

Alberta Irrigation Information 2004



IRRIGATION IN ALBERTA

Facts and Figures For The Year 2004



**Irrigation Branch
Irrigation Development Section**

May 2005

For more information please contact Brian Taylor, Irrigation Branch, Alberta Agriculture, Food and Rural Development, Agriculture Centre, Lethbridge, Alberta T1J 4V6. Telephone (403) 381-5542.

To print your own copies or view data, go to;

*Internet Posting: Link = www.agric.ab.ca Select : > Soil/Water/Air
> Irrigation
> Facts and Figures*

Cover photo – Oldman Dam Spillway – AAFRD

INTRODUCTION

This report is prepared by Alberta Agriculture, Food and Rural Development; Irrigation Branch. The purpose of this booklet is to provide a statistical overview of irrigation information and data relating primarily to the thirteen irrigation districts situated in southern Alberta, but also includes irrigation water use across the whole province.

LIST OF TABLES

	<u>Page No.</u>
Table I. – Details of Crops Grown Within The Thirteen Irrigation Districts	3
Table II. – Summary of Crops Grown on Assessment Roll Acres Within The Thirteen Irrigation Districts	4
Table III. – Crops Grown Within the Blood Tribe Irrigation Project (BTIP)	5
Table IV. – Alberta Potato Acreage.....	6
Table V. – Alberta Vegetable Acreage.....	6
Table VI. – On-Farm Irrigation Method Summary.....	7
Table VII. – Assessment Roll Acres Within The Thirteen Irrigation Districts	9
Table VIII. – Acres Actually Irrigated Within The Thirteen Irrigation Districts	10
Table IX. – Irrigation Districts Annual Water Rates.....	11
Table X. – Alberta Irrigation Districts Annual Irrigation Diversions	12
Table XI. – Conveyance Infrastructure By Type of Works.....	15
Table XII. – Irrigation District Infrastructure – By Length and Replacement Cost	16
Table XIII. – Irrigation District Reservoirs	18
Table XIV. – Provincially Owned and Operated Reservoirs	19
Table XV. – Hydroelectric Plants Associated With Water Distribution Works	19
Table XVI. – Private Water Licences for Irrigation in Alberta.....	20
Table XVII. – Historical Rainfall in Southern Alberta	23
Table XVIII. – Energy Type Used In The Irrigation Districts	24

LIST OF FIGURES

	<u>Page No.</u>
Figure 1. – Irrigated Crop Mix	8
Figure 2. – On-Farm Irrigation Method Mix.....	8
Figure 3. – Trend in Irrigation Growth Across Alberta	13
Figure 4. – Trend in Annual Irrigation District Diversions	13
Figure 5. – Trend in Annual Irrigation District Water Use	14
Figure 6. – Trend in Annual Irrigation District Water Use Productivity.....	14
Figure 7. – Density of Irrigation Area Relative to Infrastructure.....	17
Figure 8. – Summary of Condition Assessments.....	17
Figure 9. – Map Showing Private Irrigation in Alberta.....	21
Figure 10. – Optimum Crop Water and Net Irrigation Requirements (Lethbridge Area)	22
Figure 11. – Optimum Crop Water and Net Irrigation Requirements (Bow Island Area).....	22
Figure 12. – Optimum Crop Water and Net Irrigation Requirements (Brooks Area)	23
Figure 13. – Historical Irrigation Energy Costs	24
Figure 14. – Map Showing Irrigation Districts and Major Irrigation Works Within Southern Alberta	

Table II. SUMMARY OF CROPS GROWN ON ASSESSMENT ROLL ACRES WITHIN THE THIRTEEN IRRIGATION DISTRICTS
2004

IRRIGATION DISTRICTS														
CROPS	AID	BRID	EID	LID	LNID	MID	MVID	RCID	RID	SMRID	TID	UID	WID	TOTAL ASSESSMENT ROLL ACRES
CEREALS	887	73,157	67,501	1,246	51,042	6,625	234	0	15,731	128,621	22,860	13,060	27,622	408,586
	24.6%	33.8%	23.8%	26.2%	29.1%	36.2%	6.3%	0.0%	34.0%	34.5%	27.7%	38.3%	28.6%	
FORAGES	2,710	62,539	168,183	3,445	105,143	9,255	3,221	1,150	25,819	121,859	28,799	18,737	56,654	607,514
	75.0%	28.9%	59.3%	72.3%	59.9%	50.5%	86.8%	95.0%	55.8%	32.7%	34.9%	55.0%	58.7%	
OIL SEEDS	0	25,049	28,667	0	13,347	2,134	15	0	4,207	45,316	1,666	1,206	6,437	128,044
	0.0%	11.6%	10.1%	0.0%	7.6%	11.6%	0.4%	0.0%	9.1%	12.1%	2.0%	3.5%	6.7%	
SPECIALTY CROPS	3	41,547	18,340	0	4,757	286	0	0	497	72,424	26,482	1,042	3,777	169,155
	0.1%	19.2%	6.5%	0.0%	2.7%	1.6%	0.0%	0.0%	1.1%	19.4%	32.1%	3.1%	3.9%	
OTHER	11	14,241	934	72	1,280	20	242	60	42	4,759	2,708	48	2,045	26,462
	0.3%	6.6%	0.3%	1.5%	0.7%	0.1%	6.5%	5.0%	0.1%	1.3%	3.3%	0.1%	2.1%	
TOTAL ASSESSMENT ROLL ACRES	3,611	216,533	283,625	4,763	175,569	18,320	3,712	1,210	46,296	372,979	82,515	34,093	96,535	1,339,761

PREPARED BY: ALBERTA AGRICULTURE, FOOD AND RURAL DEVELOPMENT, IRRIGATION BRANCH, LETHBRIDGE

**Table III. CROPS GROWN WITHIN THE BLOOD TRIBE
IRRIGATION PROJECT (BTIP)
2004**

CROP TYPE		B.T.I.P.	
		licensed and covered by an irrigation system	
		Irrigated this year	Not developed or irrigated
CEREALS	Barley	7,870	2,855
	CPS Wheat	194	92
	Durum	1,649	650
	Grain Corn		
	Hard Spring Wheat	631	329
	Malt Barley		
	Oats		
	Rye		
	Soft Wheat		
	Winter Wheat		
FORAGES	Alfalfa - Two cuts	504	126
	Alfalfa - Three cuts		
	Alfalfa Hay		
	Alfalfa Silage		
	Barley Silage		
	Barley Silage (underseeded)		
	Brome Hay		
	Corn Silage		
	Grass Hay		
	Green Feed		
	Milk Vetch		
	Native Pasture		
	Oats Silage		
	Sorghum/Sudan Grass		
	Tame Pasture	6,002	1,331
	Timothy Hay		
Tritcale Silage			
OIL SEEDS	Canola	1,266	395
	Flax		
	Hyola		
	Linola		
	Mustard		
SPECIALTY CROPS	Alfalfa Seed		
	Canary Seed		
	Caraway Seed		
	Carrots		
	Chick Peas	264	51
	Dill		
	Dry Beans		
	Dry Peas		
	Faba Beans		
	Fresh Corn (sweet)		
	Fresh Peas		
	Grass Seed		
	Hemp		
	Lawn Turf		
	Lentils		
	Market Gardens		
	Mint		
	Monarda		
	Nursery		
	Onions		
	Potatoes		
	Safflower		
Seed Potatoes			
Small Fruit			
Sugar Beets			
Sunflower			
OTHER	Miscellaneous		
	Non Crop		
	Summer Fallow		
	Unknown (not reported)		
Total Development		18,380	5,829
Total Licenced Acres		24,209	

Table IV. Alberta Potato Acreage

(seeded acres)

Year	Process	Seed	Table	Total
1990	15,383	5,117	7,882	28,382
91	12,300	5,735	6,509	24,544
92	9,700	5,515	6,970	22,185
93	13,115	5,850	6,115	25,080
94	13,210	7,390	6,075	26,675
1995	13,450	7,400	5,765	26,615
96	13,870	8,485	5,085	27,440
97	12,225	9,430	5,025	26,680
98	12,800	10,250	5,100	28,150
99	24,616	10,886	4,698	40,200
2000	32,563	12,037	4,331	48,931
01	34,877	12,595	3,883	51,355
02	37,296	14,644	3,241	55,181
03	40,960	13,690	4,125	58,775
04	38,077	11,062	3,508	52,647

Notes: - data is obtained from the Potato Growers of Alberta
- the above acreage is from the whole province of Alberta, but does not include the potato acreage from market gardens of less than 5 acres
- typically, the processed and the table potatoes are irrigated

Table V. Alberta Vegetable Acreage

(seeded acres)

Year	Carrots	Corn	Peas
1995	62	3,884	3,163
96	58	3,869	2,775
97	95	3,044	3,125
98	100	2,818	2,983
99	65	2,442	2,646
2000	79	2,577	2,563
01	90	3,992	3,967
02	145	3,712	4,053
03	87	4,329	4,534
04	0	3,365	4,534

Notes: - data is obtained from the Alberta Vegetable Growers (Processing)
- processing is defined as canned or frozen vegetables for human consumption
- all acres are irrigated

Table VI. ON-FARM IRRIGATION METHOD SUMMARY
 Alberta Irrigation Districts - 2004
 (acres covered by an irrigation system)

