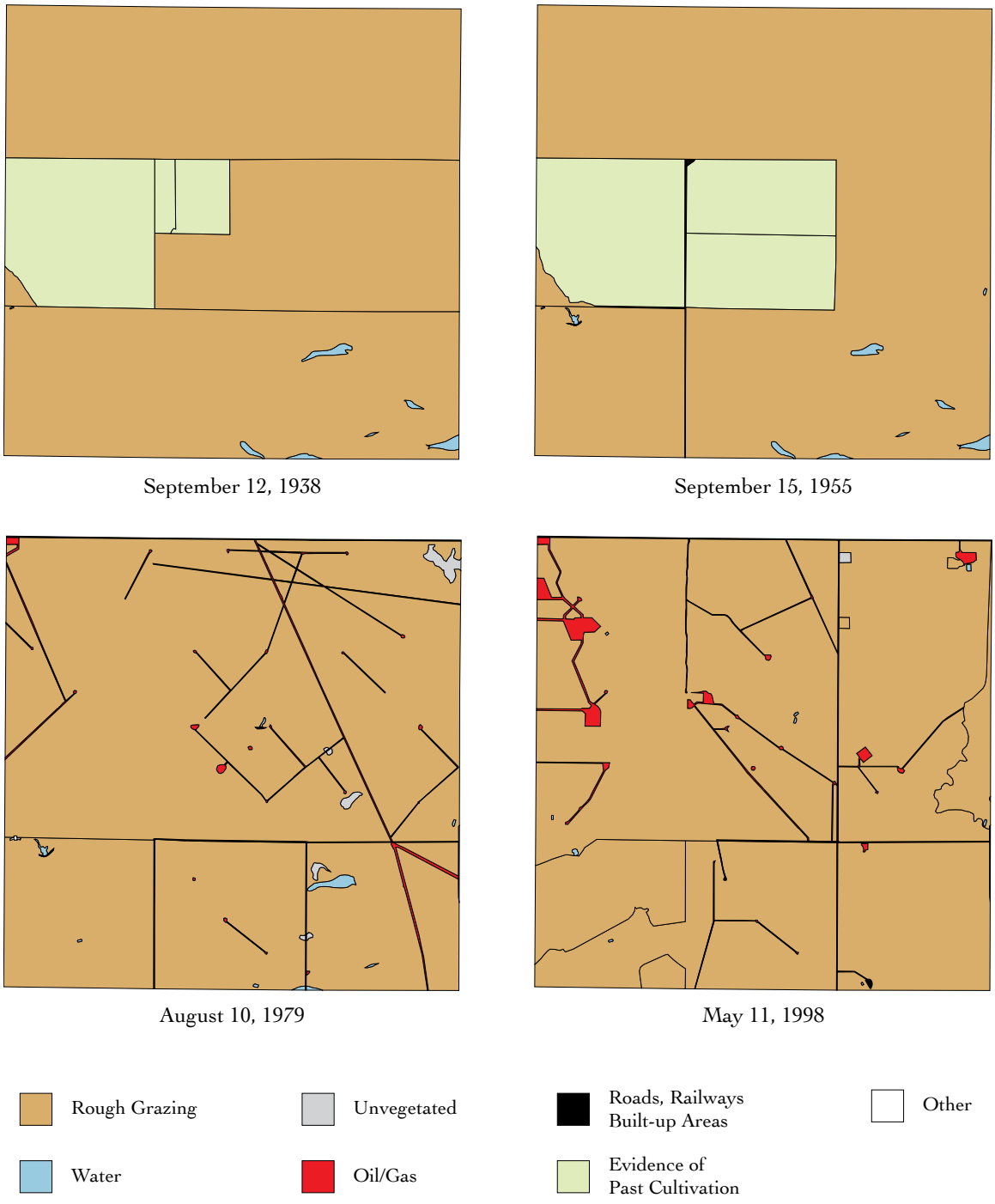

FIGURE 4.2 Alderson, Alberta study block land use, 1938 to 1998.

FIGURE 4.3 Badger, Alberta study block land use, 1938 to 1999.

As Canadian researchers meticulously searched to identify the economic and land management causes of farm failure in Alberta, SCS staff in Montana struggled with a difficult mandate. They had been charged with not only providing answers to the soil loss problem to local farmers, but they also had to successfully demonstrate validity of their solutions on a number of 'cooperative' project farms. Unsatisfied with the limited American information at

their disposal, the Montana people became acutely interested in soil loss control prescriptions that had been incorporated into the new Canadian Prairie Farm Rehabilitation Act.[75]

In October, 1935, Senior Soil Conservationist E.H. Aicher, having recently toured Lethbridge in the late summer, reported to H.J. Clemmer, regional director of the Soil Conservation Service, that he and A.E. Palmer of the Lethbridge station had enjoyed a very productive visit with the latter sharing his station's findings on conservation methods and crop use in southern Alberta.[76] Aicher was pleased to note that his Canadian contact, Dr W.H. Fairfield, superintendent of Lethbridge since its establishment in 1903, was a contemporary of his from Colorado State College.[77] A conference was planned where Montana, Alberta, and Saskatchewan people would meet to collectively discuss wind erosion control.

For many decades preceding the 1930s, agricultural experts had advocated tilled summerfallowing, where a field is worked, but left unseeded, as a dryland moisture conservation practice. Some contemporary, and many later, commenters had derided tilled summerfallow as inviting disastrous soil erosion.[78] There was certainly some evidence of increased wind erosion on large fallow fields.[79] Fields left bare, without plant roots to hold the soil, and stalks to slow the wind, were dependent on moisture to bind the particles into clumps too large to be removed. In drought, soil particle cohesion, especially in soils with lower clay content, collapsed leaving finer materials highly susceptible to erosion. It was also the case, however, that seeding cover plants in drought not only contributed little or nil production for the input costs, but also simply further depleted scarce soil moisture.

Farmers working within drought conditions were caught in a difficult choice. They could choose to seed the field, either to crop or to cover, incurring the cost losses of seed, fuel, and labour. They could ignore the field, leave it unseeded, and untilled, knowing with near certainty that weeds (in their own right, nicely adapted to the drylands) would soon cover the field, removing any accumulated soil moisture. Fallowing was a third option. Research and practice had demonstrated that a fallow field lost less moisture through direct surficial evaporation, than it did through transpiration via crop or weed plants. In the northwestern plains, it had become common practice to leave a field fallow for as many as two seasons out three.[80]

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[75] letter from E.S. Hopkins to E.H. Aicher 16 December, 1935, RG114, Box 386, Folder "Dominion Exp. Alberta."

[76] letter from Aicher to Clemmer 12 October, 1935, RG114, Box 386, Folder "Dominion Exp. Alberta."

[77] letter from Aicher to Clemmer 3 October, 1935, RG114, Box 386, Folder "Dominion Exp. Alberta."

[78] Ellis, "Land for Thine Inheritance;" and Jones, *Empire of Dust.*

[79] Palmer "Limitations of Soil Drifting control;" and E.H. Aicher, "Progress Report, Power-Dutton Wind Erosion Control Area, Great Falls, Montana," ca.1940, RG 114, Box 389, Folder "Annual Reports Montana."

[80] Hargreaves, *Dry Farming: Years of Readjustment.*

Farmers and researchers alike ultimately reached consensus that the benefits of soil moisture conservation via summerfallowing outweighed the risks of wind erosion-caused loss. 1930s government research findings advocated, not the abandonment of tilled fallow as a practice, but rather, the *modification* of it. The primary change was to incorporate 'trash covering,' where stubble and mulch were left on the surface to provide some means of mechanical protection from erosion.

Producers employed several countermeasures to reduce erosion. Field shelterbelts were one solution, aimed at reducing field-level windspeed and, therefore, wind erosivity, Advocated from the beginning of settlement for use around farmyards, beginning in the 1930s, Canadian and United States governments encouraged planting shelter trees along and within fields. However, shelterbelt distribution was geographically uneven. Typically, large-scale planting only took place where government agencies had organised deliberate projects.[81] In western Canada in the 1930s, PFRA-organised field shelter projects were limited to only two places in Saskatchewan. One shelterbelt demonstration site, a project that was considered a success, was located north of the South Saskatchewan River near Conquest. The other shelter project was organised near Aneroid, situated within the drybelt south of Swift Current. The latter project was soon abandoned as a disappointing failure.[82]

Later shelterbelt projects, initiated in the 1960s, 70s, and 80s, were more successful. A number of field trees were successfully planted around the Wymark Mennonite community south of Swift Current in the 1970s and 1980s.[83] However, on the whole, very few areas surveyed showed more than token use of field shelter. One such place was near Hazlet were some more-or-less healthy shelterbelts were planted by a few neighbouring landowners in the 1970s (Fig. 4.4).

In the Montana Triangle, field shelterbelts were virtually non-existent in the 1930s. Some shelterbelts had been planted in the western portions of the region, but had proved problematic during the drought as they trapped wind-blown soil that then had to be removed in a highly labour-intensive process.[84] However, despite the "shelterbelt problem," SCS staff at the Power-Dutton cooperative demonstration project, located north of Great Falls, had persevered with shelterbelt trials. Contemporary Montana newspaper columnists, who had begun to refer regularly to techniques used in Canada, commented on the promise of shelterbelts as a wind erosion control strategy.[85] By the end of the 1930s, shelterbelt trees in

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[81] Andrew Dunlop, "Spatial and Temporal Aspects of Saskatchewan Field Shelterbelts, 1949-98" (master's thesis, University of Saskatchewan, 2000).

[82] Dunlop "Spatial and Temporal Aspects."

[83] Dunlop "Spatial and Temporal Aspects."

[84] Aicher, "Progress Report."

[85] Paul DeVore, "Highlights of Montana Agriculture," *Great Falls Tribune,* 6 Feb. 1939.

the Montana triangle were still relatively young and farmers had planted them with particularly wide spacing to better facilitate the use of tractor-drawn cultivation equipment.[86]

FIGURE 4.4 Field shelterbelts near Hazlet, Saskatchewan, June, 2009.

Other adjustment measures were tillage-based. Much research work had been undertaken across western Canada and, to some extent, in North Dakota on 'emergency' tillage measures. The basin lister, for example, was an implement developed to create deep troughs and ridges in the field surface, with the resultant corrugations somewhat slowing soil particle movement.[87] 'Deep' tillage, widely-advocated at the beginning of the 20th century, had completely fallen out of favour by the 1930s as it destroyed soil profiles.[88]

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[86] Aicher, "Progress Report."

[87] E.A. Hardy, "Machinery for Soil Drifting Control," *Report of the Meeting of the Regional Committee on Soil Drifting Held Saskatoon, Sask, July 30th, 1937,* unpublished report, 1937.

[88] Ibid.

In Canada, basin lister deployment was only recommended as a last resort,[89] but in Montana the technique had been enthusiastically, if belatedly, embraced by the project manager at the large SCS 'Power-Dutton' demonstration project (Fig. 4.5). By 1940, SCS staff reported farmers objecting to listing very soon after agreeing to try it. Field experience in 1937 and 1938 had led to producer understanding that listing, while slowing soil erosion in the short-term tended to result in greater blowouts later on.[90]

Related tillage-based soil erosion control measures were intended to be part of ongoing field practice. Contour-farming, adapted from areas where water erosion had been a concern, created field surfaces that featured more roughness and were designed to work with the natural land morphology. Contouring had been practiced in select areas of Montana before the 1930s, but, generally, only in places where much soil had been traditionally lost due to high spring snowmelt overland runoff.

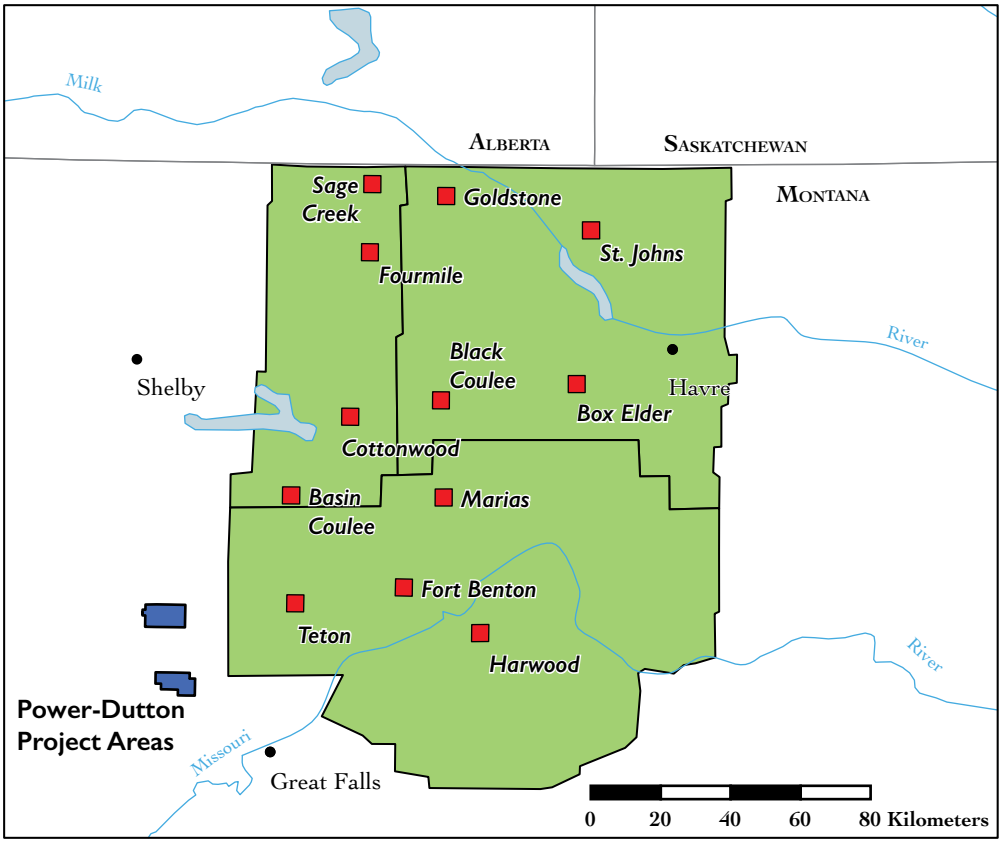

FIGURE 4.5 The SCS 'Power-Dutton' demonstration project.

[89] A.E. Palmer, "Limitations of Soil Drifting Control," *Report of the Meeting of the Regional Committee.*

[90] Attachment to letter from C.C. Starring, Project Manager, Power-Dutton Project, Dutton, MT to N.P. Hansmeier, Extension Conservationist, SCS, Montana State College, 2 May, 1940, RG114, Box 326 Folder 221.11 'Billings.'

As an erosion control measure, contour farming was unpopular with northern Montana farmers. The measure required significant reworking of the land, making it only feasible as part of large government demonstration projects. SCS engineers initially proposed contouring as one of four major areas of investigation for the Power-Dutton project in 1935.[91] Seemingly under pressure from SCS higher-ups to at least *try* contouring, Great Falls SCS staff agreed to attempt some experiments on two half-sections, reasoning that if irrigation was ever to be developed there in the future, it might be good to gain some contour experience.[92]

Not long after a small amount of land in Teton County was contoured, government agents and farmers alike saw little value in the practice. A 1941 SCS report noted that farmers and "local project personnel" in the Montana Triangle were of the opinion that "…shrub wind breaks for field protection are questionable" and that "…contouring of relatively gentle slopes is likewise questionable in the eyes of farmers and the technicians."[93] Over two years, the SCS assisted farmers in contouring 700 acres, a little more than one section (Fig. 4.6). While the SCS hoped to wait for wetter conditions to properly test the contouring, unimpressed cooperating farmers gave up on contouring almost immediately.[94] Montana SCS managers were reluctant to undertake further contouring trials, seeing them as a large drain on manpower, diverting labour from other experiments more promising for the region. If the SCS, with Civilian Conservation Corps (CCC) labourers at their disposal, were concerned about the amount of work involved in creating contours, it is not surprising that no northern Montana landowner ever saw contouring as a practical endeavour.

Among the numerous field practice adjustments, only one became truly widespread across the northwestern plains. 'Strip-cropping,' a variation on summerfallowing, was adopted in Alberta in the 1920s and soon spread locally around the Lethbridge area. Observed by Lethbridge experiential station staff, the practice was soon recommended by soil scientists as the answer to the confounding problem of moisture conservation and weed control.

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[91] L.C. Tschudy to H.J Clemmer, "Re: Engineering Work Program for Power-Dutton Project," letter, 11 October, 1935, RG114, Box 386, Folder "Working Plan, Power-Dutton."

[92] "Analysis and Evaluation Survey: Power-Dutton Demonstration Project, Dutton, Montana." unpublished report, 11 Jan, 1941, RG114, Box 308A, Folder 101.6 "Bozeman."

[93]"Analysis and Evaluation Survey."

[94] Ibid.

THE GREAT FALLS TRIBUNE

Air Photo Shows Contour Farming Near Here

This picture, taken from the air by the soil conservation service, gives a graphic idea of the contour practices being used in the Dutton-Power area. Contour strip crops are supported by terraces and contour furrows (near center) are used on grass land to protect fields below from overburden of foreign water. In the background, types of wind stripping may be seen. The farm in the foreground is operated by H. Gettel and one on the far side of the road in the center of the picture is operated by T. Halero Jr.

FIGURE 4.6 SCS contouring demonstration in Montana, 28 September, 1938. Clipping from The Great Falls Tribune.

Like traditional tilled fallow, half of the crop land was left tilled, to preserve moisture and control weeds. The other half was seeded. The difference was that single fields were worked in alternating evenly spaced seeded and tilled strips. If the strips were narrow enough, the plant stalks of the seeded strips would provide some wind protection for the unseeded portion. In some cases, alternating strips were seeded with specific plants, sunflowers for example, that would provide protection in summer and act as snow traps in winter.[95] Through a series of experiments, the Lethbridge Experimental Station discovered that the optimum

[95] DeVore, "Highlights of Montana Agriculture."

width of strips varied with the soil texture. Station staff recommended a five rod (25 metres) strip for 'light' soils, with up to fifty rods (251 metres) width advised for heavier soils.[96]

Photographs taken in 1938 of twelve Saskatchewan study blocks show farmers in eleven were strip cropping, with *all* crop acreage tilled in strips in the Pelletier, Shaunavon, Ponteix, Lynthorpe, and Wymark study blocks located south of Swift Current. In Alberta, strip-cropping was practised in five of seven cropped study blocks, with *all* fields in the Milo, Oldman, and Stewart sites near Lethbridge entirely in strips. In Montana, strip-cropping was undertaken to variable degree in eleven of twelve study blocks. The greatest proportions of crop acreage in strips were in the Goldstone and St. Johns study blocks, closest to the Canadian border in Hill County, as well as at Harwood and Fort Benton in Chouteau County. In each of those four study areas, approximately one half of fields were strip-cropped.

On his summer, 1935 visit to Alberta, Lethbridge staff had shown E.H. Aicher a number of revolutionary field management approaches. Near Monarch, Alberta, Aicher had toured the farm of local man, L. Koole. Dominion Experimental Station staff credited Koole as being the first person to strip crop a farm, having first done so in 1916.[97] From that year on, Koole had undertaken, on his own initiative, the bulk of the research in strip cropping for erosion control. In Aicher's account, Koole had first tried summerfallowing in 1911. Over the next five years, Koole had experienced severe blowout damage, which had provoked his strip farming experiments. Strip farming soon spread rapidly throughout southern Alberta because of a cooperative spirit amongst area farmers. Aicher had been impressed with the way in which Monarch area producers met yearly to agree upon an erosion strategy that would be followed by all that season.

Informed by his observations in Alberta, Aicher became highly interested in strip cropping as a soil retention strategy. Aicher relayed to his superior that by 1935, strip farming had become ubiquitous across a 100 mile belt extending fifty miles north of Lethbridge.[98] The practice was appealing in its simplicity. In preparing the land for summerfallow, the Lethbridge area farmers' main objective had to maintain as much stubble cover as possible, contrary to the 'deep ploughing' doctrine espoused by 1920s dryland agriculture experts.[99]

Maps of one Saskatchewan study area, near Hazlet, northwest of Swift Current, clearly show strip cropping well established as a practice by 1938 (Fig. 4.7). Of the nine sections in the study area, each one had been divided into strips varying in width from 100 to 260 metres. Strip lengths were either one half section (800 metres) or the full section (1,600 metres). By the early 1960s, nearly all land in the Hazlet study area was in strips. Previously

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[96] Anstey, *One Hundred Harvests*, 125.

[97] Aicher to Clemmer, 3 October, 1935, RG114, Box 386, Folder "Dominion Exp. Alberta."

[98] Ibid.

[99] Specified, for example, in Bracken, *Dry Farming.*

eroded fields were still in crop production, and most of the 710 acres of grazing land that had been observed in 1938, or 16% of the total area, was now cropped. Strips widths became more consistent, ranging from 125 to 200 metres.

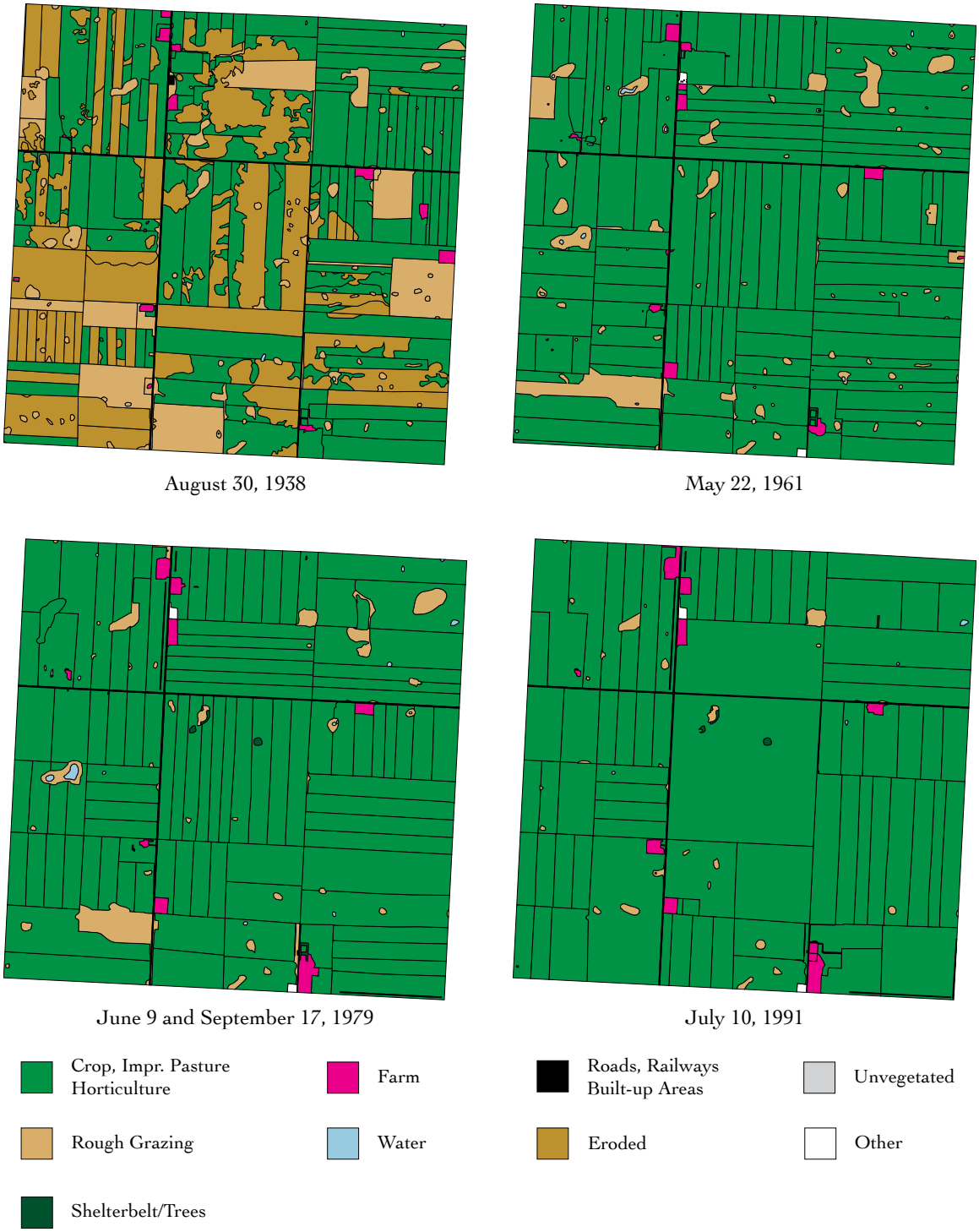

FIGURE 4.7 Hazlet, Saskatchewan study block land use, 1938 to 1991.

By the 1970s, strip cropping began to fall out of favour as new chemical fallowing methods became feasible. New non-selective, low residual herbicides allowed producers to kill vegetation on the fallow field, therefore eliminating the moisture consumption of weeds, but leaving the plant roots and stalks in place to prevent soil erosion. So effective was chemical fallowing, by the 1990s, strip cropping had been greatly reduced. In the Hazlet study area, one of few Canadian areas where farmers remain largely committed to the practice, strip cropping was reduced to 50% of the total cropped area by 1991. Using larger tillage equipment, strip widths were quite consistent by the summer of 1991 at 200 to 250 metres.

Two study areas, Hazlet, Saskatchewan and Taber, Alberta, suffered severe soil erosion during the 1930s. Outside of these two places, within the sample, severe soil drifting appears either not to have occurred or, if it had occurred, was no longer evident in 1937/38 aerial photos. If the sample areas are indicative of the wider region, contemporary accounts of a severely drifted agricultural landscape would have been referring to a relatively modest proportion of the total land area.[100] Severe soil erosion observed in the 1930s aerial photographic evidence would have been highly dependent on the localized underlying soil pattern, the form of tillage in use, and the time of year. Importantly, no severe drifting was visible in the affected areas in subsequent years.

Approximately one third of the Taber sample area, situated along the western side of the Oldman River, approximately twelve kilometres north of the town of Taber, had been cultivated before 1938. The land was, and remains, marginal for crop cultivation as it is mostly underlain by fine sandy outwash deposits. The Taber Municipal District Soil Map describes the sample area as having "Very Severe to No Growing Capability".[101] Cultivation had only been attempted on the northwestern sections, with approximately 390 acres in production by the 1930s. The eastern portion of the sample area lies in the broad, terraced Oldman flood valley, where a small 75 acre area was cultivated with irrigation by 1938.

In the spring of 1938, aerial photos showed approximately 140 acres of a 320 acre half-section field had been completely stripped of topsoil (Fig. 4.8). A further 220 acres of adjacent grassland had been buried under the newly moved soil. In the northwest section of the sample area, another 110 acres had been severely eroded, while the adjacent fields, cultivated in strips, remained largely intact. Following the 1930s, about 95 of the previously eroded acres situated within the northwest section were reseeded. Despite the district's characterization as having little to no possibility of cultivation, cultivated acreage in the Taber sample area

[100] Municipal District of Taber, "MD of Taber Soils," map. http://www.saaep.ca/docs/taber_soils.pdf

[101] "MD of Taber Soils."

continued to increase, reaching 800 acres by 1998, of which 500 were irrigated with centre-pivot booms.

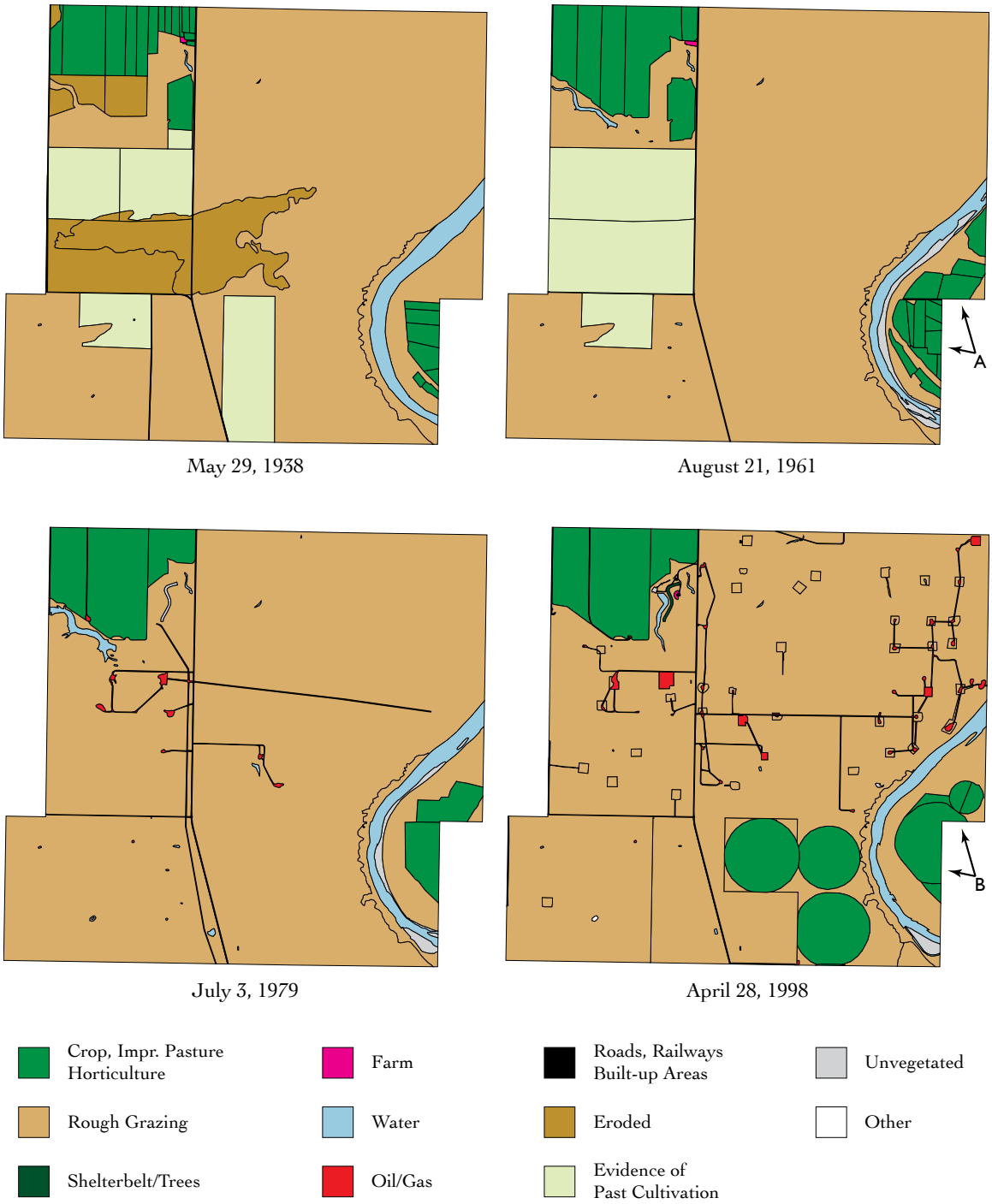

FIGURE 4.8 Taber, Alberta study block land use, 1938 to 1998. Land east of the Oldman River was conventionally irrigated in 1938 and 1961 (point 'A'), with a 'wheel line' in 1979, and with centre-pivot booms in 1998 (point 'B').

