Introduction

This book seeks to explain how and why aspects of agriculture in the Great Plains of the United States have, perhaps unexpected, roots in the steppes that lie part of the way around the globe in present-day Ukraine, the Russian Federation, and Kazakhstan.[1] Between the 1870s and 1930s, there were a series of transfers from the Eurasian steppes to the American plains. They included plants, in particular varieties of grain, fodder crops, trees and shrubs, as well as weeds; of agricultural sciences, especially the science of understanding the soils of such grasslands; and of agricultural techniques, for example planting shelterbelts of trees to protect the land from the wind.[2] They replaced or supplemented plants, sciences, and techniques already in the American plains, creating what I have called, with intentional irony, the "American steppes." These transfers from the steppes came after Euro-American agricultural settlers backed by the federal government and U.S. Army had dispossessed the Native Americans and largely ended the ways they had devised to live in the plains environment.

The transfers from the steppes to the Great Plains were facilitated by movements of people. Between the early nineteenth and early twentieth centuries there was mass migration from Europe to the United States. From the 1870s, the migrants included thousands of farmers from the steppes who moved to the similar environment of the plains. They took with them some of their plants and their experience of farming in semi-arid grasslands.

[1] See "Notes on the Text: Place Names." For an environmental history of steppe agriculture, see David Moon, *The Plough that Broke the Steppes: Agriculture and Environment on Russia's Grasslands, 1700–1914* (Oxford: Oxford University Press, 2013).

[2] The term "agriculture" is used in this book to include crops, agricultural sciences and techniques. See Frieda Knobloch, *The Culture of Wilderness: Agriculture as Colonization in the American West* (Chapel Hill: University of North Carolina Press, 1996), pp. 1–5. For similar dictionary definitions, see "Agriculture," in *Oxford Dictionary of English*, ed. Angus Stevenson (Oxford: Oxford University Press, 2010), available online at www.oxfordreference.com/view/10.1093/acref/9780199571123.001.0001/m_en_gb0014280, accessed June 6, 2018; Merriam-Webster Dictionary, available online at www.merriam-webster.com/dictionary/agriculture, accessed June 6, 2018.

From around the same time, American and Russian agricultural scientists began to visit each other's countries, including the grasslands, and learn from each other's experience. Contacts between agricultural scientists allowed them to share expertise and seeds of crop varieties. These contacts largely halted, for logistical reasons, between the Russian Revolution of 1917 and the end of the Russian Civil War in 1921. Contacts were quickly re-established and continued throughout the inter-war period, despite the absence of diplomatic relations between the United States and the new Soviet Union until 1933. Among the American scientific community were Jewish émigrés who had fled the Russian Empire in the decades before the revolution. Their origins and language skills assisted contacts between the two countries' scientists and the assimilation of Russian sciences in the United States.

Thus, this book opens in the 1870s, with the arrival in the Great Plains of the migrants from the steppes and the start of contacts between agricultural scientists interested in our two regions. It ends in the late 1930s. The contacts and transfers were sharply reduced when Stalin's terror consumed some of the Soviet scientists with international connections and created an atmosphere of suspicion of foreigners. The onset of the Cold War in the late 1940s, following the wartime alliance, prevented a resumption of contacts and exchanges on the same scale as earlier. The end of our story, in the late 1930s, coincides with the last part of the Dust Bowl, during which plains farmers, agricultural scientists, and state and federal governments grappled with the ecological crisis.

It is more complicated to explain why these transfers took place, and why some proved so important in the Great Plains. The two regions – in the centers of the North American and Eurasian continents – are very far apart and are not connected by convenient communication routes. Several millennia earlier, the Native Americans' ancestors had made their way from Eurasia, via the Beringia land bridge, to North America.[3] But, at the end of the last Ice Age, Beringia was flooded by the north Pacific, separating North America from Eurasia. Until the nineteenth century, moreover, many Americans and Russians were unfamiliar with their own countries' grasslands, since at that time they lay near or beyond their expanding borders. For rather longer, most Americans and Russians knew even less about such regions on other continents. Both familiarity with their own grasslands and, for some, with similar regions overseas,

[3] See John F. Hoffecker, Scott A. Elias, and Dennis H. O'Rourke, "Out of Beringia?" *Science* 343, no. 6174 (28 February 2014), 979–980.

developed over the nineteenth century, paving the way for exchanges between them.

