

University of Nebraska - Lincoln

DigitalCommons@University of Nebraska - Lincoln

Great Plains Quarterly

Great Plains Studies, Center for

Fall 1985

Mapping The Quality Of Land For Agriculture In Western Canada

James M. Richtik
University of Winnipeg

Follow this and additional works at: <https://digitalcommons.unl.edu/greatplainsquarterly>



Part of the [Other International and Area Studies Commons](#)

Richtik, James M., "Mapping The Quality Of Land For Agriculture In Western Canada" (1985). *Great Plains Quarterly*. 1833.

<https://digitalcommons.unl.edu/greatplainsquarterly/1833>

This Article is brought to you for free and open access by the Great Plains Studies, Center for at DigitalCommons@University of Nebraska - Lincoln. It has been accepted for inclusion in Great Plains Quarterly by an authorized administrator of DigitalCommons@University of Nebraska - Lincoln.

MAPPING THE QUALITY OF LAND FOR AGRICULTURE IN WESTERN CANADA

JAMES M. RICHTIK

The original impetus that brought explorers and settlers to the East Coast of North America had, at least as early as the eighteenth century, evolved into, among other things, an interest in the potential of the Canadian West for European types of agriculture. As settlement spread across the continent, the perceived value of the West changed from fur hinterland to possible agricultural empire. With this shift in interest there was a change in the purpose of exploration, and as features such as rivers, lakes, and mountains became known, assessing and mapping the agricultural potential of the land began. Cartographers would henceforward record soil types, rainfall and drainage patterns, and the types of vegetation existing upon the land. This paper looks at the process of evaluating and mapping the agricultural potential of the Canadian

prairies, the area that now comprises the provinces of Manitoba, Saskatchewan, and Alberta (fig. 1).

PRESETTLEMENT MAPS

The first explorers were fur traders who, understandably, showed only passing interest in a region's agricultural potential. Their maps, reflecting an interest in routes and Indian tribes, located physical features and sometimes described vegetative cover or locations of gardens and crops, but they carried no clear implications about the value of the land for agricultural production in general. Even after the establishment in 1812 of the Selkirk Settlement at the forks of the Red and Assiniboine rivers, there was no effort to map the agricultural potential of the rest of the Canadian West, perhaps because the banks of the rivers provided far more land than the small number of farmers could possibly use. Not until the 1850s, when the American frontier had spread into Minnesota and the Hudson's Bay Company's mandate for the Canadian Northwest was being reexamined, were the first attempts made specifically to chart the potential of the Canadian prairies for

James M. Richtik, professor of geography at the University of Winnipeg, has published many articles on western Canada in journals including Great Plains Quarterly and Agricultural History.

[GPQ 5 (Fall 1985): 236-248.]

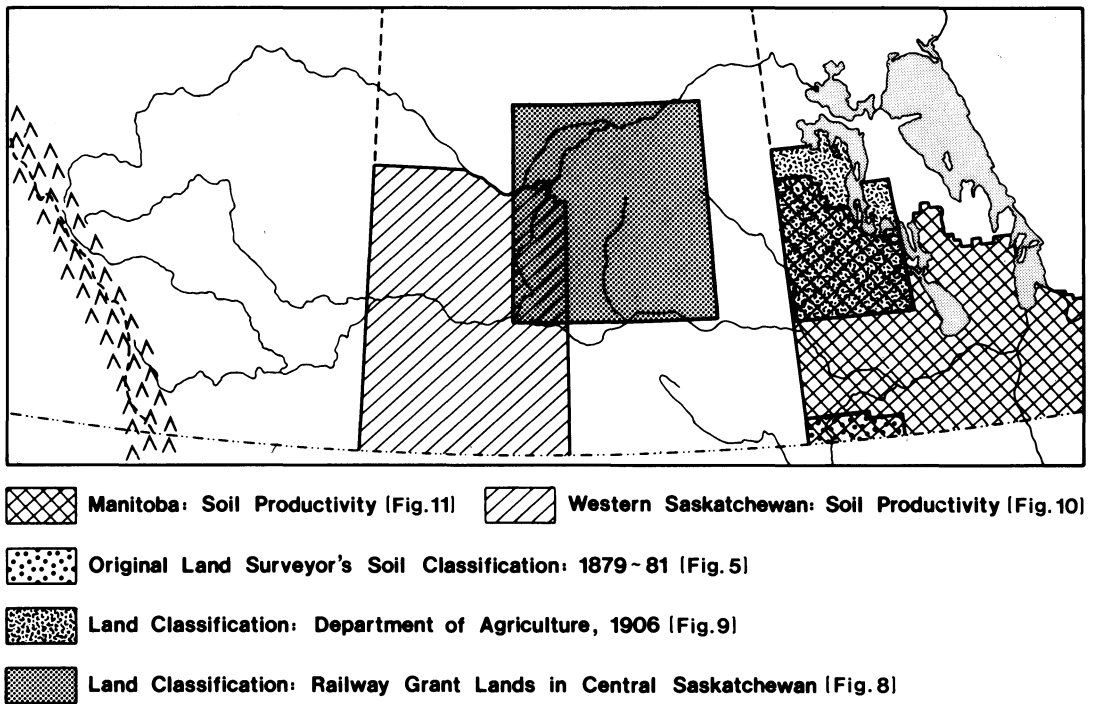


FIG. 1. Location of study area and detailed maps.

settlement and agriculture. Then both the British and Canadian governments sent out expeditions, the former under Captain John Palliser and the latter eventually under Henry Youle Hind.