IRRIGATION METHOD	AID	BRID	EID	LID	LNID	MID	MVID	RCID	RID	SMRID	TID	UID	WID	Individual Method Total	Total Acres Covered	
PIVOT SPRINKLER	Pivot High Pressure	374	66,960	38,739	822	3,441		40	10,555	10,585	14,240	6,897	29,162	190,395		
	Pivot High Pressure - Corner Arm		5,403	3,188	4,575				567	1,451	2,320		100	17,604		
	Pivot Medium Pressure			3,868	506					2,977				7,351		
	Pivot Medium Pressure - Corner Arm									154				154	786,191	
	Pivot Low Pressure		50,580	86,385	29,917	4,089			5,136	219,932	28,850	3,938		20,646	449,473	
	Pivot Low Pressure - Corner Arm		9,238	5,936	53,204				965	37,091	9,208	141		297	116,080	
	Linear - High Pressure				873				100	130	130	110			1,213	
	Linear - Low Pressure	15.6%	130	1,958	17.3%	131	41.1%	0.0%	139	1,174	1,174	389			3,921	
	percent of total -----			49.4%		60.6%			38.6%		75.9%	68.5%			61.4%	61.4%
	percent of total -----															
WHEEL MOVE	Wheel Move - Two Laterals	998	19,168	34,406	832	6,637	118		19,298	59,705	18,018	3,039	12,894	198,895		
	Wheel Move - Four Laterals		20,076	14,344	424	225			3,374	10,836	3,813	346	2,518	91,363	290,258	
	percent of total -----	42.3%	19.3%	17.2%	26.4%	37.5%	3.4%	0.0%	50.1%	19.6%	27.1%	15.7%	16.2%	22.7%	22.7%	
	percent of total -----															
GRAVITY	Gravity - Developed - No Control		7,450	61,460	135	3,689		547	1,357	449	594	93		76,113		
	Gravity - Developed - Controlled		16,788	16,329	175	1,215		568	1,587	1,107	1,382	2,253	240	41,644		
	Gravity - Undeveloped - Flood	501	6,822	16,021	2,091	1,272			1,235	12,601	1,350	4,741	25,841	75,867	193,873	
	Gravity - Undeveloped - Subsurface								70	4			120	249		
	percent of total -----	21.2%	15.3%	33.1%	50.4%	1.8%	20.2%	96.6%	9.4%	3.9%	4.1%	32.9%	27.5%	15.1%	15.1%	
OTHER	Volume Gun - Stationary									143	10		175	328		
	Volume Gun - Traveller		35	318	143					202	46		1,134	1,878		
	Solid Set (underground sprinkler)			8	516				95	254			247	1,120		
	Hand Move (sprinkler above ground)	488	323	682	284	841	219		739	1,512	116	96	1,044	6,344	10,715	
	Micro - Spray - Sprinkler				40				42	28	15		83	208		
	Micro - Drip - Trickle								7	115			715	837		
	Other Application Use													0		
percent of total -----	20.7%	0.2%	0.4%	6.0%	1.0%	1.2%	0.0%	0.0%	2.0%	0.6%	0.2%	0.4%	3.6%	0.6%	0.8%	