A further complication was the two countries' contrasting political and economic systems. Throughout our period, the United States was a federal republic with a constitution that shared powers between an elected president, elected legislature, an independent judiciary, and its constituent states. The economy was capitalist, albeit one in serious crisis in the 1930s. The Russian Empire was an autocracy where, in theory, power was held by the tsars and only slightly curtailed by elected dumas (parliaments) between 1906 and 1917. A capitalist economy was developing in the decades prior to 1917. After 1917, the Bolshevik (from 1918, Communist) Party sought rapidly to transform a largely agricultural country into an advanced, industrial, socialist state. Regardless of their contrasting systems, both the United States and the Russian/Soviet states were vast, continental countries with a diversity of environments, including semi-arid grasslands that offered opportunities for large-scale grain cultivation, if the environmental challenges could be overcome.

In explaining the transfers from the steppes to the Great Plains it is very important that they share similar environments: both are flat, semi-arid grasslands, prone to droughts, with continental climates, high winds, fertile soils, but few trees. But these similarities are not sufficient to explain why the transfers took place. Over the millennia that humans have inhabited the Great Plains and steppes, their environments have supported many different ways of life and economic activities. These have included: hunting, herding, and ranching wild or domesticated animals; extracting mineral resources, for example, shale oil in North Dakota and coal in the Donbas region in the east of present-day Ukraine; industries, including aeronautics engineering in Wichita, Kansas, and making rockets for the space program in Samara, Russia; as well as cultivating crops, from the corn, beans, and squash (the "three sisters") of Native American farming in the river valleys, to the wheat, soybeans, and canola, as well as corn, of modern farmers. Since there have been so many possibilities, there is no suggestion here that the two regions' similar environments in any way determined their inhabitants' choices about how to make their livings or the transfers of plants, sciences, and techniques between them.

What matters is that, regardless of the differing political and economic systems, from the mid eighteenth century in the Russian Empire and the mid nineteenth century in the United States, with government support, large numbers of migrants settled in their countries' grasslands, displaced the indigenous peoples, and supplanted their ways of life by plowing up

large expanses of land to cultivate crops. In both regions, agricultural settlers encountered environmental conditions that for most, but not all, differed sharply from their previous homes. Most were accustomed to less monotonous landscapes, more and more reliable rainfall, more temperate climates, weaker winds, less fertile soils, and more trees. The exceptions – who are important for our story – were the farmers who moved to the Great Plains from the steppes in the 1870s and afterwards. Many were Germanic and included Mennonites whose ancestors originated in the Low Countries. Germanic settlers moved to the steppes in the late eighteenth and early nineteenth centuries on the invitation of, and in return for land and privileges from, the Russian government. Thus, when they moved again from the 1870s to the grasslands of North America, they encountered a familiar environment on another continent. Most of the settlers in the grasslands of both countries, however, came from quite different environments and were trying to farm in unfamiliar conditions. They learned by trial and error, risking failure, but, with the exception of some crops, rarely drew on the experience of the indigenous populations.

In both countries, agricultural settlers received advice from their governments and institutions established to produce scientific expertise to support the agricultural development of the grasslands. The main institutions were the United States Department of Agriculture (USDA), agricultural departments at land-grant and state universities, agricultural and forestry experiment stations, and their counterparts in the Russian Empire and Soviet Union. Since many agricultural scientists in both countries were also unfamiliar with the environments of such regions, they carried out field work and studies to assist them in understanding the grasslands and how to farm in them. Jeremy Vetter has emphasized the importance of field work by American scientists in the distinctive environment of the American West, including the Great Plains, in the production of new scientific knowledge about the region between the 1860s and 1910s. A similar story played out in the steppes, where the Russian government and scientific organizations supported naturalists and scientists in conducting field work to assist them in understanding the environment and how it could be utilized for agriculture. A key difference was that in the steppes, the production of scientific expertise to support farming in semi-arid grasslands began around a century earlier than in the Great Plains as agricultural settlement began much earlier.[4]

[4] Jeremy Vetter, *Field Life: Science in the American West during the Railroad Era* (Pittsburgh: University of Pittsburgh Press, 2016); David Moon, "The Russian Academy of Sciences Expeditions to the

