

PRAIRIE PROVINCES WATER BOARD

218-110-7403

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SIXTEENTH

ANNUAL REPORT

FOR THE CALENDAR YEAR 1963

Prepared by

**E.F. Durrant,
Engineering Secretary,
c/o P.F.R.A., Motherwell Bldg.,
Regina, Saskatchewan.**

January 15, 1965.

(1)

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GORDON LESLIE MacKENZIE

Gordon MacKenzie died June 13, 1963, after a brief illness. He had served as Chairman of the Board since March 21, 1957. At the November 6th meeting, the members recorded his passing with regret and paid tribute to the outstanding contribution he had made to the work of the Board, and in particular to the betterment of harmonious relations between provinces in their discussions of common water problems.

MEMBERSHIP OF THE BOARD

The Prairie Provinces Water Board is composed of five members. The three provincial members represent the Provinces of Alberta, Saskatchewan, and Manitoba, and the two federal members represent the Department of Agriculture, and the Department of Northern Affairs and National Resources. The Engineering Secretary for the Board is employed by the Prairie Farm Rehabilitation Administration (Canada Department of Agriculture). During 1963, the following persons served on the Board:-

M.J. Fitzgerald (Chairman), (replacing Gordon MacKenzie - deceased)	Director, P.F.R.A., Regina, Saskatchewan.
R.H. Clark	Chief Hydraulic Engineer, Water Resources Branch, Ottawa, Ontario.
F.L. Grindley	Director, Water Resources Branch, Edmonton, Alberta.
B.W. Boyson	Director, Water Rights Branch, Regina, Saskatchewan.
J.A. Griffiths	Director, Water Control and Conservation Branch, Winnipeg, Manitoba.
E.F. Durrant	Engineering Secretary to the Board, Chief, Hydrology Division, P.F.R.A., Regina, Saskatchewan.

WARRANT AND FUNCTION OF THE BOARD

On July 28, 1948, the Prairie Provinces Water Board was established by agreement between the Governments of Canada, Manitoba, Saskatchewan, and Alberta. A copy of that agreement is attached to this report as Appendix 1.

The Board's function, as expressed in that agreement, is "to recommend the best use to be made of interprovincial waters in relation to associated resources in Manitoba, Saskatchewan and Alberta and to recommend the allocation of water as between each such province of streams flowing from one province into another province."

The duties of the Board are set out in detail in the Agreement. Briefly they are:-

- (a) to collate and analyze existing data;
- (b) to determine what other data are required from time to time;
- (c) to recommend the allocation of waters of any interprovincial stream; and
- (d) to report on any questions relating to projects for the utilization or control of common river or lake systems.

REVIEW OF ACTIVITIES

IN 1963

APPOINTMENT OF NEW CHAIRMAN

On August 21, 1963, Mr. M.J. Fitzgerald, Director of P.F.R.A., was appointed Chairman of the Board, replacing G.L. MacKenzie (deceased).

MEETINGS IN 1963

The Board held two meetings in 1963; one in Winnipeg on January 16, and one in Lethbridge on November 6 and 7.

THE SASKATCHEWAN-NELSON STUDY

In 1960 the Board adopted a resolution requesting that the Governments of Alberta, Saskatchewan, Manitoba, and Canada undertake jointly to implement a study which would lead to the formulation of an integrated development plan for the water resources of the Nelson River Basin.

During 1962 this matter was still being considered by the governments concerned, and, although some concern was expressed by Board members that no final decisions regarding the proposed study had been made, the Board took no official action concerning the matter.

THE QU'APPELLE-ASSINIBOINE STUDY

In 1962, the Board had agreed that a study should be undertaken to provide a basis for apportioning the waters of the Qu'Appelle and Assiniboine Rivers, and to arrive at a figure for Manitoba's and Saskatchewan's future needs for water from the South Saskatchewan Reservoir. Accordingly the Board Secretary met with Saskatchewan and Manitoba representatives on various occasions during 1963. As a result of those meetings a final study outline was drafted, and agreement was reached as to how the study workload would be shared. Provincial representatives agreed to develop figures for future water demands for consumptive use and for sewage dilution. The Secretary agreed to compile figures on available runoff and to carry-out studies which would compare water supply with water requirements.

