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CHAPTER 3

The Historical Setting

I. National Policy and Western Canadian Development

Two SETS of circumstances provide the essential background for a review of the economic development of the South Saskatchewan watershed. The first of these is political and economic and can be analysed under the heading of national policy. The second is geographic and concerns the relationship between the South Saskatchewan River basin and the interior continental plain. Both sets of circumstances will be examined with a view to a realistic description of economic development in the prairie provinces.

1. *Formulation of the National Policy.*— The terms of reference require the Commission to inquire whether the South Saskatchewan River Project would justify the costs which it would entail and whether it would represent the most profitable and desirable use which could be made of the necessary physical resources. The question at issue is clearly the advisability or otherwise of a substantial developmental expenditure on the part of the federal and certain of the provincial governments of Canada. Such a question cannot be considered adequately in an historical vacuum. If the prairie areas of Canada have been developed to the present time solely on the strength of private enterprise unsupported by state resources, then it is obvious that the proposals now under consideration relating to the South Saskatchewan River mark a radical departure from tried and accepted experience. If, however, governmental finance and guarantee have been the constant companion of private venture capital in the development of the West, it follows that the proposals being examined by this Commission involve no departure from Canadian usage, and the merit or lack of merit of such proposals must therefore be assessed with that in mind. The latter has, in fact, been true. Western economic expansion has proceeded to date within the framework of national developmental policy which evolved gradually after the middle of the nineteenth century. This policy has rested on the assumption that one of the main functions of the public treasury was to underwrite developmental projects which were regarded as essential in the national interest but from which the monetary returns appeared so remote or so uncertain as to prove unattractive to private capital.

When Canadians speak of the "National Policy" they have in mind the protective tariff system introduced by the Conservative government in 1879. At some loss to discover an issue on which to oppose the Liberals in the elections of 1878, Macdonald

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adopted the proposal of providing encouragement to Canadian industry by the introduction of protective tariffs and bounties. By a stroke of genius, as Professor Underhill says, Macdonald labelled this proposal the "National Policy". Winning the election on this platform Macdonald's government implemented the National Policy of tariff protection, introduced substantial increases in existing rates immediately and raised them still further over the succeeding decade. Liberal governments which followed in power after 1896 maintained the protective system with only minor modifications in the direction of imperial preference. The protective system has been the National Policy to Canadians to the present day.

The protective system was, however, but a part of the national policy in its broadest sense and has significance only in relation to the whole. Protection was, in fact, practically the last feature of the national policy to be adopted. The concept of a national policy ante-dated Confederation. It included the federation of the British North American colonies and territories as its indispensable constitutional instrument. The other elements of this policy must be indicated in order to show their inter-relationships with particular reference to the development of the prairie west.

The national policy took shape gradually and haltingly but, nevertheless, with tremendous vision, approximately a century ago. It involved what at that time could only be described as a fantastic design for the creation of a single nation, British in allegiance, to embrace the northern half of the North American continent from coast to coast and, in addition, the islands of the East and of the West. By the late eighteen-fifties these gigantic spaces contained approximately three million people scattered in isolated pockets from east to west, with a minimum of intercommunication and ruled by more than half a dozen distinct governing bodies. The main concentration of population was on the St. Lawrence where some two and one-half million people, divided approximately 45-55 between groups of French and English extraction, constituted the United Province of Canada. This colony had behind it two generations of representative government but less than a decade of responsible government. On and in the Atlantic were the four Maritime colonies of Nova Scotia, New Brunswick, Prince Edward Island and Newfoundland, each with a separate colonial government in which the responsible feature was as new as on the St. Lawrence.

A thousand miles to the west of the St. Lawrence a handful of colonists clung tenaciously but insecurely to an agricultural livelihood on the river-side strip farms about Fort Garry on the Red River. Their holdings lay within the territorial and political limits of the Hudson's Bay Company. Apart from the Red River Settlement, Rupert's Land—all land drained by waters flowing into Hudson Bay—was the empty but jealously guarded fur-producing empire of the Hudson's Bay Company. On the west coast were two groups of settlers, one on Vancouver Island and one on the mainland. Here the influx of prospectors and settlers occasioned by recent gold discoveries had led to the creation of the crown colonies of Vancouver Island and British Columbia. In retrospect, those who formulated the project of creating a nation under these geographic circumstances and with these scattered fragments of population resources, are clearly

worthy of being credited with national vision, however haltingly their project may have come to fulfilment.

The project for the creation of a Canadian nation co-extensive with the northern half of North America was initiated and moulded by influential interests within the Province of Canada. It was generated and fostered partly in envious admiration of the successful, semi-continental imperialism of the United States throughout the first half of the nineteenth century, and partly out of the desperate necessity of adoptin , what might well appear to be a next to impossible, but the only, expedient.

Little need be said concerning the American example. After the Revolution a continuous tide of settlement moved through the passes of the Appalachian and Allegheny mountains, and, filling in the arable territories as it went, had by 1850 brought the agricultural frontier of the United States to the Mississippi Valley. Bridging rather than occupying the inhospitable—or, as they were then regarded, uninhabitable—high plains beyond the Mississippi, substantial contingents trekked under appalling hardships to the Oregon country of the west coast. Gold discoveries in California in 1848 aroused a feverish interest in the south-west coastal area. Railways reached from New York to the Mississippi via the Hudson-Mohawk river valleys by 1850 and pushed southwestwardly beyond in succeeding years. In 1862 the Union Pacific was chartered to join up with the Southern Pacific, the latter building from the west coast, to provide the first transcontinental rail communication in the United States. In 1864 the Northern Pacific was chartered to link the Great Lakes area with Puget Sound.

It is not hard to discover the results of the tremendous agricultural expansion in the United States which called forth the envious admiration of observant Canadians. Immigrants poured into American territory and the national population increased by leaps and bounds. New states were carved out of the territories and added to the Union.[1] Construction and housing trades prospered. Western agricultural expansion led to eastern urbanization, to the growth and prosperity of commercial and industrial centres. To equip and service the agricultural frontier there was necessary a tremendous increase in the manufacturing, merchandising and transportation facilities of the country. The frontier farmer is typically a trader. He sells much and buys more, financing the difference by the accumulation of debt. Westward over the continental trade routes, over rivers and increasingly over railways, there moved the manufactured products of eastern cities. Eastward in return there moved the products of the expanding agricultural areas, cereals, livestock and livestock products. The national income and the national revenues multiplied, partly as a direct result of increased agricultural production but more particularly because of the commercial and

[1] The westward advance of the American agricultural frontier can be noted in the creation of new states and their admission to the Union. Michigan was admitted in 1837, Iowa in 1846 and Wisconsin in 1848. The population of Minnesota Territory (exclusive of Indians) increased from 6,000 to 172,000 between 1850 and 1860. Minnesota was admitted as a State of the Union in 1858. Dakota Territory was organized in 1861. In 1889 North and South Dakota, Montana and Washington were constituted states and admitted to the Union. In 1890 Wyoming and Idaho were created and admitted.

industrial employments which followed inevitably in the wake of agricultural immigration and settlement.

It is necessary for two reasons to stress the commercial attributes of agricultural immigration and settlement. In the first place the typical economic interpretation of Canadian development has consistently underestimated the commercial importance of immigration and settlement processes. Everyone "knows", in fact, that the pioneer settler was mainly self-sufficient, buying and selling practically nothing, and therefore of no possible interest to commercial or industrial groups. This characterization of the pioneer settler in Canada is far from correct. The Canadian frontiersman has typically been a substantial buyer and seller of goods and has consequently been of direct practical interest to commercial and industrial groups.

In the second place, the chief economic activities of producers on the St. Lawrence were commercial activities. This was true from the days when Europeans first penetrated the area, and it remained so throughout the pre-Confederation period despite substantial agricultural expansion. The influential groups in the Province of Canada throughout the period in which the national policy was gradually moulded into shape were commercial groups—importers and wholesalers, transportation interests including contractors as well as railway and shipping interests, commercial banks and insurance and trust companies. A manufacturing and industrial group was present in embryo and its interests were of increasing significance in the later stages of the formulation of the national policy, notably in the introduction and maintenance of protective tariffs. The points to be noted here, however, are, (1) that the economic purposes of the national policy were essentially commercial, and (2) that western agricultural development came to represent a substantial part of the objectives of the national policy, largely because of the recognized commercial attributes of large-scale agricultural immigration and settlement.

American experience throughout the first half of the nineteenth century demonstrated clearly the economic advantages of immigration and of agricultural expansion. Canadians of the pre-Confederation years, however, had no need to look even as far as across the St. Lawrence river for conclusive demonstration of the relationship between commercial profits and general prosperity on the one hand, and agricultural expansion on the other. The twenty-five or thirty year period after 1825 was one of substantial immigration to the Canadian part of the St. Lawrence region and concurrently there was accomplished the occupation of the great bulk of the agricultural lands of Upper Canada. The commercial frontier followed closely behind the agricultural frontier. The locations of cross-roads stores and post-offices and the stream and river sites of grist- and saw-mills developed into villages equipped for the exchange of farm produce for manufactured goods and for the processing of agricultural and forest raw materials. Many villages grew into towns, and some towns, favored by location or by exceptional enterprise, grew into commercial and processing cities. The commercial expansion created a demand for improved transportation facilities. The St. Lawrence was first improved by a costly system of canals during the eighteen-forties. But by the time of its completion, the canal

system was obsolescent in view of the widespread adoption of railways in the United States.

There is far more than coincidental significance to the mention of American railway development in the circumstances outlined here. American railways were of impelling importance to the prospects and projects of the Canadians in the pre-Confederation years because the construction of railways in the United States placed the competitive Canadian trade route at a disastrous disadvantage. Europeans established on the St. Lawrence and on the Hudson-Mohawk river systems had been bitter commercial rivals from the days of their first introduction to the North American continent in the early seventeenth century. For upwards of two centuries the fur trade was the chief field of profitable enterprise throughout the continent. French merchants situated at the mouth of the St. Lawrence struggled to secure the supremacy of their trading system in competition with the Dutch and later the English who traded inland from New Amsterdam (later New York) at the mouth of the Hudson. By the early nineteenth century agricultural settlement moved inland from the New England coast, enveloping the lower Great Lakes in its westward movement before moving onward toward the American Middle-West. The St. Lawrence and the Hudson-Mohawk river systems persisted as rivals for the inward and outward commerce of the agricultural frontier. The opening of the Erie Barge Canal in 1825 gave undoubted leadership to the New York interests as compared with those of Montreal. As noted above, the St. Lawrence canal system, created in the eighteen-forties, failed to restore the competitive prospects of the St. Lawrence group because meanwhile New York had been linked with the Mississippi agricultural frontier by a railway system.

Economic expansion and general prosperity prevailed in Canada throughout the early eighteen-fifties, associated with a continuance of substantial immigration and the occupation of new agricultural lands. The Grand Trunk Railway was built through the St. Lawrence valley to link Montreal and Toronto with Sarnia on the Canadian-American boundary, and from Montreal it joined with other railways, to emerge at the ice-free American port of Portland, Maine. The expectation was that this system would enable the St. Lawrence commercial system to share in the profitable servicing and supplying activities of the American agricultural frontier.

The latter part of the eighteen-fifties was disheartening in the Province of Canada as the early part of the decade had been promising. Immigration fell to negligible proportions. The best efforts of the provincial government to open new areas for agricultural settlement accomplished little other than to disclose the fact that little suitable land remaind unoccupied in the province, so near, in fact, were the margins of the Precambrian Shield. Settlers who were induced by the offer of free land to settle in the pine forests beyond the northern margins of established farms lands, cleared and sold the timber from their land grants and moved on to the United States. The improvement of the St. Lawrence transportation facilities, first by the construction of canals and second by the construction of a railway, left private interests and public authorities saddled with a heavy burden of

debt. The debt was a dead-weight burden for the economy was stagnant. The development expenditures had not achieved their purpose. The trade of the American agricultural frontier could in no way be drawn through the St. Lawrence trade route. Montreal lagged far behind New York, and Toronto clearly possessed few of the prospects of mid-western American cities.

The preceding pages have sketched the economic circumstances within which the national policy gradually took shape after 1850. The net result of these circumstances was that the problems facing the individual colonial governments of British North America obviously exceeded the possibility of solution by independent and disunited effort. American expansive vitality might clearly rest in part upon a comparatively favourable geographic situation, but such vitality could not be wholly divorced from the existence of a national unit with free exchange of goods throughout its geographic limits and with a central government to assume the indispensable major developmental burdens and responsibilities. The eastern British American territories—the Province of Canada and the Maritime colonies—were already considerably developed, and although their economies were weak in disunity they were nevertheless complementary in character. A national union, which would wipe out the tariff walls which separated them, would do much toward the promotion of trade among them. But the difficulties of communication could only be overcome by the construction of an intercolonial railway through barren distances. This project, already mooted, was clearly beyond the capacity of both private enterprise and governmental ability on the part of the individual colonies. A national government would be the minimum competent agency.[2]

2. *The Western Territories and the National Policy: American Experience.*— Important as were the prospects which awaited a union of the Maritime and St. Lawrence colonies after 1850, it was increasingly clear that the maximum possibilities of further economic expansion within these colonies, even on a united basis, were limited in the extreme. The prosperity and economic vitality of the eastern states of the American Republic were based on agricultural expansion far beyond the western limits of the states themselves. Prosperity for the eastern British colonies would require similar external areas for occupation and further development.

If these were the conditions of future Canadian prosperity, the geographic comparison between the Canadian and American territories was of the most discouraging kind. Where the American agricultural frontier moved steadily westward to the Mississippi through the fertile and approachable areas of the middle west, the Canadian territorial counterpart was a stretch of approximately one thousand miles of Precambrian Shield which lay along the northern shores of Lakes Huron and Superior and extended well beyond to the margins of the Red River valley. To the north of the head-waters of the Mississippi, however, the Red River valley extended across the boundary into

[2] The British North America Act of 1867 (Sec. 145) imposed upon the Government of Canada, newly constituted by the Act, the obligation to commence within six months the construction of a railway from the St. Lawrence to Halifax, to construct the railway "without intermission," and to complete it "with all practicable speed."

Rupert's Land. Beyond the Mississippi and the Red River the broad continental plain stretched to the foothills of the Rocky Mountains. Gold discoveries on the Fraser in the eighteen-fifties gave some slight air of reality to the dream of a British American nation which might some day spread from the Atlantic to the Pacific, but the barriers appeared well-nigh insuperable. The Shield and Great Lakes on the East and the mountains on the West offered tremendous handicaps to settlement. There remained the uncertain quantity, the central plains between. What could be said of the nature and settlement possibilities of this area in the pre-Confederation years?

Canadians had little reliable information concerning the central plains region before the latter part of the eighteen-fifties. This was true despite the fact that the area had been traversed by fur traders for well over a century. It was recognized that that part of the plains which lay in British territory was but the northern extension of the American central plains. Contrary to Canadian experience, the Americans had a good deal of information about this area, some of it idle hearsay and some the result of painstaking and organized investigation. The American tide of settlement had reached the eastern margins of the plains before 1850. So inhospitable did this area appear to be, however, that the settlers crossed it to reach the intermountain valleys nearer to the west coast but did not attempt to settle upon it. It had long been a well accepted premise that the inadequacy of rainfall and the absence of tree growth throughout the plains rendered them unsuitable for agricultural pursuits.

The entire plains region of the North American continent was, in fact, known as the Great American Desert. Professor Webb, an eminent present-day student of the North American plains, says that the concept of the Great American Desert is to be found in written records well back into the sixteenth century, that it was prominent in American thought from 1820 to 1858 and "was at its height in the decade between 1850 and 1860".[3] He says in part: "The fiction of the Great American Desert was founded by the first explorers, was confirmed by scientific investigators and military reports, and was popularized by travelers and newspapers".[4] Speaking of the Oregon settlers Webb says in part: "The Oregon migration, which was pretty well developed by 1843, was an example of a frontier jumping nearly two thousand miles over an unoccupied country . . ."[5]

Advanced scientific opinion of the American plains in the middle eighteen-fifties is represented by the following statement by Professor Joseph Henry, Secretary of the Smithsonian Institution. Professor Henry wrote in 1856:[6]

> "The general character of the soil between the Mississippi and the Atlantic is that of great fertility . . . The portion also on the western side of the Mississippi, as far as the 98th meridian, including the States of Texas, Louisiana, Arkansas, Missouri, Iowa, and Minnesota, and portions of the territory of Kansas and Nebraska, are fertile, though abounding in prairies and subject occasionally to droughts. But the whole space to the west, between the 98th meridian and

[3] Webb, W. P., *The Great Plains* (New York: 1931) p. 159.
[4] *Ibid*, p. 153.
[5] *Ibid*, p. 149.
[6] "Meteorology in its Connection with Agriculture", *The Patent Office Record*, for 1856, as cited in H. Y. Hind, *Narrative of the Canadian Exploring Expeditions* (London, 1860) Vol. II, pp 355-7.

the Rocky Mountains, denominated the Great American Plains, is a barren waste, over which the eye may roam to the extent of the visible horizon with scarcely an object to break the monotony. . . .

"We have stated that the entire region west of the 98th degree of west longitude, with the exception of a small portion of west Texas and the narrow border along the Pacific, is a country of comparatively little value to the agriculturist; and, perhaps, it will astonish the reader if we direct his attention to the fact that this line, which passes southward from Lake Winnipeg to the Gulf of Mexico, will divide the whole surface of the United States into two nearly equal parts. This statement, when fully appreciated, will serve to dissipate some of the dreams which have been considered as realities as to the destiny of the western part of the North American continent."

In 1858 Professor H. Y. Hind of the University of Toronto published a paper on the "Great North-West" in which he summarized the results of investigations concerning the western territories of the United States. He said in part:[7]

"The exploration for the Pacific Railroad [in the United States] and the meteorological investigations carried on under the direction of the Surgeon-General (*sic*) of the U.S. Army, show conclusively that no settlement of any importance can be established over a vast extent of country, many hundreds of miles broad, on the eastern flank of the Rocky Mountains, and south of the Great Bend of the Missouri. Owing to the absence of rain, the apparently great rivers, the Platte, the Canadian, the Arkansas, etc., are often converted into long detached reaches or ponds during the summer months, and forbid extensive settlements even on their immediate banks . . . .

"The popular impression that immense areas of land, available for the purposes of agriculture, lie between the Missouri and the Rocky Mountain chain, has, as before stated, been completely refuted by the explorations and surveys for the Pacific Railroad. The now well ascertained aridity of climate and its natural consequence, sterility of soil, both combine to confirm the title of 'The Great American Desert', given by the early explorers of the eastern flank of the Rocky Mountains to that extensive region of country . . . ."

Horace Greeley, well known as the leading American advocate of westward migration a century ago, verified and popularized the limitations of the plains area for settlement. In 1859 he crossed the American plains and published his observations in the *New York Tribune* which Professor Webb describes as "the most influential paper in the United States (at that time)."[8] Among Greeley's comments, for example, was the following: "The plains are nearly destitute of human inhabitants. Aside from the buffalo range . . . (this region) affords little sustenance and less shelter to man . . . Wood and water—the prime necessities of the traveller as of the settler— . . . . at length they gradually fail, and we are in a desert indeed."[9]

3. *Settlement Prospects in the Canadian West.* American investigations, however, were concerned primarily if not exclusively with the territory to the south of the boundary, that is, below the 49th parallel of latitude. Professor Henry noted that the 98th meridian, west of which he said the "entire region . . . is a country of comparatively little value to the agriculturist", passed southward from Lake Winnipeg to

[7] Hind, *Narrative of the Canadian Exploring Expeditions*, Vol. II, App. VII, pp. 410-13. A few years later Captain Palliser commented on the American investigations of the plains area of the continent and concluded that, "No one of these surveys, however, offers a favorable prospect for the ultimate construction of a line of railway connecting the Atlantic with the Pacific, principally from the fact that in the central part of the continent there is a region, desert, or semi-desert in character, which can never be expected to become occupied by settlers . . ." *Journals, Detailed Reports, and Observations relative to the Exploration, by Captain Palliser, of British North Amer*, London, 1863, *The General Report*, p. 4. (Hereafter referred to as Palliser, *Journals, Detailed Reports*, etc.)

[8] Webb, op. cit., p. 159.

[9] *Ibid.*

the Gulf of Mexico. While the implication was that the geographic conditions prevailing north of the border were similar to those known to exist from the border southward, there is no indication that American investigators had made any point of establishing precisely the degrees of similarity or difference. If the Canadians or the British were to acquire a specific knowledge of the plains area of Rupert's Land after 1850 they would obviously have to organize and conduct their own exploratory missions.

Both the British government and the government of the Province of Canada did, in fact, investigate the western territories in the late eighteen-fifties. In 1857 there arose the question of the renewal of the Hudson's Bay Company's exclusive fur-trading licence on the Pacific coast. The British government appointed a parliamentary committee to consider the matter and took the opportunity to question the officials of the Company concerning the agricultural capabilities of the Red River area and the plains beyond. The emphatic opinion of the officals was that Rupert's Land was without agricultural possibilities. Sir George Simpson, Governor of the Company, held that even the Red River region was not well suited to settlement. He pointed out that the Company had had to import wheat supplies for the settlers within recent years. The soil, he said, was poor except on the river banks, and frost was a common destructive factor. Of the Saskatchewan country he said, "the crops are even less certain on that river, the scarcity of timber is also a great bar."[10] The plains beyond the banks of the Red River had, he said, been tried and found poor.

The same year (1857) the British government through its Colonial Office sent an expedition to western Canada under the direction of Captain Palliser. Palliser was instructed to explore the territory between the north branch of the Saskatchewan River and the United States boundary, and between the Red River and the Rocky Mountains. Within this area he was to determine "the nature of its soil, its capability for agriculture, the quantity and quality of its timber, and any indications of coal or other minerals."[11] He was to go to the West by way of Lake Superior and to record carefully all levels between Lake Superior and Lake Winnipeg. From the western margins of the plains area he was "to endeavour to ascertain whether one or more practicable passes exist over the Rocky Mountains within the British territory, and south of that known to exist between Mount Brown and Mount Hooker."[12]

Palliser explored in the West during the years 1857 to 1860 inclusive. His reports were voluminous but the gist of them can be concisely stated and for the most part can, in fact, be presented in his own words by the selection of a few key paragraphs from his reports. His remarks concerning transportation connections to the east and west of the plains area are not of particular relevance to this study. We need only mention that he dismissed as beyond the realm of practicability the idea of a line of communication from the settled areas on the

[10] Cited in Mackintosh, W. A., *Prairie Settlements The Geographical Setting* (Toronto, 1934) p. 29.

[11] Palliser, *Papers Relative to the Exploration of British North America* (London, 1859), p. 4.

[12] *Ibid.*, p. 3.

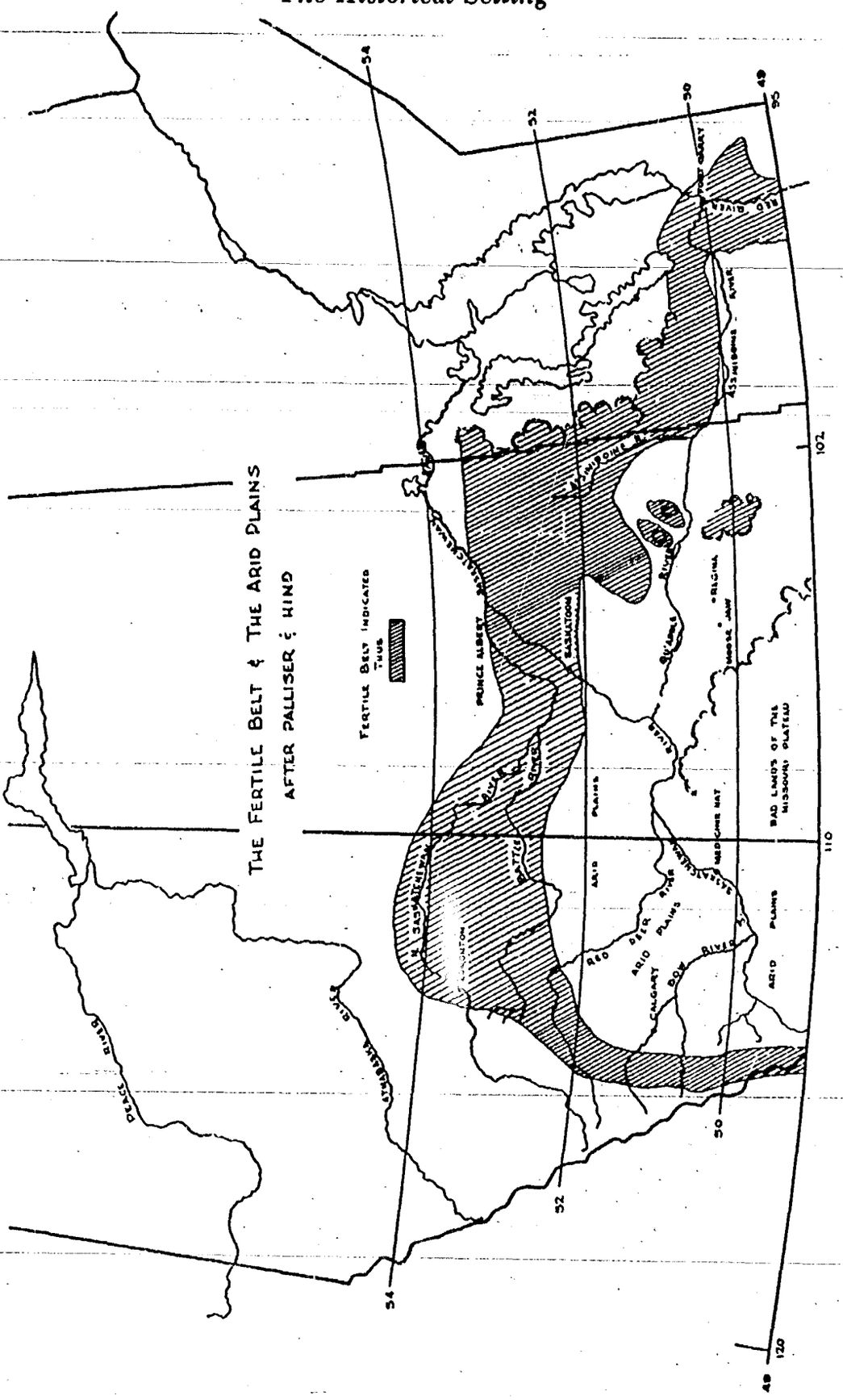
St. Lawrence to the Pacific entirely through British territory. On the east he held that the natural communication route between Canada and the Red River settlement was southward by way of the Red River valley to St. Paul. He pointed out that American railways, approaching St. Paul in 1857, were in the next year or so being rapidly extended to Pembina on the boundary, and that a railway through the western British territories might eventually be constructed from that point to run in a north-westerly direction across the fertile portions of the plains. In any case, he argued, it would not be worthwhile to attempt to link the Red River settlement with Lake Superior through British territory. As for the mountains, although he traversed several passes through the lower Canadian Rockies and crossed the Cascades through British territory, he gave it as his opinion that it would not be practicable to establish road or other communications between the plains and the Pacific coast entirely to the north of the American boundary.

For the purposes of this study it is of more importance to note what Palliser has to say about the nature and agricultural possibilities of the plains between the Red River and the Rocky Mountains. Briefly his findings in this area of inquiry were as follows: (1) The valleys of the Red and Assiniboine rivers possessed excellent agricultural prospects which, even in the Red River settlement, were as yet only slightly developed. (2) Farther to the west the arid plains of the United States, without agricultural possibilities, extended northward into British territory. (3) This extension formed a comparatively shallow "triangle" around which there existed a fairly extensive arc, eighty to one hundred miles in depth, of fertile and well-watered land from which the ancient forest had been removed by the repeated firing of the plains by the natives. He stated that the infertile triangle was based on the boundary (the 49th parallel of latitude) between 100 and 114 degrees west longitude and that its apex reached to 52 degrees north latitude. Beyond that the fertile belt stretched to 54 degrees north latitude. His map (cf. p. 79), however, did not substantiate the impression of geometric exactitude created by his verbal description.

The following quotations from Palliser's reports summarize his descriptions of the different parts of the plains region. The first excerpt indicates the relationship between the western Canadian zones and those of the United States. It also gives outlines of the boundaries of the arid "triangle".[13]

> "The fertile savannahs and valuable woodlands of the Atlantic United States are succeeded, as has been previously alluded to, on the west by a more or less arid desert, occupying a region on both sides of the Rocky Mountains, which presents a barrier to the continuous growth of settlements between the Mississippi Valley and the States on the Pacific coast. This central desert extends, however, but a short way into the British territory, forming a triangle, having for its base the 49th parallel from longitude 100 degrees to 114 degrees W., with its apex reaching to the 52nd parallel of latitude.
>
> "The northern forests, which in former times descended more nearly to the frontier of this central desert, have been greatly encroached upon and, as it were, pushed backwards to the north through the effect of frequent fires.

[13] *Journals, Detailed Reports*, etc., p. 7. Later in his report Palliser was careful to point out that the arid parts of the Canadian territories did not comprise a second Great American Desert. "In the summer of 1859," he said, "the Expedition traversed the most arid plains that lie within the British territory, without however encountering any of the great expanses of true desert country which exist further south, within the United States." *Ibid.*, p. 270.