Some Americans became aware of this Russian prior experience, recognized it could be useful in the Great Plains, and began to learn from steppe agriculture. This took time since there were barriers to influences from the Russian Empire and Soviet Union in the United States. A significant barrier was a widespread perception among Americans that their progressive society, which saw itself at the forefronts of scientific, technological, economic, political, and other developments, could have little to learn from a country on the fringes of Europe about which many knew little, besides stereotyped images of "backwardness," poverty, and oppression of its population. At the same time as the transfers from the steppes to the Great Plains discussed in this book, there were also large-scale transfers of technology the other way. From the late nineteenth century, there were major American influences in Russian and Soviet agriculture, especially machinery, and in industry. The first Soviet Five-Year Plan (1928–32) for economic development was based heavily on American technology. American designs and equipment were used for prestige projects, including the Stalingrad Tractor Factory, the dam and hydroelectric power station on the Dnepr River in southern Ukraine (DneproGES), and the iron and steel works at Magnitogorsk in the southern Urals, all of which were in the steppe region.[5] These transfers from west to east fit better widely held perceptions of American "superiority" and Russian "backwardness." These perceptions have continued to color some American and western views of Russia: hence the "unexpected" nature of the transfers from the Russian Empire and Soviet Union conveyed in the title of this book.

The plants, agricultural sciences and techniques that were transferred from the steppes proved effective in the American plains precisely because they came from a region with similar environmental conditions and where farmers from similar, European, backgrounds were trying to do similar things: engage in European-style farming. For the same reason, many of the farmers who moved from the steppes to the Great Plains were

Steppes in the Late Eighteenth Century," *SEER* 88 (2010), 204–36; Moon, *Plough*, pp. 46–88; David Moon, "Scientific Innovation in the Russian Empire: The Case of Genetic Soil Science," in *Science and Empire in Eastern Europe: Imperial Russia and the Habsburg Monarchy in the 19th Century*, ed. Jan Arend (Munich: Vandenhoeck and Ruprecht, 2020), pp. 305–20. On field work, see also Henrika Kuklick and Robert E. Kohler, "Introduction," *Osiris* 11 (1996), 1–14.

[5] See, for example, Dana G. Dalrymple, "The American Tractor Comes to Soviet Agriculture: The Transfer of a Technology," *Technology and Culture* 5 (1964), 191–214; Dalrymple, "American Technology and Soviet Agricultural Development, 1924–1933," *AH* 40 (1966), 187–206; Kendall E. Bailes, "The American Connection: Ideology and the Transfer of American Technology to the Soviet Union, 1917–1941," *Comparative Studies in Society and History* 23 (1981), 421–48. Technology transfers from the United States to Russia and the Soviet Union will not be considered in detail as they have been the subject of much research.

successful. Thus, the similarities in the environments were necessary for the transfers from the steppes to be viable in the Great Plains, but are not sufficient to explain why aspects of Great Plains agriculture have Russian roots. This requires a human dimension involving the choices made by people in both countries to settle in the unfamiliar environments of their grasslands with the intention of farming, and by their governments to support agricultural settlement and development in these regions.[6]

The transfers from the steppes were not simply contributions to the development of agriculture in the Great Plains that could have come from elsewhere and made little difference. It was significant that the transfers came from another settler society in a region with a similar environment. Some of the transfers, in particular the varieties of wheat and other crops, soil science, and the weeds, fundamentally transformed Great Plains agriculture.[7] These transfers were part of wider exchanges of techniques, knowledge, and plants between settler societies and the overseas colonies of European states in this period. In most, knowledge produced by scientists and others with "specialist" training from other, similar, societies was privileged over the local knowledge of indigenous peoples.[8] In both the steppes and the Great Plains the colonizing powers – the Russian Empire and United States – constructed similar, negative stereotypes of the indigenous populations as "backward, uncivilized, wandering, [and] primitive," in part to justify taking their land. They deemed the nomadic ways of life of the pastoralists of the steppe and hunters of the plains inferior to "civilized," settled arable farming, and certainly not models to learn from.[9]

Comparing the Great Plains and the Steppes

The Great Plains and the steppes are semi-arid grasslands: an ecosystem found in different parts of the world.[10] (See Map 1: Map of grasslands around the world.) The Great Plains extend from Texas in the south up