PREPARED BY: ALBERTA AGRICULTURE, FOOD AND RURAL DEVELOPMENT, IRRIGATION BRANCH, LETHBRIDGE

Figure 1. IRRIGATED CROP MIX

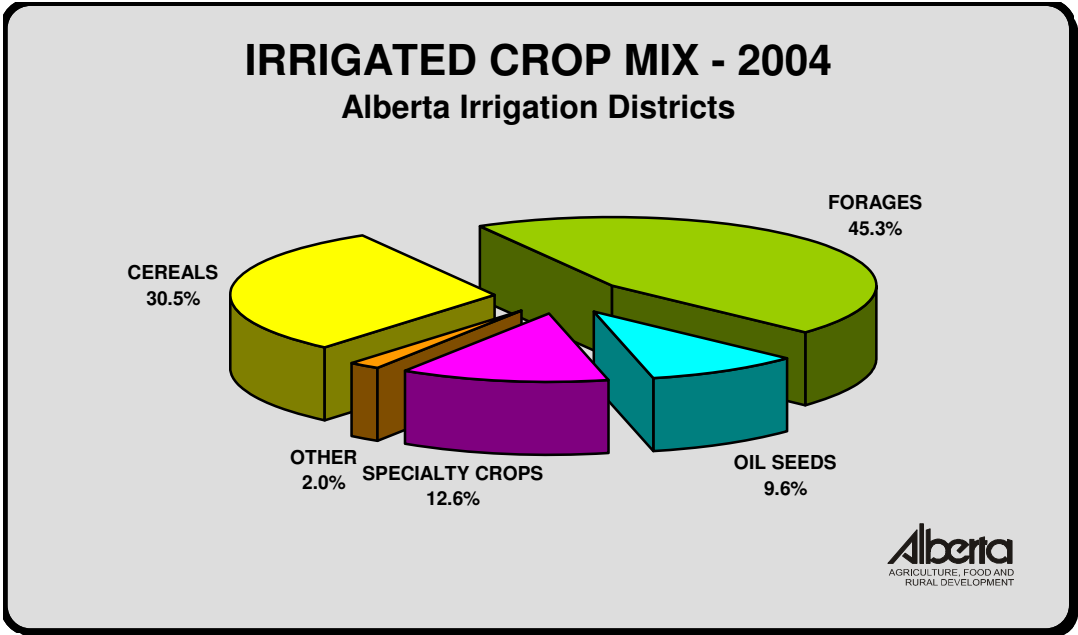


Figure 2. ON-FARM IRRIGATION METHOD MIX

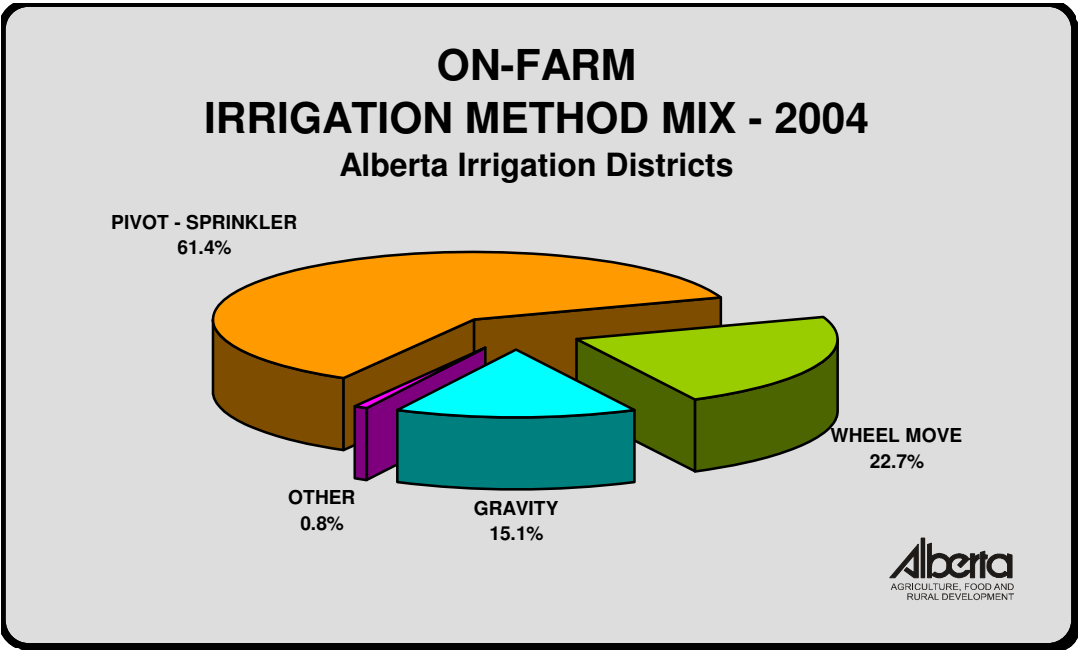


Table VII. ASSESSMENT ROLL ACRES WITHIN THE THIRTEEN IRRIGATION DISTRICTS

YEAR	AID	BRID	EID	LID	LNID	MID	MVID	RCID	RID	SMRID	TID	UID	WID	TOTAL
1970	6,673	23,783	199,729	4,523	89,360	8,506	3,719	2,068	20,847	197,540	57,484	33,353	44,006	691,591
71	6,548	24,071	200,459	4,343	89,883	8,105	3,719	2,068	20,349	199,572	59,172	33,353	43,949	695,591
72	3,131	24,196	202,225	4,305	89,379	9,042	3,719	2,068	20,269	204,051	59,833	33,353	43,899	699,470
73	3,081	26,756	205,481	4,305	98,206	9,182	3,719	2,068	20,647	216,136	61,692	33,353	43,919	728,545
74	3,081	118,741	207,245	4,421	105,958	9,077	3,717	2,068	23,257	237,244	63,823	34,034	44,219	856,885
1975	3,081	131,764	212,982	4,430	108,106	8,871	3,720	2,068	26,920	252,019	62,692	33,358	45,311	895,322
76	3,081	139,665	219,405	4,430	109,629	9,069	3,720	2,069	28,350	262,231	66,423	33,358	52,190	933,620
77	3,081	147,795	224,967	4,430	111,735	9,480	3,720	1,319	31,626	274,301	68,178	33,617	68,549	982,798
78	3,104	153,120	227,202	4,431	111,947	10,737	3,717	1,776	31,570	284,151	68,815	33,651	71,603	1,005,824
79	3,104	150,160	227,254	4,477	111,924	10,797	3,710	1,776	31,524	287,329	69,828	33,546	74,525	1,009,954
1980	3,104	164,889	229,110	4,477	112,562	10,797	3,710	1,776	33,681	293,126	70,368	33,544	76,029	1,037,173
81	3,096	174,641	230,553	4,457	113,845	10,963	3,710	1,776	35,385	299,548	70,819	33,417	79,633	1,061,843
82	3,127	179,613	239,651	4,423	114,919	11,647	3,710	1,716	39,130	301,446	71,529	33,383	81,864	1,086,158
83	2,916	181,174	244,099	4,440	116,745	12,357	3,710	1,776	39,148	313,728	72,623	33,448	81,480	1,107,644
84	3,051	183,529	244,243	4,440	117,869	13,047	3,710	1,776	41,729	319,712	72,971	33,534	82,974	1,122,585
1985	3,399	185,034	246,658	4,460	118,883	14,218	3,710	1,319	44,990	328,063	73,063	33,854	84,245	1,141,896
86	3,444	189,202	247,804	4,460	126,307	14,579	3,690	1,210	44,950	331,493	73,314	34,336	83,924	1,158,713
87	3,444	190,263	249,372	4,479	128,867	14,885	3,690	1,210	44,407	334,285	73,654	34,450	85,405	1,168,411
88	3,435	192,424	252,432	4,709	131,565	15,030	3,690	1,210	44,196	339,091	73,602	34,615	86,198	1,182,197
89	3,500	194,977	256,353	4,729	133,620	15,569	3,700	1,210	44,144	342,451	74,898	34,818	87,242	1,197,211
1990	3,500	199,980	260,523	4,742	135,632	15,099	3,728	1,210	44,044	349,849	74,568	34,769	88,480	1,216,124
91	3,527	201,070	263,889	4,762	137,719	16,665	3,728	1,210	44,305	350,108	77,740	34,687	88,112	1,227,522
92	3,519	202,499	269,462	4,800	139,688	16,391	3,734	1,210	44,279	351,393	78,177	34,868	87,949	1,237,969
93	3,519	204,466	270,008	4,780	138,095	16,775	3,737	1,210	44,229	353,039	78,412	34,772	87,453	1,240,495
94	3,519	205,983	272,024	4,780	141,517	16,785	3,727	1,210	44,219	353,466	78,629	34,438	86,725	1,247,022
1995	3,519	207,652	273,848	4,780	143,608	17,908	3,727	1,210	43,678	356,618	78,676	34,428	86,942	1,256,594
96	3,519	209,560	276,405	4,760	147,241	18,169	3,727	1,210	44,315	358,399	79,069	34,506	87,258	1,268,138
97	3,519	209,686	279,966	4,760	150,843	18,300	3,713	1,210	44,810	360,659	79,788	34,353	86,284	1,277,891
98	3,519	210,690	280,573	4,769	153,365	18,300	3,722	1,210	45,533	360,780	80,455	34,352	86,771	1,284,039
99	3,609	211,152	281,107	4,769	154,886	18,300	3,722	1,210	45,751	367,161	81,984	34,352	88,131	1,296,134
2000	3,609	210,352	281,720	4,763	157,825	18,300	3,722	1,210	45,888	369,771	82,257	34,329	87,236	1,300,982
01	3,611	209,927	281,710	4,763	163,878	18,300	3,712	1,210	46,235	370,925	82,261	34,329	87,924	1,308,785
02	3,611	214,279	282,516	4,763	163,870	18,300	3,712	1,210	46,304	371,319	82,284	34,423	96,512	1,323,103
03	3,611	214,585	282,961	4,763	164,288	18,320	3,712	1,210	46,304	372,114	82,562	34,423	96,646	1,325,499
04	3,611	216,533	283,625	4,763	175,568	18,320	3,712	1,210	46,296	372,979	82,515	34,093	96,535	1,339,760

PREPARED BY: ALBERTA AGRICULTURE, FOOD AND RURAL DEVELOPMENT, IRRIGATION BRANCH, LETHBRIDGE

Notes: - BRID increased 94,000 acres in 1974 with the amalgamation of the BRID and the Bow River Project (Federal).
 - Assessment roll acres include "irrigation", "terminable" and "annual" acres. Only "irrigation" and "terminable" acres are considered in district expansion limits.

Table IX. IRRIGATION DISTRICTS ANNUAL WATER RATES
(\$ per assessed acre per year)

YEAR	AID	BRID	EID	LID	LNID	MID	MVID	RCID	RID	SMRID	TID	UID	WID
1982	\$2.50	\$6.50	\$6.50	\$5.00	\$12.00	\$6.00	\$3.00	\$3.00	\$6.25	\$12.00	\$10.75	\$3.25	\$6.30
83	\$5.00	\$9.00	\$6.75	\$8.00	\$12.50	\$6.00	\$5.20	\$3.00	\$6.50	\$12.00	\$11.00	\$3.25	\$6.50
84	\$6.00	\$10.00	\$7.00	\$8.00	\$12.50	\$6.00	\$5.20	\$3.00	\$6.50	\$12.00	\$11.00	\$3.25	\$6.75
1985	\$6.00	\$10.00	\$7.00	\$7.50	\$12.50	\$6.00	\$5.20	\$4.00	\$6.50	\$12.00	\$11.00	\$3.25	\$7.25
86	\$6.00	\$10.00	\$7.25	\$7.50	\$12.50	\$6.00	\$5.20	\$6.00	\$6.50	\$13.00	\$11.00	\$3.25	\$7.47
87	\$6.00	\$10.00	\$7.50	\$7.50 + pipeline surcharge	\$12.50 + pressure surcharge	\$6.00	\$5.20	\$6.00	\$6.50	\$13.00	\$11.00	\$3.25	\$7.47
88	\$7.00 + pipeline surcharge	\$10.00	\$7.50	\$8.00 + pipeline surcharge	\$12.50 + pressure surcharge	\$6.00	\$5.20	\$6.00	\$6.50	\$13.00	\$12.00	\$3.25	\$7.70
89	\$7.00 + pipeline surcharge	\$10.00	\$8.00	\$8.00 + pipeline surcharge	\$13.50 + pressure surcharge	\$6.00	\$6.20	\$6.00	\$6.50	\$13.25	\$12.00	\$3.50	\$8.00
1990	\$8.00 + pipeline surcharge	\$10.00	\$8.50	\$8.00 + pipeline surcharge	\$13.50 + pressure surcharge	\$6.00	\$6.20	\$6.00	\$6.50	\$14.00	\$12.00	\$3.75	\$11.00
91	\$8.00 + pipeline surcharge	\$10.00	\$8.50	\$7.00 + pipeline surcharge	\$13.50 + pressure surcharge	\$6.00 + pressure surcharge	\$6.20	\$6.00	\$6.50	\$14.00	\$12.00	\$4.00	\$13.00
92	\$8.00 + pipeline surcharge	\$11.00	\$8.50	\$7.00 + pipeline surcharge	\$14.00 + pressure surcharge	\$6.00 + pressure surcharge	\$6.20	\$6.00	\$6.50	\$14.00	\$12.00	\$4.25	\$13.50
93	\$8.00 + pipeline surcharge	\$11.00	\$8.50	\$7.00 + pipeline surcharge	\$14.00 + pressure surcharge	\$6.00 + pressure surcharge	\$6.20	\$6.00	\$6.50	\$14.25	\$12.00	\$4.50	\$13.50 + pressure surcharge
94	\$8.00 + pipeline surcharge	\$12.00	\$8.50	\$7.00 + pipeline surcharge	\$14.00 + pressure surcharge	\$6.50 + pressure surcharge	\$6.20	\$6.00	\$7.00	\$15.25	\$12.00	\$4.50	\$14.75 + pressure surcharge
1995	\$8.00 + pipeline surcharge	\$13.00	\$8.50	\$8.00 + pipeline surcharge	\$14.00 + pressure surcharge	\$7.00 + pressure surcharge	\$8.00	\$6.50	\$7.00	\$16.15	\$12.00	\$4.50	\$14.75 + pressure surcharge
96	\$8.00 + pipeline surcharge	\$13.00	\$8.50	\$8.00 + pipeline surcharge	\$14.00 + pressure surcharge	\$7.00 + pressure surcharge	\$8.00	\$8.50	\$7.50	\$16.15	\$12.00	\$6.50	\$15.25 + pressure surcharge
97	\$8.00 + pipeline surcharge	\$13.00	\$7.50	\$8.00 + pipeline surcharge	\$14.00 + pressure surcharge	\$7.00 + pressure surcharge	\$8.00	\$8.50	\$7.50	\$16.15	\$12.00	\$6.75	\$15.25 + pressure surcharge
98	\$8.00 + pipeline surcharge	\$13.50	\$7.50	\$8.00 + pipeline surcharge	\$14.00 + pressure surcharge	\$7.50 + pressure surcharge	\$8.00	\$8.50	\$8.50	\$16.65	\$12.00	\$7.00	\$16.25 + pressure surcharge
99	\$8.00 + pipeline surcharge	\$14.50	\$7.50	\$8.00 + pipeline surcharge	\$14.00 + pressure surcharge	\$7.50 + pressure surcharge	\$8.00	\$8.50	\$8.50	\$17.00	\$12.00	\$7.25	\$16.25 + pressure surcharge
2000	\$8.00 + pipeline surcharge	\$14.50	\$7.50	\$8.00 + pipeline surcharge	\$14.00 + pressure surcharge	\$7.50 + pressure surcharge	\$8.00	\$8.50	\$8.50	\$17.50	\$12.00	\$7.50	\$16.25 + pressure surcharge
01	\$8.00 + pipeline surcharge	\$14.50	\$7.50	\$8.00 + pipeline surcharge	\$14.00 + pressure surcharge	\$7.50 + pressure surcharge	\$8.00	\$8.50	\$8.50	\$17.90	\$11.00	\$7.50	\$16.25 + pressure surcharge
02	\$8.00 + pipeline surcharge	\$14.50	\$7.50	\$8.00 + pipeline surcharge	\$14.00 + pressure surcharge	\$7.50 + pressure surcharge	\$8.00	\$6.00	\$8.50	\$16.90	\$11.00	\$7.75	\$16.25 + pressure surcharge
03	\$9.00 + pipeline surcharge	\$15.00	\$7.50**	\$10.00 + pipeline surcharge	\$14.00 + pressure surcharge	\$8.00 + pressure surcharge	\$8.00	\$13.58	\$8.50	\$17.90	\$11.00	\$8.25	\$16.25 + pressure surcharge
04	\$9.00 + pipeline surcharge *	\$14.50*	\$7.50	\$11.00 + pipeline surcharge *	\$14.00 + pressure surcharge *	\$8.00 + pressure surcharge *	\$8.00	\$13.58	\$9.50	\$17.90	\$11.00	\$8.25	\$16.25 + pressure surcharge *

Note: * The districts charge an additional levy for acres serviced by a pressure pipeline.

