

IRRIGATING THE OKANAGAN: 1860 - 1920

By

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Kenneth Wayne Wilson, 1989

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ABSTRACT

Irrigation is a powerful means of changing the landscape, and in the Okanagan Valley between 1860 and 1920 it played a major role in shifting of the regional economy from cattle ranching and grain growing to orcharding. But irrigation is not a straightforward process of building dams, flumes and canals, as this regional study of the legal, administrative and technological background of large-scale, capital intensive irrigation in the Okanagan clearly demonstrates.

Provincial water legislation is shown to refine the principles of beneficial use and prior appropriation and eliminate the stumbling block of riparian rights. For Okanagan orchardists who perceived water as a public resource, water legislation provided the means to remove it from the control of private irrigation companies. An examination of water management traces the redefinition of water as a common good rather than a private resource; the emergence of regional perspectives in water management; the shift to large scale developments reliant on large volumes of water; and the increasing reliance on scientific climatological and hydrological data for making effective water management decisions. Irrigation technology is described in relation to a system's three major components - storage, conveyance, and application.

As the transfer of large volumes of water over long distances became necessary, irrigation systems became more complex and more costly to construct and maintain. Unfortunately, many of the company irrigation works were built hastily or with poor engineering judgement. As a result, a number of the valley's larger irrigation systems were in need of extensive repairs shortly after their completion. Against this background the final chapter combines the use of maps and tables to reveal the extraordinary speed with which irrigation remade the regional economy and landscape. In less than a generation tens of thousands of acres of the valley's benchlands were opened to irrigated orcharding.

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PREFACE

This study in historical geography grew out of research initially conducted for the Kelowna Museum and British Columbia Heritage Trust in 1983. The work then was largely archival - collecting maps of early irrigation works, organizing a photographic collection of irrigation "hardware", compiling a bibliography on the subject. The following year the bibliography was published and the work seemed complete. Yet there it was obvious that the subject had much more potential. Changing the course of water, after all, whether to irrigate the Okanagan or drain the Fens, is one of the most potent means people have possessed to change the landscape, and in the dry Okanagan Valley irrigation schemes and the expansion of settlement went hand in hand.

Irrigating the Okanagan is a regional study. The first chapter describes the physical character of the Okanagan Valley and provides an environmental context for the remaining chapters. The region is semi-arid, but the soils are good and the open parkland vegetation, was well suited to early pioneer cattle ranching. Numerous upland lakes provide ideal sites for the construction of storage reservoirs for gravity irrigation. Yet when orcharding began around 1900 there was little environmental data, and it took many years of trial and error to harmonize the region's physical and climatic circumstances with available varieties of fruit trees and the routines of irrigated horticulture.

Chapters 2, 3, and 4 examine the major enabling factors that underlay the advent and development of irrigated horticulture. In Chapter 2 provincial water law is shown to refine the principles of beneficial use and prior appropriation and to eliminate the stumbling block of riparian rights. For the Okanagan orchardist who perceived water as a public resource, water law provided the means to remove it from the control of private irrigation companies. Enforcement of these laws became a management problem, and management is the focus of Chapter 3. It traces the redefinition of water as a common good rather than a private resource; the emergence of regional perspectives in water management; the shift to large scale developments reliant on large volumes of water; and the increasing reliance on scientific climatological and hydrological

data for making effective water management decisions. Chapter 4 explores the changing technological solutions to the problems of irrigating Okanagan land. The impact of the move to orcharding and of the need for large, well-designed and well-built systems becomes clear. Against this background, the final chapter combines the use of maps and tables to reveal the extraordinary speed with which irrigation remade the regional economy and landscape. In less than a generation tens of thousands of acres of the valley's benchlands were opened to irrigated orcharding.

The completion of a thesis is never a solitary task, and so it is with "Irrigating the Okanagan". In the Geography Department my greatest thanks must go to Dr. R. Cole Harris, whose comments and encouragement kept me on track. At the Kelowna Museum the Director/Curator, Ursula Surtees, offered me the widest opportunity to pursue my subject. Others who contributed helpful comments were Jon Alcock, Richard Mackie, and Frank Pells.

My wife, Connie, and my children, Rosalyn and Mark, deserve my warmest and most lasting thanks - your mere presence inspired me and kept me moving forward.

CHAPTER 1

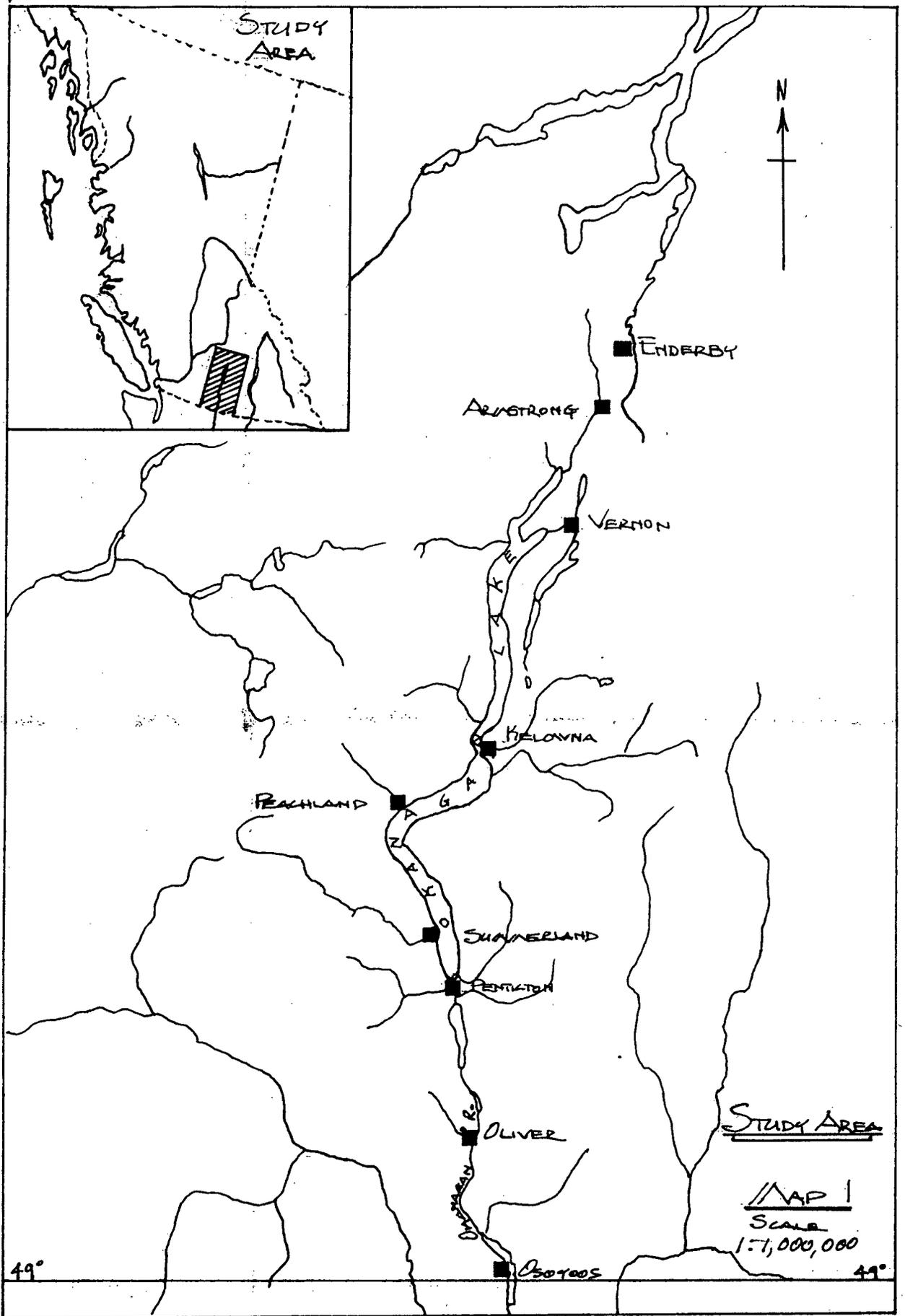
PHYSICAL GEOGRAPHY

Irrigation has figured little in either academic or popular writing on the Okanagan. Theses and dissertations on the region give the topic only the briefest mention;¹ only David Dendy's study of pre World War I land development companies deals with irrigation in more than a cursory manner.² Popular writing on the subject is equally sparse and is contained almost exclusively in the annual reports of the Okanagan Historical Society, in which irrigation is always dealt with either as an adjunct to land company activities or as anecdote.³ The paucity of research into irrigation is not a function of few resources - local and provincial archives contain much useful material, and records of all of the earliest Irrigation Districts are extant.

In the semi-arid Okanagan Valley, irrigation made orcharding possible. Yet the process of irrigation development was certainly not straightforward. Enabling legislation had to be developed and refined, water management strategies had to be worked out in consideration of increasing collateral uses, and technological solutions to increasing water demand had to be found and put in place at the lowest cost and in the shortest time. In the background of these activities was a particular physical environment that early settlers and land companies understood all too little. Nevertheless the location, topography, surficial geology, soils, and climate of the valley provided the framework within which the areas's pioneers developed strategies for water management, directed provincial water legislation, and created viable agricultural economies.

PHYSIOGRAPHY AND TOPOGRAPHY⁴

The Okanagan valley is a long north - south trench in the Interior Plateau of British Columbia. It extends north from the Columbia Plateau, in Washington State to the height of land separating the drainage basins of the Columbia and Fraser Rivers (Map 1). The main valley is occupied by Okanagan Lake in the north and centre and by the Okanagan River and Osoyoos Lake in the south. Two smaller valleys lie parallel to the main trench. One begins south and west of Peachland and runs south to the Oliver/Osoyoos area. The other, more sharply defined, begins



at Kelowna, runs north to Vernon and is occupied by Wood and Kalamalka Lakes. At its southern end, the Okanagan Valley is only 5 - 10 kilometers wide. Toward the north the valley floor broadens to some 18 kilometres at Armstrong. From a few miles north of Armstrong, elevation 372 m, the entire valley drains south to the Columbia River.

Between Vernon and the American border no major valley is tributary to the Okanagan; the watershed divides of the many small streams that do flow into the Okanagan are abnormally near the main valley.⁵ Most of the streams feeding the main valley are in narrow steep valleys and have steep gradients (Maps 2 and 3).

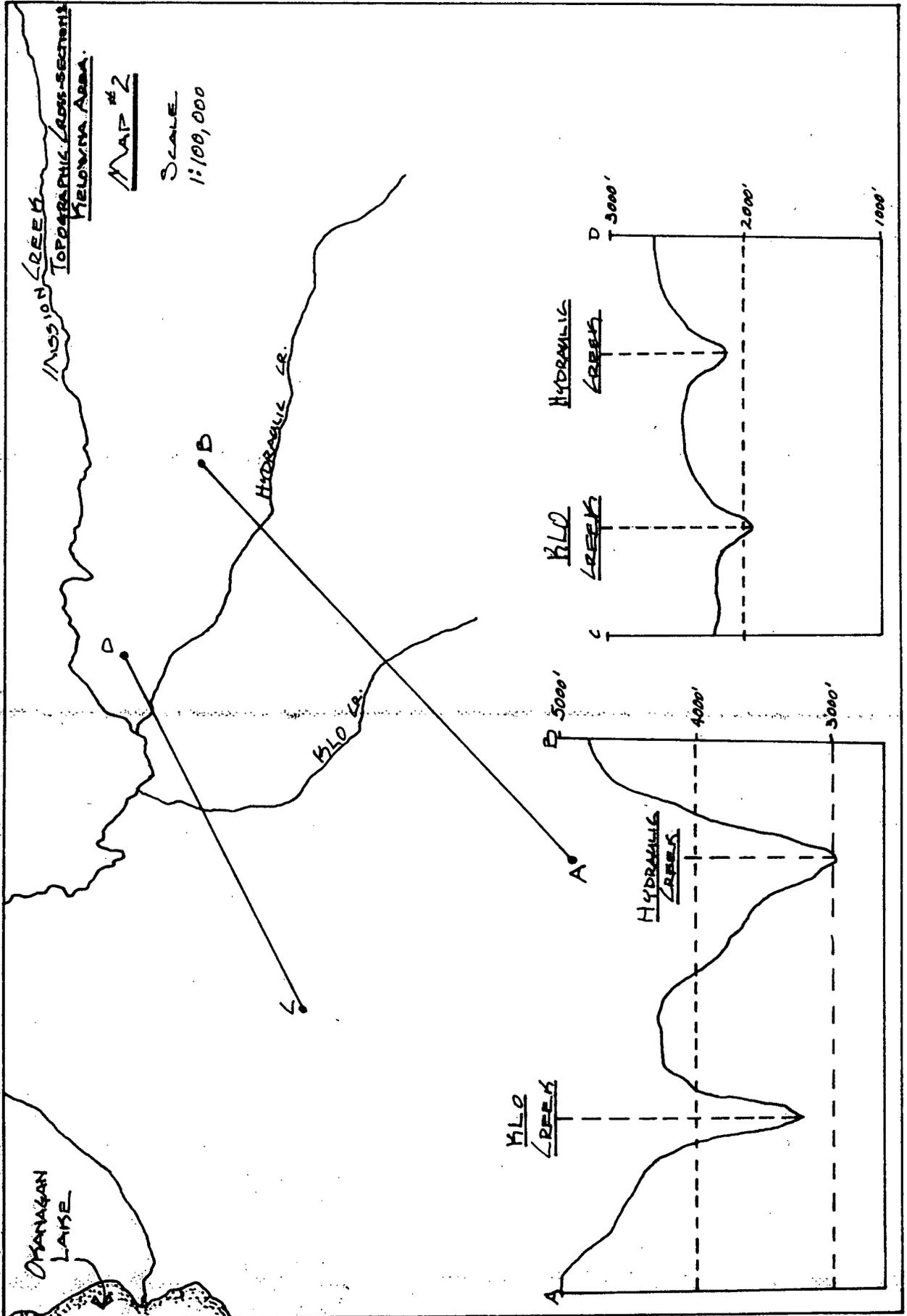
The Okanagan Valley can be divided into two broad physiographic areas: 1) the valley floor, consisting mainly of the Okanagan River floodplain, alluvial fans and deltas; and 2) the benchlands and kame and outwash terraces adjacent to the valley floor. On the valley floor access to water was relatively easy and inexpensive. The benchlands and terraces, usually bounded north and south by deeply incised valleys, were well above easy access to water.

CLIMATE

The Okanagan Valley is located in the rain shadow of the coast mountains and receives westerly air masses that have been modified in two ways:

"Firstly, much of their moisture is precipitated on the windward side of the Coast Mountains and secondly, while descending the leeward slopes into the valleys they are warmed adiabatically and consequently assume more stable air mass characteristics. Both of these orographic modifications promote conditions favouring a moisture deficit, since the warmer, drier air stimulates higher potential rates of evaporation, while the occurrence of precipitation is reduced."⁶

The winter climate in most of the Okanagan is dominated by a succession of Maritime Polar air masses, and the valley's highest monthly precipitation is in December/January. Only occasionally do Continental Polar air masses bring particularly dry, cold air.⁷ In the summer, temperatures rise and precipitation drops as the region comes under the influence of the

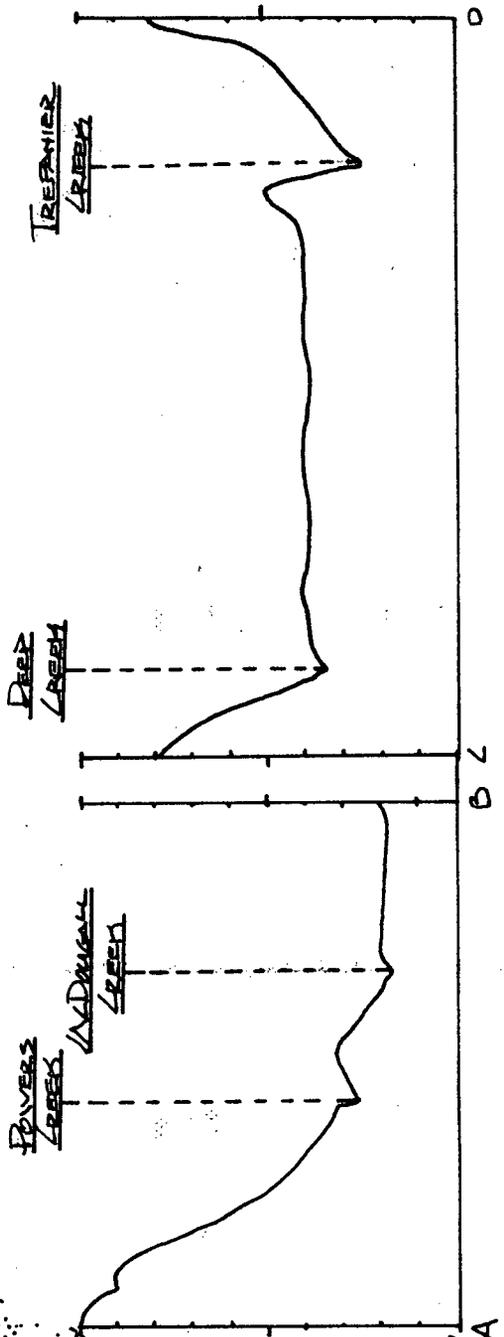
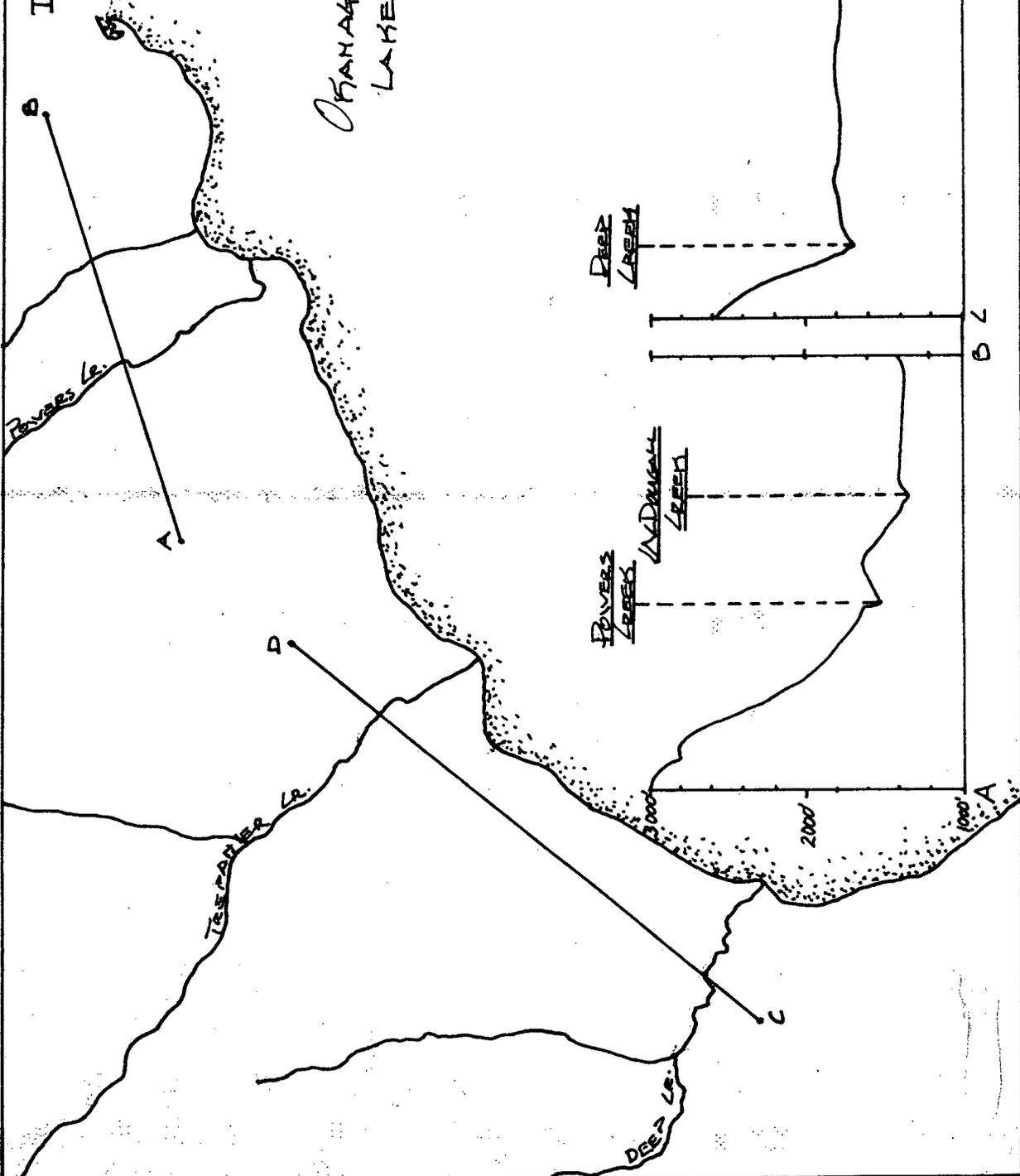


TOPOGRAPHIC CROSS-SECTION:
PEACHLAND AREA.

MAP # 3

SCALE
1:100,000

OKANAGAN
LAKE



Hawaiian High.⁸ Overall, the temperature range is more continental than maritime (double the range found on the coast)⁹ and precipitation the lowest in southern Canada.¹⁰

Within the valley precipitation increases to the north (Fig.1)¹¹ as the valley bends towards the Selkirk Mountains¹² and associated air mass uplift. Precipitation also increases with elevation (Fig. 2).¹³ Throughout the valley precipitation peaks in June and December/January (Fig. 3).¹⁴

Mean daily temperature in the valley decreases from south to north and upslope (Figs. 4 and 5).¹⁵ This pattern is reflected in the precipitation records. The frost-free period varies widely throughout the Okanagan Valley and can fluctuate dramatically from year to year (Fig. 6).¹⁶ Local variation in the pattern is largely the result of "altitude and air drainage".¹⁷ At the lowest elevations, where cool descending air collects, the frost-free period is somewhat moderated by the lakes. On the average, harvest-damaging late fall frosts occur on the valley floor once every five years.¹⁸ Damaging frosts can be even more common on the benchlands. Although most of the benchlands are gently sloping, they also hold numerous depressions ("frost pockets" or "frost hollows") in which cool, descending air can be trapped.¹⁹

Relative humidity in the region increases from south to north, particularly in the summer.²⁰ Humidity has little effect on the kind of crop grown, but has a striking impact on the growth of fungi. C. C. Kelley reported, "Apple scab and similar parasites, which have gained a foothold in the north, cannot maintain their existence in the southern Okanagan because of the prevailing low humidities. However, the virile codling moth thrives under these conditions much better than in the humid districts."²¹

SOILS

Cultivable land in the Okanagan is found on bottomlands, benches, and terraces, whose soils have been carefully described by C. C. Kelley. He identifies four major soil types and a group of groundwater soils where natural drainage is poor.²² The four soil types are graded from south to north and upslope, in response to more humid conditions at the north end of the valley

MEAN ANNUAL PRECIPITATION (MM)

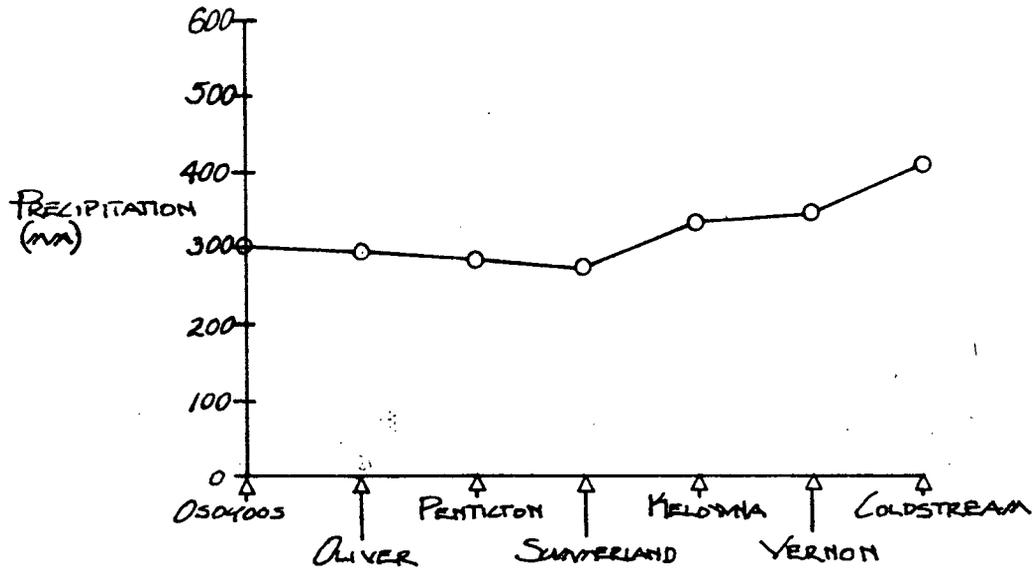


FIGURE 1

MEAN ANNUAL PRECIPITATION (UPSLOPE)