The Palliser expedition, though multifaceted, always considered the examination of agricultural possibilities as a major responsibility. In January 1857, the president of the Royal Geographical Society wrote to the British secretary of state for the colonies, Henry Labouchere, proposing an exploring expedition to the Canadian West to find all-Canadian access routes and to examine "the general capability of the country." He pointed out that the Americans had just finished exploring their Great Plains, whereas the Canadian West was barely explored but was "said to be well fitted for agriculture." Labouchere recommended the plan to the Treasury as deserving of public support, "considering that the region

referred to is supposed to contain a considerable extent of fertile soil, and that in the rapid progress of British N. America and the United States public attention is beginning to be directed towards it." In his instructions to Palliser, sent in March of that year, Labouchere stressed the importance of the agricultural mission: "I have to impress upon you the importance . . . of regularly recording the physical features . . . the nature of the soil, its capability for agriculture, the quantity and quality of its timber."¹

In keeping with these instructions, Palliser produced a map of the Canadian West dividing the territory into three categories: (1) "The true forests where spruce and pine predominate," (2) "the fertile belt," and (3) "the great plains with poor soil, scanty herbage, and no wood except on moist northern exposures." Palliser said little about the true forest belt, but seemed to imply at least that it was not very

suitable for agriculture. In the fertile belt he found the soil "abounds in vegetable matter" and that "a sufficiency of good soil is everywhere to be found." The land had previously been forested but was partially wooded with willow and poplar and elsewhere had been denuded by fire; thus coming settlers would not have "to encounter the formidable labour of clearing the land." Palliser's account noted equally good land and agricultural potential—a "superior class of soil"—along the eastern foothills of the Rockies, although this does not appear on his 1863 map. There can be little doubt that Palliser's negative reaction to the plains was due to his awareness of the "Great American Desert" to the south—an awareness that, according to John Warkentin, he got from Hind. However, Palliser explained that even "the most arid plains" in Canada did not include "the great expanses of true desert country that exist further to the south." He found the Canadian plains generally "sterile" and "sandy," and his geologist, James Hector, blamed the soil more than the climate for the lack of vegetation.² Furthermore, the 1859, 1860, and 1863 maps show different bounda-

ries for the three soil zones (fig. 2).

The Canadian expedition under Henry Youle Hind was similar to the British one in purpose and timing. It too was at least partly motivated by an awareness of American expansion and exploration to the south, and it too was organized to look for a better water route from Lake Superior to Red River "and ultimately to the great tracts of cultivable land beyond them." In 1858 Hind was instructed to explore west to the South Saskatchewan River and to "endeavour to procure all the information in your power." He was to describe "the general aspect of the whole region," observe "the character of the timber and soil," and ascertain "the general fitness of the latter for agricultural purposes . . . as far as may be from observation and inquiry."³

S. J. Dawson, leader of a portion of the Hind party, had only praise for the Canadian prairies. Although aware of the "Great American Desert," he quoted Lorin Blodgett's claim that the dry areas "*are not found above the 47th parallel in fact.*" He also declared that "the plains . . . present a soil apparently of as great fertility" as the Red River Valley. Dawson

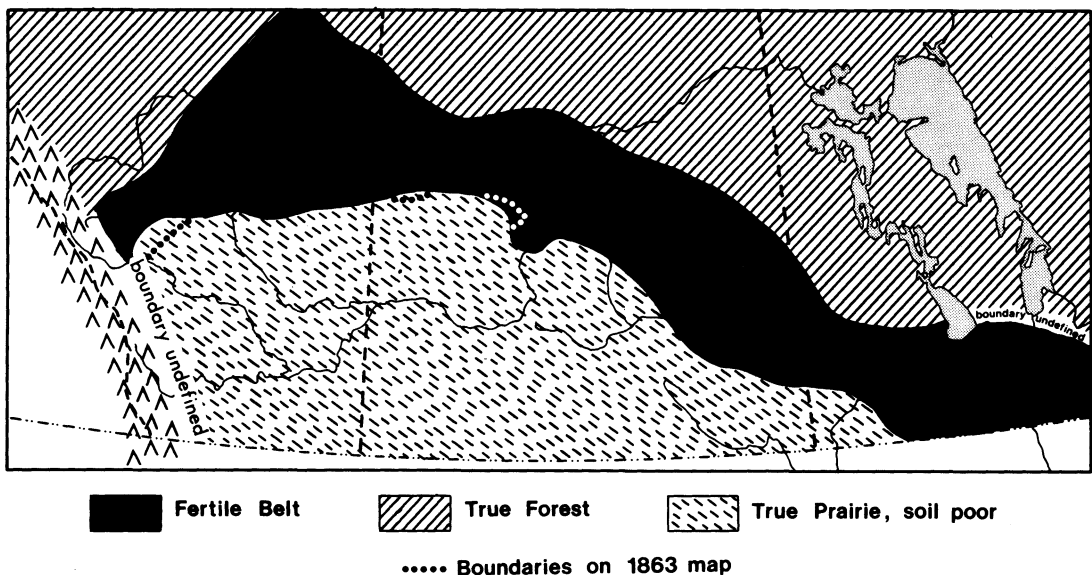


FIG. 2. Captain Henry Palliser's map of land types. After Palliser.

quoted extensively from A. J. Russell, who implied that the whole of the prairie territory would make excellent farmland because of the ease of cultivation. He can be faulted for making this judgment on the basis of second-hand information, but James A. Dickinson, the biologist of the group, seemed to agree with him. From a hill on the edge of what later was mapped as desert, he looked "across the boundless plains, no living thing in view," and "thought of the time to come" when the railway would create a thriving agricultural area. This vision of the West appeared on the map that accompanied Dawson's version of the joint report with Hind, and an area that Palliser included in his prairie or poor soil zone was identified as "good clay soil" on Dawson's map.⁴

In his own report, Hind identified an extension of the "Great American Desert" into Canada. He described the area southwest of a line from the Great Bend of the Souris River through the Qu'Appelle mission to the Moose Woods on the South Saskatchewan River as a "treeless plain with a light and sometimes drifting soil . . . and not, in its present condition fitted for the permanent habitation of civilized man." Hind referred to good soil only in the wooded or partly wooded areas and felt the "sterility of the Great Prairie" was "owing to the small quantity of dew and rain, and the occurrence of fires." He further explained that part of this desert "does not appear necessarily sterile from aridity, or poverty of soil." However, he added that "from the character of its soil and the aridity of its climate, the Grand Coteau is permanently sterile and unfit for the abode of civilized man." Hind included a map showing an approximation of Palliser's three belts, but with a larger area of aridity and poor soil than Palliser found. In fact, in the London edition of his report, he included a more detailed map of the area his expedition covered, west to the elbow of the South Saskatchewan.⁵ Much of the southern portion of the area west of Assiniboine River that he and Palliser elsewhere called the fertile belt is shown as "arable

prairie land 1st quality." The rest of their fertile belt appears as "wooded arable land" (fig. 3).

