OREGON.

INTRODUCTION.

The following pages present the statistics of irrigation for the state of Oregon collected at the census of 1920. Statistics of acreage irrigated, of acreage, yield, and value of crops grown on irrigated land, and of cost of operation and maintenance relate to the year 1919; other items relate to the year 1920. Throughout the report figures for the census of 1910 are given for purposes of comparison; and, for the purpose of showing the historical development of irrigation, items which have been reported in censuses previous to 1910 are presented.

Statistics of number of farms irrigated and of acreage, yield, and value of crops grown on irrigated land were collected in the general census of agriculture. All other statistics were obtained in a special canvass of irrigation enterprises.

TABLE 1.—SUMMARY FOR THE STATE: 1920 AND 1910.

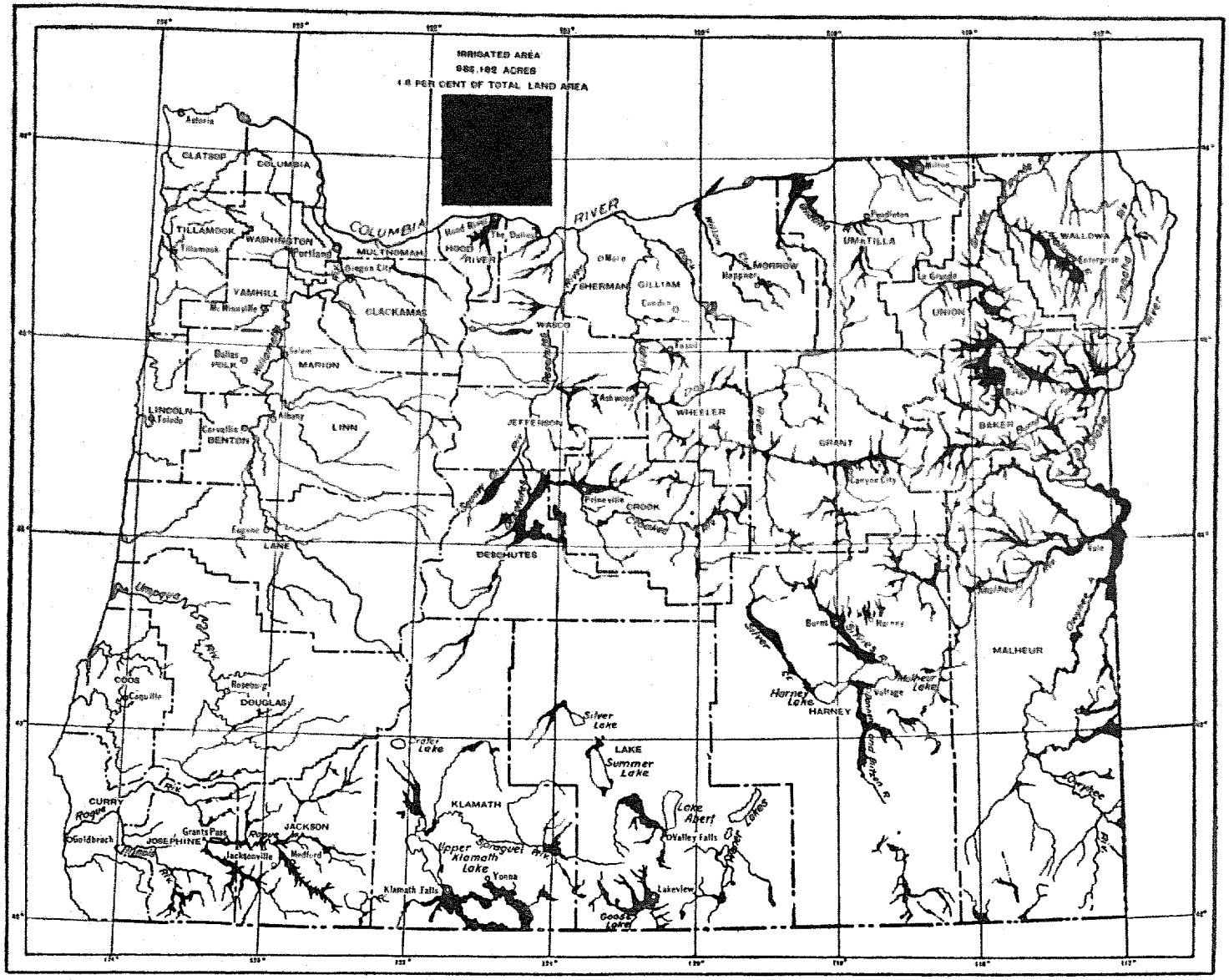
ITEM.	CENSUS OF—		INCREASE.[1]	
	1920	1910	Amount.	Per cent.
Number of all farms	50,206	45,502	4,704	10.3
Approximate land area of the state ... acres	61,188,480	61,188,480	.....	.....
All land in farms ... acres	13,542,318	11,685,110	1,857,208	15.9
Improved land in farms ... acres	4,913,851	4,274,803	639,048	14.9
Number of farms irrigated	9,154	6,669	2,485	37.3
Area irrigated ... acres	986,162	686,129	300,033	43.7
Area enterprises were capable of irrigating ... acres	1,344,046	830,526	513,520	61.8
Area included in enterprises ... acres	1,925,987	2,527,208	−601,221	−23.8
Per cent irrigated:				
Number of all farms	18.2	14.7	3.5	.....
Approximate land area of the state	1.6	1.1	0.5	.....
Land in farms	7.3	5.9	1.4	.....
Improved land in farms	20.1	16.1	4.0	.....
Excess of area enterprises were capable of irrigating over area irrigated ... acres	357,884	144,397	213,487	147.8
Excess of area included in enterprises over area irrigated ... acres	939,825	1,841,079	−901,254	−49.0
Area of irrigated land reported as available for settlement ... acres	98,609	(2)	.....	.....
Capital invested	$28,929,151	$12,760,214	$16,168,937	126.7
Average per acre enterprises were capable of irrigating	$21.52	$15.36	$6.16	40.1
Estimated final cost of existing enterprises	$41,585,742	$39,216,619	$2,369,123	6.0
Average per acre included in enterprises	$21.59	$15.52	$6.07	39.1
Average cost of operation and maintenance per acre	$1.19	$0.75	$0.44	58.7
IRRIGATION WORKS.				
Number of enterprises	4,710	3,745	965	25.8
Number of main ditches	5,252	3,582	1,670	46.6
Length of main ditches ... miles	7,115	5,539	1,576	28.5
Capacity of main ditches ... second-feet	28,897	39,686	−10,789	−27.2
Number of lateral ditches	2,784	2,518	266	10.6
Length of lateral ditches ... miles	1,956	2,052	−96	−4.7
Number of reservoirs	266	271	−5	−1.8
Capacity of reservoirs ... acre-feet	1,905,037	1,024,266	880,771	86.0
Number of flowing wells	65	51	14	.....
Capacity of flowing wells ... gallons per minute	11,968	3,035	8,933	294.3
Number of pumped wells	208	92	116	.....
Capacity of pumped wells ... gallons per minute	47,026	20,883	26,143	125.2
Number of pumping plants	573	229	344	150.2
Engine capacity ... horsepower	13,769	3,095	10,674	344.9
Pump capacity ... gallons per minute	600,045	118,514	481,531	406.3
Average lift ... feet	28	(2)	28	.....