THE FERTILE BELT & THE ARID PLAINS
AFTER PALLISER & HIND
FERTILE BELT INDICATED THUS
PRINCE ALBERT
SASKATOON
BATTLEFORD
EDMONTON
MEDICINE HAT
REGINA
ARID PLAINS
BAD LANDS OF THE MISSOURI PLATEAU
54
52
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"Thus a large portion of fertile country, denuded of timber, separates the arid region from the forest lands to the north, and the habit which the Indian tribes have of burning the vegetation has, in fact, gradually improved the country for the purpose of settlement by clearing off the heavy timber, to remove which is generally the first and most arduous labour of the colonists."

A later paragraph contrasts the "true prairie district", or arid zone, with the fertile park belt which surrounds it on the north:[14]

". . . let us imagine a line drawn from 60 miles south of Fort Carlton, which is on the verge of the great prairies, to the Wiguatinou, and thence produced to the site of old Bow Fort. This line marks the boundary of two natural divisions of the country, viz., the ancient forest lands and the true prairie district. To the north of this line generally there is timber, a good soil for agricultural purposes up to 54 degrees north latitude, and superior pasturage; to the south there is no timber, the soil is sandy, with little or no admixture of earthy matter, and the pasture is inferior. Exceptions of course may be found, as for example in the neighborhood of swamps and gullies, where the soil and pasture are better. The entire absence of wood on the prairie lands is felt by the Plain Indians during the severe months of winter. During the summer they use as fuel the bones and dung of the buffalo, but in winter they are obliged to retreat to the borders of rivers where they can obtain wood."

Several consecutive paragraphs from Palliser's report are of particular interest as bearing specifically on the drainage basin of the South Saskatchewan River. The most pertinent of these paragraphs are reproduced here as follows:[15]

"The South Saskatchewan, which in its upper part is called Bow River, resembles the North Saskatchewan in size, volume of water, and its general direction, but it passes through a very different description of country.

"After leaving the eastern limit of the country that is within the influence of the mountains (which may be considered to commence about 20 miles below where it receives Isquasquehow River), the South Saskatchewan flows in a deep and narrow valley, through a region of arid plains, devoid of timber or pasture of good quality. Even on the alluvial points in the bottom of the valley trees and shrubs only occur in a few isolated patches. The steep and lofty sides of the valley are composed of calcareous marls and clays that are baked into a compact mass under the heat of the parching sun. The sage and the cactus abound, and the whole of the scanty vegetation bespeaks an arid climate. The course of its large tributaries, Red Deer River and Belly River, are through the same kind of country, except in the upper part of the former stream, where it flows through rich partially wooded country similar to that on the North Saskatchewan.

"Towards the confluence of Red Deer River and the South Saskatchewan, there are extensive sandy wastes. For 60 miles to the east of this point the country was not examined by the Expedition, but at the elbow the same arid description of country was met with, and it seems certain that this prevails throughout the entire distance. Below the elbow the banks of the river and also the adjacent plains begin to improve rapidly as the river follows a north-east course and enters the fertile belt. From the Moose Woods to its confluence with the North Saskatchewan it in no way differs from that river, which indeed is nearly flowing parallel with it, only 30 or 40 miles distant.

"In the midst of the arid plains traversed by the South Saskatchewan, there are isolated patches of fertile land, upon the surface of which the vegetation becomes luxuriant, and pasture of fair quality may be found (e.g., the Hand Hills and the Cypress Hills).

And, finally, in one paragraph Palliser reiterates his observations concerning the apparent infertility of the short-grass plains:[16]

"The true arid district, which occupies most of the country along the South Saskatchewan, and reaches as far north as Lat. 52 degrees, has even early in the season a dry parched look. In the northern district the accumulation of humus, and the distribution of the pleistocene deposits, have given rise to a great variety in the nature of the soil; but to the south the

[14] *Journals, Detailed Reports*, etc., p. 89. [15] *Ibid*, p. 11. [16] *Ibid*, p. 246.

cretaceous and tertiary strata almost everywhere come to the surface, so that the stiff clay, highly impregnated with sulphates, bakes under the influence of the clear sun of early spring into a hard and cracked surface, that resists the germination of seeds. This must be the principal reason for the arid plains ranging to such a high latitude, as there is quite a sufficient quantity of moisture in the atmosphere during the summer months to support a more vigorous vegetation, as is shown . . . . (by the growth of trees in the Cypress Hills). The grass is very short on these plains, and forms no turf, merely consisting of little wiry tufts. Much of the arid country is occupied by tracts of loose sand, which is constantly on the move before the prevailing winds. This district, although there are fertile spots throughout its extent, can never be of much advantage to us as a possession. In June and July, the Expedition experienced great inconvenience in traversing it, from want of wood, water, and grass"

In 1857, the same year that Palliser was sent to the Canadian West, the government of the Province of Canada sent an expedition to explore and determine the most satisfactory route of communication between Lake Superior and the Red River. Professor H. Y. Hind of Trinity College, Toronto, was geologist and naturalist for this expedition. In the following year, 1858, Professor Hind was placed in charge of an expedition to explore the Assiniboine and Saskatchewan River valleys to determine their agricultural possibilities. His findings were in all major respects very similar to those of Palliser, and his reports, published in 1860, relied considerably on Palliser's work for corroborative detail. Hind, however, stressed the fact that rainfall conditions appeared to be better in the arid regions in British territory than they were farther south in the United States. His comments on this distinction follow:[17]

"The arid region, or Great Plains, west of the 101st degree of longitude, receives a very small amount of precipitation from the humid south winds coming up the Valley of the Mississippi from the Gulf of Mexico. It is too far south to be much affected by northeast winds, or the westerly winds from the Pacific. This vast treeless prairie forms, in fact, the northern limit of the great arid region of the eastern flank of the Rocky Mountains; but still its humidity is greater than that of the plains south of the Missouri, in consequence of its high northern latitude.

"Warm air from the Pacific, loaded with moisture, passes at certain periods of the year over the whole range of the Rocky Mountains in British America and in the United States. These Pacific winds occasion but a very small precipitation of rain or snow on the eastern flank of the Rocky Mountains, south of the great Missouri Bend. Similar winds from the Pacific do occasion a considerable precipitation in the northern part of the Saskatchewan Valley. Whence, then this apparent anomaly? It probably arises from the difference in the temperature of the two regions, the direction of the prevailing winds, and the lowness and comparatively small breadth of the Rocky Mountain ranges in that latitude . . .

"In the latitude of the Valley of the Saskatchewan . . . the moist south-west winds from the Pacific find a depression in the Rocky Mountain range and a low contracted plateau; they lose less humidity than winds passing over the higher and broader ranges to the south, and meet with a prevailing north-easterly wind as they begin to descend their eastern flanks; their temperature is consequently lessened instead of being elevated, and their capacity for moisture diminished; hence, precipitation in the form of rain and hail takes place in descending the slope towards Lake Winnipeg.

"There is no doubt that the south-west Pacific winds, passing through the depression in the Rocky Mountains near the 49th parallel, and over the narrow plateau on which they rest, without losing the whole of their moisture, give humidity to the large portion of Rupert's Land they traverse."

4. *Inter-Relationship between South Saskatchewan and Qu'Appelle Rivers:* Both Palliser and Hind noted the close interrelationship existing between the valley of

[17] Hind, H. Y. *Narrative of the Canadian Exploring Expeditions*, Vol. II, pp. 350-61.

the South Saskatchewan and the Qu'Appelle lake and river system. Pallister commented as follows:[18]

"At the Elbow I found a large tributary flowing from the east into the Saskatchewan . . . which I find flows from the most western of the chain of 'Qui Appelle' lakes, being navigable to large boats the whole way. Hence I have been able to ascertain that there exists a valuable water communication between the South Saskatchewan and Red River, and that a good sized boat, and even perhaps a small steamer, might descend from the South Saskatchewan, ascend the West Qui Appelle River, cross the Qui Appelle Lakes, and then descend the Qui Appelle into Red River.

"Immediately after breakfast Dr. Hector started with a branch party to explore the country to the east of the elbow, and found a small stream descending to the Saskatchewan from swampy lakes to the eastward. These lakes also send off waters to the Qu'Appelle, flowing in the opposite direction; and a very remarkable feature exists here, viz., that the summit level which divides these two streams lies in a valley more than 100 feet deep, and continuous with that of the Qu'Appelle, only 90 feet above the Saskatchewan. This valley runs N.N.E. and S.S.W. To the westward is a country covered with sand hills . . . .

Hind commented on the relationship between the two river valleys in somewhat greater detail:[19]

"The valley of the Qu'Appelle River joins the Assinniboine about five miles above Fort Ellice. It is 269 miles long, and appears to be a former continuation of the South Branch (of the Saskatchewan River), in a direction nearly due east, to the low regions now occupied by Lakes Manitoba and Winnipeg. Its western extremity issues from the South Branch at the Elbow, or the point where that river, from a south-easterly course, suddenly takes and preserves for 250 miles a north-easterly course, until it joins with the North Branch.

". . . . The highest part of the bottom of the Qu'Appelle valley is only 85 feet above the South Branch at its summer level, and from 75 to 78 feet above it during the spring elevation of its waters. This occurs at a point distant 11½ miles from the junction, where a lake is found, which discharges itself both into the Saskatchewan and Assinniboine. Before connecting with the Assinniboine, it falls about 280 feet in 256 miles, or 5 foot 1 inch per mile. The difference of level between the South Branch at one end of the Qu'Appelle Valley and the Assinniboine at the other, does not exceed, according to our estimate, 200 feet."

Palliser's observations concerning the inter-relationship of the Qu'Appelle and the South Saskatchewan led him to suggest the feasibility of a water-communication system connecting the two. Hind went on to suggest the construction of a dam across the South Saskatchewan to divert its waters down the Qu'Appelle Valley, its former outlet. He said:[20]

"The construction of a dam 85 feet high and 800 yards long would send the waters of the South Branch down the Qu'Appelle Valley and the Assinniboine into Red River, thence past Fort Garry into Lake Winnipeg.

"The same result would be produced if a cutting were made through the height of land in the Qu'Appelle Valley to the depth of forty or fifty feet, and a dam some thirty or forty feet high thrown across the South Branch. A second dam below the mouth of the Souris Forks would send these waters through the valley of that river into the Little Souris, thence into Lake Winnipeg by the Assinniboine and Red River. The time may yet arrive when the future population of Rupert's Land and Dakotah territory will find it advantageous to construct these or similar works, even if they should be for the purposes of irrigation or inland navigation."

The Souris Forks creek or river referred to in the above citation is the stream which is currently called Wascana or Pile of Bones Creek flowing through the City of Regina. On Hind's map this stream is called "Elbow Bone Creek or Souris Forks." In a footnote

[18] Palliser, *Papers Relative to the Exploration of British North America* (London, 1859) p. 14, and *Journals, Detailed Reports*, etc., p. 54.

[19] Hind, H. Y., *Canadian Red River and Assiniboine and Saskatchewan Expeditions* (London, 1860) Vol. I, pp. 426-7.

[20] *Ibid.*, pp. 428-9.

(Vol. I, p. 427 n.) Hind refers to Palliser's designation of this creek as "Many Bone Creek". ("The Indians say", Hind reports, [21] "that the Souris River of the Qu'Appelle [i.e., the Souris Forks Creek mentioned above], coming from the Grand Coteau de Missouri, inosculates with an arm of the Souris of the Assinniboine before described [i.e., the Little Souris or Mouse River] and that a canoe in high water might pass from one river to the other without a portage. If this be the case, the diversion of the waters of the South Branch down the Qu'Appelle Valley would acquire additional importance, and give value to an immense extent of territory, now comparatively inaccessible, and very insufficiently watered."

5. *Varying Degrees of Aridity within the "Arid" Zone:* The map that is reproduced on page 81 indicates the boundaries of the arid and fertile areas as defined by Palliser and Hind. The map is taken from Hind's reports with, of course, the addition of cities and provincial boundaries to serve as present-day landmarks. Palliser's maps showed the western portions of these areas but not the eastern. His verbal descriptions indicated, however, that the eastern margin of the arid zone was along a line running in a northwesterly direction from the boundary at the 100th meridian. Hind's explorations were more particularly in the eastern part of the prairie region, in the area between the Red River and the elbow of the South Saskatchewan River. In preparing a generalized map to accompany his report as published in 1860, Hind had early issues of Palliser's reports and maps before him. From these and from his own observations he prepared a composite map of the entire area between the Red River and the Rocky Mountains. For the western part of this region he adopted Palliser's delimitation of boundaries while for the eastern part he relied on his own observations. This is the map adapted for inclusion in the present analysis.

Neither Palliser nor Hind made any subdivision of the "arid triangle" in terms of gradations of aridity. They had no rainfall records for the region and, judging the agricultural possibilities of the various zones by their observations of natural vegetation and by very spotty sampling of the soils, they defined the margins, roughly speaking, of the short-grass plains and characterized these plains as wholly unfit for settlement. In the light of later settlement and agricultural experience, and in terms of present-day climatic and soil-survey information, it is known that the "arid triangle" possesses a considerable range of average annual moisture conditions and a corresponding range of agricultural possibilities.

Certain distinctions within the western plains can be made clear if we adopt a classification of regions on the basis of rainfall conditions somewhat as follows:

Regions	*Average Annual Precipitation*
Humid	20 inches or more
Sub-humid	15 to 19·9 inches
Semi-arid	10 to 14·9 inches
Arid	less than 10 inches

On the basis of this classification, and with the rainfall records which are currently available, we can note that Palliser's "triangle" is, strictly speaking, not arid at all but is rather of the semi-arid type of region, with the exception of such elevations

[21] Hind, H. Y., *Canadian Red River and Assiniboine and Saskatchewan Expeditions* (London, 1860) vol I, p. 335.

as the Cypress Hills area. We can note further that Palliser's "fertile" belt is essentially a sub-humid area. Only beyond the latter belt, in the forest areas of the North, does the annual average rainfall (or precipitation) exceed twenty inches. It is evident, then, that the entire western wheat economy of the present day is situated in semi-arid and sub-humid zones, particularly in the former.

According to the above rainfall classification of regions there is no significant part of Palliser's "triangle" which is genuinely arid, for throughout the area the average annual rainfall varies within the limits of ten to fifteen inches. There are parts of the region, however, where the average is not more than eleven or twelve inches. Furthermore, in these areas in the south-central part of the Canadian plains region, moisture utilization is poor because of high summer temperatures and dry-wind conditions. It must also be kept in mind that *average* precipitation data give no suggestion of annual variations and the extent or frequency of these in relation to the mean. A region with an average precipitation of eleven or twelve or thirteen inches per year will have cycles of moisture conditions, some years or series of years with annual rainfall adequate for the growth of cereal crops, to be followed, unpredictably, by years or series of years with rainfall quite inadequate for the purpose.

These circumstances combine to create, in effect, a second triangle within Palliser's triangle. This inner triangle has as its vertical axis the Alberta-Saskatchewan boundary with a base on the United States border approximately one-half that of Palliser's arid zone and extending northward approximately to the northern limit of that zone as defined by Palliser. It forms the hard core of the drought area of the Prariie Provinces. It was the last area in the southern part of the prairie provinces to be occupied on the basis of homestead settlement and comprises the area of heavy land abandonment in the inter-war years. Within this area the C.P.R. selected only a negligible part of its land grant, regarding the lands of the region as a whole as "not fairly fit for settlement". It includes the irrigated areas and the region subject to Special Areas legislation of 1927 and later years in the Province of Alberta. Within Saskatchewan it covers that part of the province to the west of the Missouri Coteau or, generally speaking, to the west of a line running through Moose Jaw and the Elbow of the South Saskatchewan, the line extending in a south-easterly direction to the United States border and in a north-westerly direction to the Alberta-Saskatchewan boundary. It will be noted that this area corresponds roughly with the drainage basin of the South Saskatchewan River down to the Elbow. Reference will be made later in this analysis to this triangle within a triangle (*see below*, pp. 103-5, 106 ff.)

Since the time of Palliser's explorations the concept of an arid triangle in the southern heart of the Prairie Provinces has retained such prominence in generalized analyses of the Canadian plains region that sub-division within that area has not ordinarily been attempted. It should be pointed out, however, that Hind took note of the fact that the "arid" zone as outlined by Palliser in reality comprised two zones instead of one. While he noted the distinction he neverthe-

less placed no particular emphasis upon it and in the final analysis was content to adopt Palliser's zonal classification.

Hind's reference to the dual nature of Palliser's arid zone was in a sense parenthetic. He was complaining about the lack of precision in the everyday usage of the terms "plains" and "prairies". It was his contention that the term "prairies" should be used only in reference to fertile areas while plains were basically infertile areas. Thus he quoted a geological report which described the prairie area of the United States as that territory lying between the heavily wooded areas of the East and the arid plains of the West. In the United States, the report pointed out, the true prairie region extended "over the eastern part of Ohio, Indiana, the southern portion of Michigan, the southern part of Wisconsin, nearly the whole of the States of Illinois and Iowa, and the northern portion of Missouri, gradually passing, in the territories of Kansas and Nebraska, into the *Plains*, or the arid and desert region which lies at the base of the Rocky Mountains. This passage takes place in the region between the meridians of 97 degrees and 100 degrees, west of which belt the country becomes too barren to be inhabited and worthless for cultivation...."[22]

Applying this analysis to Rupert's Land, Professor Hind made the following comments:[23]

> "The true limit of the Plains in Rupert's Land, east of the South Branch, is well shown by the Grand Coteau de Missouri. The country east of that natural boundary may be classed as Prairie country, over the greater portion of which forests of aspen would grow if annual fires did not arrest their progress. The plateau of the Grand Coteau (de Missouri) forms the true Plains of Rupert's Land, where both soil and climate unite in establishing a sterile region . . . . The Grand Coteau de Missouri, distinctly visible from the Eyebrow Hill, begins in latitude 45 degrees . . . . it enters British Territory near the 104th meridian, and still preserving a north-westerly direction comes on the South Branch of the Saskatchewan, a few miles from the Elbow, in longitude 108 degrees. The region east of the Grand Coteau belongs to the prairie region, the Grand Coteau itself and its prolongation towards Battle River, from its eastern boundary to the foot of the Rocky Mountains, constitutes the "Plains" properly so-called of the north-western territories of the United States and of British America. 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.

A few pages earlier in his report Professor Hind stated: "On the flanks of the Grand Coteau the true prairies may be said to terminate, and the plains to commence."[24] His doubts over the proper classification of the treeless Regina plains or prairie area, however, are shown when he follows the above sentence with the statement that, "It is doubtful whether the term 'Plain' is not now applicable to a large portion of the country west and south of the Qu'Appelle Mission. The destruction of 'woods' by fires has converted into sterile areas an immense tract of country which does not appear necessarily sterile from aridity, or poverty of soil." It may have been uncertainties of this kind that persuaded Hind finally to ignore any fine distinction between prairies and plains and to adopt Palliser's simpler classification which distinguished only between arid and fertile areas, and which made that distinction on the basis of existing vegetation.

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[22] Hind, H. Y., *Canadian Red River and Assiniboine and Saskatchewan Expeditions* (London, 1860) vol. I, p. 349.
[23] *Ibid*, pp. 350-1. [24] *Ibid*, p. 348.

II. Preparation for Settlement in the Canadian West

1. *Confederation and Communications.*— The explorations and reports of Palliser and Hind indicated that the British territories between the Red River and the Rocky Mountains included both an arid zone and an extensive fertile belt. So uncertain had been the western prospect before this time, however, that the strong assurance of the existence of a broad fertile area across the plains did more to influence eastern thought than did the confirmation of the vague general knowledge that some of the West was unsuitable for settlement. Both Palliser and Hind were enthusiastic about the agricultural capabilities of the Red and Assiniboine river valleys. They concurred in the view that agricultural settlement might extend from this area to the Rocky Mountains through territory generally favorable to agricultural pursuits. Although Palliser was convinced that it would not be practicable to build a railway from the eastern colonies to the Pacific coast entirely in British territory, Hind was as fully convinced that such a route was feasible. Gold discoveries on the Fraser River in the early eighteen-fifties were followed by further discoveries in the Cariboo in the early eighteen-sixties. This variety of new information did much to convince influential persons in the Province of Canada that western economic development might be fostered successfully within the framework of a comprehensive national policy. Gradually the policy took shape.

Without going into excessive detail the establishment of the main prerequisite conditions of western development can be outlined. A project in nation building such as was thus envisaged was far beyond the resources of the individual colonies and required a more comprehensive union than that which had created the United Province of Canada in 1841. This broader union was effected by Confederation in 1867, which united four colonies and provided for the later entry of the entire remaining British North American domain. The newly-created Dominion government was given responsibility for the major national purposes, defence and economic development.

The hostility of the Hudson's Bay Company to agricultural expansion in Rupert's Land made it imperative that the Company's charter rights should be liquidated and the territories transferred to the Dominion. This was accomplished by 1870. Plans had to be made for the construction of a Pacific railway, and after several uncertain starts the Canadian Pacific syndicate was chartered in 1881 to link Montreal with the Pacific coast by way of an all-Canadian route. The main line was completed in 1885, the route involving construction around the north shore of Lake Superior in defiance of Palliser's argument that the "natural" communication route between eastern Canada and the West was by way of Minneapolis-St. Paul and the Red River valley. Furthermore, the line was built straight east and west through the heart of the arid plains instead of curving northward with the arc of the fertile belt as projected in the original survey. The Kicking Horse Pass was much more difficult and costly to surmount than the Yellowhead Pass to the north. The southern route was, of course, more direct, but of greater importance was the fact that it provided a defence against the threat of encroachment by American railways from south of the bound-

ary. West of Moose Jaw—or, as Hind would have said, on the Plateau of the Grand Coteau de Missouri—the Canadian Pacific Railway company declined to select any significant part of its land grant on the ground that its charter excused it from accepting any lands which were "not fairly fit for settlement".

2. *Dominion Lands Policy.* The primary economic objective of the national policy was the establishment of a new frontier, an area where commercial and financial activity could readily expand and where labor and capital might find profitable employment. In terms of the international competition of the day the requirement was for an agricultural frontier which could attract an adequate proportion of the annual flow of emigrants from the British Isles and Europe. Of two and one-half million emigrants who left the European countries during the years 1853 to 1870, 61 per cent went to the United States, 18 per cent went to the Australian colonies, others went to Brazil and Argentina, and a mere trickle arrived in Canada.[25] After the passage of the United States homestead law in 1862 it was clear that nothing less generous than that would serve to divert the flow of European emigrants to a Canadian frontier.

The transfer of Rupert's Land in 1870 gave to the Dominion Government the rough equivalent of the American Public Domain and the raw materials for the creation of a new agricultural frontier. A new problem arose in 1870 when a part of Rupert's Land was accorded provincial status as the Province of Manitoba. According to the British North America Act (sec. 92, ss. 5) the provinces were to retain possession and control over the disposal of their unalienated lands. In order to maintain Dominion control over the western public domain, whether within provincial boundaries or in the territories beyond, the Dominion Government found it expedient to introduce an inconsistency in the land control legislation. The Manitoba Act of 1870 provided that "All ungranted or waste lands in the Province shall be . . . vested in the Crown, and administered by the Government of Canada for the purposes of the Dominion". In the Territories beyond the Province of Manitoba the question of jurisdiction over public lands did not arise until 1905 when the Provinces of Saskatchewan and Alberta were created. The Manitoba principle was extended to them at that time and public lands in the three Prairie Provinces remained as Dominion lands until 1930. While, therefore, the four original provinces of Confederation, and British Columbia and Prince Edward Island on entry into Confederation, all retained their natural resources without question at any time, the three Prairie Provinces acquired control over their public lands and natural resources in general only after 1930.

The public lands of Manitoba and the North-West Territories, or after 1905 of the Provinces of Manitoba, Saskatchewan and Alberta, had to serve two purposes which could never be wholly harmonized. Under free homestead privileges these lands had to serve as an attraction for immigrant and other settlers. But a Pacific railway had to be built in order to develop the West and to make possible the creation of a con-

[25] *Cf.* V. C. Fowke, *Canadian Agricultural Policy* (Toronto, 1946), p. 169.

tinent-wide nation. The Dominion Government, in conformity with American example, gave assurance that the railway would cost the taxpayer nothing, that it would be built on the revenues of land resources. The Canadian Pacific syndicate was thus granted twenty-five million acres of the public domain, and prairie lands had therefore to serve to finance railway construction as well as to attract immigrants. The proviso in all railway land-grants that the railways need select only those lands which were "fairly fit for settlement" meant that homestead entries were long delayed in certain areas pending the selection of such lands by the railways and, in the end, were often made available in areas in which the railways declined to accept any lands because of the opinion that such lands were not fairly fit for settlement.

Homestead regulations were provided in Dominion Orders-in-Council in 1871 and were incorporated in the Dominion Lands Act of 1872. Settlers were thus entitled to secure entry to a quarter-section (160 acres) of land on payment of a ten dollar fee. Within the railway zone, a belt twenty miles in width on either side of a Pacific railway which was to be built, homesteading was not to be permitted. Regulations were changed from time to time and most significantly in 1879 and 1882 when, in effect, the even-numbered sections of all Dominion Lands were opened for homestead entry. In areas where the railways selected their grants as the odd-numbered sections, it developed, therefore, that homesteaders had railway lands adjacent to their individual holdings available for purchase in order to enlarge their farms beyond the original quarter-section size. It has been argued and fairly conclusively demonstrated that the Canadian Pacific Railway company sold its land holdings over the years at prices which were better designed to encourage occupation and development of the West than to extract the maximum in sales returns.

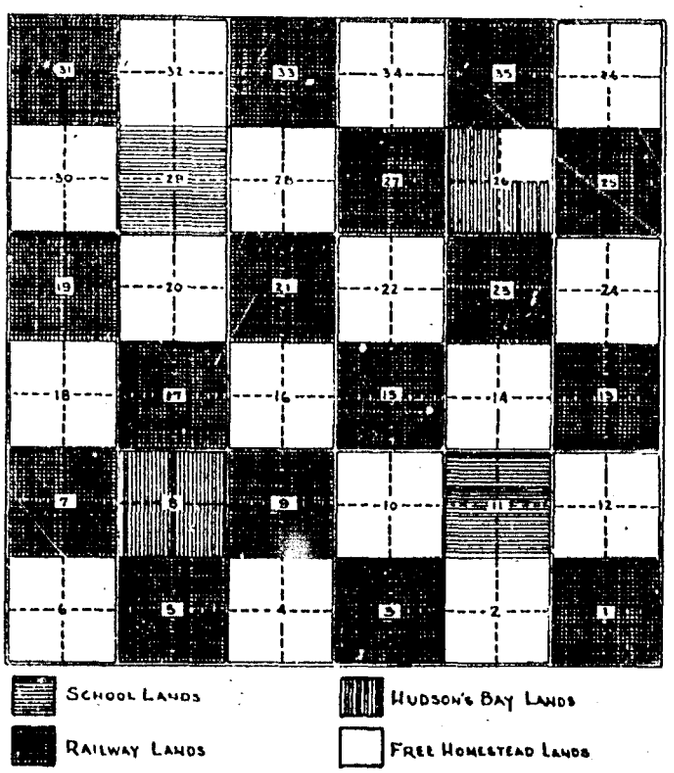
Homestead and railway lands did not make up the total land area of the western provinces available for private settlement. Allocated in specific parcels throughout the entire area were Hudson's Bay Company and school lands. As a part of the arrangement whereby the charter rights of the Hudson's Bay Company were relinquished, the Company was allowed to retain one-twentieth of the land in the "fertile Belt," the latter defined in this case as comprising the total area between Lake Winnipeg and the Rockies and between the United States boundary and the North Saskatchewan River. This grant amounted to approximately 6·6 million acres. A further allocation of one-eighteenth of all western lands was made for educational purposes.

The distribution of these various categories of lands can best be understood in relation to the system of the western survey. It was originally proposed to survey the western territories into blocks containing 800 acres made up of four two-hundred acre lots. It was very early decided, however, to duplicate in Canada the American system of western survey because it was already familiar to potential immigrants by American example. This involved the survey and division of agricultural lands into "sections" one mile square, containing 640 acres, and the subdivision of these units into quarter sections, one-half mile square containing 160 acres. Road "allowances", four rods in width, were provided one mile apart running north and

south and ordinarily two miles apart running east and west. Thus every quarter section—regarded as the basic settlement unit—fronted on at least one road allowance. The sections were in turn combined into larger units, townships, six miles square (neglecting road allowances), and thus containing 36 sections of land. The townships, lying in north-south "ranges", were numbered consecutively northward from Township 1 in each range at the international boundary. The ranges were numbered consecutively westward from meridian lines.

The diagram illustrates what might be called the typical township in the Prairie Provinces prior to settlement. Section 8 and three-quarters of section 26 (all of section 26 in every fifth township) were Hudson's Bay Company lands. Sections 11 and 29 were school lands. The remaining sixteen odd-numbered sections—in areas regarded by railways as "fairly fit for settlement"—were railway lands. And, finally, the sixteen or sixteen and one-quarter even numbered sections were available for homestead entry.