The maps by Palliser and Hind were important because they established a popular image of a huge triangle of infertile land unfit for settlement—the same image that was still being perpetuated by government agencies. G. M. Dawson, exploring the Canadian-American boundary line in 1872–75, raised questions about the aridity of the desert, but he attributed the lack of vegetation to poorer soil due to the "special quality of the Cretaceous shale parent material." However, he was not specifically mapping soil quality and confined his work to areas along the border. In 1878, the Department of the Interior produced a "Map of Part of the Northwest Territory, including the Province of Manitoba showing an Approximate Classification of the Lands" (fig. 4). On this map, Palliser's triangle appeared mostly as "open plains; poor soil; possessing occasional tracts fit for settlement; extensive pasturage," but a smaller core of the triangle was shown as "principally barren lands; excellent pasture." The equivalent of Hind's "Arable Prairie Land 1st Quality," but extending through an area at least as far south as Palliser's fertile belt and reaching westward into that belt, was shown as "mixed prairie & timber—soils rather light—but produces fine crops—good grazing lands." Hind's "wooded arable land" and a considerable extension northward into his "swampy wooded land" was labeled as a "vast region—generally excellent soil with abundance of wood & water proved to be admirably adapted for the growth of cereals—especially wheat." The same area was shown extending into the Peace River country, which was described as a "tract of extraordinary fertility." That region included a clearly defined foothills extension, described as "superior grazing and grain growing country." A small area along the foothills west of Edmonton, which had not been differentiated by Palliser and Hind, was shown as "swampy but well timbered country." The 1878 map did show an enormous increase in fertile lands over Palliser's version. Palliser's

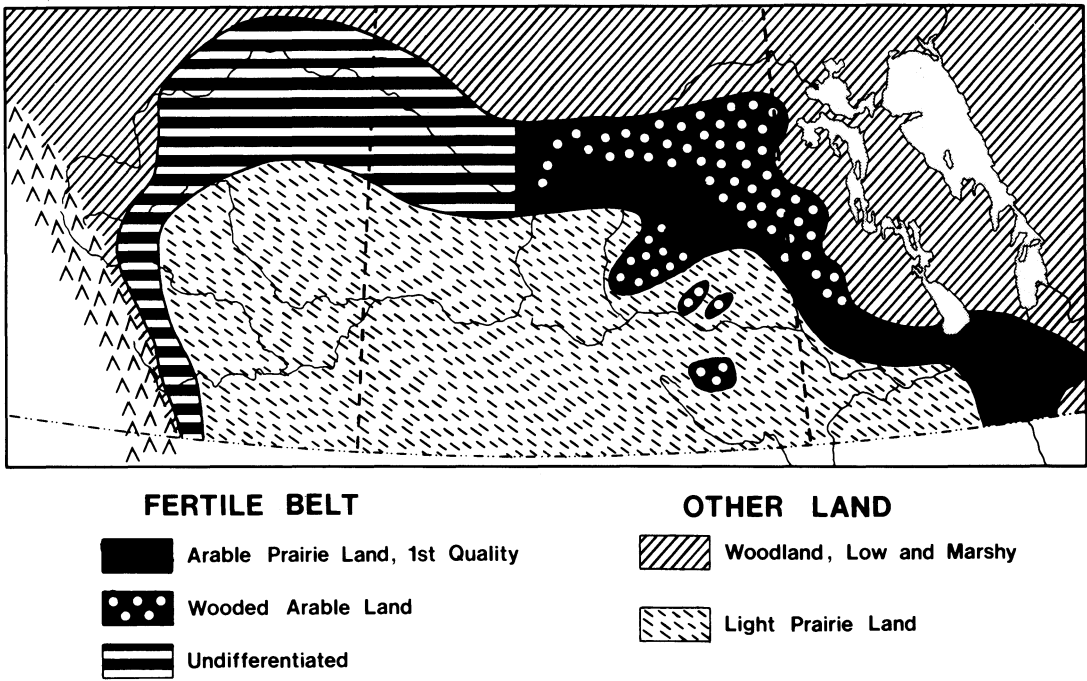


FIG. 3. Henry Youle Hind's map of land types. After Hind.

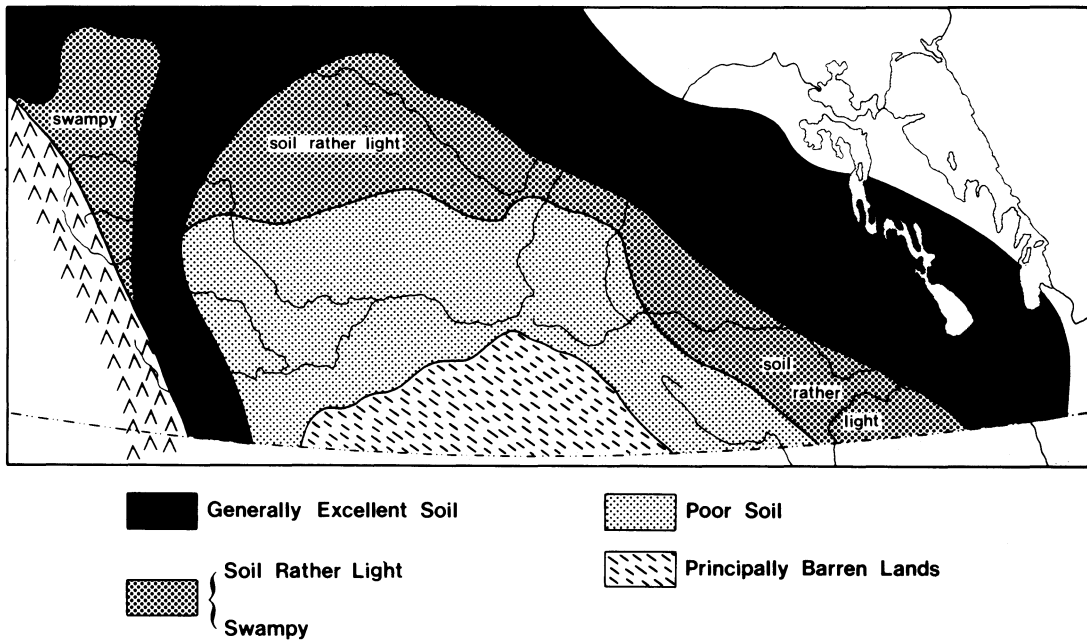


FIG. 4. Department of the Interior map showing land quality, 1878. National Map Collection, Public Archives of Canada.

triangle had encompassed 80,000 square miles of infertile land fringed by 65,000 square miles of fertile belt. The 1878 map showed only 64,000 square miles of poor soil and barren lands and 219,000 square miles of good agricultural land.⁶ The expansion of the perceived good land area mostly occurred in the North, but there was a preliminary shrinking of the triangle.