[1] A minus sign (−) denotes decrease. Per cent not shown when base is less than 100.

[2] Not reported in 1910.

OREGON

APPROXIMATE LOCATION AND EXTENT OF IRRIGATED LAND.



CLIMATIC CONDITIONS.

The climatic conditions determining the necessity for irrigation are the amount and seasonal distribution of precipitation, principally rainfall. From the standpoint of amount of precipitation Oregon is divided into two distinct portions by the Cascade Mountains.

The portion of the state west of the Cascades receives the heaviest rainfall of any part of the United States, while east of the Cascades the rainfall is so small that this part of the state is mostly arid. West of the mountains, however, there is a fairly distinct dry season, only 10 per cent of the annual precipitation occurring in June, July, August, and September. This makes irrigation necessary to the maturing of crops whose growing season extends into the late summer, and makes it desirable for pastures at this season.

The chief characteristics of the climate of the part of the state east of the Cascades are a scanty rainfall, low humidity, rapid evaporation, and an abundance of sunshine. The annual precipitation ranges from 8 to 25 inches. At the summit of the Cascades the annual precipitation exceeds 40 inches; it decreases to the eastward, and reaches 15 inches about the center of the state. East of this there is a section receiving less than 15 inches, extending in a narrow strip to the north line of the state, but expanding to the southward, and occupying the whole southeast third of the state. In the Blue Mountains, in the northeastern part of the state, the precipitation increases to about 25 inches.

The precipitation is heaviest in the winter, but there is a secondary maximum in May and June, with a very dry period during the late summer. The relatively large winter and spring precipitation makes it possible to raise grain crops without irrigation in most sections in normal years, but irrigation is necessary for the growing of other crops except in some of the higher valleys.

The snowfall in the Cascades is very heavy, and snow remains on some of the higher peaks throughout the year.

For the state as a whole, precipitation in 1919 was slightly above the normal. There was a large excess in the western section and a slight deficiency in the eastern section. While the deficiency for the year was small, there was a marked drouth in spring and summer throughout the state, May and June recording the lowest amounts ever recorded for those months, and July having the lowest precipitation on record with two exceptions. In the eastern division of the state the precipitation from May to August, inclusive, was only 0.84 inch, which is but 26 per cent of the normal. As a consequence of this drouth both irrigated and nonirrigated crops suffered.

WATER SUPPLY FOR IRRIGATION.

West of the Cascade Mountains the heavy precipitation and the large flow of the streams provide an ample supply of water for the small amount of irrigation practiced during the summer dry season. Only small areas are irrigated in this part of the state.

Deschutes River and its tributaries drain the eastern slope of the Cascade Mountains in Oregon, and a considerable area of the high plains to the east of the mountains. Because of the character of its drainage area this river has a remarkably uniform flow, and, consequently, it is a valuable source of water for irrigation. Throughout its lower course it flows in a deep canyon and is not used for irrigation. In the central part of its course there are several large enterprises in the course of development.

John Day River rises in the Blue Mountains and flows west and north to the Columbia. The river and its tributaries are used for irrigation in the valleys near the headwaters, but for the last 100 miles of its course the river flows in a deep canyon and is not used for irrigation.

Umatilla River also rises in the Blue Mountains and flows in a northwesterly direction to the Columbia. There are large level areas along its lower course near the Columbia, and works have been built to utilize its waters.

Grande Ronde River, also, rises in the Blue Mountains. It flows to the northeast into Snake River. Near its source it flows through Grande Ronde Valley, where there is a large area of agricultural land.

Powder and Burnt Rivers rise in these same mountains and flow to the southeast into Snake River, supplying water to considerable areas.

Malheur River rises in the southern part of the Blue Mountains and flows in an easterly direction to Snake River. Its waters are used for irrigation.

Owyhee River rises in northern Nevada, flows through the southwest corner of Idaho, and then in a northerly direction in Oregon to Snake River. Its waters are used for irrigation in all three of the states through which it flows.

In south central Oregon there are many streams rising in the hills and flowing into lakes or sinks which have no outlets. The larger streams are Silvies River and Donner and Blitzen River. These flow into Malheur Lake, one from the north and the other from the south. Both are used for irrigation. There are many small streams of a similar character.

West of this Great Basin drainage is the drainage basin of Klamath River. There are large projects on this stream in the vicinity of Klamath Lake.

Taking the state as a whole, there are still large opportunities for irrigation development, since there are immense areas of tillable land, and large unused supplies of water.

FARMS AND ACREAGE IRRIGATED.

TABLE 2.—NUMBER OF FARMS AND ACREAGE IRRIGATED: 1890 TO 1920.

CENSUS YEAR.	FARMS IRRIGATED.			AREA IRRIGATED.				
	Number.	Per cent of increase.	Per cent of all farms.	Acres.	Per cent of increase.	Per cent of total land area.	Per cent of land in farms.	Per cent of improved land in farms.
1920	9,154	37.3	18.2	986,162	43.7	1.6	7.3	20.1
1910	6,669	43.9	14.7	686,129	76.7	1.1	5.9	16.1
1900	4,636	47.2	12.9	388,310	118.2	0.6	3.9	11.7
1890	3,150	.....	12.3	177,944	.....	0.4	2.6	5.1

TABLE 3.—ACREAGE, CLASSIFIED BY DATE OF BEGINNING OF ENTERPRISES SUPPLYING WATER FOR IRRIGATION.

DATE OF BEGINNING.	Number of enterprises.	Area included in enterprises, 1920 (acres).	AREA IRRIGATED IN 1919.		Area enterprises were capable of irrigating in 1920 (acres).
			Acres.	Per cent of acreage in enterprises.	
Total	4,710	1,925,987	986,162	51.2	1,344,046
Before 1860	64	10,528	8,206	77.9	9,409
1860–1869	211	56,754	46,917	82.7	51,216
1870–1879	433	130,199	90,250	69.9	101,727
1880–1889	889	276,789	198,653	71.8	248,987
1890–1899	792	181,282	123,643	67.9	143,186
1900–1904	481	237,259	123,648	52.1	172,549
1905–1909	390	434,996	142,756	32.8	237,680
1910–1914	513	257,831	91,425	35.5	111,068
1915–1919	473	214,625	62,458	29.2	151,145
Not reported	559	125,524	98,106	77.7	117,109

TABLE 4.—ACREAGE, CLASSIFIED BY SOURCE OF WATER SUPPLY: 1919 AND 1909.

CLASS.	AREA IRRIGATED (ACRES).				Area enterprises were capable of irrigating in 1920 (acres).	Area included in enterprises, 1920 (acres).
	1919	1909	Increase.[1]			
			Amount.	Per cent.		
Total	986,162	686,129	300,033	43.7	1,344,046	1,925,987
Streams, gravity	786,354	643,281	143,073	22.2	1,070,244	1,423,039
Streams, pumped	64,576	3,595	60,991	.....	81,138	96,362
Streams, pumped and gravity	253	(2)	253	.....	253	293
Wells, pumped	1,993	805	1,188	147.6	2,418	2,723
Wells, flowing	72	655	−583	−89.0	146	436
Wells, flowing and pumped	340	(2)	340	.....	340	340
Lakes, pumped	1,620	821	799	97.3	1,787	1,875
Lakes, gravity	5,750	22,915	−17,165	−74.9	31,779	31,779
Springs	9,584	10,788	−1,204	−11.2	10,610	13,813
Stored storm water	3,763	3,279	484	14.8	5,522	9,635
City water	258	(2)	258	.....	264	264
Sewage	10	(2)	10	.....	10	10
Streams, gravity, and pumped wells	105	(2)	105	.....	105	130
Streams, gravity, and flowing wells	200	(2)	200	.....	200	450
Other mixed	111,137	(2)	111,137	.....	139,073	344,475
Other and not reported	147	(2)	147	.....	147	163

[1] A minus sign (−) denotes decrease. Per cent not shown when more than 1,000.
[2] Not included in 1909 classification.