In the Taber case, much of the soil drifting had not been occurring with the hot, dry winds of summer, but rather, during mid-winter when the soil was typically frozen. This obviously limited the possibilities of emergency tillage. In February, 1939, in a response to a request from SCS asking which implements were being used in Canada for emergency control of winter soil drifting, A.E. Palmer, Senior Field Assistant at the Lethbridge Station, lamented "Unfortunately, some of our area farmers failed to adopt satisfactory drift control methods on their fallows last year and there has been some drifting on a few fields this winter."[102] The Americans' letter spurred the Lethbridge Station to initiate experiments on winter erosion control tillage. Located in the Alberta Foothills, and subject to periodic warming Chinook winds, the Lethbridge scientists found some success in wintertime control cultivation using cultivators and one-way discers modified to have half the shoes/discs removed, although still having to wait for the weather to warm the soil surface sufficiently to allow working.[103]

A very different soil erosion pattern is evident in the Hazlet sample. There, photos taken at the end of summer of 1938, show soil drifting corresponding to pre-established field strips (Fig. 4.9). Some fifty strips, totalling 1,800 crop acres, (many unseeded that year, but a number in crop), had severely eroded along most or all of their lengths, with the soil drifting onto adjacent strips.

Some fields, not tilled in strips, adding up to nearly 500 acres, had been completely depleted of topsoil. Unlike in Taber, however, virtually all of the eroded lands were again in production by the time of the next photo in the spring of 1961. As with other sample areas, tilled acreage increased continually over the study period, from 4,900 acres in 1938 (of which 1,990 had been moderately to severely eroded), to 5,215 acres in 1961, to 5,475 acres by 1979, reaching a near complete tilled acreage of 5,495 acres in 1991, or 96% of the total land within the Hazlet sample area. The small left over portion was comprised of small pastures next to the farmyards and a few persistent wet spots that were seeded only during dry years.

In the United States, Montana Extension and later SCS staff enthusiastically embraced strip cropping in the late 1930s as a 'Canadian' answer to soil erosion.[104] Contour farming, the predominant American erosion control field practice had been roundly rejected by Montana farmers. Not one of the twelve study area blocks, nor twelve additional samples observed, showed *any* evidence of contour farming. By 1945, expert opinion held that contouring generally only worked in the organized conservation district projects,

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[102] A.E. Palmer to C.C. Starring, 1 Feb, 1939, RG114, Box 390, Folder 222.11 'Erosion Control.'

[103] Ibid.

[104] Strip cropping was first advocated by Wilson in the 1920s. See Wilson, *Dry Farming in the Triangle*.

predominantly where corn was part of the rotation, a non-existent situation in north-central Montana.[105]

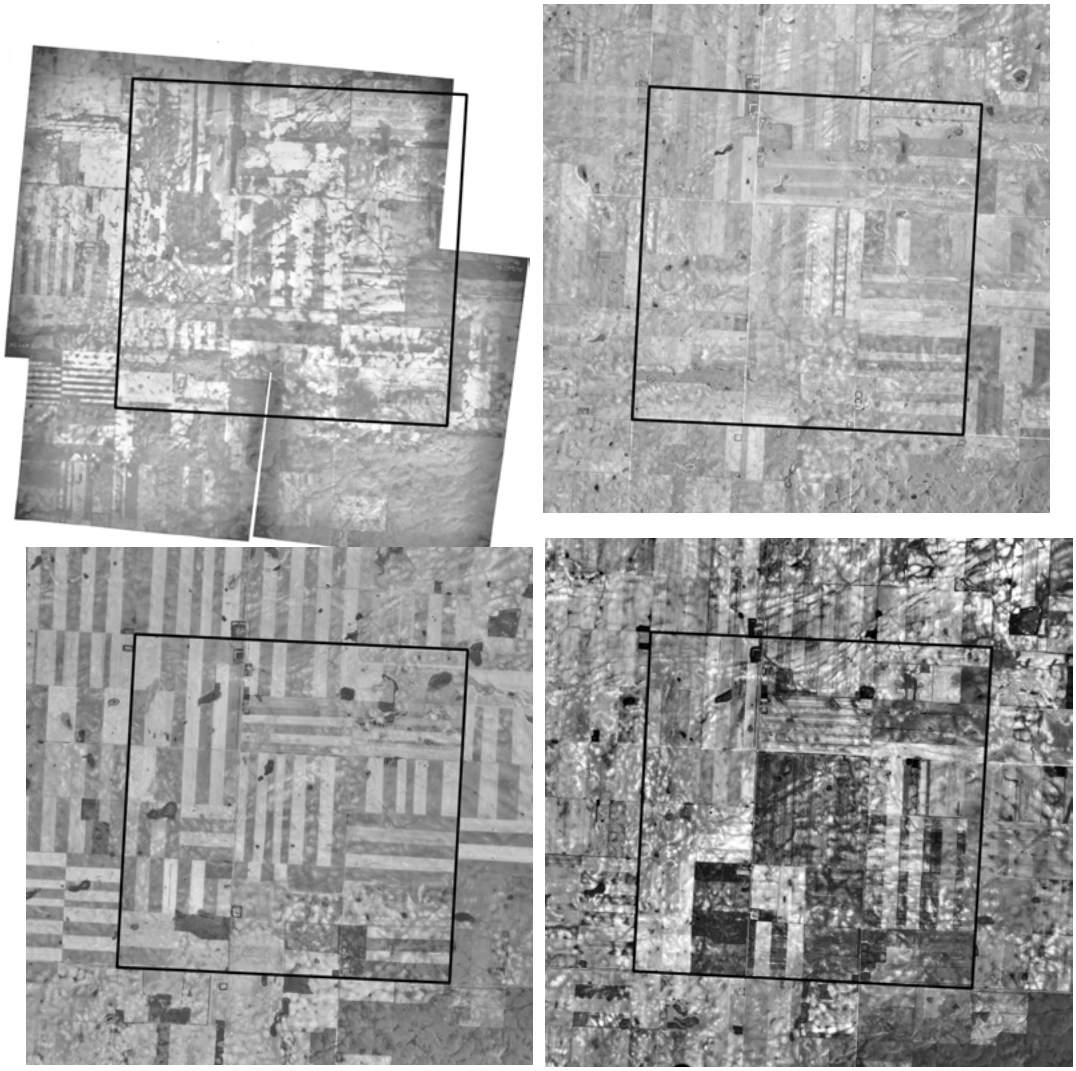

FIGURE 4.9 Hazlet, Saskatchewan study block (*outlined in black*) photos for 1938 (upper left), 1961 (upper right), 1979 (lower left), 1991 (lower right). Strip cropping and extensive soil drifting are evident in 1938. Many field strips were disappearing by 1991.

[105] Hargreaves, *Dry Farming: Years of Readjustment*, 199.

FIGURE 4.10 1930s soil drifting near Ponteix, Saskatchewan. Control of wind erosion and soil erosivity was of upmost importance for the PFRA and SCS. Image courtesy of Library and Archives Canada.

Montana government agents essentially adopted Canadian style strip-cropping 'as is,' including Lethbridge specifications on strip width and orientation. Some measure of local innovation and adaptation of strip cropping did occur in Montana. Curiously, 90% of Montana farmers were found to prefer 'rounded' strip ends to the 'squared' ends seen in Canadian fields. This local Montana preference was a modification of practice that allowed harvesting machinery to avoid having to drive over the cloddy material at the ends of the tilled strips. This strip 'rounding' practice is still observable in Montana, yet, has never been adopted north of the border (Fig. 4.11).[106]

Between 1938 and 1939, strip-cropped acreage in many north-central Montana counties had effectively doubled. In one year, Chouteau County stripped acreage had risen from 175,000 in 1938 to 260,000 the next year. In neighbouring Hill County, it had doubled from 100,000 acres to 220,000 over the same period.[107] SCS staff attributed the increase to the 'Power-Dutton' demonstration project in neighbouring Teton County. At the beginning of the project in 1935, strip cropping had been practised on only 4% of the project area's cropland.

[106] H.D. Hurd, Acting Project Manager at Culbertson, to C.C. Starring, Acting Project Manager, SCS, Great Falls, 14 February, 1939, RG114, Box 390, Folder 222.11 'Erosion Control.'

[107] Starring to Hansmeier, 2 May, 1940.

By 1940, 99% of the Power-Dutton field acreage had been converted. The remaining 247 non-stripped acres were scheduled for conversion that year.[108]

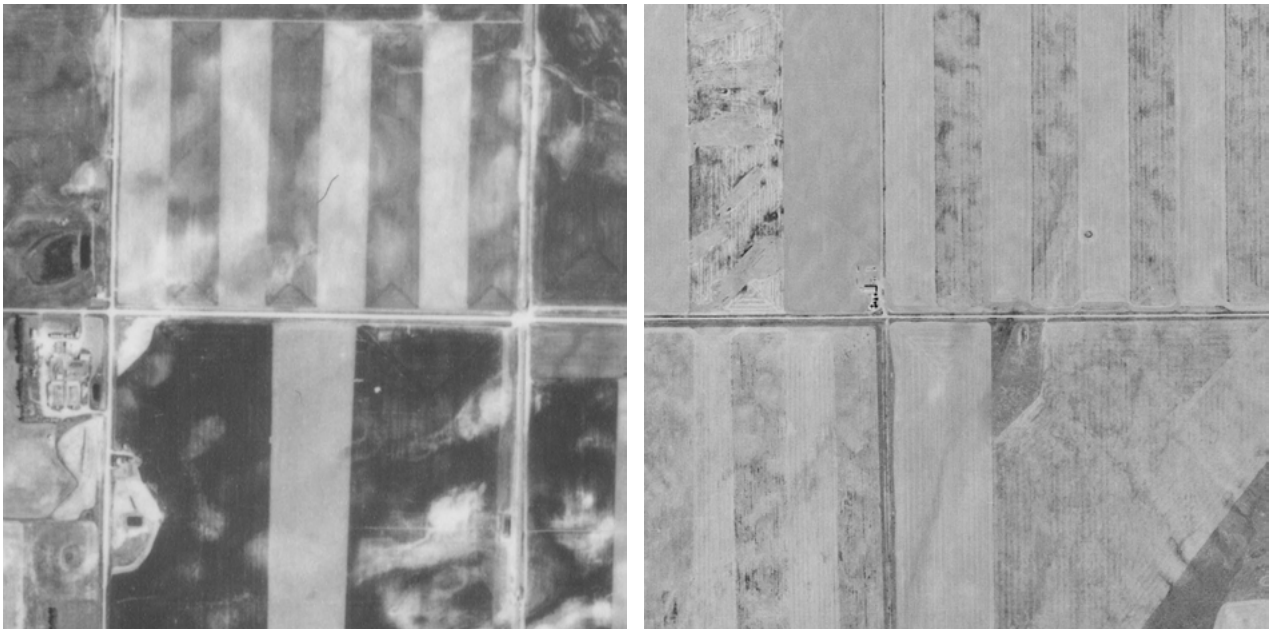

FIGURE 4.11 Comparative photo of field strip ends in Alberta (*left*) and Montana (*right*). Both images were taken in 1979.

The spillover landscape effects of the SCS Power-Dutton strip-cropping demonstration, as well as the continued promotion of 'Canadian' field practice, was immediately noticeable in neighbouring Chouteau, Hill, and Liberty counties. Liberty County, one of only a handful of Montana counties that had opted to not participate in the Soil Conservation District or State Grazing District programs, nor did it contain a federal Land Utilization Project, nevertheless readily adopted strip-cropping.[109] The land use history of one Liberty County sample area is characteristic of the Triangle. The 'Basin Coulee' study block, located fifteen kilometres south of the Marias River in Liberty County, and forty kilometres north-east of the Power-Dutton project, showed fewer fields stripped cropped in 1940 than other contemporary sample blocks (Fig. 4.12).

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[108] Starring to Hansmeier, 2 May, 1940.

[109] These three projects were highlighted under the portfolio of reclamation projects considered by architects of the Pick-Sloan Plan. See United States, United States Engineer Office, *Missouri River Basin,* map. NARS Cartographic Records, RG114, NARA, Maryland, Feb, 1948.

FIGURE 4.12 Basin Coulee, Montana study block land use, 1940 to 1997. Contouring was tried ("A") in the 1960s, but reverted by the 1990s. During the 1940s or 1950s, an airfield was built in the southwest section ("B"), but was the land was converted to crop by the late 1970s.

Of the total 1,435 acres of tilled fields in Basin Coulee in 1940, 358 acres, or 25%, was worked in strips. By 1957, 58% was strip-cropped. In 1979, it was 81%, and by 1997, when

many Canadian strips were beginning to disappear, 77% of farmland was still being strip-cropped. Conspicuously, Basin Coulee is the only study block of the Montana twenty-four that ever had a portion of land contoured. Sometime between 1957 and 1979, a series of short-lived contours were ploughed alongside a gully in the northeast section of the study block. They were removed less than twenty years later, likely converted to Conservation Reserve Program (CRP) grassland.[110]

Cropland comprised 24% of the nine square mile Basin Coulee study block in 1940. By the photo date, almost all fields were actively tilled, and were in good condition with very little evidence of soil drifting. Of twelve Montana study blocks examined, only one, Harwood, south of the Missouri River in Chouteau County showed any sign of soil drifting in 1938-40. There, modest erosion of the fine silt/sand soil was evident in the photos, with a few scours and minor strip creeping occurring on tilled fields. No equivalent erosion was evident in Basin Coulee. Furthermore, only one small thirty-four acre field in the northeast corner of the study block appeared to have been previously tilled and reverted to pasture in 1940. There was no sign that any other land had been taken out of production in the 1930s, or if it had been, it was only temporary.

Since the 1950s, approximately half of the Basin Coulee study block has been in crop. By 1957, the amount of cultivated land had reached 3,133 acres, more than doubling the amount of tilled land in less than two decades. The cultivated area thereafter remained relatively stable at 3,288 acres in 1979 and 3,020 acres in 1997. More recently, all the crop land has been worked in a wheat/chemical fallow rotation.[111] The farms have been stable as well. Three large farms have dominated the nine square miles since the 1970s (Fig. 4.13). One of the farms, located in the north centre section of the block, was originally in the northeast section, moving approximately one mile to the west in the 1960s or 1970s to better align with a well-gravelled county road. The farm in the southwest section has always been large with substantial infrastructure, including an airfield in the 1940s and 1950s, and a grain elevator from the 1990s onwards.

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[110] The USDA Conservation Reserve Program, discussed more fully in Chapter 7, encourages landowners to sign agreements with the USDA to remove "environmentally sensitive" land from production for a specified term in exchange for an annual acreage based 'rental' payment. See United States, Department of Agriculture, Farm Service Agency, "Conservation Reserve Program." http:--www.fsa.usda.gov-FSA-webapp?area=home&subject=copr&topic=crp

[111] Observed 29 August, 2009.

FIGURE 4.13 View of the Basin Coulee, Montana study block from the north. Three farms are visible in the distance, with the nearest one in the photo centre having moved to its current location sometime in the 1960s or 1970s. The upland areas in the photo background are grazing land shown on the maps as constituting the bulk of the south-east half of the study block. Photo taken September, 2009.

As the 1930s drought spread, new machinery was touted, much of it adapted or invented locally. Field management was critical as strip cropping tended to cause lateral movement of both soil and weed seeds across the fields. The strips also allowed increased infestation from wheat-stem sawflies.[112] Initially using a one-way disc cultivator, the Lethbridge farmers later adopted the standard field cultivator. Further refinement was realized through the invention of the 'Noble Blade,' a cultivation implement originally adapted from California sugar beet machinery by Lethbridge-area farmer Charles Sherwood Noble.[113] Noble modified the tool to slice off weed roots immediately below the surface, but leaving the weed stalk still standing in the soil providing a mechanical means of soil retention.

[112] Anstey, *One Hundred Harvests*.

[113] Grant MacEwan, *Charles Noble, Guardian of the Soil* (Saskatoon: Western Producer Prairie Books, 1983).

Noble and Fairfield were each awarded the M.B.E. in 1934 in recognition of their innovative work on tillage practices still unknown to American soil scientists in 1935.[114] Eventually, Montana SCS staff initiated trials of the Noble cultivator, the results of which, after only one season of use, so impressed Montana farmers that they instantly recommended the tool's continued use.[115] Repeatedly, Montana farm watchers awaited the next innovation to come south from Canada. Referring to an upcoming local farmers' tour in 1938, the Great Falls Tribune noted: "Those who plan making the trip were reminded of an open invitation to visit the 10,000 acre Henry Sheffel ranch, where the latest blade seeder recently developed in Canada is now in use."[116]

The methods and tools developed by the Lethbridge farmers and scientists had greatly reduced tillage requirements in the drylands. As a result, the traditional mouldboard and one-way ploughs were instantly rendered obsolete. Besides the mechanical tillage-based solutions, SCS Senior Soil Conservationist E.H. Aicher had also obtained much new agronomic knowledge from his Lethbridge trip. Monarch farmer Koole had abandoned the expert-prescribed use of sweet clover crops intended to maintain soil fertility through nitrogen fixation. This went against conventional wisdom, but Koole claimed yields were no different without the cover crops. Drawing on recent American soils research, Aicher speculated that the Lethbridge soils shared a particular bacteriological nitrogen fixing process that had been reported in western Kansas; reinforcing in his mind, the importance of *local* knowledge.[117] Even during the dry years, Koole had reported average wheat yields of thirty bushels per acre, with exceptional years yielding as many as fifty. Soil drifts were still observed, but Aicher dismissed them as being "old drifts." [118]

In his final assessment, Aicher concluded that "the citizens on the land have absolutely controlled blowing with their methods of stripping and summerfallowing." He added, "I believe if we can inculcate similar methods on this area in this part of Montana, we can likewise control the situation."[119] Aicher's discoveries in Alberta were enthusiastically shared with his American colleagues. The Canadian information was revolutionary at a time when America scientists were hungry for any new answers to the 'soil problem.' Because of the relationships formed between the Great Falls men and their counterparts in Lethbridge, it had

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[114] MacEwan, *Charles Noble*.

[115] Starring to Hansmeier, 2 May, 1940.

[116] "Farmers Tour To Start From Helena Friday," *Great Falls Tribune* 21 July, 1938.

[117] Aicher to Clemmer 3 October, 1935, RG114, Box 386, Folder "Dominion Exp. Alberta." Much to his disappointment, Aicher was informed that the Dominion Experimental Station had never investigated the soil fertility matter.

[118] Ibid.

[119] Ibid.

become a matter of routine by the late 1930s for the Americans to send regular inquiries by letter or telegram. By the end of the decade, they had come to see the Canadian research as reliable and invaluable. In a 1938 report entitled "Can Soil Fertility and a Desirable Soil Condition be Maintained Under an Average Rainfall of 13 Inches?"[120] the author, E.H. Aicher, by then State Coordinator for the SCS, referred to several Canadian examples as supporting evidence for his conclusions. For example, on the subject of 'green manuring,' a technique long held dear by the 1920s dryland farming experts, Aicher referred *exclusively* to a Swift Current Experimental Station report as corroborating evidence. Aicher noted that "After conducting experiments in Montana from 22 to 31 years...",[121] he felt strongly that the United States had inadequately studied the problems unique to the northern plains environment. "There is a great need for experimental work in this region to determine the answer to some of these questions. Answers cannot be based on results obtained in the humid regions."[122]

Reliance on Canadian research was not limited to just farming. SCS range experts also relied on information obtained north of the border. A report by Floyd Larson, Associate Range Examiner at Billings, intended to serve as a sort of field guide for other range examiners, was forwarded to J. Graydon Robinson, Assistant Range Examiner at Malta. The report was copied virtually verbatim from a Canadian report done at Manyberries, Alberta.[123] Emphatically reassuring his colleague as to the value of the Canadian work, Larson maintained that it was perfectly suitable in the Montana context and, furthermore, "that the Manyberries grazing trials are among the best available in the northern great plains."[124]

Moreover, the information sharing was not just between government specialists. For example, in January, 1939, the Great Falls Tribune published a story about Lethbridge Station tillage recommendations for cases where soil was blowing from large fallow fields.[125] Montana newspapers had been publishing these sorts of articles routinely. The January, 1939 story was quickly noticed by C.C Staring, acting SCS project manager at Great Falls. Starring immediately wrote to Wilkie Collins, the regional agronomist at Rapid City, South

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[120] E.H. Aicher, "Can Soil Fertility and a Desirable Soil Condition be Maintained Under an Average Rainfall of 13 Inches?" unpublished report, RG114, Box 386, Folder "Soils."

[121] Aicher refers to a SCS report entitled "Results of Experiments, 1931-36 Inclusive." See Aicher, "Soil Fertility?"

[122] Aicher, "Soil Fertility?"

[123] Floyd Larson, "Forage Acre Requirement Study at the Manyberries Experiment Station, Alberta, Canada." unpublished report, RG114, Box 326, Folder 222.11 "Billings."

[124] Ibid.

[125] G.C Starring to A.E Palmer, 26 January, 1939, RG114, Box 390, Folder 222.11 "Erosion Control."

Dakota.[126] "I would like your suggestions as to what we might do to roughen the land or otherwise check the blowing," Staring began. He continued, "The Lethbridge Experiment (sic) Station are making some recommendations to their farmers along these lines and I have written to them as to their suggestions. We may be able to try a few things out this winter if we can find out what implements are fairly promising."[127]

Starring had also written to A.E Palmer, who had replied almost immediately, detailing the types of implements and techniques that the Canadian scientists were recommending to Alberta farmers, with particular attention paid to the special considerations posed by cultivating for drift control at temperatures below frost. In a return gesture, Palmer ended his letter with the invitation "Should you have any success with any methods you may try for the control of winter drifting, we would greatly appreciate hearing of your experience."[128]

In the meantime, Collins, Starring's superior in Rapid City, had sent a letter to Starring encouraging him to pass along "any information available from the Lethbridge Experiment (sic) Station.[129] A week later, Starring wrote to Palmer, expressing the hope that should the weather be favourable, he or one of Great Falls colleagues would like to travel to Lethbridge to "see what you are doing." Like his predecessor four years ago, Starring displayed a measure of procedural naiveté, asking if it was essential to give prior notice of a visit, "would a telegram the day before, or the day we start be satisfactory?"[130] With return post, Palmer extended the offer to visit any time. Fortuitously, a chinook had blown in and the ground was now bare and ready for the Americans to inspect. That day, Starring and one of his colleagues from the Culbertson, Montana station immediately made their travel plans.[131]

The next day, a storm blew in and once again southern Alberta was blanketed under snow.[132] For the next week, snow continued to fall, an inch a day. Every day or so, Palmer sent another telegraph to Great Falls updating Starring on the weather situation. On February 27, still waiting for a break in the snowfall, Starring wrote to Palmer:[133]

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[126] G.C Starring to Wilkie Collins, Jr., 28 January, 1939, RG114, Box 390, Folder 222.11 "Erosion Control."

[127] Ibid.

[128] A.E Palmer to C.C. Starring, 1 February, 1939, RG114, Box 390, Folder 222.11 "Erosion Control."

[129] G.C Starring to Wilkie Collins, Jr., 7 February, 1939, RG114, Box 390, Folder 222.11 "Erosion Control."

[130] G.C Starring to A.E Palmer, 14 February, 1939, RG114, Box 390, Folder 222.11 "Erosion Control."

[131] A.E Palmer to G.C Starring, 16 February, 1939, RG114, Box 390, Folder 222.11 "Erosion Control."; and G.C Starring to A.E Palmer, 17 February, 1939, RG114, Box 390, Folder 222.11 "Erosion Control."

[132] A.E Palmer to G.C Starring, telegram, 20 February, 1939, RG114, Box 390, Folder 222.11 "Erosion Control."

[133] G.C Starring to A.E Palmer, 27 February, 1939, RG114, Box 390, Folder 222.11 "Erosion Control."

Dear Mr. Palmer

I wish to thank you for your letter of February 21st and for your efforts to keep us informed as to the conditions there.

I am in hopes the weather will give us a long enough break so that we can drive up and see what you are doing. We certainly appreciate the information contained your letters.

Very truly yours,
C.C Starring,
Acting Project Manager

Unknown to the Canadian and American scientists in February, their ongoing correspondence on soil drifting control would soon come to an end. 1938 would turn out to be the last year of the infamous 'dirty 30s' drought on the northern plains. The weeklong intermittent snow falling on southern Alberta in February was a forebear of a weather shift that would once again bring sufficient moisture to the western prairies. On September 10, 1939, as Alberta and Saskatchewan harvested the first good crop in the better part of a decade, Canada entered the Second World War. In Ottawa, and very soon after, Washington, the 'soil problem' was quickly relegated to tertiary status.

CHAPTER 5

ORIGINATION, AGENCY, AND THE PECULIARITIES OF PLACE

The district that lies between the western Saskatchewan towns of Abbey and Cabri is farmland.[1] Stretching along the southern banks of the South Saskatchewan River, the land is flat to gently undulating, the horizon broken only by low remnants of the Missouri Coteau, an old geological formation lying to the north of the river.[2] The district is named Miry Creek, conferred by Dominion Lands surveyors in 1882, presumably after being repeatedly mired in the muddy gullies that lie perpendicular to the South Saskatchewan as they conducted their transects.[3] Miry Creek is also the name of Saskatchewan Rural Municipality Number 223, created in 1913 to provide local governance for a rapidly-growing population (Fig. 5.1).

The South Saskatchewan River is much wider by Cabri than it once was. Now more resembling a lake than a river, for all but forty-five years of its existence the South Saskatchewan was only a modest braided stream. For thousands of years, the river meandered through thick sand and gravel sediments deposited during every spring melt along the bottom of a 600 metre wide valley instantaneously carved 10,000 years ago by a brief glacial outburst flood.[4] In the 1960s, Prairie Farm Rehabilitation Administration (PFRA)

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[1] See Appendix for location maps for all places mentioned in the text.

[2] Eric N. Clausen, "Origin of the Missouri Escarpment, North Dakota," in *Glacial Geology of Central North Dakota, 1987*, ed. North Dakota Geological Society (Bismarck, ND: NDGS, 1987).

[3] Miry Creek Area History Book Committee, *Bridging the Centuries: Shackleton, Abbey, Lancer, Portreeve* (Abbey, Saskatchewan: Miry Creek Area History Book Committee, 2000).

[4] E.A. Christiansen, "The Wisconsinan Deglaciation of Southern Saskatchewan and Adjacent Areas," *Canadian Journal of Earth Sciences* 16 (1979): 913-938.

engineers built a large dam 200 kilometres downstream of Cabri, flooding the valley.[5] Irrigation of lands further downstream was a primary aim of the project[6], although little water was available to Miry Creek farmers for that purpose.

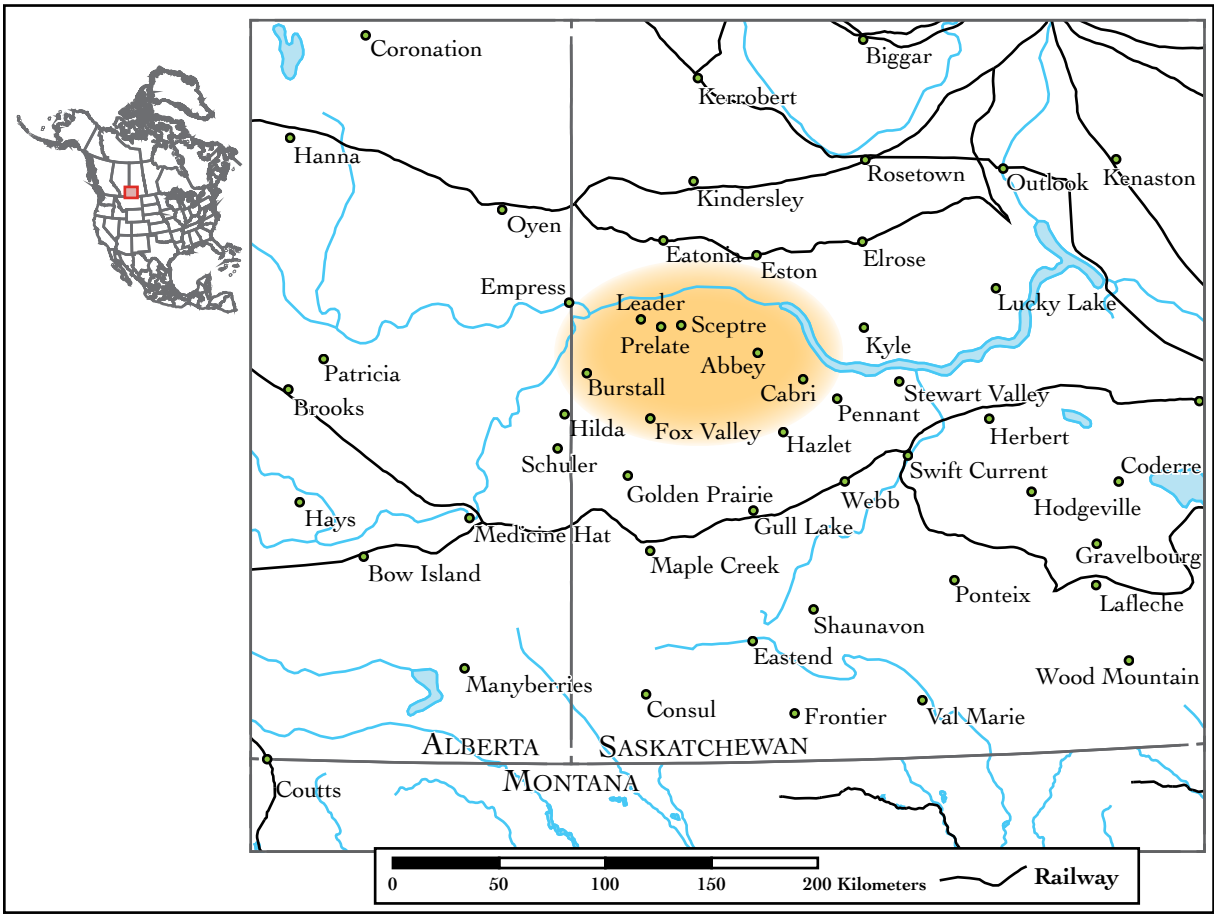

FIGURE 5.1 Map of the Miry Creek, Saskatchewan area (in gold).

Virtually all of the Miry Creek district is cropland, sown each spring with a nearly-equal mix of grains, oilseeds, and pulses.[7] A few untilled grazing areas remain, mostly along steep-sided narrow gullies. The short distances of barbed-wire fence outlining these small patches of grassland pose little inconvenience to small herds of pronghorn antelope that roam unhindered through neighbouring fields of wheat, barley, and peas. In summer months, Swainson's hawks soar overhead, searching for field mice and Richardson's ground squirrels.

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[5] Canada, Agriculture and Agri-Food Canada, Agri-Environment Services Branch, *75 years: PFRA-AESB 1935-2010,* (Ottawa, 2010).

[6] Canada, Department of Agriculture, *Survival of a Vision*, by George Spence. Historical Series No.3. (Ottawa, 1967).

[7] Observed June, 2009.

Trees are scarce, just a few scattered poplars growing in the sheltered gullies and some intermittent rows of caragana shelterbelt planted by farmers to shield crop fields from the persistent winds and to trap snow for moisture.

Farmyards in the Miry Creek area are well spaced, each one to two miles from its nearest neighbour. Many yards are long-abandoned, their past domestic existence marked only by unruly hedges of caragana or lilac. In some of the farmyards, decades-old wooden granaries remain in use. In some, a greying, sagging house or barn persists. The handful of occupied farms have large yards with modest bungalows, metal machine sheds, assorted outbuildings, large corrugated steel grain bins, and neat rows of expired machinery. Roads of gravel or dirt extend north-south every mile and east-west every two miles. Alongside the roads, intermittent orange marker stakes signal the presence of buried electrical and telephone cables. Miry Creek is, in its entirety, a human-built landscape (Fig. 5.2).