In October the Secretary distributed a report entitled "Compilation and reconstruction of Monthly Streamflow Records for the Qu'Appelle-Assiniboine Study" indicating completion of the first stage of this joint venture.

ALLOCATIONS, RESERVATIONS, RECORDINGS

No new allocations were recommended during 1963. Allocations in good standing as of December 31, 1963, are listed in Appendix 2.

At the January meeting of the Board, the Alberta member tabled a progress report on investigations for the William Pearce (Red Deer) Project. These investigations are not complete, and water requirements can not yet be accurately determined, so the Board renewed the reservation for a further two years. The quantities of water reserved are shown in Appendix 2.

An Inventory of all small projects in the Saskatchewan River Basin was completed and circulated to members in the year. It disclosed that a total allocation of 563,746 acre-feet of water annually to small projects had been made by provincial agencies as of August 1962. The Board considered the desirability of recommending an allocation on the basis of this inventory but decided that the inventory was not sufficiently accurate and further, that water use in this category was growing at a steady rate. For these reasons the reservation of 1,000,000 acre-feet for small projects was renewed for one year at the January meeting and again at the November meeting.

IRRIGATION WATER USE

In October, a report entitled "Report on Irrigation Water Use Study" was distributed to Board members. The report was prepared by A.G. Underhill, P. Eng., of the Alberta Water Resources Branch acting as Chairman of a Board Committee on Irrigation Water Use. The Committee had been instructed as follows:-

"The committee will report on allocation procedures used by various agencies, methods of computing gross diversions used by various agencies, and procedures under which diversion requirements are administered. If sufficient data are available the committee will recommend procedures for computing gross irrigation diversion requirements for the Prairie area. It would be in order for the committee to suggest what further data or research would be required if such recommendations cannot be made at this time. The committee will also review allocations made by the P.P.W.B. and suggest those which need revision. Finally the committee will prepare a standard form which might be used by the Board in receiving requests for and in authorizing allocations of water."

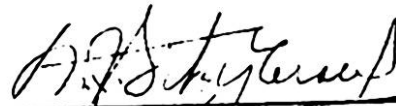
To supplement the information contained in this report the Board held, on November 6, a semi-public hearing to which a number of irrigation project managers had been invited. These project managers presented written and verbal statements to the Board in support of their contention that the "legal duty of water" of 1.5' (the basis for the Alberta allocations shown in Appendix 2) was no longer adequate due to steadily increasing irrigation factors, and the increasing emphasis on forage in cropping patterns.

On November 7, the Board considered the recommendations of the Irrigation Water Use report and the statements presented at the previous day's hearing. Subsequently a number of the report's recommendations were adopted or amended and adopted and are listed in Appendix 3.

CURRENT STUDIES

A number of minor studies were conducted and briefs prepared by the Secretariat during the year in addition to those already mentioned. These included:-