ACREAGE, BY CHARACTER OF ENTERPRISE.

Oregon enacted its original irrigation district law in 1895, and this act, as amended from time to time, is still in force.

The conditions of the Federal Carey Act (act of Congress, Aug. 18, 1894) were accepted by Oregon in 1901, and several large projects were begun under this act. These were not successful and in 1913 the state took over one of these projects and is completing it. This is reported under "Carey Act" in Table 5. The small area credited to the state belongs to a state institution, and does not represent a scheme of state construction.

The land in the Klamath project of the United States Reclamation Service has been organized into an irrigation district, but the acreage is credited to the Reclamation Service because the Government constructed the works and still controls them to a large extent. The Reclamation Service also supplies some water under special contract to lands included in another irrigation district and, to that extent, the acreage credited to the Reclamation Service in Table 5 does not represent the entire acreage receiving water from its works.

TABLE 5.—ACREAGE, CLASSIFIED BY CHARACTER OF ENTERPRISE: 1920 AND 1910.

ITEM AND CLASS.	CENSUS OF—		INCREASE.[1]	
	1920	1910	Acres.	Per cent.
ACREAGE IRRIGATED.				
Total	986,162	686,129	300,033	43.7
Individual and partnership	590,626	410,078	180,548	44.0
Cooperative	186,037	149,985	36,052	24.0
Irrigation district	92,081	1,500	90,581	.....
Carey Act	30,665	24,750	5,915	23.9
Commercial	27,338	77,387	−50,049	−64.7
U. S. Reclamation Service	54,981	22,000	32,981	149.9
U. S. Indian Service	4,000	429	3,571	832.4
State	.....	.....	.....	.....
City	330	(2)	330	.....
Other	104	(2)	104	.....
ACREAGE ENTERPRISES WERE CAPABLE OF IRRIGATING.				
Total	1,344,046	830,526	513,520	61.8
Individual and partnership	689,723	454,074	235,649	51.9
Cooperative	236,171	169,944	66,227	39.0
Irrigation district	198,540	1,500	197,040	.....
Carey Act	67,580	65,500	2,080	3.2
Commercial	67,163	93,750	−26,587	−28.4
U. S. Reclamation Service	76,525	45,319	31,206	68.9
U. S. Indian Service	7,600	439	7,161	.....
State	300	(2)	300	.....
City	340	(2)	340	.....
Other	104	(2)	104	.....
ACREAGE INCLUDED IN ENTERPRISES.				
Total	1,925,987	2,527,208	−601,221	−23.8
Individual and partnership	828,471	619,986	208,485	33.6
Cooperative	329,241	399,632	−70,391	−17.6
Irrigation district	271,172	5,980	265,192	.....
Carey Act	164,970	623,264	−458,294	−73.5
Commercial	159,289	692,467	−542,178	−78.3
U. S. Reclamation Service	171,444	185,000	−13,556	−7.3
U. S. Indian Service	9,600	879	8,721	992.2
State	300	(2)	300	.....
City	390	(2)	390	.....
Other	110	(2)	110	.....

[1] A minus sign (−) denotes decrease. Per cent not shown when more than 1,000.
[2] Not included in 1910 classification.

ACREAGE, BY CHARACTER OF WATER RIGHTS.

The laws of Oregon relating to water rights are summarized in the following paragraphs:

Although Oregon was admitted to the Union in 1859, there was no legislation relating to water rights until 1891, when a law relating principally to the rights of corporations organized to supply water for hire was enacted. This law contained the following general declaration regarding water rights:

"All existing appropriations of water made for beneficial purposes, by any person, corporation, or company, in accordance with the laws of the United States, or in accordance with the laws of the state of Oregon, or the decisions of its supreme court, or the established customs and regulations of the district in which such appropriations have been made, shall be respected and upheld to the extent of the amount of water actually appropriated."

In the same year, 1891, it was provided that in any suit regarding water rights all parties taking water from the same source might be made parties to the suit, in order that all rights might be settled in a single action.

In 1905 the office of state engineer was created, but he was given no control over the waters of the state.

In 1909 a new code of water laws was adopted. The state board of control was created and given control over the waters of the state. This board consisted of the state engineer and the superintendents of the two water divisions into which the state was divided. Parties wishing to acquire rights are required to make application to the state engineer for a permit. When rights have been perfected in accordance with a permit proof is submitted to the board of control, which issues a certificate showing what rights have been acquired.

This law also provided a new procedure for adjudicating existing rights. The state engineer and the superintendent of the water division in which the source, the rights to which are being adjudicated, is located, collect all information regarding rights, make surveys of streams, ditches, and lands, and prepare findings and an order defining all rights. All testimony, reports of surveys, and the findings and order are filed with the court, which holds hearings, and issues a decree fixing all rights. Certificates are issued to all claimants in accordance with the decree of court.

Riparian rights are recognized to some extent in Oregon.

TABLE 6.—ACREAGE IRRIGATED, CLASSIFIED BY CHARACTER OF RIGHTS UNDER WHICH WATER IS RECEIVED: 1919 AND 1909.

CLASS.	1919		1909, per cent of total.
	Acres.	Per cent of total.	
Total	986,162	100.0	100.0
Appropriation and use	148,523	15.1	58.3
Notice filed and posted	150,332	15.3	29.0
Adjudicated by court	293,913	29.8	5.4
Permit from state	131,540	13.3	3.8
Certificate or license from state	217,228	22.0	.....
Riparian rights	14,277	1.5	3.5
Underground	3,235	0.3	(1)
Other unclassified	12,189	1.2	(1)
Not reported	14,955	1.5	(1)

[1] All land for which the class of water rights was not reported was included in "Appropriation and use."

ACREAGE, BY DRAINAGE BASIN.

The report of a special census taken in 1902 presented all data by drainage basins rather than by counties. The results of the census of 1920 have been tabulated on the same basis, and the data for 1902 are presented for purposes of comparison. For no other census have the results been tabulated in this form. The acreage reported for each drainage basin in 1919 comprises all the irrigated land in that drainage basin, including that watered from springs and wells. In the 1902 results the acreages irrigated from springs and wells were not reported for the smaller tributary streams, but the acreages for the tributaries were included in those reported for the main streams. This area is so small, however, that the comparison of the areas reported for the tributary streams is not seriously affected.

TABLE 7.—ACREAGE IRRIGATED, CLASSIFIED BY DRAINAGE BASIN: 1919 AND 1902.