LAND DISTRIBUTION IN A TYPICAL WESTERN TOWNSHIP



3. *Western Development in the Period from 1867 to 1900.*—The 30-year period after Confederation laid the foundations for the prairie wheat economy. Settlement awaited the construction of railways, although, conversely, areas through which railways were constructed were not in all cases immediately occupied. Even before Confederation Professor Hind had observed that American railways already reached beyond Chicago to St. Paul and were, in fact, extending through the upper Mississippi valley into the Red River valley and were approaching Pembina on the international border. In 1878 this line was extended northward to Winnipeg, thus providing the first all-rail connection between the Red River settlement and the outside world. In 1883 the Canadian Pacific Railway linked Winnipeg with eastern Canada by the north-shore route. In 1885 the western part of the C.P.R. was completed from Winnipeg to Vancouver (or Port Moody) via the difficult Kicking Horse Pass and through the heart of the semi-arid plains, through Palliser's "triangle".

Within the next six or eight years a considerable mileage of feeder and connecting railways was constructed in Manitoba and the Territories beyond. A number of branch lines radiated from Winnipeg into southwestern Manitoba with an extension or two into the southeastern Territories. To the north of the C.P.R. main line the Manitoba

and North-Western was completed into the Territories, linking the Yorkton district with Winnipeg by 1890. The C.P.R. secured control of the Minneapolis, St. Paul and Sault Ste. Marie railway, which reached northward to Portal on the boundary, and extended it from Portal to Moose Jaw. "Vertical" lines were constructed in the Territories, one to link Regina with Prince Alberta via Saskatoon, and one through Calgary to Edmonton on the north and Macleod on the south. A narrow-gauge railway which had linked Medicine Hat with Lethbridge by 1885 was taken over by the C.P.R. and in the late 1890's was extended through the Crow's Nest Pass to the Kootenay Valley. There were approximately 3700 miles of railway in Manitoba and the North West Territories by 1900.

Railway construction contributed to the settlement process in two ways. In the first place, the completed railway was indispensable to the production and marketing of a bulky cash crop such as wheat. Settlement therefore never advanced far beyond the "end of steel" whether already completed, under construction, or, at the very least projected for early commencement. In the second place, the construction of railways provided a source of cash income for settlers and potential settlers. Railway construction in the west before 1900 therefore provided a marked stimulus to agricultural expansion, and at the same time marked out the limits of the areas within which such expansion might for the time being be regarded as feasible.

Table 1 indicates the progress of homestead location in the 60-year period following the introduction of the homestead land-grant system in Canada. Referring particularly at this point to the period before 1900, it will be noted that approximately 80,000 entries had been made by the turn of the century, a total for the twenty-six-year period smaller than that for the first five-year period in the new century. It will also be noted that the five-year period, 1880-85, during which the C.P.R. main line was constructed, had the largest number of homestead entries (22,126) of any five-year interval before 1900.

TABLE I

Number of Homestead Entries in Western Canada, 1874-1933

Year	Number of Entries		Year	Number of Entries	
	For the Year	Five-year Total		For the Year	Five-year Total
1874	1,376		1900	7,426	
1875	490		1901	8,167	
1876	347		1902	14,633	
1877	845		1903	31,383	
1878	1,788		1904	26,073	
1879	4,068				87,682
		8,923 (6 yrs.)			
1880	2,074		1905	30,891	
1881	2,753		1906	41,869	
1882	7,483		1907	21,647	
1883	6,063		1908	30,424	
1884	3,753		1909	39,081	
		22,126			163,912
1885	1,858		1910	41,568	
1886	2,657		1911	44,479	
1887	2,036		1912	39,151	
1888	2,655		1913	33,699	
1889	4,416		1914	31,829	
		13,622			190,726

Number of Homestead Entries in Western Canada, 1874-1933 (Conc.)

Year	Number of Entries: For the Year	Number of Entries: Five-year Total	Year	Number of Entries: For the Year	Number of Entries: Five-year Total
1890	2,955		1915	24,088	
1891	3,523		1916	17,030	
1892	4,840		1917	11,199	
1893	4,067		1918	8,319	
1894	3,209		1919	4,227	
		18,594			64,863
1895	2,394		1920	6,732	
1896	1,857		1921	5,389	
1897	2,384		1922	7,349	
1898	4,848		1923	5,343	
1899	6,689		1924	3,843	
		18,172			28,656
			1925	3,653	
			1926	4,685	
			1927	5,760	
			1928	7,233	
			1929	16,157	
					37,488
			1930	17,504	
			1931	15,133	
			1932	8,108	
			1933	5,215	
					45,960 (4 yrs.)

Source: Mackintosh, W. A., *Economic Problems of the Prairie Provinces* (Toronto, 1935) App. A., p. 282.

While a substantial proportion of the homestead settlement in the West before 1900 was effected by individuals, the establishment of colonies was a much more significant feature of the period. A number of the groups came unsolicited. In 1872, for example, the German Mennonites of the Province of Berdiansk, Russia, investigated the possibilities of transfer to western Canada. In addition to free land for settlement they sought and secured the guarantee of educational freedom and of exemption from military service. They were granted financial assistance toward their passage, and settlement reservations were set aside for them in the Red River valley. By 1876 there were 6,150 Mennonites in the Manitoba settlements. In 1874 the first reservations were made in western Canada for French Canadians repatriated from the New England states. In the 10-year period, 1876-85, 4,800 of these migrated to the West to form 10 new settlements and to add to a number of others. In 1875 and 1876 an Icelandic colony was formed on the west shore of Lake Winnipeg. Until the end of the century the numbers of settlers in the West, whether as individuals or in colonies, remained generally disappointing, but a wide variety of European groups was scattered throughout parts of the plains area to form the nuclei for units of later expansion. On reservations or "nominal reservations", the latter without exclusive rights of entry to allocated territory, there were groups from England and Scotland and colonies of Hungarians, Scandinavians, Germans, Roumanians, Icelanders, Mennonites, Danes, Finns, Russians, Ukrainians, Belgians and Jews. Attempts at company colonization proved unsuccessful and Professor Morton comments that, although some 30 contracts were made under the plan, "probably nobody got anything out of the scheme but the directors of the companies."

Settlement did not spread uniformly throughout the West in the period before 1900. In general this period saw the occupation of southern Manitoba to the west

of the Red River. This area with comparatively little extension constitutes the agricultural portion of that province to the present day. Settlement spread westward from the southwestern part of Manitoba into southeastern Saskatchewan and had occupied a substantial part of the east and southeastern areas of the province by 1900. Apart from this more or less consolidated region the settlement at the turn of the century was concentrated in regions scattered from Manitoba to the foothills of the Rocky Mountains, a ribbon along the line of the C.P.R., a wider strip from Edmonton southward through Calgary to the boundary and a cluster around the forks of the North and South Saskatchewan Rivers. It was already noticeable that settlers tended to avoid the short-grass plains and to occupy its margins in preference to forming a pattern of continuous settlement from east to west. This was similar to the development of western settlement in the United States half a century earlier. The drainage basin of the South Saskatchewan and of the lower portions of its tributaries was commonly still regarded as unfit for agricultural occupation. As far north as Saskatoon this area, the central core of Palliser's triangle, was still occupied only by ranching in scattered areas.

By the end of the century there were approximately 419,000 persons in Manitoba and the Territories. Of these, approximately 255,000 were in Manitoba and 91,000 and 73,000 respectively, were in the territories which today comprise the Provinces of Saskatchewan and Alberta.

4. *Improvements in Agricultural Practice: Red Fife and Summer-fallow.* It should be noted that the western development as described above (and, indeed, the development as late as 1910) took place on the basis of Red Fife wheat which was introduced into the Red River settlement in 1870. This wheat, which had been introduced into Upper Canada in the 1840's, had gone through the mid-western states and eventually came to western Canada in replenishment of seed following a local crop failure. Red Fife was a marked improvement over the wheat formerly grown in the Red River valley. Of unsurpassed milling and baking qualities it was of high-yield capacity and had a maturity period of 115 to 125 days, as compared with that of the former Red River variety which required from 125 to 145 days to mature. The latter characteristic served to minimize the hazard of frost which was by no means negligible in the low lying areas of southern Manitoba. Red Fife continued without even a distant rival as the outstanding western Canadian wheat until after 1910 when Marquis became generally available and was widely adopted.

While the period before 1900 saw practically no settlement on the semi-arid Canadian plains it nevertheless brought agricultural occupation to the margins of these plains in eastern Saskatchewan. On these margins, in the area east of Regina, there were recurring years when summer precipitation was barely adequate for grain production. Under these circumstances a premium was placed upon the discovery and adoption of methods of cultivation which might compensate at least in part for the hazards of drought. The most significant contribution in this regard was found in the practice of summer-fallow as a means of moisture conservation. The establishment and general

recognition of the value and function of this cultural practice before 1900 was of fundamental importance in the occupation of the semi-arid plains which took place in the decade after 1906. If summer-fallowing was of great assistance to settlers on the eastern margins of the short-grass plains, where it may be said to have been introduced into the Canadian wheat economy, it was more than helpful on the plains themselves, it was indispensable.

A considerable initial impetus was given to summer-fallowing by a purely fortuitous circumstance which interfered with the routine of cultivation on the Bell Farm, a large corporate venture at Indian Head (North-West Territories). With the farm horses drafted into the hauling of military supplies for the suppression of the Riel Rebellion, spring plowing and seeding were curtailed on this farm in 1885. The idle land was plowed and cultivated during the summer as unintended summer-fallow. This acreage withstood the drought which occurred in 1886 and yielded exceptionally well. In the ensuing years Angus Mackay, director of the Dominion Experimental Farm which had been established at Indian Head in 1876, commenced and continued the practice of summer-fallowing on an experimental basis. His observations very early led him to the firm conviction that no other practice of cultivation currently known offered the prospect for offsetting drought to a degree remotely approaching summer-fallow. Mackay's report for 1889 is typical of his printed and spoken opinion on the matter, an opinion which he urged upon western farmers at every opportunity. He said:[26]

> Our seasons point to only one way in which we can in all years expect to reap something. It is quite within the bounds of probabilities that some other and perhaps more successful method may be found, but at present I submit that fallowing the land is the best preparation to assure a crop. Fallowing the land in this country is not required for the purpose of renovating it, as is the case with worn-out lands in the east, and it is a question yet unsettled how much or how little the fallows should be worked, but as we have only one wet season during the year, it is found beyond doubt that the land must be ploughed the first time before this wet season is over, if we expect to reap a crop the following year. This wet season comes during June and July, at a time when every farmer has little or nothing else to do, and then this work should be done. Usually seeding is over by the first of May, and to have the best results the land for fallow should be ploughed from five to seven inches deep as soon after this as possible. Land ploughed after July is of no use whatever, unless there is rain in August, which very seldom comes to any great extent. A good harrowing should succeed the ploughing, and all weeds or volunteer grain should be kept down by successive cultivation.

The paragraph cited above describes what came to be known widely as "black summer-fallow", the implication of the term being that a field under summer-fallow should be worked sufficiently throughout the summer to prevent weed growth. As western settlement moved in onto the edges of the semi-arid regions and eventually (between 1906 and 1916) spread over the entire short-grass plains, black summer-fallow was accepted as a standard constituent of a three or a two-year system of crop rotation. This is not to suggest that summer-fallow was practised by all settlers, or that it was practised consistently by those who did adopt it. If a

[26] As cited in A. S. Morton and Chester Martin, *History of Prairie Settlement and "Dominion Lands" Policy* (Toronto, 1938) pp. 101, 106.

wet season were anticipated, and without certain knowledge it was as reasonable in the early spring to expect a wet as a dry crop year, there was every temptation for the individual farmer to get a maximum acreage in crop for the current year without undue concern for the season after.

Generally speaking, however, summer-fallowing proved to be an indispensable part of a sound, long-run pattern of cultivation throughout the wheat growing region of the Canadian West. In the drier regions its primary purpose by a considerable margin was the conservation of moisture, the "storing up" of two years' rainfall for the production of a single crop. Even in these areas, however, weed control was by no means a negligible function of the summer-fallow practice. In parts of the wheat producing area where rainfall was rather less precarious, notably within the park belt, or Palliser's "fertile belt", weed control and moisture conservation shared with rough equality in the purposes of the summer-fallow usage.

The adoption of black summer-fallow made possible the occupation of the western short-grass plains. Nevertheless it contributed immensely to the difficulties in many areas of the West in the 1920's and more particularly in the 1930's when drought and summer winds led to widespread soil drifting and the eventual abandonment of substantial areas of wheat lands in south-central Alberta and Saskatchewan. The repeated cultivation necessary for the prevention of weed growth, and adherence to the principle that moisture could best be preserved by the maintenance of a fine top-soil mulch, left summer-fallowed soils without fibre and in condition nearly pulverized. Fields in this condition were highly susceptible to wind erosion. Spring winds blew the seed from the ground except under the rather unusual circumstances where crop growth had effectively covered the ground with cereal foliage before any winds occurred. Fields in such a state of tilth and without crop coverage would drift before a wind even during a light rain shower and would drift freely within a very few hours after the heaviest downpour.

By the early 1930's it was clear that the practice of summer-fallowing in western Canada would either have to be abandoned or drastically revised. Its abandonment would leave no practicable alternative as an instrument of moisture conservation. The suggestion often made that the place of summer-fallow in western crop rotation should give way to the planting of cover crops such as grasses or corn, could not be considered seriously for various reasons, among the more important of which was the substantial acreage involved on the individual farm.

Cultural practices have been markedly changed in western Canada within the past 20 years and, as might be expected, in ways which make it possible to continue the use of summer-fallow with a substantial reduction of its worst hazards. The problem has been to preserve the efficacy of summer-fallow in the conservation of moisture and in weed control without the need for methods of cultivation which would leave the top-soil without fibre and in a nearly pulverized condition. These objects have been largely attained by replacing the mouldboard plow and the disc-and drag-harrow with one-way discs and a variety of ridging cultivators.

The "black" summer-fallow has given way to the "trash covered" summer-fallow. Whereas the mouldboard plow buried all stubble and trash beneath the plowed surface, the diskers now in use turn over the field's surface and leave the stubble and other trash mixed into the cultivated surface layer of soil. The disc-harrows formerly used for the second and subsequent cultivations of plowed summer-fallow reduced the surface to a fine tilth. The duck-foot and other ridging cultivators now in use destroy weeds effectively and at the same time leave the surface in ridges of coarse textured soil in which stubble and trash provide a variable amount of fibre. Summer-fallow, in short, is now more firmly established than ever before in the cultural routine of the wheat economy, but it is no longer the summer-fallow as advocated by Angus Mackay in the 1880's and 1890's.

In some areas strip-farming has been adopted as an additional safeguard against the hazard of soil drifting. Under this system fields are divided into alternate strips of summer-fallow and crop land. On farms where one-half the cultivated acreage is summer-fallowed each year, the alternate strips of summer-fallow and crop are of equal size. Where one-third of the acreage is summer-fallowed the alternate strips in any particular year are in groups of three, one of summer-fallow crop, one of stubble crop and one of summer-fallow. Since the wheat growing region in Canada is in the latitude of the prevailing westerly winds it is preferable to have the strip divisions running north and south rather than east and west.

III. Establishment of Canadian Wheat Economy, 1900-1930

1. *Defensive and Economic Aspects of Western Development.*—The first thirty years of the present century saw the establishment of the prairie wheat economy. The foundations had been laid in the decades before the turn of the century. Land and immigration policies had been established and railways had in large measure been provided. Many of the techniques necessary for the mastery of the plains had been introduced from other areas, or developed anew in the Canadian environment, and all had been considerably adapted to the exacting requirements of dry-land farming.

The establishment of the wheat economy was a major national achievement and its significance was of only slightly lesser relative importance for the total Canadian economy than it was for the prairie region itself. Western development on the scale which characterized it was only possible on the basis of an immigration movement of such proportions as to rank among the great population movements in history. From 1900 to 1930, four and one-half million immigrants came to Canada, three times as many as had come in the previous half century. Four hundred thousand came in a single year, 1913. Immigrants came from the British Isles, from northern and western Europe and from the United States. An estimated million and a quarter out of the thirty-year total came from the United States and of these a great proportion came directly to the Prairie Provinces. Many Canadian-born migrants from the eastern and maritime provinces moved west to swell the flood of new prairie settlement, both on

the land and in the numerous market centres that sprang up to serve the wheat growing areas around them.

It would be scarcely possible to over-emphasize the contribution which western development made toward the fulfilment of the national policy, the master plan for creating and integrating a national economy from coast to coast. It is easy today, perhaps, to forget the extent to which the development of Western Canada constituted a defensive measure against the aggressive continental nationalism of the United States. Yet the defensive nature of this development is a fact, and a fact of some significance. As early as the eighteen-forties the Americans were seized with the concept of Manifest Destiny, a concept revealingly defined by an eastern newspaperman[27] as "the right of our manifest destiny to overspread and to possess the whole of the continent which Providence has given us for the development of the great experiment of liberty and federated self-government entrusted to us". Ten or twelve years later both Palliser and Hind noted that economic links were already becoming firmly established between the Red River settlement and the American Middle-west via St. Paul and Chicago. As Palliser put it:[28] "No doubt the natural outlet of this great western district is across an easy country to the water of the Mississippi and Missouri, which if first established the West is lost to Britain". A few years later, with Confederation achieved, Macdonald commented that "the United States Government are resolved to do all they can, short of war, to get possession of the western territory, and we must take immediate and vigorous steps to counteract them."[29] The construction of the Canadian Pacific Railway was one of the means of "counteracting them", and the desire to do this most effectively was one of the most important reasons for the decision to build the railway across the southern part of the prairie area, through the semi-arid plains, rather than through the northerly arc of the park belt as had originally been planned.

Simultaneously with the construction of the all-Canadian trans-continental railway the establishment of a system of protective tariffs helped to cut through the economic links which had previously been in formation between the Canadian West and the industrial areas of the American Middle-West. The construction of the Crow's Nest Pass railway by the C.P.R. in the late eighteen-nineties struck at the spread of American economic empire, particularly that of the Great Northern Railway interests in the inter-mountain valleys to the north of the international boundary. By 1900 notice had been served upon the Americans that Canada had no intention of allowing the western territories to go by default. It remained to make this notice effective by actual and productive occupation of the empty plains.

Western agricultural development was of the utmost importance to the fulfilment of the national policy, economically as well as

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[27] John L. O'Sullivan in the *New York Morning News*, Dec. 27, 1845, as quoted by Albert K. Weinberg, *Manifest Destiny: A Study of National Expansion in American History* (Baltimore, 1935), p. 145. As the date of the original editorial will suggest the concept was first employed in argument over title to the Oregon Territory. It nevertheless had unmistakable implications for all other British American territories.

[28] Palliser, *Papers Relative to the Exploration of British North America*, p. 18.

[29] Pope, *Correspondence of Sir John A. Macdonald* as quoted in Morton and Martin, *History of Prairie Settlement*, pp. 225-6.

defensively. The vision of a Canadian nation with dominion from sea to sea in North America was futile if economic development were to stop at the geographic boundaries occupied by the eastern colonies at the time of Confederation. Before Confederation the westward extension of the St. Lawrence economy was limited by the lower Great Lakes and the Laurentian Highlands. The eastern extension of the Pacific-based economy was no farther inland than the Fraser valley, the first of the inland valleys of the mountain barrier. Between the eastern and western economic bases lay two thousand miles of empty Shield, empty interior plains and, finally, almost insuperable mountain ranges and empty intermountain plateaus. The wheat economy, even when fully developed as it was by 1930, spread some eight hundred miles through the plains portion of these empty spaces and thus did not occupy all or even half of the total geographic gap in the national framework. Limited though the area of western economic development was, it was nevertheless sufficient to convert a vision into a reality. The traffic-poor bridge of the Precambrian Shield remained, but the scale of economic development at both its ends had transformed it from an insuperable obstacle in the way of the achievement of a national economy to a costly but nevertheless manageable continuing handicap.

2. *Capital Requirements of Prairie Development.*—The establishment of the wheat economy did more than fill a tremendous geographic gap in the national economy. The development of the wheat producing area required hundreds of thousands of immigrants among whom the adult population of both sexes constituted, in effect, the labour force for the production of the new staple. It required also the assembly in the Prairie Provinces of an entire structure of capital equipment without which the large-scale production and marketing of wheat would have been impossible. Most obviously this meant the outfitting of each of the hundreds of thousands of new farm units with buildings—a house or some sort of dwelling, a barn or stable, and granaries; the provision of a complete if variable set of farm machinery for cultivating, seeding, harvesting and threshing; the provision of power units, first oxen or horses and later a tractor; and along with all these, a wide variety of incidental capital such as household furnishings, fencing materials, pumps and windmills. The marketing of farm produce and the purchase of equipment and supplies by the farming population required railways and market centres, each of the latter equipped with sidings, elevators and loading platforms, warehouses and stores, and housing for the local residents.

The capital equipment for the Prairie Provinces came largely from other parts of Canada. Tariff policy contributed substantially toward this end, diverting to the Provinces of Ontario and Quebec much of the demand for machinery, tools, hardware, articles of leather, clothing and home furnishings which would otherwise have been supplied by American manufacturers. Buildings and structures of all kinds were, of course, assembled from raw lumber on the spot of their final location, but the lumber came from outside the prairie region, for the most part from British Columbia. All parts of the Dominion, with the exception of the

Maritime Provinces, expanded their industrial and other economic activity in direct response to the opening of the prairie market. Railways moved the equipment and building materials to the prairies and transported grain to eastern and export terminal markets. By 1920, wheat was the largest single Canadian export in terms of dollar value.

3. *Population and Homestead Entries.*—Within the thirty years after 1900 the population of Canada all but doubled to total 10,377,000 in 1931. Meanwhile the population of the Prairie Provinces increased more than five-fold to a total of 2,354,000. In 1901 only eight per cent of all Canadians lived on the plains. By 1931 nearly one quarter were there. Table II indicates the extent and rapidity of population growth in the Prairie Provinces after the turn of the century.

Table I indicated the tremendous concentration in homesteading activity in the years between 1900 and the outbreak of the first world war. In this fifteen year period over four hundred and forty thousand homestead entries were made in the Prairie Provinces. In the first five-year interval, 1900 to 1904 inclusive, more entries were made than in the preceding quarter of a century, and even by 1905 Canadian homesteading had not begun to approach its maximum rate. The four years from 1909 to 1912 witnessed the greatest sustained establishment of new homesteads in Canada with an average of over forty thousand per year. It was during these years that the short-grass plains area between Moose Jaw and Calgary, the driest part of the Prairie Provinces, was thrown open for homesteading and pre-emption. The entire area was quickly occupied.

TABLE II

Population of the Prairie Provinces and the Percentage of Rural to Total Population 1901 to 1951

—	Manitoba	Saskatchewan	Alberta	Total	Rural Population as Percent of Total.
1901	255,211	91,279	73,022	419,512	75
1906	365,688	257,763	185,195	808,646	70
1911	461,394	492,432	374,295	1,328,121	65
1916	553,860	647,835	496,442	1,698,137	64
1921	610,118	757,510	588,454	1,956,082	64
1926	639,056	820,738	607,599	2,067,393	64
1931	700,139	921,785	731,605	2,353,529	62
1936	711,216	931,547	772,782	2,415,545	64
1941	729,744	895,992	796,169	2,421,905	62
1946	726,923	832,688	795,007	2,362,941	57
1951	776,541	831,728	939,501	2,547,770	*

* Not available
Source: Dominion Bureau of Statistics, *Census Reports.*

4. *Agricultural Occupation of Western Lands.*—Table III sketches the main outlines of the agricultural occupation of the Canadian plains after 1900 in terms of numbers, size and state of improvement of farm units. The rate of settlement and land improvement was particularly rapid from 1901 to 1911 but remained high until 1931. The period from 1921 to 1926 merits passing comment in that it witnessed a decline in the number of farms and but a slight increase in the area of occupied farms and of improved land. This was the first instance of widespread retrenchment in the prairie wheat economy and it will be considered in greater detail at a later stage of this analysis. The shrinkage in the number of farms during this period was more than compensated for

TABLE III

Number and Area of Farms and Acreage Under Field Crops in the Prairie Provinces, 1901 to 1951

	Number of Farms (Thousands)	Area of Occupied Farms (Millions of acres)	Average Size of Farm			Area of Improved Land (Millions of acres)	Area Under Field Crops (Millions of acres)
			Manitoba (acres)	Saskatchewan (acres)	Alberta (acres)		
1901	55·2	15·4	274·2	285·1	288·6	5·6	3·6
1906*	.....	.....	.....	.....	.....	.....	.....
1911	199·2	57·7	279·3	295·7	286·5	23·0	17·7
1916	218·6	73·3	288·5	353·8	339·3	34·3	24·6
1921	255·6	87·9	274·5	368·5	353·1	44·9	32·2
1926	248·2	88·9	270·6	390·1	370·5	49·3	35·0
1931	288·1	109·8	279·2	407·9	400·1	59·7	39·9
1936	300·5	113·1	271·4	399·6	405·2	60·9	40·2
1941	296·5	120·2	291·1	432·3	433·9	65·5	38·4
1946	269·7	117·6	306·2	473·0	462·9	65·4	41·7
1951†	248·7.‡	123·9	*	*	*	*	43·4

* Not available.
† Preliminary.
‡ Not directly comparable with previous data due to change of definition.
Source: Dominion Bureau of Statistics, *Census Reports*.

by an increase in the average size of those remaining. This is made clear by the fact that the area of occupied farms did not decline during the five-year interval. Nevertheless there was also considerable farm abandonment during the period, particularly in eastern Alberta and south-western Saskatchewan. The number of farms in the Prairie Provinces reached a maximum of three hundred thousand in 1936 and consolidation of holdings by lease and purchase into larger units has reduced the number appreciably since that time.

The increase in the size of the average farm as indicated in Table III is particularly noticeable in Alberta and Saskatchewan. Obviously the data given in the table are the result of arithmetic calculation and do not purport to represent typical farms. Farm units in the Prairie Provinces consist of one or more quarter sections of land of 160 acres each. They exist therefore as units made up of multiples of 160 acres, such as 320, 480 or 640 acres and so on without limit. More will be said later about the change in prairie farm sizes and about the geographic distribution of the various typical sizes. The persistent and continuing tendency toward larger farm units in Saskatchewan and Alberta is nevertheless clearly indicated in Table III.

Cultivated acreage on the prairie farms was used by the settlers almost wholly for wheat as the cash crop and for coarse grains to be fed to livestock on the farms. Tractors

were of relatively little importance until the inter-war years and meanwhile horses were necessarily used for power with the resultant requirement that a part of the farm acreage be utilized in the production of feed. Beef and dairy cattle and hogs were of considerable importance in certain areas but for the most part did not appreciably affect the allocation of cultivated acreage. Table IV indicates the degree of specialization on prairie farms and its variability from province to province.

TABLE IV

Percentages of Prairie Field-Crop Acreages in Wheat, Oats and Barley, 1901 to 1931

	1900	1906	1911	1916	1921	1926	1931
Manitoba							
Wheat	71·3	64·5	60·0	53·3	48·1	33·3	36·3
Oats	20·8	22·1	25·3	28·2	30·6	26·4	22·6
Barley	5·1	8·0	8·7	13·4	14·1	28·1	30·1
Saskatchewan							
Wheat	74·3	64·7	57·5	64·6	65·6	69·3	65·4
Oats	21·6	27·6	25·5	27·1	27·3	20·0	16·9
Barley	1·8	2·4	3·0	2·6	2·4	4·5	8·2
Alberta							
Wheat	22·8	24·4	48·5	47·3	57·3	67·2	66·7
Oats	62·5	51·9	36·1	38·6	29·9	20·9	18·2
Barley	5·9	11·8	4·9	6·1	4·6	4·5	5·9

Source: Table prepared by K. A. H. Buckley. See his unpublished Ph.D. thesis, *Real Investment in Canada* (University of London, 1950).

Increased wheat acreage provided the real basis of prairie agricultural and economic expansion. Canadian wheat plantings (practically all in the Prairie Provinces and all spring sown) increased from 4·3 million acres in 1901 to 11·1 million in 1911, to 23·3 million in 1921 and 26·4 million in 1931. Wheat shipments abroad increased from small amounts in the eighteen-nineties till by the end of the first world war they were the largest single Canadian export in terms of dollar value. Wheat and flour exports yielded $10·9 million in 1901, $377·5 million in 1921 and $495 million in 1929. Canada exported more than a million bushels of wheat a day on the average in 1929.