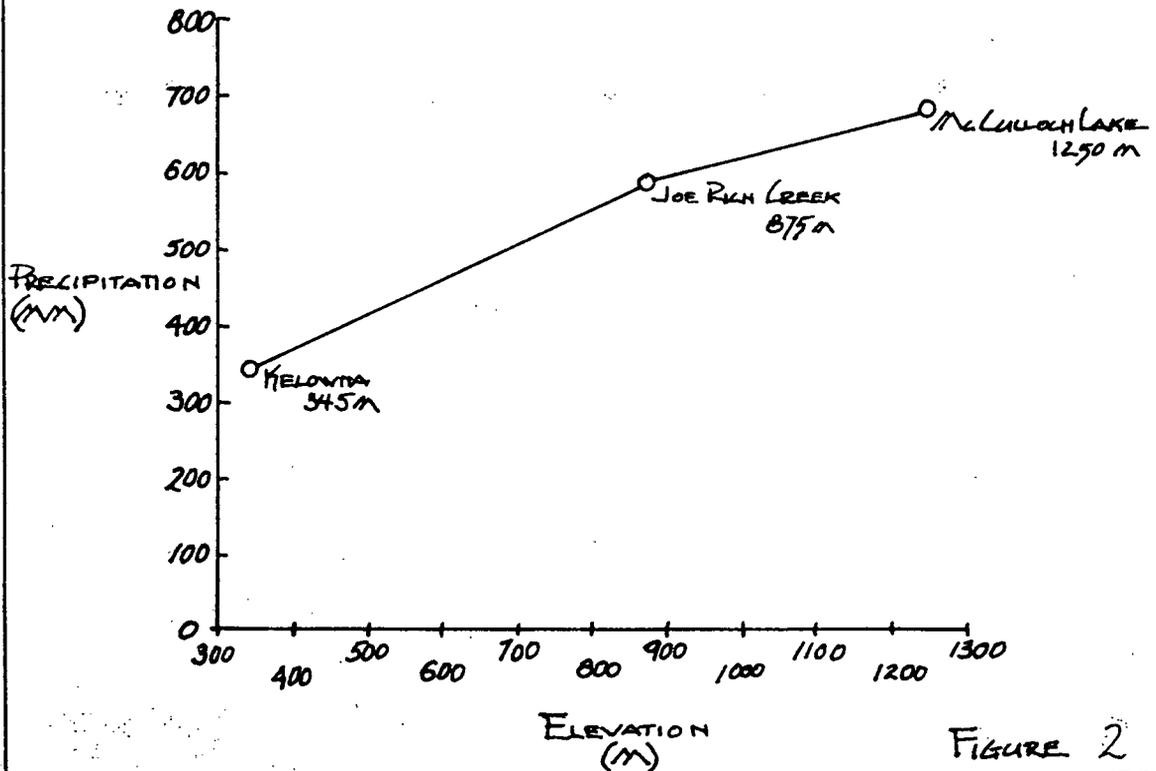


FIGURE 2

MEAN MONTHLY PRECIPITATION

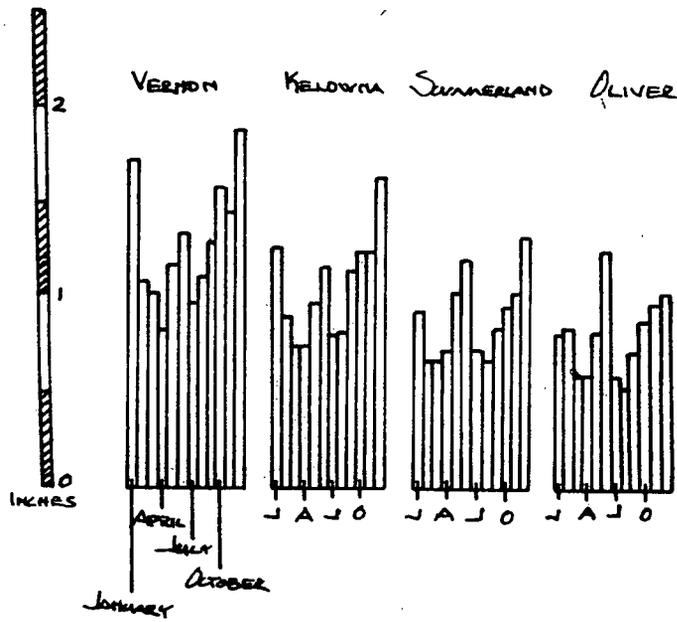


FIGURE 3

MEAN TEMPERATURE: SOUTH - NORTH

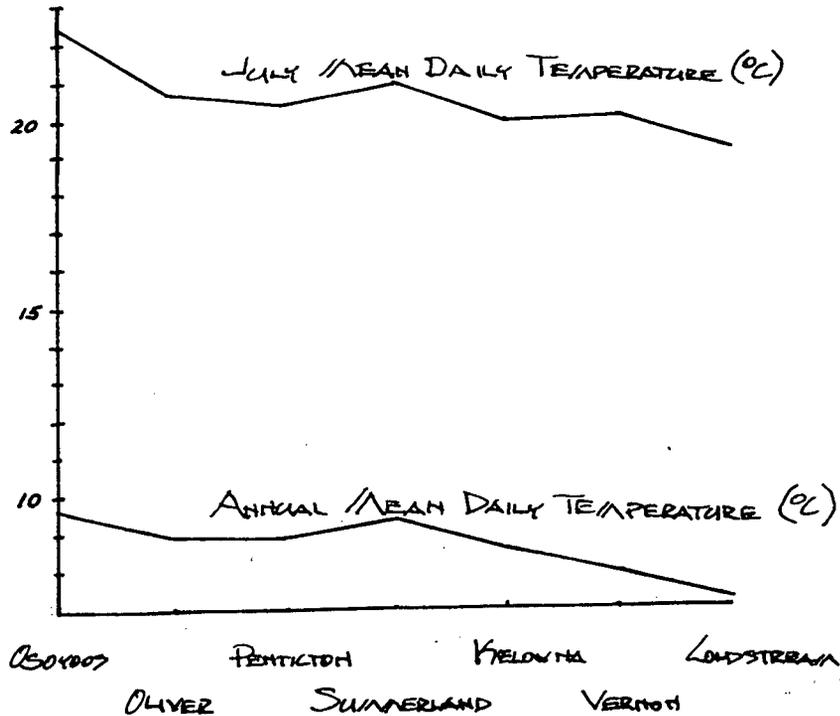


FIGURE 4

MEAN TEMPERATURE UPSLOPE

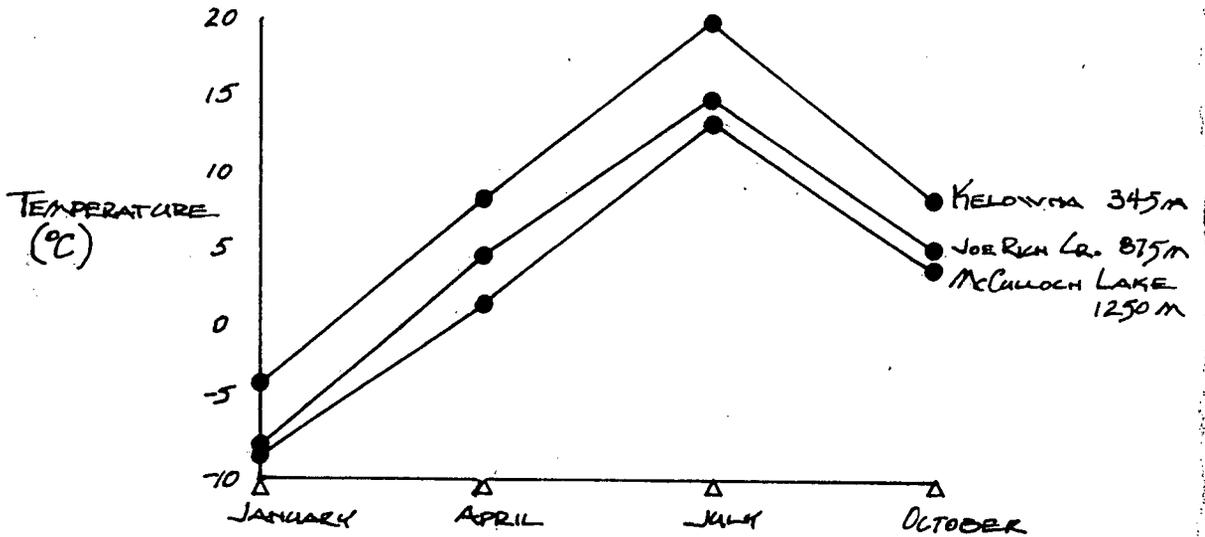


FIGURE 5

MEAN FROST-FREE PERIOD

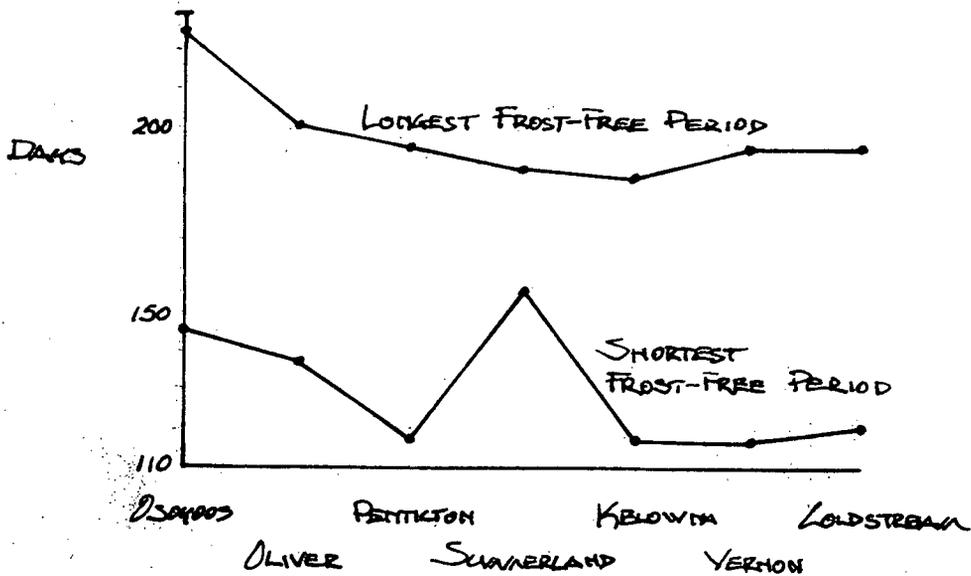


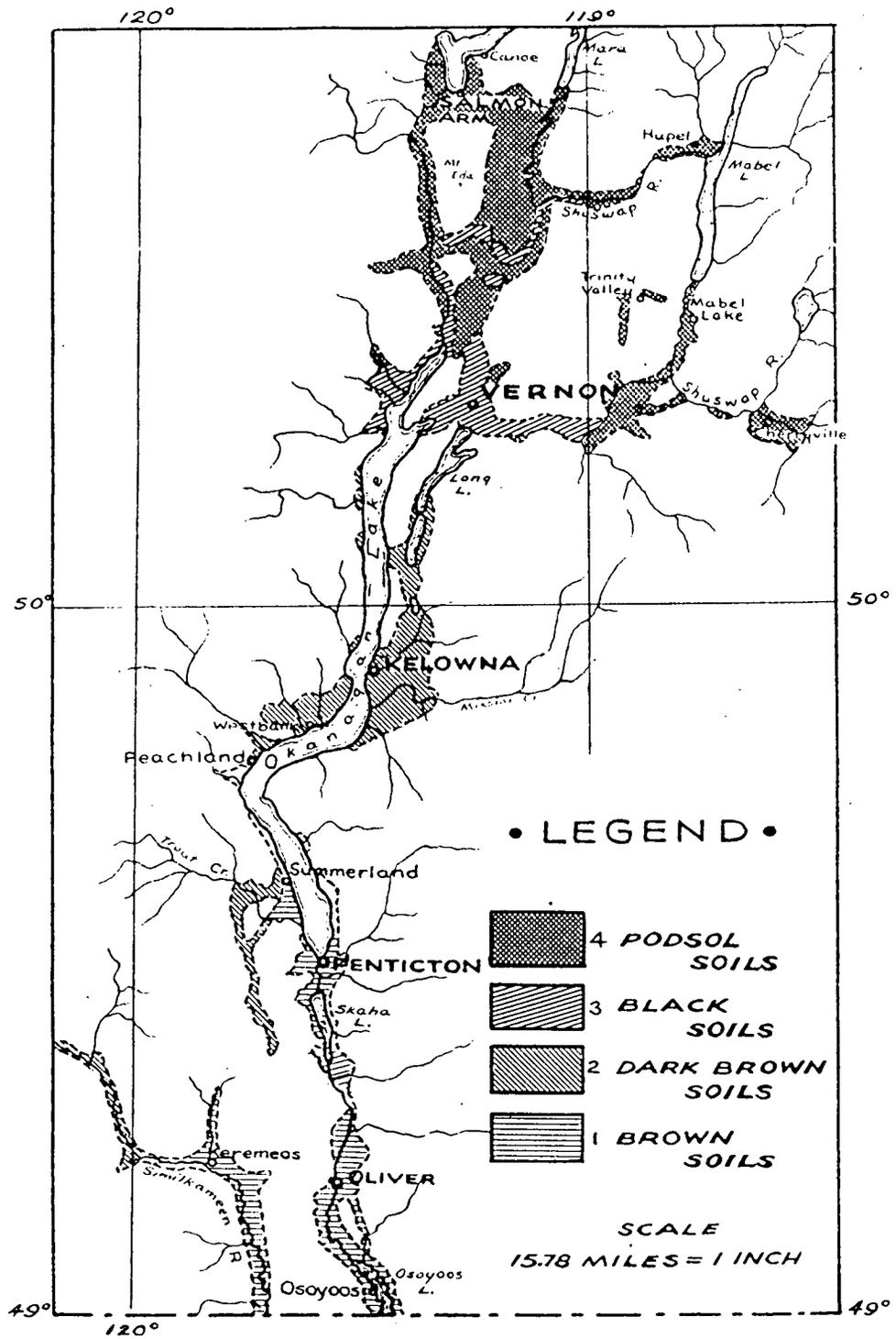
FIGURE 6

and at higher elevations.²³ (Maps 4 and 5)²⁴ This general pattern is interrupted by peculiarities of slope, parent material, vegetation, exposure, and aridity.

In the south Okanagan, brown soils predominate to a maximum elevation of approximately 610 m and as far north as Summerland. These well-drained soils are the most arid in the region; extreme soil temperatures are common and soil moisture deficits can reach 400 mm annually.²⁵ Only the finer textured soils can be farmed successfully.²⁶ This soil group is identified partly by vegetation not found elsewhere in the province; Dwarf Sagebrush (*Artemisia tripartita*) and Phlox (*Phlox longifolia*).²⁷ Dark brown soils occur further north, between Summerland and Oyama, and range in elevation from 344 to 1067 m.²⁸ They are a transitional group of soils found, "on the lower slopes and in well-drained parts of the valley bottom."²⁹ They also occur on the benchlands adjacent to Okanagan Lake. Generally they are ideal soils for orcharding. The black soils occur largely in the north Okanagan, with the most distinct example of the group found in the Vernon area. These soils also occur on the southern exposures throughout the entire region, to an elevation of 1372 m,³⁰ and are associated with low soil moisture levels and grassland vegetation. The intermontane podsol soils, predominant in the north Okanagan, are also found on the north-facing slopes throughout the valley. They are of little agricultural importance.³¹

VEGETATION

In their enumeration of biogeoclimatic zones for British Columbia, R. K. Jones and R. Annas describe the Okanagan Valley as Interior Douglas-fir (IDF) and Ponderosa Pine - Bunchgrass (PPBG). At lower elevations in the IDF zone there is open forest of Ponderosa Pine and Douglas-fir with Bluebunch wheat grass forming, "... the most important range species in the steppe-like understory vegetation."³² At higher elevations the forest is more closed and Western Larch, Western Red Cedar and Lodgepole Pine are found more frequently.³³ The PPBG zone occupies the valley bottoms and lower slopes to a maximum elevation of approximately 750 m.³⁴



MAP 4
Soil Distribution Pattern - South to North.

ZONAL SOILS

BROWN SOILS 

DARK BROWN SOILS 

BLACK SOILS 

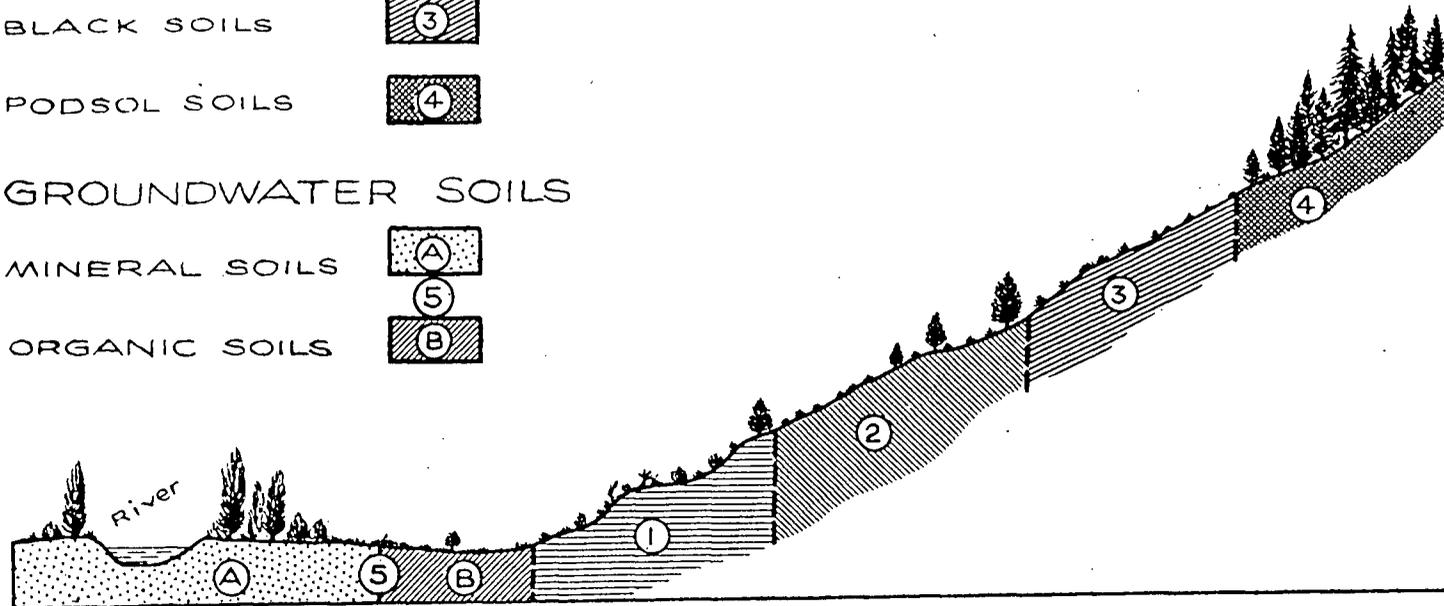
PODSOL SOILS 

GROUNDWATER SOILS

MINERAL SOILS 



ORGANIC SOILS 



MAP 5
Distribution of soils - Upslope.

Ponderosa Pine and Douglas-Fir are the dominant trees in this zone but open grassland is the dominant ground cover.³⁵

Early settlers in the Okanagan had almost none of this basic environmental information. Often, when required information was unknown, figures were made up on the spot. One real estate pamphlet advertising orchard land in the Kelowna area boasted that there were no extreme winter storms and that, "the district is by no means arid..."³⁶ In fact, horticulture in the Okanagan Valley developed in a semi-desert environment with, for many crops, a marginal or prohibitively short growing season and insufficient rainfall.

As orcharding developed in the Okanagan Valley elaborate irrigation works were constructed and environmental data accumulated rapidly. By the beginning of World War I, the provincial government was recording hydraulic and climatic data, and rough soil surveys were under way. Armed with this information, legislators, civil servants, and orchardists began to manage the valley's water to greater economic advantage.

Chapter 1 Endnotes

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CHAPTER 2

WATER LAW AND IRRIGATION

Water law for mining and agricultural purposes was established early in British Columbia. From 1865 through 1920 Colonial Proclamations and Provincial Statutes provided instruction and guidance for the expedient and equitable distribution of water to the region's miners and settlers. During this period, the increasing complexity of the province's water laws reflects new economic constraints and increased pressure on the resource. However, despite these changing circumstances, the principles of "beneficial use" and "prior appropriation" were always at the heart of all water legislation in British Columbia. ¹

When the territory of New Caledonia was declared a Crown Colony in 1858, a British Proclamation was issued to confirm English common laws in the territory "... so far as they are not, from local circumstances, inapplicable to the Colony of British Columbia."² This phrasing is critical, for it allowed the removal of a major stumbling block - riparian proprietorship - in the development of the province's water resources.

English Common Law regarded landowners living adjacent to creeks or rivers as having riparian proprietorship. That is, they held the right to the undiminished and unpolluted flow of water past their property. In its strictest sense, this principle maintained that, "uses of water, whether for domestic or other purposes, are restricted to the riparian tenant and cannot readily be transferred to other land even with the consent of the riparian owner."³ In British Columbia, as in Alberta, the principle of riparian ownership had three major drawbacks:

Most importantly, the limitation of water use to riparian land in the dry climate of the southern prairies obviously inhibited the development of land distant from good sources of water.... Secondly, the development of even riparian lands was inhibited by supply problems under the common law doctrine. Major consumptive uses of water were clearly denied riparian owners.... Finally, in dry years when there might not be sufficient water to satisfy the legitimate needs of riparians, no scale of priorities was available to apportion the scarce water to its most important uses. All riparians had equal claim to the resource. ⁴

Clearly, if British Columbia were to realize the potential of its placer gold deposits and its semi-arid agricultural lands in the interior, it could not retain the principle of riparian ownership.⁵

The first Colonial Proclamation dealing with water rights, published on February 14, 1859, was concerned with the alienation of Crown land. Section 6 declared that:

Unless otherwise specially notified at the time of sale, all such sales of Crown land shall be subject to such public rights-of-way as may at any time after such sale, and to such private rights-of-way, and of leading or using water for animals, and for mining and engineering purposes, as may at the time of such sale be specified by the Chief Commissioner of Lands and Works.⁶

This is not a very clear statement. It did not deal, for example, with compensation for rights-of-way loss to the original land owner or with allowable time for construction of works on rights-of-way. However, the section did clearly open the door to mining and agricultural development that requires water from off-site sources.

Rights to water were more fully dealt with seven months later when the "Rules and Regulations for the Working of Gold Mines" were published to accompany the Gold Fields Act of August 31, 1859. In this Proclamation, nine of the twenty-six regulations dealt with procedures for the appropriation of water; they set the tone and direction of water policy in British Columbia to this day.⁷ The nine water-related regulations established who could apply for ditch or water privileges, the principle of beneficial use, government regulation of water rates, penalty for waste of water, rights-of-way for construction of works, ensuring of water quality, and priority of access based on priority of appropriation.⁸ Subsequent proclamations and legislation added very few other principles; rather, they expanded the details and powers of the initial few. In 1860, a Proclamation required a standard measure for water use.⁹ In 1862 another proclamation dealt strictly with ditch privileges and maintenance, outlined liability for damages suffered, and laid down procedures for the issuance and posting of public notice before records were granted.¹⁰ Ordinance 26, issued on April 11, 1865, made the first explicit reference to water rights for those "*bona fide* cultivating lands".¹¹ Finally, Section 36 of the 1870 Land Ordinance eliminated

speculation in water privileges by stipulating that " transfer of pre-emption rights transfers water rights."¹²

It is not surprising that Governor Douglas and his successors would include such dramatic regulations of water for agriculture and mining. While in charge of the Cordilleran fur trade theatre in the pre-colonial period, Douglas was certainly aware of the need for irrigation especially in the region's interior. Indeed, George Simpson, Governor of the Hudson Bay Company, had been anxious that fur trade posts become self-sufficient, and sent shipments of seeds to Fort Okanogan and Spokane House as early as the 1820's. By the 1830's irrigation was almost certainly practised in the very dry country at Fort Walla Walla.¹³ This early awareness of the need for irrigation, combined with regulatory practices adumbrated in nearby United States territories, must certainly have aided Douglas and others in drafting water legislation. In short, a good deal of Cordilleran experience lay behind the new water law.

Ultimately, the colonial proclamations can be reduced to three principles of water use: 1) beneficial use, 2) priority of appropriation, and 3) restriction of riparian rights. Given the failings of the riparian tenet, its restriction may be seen as a corollary of beneficial use. Furthermore, it has been suggested that riparian proprietorship was actually replaced by the doctrine of prior appropriation.¹⁴

The principle of beneficial use is eminently suited to British Columbia where the strength of early placer mining and later of irrigated horticulture depended on efficient and ready access to water. There is no precedent for this tenet in English Common Law, and historians have suggested it originated in California in the 1850's with the exploitation of placer deposits and the settlement of agricultural lands.¹⁵ Duane Thomson, writing on the development of water legislation in the north western United States, argues more plausibly that the principle took shape in the Mormon settlements of Utah in the early 1840's and was adopted subsequently by pioneers in California.¹⁶

The doctrine of prior appropriation appears to have its first North American application in California during the 1849 - 1855 gold rush; it was upheld by the Supreme Court of the United

States of America as early as 1855.¹⁷ Under this principle in British Columbia, access to water was granted on a "first come - first served" basis. Continued supply for the earliest appropriator depended on his ability to use the amount of water he had recorded and on his beneficial use of that water. With violation of the former, his privilege could be reduced to the amount he was capable of using,¹⁸ and of the latter the Gold Commissioner could, "... declare all rights to the water forfeited."¹⁹ Some historians of water law have declared this doctrine, "a rather arbitrary rule;"²⁰ nevertheless, it stands with beneficial use as the basis of all western Canadian water law. Opinion aside, the principle of prior appropriation, in its broadest sense, dramatically redefines notions of property rights in English Common Law.²¹

The elimination of riparian proprietorship relies on the conception of water as a public resource, and on control of that resource by the State rather than by the individual. Under arid conditions in North America such control was probably exercised first in Utah, where it was formalized in the "Old Utah Code" of 1852.²² This code "... provided for public ownership of natural resources, including water, for the granting of rights by an executive board familiar with irrigation problems and for the protection of those rights by a board."²³ The doctrine moved west to California and, subsequently, north to British Columbia.

In addition to the North American development of this last principle, British Columbia may have been influenced by legislation from other British colonies. The India Act of August 2, 1858 placed administration of that colony's natural resources in government hands.²⁴ The connection between water policy in India and British Columbia in the late 1850's is plausible given the movement of colonial officials from one British Colony to another. The statutes of British Columbia did not specifically claim all Crown rights to water until 1892, but the region's early colonial officials were effectively exercising that control by requiring written application for water.

The principles thus established appear fairly straight forward. Yet, their implementation was another matter, especially as there was no administrative structure to manage the resource. Initially, water records were handled by Gold Commissioners and later by local government

agents, none of whom knew much about water resource management. As a result much of the information required on the water record forms was given in error or without sufficient detail. Whatever the Gold Commissioner knew of water management and hydrology, he had no data from which to make his assessments and upon which to issue records. There were no stream discharge tallies, no upland snow counts, and no meteorological records. Moreover, lands were unsurveyed, streams were unnamed and it was difficult to ensure that adequate notice had been posted before irrigation development. Robert Cail has clearly identified the problems:

the applicant asking for and receiving without question the right to use any quantity of water from 100 to 1000 miners' inches with no real consideration of his needs or knowledge of whether the stream could actually supply the quantity of water called for on the record. Regardless of the quantity of water sought the recording fee of two dollars was the same. If the owner needed 100 inches for the irrigation of his homestead, he almost invariably took out a record for 500 to 1000 inches. No track was kept of the records from the same water course and many streams were recorded ten times beyond their available supply. ²⁵

Between 1871 and 1892 the provincial legislature enacted few and minor changes to water clauses in provincial statutes. Only the Water Viewers Act of April 6, 1886 had the potential to alter dramatically the use of water by enabling the election of a "water viewer [who] was empowered to hear, determine and adjust water disputes...." ²⁶ However, legislation was premature. A. V. White, head of the 1919 Commission of Conservation, pointed out that "This act was a move along good lines, but it was not much used, probably because of the lack of necessary collateral government agency by which to make the operation of its provisions effective." ²⁷

It was only in 1892 that the provincial government strengthened by statute what it had been practicing tacitly since 1858 - complete legal and administrative jurisdiction over the province's water. Section 2 of the Water Privileges Act declared that, " the right to the use of all water at any time in any river, watercourse, lake or stream not being a navigable river or otherwise under the exclusive jurisdiction of the Parliament of Canada, is hereby declared to be vested in the Crown in the right of the Province...." ²⁸ In this legislation the influence of British

colonial connections is clear. The Act was based on an Irrigation Act passed in 1886 by the province of Victoria, Australia.²⁹ A second important feature of the Act of 1892 lay in its expansion of the classes of people who could apply for water privileges. Previously, only miners and "bona fide" agriculturalists were allowed to record water rights. Beginning in 1892 companies were permitted to develop water works. Moreover, companies whose plans were approved by the government were empowered to enter and construct works on lands other than their own, and to "divert or use the water for the purpose intended."³⁰

Five years later British Columbia took its first step toward comprehensive control of water resources with the passage of the Water Clauses Consolidation Act, 1897. As its title suggests, this legislation regulated more fully the various and sometimes conflicting demands for water - for agriculture, mining, hydro-electric generation, domestic use, and industry. The new act was a commendable step towards a conservation-minded approach to water. Its preamble stated that "... it is necessary and expedient.... to provide for the due conservation of all water and water-power,.... and to provide means whereby such water and water-power may be made available to the fullest possible extent in aid of the industrial development and of the agricultural and mineral resources of the Province."³¹ To this end various sections of the act stipulated diligent and expedient construction of proposed works; water applied for had to be used; and clauses relating to the expropriation of lands for rights-of-way were strengthened. Yet this new legislation was impotent because it did not create a supporting administrative structure.³² New and more comprehensive Water Record Forms were printed and used throughout the province. But the granting of privileges still rested on over-worked, ill-informed government agents. The administrative sluggishness was further compounded because "the failure to cancel records for adequate cause permitted troublesome documents to accumulate."³³

The following 12 years of amendments to the Water Clauses Consolidation Act dealt almost exclusively with corporate development of domestic water works and with the generation of hydro-electric power. Growth in these sectors of the province's economy was dramatic during these years, but so it was in irrigated horticulture. Irrigation law lagged partly, perhaps, because

the government received little direct revenue from irrigation projects.³⁴ For decades water rights had cost a mere two dollars for a ninety-nine year lease. Moreover, existing legislation may well have been adequate to serve those developing irrigation systems. Within a few years after 1900, however, as interior orchards burgeoned, orchardists began to agitate for new legislation and better administration of the region's limited water resources.

Before 1906 large scale irrigation schemes had been undertaken by only four companies, and only a few large private systems, such as that developed by Lord Aberdeen at Coldstream, were in place. Between 1906 and 1912, however, " fifty-six land companies and eighteen water companies were incorporated." ³⁵ The Water Privileges Act, 1892 and the Water Clauses Consolidation Act, 1897, in combination with the extant Companies Acts, allowed such development because the land companies' water rights were appurtenant to the lands they owned. These companies' water rights were either primary applications or they were purchased from record holders under an agreement by which the company would assure continued supply to the vendor. Such agreements were permitted, and rates were set in consultation with officials of the Department of Lands and Works.

In 1907, the newly formed Western Canada Irrigation Association (hereinafter W. C. I. A.) held its first annual conference in Calgary, with a contingent of irrigationists from British Columbia in attendance. Partially in response to concerns expressed at that conference, the British Columbia government established a commission to examine problems of irrigation in the interior. The head of that commission, Professor L. G. Carpenter, an American irrigation expert, filed a report in January, 1908, that called for dramatic changes to the province's water laws. The professor supported the conservation minded approach heralded in the 1897 Act, but emphasised the need for some form of provincially managed water administration.³⁶ Commission recommendations included, " recognition of the right to store water," " a means of investigating and handling the excess records that already exist, " and the establishment of " a water administration." ³⁷ Only the first recommendation was acted on immediately as the legislature amended the 1897 Act to allow for storage of water, expropriation of land for same, and conduct

of stored water in natural streams. Considering the dam construction which had taken place to that date, the amendment must be seen as legitimizing established practice rather than as a new approach to water use.