- AID - \$2.00 per acre for pipeline delivery in township 2
- \$3.00 per acre for pipeline delivery in township 3
- BRID - \$0.60 per acre for every inch of water applied over 24" up to a maximum of 30"
- LID - \$3.00 per acre for pipeline delivery
- LNID - \$0.12 per psi for pressure up to and including 40 psi
- \$0.25 per psi for pressure above 40 psi
- MID - \$1.00 per 10 psi for pressure
- WID - \$0.26 per psi for pressure

** The Eastern Irrigation District waived the irrigation rate for irrigated acres in 2003 in recognition of the local BSE related agricultural economic impacts.

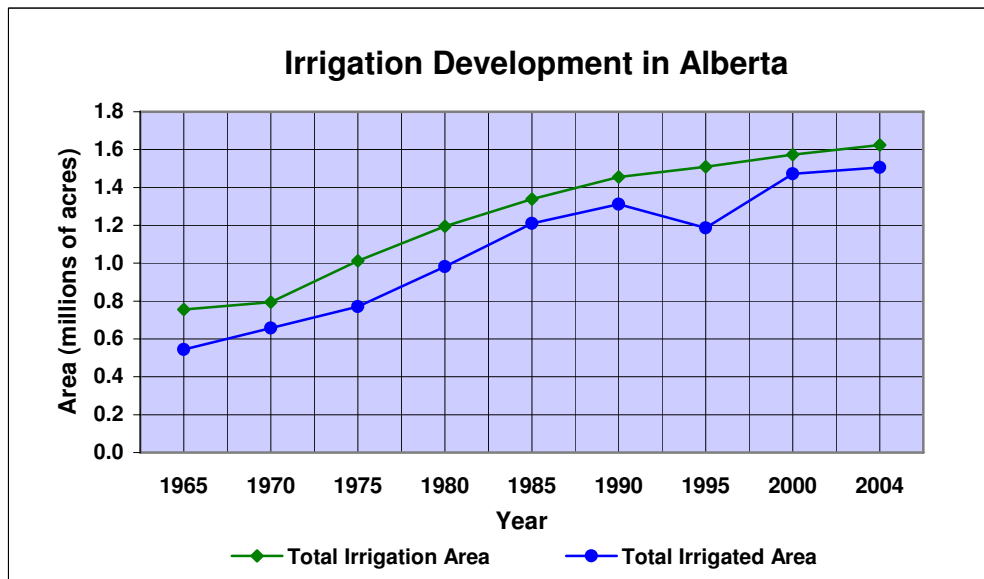
Table X. ALBERTA IRRIGATION DISTRICTS ANNUAL IRRIGATION DIVERSIONS
2004

OLDMAN RIVER BASIN												BOW RIVER BASIN				
DISTRICT	AID	LID	LNID	MID	MVID	RCID	RID	SMRID	TID	UID	BRID	EID	WID	TOTALS		
WATER SOURCE	diversion from Belly River	diversion from Belly River	diversion from Oldman River	diversion from SMRID main canal	diversion from Belly River	diversion from Gros Ventre Ck. and Ross Ck.	diversion from SMRID main canal	diversion from Belly, Waterton and St. Mary Rivers	diversion from SMRID main canal	diversion from Waterton Rivers	diversion from Bow River	diversion from Bow River	diversion from Bow River			
EXPANSION LIMITS (acres)	3,560	4,770	177,000	18,300	4,240	1,210	46,500	372,000	82,200	34,400	232,000	311,000	95,000	1,362,180		
WATER LICENCE ALLOCATION (acres ft.)	9,000	12,000	317,000	34,000	8,000	3,000	81,000	722,000	158,000	66,210	450,000	762,000	160,400	2,782,610		
VOLUME OF WATER DIVERTED (acres ft.)																
YEAR																
1976			154,844	7,600		1,981	36,414	339,188	86,330	14,998	309,000	555,100	153,222	1,666,677		
77			169,436	14,300		2	48,317	423,509	122,209	31,050	304,600	572,100	137,008	1,625,531		
78			85,934	3,900		2,489	12,848	202,066	35,303	10,620	387,100	397,100	102,989	1,047,487		
79			138,630	9,500		5,561	24,521	303,097	94,796	23,517	262,593	542,846	138,630	1,543,631		
1980			134,576	8,100		0	19,944	340,254	94,558	17,754	287,892	546,686	136,188	1,586,282		
81			132,955	5,910		264	22,162	379,075	108,427	12,242	307,452	577,969	108,630	1,655,086		
82			142,683	9,404		3,551	27,697	332,337	91,998	19,133	281,000	481,258	129,712	1,516,773		
83			150,790	9,800		1,354	14,955	361,537	97,674	24,078	313,897	580,299	146,737	1,701,121		
84			177,543	14,106		67	17,544	492,674	101,643	25,093	322,335	657,640	162,140	1,970,785		
1985			184,029	13,457		3,827	27,302	425,563	95,751	24,193	337,409	655,188	158,897	1,943,406		
86			182,408	13,515		3,212	22,045	406,536	101,597	20,106	309,560	680,592	131,333	1,863,688		
87			181,597	11,761		3,180	20,459	426,434	98,621	19,958	275,841	639,928	129,712	1,783,948		
88			222,943	23,414		6,066	55,411	563,621	121,668	30,462	389,186	730,274	171,868	2,331,477		
89			198,622	10,795		2,750	34,540	504,255	78,396	18,372	301,442	605,148	122,416	1,884,988		
1990			192,136	16,196		2,980	32,000	467,244	96,572	16,133	380,307	669,178	128,091	2,033,127		
91			184,840	16,521		2,662	30,702	391,634	94,956	17,003	334,792	629,872	147,547	1,860,328		
92			137,008	12,261		1,775	32,070	396,878	101,122	18,628	336,650	625,650	135,387	1,856,253		
93			61,775	5,792		3,300	13,574	218,375	59,278	8,107	210,340	423,551	114,309	1,123,339		
94			180,000	8,073		758	13,574	415,162	103,028	16,827	364,126	559,476	132,104	1,819,636		
1995			110,200	2,180		208	17,600	385,290	79,818	7,710	302,305	602,098	116,254	1,627,874		
96			209,600	15,539		2,660	45,527	488,483	127,436	19,832	328,182	615,478	117,065	1,989,814		
97			193,574	7,337		1,529	38,043	466,000	115,582	20,364	343,428	572,151	116,740	1,887,752		
98			160,800	13,514		2,323	33,834	424,700	116,300	14,895	303,565	638,500	142,367	1,862,729		
99			179,987	20,800		2,499	42,960	411,532	105,208	20,900	298,524	426,788	88,410	1,614,208		
2000			245,976	30,160		6,700	58,202	540,200	140,046	37,200	417,897	675,000	156,400	2,325,021		
01			275,475	17,109		6,814	40,207	461,200	94,770	27,528	413,780	685,000	160,000	2,193,426		
02			109,704	11,940		3,033	23,552	543,600	53,324	21,283	333,541	562,000	149,577	1,824,327		
03			187,518	18,020		5,889	49,723	466,800	86,500	32,500	279,788	459,700	128,700	1,727,710		
04			159,286	12,475		2,660	28,224	460,200	64,399	21,600	230,817	417,370	114,195	1,520,091		
Percent of Licence (2004)	38.2%	45.2%	50.2%	36.7%	33.3%	0.0%	34.8%	63.7%	40.8%	32.6%	51.3%	54.8%	71.2%	54.6%		
Avg. Volume	4,095	6,575	167,064	12,534	3,440	1,215	31,683	416,977	95,802	20,417	313,289	579,515	133,676	1,785,983		

PREPARED BY: ALBERTA AGRICULTURE, FOOD AND RURAL DEVELOPMENT, IRRIGATION BRANCH

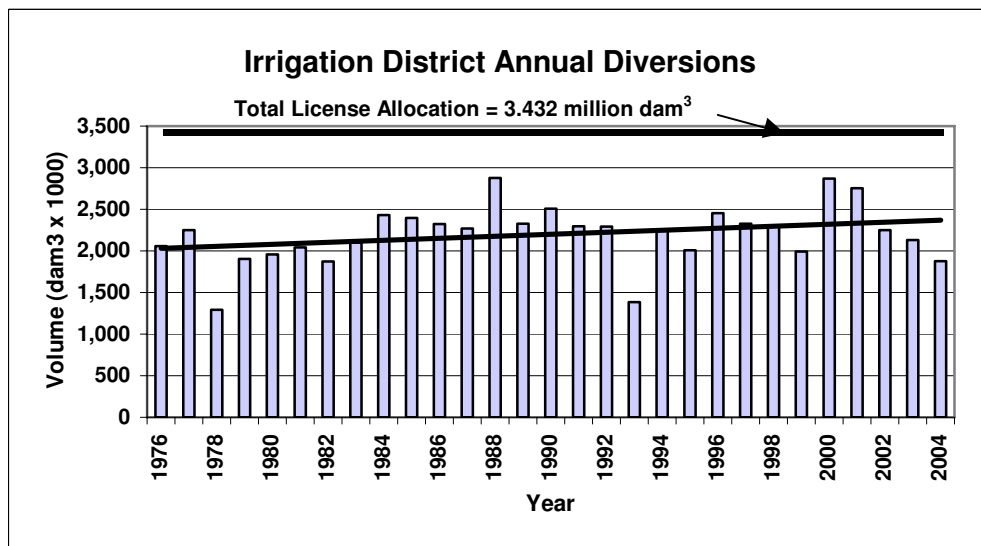
Notes: - Data is obtained from Water Survey of Canada (WSC), Alberta Environment and Irrigation Districts' annual reports.
- RCID has a second supply from Ross Creek, but data has not been consistently recorded at that location.
- Diversion data is the gross diversion into and through the works of the districts and include volumes used directly for irrigation purposes, reservoir filling and the water supplied or licensed to municipal, domestic, other agricultural, industrial and environmental uses.
- UID licence amended in 2004, re-allocating 1300 acre-feet of diversion authority to the Southeast Alberta Water Cooperative.