FIGURE 5.2 Farm in the Miry Creek, Saskatchewan area. To the north, the Missouri Coteau rises above the surrounding land *background*. In the fields, peas are newly in flower. The farmstead is long abandoned. Photograph taken June, 2009.

Humans have been part of the South Saskatchewan landscape for millennia. Approximately fifty kilometres from Abbey, one of the oldest archaeological sites in Saskatchewan provides evidence that people have occupied the area for at least 9,000 years.[8] Century after century, a succession of cultures maintained bison-hunting economies, their population numbers ebbing and flowing with long-term variations in climate. Niitsitapi, Nakota, and A'ani peoples were well-established in the area by the time the Hudson's Bay Company (HBC) founded its short-lived Chesterfield House trade post at the forks of the Red Deer and South Saskatchewan Rivers in 1800.[9] By 1823, competing Aboriginal interests forced the HBC to abandon what had been the first European foothold on the open plains.[10]

For the first half of the nineteenth century, the district remained the bison-hunting grounds of Aboriginal people. In 1859, John Palliser's British North American Exploring Expedition mapped the region.[11] Palliser did not recommend the area for settlement, but was interested in charting the navigational possibilities of the South Saskatchewan river system. Forty years after Palliser's visit, the Miry Creek district was virtually unoccupied. Shortly after the Cree and Saulteaux signed Treaty Number 4 at Fort Qu'Appelle in 1874, the Crown removed Aboriginal people to newly-surveyed reserves located far from Miry Creek.[12]

The Miry Creek district remained unoccupied for the final two decades of the nineteenth century, until a few Euro-American ranchers arrived in 1896.[13] The first farmers

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[8] Refers to the 'Heron-Eden' Site. See Marcel Ronald Corbeil, "The Archaeology and Taphonomy of the Heron Eden Site, Southwestern Saskatchewan" (master's thesis, University of Saskatchewan, 1995) and Aileen Anne Novecosky, "The Heron Collection: Antelope Creek and Miry Creek Sites, Southwestern Saskatchewan" (master's thesis, University of Saskatchewan, 2003).

[9] Gerhard J. Ens, "Fatal Quarrels and Fur Trade Rivalries: A Year of Living Dangerously on the North Saskatchewan, 1806-07" in Catherine Anne Cavanaugh, Michael Payne, Donald Grant Wetherell ed., *Alberta Formed, Alberta Transformed* (Calgary: University of Calgary Press, 2006), 4:133-160.

[10] Ibid.

[11] Irene M. Spry, *The Palliser Expedition: The Dramatic Story of Western Canadian Exploration, 1857-1860* (Toronto: Macmillan, 1963). See also Bill Waiser, *Saskatchewan: A New History* (Calgary: Fifth House, 2005).

[12] Treaty 4 covered the "Tribes of Indians inhabiting the Territory therein indicated, lying West of the Boundary of Treaty No. 2, and between the International Boundary Line and the Saskatchewan." Although Niitsitapi (Blackfoot), Nakota (Assiniboine or Stoney), and A'ani (Gros Ventre) peoples occupied the district when the HBC manned Chesterfield House, Treaty 4 was signed "between Her Majesty the Queen and the Cree and Saulteaux Tribes of Indians at the Qu'appelle and Fort Ellice." Qu'appelle and Fort Ellice are situated over 350 and 500 kilometres respectively to the east of Miry Creek. By the time the numbered treaties were signed in the 1870s, the Cree and Nakawē (Saulteaux) peoples had largely displaced the Niitsitapi, Nakota, and A'ani in what is now western Saskatchewan. The latter peoples signed Treaty 7 in 1877, restricting them to reserved land west of 110°W. See Canada, Order in Council, *Setting Up Commission for Treaty No. 4*, P.C. No. 944; and Canada, Order in Council, *Setting Up Commission for Treaty No. 7*, P.C. No. 650.

[13] Miry Creek Area History Book Committee *Bridging the Centuries*.

appeared four years later.[14] Other newcomers passed through the area along the Red Deer Forks - Edmonton Trail, an overland pre-railway conduit for settlers and traders migrating to more attractive destinations to the northwest. About ninety kilometres west of Abbey, the trail forded the river near the Red Deer - South Saskatchewan forks. At that point, travellers could follow a branch trail to Fort Benton, Montana, or continue to Edmonton.

In 1910, the Canadian Pacific Railway (CPR) started work on the Swift Current - Empress branch line, completing it as far as Abbey by 1913.[15] The track connected Miry Creek, via the CPR's main line, to Vancouver and Eastern Canada. It also opened a direct connection, via the CPR's subsidiary Soo Line, to Minneapolis and Chicago. Immediately after train service began, rudimentary farms and newly ploughed fields dotted the district. Over the next ninety years, individual farms both flourished and failed, but throughout that time, farmers worked fields, built roads and planted trees, the agricultural economy persisted. The agricultural landscape became permanent.

Created over a century, anthropogenic landscapes such as that of Miry Creek took their complex and characteristic forms because landholders responded to highly localized geographies and variable weather patterns. Some farmers had arrived in the northwestern plains armed with experience and knowledge gained in other places. They enjoyed an invaluable advantage, quickly building up their farms in an area that, at one time, had been considered unfit for agriculture. Newcomers not possessing such expertise were obliged to work out the nuances of the land and weather, learning over time which adaptations worked most efficiently and reliably.

In the early twentieth-century Canada and United States, prevailing deterministic frontierist attitudes greatly influenced the land settlement policies advanced by governments and agricultural experts. Authorities were convinced that western expansion, guided by the progressive mechanisms of scientific enquiry and industrial production, would convert an under-utilized wilderness into a productive ecumene. As Miry Creek was connected to eastern Canada and the United States by the CPR in 1913, so would all other new northwestern dependencies become firmly entwined with the East and its American/British values of capital and governance. Over the following pages of this and the next chapter, several place-based narratives reveal different political, economic, environmental, and personal contributions to the making of a distinct region with unique geographical histories.

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[14] Ibid.

[15] Ibid.

The land immediately south of the Red Deer River Valley, to the west of Miry Creek in south-central Alberta, is a mix of geographical contrasts. From some vantage points, where severely denuded badlands extend outwards from the river, the land appears to be among the least hospitable on earth for agriculture. Yet just beyond the barren badlands, lies vibrant crop land and lush pasture. The area is semi-arid, receiving the bulk of its moisture from infrequent summer storms and spring melt runoff. Before conversion to crop agriculture, the landscape, comprised of flat poorly-draining clay-rich glacial lake sediments, was covered with a mix of short and mid-height grasses, sages, and other prairie forbs.[16] Trees were scarce, growing only in the low-lying gullies.

In 1900, the crops and pastures had not yet appeared. That year, a semi-retired ranch-hand named John Ware settled on a relatively sheltered bank of the Red Deer River, about forty kilometres northeast of Brooks. Having chosen his new homestead site, Ware set about building a small house and some livestock shelters. A freed slave originally from South Carolina, Ware had worked as a drover in Texas until his move to the North-West Territories in 1881. A physically imposing and gregarious figure, Ware soon became locally famous in the Calgary area.[17]

Giving up droving in the 1890s, Ware established his first homestead in the Turner Valley southwest of Calgary. Perhaps due to his lack of farming experience, Ware's first farm was "unproductive." According to his daughter, John Ware was much more proficient with cattle raising than with farming.[18] Ware then decided to move to the Red Deer district, an area which few had considered worth farming. As had happened in Calgary, Ware quickly became something of a folk hero in the Brooks area and, following his death, several topographical features were named for him, including the main irrigation canal that passes through the study area. In 1905, John Ware died in a farming accident, mere days after Alberta was named a province. Ware's story fits perfectly the North American western narrative of the 'lone pioneer.' In Alberta, though, where 40,000 farmsteads had been granted between 1901 and 1905, the achievement of provincial status instantly closed the gate on the ranching and pioneer era, and marked the birth of a modern agricultural economy.[19]

In 1905, the few nascent farms north of Brooks were scattered along the Red Deer River near John Ware's old homestead. Like many other areas of the western borderlands,

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[16] Joseph D. Shorthouse, "Ecoregions of Canada's Prairie Grasslands" in *Arthropods of Canadian Grasslands (Volume 1): Ecology and Interactions in Grassland Habitats*, ed. J. D. Shorthouse and K. D. Floate (Ottawa: Biological Survey of Canada, 2010) 53-81.

[17] Warren M. Elofson, *Frontier Cattle Ranching*.

18 Janet Ware, "The Ware Family of Duchess," in Duchess and District Memories, ed. Duchess and District Historical Society (Brooks, Alberta: Nesbitt Publishing, 1982), 445-446.

[19] Alberta, Department of Agriculture and Development, "Agriculture in Alberta: The History of Agriculture in Alberta." http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/agdex2

without deliberate environmental modification, most of the area would have been destined to remain open range land. This outcome was circumvented by the initiation of several irrigation projects.[20] Realizing the importance of irrigation for attracting settlers to the unappealing semi-arid lands situated between the Red Deer and South Saskatchewan rivers, the CPR purchased controlling interests in existing irrigation companies, and undertook several expensive new infrastructure developments. One large initiative, the Bow River Irrigation Project, resulted in the building of a massive dam and reservoir. Completed in 1914, the Bow River Dam diverted water through approximately 3,000 kilometres of canals, aqueducts and syphons, for distribution to what had been previously considered unusable land (Fig. 5.3).[21]

FIGURE 5.3 The Bassano Dam and Reservoir. Photograph taken July, 2009.

[20] C.S. Burchill, "The Eastern Irrigation District," *Canadian Journal of Economics and Political Science* 5, no.2 (May, 1939): 206-215.

[21] Ibid.

A strong incentive impelled the CPR to undertake the ambitious Bow River project. Approximately 200 kilometres of the CPR main line ran westward from Medicine Hat across virtually unoccupied grassland. Successful agricultural settlement would offset the cost of needed service points. The completion of the first branch canals and the subsequent opening of the Empress-Bassano CPR subdivisional rail line in 1915 finally made agricultural settlement practical in dry land south of the Red Deer River. Wishing to prevent wide-scale failure, the CPR attempted to lower costs borne directly by producers. However, in 1926, the total number of acres in crop had declined to less than three quarters of what it had been in 1921. By 1930, barely one quarter of the installed 400,000 acre irrigation capacity was being used. In 1935, the CPR, having lost almost $25 million on the Bow River Project and, desperate to rid itself of a costly failed venture, turned over all project assets to the newly-formed Eastern Irrigation District (EID). With the Eastern Irrigation District Act, the province established the EID as a landowner-administered land management cooperative.[22]

Following the Second World War the EID-managed landscape changed very little.[23] Availability of irrigation water remained at the heart of most land use decisions. Large portions of the area still were considered unfit for agriculture. However, even though the CPR venture had failed, agriculture proved to be reasonably viable under collective landowner administration. Land that was unirrigable was, for the most part, reserved for grazing under direct EID board control.[24] Any proposal for agricultural expansion was carefully evaluated by the board before permission was granted to proceed. The irrigation water, directly managed by the EID, allowed crop agriculture to be modestly successful on relatively flat lands such as those of the Ware ranch.

The CPR's expensive efforts to build and maintain their Alberta irrigation network demonstrate that the northwest plains climate was barely viable for rain-fed agriculture, certainly not without large capital and technological inputs. 'Drought' had occurred frequently from first settlement from 1905 to 1910, and through to the 1920s.[25] The 1930s drought, more widespread across the entire Great Plains was, in the northwest, not an *unexpected* calamity for farmers and government agents. The area was *known* to be dry. The limited climate record showed that a large proportion of years received less precipitation than was required to sustain crop agriculture.[26]

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[22] Burchill, "Eastern Irrigation District."

[23] See Chapter 3.

[24] Eastern Irrigation District, "Policy Governing Eligibility and Operation of Community Pastures," in *Eastern Irrigation District Policy Manual, 2013* http://www.eid.ca/documents/other/Policy_Governing_Elgibility_and_Operation_of_Community_Pastures.pdf

[25] Jones "Canadian Prairie Dryland Disaster."

[26] United States, NOAA-NCDD; and Environment Canada, NCDIA.

It can be argued that the 1930s drought crisis, at least its meteorological aspect, simply coincided with a collective comprehension of the region's environmental limitations. The 1930s drought occurred merely a decade after the last damaging drought, and only fifteen to twenty years after initial settlement. Government scientists approached it not as a temporary event requiring one-time emergency response, but rather a permanent condition, offering the opportunity to 'adjust' land use systems to best suit the setting. The economic depression was a different matter. Losses endured due to poor market conditions provided further evidence that crop agriculture was viable only at a certain scale, with sufficient capital resources, and especially, if markets permitted a reasonable return within an average or better-than-average precipitation year.

Government intervention is the key element of the Brooks land management history. The EID example was just one within the northwestern plains where provincial, state, and federal government agencies took responsibility for the agricultural well-being of their respective jurisdictions. The Province of Alberta was *compelled* to interject following the failure of an enterprise initiated by one of Canada's largest corporate entities. Direct government involvement in agriculture was not novel. Beginning in the last decades of the nineteenth century, governments increasingly created sweeping policy portfolios directed at agricultural success. The very existence of agriculture at all in the Northwest had been driven largely by pre-settlement land organization and disbursement policies. Public support for railways to provide necessary accessibility, and in the Brooks case, water, made secure settlement possible.

Governments also immersed themselves in field level production research and knowledge sharing, establishing and providing substantial funds to experimental stations and outreach programs. Direct government involvement in agricultural land management was from a position of scientific and economic authority. In creating the EID, however, the province acknowledged that the people working the land were those best suited to manage it. On the northwestern plains, reliance on local knowledge would become an important component of government agricultural support.

* * *

Taber, Alberta is situated one hundred kilometres west of Medicine Hat along Alberta Highway 3, or, alternatively, one hundred kilometres south of Brooks on Highway 36. Travel along either route entails a journey across a stereotypical western plains landscape. From Brooks, farmland is interspersed with pasture, towns are sparse and small, with only a few large, well-kept, mostly prosperous farms dispersed along the highway. The road rises and falls across deep wide spillway valleys cut by the Bow and Oldman rivers.

The landscape along Highway 3 from Medicine Hat is similar. The highway runs parallel to the CPR Crowsnest Route, a stretch of track that every western Canadian grain farmer once knew almost mythically through its association with a long dominant federal transport subsidy scheme.[27] Beginning in the 1950s onwards, the area was among the first in Canada to install centre-pivot irrigation as the St. Mary's Irrigation District was extended eastward. Similarly, the highway south from Brooks also passes through a heavily irrigated landscape. A present day observer would have difficulty reconciling these landscapes, green, scenic, productive, and prosperous, as spaces that one historian described as "desolate places to be buried in."[28]

Upon reaching Taber, from either the north or east, the landscape changes. The farms give way to a large service town; at over 8,000 people, a city by northwestern plains standards. Taber provides the expected array of agricultural services including implement dealers, fuel and fertilizer suppliers, as well as grocery and home retail stores, big box strip malls, and fast food outlets. Compared to the surrounding farmscape, Taber is incongruously industrial. Eleven agricultural processing plants fill the town.

Taber is a clear example of how a balanced combination of technology, labour supply, and transportation infrastructure can have great influence on surrounding agriculture choices. Near Taber, unlike anywhere else in the study region, numerous non-grain crops are grown including potatoes, corn, sugar beets, pulses, and table vegetables. A consumer living in Calgary, Saskatoon, Red Deer, or any other city in western Canada, is almost certain to have recently purchased a food product: fresh vegetables, potatoes, potato chips, milk, onions, or sunflower oil, originating in Taber. For *all* western Canadians, one food staple, sugar, either as refined table sugar, or in food processed elsewhere in western Canada, is almost *guaranteed* to have come from Taber. Due to longstanding and complex legislation on both sides of the Canada-United States border, virtually all sugar consumed on the Canadian Prairies originates in southwest Alberta.

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[27] The 'Crow's Nest Pass Agreement' of 1897, negotiated between Canada and the CPR, specified a set rate for grain transportation (the 'Crow Rate') in exchange for a Crown subsidy for building the Crow's Nest Pass route form Medicine Hat to Vancouver. In the 1920s, the rates were extended to other routes and railways including the CNR. The rates were often contentious, with railways, especially after the 1950s, feeling they were not high enough to cover costs. The government continually navigated the politically charged issue until the 'Crow' was replaced with the Western Grain Transportation Act in 1983. See Darcie Doan, Brian Paddock, and Jan Dyer, "The Reform of Grain Transportation Policy and Transformation in Western Canadian Agriculture" in David Blandford and Berkeley Hill ed. *Policy Reform and Adjustment in the Agricultural Sectors of Developed Countries* (Wallingford, UK: CABI, 2006).

[28] David C. Jones used this description as the title of a chapter in which he described universal agricultural and social failure in the Bow Island area during the 1920s. See Jones, *Empire of Dust*.

TABLE 5.1 Agricultural product processors in Taber, 2013
Alberta Community Profiles, Taber, Economic Base https://albertacommunityprofiles.com/Profile/Taber/4

Alberta Pool Bean Business Unit - Bean Contracting and Production
Chin Ridge Seed Producers - Seed Sales
Frito-Lay Products - Potato Chips
Greenley Trading (Canadian Bean Division) - Contract Bean Broker
Gouw Quality Onions - Vegetable Production
Lamb Weston - Potato Processing
Lucerne Foods - Processed Foods and Canning
Masterfeeds - Livestock and Poultry Feeds
Roger's Sugar - Granulated Sugar, Icing Sugar, Molasses
Select Turkey - Poultry Processing
Sunland Foods - Table Produce

FIGURE 5.4 Irrigated corn (left), and canola (right), near Taber, Alberta, July, 2009. Whereas most corn grown in the northern plains is destined for livestock feed, with a much smaller portion going to ethanol and High Fructose Corn Syrup markets, much of the corn grown near Lethbridge is used as a food grain. Frito-Lay Canada operates tortilla and potato chip plants in Lethbridge and Taber, contributing to a strong local market for non-wheat crops. The irrigation infrastructure is producer-managed within the Taber Irrigation District.

By commodity ton, sugar has never been more than a paltry part of overall Canadian and western United States agriculture. In the northwest, sugar beets (a strain of common *Beta vulgaris*) are the raw material for crystalline sugar. Beets are a high value crop, albeit one with high labour demands, and limited tolerances for less-than-optimal temperature and moisture conditions. Irrigation is essential in the northwest. Sugar has also historically been the most policy-controlled commodity in North America, with notable legislative differences between the Canada and the United States, largely around import and export controls and production quotas.

Canada's first sugar processing plant was built in 1903 by the Knight Sugar Company at Raymond, Alberta, only because the Canadian government had agreed to pay a $1 per 100 pounds subsidy to farmers, for a guaranteed twelve years (Fig. 5.5).[29] By 1914, with the agreement about to expire, disappointing production due to poor weather and insufficient irrigation water from the , forced the unprofitable factory to close. The very year the Knight plant closed, Britain's Royal Commission on Sugar Supplies specified strict controls on the import of sugar into Canada.[30] These policies strengthened domestic demand, however, the Commission also decided that prices would not be controlled, but rather remain subject to the free market, ultimately determining the future farm economics of growing beets. Even with the available St. Mary's irrigation infrastructure, strong prices and guaranteed demand still had to overcome the limits of year-to-year weather.

Following the First World War, as grain prices began to fall, and as the Alberta irrigation network expanded, Lethbridge area farmers renewed their interest in sugar beets. Local boards of trade in Raymond, McGrath, and other towns petitioned the Utah-Idaho Sugar Company, a large business owned by the Church of Christ (Latter-Day Saints), to build a new Canadian plant. Utah-Idaho's interest in the proposal was tempered by their conditional requirement of two year crop feasibility tests to be conducted in 1923 and 1924. Should the test beets prove to produce at minimum thresholds for quantity and sugar content, Utah-Idaho further insisted that 6,000 acres would be fallowed in 1924 ahead of seeding to beets in 1925. Ultimately, the conditions were met and the Utah-Idaho owned Canadian Sugar Factories Limited was built over the summer of 1925. Due to mounting losses encountered during the first few years of production, culminating in the complete ruin of the

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[29] Leland Buff, "Sugar Beet Production," in *Water Works Wonders: A History of the White, Wilson, McMahon, River Junction School Districts,* edited by McNally Community Association, 95-97, (Lethbridge: McNally Community Association, 1995).

[30] Britnell and Fowke, *Canadian Agriculture.*

1930 harvest due to an early snow storm, Utah-Idaho sold the Raymond plant to the Canadian-owned Rogers Brothers British Columbia Sugar Refining Company in 1931.[31]

FIGURE 5.5 Irrigating sugar beet field, ca. 1904 near Raymond, Alberta. The first large-scale irrigation project in Alberta was initiated in 1898 as a partnership between Galt Irrigation Canals and the Mormon Church (image courtesy of Library and Archives Canada).

On the United States side of the border, sugar production history had followed a course shaped by environmental constraints similar to those in Alberta, but with very different policy influences. As in Alberta, sugar beets are a tertiary crop in Montana, contributing only a relatively small amount of value to the state's overall agricultural output, but locally important in a few areas. Like elsewhere in the Great Plains, beet cultivation was geographically restricted. Since the 1950s, all Montana sugar beets are grown in sandy loam

[31] Buff, "Sugar Beet Production."

soils found in association with the Yellowstone River and its tributaries.[32] The arable portion of northeast Montana centred around Sydney, earmarked by M.L. Wilson in the 1920s for 'new' agriculture, is still characterized by prominent beet production.

For the past six decades, there has been a complete *absence* of sugar beet cultivation within the Montana Triangle study area.[33] Early in the twentieth century, at the time of first agricultural settlement, sugar beets had been promoted as a potential crop in the Triangle, but were never pursued simply because no nearby processing facility was available. Any sugar beets grown were used strictly for animal feed purposes.[34] In 1914, local business owners proposed to build a sugar processing plant in adjacent Teton County, located west of the study area, with a community-organized fund to support its construction.[35] After a few years of little activity or investment, the idea was dropped.[36]

On the eastern edge of the Triangle, a sugar factory was eventually built in Chinook, Blaine County. In 1924 the Utah-Idaho Sugar Company shipped 100 rail cars of sugar processing equipment from a recently-closed factory in Washington State to north-central Montana, with the expectation that production would begin the following year.[37] In 1925, 6,000 acres of sugar beets were seeded in the Triangle.

The rapid development of beet growing in north-central Montana required labour. Large numbers of undocumented Mexican workers were transported from the United States southern border to the Milk River beet growing area. Such was the scale of labour importation, United States government concerns over illegal Mexican immigration across the *northern* border spurred the establishment of a border patrol station in Havre.[38] By 1940, the seeded acreage in the Chinook area exceeded 16,000. During the Second World War, the labour requirement was filled not only by additional Mexican workers, but also by interred

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[32] United States, Department of Agriculture, National Information System of the Regional Integrated Pest Management Centers, *Crop Profile for Sugar Beets in Montana* http://www.ipmcenters.org/cropprofiles/docs/mtsugarbeet.pdf

[33] In 2012, total sugar subsidies granted to producers in Chouteau, Liberty, and Hill counties amounted to $0. Environmental Working Group, "Farm Subsidy Database" http://farm.ewg.org

[34] At the time of first settlement beets were actually a recommended feed crop. See Helen Fitzgerald Sanders, "History of Chouteau County," in *A History of Montana* (Chicago: Lewis Pub. Co., 1913).

[35] Nancy Thornton, "News Highlights from 1914 Teton County Montana," (compiled from the Choteau Montanan) http://www.rootsweb.ancestry.com/~mtteton/1914newshighlights.html

[36] Ibid.

[37] Leonard J. Arrington, *Beet Sugar in the West: A History of the Utah-Idaho Sugar Company, 1891-1966* (Seattle: University of Washington Press, 1966). The Union Gap, Washington plant closed in 1918 due to a prolonged outbreak of Beet Curly Top Virus.

[38] United States, Customs and Border Protection, "History of Havre Border Station" http://www.cbp.gov/xp/cgov/border_security/border_patrol/border_patrol_sectors/havre_sector_mt/stations/havre.xml

German prisoners.[39] Following the war, in 1953, the Chinook processing plant subsequently closed for "economic reasons."[40] That year, a number of countries, although not the United States, signed the International Sugar Agreement. The pact set a complex set of export quotas for member countries with the intent of stabilizing global sugar prices. It had little effect on the market and prices continued to fall.[41] The agreement was renewed for another five years in 1957.[42]

Canadian sugar policy was altered in the Second World War, as part of a much wider sweep of production controls on almost all agricultural commodities. Wartime law imposed nominal sugar production caps, to be maintained throughout the duration of the war, but due to the limited extent of seeded acreage, these were in little risk of being surpassed. Furthermore, the Canadian government had resisted strong pressure to provide a compensatory subsidy to beet farmers. The federal government did concede to relent on the sugar excise tax, lowering it by $1 per ton in the hope of increased production. The combined net effect of wartime federal sugar production policy was nil, and beet acreage remained stable throughout the 1940s.[43]

Before the Second World War, approximately forty percent of Canada's total 50,000 acres of sugar beet production was concentrated in Alberta around Lethbridge. Southern Ontario accounted for the remainder. By the outbreak of the Second World War, Alberta production was sufficient to meet only six percent of Canada's overall demand, even with import controls in place. The majority of Canadian consumed sugar was cane-derived, imported from the Caribbean for eastern markets, or from Australia for British Columbia and the prairies. The relatively higher costs of domestic production and transportation meant that western Canadian beet farming viability directly depended on a strong regional market. In its 1954 annual report, BC Sugar noted that the "volume of sales is almost entirely domestic in nature, so our volume of sales is almost directly dependent on the population of the three western provinces." BC Sugar optimistically predicted that the growing BC population would help future sales.[44]

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[39] Chinook Area Chamber of Commerce "The History of Chinook, Montana" http://www.chinookmontana.com/History.html

[40] Arrington, *Beet Sugar*. Curiously, the area adopted a cultural identity based on the beet industry *after* the factory had closed. School teams are named the Sugarbeeters, and the town of Chinook now holds an annual Sugarbeet Festival.

[41] The British Columbia Sugar Refining Company, Limited, *Consolidated Accounts and Report for the Year Ending September 30th, 1954.*

[42] BC Sugar, 1958.

[43] Britnell and Fowke, *Canadian Agriculture.*

[44] BC Sugar, 1954.

An increase in beet production in Alberta was only realized with the introduction of new freight subsidies in the late-1940s, coupled with an increase in mechanization driven by a post-war labour shortage. During the war, production had been maintained largely through the employment of interred Canadian Japanese people, moved in 1944 to the Lethbridge area in large numbers to work on sugar beet farms.[45] Pre-war, sugar processing had been focussed at two locations, north and south of Lethbridge, at Picture Butte, and Raymond. In 1950, a modern processing factory was built in Taber. That year, beet acreage in the Taber district exceeded 60,000, three times the previously-stable pre-war amount (Fig. 5.6).

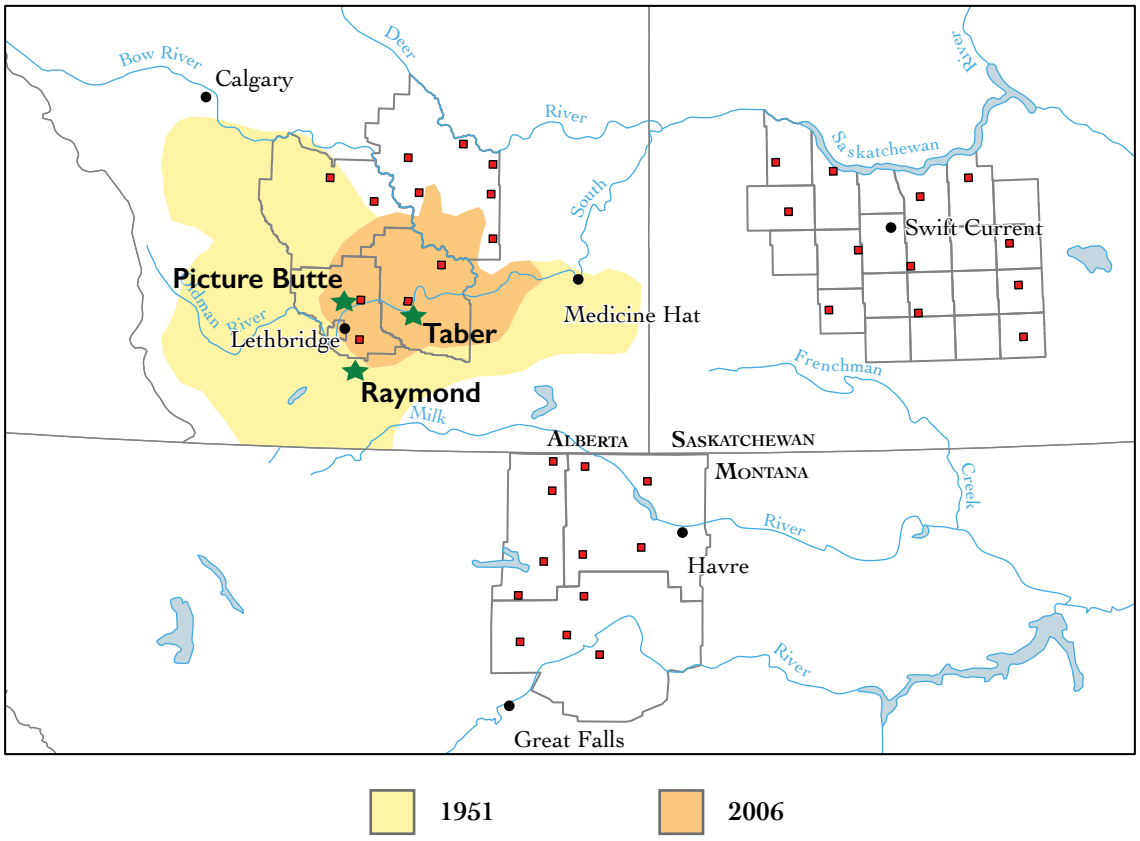

FIGURE 5.6 Sugar beets growing areas in Alberta 1951 (*yellow*) and 2006 (*orange*). Locations of processing plants shown (*green stars*).
after Remote Sensing and Geospatial Analysis (RSGA), Agriculture Division, Statistics Canada, 2008.

[45] Britnell and Fowke, *Canadian Agriculture*. For a detailed analysis of beet production labour history in the pre-war period, see John Herd Thompson and Allen Seager, "Workers, Growers and Monopolists: The "Labour Problem" in the Alberta Beet Sugar Industry During the 1930s," *Journal of Canadian Labour Studies* 3 (1978): 153-174.