In August, 1908, the W. C. I. A. held its second annual conference at Vernon. Nearly the entire time was taken up with discussion of the inadequacies of existing water legislation and with demands for what was broadly labelled "government irrigation."³⁸ A resolution indicates the conference's tone:

Therefore, be it resolved that in the opinion of this convention, the most urgent need of the province to-day is the enactment of a simple and comprehensive law under which the sources of water supply for irrigation may be used to their fullest extent in extending irrigation development, and to that end the government in the proposed legislation enact provisions which will clear the streams of existing records that are not being used, provide for the careful and systematic gauging of all sources of supply for the storage of flood water on a basis which will protect those constructing expensive works necessary to conserve this water, and provide the needed staff of competent government officials to administer the law after it is enacted.³⁹

While this external pressure was being brought on the government, members of the Legislative Assembly began to take up the cause as well. Price Ellison, provincial legislative member for the Okanagan district, prodded his colleagues in Victoria to action by pointing out that " the Government of the day was spending thousands of dollars in dyking land to keep the water off, [and] ... they could very well afford to spend very much more in putting the water on the land, for the returns would be very much greater."⁴⁰

With input from the Commission on Irrigation, American and Canadian consultants and pressure from W. C. I. A. delegates, the provincial government passed a new Water Act in 1909. The act included all of Professor Carpenter's recommendations and more. In his monumental tome on irrigation law, C. S. Kinney stated that in the 1909 Water Act, "the legislature of British Columbia provided one of the most effective laws governing this subject that can be found in North America."⁴¹ Mr. S. Fortier, Chief of Irrigation Investigations for the U. S. Department of

Agriculture concurred with Kinney's assessment that, "... British Columbia in one leap had crossed the barrier lying between the crude laws and customs of the placer miner, and the most advanced legislation of modern times."⁴² Important new aspects of the act's seventeen parts include a section defining special terms, strong re-affirmation of provincial control of water, elimination of right to permanent diversion or exclusive use of water by those either claiming riparian ownership or right-to-access by claim of "length of use", introduction of a standard measure of water flow (cubic feet per second) and water volume (acre foot), and the establishment of water districts with their own water commissioners.⁴³ The most important feature of this act, however, was the establishment of the Board of Investigation - a quasi-judicial tribunal whose duty it was to examine and adjudicate all water records in the province and, based on priority of record, issue "... licences authorizing the use of the water in question."⁴⁴ In addition, and in order to make the best appraisal, the Board was empowered to make measurements of stream discharge and conduct other data-gathering activities. This latter provision marked the formation of the provincial Water Rights Branch. Finally, Section 63 of the 1909 act allowed those holding water licences to build co-operative works,⁴⁵ and an amendment to the act in 1911 permitted the mingling in such works of waters from separate licences. For orchardists of limited means, these were crucial changes.

The new act brought Okanagan irrigators few immediate changes. After all, fair adjudication required hard data which would not be available for at least two to three years after passage of the act. Meantime, corporate irrigation schemes continued apace, and the cry for public take-over of the corporate irrigation ventures mounted. At the W. C. I. A. convention in Kamloops in 1910, for example, a resolution called on the government of British Columbia to, "take steps towards the introduction of a system of government ownership, conservation, and operation of water systems for irrigation in the dry belt, to ensure fair and equitable distribution according to the Water Act."⁴⁶ Two years earlier the legislature had passed laws allowing municipalities to develop new irrigation schemes or expropriate existing ones. The W. C. I. A. resolution of 1910 clearly went much further, viewing water as a public resource.

An amendment to the Water Act in 1910 dealt with "certain verbal and other modifications affecting executive procedure." ⁴⁷ The following year, more amendments of a similar nature were passed and an "extension of time with respect to conducting surveys...." was granted. ⁴⁸ In addition, regulations regarding the issuance of licences were modified, shifting that responsibility from district Water Commissioners to a central issuing office in Victoria. ⁴⁹ Further amendments in 1912 were concerned with procedural matters that did not affect the principles of the Act of 1909.

In 1912 the W. C. I. A. met in Kelowna; again much discussion revolved around government control of irrigation. A motion on the agenda called for the enactment of legislation. "to authorize the incorporation of water districts with control and distribution of all water supply...." ⁵⁰ The motion carried. In response, the 1913 amendment to the Water Act included a new section, Part XA, permitting the incorporation of "Irrigation Communities". ⁵¹ The chairman of the Board of Investigation commented: "These amendments enable parties using a system of works to form a partnership called an "irrigation community" - to maintain and, if necessary, to construct the main works, to appoint a manager and to levy assessments for the expense incurred." ⁵²

There were, at that time, two methods by which companies could construct irrigation works and still satisfy appurtenancy requirements. One method was through the establishment of an entirely separate carrying company whose rates were publicly regulated. ⁵³ The other method saw shares in the irrigation company transferred to land purchasers until the entire system was owned by the irrigators. ⁵⁴ The latter formula was favoured in the 1913 amendments to the Water Act, and one irrigation consultant stated that its purpose was, "to provide for the creation of one type of irrigation company at least, that will be approved by the Government, that will be in harmony with the principles of existing legislation, and under which an opportunity may be afforded to capital to receive ample profits from its investment in this field of enterprise." ⁵⁵

Concurrent with the 1913 amendments, the government hired Mr. H. W. Grunsky, another American irrigation expert, to draft "comprehensive legislation relating to irrigation communities."⁵⁶ In November, 1913, Grunsky presented his Report on A Public Irrigation Corporation Bill ; based on this document, a new 192 page Water Act was passed on March 4, 1914. In this, four types of companies or associations were permitted to apply for water licences and develop works: i) Water User Communities, ii) Mutual Water Companies, iii) Land and Water Companies, and iv) Public Irrigation Corporations.⁵⁷ It is not surprising that, given the push for public ownership of water works and the co-operative philosophy that was increasingly represented among growers, the first and fourth of these options were pursued immediately. The other two options had existed for a number of years, and their obvious failure had made them unattractive for further investment.⁵⁸

The opportunity to establish Public Irrigation Corporations was taken up first by the farmers in the Ellison district north of Kelowna who filed a petition for incorporation soon after the 1914 legislation was passed.⁵⁹ Their action was followed by similar applications by farmers in Westbank, Naramata and Peachland.⁶⁰ Application was also quickly made to set-up water user-communities.⁶¹

During World War I few legislative changes and little irrigation development took place. The government moved carefully during this time to assess the physical and financial state of various irrigation schemes in order to establish their take-over value. Throughout the period, however, many orchards were coming into production and the inability of hastily built irrigation works to provide enough water was becoming obvious. In 1916 the W. C. I. A. passed a resolution that reflected the sentiments of most valley orchardists. It doubted the ability of, "various irrigation companies to carry out their original contracts as conveyors of water," and called on "the Provincial Government of British Columbia to take immediate steps to deal with this serious problem, and thus restore confidence and ensure an adequate supply to the settler."⁶²

Finally, in 1918, an amendment to the 1914 Water Act established a "Conservation Fund".⁶³ Under this act, \$500,000.00 was set aside by the provincial government to be drawn

upon by companies and municipalities to repair, construct or purchase irrigation storage and distribution works.⁶⁴ The following year the fund was increased to \$2,000,000.00, a move that almost certainly reflects the anticipated purchase of privately developed systems by Public Irrigation Corporations.⁶⁵

By 1920 review of the irrigation systems had been completed and purchase prices agreed upon. Between August and December, 1920, six Okanagan Irrigation Districts received their letters patent, thereby completing the shift of control of irrigation water in the Okanagan from private to public hands.

The principles of water management that were in place in British Columbia at the end of the colonial period had been developed outside the region. The experience of settlers, miners and government officials with water use in the western United States was transferred north to British Columbia in the late 1850's and early 1860's and admirably suited the region. These principles facilitated the development of placer mining and irrigated horticulture and, equally important, were familiar to incoming American miners.

From the end of the colonial period to 1920 provincial legislation slowly refined the principles of beneficial use and prior appropriation (that is, the elimination of riparian rights) to meet changes in local economic circumstances. As irrigation systems increased in size, scale, and capitalization, water legislation was elaborated to encompass these developments. Furthermore, when social perception of water resources changed and Okanagan orchardists began to view water management as a public responsibility, laws were enacted to remove water from the control of private irrigation companies.

Chapter 2 Endnotes

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CHAPTER 3

WATER MANAGEMENT

The growth of a viable orchard industry in the Okanagan Valley required an inexpensive, ready supply of water that could be distributed reliably among orchardists. By 1920 such a system was in place, and the Okanagan fruit industry was well established. As irrigation systems developed and changed in the Okanagan, so did the role of the farmer in the irrigation process. The first irrigators worked at almost every decision-making level from planning the system to pick-and-shovel work. Under company control, between 1900 and 1920, orchardists opened and closed flumes, but otherwise were not directly involved in the delivery of irrigation water to their land. With the establishment of Irrigation Districts in late 1920, orchardists again took a management role by co-operatively directing the construction and maintenance of the newly acquired company works.

Between 1860 and 1920 there were four main changes in the management of water, each associated with increasing demand for a limited supply. First, water was re-defined as a common good rather than a private resource. Until the late 1890's, Okanagan farmers tapped local supplies as needed and relatively few users drew on any one source. Company irrigation began at the turn of the century, and its failings became evident by the beginning of World War I. To maintain their livelihood, Valley orchardists organized to petition the provincial government to enact legislation that would ensure public control of irrigation works "for the good of all."¹ Second, regional perspectives overrode local concerns. Okanagan pioneers occupied isolated holdings, and the water they used had little impact on their few neighbours. With the advent of company irrigation a new regional scale of water demand emerged and the provincial Water Rights Branch was formed to oversee the harmonious distribution of water to irrigable lands. The new approach used watersheds as management units. Third, large scale development schemes became the dominant order. As settlement in the Okanagan Valley expanded in the 1890's, the easily-irrigated bottom lands were quickly taken up. Much agricultural land remained on the region's benchlands, but its improvement (by irrigation) was beyond the financial capacity of

individuals. Companies formed to develop these lands underwrote the construction of elaborate, high volume irrigation systems that served hundreds of orchards. Fourth, efficient water management increasingly relied on climatological and hydrological data. When Okanagan agriculture moved from cattle ranching to irrigated horticulture, the assessment of environmental risk became more critical. Upland reservoirs provided most growers with an even supply of water. Continued success, however, required planning based on assiduously kept records of precipitation, temperature, snow count and stream discharge.

The changing character of the region's water demands could be met, initially at least, by building more and slightly longer works to irrigate new hay flats and grain fields. However, with the shift to benchland orcharding around the turn of the century, such supplies of water were inadequate, and a dramatically new scale of water supply was put in place by the land development companies.

The first direct legal reference to the use of water for agriculture in British Columbia, placing water management largely in the hands of individuals, is found in the Land Ordinance Act of 1865. Under Section 44 of that Act, "Every person lawfully occupying and *bona fide* cultivating lands may direct any unoccupied water from the natural channel of any stream, lake, or river adjacent to or passing through such land, for agricultural and other purposes" ² The Act empowered regional Land and Gold Commissioners, through the Chief Commissioner of Lands and Works in Victoria, to grant settlers water records based on applications that stated no more than the quantity of water desired, its source, and its destination. Thus, in terms of water management, there was from the beginning a tripartite system for the administration of water resources - the government Commissioner in Victoria, the regional Gold and Land Commissioners, and the farmer.

In the Colonial period and for some time after 1871 the Chief Commissioner of Lands and Works established overall policy. At this early stage the Commissioner in Victoria had little or no knowledge of the circumstances of water use. The region was unsurveyed and no meteorological or hydrological data were available, until after the turn of the century. The

regional Land and Gold Commissioners, and later the Government Agents, who accepted water record applications held some discretionary powers to settle disputes (of which there were surprisingly few throughout this period), but their influence on the region's water management was negligible. Like the Chief Commissioner, they operated without detailed knowledge of the resource; moreover, they were "already burdened with duties".³

By contrast, the farmer in early British Columbia operated with a wide range of decision making powers. The nature of his enterprise and the looseness of the legislation required that, after receiving his water record, he draft plans for the storage and delivery system, hire labourers, buy materials, and supervise the work. If his project were small he probably did the physical work himself. By later standards these first systems were simple; even so, faulty planning, construction or water use could be disastrous, and none but the farmer was responsible for the failure.

The degree to which water was controlled locally and privately before about 1900 is suggested by scattered references to the construction of works and the use of water. In the 1880's Duncan Woods and J. Gartrell, two of the Summerland's earliest pre-emptors, built a makeshift dam on Trout Creek. "The creek was blocked with logs and rocks and then the land was periodically flooded."⁴ In the Kelowna area George and Hugh Rose farmed a small bottomland acreage irrigated by water from nearby Mission Creek. George's diary contains many references to construction, maintenance and repair work on their small system:

June 8, 1893. ... in the afternoon Hugh and I dug a good portion of the irrigation ditch along the road.

July 20, 1893. In the morning, Hugh, Bill Clouston and I repaired [the] dam of the Nicholson ditch at Crozier's as no water was coming down.

August 3, 1893. Spent all morning until 2 o'clock working on the ditch, putting in a new dam at its junction with the creek, and digging out places and making the dam across the August ditch better.⁵

In the 1890's Prior Brown and John McClure built an irrigation ditch "from Prather Creek around the bottom of the shale slides of Black Mountain and into a small lake. From the end of the lake they ran another ditch to Gopher Creek ... and ran water down the creek bed to their farms...."⁶

By the early 1890's a few individuals had begun more ambitious works. Joseph Brent, who built and operated the first grist mill in the Okanagan Valley (1871), wrote to the 1891 provincial Report On Agriculture that he was building nine miles of irrigation ditches.⁷ In October the same year the Vernon News noted a new irrigation ditch had been surveyed to take water from Mission Creek to Guisachan, Lord Aberdeen's new holding at Kelowna.⁸ That farm's manager, Mr. Eustace Smith, held that "Irrigation [is] necessary in all cases."⁹ Such systems, though larger than most pioneer works, still met private demands with local water supplies. Commercial orcharding was not yet in place and these somewhat larger works were generally built to irrigate hay flats.¹⁰

The administrative heirarchy - with little apparent advice and counsel passing between levels - remained unchanged until after the turn of the century. In the 1880's and 1890's, however, provincial legislation began to express a new approach to water management. Few of these legal changes had an immediate or visible impact on the management of water in the Okanagan, but they did give water a higher value. Amendments to the Land Act in 1886 defined a measure of water quantity, the Miner's Inch.¹¹ Up to this time the Miner's Inch, was an arbitrary measure with different meanings in different places.¹² The Water Viewer's Act of the same year was an attempt to handle water issues on a regional basis by allowing an elected official to hear and adjudicate water disputes. The legislation, however, provided no administrative structure to support the Act's provisions. The Water Privileges Act, 1892, eliminated exclusive rights to water sources or bodies except by parliamentary enactment, empowered companies to develop works, and required "the publication of notice of application for water in the British Columbia Gazette."¹³ The Water Clauses Consolidation Act, 1897, was the first legislative attempt to recognize the full range of water uses in the province. Much previous legislation was repealed¹⁴ and placed under one Act. A section of the new act required proposed works to be "started and diligently prosecuted" within sixty days after a record had been made.¹⁵ Despite this and other conservation-minded

clauses, the responsibility of enforcement still lay with over-worked, ill-equipped and ill-informed regional Commissioners. In fact, the Commissioners rarely exercised their right to cancel records, and "records continued to accumulate, no matter how unreasonable may have been the circumstances under which some of them were held."¹⁶ Whatever its failings, the new legislation did recognize the increasing importance of water in the development of the province's agriculture.

By the 1890's the public was also becoming aware that judicious water management was an important component of the region's agricultural economy. In 1893, Alfred Postill, an early and observant pioneer, wrote:

Where water can be applied, there has been no lack of enterprise in making a course for it, but the lakes and natural reservoirs in the mountains will have to be utilized, and a better system for the distribution of water to be introduced, as larger areas are brought under cultivation and increased settlement takes place.¹⁷

The following year Postill observed: "There is little doubt that the foothills could be made productive fields if some method were arrived at for the proper applying and handling of the water flowing into the valley."¹⁸ Two years earlier, at the Coldstream Ranch the estate manager, Mr. Coutts Marjoriebanks, hired a surveyor to locate a major irrigation ditch sufficient to supply a ranch of several thousand acre. Such action certainly reveals the power of wealth, and the growing recognition that water was a limited and largely unreliable resource - the Coldstream Ranch could not be developed fully by relying on the unregulated discharge of Coldstream Creek.

At the same time, the valley's burgeoning agricultural population remained ignorant of the region's environmental limits - a situation that lasted until roughly World War I. There were no climatological records, soils were unsurveyed, and stream discharge tallies were unknown. While farming is inherently risky, such information could reduce risk substantially, especially for intensive horticulture near climatic margins. In addition, many new Okanagan farmers were unfamiliar with irrigation practices.¹⁹

The incorporation of the Peachland Townsite and Irrigation Company on December 28, 1899²⁰ heralded a new phase of irrigation management in the Okanagan. The company's founder, John Moore Robinson, purchased a thousand acres of benchland behind the townsite, subdivided it to 10-acre lots and serviced the land with irrigation water from local creeks. The details of this first corporate irrigation scheme have been lost, but it is clear that a new system of water management had emerged. At Peachland the corporation controlled the system. Purchasers of lots were not responsible for any administrative decisions regarding the planning, financing or maintenance of water storage and delivery. Rather, the farmer turned the water on his crop to the amount allotted by the company.

Robinson repeated his land development formula at Trout Creek in 1902, founding Summerland, and at Naramata on the east side of Okanagan Lake in 1907. No doubt his success encouraged most of the region's other land development companies,²¹ the majority of which did not form until 1904 or later. Although many of the companies were not financially successful, they all represented a new, corporate level of water management.

Corporate development of irrigated benchlands in the Kelowna area is typical of those throughout the valley. The Kelowna Land and Orchard Company (incorp. 1904), the Central Okanagan Land and Orchard Company (incorp. 1906), the South Kelowna Land Company (incorp. 1908), and the Belgo Canadian Fruitlands Company (incorp. 1909) undertook the improvement of thousands of acres near Kelowna.²² The financial and organizational history of these companies is well described by David Dendy in, *One Huge Orchard*. Of importance here is the recognition of a completely new scale and organization of irrigation. Company schemes were huge undertakings laid out by surveyors and engineers such as Charles A. Stoess for the Belgo-Canadian Company or Col. W. H. Moodie for the South Kelowna Land Company. These schemes required construction of dams to store thousands of acre-feet of water and control mechanisms to metre the flow from reservoirs. In the Kelowna area alone over 105 miles of main distribution works - canals, flumes, siphons and pipe - were constructed.²³ A survey in 1915 of Kelowna's four largest company systems estimated 1.8 million dollars had been spent building storage and distribution

works.²⁴ Companies served more than 15,000 acres of irrigable land in the Kelowna area alone.²⁵

Despite their size, the region's corporate irrigation schemes were fraught with problems. The systems were generally poorly constructed.²⁶ Dams were not built to last,²⁷ concrete lined canals cracked from the weight of water or from frost heaves,²⁸ wooden structures rotted within a few years of installation²⁹ and steel siphons, like that operated by the Kelowna Irrigation Company to feed the Glenmore Valley, were rusted and badly pitted within five years of construction. Other problems included the arbitrary setting of the "duty of water" (the amount of water required by an orchard at any given stage of growth),³⁰ lack of concern for establishment of a fund for maintenance and repair of works,³¹ and, in general, the irrigators' inexperience.³²

The number of new water records (Table No. 1)³³ coupled with the size of corporate

TABLE 1 New Water Records In The Okanagan.

	Fairview	Penticton	Summerland	Peachland	Kelowna	Vernon	Totals
1870-79	1	0	0	1	13	15	30
1880-89	11	2	3	1	39	26	82
1890-99	35	16	9	15	103	79	257
1900-10	49	117	59	156	193	96	670
Totals	96	135	71	173	348	216	1039

developments placed great pressure on limited supplies of water, the extent of which was still unknown.³⁴ A cycle of dry years compounded problems,³⁵ and as early as 1906 the Central Farmers' Institute passed a resolution calling for the establishment of a government survey of potential irrigation works and for a board to investigate and adjudicate disputes.³⁶ The delegates noted the injudicious use of water was detrimental to both crops and land³⁷ while, at the same time, they recognized the benefit of water storage for irrigation as an important part of spring flood control.³⁸ Furthermore, because there was no controlling government water agency, there were disparities in granting records - what was allowed in one area was not in another.³⁹

The following year, 1907, the provincial government hired L. G. Carpenter, an irrigation consultant from Colorado, to conduct the Irrigation Commission of British Columbia. Carpenter filed his report in January 1908 with the recommendation that a water administration be established⁴⁰ and that "a means of investigating and handling the excess records that already exist on streams"⁴¹ be put in place. His suggestion that a Commission or an officer of the government "with irrigation experience undertake the necessary adjudications"⁴² (ie. rather than a court), was premature, because there were no data upon which to base allocation.

Later in 1908, the Western Canada Irrigation Association (W. C. I. A.), a newly formed group interested in developing and promoting irrigable lands in the West, met in Vernon and resolved that "the Dominion and Provincial Governments be asked to undertake a system of topographical and hydraulic surveys in British Columbia to ascertain the conditions of the water sheds, the amounts of water available for irrigation and the extent of irrigable land."⁴³ The need for reliable information for orchardists was also recognized. At their conference in 1908 the provincial Farmers' Institutes called on the government to hire speakers knowledgeable in irrigation because "Speakers [had] been brought from the East but the conditions there are different...."⁴⁴ All of these events indicate that public and governmental perceptions of water were broadening, that a new concern for environmental data was developing, and that the incorporation of land companies had permanently altered the scale of irrigation.

In 1909 L. G. Carpenter's recommendations, the resolutions of the W. C. I. A., and advice from experts such as Mr. J. S. Denis (Commissioner of Irrigation for the C. P. R. in Alberta)⁴⁵ and others were combined in sweeping new legislation.⁴⁶ The Water Act of that year created the long needed management body to which Okanagan irrigators, corporate or otherwise, could address their concerns. Sections of the Act dealt with management issues: the definition of significant legal terms, adoption of standard units of water volume and flow, division of the province into management units based on existing Land District boundaries, establishment of a priority of water use that clearly recognized the multi-purpose nature of the resource,⁴⁷ and allowance for the co-operative organization of irrigation.⁴⁸ These were important developments.

However, the most significant management feature of the Act were the appointment of a Board of Investigation and the organization of the Water Rights Branch.

The Board of Investigation provided the mechanism by which all existing water records were investigated - either they were cancelled for non-use or non-compliance or, based on prior appropriation, licenses were issued authorizing the use of water.⁴⁹ To do this work fairly, the Board was empowered to begin extensive hydrological and meteorological measurements and to conduct topographic surveys of irrigated and irrigable lands.⁵⁰ This technical work required the formation of the Water Rights Branch. While the Board's function was terminal - that is, when its work was completed it was dissolved (late 1930's) - the Water Rights Branch, became an ongoing part of water management in the province.

The operations of the Board and the Branch were tentative at first. The Board did not fill its tribunal of adjudicators until mid 1910, and it was mid-1911 before the first meetings to hear claims and adjust records were held in Kelowna, and a year later when the first meetings were held in Peachland, Okanagan Centre, Fairview and Vernon.⁵¹ In 1912 the head of the Branch, J. F. Armstrong, offered the disclaimer that the Branch "had commenced work without precedent to guide it, and the organization had to be created as necessity arose."⁵² The 1909 Act, for example, allowed water licences to be issued by district Water Commissioners creating "difficulties of the very kind the Board of Investigation was appointed to remove."⁵³ Some Commissioners "issued licences under the easy system which had led to the granting of so many imperfect records in the past."⁵⁴ In remedy, the Revised Statutes of 1911 required all licences to be issued by a central agency.⁵⁵ It was also difficult to organize field surveying, as one employee of the Branch noted:

It is interesting to note now that it was not appreciated then exactly what information was required as the several field parties seemed to have collected data and made surveys along different lines. Whether the instructions given were the same or whether the chiefs of the respective parties had their own ideas of what was required is uncertain, but one party devoted most of its time in the field during 1910 making surveys of reservoir sites and traverses of streams; another made contour surveys of reservoir sites and traverses of streams; another devoted most of the time tracing out the courses of the ditches used for irrigation

while others simply made traverses of the courses of the streams from mouth to headwaters.⁵⁶

By 1911 surveyors "were sent into the field better equipped as to the information and data they were to secure."⁵⁷ Despite the steadily increasing efficiency of the Water Rights Branch, its working pace was slow. Engineers had over 7000 records to investigate,⁵⁸ irrigation works to inspect, "duty of water" requirements to assess, and minor disputes to settle.

As the Water Rights Branch and the Board of Investigation struggled to address their organizational problems, corporate irrigation was approaching its apogee. Orchardists were quickly becoming disillusioned about the ability of private companies to manage the region's water. At the 1910 W. C. I. A. convention in Kamloops, a petition of more than 300 Kelowna area orchardists requested that:

The Government of British Columbia assume control of all water and water systems within the province, to institute an energetic policy of water conservation so that water now going to waste may be held in reserve for use when most required, and to so amend the laws relating to the distribution of same as to give adequate protection to flumes, ditches, and gates, so that the same shall not be interfered with except by the person in authority.⁵⁹

During that same meeting delegates resolved to ask the provincial government to take steps to ensure a "fuller supply of water and its more equitable distribution."⁶⁰

The W. C. I. A. was a powerful lobby.⁶¹ Its pressure roused the government to appoint Mr. B. A. Etcheverry, an irrigation expert from California, to conduct a tour of the province's irrigated lands and recommend improvements to methods of irrigation, and to initiate a continuous process of irrigation investigation and public education on the topic.⁶² Following his recommendations, the government commissioned Etcheverry to write, Practical Information on Irrigation for British Columbia Fruit Growers, published by the King's Printers in 1912.⁶³ It was a useful manual that dealt with everything from building dams and laying out an orchard to construction of headgates and the operation of weirs for measuring use. Its value is reflected in its numerous

reprintings, yet it did not address the central problem for many orchardists, continued access to sufficient water.

Growers cited few specific instances of corporate mismanagement. Rather, their general feeling was that, "water users under the 'Company System' were absolutely dependent on the successful operation of a large system over which they had no control."⁶⁴ Possibly the companies were a convenient scapegoat. In 1913 one American irrigation expert noted that the "gradual completion of works by the early record-holders and the calling for all the water to which their records entitled them, or, rather to all the water which could be used beneficially under those records, brought the situation to an acute stage."⁶⁵ Companies, with their massive, newly-completed storage reservoirs, were an easy target, especially as problems of dam and flume construction became apparent.

By 1912 most company irrigation works were operating, the first commercial orchards (planted roughly 1904-06) were coming into bearing, and hundreds of acres of new orchard were spreading across the benchlands. At the same time, Board of Investigation meetings were being held throughout the valley. The W. C. I. A. held its annual convention in Kelowna in August; interest in irrigation was never greater, and delegates to the conference passed a resolution asking the provincial government to formulate a scheme "giving the inhabitants of districts served from common sources of water supply the power to take over, control and operate for the benefit of all land in such districts, all water records, irrigation companies and associations."⁶⁶ The following year the provincial Farmers' Institutes passed a similar resolution.⁶⁷

The government responded in two ways. First, it amended the Water Act. Amendments included an eight part order-of-work to be carried out by newly appointed district engineers.⁶⁸ As regional representative of the Water Rights Branch, the engineers were required to have both engineering and administrative skills.⁶⁹ In addition, new water districts were drawn to conform with natural watersheds.⁷⁰ Second, it prepared draft legislation, entitled Report on a Public Irrigation Corporation Bill, in late 1913⁷¹ and, after public review,⁷² the legislation was passed in 1914 as a comprehensive Water Act.

The Act of 1914 consolidated the management changes begun by the 1909 Act and subsequent amendments. At the provincial level, the central control of the Department of Lands and Works was strengthened as it acquired authority to regulate water rights applications and approve proposed works. All the Department's policies were managed through the Water Rights Branch and the Board of Investigation. Regionally, the District Engineer was given more "extensive authority in connection with the direction and control of the diversion, storage and distribution of water, and ... vested with wide powers of inspection and other duties under the Act and the 'Rules'."⁷³ He was also permitted to appoint water bailiffs to carry out and supervise his instructions and, generally, to exercise the powers of a justice of the peace.⁷⁴ The engineer was to be guided in his work by an elaborate set of "Rules" passed by the Lieutenant-Governor in Council, January 13, 1914,⁷⁵ and by the enumeration of three principles of water use for irrigation:

1. Limiting the quantity to beneficial use. That is to say: the quantity of water used per acre shall be limited to such quantity as experience may from time to time indicate to be necessary for the production of crops in the exercise of good husbandry.

2. Rotation in use, when a number of water users may arrange a system of rotation that will best meet the requirements of growing crops and at the same time secure an economic use of water.