[6] For a similar point, see Edward Dallam Melillo, *Strangers on Familiar Soil: Rediscovering the Chile–California Connection* (New Haven: Yale University Press, 2015), pp. 6–8.
[7] See Melillo, *Strangers on Familiar Soil*, p. 11.
[8] Richard Grove found evidence that European naturalists were more open to indigenous knowledge in colonial contexts before the mid nineteenth century. Grove, *Green Imperialism: Colonial Expansion, Tropical Island Edens and the Origins of Environmentalism, 1600–1860* (Cambridge, England: Cambridge University Press, 1995).
[9] Steven Sabol, *"The Touch of Civilization": Comparing American and Russian Internal Colonization* (Boulder, CO: University Press of Colorado, 2017), pp. 14, 33–59.
[10] See Andrew C. Isenberg, "Seas of Grass: Grasslands in World Environmental History," in *The Oxford Companion of Environmental History*, ed. Isenberg (Oxford: Oxford University Press, 2014), pp. 133–53. The grassland that most closely resembles the Great Plains and steppes is the pampas of

the middle the United States, through Oklahoma, Kansas, Nebraska, the Dakotas, and into the Canadian prairie provinces. The plains encompass much of the upper and middle basin of the Missouri–Mississippi river system, and a smaller area in the basin of the Red River of the North. In the west, the plains run up against the foothills of the Rocky Mountains, and include eastern Montana, Wyoming, Colorado, and New Mexico. In the east, they merge into the prairies roughly along the eastern borders of North and South Dakota and Nebraska, in eastern Kansas, central Oklahoma, and central Texas. The plains extend into southwestern Minnesota, but the prairies in most of Minnesota as well as Iowa, Missouri, Illinois, Indiana, and Ohio, are largely beyond the scope of this book as the conditions differed from those in the steppes. Much of the attention will be on the northern and central plains (North and South Dakota, Nebraska, and Kansas). The United Stated acquired much of the Great Plains from France by the Louisiana Purchase of 1803. The smaller area in the Red River basin was transferred from British North America by the Treaty of 1818 that established the 49th parallel as the international border west of the Great Lakes. At the start of our story in the 1870s, therefore, the Great Plains region was a relatively recent acquisition to the United States.[11] (See Map 2: Map of the Great Plains.)

The conquest and annexation of much of the Eurasian steppe by the Russian state began a lot earlier, in the late fifteenth century, and took longer, into the early nineteenth century.[12] The steppe region of the Russian Empire and Soviet Union (and its successor states) is orientated – in contrast to the Great Plains – from west to east. It encompasses the lower parts of the basins of the rivers Dnestr, Bug, Dnepr, Don, Volga, and Ural extending to the northern shores of the Black, Azov, and Caspian seas and the Caucasus Mountains, and part of the basin of the Irtysh (Ertis) river system in southern Siberia and northern Kazakhstan. The steppe continues beyond the Altai Mountains into northern Mongolia and

South America. See Adrián Gustavo Zarrili, "Capitalism, Ecology, and Agrarian Expansion in the Pampean Region, 1890–1950," *EH* 6 (2001), 561–83. See also C. E. Solberg, *The Prairies and the Pampas: Agrarian Policy in Canada and Argentina, 1880–1930* (Stanford CA: Stanford University Press, 1987); Jeremy Adelman, *Frontier Development: Land, Labour, and Capital on the Wheatlands of Argentina and Canada, 1890–1914* (Oxford: Oxford University Press, 2004).

[11] See Peter J. Kastor, *The Nation's Crucible: The Louisiana Purchase and the Creation of America* (New Haven: Yale University Press, 2004); 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), 228–62.

[12] See Michael Khodarkovsky, *Russia's Steppe Frontier: The Making of a Colonial Empire, 1500–1800* (Bloomington: Indiana University Press, 2002).

Manchuria.[13] The significance of the different orientations of the two grasslands – the Great Plains run from north to south, while the steppes extend from east to west – will be considered later. (See Map 3: Map of the Steppes and other environmental regions of Eurasia.)