Sugar beet production continued to expand through the 1950s. A new record tonnage was taken in 1952, and the 1953 sugar beet harvest contributed to the third largest total refined sugar production in BC Sugar's corporate history. Another production record was achieved in 1956.[46] These harvest successes caused other problems. The 1953 crop added to a large volume of unsold sugar carried over from the previous year, a situation that, in the understated words of BC Sugar's directors, "presented a marketing problem."[47] Even after relatively poor fall weather conditions in southern Alberta in the late summer of 1957, another 600,000 tons of beets, the most ever harvested, led to BC Sugar to warn "…once again, the problem of storing and disposing of the sugar produced becomes of major importance."[48] The 'overproduction problem' was only alleviated when adverse weather in Manitoba in 1959 resulted in a thirty percent drop in beet tonnage there, with that harvested having "abnormally low" sugar content. The Manitoba crop failure allowed BC Sugar to ship crop surplus from Alberta to its Winnipeg, Manitoba processing plant.[49] Labour supply remained a problem for the post-War Alberta agricultural industry. BC Sugar officials noted in 1956:

> "The chief problem confronting the industry in Alberta at the present time is the difficulty in securing sufficient farm labour. Increased mechanization of beet cultivation is helping to minimize the problem, but it is a long way from being entirely solved."[50]

In the early 1950s, European migrants filled the labour void, but by the mid-1950s, post-war European quality of life improved, reducing migration to Canada and threatening the viability of Alberta beet cultivation. BC Sugar noted that each year, labourers "drifted off into industrial work or themselves became farmers."[51] The boom economy of the early 1960s, particularly in western Canada, further strained labour supply, raising wages for both farm and processing workers. Throughout the 1960s and 1970s, BC Sugar continued to struggle with their labour issues, reassuring investors in 1965, that:

> "…our Company together with our growers and the Department of Agriculture, is exploring every means of reducing the amount of farm labour required. This work includes the production of monogerm seed suitable for our

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[46] BC Sugar, 1957.

[47] BC Sugar, 1954.

[48] BC Sugar, 1958.

[49] BC Sugar, 1959.

[50] BC Sugar, 1956.

[51] BC Sugar,, 1956.

climate, mechanization of cultivation and harvesting procedures, and increased use of modern herbicide techniques."[52]

By 1973, with a new Liberal federal government in power, and a newly emerging national social-political ideology, BC Sugar resorted to blaming federal policy for the company's labour woes, lamenting, without evidence: "In our view, the extensive welfare programs initiated by the Federal Government encourage many people to prefer unemployment benefits to working for a living at good wages."[53]

At the close of the 1950s, with sugar prices stable due to the International Agreement, the economics of Alberta sugar production faltered. Cuba, the supplier of one third of United States sugar, nationalized its industry in 1960. By 1958, the United States had "for many years" obtained 35% of its sugar supply from Cuba, the largest sugar supplier in the world, at prices "considerably higher" than were available to producers in other countries.[54] With Cuba's sugar industry cut off from its traditional buyer and now competing globally, world markets went through wild fluctuation in the first years of the 1960s. Many countries abandoned pursuit of another international agreement after the existing one came to an end in 1962, further driving down prices for member countries. The USA continued to enforce its quota and moved to rapidly increase domestic production.[55]

The effect of these events on prices proved difficult for the western Canadian industry. In 1961, BC Sugar complained that with the "confused conditions" caused by the Cuba situation, it was "quite ridiculous" that the USSR was rapidly expanding production, and the USA was endeavouring to increase domestic output. Prices dipped to below pre-war levels. Other global political disruptions, including the Arab-Israeli War, and what BC Sugar directors referred to as "brush-fire wars threatening to go large" in newly-independent countries added to the sugar price instability.[56] Despite the price volatility, BC Sugar continued to upgrade and modernize the Alberta plants through the 1960s. In 1966, BC Sugar optimistically:

"…hoped that as the standard of living in the so-called 'emerging' countries improves, so also will their per capita consumption of sugar. This, together with

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[52] BC Sugar, 1965.

[53] BC Sugar, 1973.

[54] BC Sugar, 1959.

[55] BC Sugar, 1962.

[56] BC Sugar, 1969.

an expanding world population, may eventually bring demand for sugar nearer to supply and world prices up to the true cost of production."[57]

BC Sugar's deep concern over future global market prices was curious considering the company was really only supplying a restricted domestic market with its production, and was having to import large quantities of raw cane, under preferential trade conditions, to meet Canadian demand. To make up for slimming profits in the early 1960s, BC Sugar found new markets for sugar by-product material, particularly animal feed that could supply Alberta's newly and rapidly developing beef "fattening and finishing" industry.[58] The Picture Butte and Taber factories[59] were updated to process molasses, dry pulp, and pelleted pulp.[60] The venture proved profitable. By 1967, BC Sugar had "no difficulty" in marketing the entire output of feed products.[61] By 1973, demand for beet pulp and feed molasses exceeded supply and BC Sugar invested heavily in expanding the feed side of their business, creating new storage and distribution infrastructure. The company, which owned a large commercial feedlot at Picture Butte, also invested in various farm and lab feed testing programs, "not only for the financial benefit of the Company, but also to keep abreast of markets and bring the very latest feeding techniques to customers."[62]

Worried about unpredictability in the sugar market, BC Sugar further diversified into fertilizer sales (mainly back to sugar beet producers) and cereal grain genetic seed research under a new "World Seeds, Inc." subsidiary.[63] The latter venture made some sense in the era of the Green Revolution. BC Sugar had earlier undertaken substantial seed research, adapting previously imported European beet seeds and boasted of having made great strides through "careful, scientific breeding"[64] Unfortunately, because the new grain seed venture had been set up privately with American scientific partners, the seed was ineligible for import into Canada.[65] Furthermore, BC Sugar was surprised to receive a substantial amount of unfavourable publicity on its seed research. A new era of public environmental awareness and

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[57] BC Sugar, 1966.

[58] BC Sugar, 1961.

[59] BC Sugar, 1963. By 1963, all BC Sugar production operations were concentrated at these two plants.

[60] BC Sugar, 1961.

[61] BC Sugar, 1967.

[62] BC Sugar, 1973.

[63] BC Sugar, 1967.

[64] BC Sugar, 1962.

[65] BC Sugar, 1969. BC Sugar had noted that "great progress" was made with the seed research.

suspicion of corporate science in the 1960s hurt American sales. World Seeds was divested to the American partners in 1969.

BC Sugar further diversified its business interests in the 1970s, this time well beyond agriculture, investing in packaging and paperboard,[66] natural gas exploration,[67] and eventually, Calgary residential real estate development during the 1980s oil boom.[68] By 1977, in Alberta, the company had its two sugar operations at Taber and Picture Butte, two livestock feed manufacturing plants, six fertilizer distribution sites, and seven gas producing properties (including a large one next to the Princess study block in the northern portion of the study area).[69] Soon after, BC Sugar closed the Picture Butte sugar plant, partly due to rising freight and labour costs, but also to avoid installing provincially-ordered pollution control equipment. The Picture Butte operations relocated to Taber, which had yet to reach its oft-expanded capacity.[70] By the end of the 1970s, despite the continued profitability of sugar production, BC Sugar seemed more interested in their gas and packaging operations.[71]

Despite BC Sugar Company complaints to the contrary, overall company profits continually rose throughout the 1960s. Because Canada only bought from Commonwealth producers, the deterioration in USA-Cuba relations had little effect on Canadian domestic prices.[72] By 1969, the first International Agreement following the Cuba disruption was finally in place, raising prices. In 1971, production acreage was curtailed, but due to "very favourable growing conditions" record production of over 1,000,000 tons, leading BC Sugar to further reduce acreage in 1972.[73] The mechanization, plant development, and subsidies were *too* successful within the unique regionalized context of the Canadian sugar market.

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[66] BC Sugar, 1970.

[67] BC Sugar, 1976.

[68] BC Sugar, 1982.

[69] BC Sugar, 1978.

[70] BC Sugar, 1977.

[71] The 1978 BC Sugar annual summary report has *one* paragraph on sugar, *ten* paragraphs on the Belkin Packaging Company, and *four* paragraphs on natural gas development.

[72] BC Sugar, 1959.

[73] BC Sugar, 1971.

TABLE 5.2 Canadian sugar prices, selected years 1928-1969. *BC Sugar,, 1969.*

Year	price per 100 pounds refined sugar at Vancouver ($ CDN)
1928	5.80-6.60
1933	4.30-4.70
1938	4.00-4.30
1943	5.65-6.15
1948	8.15-8.15
1953	7.80-8.70
1958	7.65-8.55
1963	9.40-17.50
1968	6.25-7.85
1969	7.85-9.05

In the United States, throughout the 1960s and 1970s, the American sugar market continued through a range of ever-altered import and production revisions. Due to local market, labour, and transportation restrictions, beets were only grown in eastern Montana, and along the Yellowstone, largely shipped to plants in North Dakota. Not until the early 1980s, as the United States 'sugar program' caused dramatic change in both corn and sugar beet demand, did Montana and North Dakota see regional changes in the importance of sugar crops.[74]

United States sugar policy not only served to greatly increase sugar beet production in northern plains states,[75] but later amendments also had a simultaneous effect on beet production in Canada as well. At the time, Canada's sugar industry was unique in the world in not being supported through government import protection, a globally-common policy

[74] This refers to a series of policy directives related to price support, domestic marketing allotments and tarriff-rate quotas intended to control the US domestic sugar market. It was part of the 1981 Agriculture and Food Act. See United States, Department of Agriculture, Economic Research Service, Sugars and Sweeteners: Policy, by Stephen Haley. http://www.ers.usda.gov/topics/crops/sugar-sweeteners/policy.aspx#.VBxve0ur-6U

[75] United States, Department of Agriculture, Economic Research Service, Commodity Economics Division, *Sugar: Background for 1990 Farm Legislation*, by Robert D. Barry, Luigi Angelo, Peter J. Buzzanell, and Fred Gray. Staff Report No. AGES 9006. (Washington, DC, 1990).

device.[76] In Canada, payments to farmers were directly connected to sales of *processed* sugar. Contract terms varied from 60-63% of sales proceeds to producers and 37-40% to the processor.[77] Canadian producers also benefited from a meagre deficiency subsidy, but as the directors of BC Sugar opined, while calling for an American-style national sugar policy in 1966:

> "Fortunately, the growers are protected by deficiency payments made to them by the Federal Government under the terms of the Agricultural Stabilization Act, but no such aid is available to the Company."[78]

In Canada, price disputes between processors and producers in 1985, led to producers seeding absolutely *no* acreage of sugar beets that year.[79] To settle the impasse, Canada initiated the 1987 "National Tripartite Stabilization Program" (NTSP) under which beet farmers received government income support payments. Funded equally by Canada, the provinces of Alberta and Manitoba, and the producers themselves when prices were high, the program offered a guaranteed minimum return. Initially, due to the market upheaval of the late 1980s, the program paid out a considerable amount of money. After 1991 however, the market stabilized, prices rose, and no further payments were made.

In 1994, changes to US import quotas resulted in Canada losing a newly-won import allocation.[80] For a short period in the 1980s, Canada had been allowed modest exports of raw beets into the United States in order to boost processing plants in North Dakota. Quickly, processors located near the Canada-United States boundary became reliant on the quota supply of Canadian beets.

With one sweeping United States federal policy change, cross-border regional production and supply, only recently developed, was upended. Manitoba sugar beet harvests ceased abruptly in 1997 when the Winnipeg processing facility, in operation since 1940, closed as the American market for Manitoba beets collapsed. Manitoba farmers in the 1980s profited from growing sugar beets, but only because a sizeable portion of the harvest could be sold to

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[76] Canadian Sugar Institute, "CSI President Encourages US Sugar Industry to 'Walk the Talk' on Free Trade," *2004 Sugar Industry and Trade News*, 3 May, 2004. http:--www.sugar.ca-News-Industry-Trade-CSI-President-Encourages-US-Sugar-Industry-to-Walk.aspx

[77] BC Sugar, 1966. The agreement in effect in 1966 specified that profits from sales of beet sugar be distributed as 60% to producers, and 40% to BC Sugar.

[78] BC Sugar, 1966.

[79] Peter Buzzanell, "The North American Sugar Market: Recent Trends and Prospects Beyond 2000," (proceedings of the Fiji/FAO 1997 Asia Pacific Sugar Conference, Food and Agriculture Organization of the United Nations, 1998).

[80] Buzzanell, "North American Sugar."

United States processors.[81] Once the border was closed to Canadian beets, the local market demand was insufficient and farmers simply switched crops.

To better compete within the United States-dominated world sugar regime, BC Sugar, the company that owned the Manitoba refining plant, was compelled to concentrate all beet processing at Taber.[82] Until that point, virtually all of the Taber sugar had supplied the Canadian market; approximately 60% of the Manitoba production output had been destined for the USA.[83] Farmers in Alberta and Manitoba subsequently withdrew from the NTSP program in 1995 and 1996 respectively.[84]

The national 'sugar policies' had other implications on northern Great Plains agriculture. The 1980s introduction of High Fructose Corn Syrup (HFCS) as a sugar substitute greatly increased corn demand, a development that directly attributed to the artificially high domestic price for raw sugar initiated by the US sugar program.[85] Perversely, while HFCS production caused a dramatic decline in American beet and cane-derived sugar consumption, United States sugar beet production *increased* as the country cut off imports.[86]

Beyond the borders of the United States, sugar prices have never been able to keep up to the American standard. As a consequence, Canadian beet acreage fell to approximately one half of its 1951 peak[87], mainly due to price variation, market access restriction, and availability of alternatives such as HFCS.[88] Under the North American Free Trade Agreement (NAFTA), Canada received no preferential change in United States import access. Increasingly, from the mid-1990s onwards, Alberta beet farmers saw grains as a better bet.

The post-war ramp-up of sugar production in the northwest had come with an understanding that a complex interacting system of weather, domestic and global markets, labour supply, and technology had to be kept in balance. In the early 1950s, BC Sugar

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[81] Buzzanell, "North American Sugar." This fee dates back to the AAA of 1933

[82] BC Sugar, 1956. BC Sugar first bought into the Manitoba Sugar Company Limited in 1955.

[83] Buzzanell, "North American Sugar." In 1995, Canadian producers paid an export duty of 0.2 cents per pound, plus a 1 cent per pound fee on an estimated 40,000 ton exports of beet sugar to the United States

[84] Buzzanell, "North American Sugar."

[85] BC Sugar began warning shareholders about a pending corn sweetener caused price hit as early as 1979. See BC Sugar, 1979 report

[86] United States. *Sugar: Background.*

[87] Statistics Canada, 2006 Census of Agriculture.

[88] see also: United Nations, Food and Agriculture Organization, "Proceedings of the Fiji/FAO 1997 Asia Pacific Sugar Conference, Fiji, 29-31 October, 1998. Peter Buzzanell "The North American Sugar Market: Recent Trends and Prospects Beyond 2000" Food and Agriculture Organization of the United Nations, 1998

understood that they and the farmers mutually depended upon each other.[89] BC Sugar knew producers had commodity options. The unique market conditions instituted by Canadian, American, and world policy required a fluid approach. In the uncertain years of the 1950s, BC Sugar had reminded impatient investors:

> "It is your Company's policy to support and encourage the farmers of Southern Alberta as much as possible, in return for which we rely on them for a continued supply of raw material. Since the farmers participate in the price for our product, their returns are also reduced over last year. However, in line with our policy, our beet growers' contract is liberal and to change it at this time appears inadvisable."[90]

As the global, North American, and domestic political and economic events of the 1960s, 70s, 80s, and 90s unfolded, the sugar industry and Alberta producers drifted from one another. The agricultural landscape shifted likewise. Beets are still grown in Alberta, enough to serve the requirements of western Canada, but they are only one of many specialty crop options available to farmers. The infrastructure investment was largely in irrigation capacity, easily used for other specialty crops. Central Montana's fling with sugar was short-lived, but as in Alberta, other crop options, commodities each differently regulated in each country, would prove more appealing.

[89] Thompson and Seager, "Workers, Growers and Monopolists."

[90] BC Sugar, 1954.

CHAPTER 6

MAKING THE CHOICE: LAND, SCALE, AND THE PRICE OF WHEAT

Land use histories are complex. Discerning causal aspects of agricultural land use change requires consideration of a wide variety of environmental, cultural, economic, and political factors. Northwestern plains farmers organized production systems that worked within larger scale national or international agro-economic contexts. Producers also contended with regional-scale environmental limitations and government-imposed conditions. Local-level landscapes reflect the influences of these larger scale factors, but ultimately, land use decisions are subject largely to individually-unique subtleties of culture, family history, personal experience, household situation, and not least, the unique physical qualities of their land. The land histories of three local study blocks, one for each sub-regional study area demonstrate the effects of the local and individual that contribute to local place making.

Beginning in 1955, the land use pattern near Patricia, Alberta began to undergo dramatic change. The Patricia study block lies within the Eastern Irrigation District, a farmer-directed land management cooperative set up by the Province in 1935. In 1955, a group of Hutterian Brethren Lehrerleut split from their existing colony at New Rockport, near Lethbridge. Two new daughter colonies were founded, one near the town of Choteau, in Teton County, Montana, and the other, named Springside, near Patricia (Fig. 6.1).[1] The Springside colony purchased a sizeable acreage from Oscar Lassiter, a farmer who's holdings included a large amount of land that had once belonged to John Ware, the cowboy-settler. Oscar Lassiter personified agricultural innovation in the Patricia district. Described as a specialist in land-breaking, Lassiter had originally arrived in Alberta from North Carolina in 1916. Bringing sixty plough horses and twenty mules across the border, Lassiter quickly established a successful contract cultivation business in east-central Alberta. Lassiter is

[1] Carolyn L. Olsen, "The Demography of Colony Fission from 1878-1970 among the Hutterites of North America," *American Anthropologist* 89, no. 4 (December 1987): 823-837.

credited with importing both the first diesel tractor and the first combine harvester, into Alberta, both machines emblematic of agricultural modernization.[2]

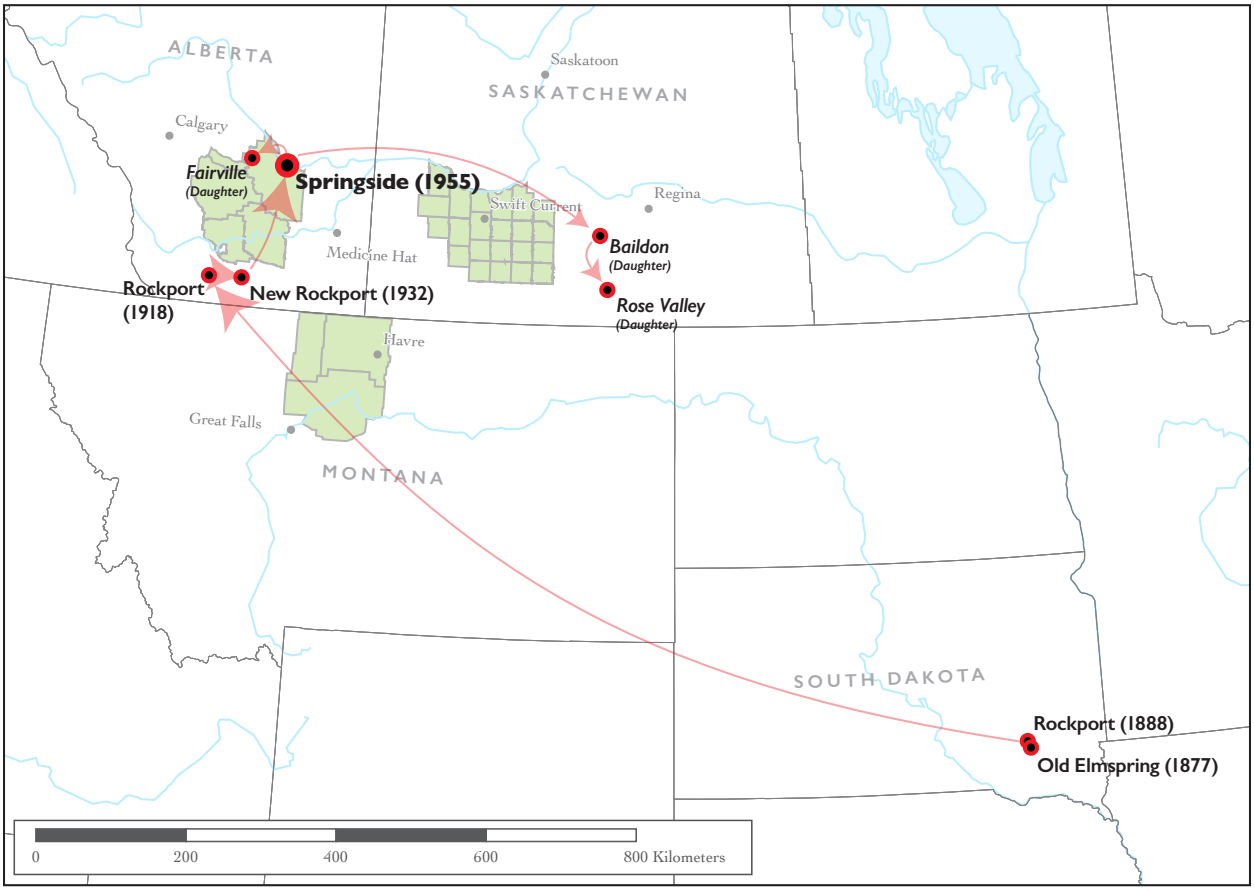

FIGURE 6.1 Mother and daughter colonies, and date of colony founding, of the Springside Hutterian Brethren (Lehrerleut).

The Hutterian Brethren are a religious group that communally farms and considers most property to be collectively owned by the colony. The Lehrerleut, located in the western states and provinces are one of four sects that make up the larger brethren.[3] Almost all

[2] See Robert Lassiter, "About TripleX Red Angus," TripleX Red Angus, http://triplexredangus.com/aboutus.html (accessed 1 May, 2010); and Owen Stringham, "John Ware Ranch" in *Duchess and District Memories,* ed. Duchess and District Historical Society, 423.

[3] There are three main branch groups (or "leuts") of North American Hutterites. The groups are named for the leaders of the original Hutterian colonies emigrating to South Dakota between 1874 and 1879. Upon moving to Canada in 1918, the Lehrerleut and the Dariusleut went to Alberta, later expanding into Saskatchewan, Montana, British Columbia, Washington, and Oregon. The Schmiedeleut moved to Manitoba, and later back into South Dakota, as well as into North Dakota and Minnesota. The leut distinctions are described in Hutterian Brethren "Types of Hutterites," Hutterian Brethren Schmiedeleut Conference, http://hutterite.org

Alberta Hutterites are descended of people who migrated from South Dakota in 1918. Two decades prior to their arrival, the pacifistic Hutterites had negotiated an agreement with Canada which promised that the Hutterian communal way of life would be free from governmental interference and that Hutterites would be exempt from military service. Threatened with conscription in 1917, virtually all Hutterites living in the United States quickly abandoned that country and moved to Alberta and Manitoba.[4]

Having among the highest birth rates of any cultural group in North America, the Alberta Hutterite population grew rapidly through the first half of the twentieth century. When a colony reached about 120 to 150 persons (equivalent to about fifteen families), effective farm management became impractical and the colony divided.[5] Due to their relatively late arrival, Hutterites never had the opportunity to apply for homestead grants, having to purchase land instead.[6] As colonies divided, obtaining large contiguous blocks of new land within the better agricultural areas was difficult and Hutterites were often forced to move to marginal lands.

Due to a strengthening of nativist sentiment during the Depression and the Second World War and, at the urging of the politically powerful Alberta Farmer's Union, the Province of Alberta enacted policy specifically targeted at Hutterites, greatly restricting their ability to increase their land holdings. The 1942 Land Sales Prohibition Act, and the Communal Property Act of 1947, prevented colonies from purchasing any land within forty miles of any other colony. Furthermore, these acts restricted an individual colony to owning or leasing a maximum limit of ten sections (6,400 acres).[7] In effect, the new laws forced Hutterites to move far from the parent colonies into the sparsely-settled marginal lands of the EID and the Alberta Special Areas or outside the Province.[8]

In 1951, further amendment to the Communal Property Act allowed colonies to own a maximum of sixteen sections of "medium-quality" land (labeled 'Zone B'), or twenty-four sections of the poorest land ('Zone C').[9] The land on which the Springside Colony established itself in 1955 was located in 'Zone C'.[10] Alberta enacted even more stringent land ownership restrictions in 1958. This last act resulted in the initiation of a number of legal challenges

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[4] William Janzen, *Limits on Liberty: The Experience of Mennonite, Hutterite, and Doukhobor Communities in Canada* (Toronto: University of Toronto Press, 1990).

[5] Olsen, "Demography of Colony Fission."

[6] Janzen, *Limits on Liberty*.

[7] Janzen, *Limits on Liberty*, 61, 68.

[8] Marchildon, "Institutional Adaptation."

[9] Janzen, *Limits on Liberty*.

[10] Canada. Alberta. Surveys Branch, Department of Highways and Transport "Hutterite Colonies," map, 1972.

throughout the 1960s (Fig. 6.2). In 1972, with public opposition to Hutterites diminished, and having greater political awareness of human rights concerns, the Alberta government eased the insular land ownership policies. Since then, Hutterite communities have met with the provincial and municipal governments to collectively consider land acquisition issues.

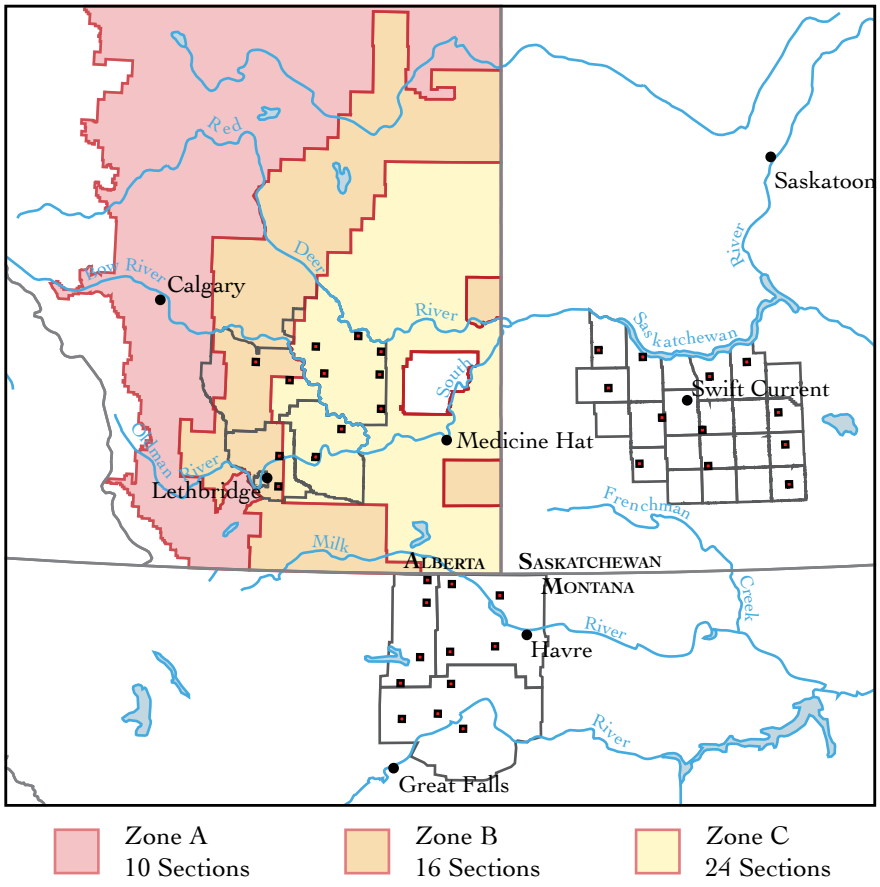

FIGURE 6.2 Hutterite land restrictions in Alberta. Map after Alberta, Department of Highways, Surveys Branch, "Hutterite Colonies, 1972."

Once settled in the Patricia area, the Springside Colony set about reworking the landscape. Maps produced from aerial photographs flown in September, 1938 show only a small amount of 'dry' farming in the northwest section, totalling approximately 280 acres. In the northeast portion, the canals and distinctive field pattern indicate that another 280 tilled acres were under conventional gravity-fed irrigation. The remainder was maintained as rough grazing land. Throughout the grassed portion, numerous saline deposits are visible (Fig. 6.3).

After the founding of the Springside Colony in 1955, the land underwent rapid change. The most obvious result of colonization was the building of the farm itself. Approximately

forty acres were eventually used to build the housing and cooking buildings, as well as the barns, machine shops, grain storage bins, and other structures. The initial farm construction happened quite quickly, involving not only the building of new structures, but the purchase and moving of older buildings to the new central location, including some from the old Ware Ranch.[11] Simultaneously, the dry farming portions were greatly expanded. To the north-east of the colony, the land remained under private control. There, from the mid-1950s to the late 1970s, previously irrigated land was progressively taken out of production. Meanwhile, the Springside Colony began installing centre-pivot equipment to irrigate higher land that had at one time been only dry-farmed. By 1979, construction of intensive livestock barns for housing dairy cattle and swine had begun. New dry-cropped fields were broken. Centre-pivot equipment was installed on the privately held lands northeast of the colony, and by the 1990s, that land was once again producing crops (Figs. 6.4 and 6.5).

[11] Duchess and District Historical Society, *Duchess and District Memories*.

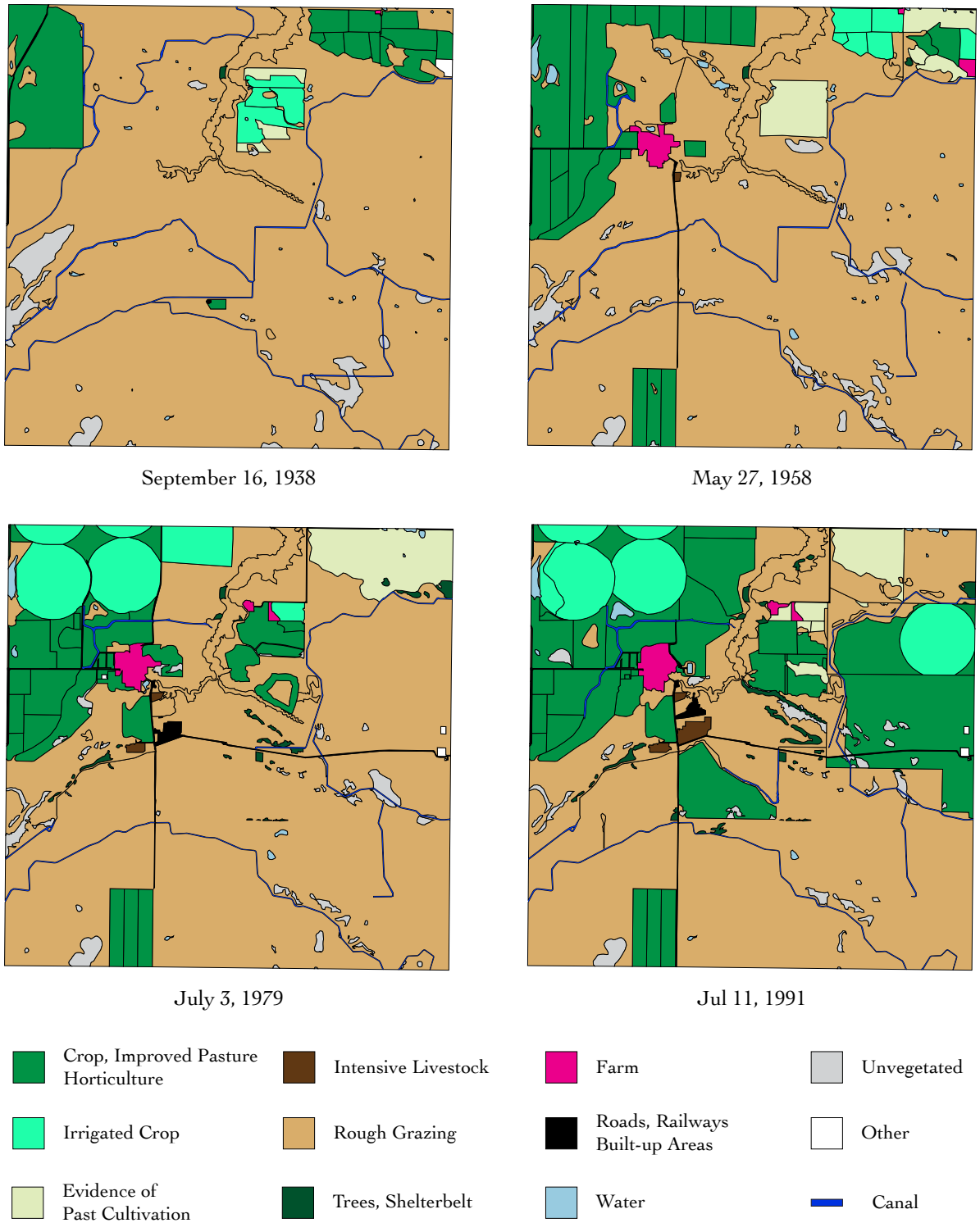

FIGURE 6.3 Land use in the Patricia study area, 1938-1991. Classifications are based on photos taken on the dates shown. The Springside Colony is the large pink area *upper-left* of the 1958, 1979, and 1991 maps. The north-east section remained privately-held throughout the fifty-three year study period.