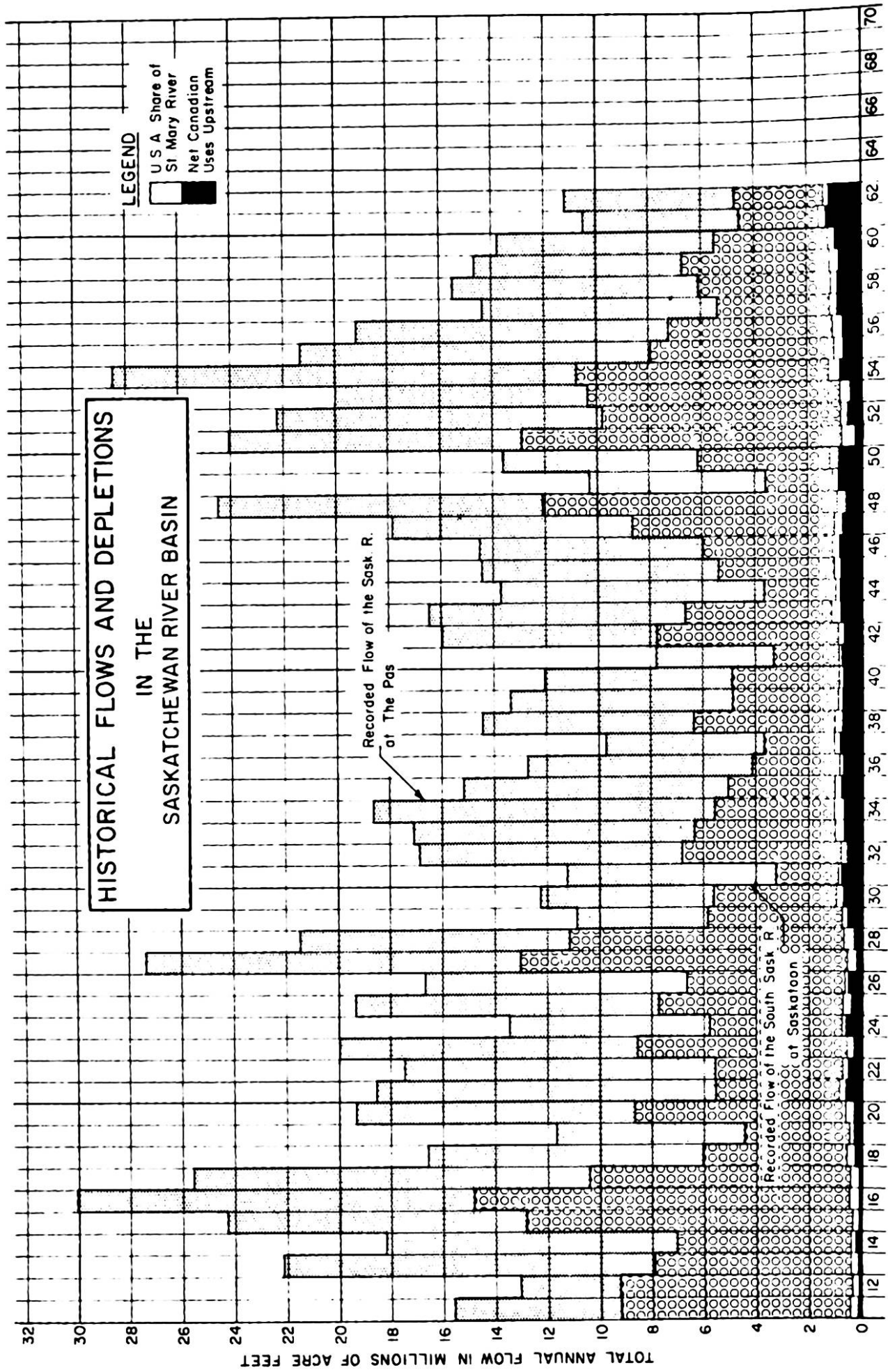
1. the Unit Runoff study which was completed in 1963 and preparation of a final report was in progress. This report should be available early in 1964;
2. a report on the November 6th Water Use Hearing. This was prepared by the Secretariat so as to preserve, for the records of the Board, the statements of the Irrigation Project Managers;
3. a brief entitled "Research Needs Relating to Estimates of Irrigation Water Use." This brief will be reviewed by the Board members early in 1964, then transmitted by the Chairman to the appropriate research bodies for consideration;
4. an estimate of streamflow depletions is kept current by the Secretariat for the Saskatchewan River System. A chart on the following page provides a graphical comparison between these depletions and the recorded flows at Saskatoon and The Pas;
5. a tabulation of "Acres Actually Irrigated" in the Alberta portion of the South Saskatchewan Basin has been prepared and may be found immediately following the flows and depletions graph. The tabulation is based primarily on material supplied by the Alberta Water Resources Branch.



M.J. Fitzgerald,
Chairman.



E.F. Durrant,
Engineering Secretary.