TABLE V

Production of Wheat in the Prairie Provinces and Canada, 1871 to 1951

	Prairie Provinces			Canada
—	Wheat Acreage (Millions)	Yield per acre (bushels)	Output (Millions of bushels)	Output (Millions of Bushels)
1871	.....	.....	.....	16·7
1881	.....	.....	.....	32·4
1891	.....	.....	.....	42·2
1901	.....	.....	.....	55·6
1911	10·0	20·8	208·4	230·1
1921	22·2	12·6	280·1	300·9
1925	19·8	18·2	367·1	395·5
1926	21·8	17·5	380·8	407·1
1927	21·4	21·2	454·6	480·0
1928	23·2	23·5	544·6	566·7
1929	24·3	11·6	281·7	304·5
1930	24·8	16·0	397·3	420·7
1931	25·6	11·8	301·2	321·3
1932	26·4	16·0	423·0	443·1
1933	25·2	10·4	263·0	282·0
1934	23·3	11·3	263·8	275·8
1935	23·3	11·3	264·1	281·9
1936	24·8	8·1	202·0	219·2
1937	24·6	6·4	156·8	180·2
1938	25·0	13·5	336·0	360·0
1939	25·8	19·1	494·0	520·6
1940	27·7	18·5	513·8	540·2
1941	21·1	13·9	296·0	314·8
1942	20·7	25·6	529·0	556·7
1943	16·1	16·6	267·8	284·5
1944	22·4	17·5	391·7	416·6
1945	22·6	13·1	294·6	318·5
1946	23·7	16·6	393·0	413·7
1947	23·4	13·7	320·0	341·8
1948	22·8	15·6	356·0	386·3
1949	26·5	12·7	337·0	371·4
1950	25·8	17·6	455·0	461·7
1951	24·6*	21·6*	531·0*	562·4*

* Preliminary estimate.

Source: *Grain Trade Year Book*, Sanford Evans Statistical Service, Winnipeg, and *Quarterly Bulletin* of Agricultural Statistics, Dominion Bureau of Statistics.

5. *Delay in the Occupation of the Short-grass Plains.*—We have spoken in general terms of the period from 1900 to 1930 as the period in which the Canadian wheat economy was established. The spread of settlement was, however, by no means uniform throughout the thirty-year period either regionally or in total. It has already been indicated that the major influx of migration into Canada and the most intensive period of homesteading and settlement in the Prairie Provinces were completed by the early years of the first world war. After 1926 there was another and rather less pronounced peak in immigration and western settlement, the latter particularly in the Peace River area in Alberta. There was also, however, a significant regional pattern evident in the spread of settlement in the earlier period of intensive activity, up to the early days of the war.

We have noted earlier that Hind recognized gradations of aridity within the overall "infertile triangle" as defined by Palliser. He really distinguished, without emphasizing the distinction, a drier triangle within the dry triangle. This exceptionally dry area, according to his observation, lay west of the Missouri Coteau and comprised the plateau stretching westward to the foot-hills of the Rocky Mountains. In terms of present-day landmarks this dry belt comprises the territory from Moose Jaw to Calgary, approximately, and extending from a broad base on the international boundary northward beyond the valley of the South Saskatchewan river. In general it comprises the drainage basin of the South Saskatchewan with its tributaries as far down as the Elbow. It is generally called the third prairie steppe in Canadian topographic terminology. It

might also be described as the Canadian extension of the Missouri plateau, lying as it does beyond the upper level of the modified escarpment of the Missouri Coteau. This drier triangle within a triangle constitutes the short-grass plains proper, its soil is generally light brown to brown signifying comparatively little accumulation of humus, and within its margins there are areas where average annual rainfall exceeds only slightly the ten-inch minimum which may be regarded as marking the margin between true aridity and semi-aridity.

There are a variety of reasons why more attention should be accorded this subdivision of the Prairie Provinces than is ordinarily given in analyses which treat the Prairie Provinces and the wheat economy as homogeneous units. The closer approach to aridity within this area than in other parts of the wheat growing region of the West is obviously of basic importance. This area comprises within its boundaries the irrigated parts of the Prairie Provinces as well as those territories in which additional irrigation is proposed. All of the various proposals for the development of irrigation projects on the South Saskatchewan or its tributaries are directed toward the application of river water on lands within, or on the northern and eastern margins of this region. One year or period of years with another, this area has raised an exceptionally heavy proportion of the problems that arise in the wheat economy. Finally, this area was the last to be occupied by farmer settlers and parts of it were soon abandoned. The abandoned parts, and others where settlers have clung tenaciously to their holdings under nearly impossible conditions, might better never have been occupied for purposes of cultivation.

By 1900 the geographic pattern of western settlement was already apparent in outline. The spread of occupation westward out of the Red River valley, through the Brandon plains and up the valleys of the Assiniboine and Souris rivers might suggest that succeeding waves of settlers would occupy the plains by a steady westward advance of the agricultural frontier until the Rocky Mountains were reached. There was already, however, a considerable band of settlement down the western margins of the plains from Edmonton through Calgary and Macleod to the boundary. There was also a pocket of settlement extending from the forks of the North and South Saskatchewan Rivers up the diverging valleys of these rivers for a hundred miles or so. There was already, therefore, a clear suggestion that newcomers preferred the "fertile" area or park belt and were not yet ready to strike out into the short grass plains for farming operations.

The comparatively heavy movement of settlers in the first six or eight years of the new century confirmed the earlier intimations of settlers' regional preference. Maps prepared from the data of the 1906 Census[30] show the short grass plains entirely surrounded on the east, north and west by a strip of agricultural settlement. Palliser's "fertile belt" was already wholly occupied, not necessarily exhaustively but with a spread of settlement which completely surrounded the short-grass plains.

6. *Re-Introduction of the Pre-emption Principle.*—In 1908 the Dominion Lands Act was significantly amended to re-introduce

[30] See W. A. Mackintosh, *Prairie Settlement: The Geographical Setting* (Toronto, 1934) p. 50.

the pre-emption principle into the Canadian land-grant system.[81] According to this principle as embodied in the Canadian homestead scheme, the homesteader could "pre-empt" a quarter section of land adjoining his homestead quarter for purchase from the government at $3 per acre. The pre-emption was to be paid for, one-third within the first three years following the homestead entry and the balance in five equal annual instalments. The pre-emption quarter was subject to improvement and residence requirements similar to those for the homestead, so that the settler was required to cultivate 50 acres of land in addition to his homestead requirements and was to live either upon his homestead or pre-emption quarter of land "for at least six months in each of the six years subsequent to the date of entry of his homestead".

The re-introduction of the pre-emption privilege in 1908 was double-barrelled in purpose. On the one hand it represented the final liquidation of the prior claim which railway land grants had formerly had upon the odd-numbered sections throughout the West. Within the pre-emption area as defined in the legislation of 1908, and as prescribed in a following paragraph, railways, particularly the Canadian Pacific Railway whose main line traversed the area, had selected only negligible amounts of their earned grants. Throughout the area the odd-numbered sections were by the new legislation to be available for homestead entry or for pre-emption sale by the government. These lands were nevertheless still expected to further the process of railway construction, for the government committed itself by the legislation of 1908 to apply the proceeds from the sale of pre-emptions to the completion of the Hudson Bay Railway.

The other purpose of the new pre-emption measure was the extension of homestead settlement throughout the remainder of the prairie plains. Even in the more humid portions of the West it had become evident that a 160-acre farm was generally a less suitable unit than one of 320 acres. The homestead provided 160 acres only. The railways, however, had selected their land grants from the odd-numbered sections in the more humid regions, and the settlers in these areas therefore had railway lands adjacent to their homesteads available for purchase in order to enlarge their holdings. West of Moose Jaw the railways had not made any widespread selection of lands, regarding the entire regions as generally unfit for settlement. The proposal of the Dominion Government in 1908 was therefore to throw this area open for settlement, retaining the standard 160-acre homestead unit but offering the odd-numbered, as well as the even-numbered sections for homestead entry or for sale in quarter-section pre-emptions as described above. In this way the settler on the short-grass plains could normally start with a half-section instead of a quarter-section farm, the larger acreage being demonstrably even more essential for the purpose of securing a livelihood in the drier prairie areas than in the more humid parts of the West.

The pre-emption area established by the legislation of 1908 extended from Moose Jaw on the east to Calgary on the west, and from

[81] The pre-emption principle had been incorporated in Dominion Lands legislation in 1874 but had been removed in 1894 because it contributed so obviously to land speculation and so negligibly to stable settlement. *Cf.* Morton and Martin, *History of Prairie Settlement*, pp. 417 ff.

Battleford on the north to the international boundary on the south. There were substantial sections within these boundaries, particularly along the west and north, where the pre-emption privileges did not apply to specific townships because in these townships "eight sections or more had been accepted by any railway company as part of its land grant.[32] It was estimated that approximately 28 million acres remained available for disposal under the new legislation.

The pre-emption area was thrown open for settlement in 1909. The succeeding few years, with the exception of 1910, brought better than average moisture conditions in the area and increasingly favourable cost-price relationships for wheat growers in general. Land agencies were established in the newly-opened territory and their personnel actively promoted the homestead process. Railway building was extensive in the region at the same time. The Canadian Pacific Railway built a "south line" roughly parallel to, and half way between, the main line and the international boundary. This line ran west from Weyburn on the "Soo" line of the C.P.R. for some three hundred miles, while another line was built eastward from Raymond on the Lethbridge line of the C.P.R. to meet it. The C.P.R. also built branches south-east and north-west from Swift Current. The Canadian Northern built south-west from Moose Jaw. Some 860 miles of railway were built south of the South Saskatchewan river in the five-year period after 1910. Railway construction opened the new territory to the settler and provided cash income to ease the financial burden of settlement. In this multiple coincidence of exceptionally favourable circumstances the over-all occupation of the driest portions of the semi-arid western Canadian plains was quickly accomplished, for the most part within the period from 1909 to 1914.

7. *Population Trends in the Inner Triangle.*—The heart of the semi-arid plains, the "inner triangle", if we may so describe it, can be roughly identified in relation to a certain number of the federal census divisions. These are Divisions 2, 3, 4, 7, 8, 12 and 13 in Saskatchewan and 1, 3, 5 and 7 in Alberta. (See map). An analysis of the census data for these districts as a group reveals important features of the development of the area which they cover (see Table VI).

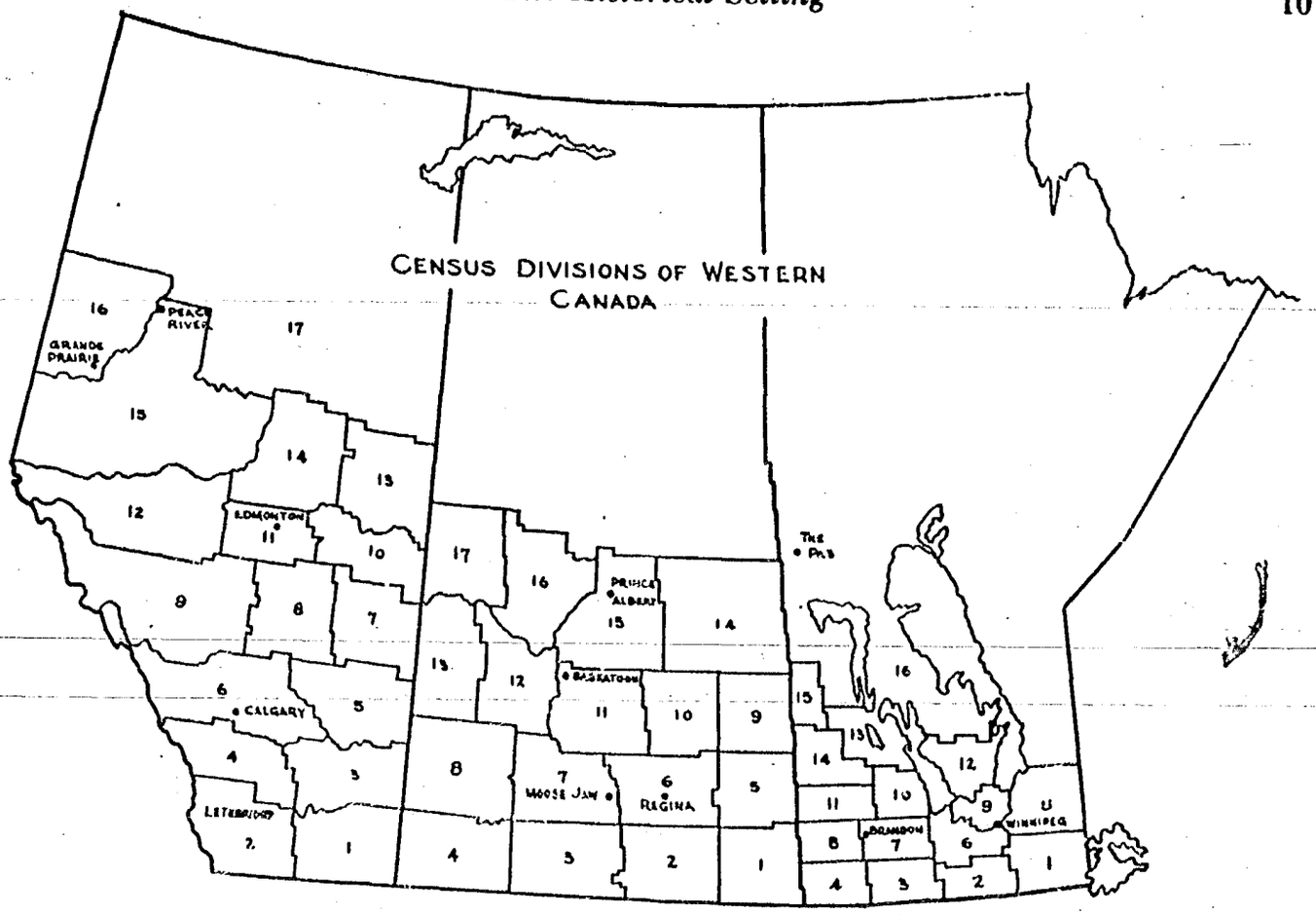
TABLE VI

Population in a Group of Census Divisions in South-Western Saskatchewan and South-Eastern Alberta 1901 to 1951

—	Census Divisions 2, 3, 4, 7, 8, 12 and 13 in Saskatchewan	Census Divisions 1, 3, 5 and 7 in Alberta	Total for Census Divisions Listed
1901.....	8,253	3,556	11,809
1906.....	52,505	13,779	66,284
1911.....	153,908	69,345	223,253
1916.....	243,874	98,574	342,448
1921.....	275,980	118,930	394,910
1926.....	296,096	98,433	394,529
1931.....	313,673	108,672	422,345
1936.....	288,845	103,447	392,292
1941.....	264,804	97,324	362,128
1946.....	239,589	92,652	332,241
1951.....	225,131	101,474	326,605

Source: Dominion Bureau of Statistics, *Census Reports.*

[32] *Cf.* Morton and Martin. *History of Prairie Settlement,* p. 419, and for a map of this area see *ibid.,* p. 421.



These data show clearly the rapid rate of settlement in this central area after 1901. The whole area had less than twelve thousand inhabitants at the turn of the century. Particular census districts, notably those situated around the east and north of this inner triangle, had experienced heavy influxes of settlement by 1906. The region as a whole thus had a considerable increase in population over this five-year period but substantial blocks in the middle of the zone remained almost entirely vacant. By 1911 the pre-emption law had been in effect for two years and the settlement which took place in accordance with its terms is clearly evident in the population data for that year. Settlement, moving in from the east, the north, the west and the south-west in a steadily shortening arc, had finally converged at one and the same time upon the centre and the driest parts of the semi-arid plains. The population increased from less than twelve thousand in 1901 to 66,000 in 1906, to 223,000 in 1911, to 342,000 in 1916 and 395,000 in 1921.

8. *Relationship between the American and the Canadian Frontiers.*—The point is frequently made that the occupation of the Canadian plains relied heavily on techniques and equipment which had been gradually evolved by the Americans in their mastery of similar areas to the south of the inter-

national boundary. The substantial validity of this contention is beyond dispute. The chilled-steel plow which was developed in the United States was indispensable for the breaking of the Canadian prairies. The self-binding reaper was perfected in the American middle west. Other implements of particular usefulness in the Canadian prairie region had been adapted to the agriculture of the plains by a generation or two of American experience. The steel windmill and barbed wire fence were American adaptations to the agricultural demands encountered in a region with a scarcity of water and a complete absence of wood for fencing materials. Americans constituted a large proportion of the settlers in the Canadian west. They brought with them the methods and equipment with which they had already had experience west of the Mississippi. Granted all this, it remains true that the wheat varieties which mastered the Canadian plains—Red Fife and Marquis—were Canadian varieties, the first by chance importation into Upper Canada in the eighteen-forties and the second by breeding and selection. It is also true that the practice of summer-fallowing as a means of moisture conservation, whether familiar to the Americans or not, was developed and popularized in the Canadian west in relation to specific Canadian requirements.

It will serve no useful purpose to argue over what the Americans did or did not contribute to the agricultural technology of the Canadian wheat economy. There is no point in attempting to belittle their very significant contribution. There is, however, a much more fundamental qualification to be made to the customary analysis of the subject.

The commonly accepted assertion is that the American agricultural frontier of free land was exhausted by 1890 and that immigrant and American settlers turned to the Canadian north-west in the succeeding decades. The implication is that American settlers had occupied in closely consecutive stages the humid, the sub-humid and, finally, the semi-arid American plains by 1890, roughly to the same extent that the Canadian plains were occupied by 1916 or 1921. The further implication is that American settlers had developed techniques for the establishment of a wheat economy under the varying conditions encountered in each of these types of regions before they moved over to occupy the corresponding regions in Canada. This general approach is in part incompatible with the fact that the heaviest phase of homesteading in Montana and Alberta occurred simultaneously, in the years from 1909 to 1911. The common assumptions concerning the consecutive nature of American and Canadian prairie settlement apparently require modification.

A proper statement of the inter-relationship between settlement in the American and Canadian plains calls for emphasis upon the distinction between sub-humid and semi-arid regions. We have called attention to this distinction in relation to the Canadian west and have stressed the fact that the semi-arid areas in southern Saskatchewan and Alberta were not settled until after 1908, at which time the sub-humid and more "fertile" park

belt surrounding the drier central plains had been generally occupied. Similar stages of occupation are observable in American experience and they were not completed by 1890, nor were they closely consecutive as has been commonly assumed.

In general terms the frontier of free land which was exhausted in the United States by 1890 was on the margin between the sub-humid and the semi-arid regions. At that time comparatively little sub-humid land remained available for settlement in the American west. At the same date, however, comparatively little semi-arid land had as yet been settled upon. The current verdict was that the moisture conditions which characterized a semi-arid territory were by no means adequate for cereal production. Settlement moved out onto the semi-arid American plains, the "high plains", at the end of the first decade of the twentieth century at the same time that the movement took place onto the semi-arid Canadian plains. A series of years of better than average rainfall conditions, coupled witth an improved cost-price relationship in wheat growers' markets, encouraged the movement in both cases. The driving imperative, however, was a widespread and apparently insatiable land hunger which persisted despite the exhaustion of the better settlement prospects in both the United States and Canada.

9. *Crop Experience on the Canadian Short-grass Plain.*—Neither the Americans nor the other immigrants who settled in the driest parts of the Canadian west after 1908 had the mastery of methods of cultivation which were adequate to the long-run requirements of such a region. The year 1910 was a dry year but it was followed by three years of satisfactory rainfall conditions. The year 1914 was one of drought with almost complete crop failure in many areas in Saskatchewan and Alberta. This was followed, however, by the fabulous year of 1915 when rainfall and other climatic conditions combined to produce a crop which was known in the west until 1928 as *the* bumper crop and which is still regarded by many an old-timer as the finest wheat crop ever grown in Canada. Rainfall was abundant in 1916 but the quality of the crop was impaired by rust. In 1917 the moisture conditions varied widely from place to place, being adequate in certain areas and quite inadequate in others. The next four years formed a period of widespread and persistent drought and for substantial portions of the Canadian semi-arid plains this meant five crop failures in a row, 1917 to 1921 inclusive.

Table VII records the specific crop results referred to in the preceding paragraph and illustrates the high degree of variability of crop production from year to year at specific sample points in south-eastern Alberta and in south-western Saskatchewan.

10. *Agricultural Investigations in Saskatchewan and Alberta, 1920-21.*—Agricultural conditions had become so serious throughout the short-grass plains of Saskatchewan and Alberta by 1920 that the provincial governments undertook to investigate in an attempt to discover causes and remedies. The Saskatchewan government convened a "Better Farming Conference" in Swift Current in July, 1920. Shortly there-

TABLE VII

Wheat Yields in the Semi-Arid Zone

(bushels per acre)

	Lethbridge	Medicine Hat	Sounding Creek	South-western Saskatchewan
1905	9·4	15·9	.....	.....
1906	21·8	18·7	.....	.....
1907	21·3	11·4	.....	.....
1908	20·7	7·7	.....	.....
1909	19·8	22·8	.....	.....
1910	6·8	7·0	.....	.....
1911	20·7	18·2	.....	.....
1912	16·7	15·6	.....	.....
1913	18·6	11·1	17·9	.....
1914	6·3	3·2	8·9	.....
1915	43·6	37·5	40·4	.....
1916	34·7	23·3	29·1	18·1
1917	.....	20·0	18·0	12·2
1918	7·1	5·0	5·4	4·7
1919	5·2	2·4	5·5	3·5
1920	13·0	7·7	15·7	9·9
1921	9·8	7·2	7·9	8·6
1922	18·5	9·3	6·7	16·7
1923	32·8	22·5	20·8	16·7
1924	17·0	6·0	6·0	6·3
1925	18·9	8·9	10·0	9·8
1926	20·0	9·0	9·0	8·8
1927	29·6	30·4	26·4	26·9
1928	27·1	28·6	22·8	27·1
1929	18·5	12·7	5·5	13·2
1930	21·1	9·9	.....	13·1

Source: Reproduced with kind permission of the author and publisher from W. A. Mackintosh, *Prairie Settlement: The Geographical Setting*, (Toronto, The Macmillan Co., 1934), p. 128.

after they appointed a royal commission to inquire into farming conditions in the south-western part of the province. In 1921 the Alberta Government appointed a survey board for the investigation of agricultural conditions in the southern part of the province.[33] There is no point in giving any detailed outline of the findings of these bodies. They did not, in fact, present the conditions in any statistical frame of reference which might serve as a summary of the situation. One or two of the points which these groups developed in their reports are, however, worthy of comment in historical perspective.

The most important point which showed up in these analyses concerned the practice of summer-fallowing and its results within the drier portions of the plains area. Within these regions it was clear that soil conservation measures were more necessary than in any other part of the west. Summer-fallow was the great moisture-conserving device and was therefore absolutely indispensable in the dry areas. But here was the dilemma: summer-fallow could conserve moisture only if moisture existed, and during a succession of dry years such as were currently being experienced the rainfall was indequate even for proper summer-fallowing practice. The cultivation which created the "black" or weed-free summer-fallow with its surface "dust mulch" created at the same time the ideal conditions for soil drifting. By 1920 this destructive condition was firmly established in certain parts of south-western Saskatchewan and eastern Alberta and was a menace which threatened to engulf much larger areas. The Saskatchewan royal commission of 1920 outlined the problem under

[33] *Cf. Report of the Survey Board for Southern Alberta* (Edmonton, 1922); *Report of the Royal Commission of Inquiry into Farming Conditions* (Regina, 1921); *"Progress Report on the Manitoba Agricultural Survey, 1921," and Some of the Charts and Maps Accompanying the Progress Reports on the Manitoba Agricultural Survey, 1921* (Winnipeg, 1921).

the heading, "Tillage Methods in Vogue in Southwest Saskatchewan and Resulting Conditions". They said in part: [34]

> The "summerfallow" method of using the precipitation of three years to grow two crops, or of two years to grow one crop, has made possible the growing of grain in areas in which it is doubtful whether any other system of tillage and cropping would have produced equally good results. To "summerfallow" has meant to plow the land late in May or early in June and keep it free from vegetation during the remainder of the year so that what rain falls on it is absorbed by it and a considerable portion retained as a surplus for the next year's crop . . . . The early efforts of the homesteader have to do with breaking up the prairie and destroying native vegetation so as to have a place in which to grow crops. Soon, however, he has to consider what is the most profitable method of treating stubble land, and this introduces the summerfallow and with it come some of the problems of the summerfallow.
>
> For over thirty years, the summerfallow once in three years has been the practice upon which successful grain growing has been carried on in Eastern and Central Saskatchewan. Until this plan of storing moisture was devised, crop failure was as frequent and just as serious in the eastern part of the province as it is now in the southwest. But while it stabilized grain growing, it was learned that when the root fibres of the native prairie plants had been worked out or destroyed by frequent plowing and cultivating, the land developed a tendency to blow and drift, and this has been the history of most open plains districts where grain growing has been carried on for a dozen years or so, while some have reached this stage much sooner. The southwest being more recently settled than any other part of Saskatchewan should not yet experience soil drifting, but this has developed in some districts, and it may therefore be assumed that the soils which have already proved very troublesome in this respect are naturally deficient in fibre, and that provision will have to be made to restore organic matter if these soils are to continue in use for grain production according to prevailing methods. Soil drifting is one of the most serious conditions in connection with grain growing on the lighter soils in Saskatchewan and calls for immediate action.
>
> What the cure will be is not fully apparent . . . .

Both the Saskatchewan and the Alberta investigating groups made a variety of helpful suggestions for the improvement of agricultural practices in the dry zone. The Alberta survey board envisaged the extension of irrigation projects as the ultimate solution of all major difficulties throughout the Alberta section of the semi-arid plains. The Saskatchewan commission mentioned irrigation, but without enthusiasm. Both groups were greatly impressed with the apparent virtues of mixed farming. "The advantages of dairying", said the Saskatchewan commission,[35] "have never been better demonstrated than during the past three years when crops were poor and the income from grain growing slim and uncertain . . . . These men who had a few milch cows, a flock of hens, and a pig or two were immeasurably better off than those who had none of these to bring in a little money regularly to provide groceries and living necessities." "It is very remarkable", said the Alberta survey board [36], "that, in practically every case . . . the farmer who has been consistently carrying a few head of milk cows, a few cattle, and a few hogs, and whose wife has been keeping poultry, is in a much better financial condi-

[34] *Report of the Royal Commission into Farming Conditions*, pp. 35-36. The same report (p. 35) described the method of breaking the prairie sod as follows: "The first tillage operation, however, is that of 'breaking' the prairie. Two methods are followed, namely deep breaking and shallow breaking, the latter being the first operation in 'backsetting'. 'Deep breaking' is taken to mean plowing to a depth of from four to five inches. When the furrow slice is sufficiently rotted that it can be disced without turning up unrotted sod, it is cultivated to make a good seed bed and to kill any remaining vegetation. Shallow breaking means plowing to a depth of from two to four inches, leaving the sod flat to rot, and 'backsetting' or laying it over again by plowing a couple of inches below the sod so as to expose fresh soil to make a mellow seed bed. In districts where the sod is not grassy and is easily tilled, 'deep' breaking is the method commonly practised."

[35] *Ibid*, p. 36.

[36] *Report of the Survey Board for Southern Alberta*, p. 16.

tion than his neighbours . . . . And the very fact that he had to devote a certain amount of attention to these matters, helped to prevent his over-extending his cultural operations".

The Saskatchewan commission transformed their admiration for mixed farming into a proposed program for the ultimate salvation of agriculture in southwestern Saskatchewan. They summarized their recommendations on this score as follows [37]:

> The foregoing may be briefly summed up as a suggestion for conducting a diversified farm on a rather small scale, providing for pasture and meadow facilities, keeping a limited amount of livestock to consume products otherwise unsaleable, such as forage, straw, drouth stricken or rusted sheaf grain, and providing for a limited amount of cash or market grain crops. The fundamental principle underlying the whole system is division of risk, provision for a large part of the food supplies on the farm itself, thus ensuring a degree of independence and freedom from debt not possible either in straight grain farming or stock ranching . . .
>
> It will be a slower process than would follow a succession of years like 1915 and 1916, but it will be safer and surer, and will bring less worry and we believe less hardship, and more comfort and satisfaction than a system of grain farming alone."

In retrospect we may note that diversified farming and the small farm unit have not been among the many modifications in cultural practices which, over the thirty-year period since the Saskatchewan and Alberta farming commissions reported, have offered an increasing prospect of successful farming operations in the semi-arid portions of the Prairie Provinces. Parts of this inner triangle have been irrigated, parts have reverted to ranching or have been converted into community pastures. In the portions of the triangle which have persisted in cereal cultivation, however, there is greater specialization in wheat growing now than in 1920, and within the same area there has been the most persistent tendency toward the larger farm unit at the expense of the small.

11. *Agricultural Readjustment during the Nineteen-Twenties.*—The first half of the nineteen-twenties was a period of painful readjustment in the economic life of the region lying along the Alberta-Saskatchewan boundary [38]. Some of the most striking of the indices of this readjustment are observable in a comparison of the census data for 1921 and 1926. The population of the inner triangle, made up of the census divisions as listed on page 104 above[39] and represented on the map on page 105, was practically the same in 1926 as it was in 1921. The total population of these census divisions was approximately three hundred and ninety-five thousand in 1921 and slightly less in 1926. This means that the heavy immigration of the ten or twelve years before 1921 had been reversed and converted into an exodus which, for the years 1921 to 1926, was of a magnitude equal to the entire natural increase in the area.

This, however, is the over-all picture for the region. The retreat from the land was much more pronounced in Alberta than in Saskatchewan. Of the seven Saskatchewan

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[37] *Report of the Royal Commission into Farming Practices*, p. 59.

[38] The readjustment within this area was particularly severe because persistent crop-failure conditions were added to the general economic distress of the early inter-war years. All Canadian agricultural producers suffered from the precipitous decline of agricultural prices following the war and from the comparative rigidity of the prices of goods and services required for farming operation and farm living. Debt burdens were particularly acute because such a substantial proportion of them had been incurred during the war years and on the basis of inflated property valuation.