The real shrinkage of the triangle occurred in the late 1870s, especially after 1879, when John Macoun began to insist that the entire area of the prairies was suitable for agriculture, climatically and pedologically. Macoun found "excellent soil" between Old Wives Lakes and Cypress Hills in the "barren lands" (see fig. 4). However, he did not produce maps of land quality.⁷

LATE NINETEENTH-CENTURY MAPS

Whereas Palliser, the Dawsons, and Hind mapped soil on a small scale, the Dominion Land Surveyors (DLS.) worked only on a large scale. In 1871 they began the arduous task of dividing the newly opened West into the grid pattern of roads with the enclosed square-mile sections of land on the American plan. Their primary task was to have the land accurately surveyed and available for selection when the

first settlers arrived. They were also instructed to record terrain and vegetative cover. The surveyors' manual also required them to indicate "the nature of the soil," and classify it "according to its fitness for agriculture, as first, second, third or fourth rate" but gave no instructions on how they should arrive at the ratings.⁸ As John Tyman has pointed out in his assessment of their work, "Certain surveyors . . . were unable to bring themselves to grade any land as 4th class," and there was considerable variability in the ratings that different surveyors gave to identical areas. In another analysis, T. R. Weir used a map to illustrate the same point (fig 5). He showed that DLS. classifications did not correlate with either the more recent Manitoba Soils Survey classifications of land quality or the timing of settlement. Tyman also showed lack of correlation of DLS. classifications with the Canada Land Inventory classification, with vegetation, or with time between survey and settlement. Some surveyors were still working in the snow, when "good opportunity for observing the soil seldom occurred," so it is not surprising that their ratings are at variance. Furthermore, individual surveyors gave higher ratings for similar prairie soils after a year or two of surveying. At any rate, this early classification was mapped only in the

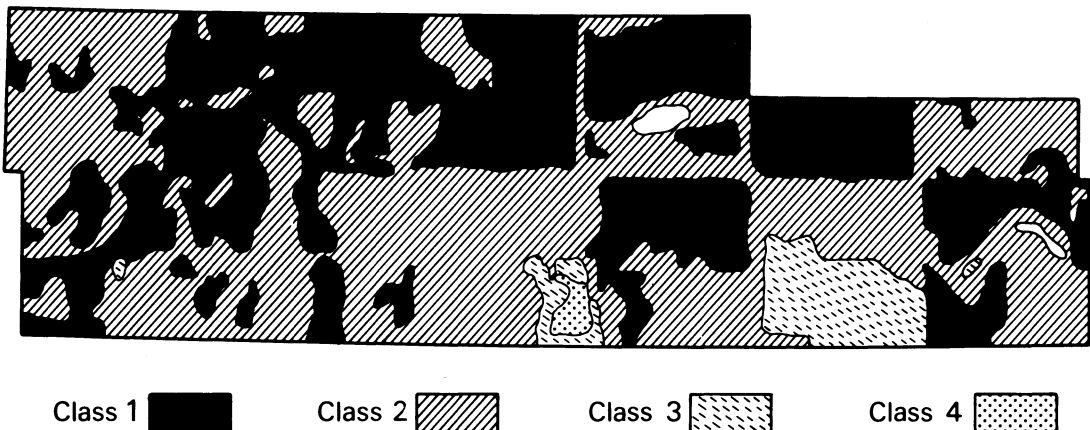


FIG. 5. Land classification by first surveyors in southwest Manitoba. After T. R. Weir.

field notes, and has never appeared in maps, except those published in recent academic studies.⁹ The field notes were available for purchase by intending settlers, but there is no evidence that any great number used them. By 1880 the surveyor general could report that the surveys showed much more first-class land than earlier estimated and that the fertile areas "have their limits extended the fuller our information becomes."¹⁰ This detailed soil information had the effect, along with Macoun's propagandizing, of expanding the perceived fertile belt.

During 1879 the Hudson's Bay Company also began evaluating land quality throughout the Canadian West. That year, as surveying proceeded, the Company put up for sale the lands it was receiving as its one-twentieth share of the "fertile belt." Charles J. Brydges, the Company's land commissioner, complained that "there is no information" on any of the Company's lands, "which makes it very difficult to talk about price." He therefore hired a surveyor "to go over some of the lands and report as to wood on them, whether they are wet or dry." The next year he arranged for three surveyors to report on the same characteristics and also the "nature of soil." He was very concerned about the accuracy of the information because "a good many complaints" had been made about the claims of "speculators" and he wished to preserve the Company's good name. The classification of soil during the first two years was unsystematic, so a four-class grading system was introduced. Montague Aldous, the chief surveyor, explained the grades:

1st class indicates a country with rich loam soil from 12 to 20 inches or more in depth, with a good clay or sandy clay subsoil, it may be prairie or partially wooded, but in any event it is what was considered by our inspectors as 1st class agricultural country; 2nd class is land well adapted for settlement, but having the drawbacks of being broken with hills and ponds or possibly consisting of open prairie land where the

soil is somewhat light, say from 10 to 15 inches of loam or sandy loam; 3rd class is what I call the plains as distinguished from prairie lands, the soil is light and shallow, often of a very fair quality but always having a large percentage of sand or gravel, the ground is dry and baked and the ponds for the most part alkaline or brackish, 4th class means the worst grade of 3rd class sand hills without any soil overlying them, and is generally termed worthless by those inspecting it.