ACREAGE ACTUALLY IRRIGATED IN ALBERTA 1911 - 1962

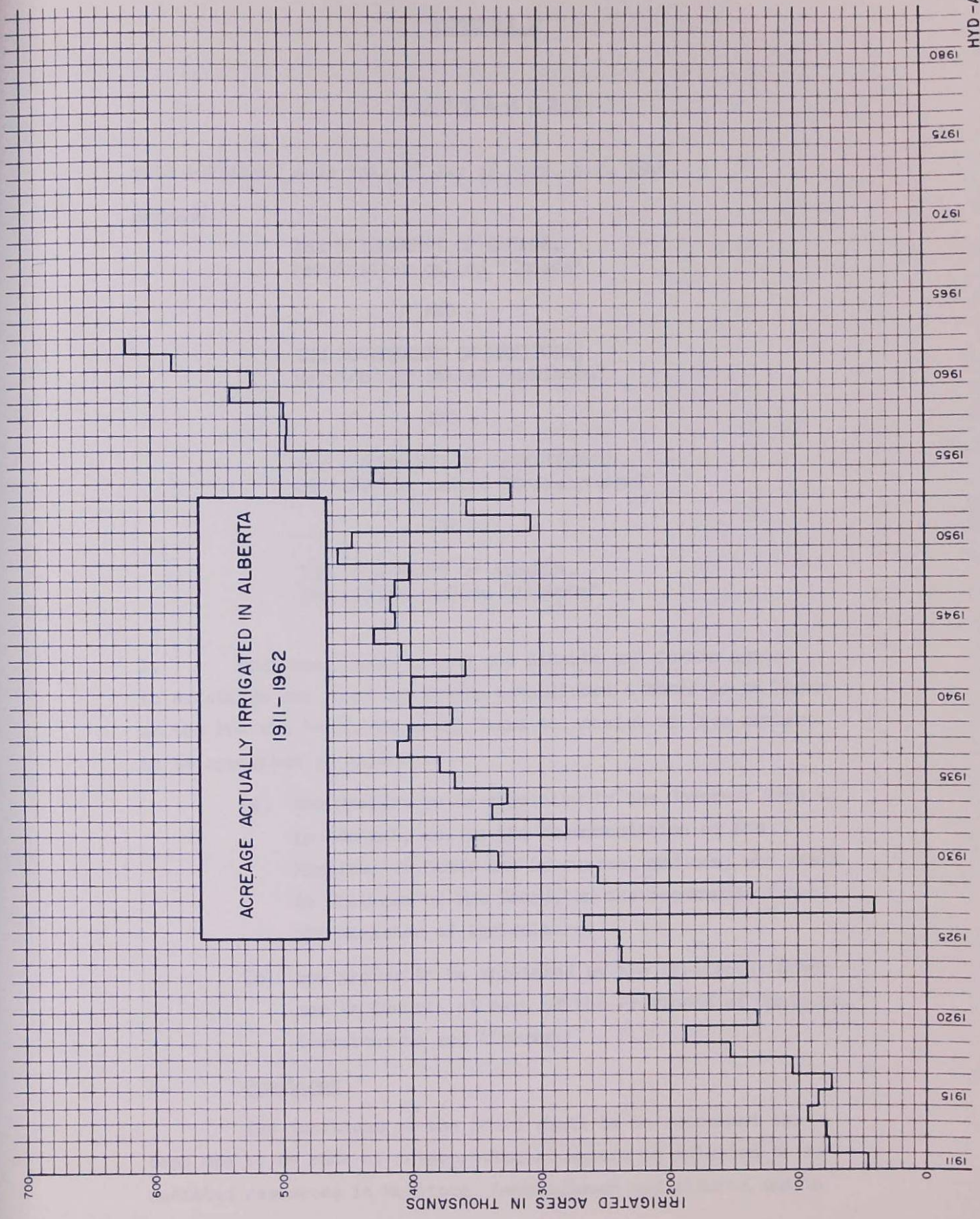
YEAR	ST. MARY	WESTERN I.D.	EASTERN I.D.	BOW RIV. DEVELOP.	L. N. I.D.	U.I.D.	M. V. I.D.	L.I.D.	A. I.D.	MACLEOD I.D.	ROSS CR. I.D.	TOTAL
1911	47,000	500										47,500
12	76,200	500										76,700
13	76,200	2,600										78,800
14	76,200	8,448	7,806									92,454
15	76,200	512	7,800									84,512
16	71,281	859	1,497									73,637
17	91,780	3,657	9,005									104,442
18	102,900	25,191	24,440									152,531
19	112,569	31,908	43,460									187,937
1920	62,893	4,083	60,762	4,240								131,978
21	85,902	33,619	88,299	9,400								217,220
22	88,680	49,752	93,375	9,509								241,316
23	75,968	3,074	42,928	11,249	6,963							140,182
24	84,751	24,297	84,200	9,720	29,991	5,264						238,223
25	94,582	5,384	72,994	13,252	43,628	10,000						239,840
26	92,782	19,561	74,401	13,467	56,395	10,026						266,632
27	22,176	1,273	7,921	810	10,012	41						42,233
28	31,924	3,892	45,677	19,361	33,436	2,576						136,866
29	46,441	37,395	78,610	29,260	61,231	3,102						256,039
1930	98,483	41,570	89,913	27,102	70,007	5,847						332,922
31	100,403	47,593	90,724	29,803	70,408	12,983	300					352,214
32	99,788	8,680	90,651	26,379	41,842	11,500	800					279,640
33	104,854	40,812	96,019	21,917	62,416	10,500	1,168					337,686
34	105,490	31,131	101,566	22,208	54,200	10,000	1,950					326,545
35	93,471	19,109	143,997	22,694	73,022	12,000	3,000					367,293
36	111,397	44,614	111,781	26,660	62,790	18,000	2,900					378,142
37	113,546	50,866	124,645	30,107	70,020	17,500	3,500					410,184
38	112,629	35,755	133,928	33,326	73,297	10,000	3,500					402,435
39	110,677	11,647	141,688	34,984	56,712	10,000	3,200					368,908
1940	115,030	20,134	138,462	37,906	76,492	10,500	3,000					401,524
41	109,148	21,144	156,501	35,312	63,575	11,000	3,300					399,980