FIGURE 6.4A Conventional (gravity) irrigation in the Patricia study block, May, 1958. Field channels and the canal network are clearly visible. The dark tone of the irrigated fields indicates the higher moisture content of the plants and soil.

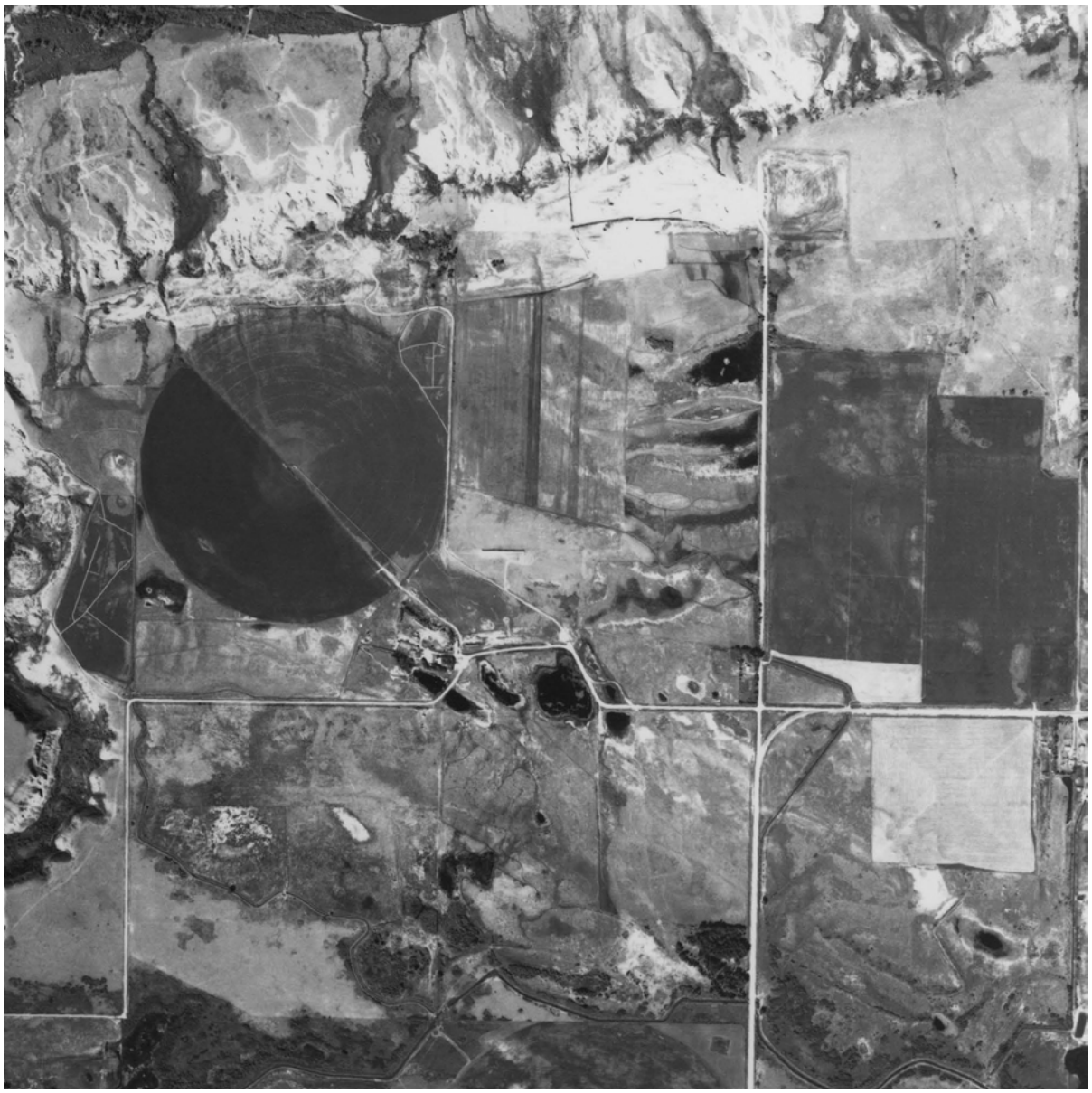

FIGURE 6.4B Pump irrigation installed before July, 1991 in the Patricia study block. Both centre-pivot (*photo left*) and wheel-line booms (*photo right*) have replaced older gravity-irrigated and non-irrigated fields.

FIGURE 6.5A Irrigation canal modified by the Springside Hutterite Colony.

FIGURE 6.5B Centre-pivot irrigation boom installed after 1991 by non-Hutterite land owners near Patricia, Alberta.

Several other landscape changes took place at the Patricia site, including the near-continual alteration of the canal network, the grassing over of the saline low spots, and the growth of shrubby vegetation along the canals. The saline areas have diminished in size over the span of the study period, perhaps due to the seeding of salt tolerant forage grasses. Also evident is the recent installation of oil and gas infrastructure. Although representing only a miniscule portion of the Patricia example, the installation of oil and gas infrastructure has had a large impact on land use change in many other places within the larger study region.

The Patricia, Alberta example demonstrates that spatial-environmental factors in the 'cost calculation' cannot be ignored. There, agricultural expansion was made possible only by irrigation, although the introduction of new technology widened the range of possibilities over time. However, the role of policy is arguably as important to land use as are situational environmental restrictions. While much of the policy shaping the northwestern plains agricultural landscape was formulated largely at the federal level, its application and degree of influence on land could be very local. Locally informed social-cultural factors, for example, the influence of Hutterite demographic and economic history, can be highly important. The Alberta land acquisition policies, and the unique public-private management structure of the EID, are two other examples. The aggregate result of these policies was an interplay of variables leading to specific land use patterns, those both local in nature, but also adding up to a more regionally defined characterization. As the producers of the northwestern transboundary plains entered the post-War era, the land use effects rooted in two decades of sometimes-radical political and collective reorganization began to manifest themselves as a dramatically changed landscape.

* * *

Approximately thirty kilometres southwest of Swift Current, Saskatchewan, along the main line of the CPR, is the village of Webb. When agricultural settlement first began in 1909, Webb was the least isolated of the three case examples. The Webb siding is only 200 kilometres west of the CPR's divisional point at Moose Jaw, which also serves as the terminus of the Soo Line originating in St. Paul, Minnesota. The transcontinental CPR, and its subsidiary Soo Line, were the principal conduits for most of settlers arriving in the southern Canadian prairies during the early twentieth century settlement boom.

Arriving via the CPR, initial migrants to the Webb area were a mix of experienced farmers from Ontario, Manitoba, and the Dakotas, newly-minted ranchers from Scotland, gentlemen landowners from New York, and assorted others.[12] A particular attraction of Webb, especially for migrants from the Dakotas, was rail and road access that was

[12] Webb History Book Committee, *Prairie Memories*.

considerably better than what was available to them in the United States. The Hinds family were a typical case. They had originally homesteaded near Burnstad, North Dakota, where the nearest grain delivery point was thirty miles away. Weary of the isolation, and having suffered poor crop returns during a series of dry years preceding 1910, the family took a 'blind' homestead in southern Saskatchewan near the Montana border. Discovering that the new location was equally remote, the Hinds' immediately reapplied for a homestead next to the CPR track near Webb.[13]

Connectivity remained an important aspect of the Webb area geography throughout the twentieth century. By 1928, the town was serviced by "Saskatchewan Highway Number 1," a "standard earth road," the highest possible category at a time when the majority of the province's roads were listed as "fair earth" or worse.[14] By the mid-1930s, a bituminous surface road extended halfway from Swift Current, the regional business hub. In the early 1960s, the route was incorporated into the Trans-Canada Highway system. From the 1980s onwards, four lanes of all-weather road put most Webb area farmers only thirty minutes from Swift Current. The village of Webb quickly disappeared.

Although Webb was extraordinarily well-connected to the eastern Canadian and American commodity markets and labour supply, its settlement and landscape development history is generally similar to those of the other case examples. In common with the Patricia case, land use maps generated from aerial photographs show analogous cycles of land transiting in and out of crop, as well as ongoing trends of farm consolidation and abandonment. The 1930s drought influenced Webb land use, although not in a lasting way. In the Webb sample, only ninety acres were left untilled in 1938, of which a mere twenty-five were never tilled again (Fig. 6.6).

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[13] See Marvin Hinds, "The Hinds Family," in *Prairie Memories*, ed. Webb History Book Committee, 622-625.

[14] Road information obtained from the 1928 and 1938 editions of the Saskatchewan Highway Map. Canada, Saskatchewan, Department of Highways and Transportation, Highway Map of Saskatchewan Canada, (Regina: 1928, 1938).

FIGURE 6.6 Land use in the Webb study area.

Almost all land area within the nine square miles of the Webb example is characterized as having "Class A" drainage. This means that almost all surface water is removed as runoff. Gullies are a common feature on such slopes.[15] Because of the soil erodibility, in addition to other limitations related to adverse soil chemistry, most of the Webb study area has been assigned 'soil capability for agriculture' classifications of "Class 4" or "Class 5". In the Canadian Land Inventory (CLI) system of Soil Capability for Agriculture, 'Class 4' soils "have severe limitations that restrict the range of crops or require special conservation practices, or both." 'Class 5' soils "have very severe limitations that restrict their use to the production of native or tame species of perennial forage crops."[16] It remains a characteristic quality of Saskatchewan agriculture that a great amount of the land actively farmed has been classified as "unsuitable" for agriculture. The Webb area is no exception (Fig. 6.7).

Other land quality attributes have influenced land use. Several low spots that are too wet, as well as numerous small areas that are too stony, have been left untilled. However, over time, several of these small sloughs and outcrops were drained or cleared, and were incorporated into the surrounding fields. The increasing size of field equipment influenced the way land was worked. The inconvenience of negotiating small pockets of poor land with the increasingly wide tillage implements was a strong incentive to make fields more contiguous.

[15] See Canada, Saskatchewan., Saskatchewan Soil Survey, *Rural Municipality of Webb, Number 138 Preliminary Soil Map and Report*.

[16] Saskatchewan Soil Survey, *Rural Municipality of Webb, Number 138 Preliminary Soil Map,* 14.

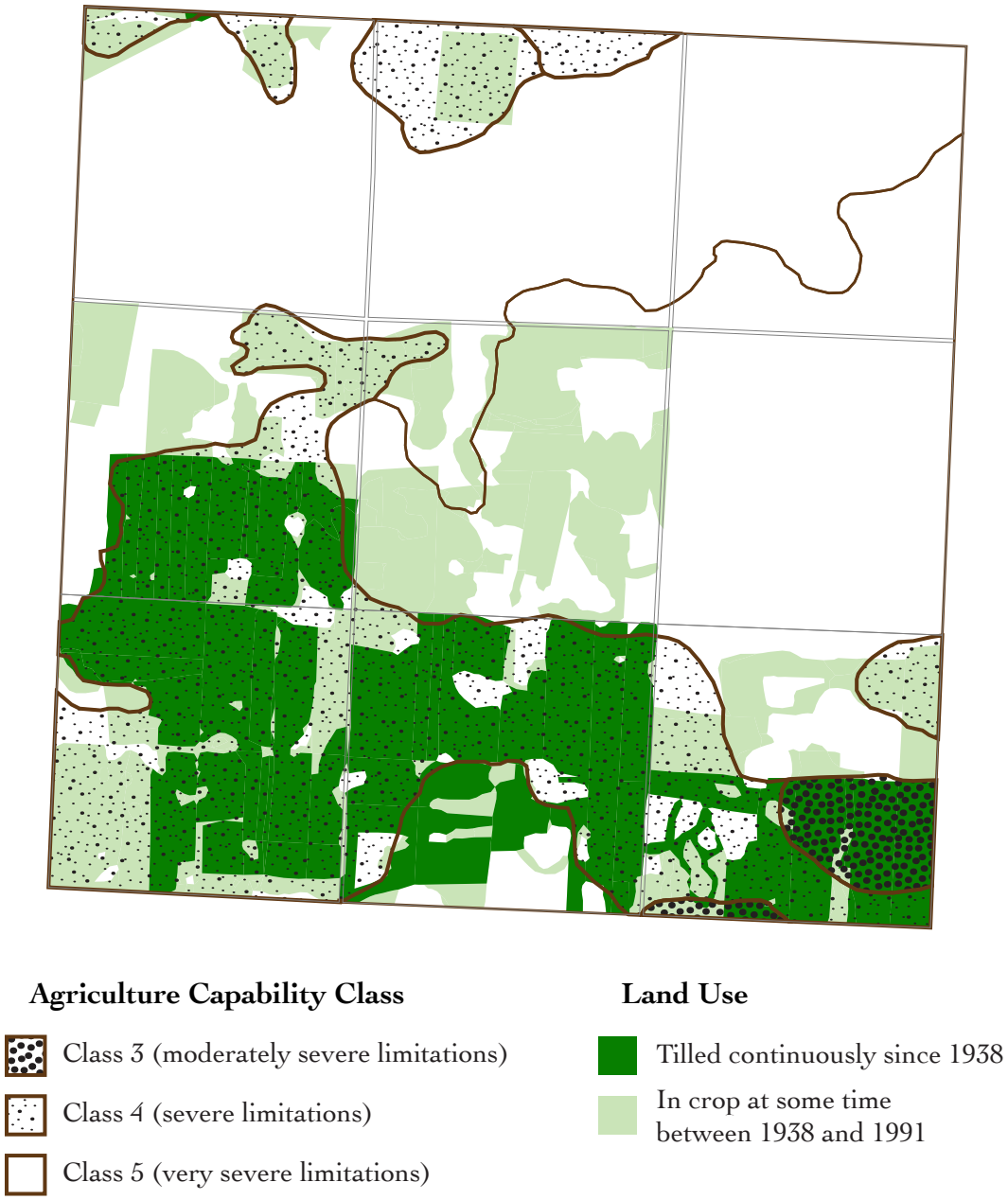

FIGURE 6.7 Soil limitations to agriculture in the Webb study area. Soils data from Saskatchewan Soil Survey, *Rural Municipality of Webb, Number 138 Preliminary Soil Map and Report*.

Some of the longer-term land use changes in the Webb area can be explained by through examination of land ownership records (Fig. 6.8). Three quarters of Section 26 were originally granted to the Hudson's Bay Company (HBC) in 1885. Section 24 remained with the Crown, and Sections 25 and 27 were reserved as CPR lands.[17] Most of these lands were characterized by steep slopes and poor soils. They were never privately owned, but rather

[17] Webb History Book Committee, *Prairie Memories*.

leased for grazing. Eventually each of these sections reverted to the Crown. The remaining five sections were distributed as homesteads or were purchased as pre-emptions, between 1910 and 1913.[18] Through the process of farm consolidation, many of these sections were sequentially held by four or more owners over the following sixty years.

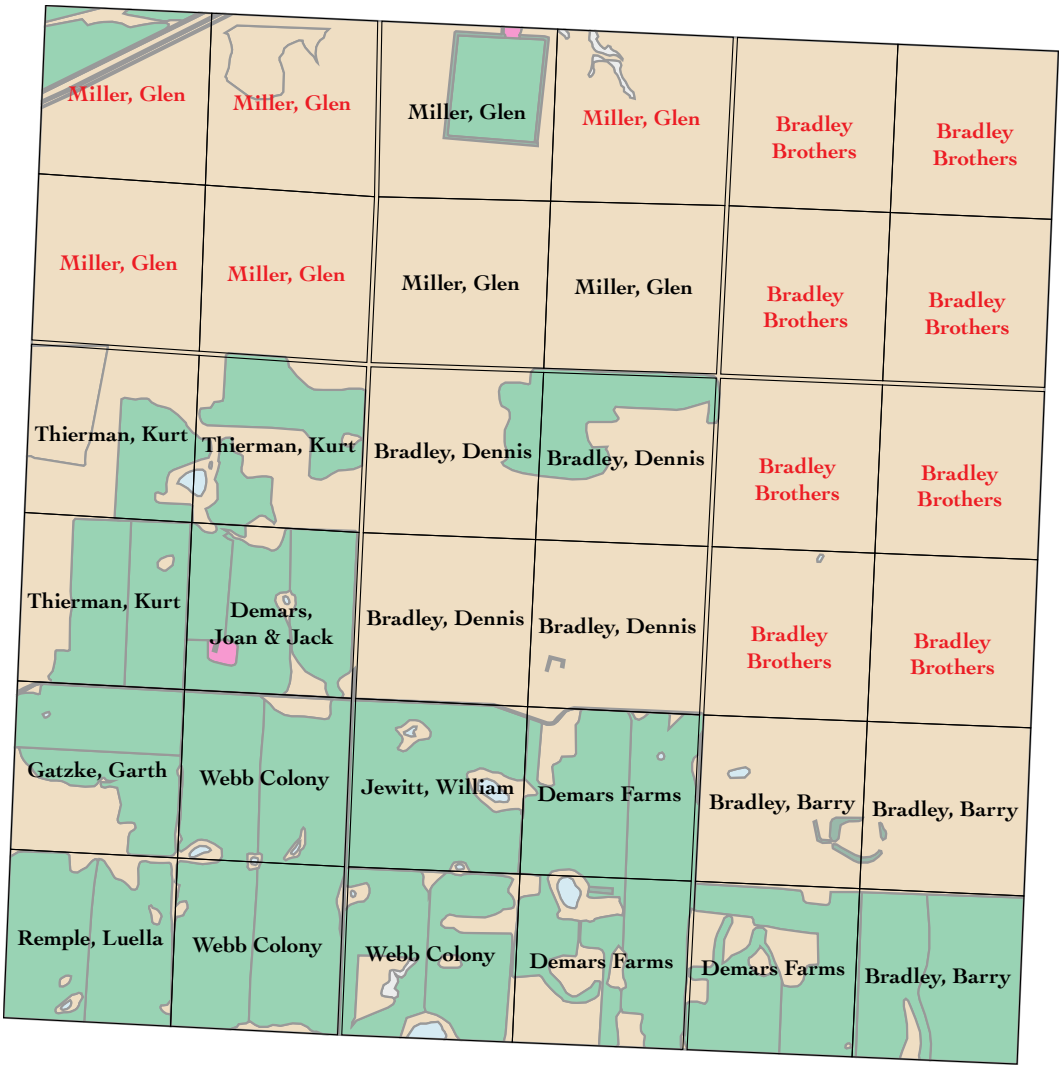

FIGURE 6.8 Land ownership in Webb in 1993 (*in black*) and operators of land leased from the Crown (*in red*). Section numbers are shown in section centres. Ownership data from Marcan Mapping "Rural Municipality of Webb No. 138," map, 1993.

[18] Webb History Book Committee, *Prairie Memories*.

In the 1980s, a nearby Hutterite colony (Webb Colony) began to purchase much of the already cropped land within the study area.[19] Hutterites have only existed in Saskatchewan since 1958, when they were forced to move there because of restrictive amendments to the 1947 Alberta Communal Property Act. However, due to public sentiments against Hutterite expansion within Saskatchewan, the Saskatchewan government enacted restrictive controls over Hutterite colonization that were, in effect, equivalent to the policies of Alberta.

An interesting example of farm-level landowner-based land use decision-making can be found in the management histories of Sections 13, 23, 24, and 25. In 1941, this land was taken over by brothers Campbell and John Bradley.[20] Sections 24 and 25 had been initially operated by John R. Lair. Lair had served as manager of the Canadian Division of the famous Matador Land and Cattle Company. The Webb land was not part of the Matador Company's extensive Saskatchewan holdings, but rather, was leased by Lair as an individual.

In 1933, the Bradley brothers inherited their family's dairy farm, located about twelve miles north of the Webb study area. Looking to switch from dairy to beef cattle, but concerned about the poor forage conditions prevalent during the drought, the Bradleys selected a rare breed, the Belted Galloway (Fig. 6.9). The Bradleys' interest in Galloways was based on the results of hardiness experiments conducted by the University of Saskatchewan during the drought years. Through the 1940s and 1950s, the Bradleys, having taken over the Lair ranch, gradually developed and expanded their herd, cross-breeding the Galloways with other breeds, but also maintaining a small number of purebred animals.

By the 1960s, the Galloway breeding enterprise had grown to be so successful that "Campbell and John seeded a lot of their cropping land to grass and expanded their commercial herd"[21] Upon the retirement of Campbell and the death of John in 1970, the ranch was taken over by sons Dennis, Brent, and Barry who maintain the Galloway herd in the Webb area to this day.[22] Occasionally, small Bradley fields that had been reverted were reworked, but soon after, were invariably reseeded with grass. Based on the economic decisions and personal farming interests of one family, a substantial portion of the Webb area landscape has been permanently defined.

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[19] Janzen, *Limits on Liberty*. Initial Hutterite land acquisition in the Webb study sections is noted on Marcan Mapping, "Rural Municipality of Webb No. 138," map, 1993.

[20] Globex Gully Ranches Pty., "The Bradley Brothers Story," http://www.globex-au.com/history.htm#Bros (accessed 22 March, 2010).

[21] Globex Gully Ranches, "The Bradley Brothers Story."

[22] Ibid.

FIGURE 6.9 Belted Galloway cattle near Webb, July, 2009.

* * *

Fort Benton, the county seat of Chouteau County, Montana, has been important to western American commerce since Lewis and Clark passed through its location in 1805. Located at the highest navigable point on the Missouri River, Fort Benton was established in the mid-nineteenth century by the American Fur Company and quickly became an important communications and trade hub. From Fort Benton, trade goods were transferred for overland dispersal to the Columbia River territory to the west, as well as along the 'Fort Whoop-Up' trail into what is now southern Alberta.[23] As the fur trade declined into the 1860s, substantial trade traffic continued to pass through Fort Benton as mining expanded in western Montana. In the 1870s, the I.G Baker Company, based out of Fort Benton, was awarded a contract to

[23] Sharp, "Northern Great Plains."

supply beef to the Northwest Mounted Police.[24] I.G. Baker, which had wintered cattle in southern Alberta in the 1870s and 1880s, became a sales agent for the first Alberta produced beef.

Fort Benton profited greatly from trans-border trade with the movement of goods to Canada constituting twenty per cent of all commercial activity.[25] Despite Fort Benton's military and trade importance, agricultural settlement did not occur in a significant way until the early twentieth century. In 1887, railway builder James Hill extended a branch of his Montana Central Railroad between Havre and Great Falls.[26] However, the surrounding land remained uncultivated until 1910, when numerous settlers, many attracted by Hill's vigorous advertising efforts, were drawn to the area. Importantly, in 1909, Congress passed the Enlarged Homestead Act which allowed settler grants of 320 acres, twice the usual 160 acres, in lands that were considered to be "poor" or unirrigable. Virtually all of Chouteau County qualified under the Act, an attribute that Hill's Great Northern Railway (GNR) advertised widely.[27]

Some of the newcomers drawn by Hill's promotional efforts claimed land to the northwest of the Fort Benton townsite. They established their farms along a broad flat valley next to Vimy Ridge, a strip of higher land separating the Missouri and Teton rivers. Soils there have a mix of textures ranging from fine sandy loams to silty-clays and clay-loams.[28] Aerial photographs taken early in the autumn of 1937 clearly show much of the Fort Benton study area (approximately 3,140 acres) in crop. There were also a number of fields (totaling 665 acres) that had previously been cropped but, for that year at least, had been left unseeded (Fig. 6.10). Photographic evidence suggests that these fields were either left to revegetate on their own or, alternatively, were deliberately seeded to grass. Whether farmers were following the advice of the agricultural agents of Roosevelt's Great Plains Committee, were induced by AAA incentives, or were simply attempting to retain soil and moisture at a time of low commodity prices, the reasons for leaving land unseeded in 1937 likely varied from case to case. Many writers have argued that various government programs have had inordinate influence on land retirement choice, but tend to understate the importance of personal landowner decision-making.[29]

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[24] MacLachlan, "Historical Development of Cattle."

[25] Sharp, "Northern Great Plains."

[26] Malone, *James J. Hill.*

[27] GNR efforts to promote dryland farming in Montana are documented in Clair Strom, *Profiting from the Plains.*

[28] United States, Department of Agriculture, Natural Resources and Conservation Service, *Soil Survey Geographic (SSURGO) Database for Chouteau County, Montana*, http://soildatamart.nrcs.usda.gov

[29] For examples focussing on the role of government in farmer decision-making, see Hargreaves, *Dry Farming*; Jones, *Empire of Dust*; and Worster, "Transformations of the Earth."

FIGURE 6.10 Land use in the Fort Benton, Montana study area, 1937-2006.

Significantly, within the nine square miles of the Fort Benton study area, virtually none (fewer than three acres) of the land that had been left unseeded in 1937 was *permanently* reverted. Almost all of the 665 previously-cropped acres (more than one square mile) left untilled in 1937, was eventually reseeded to crops later. By 1956, much of the land was back in production, and 860 acres of previously untilled land had been newly broken. By 1979, this pattern of expansion continued and the amount of land under cultivation reached its peak at 4,685 acres, or eighty-two percent of the total. Only land owned by The State of Montana in the eastern portion was left in grass. However, this growth trend soon reversed. By the mid-1990s, just as had occurred in the 1930s, a portion of the land was left untilled and showed signs of having been seeded to more permanent cover. The land reversion continued over the next decade to the extent that by 2006, almost 750 acres of previously-cropped land had been removed from active production.

The rural landscape of Fort Benton shows the influence of United States agricultural policies responsible for the trend towards reduced tillage throughout the Great Plains in the latter part of the twentieth century.[30] For the most part, the land use history of the Fort Benton site mirrors that of other sites in Alberta and Saskatchewan. There is, however, an agricultural land use distinction in Fort Benton that clearly demonstrates how landscapes can differ comparatively depending upon which side of the international boundary the farm lies.

In the 1980s, the Conservation Reserve Program (CRP) was deployed as part of the 1985 Food Security Act. The CRP provided incentive payments to landholders as compensation for the voluntary conversion of tilled land to permanent cover which was subject to cutting and grazing limits (Fig 6.11).

[30] For a survey of cropland acreage reduction programs in place since 1933, see United States, Department of Agriculture, Economic Research Service *Major Uses of Land in the United States, 2002,* by Ruben N. Lubowski et al. Economic Information Bulletin No. 14. (Washington, DC, 2005).

FIGURE 6.11 CRP land in the Fort Benton area in August, 2009. The map is based on 2006 imagery.

A map of land ownership in the Fort Benton study area (Fig. 6.12) reveals that only a few families have controlled the land over the past two decades.[31] The Elliott family, which in 2006 owned 1,120 acres in the study area, and a further 3,000 in other parts of Chouteau County, were described in a Farm Service Agency news release as a "conservation success story."[32] Stuart Elliott was quoted saying the "CRP is the only answer to save sandy highly erodible land." Elliott first enrolled in the CRP in 1987 and subsequently re-enrolled in 1997. Within the study area, the Elliott land retired in the 1990s is classified as Wind Erodibility Group 5 to 7. A soil with a WEG classification in this range is only modestly erodible. Other

[31] United States, Montana, Montana Cadastral Mapping Program, "Chouteau," geodatabase. ftp://ftp.gis.mt.gov/cadastralframework/chouteau.mdb

[32] United States, Department of Agriculture, Farm Service Agency, "CRP Saves Soil Along the Montana Highline," http://www.fsa.usda.gov/FSA/printapp?fileName=ss_mt_artid_633.html&newsType=crpsuccessstories

lands in the Fort Benton study block are classified as WEG 3 (highly erodible) and have always been maintained in crop.[33]

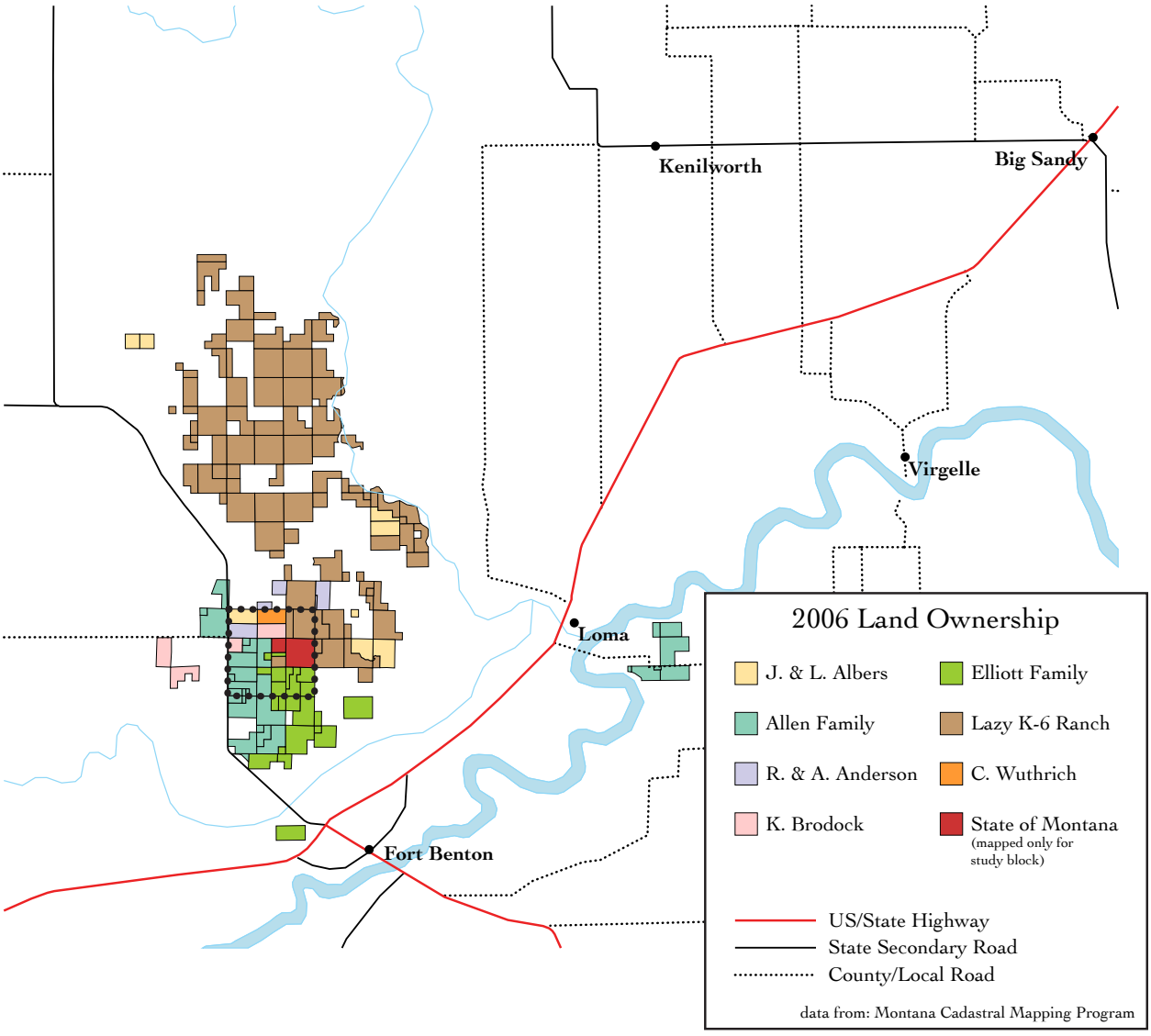

FIGURE 6.12 Land ownership in the Fort Benton, Montana study block, 2006. The three-mile by three-mile study block is marked by the dotted square. Ownership data from Montana Cadastral Mapping Program, "Chouteau."