The same system was being used in 1888 when the "general inspection of the whole country was completed."¹¹ The resultant map (fig. 6) shows enough correlation with Weir's and Tyman's maps of the DLS. classifications to suggest the DLS. may have used much the same system.

Both Brydges and Aldous found the land in Manitoba to be "very superior," especially below the Manitoba escarpment, where most land was designated as class 1. Above the escarpment and west to the Missouri Couteau, they found mostly class 2 land and west of there they found mostly class 3 and 4 land. They also questioned whether it was possible to grow wheat west of the Missouri Couteau because the elevation was too high, and there was not a month without "more or less frost." Only Brydges found this area to be "clearly the northern apex of the Great American Desert," an opinion he expressed in both 1883 and 1888. Much of what Brydges called desert was considered suitable for cultivation by one of the surveyors if it got "abundant rainfall" from May to July. Aldous's soils map showed some class 2 land west of the Couteau and even some class 2 land west of Moose Jaw Creek, which Brydges identified as the start of the desert.¹²

Finally, it seems clear that the Hudson's Bay Company's land evaluation had direct results. The values placed on lands for sale were partly based on soil quality, and Brydges found the HBC reports "of the greatest use in the sale of lands" because incoming settlers "all

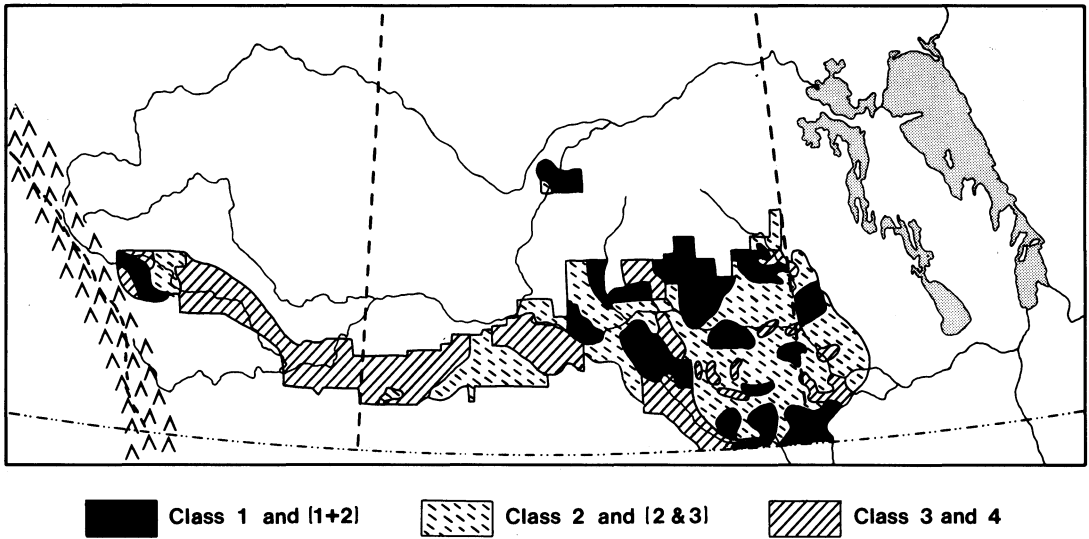


FIG. 6. *The Hudson's Bay Company's land classification.* Hudson's Bay Company Archives, Provincial Archives of Manitoba.

want to have particulars." In fact, he complained in early 1882 that he was having trouble selling land because all the evaluated or graded lands had been sold.¹³ The collapse of sales in 1883–84 made the surveys largely superfluous for almost two decades because so little land was being sold.

Like the Hudson's Bay Company, the

Canadian Pacific Railway (CPR) was entitled to huge acreages of western land. The CPR had been promised twenty-five million acres of land "fairly fit for settlement." As early as 1882, Brydges reported the railway would reject everything from just west of Moose Jaw to near Calgary, a prediction that proved accurate in the event (fig. 7). Like the Hud-

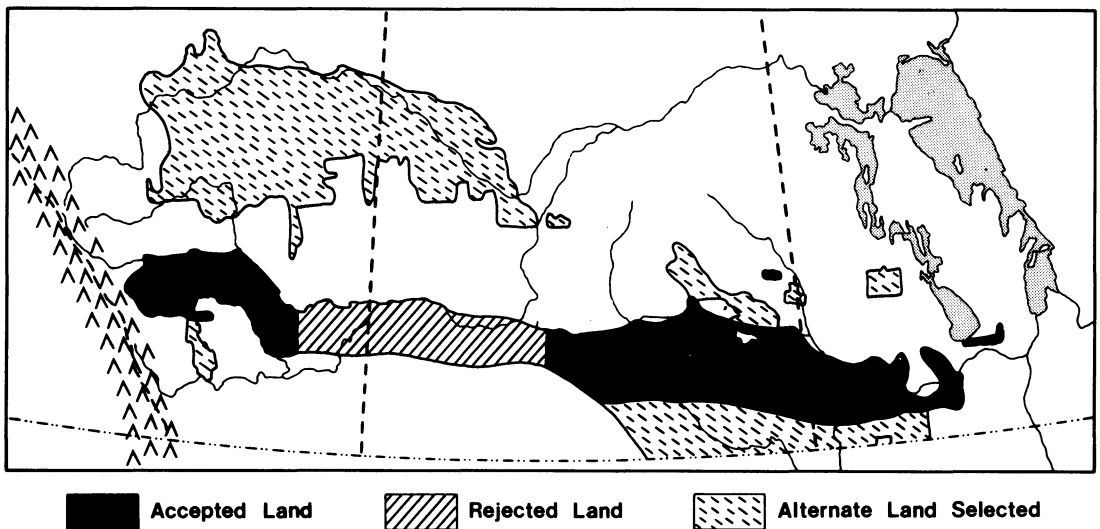


FIG. 7. *Land accepted and rejected by the CPR.* Public Archives of Canada.

son's Bay Company, the CPR had surveyors assessing land quality. The rejection of most land was largely on the basis of climate as the drought of the mid-1880s produced crop failure throughout most of Palliser's triangle. In Manitoba, the CPR's rejection was more selective and was mostly of the excessively sandy areas in the Carberry and Oak Lake districts. As Tyman pointed out, much land ultimately rejected as unfit for settlement had been offered for sale in the 1881-82 boom and some had even been sold but had reverted to the company for nonpayment prior to its rejection by surveyors.¹⁴ The CPR's selection of alternate lands was generally within Palliser's fertile belt. Using Macoun's claims of the fertility of the entire prairie area as a rationale, the syndicate running the CPR had chosen a southern route for the line. However, when it came time to select land, the vision of the

Great American Desert canceled that choice.