42	103,183	9,194	166,453	32,946	31,102	12,000	3,400					358,278
43	112,142	7,666	168,496	35,143	67,777	14,000	3,254					408,478
44	112,550	20,000	167,094	37,266	75,927	13,000	3,400	526				429,763
45	112,484	20,000	167,100	38,838	57,126	13,000	3,300	1,000				412,848
46	112,734	19,000	166,326	42,457	64,894	7,453	3,300	1,300				417,464
47	110,848	20,000	168,580	43,594	57,434	7,453	3,300	1,300				412,509
48	109,571	12,000	172,200	44,160	55,374	2,970	3,700	1,500				401,475
49	107,150	26,197	180,000	44,050	72,807	21,000	3,300	1,500				456,004
1950	111,513	23,079	180,000	36,508	78,721	9,758	3,500	2,500				445,579
51	104,571	1,000 ⁽¹⁾	153,804 ⁽¹⁾	24,283	21,979	1,869	(100)	200		0	0	307,806
52	117,261	700	149,289	40,416	35,314	6,072	3,350	940		1,600	850	355,792
53	112,779	500	114,776	(40,000)	37,409	8,894	3,380	980		1,800	1,100	321,618
54	152,489	1,900	156,884	(40,000)	58,745	10,033	3,392	254		2,600	2,100	428,397
55	123,679	2,500	148,894	(40,000)	31,753	10,115	3,132	423			1,500	361,994
56	142,156 ⁽²⁾	6,000	190,976	109,400	31,588 ⁽²⁾	11,082 ⁽²⁾	2,773 ⁽²⁾	852 ⁽²⁾	0 ⁽²⁾	0	1,800 ⁽²⁾	496,627
57	161,295 ⁽²⁾	4,500	189,928	65,000 ⁽²⁾	51,805 ⁽²⁾	15,886 ⁽²⁾	2,773 ⁽²⁾	2,779 ⁽²⁾	0 ⁽²⁾	0	1,680 ⁽²⁾	495,652
58	168,794 ⁽²⁾	9,870	189,845	60,185	51,916 ⁽²⁾	11,032 ⁽²⁾	2,759 ⁽²⁾	1,542 ⁽²⁾	0 ⁽²⁾	0	(1,500) ⁽²⁾	497,443
59	241,090 ⁽²⁾	9,330	163,993	54,514	46,452 ⁽²⁾	17,761 ⁽²⁾	2,789 ⁽²⁾	1,542 ⁽²⁾	360 ⁽²⁾	0	(1,400) ⁽²⁾	539,238
1960	179,477 ⁽²⁾	12,000	167,597	71,392	71,005 ⁽²⁾	16,536	2,789 ⁽²⁾	1,542 ⁽²⁾	440 ⁽²⁾	0	405 ⁽²⁾	523,184
61	208,547 ⁽²⁾	23,200	170,413	78,260	73,637 ⁽²⁾	23,095	2,760 ⁽²⁾	1,542 ⁽²⁾	1,800 ⁽²⁾	0	200 ⁽²⁾	583,454
62	217,029	30,000	176,695	83,910	73,317	28,465	2,760	4,187	2,178	0	200	618,741
63												
64												
65												
66												
67												
68												
69												
1970												
71												
72												