[33] Soil WEG classifications are from United States, Department of Agriculture. Natural Resources and Conservation Service, *Soil Survey Geographic (SSURGO) Database for Chouteau County, Montana*.

The CRP land excepted, some landscape trends notable in the Fort Benton area are generally evident throughout the greater study region. As M.L. Wilson had predicted as early as the 1920s, farm consolidation had become widespread by the time that the USDA had begun flying aerial photographic runs over Montana in the summer of 1937.[34] When the photos of the Fort Benton study area were taken in October of that year, there were twelve occupied or very recently occupied farms within the nine square mile study area,[35] and only two showed signs of abandonment. Twenty years later, this number had been reduced to eight farms. By 1979, it was five. Today, there are only three occupied farm sites, of which only one could be considered a 'farm.' The other two exist essentially as residential lots.[36] The map of recent land ownership demonstrates the extent of farm consolidation in the Fort Benton area. Detailed analysis of the aerial photographs provides further evidence of an ongoing consolidation process. Two examples are the modification of roads to better fit an expanding road network, and the greater persistence of farms situated next to major roads or electrical transmission lines.

Fort Benton aerial photo imagery also reveals important changes in field working patterns. These are due to the evolution in conservation practices brought about by field machinery advances. For example, the once widely employed erosion control and moisture conservation practice of strip-cropping has been largely abandoned in recent years. In 1930, only 2,520 acres in all of Montana had been strip-cropped. By 1940, Chouteau County alone had over 250,000 acres farmed in this way.[37] Extensive use of strip-cropping is readily apparent in the 1937 photographs.

In the Fort Benton area, the reasons for discontinuing strip-cropping are the same as they are elsewhere in the northern Great Plains. The principal consideration was the increasing size of tillage equipment that made larger fields more easily worked than the narrow strips. In the past two decades, an important cause for the disappearance of strips was the widespread movement towards minimum tillage and direct seeding. More than any other single factor, the adoption of minimum-tillage implements and techniques has been responsible for changes in land use practice related to environmental issues. Problems such as soil erosion, soil compaction, and moisture loss have been greatly alleviated. Also closely connected to minimum tillage and direct seeding are changes in herbicide and fertilizer application, as well as the increasing use of genetically modified crop varieties.

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[34] See Rowley, "M.L. Wilson."

[35] Farm occupancy numbers have been interpreted from image analyses, in which, individual farmsteads were examined for signs of recent activity such as road use, dwelling condition, maintained gardens, and other such indicators.

[36] Recent farm occupancy was observed during a field survey conducted in August, 2009.

[37] Acreage statistics are from Hargreaves, *Dry Farming,* 144.

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Each of the three local land use histories, those of Patricia, Webb, and Fort Benton, demonstrate the complexity of factors that went into land use decisions and the role of the individual or local group in interpreting policy, adopting new technology, and changing the type of farming. Large-scale external environmental, social, and political factors influenced decisions, but ultimately decisions resulting in finer landscape differences were much more local in origin. On the whole, regional patterns dominated. Whether organized by a communal cooperative group, like the Hutterites, or by a few dominant individual landowners, farms grew larger in size, smaller in number, with ever more technological investment.

Some areas in Montana and Saskatchewan continued practicing erosion control strip cropping throughout the study period. Producers in other areas, especially where irrigation was increasingly pursued, abandoned tillage-based erosion control, with fields taking on a characteristic 'circle with corners' pattern. In 1930, only 2,520 acres in all of Montana had been strip-cropped. By 1940, Chouteau County alone had over 250,000 acres tilled in long narrow strips, a dominant land management pattern that persisted until the 1990s. Only with the introduction of minimum tillage techniques, did strip-cropping finally begin to disappear, fields becoming very large with one-quarter, one-half, or even entire one mile by one mile section plots being tilled as one unit.

Unless swayed by the CRP policy, seeded acreages remained fairly consistent, or grew modestly after the Second World War. Field cultivation patterns reflected the increasing scale of machinery. Infrastructure was added and modernized. All of these changes occurred within a larger evolving rural economy. New crop or livestock choices notwithstanding, diversification was largely an economic, not agricultural process. Through the 1960s to the 1990s, as rural transportation infrastructure and connectivity improved, northwestern plains farm families considered economic options more varied and nuanced than Earl Butz's "Get big or get out." Long before the United States government made scale a cornerstone of federal agricultural policy, most farmers had already become 'big.'

FIGURE 6.13 'Big Bud 450/50' tractor pulling a Flexi-Coil air drill in Chouteau County, Montana, 30 August, 2009. This tractor was built in 1979 by the Northern Manufacturing Company of Havre. Big Buds were a local response to requirements of Montana farmers working large acreages. The work rate for this machine is approximately one acre per minute for normal tillage. The tractor is hitched to a 58 foot Flexi-Coil air seed drill. In 1952, Flexi-Coil started making tillage equipment in Saskatchewan, specially designed for northern dryland farming. Air seeders are ubiquitous in minimum tillage farming. The chemically fallowed field in the photo has a dense stubble cover into which the seed is injected.

CHAPTER 7

FARM CONSOLIDATION AND THE POPULATION EQUATION

When Earl Butz, United States Secretary of Agriculture from 1971 to 1976, famously told American farmers to "Get big or get out," and "Adapt or die," he reiterated sentiments integral to North American governmental perspective since the 1920s.[1] From first settlement, farm sizes in the northwest plains had continually increased. Initially, rural population grew in concert with settlement, reaching a peak in the early 1930s. From that decade onward, a process of farm consolidation, continuing through to the present, led to rural population decline. Because of losses incurred in the 1930s drought, some farm acreage was abandoned. In Canada, abandonment in the southern prairies had been offset by the opening of new farms along the northern forest fringe.[2] However, photographic evidence shows that the majority of northwestern plains land tilled before the 1930s was not permanently retired, but continued to be farmed. Individual *farms* had been abandoned, but *farmland* had not. In most areas, the total number of tilled acres continued to increase following the drought, corroborating 1930s production statistics. While yields were severely curtailed in many places, the great majority of land was worked in much the same way as it had been in the 1920s. Across the northern plains, truly 'abandoned' cropland accounted for only a small proportion of the overall agricultural acreage.

The one exception to the pattern of 'non-abandonment' was in places where land had been purchased by the Crown (in Canada), or federal or state government (in the United

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[1] The phrase "Get big or get out." is credited to Eisenhower Administration agriculture secretary Ezra Taft Benson, expressed in a 1950 speech. See James Earl Sherow, *The Grasslands of the United States: An Environmental History* (Santa Barbara, CA: ABC-CLIO, 2007).

[2] Massie *Forest Prairie Edge.*

States), as part of a resettlement policy.[3] The Alberta Special Areas Act was one such example whereby land was returned to government ownership and control.[4] In 1941, the Alberta government leased to Canada, acting on behalf of the British Crown, 600,000 acres of Crown land, and 100,000 acres of settled *patent* land.[5] Settlers were removed within three months, and offered compensatory cultivation and grazing leases on 100,000 acres of alternative Crown land. Incrementally, management of some Crown lands returned to producer control via collective organizations such as the Eastern Irrigation District, or was retained by the Crown as public pasture or military reserve.[6]

Nevertheless, the 1920s and 1930s drought experiences were instructive, and initiated an array of creative responses from individual farmers and government agents. When another widespread aerial photography program was undertaken in the 1950s and early 1960s, the postwar agricultural landscape captured on film looked quite different than that of the twenty years before. The effects of a number of 1930s field management and occupancy decisions were now fully realized as visible permanent alterations of the agricultural landscape. Photographs taken before and after the Second World War show stark changes in field patterns, built infrastructure, and farm number. In most areas, the essence of these patterns remained relatively unchanged from the 1950s to present day.

Adjustment and *adaptation* were the key themes of the decades following the 1930s drought. The cycles of relative economic success and failure had demonstrated that the farm economy equation was a finely balanced one. Profit was possible, but to achieve it, producers had to strive for the right combinations of crop choice, land management, labour, and scale; at the same time, hoping for the best with the weather and global commodity markets. Of the former, each was manageable in some way, often depending on the capital and personal resources at the individual producer's disposal. Cooperation in land management, as adopted in eastern Alberta, had proved to be both possible and effective, but also depended on the right political and economic contextual conditions.

Individual farmers, many of them original settlers or the descendants of settlers, were faced with a stark choice: they could abandon farming; they could change the type of farming, for example, from dry farming to irrigated, or from grain to livestock; or they could modify specific key elements of cropping and tillage systems in use since first settlement. Staying on

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[3] For example, the Alberta Special Areas Act, or the Resettlement Administration.

[4] Special Areas Act.

[5] Canada, Order In Council, PC. 2508, 1941, "Lease Arrangement with Alberta." The terms of the lease were a one-time payment of $600,000 to Alberta for a 99-year lease, with an annual rental payment of $1.

[6] The Suffield military reserve was initially established under the 1941 War Measures Act. In peacetime, military control over the land has, in effect, provided a powerful environmental regulatory mechanism against resource development, leading to conflict with provincial and business interests. See Shirley Bray "Who's in Charge? The Secret Standoff in CFB Suffield," *Wildlands Advocate: The Alberta Wilderness Association Journal* 14, no.6 (2006).

the land generally meant increased investment in field mechanization, changes in field management, and most importantly, an increase in scale. These three elements were dependent on each other. To increase in size, a farm had to use larger and more efficient machinery; a required adjustment accelerated by labour shortages during and following the Second World War. Changes in field tillage, including newly adopted tillage-based moisture conservation techniques, also required greater investment in larger and more-specialized machinery. At the same time, individuals who were financially able to make large investments in machinery were also able to benefit from scale-dependent efficiency and, with the associated potential for profitability, these producers were able to buy up land of struggling smaller farms.

Discussion of the effects of farm consolidation on the rural landscape has often focussed on the negative social aspects of depopulation.[7] Perhaps surprisingly, beyond a few superficial characterizations, there has been little scholarly examination of the outcomes of farm consolidation and depopulation on agricultural land organization and use. A 1968 study documenting changing field patterns in the midwestern United States provided some indication of the farm-level effects of consolidation.[8] Fields were becoming larger and particularly longer, accomplished by the removal of fence lines, shelterbelts, farmyards, and farm houses. These larger, rectangular fields better accommodated larger farm machinery that had become essential for ever-growing farms. The findings of the 1968 paper are partially corroborated by the patterns observed in 1960s aerial photographs of the northwestern plains. Many of the documented changes in the Mid-West were analogous to those in the northwest. In the case of the latter, however, field pattern changes were more subtle, with fields and field strips tending to be scaled-up, and less complex in form (Fig. 7.1).

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[7] A number of works have described a general Great Plains social down spiral. Most works are declensionist in theme, some are virtually apocalyptic. See Susan L. Cutter and Christina Finch "Temporal and Spatial Changes in Social Vulnerability to Natural Hazards," in B. L. Turner, ed. *Proceedings of the National Academy of Sciences of the United States of America* 105, no. 7 (2008): 2301–2306.; and Deborah Epstein Popper and Frank J. Popper, "The Great Plains: From Dust to Dust," *Planning* 53, no.12 (1987): 12-18.

[8] John Fraser Hart "Field Patterns in Indiana," *Geographical Review* 58 (1968): 450-71.

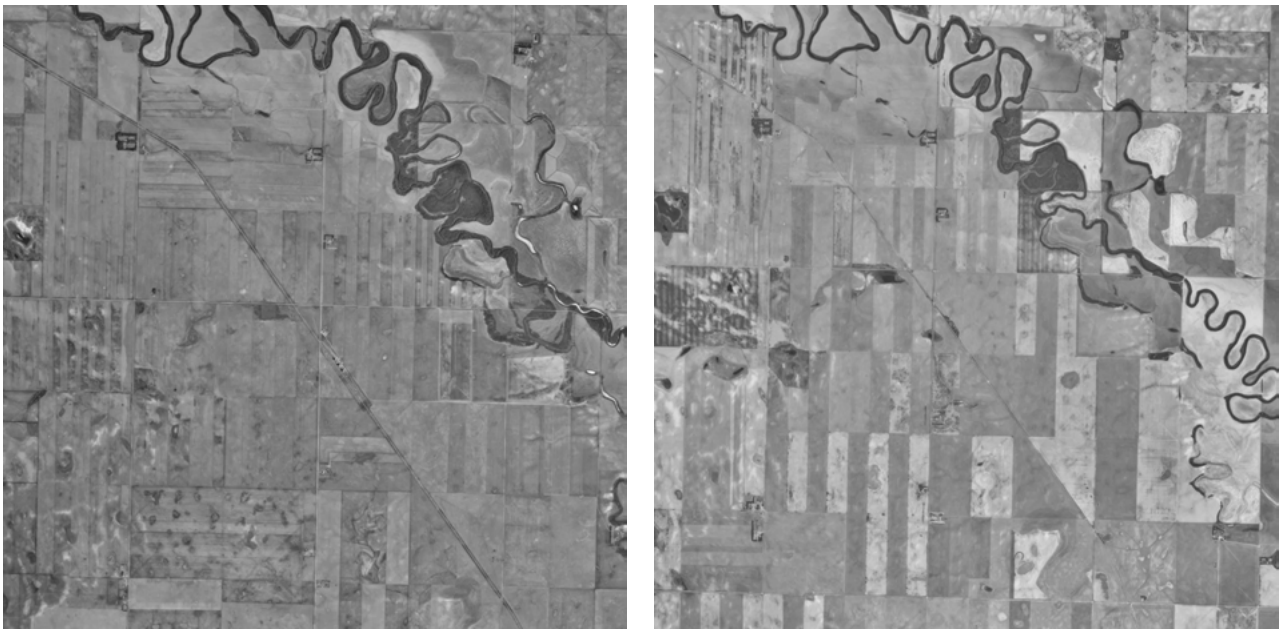

FIGURE 7.1 Field size changes, 1960 (*left*) versus 1986 (*right*) near Coppen, Saskatchewan.

The spatial distribution of changing field patterns in the post-war period, particularly after the 1960s, reflected an increasing importance of non-farm income. Larger fields tended to be the norm on farms located further away from sources of off-farm employment, where proportionally more of farm family income was derived from farming.[9] The type of farming enterprise was also important. Grain farms, predominant in the northwest, were characterized by larger fields that accommodated larger machinery.

* * *

At the outset of agricultural settlement during the first decades of the twentieth century, the northwestern plains were envisioned as a new 'breadbasket.' Wheat, as it had been in the northeastern plains of Minnesota, North Dakota, and Manitoba at the end of the nineteenth century, would be "King" in the northwest in the twentieth. And, for the first few decades of settlement, wheat did predominate. "Wheat, on the demand side, was not only the cornerstone but the entire foundation of British food policy…" reflected one economic historical account.[10] The emphasis on "King Wheat" reflected the market importance of wheat, not only as a staple of urban diets, but a stable-value export crop. Innovations in milling technology in the 1870s had made spring-seeded wheat viable, leading ultimately to

[9] Andrew Dunlop and Susan Hautaniemi Leonard, "Abandoned Farmsteads: Rural Infrastructure Change in the US Great Plains, 1930 -2000," (paper presented at the Social Science History Association Meeting, Boston, MA, 17-20 November, 2011).

[10] Britnell and Fowke, *Canadian Agriculture.*

northwestern agricultural expansion.[11] The effect of food policy on western Canadian commodity choice, and therefore, the agricultural landscape, was clear.

In Canada, the rise in both demand and price for wheat during and following the First World War had instilled optimism in the profitability of a near-monocrop wheat economy.[12] As the northern agricultural economy matured through the 1920s, the establishment of cooperative marketing, initially through the producer-directed grain pools and, later through the revitalized Canadian Wheat Board, further focussed seeding activity on just a few successful cereal crops.

As profitable as the 1920s were for many northern wheat belt farmers, familiar challenges were endured. Late-1910s and early-1920s droughts had delayed agricultural economic maturation and slowed settlement stabilization.[13] Furthermore, many of the northwest plains settlers were farmers relocated from the eastern plains who would have been well aware of the *probability* of periodic market decline. But increasingly, laissez-faire government attitudes, prevalent on both sides of the border, became ever-more interventionist in the first decades of the twentieth century.

Commodity prices are dynamic and fluctuation can cause rapid year-to-year temporary response changes in the agricultural landscape. Policy, mostly at the national level, directly influenced twentieth century commodity production and, in turn, land use choices. In Canada and the United States, commodity price and supply control policy effects on production led to uniquely contextual agricultural geographies. Through the market cycle rise and fall of the 1920s and 1930s, the landscape patterns remained largely consistent. To some extent, provincial/state and national policy designed to maintain a rural economic stability contributed to the consistency. In the early years of settlement, the governments of Saskatchewan and Alberta had established a supposedly 'cooperative' elevator system that, in practice, according to some accounts, was virtually government controlled.[14]

Beginning in 1939, the onset of war had a net positive effect on the agricultural markets in the first half the 1940s, just as it had at the time of first agricultural settlement.[15] Although wartime production in Canada was more tightly controlled through federally-imposed quotas, demand was high. Compared to the 1930s drought years, the weather was

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[11] The term "King Wheat" is attributed to mid-19th century Minnesota farmers. See Merrill E. Jarchow "King Wheat" *Minnesota History* 29, 1 (Mar., 1948), 1-28; and Hildegard Binder Johnson, "King Wheat in Southeastern Minnesota: A Case Study of Pioneer Agriculture" *Annals of the Association of American Geographers* 47, no.4 (1957), 350-362.

[12] Thompson, *The Harvests of War*.

[13] Jones, *Dryland Disaster*.

[14] Britnell and Fowke, *Canadian Agriculture*.

[15] Thompson, *The Harvests of War*.

moderate, and most producers enjoyed reasonable returns. To some extent, the war economy stimulated farm diversification, rural depopulation, mechanization, and orderly marketing, but it can be argued that these changes were inevitable.[16] Relative price stability through the 1950s and 1960s allowed a gradual expansion of tilled acreage. Year-to-year prices and production fluctuated, the latter due to the usual limiter, untimely bad weather, but farming generally was a much more predictable enterprise than it had been in the first three decades of the twentieth century.

It was within this context of relative market and production stability, over three decades from the 1940s to 1960s, that the wheat price rise in the 1970s, and subsequent crash in the 1980s was so unsettling to producers and government alike. By the 1980s, United States government economists increasingly were referring to a persistent state of "overproduction."[17] United States agriculture, operating in the Nixon administration's 'go big or go home' regime, suffered a price crash that was directly attributable to an approximately fifty percent increase in wheat sown acreage between 1972 and 1976.[18] The reliance on wheat in North Dakota and Montana meant that farms in these states suffered disproportionally greater losses.

In 1973, the United States passed the production oriented Agriculture and Consumer Protection Act which replaced price supports with fixed 'target prices' coupled to deficiency payments.[19] Low commodity loan rates were made available to encourage producers to base seeding decisions on market prices.[20] In actuality, America's northern grain farms, scaling up since the 1920s, were already achieving record production by the early 1960s, well before Earl Butz's infamous directive. At the same time, the rise of the fast food industry in the United States drove renewed demand for wheat as Americans consumed a larger proportion of their diet as fast food in the form of hamburger buns, breaded chicken, and pizza.[21] However, even with what seemed to be the ideal combination of record production and high demand, the

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[16] Ian MacPherson and John Herd Thompson, "An Orderly Reconstruction: Prairie Agriculture in World War Two," in *Canadian Papers in Rural History* edited by Donald H. Akenson (Gananoque, Ontario: Langdale Press, 1984): 11-32.

[17] Gardner, *American Agriculture.*

[18] Ibid.

[19] United States, "Agriculture and Consumer Protection Act," 93rd Cong. (Aug. 10, 1973), PL 93-86.

[20] United States, Department of Agriculture, Economic Research Service, *The 20th Century Transformation of U.S. Agriculture and Farm Policy*, by Carolyn Dimitri, Anne Effland, and Neilson Conklin. Economic Information Bulletin No. 3., Washington, DC, 2005.

[21] United States, Department of Agriculture, Economic Research Service, *Wheat's Role in the U.S. Diet,* by Gary Vocke and Olga Liefert. Washington, 2013. http:--www.ers.usda.gov-topics-crops-wheat-wheats-role-in-the-us-diet.aspx#.U_tvklYmWRM

extended period of lower prices from the end of the 1970s and into the 1980s necessitated a direct federal policy response.[22]

As production efficiency had risen in the United States, non-American production had become more efficient. The 1973 Agriculture and Consumer Protection Act had intended to encourage greater American involvement in global commodity trade. Other grain suppliers, including Canada, with its carefully controlled and marketed production, were happy to take advantage of the newly accessible United States domestic market. Furthermore, in an echo of the 1920s western Canadian experience, United States producers, enjoying rare prosperity, had invested greatly in new machinery at a time of rapidly inflating interest rates. Debt loads tripled over a ten year period and despite strong returns, the United States wheat economy had become fragile.[23] The result was the early 1980s 'farm crisis.'

In 1985, the Reagan Administration, forced to address the price crash and overproduction, introduced the sweeping Food Security Act.[24] Along with a number of direct changes to subsidy programs for various commodities, including an allowance for temporarily grazing cattle on wheat fields, and the possibility of up to $50,000 in deficiency payments to individuals, the Act also introduced the Conservation Reserve Program (CRP). No other policy introduced since the 1930s AAA had as much direct influence on northern United States agricultural land use as did the CRP.

The CRP provided land owners or operators with annual payments on a per-acre basis to 'retire' "environmentally sensitive" land for a contracted ten to fifteen year period. Retired land was to be seeded with "species that will improve environmental health and quality."[25] Nominally designed to allow depleted land to recover from degradation caused by intense production, the CRP was essentially a farm income stabilization plan. Across the Great Plains, a massive acreage was removed from active production and seeded to grass (Fig. 7.2).

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[22] Gardner, *American Agriculture.*

[23] Robert Barry Carson, Wade L. Thomas, and Jason Hecht, *Economic Issues Today: Alternative Approaches* (New York: M.E. Sharpe 2005).

[24] United States, "The Food Security Act," 99th Cong. (Dec. 23, 1985), PL 99-198.

[25] United States, "Conservation Reserve Program."

FIGURE 7.2 Two approaches to land conservation: CRP land (*right*) and chemical fallowed land (*left*) in the 'Box Elder' study block, Hill County, Montana.

The CRP was especially attractive to landowners who were close to retirement age, had already retired, were absentee landowners, or were what the USDA referred to as "lifestyle farmers."[26] The CRP program proved very popular and, between 1996 and 1999, a large number of the original ten-year CRP contracts were renewed upon expiry.[27] By 2013, Montana at 1.27 million acres, had among the greatest amounts of farm acreage contracted to CRP; exceeded only slightly by Texas and Kansas.[28]

While 1970s and 1980s farm policies influenced seeding choices on both sides of the border with respect to the dominant cereals, changing demand for non-food agricultural commodities also contributed to agricultural landscape change. On the whole, staple food-

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[26] United States, Department of Agriculture, Economic Research Service *Conservation-Compatible Practices and Programs: Who Participates?,* by Dayton Lambert et al. Economic Research Report No. 14. (Washington, DC, 2006).

[27] Gardner, *American Agriculture,* 211.

[28] United States, Department of Agriculture, Farm Service Agency, "Report of Conservation Reserve Program Monthly CRP Acreage: Summary of Active and Expiring CRP Acres by State" data server http://www.fsa.usda.gov/FSA/webapp?area=home&subject=copr&topic=rns

related commodity demand remains fairly consistent.[29] Demand for non-food products fluctuates more widely, depending on the availability of alternatives. During the Second World War, a jump in demand for flax fibre for textiles put new market pressure on crop choice.[30] Flax seeded acreage in Alberta quadrupled from 30,519 acres in 1931 to 133,033 acres in 1941. In Saskatchewan, it went from 369,371 acres to 688,905 acres over the same period. Once established, flax acreages continued to climb after the Second World War. Later, a rise in industrial demand for rapeseed/canola-derived oil products led many northern plains producers to switch a portion of their fields to oilseeds, partially aided by government support for new varieties.[31]

Even with policy-driven incentives, crop choices are still limited by the growing location. By the latter decade of the twentieth century, United States federal promotion and subsidy of biofuels, particularly corn-derived ethanol, and an increasing market for corn-based fructose, a sugar substitute, impelled many United States Great Plains producers to seed proportionally more corn acreage. The movement to corn also led to new farm investment in field machinery and irrigation. Corn, although sporadically grown for feed, was never a feature crop in the drylands of central Montana. Total seeded corn acreage in Montana, mostly along the Yellowstone River valley, actually declined over the 'corn boom,' from 85,000 acres in 1988, to 60,000 acres in 2000.[32]

Although agricultural commodity prices on the whole tended to rise and fall throughout the twentieth century, year-to-year demand differences for *specific* commodities allowed producers to diversify crop seeding choices, effectively building in a measure of risk management. Even in the more restrictive environment of the northwestern plains, where wheat had overwhelmingly dominated for the first several decades, producers increasingly chose to plant oilseed and other non-cereal crops, and also reestablished livestock. Indeed, United States agricultural economists encouraged crop diversification as a justification for

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[29] Gardner, *American Agriculture.*

[30] Canada, Census of Agriculture, CANSIM Table 004-00031 "Selected crop data, Canada and provinces."

[31] See Saskatchewan Canola Development Commission "Research Project Reports," http://www.saskcanola.com/research/research.php ; and Alberta Canola Producers Commission, "Canola Research," http://canola.ab.ca/research.aspx

[32] Statistics from United States, Census of Agriculture, 1991 Table 41 "Corn: Area, yield, and production, by States, 1988-1990;" and Census of Agriculture, 2001 Table 1-37 "Corn: Area, yield, and production, by States, 1998–2000."

commodity price control.[33] Agricultural economists believed that if farmers were provided protection from large price fluctuations, they would be more inclined to specialize.[34]

Throughout the 1970s and 1980s, governments regularly encouraged the adoption of new crops. Despite the efforts to protect farm incomes through diversification, market robustness for 'alternative' commodities was crucial. Many recommended alternate crops required specialized labour and investment in new machinery. Furthermore, many of the crop products were attractive only to niche markets. Ultimately, government speculation on the demand for exotic agricultural products usually proved overly optimistic, and producers realized little return for the investments that went into producing them.

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Many scholars and popular writers have documented and opined on rural economic and social development, including economic diversification, which is indelibly connected to rural standards of living, population retention, and community social health. In the Taber case, a complex system comprised of business interests (BC Sugar), government policy, and world markets shaped the local agricultural economy, and by extension the rural landscape. In operating the Lethbridge area processing plants, BC Sugar provided a relatively reliable market, brought investment, created on- and off-farm employment, encouraged agricultural diversification, and conducted research. The system was fragile though, and farmers did have land use and planting options.

The Taber example is also somewhat unique within the greater northwestern plains. Specialized agriculture was possible, not only because of co-location with local processors but ultimately, because of well-developed irrigation and transportation infrastructure. Elsewhere in the study region, where proportionally more of the rural income was derived directly from farming, land use change patterns followed a different trajectory. In the drylands, keeping ahead of the farm scale equation continued to be the ongoing pursuit. Farm consolidation meant specific changes to the rural landscape. As farms got larger, they became fewer in number, and more spatially isolated. Many farmsteads became superfluous.

While much has been written on socio-economic effects of both rural economic diversification and farm consolidation, the effects of these trends on the northern plains agricultural landscape is less understood. Larger consolidated farms allow for certain efficiencies. Large uninterrupted fields are more easily worked with large machines.

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[33] United States, Department of Agriculture, Alternative Farming Systems Information Center http://afsic.nal.usda.gov

[34] Martin H. Entz, Vern S. Baron, Patrick M. Carr, Dwain W. Meyer, S. Ray Smith and W. Paul McCaughey "Potential of Forages to Diversify Cropping Systems in the Northern Great Plains," *Agronomy Journal* 94, no.2 (2002): 240-250.

Additional farmland gains are made through the conversion of previously untilled spaces. Low areas are drained and tilled. Wooded patches are cleared. Fields become more regularized. Abandoned farmsteads are often eliminated, the buildings, trees, and gardens removed, and the space, although relatively small in the context of the overall farm acreage, converted to cropland. Conversely, farmsteads located on ranching areas, or on marginal land that has been retired or reverted to grazing, may persist indefinitely, becoming slowly weathering artifacts of rural demographic change.

Farmstead loss affects rural built and social infrastructure. Because rural population decline is most pronounced in places further removed from large towns and cities, a greatly disproportionate increase in cost of living and social isolation is borne by those remaining. Fewer residences, spaced further apart, with lower occupancy density, provide less public demand and tax revenue to upkeep roads and bridges. Accessibility of basic goods and services is limited, with greatly increasing travel time and cost.[35]

Whether depopulation is caused by, or causes, increased farm mechanization has been understudied, but whichever the direction of causation, farm consolidation is the end result. Middle-sized farms disappear, with fewer and typically older, full-time farmers. Small farms under 640 acres are more likely to be operated by 'hobbyists,' retired persons, or part-time farmers whose family income is dependent on accessible off-farm employment. Increasing economic inequality causes money and social resources to leave communities, leading to a downward spiral of negative rural development.

Farmstead abandonment is generally driven by off-farm economic opportunity. Proximal off-farm employment possibilities result in lower rates of farmstead abandonment, and, in many places the number of non-farm rural residences increases. Agricultural statistics provide a near-continuous record of demographic and farm management change at the county scale, but do not describe sub-county spatial nuance. At the local, farm-level scale, aerial photographs clearly show changing patterns of tillage, field size and shape, farmyard distribution, and the development of other infrastructure.

Detailed analyses of digitized land use classification maps illustrates some of the landscape effects of farm consolidation. Close examination of aerial photographs reveals proportionally more abandoned farmsteads further from built-up areas. Additionally, the greater the distance from a town, the more likely was an abandoned farmsteads to have been completely cleared of any buildings or other infrastructure.[36] In many cases, these farmyards were not only cleared, but had been converted to cropland, hiding any trace of their existence. The rate of decline in the total number of farms across the United States was highest between

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[35] Mustaque Hossain, Stefan A. Romanoschi, and Larry W. Emig, "Rural Transportation Infrastructure Preservation in Kansas: Issues and Challenges." *Transportation Research Record* 1819, Paper No. LVRB-1134 (2003): 30-38.