Slightly more detailed land quality maps were produced in 1893 for the Qu'Appelle-to-Prince Albert area for railway land grants (fig. 8). Part of the grant was for construction of a branch line from Regina to Prince Albert, including land to be substituted for unacceptable or unavailable sections, part was for land owed for the Manitoba and Southwestern Railways land grant, and part was for the CPR mainline grant in lieu of land rejected elsewhere. The categories used in these maps were "worthless" (class 5), "doubtful" (class 4½) and "accepted" (class 4 and better). Again, the basis for selection was not identified, but there was a fairly good correlation with the ratings shown by the Hudson's Bay Company.

Beginning in 1883, as part of the "better terms" for the province of Manitoba, the federal government began deeding swamplands to it. At first the province received only alternate sections of land actually drained, but later, after swampland inspectors examined the land, it received all except four sections per township. The first maps of the swamplands appeared about 1900, shortly before the transferring was discontinued. These maps showed only one of the features of land quality and made no reference to soil materials. Such land transfers never occurred after Saskatchewan and Alberta became provinces in 1905, so the phenomenon was unique to Manitoba.¹⁵

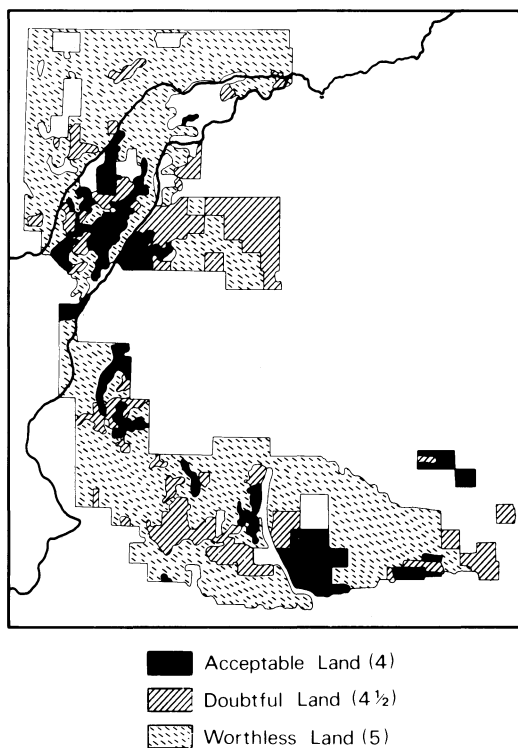


FIG. 8. Land map for selection of railway lands in Central Saskatchewan. Public Archives of Canada.

TWENTIETH-CENTURY MAPS

More ephemeral were the manuscript ratings on the 1906 maps of the northern Interlake and Duck Mountain areas of Manitoba. The categories were "good land" and "poor land and swamp" (fig. 9). The area mapped included the present Duck Mountain forest reserve and Riding Mountain National Park. The almost barren high lime soils of the Interlake were designated as "good" and the land near Arborg (presently considered excellent) was shown as "swamp," which indeed it then was. The maps appear never to have been used.

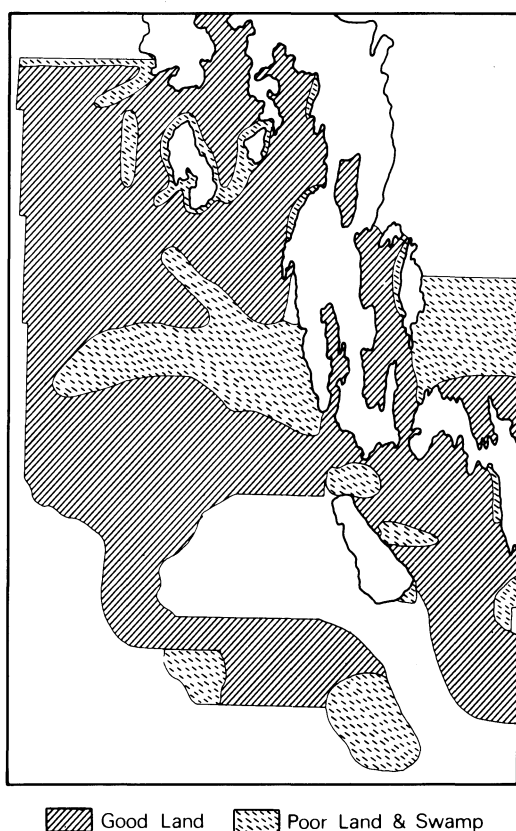


FIG. 9. Map of land quality in west central Manitoba based on a 1906 manuscript map. Public Archives of Canada.

The expectation that returning soldiers would take up land after World War I led the dominion government to undertake land classification to help guide the potential settlers. The topographical surveys branch produced maps showing "classification of land by quarter sections for settlement purposes." It actually mapped land quality only on areas still available for homesteading.¹⁶ Like the 1906 map, these maps give a very optimistic view of land that is now abandoned and considered of no future value. Their primary purpose was to save the settler time by directing him to the more promising areas, but they reminded the settler that the final choice was his. Considering the optimistic view represented by these maps, the caution was certainly in order.

In the 1930s the Manitoba Soil Survey began reconnaissance soils surveys. Their object was to obtain "the essential facts about the soils" in order to ascertain "the characteristics, the possibilities and the problems of the respective soils." The writers of the reports hoped to improve conservation by providing a useful guide to land use policy. They did not claim to evaluate land quality but rather to describe the soil profiles. A table identified the suitability of the various soils for particular crops, but generally as a range. It was only by working from this table that T. R. Weir was able to construct his map of land quality for southwestern Manitoba.¹⁷ These maps were of significant help to government agencies advising farmers, but the farmers themselves were generally unaware of their existence.