NOTE Acreage figures from early Irrigation Company annual reports, except as noted below

(1) From "Report on Return Flows from Irrigation Districts in Alberta, 1951 to 1962" by Water Resources Branch, Department of Northern Affairs and National Resources, Calgary, March 7, 1963

(2) Information by letter from Alberta Water Resources Office, Edmonton.

E No records - estimated -



ACREAGE ACTUALLY IRRIGATED IN ALBERTA
1911 - 1962

APPENDIX 1A G R E E M E N T

THIS AGREEMENT made this 28 day of July, A.D. 1948.

BETWEEN:

THE GOVERNMENT OF CANADA,
hereinafter called "Canada"

- AND -

THE GOVERNMENT OF MANITOBA,
hereinafter called "Manitoba"

- AND -

THE GOVERNMENT OF SASKATCHEWAN,
hereinafter called "Saskatchewan"

- AND -

THE GOVERNMENT OF ALBERTA,
hereinafter called "Alberta"

1. Manitoba, Saskatchewan and Alberta and Canada agree to establish and there is hereby established a Board to be known as the Prairie Provinces Water Board to consist of five members to be appointed as follows:

(a) two members to be appointed by the Governor General in Council, one on the recommendation of the Minister of Mines and Resources, and one, who shall be Chairman of the Board, on the recommendation of the Minister of Agriculture:

(b) one member to be appointed by the Lieutenant Governor in Council of each of the Provinces of Manitoba, Saskatchewan and Alberta.

2. Functions

The functions of the Board shall be to recommend the best use to be made of interprovincial waters in relation to associated resources in Manitoba, Saskatchewan and Alberta and to

recommend the allocation of water as between each such province of streams flowing from one province into another province.

3. Composition of Board

The members of the Board shall be chosen from those engaged in the administration of water resources or related duties for Manitoba, Saskatchewan, Alberta or Canada, as the case may be, and shall serve as members of the Board in addition to their other duties.

4. Duties of Board

The duties of the Board shall be as follows:

- (a) to collate and analyze the data now available relating to the water and associated resources of interprovincial streams with respect to their utilization for irrigation, drainage, storage, power, industrial, municipal, navigation and other purposes;
- (b) to determine what other data are required from time to time in order to reach decisions on questions referred to it and to make recommendations to the appropriate governmental organizations concerned for the carrying out of such field surveys, power investigations, soil surveys, establishment of gauging stations, economic studies relating to drainage and flood control and all similar work which the Board considers necessary to supply information required for the proper performance of its duties;
- (c) upon the request of any one of the three Provinces or the Dominion to recommend the allocation of the waters of any interprovincial stream among the respective Provinces;
- (d) to report on any questions relating to specific projects for the utilization or control of common river or lake systems at the request of one or

more of the Ministers or authorities charged with the administration of such river or lake systems.