[39] Census divisions 2, 3, 4, 7, 8, 12 and 13 in Saskatchewan and 1, 3, 5 and 7 in Alberta.

census divisions within the area all except one (number 7, west of Moose Jaw) had at least a slight increase of population during the five-year period, 1921 to 1926, and as a group their population increased by twenty thousand. The population within these divisions was thirty-two per cent of the total population of the province in 1921 and thirty-six per cent in 1926. In Alberta, on the other hand, all four of the census divisions included in the area declined absolutely in population. Division 3, comprising a large area north of Medicine Hat, declined by thirty per cent.[40] The four divisions as a group had approximately twenty thousand less residents in 1926 than in 1921. These four divisions contained almost twenty per cent of the total provincial population in 1921 but less than seventeen per cent in 1926.

Loss of population from the area under consideration here is more specifically related to agricultural failure if we take note of the farm abandonment associated with it. There were forty-nine hundred abandoned farms in Saskatchewan in 1926 but they were not concentrated in any particular area except for a grouping of some nine hundred in census division number 8. At the same time there were one hundred and eighteen thousand operating farms in the province and the proportion of abandonment may not be regarded as exceptionally high. In Alberta, however, the situation was more acute. With seventy-seven thousand operating farms in Alberta in 1926 there were ten thousand four hundred abandoned farm units. Over seventy-three hundred of these were concentrated within the four census divisions along the Saskatchewan boundary and five thousand of them were in divisions 3 and 5. Thirty per cent of the farm units in the four divisions were abandoned. In division number 3 over half the farm units and farm acreage were abandoned. The proportion was particularly high among the quarter section units and heavy as well for the half and three-quarter section units.

There is no need to describe in any detail the economic circumstances of the second half of the nineteen-twenties. Moisture conditions improved throughout the entire

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[40] The Tilley East Area, covering approximately one million and a half acres, coincides roughly with the eastern half of census division number 3 in Alberta. It was the first of the Special Areas established by the Alberta Government to provide a settlement program which might correct the errors of homestead and pre-emption settlement in the driest part of the Canadian plains region. Farm and village residents and public agencies within the Tilley East Area were in such desperate financial circumstances by the middle 'twenties that the Alberta Legislature appointed a commission in 1926 to investigate and recommend corrective measures.

The commission reported that agricultural settlement had gradually displaced ranching in the area in the years immediately before and after 1910, that there had been few good crops except for those of 1915 and 1916, and that intolerable debt burdens had been accumulated. The commission found that at the peak there had been approximately 2,400 resident farmers in the district but that the number was already reduced and should be still further reduced. They pointed out that "a considerable percentage of the land alienated from the Crown in the right of the Dominion of Canada (was) passing to the Crown in the right of the Province of Alberta through the failure of the owners . . . . to pay taxes levied against their lands, and that the claims registered against such lands were far in excess of their value." The commission recommended a complete cessation of land alienation in the area, the disorganization of existing municipalities and inactive school districts, and a consolidation and re-organization of settlement under a joint Dominion and provincial board. The province effected the recommendations of the commission in 1927, by *Statutes of Alberta*, 1927, c. 45. The joint board operated from 1929 to 1931 when, following the transfer of natural resources to the province, the Area came under the control of a provincial administrator in the Department of Municipal Affairs. By the early nineteen-thirties only approximately 500 farmers were in the Area as compared with the peak total of 2,400 a decade or so before. Cf. G. A. Elliot, "Problems of a Retrograde Area in Alberta", in W. A. Mackintosh, *Economic Problems in the Prairie Provinces* (Toronto, 1935, Appendix B pp. 291-4; also "Report of the Commission on the Tilley East Area," Province of Alberta, *Sessional Papers*, 1927, No. 20 (Edmonton, Queen's Printer).

wheat economy. Good crops in the years 1925 to 1927 were followed by the "bumper" crop of 1928. Over the same period of years, price relationships were much more favourable to agricultural producers of all kinds than they had been in the first half of the decade. The wheat economy prospered again. Immigration revived and agricultural settlement moved northward in the Prairie Provinces with a particular regional concentration in the Peace River area in Alberta. Along with the new out-thrusting of the agricultural frontier went the customary complement of railway building and the mushroom growth of market centres. Approximately twenty-nine hundred miles of railway line were added in the Prairie Provinces between 1920 and 1930, with practically no increase in the mileage of any other part of Canada.[41]

The comparative prosperity of the later nineteen-twenties gave considerable impetus to the first major mechanical revolution to take place in the wheat economy. Table VIII provides indices of this revolution in terms of tractors, trucks and harvester combines.

The gasoline tractor was well established in the West by the end of the first world war but its use became much more general in the later 'twenties. The harvester combine and the farm motor truck first appeared in significant numbers in the Canadian wheat economy after the middle of the decade.

TABLE VIII

Number of Tractors, Harvester Combines and Motor Trucks in the Prairie Provinces, 1921 to 1946.

—	Tractors	Harvester Combines	Motor Trucks
1921	38,485	.....	.....
1926	50,136	.....	5,640
1931	81,659	8,897	21,517
1936	81,657	9,827	21,203
1941	112,624	18,081	43,363
1946	142,833	44,289	54,718

Source: Dominion Bureau of Statistics, *Census Reports.*

IV. The Disastrous Decade, 1930-1939

1. *Introduction.*—The fulfilment of the national policy was symbolized in 1930 by the transfer of the natural resources in the Prairie Provinces to the provincial governments. The era of substantial settlement of new lands in western Canada was at an end. The lands in Manitoba had been declared to be "Dominion lands" by the Manitoba Act of 1870 and had been retained by the Dominion Government "for the purposes of the Dominion". These purposes—the construction of railways and the settlement of the West—were for the most part attained by 1920. It is true that a considerable additional mileage of branch line railways was built in the Prairie Provinces in the nineteen-twenties and there was a final flurry of new homestead settlement in the Peace River area after 1925. In general terms, however, the transfer of crown lands from the Dominion Government to the provinces merely awaited a solution of the difficult problem of determining an equitable financial adjustment. By 1930 this had been

[41] Of this mileage, 1,600 miles were added in Saskatchewan, 1,200 miles in Alberta and 100 in Manitoba. Cf. *Report of the Royal Commission on Dominion-Provincial Relations,* Book I, p. 121n.

achieved and the transfer was effected. The transfer coincided with the commencement of a decade of unprecedented economic distress in the Canadian West.

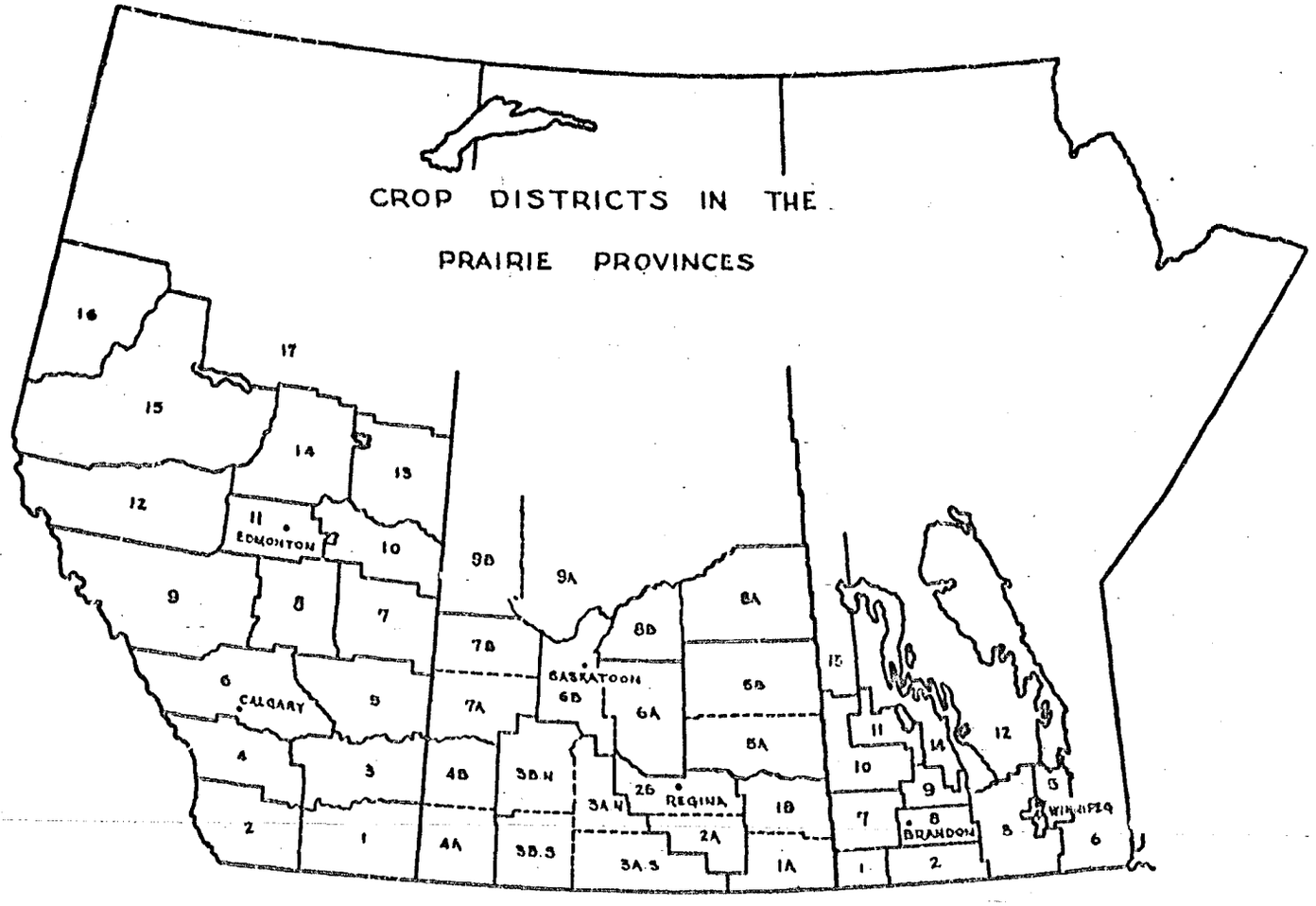
The economic disaster which encompassed the wheat economy in the nineteen-thirties was compounded from the ill effects of world-wide depression and persistent local drought. Agricultural prices declined first and farthest of all price groups in typical response to depression influences. The drought which struck the American continental plains, and which enveloped the Canadian and American wheat economies alike, may have been no worse than the dry cycles of some previous periods. It was, however, the worst within the experience of the farmers of the day. Its impact upon western lands was of exceptional severity because of cultural practices which, ironically enough, had been adopted and pursued as a safeguard against the threat of drought. "Black" summer-fallow, carefully cultivated to destroy weed growth and thus to conserve moisture, was in a pulverized condition without fibre or structural resistance. Thus the top-soil drifted before the high regional winds over tremendous areas and destroyed crop prospects year after year by exposure of germinating seed or by erosion of young and easily injured seedlings.

2. *The Production Record.*—Turning first to consider the relevant production record we may show the significant facts most clearly by contrasting the data for the Prairie Provinces for the nineteen-thirties as compared with those for the nineteen-twenties.[42] For the ten-year period 1920 to 1929 inclusive the Prairie Provinces had produced an average wheat crop of 360 million bushels per year representing an over-all average yield of 17 bushels per acre. The crop of 1928, which still ranks as one of the four or five "bumper" crops in the Canadian wheat economy, had averaged 23·5 bushels per acre and had totalled 545 million bushels. The average wheat crop throughout the nineteen-thirties was but 286 million bushels, representing an average yield per acre of 11·6 bushels. Over the five-year period from 1933 to 1937, inclusive, the average prairie wheat crop was but 230 million bushels and the average yield was only 9·5 bushels per acre. The year 1936 was worse than this average even. The average wheat yield this year was 8 bushels per acre and the total crop for the three Prairie Provinces was 202 million bushels. The year 1937, however, was by all odds the worst in the history of the Canadian West, with a total wheat crop of 157 million bushels and an over-all average yield of 6·4 bushels per acre.

Broad regional averages conceal wide variations in actual yield data from place to place, and five- or ten-year averages conceal sharp irregularities, taking one year with another. Table IX illustrates these points with reference to the Province of Saskatchewan. As shown in this table, the average wheat yield for Saskatchewan for the decade of the 'thirties was 10·3 bushels per acre. This average, however, embraces the extremes of annual data ranging from 2·6 bushels per acre for the 1937 crop to 17·6 bushels for that of 1939. Variations in the ten-year average yield data by crop districts ranged from 6·6 bushels in district number 3

[42] See Table V, above.

to 18·5 in district number 8. Generally speaking the low yields for crop districts 1 to 4 are indicative of the climatic conditions throughout the short-grass plains for the entire decade. These four crop districts (cf. map) take in the entire southern part of the province below the valleys of the Qu'Appelle and South Saskatchewan Rivers, and comprise approximately one-half of the total wheat acreage of the province. In the total dismal record as portrayed in Table IX, the year 1937 stands out only in degree of extremity. Even here the regional comparison is striking. With total crop failure prevalent throughout the south-western and central part of the province, nevertheless crop district number 8, lying well within the park belt, gathered a ten-bushel per acre wheat crop, the full equivalent of the provincial average for the decade.



Throughout the decade prairie farmers planted an average of twenty-four and three-quarter million acres of wheat a year. Actual acreages fell to a low of 23·3 million for each of the years 1934 and 1935, and increased to 25·8 for the year 1939.

TABLE IX

Average Yields of Wheat by Crop Districts in Saskatchewan and for the Province of Saskatchewan, 1930 to 1939.

Year	No. 1 South Eastern	No. 2 Regina-Weyburn	No. 3 South Central	No. 4 South Western	No. 5 East Central	No. 6 Central	No. 7 West Central	No. 8 North Eastern	No. 9 North Western	Province of Saskatchewan
1930.....	13·9	11·2	8·4	13·7	16·0	10·9	19·9	24·1	29·3	14·4
1931.....	4·8	1·8	3·1	5·7	10·6	8·4	13·0	22·0	23·4	8·8
1932.....	11·9	11·0	8·3	15·7	17·2	11·6	16·9	22·0	20·7	13·6
1933.....	8·5	12·4	4·0	4·3	23·4	5·6	4·1	16·6	14·4	8·7
1934.....	4·8	4·8	3·6	4·3	18·1	8·2	8·6	16·7	18·1	8·6
1935.....	4·3	7·4	11·6	7·1	9·7	13·8	10·6	16·3	14·3	10·8
1936.....	5·7	9·1	4·4	1·2	16·5	9·8	5·0	13·4	7·7	7·5
1937.....	3·9	1·5	0·2	0·1	7·5	1·2	1·4	10·2	5·5	2·6
1938.....	8·2	10·1	7·0	9·9	15·2	9·3	11·7	13·8	9·0	10·0
1939.....	7·0	9·9	16·6	16·4	21·9	19·3	19·3	27·9	20·0	17·6
Ten-year average..	7·4	8·0	6·6	8·1	15·3	9·7	11·1	18·5	16·1	10·3

Source: Report of the Secretary of Statistics for the Fiscal Year April 30, 1940, Saskatchewan Department of Agriculture.

3. *The Price Record.*—Price experience during the nineteen-thirties was at least as devastating for the prairie farmer as was his production record. With many grades of wheat and many freight-rate zones it is only possible to give illustrative figures bearing on local farm prices. So startling are the contrasts, however, that even rough indices serve the purpose well. Table X shows the record of Wheat Pool payments for wheat for the crop years 1924-25 to 1928-29 inclusive. The prices are for No. 1 Northern in store at Fort William. The pools handled roughly one half of the western wheat crop over the years represented in the table and it has not been clearly demonstrated that their price yields were appreciably out of line, either up or down, from any annual average which could be regarded as more representative of reality for the years in question.

TABLE X

Wheat Pool Payments, 1924-29

(basis No. 1 Northern, Fort William)

Crop Year	*Payment per bushel of wheat*
1924-25	$1.66
1925-26	1.45
1926-27	1.42
1927-28	1.42¼
1928-29	1.18¼

The data in Table X are introduced as giving a reasonable picture of the cash yield of western wheat throughout the latter half of the nineteen-twenties.

The Wheat Pools were not operative on a pooling basis throughout the 'thirties so

that it is not possible to project the data of Table X over the succeeding ten years. Reference to the Winnipeg price for No. 1 Northern wheat, basis Fort William, will however suggest the disaster of the price decline. The Winnipeg price for No. 1 Northern (in store at Fort William) fluctuated roughly between $1.15 and $1.30 per bushel throughout the latter half of 1928 and the early months of 1929. A sudden speculative flurry in the mid-summer of 1929 carried the price to a peak of $1.78¾ in July and a high of $1.73⅝ in August. Thereafter, however, the decline was continuous and at times precipitous. By March of 1930 a low point of $1.00⅞ was momentarily reached. In June the price dropped below a dollar a bushel for the first time in fifteen years. In August, 1930, No. 1 Northern achieved a momentary high of $1.00⅞ and dollar wheat did not re-appear in Canada until July, 1936, a period of six years. The low point for the decade and for all-time Canadian experience was in December, 1932, when No. 1 Northern wheat sold in Winnipeg (in store at Fort William) for 39⅜ cents per bushel. This would represent a farm price of approximately 20 cents. The annual average Winnipeg prices of No. 1 Northern for the decade were as follows:

1929-30	$1.24⅜
1930-31	.64¼
1931-32	.59⅞
1932-33	.54¼
1933-34	.68⅛
1934-35	.81⅞
1935-36	.84⅝
1936-37	1.22⅞
1937-38	1.31⅝
1938-39	.62

The declines in the price of wheat during the early and middle 'thirties as indicated by the above data were far more severe than were the declines in the prices of goods and services necessary for farming operations. In terms of purchasing power, therefore, wheat —along with other farm produce—declined drastically. One careful estimate [43] places the purchasing power of a bushel of wheat at 49, 46, and 42 per cent of the 1913 figure for the years 1931, 1932, and 1933 respectively.

4. *Income, Relief and Debt.*—The combination of short crops and low prices described in the preceding paragraphs resulted in income effects of disastrous proportions. These circumstances are apparent from Tables XI and XII showing cash income data for Canada and the Prairie Provinces for the past twenty-five years. Table XI shows the gross cash income received from the sale of farm produce. Table XII shows *net* income but lumps unincorporated business along with farm enterprises.

High yields and high prices in the late nineteen-twenties had brought prosperity to the farmers of the Prairie Provinces. The average yearly income from the sale of farm products in the Prairie Provinces, for the years 1926 to 1929 inclusive, was $543 million. The bumper crop of 1928, animal as well as cereal, had yielded well over six hundred million dollars. In sharp contrast to these results, prairie farmers derived an average cash income of but $245 million per year for the entire decade from 1930 to 1939 inclusive, a figure substantially below half that of the later nineteen-twenties. The

[43] The Searle Grain Company, Limited, Winnipeg, compares the Searle Index of the cost of 147 items of groceries, clothing, household and farm equipment, farm machinery and municipal and school taxes with the index for the price of wheat.

cereal and livestock crops of 1931, 1932 and 1933 each yielded a bare $175 million, or less than one-quarter of the yield of 1928.

TABLE XI

Cash Income from the Sale of Farm Products for Canada and the Prairie Provinces, 1926 to 1950.

(millions of dollars)

Year	Canada	Manitoba	Saskatchewan	Alberta	Prairie Provinces
1926	963	90	291	163	544
1927	941	80	271	170	521
1928	1,072	83	321	214	618
1929	936	74	245	171	490
1930	640	48	122	96	266
1931	450	31	71	71	173
1932	388	29	78	69	176
1933	402	32	77	69	178
1934	492	43	93	95	231
1935	519	36	108	98	242
1936	580	47	126	94	267
1937	640	75	84	121	280
1938	661	65	93	134	292
1939	717	65	158	120	343
1940	748	64	151	127	342
1941	896	82	162	147	391
1942	1,099	104	195	168	467
1943	1,407	146	328	221	695
1944	1,830	177	544	338	1,059
1945	1,695	153	410	288	851
1946	1,743	167	388	282	837
1947	1,967	182	428	340	950
1948	2,463	248	534	452	1,234
1949	2,495	243	561	460	1,264
1950	2,224	196	408	369	973

Source: Shefrin, Frank, *Farm Income: Cash and Net, 1926 to 1948* (Preliminary Report) Economics Division, Marketing Service, Department of Agriculture, Ottawa, Sept., 1949, p. 8: data for 1949 and 1950 by correspondence.

TABLE XII

Net Income Received by Farm Operators from Farm Production and Net Income of Non-Farm Unincorporated Business for Canada and the Prairie Provinces, 1926 to 1950.

(millions of dollars)

Year	Canada	Manitoba	Saskatchewan	Alberta	Prairie Provinces
1926	1,123	89	200	126	415
1927	1,166	56	208	171	435
1928	1,223	86	220	139	445
1929	1,015	58	89	91	238
1930	874	52	60	71	183
1931	573	19	−10	36	45
1932	464	26	15	33	74
1933	396	18	2	22	42
1934	519	31	13	52	96
1935	588	30	43	49	122
1936	619	38	30	39	107
1937	748	82	−13	87	156
1938	806	59	49	104	212
1939	899	60	125	92	277
1940	980	70	114	117	301
1941	1,118	90	94	102	286
1942	1,740	144	316	243	703
1943	1,599	147	200	150	497
1944	2,010	160	393	252	805
1945	1,841	133	230	190	553
1946	2,161	161	253	243	657
1947	2,350	189	304	282	775
1948	2,953	262	429	386	1,077
1949	2,969	232	441	362	1,035
1950	2,942	219	339	335	893

Source: *National Accounts, Income and Expenditure, 1926-50*, Dominion Bureau of Statistics, pp. 62-3.

The following table groups the cash income receipts into significant periods of years and shows the average per year within each period.

TABLE XIII

Average Annual Cash Income from the Sale of Farm Products in the Prairie Provinces, 1926-50

(millions of dollars)

1926-29 (4 years)	543·2
1930-34 (5 years)	204·8
1935-39 (5 years)	284·8
1940-45 (6 years)	634·0
1946-50 (5 years)	1051·6

Source: Calculated from data in Table XI.

The income position of prairie wheat growers in the nineteen-thirties was at the level of destitution and relief was required on an unprecedented scale in order to avert the most rigorous hardships. In the drought areas of the Prairie Provinces the repeated crop failures wiped out not only the livelihood but also the entire working capital of resident farmers. The relief requirement therefore was not only for food, fuel, clothing and shelter, as it was for the unemployed wage earner, but for seed, feed, fodder, tractor fuel and supplies as well.

The impact of these circumstances was worse in Saskatchewan than in any other province in the Dominion. Successive crop failures affected an area of crop land, concentrated for the most part in this province, equal to one-quarter of the total improved farm acreage in Canada. The drought area during the decade comprised the farms of approximately one-half of all Saskatchewan farmers. In 1931, one-half; in 1933, 1934 and 1936, one-third; and in 1937, two-thirds of the farm population of Saskatchewan was destitute.[44] As early as 1930, municipal and provincial financial resources proved inadequate to the relief requirements of the drought areas in Saskatchewan. The Dominion Government assumed roughly one-half of the total burden by outright grant and for several years provided one hundred per cent of the total relief funds required, by way of grant, loan or bank guarantee. For the period from 1930 to 1937 inclusive, the relief burden amounted to three-fifths of the total ordinary revenues of the provincial and municipal governments of Saskatchewan compared with one-fifth for the rest of the country. In 1937 relief costs amounted to 163 per cent of provincial and municipal revenues in Saskatchewan.[45] Churches, welfare organizations and private individuals within and without the province contributed unstintingly to the alleviation of distress which paradoxically for an agricultural community, but none the less certainly, approached dangerously close to famine proportions.

The wheat economy suffered a tremendous set-back as a consequence of the disastrous years of the 'thirties.[46] The capital accumulated before 1930 was in considerable measure consumed thereafter. Farm buildings and equipment went into disrepair, as did those of the local market centres in almost equal measure. Private and public debt accumulated. Public services of all kinds throughout the Prairie Provinces avoided complete disorganization with the utmost difficulty. It was estimated that the total agricultural debt in Saskatchewan amounted to $525 million as at December 31, 1936, and that a year later it stood at $482 million or $15 per acre of crop land despite

[44] *Report of the Royal Commission on Dominion-Provincial Relations*, Book I, p. 169.

[45] *Ibid*, p. 170.

[46] For a thorough and sympathetic treatment of economic and social conditions in the central prairie province during the nineteen-thirties, see G. E. Britnell, *The Wheat Economy* (Toronto, 1939).

the cancellation of $83 million in 1937 under debt adjustment legislation.[47] Estimates made for the Rowell-Sirois Commission placed the agricultural debt of the Prairie Provinces at $806·3 million as at December 31, 1937.[48] Between 1930 and 1937 the total debt of the Saskatchewan provincial government was more than doubled, with three-fourths of the increase due to relief.[49] In 1929 the per capita dead-weight debt of the province was the lowest in Canada with the exception of Quebec; in 1937 it was the highest.[50]

5. *Population Movements.*—The economic conditions of the nineteen-thirties led to a reversal of earlier population movements within the Canadian economy. The Prairie Provinces became an area of net emigration, providing a substantial flow of population to central Canada and to British Columbia. Within the Prairie Provinces themselves, population moved away from the short-grass plains, the most seriously drought-ridden areas, toward the park belt on the north and east. Tables XIV and XV indicate significant population movements for the Prairie Provinces individually and as a group.

TABLE XIV

Population of the Prairie Provinces 1921 to 1941

	1921	1926	1931	1936	1941
Manitoba....	610,118	639,056	700,139	711,216	729,744
Saskatchewan	757,510	820,738	921,785	931,547	895,992
Alberta.....	588,454	607,599	731,605	772,782	796,169
Prairie Provinces..	1,956,082	2,067,393	2,353,529	2,415,545	2,421,905

Source: *Eighth Census of Canada, 1941*, p. 3, and *Census of the Prairie Provinces, 1936.*

TABLE XV

*Net Immigration into or Emigration from the Prairie Provinces, 1921-31, 1931-36, 1936-41**

	1921-31	1931-36	1936-41
Total Increase in Population...	397,447	62,016	6,360
Natural Increase.....	356,729	165,442	150,770†
Net Immigration (+) or Emigration (−).....	+40,718	−103,426	−144,419

* Adapted from *The Interests of Western Canadian Agriculture in the Peace Settlements* (Midcontinent and the Peace, No. 2, Minneapolis, 1943, p. 9.
† Estimated.

There were more people in the Prairie Provinces in 1941 than in 1931, but very few more than in 1936. In the five years after 1936 these provinces lost population equal to more than ninety-five per cent of their natural increase. Even between 1931 and 1936 there was a substantial net emigration from the three provinces. During the nineteen-thirties the Prairie Provinces provided a net emigration of close to a quarter of a million persons.

The loss of population from the Prairie Provinces as a group was accompanied by a pronounced internal migration. Many residents of the worst drought areas of Alberta and Saskatchewan in particular, and to a lesser extent, of Manitoba, migrated northward and northeastward, away from the short-grass plains to the circling park belt. The census divisions in the inner triangle along the Saskatchewan-Alberta

[47] *A Submission by the Government of Saskatchewan to the Royal Commission on Dominion-Provincial Relations* (Regina, 1937), p. 194.
[48] Waines, W. J., *Prairie Population Possibilities* p. 55.
[49] *Report of the Royal Commission on Dominion-Provincial Relations*, Book I, p. 170.
[50] *Ibid.*

boundary lost particularly heavily. Whole census divisions in that area had only four residents in 1941 where there had been five in 1931. Census division number 5 in Alberta had little more than two-thirds the population in 1941 that it had in 1931. These, be it noted, are losses in absolute numbers and indicate total net emigration from the particular districts of numbers equal to total natural increase *plus* the declines recorded in census data.

The thinning out of population in the period of the nineteen-thirties was much more pronounced and widespread in Saskatchewan than in Alberta. The removal had occurred in Alberta in the five-year period from 1921 to 1926 following the four or five years of disastrous drought which had affected particularly the eastern part of that province at the end of the first world war.[51] Between 1921 and 1926, census divisions 1, 3, 5 and 7 in Alberta, which blanket the eastern part of the province below the North Saskatchewan River, declined in population by 20,500 persons or by approximately 17 per cent of their 1921 total. South-western Saskatchewan had suffered throughout those years as well, and had experienced certain readjustments of population and farming practices in the first half of the nineteen-twenties. Nevertheless, throughout this earlier period of readjustment, which had been of such drastic magnitude for eastern Alberta, only two census districts in Saskatchewan (8 and 9) had registered any absolute loss of population. This decline had been of the order of twenty-five hundred or less than three per cent. The Alberta agricultural economy had been much more thoroughly shaken down before 1931 than had that of Saskatchewan. The readjustment in the latter province was particularly acute thereafter.

Eleven census divisions in Saskatchewan (divisions 1-8, 11, 12, and 13) lost population absolutely between 1931 and 1941. Their absolute decline equalled 73,000 or approximately 12 per cent of the population in these divisions in 1931. These divisions as a group had two-thirds of the population of the province in 1931 and only 60 per cent of it in 1941. Meanwhile census divisions in the park belt portions of the province increased substantially in population. One division (number 14, running east from Melfort to the Manitoba boundary) increased from 46,222 to 65,166, or by 41 per cent.