The boundaries of the two regions have been defined in various ways and with varying degrees of precision. In this book they are defined in two ways. The first is the definitions used in the sources the book draws on, which therefore differ, and will be explained when necessary. The second is the regions' environmental conditions, in particular topography, average annual precipitation, vegetation, and soil. Both regions are largely flat, but also contain undulating countryside, and thus end when they come up against mountains or seas. The two regions receive less precipitation than the lands to the east (in North America) and the northwest (in Eurasia), where many of the agricultural setters came from. The eastern boundary of the Great Plains has been defined as the 98th or 100th meridians. In the northern plains these coincide roughly with the isohyet – a line connecting points with the same yearly average rainfall – of 20 inches (c. 500 mm). Other specialists have considered the eastern boundary to be the 28 inch (700 mm) isohyet, which approximates to the 98th or 100th meridian in the southern plains, where the climate is warmer and evaporation higher.[14] In Eurasia, the northwestern boundary of the treeless steppe is generally considered to be around the 16 inch (400 mm) isohyet, although parts in the west of Ukraine and the North Caucasus receive more rainfall.[15]

The climates of the two regions can be compared with reference to the Köppen–Geiger climate classification, which designates different climates by letters that refer to the main climate group and seasonal distributions of precipitation and heat.[16] According to data for 1901–25, the climate of the

[13] See A. A. Chibilev, *Stepi Severnoi Evrazii: ekologo-geograficheskii ocherk i bibliografiia* (Ekaterinburg: UrO RAN, 1998); Moon, *Plough*, pp. 6–10.

[14] See Walter Prescott Webb, *The Great Plains*, new edition [1st published 1931] (Lincoln: University of Nebraska Press, 1981), pp. 3–44; Geoff Cunfer, *On the Great Plains: Agriculture and Environment* (College Station: Texas A&M University Press, 2005), p. 242. See also Frederick C. Luebke, "Regionalism and the Great Plains: Problems of Concept and Method," *WHQ* 15 (1984), 19–38. For a map showing "as least fifty versions of the Great Plains regional boundary," see Douglas Hurt, *The Big Empty: The Great Plains in the Twentieth Century* (Tuscon: University of Arizona Press, 2011), p. xvii.

[15] See Moon, *Plough*, pp. 7, 70–2, and works cited therein.

[16] See Franz Rubel and Markus Kottek, "'The Thermal Zones of the Earth' by Wladimir Köppen (1884)," *Meteorologische Zeitschrift* 20, no. 3 (2011), 361–5. Köppen was born in St. Petersburg, Russia, attended Simferopol' gymnasium in the Crimea and St. Petersburg University, before continuing his education at Heidelberg and Leipzig universities. He worked for a short time in Russia, but from 1875 lived in Germany and Austria. "Wladimir Köppen, 1846–1940" [obituary], *Bulletin of the American Meteorological Society*, 21–2 (1940), 81.

two regions has been classified as follows. The eastern and central parts of the Canadian prairies, North Dakota, and northern South Dakota were designated Dfb. This signified that the climate was: cold/continental, humid (i.e. no dry season), and with warm summers. The climate of the eastern and central parts of southern South Dakota and Nebraska was assigned the letters Dfa, which stand for cold/continental, humid, and hot summers. In eastern and central Kansas, Oklahoma, and Texas the climate was designated Cfa: warm temperate, humid, hot summers. Much of the western plains from Alberta to West Texas, however, were classified BSk: cold, semi-arid, steppe. The same four classifications designated the climate of the Eurasian steppe for these years. The climate of the northern steppes, both west of the Urals and in southern Siberia and northeastern Kazakhstan, was classified as Dfb (similar to the northern plains and Canadian prairies). Further south and west, in southern Siberia, northwestern Kazakhstan, and across the Ural and Volga rivers into the north-central Caucasus, the climate was Dfa (the same as southern South Dakota and Nebraska). Along the coasts of the Black and Azov Seas in southern Ukraine, including the Crimean peninsula, and the northwestern Caucasus, the climate was defined as Cfa (the same as eastern and central Kansas). Further south and east, to the north of Caspian Sea and in central Kazakhstan, the climate was cold, semi-arid, steppe (BSk) – the same as the western plains.[17] (See Map 4: World map of Köppen–Geiger climate classification for 1901–25.)