Figure 3. TREND IN IRRIGATION GROWTH ACROSS ALBERTA



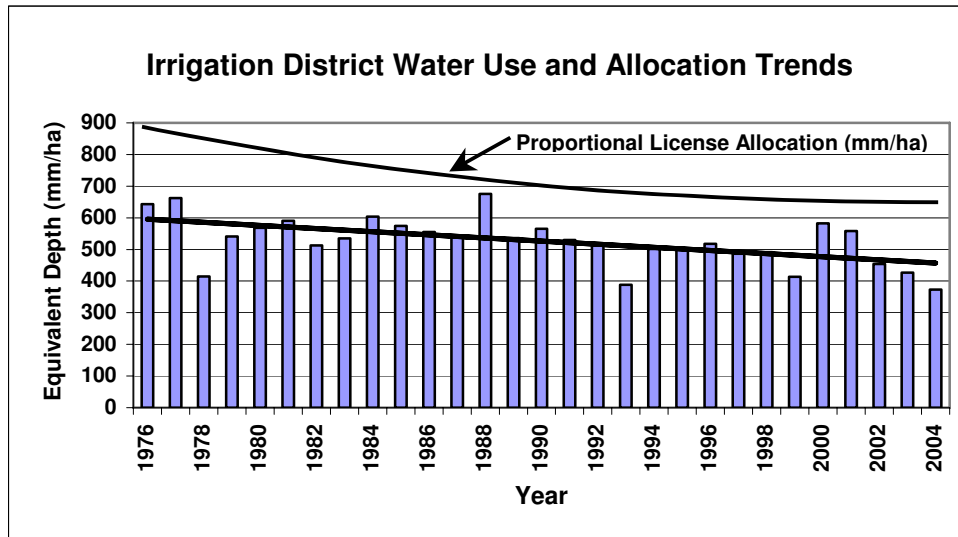
Note: The ratio of the actual irrigated area vs. the authorized or assessed irrigation area is referred to as the "Utilization Factor". During the course of the past 30 to 40 years, this ratio, weighted for all irrigated areas, has increased from a little over 70%, in a given year, to approximately 93%.

Figure 4. TREND IN ANNUAL IRRIGATION DISTRICT DIVERSIONS



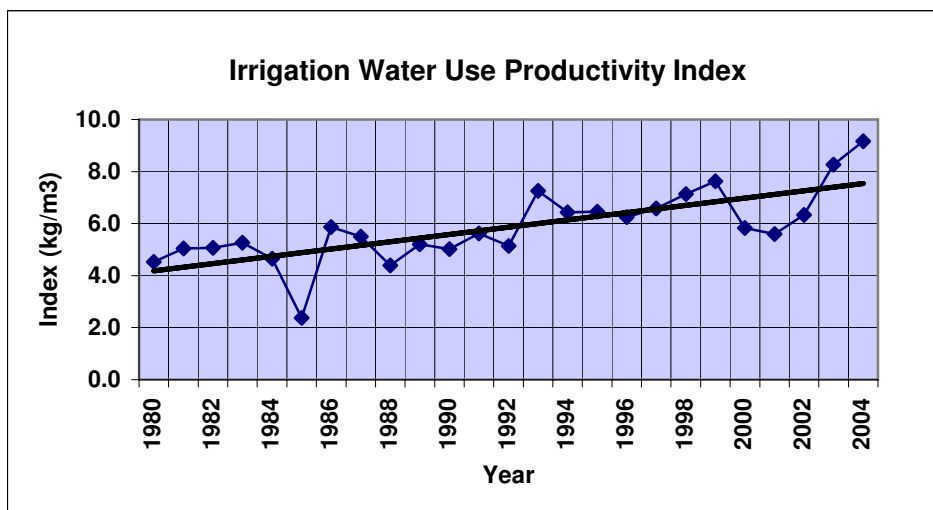
Note: The annual gross diversion volumes indicated represent the gross volume of water diverted into the works of all 13 irrigation districts and includes, in addition to the volume of water actually distributed for irrigation purposes, those volumes which may have accrued as net gains in reservoir storage within the districts as well as those volumes diverted through the works of the districts for other uses such as domestic, municipal, other agricultural, industrial, recreational and habitat enhancement purposes.

Figure 5. TREND IN ANNUAL IRRIGATION DISTRICT WATER USE



Note: The amount of annual gross diversion of water into the works of all 13 irrigation districts, divided by the total number of hectares actually irrigated in respective years, represents a measurement of irrigation water use. However, this “depth” also includes that water which may have accrued as net gains in reservoir storage within the districts as well as those volumes diverted through the works of the districts for other uses such as domestic, municipal, other agricultural, industrial, recreational and habitat enhancement purposes. The “Proportional Licence Allocation” represents the equivalent depth of the total licensed water volumes over all district assessed irrigation areas. The change through time is a reflection of the historical growth in irrigation area.

Figure 6. TREND IN IRRIGATION DISTRICT WATER USE PRODUCTIVITY



Note: Commodity yield per unit area divided by the volume of irrigation water diverted per unit area provides a measure of productive output per unit of irrigation water used. The historical yields of sugar beets (as recorded by the Alberta Sugar Beet Growers Marketing Board), the historical yields of potatoes (as compiled by the Potato Growers of Alberta) and the historical yields of soft white spring wheat (as provided by the Alberta Soft Wheat Growers) are tallied and then divided by the respective annual gross water use values of the 13 irrigation districts to derive a “Productivity Index”.

Table XI. CONVEYANCE INFRASTRUCTURE BY TYPE OF WORKS
Rehabilitated and Un-rehabilitated - 2004

Irrigation District	REHABILITATED												UN-REHABILITATED		Total Conveyance Works (km)
	Membrane-Lined Canals		Pipelines - Closed		Pipelines - Open		Concrete - Lined		Earth Canals		Un-Rehabilitated Canals		Length (km)	% of District Works	
	Length (km)	% of District Works	Length (km)	% of District Works	Length (km)	% of District Works	Length (km)	% of District Works	Length (km)	% of District Works	Length (km)	% of District Works			
AID	2.3	6.6%	15.7	45.1%	0.0	0.0%	0.0	0.0%	0.7	2.0%	16.1	46.3%			35
BRID	183.4	17.2%	263.4	24.7%	17.3	1.6%	37.6	3.5%	212.4	19.9%	351.6	33.0%			1066
EID	274.9	14.3%	636.9	33.2%	40.0	2.1%	0.0	0.0%	231.2	12.1%	733.4	38.3%			1916
LID	2.0	3.6%	25.2	45.1%	0.4	0.7%	0.0	0.0%	12.7	22.7%	15.6	27.9%			56
LNID	53.2	7.1%	289.1	38.8%	18.3	2.5%	52.7	7.1%	72.3	9.7%	260.1	34.9%			746
MID	1.2	1.2%	48.0	47.9%	1.1	1.1%	0.4	0.4%	36.0	35.9%	13.6	13.6%			100
MVID	0.0	0.0%	9.8	25.5%	1.8	4.7%	0.0	0.0%	18.1	47.0%	8.8	22.9%			39
RCID	1.3	6.4%	0.0	0.0%	1.7	8.4%	0.0	0.0%	9.4	46.3%	7.9	38.9%			20
RID	2.3	1.0%	90.1	37.3%	7.6	3.1%	0.0	0.0%	102.9	42.6%	38.6	16.0%			242
SMRID	75.9	4.2%	680.0	37.2%	20.1	1.1%	112.7	6.2%	461.7	25.3%	476.4	26.1%			1827
TID	58.2	17.6%	151.6	45.8%	12.3	3.7%	11.5	3.5%	71.9	21.7%	25.3	7.6%			331
UID	15.6	6.5%	43.6	18.1%	31.1	12.9%	0.2	0.1%	52.9	22.0%	97.5	40.5%			241
WID	35.4	3.3%	48.8	4.5%	33.3	3.1%	5.3	0.5%	141.5	13.0%	822.9	75.7%			1087
Total	706	9.2%	2,302	29.9%	185	2.4%	220	2.9%	1,424	18.5%	2,868	37.2%			7705
Headworks Owned by Alberta Environment (AENV)															337
Total Length of Conveyance System in Southern Alberta (km)															8042