6. *Rehabilitation.*—During the early nineteen-thirties the economic distress throughout the Prairie Provinces was so great and the various governmental agencies were so ill prepared to meet the situation that little long-run planning was possible. Problems were dealt with as they arose, on a day-to-day or year-to-year basis. It was a question of assuring relief rather than of planning rehabilitation. Toward the middle of the decade, although relief requirements abated little, the Dominion and provincial governments began to take the longer view and to formulate measures which would contribute to rehabilitation and not merely to temporary relief. Relief and rehabilitation became complementary purposes of the Dominion and provincial governments.

Most far-reaching of all the measures looking toward re-orientation of prairie agricul-

[51] See Table VI, above.

ture was the institution of the Prairie Farm Rehabilitation Administration by the Dominion government in 1935.[52]

This agency of the Dominion Department of Agriculture has since its inception gone far toward the formulation and implementation of a program for the improvement of prairie agriculture. In general terms this program has required action in three areas, those of cultural practice, land utilization, and water conservation.

The most critical problem which awaited the Administration on its establishment was that of widespread soil drifting or massive wind erosion. Millions of acres, entire regions in the short-grass areas, were rapidly becoming uninhabitable by virtue of this condition. This and many other problems as well as many variants of the problem of wind erosion have been dealt with in terms of cultural practices with a most encouraging measure of success. The demonstration and encouragement of such practices as the use of the plowless or trash-covered summer-fallow and of strip farming contributed to the restoration of a high proportion of the eroded land to effective cereal cultivation. Substantial acreages of the poorest lands were, however, permanently removed from cereal production, and large areas were re-grassed and individual holdings consolidated into community pastures. The community-pasture project, well under way before the end of the 'thirties, has continuously expanded until by 1951 more than eighty such pastures comprising over a million and a half acres of sub-marginal land had been established. These pastures provide grazing facilities for some seventy thousand head of livestock belonging to six thousand farmers within reach of the respective pastures. Obviously the establishment of community pastures has involved much effort in the way of land classification and in the resettlement of resident farmers—this by way of correction of the worst of the mistakes of the original settlement movement.

The water conservation activities of the P.F.R.A. comprise "small" and "large" water development projects, the latter more recently sub-classified as "community" and "major" water development projects. Under the small water development program the P.F.R.A. has provided engineering and financial assistance toward the construction of upwards of fifty thousand small dams and dugouts for the conservation of spring run-off waters on individual farms. Large water development projects, whether of the community or of the major category, have been financed exclusively by P.F.R.A. or on an agreed Dominion-provincial basis. The major water development projects envisage the damming of rivers which cross the plains in order to control their flow for irrigation and power production. The completion of the St. Mary Dam in 1950 and the creation of the distributive system which has been in process since that time brings one of the major projects appreciably nearer to completion. The South Saskatchewan River Project is, of course, one of the remaining major water development possibilities which is still under review. In terms of rough perspective the P.F.R.A. river projects envisage of the possibility of placing two million acres of land "under the ditch" in

[52] *Statutes of Canada*, 25-26 Geo. V (1935) c. 23.

addition to some six hundred and fifty thousand acres now in that category in the Prairie Provinces.

The P.F.R.A. was clearly designed to deal with production difficulties as a necessary step toward the restoration and maintenance of real agricultural income in the wheat economy. In addition to the establishment of this agency the Federal Government took steps in the 'thirties to deal more directly with the price and income hazards to which wheat growers are subject. The price stabilization operations carried on after 1930 by J. I. MacFarland with federal moneys gave way to a federal wheat board with an annual guaranteed minimum price for wheat after 1935. This agency served as an optional wheat-marketing channel until 1943 when the Canadian Wheat Board was given exclusive control over the marketing of Canadian wheat, a control which it has since retained. In 1939 the Prairie Farm Assistance Act[53] provided for annual grants to individual farmers under certain production and/or price conditions conforming to the legislative definition of a "national emergency" or a "crop failure year". The maximum grant to the individual farmer could not exceed $500 in any year. Growers pay a levy of one per cent of the sale price of all wheat, oats, barley and rye which they market. Deficiencies are made up out of the Consolidated Revenue Fund. From 1939 to the end of the fiscal year 1950-51, total payments under the Prairie Farm Assistance Act had amounted to $135 million and total receipts to $52 million.

The federal government attempted to contribute toward the solution of the agricultural debt problem in the Prairie Provinces by the enactment of the Farmers' Creditors Arrangement Act in 1934.[54]

The provincial governments as well as the Dominion gradually came to combine rehabilitation with relief. The transfer of the natural resources to the Prairie Provinces in 1930 gave the governments of these provinces a much greater interest and responsibility in the matter of settlement and resettlement than they had had at any previous time. Alberta had already devised special legislation to deal with acute resettlement problems in one of the areas—the Tilley East Area—most severely affected by the drought in the early inter-war years. The Tilley East Area Act of 1927[55] established a joint Dominion-provincial board for the supervision of this area. The board began operations in 1929 but the Dominion interest in the matter was relinquished in 1931 after the transfer of natural resources to the provinces. The Board worked for a thorough reorganization of agricultural production in the Area. Settlers were moved from the worst of the land to better parcels within or, more commonly, without the district. Holdings were consolidated to provide private or community grazing leases. The Area was closed to further settlement and public facilities were abandoned or consolidated. In 1932 the special-areas type of approach was generalized in Alberta by the passing of the Special Areas Act, a land utilization act providing for a provincial board for the administration of existing special areas and for additional areas which it might be considered advisable to add.

[53] *Statutes of Canada*, 3 Geo. VI, (1939) c. 50. [54] *Ibid*, 24-25 Geo. V (1934) c. 53. [55] *Statutes of Alberta*, 1927, c. 45.

Saskatchewan faced the problems of resettlement on a major scale for the first time after 1929. Considerable governmental assistance was given to the movement of families from unsuitable lands. In 1936 the government established a Land Utilization Board under provincial statute[56] which empowered the Board to withdraw land from cultivation and to control the use of grazing lands. These powers were modified and extended by later legislation. By the end of the decade it was estimated that upwards of 10,000 families had moved from the worst of the drought areas in southern Saskatchewan to new holdings in the wooded areas and park belt of the north.[57]

7. *Summary.*—By the end of the nineteen-thirties considerable progress had been made toward a re-orientation of the prairie agricultural economy and the correction of the worst of the mistakes made in the unreasoning enthusiasm of the land-rush days. A decade of public and private effort had begun to show long-term results. Many thousands of individuals had suffered acutely, some irreparably. Land abandonment and resettlement are impersonal terms with tragic personal import. Human resources no less than other resources are subject to misuse, erosion and destruction.

The wheat economy exemplified all these processes in full measure in the 'thirties but by the end of the decade the most painful of the inevitable readjustments had been made. Lands had been abandoned or restored to grazing use, population had been thinned out and farm units had been enlarged. Methods of cereal cultivation had been revolutionized. "Black" summer-fallow had made farming possible on the short-grass plains but had eventually come near to destroying the plains and the plains population as well. This type of summer-fallow had to be replaced but it was replaced by another type, the trash-covered summer-fallow, and not by no summer-fallow at all. The plow and disc harrow which buried all stubble and pulverized the top soil were replaced by the one-way disc, the rod weeder, the duck-foot cultivator and a considerable variety of other cultivators which individually or collectively left stubble and trash on or near the surface and left the surface in clods, lumps and ridges instead of in a floor of powder. Tractors replaced horses in increasing proportions, harvester combines became more plentiful and farm trucks more common (see Table VIII above). The development and introduction of rust resistant varieties of wheat in the middle 'thirties wiped out almost completely, for the immediate future at least, the greatest of all hazards to the wheat grower with the single exception of drought.

V. Effects of the Second World War on the Prairie Economy

1. *Wheat and Wartime Agricultural Policy.*—The outbreak of the second world war in 1939 came at a time when the prairie wheat economy had made significant beginnings in the processes of re-orientation of agricultural location and methods and some recovery from the economic difficulties of the preceding decade. Moisture conditions had improved in 1938 and 1939 and agricultural

[56] *Statutes of Saskatchewan*, 25 Geo. V, c. 62.
[57] Eisenhauer, E. E., "Land Utilization in Saskatchewan", *C.S.T.A. Review*, December 1939, p. 23.

prices had risen moderately from those prevailing in the middle of the decade. Prairie farmers were, however, still saddled with an impossible burden of debt, and farm buildings and equipment were in a desperate state of disrepair. Urban and public facilities were scarcely better preserved.

The early alignment of combatant groups in the new struggle, with Britain and France in alliance against Germany and Italy, suggested striking similarities between the circumstances of the first and second world wars. The imperative demand of the Allies for wheat after 1914 had given tremendous impetus to the expansion of the prairie wheat economy. There was much to suggest that the new conflict, deplorable though it was, would nevertheless solve the long-standing problems of the wheat market. The Canadian wheat carryover had fallen to 24·5 million bushels by July 31, 1938, and although it was 103 million bushels on July 31, 1939, the figure was still less than half the carryover at the ends of specific crop years in the middle 'thirties. Wheat prices rose with the British and French declarations of war against Germany and remained firm throughout the winter months of 1939-40. Prairie farmers increased their seeded wheat acreage from 25·8 million acres in 1939 to 27·7 in 1940. The obvious hope was that the disastrous economic conditions in the Prairie Provinces might soon be reversed.

The military developments of 1940 altered wheat-market prospects adversely and with drastic suddenness. The German occupation of Norway and Denmark, of the Low Countries and, finally, of France, all by midsummer of 1940, closed western Europe to Canadian wheat or any other product. With a large crop of wheat in Canada in 1939, with great pressure on shipping facilities and with the loss of substantial pre-war markets, the outlook for the disposal of Canadian wheat became worse than ever. By the beginning of the crop year of 1940 (August 1, 1940) the Canadian wheat carryover had trebled to 300 million bushels with a crop of 540 million bushels in harvest. On top of all these circumstances it was very early made clear that Britain's food demands were not to be exclusively or even primarily for wheat as in the first world war, but for concentrated protein and fat products involving bacon, beef and cheese, and a considerable range of dehydrated products including particularly milk and eggs. In response to these various circumstances a substantial segment of Canadian war-time agricultural policy after 1940 was directed toward the transformation of as much as possible of the prairie wheat economy into a coarse grains and livestock economy.

Measures designed to divert prairie acreage from wheat to coarse grains production began with the emergency imposition of marketing quotas in August, 1940. These were applied to oats and barley as well as wheat. In the spring of 1941 the Dominion Government instituted the wheat acreage reduction program which envisaged a reduction of one-third in prairie wheat acreage. A limit of 223 million bushels was set for prairie wheat marketings for the year, an amount estimated to represent the normal yield on two-thirds of the seeded acreage of 1940. Farmers were to be paid $4.00 per acre for wheat acreage diverted to summerfallow and $2.00 per acre for land diverted to coarse grains or hay. Under the combined pressures and incentives of this policy prairie farmers reduced wheat plantings by

22 per cent (6·2 million acres) in 1941 and by an additional 20 per cent of the original figure (5·5 million acres) by 1943. The first reaction was to leave the diverted acreage in summer-fallow, but by 1942 there was an increased interest in coarse grains and flaxseed with the establishment of minimum prices for oats and barley and a fixed price for flaxseed in March, 1942.

Climatic conditions favored wheat and other cereal production in the Prairie Provinces throughout the years of the second world war and indeed, throughout the 13 years from 1939 to 1951 inclusive. Marketing quotas and acreage reductions were not sufficient to keep the annual wheat crop down to marketable proportions. The Canadian carryover multiplied to a maximum of 595 million bushels at the end of the 1942-43 crop year, July 31, 1943. Elevator capacity in the Dominion, which amounted to 423 million bushels at the outbreak of war, was far over-taxed and was rendered only reasonably adequate by the construction of temporary and special annexes with a capacity of approximately 180 million bushels. The Canadian Wheat Board increased its initial price for wheat only twice during the war, from 70 to 90 cents per bushel (basis No. 1 Northern Fort William) effective August 1, 1942, and again to $1.25 per bushel (same basis) effective September 28, 1943.

Restrictions on wheat marketings and only moderate increases in the price of wheat were paralleled by an almost unlimited demand for livestock and dairy products and by favorable prices for these products. In 1928, 72 per cent of the cash income from the sale of farm products in the Prairie Provinces had been derived from wheat. In the late inter-war years approximately two-thirds of the cash income of prairie farmers came from the wheat market. In 1942 only 30 per cent of the cash income of prairie farmers came from wheat. In 1942 the Prairie Provinces provided 60 per cent of Canadian hog slaughterings as compared with 40 per cent before the war. For several years commencing in 1942 Alberta had a larger hog population than Ontario, and Saskatchewan was a not-too-distant third. Throughout the years of the second world war considerably less than half of the cash income of the farmers in the wheat economy came from wheat.

2. *Cash Income and its Uses.*—Cash income from the sale of livestock and livestock products from prairie farms multiplied during the years of the second world war. Increases in the income from these sources were more than sufficient to compensate for restrictions placed on the production and marketing of wheat. Total agricultural cash income in the prairie economy increased greatly over that of the pre-war years (see Tables XI and XIII above). Cash income from the sale of farm products in the Prairie Provinces had averaged just over two hundred million dollars per year for the first half of the 1930's and less than $250 million per year for the entire decade. The annual figure became steadily higher following the outbreak of war. In 1943 it was just short of $700 million and exceeded the figure for 1928 for the first time since that date. The wartime peak came in 1944 with a cash income for prairie agriculture in excess of $1 billion. The average for the six war years, 1940 to 1945 inclusive, was $634 million. The average for the five post-war years, 1946 to 1950 inclusive, was $1,052 million.

The figures given above are gross figures. Production costs increased sharply for prairie farmers during the war years and the increases in gross incomes were by no means all clear additions to the net returns of producers. Nevertheless, net incomes increased markedly and the ready cash was available for a wide variety of essential purposes in addition to provision for living costs. Debt reduction was one of these.

Estimates cited above placed the agricultural debt in the Prairie Provinces at a peak figure of approximately $800 million at the end of 1937. Debt cancellations reduced this total somewhat within the next year or so, but the increases in cash receipts which commenced with the marketing of the bumper wheat crop of 1939 and which continued with the more varied marketings of successive years made further reductions possible by way of repayment. The Dominion Mortgage and Investments Association released an analysis[58] on March 28, 1945, which embodied the estimate that prairie farmers had reduced their indebtedness between December 31, 1937, and December 31, 1944, by fifty per cent or by $400 million. The Association summed up its analysis at that time by saying: "As a result [of debt reductions] the farm debt problem of the 'thirties has disappeared".[59] The Annual Report of the same Association, issued on May 1, 1952, summed up its comments on farm mortgage investments with the following paragraph:[60]

"It will be noted that the amount owing by Alberta farmers shows a reduction of 76 per cent since 1937, whereas the amount owing by Saskatchewan farmers has dropped 84·8 per cent, and by Manitoba farmers, 83·3 per cent. This does not mean that Alberta farmers have a poorer record than Manitoba and Saskatchewan farmers. Rather repayments by Alberta farmers since 1947 have been largely offset by money advanced on new farm mortgages in that province. The Manitoba figure would also show a greater reduction if repayments in recent years had not been offset partly by money advanced on new mortgages."

A substantial part of the cash income of prairie farmers during the war and post-war years had of necessity to be used for replacements and repairs to the machinery, equipment and buildings essential to farming operations. Machinery and repair parts and building materials were in short supply throughout the war years, but labor shortages and the deplorable condition of prairie farming equipment made it imperative that the utmost effort be made toward the provision of new implements and repairs. As indicated in Table VIII above), prairie farmers were able to make substantial net additions to their equipment by way of purchases of tractors, trucks and combines even by the end of the war. It should be emphasized also that the units purchased within these categories were substantially more effective than those which had been available a decade earlier. Trucks have, of course, been mounted on pneumatic tires from the early days, but not until the second world war did rubber tires come to be the standard type of mounting for tractors, combines and, indeed, for all other farm machines. Improvements in design, notably the development of the self-propelled combine and the increase in the economical operating speed of the farm tractor, have all contributed to the effectiveness of farm labor in the Prairie Provinces.

[58] *Report on Farm Mortgage Debts in the Three Prairie Provinces*, (Dominion Mortgage and Investments Association, March 28, 1945).

[59] *Ibid.*

[60] Dominion Mortgage and Investments Association, *Annual Report*, May 1, 1952, p. 11.

Other portions of the wartime cash income of prairie farmers went into the payment of arrears of taxes and into the purchase of rural and urban real estate. Funds devoted to the first of these uses, and to the payment of current tax levies as well, enabled provincial governments, municipal units and school districts to deal adequately with their essential functions for the first time in more than a decade. By the purchase of agricultural lands many farmers were able to enlarge their holdings to a more economical size. The purchase of urban property was for either one of two purposes: either to provide a town or city home for the retirement of an elderly farmer, or to provide a winter or year-round urban residence for the family of a still active farmer. Increasing proportions of prairie agricultural land are being operated by farmers who live continuously "in town", the town being a population grouping which may vary in size from a few dozen to many thousands of families and may be classified for local government purposes as a hamlet, a village, a town or a city.

3. *Population Movements during the Forties.*—Much of the impact of the second world war on the prairie economy was transitory but much, also, was of continuing significance. The continuing effects are most readily noticeable in circumstances where the pressures and incentives engendered by the war merely served to reinforce those already at work. Population movements provide the clearest example of this fact.

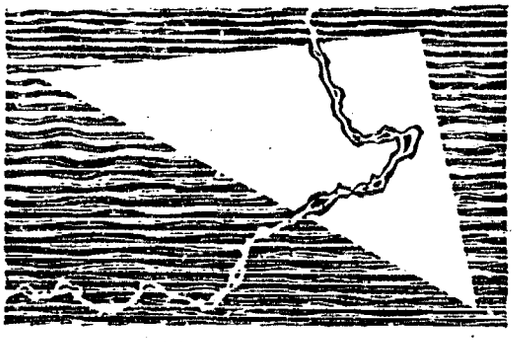
Census data (*see* Table II, above) indicate that the population of the Prairie Provinces increased by 125·7 thousand or by approximately five per cent from 1941 to 1951. This is less than half the rate of increase for the Dominion as a whole (exclusive of the increase due to the entry of Newfoundland). Ontario and Quebec each increased their total by one-fifth and British Columbia by two-fifths from 1941 to 1951. The increase in the prairie provinces is placed more clearly in perspective when it is related to data concerning natural increase. Vital statistics reports issued by the Dominion Bureau of Statistics indicate that total natural increase (the excess of births over deaths) in the Prairie Provinces between 1941 and 1951 was approximately 396 thousand. Over the decade of the 'forties, therefore, with a population increase of 125·7 thousand, it is indicated that the Prairie Provinces had a net emigration of approximately 270 thousand or a number roughly equal to two-thirds of the total natural increase.

The circumstance in which the Prairie Provinces are unable to provide economic opportunities for their total natural increase, let alone for substantial net immigration, is not new, nor is it attributable to wartime influences. It has already been pointed out (*see* Tables XIV and XV, above) that the Prairie Provinces had a net emigration of approximately 248 thousand in the 'thirties. From 1936 to 1941 these provinces lost population equal to 96 per cent of their natural increase. The influence of war and post-war economic conditions was salutary for the Prairie Provinces in that the industrial expansion which came with the war and which multiplied thereafter provided occupational opportunities in the central provinces and British Columbia for the surplus labour of the wheat economy. Mechanization of prairie wheat farms has displaced farm labour in the West and made it available for employment elsewhere. War and post-war

industries have relieved the Prairie Provinces of unemployed and underemployed farm labour.

Saskatchewan was the only one of the Prairie Provinces which had an absolute decline in population between 1941 and 1951. In this province an absolute decline of 64 thousand, when taken in conjunction with a natural increase of 137 thousand, indicates a net emigration of just over 200 thousand for the decade. Neither Manitoba nor Alberta had a decline in population in the decade, but neither one retained all of its natural increase. Alberta came closest to doing so with an indicated net emigration of less than eight thousand for the decade. Most striking feature of the population situation in Alberta is the tremendous expansion of the cities of Calgary and Edmonton throughout the decade. The population of Calgary increased from 93 to 139 thousand and that of Edmonton from 98 to 173 thousand over the decade of the 'forties.

4. *Conclusion.*—Reasoning from the experiences of the years after the first world war an agricultural recession was confidently expected after the end of the second. This did not occur. Cash income of prairie farmers averaged $634 million per year throughout the war and $1,052 million for the five post-war years, 1946 to 1950, inclusive. The Canadian Wheat Board has retained the monopoly position in the marketing of Canadian wheat which was assigned to it in September, 1943. The four crops from 1946 to 1949 were sold with the United Kingdom Wheat Agreement as the predominant instrument. Simultaneously the five crops from 1945 to 1949, inclusive, were placed in a compulsory domestic pool. Total payments for wheat delivered to this pool amounted to approximately $1.83 per bushel, basis No. 1 Northern Fort William. An international wheat agreement governs the bulk of the crops from 1949 to 1952, inclusive, and negotiations are under way looking toward a new agreement to replace the current one upon its expiry. Livestock prices like wheat prices rose in the post-war years and remain high. Returns from wheat continue since the war, as they did during the war, to yield less than half the total of prairie agricultural income. This is a substantial change from the typical pre-war situation where wheat accounted for approximately two-thirds of the total.



CHAPTER 4

Irrigation Development in Western Canada

IN HALF a century marked by notable achievements and painful reverses, the development of irrigation within the South Saskatchewan watershed had reached a total of 610,150 acres in 1952. Almost all of this acreage was in Alberta. The ultimate irrigated area allowed for, by extension of existing projects, was approximately 1,300,000 acres. Plans for the future, including the Red Deer River Project, bring the total to 1,721,400 acres. This is the full claim to date made upon the flow of the South Saskatchewan River for irrigation purposes, and it has been allocated by the Prairie Provinces Water Board and approved by the Governments of Canada, Alberta, Saskatchewan and Manitoba.

Irrigation was undertaken initially by private enterprise, but the prospects of profitable investment soon turned out to be illusory. As will be seen, the costs were transferred, in more or less degree, to the general taxpayer until today the provision of substantial public subsidy is taken for granted as a necessary concomitant of irrigation policy.

This section will review the beginnings of irrigation in Alberta, with the help and encouragement that was provided by the Federal Government through its Commission of Irrigation and, later, the Reclamation Service that was established in 1919. The stage at which the Federal Government began to assume a share of the capital costs of irrigation works is relatively recent. An account is given of irrigation projects that were undertaken by corporate owners, and of the transformation of these into community organizations. Following that, the section will deal with the engineering, the colonization and the financial problems encountered in the development of irrigation in Western Canada, and the steps taken to solve them.

Beginnings of Irrigation on the Prairies

The development of irrigation in Western Canada has avoided the legal confusion that arose regarding water rights throughout most of North America. Legal difficulties arose principally because of a conflict between the traditional common law, derived from England, and the practice of the frontier. The common law was designed to secure to all landholders along the banks of a stream the right to enjoy the full and uninterrupted flow of that stream. The practice of the frontier, explicitly sanctioned by much local legislation allowed the appropriation, as private property, not only of land and mineral deposits, but of running water as well. This practice was in conflict with the accepted interpretation of common law, and endless confusion and litigation resulted.

Existing and planned projects, with acreages to be irrigated are:

Project	Acreage under Irrigation, 1952	Ultimate
Western Irrigation District	50,000	50,000
Eastern Irrigation District	200,000	281,000
Bow River Project (Canada Land)	50,000	240,000
Lethbridge Northern	75,000	96,135
United Irrigation District	21,000	34,000
Mountain View Irrigation District	3,600	3,600
Leavitt Irrigation District	2,500	4,400
Aetna Irrigation District	50	7,300
St. Mary-Milk River Project	150,000	495,000
Red Deer River Project	(Planned only)	350,000
Macleod Irrigation District	500	5,000
*Small Projects	(Planned only)	64,000
Swift Current Irrigation Project	7,500	21,000
Private Projects	50,000	70,000
	610,150	1,721,400

* Possible small projects in Alberta are:

	acres
Carmangay	12,000
Macleod Extension	20,000
Pincher Creek	16,000
Oldman projects	16,000
	64,000

Similar confusion never arose in Alberta, largely because the foresight and enthusiasm of a few civil servants in the Canadian Department of the Interior led to the adoption of an overriding statute, the Northwest Irrigation Act of 1894. The basic principles of this Act have never been altered, and may be summerized as follows:

1. The ownership of all surface waters is vested in the Crown and these waters, or the right to their use, cannot become private property.

2. The use of water is regulated by licences from the Crown which are subject to cancellations for non-use or mis-use.

Subsequent amendments made little change in the principles of the Federal legislation, which proved remarkably successful in preventing the litigation and confusion elsewhere associated with irrigation development.[1]

The earliest irrigation projects in Alberta were undertaken by private citizens who appropriated water and sometimes land, without title or licence. It was the activities of these early appropriators which had convinced Dominion officials of the necessity for comprehensive legislation governing the use of water. Private projects since 1894 have been regulated under government licence. Some seven hundred licences are now operating. The total area irrigated in this way amounts to only about 70,000 acres, and the total cost of irrigation works for the private projects is estimated at $700,000 or approximately $10.00 per acre.[2]

Construction of private irrigation projects has been facilitated by the operation of the Prairie Farm Rehabilitation Act, and Federal aid for such projects between 1935 and 1948 amounted to $58,784.99 for a total of 365 such projects. In addition to cash subsidies, the P.F.R.A. provides complete engineering service free of charge.

[1] Col. J. S. Dennis, who as Chief Inspector of Surveys in the Department of the Interior was principally responsible for drafting the Northwest Irrigation Act, once stated that while "in the States to the South more money had been spent on litigation than on irrigation development" the Northwest Irrigation Act in Canada had been in operation for over 15 years and . . . they had yet to have their first dispute in the courts in connection with that law. Report of the Proceedings of the Second Annual Convention of the Western Canada Irrigation Association, August 1908, Government Printing Bureau, Ottawa, 1909, p. 5.

[2] Report on Surface Water Supplies and Water Power of Alberta, Edmonton, 1948, p. 35.

The interest of the Dominion Government in irrigation developed out the policies pursued to settle the Canadian West.[3] Land settlement required a method for locating parcels, and the rectangular system of the United States was adopted. The necessary survey activity occupied land surveyors in the West for many years. These surveyors employed by the Dominion Department of the Interior, were the first to realize the possibilities for irrigation in the semi-arid regions of southern Alberta, and their earliest reports contain frequent reference to the subject.

Much credit for awakening official interest in irrigation belongs to Wm. Pearce [4] who was Superintendent of Mines in the West over the turn of the century. In his report of 1885 extensive reference is made to the possibilities of inexpensive irrigation of large tracts of land in various parts of grazing districts. He visualized the use of these lands for growing extra hay for feeding livestock. He suggested that this would reduce the risk to the ranchers and create more stability for the livestock industry.

Pearce's interest was later attracted to the possibilities of irrigating tracts of land which were being brought under cultivation by settlers. Evidently he was impressed by the increase in productivity achieved by the combination of cultivation and irrigation. After a trip into the Lethbridge district his interest was heightened by the enthusiasm shown for irrigation in that area.

In 1889 he urged legislation, which was subsequently passed by the Northwest Assembly, to regulate the use of public waters for irrigation purposes He also urged topographical surveys so that irrigation costs might be estimated and sites for reservoirs reserved. In 1893 the report of the Deputy Minister of the Department of the Interior suggested that the relatively small area which suffered from recurrent dry periods could profitably use irrigation, making the adjacent dry land more valuable. The Deputy and Pearce together submitted [5] that about three million acres could be reclaimed from comparative aridity and rendered productive for purposes of mixed farming. The Dominion Government thereupon accepted a definite policy to encourage irrigation. One of the first steps taken was to send J. S. Dennis to the United States to study irrigation at first hand. As a result of the experience he gained, and upon his suggestion, the Northwest Irrigation Act was passed by Parliament in 1894. This Act regulated the use of waters flowing through the semi-arid region. Mr. Dennis became the first Commissioner of Irrigation under the Act and held that post for the next eight years.

The major task of the Commissioner of Irrigation was to survey the lands of Western Canada which were potentially irrigable.

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[3] Morton A. S. and Martin, Chester. History of Prairie Settlement and Dominion Lands Policy. Volume II, Canadian Frontiers of Settlement. Toronto 1938.

[4] J. S. Dennis, Chief Inspector of the Surveys Branch, said in his report of 1894: The existing climatic conditions and the necessity for irrigation had been frequently referred to in the reports of land surveyors employed in surveying of this arid region into townships and sections, but it is probably due to the lengthy reports upon the subject and to the persistent advocacy of the principle by Mr. Wm. Pearce, more than any other cause, that the public have at last recognized the necessity for irrigation and the benefits to be secured therefrom.

[5] The submissions made by these gentlemen were aided by agitation from the Calgary Chamber of Commerce.

By 1897 Dennis had classified as arid all the area south of Clive from a point on the 4th Meridian north of Provost southwesterly to Three Hills and thence straight west to the mountains.