3. Consideration of the particular crop grown, a provision which opens the way for adjustment that is in the interest of a community as a whole.⁷⁶

The new Water Act also dealt with the development of co-operative irrigation works. Fully 127 of the Act's 302 sections dealt with the formation of Water User's Communities, Mutual Water Companies, Land and Water Companies, and Public Irrigation Corporations.⁷⁷ The aim of each of these approaches to irrigation development and management was to enable growers, "to co-operate effectively and on a large scale in the solution of their water problems."⁷⁸

Upon enactment of the new Water Act the Water Rights Branch received petitions for public irrigation corporations in Ellison, Kelowna, Westbank, Naramata, and South Vernon.⁷⁹

Prior to incorporation, however, the Board of Investigation required a thorough study of each district's proposed source of supply, and much of 1914 was taken up with this work.⁸⁰ World War I had broken out and field survey work was hampered as a "large percentage" of Branch staff joined the armed forces.⁸¹ Depleted manpower remained a limiting factor for the Branch throughout the War.⁸²

In addition to its own investigations of proposed public irrigation corporations, the Water Rights Branch hired Mr. A. R. MacKenzie, a Vancouver civil engineer, to conduct an in-depth study of the physical operations and financial conditions of six of the Okanagan's major irrigation companies.⁸³ Mackenzie found the companies' finances and works generally in poor condition;

The general tendency of promoters has been to hasten the construction, in its entirety, of a more or less ambitious scheme and, on the completion of the works in readiness for service, to immediately throw on the market all the land under the system. Irrigated holdings have been more or less readily disposed of, under recent boom conditions, but the bulk of the lands purchased have been the attractive portions, often in widely scattered locations over each large tract for which irrigation has been provided. Such scattered settlement has necessitated the operation and maintenance of the entire water-distribution system and, in many cases, the conveyance of water over considerable distances to irrigated areas, unremuneratively in respect of cost of service.⁸⁴

To five of the six companies studied, he attached a note that, "There has been no sinking fund provision for depreciation of works."⁸⁵ In conclusion, Mackenzie set the estimated cost of repairs (1916 - 1922) at over \$807,000.00.⁸⁶

Some dams were found to be in "dangerous condition and cannot be guaranteed to hold back another season's storage."⁸⁷ One steel syphon 62 inches in diameter and 1247 feet long was found to be "too thin a gauge throughout and will have to be replaced by 1920."⁸⁸ Thousands of feet of concrete-lined canals were cracked and leaking,⁸⁹ and some earth canals were loosing

nearly 30 percent of their water to seepage.⁹⁰ Wood pipes, flumes, and support structures were in overall bad repair. More generally Mackenzie observed that;

... successful development called for more than plentiful water supply and sound, economical construction of the irrigation works. Ultimate general prosperity can only be expected when the quality of the land, terms of purchase, the conditions of irrigation service and marketing facilities combine to attract the appropriate type of settler with agricultural experience and accustomed to strenuous physical effort.⁹¹

In 1916, after reviewing MacKenzie's report the Board of Investigation decided not to approve public take-over of works which, even in their dilapidated and devalued condition, would have cost too much.⁹² Purchase and repair to the Kelowna Irrigation Company's system alone, for example, were estimated at almost \$500,000.00 or roughly \$7.20 per acre per annum - a figure considered far too high for growers.⁹³

Companies' finances continued to deteriorate, and in 1917 the government passed an Order-in-Council against the White Valley Irrigation and Power Company, the Kelowna Irrigation Company, the Canyon Creek Irrigation Company and the Peachland Townsite Company under which, "maintenance and operation became the first charge against revenue to the exclusion of all other claims."⁹⁴ In July the same year, another government Commission was appointed to investigate the Valley's irrigation companies.⁹⁵ Its findings mirrored those of A. R. MacKenzie: insufficient supply, dilapidated works and water supply agreements "founded on ignorance or misconception of irrigation requirements."⁹⁶

By 1917 it seemed clear that the water management by private irrigation companies was not in the best interests of the Valley's farmers. The Comptroller of Water Rights, Mr. William Young, stated in the Water Rights Branch Annual Report that "studying the irrigation company problem, it is obvious that in one or more districts financial assistance will be necessary if communities are to be placed on a permanent basis"⁹⁷ (my emphasis) He recommended establishing a "Conservation Fund" through which co-operative public organizations could purchase, repair, and extend existing company works.⁹⁸

Young's suggestions were adopted in legislation passed in 1918: a Conservation Fund of \$500,000.00 was set up, withdrawals from which were a first charge against assets of the private companies. That year projects were either under consideration or under way in Naramata, Peachland, Rutland, Kelowna, Ellison and Vernon.⁹⁹ Work funded by these monies was only part of the companies' larger schedule of development. Hundreds of acres of orchard were coming into bearing. Water demand was quickly outstripping supply, and to meet this demand several companies began construction of new storage reservoirs or increased the capacity of existing ones.¹⁰⁰

In 1919 the Conservation Fund was increased to \$2,000,000.00, a move that almost certainly anticipated the public purchase of private systems. But the public petitions awaiting incorporation were not approved until the following year (1920); perhaps postponed somewhat by the effort to bring the Soldier's Settlement Project into life in the south Okanagan. In addition, the Kelowna Irrigation Company and the Canyon Creek Irrigation Company were in receivership¹⁰¹ and most of the remaining companies were in dire financial straits.¹⁰² For irrigators anticipating full public control, this meant protracted negotiations to arrive at agreeable take-over prices. Finally, the Public Irrigation Corporation legislation passed in 1914 was seen to be unworkable as early as 1916.¹⁰³ The Act of 1914 identified the type of Public Corporation deemed most satisfactory, but did not provide the legal means (ie. purchase or expropriation) by which growers could take over private companies.¹⁰⁴ It was 1920 before alternate legislation laid out a means of establishing "Improvement Districts" and their attendant obligations and responsibilities.

In late 1920 five Improvement Districts in the Okanagan were given their letters patent - Vernon Irrigation District, Glenmore Irrigation District, Naramata Irrigation District, South East Kelowna Irrigation District, and Black Mountain Irrigation District. Okanagan orchardists assumed a wider responsibility for the management of the regional water supply and demand. Under the new plan, orchardists who were served by a particular irrigation company system met and elected a management committee, from within their ranks, whose responsibility it was to negotiate take-

over of the company works, hire management and maintenance staff, and establish the overall policies of the new "Irrigation District".¹⁰⁵ With Irrigation Districts in place and with provincial policy interpreted at regional and local levels through District Engineers, the shift to public, regional, large scale, data-based water management was complete. Experimentation, trial and error, and new technology would bring even greater efficiency to the valley irrigation practices, but by 1920 the management pattern that exists today was set.

Chapter 3 Endnotes

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23. A. R. Mackenzie, Report on the Physical and Financial Conditions of Irrigation Projects in the Vernon and Kelowna Districts, Vancouver, 1916, Volume 2, p. 174 - 313. Cited in C. Reeves, Ibid. p. 62.
24. Mackenzie, op. cit., Volume 1, Summary, p.75.
25. Dendy, op. cit., p.43.
26. Mackenzie, op. cit., Passim.
27. Ibid. This report is perhaps the most revealing when it comes to the state of Okanagan irrigation works while under the development and care of companies. Volume No. 2 is especially telling through its suggested schedule of reconstruction and repair.
28. Ibid., Passim.
29. Ibid., Passim.
30. Figures range from .85 acre feet per year (A. R. Mackenzie, Ibid., Volume 2, p. 168 - 171. Cited in C. Reeves, op. cit., p. 68.) to 2.5 acre feet per year. (C. Reeves, op. cit., p. 65.)
31. Mackenzie, op. cit., Volume 1, p. 46.
32. Reeves, op. cit., passim. Also, see B. C. S. P. "Report on Agriculture" and "Farmers' Institutes" papers for a few years either side of 1900. These papers offered advice on setting up an orchard and none of them made more than passing mention of irrigation.
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CHAPTER 4

IRRIGATION TECHNOLOGY

As water law became more complex and water management became more concerned with conservation, changing irrigation technology offered increasingly efficient solutions to problems of limited water supply. After 1900 irrigated horticulture began to move from the valley floor to the adjacent benchlands, and new conveyance technology financed by land and development companies was required to move large volumes of water long distances over difficult terrain. By the beginning of World War I the landscape of the Okanagan was criss-crossed with irrigation works. Concrete-lined canals, elevated flumes, and steel syphons lured potential orchardists to newly subdivided lots. Frequently these irrigation works were poorly built. Lack of capital often forced companies to use wood, which deteriorated quickly. Poor engineering judgement resulted in the use of inappropriate materials, such as steel of sub-standard gauge in the Glenmore syphon. Benchland irrigation necessitated the construction of long canal and flume works that were easily damaged by earth movements and free-range livestock, and adversely affected by variable soil porosity. Unskilled and careless construction crews left some important concrete-lined canals cracked and leaking. The managers of the new Irrigation Districts inherited a dismal legacy that took many years and hundreds of thousands of dollars to correct. Nevertheless, by 1920, some systems were operating well, bringing large volumes of water over rugged terrain from distant reservoirs.

All irrigation systems comprise three basic components: storage, conveyance and application. The capacity, permanence, length, and safety of each component changes dramatically with the type of agriculture, the source of supply, and the scale of the endeavour. In the Okanagan Valley between 1860 and 1920 agriculture moved from stock raising and grain growing to intensive orcharding. With this shift the delivery of water in the region was fundamentally altered. The short, low volume, inefficient, and inexpensive systems built by the early farmers quickly gave way to long, high volume, elaborate, and expensive systems that relied on engineers and on consistent management.

STORAGE

Storage of irrigation water was not a concern for the Okanagan's first settlers. They took up lands adjacent to creeks, lakes, and springs, and these water courses and bodies provided storage for the limited irrigation systems they built. Supply was subject to the vagaries of the weather. If the upland snowpack were light and the summer hot or windy, many creeks and kettle holes dried up. For the most part, local water courses held enough water for the limited requirements of the early pioneers.¹

As stock raising and grain farming expanded in the late 1880's and early 1890's, some farmers built more elaborate works,² but these systems also relied on the variable seasonal discharge in local creeks. The few dams built at this time were make-shift affairs.³ Local materials were used (ie. earth, rocks, logs, etc.) to build low-head structures that commonly only allowed the farmer "one good irrigation during the summer."⁴ In some cases beaver dams were upgraded.⁵

Orcharding required far more elaborate irrigation works, and storage well beyond the natural flow of local creeks. Between 1900 and 1920 dozens of dams of varying sizes and qualities were built in the Okanagan uplands. Land Development Companies sent out surveyors to explore potential reservoir sites in the hills flanking the main valley (Map 6).⁶ Based on their reports dam sites were selected and developed.

In 1914, G. N. Houston, an employee of the Irrigation Branch of the Canadian Department of the Interior, in Calgary, distinguished four basic types of dams⁷ on the basis of construction material: earth, timber, loose rock, or masonry.⁸ (Masonry dams were not used in the Okanagan during this period.) Considerations affecting the selection of one type over another included the money available, the character of construction materials near the site, type of foundation, and the volume of storage required.⁹ In the earlier years earth dams were common largely because construction materials were at hand and costs were relatively low.¹⁰ But earth dams posed certain problems: depending on the type of earth used, water seeped

through at varying rates, and waves could wear the dam away. However, with good compaction and the inclusion of a clay core and a layer or "puddle" of clay on the upstream slope, earth dams were generally reliable and could be built to a maximum height of approximately 100 feet. Timber crib dams, filled with earth or rocks, were also common in the Okanagan. Unless completely submerged, however, the timbers rotted quickly, and this type of construction was not recommended for important dams.¹¹ Loose rock dams, though more expensive than those of earth or timber, were especially dependable when their upstream face was made impervious with a layer of clay.

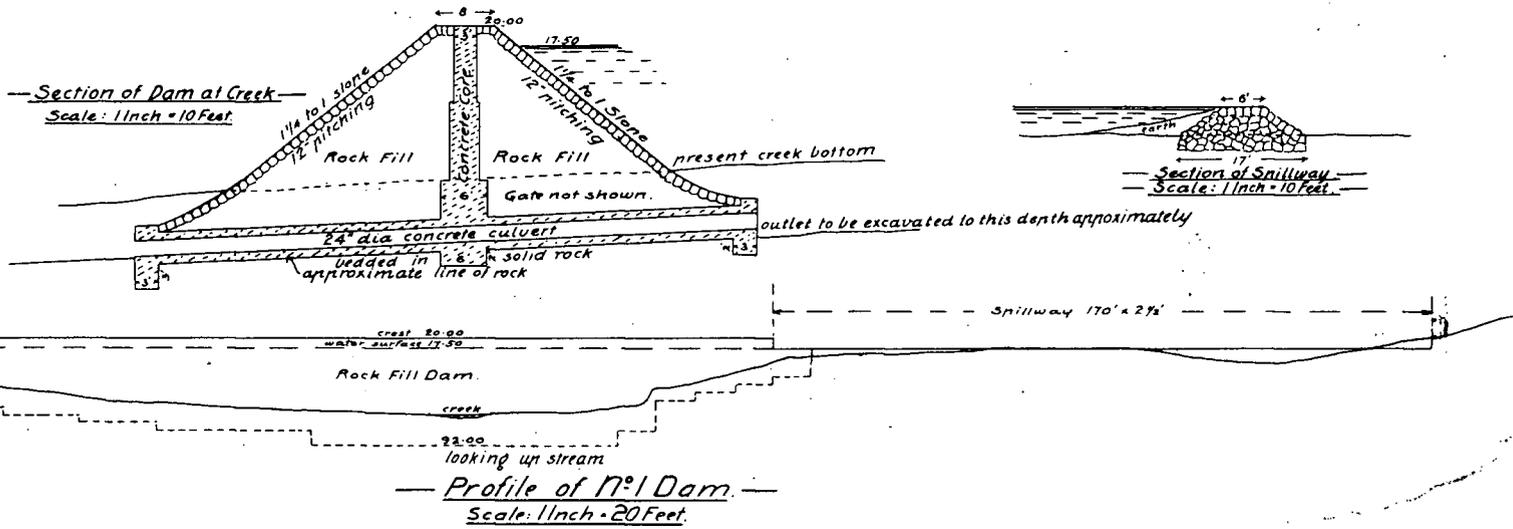
No single type of dam construction predominated in the region during this period. Few plans of the early dams built by Land Development Companies have survived, but those of the Belgo-Canadian Fruitlands Company Limited are probably typical (Figures 7 and 8).¹² The Canyon Creek Irrigation Company, a wholly owned subsidiary of the Kelowna Land and Orchard Company,¹³ built three dams¹⁴. Dam No. 1, log crib with earth and rock fill, was sixty feet long and twelve feet high.¹⁵ Dam No. 2, of the same construction, was 950 feet long and only six feet high.¹⁶ Reservoir "B" was a simple earth dam 150 feet long and ten feet high with an upstream slope of 1 - 1 (45 degrees) and downstream slope of 1 1/2 - 1.¹⁷ The Kelowna Irrigation Company had two dams. Its main storage was behind the Postill Lake Dam east of Kelowna. This structure was 550 feet long, 28 feet high, and built of rock filled timber crib.¹⁸ (Photograph 1)¹⁹ Its spillway, 50 feet wide and four feet deep, was located in the centre of the crest. The sluice gate, four feet wide by three feet high and controlled by three screw-lift wooden gates, ran 115 feet through the base of the dam. The company also had a smaller regulating reservoir in the Glenmore Valley. Like the first, it was rock-filled timber crib, but was smaller - 412 feet long and 13 feet high.²⁰ The typical components of these early dams is indicated in Figure 9.²¹

Irrigation dams were not completely safe. Documentation is weak, but there were at least three dam failures in this study period. Around 1907 the Garnett Valley Dam, near Summerland, broke sending a torrent of water down the valley and washing away at least one house and an orchard.²² In the spring of 1912 the Postill Lake Dam east of Kelowna sprang a leak when water

FIGURE 7

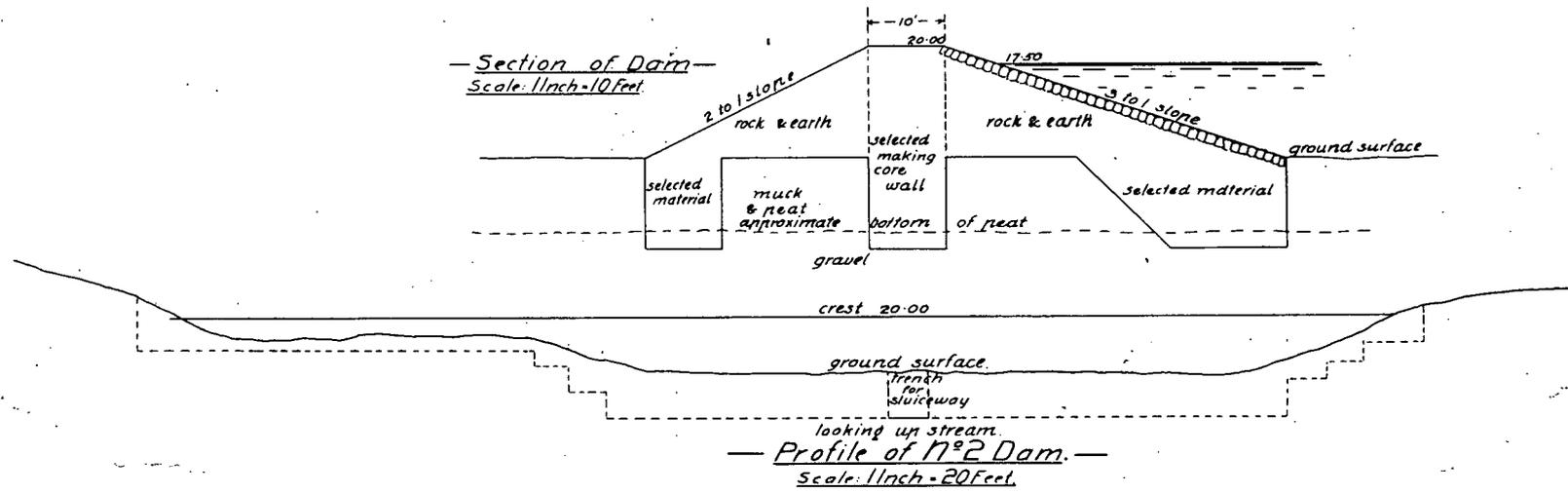
— BELGO CANADIAN FRUIT LANDS CO. —
— IRRIGATION WORKS. —
— DAMS AT RESERVOIR. —

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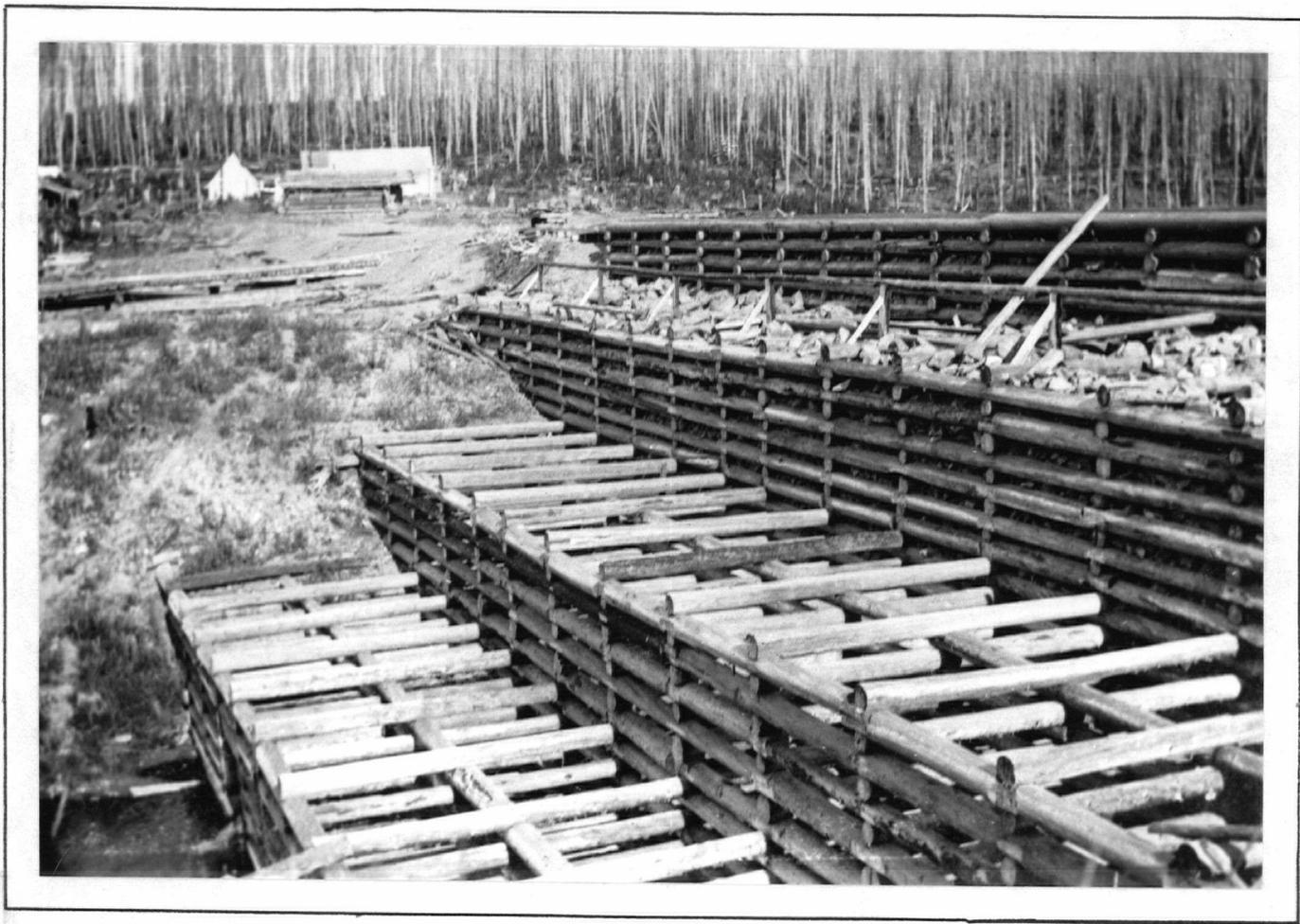


P983.1.1

FIGURE 8



P983.1.1



PHOTOGRAPH 1

Construction of log-crib dam at Postill Lake east of Kelowna, circa 1911.

Kelowna Museum Photo No. 10, 347.

TYPICAL COMPONENTS OF
ORANAGAM IRRIGATION DAMS.

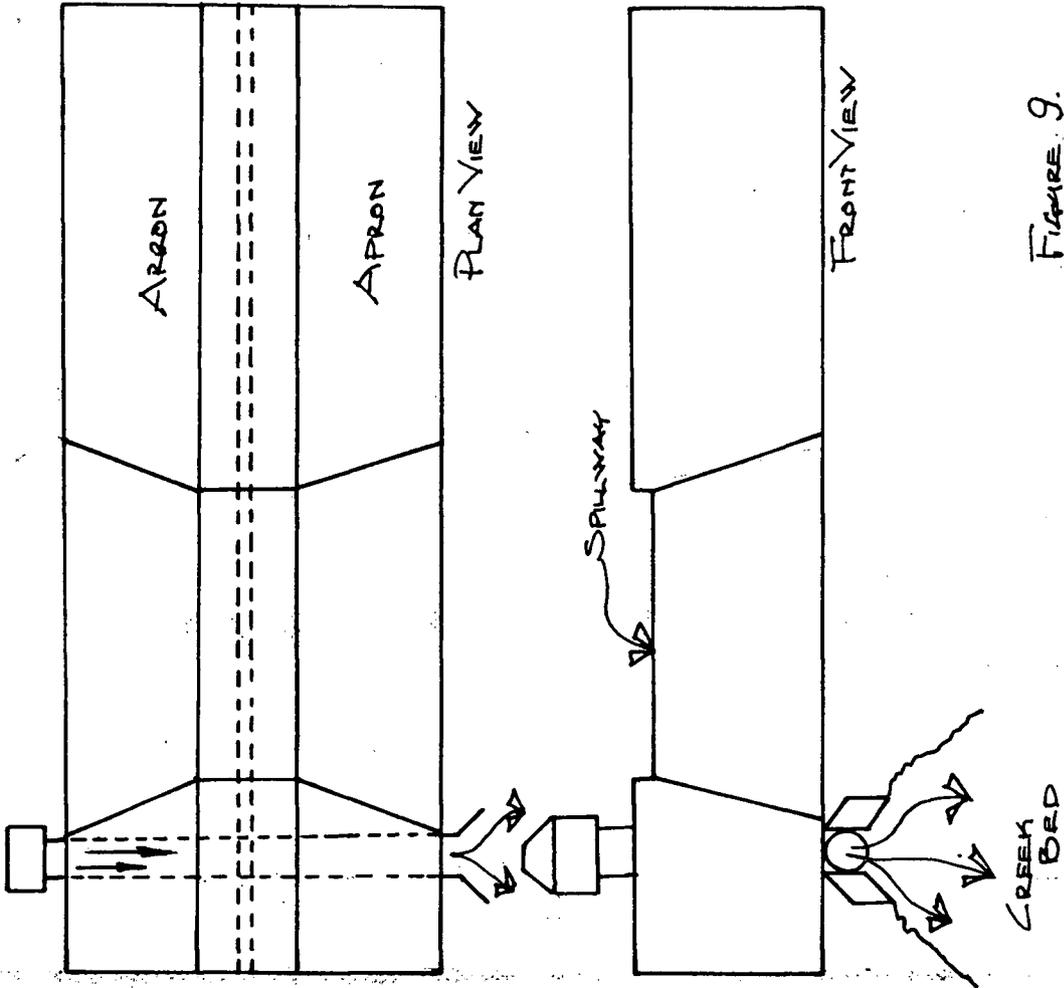
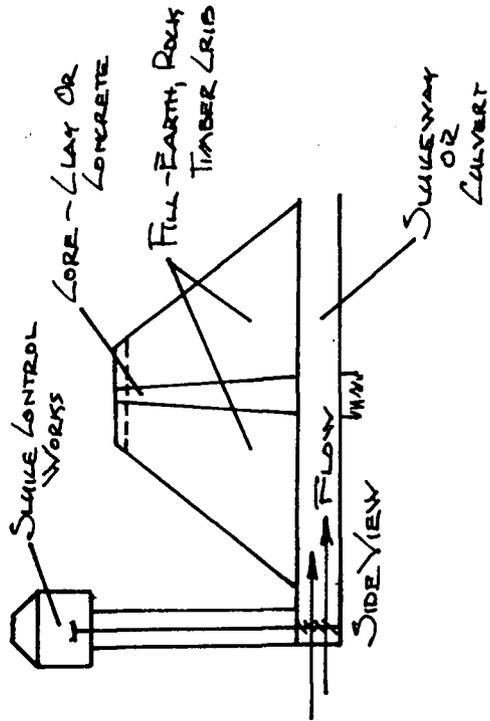


FIGURE 9.

was allowed to get too high, but the dam held.²³ A small dam in the hills behind Naramata gave way, probably in 1914.²⁴ Given the number of dams built in the region, and the ill-considered construction of many of them, it is surprising there weren't more dam failures.

Irrigation water can also be stored by pumping, but when irrigated horticulture began to develop on the region's benchlands experts and government officials alike pointed out that pumping was too expensive for the amounts of water that could be raised. The tenor of these remarks is consistent throughout the period. B. A. Etcheverry, a renowned American irrigation expert, observed in 1911 that, "In many localities electric power is not available and steam engines require a licenced engineer for their operation...."²⁵ In 1922, the provincial Comptroller of Water, E. A. Cleveland, noted that pumping, "in general is often restricted by the elevation of the lands and frequently by the absence of cheap power."²⁶

Yet there was some pumping. Mr. D'Aeth, in Westbank, irrigated his land with water raised by a steam pump at the turn of the century.²⁷ Though apparently successful, the provincial Department of Agriculture pointed out that such a method, "whilst it answers for small places and orchards can only be utilized at elevations little above the source of supply...."²⁸ Archival photographs also reveal some use of pumps (Photograph 2).²⁹ But the large acreage to be served and the cost of purchasing and maintaining pumps, not to mention their questionable technical capability, ruled against pumping water to benchland tracts. Instead developers built upland storage reservoirs that fed elaborate gravity systems.

CONVEYANCE

Before about 1900 inexpensive and inefficient earth ditches (and occasionally wooden flumes) carried low volumes of water short distances (Figure 10).³⁰ Living on the bottomlands close to creeks, Okanagan settlers spent little effort and money bringing water to their gardens and homes. Theirs were simple works well within the capability of most pioneers. Many of these settlers had some experience with placer mining³¹ and were familiar with the basics of water engineering. A hastily built wing dam into a creek, or a weir across a creek, would create the backwater necessary to divert some of the flow into an earth ditch. There appears to be no



PHOTOGRAPH 2

Early irrigation pump in the Okanagan Valley.
Kelowna Museum Photo No. 5272.

(10)

Start from 10 S. 12 x 10 I 20

Run due S 100 23.85' S

2.00 Base } low prairie rocky ridge.
700 Moss }

1600 Moss sloping southward.

2000 400 to Moss as per sketch

3000

3440 across Pottery creek behind the house

4000 Centre of S 12 I 2 S Post x stone

65.50 Water ditch

67.00 follow

67.70 top } steep bank.

67.40 } flat of good heavy soil early

67.70 } irrigated; this applies to ground along the line 4 to W of it - stop to the E.