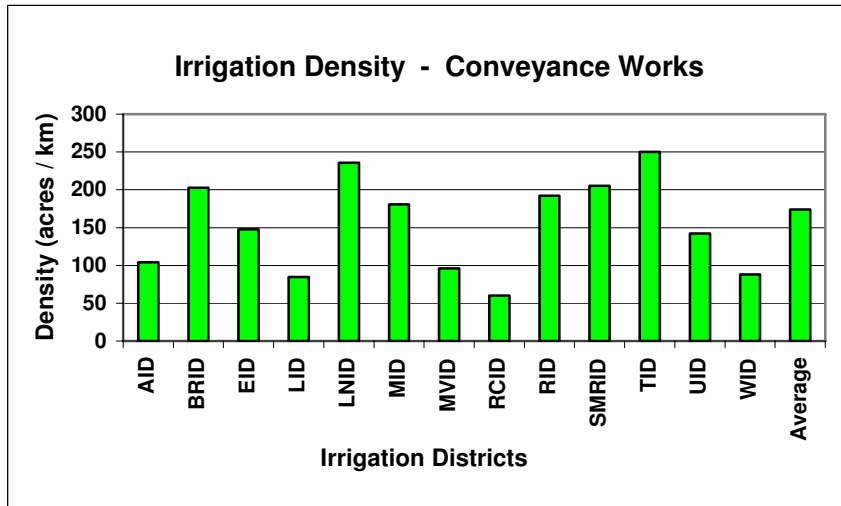
NOTE: Rehabilitated infrastructure includes those works re-constructed through:
- the Irrigation Rehabilitation Program (IRP)
- Alberta Environment's headworks improvement program
- Individual district O & M program

Table XII. IRRIGATION DISTRICT INFRASTRUCTURE - BY LENGTH AND REPLACEMENT COST
2004

IRRIGATION DISTRICTS	CONVEYANCE WORKS (length - km) (replacement cost)	MAJOR STRUCTURES (number of units) (replacement cost)	DRAINAGE WORKS		TOTAL of ALL WORKS (length - km) (replacement cost)
			CONSTRUCTED (length - km) (replacement cost)	NATURAL (length - km) (replacement cost)	
AID	34.6 \$7,136,355	0.0 \$0	0.0 \$0	19.0 \$212,877	53.6 \$7,349,232
BRID	1068.8 \$278,628,994	22.0 \$71,421,570	35.9 \$1,410,018	420.6 \$3,717,260	1,525.3 \$355,177,842
EID	1918.4 \$469,729,559	57.0 \$253,584,925	166.9 \$4,954,476	1702.5 \$13,723,633	3,787.8 \$741,992,593
LID	56.2 \$10,779,835	0.0 \$0	10.9 \$361,112	3.4 \$28,332	70.5 \$11,169,279
LNID	745.5 \$183,021,636	2.0 \$2,090,000	18.7 \$732,300	227.1 \$2,164,670	991.3 \$188,008,606
MID	101.4 \$20,113,259	0.0 \$0	12.2 \$489,142	149.2 \$1,593,536	262.8 \$22,195,937
MVID	38.6 \$9,553,735	0.0 \$0	0.4 \$20,755	0.0 \$0	39.0 \$9,574,490
RCID	20.1 \$5,970,841	0.0 \$0	0.0 \$0	3.0 \$32,637	23.1 \$6,003,478
RID	240.8 \$44,197,903	0.0 \$0	18.6 \$761,015	188.1 \$2,786,239	447.5 \$47,745,157
SMRID	1817.3 \$453,656,877	48.0 \$245,213,430	28.9 \$2,114,526	321.4 \$3,435,491	2,167.6 \$704,420,324
TID	329.9 \$80,293,129	12.0 \$10,351,770	10.3 \$628,629	60.9 \$641,357	401.1 \$91,914,885
UID	240.0 \$50,499,137	10.0 \$11,281,820	3.9 \$260,105	55.7 \$550,461	299.6 \$62,591,523
WID	1099.2 \$231,739,065	14.0 \$12,380,115	5.0 \$371,923	845.6 \$11,871,502	1,949.8 \$256,362,605
DISTRICT TOTALS	7,710.8 \$1,845,320,325	165.0 \$606,323,630	311.7 \$12,104,001	3,996.5 \$40,757,995	12,019.0 \$2,504,505,951

NOTE: - Constructed drainage works include both open channels and pipelines.
- Natural drains are those channels that exist as natural watercourses and provide a means to drain unused tailwater away from irrigated works.
- Total of All Works length values include the summation of conveyance and drainage works only.

Figure 7. DENSITY OF IRRIGATION AREA RELATIVE TO INFRASTRUCTURE



Note: Irrigation Density is a measure of the “compactness” of an irrigation district. Greater compactness or being able to serve more irrigated area per unit of conveyance length is one factor that leads to opportunities for conveying water more efficiently.

Figure 8. SUMMARY OF CONDITION ASSESSMENTS
2004

Works Category	Summary of Condition - All Works by Replacement Cost			TOTAL
	Good	Fair	Poor	
Conveyance	\$1,017,047,493	\$705,668,733	\$122,604,099	\$1,845,320,325
Drainage (Const.)	\$7,609,315	\$4,494,688	\$0	\$12,104,003
Drainage (Natural)	\$96,216	\$29,362,067	\$11,299,712	\$40,757,995
Major Structures	\$385,027,115	\$216,842,725	\$4,453,790	\$606,323,630
Total Proportion	\$1,409,780,139 56%	\$956,368,213 38%	\$138,357,601 6%	\$2,504,505,953 100%

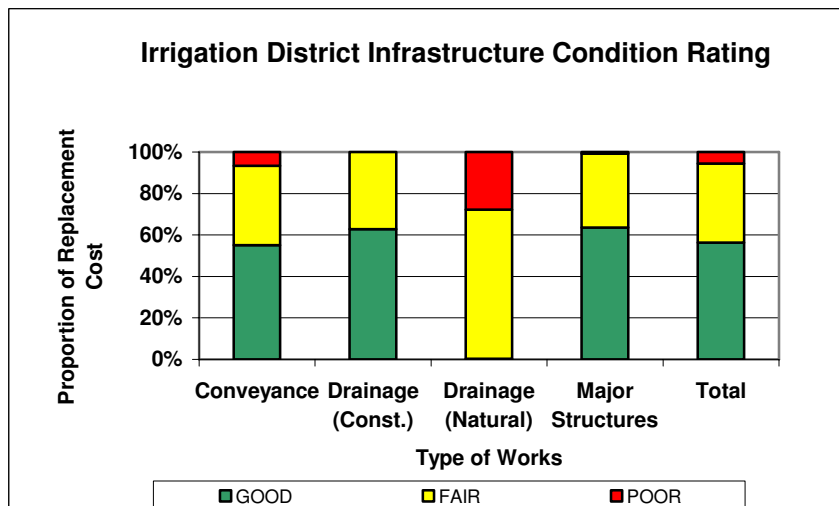


Table XIII. IRRIGATION DISTRICT RESERVOIRS
2004

Location	Reservoir	Live storage (dam3)	Live storage (acre-feet)
Bow River Irrigation District	Badger	53,650	43,494
	H reservoir	2,220	1,800
	Lost Lake	5,050	4,094
	Scope	19,740	16,003
	Total storage	80,660	65,391
Eastern Irrigation District	Bantry #1	617	500
	Bantry #2	5,550	4,500
	Cowoki Lake	19,735	16,000
	Crawling Valley	130,500	105,797
	J reservoir	615	500
	Kitsim	26,520	21,500
	Lake Newell	320,215	259,600
	One Tree	2,345	1,901
	Rock Lake	9,250	7,500
	Rolling Hills	46,000	37,292
	Snake Lake	18,230	14,779
	Tilley "A"	33,300	26,996
	Tilley "B"	38,235	30,997
Total storage	651,112	527,862	
Lethbridge Northern Irrigation District	Park Lake	740	600
	Picture Butte	1,600	1,297
	Vandenburg	114	93
	Total storage	2,454	1,990
Raymond Irrigation District	Corner Lake	495	400
	Craddock	615	500
	Factory Lake	370	300
	Total storage	1,480	1,200
St. Mary River Irrigation District	Bullshead	125	101
	Chin	190,330	154,300
	Cross Coulee	2,590	2,100
	Forty Mile	86,345	70,000
	Murray	30,590	24,800
	North East	2,095	1,698
	Raymond	1,600	1,297
	Sauder	37,745	30,600
	Seven Persons	1,355	1,099
	Sherburne Lake	10,625	8,614
	Stafford	23,315	18,900
	Yellow Lake	18,130	14,690
Total storage	404,845	328,199	
Taber Irrigation District	Fincastle	3,085	2,501
	Horsefly Lake	9,250	7,499
	Taber Lake	6,415	5,200
	Total storage	18,750	15,200
United Irrigation District	Cochrane Lake	3,100	2,513
Western Irrigation District	Chestermere Lake	5,180	4,200
	Langdon	7,895	6,400
	Total storage	13,075	10,600
Blood Tribe Irrigation Project	Mokowan	6,000	4,864
Grand Total		1,181,476	957,820