In the years that followed the beginning of the surveys, the Dominion Government did much to assist irrigation. For developmental purposes an Irrigation Branch Office was opened at Calgary. The duties of its staff were primarily to catalogue the water resources that might be used for irrigation and the areas to which the water might be applied. Extension work was carried on by the use of reports about irrigation, aimed to persuade the irrigation farmer to rely more on irrigation and less on the natural rainfall with its attendant uncertainty. These reports also explain the best methods to be adopted in irrigation farming.

The year 1898 marked the end of what may be called the experimental stage of irrigation development in Alberta. Dennis stated in his report for that year:

> Private enterprise has sufficiently proved the benefits to be derived from irrigation to induce the investment of the sums required to complete the larger canals which must be undertaken as corporate works, this result being shown by the commencement of the construction by the Alberta Irrigation Company of the St. Mary Irrigation Canal . . .

Federal Participation in Irrigation

In pursuit of a general policy of developing the West and its resources, the Dominion encouraged irrigation but resolutely avoided financial participation. Irrigation over a large area in southern Alberta was physically possible, and if anything there was more land than available water. The Dominion was prepared to facilitate development within the confines of its policy and to this end arranged possession of large blocs of land. Further, it passed the Northwest Irrigation Act designed to regulate the use of irrigation waters and to provide a system of selling land with a virtual rebate of two-thirds of the initial price to offset money expended on irrigation. The activities and personnel of the Dominion were effective and influential. The officers of the Irrigation Branch indicated their belief that the benefits of irrigation were:

(a) the reduction of the risks to which farming and ranching were otherwise subjected;
(b) continuous increased yields;
(c) increased livestock producing capacity;
(d) an increase in agricultural industries and services;
(e) an increase in population and the assurance of its stability.

A recurrence of drought in 1914 was "the outstanding feature of the crop season".[6] To the Irrigation Branch two such seasons in five years forcibly illustrated several things. First, it illustrated the wisdom of installing irrigation systems wherever the water supply would permit and the land was adaptable. Second, it showed the absolute necessity of improved farm methods for the conservation of soil moisture where dry land farming was practised. Third, it indicated the hazardous nature of grain farming as contrasted with mixed farming. After wet seasons in 1915 and 1916, the year 1917 was comparatively

[6] Report on Irrigation for the year 1915. King's Printer. Ottawa 1916.

dry and in the next season the full effects of drought were again experienced. The interest of virtually all southern Alberta turned to irrigation.[7] The Department of the Interior spent $600,000 on irrigation surveys during that year alone.

The war introduced a period of stagnation into the development of irrigation. The difficulty of securing funds, the decline in immigration, a shortage of labour and the higher rate of wages forced the discontinuance of irrigation enterprises. The efforts of the Irrigation Branch at this time were directed to extension work emphasizing the importance of correct irrigation methods in producing maximum benefits. The difficulties in this matter were indicated by Superintendant Drake in his report for 1917.

> Our officers are, primarily, engineers rather than agriculturists, and, while in the course of their duties they have acquired considerable knowledge of up-to-date agricultural methods, they cannot and do not profess to be agricultural experts.
>
> Much of the stagnation in irrigation development is probably due to ignorance on the part of the settlers as to the proper methods to follow in order to produce the best results, and it would seem that the time is now ripe for a campaign of education along this line. Efforts are being made to secure competent agricultural experts who can first be taught the essential features of irrigation practice, and thereafter be assigned to the duty of advising and instructing the settlers. It is difficult, however, at this time to secure properly qualified men for this work, and there is very little prospect of much development along this line as long as the war continues.
>
> As a result very strong demands arose for completion of the surveys of all large projects which have been contemplated and in addition a very large number of applications were received during the year from persons who wanted to construct small private schemes. It was not found possible to complete either all the large survey work required, or the necessary inspection of the small private schemes. It is consequently expected that a very heavy program of work will have to be undertaken in both these departments during 1920.
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> Annual Report of the Reclamation Service. 1919-20. King's Printer. Ottawa 1920.

In 1919 the Dominion Government recognized its responsibilities for reclamation work in western Canada and established the Reclamation Service. There was an insistent demand for the Government to either construct the necessary works or materially assist in financing of construction. Early in 1919 the Minister of the Interior (Mr. Meighen) made a definitive statement of the position of the Dominion Government. He said:

> . . . After prolonged correspondence and after many conferences where we failed to agree, we finally came to an understanding, and the Provincial Government acquiesced in our position that we should not be called upon to undertake further responsibility after we had undertaken and discharged the work of surveying the whole field and of engaging the engineering forces necessary for that purpose. We propose, now that we have come to an understanding, to carry it out on our part to the full and to interpret the understanding generously. Already I have instructed that to be done.[8]

The clarification of responsibility which was implied in these words did not solve the problem of finance. W. A. Buchanan, Member of Parliament for Lethbridge, was most concerned with this side of the matter and

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[7] Irrigation meetings were held on February 19, 20 and 21, 1919 at Turin, Coalhurst and Monarch, with respective attendances of one hundred and thirty, eighty and seventy farmers. These meetings were all strongly in favour of irrigation, with the partial exception of the meetings at Monarch where the members of a colony of Dutchmen surrounding this town were opposed to irrigation development.

As was indicated in last year's report, due to the succession of two dry years, 1917 and 1918, a very strong movement developed in the south country during the winter of 1918-19 in favour of irrigation development. The year 1919 was almost as dry as 1918 with the result that people in Southern Alberta—both farmers and business men—have at last become generally convinced of the great desirability, if not necessity, of irrigating every possible acre in southern districts.

[8] Official Report of the Debates of the House of Commons of the Dominion of Canada, 1919. Volume 5. Page 4603.

made every effort to get Dominion aid. The Director of Reclamation reported on the subject in these terms:

> The principal deterrent to further irrigation development is the difficulty of financing. The money for the construction of new works must be raised by bonds secured upon the land and irrigation bonds are not readily saleable at anything like par value.
>
> The only practicable solution of the problem seemingly is the purchase of the bonds either by Provincial or Dominion Government, but this is a question of policy that must be decided by the Governments, and its further discussion in this report would be inappropriate. It is to be hoped however, that some solution of the problem will be found quickly.[9]

A "solution" to the finance problem was given by the several Acts dealing with irrigation passed by the Alberta Legislature in the early nineteen twenties. These Acts will be discussed at a later stage of this study but it must be noted that from 1920 to 1935 they provided the basis for irrigation development in Alberta.

St. Mary-Milk River Development

In the year 1935 the irrigated area in Alberta was in excess of 400,000 acres but the problem of drought costs still faced the Dominion. In the years that followed the good yields of 1927 and 1928 farm distress reached alarming proportions. In 1934 the Dominion Government passed the Prairie Farm Rehabilitation Act which committed resources to an attack on the drought problem on a broad scale. As part of the program stemming from this Act there was a re-examination of irrigation possibilities in Alberta. The St. Mary and Milk Rivers Water Development Committee Report represents the considered opinion of both Provincial and Dominion officials on the economic basis of these possibilities. The matter can not be stated more succinctly than by direct reference to the findings of the Committee.

The report summarized the benefits which the proposed development would confer:

National Benefits

1. The completion of the development would provide an insurance against the loss of a valuable national resource.
2. The construction of the project following the war would provide employment during the readjustment period.
3. The lands made irrigable would provide opportunity for establishing returned soldiers and others including farm families located on submarginal lands with the drought area, thereby effecting a substantial saving in relief expenditures.
4. Increased production and volume of trade from irrigation development would result in business expansion to transportation, manufacturing, and other national interests and the general benefits arising therefrom would be of advantage to Canada.

Provincial Benefits to Alberta Municipalities and Local Communities

1. Stabilization of agriculture on lands irrigated and adjoining grazing lands comprising a large section of southern Alberta.
2. Increased production would result in increased assessment values for taxation purposes.
3. Increased production and buying power would result in increased business opportunities to provide goods and services to a prosperous farm population.

Benefits to Ultimate Landowners and Water Users

1. Insurance against crop failure in years of drought.
2. Opportunity for diversifying crops to meet changing market requirements, and to reduce wheat acreage.
3. Increase in land values resulting from increased production.
4. Opportunity for home-building, a higher standard of living, and improved social services.

[9] The Report of the Reclamation Service, 1919. King's Printer, Ottawa 1920.

The Committee concluded that:

> While the annual cost of maintenance and operation of the proposed development should be regarded as a proper charge against the lands irrigated, a substantial part of the capital cost, depending on condition, could not be fairly charged against them.

The acceptance of this Report and the construction of the St. Mary-Milk River project under an agreement between the Federal and Provincial Governments marked a major change in the policy of the Federal Government in regard to irrigation development. The terms of this agreement provided, in effect, that each government contribute about one-half of the cost of the major capital works. The Federal Government had previously avoided financial participation in irrigation construction but had now recognized the relationship of irrigation development to national economic well-being. Irrigation thus came to be included with other aspects of agricultural resource conservation and development, and action along these lines has been implemented by the Prairie Farm Rehabilitation Administration.

The P.F.R.A. has had a considerable part in the later development of water resources in Western Canada. This administration was established in 1935 primarily to provide emergency action against the soil erosion and local water shortages that accompanied the drought of the period. Its early activities included regrassing in areas of light soils and the promotion of farming practices to control erosion and conserve moisture.

Water development under the P.F.R.A. began with assistance to individual farmers to construct dug-outs and small dams to conserve local run-off for domestic water, stock-watering and irrigation for gardens and small fields. While individually small, there were 46,534 farm projects at March 31, 1952, and the aggregate of these developments is considerable.

The numerous small streams and watercourses in the prairie area provide opportunities for water storage in larger reservoirs. At March 31, 1952, P.F.R.A. had constructed 244 of these, which are designated as community projects because of the diffusion of use over a wider area. This applies not only to the number of individuals affected but also to the regional stability which results, as in the case of local ranchers who are assured of feed supplies from the irrigated land.

As development on smaller watercourses proceeded, the attention of the P.F.R.A. was directed to the larger rivers in the area, notably the St. Mary and the Milk Rivers in Southern Alberta, the Red Deer and Bow in Central Alberta and the lower South Saskatchewan River in the Province of Saskatchewan. Irrigation development on these rivers involves major works, of which the St. Mary-Milk River Development is now approaching completion at an over-all cost of about $40 millions. Development of the Bow River is now being furthered on the former Canada Land and Irrigation Project, purchased by Canada and under the administration of the P.F.R.A. Irrigation development on the Red Deer River, in the vicinity of Hanna, Alberta, is now under study as is the proposed South Saskatchewan River Development above Saskatoon.

Throughout its period of operations the P.F.R.A. has assisted in the construction of individual farm projects which conserve enough water to irrigate over 110,000 acres. Sufficient water storage has been created on community irrigation schemes to irrigate

328,758 acres if the water were all committed to that use. The major part of the St. Mary-Milk River Development is designed to irrigate 519,000 acres. The Bow River Project, which the P.F.R.A. now has in hand, is delivering water to 57,000 acres with plans for extensions of an additional 180,000 acres.

The St. Mary and Milk Rivers are both international streams. The allocation of such waters between Canada and the United States is influenced by the principle of prior appropriation and beneficial use, and the United States has held the point of view that they should not be deprived of the use of international water which would otherwise be wasted.

Accordingly, it was expedient for Canada to prepare to put to beneficial use the waters of these two rivers allocated to this country by the Treaty of 1909, and subsequent decisions of the International Joint Commission.

Formerly known as the Lethbridge Southeastern Project, this development was surveyed and mapped between 1913 and 1922. Construction of the works was undertaken by the Prairie Farm Rehabilitation Administration, and mostly completed in 1951. The key structure is a large dam and reservoir on the St. Mary River, together with auxiliary reservoirs and appurtenant works. The main distribution canal leads from the St. Mary reservoir towards the irrigable land to the northeast.

A total of 796,000 acre-feet per year are thus to be made available to the system for the irrigation of about 120,000 acres for which water rights have already been granted, and for an additional 345,000 acres of new land. The total area to be served by the system is thus about 465,000 acres.

The St. Mary-Milk River development has been brought to fruition at this time by joint action of the Governments of Canada and the Province of Alberta. The contribution of each party is defined in a formal agreement. The Federal Government has undertaken the construction and maintenance of the main dams and reservoirs and their appurtenant works. The Government of Alberta has assumed responsibility for the construction of the secondary distribution system which delivers the water to individual farms, and for a satisfactory colonization program. In financial terms it is expected that the contributions of both governments will be approximately equal. These arrangements represent the basis on which the Federal Government abandoned the position it had held closely in previous years, and undertook to participate in the financing and construction of irrigation works in Western Canada.

Corporate Irrigation Development

1. *The Alberta Railway and Irrigation Company.*—Large land grants were made to the railways in western Canada to provide finances for railroad construction. The mere sale of these lands was not sufficient from the railway standpoint; it was also necessary to make them productive of traffic. Railway lands thus had a dual role. Initially they were to provide capital, later they were to provide operating revenue. Railway irrigation expenditure in Alberta must be analyzed in this context.

The pioneer company in Alberta irrigation, The Canadian Northwest Irrigation Company, grew out of the Alberta Irrigation Company, a land-holding subsidiary of the

Alberta Railway and Coal Company. The Alberta Railway and Coal Company had been granted two million acres of land by the Federal Government as a subsidy for the construction of a railway from Dunmore to Lethbridge and from Lethbridge to Great Falls, Montana. In 1892 the Canadian Pacific Railway took a lease-purchase-option on the Dunmore to Lethbridge section of the railway with the result that the land held by the Alberta Railway and Coal Company became highly significant to that company. At this time John W. Taylor and Charles O. Card, who were interested in establishing Mormon settlements in southwestern Alberta, obtained an option on certain of the lands owned by the Alberta Railway and Coal Company with the intention of promoting irrigation development. Because of the alternate section pattern of the land holdings of the railway, exploitation for irrigation was not feasible and the option lapsed. The two had succeeded in stimulating the irrigation interest of the Galt brothers, Sir Alexander and Elliot T., holders of a large equity in the Alberta Railway and Coal Company. These gentlemen forthwith incorporated the Alberta Irrigation Company.

The Alberta Railway and Coal Company arranged an exchange of land with the Honourable Clifford Sifton, Minister of the Interior, and accepted a block of potentially irrigable acreage in return for part of the original grant. This company then made the block of land available to the Alberta Irrigation Company at $2 per acre. This company in turn sold parts of it to settlers at $10 per acre. After some delay a canal was constructed from the St. Mary River to these lands and irrigation commenced in 1901. This marked the first corporate irrigation in Alberta.[10]

In 1898 the Alberta Irrigation Company became the Northwest Irrigation Company and in 1904 it was amalgamated with the Alberta Railway and Coal Company to form the Alberta Railway and Irrigation Company. The assets of this Company were acquired in 1912 by Canadian Pacific who operated the irrigation side of the enterprise until 1946 when the ownership and operation was transferred to the Government of Alberta.

The first organizers of the company, Taylor and Card, apparently based their calculations on the belief that the increased productivity of the land would increase the value to an extent sufficient to enable them to repay the capital costs of the development. However, they were not as much concerned with economics as with sociology; specifically they were interested in establishing Mormon settlements in the area. When they were forced to abandon the original project because the land was not in a block they entered into a deal with the Galts. The Galts were responsible for the promotion of the project as actually constructed.

The economic interests of the Alberta Railway and Coal Company and the Galt

[10] The report to the Minister of the Interior in 1901 spoke optimistically of the future development likely to arise due to the water supplied by the newly completed canal.

> The changes which will brought about within a few years promise to rival the most rapid development in any portion of the west, and there now seems to be no doubt that a large area which up to this time has been entirely devoted to the grazing of cattle and sheep will in a very short time be covered with farms producing abundant crops by the aid of irrigation.

brothers were very closely connected. They were willing to spend money on irrigation for three reasons:

(a) Land potentially irrigable commanded a premium when sold for settlement. In addition, when the land was settled and the water available the investment in irrigation facilities offered very choice returns to its owners.

(b) The increase in land productivity would enhance the general prosperity of the area and as there was a number of privately owned enterprises held by officials of the Alberta Railway and Coal Company, these men would enjoy substantial gains.

(c) Direct and ancillary services of the operating company would gain from the introduction of the closer settlement encouraged by irrigation.

2. *Canadian Pacific Railway:* Canadian Pacific was interested in the irrigation scheme from its inception. In 1898 they offered to subsidize construction to the extent of $100,000 because of the potential feeder line traffic that would originate in the irrigated area. It is also important to remember that at this time Canadian Pacific was very anxious to build new lines and reorganize old ones to get into the newly developed area of the Kootenay Valley of British Columbia.[11] The relationship between the railroad and irrigation was to some extent conditioned by this development.

When Canadian Pacific purchased the assets of the Alberta Railway and Irrigation Company in 1912 the land and irrigation works of that Company were incorporated into the general colonization program of the railway. The economic interest of Canadian Pacific was not primarily the irrigation works but the railway and coal holdings of the Alberta Railway and Irrigation Company. They proceeded with irrigation as a secondary matter.

The acceptance in 1903 by Canadian Pacific of a block of land between Calgary and Medicine Hat that had been previously termed "not of fair average quality for settlement", as settlement of its outstanding grants, was premised upon several considerations. The Company was faced with the necessity of choosing the "irrigation block" along its lines, or more humid lands farther to the north where a settler would be too far from the railway to contribute traffic. The choice made by Canadian Pacific was based primarily upon the claims of the Federal Government engineers as to the economic feasibility of irrigating the area. It was suggested that the use of Bow River waters could bring irrigation at a capital cost of $3.50 per acre. With this figure as a planning base the company anticipated a traffic stream "that would far excel that of any similar area in Western Canada".

From the record it appears that while a general increase in the value of land was expected by Canadian Pacific they made the irrigation investment not in anticipation of land profits and profits on irrigation construction, but almost wholly in terms of increased railway traffic. In these early stages there was certainly no thought of losing money just to create irrigation, but on the other hand the use of irrigated land sales as a source of capital funds comparable to the dry land sales was not seriously considered.

[11] Negotiations are pending with the Alberta Railway and Coal Company for the lease and subsequent purchase of that Company's line extending from Dunmore to the coal mines at Lethbridge, 109 miles. This line will be necessary to your Company in the event of the construction of a line through the Crow's Nest Pass, and in any case it will be quite self-supporting.—Canadian Pacific Railway; Annual Report, 1892.

The general view of Canadian Pacific therefore appears to have been that irrigation would not result in a new cost to the Company, but would do away with uncertainty in a hazardous crop area and would greatly increase the productivity of the land. Intensified farming with increased farm and non-farm populations would create an area exclusively within the orbit of their own transport system and enure to the general good of that system. They anticipated a sufficient return from irrigation to pay capital costs and this would leave the net return from the increased traffic as a clear profit which would accrue annually in ever-increasing amounts. They assumed, in common with everyone else, that the farmers would be able to pay for the higher priced land as a result of the increased productivity.

By 1929 it was apparent that the original economic basis for expenditure had been incorrect. While there had been traffic benefits to the railway there were large capital, operating and maintenance deficits. The problem at hand resolved itself into the selection of a suitable way to get out from under the load.

In 1935 the farmers of the Brooks area "approached" the Company with the suggestion that they (the farmers) form an Irrigation District and take over the operation of the project. There was little reluctance by Canadian Pacific to this suggestion. From 1930 to 1934 the annual cost to the Company of maintaining the project had been in excess of $450,000 per year and the officials of the Company felt that until the success or failure of the scheme rested directly upon the farmers there was little hope of improving the situation. The farmers in turn were burdened by capital costs which they saw no hope of repaying.

As a result of an agreement between Canadian Pacific and the farmers, the Eastern Irrigation District came into existence. This District took over all the land and irrigation structures of the Company and in addition received $300,000 as a cash grant.

In 1944 Canadian Pacific was similarly induced to turn the Strathmore section over to the farmers who had organized an Irrigation District. The capital costs on the land classified as irrigable were a burden which the productivity of the land would not bear. In addition, irrigation was not used efficiently because the natural precipitation was often sufficient. This project was given to the farmers to eliminate the cost of maintaining and operating the system, but the Company transferred only its irrigation works, canal rights-of-way and so forth. They retained their land contracts and unsold lands. A cash bonus of $400,000 was paid by the Company. In similar fashion the Alberta Railway and Irrigation Company works were given to the Government of Alberta in 1946. The Company retained its contracts and unsold lands and paid a cash bonus of $100,000.

The experience of Canadian Pacific in the matter of irrigation development may be summarily stated. They undertook development because they anticipated a small return on their land and structures and they wished to develop rail traffic. They ended their irrigation experience by giving the major part of their investment to the farmers along with a cash grant. They were content to minimize their losses on irrigation and escape with the traffic increases the losing investments had generated.

3. *Canada Land and Irrigation Company:* The history of irrigation development in Alberta reveals only one enterprise which entered the field solely concerned with the commercial possibilities that were afforded, the Canada Land and Irrigation Company. There was no duality of motive in this instance; the economic basis was the anticipated investment return and nothing else.

In June 1906 the Robins Irrigation Company made an Agreement with the Dominion Government to purchase 380 000 acres of potentially irrigable land in the Medicine Hat area at a rate of $3 per acre.[12] The acreage conveyed by the Agreement covered a project "developed" by Government engineers and it was undoubtedly the favourable views advanced by these men that prompted the activity of the Company. The Robins Company made a few preliminary surveys for canal location and with the consent of the Government transferred their interest to the Southern Alberta Land Company, an English syndicate with head offices in London. Further surveys by this Company revealed that a considerable portion of the tract they had purchased could not be irrigated so an exchange of land was arranged.

Engineering work on the project commenced in earnest in 1909. To the end of 1913 the Company had spent more than $8,000,000 without irrigating an acre and could foresee the expenditure of an additional $3,000,000 to complete the system. The Robins Company had anticipated a total investment of about $1,750,000.

The engineering and financial difficulties, which made the Company's problem so complex, created considerable scepticism as to its ability to carry the project to a successful conclusion. Reorganization in 1917, which amalgamated it with the Canadian Wheatland Company to produce the Canada Land and Irrigation Company, eased the financial strain. The new company completed the main canals in 1918. In 1920 the first land was irrigated.

From 1919 to 1950, when the assets of the Canada Land and Irrigation Company were purchased by the Federal Government, the project operated on a subsistence basis.

Present Status of Irrigation Projects

Most irrigation activity in Alberta at present is carried on by community organizations formed for the express purpose of operating irrigation systems and ancillary institutions, possessing quasi-municipal status, and known as Irrigation Districts.

Irrigation Districts were first authorized under an Ordinance of the Northwest Territories of 1894, which was repeatedly amended by the territorial legislature and was finally repealed by the Alberta Legislature in 1915 when the present Irrigation Districts Act was substituted for the earlier measure.

Only one Irrigation District was set up under the territorial ordinance, the Springbank Irrigation District, incorporated in 1898 to serve 23,493 acres near Calgary. This district borrowed $40,000 and carried out considerable construction work, but apparently never delivered any water. The works fell into disrepair, but the debt remained for years a charge against the land of the

[12] An outline history of the Canada Land and Irrigation Company may be found in the 1913-1914 Report of the Superintendent of Irrigation for the Department of the Interior. King's Printer. Ottawa. 1914.

District until in 1914 the Provincial Legislature passed an Act for the Relief of the Springbank Irrigation District. Under this measure the provincial government paid off the remaining principal debt of $25,000 on the understanding that the District itself would meet the outstanding interest and costs of $15,000.

The Irrigation Districts Act of 1915 was based on a California Statute and was framed especially to meet the requirements of the Taber Irrigation District, which was formed in the same year. This district, like the Magrath Irrigation District and the Raymond Irrigation District, formed respectively in 1925 and 1926, receives water from the works originally constructed by the Alberta Railway and Irrigation Company.

The Lethbridge Northern Irrigation District was formed in 1920 and was the only large project to operate as an Irrigation District from its inception. Its irrigable area of 96,135 acres is exceeded only by that of the Eastern Irrigation District and by the Canada Land and Irrigation Company development.

The huge C.P.R. irrigation block has now been transferred to Irrigation Districts, the Eastern Irrigation District formed in 1935, being the largest project in the province, with 281,000 irrigable acres. The Western Irrigation District which took over the operation of the western section of the C.P.R. irrigation block in 1946 has an irrigable area of 50,000 acres.

The Canada Land and Irrigation Company has now been transferred to public ownership and new developments in connection with the St. Mary-Milk River Project are being integrated with the provincially operated Alberta Railway and Irrigation Project.

Four other small Irrigation Districts were set up during the inter-war period—the United Irrigation District in 1921, and New West Irrigation District in 1923, the Mountain View Irrigation District in 1925, and the Leavitt Irrigation District authorized in 1936. The Aetna Irrigation District formed in 1945 is the only other post-war development undertaken to date.

Irrigation Districts have thus taken over all the important enterprises in the province. The Irrigation District would appear to be the most durable form yet devised for the administration of irrigation projects.

General Progress of Irrigation Districts

The Irrigation Districts have had a singularly varied history, both with regard to the obligations initially assumed and as to the degree of prosperity attained. Most successful of the group has been the Taber Irrigation District, whose works cost $272,000 for the irrigation of 17,000 acres. These works were constructed for the District by the C.P.R. and were paid for by the issue of six per cent 30-year debentures, the entire issue being accepted by the C.P.R. Interest on the bonds was adjusted to five per cent during the depression, and principal payments had to be deferred for four years during that period, but these concessions were the only ones required. As of Dec. 31, 1951, the District had a bonded indebtedness of $27,200. The original district has been increased by approximately 25 per cent, from 17,000 to 21,500 irrigable acres, and the works necessary for this expansion have been

paid for out of revenue. This District is almost unique in that it has been a straightforward commercial success. It enjoyed the advantage of a very low construction cost, averaging only $13.66 per acre for the full area, but this advantage was partially offset by the disadvantage of having to buy water, at a rate of 50 cents per irrigable acre per year. There was no offset, however, to the principal advantage enjoyed by the Taber District—the fact that it was already settled with a strong community of experienced and enthusiastic irrigators. It was spared to a considerable extent the costly process of development and the equally costly and painful process of weeding out unsuitable settlers, which other districts had to endure. Partly because of this advantage the District was able to attract at an early date industries providing a market for those specialized crops on which the success of an irrigation project ultimately depends.

None of these advantages was enjoyed by the Lethbridge Northern Irrigation District. Its cost of construction was high, $57.00 per acre, its bonds sold at a heavy discount, and it suffered more than its fair share of disaster from unforeseen flood damage. The settlers already in the district were unused to irrigation and had little appreciation of the methods required or the drudgery involved in irrigation farming. While a sugar beet factory was eventually secured, the market for specialized crops is still far from adequate. Financially the project has been discouraging.

The Eastern Irrigation District, on the other hand, began its career in peculiarly favourable circumstances. It owed no debt whatever for its irrigation works, which had been constructed by the C.P.R. at a cost of $13,000,000, approximately $47 per irrigable acre. The railway company had shouldered the heavy operating loss of approximately $315,000 per year during the twenty-year period of development and settlement, and had colonized the district with reasonably suitable settlers, experienced by 1935 in the techniques of irrigation. At its formation the district received a comfortable cash subsidy of $300,000 from the C.P.R. and acquired from that company not only clear title to the irrigation works but also to the unsold lands in its district, to the company's buildings, machinery and equipment, and to its equity in the lands which were already under agreement for sale. Starting with these considerable advantages the district has operated quite successfully since 1935, even though no adequate markets for specialized crops have yet been developed.

Problems of Irrigation Development

The Engineering Problem: The engineering problem is many sided and highly technical, usually beyond the comprehension of the layman, except when the failure to solve it results in spectacular disaster It can be subdivided into the fo' v- ing phases:

1. The problem of water supply is always present, for in any area requiring irrigation the amount of land needing water to increase its productivity far exceeds the available supply of water. Strict government controls imposed from the very beginning of irrigation development on the Canadian

prairies have virtually eliminated this problem here. With one early exception, the Springbank Irrigation District, all projects undertaken have had ample water supplies assured. This assurance results from:

(a) Accurate hydrographic records of stream flows at all seasons of the year, and over a sufficient succession of years to determine the quantity of water actually available.

(b) Adoption of a satisfactory unit of measure—the acre-foot—has proved in practice far superior to the "miners inch" unhappily used as a standard in much of the United States and in British Columbia.

(c) A clear and explicit legal definition of the duty of water.

Complaints of water shortage are chronic in all irrigation districts, but have no real validity in Alberta, at least for the present. The early Regulations, adopted under the Northwest Irrigation Act and copied into the Provincial Water Resources Act, set the irrigation season as the period from May 1st to September 30th inclusive, adopted the cubic foot per second as the unit for measuring the flow of water, and fixed the duty of water —the amount of land irrigable by this unit of flow delivered through the 153 days of the irrigating season —at 150 acres. Such a flow would provide almost exactly (excluding losses through evaporation and seepage) a total delivery of 24 inches depth of water for an area of 150 acres, providing the water users applied a continuous flow for 24 hours a day throughout the entire irrigating season.