67.70 } flat bench 1st class soil
80.00 } can be irrigated

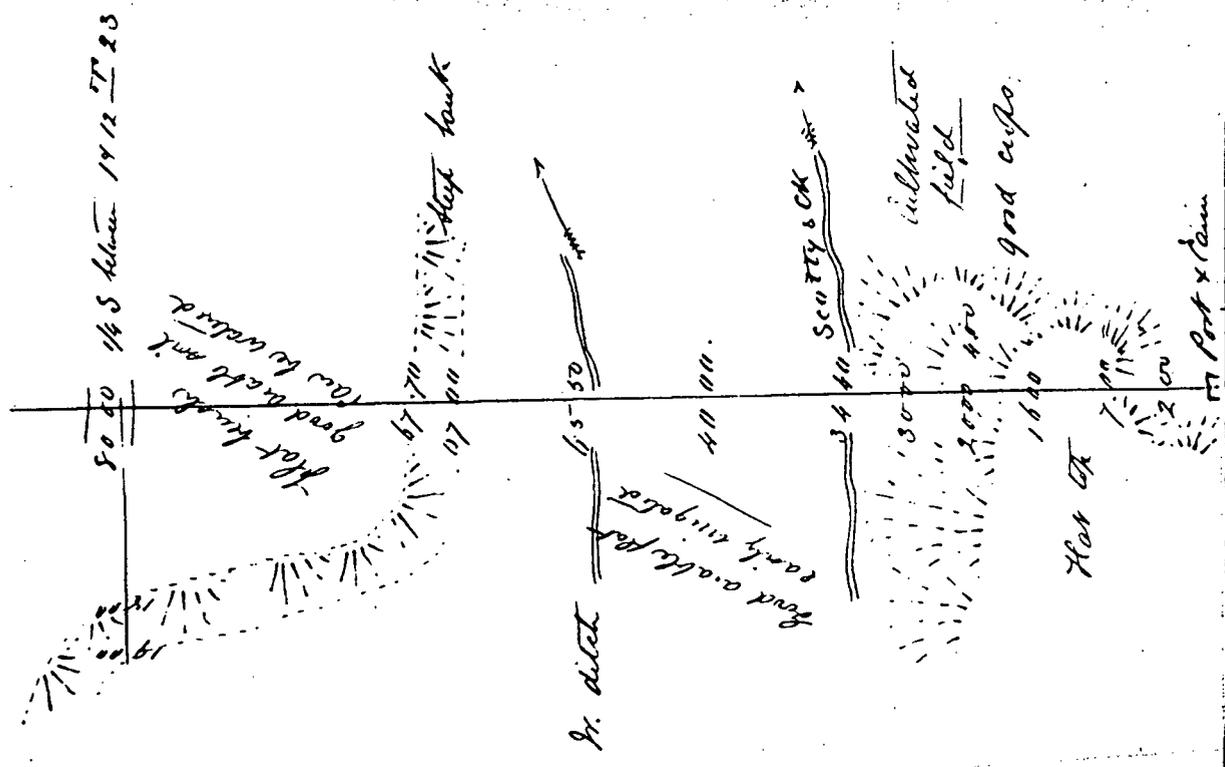


FIGURE 10

record of the early headgates used to control the "take-off" or "take-down" of water from the creek.

The first ditches were dug either by hand³² or by ploughing repeatedly along a line.³³ One pioneer recalled the precarious supply of water in early conveyance works when he complained that, "with washouts, gophers, and Lequime's cattle breaking down the ditches, Harry McClure says that they had a tough time getting water enough to grow hay and a garden."³⁴ Sometimes weeds clogged the ditches. Where flumes were necessary, hand hewn lumber was used occasionally;³⁵ by the 1890's local sawmills provided standard board measures for longer flumes.

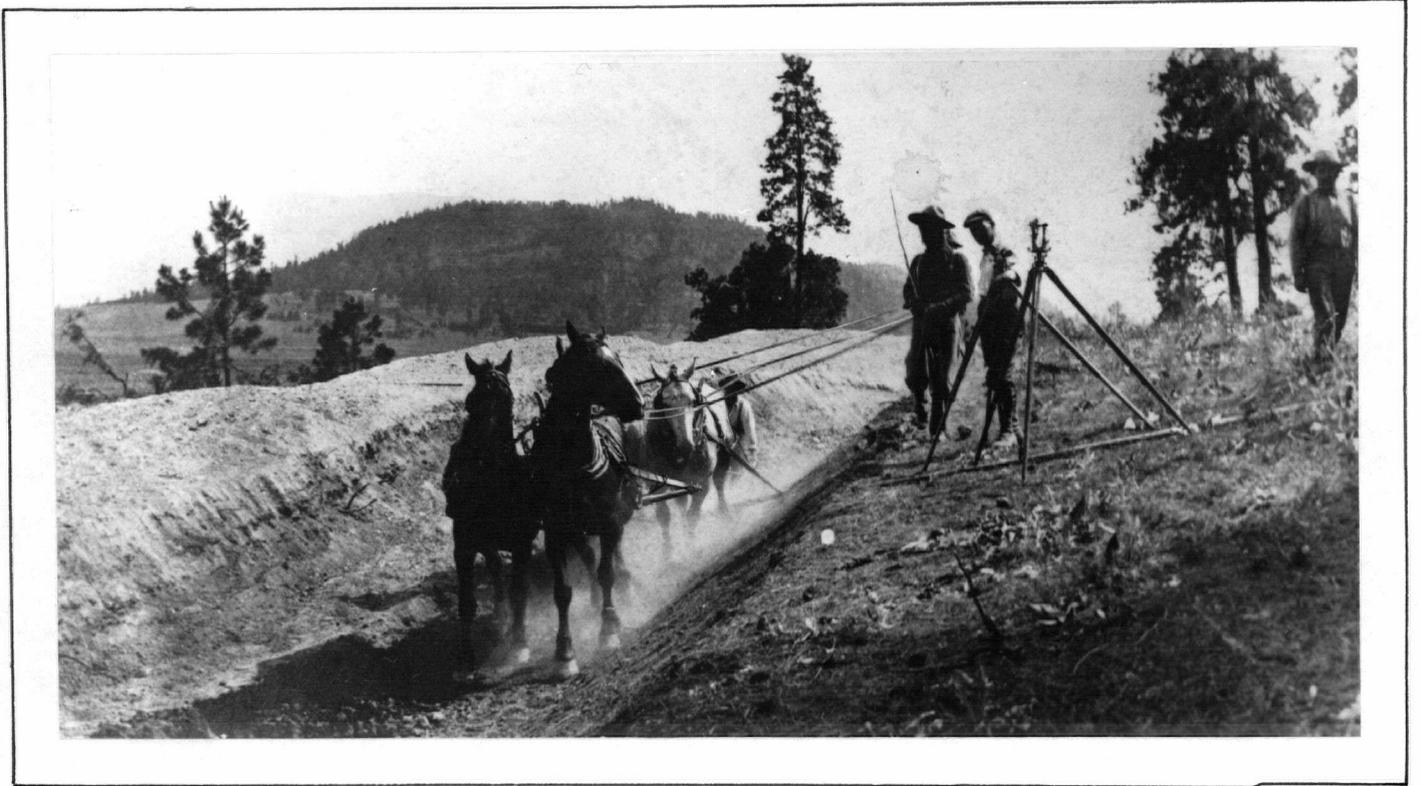
The first land development projects, subdividing the lowlands near Kelowna, had little problem building flumes and digging ditches from Mill and Mission Creeks (Photograph 3).³⁶ The Okanagan Fruitlands Company Limited, for example, which took over the A. B. Knox ranch, built a headgate and one or two miles of ditches and flumes from Mill Creek to irrigate its subdivision. The system was eventually taken over by the City of Kelowna.³⁷ With the subdivision of benchlands throughout the valley, however, local creeks clearly carried insufficient water, were too deeply incised, and frequently were over-recorded.³⁸ Land Development Companies seeking to irrigate benchland tracts had only one option - to develop storage reservoirs and construct long delivery systems (Photograph 4).³⁹

A company conveyance system from dam to orchard, typically comprised the following general features. Stored water was released from the dam into a creekbed where it flowed unimpeded until it reached the headgate, usually made of concrete. Headgates controlled the amount of water taken into the gravity system and they could be substantial structures (Photograph 5).⁴⁰ One headgate built by the White Valley Power and Irrigation Company in Vernon was 50 feet long, eight feet high, and controlled by three gates four feet by five feet.⁴¹ Once in the system, the water flowed in large canals, flumes or syphons (depending on terrain) until the company's lands were reached (Photograph 6).⁴² Smaller volumes of water were then



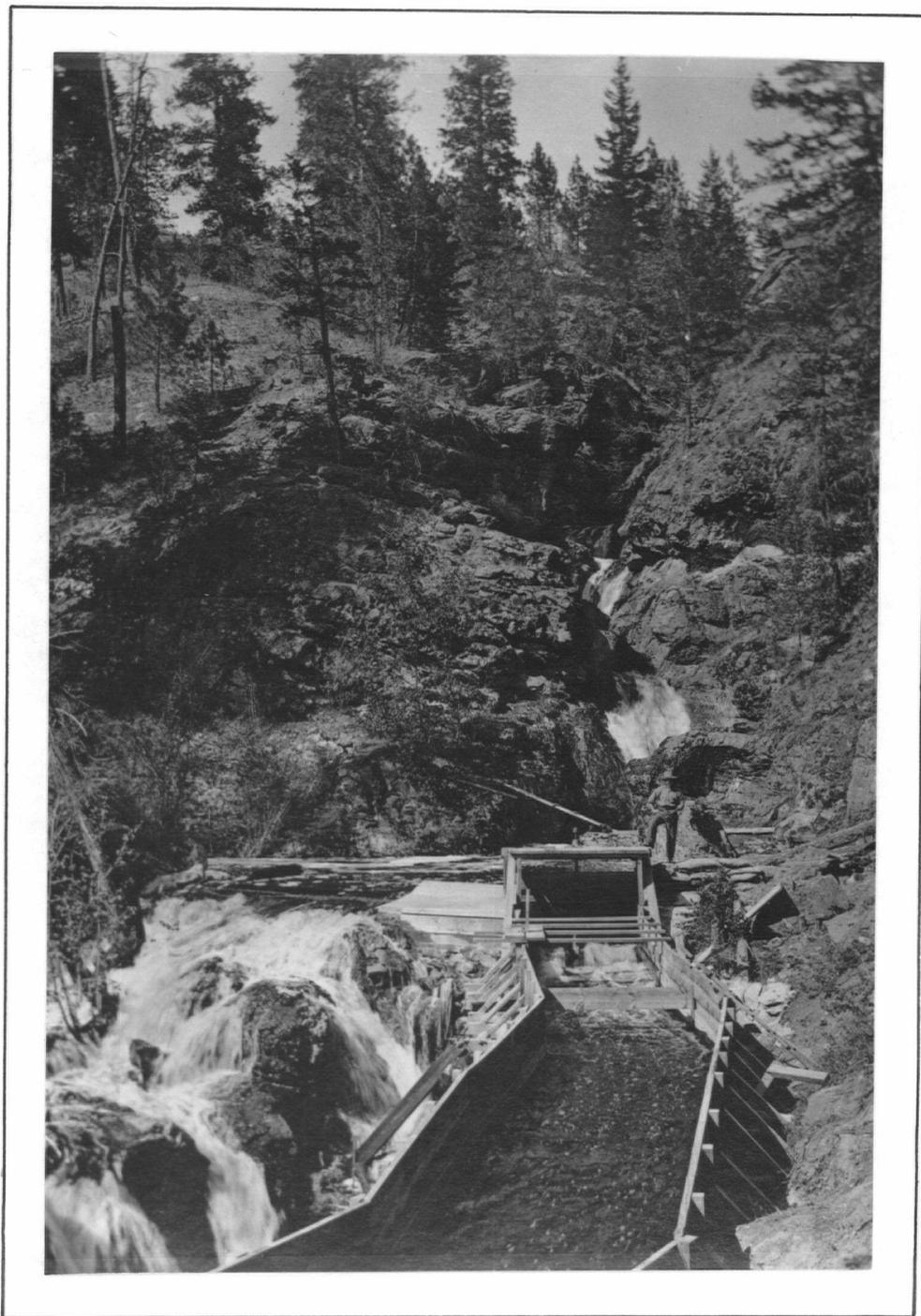
PHOTOGRAPH 3

Irrigating the Bankhead Orchard, Kelowna, circa 1908.
Kelowna Museum Photo No. 4158



PHOTOGRAPH 4

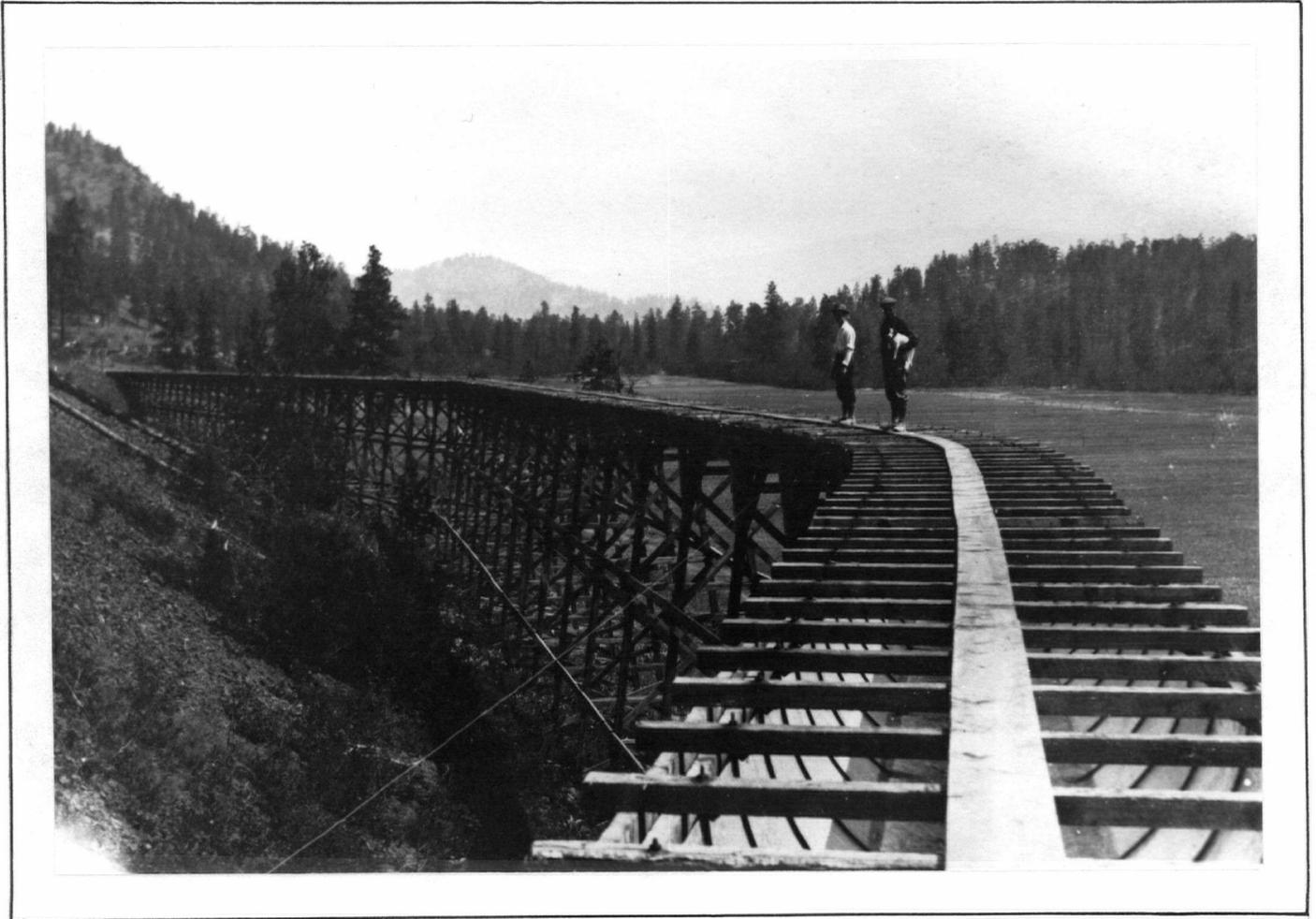
Construction of irrigation canal near Kelowna, circa 1910.
Kelowna Museum Photo No. 151.



PHOTOGRAPH 5

Headgate on Mill Creek in the hills east of Kelowna,
circa 1912.

Kelowna Museum Photo No. 6147.



PHOTOGRAPH 6

Elevated irrigation flume in the Glenmore District
of Kelowna, circa 1914.
Kelowna Museum Photo No. 150.

turned into lateral pipes, canals or flumes which served one or more orchards. Orchards were fed at the highest point of elevation.

The White Valley Power and Irrigation Company and the Black Mountain Water Company in Rutland built typical conveyances. From the headgate of the White Valley Power and Irrigation Company, described above, water was turned into a canal fifteen feet wide at the bottom, at least three feet deep, and with sides sloping up at 45 degrees.⁴³ This canal was graded at one foot per 1000 feet, and with 27 inches of water it flowed at 143 cubic feet per second.⁴⁴ The laterals leading water from this canal carried up to 50 cubic feet per second⁴⁵ and fed orchards by pipe ranging in diameter from three to ten inches.⁴⁶ The Black Mountain Water Company headgate was a screened screw-lift gate, 5 1/2 feet wide by 3 feet high, set in concrete. It released water into over 42,000 feet of earth canals 60 inches wide at the bottom, 48 inches high and with sides sloping at 30 degrees.⁴⁷ There was also over a mile of smaller concrete-lined canal ranging from 24 to 42 inches across the bottom, and approximately 8700 feet of semi-circular wood-stave flume 66 inches in diameter.⁴⁸ The system also contained a 1220 foot syphon 27 inches in diameter.⁴⁹ From these works, water was turned into pipes 6 to 24 inches in diameter - the smaller pipes feeding single orchards and the larger serving several holdings.⁵⁰

Although expensive and elaborate, many of the company works were poorly built. The worst built, perhaps, were those of the Kelowna Irrigation Company. Less than five years after its completion in 1910 - 1911 one engineer recommended that the entire system be re-built. In 1916 the company's headgates and largest canals were still in fairly good condition, but its syphon (10,128 foot long and 32 inch diameter), which took water into the Glenmore valley north of Kelowna, was badly rusted and was scheduled for replacement by 1920.⁵¹ By 1918 conveyance works in the Glenmore Valley required extensive repairs - mostly to re-line over 3800 feet of poorly built canals.⁵² In that year the Water Rights Branch noted;

The cracking of the sides was due to two causes - the expansion of the stiff clay at the back of the concrete lining, due to moisture, also, and principally, to surface water getting behind and under the lining in the early spring during the day

and freezing at night Another cause which has contributed to the cracking and destruction of long lengths of ditch was the placing of a board longitudinally underneath the bottom of the ditches for the purpose of forming a cover to a stone drain laid underneath same to carry away seepage-water. This board swelled and burst up the bottom for thousands of feet.⁵³

Another constructional error was the use of a poor quality concrete which was "anything but watertight."⁵⁴

The problems of the Kelowna Irrigation Company were only more severe than those encountered by other irrigation and land development companies. All earth canals were prone to water loss through seepage, susceptible to damage by livestock or by poorly controlled flows, and perfect environments for plants that clogged the ditches and restricted water flow. Yet, in some locations, ease of construction and low cost made earth canals the most attractive method of conveyance. Wood for pipes, flumes and syphons also presented problems. Under the best conditions wooden works lasted only a few years as wet-dry cycles quickly rotted staves, boards and trestles. Some attempt was made to use ceramic pipe, and a factory for its manufacture was opened in Peachland in 1911.⁵⁵ The quality of the product was questionable and within four years it was closed.⁵⁶

Yet some company systems were well built. In 1916 the Black Mountain Water Company had almost 10 miles of main canals and flumes feeding over 45,000 feet of smaller flumes, pipes, syphons, and canals.⁵⁷ The system cost was just under \$400,000.00, yet reconstruction estimates to 1922 were a mere \$34,000.00.⁵⁸ The South Kelowna Irrigation Company built a system of similar dimensions through equally rugged terrain at a cost of almost \$300,000.00. This system was so well built that Mr. A. R. Mackenzie could suggest only minor repairs totalling \$13,496.44 between 1916 and 1922.⁵⁹ Clearly the engineering skill and judgement necessary to direct the laying and construction of major conveyance systems were available.

By 1920 the most visible component of the irrigation systems was the conveyance works. Steel pipes, concrete-lined canals, and metal flumes on wooden trestles were the sturdiest parts of

these systems, and as orchardists undertook collective management of the systems, the weak wooden links were either replaced or set into maintenance routines. Aided by their own increasing knowledge of the local circumstances, orchardists managing the newly formed Irrigation Districts embraced efficiency as a watchword.

APPLICATION

In these years there were two main methods of applying irrigation water to fields: flood irrigation and furrow irrigation. Sprinkler technology found its way to the region just before World War I (Photograph 7),⁶⁰ but was not extensively used until after World War II. Sprinklers require clean water to operate efficiently and, until 1920 and well beyond, the valley's irrigation works were largely above ground and open to all manner of debris (Photograph 8).⁶¹

Flood irrigation was a quick means of providing water to low-lying grain fields and hay flats.⁶² Water was turned out of the canal or ditch and allowed to flood a designated area. Ideal for flat alluvial bottomlands, the method was unsuitable on rolling land where erosion could become a serious problem. In addition, under this method irrigation was strikingly uneven.

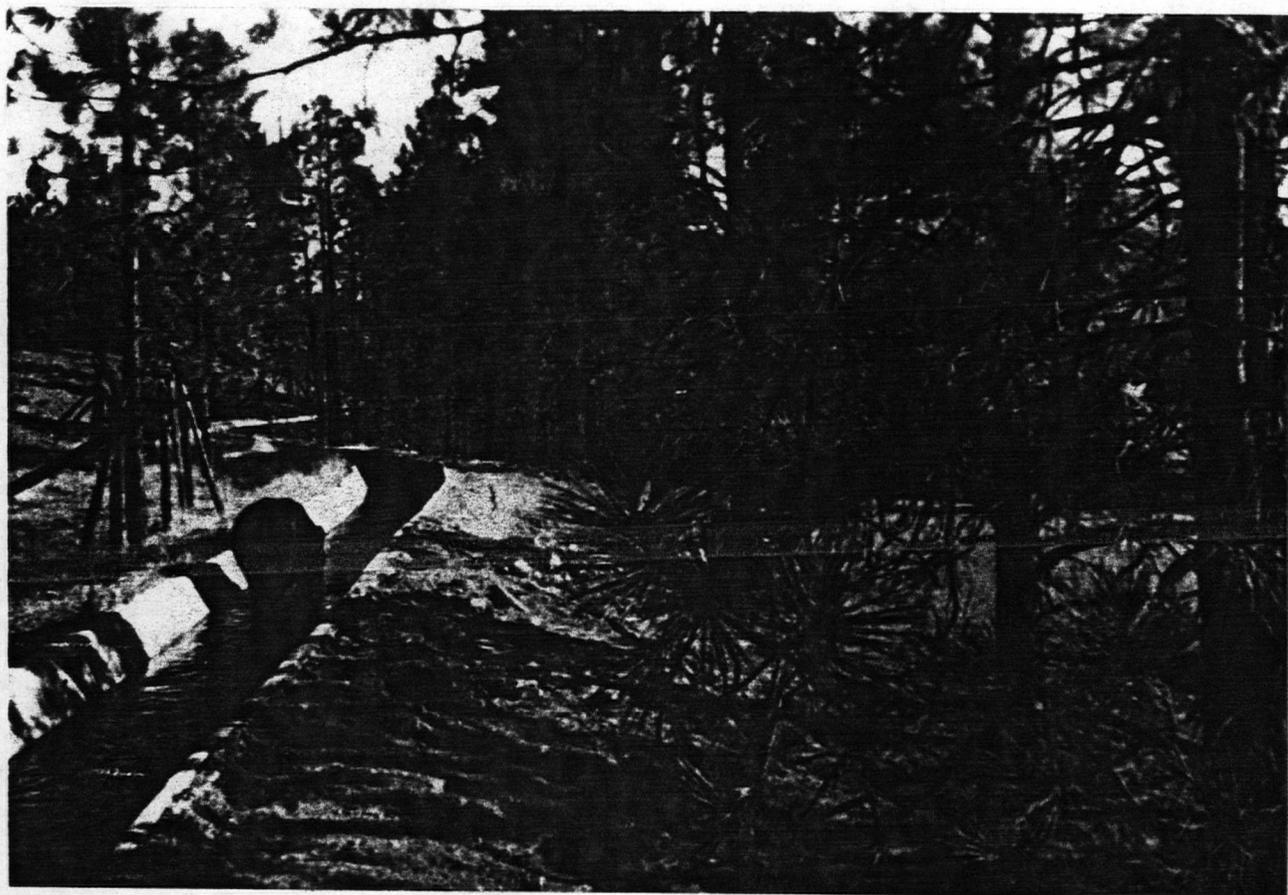
Flooding was used on gently sloping benchland orchards, but the flow of water required more careful control. There were at least three different approaches to flooding, all involving the release of water from the main lateral and allowing it to run downslope across the orchard.⁶³ Clearly the method was restricted by "the degree of steepness of the land, the smoothness of the surface, the physical properties of the soil, the amount or head of water to be used, and the crop to be irrigated."⁶⁴ The Water Rights Branch was quick to point out that "the initial cost of wild flooding is less than that of any of the other methods, yet this is more than offset by the increased cost of handling the water upon the ground."⁶⁵

Furrow irrigation was adopted as the most effective means of watering orchards (Photograph 9).⁶⁶ Under ideal conditions evenly dug furrows (6 - 12 inches deep) ran the length of the orchard.⁶⁷ (Figure 11)⁶⁸ In practice, the layout of the furrows varied widely from orchard to orchard depending on the spacing of trees, the presence of intercropping, the slope of the land,



PHOTOGRAPH 7

Early efforts at sprinkler irrigation north
of Kelowna, circa 1912.
Kelowna Museum Photo No. 4662



PHOTOGRAPH 8

The horse standing in this irrigation canal indicates something of the problems encountered in maintaining open, above-ground irrigation systems.
Kelowna Museum Photo No. 11, 213.



PHOTOGRAPH 9
Typical Okanagan orchard under furrow irrigation.
Kelowna Museum Photo No. 119.

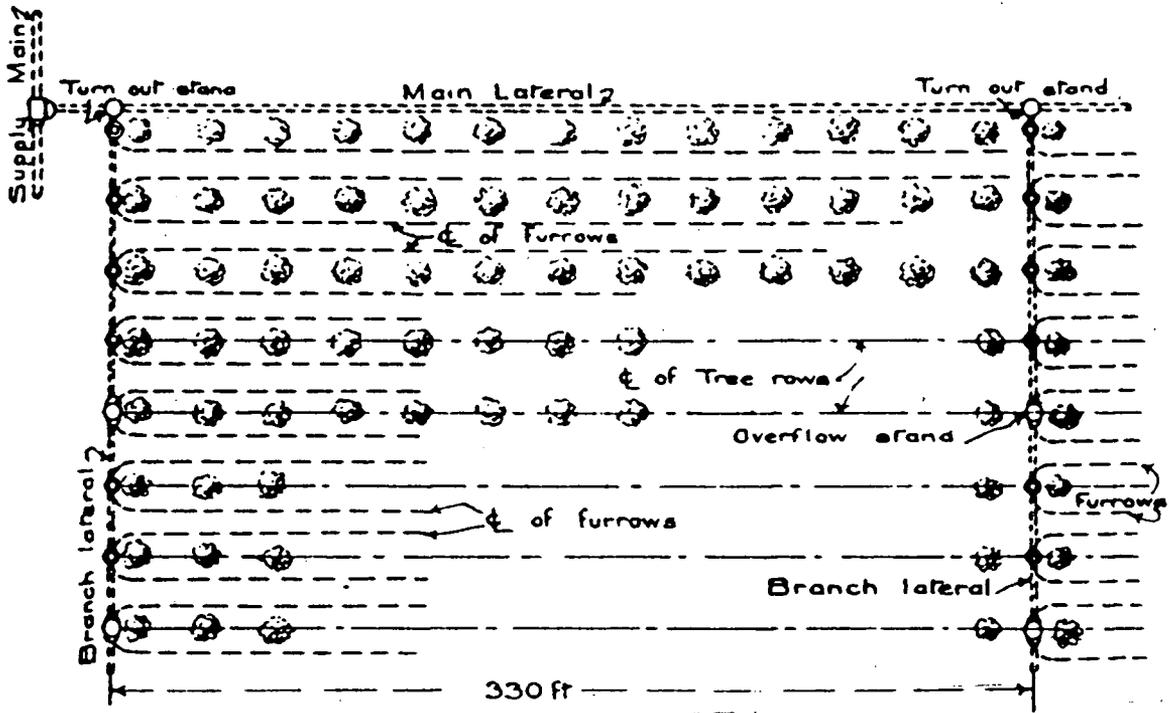


Figure 11
Standard lay-out for furrow irrigation.

and the vegetation cover. For the times, furrowing was perhaps the best solution to the problem of water application. Like flooding, however, furrow irrigation easily led to soil erosion, provided poor control of soil wetting, and required intensive labour.⁶⁹ One retired orchardist recalled, "The biggest trouble with ditch irrigation was to find a good irrigator ... a good conscientious man, who would get up in the morning, (at three or four in the morning), and then go to bed at night about seven o'clock having cleaned all the holes in the flume and checked his ditches. But we also had some trouble with gophers who would make underground burrows, and the water would then just disappear."⁷⁰

The quantities of water applied to the land varied as widely as the configuration of furrows; until at least World War I, assessments of water requirements were not based on scientific data. Indeed, the problem of applying safe quantities of water was amplified because initially there were no measuring weirs to gauge an orchardist's use of water from the company system.⁷¹ Quantities sufficient for young trees were far from adequate for fully bearing orchards.