DRAINAGE BASIN.	AREA IRRIGATED (ACRES).			Area included in enterprises, 1920 (acres).	Area enterprises were capable of irrigating in 1920 (acres).
	1919	1902	Per cent of increase.[1]		
Total	986,162	439,981	124.1	1,923,987	1,344,046
Columbia River and tributaries	638,223	232,145	174.9	1,145,451	845,918
Columbia River direct	92	198	−53.5	223	123
Snake River and tributaries	394,205	167,790	134.9	628,598	450,719
Snake River direct	22,199	415	.....	31,925	28,469
Owyhee River	36,295	13,215	174.7	78,311	42,093
Malheur River	52,850	40,686	29.9	117,628	72,618
Burnt River	34,287	16,042	113.7	54,467	37,906
Powder River	146,026	58,482	149.7	188,463	165,826
Pine Creek	12,635	10,149	24.5	40,637	39,321
Imnaha River	4,826	3,781	27.7	10,146	6,069
Grande Ronde River	79,191	22,628	250.0	98,774	87,191
Other tributaries of Snake River	5,884	[2] 2,392	146.0	8,177	6,826
Walla Walla River	17,514	3,321	427.4	18,457	17,790
Umatilla River	43,571	4,485	871.5	99,012	83,341
Willow Creek	5,553	3,013	84.3	7,159	6,618
John Day River	360141	27,694	30.9	48,191	41,492
Deschutes River	111,946	21,108	430.2	291,014	174,790
Hood River	19,765	2,537	596.7	39,660	21,161
Willamette River	2,892	448	545.5	4,696	4,302
Other tributaries of Columbia River	6,574	[3] 1,341	390.2	8,491	7,652
Rogue River and tributaries	38,569	13,900	177.5	131,134	52,846
Rogue River direct	3,256	538	505.2	14,196	4,673
Little Butte Creek	6,706	1,208	455.1	54,383	8,417
Bear Creek	8,319	2,902	186.7	28,275	14,573
Evans Creek	1,323	225	492.4	2,746	1,614
Applegate River	10,659	4,239	151.5	17,315	13,612
Illinois River	4,961	2,804	76.9	8,795	6,323
Other tributaries of Rogue River	3,325	[3] 1,984	68.1	5,521	4,204
Klamath River and tributaries	90,570	27,724	226.7	239,940	135,699
Klamath River direct	3,195	195	.....	5,910	5,899
Lost River	58,968	1,180	.....	194,748	95,304
Sprague River	7,930	3,690	111.4	10,150	8,989
Other tributaries of Klamath River	21,017	[3] 22,749	−7.6	29,132	24,615
Other Pacific Ocean streams	2,134	(3)	.....	8,695	5,653
Independent streams	218,668	166,212	30.4	490,770	305,568
Deep Creek	1,806	2,125	−12.0	2,118	2,098
Donner and Blitzen River	21,335	34,701	−38.5	54,651	27,956
Silver Creek	16,819	13,640	23.6	42,779	17,394
Silvies River	64,842	26,061	149.0	102,258	95,867
Thomas Creek	5,386	1,980	172.0	5,866	5,466
Other independent streams	108,357	[3] 87,716	21.3	192,818	156,789

[1] A minus sign (−) denotes decrease. Per cent not shown when more than 1,000.
[2] Includes springs and wells.
[3] Not reported separately in 1902.

CAPITAL INVESTED AND COST OF OPERATION AND MAINTENANCE.

TABLE 8.—CAPITAL INVESTED IN IRRIGATION ENTERPRISES: 1890 TO 1920.

CENSUS YEAR.	Amount.	Per cent of increase.	AVERAGE PER ACRE.	
			Amount.	Per cent of increase.
1920	$28,929,151	128.7	$21.52	40.1
1910	12,700,214	592.1	15.36	223.4
1900	1,843,771	128.3	4.75	2.4
1890	806,690	.....	4.64	.....

TABLE 9.—CAPITAL INVESTED, CLASSIFIED BY DATE OF BEGINNING.

DATE OF BEGINNING.	Amount.	Per cent of total.	Average per acre.
Total	$28,929,151	100.0	$21.52
Before 1880	151,216	0.5	16.07
1880–1889	398,603	1.4	7.78
1870–1879	1,072,943	3.7	16.55
1890–1899	2,321,551	8.0	9.33
1890–1899	1,606,226	5.8	11.64
1900–1904	4,193,362	14.5	24.30
1905–1909	10,876,802	37.6	45.76
1910–1914	2,741,235	9.5	24.68
1915–1919	4,759,191	16.4	31.49
Not reported	798,002	2.8	6.39

TABLE 10.—CAPITAL INVESTED, 1920, AND COST OF OPERATION AND MAINTENANCE, 1919, CLASSIFIED BY SOURCE OF WATER SUPPLY.

[When water is pumped, cost of operation and maintenance includes cost of fuel and attendance.]

CLASS.	CAPITAL INVESTED, 1920.			OPERATION AND MAINTENANCE, 1919.	
	Amount.	Per cent of total.	Average per acre.	Area for which cost is reported (acres).	Average cost per acre.[1]
Total	$28,929,151	100.0	$21.52	801,891	$1.19
Streams, gravity	20,028,187	69.2	18.71	651,124	1.00
Streams, pumped	2,807,896	9.7	34.61	59,087	3.09
Streams, pumped and gravity	3,700	(2)	14.07	253	2.55
Wells, pumped	118,306	0.4	48.93	1,419	8.04
Wells, flowing	6,900	(2)	47.28	66	9.47
Wells, pumped and flowing	2,600	(2)	7.65	20	18.00
Lakes, pumped	26,583	0.1	14.88	457	2.52
Lakes, gravity	783,762	2.7	24.66	1,735	0.90
Springs	165,946	0.6	15.64	6,735	0.92
Stored storm water	124,499	0.4	22.55	3,267	1.28
City water	153,650	0.5	562.01	252	23.89
Sewage	1,500	(2)	150.00	.....	.....
Streams, gravity, and pumped wells	11,500	(2)	109.52	95	17.89
Streams, gravity, and flowing wells	1,000	(2)	5.00	200	4.00
Other mixed	4,691,072	16.2	33.73	97,014	1.13
Not reported	2,200	(2)	14.97	147	0.78

[1] Based on area irrigated in 1919.
[2] Less than one-tenth of 1 per cent.

TABLE 11.—CAPITAL INVESTED, CLASSIFIED BY DRAINAGE BASIN: 1920 AND 1902.