Note: - all reservoirs are off-stream storage sites

Table XIV. PROVINCIALY OWNED AND OPERATED RESERVOIRS
2004

Source Supply for:	Reservoir	Live storage (dam ³)	Live storage (acre-feet)
Bow River Irrigation District	Little Bow	21,078	17,088
	McGregor	351,059	284,604
	Traverse *	104,638	84,830
	Total Storage	476,775	386,522
Lethbridge Northern Irrigation District	Keho	95,635	77,531
	Oldman River *	490,180	397,390
	Total Storage	585,815	474,921
Ross Creek Irrigation District	Cavan	4,625	3,750
Mountain View, Leavitt, Aetna	Payne	8,690	7,045
St. Mary Project (SMRID, MID, TID, RID)	Jensen	19,000	15,403
	Milk River Ridge	127,297	103,200
	St Mary *	369,310	299,400
	Waterton *	111,196	90,147
	Total Storage	626,803	508,150
Diversions Outside of Irrigation Districts	Chain Lakes	14,679	11,900
	Twin Valley Dam *	62,700	50,831
	Pine Coulee	51,000	41,346
	Women's Coulee	362	293
	Total Storage	128,741	104,370
Grand Total		1,831,449	1,484,759

Note: - * denotes on-stream storage reservoir

**Table XV. HYDROELECTRIC PLANTS ASSOCIATED WITH
WATER DISTRIBUTION WORKS**
2004

Location	Owner	Capacity (megawatts)
Oldman Reservoir	ATCO Electric	32.0
Waterton Reservoir	Canadian Hydro	2.8
Belly River Chute	Canadian Hydro	3.0
St. Mary Reservoir	Canadian Hydro	2.5
Taylor Coulee Chute (Jensen Reservoir)	Canadian Hydro	12.7
Raymond Reservoir	Irrican	20.5
Chin Chute (Chin Reservoir)	Irrican	11.0
SMRID main canal drops #4, #5 and #6	Irrican	7.0

Table XVI. PRIVATE WATER LICENCES FOR IRRIGATION IN ALBERTA

There are 2,864 individual irrigation projects, outside of the 13 irrigation districts, irrigating approximately 293,055 acres in Alberta. These projects vary in size from 1 acre to over several thousand acres of agricultural or horticultural production. Each of these projects is licensed to an individual, a group of producers or to private or public lands (ie- golf courses or parks). The agricultural feasibility of these projects is reviewed by Alberta Agriculture and the licencing is regulated by Alberta Environment.

RIVER BASIN	Total Acres Irrigated	No. of Licences 1 to 100 ac.	No. of Licences 101 to 300 ac.	No. of Licences over 300 ac.
ATHABASCA RIVER	2,545	44	7	1
MILK RIVER	18,780	102	43	14
NORTH SASKATCHEWAN RIVER	28,329	332	58	15
PEACE RIVER	3,731	78	9	0
SOUTH SASKATCHEWAN RIVER				
- Bow River	28,045	157	62	17
- Little Bow River	21,855	113	42	16
- Lower Oldman River	15,595	19	23	11
- Red Deer River	40,636	423	87	17
- South Saskatchewan River	48,048	531	83	25
- Upper Oldman River	7,383	63	22	3
- Waterton / Belly / St. Mary Rivers	52,929	136	70	21
- Willow Creek	25,179	140	66	14
Total (2005)	293,055	2,138	572	154
<u>Year</u>				
2004	285,276	2,113	575	152
2003	283,254	2,108	571	149
2002	275,599	2,100	567	141
2001	272,353	2,085	558	143
2000	277,826	2,076	555	140
1999	257,258	1,863	509	137
1998	255,192	1,884	501	138
1997	253,868	1,893	486	129

- Notes:
- upper Oldman reach is defined as upstream of the Belly River confluence
 - lower Oldman reach is defined as downstream of the Belly River confluence
 - 25,000 acres from the Waterton / Belly / St. Mary Rivers category is for the Blood Tribe Agricultural Project
 - does not include irrigation licences issued to irrigation districts in southern Alberta
 - data is obtained from Alberta Environment
 - licence authorization as of January 2005