***** ***** ***** *****

From the beginning of Okanagan agriculture until 1920 there was an overall trend toward efficiency in the storage, conveyance, and application of irrigation water. The most significant advance came with the incorporation of Land and Development Companies around 1900. Proposing large scale and intensive irrigated horticulture, these companies required large volumes of water to be transferred over rugged terrain from storage sites to distant orchard lots. Success for this new agricultural order required an uninterrupted water supply delivered through systems designed by qualified engineers. Some of the systems were unsatisfactory from the start, providing insufficient water through poorly built works. Nevertheless, by 1920 the technological shortcomings of most of the corporate irrigation schemes had been identified and placed in schedules of repair, reconstruction and maintenance acceptable to Valley growers. Backed by government water engineers, protected by water bailiffs, and supported by a clear conservation-minded government water policy, the new Irrigation Districts looked forward to an increasingly efficient and reliable water delivery network.

Chapter 4 Endnotes

1. Provincial Archives of British Columbia. GR 884 Vol. 1, File 7, p. 2. Also see E. Mugford Sr., History of Rutland, 1858 - 1958. Rutland Centennial Committee, Rutland, 1958, p. 100.
2. D. D. Thomson, A History of the Okanagan Indians And Whites in the Settlement Era, 1860 - 1920. University of British Columbia, unpublished Ph. D. dissertation, 1985. p. 288.
3. F. W. Andrew, "Summerland Before Incorporation." Okanagan Historical Society Report No. 20 (1956). p. 15. Also see A. W. Gray, "Black Mountain Settlement." Okanagan Historical Society Report No. 26, (1962) p. 49.
4. H. W. Corbitt, The History of Kaleden. The Kaleden Community Centre, n.d., p. 8.
5. Water Rights Branch. Annual Report, 1918, King's Printer, Victoria, p. P9.
6. Kelowna Museum Archives. Map No. 983.2.2.
7. Western Canada Irrigation Association. Conference Proceedings, 1914, Ministry of the Interior, Ottawa, pp. 166 - 172.
8. Ibid., p. 169.
9. Loc. cit.
10. Ibid., p. 169 - 170.
11. Ibid., p. 170.
12. Kelowna Museum Archives. Plan No. P983.1.1.
13. D. R. B. Dendy, One Huge Orchard. University of Victoria, Department of History, unpublished B. A. essay, 1976. p. 33.
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15. Loc. cit.
16. Loc. cit.
17. Loc. cit.
18. Ibid., p. 174.
19. Kelowna Museum Archives. Photograph No. 10,334A.
20. Mackenzie, Ibid., p. 174.
21. This composite is arrived at through review of early plans of dam works, held in the archives of the Kelowna Museum, and from review of numerous historical photographs. Also, the drawing was reviewed by Mr. Frank Pells, an hydraulic engineer (retired) with Noranda Mines, (Brenda Mines).

22. S. Riordan, The History of Summerland's Water System. Summerland Heritage Advisory Committee. 1986. p. 7.
23. Glenmore Centennial Committee. Glenmore: The Apple Valley. Kelowna. 1958. p. 22.
24. Water Rights Branch, Annual Report: 1917. King's Printer, Victoria, p. J20.
25. B. A. Etcheverry, Report on Irrigation Conditions of British Columbia and Recommendations for the Initiation of Government Work on Irrigation Investigations. Ministry of Lands, Victoria. 1911. p. 4.
26. E. A. Cleveland, Irrigation In British Columbia. Department of Lands, King's Printer, Victoria. 1922, p. 8.
27. British Columbia, Sessional Papers, 1903/04. "Report On Agriculture.", King's Printer, Victoria, p. A26.
28. Ibid., p. A26.
29. Kelowna Museum Archives. Photograph No. 5272.
30. John Jane's Diary, 1876. Book No. II of III. Provincial Archives of British Columbia. p. 13.
31. Thomson, Ibid., p. 255.
32. Rose Brothers Diary, 1893 - 1895. Kelowna Museum Archives. Summer, 1893.
33. British Columbia, Sessional Papers, 1907. "Fruit Growers' Association". King's Printer, Victoria, p. G39 - G40. Ditches were often "dug by ploughing along the pegged line and throwing the furrows to the lower side...." This is done several times and then the ditch is "levelled by means of a plank scraper shod with steel and made slightly narrower than the width of the ditch." Ditches could then be sprinkled with crude petroleum, raked and resprinkled and rolled flat. All of this to prevent growth of plants and to make the ditch watertight.
34. A. W. Gray, "Black Mountain Settlement" Okanagan Historical Society Report. No. 26. (1962). p. 49.
35. The Summerland Review. "Famous Fruit and Famous Men." December 9, 1948. p. 14.
36. Kelowna Museum Archives. Photograph No. 4158.
37. As indicated by A. B. Knox's water record taken out October 17, 1884, and by the City of Kelowna Claim to that record on November 24, 1911. Water Rights Branch, Board of Investigation Record, Kelowna Precinct. Kelowna Museum Archives.
38. Dendy, Ibid., p. 32.
39. Kelowna Museum Archives. Photograph No. 151.
40. Kelowna Museum Archives. Photograph No. 6147.
41. Mackenzie, Ibid., Volume II. p. 17.

42. Kelowna Museum Archives. Photograph No. 150.
43. Mackenzie, Ibid., p. 18.
44. Loc. cit.
45. Loc. cit.
46. Ibid., p. 21.
47. Ibid., p. 237.
48. Loc. cit.
49. Ibid., p. 238.
50. Ibid., p. 239.
51. Ibid., p. 175.
52. Water Rights Branch. Annual Report, 1918. King's Printer, Victoria, p. P10.
53. Loc. cit.
54. Loc. cit.
55. S. Paynter, "Peachland Glazed Cement Pipe Company, 1910 - 1912." Okanagan Historical Society Report No. 47, (1983). p. 48.
56. Ibid., p. 49.
57. Mackenzie, Ibid., Volume II, p. 239 - 240.
58. Ibid., p. 245.
59. Ibid., p. 318.
60. Kelowna Museum Archives Photograph No. 4662. Also see V. Casorso, The Casorso Story. Vernon Interior Printers. pp. 146 - 148.
61. Kelowna Museum Archives. Photograph No. 11,213.
62. Flood irrigation seems to have been used up to about the turn of the century by the grain growing and hay raising farmers in the district. The method may have been used after orcharding became the region's main agricultural pursuit, but references to its practice are few.
63. Water Rights Branch. Practical Information On Irrigation for British Columbia Water Users. King's Printer, Victoria, Revised, 1941. p. 79 - 80.
64. Ibid., p. 80.
65. Ibid., p. 80.
66. Kelowna Museum Archives. Photograph No. 2887.

67. British Columbia, Sessional Papers, 1907. "Fruit Growers' Association". King's Printer, Victoria, p. G42. Furrows were ideally about five feet apart and ran to a maximum of about 350 feet.
68. Water Rights Branch. Practical Information..... Ibid., p. 75.
69. Personal communication with Mr. Phil Johnson, fieldman for Kelowna Growers' Exchange, 1986. (Now, British Columbia Fruit Shippers.)
70. Frank Turton, Okanagan Irrigation: A Century Of Change. Kelowna Museum video script. 1983. Kelowna Museum Archives.
71. Etcheverry, Ibid., p. 10.

CHAPTER 5

IRRIGATING THE OKANAGAN

At the beginning of World War I irrigated horticulture was firmly established in the Okanagan Valley. By this time, all of the major corporate irrigation systems were in place; for almost a decade land development companies had been advertising irrigated orchard lots across Canada and in Great Britain. Some of the earliest companies had disposed of all or most of their lands. One or two of the later ones were beginning to sell irrigated lots when war was declared. Whatever the ultimate success or failure of these companies (or their subsidiary irrigation companies), by 1914 corporate land development had set the geographic limits of orcharding in the valley.

In 1913 the provincial Water Rights Branch estimated that more than 37,000 acres of land were being irrigated between Vernon and Osoyoos. (Table 2)¹

TABLE 2 Irrigated Land in the Okanagan Valley, 1913.

	Irrigated (acres)	Irrigable (acres)
Vernon	17,000	48,800
Kelowna	9,682	30,000
Westside	6,875	54,100
Naramata south	4,274	37,800
TOTAL	37,831	170,700

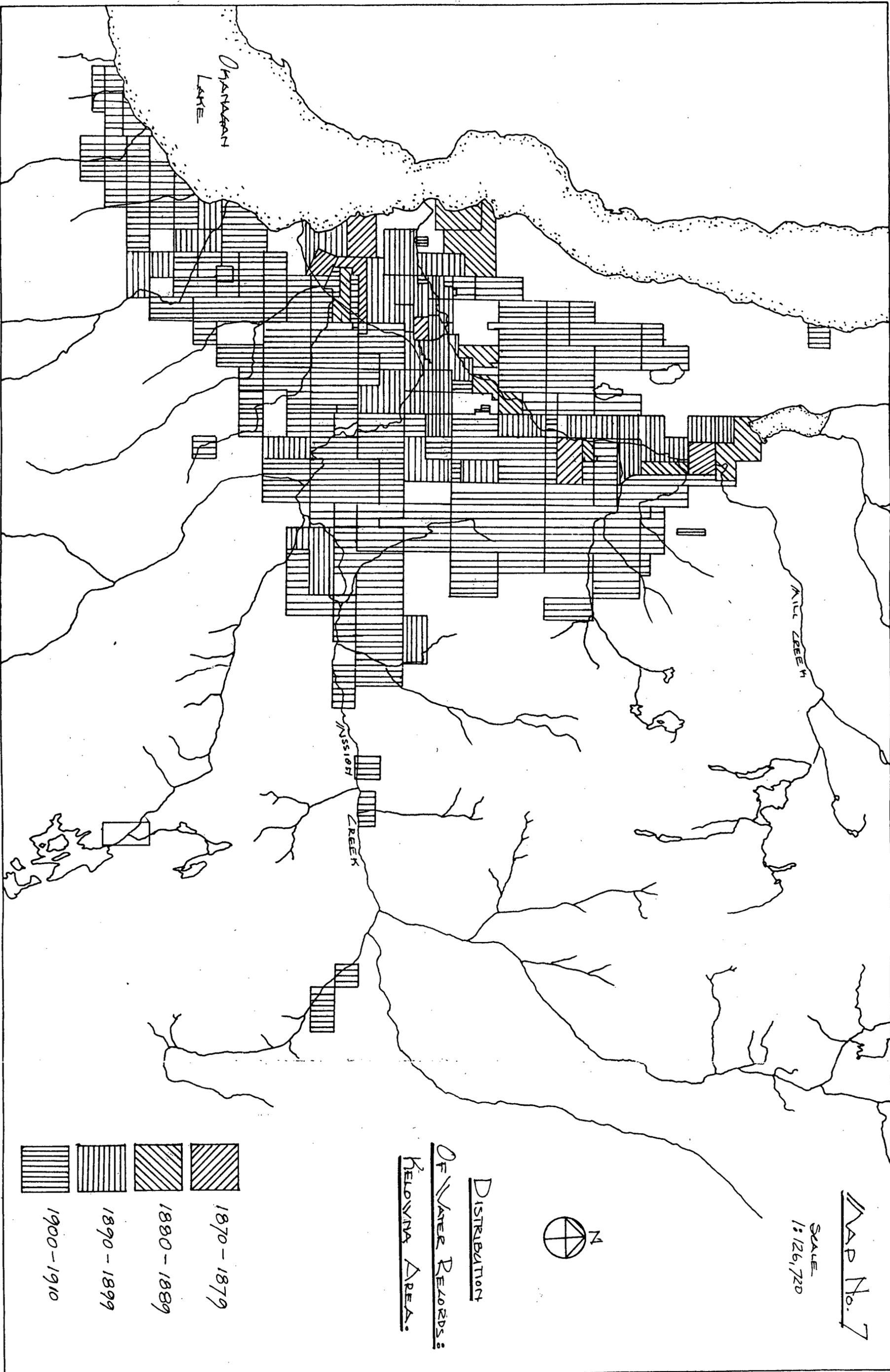
Two year later A. R. Mackenzie reported to the provincial government on the irrigated lands developed by six of the largest land companies in the Vernon and Kelowna areas. (Table 3)²

TABLE 3 Acreage Served By Company Irrigation Works.

Irrigated (1915)	Projected (1925)	
White Valley Co.	4,814	10,771
Coldstream Estate Co.	1,848	2,564
Kelowna Irrigation Co.	3,070	4,555
Black Mnt. Irrigation Co.	778	1,358
Canyon Cr. Irrigation Co.	1,403	1,911
S. Kelowna Irrigation Co.	162	552
TOTAL	12,075	21,711

The considerable discrepancy between the figures in these tables, Reflects partly the fact that the latter is a record of company lands only. Furthermore, when Mackenzie made his survey the war had begun to take its toll of local labour, and although orchards could not be safely abandoned, irrigated hay flats, grain fields, and commercial garden plots could be left unused or converted to pasturage with little capital loss. In any event Mackenzie's total for 1915 indicates irrigated lands that land companies brought to market between roughly 1906 and 1912 and represents, therefore, a substantial shift in the scale, pace, and direction of the region's agricultural economy. Finally, Mackenzie projected the demand for irrigation water on company lands to 1925, clearly feeling the trend to commercial orcharding would only strengthen over the years.

The distribution of irrigated land just before World War I can be roughly determined by plotting the water records presented to the provincial Board of Investigation between 1910 and 1913.³ Cumulative maps for the Kelowna and Vernon areas, which may be considered typical of the region, clearly show the outward expansion and movement upslope of irrigation as land development companies purchased and sub-divided the land adjacent to the growing towns (Maps 7 and 8).⁴ The benchlands became the new focus of the region's orchard development.

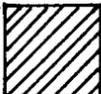


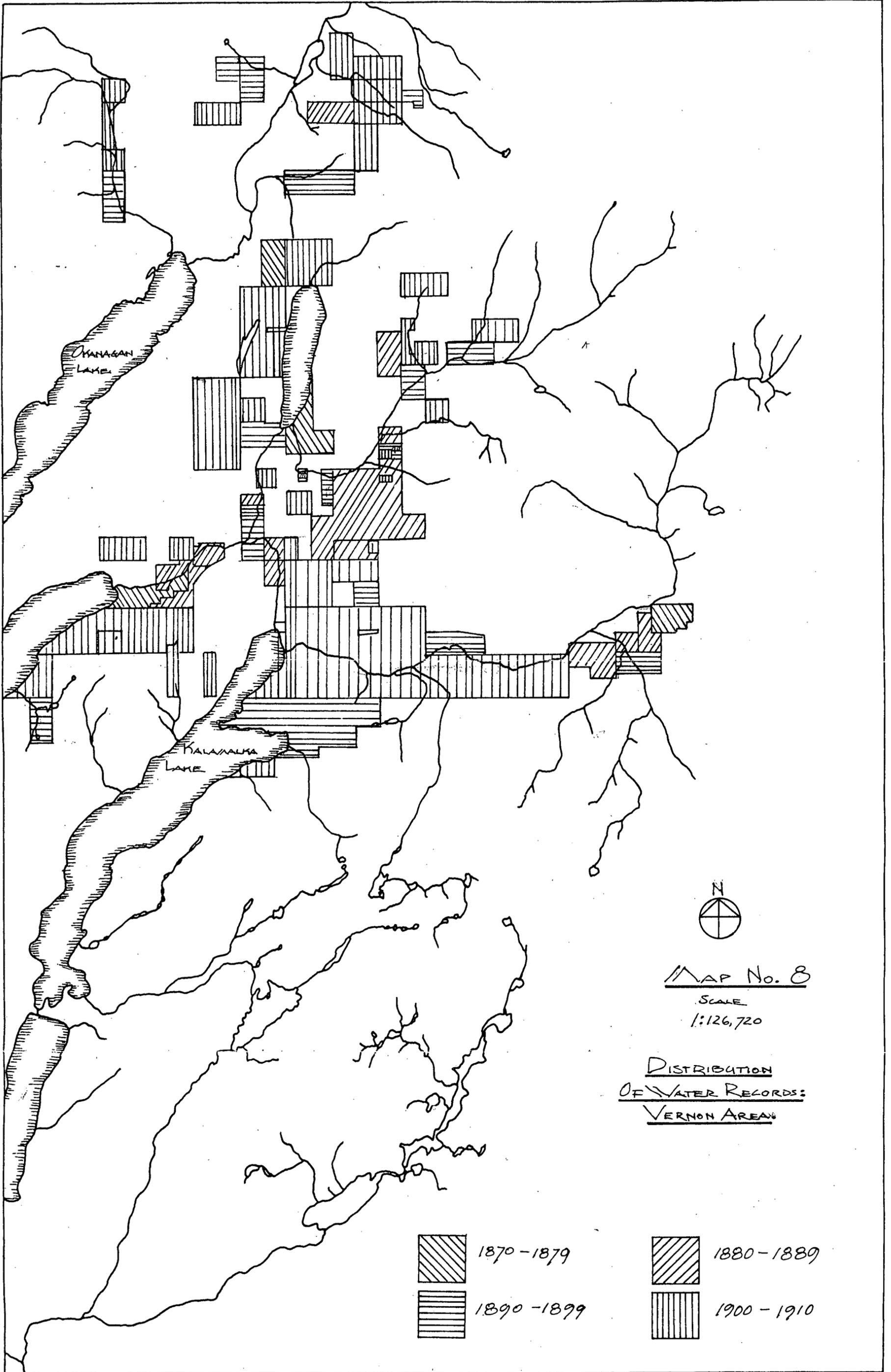
MAP No. 7

SCALE
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DISTRIBUTION
OF WATER RECORDS:
KELOVYNA AREA.

-  1870 - 1879
-  1880 - 1889
-  1890 - 1899
-  1900 - 1910



The scale and extent of this new agricultural economy and the speed with which it was set in place, dramatically reworked the regional landscape. Within a decade, often in a year or two, huge tracts of benchland and more gently sloping valley sides were transformed from open range and parkland forests to small, neatly manicured orchards. One of the most graphic examples of this shift was in the Glenmore Valley, north of Kelowna. Before 1900 the area was known as Dry Valley and early photographs of the district attest to the aptness of the name (Photo 10).⁵ A few years after the Central Okanagan Land and Orchard Company began to develop the valley around 1910, the barren tract had been renamed "Glenmore" and sported acre after acre of newly planted fruit trees (Photo 11).⁶ The Company's map of the area indicates how completely rangeland could be made over when supplied with irrigation water (Map 9).⁷

The delivery of irrigation water to the new orchards required the construction of a maze of flumes, concrete canals, syphons, and earth ditches (Photo 12 and 13).⁸ These were new and highly visible elements on the land, and they seemed further to strengthen the image of economic prosperity and stability generated by the thousands of acres of young fruit trees. In addition, the scale of corporate irrigation schemes required massive amounts of lumber, cement, and pipe. Wagonloads of these goods were common sights in valley towns and made ideal promotional photographs (Photo 14).⁹

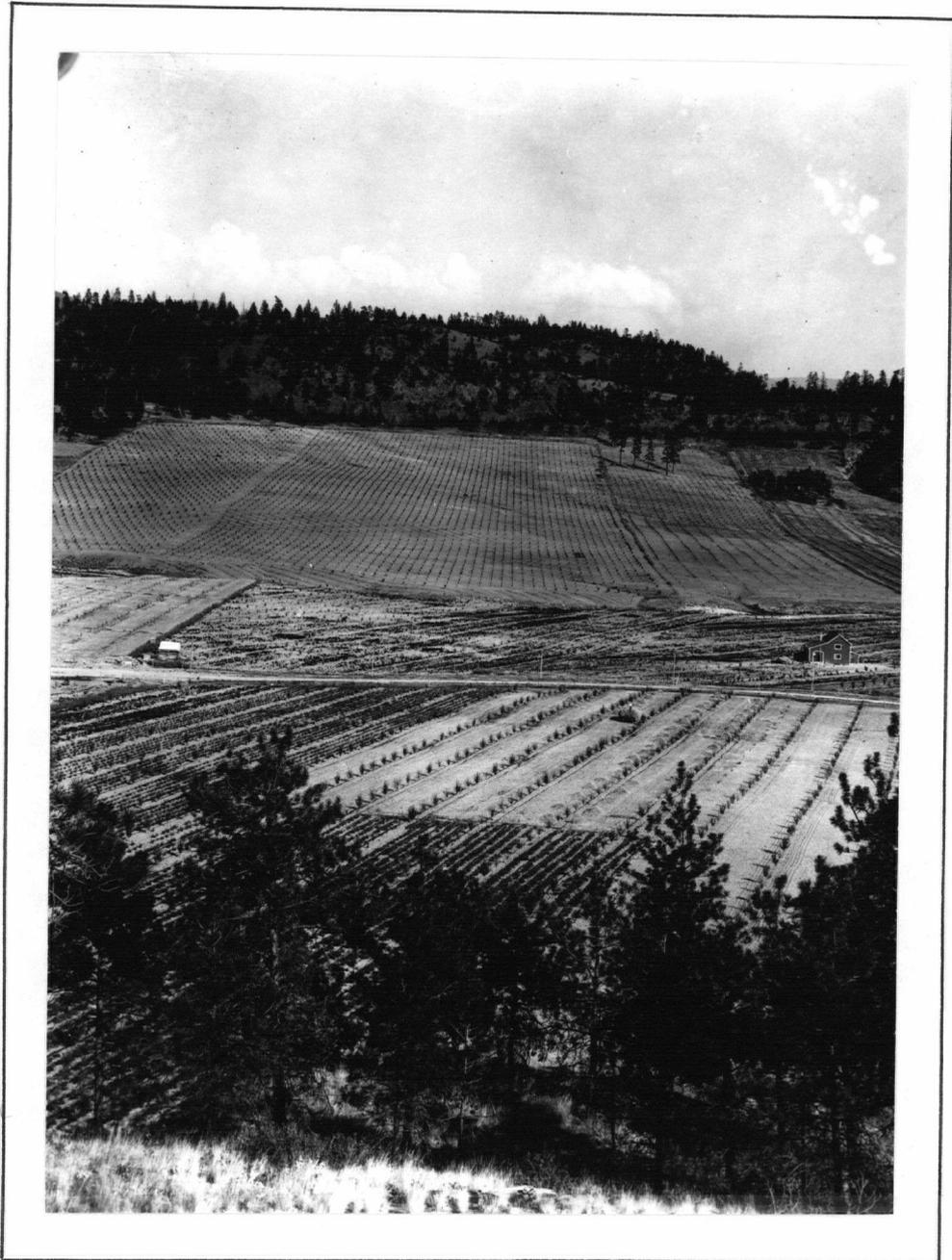
As the benches were cleared and orchards planted, the parched Okanagan landscape greened - and stayed green all summer. This was a lush deciduous green that marked the boundary between the ponderosa pine and bunchgrass of the wilderness and the symmetric orchards of agrarian civilization. A. E. Ashcroft, one of the valley's earliest civil engineers, waxed eloquent about this demarcation, "There is no sight so arresting as the contrast afforded by the vivid green of a field of alfalfa surrounded by the desolate looking sage and cactus characteristic of the "Dry Belt" of this province."¹⁰ He could as easily have substituted "of an apple orchard."

The irrigated lands in the Okanagan at the beginning of World War I had been created remarkably quickly. Maps 10 - 17, drawn from water records compiled for the Provincial Board



PHOTOGRAPH 10

Glenmore Valley prior to orchard development, circa 1909.
Kelowna Museum Photo No. 10,277.



PHOTOGRAPH 11

Newly planted orchards in the Glenmore Valley, circa 1914.
Kelowna Museum Photo No. 706.

MAP OF
GLENMORE & MILL VALLEYS
 SHEWING THE
DISTRIBUTION SYSTEM
 OF THE
KELOWNA IRRIGATION CO. LTD.
KELOWNA, B.C.

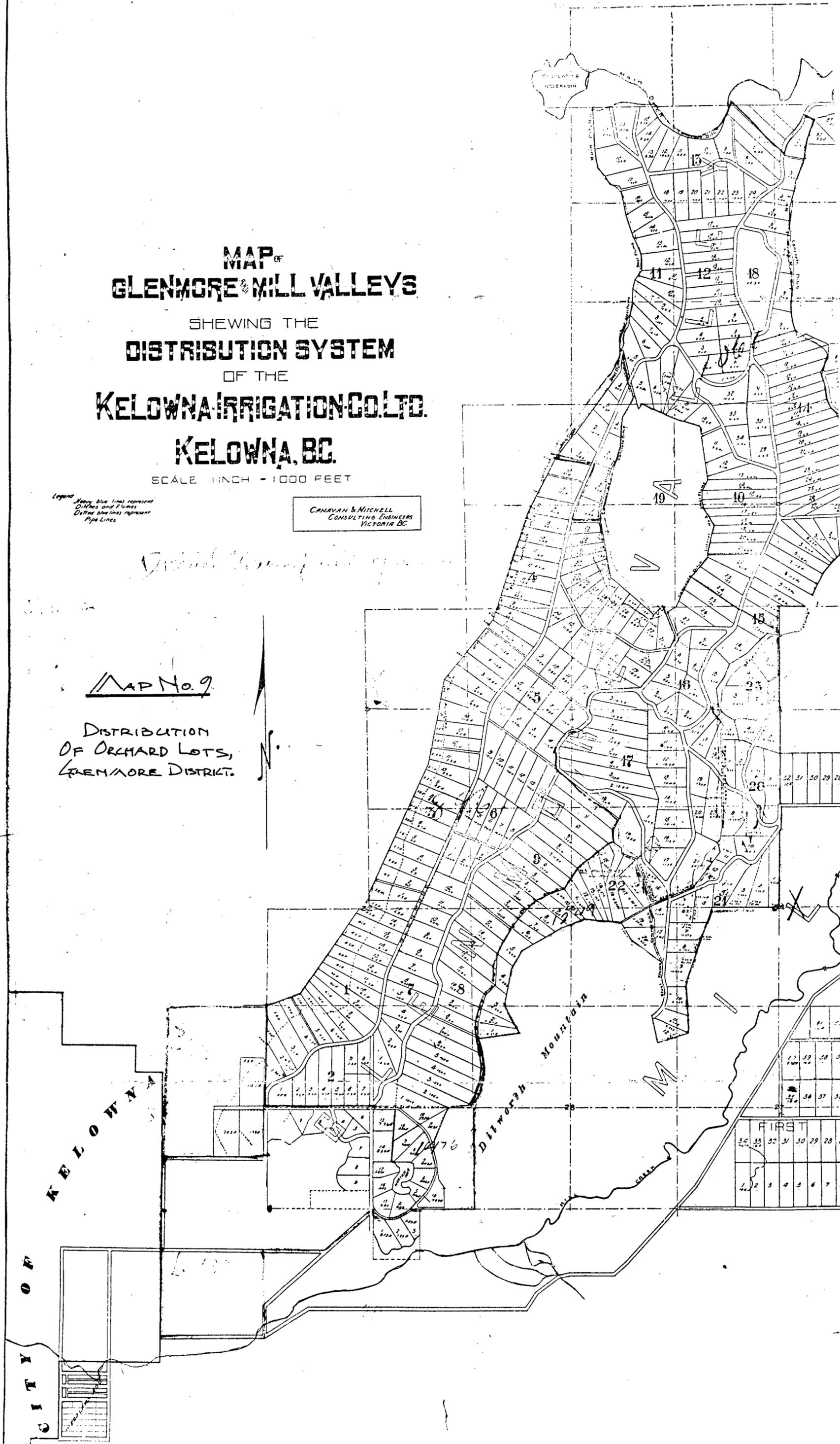
SCALE 1 INCH = 1000 FEET

Legend
 Heavy blue lines represent
 Ditches and Flumes
 Dotted blue lines represent
 Pipe Lines

CANAVAN & MITCHELL
 CONSULTING ENGINEERS
 VICTORIA, B.C.