DRAINAGE BASIN.	1920	1902	INCREASE.	
			Amount.	Per cent.[1]
Total	$28,929,151	$2,069,609	$26,859,542	.....
Columbia River and tributaries	18,480,068	1,385,671	17,094,397	.....
Columbia River direct	11,150	3,500	7,650	218.6
Snake River and tributaries	7,093,652	971,743	6,121,909	630.0
Snake River direct	209,478	15,154	894,324	.....
Owyhee River	1,154,185	191,736	962,449	502.0
Malheur River	2,027,683	282,898	1,744,785	616.8
Burnt River	639,491	65,691	573,800	873.5
Powder River	1,552,387	268,101	1,284,886	479.3
Pine Creek	97,522	36,595	60,927	166.5
Imnaha River	206,378	10,885	195,493	.....
Grande Ronde River	471,426	82,011	389,425	474.8
Other tributaries of Snake River	34,492	[2] 18,672	15,820	84.7
Walla Walla River	280,934	4,885	276,049	.....
Umatilla River	4,308,892	61,430	4,247,462	.....
Willow Creek	60,139	20,375	39,764	195.2
John Day River	510,248	129,060	399,188	325.0
Deschutes River	5,078,636	138,755	4,939,881	.....
Hood River	807,269	54,000	753,269	.....
Willamette River	100,561	3,240	97,321	.....
Other tributaries of Columbia River	228,587	[2] 7,683	220,904	.....
Rogue River and tributaries	1,783,989	147,223	1,636,766	.....
Rogue River direct	165,665	7,540	158,125	.....
Little Butte Creek	604,794	10,490	594,304	.....
Bear Creek	615,878	20,895	594,983	.....
Evans Creek	40,836	2,675	38,161	.....
Applegate River	180,894	60,325	120,569	199.9
Illinois River	87,966	27,748	60,218	217.0
Other tributaries of Rogue River	87,956	[2] 17,550	70,406	401.2
Klamath River and tributaries	3,811,932	247,560	3,564,372	.....
Klamath River direct	43,141	1,100	42,041	.....
Lost River	3,451,383	17,550	3,433,833	.....
Sprague River	32,368	26,560	5,808	21.9
Other tributaries of Klamath River	285,040	[3] 202,350	82,690	40.9
Other Pacific Ocean streams	191,200	(2)	191,200	.....
Independent streams	4,661,962	309,155	4,352,807	.....
Deep Creek	6,829	6,100	729	12.0
Donner and Blitzen River	131,750	35,400	96,350	272.2
Silver Creek	26,016	21,845	4,171	19.1
Silvies River	1,005,862	74,310	931,552	.....
Thomas Creek	6,506	5,360	1,146	21.4
Other independent streams	3,484,999	[3] 166,140	3,318,859	.....

[1] Per cent not shown when more than 1,000.
[2] Includes springs and wells.
[3] Not reported separately in 1902.

In classifying capital invested by type of enterprise (Table 12) the average capital invested per acre is not presented, for the reason that it is not possible to compute this correctly. The United States Reclamation Service supplies stored water to enterprises controlled by agencies of some of the other classes shown in the table and a part of its expenditure is properly chargeable to those lands, but it is not possible to tell how much should be so charged or how it should be distributed among the various classes.

TABLE 12.—CAPITAL INVESTED, 1920, AND COST OF OPERATION AND MAINTENANCE, 1919, CLASSIFIED BY CHARACTER OF ENTERPRISE.

[When water is pumped, cost of operation and maintenance includes cost of fuel and attendance.]

CLASS.	CAPITAL INVESTED, 1920.		OPERATION AND MAINTENANCE, 1919.	
	Amount.	Per cent of total.	Area for which cost is reported (acres).	Average cost per acre.[1]
Total	$28,929,151	100.0	801,891	$1.19
Individual and partnership	6,584,382	22.8	463,527	0.95
Cooperative	3,143,698	10.8	157,111	1.69
Irrigation district	6,313,753	21.8	72,535	1.56
Carey Act	3,231,298	11.2	30,665	2.26
Commercial	3,281,034	11.3	18,638	2.47
U. S. Reclamation Service	5,956,950	20.6	54,981	1.85
U. S. Indian Service	230,038	0.8	4,000	1.00
State	16,107	0.1	.....	.....
City	171,068	0.6	330	18.39
Other	823	(2)	104	0.44

[1] Based on area irrigated in 1919. [2] Less than one-tenth of 1 per cent.

DRAINAGE OF IRRIGATED LAND.

The acreages reported in Table 13 relate to lands within the boundaries of irrigation projects, and do not include lands within the vicinity of these projects.

TABLE 13.—ACREAGE WITHIN IRRIGATION ENTERPRISES FOR WHICH DRAINS HAVE BEEN INSTALLED AND ADDITIONAL ACREAGE IN NEED OF DRAINAGE: 1920.

Number of enterprises reporting land drained or needing drainage	176
Acreage included in enterprises reporting land drained or needing drainage	347,750
Acreage for which drains have been installed	93,799
Additional acreage needing drainage	46,115
Per cent that acreage for which drains have been installed is of total acreage included in enterprises reporting drainage	27.0
Per cent that acreage for which drains have been installed is of total acreage included in irrigation enterprises in the state	4.9
Per cent that acreage for which drains have been installed plus that needing drainage is of total acreage included in irrigation enterprises in the state	7.3

QUANTITY OF WATER USED.

The quantity of water used in 1919 was reported on only part of the irrigation schedules, and the figures given vary greatly. Those representing estimates are reported separately in Table 14.

TABLE 14.—QUANTITY OF WATER USED IN 1919.

ITEM.	Total.	Measured.	Not measured.
Average volume of water entering canals, second-feet	8,311	2,926	5,385
Area irrigated in 1919 ..... acres	446,014	180,022	265,992
Average number of acres per second-foot	54	62	49
Total quantity of water entering canals, acre-feet	2,237,727	1,016,713	1,221,014
Area irrigated in 1919 ..... acres	498,843	212,100	286,743
Average quantity per acre ..... acre-feet	4.5	4.8	4.3
Total quantity of water delivered ..... acre-feet	458,880	159,035	299,845
Area irrigated in 1919 ..... acres	206,448	109,326	97,122
Average quantity per acre ..... acre-feet	2.2	1.5	3.1

IRRIGATION WORKS.

TABLE 15.—IRRIGATION WORKS, CLASSIFIED BY DATE OF BEGINNING.

DATE OF BEGINNING.	Number of diverting dams.	Number of storage dams.	MAIN DITCHES.			LATERAL DITCHES.		RESERVOIRS.	
			Number.	Capacity (second-feet).	Length (miles).	Number.	Length (miles).	Number.	Capacity (acre-feet).
Total	3,285	309	5,252	28,897	7,115	2,784	1,956	266	1,905,937
Before 1860	50	1	76	154	168	12	19	2	2
1860–1869	188	6	295	925	407	111	62	7	97
1870–1879	362	12	662	3,808	757	302	163	8	18,774
1880–1889	839	79	1,155	4,060	1,443	450	238	32	2,370
1890–1899	526	45	754	3,532	985	538	302	39	40,134
1900–1904	330	26	520	3,752	806	265	179	24	184,578
1905–1909	240	35	386	5,590	741	287	558	49	1,308,879
1910–1914	209	43	486	3,297	742	248	216	41	52,639
1915–1919	195	33	395	2,648	635	204	195	48	296,449
Not reported	336	31	527	611	504	269	33	16	315

DATE OF BEGINNING.	Pipe lines, length (miles).	FLOWING WELLS.		PUMPED WELLS.		PUMPING PLANTS.			
		Number.	Capacity (gallons per minute).	Number.	Capacity (gallons per minute).	Number.	Engine capacity (horse-power).	Pumps.	
								Number.	Capacity (gallons per minute).
Total	159.6	65	11,968	208	47,026	573	13,769	614	600,045
Before 1860	2.3					1	8	1	700
1860–1869	4.5					3	55	3	60
1870–1879	13.6			1	110	6	40	6	1,050
1880–1889	6.7	14	137	1	800	6	554	7	47,300
1890–1899	23.3	17	10,053	3	557	14	181	14	5,625
1900–1904	36.5	4	572	14	2,095	27	419	28	18,320
1905–1909	20.6	15	405	38	9,280	82	1,601	86	44,357
1910–1914	28.5	8	225	75	19,029	173	7,250	183	231,708
1915–1919	20.1	5	574	54	8,060	198	3,563	201	182,794
Not reported	3.5	2		22	7,095	63	658	74	44,351

TABLE 16.—IRRIGATION WORKS, CLASSIFIED BY CHARACTER OF ENTERPRISE: 1920.