Figure 9. MAP SHOWING PRIVATE IRRIGATION IN ALBERTA
2005

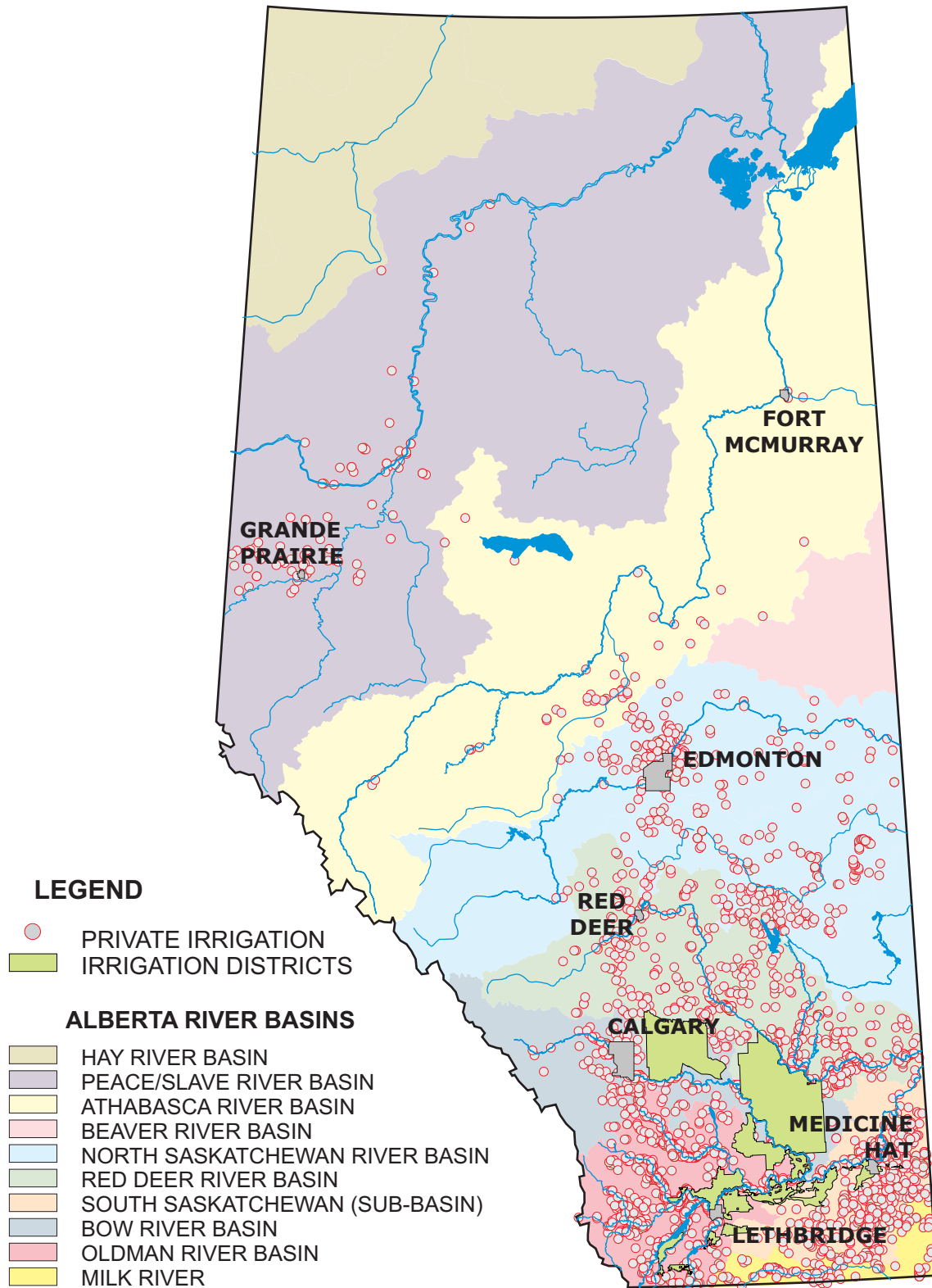


Figure 10. OPTIMUM CROP WATER AND NET IRRIGATION REQUIREMENTS

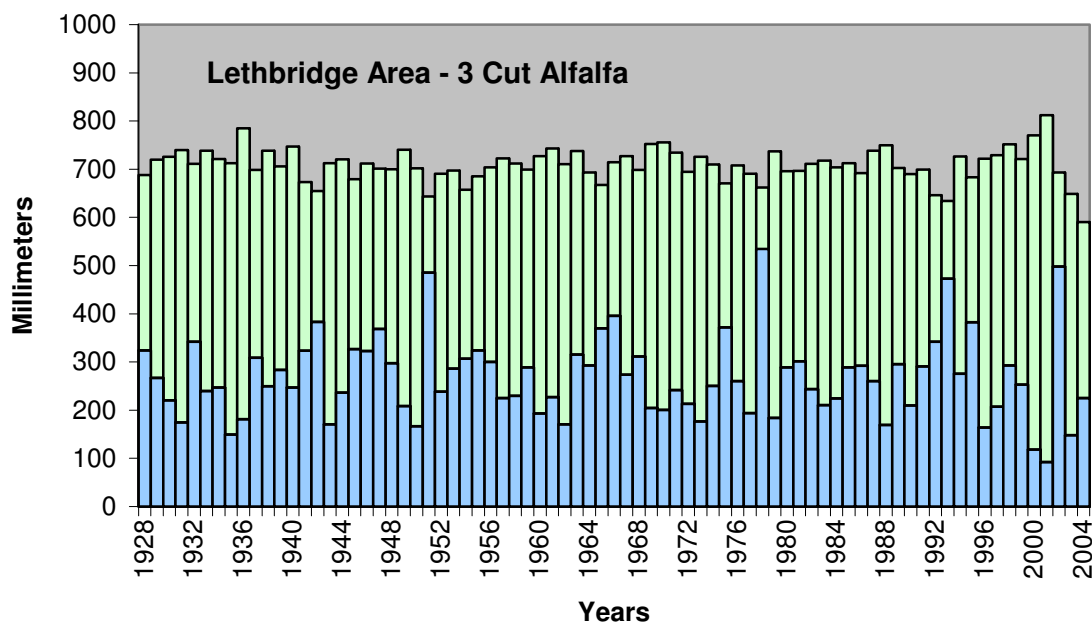
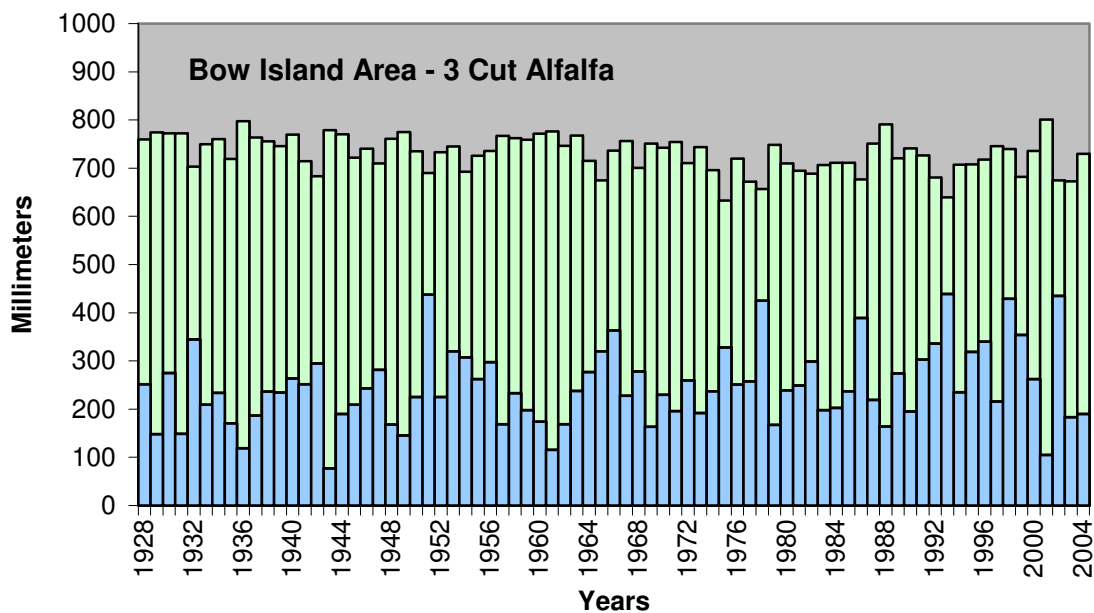


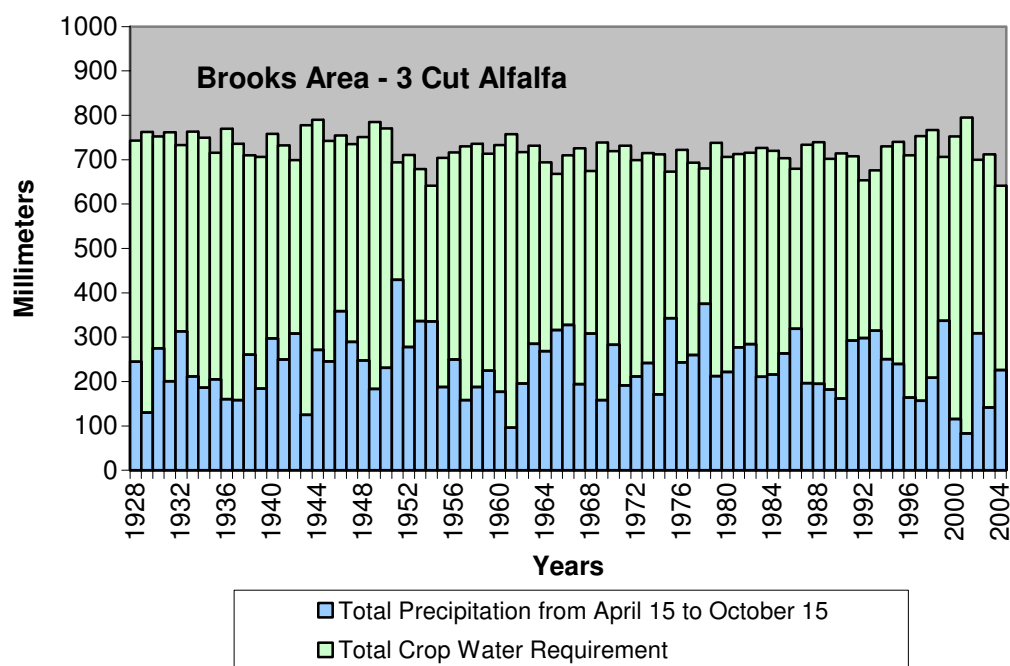
Figure 11. OPTIMUM CROP WATER AND NET IRRIGATION REQUIREMENTS



■ Total Precipitation from April 15 to October 15
■ Total Crop Water Requirement

Note: The high water use, 3 cut alfalfa is used in these examples because this crop's annual growing season closely coincides with the annual irrigation season. The difference between the total crop water requirement and total precipitation is the NET irrigation requirement.

Figure 12. OPTIMUM CROP WATER AND NET IRRIGATION REQUIREMENTS



Note: The high water use, 3 cut alfalfa is used in these examples because this crop's annual growing season closely coincides with the annual irrigation season. The difference between the total crop water requirement and total precipitation is the NET irrigation requirement.

Table XVII. HISTORICAL RAINFALL IN SOUTHERN ALBERTA
(from April 15 to Oct. 15)

AREA	MAXIMUM RAINFALL (mm)	MINIMUM RAINFALL (mm)	AVERAGE RAINFALL (mm)	RAINFALL 2004 (mm)
Lethbridge	534 (1978)	92 (2001)	269	255
Bow Island	439 (1993)	77 (1943)	248	190
Brooks	430 (1951)	83 (2001)	237	226

Figure 13. HISTORICAL IRRIGATION ENERGY COSTS

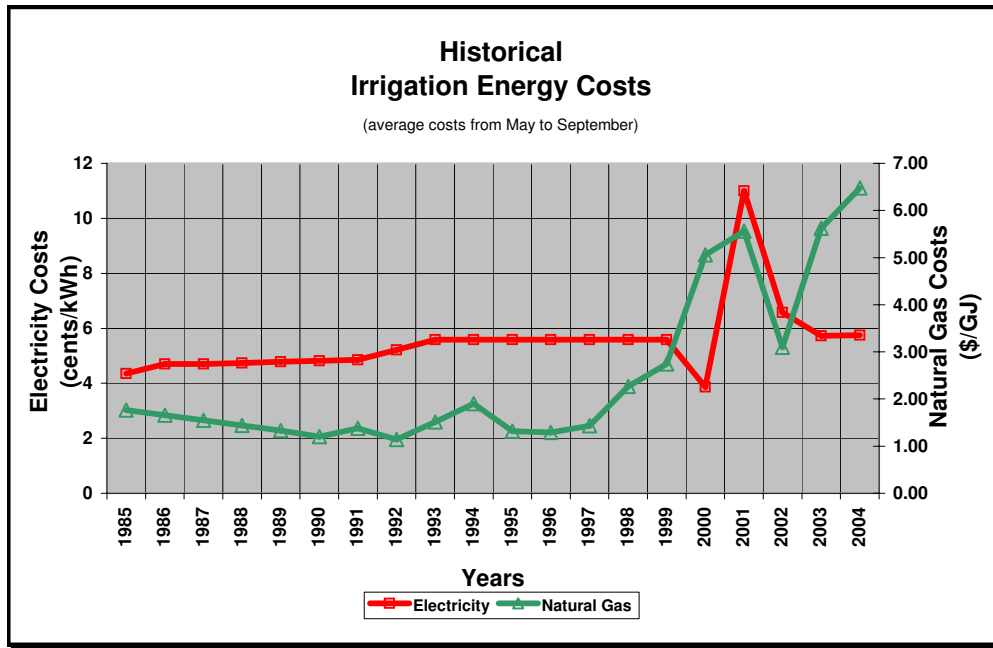


Table XVIII. ENERGY TYPE USED IN THE IRRIGATION DISTRICTS
2004
(acres irrigated by energy type)

Energy Type	BRID	EID	LNID	MID	RID	SMRID	TID	UID	WID	Average Energy Type
electricity	58.1% 117,941	30.1% 85,013	42.5% 67,504	9.2% 1,683	32.9% 14,871	47.6% 171,536	55.2% 44,449	40.9% 5,991	26.6% 25,292	38.1%
natural gas	22.8% 46,176	29.0% 81,833	44.1% 69,981	58.1% 10,628	50.5% 22,842	45.0% 162,330	38.7% 31,160	14.1% 2,064	26.2% 24,902	36.5%
diesel	2.2% 4,403	4.7% 13,162	0.3% 524	0.0% 0	1.0% 444	1.5% 5,383	1.0% 767	1.3% 189	8.6% 8,138	2.3%
gravity	16.1% 32,584	34.4% 97,137	12.0% 18,983	32.6% 5,959	7.4% 3,329	5.4% 19,603	4.8% 3,885	43.7% 6,409	31.6% 30,067	20.9%
pump pressure	0.1% 267	0.3% 961	0.1% 98	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.1% 125	0.1%
other*	0.6% 1,310	1.0% 2,819	0.8% 1,238	0.2% 30	2.0% 891	0.4% 1,597	0.2% 185	0.1% 12	6.9% 6,587	1.4%
unknown	0.1% 229	0.4% 1,227	0.2% 368	0.0% 0	6.4% 2,888	0.0% 0	0.0% 15	0.0% 0	0.1% 55	0.8%

Notes: -* other includes gasoline, propane or butane
- AID, LID, MVID and RCID did not report any data