5. Confirmation of Board's Recommendations

A recommendation of the Board with respect to any matters referred to it under Subsection (c) and (d) of Section 4 hereof shall become effective when adopted by Orders in Council passed by Canada and by each of the Provinces affected thereby.

6. Authority of Board

The Board shall have authority to correspond with all Governmental organizations and other sources of information in Canada or abroad concerned with the administration of water resources, and such other authority as may be conferred on the Board from time to time by agreement between the parties hereto; all agencies of the four governments having to do with the water and associated resources in the area covered by the Agreement shall be required to supply the Board with all data in their possession requested by the Board.

7. Records

The records relating to the water resources of the three Provinces collected and compiled by the P.F.R.A. organization at Regina shall be made available to the Board.

8. Meetings of the Board

The Board shall meet at the call of the Chairman and meetings shall be called at least twice annually; the expenses of the members shall be borne by their respective governments.

9. Reports

The Board shall submit an annual progress report outlining work done and work contemplated in the agreed program to each of the responsible Ministers of the parties hereto and such other reports as may be requested by any one of such Ministers.

SUMMARY OF FINAL ALLOCATIONS IN THE SASKATCHEWAN RIVER BASIN

PROJECT	PROV- INCE	Irri- gable Acreage Acres	Alloca- tion Ac-ft.	Recom- mended by Water Board	Recommen- dation approved by O.I.C. from all Govern- ments
St. Mary-Milk River Project..	Alberta	465,000	796,000	6-5-49	4-7-51
Western Irrig. District.....	"	50,000	85,700	"	"
Eastern Irrig. District.....	"	281,000	562,000	"	"
Bow River Irrig. District...	"	240,000	478,534	"	"
United Irrig. District.....	"	34,000	51,000	"	"
Leth. Northern Irr. District	"	96,135	150,000	"	"
Mountain View Irr. District.	"	3,600	6,000	"	"
Leavitt Irrig. District.....	"	4,400	7,000	"	"
Aetna Irrig. District.....	"	7,300	13,000	"	"
MacLeod Irrig. District.....	"	5,000	8,000	"	"
Private Projects.....	"	70,000	80,000	"	"
Saskatoon - Municipal.....	Sask.		11,426	18-12-50	8-8-51
- Steam Plant.....	"		31,260	"	"
Caron - Moose Jaw Div.....	"		12,600	"	"
Swift Current Irr. Project..	"	21,000	55,000	"	"
<u>Small Projects</u>					
- Main Stem.....			1,500	"	"
- Swift Current Basin..			5,600	"	"
- Other Tributaries....			4,500	"	"

SUMMARY OF TENTATIVE ALLOCATIONS IN THE SASKATCHEWAN RIVER BASIN

Regina-Moose Jaw Div.....	Sask.		29,000	18-12-50	8-8-51
French Flats-Valley Park....	"	6,502	11,140	"	"
South Sask. River Project...	"	470,000	960,000	15-5-53	-53

SUMMARY OF RESERVATIONS IN GOOD STANDING IN THE SASKATCHEWAN RIVER BASIN

Red Deer (Wm. Pearce).....	Alberta	250,000	700,000	18-12-58	(Original Reservation)	EXPIRED Dec.1960
				1-12-60	(Renewed)	EXPIRED Dec.1962
				16-1-63	(Renewed)	EXPIRES Dec.1964
Small Projects.....	Alberta and Sask.		1,000,000	2-12-59	(original reservation)	EXPIRED Dec.1960
				1-12-60	(Renewed)	EXPIRED Dec.1961
				6-12-61	(Renewed)	EXPIRED Dec.1962
				16-1-63	(Renewed)	EXPIRED Dec.1963
				6-11-63	(Renewed)	EXPIRES Dec.1964