CLASS.	Number of diverting dams.	Number of storage dams.	MAIN DITCHES.			LATERAL DITCHES.		RESERVOIRS.	
			Number.	Capacity (second-feet).	Length (miles).	Number.	Length (miles).	Number.	Capacity (acre-feet).
Total	3,285	309	5,252	28,897	7,115	2,784	1,956	266	1,905,937
Individual and partnership	3,095	266	4,957	13,531	5,389	1,880	748	231	317,273
Cooperative	145	24	213	6,246	924	600	385	16	228,471
Irrigation district	16	9	39	2,145	347	70	246	9	719,700
Carey Act	5	2	9	2,665	139	14	64		
Commercial	12	6	15	1,279	189	35	163	7	122,850
U. S. Reclamation Service	5	2	9	2,884	117	170	393	3	515,743
U. S. Indian Service	1		3	160	19	12	24		
State			1	8					
City	3		4	18	7				
Other	3		2	1	2	3	1		

CLASS.	Pipe lines, length (miles).	FLOWING WELLS.		PUMPED WELLS.		PUMPING PLANTS.			
		Number.	Capacity (gallons per minute).	Number.	Capacity (gallons per minute).	Number.	Engine capacity (horse-power).	Pumps.	
								Number.	Capacity (gallons per minute).
Total	159.6	65	11,968	208	47,026	573	13,769	614	600,045
Individual and partnership	65.8	63	11,668	200	42,101	541	6,438	552	329,349
Cooperative	12.8			6	2,925	14	2,793	25	116,955
Irrigation district	43.6					15	3,463	34	109,750
Carey Act	0.9								
Commercial	20.3	2	300	2	2,000	2	145	2	4,000
U. S. Reclamation Service	14.0								
U. S. Indian Service	0.3								
State	0.9					1	30	1	30,000
City	1.0								
Other									

TABLE 17.—IRRIGATION WORKS, CLASSIFIED BY DRAINAGE BASIN: 1920.

DRAINAGE BASIN.	Number of diverting dams.	Number of storage dams.	MAIN DITCHES.			LATERAL DITCHES.		RESERVOIRS.	
			Number.	Capacity (second-feet).	Length (miles).	Number.	Length (miles).	Number.	Capacity (acre-feet).
Total	3,285	309	5,252	28,897	7,115	2,784	1,956	266	1,905,037
Columbia River and tributaries	2,458	168	3,901	19,161	5,300	1,866	1,256	153	796,736
Columbia River direct			4	2	1			3	1
Snake River and tributaries	1,162	193	2,130	10,917	3,121	772	489	109	634,859
Snake River direct			40	330	195	9	7	1	4,743
Owyhee River	96	15	125	1,555	236	8	11	15	19,195
Malheur River	256	34	350	2,022	540	92	84	31	368,446
Burnt River	213	8	318	784	400	20	14	14	12,331
Powder River	291	19	651	3,754	1,133	287	202	37	18,484
Pine Creek	51	4	83	176	107	7	18	3	10,350
Imnaha River	34	1	36	192	73	16	13	1	200
Grande Ronde River	203	19	475	1,883	483	329	138	6	205,230
Other tributaries of Snake River	18		22	314	44	4	2	1	880
Walla Walla River	101	7	170	404	140	331	66	4	15,000
Umatilla River	139	19	229	2,097	318	201	143	4	54,700
Willow Creek	71	7	94	110	94	18	11		
John Day River	504	8	670	1,052	655	151	52	10	39,236
Deschutes River	351	25	390	4,023	768	226	333	8	52,927
Hood River	34	5	72	435	88	86	132	5	13
Willamette River	15		40	148	53	15	5	2	
Other tributaries of Columbia River	71	3	82	63	62	66	25	8	
Rogue River and tributaries	257	18	645	1,978	637	169	117	47	35,882
Rogue River direct	8		26	149	38	2	3	9	1
Little Butte Creek	13	2	58	161	108	86	50	3	5,350
Bear Creek	29	6	99	512	159	18	37	10	30,507
Evans Creek	22		34	66	41	11	3		
Applegate River	55	4	164	434	241	17	8	15	16
Illinois River	87	3	135	400	127	19	10	4	1
Other tributaries of Rogue River	43	3	129	256	123	16	6	6	7
Klamath River and tributaries	57	18	121	3,162	231	259	324	20	927,311
Klamath River direct	4		22	62	43	3			
Lost River	8	13	39	1,889	71	113	232	14	925,923
Sprague River	9	5	15	212	34	6	8	6	1,388
Other tributaries of Klamath River	36		45	999	83	137	84		
Other Pacific Ocean streams	78	8	107	238	92	39	20	5	10,005
Independent streams	425	97	478	4,358	655	451	239	41	135,103
Deep Creek	1		10	18	11				
Donner and Blitzen River	44	6	30	239	74	122	84	6	57,580
Silver Creek	24	1	24	398	39	31	2		
Silvies River	206	72	187	876	220	115	54	17	360
Thomas Creek			10	10	28			1	
Other independent streams	160	18	217	2,817	283	183	99	17	77,163

TABLE 17.—IRRIGATION WORKS, CLASSIFIED BY DRAINAGE BASIN: 1920—Continued.

DRAINAGE BASIN.	Pipe lines, length (miles).	FLOWING WELLS.		PUMPED WELLS.		PUMPING PLANTS.				
		Number.	Capacity (gallons per minute).	Number.	Capacity (gallons per minute).	Number.	Engine capacity (horsepower).	Pumps.		Average lift (feet).
								Number.	Capacity (gallons per minute).	
Total	159.6	65	11,968	208	47,026	573	13,769	614	600,045	28
Columbia River and tributaries	132.2	19	1,182	178	32,077	416	11,479	442	491,607	28
Columbia River direct	2.5			9	178	11	42	12	2,418	45
Snake River and tributaries	29.2	12	1,102	39	9,818	176	9,299	190	377,169	24
Snake River direct	14.4					46	5,594	60	185,022	31
Owyhee River	2.4	4	787	2	240	60	1,312	60	80,153	28
Malheur River	2.0			2	60	10	521	10	30,010	17
Burnt River	1.0					3	24	3	965	17
Powder River	7.9	8	315	13	4,780	14	1,601	14	60,132	33
Imnaha River	0.1					4	23	4	500	40
Grande Ronde River	1.1			20	4,268	35	169	35	10,743	12
Other tributaries of Snake River	0.3			2	595	4	25	4	695	12
Walla Walla River	23.6	1		88	19,325	90	467	93	13,425	25
Umatilla River	14.3	2		6	171	13	115	13	4,248	34
Willow Creek	0.3					1	2	1	290	12
John Day River	5.7			6	475	45	413	47	41,250	25
Deschutes River	8.5			3	386	22	764	26	36,954	38
Hood River	38.6	3	10	1	17	5	36	5	755	70
Willamette River	3.2			15	1,360	30	220	32	7,813	24
Other tributaries of Columbia River	6.3	1	70	11	336	23	122	23	1,746	52
Rogue River and tributaries	20.5	3	10,000	23	11,499	102	723	111	38,147	28
Rogue River direct	7.1			11	6,964	44	347	44	16,597	30
Little Butte Creek	0.8					1	9	1		23
Bear Creek	6.3			9	1,133	26	120	26	8,138	23
Evans Creek	0.5					5	77	5	1,175	29
Applegate River	2.1					8	93	8	3,200	26
Illinois River	1.0			2	462	7	32	8	3,087	11
Other tributaries of Rogue River	2.7	3	10,000	1	3,000	9	45	9	5,970	25
Klamath River and tributaries	3.0	1	35	2	1,600	31	1,301	36	62,475	31
Klamath River direct	1.7					14	453	15	30,775	31
Lost River	0.6			2	1,600	14	786	16	21,100	22
Other tributaries of Klamath River	0.7	1	35			3	62	5	10,600	30
Other Pacific Ocean streams	3.2	1				10	66	10	3,705	49
Independent streams	0.7	41	751	5	1,850	14	209	15	4,111	26
Deep Creek		1				1	6	2	1,000	10
Donner and Blitzen River		1	10			1		1		15
Silver Creek		1	2	2	450	3	6	3	550	15
Silvies River				2	1,200	2	26	2	1,265	22
Other independent streams	0.7	38	739	1	200	7	171	7	1,296	51