Detailed description of the map

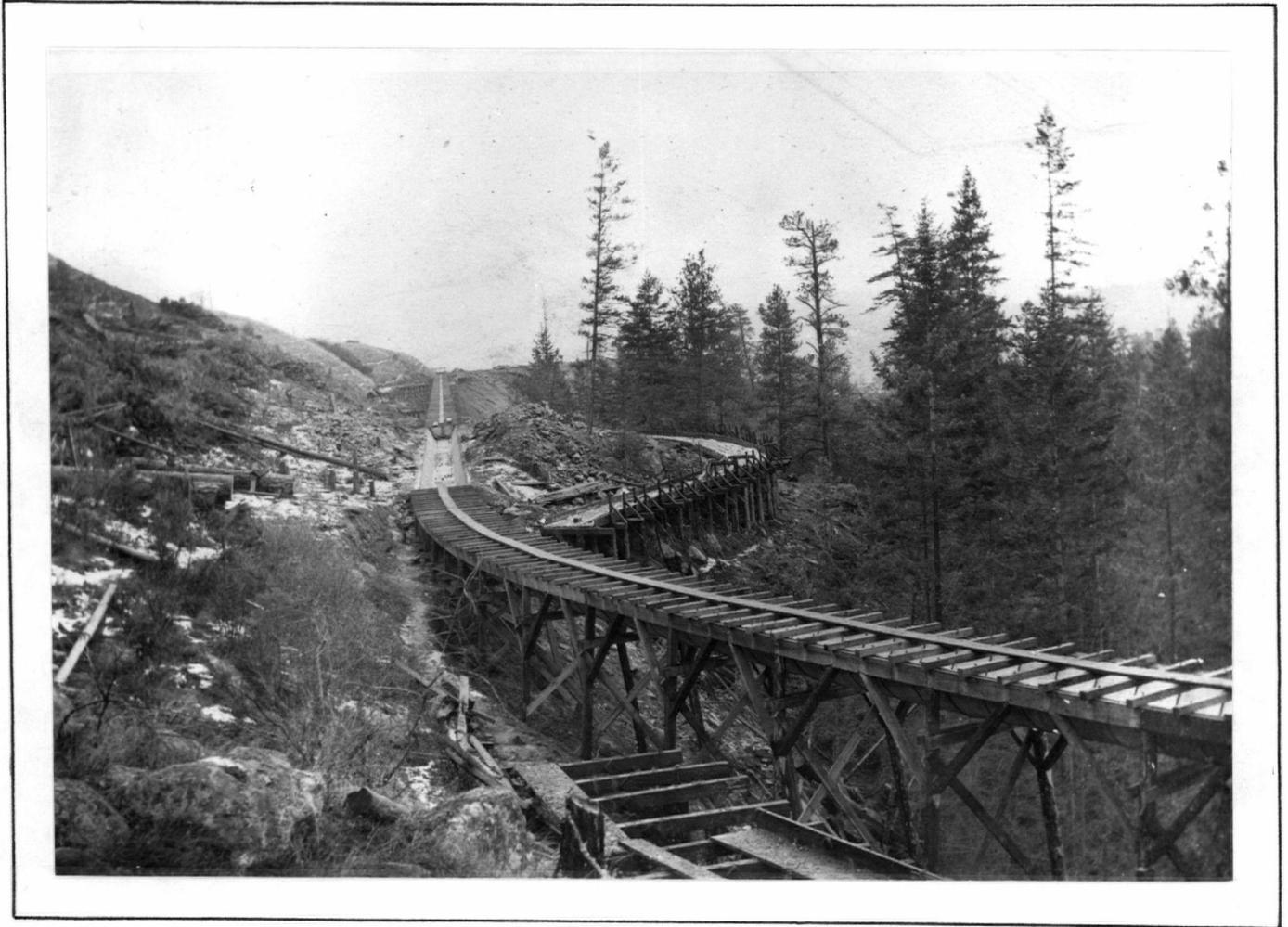
MAP No. 9
 DISTRIBUTION
 OF ORCHARD LOTS,
 GLENMORE DISTRICT.



CITY OF KELOWNA

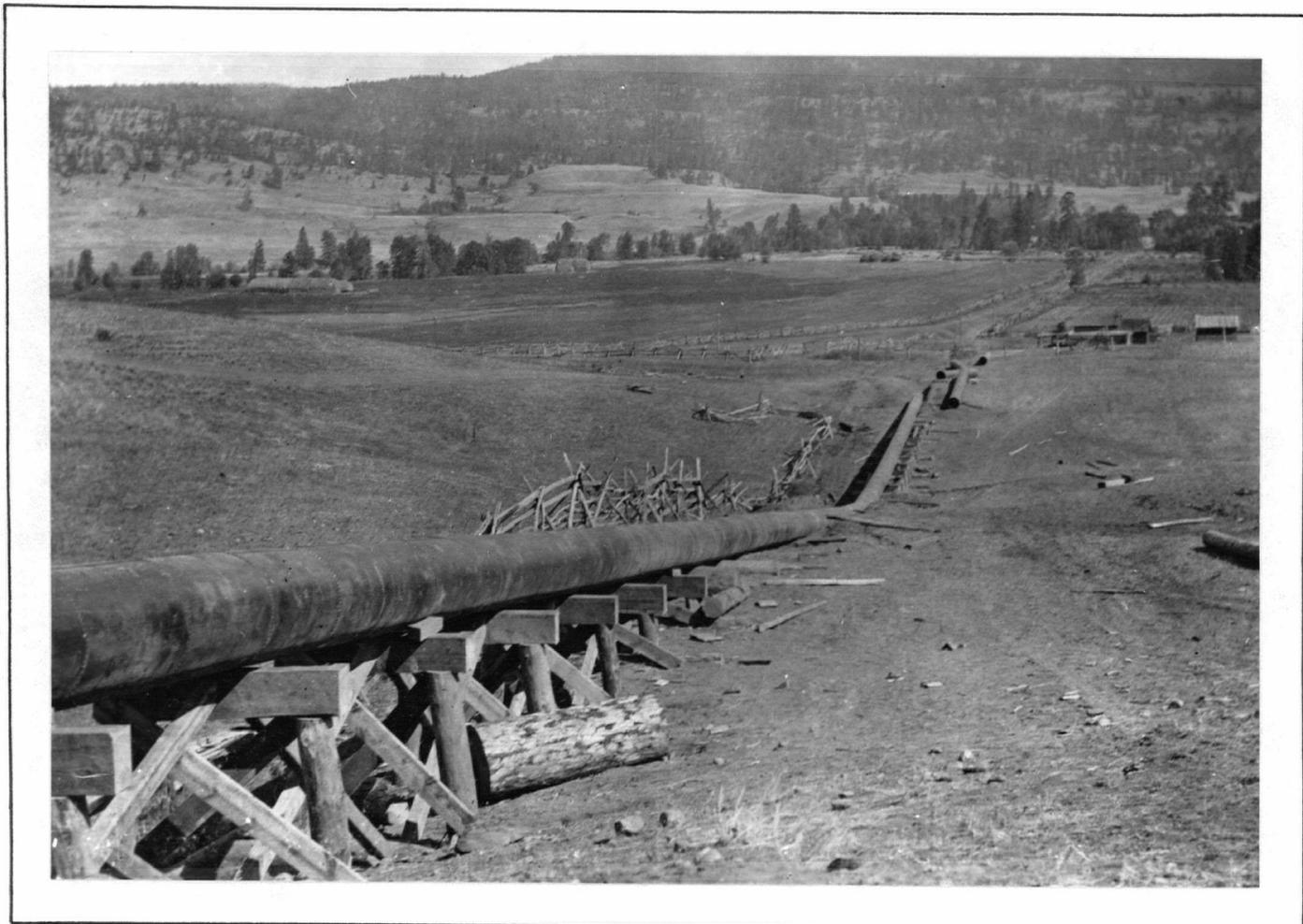
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40

1	2	3	4	5	6	7	8
9	10	11	12	13	14	15	16
17	18	19	20	21	22	23	24
25	26	27	28	29	30	31	32
33	34	35	36	37	38	39	40



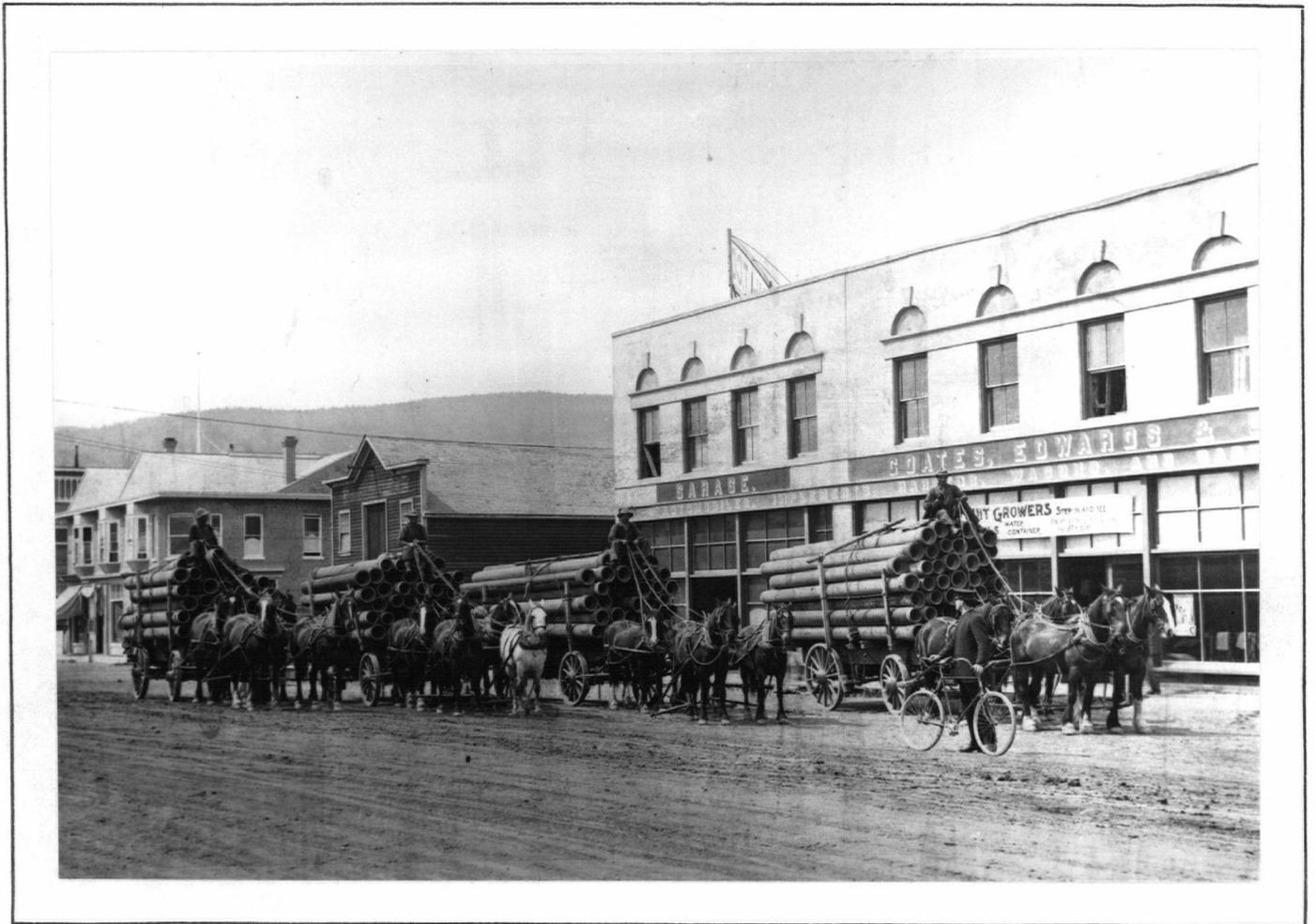
PHOTOGRAPH 12

Large volume, elevated irrigation flume built by the Kelowna Irrigation Company between 1910 and 1912.
Kelowna Museum Photo No. 10,368.



PHOTOGRAPH 13

Steel syphon that delivered irrigation water across the Ellison District to the Glenmore Valley, circa 1912.
Kelowna Museum Photo No. 10,325.



PHOTOGRAPH 14

Wagon loads of irrigation pipe destined for the Kelowna Irrigation Company system, circa 1911.
Kelowna Museum Photo No. 2639.

of Investigation, show where and when local supplies of irrigation water were secured. Again, the Kelowna and Vernon areas are considered to be typical of the region.

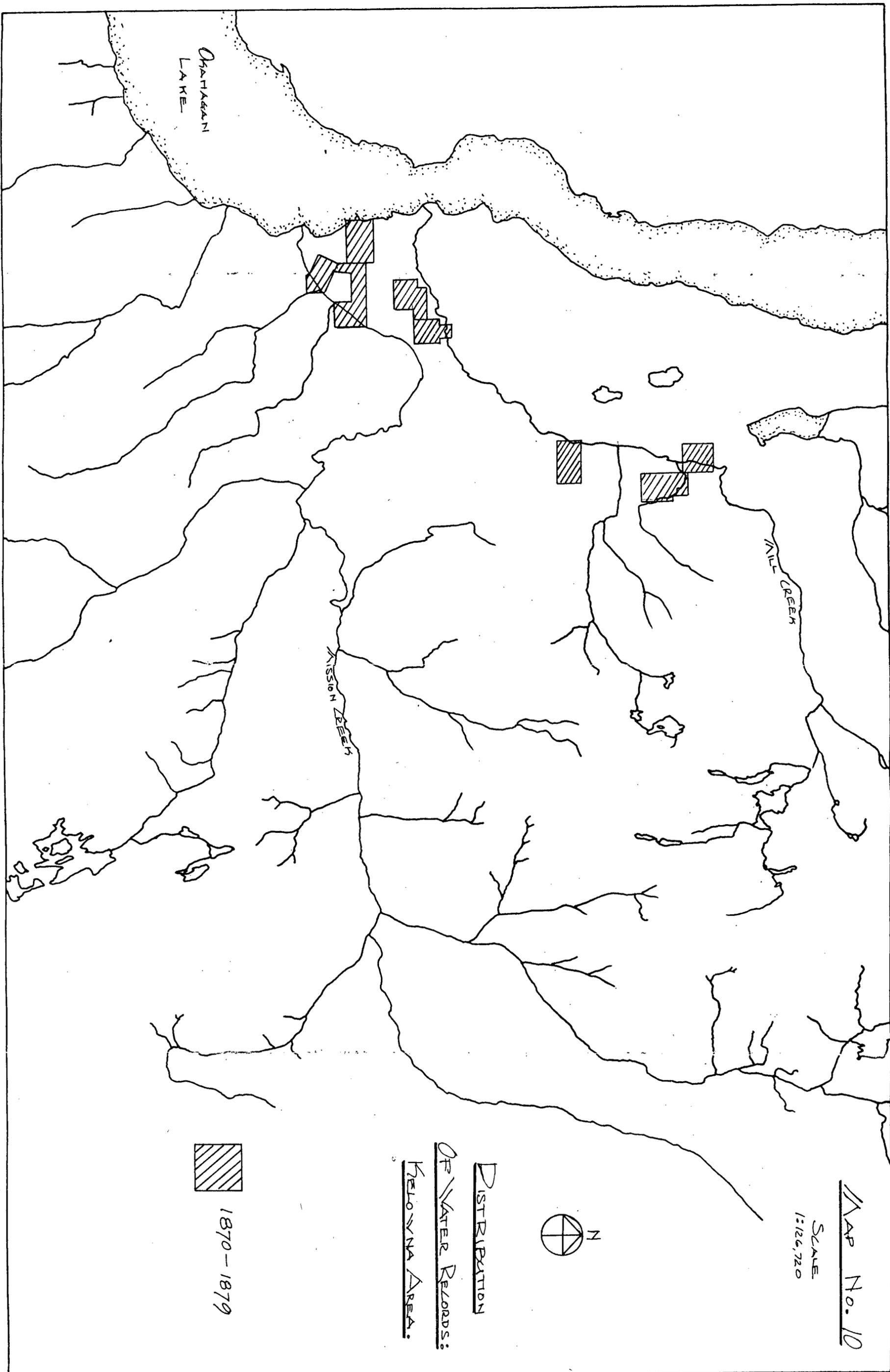
The first water records in the valley were taken out in the early 1870's. Although neither relict landscape features nor maps of these irrigation works remain, they undoubtedly were small works intended to water household gardens and orchards. All of the water records in the 1870's were strategically located on or adjacent to lakes or creeks for quick and easy access (Maps 10 and 11).¹¹ In the 1880's the pace of water record applications increased, (Table 4)¹²

TABLE 4 Water Records Granted (1870 - 1910)

	Kelowna	Vernon	Okanagan Valley
1870 - 1879	13	15	30
1880 - 1889	39	26	82
1890 - 1899	103	79	257
1900 - 1910	193	96	670
TOTAL	348	216	
Cancelled or Abandoned Records	97	49	
TOTAL	251	167	

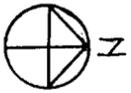
perhaps in response to the perceived threat to resource access posed by increased settlement as the C. P. R. mainline neared completion, perhaps the reflection of an overall increased awareness of the need for irrigation water. Yet the pattern of water records in the 1880's is almost identical to that of the previous decade (Maps 12 and 13).¹³

In the 1890's grants for water records were more than triple the number issued in the previous ten years (Table 4). By the late 1890's a few of the large lowland ranches were being subdivided and the new owners were applying for water. In addition, the Shuswap and Okanagan Railway was opened to Okanagan Landing in 1891 and settlers began to pour into the valley. When the water records granted to these settlers are plotted, the resulting maps show a



MAP No. 10

SCALE
1:126,720



DISTRIBUTION

OF WATER RECORDS:

KELOMVA AREA.

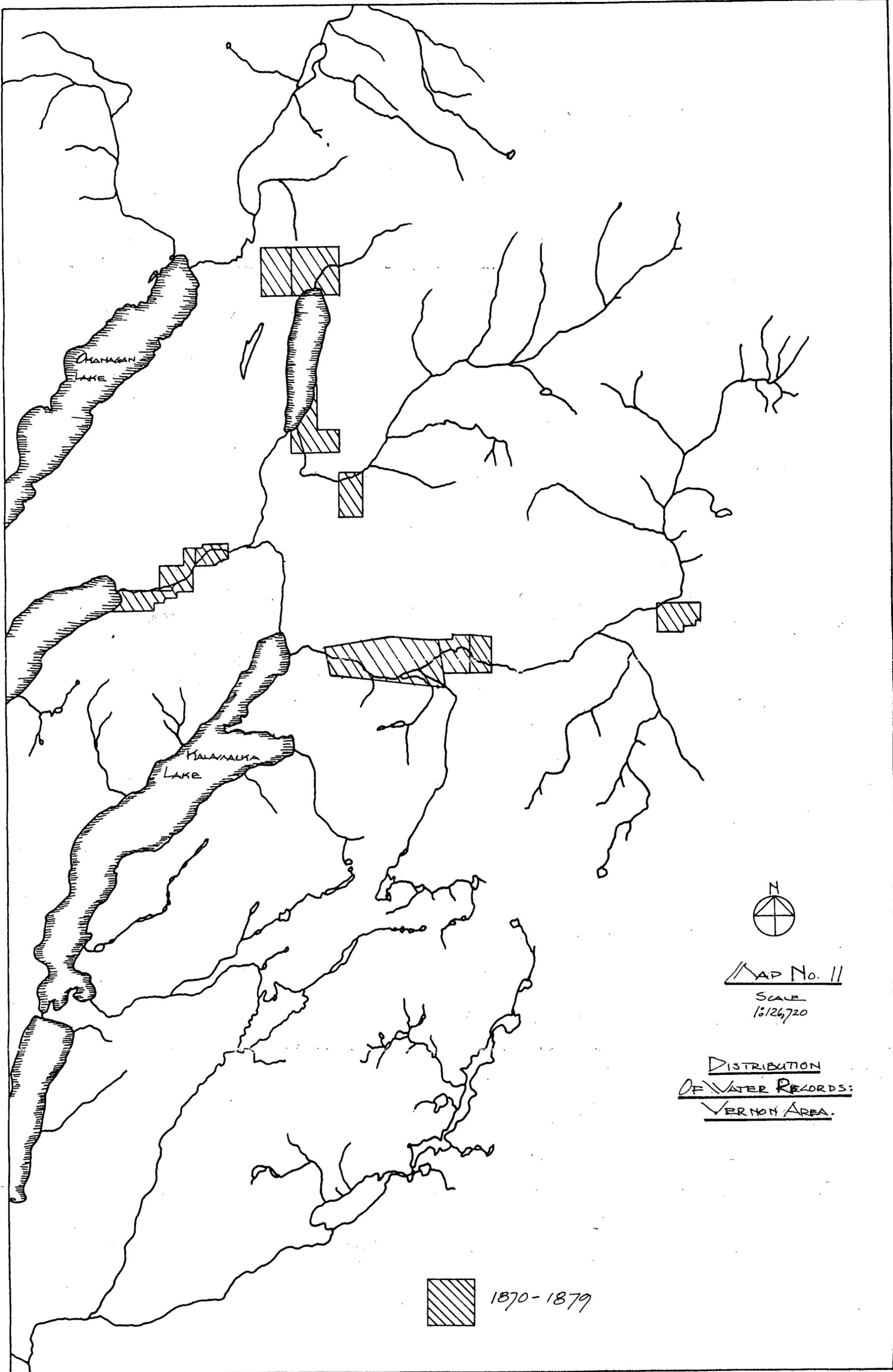


1870-1879

CHATASKAN
LAKE

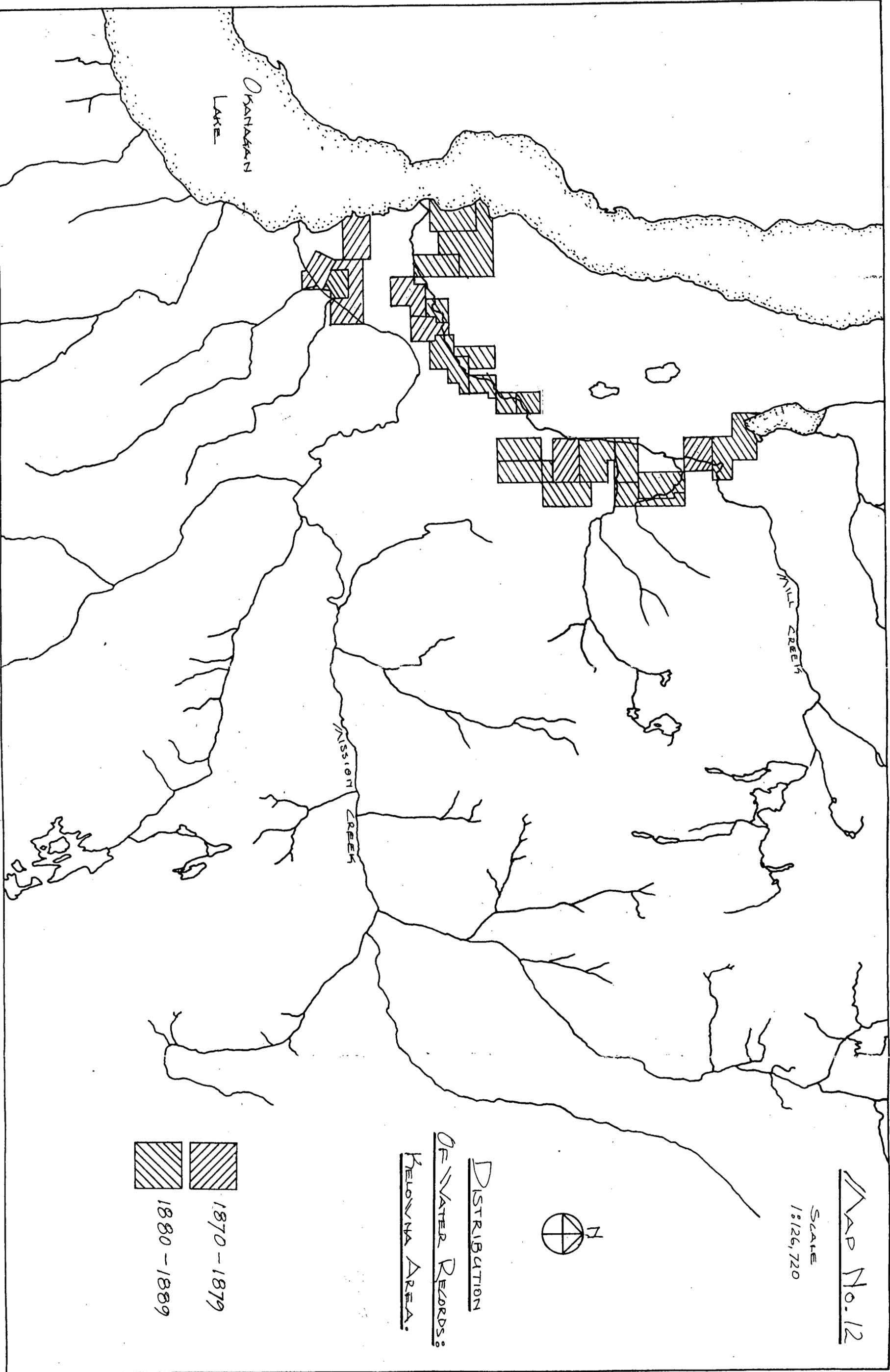
MILL CREEK

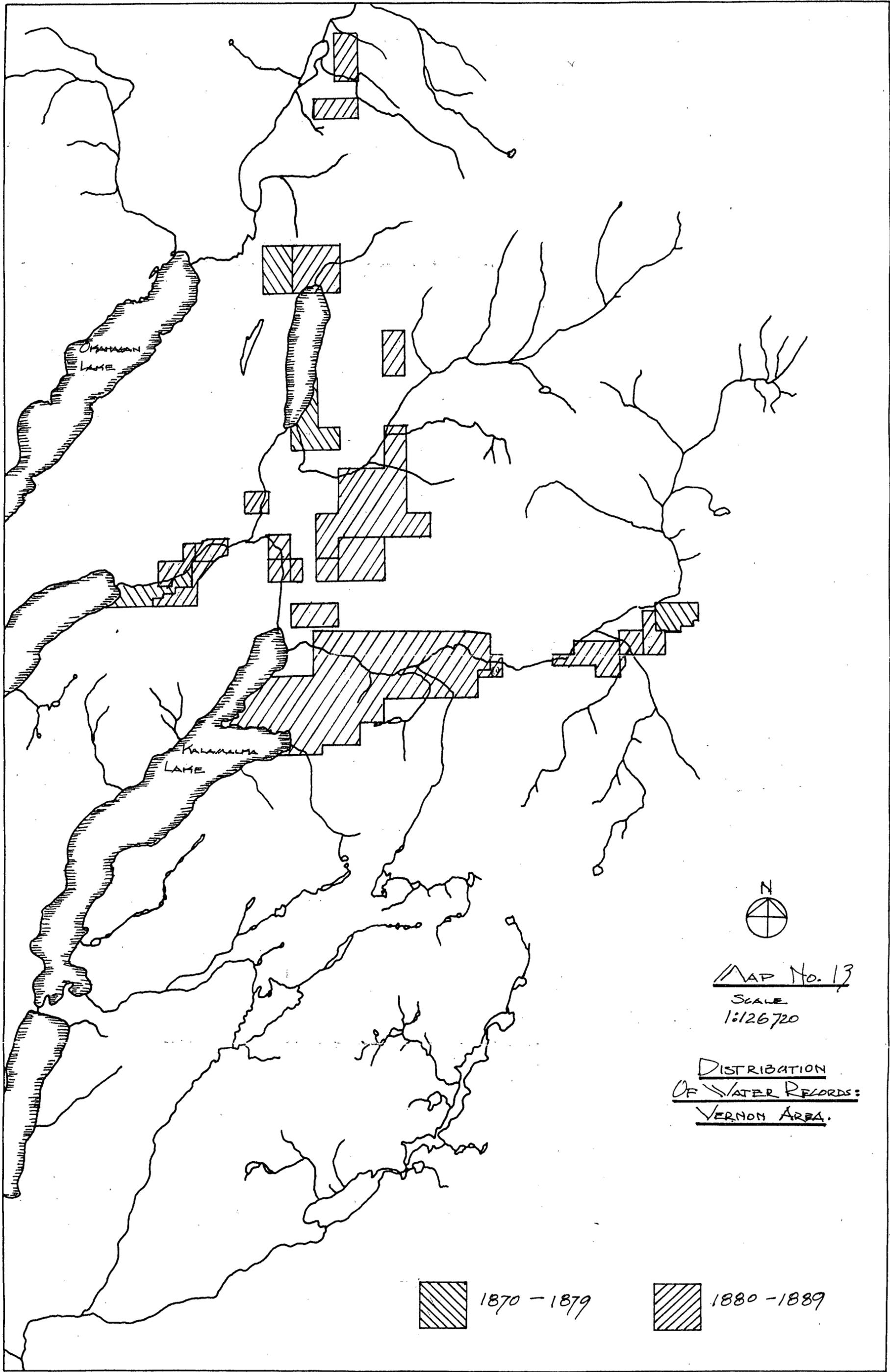
MISSION CREEK



 1870-1879

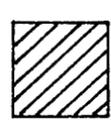

MAP No. 11
SCALE
1:126,720
DISTRIBUTION
OF WATER RECORDS:
VERNON AREA.





MAP No. 13
 SCALE
 1:126720

DISTRIBUTION
OF WATER RECORDS:
VERNON AREA.