In 1953 the Canadian Department of Agriculture prepared a map of part of Saskatchewan showing potential wheat production per quarter section based on long-term average wheat yields (fig. 10). Production on Class 1 soils was less than 350 bushels per quarter section due to "poor soil texture or low arability or both." Class 2 soils had similar limitations but produced 357 to 475 bushels. Class 3 soils produced 476 to 720 bushels on loam soils with level to rolling topography. Class 4 soils produced 721 to 900 bushels on "superior loams to clay. . . with very few stones." Class 5 produced over 900 bushels per quarter section on soils "of a heavy clay texture . . . usually well drained and stone free." Figure 10 shows that some of the highest yielding land was in areas rejected by Palliser, Hind, and the CPR, and the actual production correlates poorly with the map of land quality for the railway grant lands north of Qu'Appelle. Only the Hudson's Bay Company surveyors produced a similar map of land potential.

A more recent example of maps based on soil productivity is that by T. R. Weir (fig. 11). It is based on indices of soil and climate together, which were calibrated by actual twenty-five-year yields of red spring wheat. The Manitoba Crop Insurance Corporation

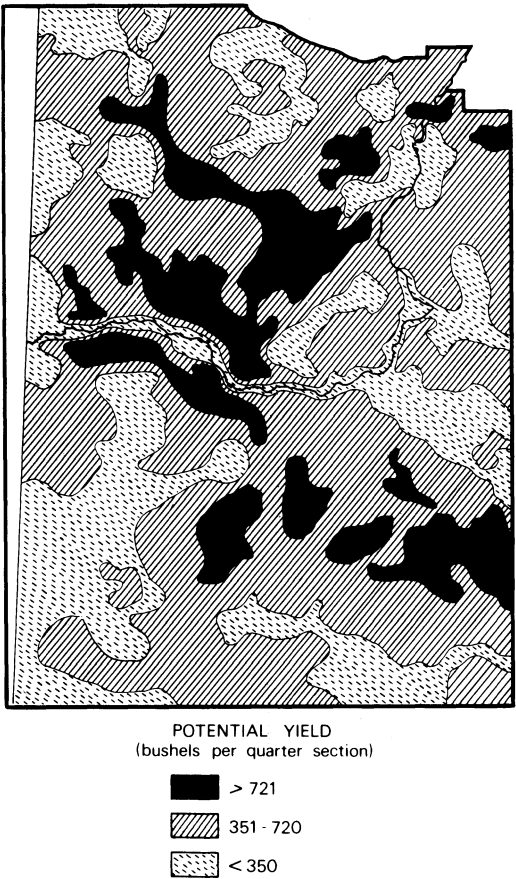


FIG. 10. Map of soil productivity in southwestern Saskatchewan. Canada Department of Agriculture and the University of Saskatchewan.

produced the yield estimates for their own purposes, but the resulting map is a visual expression of one aspect of soil quality.¹⁸ Correlations with other land quality maps are not great.

The most recent effort at fairly complete mapping of soil quality was that carried out by Canada Land Inventory (fig. 12). It was based on limitations for agriculture, recognizing that these might be climate, erosion, flooding stoniness, topography, or high water tables. Class 1 soils have no significant limitations for agriculture. Class 2 soils have moderate and Class 3 have moderately severe limitations. Land falling in these three classes is considered

good for agriculture. Class 4 land, with severe limitations, and Class 5, with very severe limitations, are marginal to submarginal. Class 6 land is only marginally suitable for forage crops, and class 7 is unsuitable for any agricultural use.¹⁹ The correlation with the Saskatchewan crop yield map is, not surprisingly, very high. More surprising is the correlation of the CLI maps with Palliser's and Hind's maps, although the CLI maps show a much smaller area of submarginal land.

CONCLUSION

The mapping of land quality in western Canada began early and has continued to be an important scientific objective. The maps produced by the many evaluators have varied enormously, reflecting the different purposes involved in the mapping, the degree of information available, and the perceptions of the evaluators. Although it is easy to see, in retrospect, that Palliser's triangle and its equivalent shown by Hind included enormous areas

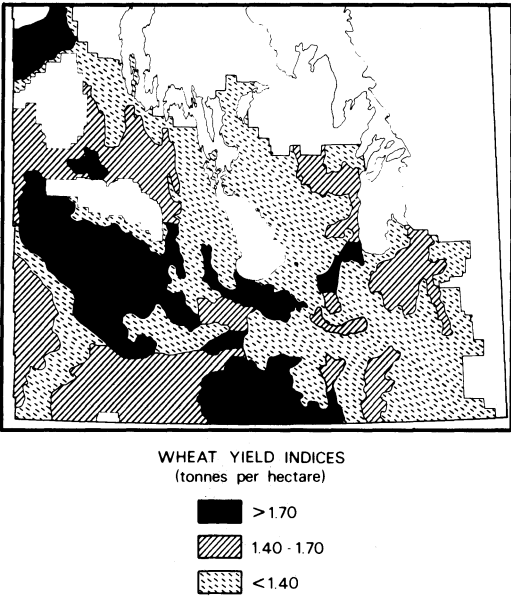


FIG. 11. Crop insurance map soil productivity in Manitoba. After T. R. Weir.