CROPS.

TABLE 18.—ACREAGE, YIELD, AND VALUE OF PRINCIPAL CROPS GROWN ON IRRIGATED LAND, AND COMPARISONS WITH TOTALS FOR THE STATE: 1919 AND 1909.

[Totals for the state, used in making comparisons, are shown in state bulletin on agriculture.]

	Crop.	Area harvested.					Quantity harvested.					
		1919		1909				1919		1909		
		Acres.	Per cent of total for state.	Acres.	Per cent of total for state.	Per cent of increase.[1]	Unit.	Amount.	Per cent of total for state.	Amount.	Per cent of total for state.	Per cent of increase.[1]
	Cereals:											
1	Corn	1,794	3.5	686	4.0	157.1	Bu	62,167	7.3	17,921	4.0	246.9
2	Oats	7,980	2.8	20,415	6.9	−60.9	Bu	235,637	2.8	896,427	8.2	−73.7
3	Winter wheat	4,511	0.6	21,059	2.8	24.9	Bu	78,649	0.5	569,942	4.6	−18.2
4	Spring wheat	21,799	8.3					387,487	11.3			
5	Barley	7,602	11.4	18,395	16.9	−58.7	Bu	216,493	15.1	565,074	23.8	−61.7
6	Rye	1,929	4.5	1,458	11.3	32.3	Bu	18,470	5.9	17,662	12.0	4.6
	Hay and forage:											
7	Timothy alone	5,340	17.4	16,297	40.6	−67.2	Tons	7,066	15.5	31,871	47.4	−77.8
8	Timothy and clover mixed	23,377	28.6	17,592	26.4	32.9	Tons	33,484	24.7	31,009	24.0	8.0
9	Clover alone	5,275	9.9	1,549	3.3	240.5	Tons	9,795	9.5	3,337	4.0	193.5
10	Alfalfa	102,469	48.6	100,623	83.6	1.8	Tons	309,206	52.2	331,515	88.3	−6.7
11	Other tame grasses	7,094	8.6	3,442	5.9	106.1	Tons	9,759	6.8	6,329	5.9	54.2
12	Small grains cut for hay	23,022	4.9	14,172	3.8	73.2	Tons	26,695	4.6	21,530	4.2	29.7
13	Annual legumes cut for hay	1,523	6.2					1,219	3.1			
14	Wild, salt, or prairie grasses	51,453	22.7	138,143	63.3	−62.8	Tons	49,792	18.6	157,100	63.1	−68.3
15	Silage crops	1,432	4.3	(2)			Tons	6,578	3.6	(2)		
	Vegetables:											
16	Potatoes	1,880	4.7	3,402	7.7	−44.7	Bu	181,986	5.1	413,167	8.6	−56.0
	Fruits:											
17	Grapes	[3] 8,525	2.4	(2)			Lbs	110,395	3.9	(2)		
18	Apples	[4] 177,789	5.4	(2)			Bu	402,912	5.8	(2)		
19	Peaches	[4] 25,953	6.3	(2)			Bu	50,692	10.0	(2)		
20	Pears	[4] 115,520	15.9	(2)			Bu	141,258	18.6	(2)		
21	Plums and prunes	[4] 21,664	0.7	(2)			Bu	36,930	1.7	(2)		
22	Cherries	[4] 6,656	1.7	(2)			Bu	7,803	2.6	(2)		

	Crop.	Average yield per acre, 1919.						Value.				
					On irrigated land.			1919		1909		
		Unit.	For state.	On non-irrigated land.	Average.	Per cent of average for state.	Per cent of average on nonirrigated land.	Amount.	Per cent of total for state.	Amount.	Per cent of total for state.	Per cent of increase.[1]
	Cereals:											
1	Corn	Bu	26.5	26.0	35.2	132.8	135.4	$102,576	7.3	$15,187	4.9	575.4
2	Oats	Bu	29.4	29.4	29.5	100.3	100.3	223,855	2.8	485,570	9.6	−53.9
3	Winter wheat	Bu	19.7	19.7	17.4	88.3	88.3	165,949	0.5	507,089	4.7	94.0
4	Spring wheat	Bu	13.0	12.6	17.8	136.9	141.3	817,598	11.3			
5	Barley	Bu	21.5	20.6	28.5	132.6	138.3	335,564	15.1	380,643	25.2	−11.8
6	Rye	Bu	7.4	7.3	9.6	129.7	131.5	38,787	5.9	14,463	10.9	168.2
	Hay and forage:											
7	Timothy alone	Tons	1.48	1.52	1.32	89.2	86.8	176,650	15.5	285,065	39.4	−38.0
8	Timothy and clover mixed	Tons	1.66	1.75	1.43	86.1	81.7	770,132	24.7	286,819	19.8	168.5
9	Clover alone	Tons	1.94	1.95	1.86	95.9	95.4	200,797	9.5	41,106	4.4	388.5
10	Alfalfa	Tons	2.81	2.62	3.02	107.5	115.3	6,493,326	52.2	2,756,875	84.2	135.5
11	Other tame grasses	Tons	1.74	1.77	1.38	79.3	78.0	175,662	6.8	61,342	5.7	186.4
12	Small grains cut for hay	Tons	1.24	1.25	1.16	93.5	92.8	560,595	4.6	228,339	4.0	156.2
13	Annual legumes for hay	Tons	1.61	1.66	0.80	49.7	48.2	24,380	3.1			
14	Wild, salt, or prairie grasses	Tons	1.18	1.24	0.97	82.2	78.2	796,672	18.6	1,056,442	62.7	−24.6
15	Silage crops	Tons	5.43	5.47	4.59	84.5	83.9	65,780	3.6	(2)		
	Vegetables:											
16	Potatoes	Bu	88.4	87.9	96.8	109.5	110.1	382,171	5.1	243,019	11.6	57.3
	Fruits:											
17	Grapes	Lbs	[5] 7.9	[5] 7.7	[5] 12.9	163.3	167.5	6,624	3.9	(2)		[6]
18	Apples	Bu	[6] 2.1	[6] 2.3	[6] 2.3	109.5	109.5	543,931	5.8	(2)		
19	Peaches	Bu	[6] 1.2	[6] 1.2	[6] 2.0	166.7	166.7	78,573	10.0	(2)		
20	Pears	Bu	[6] 1.0	[6] 1.0	[6] 1.2	120.0	120.0	226,013	18.6	(2)		
21	Plums and prunes	Bu	[6] 0.7	[6] 0.7	[6] 1.7	242.9	242.9	81,246	1.7	(2)		
22	Cherries	Bu	[6] 0.8	[6] 0.8	[6] 1.2	150.0	150.0	27,310	2.6	(2)		

[1] A minus sign (−) denotes decrease.
[2] Not reported separately in 1909.
[3] Number of vines of bearing age.
[4] Number of trees of bearing age.
[5] Yield per vine.
[6] Yield per tree.