APPENDIX 2 (Cont'd)BATTLE CREEK BASIN

PROJECT	Province	Irrigable Acres	Allocation Ac.Ft.	Recommended by Water Board	Recommendation approved
<u>FINAL ALLOCATIONS</u>					
Small Projects	Sask.	-	10,946	18-12-50	8-8-51
Richardson-MacKinnon Project	Sask.	-	3,054	18-12-50	8-8-51
<u>TENTATIVE ALLOCATIONS</u>					
Small Projects	Sask.	-	2,000	18-12-50	8-8-51
Vidora Project	Sask.	2,136	3,360	18-12-50	8-8-51
Consul Project	Sask.	1,500	2,400	18-12-50	8-8-51

MIDDLE CREEK BASIN

PROJECT	Province	Irrigable Acres	Allocation Ac.Ft.	Recommended by Water Board	Recommendation approved
<u>FINAL ALLOCATIONS</u>					
Small Projects	Sask.	-	1,027	18-12-50	8-8-51
Middle Cr. Reservoir Losses	Sask.	-	2,335	18-12-50	8-8-51

LODGE CREEK BASIN

PROJECT	Province	Irrigable Acres	Allocation Ac.Ft.	Recommended by Water Board	Recommendation approved
<u>FINAL ALLOCATIONS</u>					
Small Projects	Sask.	-	600	18-12-50	8-8-51
Spangler Project	Sask.	1,322	2,970	18-12-50	8-8-51

QU'APPELLE RIVER BASIN

PROJECT	Province	Irrigable acres	Allocation Ac.Ft.	Recommended by Water Board	Recommendation approved
<u>FINAL ALLOCATIONS</u>					
Small Projects	Sask.	-	20,000	18-12-50	8-8-51

APPENDIX 3RECOMMENDATIONS ADOPTED BY THE BOARD NOVEMBER 7, 1963,
(based on the Underhill report on Irrigation Water Use)

1. A standardization in the interpretation of all terms concerned with water resources in general and irrigation in particular in the three Prairie Provinces. In this regard (the committee) recommends the establishment of a glossary of water resources' terms.
2. A standard form and method for the calculation of the amount of water required for irrigation use be established^{1/}.
3. That the Blaney-Criddle method be accepted as the basis for calculating consumptive use for the present, but that a periodic re-assessment be made of the methods available.
4. That further data was necessary for a more complete understanding of irrigation water use and to enable the water to be administered efficiently.
5. That the objective of allocation of water by provinces is consistent with the functions of the Board set out in the 1948 agreement, and that steps be taken immediately to achieve this objective.
6. That the existing network of meteorological and hydrologic stations be augmented to provide the information needed by the P.P.W.B. and the Provinces.
7. That studies be undertaken to determine the water supply requirements in natural and artificial channels for the supply of water for stock and domestic use.

^{1/} The computation form adopted by the Board is shown on page 17.

Prairie Provinces Water Board

FORM OF CALCULATIONS FOR IRRIGATION PROJECT WATER USE

1. Name of Project: _____
2. Total irrigable acreage on project _____ acres
 Irrigation Factor _____
 Effective Acreage _____
3. Plant Consumptive Use _____ acres
 (a) by measurements if available _____ inches
 (b) by Blaney-Criddle formula^{1/} _____ inches
4. Rainfall during growing season _____ inches
 Effective Rainfall (approved graph) _____ inches
5. Net Irrigation requirements (3)-(4) _____ inches
 $\frac{(3)-(4)}{12} \times \text{effective (acres)} =$ _____ Ac-ft.
6. Irrigation efficiency
 (a) by measurements if available
 (b) 60% (est.)
7. Farm delivery requirements
 = $\frac{\text{item (5)}}{\text{irrigation efficiency}}$ = _____ Ac-ft.
8. Conveyance losses
 (a) % by measurement
 (b) % by estimation _____ Ac-ft.
9. Reservoir Evaporation (Annual)
 Ac-ft. measurement
 Ac-ft. by estimate _____ Ac-ft.
10. Gross irrigation requirements _____
11. Return flow
 (a) measured %
 (b) estimated % _____ Ac-ft.
12. Net depletion (10)-(11) _____ Ac-ft.

^{1/} Assumed crop distribution to be shown.