[36] Discussed in previous chapters.

1945 and 1974, higher even than during the highly publicized Farm Crisis of the 1980s. In Canada, the pattern of demographic change was similar.

The demographic and agricultural landscapes of Chouteau County, Montana are characteristic of patterns seen across the wider northwestern plains. In Chouteau County, farm acreages are comparatively large, and population density is low. In 2010, 5,800 people resided on the county's 10,200 square kilometres.[37] Six built-up areas are distributed across the county, four of which are located along a northeast-southwest transect paralleling US Highway 87 and the now seldom used Havre-Great Falls connector railway (Fig. 7.3). Away from the highway, a few additional 'settlements' are marked on maps, but have few or no residents, nor any remaining infrastructure.[38] Some now exist only as single farmyards. Access to Chouteau County farms is via a network of secondary gravel roads, comparatively limited in both mileage and distribution compared to the regularized grids of Saskatchewan.

Chouteau County's towns are small, most with fewer than 100 residents. Fort Benton, the county's economic and public service centre had a 2010 population of 1,400. Big Sandy, the next largest town had 600 residents (Fig. 7.4). Great Falls, a large regional city of 59,000 in neighbouring Cascade County, is located sixty kilometres southwest of the Chouteau County centre. Outside of the 'urban' populations of Fort Benton and Big Sandy, 3,800 residents equate to an overall density of 0.37 persons per square kilometre. The Chippewa Cree Tribe of the Rocky Boy's Indian Reservation, with a 2010 population of 3,300, straddles Chouteau and Hill counties, with the population predominantly living in the latter.

[37] United States 2010 Census.

[38] Including Eagleton, Floweree, Iliad, Kenilworth, Shonkin, Virgelle, Warrick, and Woods Crossing.

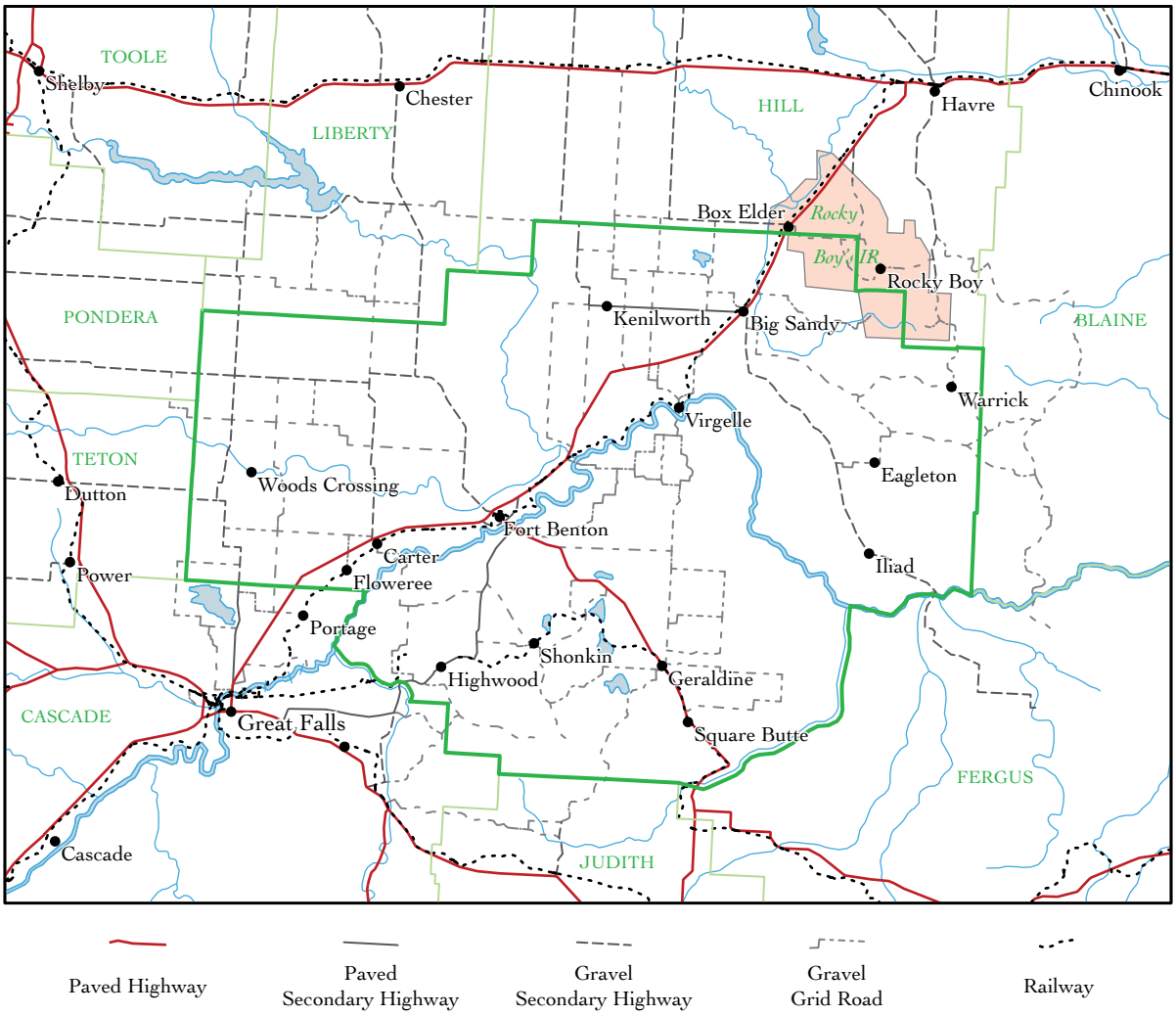

FIGURE 7.3 Map of Chouteau County, Montana settlements and roads. Roads and settlements outside Chouteau boundaries are simplified.

FIGURE 7.4 Johannes Avenue, the main commercial street of Big Sandy, Chouteau County, Montana. With 600 residents, Big Sandy is the county's secondary (after Fort Benton) commercial centre. The nearest neighbouring commercial hubs are Havre, Hill County, fifty kilometres to the north, and Fort Benton, sixty kilometres to the south. Photo taken 13 February, 2007.

Spatial land use data analysis undertaken for this dissertation reveal changes in farmstead density and occupancy within Chouteau County. Farmstead data was extrapolated from the ICPSR Great Plains Project land use database, which had originally been interpreted and classified from USDA aerial photos to ascertain basic agricultural land use in fifty Great Plains counties.[39] The original ICPSR classifications were primarily aimed at distinguishing land under tillage from untilled grassland, wetland, or forest. Human-modified non-agricultural areas were classified within a generic "developed" category. Land use polygons designated as "developed" represented farmyards, private driveways, extraction and irrigation infrastructure, stock watering dugouts, refuse tips, or otherwise built-up or disturbed non-farm areas.

[39] Kenneth M. Sylvester, Daniel G. Brown, Glenn D. Deane,and Rachel N. Kornak, "Land Transitions in the American Plains: Multilevel Modelling of Drivers of Grassland Conversion (1956-2006)," *Agriculture, Ecosystems, and Environment* 168, (2013): 7-15.

Crude as they were in their original definition, the ICPSR-identified "developed" lands provide a good starting point for a farmstead inventory. Testing the generic 'developed' polygons against a series of rule-based extraction criteria allowed for the elimination of the majority of non-farm polygons from the dataset. Visual confirmation of land use for a sample of the developed polygons, using the original images, informed the specification of area, perimeter, and 'perimeter-area ratio' thresholds. Any 'developed' polygons characterized by one or more criteria values falling outside the thresholds were rejected as being 'non-farm.' Application of these tests also eliminated a small number of polygons erroneously classified, for example, crop fields mistakenly coded as 'developed' within the database.

The perimeter-area (p/a) ratio, a measure commonly used in remote sensing applications[40] proved particularly useful for extracting farmyards from other 'developed' land types such as roads or well sites. A visual confirmation process conducted on approximately five percent of the three-mile by three-mile blocks demonstrated that Great Plains farmyards were characterized by a signature 'squareness,' corresponding to p/a values of less than 0.17.

TABLE 7.1 Farmyard polygon extraction criteria. Polygons with values outside those specified were considered 'non-farm.'

Measure	**Thresholds**
Area	Greater than 3 acres; less than 50 acres
Perimeter	Less than 3 miles
Perimeter/Area Ratio	Less than 0.17

A small, but unspecified number of misrepresented polygons, those fitting within the extraction criteria, but representing other non-farm land uses, remain in the dataset. Based on visually confirmed samples in Chouteau, the total number of non-farm developed polygons is greater later in the study time period. The increasing number of non-farm polygons across the great plains as a whole reflects an increasing amassing of non-farm infrastructure, particularly that accompanying petroleum extraction. Across the entire Great Plains sample, very few 'non-farm' developed areas, less than 12% of the total number of developed polygons tested, are identifiable in 1930s and 1950s imagery.

In Chouteau County specifically, with limited non-farm economic activity in rural areas, the number of farmyards corresponds very closely with the total number of 'developed' polygons throughout the study period. If land was built up at any stage in Chouteau County, odds are that it was a new or enlarged farm yard. Elsewhere in the United States Great

[40] W. A. Salas, S. H. Boles, S. Frolking, X. Xiao and C. Li, "The Perimeter-Area Ratio as an Index of Misregistration Bias in Land Cover Change Estimates," *International Journal of Remote Sensing* 24, no.5 (2003): 1165–1170.

Plains, approximately 80% of developed polygons in the 2000s were verified as farmsteads, indicating comparatively larger expansion in non-farm infrastructure outside Montana

All developed polygons in the Chouteau County photographs were visually examined to positively identify farmyards. Farmyards were deemed as such if dwellings or other farm buildings were visible. It was not feasible to conclusively determine whether an identified farmyard, was in fact, occupied on the photo flight date. It is assumed that a portion of the farmyard dataset represents abandoned farms that still retained some infrastructure. The lag between farmyard abandonment and a visible change in the use of the land upon which it was situated, generally to tillage, grain storage, or some other agricultural use, varies considerably (Figs. 7.5 and 7.6).

FIGURE 7.5 Abandoned house used for grain storage, Liberty County, Montana. Other than the grain storage buildings, the rest of the one-time farmyard is seeded.

FIGURE 7.6A Farmstead removal near Abbey, Saskatchewan. An aerial photograph taken in 1991 shows a farm to the right of the road (*'A'* and *inset*), alongside a radio tower with service building immediately to the south. By 2009, only the tower remained (*overleaf*). This farm was purchased not long before by a local Hutterite colony located two miles south and two miles east (*'B'*).

FIGURE 7.6B Farmstead removal near Abbey, Saskatchewan. By June, 2009, the house, farm buildings, drive, shelterbelts, dugout, and corrals have been removed. Only the radio tower, access road and a grain bin remain. The farmstead land has been incorporated into a surrounding field (seeded with field peas in 2009).

In some cases, relatively little time passes between dwelling abandonment and removal, either by decay, destruction, or relocation of structures. In other instances, dwellings and other buildings may persist for decades. The time to building collapse following abandonment is determined by the original integrity of the structure, the state of maintenance at the time of abandonment, and most importantly, the integrity of the structure's roof.[41] The great majority of northwestern plains farm buildings are of wood frame construction. Left unoccupied, in the relatively dry northwestern plains climate, a wooden building could conceivably last decades. However, over time, as the roof surface deteriorates, water begins to weaken the supports beneath. Eventually, a large snowfall will cause collapse. Even then, it may be some time before the land owner decides to demolish and remove the ruins. Determining the potential influence of personal nostalgia, or attachment to the family home

[41] Observed.

and how it factors in a decision whether to remove an unoccupied homestead, is beyond the scope of this work.

Built infrastructure, if it hinders the movement of machinery in cropland, tends to be removed. New infrastructure that serves to increase productivity, irrigation equipment for example, or provides value above that of agricultural production such as oil/gas well sites, is accommodated. Further spatial research is necessary to ascertain the effect of distance to towns (for employment) or whether farm consolidation resulted in remaining farmsteads being relocated to be closer to amenities, all-weather roads, or utility supply lines. The scale of the aerial photographic sample did not permit reasonable calculation of these factors. Determining the lag between abandonment and removal requires very close examination of the photos for evidence of occupation. Such close inspection was undertaken for one nine square mile sample block in Chouteau, Montana. Photos were examined at high magnification for signs of occupation, for example, fresh driveway tracks, serviceable vehicles, maintained lawns and shelterbelts.

Farmstead counts derived from photo-interpreted land use data are revealing. The larger pan-United States Great Plains study demonstrated that farmstead changes tended to closely reflect census records of farm size change. In the short-grass zone that included samples from Montana, Colorado and Texas, contextual economic factors drove both farm count and farm size changes. For example, the number of Texas farmsteads declined from the 1950s onwards, mirroring both the decline in the number of medium-size farms (140 to 500 acres)[42] and the increase in the number of farms over 1,000 acres. At the same time, small holdings under 140 acres also increased in number from the early 1970s onwards, an almost universal occurrence throughout the American Great Plains.

Comparatively, a rather dramatic pattern was evident in photographs of five Colorado counties where farmstead counts had declined modestly from the 1950s to 1970s, to a low of 330. However, the number rose dramatically thereafter, nearly doubling in number by the 2000s. This jump in farmstead counts coincided with the division of several large farms into smaller ones as small acreage holdings rapidly developed in concert with urban expansion along the Colorado front range. More than one half of farms in the Colorado sample were smaller than 140 acres by the 2000s as "lifestyle farmers"[43] migrated to land east of the Denver metropolitan area.

Over the same time period, Montana farmsteads remained at a consistently low number (under 200) from the 1950s onwards for five sample counties, Chouteau, Cascade, Hill, Liberty, and Toole, although the majority of farms continued to grow in extent, with over 70% of farms exceeding 1,000 acres by 1970 (Fig. 7.7). Census data and detailed photo

[42] Not everything is bigger in Texas. Farms of 140-500 acres would be considered "small" in the Montana Triangle.

[43] A USDA term. See United States, *Conservation-Compatible Practices*.

analyses of the five county samples reveal much about farm abandonment. In Montana, almost all the land that would be incorporated into farms was already converted by 1935, with only a modest proportional increase to the early 1960s. Very large farms were already an important feature of the 1930s Montana agricultural landscape, but declined as a proportion of the total of all farms from the mid-1960s, as the number of smaller 'acreage' farms made a resurgence. Many of these smaller 'farms' did not list tractors among their farm equipment.[44] A trend towards a decrease in the number of farms reporting combine harvester ownership reflects both a shift towards larger wheat farms, and a corresponding increase in the use of contracted combining services. Although the rise in the number of very small tractorless 'farms' is intriguing, their combined acreage never accounted for more than two percent of the total farmed acres.

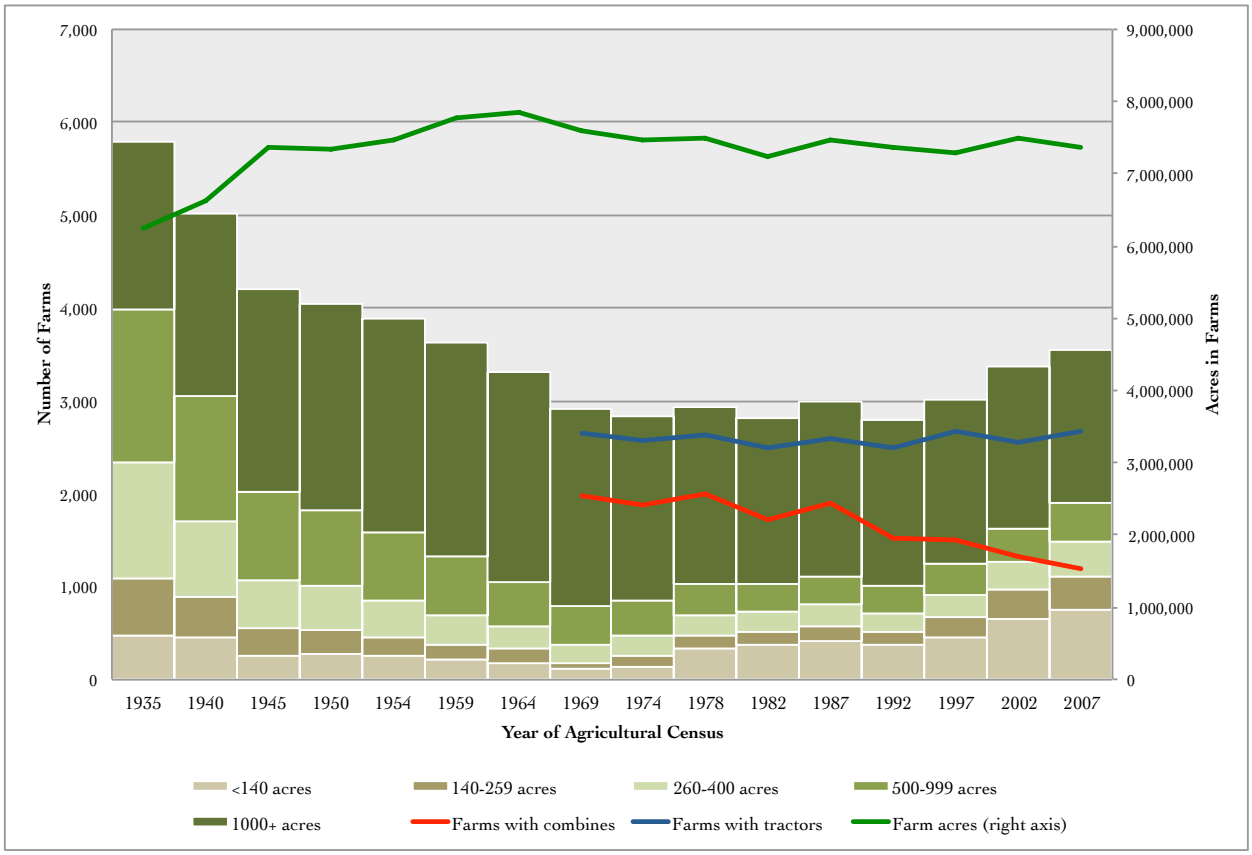

FIGURE 7.7 Aggregate farm size trends for five Montana Counties (Cascade, Chouteau, Hill, Liberty, Toole).

[44] This pattern was also observed to be the case in a similar study conducted for western Kansas. See Dunlop and Hautaniemi-Leonard. "Abandoned farmsteads."

The largest Montana farms, those over 1,000 acres at a minimum, accounted for approximately 30% of farmland in the 1930s, falling to somewhat less than 25% by 2007. However, interpretation of census evidence suggests that the largest farms were becoming even greater in size over 1960s to mid-2000s span, so the actual proportion of farmland acres among the largest farms may have been much more. The difference was in the mid-sized farms, which modestly increased in number beginning in the early 1990s. Land use was dominated by pastured cattle, accounting for well over half of all farmed acres from 1930. Wheat was the only major crop in this area (Fig. 7.8), grown in a wheat/fallow rotation visible in the aerial photographs. Irrigation was never a feature of the north-central Montana agricultural system.

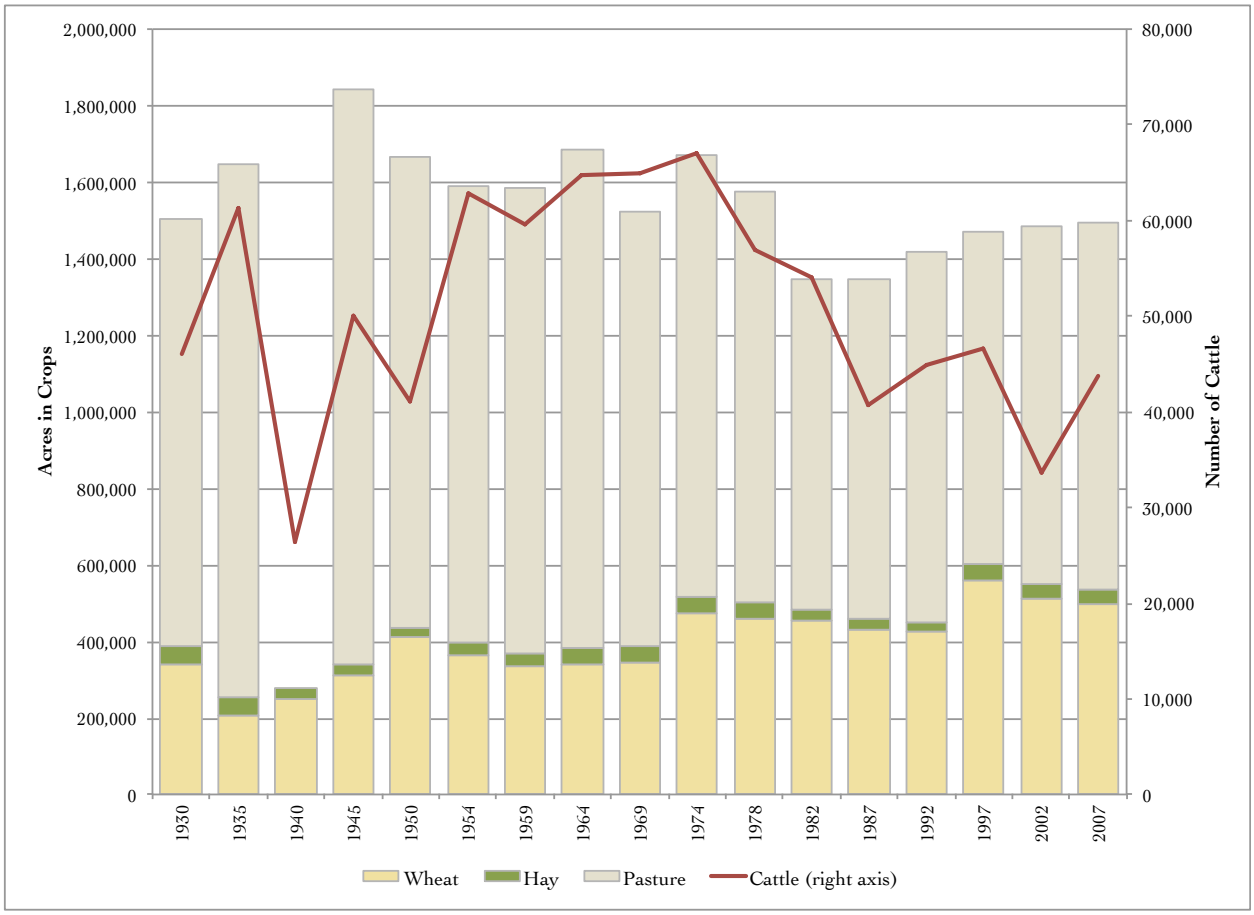

FIGURE 7.8 Relative proportions of land devoted to wheat, pasture, tame hay. Number of cattle also shown.

Situated on the dry northern plains, where climatic and accessibility restrictions limit agroeconomic diversification, the Chouteau pattern of farm change was markedly linear, compared to that elsewhere in the Great Plains. Aerial photo interpretation of the larger five-

county sample confirmed a persistent decline in number of farmyards from the 1930s to the 2000s, inversely relating to a steady increase in both field and farm size. Chouteau County mirrored the overall northern Montana pattern in terms of farm size changes and land use.

Over time, the proportion of Chouteau land devoted to pasture versus wheat changed in favour of cropping. Dryland cattle ranching requires extensive pasture, and sufficient water supply. For the most part, in Chouteau, other than in gullies or on particularly stony sections, grazing land was generally of similar quality to the farmland. Furthermore, as with the sugar industry, where proximity to a processing plant determinant whether or not beets would be grown, the availability of nearby meat processing facilities has been an important determinant of how much land has been devoted to pasture. Historically, a few meat packing plants have located in counties adjacent to Chouteau, and some Chouteau cattle were also shipped to be finished in feed lots far away, including in Alberta (Fig. 7.9).[45]

Chouteau is a very rural county that has been losing population with consistent out-migration since the 1930s, except for a small increase from 1990. The population in the 2000 census was just under 6,000 (of whom only forty were Hispanic)[46] and population density was 1.5 persons per square mile. Fifteen percent of the population was Aboriginal, the majority of them living on the largely non-arable Chippewa Cree Tribe's Reservation. The population has become skewed towards older adults over time, with over half of the population 35 and older in 2000, and seventeen percent 65 or older (Fig. 7.10). Employment has been steady, and also reflects a continuing, yet declining, dependence on agriculture. In 1930, nearly 70 percent of the labour force was employed in agriculture, falling to 30 percent in 2000 (Fig. 7.11). Government employment, trade, and to a smaller extent healthcare and construction have filled the gap left by falling agricultural job opportunities. The number of occupied housing units in the county remained very steady, with a small and fluctuating number of unoccupied units.

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[45] Linda M. Young, "Moving Toward a Single Market is Hard: Trade Tensions in the Canadian-US Cattle and Beef Markets," (discussion paper no.27, Montana State University, Trade Research Centre, March, 1999). The number of cattle entering the United States from Alberta is far greater than the reverse. Canadian restrictions on the importation of live cattle were eased in 1997 providing Montana ranchers with processing alternatives in Alberta.

[46] United States Census, 2000. In the southern and middle Great Plains, Hispanic migrant workers account for a large proportion of the food processing labour force. The United States government's 1940s fear of widespread illegal Mexican immigration into Montana apparently did not materialize over the long term.

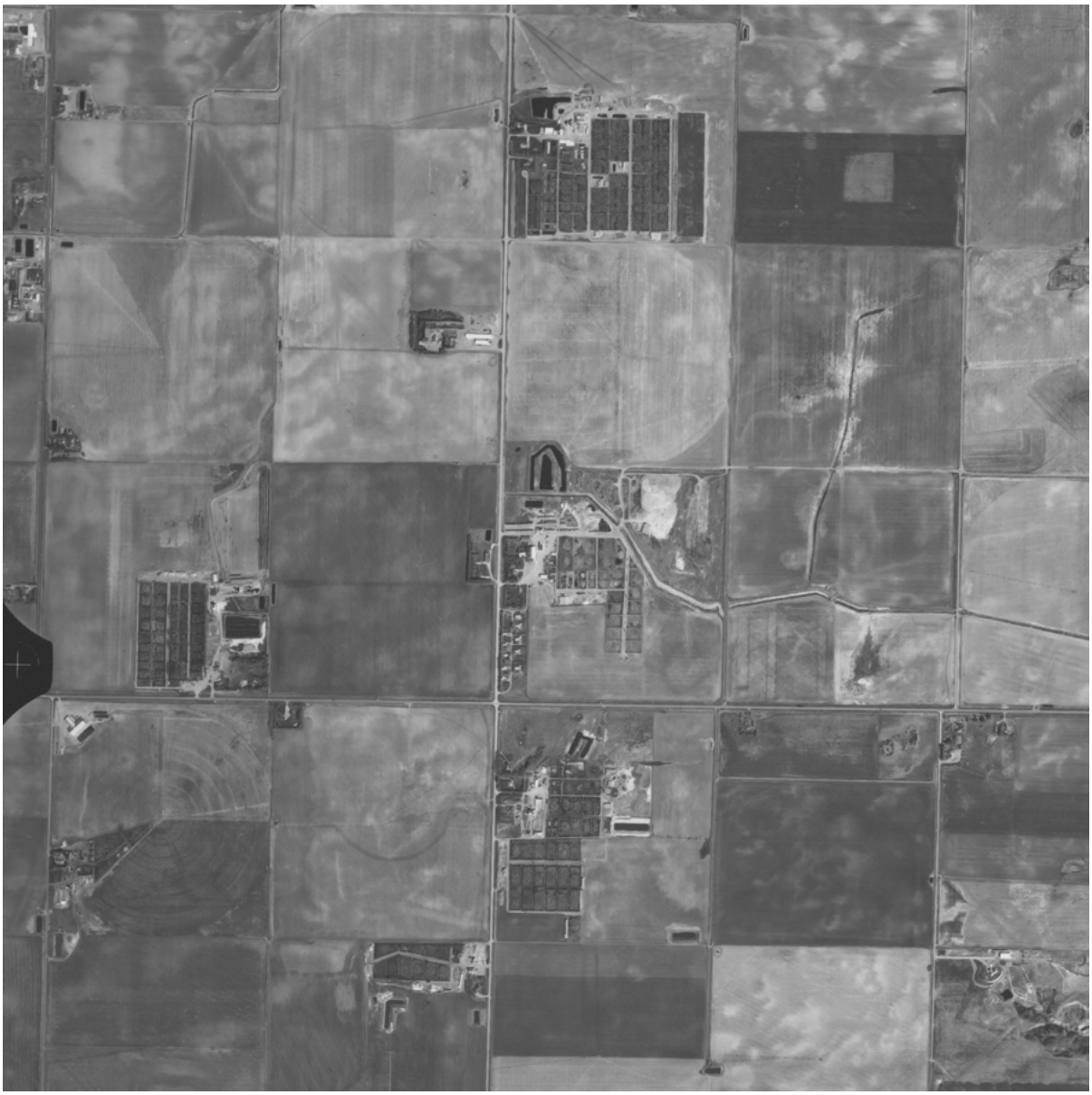

FIGURE 7.9 Aerial photograph of feed and finishing lots near Coaldale, Alberta, 1999.

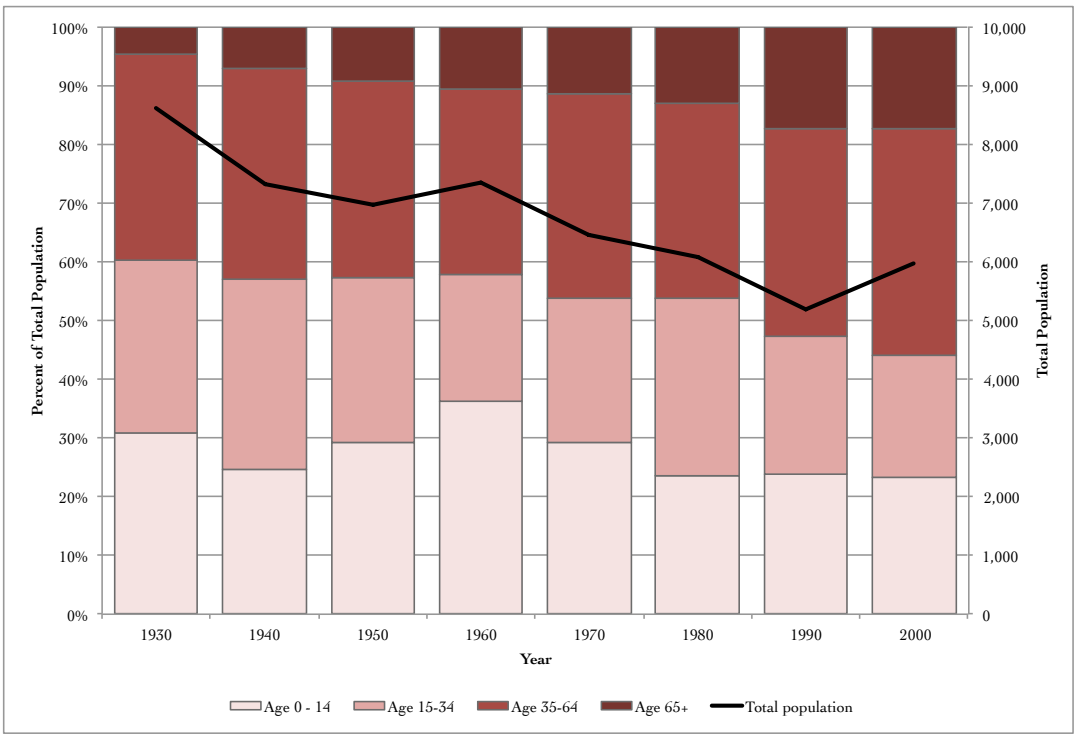

FIGURE 7.10 Chouteau County, Montana demographic change.