These broad classifications conceal significant differences between the two regions' climates. The Great Plains as a whole is slightly warmer than the steppes in their entirety. However, the temperatures in the northern plains and Canadian prairies resemble southern Siberia and northern Kazakhstan. The average, annual precipitation in the Great Plains is slightly higher than in the steppes. But, due to the higher temperatures,

[17] Franz Rubel and Markus Kottek, "Observed and Projected Climate Shifts 1901–2100 Depicted by World Maps of the Köppen–Geiger Climate Classification," *Meteorologische Zeitschrift* 19, no. 2 (2010), 136; M. C. Peel, B. L. Finlayson, and T. A. McMahon, "Updated World Map of the Köppen–Geiger Climate Classification," *Hydrological Earth System Science* 11 (2007), 1633–44. In both regions, the climate is getting harsher, and is projected to get more extreme, as a result of climate change. Rubel and Kottek, "Observed and Projected Climate Shifts 1901–2100," 137; "A North American Climate Boundary Has Shifted 140 Miles East Due to Global Warming," *Yale Environment 360 Digest*, (April 11, 2018), available online at https://e360.yale.edu/digest/a-north-american-climate-boundary-has-shifted-140-miles-east-due-to-global-warming, accessed May 14, 2018. Plains ecosystems "have shifted hundreds of miles northward in the past 50 years, driven by climate change, wildfire suppression, energy development, land use changes, and urbanization." "Great Plains' Ecosystems Have Shifted 365 Miles Northward Since 1970," *Yale Environment 360 Digest* (July 2, 2019), available online at https://e360.yale.edu/digest/great-plains-ecosystems-have-shifted-365-miles-northward-since-1970/, accessed July 3, 2019.

more moisture evaporates than in the steppes. The thermal and moisture conditions combined of Pierre, in southern South Dakota, resemble those in Odessa on the north coast of the Black Sea and Rostov-on-Don near the Sea of Azov. These are the parts of the steppes with the most favorable conditions for agriculture, while the same cannot be said of southern South Dakota in the Great Plains.[18] The generally harsher climate of the steppes, with greater extremes to the east in southern Siberia and the north of present-day Kazakhstan, will play an important part in our story.

The climates of the Great Plains and the steppes resemble each other, however, in that the rainfall fluctuates from year to year and there are recurring droughts.[19] Long into the nineteenth century, many Americans considered the Great Plains unsuitable for agriculture and called it the "Great American Desert."[20] A further similarity is that in both regions dust storms are whipped up by the high winds that blow across the flat landscapes. Droughts and dust storms created terrifying experiences that are well known from accounts of the Dust Bowl in the United States, but have also been a recurring experience in the steppes.[21]

The climate, especially the available moisture, influences the regions' vegetation. In both, the predominant natural vegetation is grasses. This contrasts with trees in the more humid regions east of the Great Plains and north of the steppes, and desert vegetation in the more arid regions west of the Great Plains and southeast of the steppes. In the drier western plains, the natural vegetation is short grasses, while in the more humid east, it is tall grasses. In between is an ecotone (transition area) of mixed grasses. There are similar variations in the steppes, with shorter grasses in the more arid south and southeast. Topography, climate, and vegetation are three of

[18] See N. C. Field, "Environmental Quality and Land Productivity: A Comparison of the Agricultural Land Base of the USSR and North America," *Canadian Geographer* 12 (1968), 1–14. See also David Moon, "The Saskatchewan Steppe in a Comparative and Transnational Perspective," *Network in Canadian History & Environment/Nouvelle initiative Canadienne en histoire de l'environnement*, (June 21, 2018), available online at http://niche-canada.org/2018/06/21/the-saskatchewan-steppe-in-a-comparative-and-transnational-perspective/, accessed June 21, 2018.

[19] See Kevin Z. Sweeney, *Prelude to the Dust Bowl: Drought in the Nineteenth-Century Southern Plains* (Norman: University of Oklahoma Press, 2016); Donald Worster, *Dust Bowl: The Southern Plains in the 1930s* (New York: Oxford University Press, 2004), pp. 10–12, 75; Moon, *Plough*, pp. 65–8; Nikolai M. Dronin and Edward G. Bellinger, *Climate Dependence and Food Problems in Russia, 1900–1990* (Budapest: CEU Press, 2005), pp. 44–53, 80–9, 123–35, 200–7, 245–52, 293–305.

[20] B. H. Baltensperger, "Plains Boomers and the Creation of the Great American Desert myth," *JHG* 18 (1992), 59–73.

[21] James C. Malin, "Dust Storms, 1850–1900," *KHQ* 14 (1946), 129–44, 265–96, 391–413; Moon, *Plough*, pp. 144–8; Marc Elie, "The Soviet Dust Bowl and the Canadian Erosion Experience in the New Lands of Kazakhstan, 1950s–1960s," *GE* 8 (2015), 274–8.