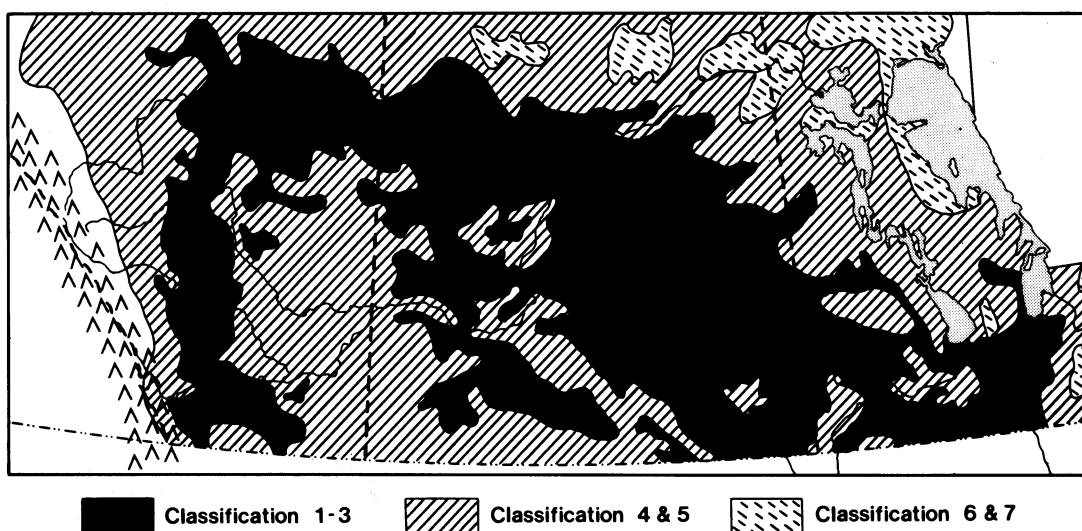


FIG. 12. CLI. map of soil capability for agriculture. Canada Land Inventory.

of what is now prime farmland, the CLI maps show at least a remnant of it, and other early maps are at least partly reflected in more recent land quality maps. No doubt future maps of agricultural land quality will differ in detail as scientific knowledge increases and perceptions of value continue to evolve.

NOTES

1. Irene M. Spry, ed., *The Papers of the Palliser Expedition 1857-1860*, (Toronto: Champlain Society, 1968), pp. 5, 495-502.

2. *Ibid.*, pp. 22, cx, map in pocket, passim.

3. Henry Youle Hind, *Narrative of the Canadian Red River Expedition of 1857*, (1860 reprint, New York: Greenwood Press, 1969), vol. 1: 4, 269-270; S. J. Dawson, *Report of the Exploration of the Country Between Lake Superior and the Red River Settlement* (1859; reprint, New York: Greenwood Press, 1968), p. 2.

4. Dawson, *Report*, passim; Hind, *Narrative*, 1: 373.

5. Hind, *Narrative*, 1: 317, 348, 351; Dawson, *Report*, p. 2; Henry Youle Hind, *Reports of Progress Together with a Preliminary and General Report* (London: Houses of Parliament, August 1860).

6. George M. Dawson, *Report on the Geology and Resources of the Region in the Vicinity of the Forty-ninth*

Parallel (Montreal: Dawson Bros., 1875), pp. 144-45, 299, passim; Map 0008438, National Map Collection, Public Archives of Canada.

7. John Macoun, *Manitoba and the Great North-West*, (Guelph, Ontario: World Publishing Co., 1882), passim, especially pp. 60-79.

8. Canada, Department of the Interior, *Manual Showing the System of Survey of the Dominion Lands with Instructions to Surveyors* (Ottawa: 1881), p. 17.

9. John L. Tyman, "Subjective Surveyors: The Appraisal of Farm Lands in Western Canada, 1870-1930," in Brian W. Blouet and Merlin P. Lawson, eds., *Images of the Plains: The Role of Human Nature in Settlement* (Lincoln: University of Nebraska Press, 1975), pp. 75-89; Thomas R. Weir, "Pioneer Settlement of Southwest Manitoba: 1879 to 1901," *Canadian Geographer* 8, no. 2 (1964): 64-71; Canada, *Sessional Papers: 1883*, no. 23, "Report of the Department of the Interior," pt. 1, pp. 8-9; Original Surveyors' Plans, Provincial Archives of Manitoba, Winnipeg (hereafter PAM).

10. Canada, *Sessional Papers: 1881*, no. 12, "Report of the Department of the Interior," pt. 1, p. 9.

11. Brydges to Armit, 9 June 1879, A12/8, fo. 31-34; 4 May 1880, A12/19, fo. 200; 11 June 1880, A12/19, fo. 258; 5 November 1888, A12/26, fo. 47; Aldous to Brydges, 5 December 1883, A12/22, fo. 515, in Hudson's Bay Company Archives (hereafter HBCA), PAM.

12. Brydges to Armit, 28 September 1882, A12/21, fo. 289-291; 4 October 1883, A12/22, fo.

383; 5 November 1888, A12/26, fo. 471-72; Aldous to Brydges, 5 December 1883, A12/22, fo. 515-16; W. J. Riley to Aldous, 10 November 1884, A12/24, fo. 20, in HBCA, PAM.

13. Brydges to Armit, 4 May 1880, A21/19, fo. 200-201; 1 June 1881, A12/20, fo. 153-54; 29 May 1882, A12/21, fo. 164; 15 February 1886, A12/25, fo. 42, in HBCA, PAM.

14. Canada, *Statutes: 1881* (Ottawa: 44 Vic, C.1, S. 11); Brydges to Armit, 6 October 1882, A12/21, fo. 312 in HBCA, PAM; Tyman, "Subjective Surveyors," pp. 75-76; T. P. Shaughnessey, CPR president, to L. A. Hamilton, CPR land commissioner, 25 January 1900, and attachments, Shaughnessey Letter Bank 69, file 67821, Canadian Pacific Corporate Archives, Montreal.

15. Chester Martin, *Dominion Lands Policy* (1938; reprint, Toronto: Carleton Library, McLel-

land and Stewart, 1973), pp. 175-78.

16. Tyman, "Subjective Surveyors," p. 78; "Map of the District Adjacent to Lake Winnipeg and Manitoba" prepared by the Topographical Surveys Office, 1921 edition.

17. J. H. Ellis and W. H. Shafer, *Reconnaissance Soil Survey of South-Western Manitoba*, Soils Report no. 3 (1943; reprint, Winnipeg: Manitoba Soil Survey, 1974), p. 5; Weir, "Pioneer Settlement," pp. 64-71.

18. Thomas R. Weir, ed., *Atlas of Manitoba* (Winnipeg Surveys and Mapping Branch, Department of Natural Resources, Province of Manitoba, 1983), pp. 14-15.

19. Canada, Department of Regional Economic Expansion, *The Canada Land Inventory: Objectives, Scope and Organization*, Report no. 1, (Ottawa: 1970), pp. 22-25.