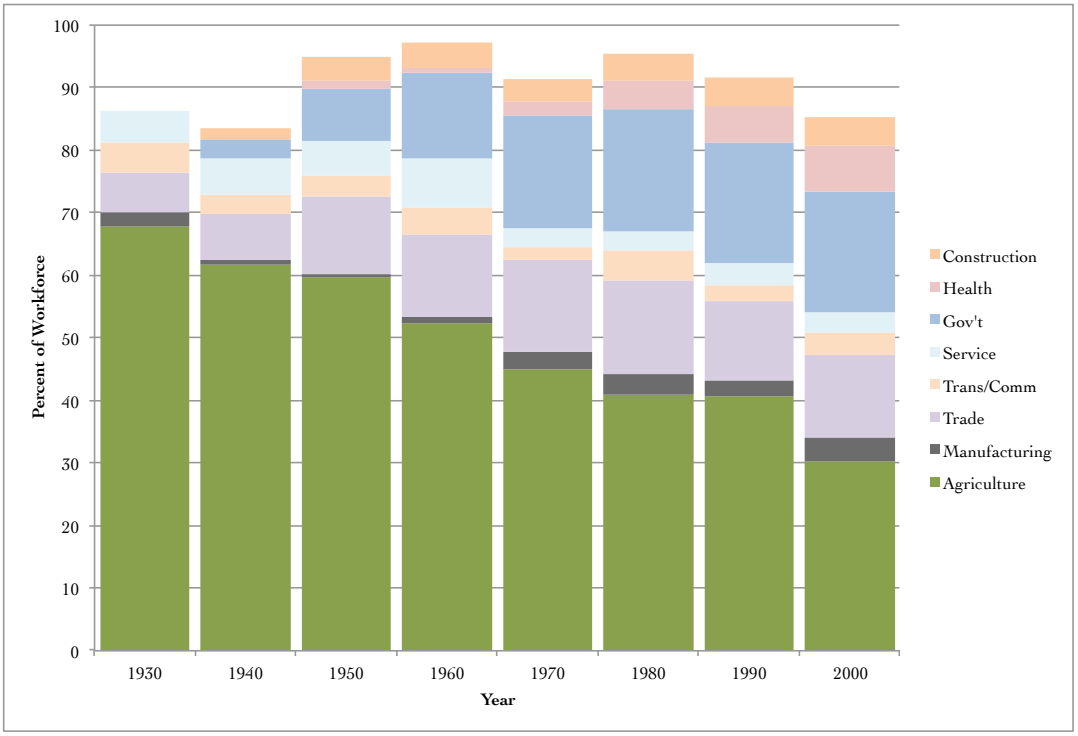

FIGURE 7.11 Employment trends for Chouteau County, Montana.

Aerial photo interpretation confirmed a decline in number of farmyards persisting throughout the 1930s to 2000s study period, inversely mirroring a steady increase in both field and farm size (Fig. 7.12). Chouteau County also saw a decrease in the percentage area cropped from the 1990s to the 2000s, but with a sharp increase in average field size, suggesting field consolidation along with farm consolidation. The number of farmsteads in north-central Montana steadily declined from the 1930s, suggesting that farmsteads were demolished and the land incorporated into fields. Close inspection of Chouteau imagery confirmed this was the case. On one level of interpretation, the Montana case is reminiscent of the narrative of farm consolidation and abandonment that has been told from the 1920s onwards. The relative stability of the rural economy of later decades suggests a more nuanced dynamic.

Interpretation of aerial photographs allows a closer examination of patterns of farmstead change that may then be reconciled with larger trends of commodity and rural labour and industry shifts. From the county-level census data, farms clearly became larger. Aerial photos show that fields became larger at the same time. Northern Montana, unlike others regions observed, such as in western Kansas or central Colorado,[47] experienced persistent farm consolidation, resulting in a landscape dominated by very large farms.

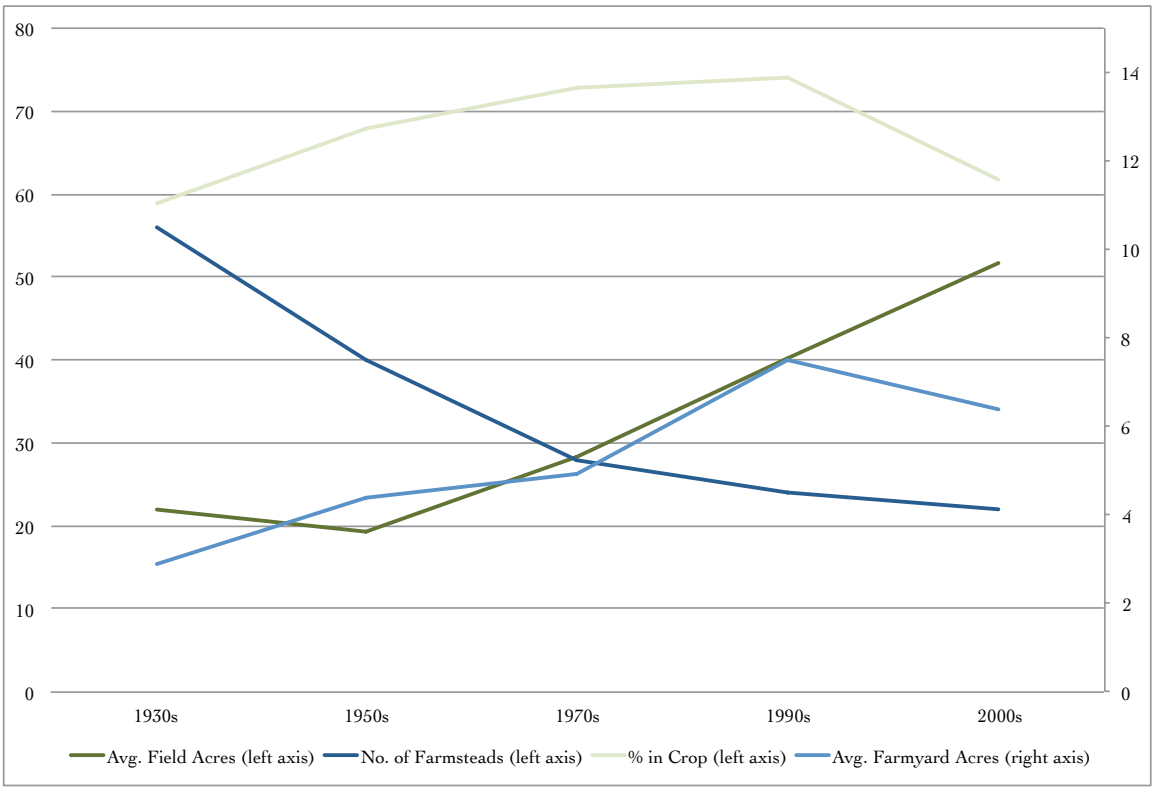

FIGURE 7.12 Chouteau County farmstead trends. As field sizes increase, the number of farmsteads decrease.

[47] Dunlop and Hautaniemi Leonard, "Abandoned farmsteads."

However, Chouteau never developed a heavy dependence on centre-pivot irrigation, (no water is available), nor cattle feedlots, (restricted by labour availability and distance to market), that characterized the late twentieth century agricultural landscape in other parts of the United States and western Canada. Nor did Chouteau experience booming petroleum extraction that took increasing amounts of farmland acres out of production elsewhere, for example in western North Dakota, and in many parts of Saskatchewan and Alberta.

Elsewhere, proximity to off-farm economic opportunity encouraged new small 'lifestyle farmsteads' to be built, and perhaps some existing farmsteads to be preserved. Chouteau County, though, much more closely followed the narrative of farm consolidation and depopulation that dominates agricultural economic literature and popular perception.[48] Farmsteads were steadily abandoned, with the land used to pasture cattle or increase wheat production, in ever larger fields, and with the expected increase in the size of the remaining farmyards. With nearly continuous population decline, and few nearby off-farm opportunities, even the more recent increase in the number of small farms could not offset the falling number of farmsteads overall.

In 1931, laying the groundwork for the Roosevelt Administration agricultural policy that would influence American institutional farm thinking for decades following, M.L Wilson, Assistant Secretary of Agriculture (1934-1937), postulated that America had 2,000,000 *too many* farmers cultivating 100,000,000 *too many* acres.[49] Observing trends of rural depopulation and farm consolidation from his vantage point in Montana, Wilson was adamant that a higher quality of life on the rural Great Plains was only possible if farmers embraced the ideals of mechanization and economy of scale. Whether it was Wilson's policy recommendations, or larger economic contexts that hastened the actual outcome, an increase in machines, large consolidated farms, and the movement of people off farms, is a matter for debate, although the processes that ultimately played out over much of the Great Plains did prove Wilson prophetic. The quality of life argument is one of conjecture.

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[48] John C. Hudson, "Migration to an American Frontier," in *Geographical Perspectives in America's Past: Readings on the Historical Geography of the United States,* edited by David Ward (New York: Oxford University Press, 1979).

[49] Harry Carson McDean, "M.L. Wilson and Agricultural Reform in Twentieth Century America" (PhD thesis, University of California, Los Angeles, 1969).

CHAPTER 8

A STABLE LANDSCAPE

"If it rains, it rains. If it doesn't rain, we make it rain"[1]

On April 25, 1882, a London-based enterprise, the North Western Coal and Navigation Company (NWC&NCo.) incorporated with the aim to develop the Crowsnest Pass coal fields of southwest Alberta.[2] The nascent CPR and GNR were to be the market for the coal. Two years later, the Alberta Railway & Coal Company (AR&CC) formed to build track that would connect the coalfields with the CPR's transcontinental line at Medicine Hat, and with the GNR line at Shelby, Montana. Canada, recognizing that the new railways offered opportunities for development and settlement, awarded the AR&CC one million acres of land near Lethbridge as compensation. Government and investors alike were excited with the prospect of a new *western* agricultural frontier, this time looking eastwards.[3] There was, however, one difficult issue. The land was dry, too dry for the Ontario-style agricultural adaptations being applied on the Manitoba eastern agricultural frontier.

Irrigation was the obvious answer to the aridity. The Canadian Department of the Interior had proposed irrigation for the area after initially surveying it in the 1880s.[4] In 1891, the AR&CC agreed to lease 700,000 acres of the company's grant along the St. Mary River, to the Church of Christ (Latter Day Saints). By contract, the Mormons were to develop irrigated farmland, and by 1900, canals and control gates were complete as far as Lethbridge.

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[1] Kelly Norrington, farmer, Bradwell, Saskatchewan, June, 2012.

[2] Lester, *Atlas of Alberta Railways*.

[3] Canada, Department of Agriculture, Research Branch, *To Serve Agriculture: The Lethbridge Research Station, 1906-1976,* by Alex Johnston. Historical Series No.9 (Ottawa, 1977).

[4] St. Mary River Irrigation District, "History" http://www.smrid.ab.ca/history.html

Promotional material published in 1901 by the Lethbridge town council proclaimed "Every Man His Own Rainmaker."[5] But drought remained a threat.

To assist in developing agriculture, and to convince potential settlers that farming success was achievable, the renamed Alberta Railway and Irrigation Company (AR&IC) convinced Dr. W.H. Fairfield, Superintendent of the University of Wyoming's Experimental Station in Laramie, to come to Lethbridge to establish a demonstration farm. It 1906, one year after Alberta achieved provincial status, and widespread agricultural settlement was underway, the federal government realized its agricultural vision for the region. The AR&IC's proposed demonstration station, with its founding superintendent in place, was newly commissioned as the "Dominion Experimental Station, Lethbridge."[6]

Five years later, after barely ten years of agricultural use, the fields surrounding Raymond "blew out."[7] More dust storms followed in 1912, and 1914.[8] While Experimental Station staff worked on the challenges of dry land farming, settlers poured into the drylands of southern Alberta, southern Saskatchewan, and northern Montana.

* * *

> "The Minister may in respect of special areas generally or in respect of any specified special area or any part of it…order and require any owner or occupant of land to adopt any methods of farming or grazing that the Minister considers necessary to prevent soil drifting, water erosion, over-grazing or any hazard that might jeopardize the economic security of residents of the special area."[9]

The preceding quote from the Alberta Special Areas Act (2000) is profound. The language plainly indicates the extent to which the Crown is prepared to intervene in the practice of agriculture within the designated special areas. That such interventionist sentiment still exists in current legislation is perhaps not surprising. The blueprints for the northwestern transboundary plains agricultural landscape were drawn by government. Government conducted land surveys, moved Aboriginal populations, sponsored railway building, and

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[5] St. Mary River Irrigation District, "History."

[6] Canada, *To Serve Agriculture.*

[7] Ibid.

[8] Ibid.

[9] Section 7e of the Alberta Special Areas Act, R.S.A, 2000. Ch. S-16.

fashioned land dispersal schemes. And the extensive efforts paid off. A vast territory of prairie grass was transformed to a regularized mosaic of fields and grazing land. Once the land was settled, direct government involvement might have ended. However, government officials remained convinced that certain limitations of land, climate, and distance, forewarned by the surveyors, and fretted over by railway executives, would continue to pose real and ongoing challenges to agricultural success.

This dissertation is about the making of the northwestern plains agricultural landscape. The narrative is one of learning and adaptation. It is about resilience and inventiveness.[10] It explores the tug of disparate forces, between government and people, between the larger world and the local. It is about place and time. Five themes have emerged in this research, each threading across nearly a century of land occupation, use, and change: *Environment and Adaptation, Efficiency and Scale, Timing, The Role of Government,* and *Landscape and Place*.

Environment and Adaptation

One fact of farming on the northwestern plains is inescapable: agricultural success in the region is a function of weather, rather than climate. Over the long term, average moisture and temperature conditions allow agricultural flourish, but short-term variations in rainfall and freeze/thaw dates pose risks. The very first settlers were aware of the general aridity and other environmental limitations, and practices were adopted to suit them. Virtually every farm contained a percentage of land that was unworkable because of soil, slope, or drainage limitations, but, on the whole, soils were of sufficient quality to support a modest range of crops. Adaptations were designed to address the variability, providing a buffer from the years that were too dry, or brought early frost. The ability to cope with year to year variability was the main determinant of success. Droughts occurred frequently in the region, enough so that many settlers were quickly discouraged, but agricultural development continued.

The 1930s drought, at least in southern Alberta and Saskatchewan and northern Montana, indisputably caused a financial setback in terms of overall production tonnage and farm-derived income. Many longer-term farmers had likely had enough of drought, or were unable to financially withstand a period of low income, and moved away. However, their land was still farmed by *someone*. Very little acreage was permanently retired from crops, although a few examples are evident in most study cases. On the *whole*, farmers carried on through the drought, seeding fields, tilling weeds, and harvesting a crop. This was no different from the

[10] "Resilience" in this context is defined in the sense of an individual or societal capacity to absorb and recover from an environmental or social hazard. For examples of use of the term in hazards literature, see Susan L. Cutter, "Vulnerability to Environmental Hazards," *Progress in Human Geography* 20, no.4 (1996): 529-539.

previous decade when settlement records show the same sort of resilience was required to successfully establish farming.

Approximately one half of the northwestern plains arable land was in production by the onset of the 1930s drought. Land taken out of crop production by 1937 to 1940, the time that the Canadian and United States governments flew photographic flights expressly for the purposes of monitoring field recovery and production, was only a small portion of the total. Much of this first reverted land had been out of production long enough that by 1937 to 1940, only the faintest traces of previous cultivation remained visible. In some places, for example in the Badger and Webb study cases, new land was sometimes broken repeatedly, reverted again after only a few years. Land found unsuitable for tillage was not kept in production for long. Farmers knew the nature of the land from first settlement. Drought and soil erosion, in places prone to it, had happened over and over again. If a settler had enough accumulated capital, it was possible to work land in a modified way. Machines were not viewed as contributing to the problem, rather they were seen as an integral component of adaptation.

After World War Two, the remaining bits of agriculturally viable land were brought into cultivation. In a few areas, this as much as doubled previously cultivated acreage. But in the majority of cases, the increase was more modest, with most cropland having been put into production before the War. Cropland increases were incremental. "Stability" describes the post-War farming-land relationship, at least in terms of the cropland/grazing land balance. Throughout the latter half of the decade, fertilizer inputs, ever increasing machine efficiency, and improved tillage techniques kept yields rising. Periodic drought caused downturns, but not disasters. Although one might be tempted, it is inaccurate to say that the 1930s marked a 'resetting' of agricultural systems. The decade was a period of adjustment and learning, but nothing happened in the field that was radically different from what was done in the 1920s.

Efficiency and Scale

With advances in mechanization and production efficiency, successful farms grew from the time of initial settlement. Larger machines necessitated larger fields. Decreased farm product diversity, beginning in the 1920s, made working large fields more practical. By the 1970s, fields of 160 or more acres were commonplace. Farming on this scale involved the conversion of a measurable amount of less optimal land, an outcome foreseen *before* settlement. In 1908, James J. Hill, noted that any future increases in wheat yields were not going to be made possible through an increase of new frontier acreage. Observing that there was little new public land to be ploughed, Hill recognized that much of the new production would

occur on reclaimed arid land.[11] Speaking at the dawn of the twentieth century, Hill's rationale for expansion was phrased in contemporary Malthusian terms of population growth and food productive capacity.[12]

Whereas Hill's personal motivations for promoting efficiency were more profit-driven, others were convinced the good of society depended on stable agricultural production. Scientific efficiency was the means to achieving such stability. People like M.L. Wilson of Montana State College were convinced that efficient, mechanized large-scale monocrop farming, already adopted in the Montana Triangle, was a model for the rest of the United States, and through his political influence, was able to have his ideas adopted as the underlying principles of 1930s United States New Deal agricultural policy. Of course, Triangle farmers were presented with little choice. The semi-arid climate greatly restricted crop possibilities, and the lack of water for stock, combined with relatively uniform land surface made large-scale wheat farming the most promising system. If the settler had sufficient capital to purchase land and machinery, and pay for labour, large farms could be viable.

By 1930, at the start of the decade's economic depression and drought, the experience of Alberta settlers had shown that a minimum farm size, ideally 640 acres or larger, was necessary for success. Landowners faced three options: try to grow larger, maintain the same scale, but with an off-farm income supplement, or sell to a willing buyer. Many chose the latter, simply tired of farming, wishing to experience other places, obtain an education for themselves or their children, or to try a different livelihood altogether. Many people left farming from the very beginnings of settlement, but farming itself continued. Following the 1930s setback, farms continued to grow, and almost all acres that could support crop agriculture, (and a few that could not), were brought into production by the 1950s. By the 1960s, crop acreages plateaued and stabilized. Only in the 1980s, did a reduction in seeded acreage take place, largely in the United States due to the Conservation Reserve Plan.

Timing

Northwestern transboundary plains agricultural development was subject to a chronology sufficiently different from other parts of the Great Plains that it contributes to a regional definition. Most Great Plains farming areas, other than a few on the northern and southwestern fringes, were settled a few decades earlier than was the northwest. The timing is key to the agricultural landscape evolution for three main reasons: 'effective settlement' policy, mechanization, and development lead time ahead of the 1930s.

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[11] James J. Hill, "Address delivered by Mr. James J. Hill before the Farmers' National Congress Madison, Wisconsin, September 24, 1908."

[12] Ibid.

Northwestern settlers came relatively late to lands that the federal governments and the transcontinental railways deemed absolutely essential to be 'effectively' settled. Much of the landscape was pre-planned. Government agents undertook the land survey, policy architects added new settlement incentives, such as the enlarged homestead provision under the Homestead Act. Governments also provided financing and land grants to support the budding of a well-developed railway network. Laying out regional service centres, grain delivery points, and building irrigation infrastructure, the railways did their part to encourage migrants to take a chance on lands popularly known as the dry and unfit 'Palliser Triangle' and 'Great American Desert.'

Settlers arrived in the northwestern plains just as farming underwent a great technological shift from horse-drawn tillage to machine traction. In the 1908 to 1914 window of settlement, land breaking could be contracted to well-established operators of large machinery. Custom threshing outfits made mechanized harvest finically viable for new settlers.[13] The Great War spurred the development of the small petrol engine. Fordist production principles, developed through the First World War made them inexpensive, with readily available interchangeable parts, and simple enough that owners themselves could do many repairs. The commodity price jump that resulted from war demand and policy, coupled with decent weather, meant farmers were better equipped to buy machines, especially if they had farmed elsewhere and already had accumulated capital. Some settlers brought machinery with them. Most enthusiastically embraced new technology. Much of the initial cropland was broken in the 1920s, perhaps still largely with horses. Even for the most successful individual farmer, this was still a slow process. But the subsequent working of the land was aided by tractors. By 1930, a good portion of the arable land (about one-half is a rough estimate for most study blocks) was in production. Five years later, very little land was still being worked on a year-to-year basis with horses.

Finally, the economic depression, the effects of which began to be felt in 1930 and 1931, was a turning point. The depression coincided with two things: change in government (and government attitudes) in both countries and a change in the weather. The laissez-faire policies that had characterized the Conservative government in Canada and the Hoover Administration in the United States were replaced by a move towards centralized management of regional issues. Even before the governments changed hands, the shift in the political winds was leading to a more prominent federal role an influence in land use decisions. The governments of both countries enacted legislation that had tangible in-the-field effects. The dry weather provided a good reason.

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[13] Ingles, "Custom Threshermen."

The Role of Government

The federal governments of Canada and the United States knew the environmental restrictions to farming in the northwestern plains. In establishing experimental stations and passing legislation supporting extension programs, they knew that certain adaptations to dry land farming were necessary. Western-based Canadian government agents knew the local environmental context quite well. They consulted regularly with farmers, relying on local inventiveness and a spirit of cooperation to come up with solutions. United States government agents were of two different sorts. Extension people, such as M.L. Wilson, who had gained a range of experience in the Montana drylands, made up one group. Wilson was prolific in his outreach work, publishing extensively on field-level farming practices and adaptations. He sought the knowledge of Triangle farmers, and kept up to date on adaptations made across the border in Alberta and Saskatchewan. Wilson's conviction on efficient production, and his political savvy, carried him into a prominent place within the United States federal hierarchy where he was able to parlay his Montana knowledge into national agricultural policy.

A different group of government agents came out of the SCS, to some extent mirrored in the PFRA; both agencies born out of the New Deal political climate. Although Montana was not a national region of focus in the 1930s, the SCS agents assigned to the state took their jobs seriously. They were determined to contribute solutions to the 'soil problem,' but also they recognized the limits of their knowledge of the northwestern plains context. Oddly perhaps, considering the SCS people should have been well aware of Montana State's 1920s extension work, they didn't refer much to it and, instead, approached the 1930s situation with fresh eyes. Perhaps the high-priority Wilson had put on scale-based efficiency in the 1920s seemed out of place in the 1930s. Also, there would not have been many practical solutions from the earlier extension work, that would not have been already tried. Perhaps it a case of the SCS agents feeling the 1920s methods were lacking and new answers were required.

Clearly, the SCS principals were convinced that Canadian scientists held the key to the Montana farm problem, even though they, in their own right, were struggling with farming challenges in Alberta and Saskatchewan. SCS staff repeatedly sought advice on Canadian findings and methods, quickly including them in Montana experimental programs. Possibly, 'Canada' provided the SCS with a convenient reason, an 'expert second opinion' so to say, for Montana farmers to try new field methods. Yet, newspaper accounts suggest that the farmers needed little convincing that Canadian solutions were good ones. There were likely other, more personal and direct linkages between farmers across the border, just as there are now.[14]

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[14] Cross-border connections are common for reasons ranging from machinery purchases, livestock or grain transportation, attending farm shows and cultural events, or hunting trips. Other connections are more personal, such as family exchanges between Hutterite colonies.

Furthermore, a number of Triangle farm settlers still farming in the 1930s had come from Canada, many from Saskatchewan.

Strip-cropping is a good example of a field practice that transcended the international border. There is evidence that strip-cropping originated in the Lethbridge area before the 1920s, but remained unheard of (at least by government agencies) in the western United States until the mid-1930s. By the late 1930s, strip-cropping was ubiquitous in Canada. Undoubtedly, the experimental stations played a role, as there seems to have been greater adoption surrounding the Swift Current and Lethbridge stations, but farmer-to-farmer communication, including across the border, must have happened as well. Greater strip-cropping acreages were evident in study blocks nearer to the border, rather than in ones closer to the large SCS Power-Dutton demonstration project. However, the SCS enthusiastically continued to promote strip-cropping. By the late 1950s, Montana Triangle farmers had universally adopted strip-cropping, persisting with the practice to an extent that was, by the 1990s, greater than in Saskatchewan and Alberta.

However, agricultural economists and soil scientists disagreed on the best ways to solve the 1930s farm crisis. The economists maintained that the efficiency and scale equation was key. The soil scientists were convinced it was in how land and fields were managed. The arguments of both groups were correct. Without doubt, at the time of first settlement, and now, there was a clear equation between capital, scale, and success. Given the limited number of viable land husbandry options, farm consolidation had to happen if there was to be a sustainable world-competitive agricultural economy. Of course, exceptions can be found: small landholders and hobby farmers growing alternative crops for a local market, or on a somewhat larger scale, specific crops like sugar beets or grain corn grown because the infrastructure and market allowed it. But based on *overall* acres cropped, these deviations from the pattern of large-scale grain farming accounted for only a small percentage of the total farmland.

The soil scientists on the other hand, recognized the limits, and possibilities, of soil management. Large-scale grain farming could pay only if land was managed to preserve moisture and prevent soil loss. This approach was more practical. Despite some vocal calls in the 1930s for a movement to mixed farming, it was not a realistic option for most northwestern plains farmers. Mixed farming was not going to work if there was no water for livestock, or a market to sell non-grain products to. Only after the PFRA, the irrigation districts, and the Bureau of Reclamation were able to complete additional water management infrastructure, were farmers able to try different crop and livestock possibilities.

On one level, the federal agencies of Canada and the United States were overtly interventionist. Governments in Ottawa, Washington, Edmonton, Regina, and Helena variously influenced northwestern farming. The influence ranged from the relatively benign, such as Montana's support for ongoing state extension programs, or Saskatchewan's premier

advocating for more mixed farming, to the authoritarian, such as the Resettlement Administration's removal plans (not enacted in Montana), or the Alberta Special Areas Act (which was passed). Simply the act of setting up 'expert' research points, at the experimental stations, and in the SCS offices, implied government saw itself best suited to finding and disseminating the correct ways to farm.

Yet, such top-down impositions were tempered by the willingness of on-the-ground staff to work with co-operatively and supportively with local farmers. When senior SCS administrators had pushed for a contouring demonstration against the better judgement of local scientists, the Great Falls field men compromised. They undertook a small project, and only with the cooperation of farmers. In the end, it was the farmers and field men who, having tried the contouring, a practice accepted as convention elsewhere in the Great Plains, made the decision that it was not a practical solution in their region. Even the extremely interventionist Special Areas policy recognized the importance and cruciality of local knowledge. The Special Areas Act actively removed landowners, but it also sought to assist farmers in making a viable living. The 2000 renewal of the Act still states, as it did in 1938, that the legislation was to:

> "…promote approved farm cultural practices and efficient range management and any community effort and enterprise that might contribute to greater economic security of residents of the special area."[15]

and,

> "…promote greater stability and diversity of sources of income for residents of any special area to the end that they may become self-supporting."[16]

The role of government in the shaping of the agricultural landscape is nuanced; authoritarian and interventionist, but also pragmatic and responsive to local knowledge. At the regional scale, it is impossible to separate, as James C. Scott might, state authority from the people.[17] Federal field agent correspondence clearly shows that the government employees saw themselves, and were seen by producers, as part of a larger agricultural society; an organized coalition of settler-farmers, business, and government, evolving from the beginning as complicit partners working to achieve twentieth century modern progressive aims.

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[15] Section 7g of the Alberta Special Areas Act.

[16] Section 7j of the Alberta Special Areas Act.

[17] Scott's separation of government authority from local knowledge, even if the states' plans depended to some extent on the local knowledge, is difficult to reconcile with the 'business' models of ordered, mechanized farming practiced in the northwestern plains since first settlement. See Scott, *Seeing Like a State*.

In the end, the form of the northwestern plains agricultural landscape came down to local and regional decision-making. The farmers who remained over the long-term worked out which land use changes were warranted. Typically, these changes were not radical, they were evolutionary. Government agency certainly played a role, but federal government research sought not to create solutions to farming problems identified in the 1920s and 1930s, but rather to collect, test, and disseminate more widely, the success of locally derived innovations. It was local knowledge of the land, the national and global grain economy, and of what was working for others that drove the development of the landscape.

A classic progressive narrative works for the northwestern plains, up to the point of where the landscape matured in the 1950s. At that point, the change process shifted into one of longer-term innovative response to ongoing and new challenges. The weather remained unchangeable, but systems and technologies were adapted to better suit it. Undoubtedly, adoption of these adaptations bore a cost, monetary certainly, and perhaps also in land degradation, and long-term reliance on external economic forces. It is a truism that in any given place, in any agricultural system, that decisions are farm-specific, and examples of neighbouring farms, some making good land decisions and some poor ones, can be found everywhere.[18] Ultimately, though, the process of landscape building is largely incremental. The change process may mean switching crop type, adopting new forms of field management, changing land use, or giving up farming and taking a job in town. The process is kept in motion by new options in technology, new markets, new resource economies, and new off-farm opportunities.

In 2013, the Rural Municipality of Miry Creek marked its one-hundredth anniversary. The RM celebrates its history and agricultural success on a simple website. The banner image on the "History" page[19] is of a stereotypical western prairie agricultural landscape, with strip-cropped fields and a backdrop of hay bales. On the RM's "Regional Profile" page, the text praises the district's quality durum, spring wheat, barley, lentils, peas, and canola, along with "some of the best herds of cattle raised in the southwest." The banner image on this page is of pipeline pumping equipment.[20] Miry Creek's self-assessment could apply to any of the study areas examined in this research:

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[18] An observation made in other agricultural land use studies. See Patricia L. Salzsauler "The Influence of the Canada Land Inventory on Land Use in the Pembina Hills, 1966-1996" (master's thesis, University of Manitoba, 1999).

[19] RM of Miry Creek No.229, "History" http://www.rm229.com/History

[20] Miry Creek, "Regional Profile" http://www.rm229.com/Regional_Profile

"The primary industry within the area is still agriculture, although a recent major gas discovery in the area has provided a welcome boost to the local economy. Today's farmers continue to face as many challenges as their predecessors did, but residents are hopeful that the farming and ranching lifestyle our community enjoys will be maintained for many generations to come."[21]

FIGURE 8.1 Website banner images, Saskatchewan Rural Municipality of Miry Creek, 18 August, 2014.

Northwestern transboundary plains farmers, well aware of M.L. Wilson's old economy and efficiency balances, if not, perhaps, the individual man who so strongly advocated for them a century ago, tended not to make rash or negligent land use decisions. They adapted and developed land use practices that suited their local conditions. The goal of government staff was to provide useful information to assist in making those decisions. In the end, for farmers and their descendants, the agricultural landscape was simply the substantiation of home; land worked, and reworked, in order to secure a decent quality of life.

[21] Miry Creek, "History"

"Dominion Survey Marker, Taber, Alberta"

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