 1870 - 1879
  1880 - 1889

continuation of the pattern already established (Maps 14 and 15).¹⁴ Some outward expansion is evident, particularly in the Kelowna area. But, essentially, this was a time of in-filling available lowland that had access to water, transportation routes, and community services.

During the first decade of the 20th century, applications for water records continued apace. In 1909, however, more powerful water legislation was passed and water application approvals dropped from 85 in 1908 to 29 in 1909, and to only 6 in 1910.¹⁵ Examination of the provincial Board Of Investigation records shows that of the records granted in the Kelowna and Vernon areas between 1871 and 1911 thirty percent (30%) and twenty percent (20%) respectively were taken out or taken over by land development companies. These percentages somewhat belie the scale and impact of company involvement. When the company lands are mapped, however, the dimensions of their undertakings becomes more clear (Maps 16 and 17).¹⁶ Furthermore, the company lands were largely benchlands, removed by distance and elevation from traditional supplies of irrigation water. These lands required long and expensive gravity irrigation systems that cost the six largest land development companies in Kelowna and Vernon more than 1.8 million dollars to install.¹⁷ In terms of the capital investment in mining, forestry and fishing this was not a large sum, but it does represent a successful, significant and organized strategy used to develop a natural resource. Indeed, the stunningly quick shift from cattle and grain to orcharding was catalysed by companies looking for a high return on investment.

Until the late 1890's the Okanagan, in the broadest terms, was not unlike many other North American agricultural frontiers - land was open to pre-emption, markets were distant, settlers were few and scattered, labour was expensive, and transportation links were poor. Irrigation in the Okanagan (as in Washington, Oregon, and southern Alberta at the time) depended on works that were short and cheaply built, and that served private gardens, hay flats and grainfields.¹⁸ By the turn of the century, however, circumstances had changed. The C. P. R. had taken over the Shuswap and Okanagan Railway's line to Okanagan Landing. This link, combined with the launching of the S. S. Aberdeen in 1892 and the S. S. Okanagan in 1907, provided a reliable service capable of shipping perishable goods long distnaces cheaply and

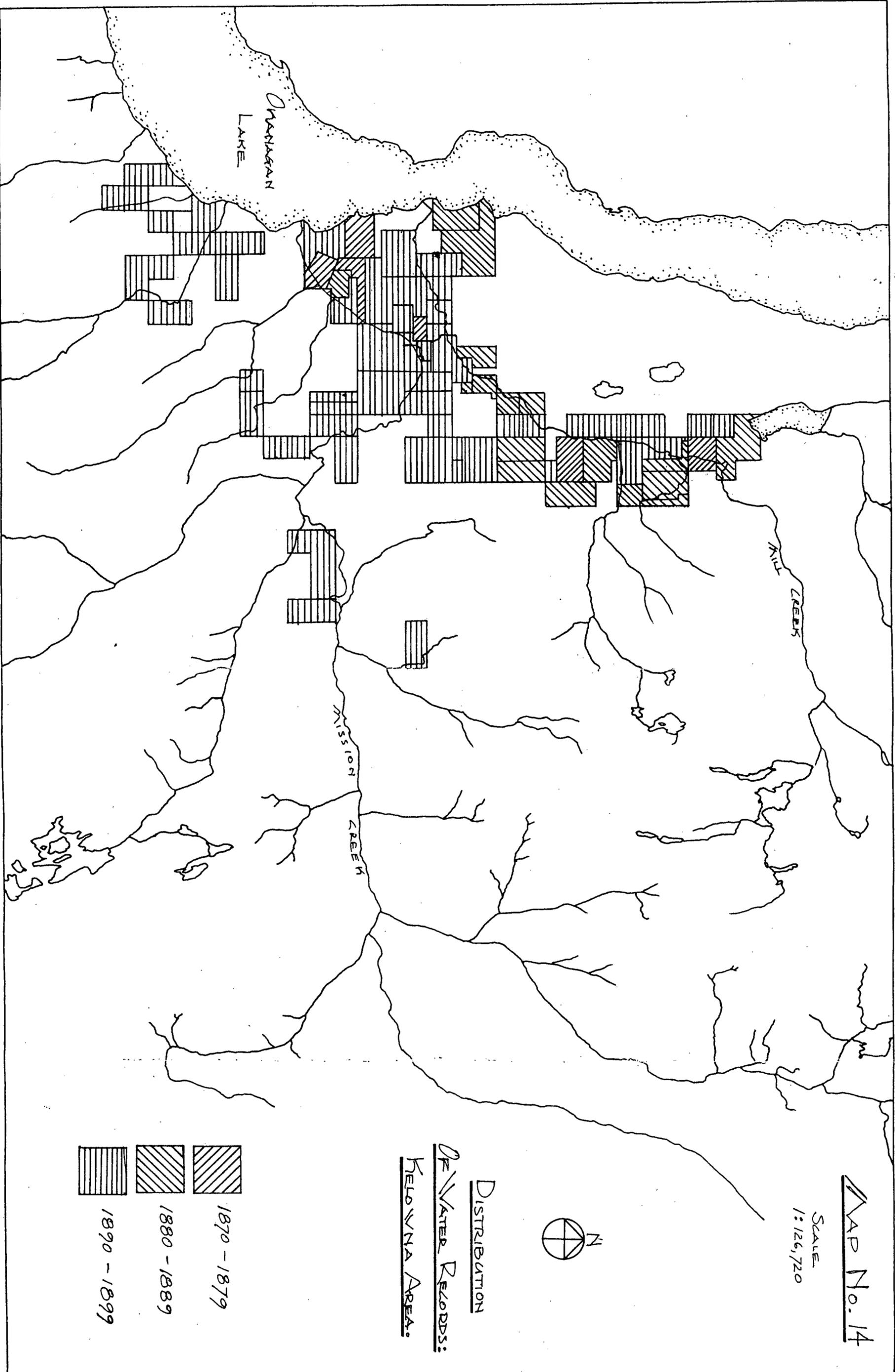
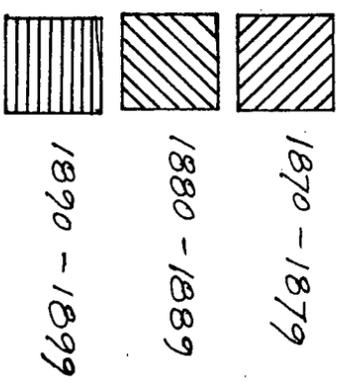
MAP No. 14

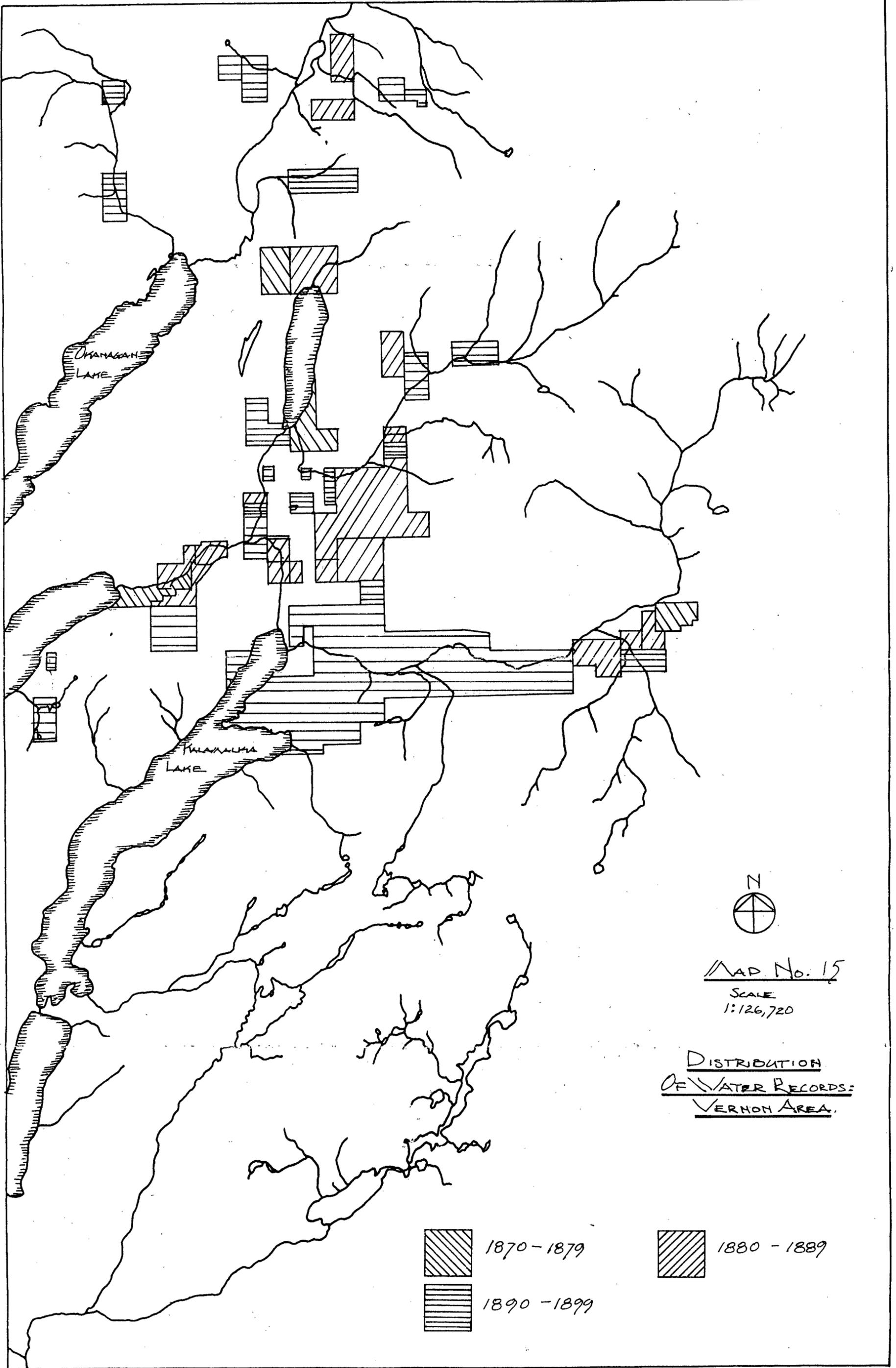
SCALE
1:126,720



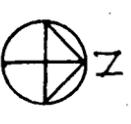
DISTRIBUTION

OF WATER RECORDS:
KELOWNA AREA.

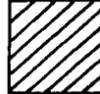


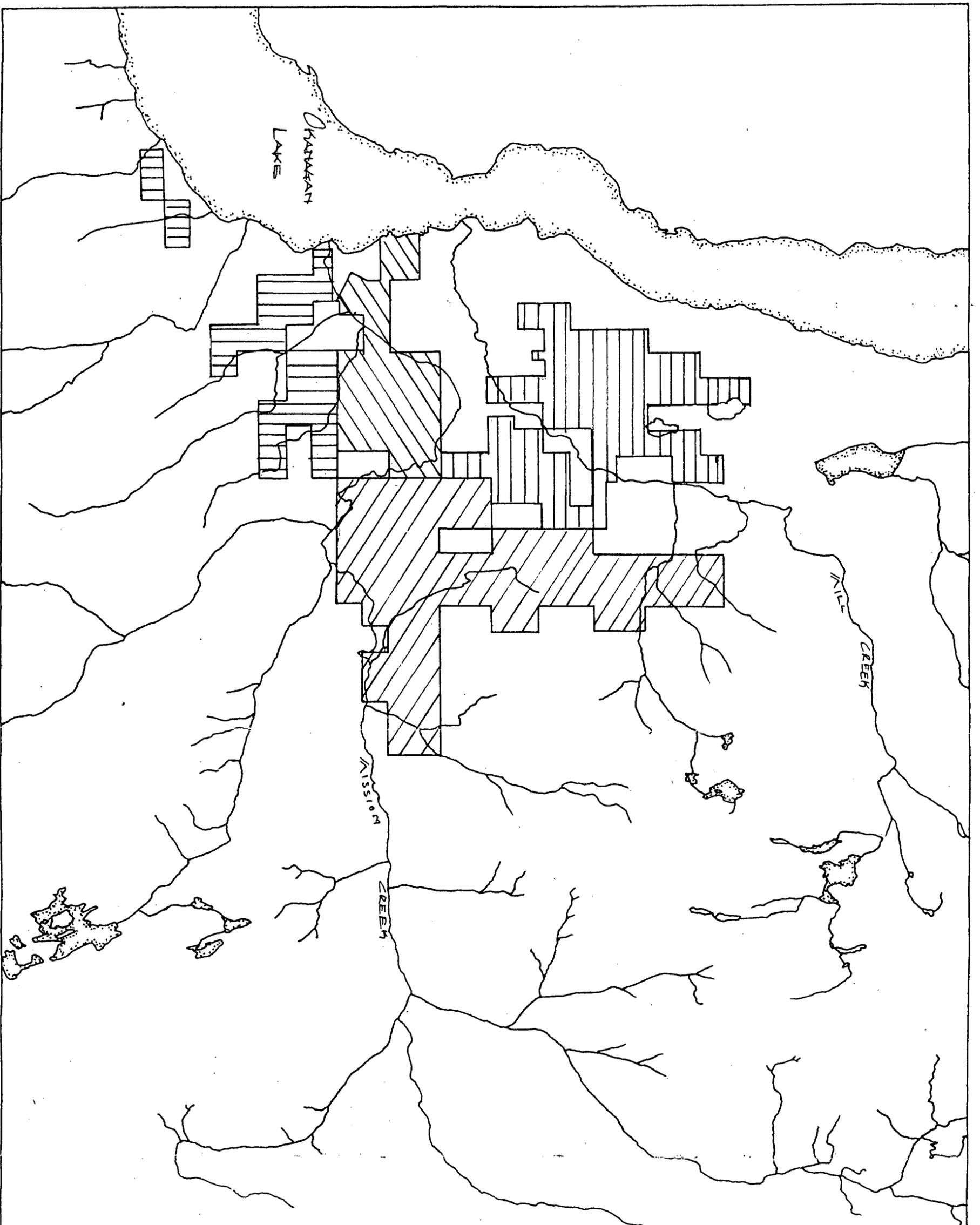


MAP No. 16
SCALE
1:126,720

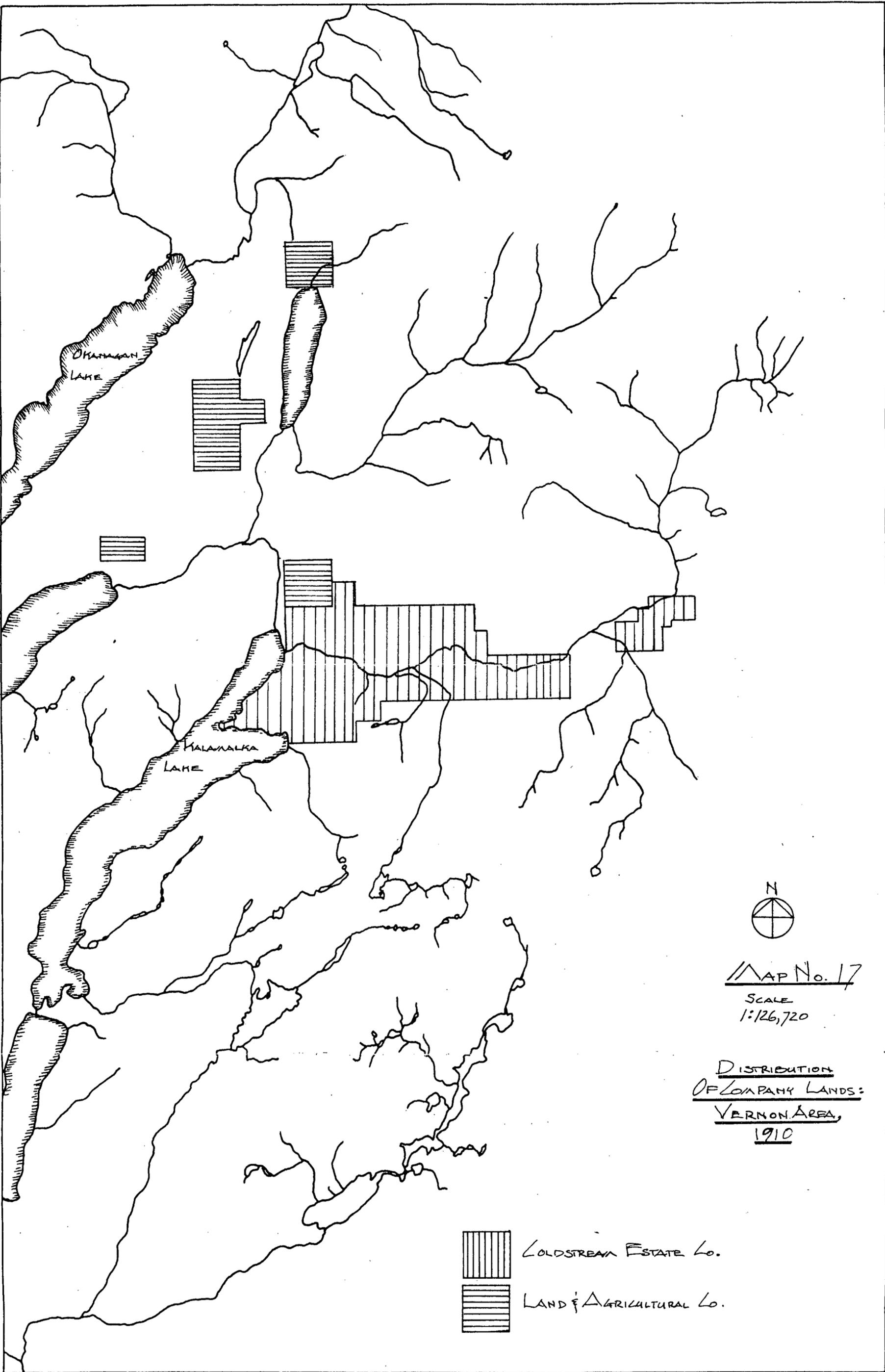


DISTRIBUTION
OF COMPANY LANDS:
KELOVNA AREA,
1910.

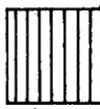
-  CENTRAL OKANAGAN
LAND & ORCHARD CO.
-  SOUTH KELOVNA
LAND CO.
-  KELOVNA LAND &
ORCHARD CO.
-  BELLEFLO CANADIAN
FRUITLANDS CO.



001




MAP No. 17
 SCALE
 1:126,720
DISTRIBUTION
OF COMPANY LANDS:
VERNON AREA,
1910

 COLDSTREAM ESTATE Co.
 LAND & AGRICULTURAL Co.

quickly. The few large orchards in the region prior to company development were in full bearing and found good markets for their produce in Eastern Canada, on the prairie, and in the lower mainland. In 1895, for example, Okanagan growers shipped roughly 2000 boxes of fruit out of the region.¹⁹

The organization of land companies coincided with these developments. Although such companies were common in other parts of the greater Pacific Northwest, the costs and scale of attendant irrigation in the Okanagan were unique. Irrigation development came late to the Okanagan and, initially, many company systems had to serve widely scattered locations. Both of these conditions resulted in high construction and maintenance costs.²⁰ The Okanagan after 1900 was not a poor man's frontier. At the height of the land boom irrigated orchard lots were selling for as much as \$350.00 per acre. In addition, the Okanagan Valley drew irrigated horticulture later than American counterparts and thus benefited from technological developments and management strategies adumbrated in the United States. In addition, Okanagan irrigation schemes did not receive the financial backing of railway companies as did enterprises in Washington, Oregon and Alberta. Rather, Okanagan settlers used their own funds and enlisted family support to finance both land purchases and the construction of irrigation works.²¹

The Okanagan attracted a different type of settler to its irrigated orchard lands than did the American orchard lands to the south or, for the most part, the wheatlands of the prairies. Okanagan land development companies set up sales offices in Great Britain and pictured the region as "The most favored by nature of all the famous valleys of British Columbia..."²² and orcharding as having "acquired the distinction of being a beautiful art as well as a most profitable industry ... [offering] the opportunity of living under such ideal conditions as struggling humanity had only succeeded in reaching in one or two of the most favoured spots upon the earth."²³ The start-up costs of orcharding were high and many potential settlers could not afford them. In about 1912 E. M. Carruthers estimated the amount of money required to start an orchard was roughly \$1500 and added, "This is the minimum needed, if he (the orchardist and his family)

intends to live with any comfort."²⁴ Yet hundreds of settlers, a great many of middle class, English background, purchased company lots.

At the centre of this growth was a corporate assessment that irrigation water could be procured at a cost that could be borne by large numbers of small family orchards. Yet, though irrigation systems were put in place quickly, they required an enabling framework of legislation, water management practices, capital, and technology. Without such support the land companies and the orcharding economy they promoted would necessarily fail.

The provincial government controlled water laws that related to irrigation. Various Acts of the 1890's permitted corporate development of irrigation works, but the rights and responsibilities of irrigation companies were defined poorly if at all. It was not until 1908, for example, that land and irrigation companies could consider water stored behind company dams as private property. Of all the legislation prior to the establishment of publicly managed Irrigation Districts, the amendments of 1908 relating to storage were perhaps the most critical. Without the assurance of the control of such water, investment capital for dams would not have been forthcoming.

The company management of irrigation water, critical to the success or failure of individual orchardists, was recognized by provincial statutes. Water rights were appurtenant to the land and, as long as the company owned the largest acreage under the water record, it controlled access to and further development of works. Management of a public resource is susceptible, however, to public pressure, and as increasing numbers of orchardists saw their livelihoods dependent on management for short-term profit rather than long term stability, they lobbied for change.

There is no evidence that corporate irrigation development was based on more than the most superficial environmental data. While growers may not have been aware of this, the results of such ignorance were quickly evident. The Water Rights Branch reported in 1913 that while there was no current shortage there was a general "scarcity of water." In 1915 Mackenzie noted that the Kelowna Irrigation Company was running a water deficit of more than 450 acre feet.

Orchardists had organized a lobby group, the Western Canada Irrigation Association, as early as 1908. This body was clearly instrumental in placing the issue of public management of works before the provincial legislature and in effecting changes in that direction with the passage of the Water Act of 1914. Moreover several powerful provincial cabinet ministers had a vested interest in establishing and maintaining long-term and stable access to irrigation water, access that by World War I could not be assured by companies. Price Ellison, for example, had substantial orchard holdings in the central and north Okanagan and was provincial Minister of Finance and/or Agriculture just prior to World War I. Other influential Okanagan land holders included T. G. Shaughnessey, Premier McBride, and Lord Aberdeen. Finally, the ideas of the progressive conservation movement, favouring the long-term planning of resources and public control of resource development, were in the air. Such pressures and influences account for the government's remarkably rapid response - given the unavailability of environmental data and the constraints of World War I - to orchardists' demands for public control of water.

Technologically, corporate irrigation was the fortuitous recipient of skills, strategies, and equipment developed in the northwestern United States. Although many of the companies' resident engineers were British, American engineers were everpresent speakers at W. C. I. A. conventions and were often hired by the provincial government as consultants on major surveys of works. In many ways the technological component of Okanagan irrigation seems complex because many of the companies' works were so poorly built. However, the lack of available capital and, even more importantly, the need to build quickly, rather than the lack of technical expertise compromised the efficiency and longevity of most company irrigation systems.

The financial component of the Okanagan irrigation complex has been most carefully considered by David Dendy in his study, One Huge Orchard.²⁵ Briefly, land development companies and their subsidiary irrigation companies were financed largely by capital mobilized through family connections in Canada or Great Britain. The earliest companies appear to have turned more than respectable profits. Many later companies, however, though demonstrating fully - or near fully - subscribed stock or debentures, were in fact either over-extended or

brought their land onto the market too late. By 1915 the South Kelowna Land Company had sold only 162 acres of its orchard lands.²⁶

These components of the corporate irrigation complex converged quickly in the Okanagan Valley. Railways and sternwheelers provided quick, safe routes to large markets. At the same time, immigration to Canada was increasing rapidly, and land agents were offering attractive images of life as an orchardist in the Okanagan - marketing aimed at the English middle class. The promoters' success is reflected, partly at least, in the 1921 Census of Canada which shows that British people made up roughly 80 percent of the Okanagan population. These middle class immigrants swelled the population of the region, brought sufficient capital to establish themselves as orchardists, and created a regional character that is evident even today.²⁷ Nationally, this was the start of "Canada's Century", and the provincial government echoed the sentiment by publishing floridly written settlers guides to the province's interior agricultural lands. The Okanagan, the government proclaimed, "has been appropriately named the garden of the Province, for in no portion of British Columbia is cultivation more general and successful."²⁸ Supporting these claims, the government passed enabling water legislation, and subsequently established a water management body (the Water Rights Branch) to oversee equitable access to the resource. Seizing the opportunity were entrepreneurs capable of mobilizing capital and of organizing the large scale development projects that completely remade the regional agricultural economy and the very look of the valley.

The emerging pattern of irrigated orcharding - its outward expansion and movement upslope - continued to strengthen between 1914 and 1920, albeit at a slower pace.²⁹ During this period the Water Rights Branch was able to improve its data gathering activities, and the Board of Investigation was able to rule on most of the valley's water record claims. These duties accomplished, the broader question of public control of irrigation water could be more fairly met. This was also a time when consultants assessed the viability of many of the region's larger irrigation schemes. In their accounts, irrigating the Okanagan was a laudable task that was "founded on ignorance or misconception of irrigation requirements."³⁰ At the same time, neither

government appointed Commissioners nor the Water Rights Branch ever suggested the irrigation schemes be abandoned. When the government approved formation of the first public Irrigation District in 1920 the irrigation question did not die completely. Organization of the districts did, however, sound a note of hope to hundreds of orchardists and allowed them to turn a serious eye to their next and pressing problem - marketing.³¹

Chapter 5 Endnotes

1. Water Rights Branch, Annual Report, 1913. British Columbia Sessional Papers. Victoria. pp. D164 - D170.
2. A. R. Mackenzie, Report on the Physical and Financial Conditions of Irrigation Projects in the Vernon and Kelowna District. Vancouver, 1916. Volume 1, Summary Table, pp. 75 - 76.
3. As indicated in D.R.B. Dendy, One Huge Orchard. University of Victoria, unpublished B. A. graduating Essay, 1976. *passim*.
4. Water Rights Branch. Board of Investigation Records. Kelowna Museum Archive. At this scale these maps do not indicate minor creeks and springs.
5. Kelowna Museum Photograph No. 10,227.
6. Kelowna Museum Photograph No. 706.
7. Kelowna Museum Map No. M983.1.57.
8. Kelowna Museum Photograph No. 10,368 and 10,325.
9. Kelowna Museum Photograph No. 2639. This was a promotional photograph taken by G. H. E. (Huddy) Hudson and used in the Report of the Proceedings of the W.C.I.A. Conference, 1912. P. 95.
10. Wester Canada Irrigation Association. Conference Proceedings, 1910. Ministry of the Interior, Ottawa. p. 71.
11. Water Rights Branch. Board of Investigation Records. Kelowna Museum Archive.
12. Loc. cit.
13. Loc. cit.
14. Loc. cit.
15. Loc. cit.
16. Loc. cit.
17. Mackenzie, op. cit.
18. E. K. Vandevere, History of Irrigation In Washington. University of Washington, unpublished doctoral dissertation, 1948. *Passim*. Also see Conference Proceedings of the W.C.I.A. for 1908 for a note on the C. P. R. involvement in irrigation development in Alberta.
19. Cited in D. D. Thomson, A History of the Okanagan. University of British Columbia, unpublished Ph.D. dissertation, 1985. pp. 317-318.
20. Mackenzie, Volume 1, op. cit., p. 1.
21. Dendy, op. cit., pp. 82 - 85.

22. Central Okanagan Land and Orchard Company, Okanagan Valley Fruit Lands. Kelowna, circa 1908. p. 3.
23. British Columbia. Agriculture In British Columbia. Bulletin No. 10, Victoria, 1907, p. 23.
24. E. M. Carruthers, The Creation of an Orchard in British Columbia, Hudson and Kearns Ltd., London, circa 1912, p. 31.
25. Dendy, op. cit.
26. Mackenzie, op. cit.
27. The distinctive character of the region's British middle-class immigrant population is described in D. Mitchell and D. Duffy, Bright Sunshine and a Brand New Country. Sound Heritage, Volume VIII, No. 3 (1979), Victoria. passim. For a corroborative examination of this class of immigrant in the East Kootenay region see R. C. Harris and E. Philips, Letters from Windermere, University of British Columbia Press, 1984. While I was attending high school in Kelowna there were both teachers and students who, though born and brought up in Kelowna, had British accents.
28. British Columbia, Agriculture in British Columbia. Bulletin No. 10, Victoria, 1907. p. 55.
29. Water Rights Branch, Annual Report 1918. British Columbia Sessional Papers, p. 9.
30. Water Rights Branch. Annual Report 1917. British Columbia Sessional Papers, p. J24.
31. This new problem has been examined by David Dendy in his unpublished M. A. thesis, Cent A Pound Or On The Ground, University of British Columbia, 1981.

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