Most of the early canals were designed in accordance with these regulations to provide a flow of one cubic foot per second for each 150 irrigable acres. This design naturally restricted the rate of flow required to sustain uniform crop growth in a farm unit as all the area needs water in a reasonably short period to prevent crops deteriorating. The generally accepted minimum use is at the rate of 2·5 second feet or the equivalent of 5 acre-feet per day. This volume, applied to land in depths of 4" to 6", will irrigate 10 to 15 acres per day thereby enabling 160 acres of land to be irrigated in 12 to 16 days. This rate of required flow is about twice that provided for in the original regulations, necessitating the enlargement of the works built in the early railway projects.

The inadequacy of the earlier structures is at present important only in the case of the Brooks aqueduct whose low capacity is a real impediment to further development in that area.

In general, water is still rather wastefully applied in most regions, and if much expansion of the irrigated acreage takes place, farmers may find it difficult to adapt themselves to the legal duty of water.[13]

2. The Adequacy of Engineering Structures: No engineer can plan the construction

[13] In a report on the available water supply of the Bow River, prepared in 1945, Mr. F. R. Burfield, Chief Engineer for the Department of Water Resources, pointed out that in 1944 the Eastern Irrigation District had diverted 650,000 acre-feet to serve an area of only 160,000 acres. The difference between the presently obtainable amount of more than four feet per acre, and the legal allowance of only 18 inches per acre which may have to be enforced in the near future, is rather alarming. (See Report on Surface Water Supplies & Water Power of Alberta, 1948, p. 57.)

of works proof against all possible contingencies, and every structure involves acceptance of a calculated risk of failure. The "margin of safety" allowed depends partly on the conscience or optimism of the engineer, partly on the funds available for expenditure. Structures in Alberta have been generally adequate, but certain costly failures or miscalculations have occurred. Both the Canada Land and Irrigation Co. and the Lethbridge Northern Irrigation District suffered disaster when unexpected floods destroyed their intake structures and postponed for a year or more the initial delivery of water. Operation of the Taber Irrigation District was hampered by dust storms which filled ditches and made it impossible to provide water for irrigation until the growing season was over during the first year of that district's operation. The Canada Land and Irrigation Co. suffered further delay and loss during the 1919 irrigating season through the inadequacy of the canal designed to draw water from Lake Macgregor, and the usefulness of this system is still restricted by the cave-ins which cut down the capacity of its main canal during the first year of operation.

Although Alberta has suffered no major disaster from the failure of irrigation works, much of the construction has been admittedly flimsy, and durability has been regularly sacrificed to cheapness. Sir William Willcocks, who visited the major Canadian projects in 1912, remarked that "all the regulating works on the rivers are much bolder here than in the East, where the welfare of millions of people is concerned we cannot afford to run any risks. Time alone can tell whether the boldness of the engineers here is justified or not".[14]

Standards of maintenance have been even more flexible than standards of construction. Where money is scarce, shaky structures are likely to be continued in service long after good engineering practice would require their replacement.

The Colonization Problem.—Much of the history of Alberta irrigation development revolves around the problem of colonization, the securing of suitable settlers to farm the lands brought under irrigation.

In a few cases, settlement preceded irrigation. This was the case in two of the earliest projects in Alberta, whose history has been strikingly dissimilar. The Springbank Irrigation District was set up by farmers already established in the Calgary Area, who had no previous experience in irrigation and who accepted the idea chiefly to prevent some other oganization securing water rights which might later become valuable. Before the system was completed a succession of wet years had destroyed all inducement to use the new facilities, and the loosely drafted Northwest Irrigation Ordinance imposed no compulsion to pay for them. This project was an unqualified failure, even though the

[14] Report of the Proceedings of the Sixth Annual Convention of the Western Canada Irrigation Association, p. 177. In this connection, Mr. P. M. Sauder, with all deference to the reputation of Sir William rejects the implied criticism. The works, while as cheap as good practice warranted, were not flimsy in the sense that they represented in any way a danger either to life or to property. The life of wooden structures is admittedly short; where revenue expected is large, particularly in the early stages of operation, it is undoubtedly more economical to build permanent, concrete structures. Where these conditions are not present, a cheap wooden structure will serve equally well until revenues expand sufficiently to warrant their replacement by more expensive and more durable constructions.

problem of colonization did not arise. A sufficient number of settlers were already in the district at its inception, but they had neither the present need nor the past experience to use the system which had been created.

The Mormon immigrants who began to settle in Alberta in 1887 had an entirely different background. They were refugees expelled from the United States by the operation of the Edwards Act, and they came from an area which had been for the previous forty years almost completely dependent on the production of irrigated lands. It was their enthusiasm for irrigation that helped to convince both the officials of the Federal Department of the Interior and the railway officials of the possibilities of irrigation development; it was their labour that helped to construct the original works of the A.R. & I., and it was their skill which utilized the water as soon as that company began deliveries in 1901.

The problem of colonization assumed a particularly urgent form with the development of the Lethbridge Northern Irrigation District in the 1920's. This was an area which had grown up under dry farming conditions and had enjoyed a period of considerable prosperity. Roads, railways, telephone systems, school districts and villages had all come into existence to serve the agricultural community, and all such enterprises were threatened when a succession of dry years undermined the farming economy. The irrigation project was intended to restore and to enhance the prosperity on which all sections of the community depended.

From the inception of the project it was realized that a drastic change would have to be effected in farming methods. A Royal Commission, the Survey Board for Southern Alberta, in a Report submitted to the provincial legislature early in 1922, emphasized that "as irrigation water is made available a much greater number of farmers on smaller farms is essential . . . a farmer with a growing family will succeed far better on irrigated land by concentrating his efforts on a holding that, in comparison with what may be worked under dry farming conditions, would be considered small . . . a quarter section (160 acres) 'under the ditch' is the maximum area that a farmer and his family may farm profitably". To reduce farms in the district to this desirable size, the Survey Board recommended that the Trustees should secure firm listings for sale of the "surplus" lands, and should then carry out a vigorous colonization campaign to secure the resale of these lands to new settlers. Since the average size of farm holding in the district was about 450 acres, such a program envisaged a great reduction in the size of the farm unit.[15] During the grain boom of 1915-19 much of the land had changed hands at high prices—from $75.00 up to as much as $100.00 an acre. The district had undertaken to construct irrigation works costing $57.00 per acre and presumably enhancing

[15] Large land holdings in 1924 were approximately as follows:

Dominion Lands	4,899 acres
C.P.R. Lands	7,780 acres
British-Canadian Trust Co. Lands	5,883 acres
Individual farms:	
1 farmer had	2,560 acres
2 farmers had, each	1,760 acres
1 farmer had	1,600 acres
5 farmers had, each	1,120 acres
3 farmers had, each	960 acres
5 farmers had, each	800 acres
17 farmers had, each	640 acres
26 farmers had, each	480 acres

the value of the dry land by an equal amount. It was difficult in the circumstances to persuade farmers to offer their surplus land at prices which offered any inducement to settlement, and the district began operations with farms still far from the optimum size. Rates were first levied in 1924, at the rate of $5.25 per irrigable acre, and very few of the water-users were either able or willing to pay the assessment. Total collections amounted to only $13,269.52 against a total levy of more than $500,000.00.

The ratepayers' strike led to a drastic remedy. Acting on the advice of Dr. J. A. Widtsoe, contracts were revised to spread the water-users' payments over a fifty-year period with very low payments required in the earlier years of the contract. This concession was given only to owner-occupiers and only for a Home Place of 320 acres. All other land in the district, whether held by non-resident owners, or surplus land held by resident owners, was required to pay the full annual charge of $5.25 per acre. A special Rate Enforcement Act was passed by the Legislature in 1926 to enable the district to seize lands for arrears of rates and these lands were then transferred to a colonization manager for sale to settlers.

In 1925, the first year of full operation of the district, some 70,000 acres were in use for all purposes—crop, pasture and summerfallow. Only 48,291 acres were cropped, of which amount only 21,912 acres were irrigated. The actual resident population was small. There were only 230 houses on the whole project, and a considerable number of these were inhabited by tenant farmers.

The vigorous colonization policy gradually brought in new settlers, and by 1930, the year of the Wilson Report, there were 777 waterers irrigating 69,807 acres. The district was attracting and holding population, in spite of the fact that the farmers in general had little or no equity in their land and small prospect of ever becoming owners. Much of the project was farmed under crop lease agreements, which gave the colonization manager considerable control over farming operations, and at least provided some assured return to the farmer.[16] The project continued to grow during the early years of the depression, and in 1935 there were 848 water-users irrigating 73,022 acres.

Progress during the first ten years of operation was more apparent than real. It was made possible only because the Provincial Government had assumed the capital costs of the project and in addition was consistently advancing maintenance and operating costs against future collections. The system could not possibly have been kept in being had this not been done.

In 1935 construction of a sugar beet factory was commenced, and the Ewing Commission began the investigations which resulted in cutting down the price of land to an amount which its productivity could reasonably support. The average price for the land and water right combined was set by the Ewing Commission at approximately

[16] The price set in 1927 was an average $12 an acre for the land, plus a fixed $55 per acre for the water right. The land contract would appear to have been usually amortized at 6 per cent over a ten-year period; the water-right contract was amortized at the same rate but over a fifty-year period. Sale contract normally provided that the farmer should turn over to the District one-third of his crop, should reside on the land, break and prepare for crop the full irrigable acreage in the first year, sow at least 10 acres to alfalfa, and plant a shelter belt around his farm buildings.

$17.00 per acre, almost exactly one-quarter of the prices set in the 1926 contracts. Collections began to rise rapidly as a result. By 1938 eighty-one contract holders had paid up in full for their land and water right, and crop leases were being generally converted into agreements for sale. Ten years later, in 1948, the colonization manager had sold the last of the lands which had come into his hands, and, out of the 1,087 contracts in force, 833 had been paid up in full.

Although the available farm land of the district had been almost completely taken up by the end of the war, population continued to increase. During 1947-48, sixty-two Dutch families—approximately 400 men, women and children—forty-seven families of displaced persons, and 155 single D.P's were absorbed in the district as hired help.

The successful colonization of the district would appear to have depended on the following factors:

(a) The ruthless reduction in the size of farm units. The Widtsoe Report had made it difficult for the average farmer to hold more than 320 acres. The predominant size of farm is the one-quarter section, each containing approximately 100 to 125 acres of irrigable land, with the remainder of the quarter classified as dry land. The next size in importance is the half-section. There are also a number of 80-acre farms, but these have proved usually less successful than the larger farms.

(b) The policy of "trial leases", which kept the district in production during the period of the depression, secured to the district revenues as much as the farmer could spare from his own livelihood, and yet avoided the accumulation of still more unpayable debt against the land. This policy gave both the District Management and the farmer himself an opportunity to assess each individual's ability to adapt himself to irrigation techniques, and enabled the elimination of unsuitable settlers with a minimum of delay and waste.

(c) The firm collection policy, the supervision of farming methods, and the wise provision of short term loans at low interest rates to encourage diversification and to assist improvement, were all factors which made it possible for the district to attract and to hold good settlers, even under very trying conditions.

The experience of supplying irrigation facilities to settled districts in Alberta—Springbank, Lethbridge, United New West and Magrath each affords proof of one or more of these points—would seem to indicate the following principles:

1. Where dry farming is at all possible, settlers will welcome irrigation during a dry cycle; they will not use the irrigation facilities provided, and will evade responsibility for paying for these facilities if any opportunity for non-use or for evasion exists.
2. Unless the settlers are skilled irrigators, they will not reduce their land holdings to optimum size, nor will they follow sound irrigation practices, unless compelled to do so. Where such compulsion is applied honestly and impartially it will be accepted with fairly good grace, and will not result either in general abandonment of the District nor in serious disaffection.

3. No District has a reasonable prospect of success until land payments are brought into harmony with the productivity of the area.
4. If settlers are to survive the period of development, they must either possess considerable working capital or be able to obtain it at low rates of interest.
5. A District may survive, and pay at least part of its operating and maintenance costs, but it cannot become prosperous or make any worthwhile contribution towards its capital costs, until markets are developed for specialized, high-value crops, in the production of which irrigated land has a marked competitive advantage over non-irrigated land.

The larger irrigation developments in the province, the two C.P.R. projects, the Canada Land and Irrigation Co's venture, and at least part of the A.R. & I. system were built to provide irrigation facilities to unsettled areas which it was then necessary to colonize with suitable settlers.

The C.P.R. Western District illustrates what has happened in the past when an area suitable for dry farming is colonized as good agricultural land with supplementary irrigation facilities. The C.P.R. Eastern District provides an example of what has occurred when land naturally suitable only for grazing purposes is supplied with irrigation facilities and colonized for irrigation farming only.

In the Western and Central sections of its project, the C.P.R. sold approximately 202,000 acres of irrigable land at an average price of $39.50 per acre, and 1,400,000 acres of non-irrigable land at an average price of $13.20 per acre. Of these sales, at the end of 1937, some 500,000 acres were still unpaid for, and the amount outstanding was approximately $20.00 per acre, indicating that payments were far in arrears on the irigable land, but that most of the non-irrigable land had been fully paid for.

This land was sold in a vigorous campaign which stressed the advantages of irrigation farming; these advantages were further illustrated by the operation of an admirable demonstration farm at Strathmore, and by a tireless education campaign. The farmers remained, on the whole, unconvinced. They fought vigorously through their U.F.A. organization and as individuals to secure cancellation of their water contracts, reclassification of their land as non-irrigable, and exemption from the extra costs imposed on irrigable land. When the C.P.R. in 1946 eventually decided to abandon operation of the irrigation system, and to transfer the works without cost and accompanied by a considerable cash bonus to the water-usuers, a full three-quarters of the irrigable acreage was withdrawn from the re-organized project. On this section of the prairies, water added too little to the productivity of the land to warrant any appreciable payment for the irrigation facilities.

The story is significantly different in the case of the Eastern Irrigation District. This area was settled by the same agency and very largely by the same methods as the Western and Central sections. The type of settler attracted was very much the same —methods of administration and programs of education were identical. There were,

in fact, only two important differences: The first was that settlers in the Eastern Irrigation District were required to pay an annual water rate of $1.25 an acre instead of only 50 cents an acre as in the Western District, and an increase of 150 per cent in annual water rates was a considerable item in the farmer's budget. The second significant difference was that climatic conditions in the Eastern Section made dry farming a hopeless proposition. The alternative here was not between irrigated and dry farming as in the Western District; it was a choice between the utilization of low-grade grazing land to support scanty numbers of livestock, and the use of the same land for irrigation farming.

These alternatives were open to settlers who remained in the district. There was naturally a third course open to settlers in either section of the project—they could abandon the attempt to farm in the Irrigation Block altogether and go elsewhere. This was the course followed by a very large number of those who bought land in the Eastern Block. The big influx of settlers had come to the district in the years immediately following World War I, and, in the summer of 1921, 1,140 farm units were occupied. The exodus began almost immediately. By 1924, 407 farms had been abandoned by their original purchasers. Lenient collection policies, reclassification of land on terms more favourable to the farmers, and very considerable reductions in the purchase price of the land failed to hold the farmers. New settlers could still be attracted by vigorous sales campaigns, but no sales campaign could keep them on the land. Between 1927 and 1930, 524 new sales contracts were written, but the number of water-users increased by only 123.

The Western Section had been able to hold its settlers, for a good living could be made there, but it had been unable to make its settlers irrigate their lands. The Eastern Section had no difficulty in persuading its settlers to use irrigation water; it could not persuade them to continue as irrigation farmers. The chief discouraging factor was undoubtedly the high price charged for irrigated land. Even when prices were reduced in 1927 to approximately $35.00 an acre, prospects remained very bleak. Irrigated land can be made productive only by a heavy expenditure of labour and of capital in levelling land, in the erection of fences and buildings, in stocking farms with good-quality livestock. Few of the immigrants had any capital beyond the small amount expended as a down payment on their land; many lacked even this, and had no equity in their farms whatever. Yet all permanent improvements carried out by the tenant—all levelling, fencing and building—became the property of the landlord. The tenant or buyer who made such improvements could only become their owner when his contract was paid out, some thirty-five years in the future, if he lived that long. There was small incentive to improvement, and until improvement had been carried out on a very considerable scale, productivity must remain low.

A third colonization project enjoyed a happier conclusion. At the south-eastern extremity of the Eastern Irrigation District is the Rolling Hills area, an irrigable pocket

for whose supply the C.P.R. had constructed the major irrigation works, but which had never been developed because of the scanty supply of settlers available for irrigated lands. In 1938 the old works constructed for this area were refurbished and extended by the Eastern Irrigation District, which has expended approximately $300,000 on the development of the project. Part of this cost was met by a $50,000 grant from P.F.R.A., but in return for the cash grant the Eastern Irrigation District credited each purchaser of land in the section who was sponsored by P.F.R.A. with a cash payment of $2.00 an acre on his land contract. P.F.R.A. expended an additional $21,000 in land levelling operations with power machines supplied by the E.I.D., and approximately 100 acres on each quarter section was broken before the arrival of the settlers. The latter began to arrive in the fall of 1939; by June of 1941, 104 farms were in operation. Approximately three-quarters of the settlers were farmers moved out of dried-out sections of Saskatchewan to make way for community pastures there. The remainder, for whom the northwest quarter of each section was reserved, were experienced irrigators, chiefly farmers' sons from the Eastern Irrigation District. The average capital possessed by the settlers was approximately $1,000 per family, chiefly in the form of worn-out implements, salvaged fencing and building materials, and salvaged livestock. The nearest railway point was at Scandia, on a branch line fifteen miles from the district, accessible by dirt road. Another dirt road was constructed to reach the C.P.R. main line near Tilley.

The settlers selected their own land, and were given two-year leases with the option of purchase at the end of that period. If they then decided to buy, they were credited with $2.00 an acre from the original P.F.R.A. grant. The remainder of the purchase price, $8.00 an acre, was spread over the next twelve years, with interest at 5 per cent on all overdue payments. During the first two years of occupancy, under the lease option, the settler paid a nominal rental of $10.00 per year, or, if a school district was formed to include the settler's land, of $45.00 per year. One-half of the normal water rate on the full irrigable acreage was paid by the settler during his first year of occupancy. During his second year he paid the full rate, but only on the acreage actually cultivated; thereafter, if he converted his lease into a purchase agreement, he paid the full water rate on the surveyed irrigable acreage, regardless of the amount actually cultivated.

The Rolling Hills colonization project has been remarkably successful. Of the first 152 men established, only 16 signed quit claims and left the district, a turnover of only slightly more than 10 per cent in the first six years of operation. The project is now solidly established and prosperous. Average capital per farm increased from approximately $1,000 per farm in 1939-40 to between $5,000 and $8,500 per farm in 1946, depending on the type of farming carried out.

Successful colonization here did not depend on the development of specialized crops; except for a small market for garden seeds, the district has had to depend on the unspecialized markets for livestock and grain, in which the comparative advantage enjoyed by irrigated land is minimal.

The success would appear to depend chiefly on three factors of policy, and one fortuitous factor.

In the first place, the very low price charged for irrigated land was probably the most important single factor in ensuring the success of the project. From the first, there was every prospect that the farmer could become the owner of the land and of all improvements which placed upon it. The incentive to improvement was strong and the rapid increase in the productivity of the district reflects the power of this incentive.

In the second place, the high proportion of experienced irrigators on the project ensured to every inexperienced man a neigh bour on the adjoining farm who could supply advice and assistance.

In the third place, the very careful selection of settlers, and the preparatory work done in breaking and levelling land, both reduced the hardships of pioneering and ensured that the pioneers who had to submit to these hardships would be of a type not easily discouraged.

The fortuitous factor was the accident which established the settlement at a time when the prices for agricultural products were rising more rapidly than farming costs. No better time could have been chosen to initiate such a project than 1939-40.

The Financial Problem.—Alberta's major irrigation systems were built under a mistaken assumption—that irrigation would so increase the productivity of the land that both the costs of operation and the costs of construction would easily be repaid out of this increase.

The falsity of this assumption, so far as most of Alberta's irrigable acreage is concerned, is indicated in the following table:

Project	Capital Expense; Colonization, Drainage, Construction Cost, etc.		Written Off		Repaid by Contract Holders	
	Total	Per Acre	Amount	%	Amount	%
	$	$	$		$	
Western (C.P.R.)..	5,860,000	17.20	5,860,000	100	Nil	
Eastern (C.P.R.)..	12,952,964	46.26	12,952,964	100	Nil	
Taber.....	300,000	13.95	Nil	.....	300,000	100
Lethbridge Northern	5,400,000	57.52	4,770,000	88·4	630,000	11·6

In the interpretation of these figures, one should note that:

(1) The Western Irrigation District works were constructed to serve an irrigable area of 219,000 acres. Reduction of the District to less than one-quarter of this size has more than quadrupled the per-acre cost assessed against the land still retaining water right.

(2) The low construction cost per acre on a number of the smaller projects is misleading. While it represents the actual cost of the works operated by these districts, the water they use is carried for considerable distances through works belonging to other systems, and this carriage must be paid for. Thus the Taber Irrigation District pays 50 cents an acre for water delivered at its headgates through the works of the old A.R. & I. system, and the New West Irrigation District pays the Canada Land and Irrigation Company $1.25 per irrigable acre per year as a service charge for the delivery of its water through the Company's main canal.

(3) It is almost impossible to disentangle from the land sales accounts of the railway companies the amount which may fairly be classed as a return for capital expenditure. The C.P.R. transferred to the water-users, without charge, clear title to all its works and to considerable additional real estate and moveable property, and might reasonably be held to have written off the whole cost of the development. The railway company did, however, receive a considerable return from the sale of irrigable land. The premium charged for irrigable land above the price charged for dry land in the same District might logically be set off against the capital loss incurred in constructing the irrigation works.

(4) The accounts of the Lethbridge Northern System are particularly difficult to unravel, in such a way as to segregate capital losses from operating losses.

Collections from water-users from the first fell far behind the requirements of the District, and assistance was required if it was to continue operations.

Each year the District continued to set a rate, which, if paid, would meet requirements for operation, maintenance, sinking fund, bond interest and necessary reserves. The Provincial Government advanced to the District each year the full amount of this levy. Advances made in this way had reached a cumulative total of $11,437,979.25 by the end of 1949.

The Provincial Government also expended slightly more than $1,000,000 on behalf of the District, more than half of this amount being "colonization expense", and the remainder being expenditures for construction of reservoirs, for the draining of lands and the prevention of seepage, and for the payments of arrears in taxes.

Finally, the Provincial Government in 1945 relieved the District of its debenture liability, of $5,400,000.

The total Provincial outlay on behalf of the District to the end of 1949 thus amounted to $17,837,979.29.

Offsetting this expenditure the Provincial Treasury had collected from the District a total of $4,826,921.54 to the end of 1949. This sum represents payments for water rates, land contracts, interests, lease revenue, etc., and thus lumps together both capital and current items.

In addition, the Provincial Government took over from the District in 1945 $2,199,230.58 which had been accumulated in a sinking fund for the retirement of debentures.

Total collections from the District thus amount to $7,026,152.12; the Provincial Government's outlay exceeds this amount by $10,811,827.13 or almost exactly double the capital cost of construction for the original system.

The average value of the irrigable land of the system was set by the Ewing Commission at $17.00 per acre. Existing contracts were revised to this valuation, and new contracts were in accordance with it. All the land of the District has now been sold, and the great majority of the contracts have been paid out in full. If dry land values are arbitrarily set at $10.00 an acre, then the water-users of the District may be credited with approximately $7.00 an acre on 90,000 irrigable acres, or $630,000 as their contribution towards the capital cost of the system. The capital loss

assumed by the Province would then be assessable at $4,770,000 and the remainder of the provincial outlay, $6,041,827.13, would represent an average annual operating loss of $223,916.43 during twenty-six years of operation.

The District would appear to be out of danger financially now, and should not require any further outlay of provincial funds. There is still a small amount due the Provincial Treasurer for land sales and uncollected loans, interest and other items, but any proceeds from this source might wisely be added to the reserves of the District, since these are still rather inadequate in case of emergency.

In addition to the heavy capital loss outlined above, the operating losses on the major irrigation projects in Alberta have been very heavy. Their magnitude on two such projects is illustrated in the following table:

Project	Period	Total Operating Loss OR Profit		Yearly Average Total		Yearly Average Per Acre
		$ cts.	$ cts.	$ cts.	$ cts.	
Eastern (C.P.R.)..	1929-34	2,994,213 94	.....	499,035 66		4 82
Eastern (I.D.).....	1935-48	.....	111,731 60	7,980 83		0 00
Lethbridge Northern..	1924-49	6,041,827 13	.....	223,916 43		2 49

Financial results from these projects have been discouraging but Albertans have the dubious consolation that at least they were no worse here than elsewhere.

With the single regrettable exception of the Springbank Irrigation District, the early activity in irrigation development in Alberta was entirely in the hands of private companies, and public opinion was quite content with this condition. Experiments in state assistance for irrigation projects then being carried out in the United States, first under the Carey Act and subsequently by the Federal Reclamation Bureau, were naturally attracting attention, and support for similar experiments in Canada was voiced by certain delegates from British Columbia at the second annual convention of the Western Canada Irrigation Association. No support came from the Alberta delegates. J. S. Dennis asserted that Government irrigation in the United States was a failure, and that the time for such schemes would never come to Canada. This view was heartily endorsed by R. B. Bennett, who was strongly opposed to employing either Government funds or Government credit to finance irrigation developments.

As the prospects for profitable private investment in irrigation projects faded opposition to public investment faded too. At the sixth convention of the Association, 1913, A. E. Ashcroft strongly recommended (a) legislation to facilitate the creation of irrigation districts, (b) government guarantees to assist the sale of irrigation district debentures, (c) direct government expenditure on the construction of major reservoirs, and (d) government expenditure for the construction of irrigation works in regions not sufficiently developed to form irrigation districts. These recommendations were well received by the convention, and J. S. Dennis himself, though calling attention to the failure of the Wright Act in California and of the Northwest Irrigation Ordinance on the Prairies, moved a resolution urging the

British Columbia government to explore the possibility of creating irrigation districts. Enabling legislation of this kind was adopted by British Columbia in 1914 and by Alberta in 1915. When F. H. Peters, Commissioner for Irrigation in the Department of the Interior, presented a paper at the 1916 convention of the Association, predicting a brilliant future for irrigation district development, there was no opposition in principle from any of the delegates. At the same time the assembled irrigators had no doubt that each district would be able to stand on its own feet financially, both in borrowing money for development and in paying it back. There was still no suggestion of the propriety of provincial or Dominion assistance to irrigation districts, and for the development of unsettled areas the private corporation appeared to be the only acceptable agency.

This optimism was somewhat tempered in 1920. The Alberta Irrigation Districts Act was revised in that year to permit the formation of the Lethbridge Northern Irrigation District, but the New District could find no buyer for its debentures, even when supported by a partial guarantee from the Province. To make the venture possible the Provincial Government was forced to guarantee the bonds unconditionally, both as to principal and interest, and even then the sale was accomplished only at a serious discount. There was still no retreat from the principle that irrigated land must pay the whole cost of its own development.

"The Government is so satisfied that these lands can carry the burden imposed upon them", L. C. Charlesworth, Chairman of the Irrigation Council, assured the 1921 convention of the Irrigation Association, "that it is willing to put the whole credit of the Province behind the bonds to enable these people to get the money."

"This guarantee", A. Griffin assured the same meeting, "is not intended to relieve the District of one iota of responsibility for one cent of payment when it is due."

In spite of these vigorous declarations of policy it became increasingly clear that many of the new irrigation districts, like the old development companies, would find it impossible to recover the entire cost of irrigation development from the irrigated lands. The discovery which Alberta was making had already been made in the United States. On April 21, 1924, President Coolidge submitted a message to Congress recommending:

> (a) That the Federal Government should write off as irrecoverable both a capital expenditure of $18,961,146 and a further anticipated loss of $8,830,000.
>
> (b) That charges for water use and irrigation should be based solely on the productivity of the irrigated lands, without regard either to construction costs or to operating costs.

Ten years later, similar conclusions were being reached in Alberta. The Ewing Commission in 1935 based payments for irrigated lands in the Lethbridge Northern system on what farmers could afford to pay, regardless of costs incurred in development and construction. In the same year, the C.P.R. wrote off its capital and operating losses in the Eastern Irrigation District and surrendered that system and all its assets to the water-users, to operate as best they could.

The principle that the entire cost of irrigation development must be paid by the farmer regardless of the productivity of his land has

now been generally discarded in Alberta. The present formula is that the farmer should pay for the costs of irrigation development whatever the increased productivity of his land will permit him to pay. In some cases, as in that of the Taber Irrigation District, the increase in productivity has been so great that the farmers have been able to pay the entire costs of the development. In other cases such as the Lethbridge Northern Irrigation District, the increase in productivity has been so small that the farmers have been able to meet only a small part of the costs of development and the remainder has been borne by the general taxpayers of the Province.

The difficulty with both formulas results from the fact that the farmer receives only a fraction of the total increase in productivity which results from irrigation development. The remainder of the benefits from irrigation are spread very widely through the nation. They represent increased revenues to railways and to other carriers, increased sales to all producers who share the expanded market created in the irrigated communities, and increased supplies of consumer goods to the public at large which draws an increasing proportion of its food supplies from the irrigated lands. They mean larger payrolls, greater profits, higher tax returns and lower living costs in widely separated segments of society. The assessment of these remote returns, and the determination of the proportion of the cost of irrigation development properly chargeable to the farmer on the one hand and on the other to more remote beneficiaries is a baffling problem.