COUNTY TABLE.—ACREAGE IRRIGATED, 1919 AND 1909; AND ACREAGE IN ENTERPRISES, IRRIGATION WORKS, AND CAPITAL INVESTED IN IRRIGATION ENTERPRISES, 1920 AND 1910.

[A minus sign (—) denotes decrease. Per cent not shown when base is less than 100.]

		THE STATE.	Baker.	Crook.[2]	Deschutes[2]	Douglas.	Gilliam.	Grant.
1	Number of all farms in 1920	30,206	1,509	591	731	2,275	454	728
2	Number of farms irrigated in 1919	5,134	1,102	391	530	78	53	364
3	Per cent of all farms	18.2	73.0	33.7	73.2	3.4	11.7	50.0
4	Number of farms irrigated in 1909	6,009	1,051	546	.....	132	51	341
5	Per cent of increase, 1909-1919	37.3	4.9	.....	.....	—40.9	.....	6.7
	LAND AND FARM AREA.							
6	Approximate land area ... acres	81,188,480	1,973,040	1,877,760	1,961,600	3,194,240	788,640	2,592,000
7	All land in farms ... acres	13,542,318	493,145	554,360	144,979	566,305	486,941	750,160
8	Improved land in farms ... acres	4,913,851	163,317	93,957	51,744	136,553	259,602	74,729
9	Area irrigated in 1919 ... acres	996,162	171,490	42,708	57,293	1,991	3,298	32,409
10	Per cent of improved land in farms	20.1	105.0	45.5	110.7	1.4	1.3	43.4
11	Area irrigated in 1909 ... acres	946,129	129,873	55,800	.....	1,798	2,087	26,069
12	Per cent of increase, 1909-1919	43.7	32.2	.....	.....	11.3	58.0	—19.1
13	Area enterprises were capable of irrigating in 1920 ... acres	1,344,048	218,671	52,757	106,246	3,328	3,810	38,728
14	Area enterprises were capable of irrigating in 1910 ... acres	830,526	136,914	111,360	.....	4,509	2,267	38,651
15	Per cent of increase, 1910-1920	61.8	60.8	.....	.....	—26.0	68.0	0.3
16	Area included in enterprises in 1920 ... acres	1,925,987	239,361	62,449	176,387	8,370	4,621	42,079
17	Area included in enterprises in 1910 ... acres	2,527,208	241,919	453,811	.....	9,349	3,379	73,578
18	Per cent of increase, 1910-1920	—23.8	7.2	.....	.....	—10.5	37.1	—42.8
19	Area of irrigated land reported as available for settlement ... acres	98,609	2,002	1,278	29,675	.....	.....	.....
	IRRIGATION WORKS.							
	Independent enterprises:							
20	Number, 1920	4,710	825	158	38	93	32	289
21	Number, 1910	3,715	566	202	.....	197	48	319
	Main ditches:							
22	Number, 1920	5,232	659	212	35	98	51	512
23	Number, 1910	3,582	606	217	.....	86	47	306
24	Length, 1920 ... miles	7,113	1,461	313	255	87	60	516
25	Length, 1910 ... miles	5,539	1,175	504	.....	79	54	519
26	Capacity, 1920 ... second-feet	28,897	3,925	734	2,898	234	64	801
27	Capacity, 1910 ... second-feet	39,686	7,691	2,997	.....	329	202	1,771
	Laterals:							
28	Number, 1920	2,784	392	97	93	28	19	90
29	Number, 1910	2,518	313	222	.....	31	66	149
30	Length, 1920 ... miles	1,956	201	111	142	20	5	41
31	Length, 1910 ... miles	2,052	399	340	.....	8	33	37
	Reservoirs:							
32	Number, 1920	266	33	3	4	4	1	8
33	Number, 1910	271	72	11	.....	4	4	5
34	Capacity, 1920 ... acre-feet	1,905,037	26,145	47,101	5,123	10,005	.....	26,896
35	Capacity, 1910 ... acre-feet	1,024,266	100,998	11,856	.....	5	2	8
	Flowing wells:							
36	Number, 1920	65	8	.....	.....	1	.....	.....
37	Number, 1910	51	3	.....	.....	.....	.....	.....
38	Capacity, 1920 ... gallons per minute	11,998	315	.....	.....	.....	.....	.....
39	Capacity, 1910 ... gallons per minute	3,035	19	.....	.....	.....	.....	.....
	Pumped wells:							
40	Number, 1920	298	13	2	.....	.....	1	1
41	Number, 1910	92	5	.....	.....	.....	4	1
42	Capacity, 1920 ... gallons per minute	47,026	4,780	371	.....	.....	20	20
43	Capacity, 1910 ... gallons per minute	20,893	1,003	.....	.....	.....	66	35
	Pumping plants:							
44	Number, 1920	573	19	11	1	9	8	2
45	Number, 1910	229	8	3	.....	3	10	1
46	Engine capacity, 1920 ... horsepower	13,799	1,668	430	200	36	41	12
47	Engine capacity, 1910 ... horsepower	3,095	139	512	.....	13	48	1
48	Pump capacity, 1920 ... gallons per minute	600,045	71,207	23,121	7,500	3,225	1,710	22,510
49	Pump capacity, 1910 ... gallons per minute	118,514	5,964	5,548	.....	583	2,621	35
50	Average lift, 1920 ... feet	28	31	32	120	54	21	28
	CAPITAL INVESTED.							
51	Capital invested to Jan. 1, 1920 ... dollars	28,929,151	2,153,639	1,799,917	2,758,084	186,894	119,909	281,332
52	Capital invested to July 1, 1910 ... dollars	12,760,214	1,468,334	1,861,817	.....	78,127	32,939	241,086
53	Per cent of increase, 1910-1920	126.7	46.9	.....	.....	141.8	268.0	8.4
54	Average cost per acre based on area enterprises were capable of supplying with water in 1920 ... dollars	21.52	9.85	33.99	25.96	56.78	29.11	6.75
55	Average cost per acre based on area enterprises were capable of supplying with water in 1910 ... dollars	15.36	10.63	17.62	.....	17.36	13.88	6.24
	ESTIMATED FINAL COST.							
56	Estimated final cost of existing enterprises in 1920 ... dollars	41,585,742	2,941,589	2,115,042	4,747,115	294,994	111,409	266,507
57	Estimated final cost of existing enterprises in 1910 ... dollars	39,234,619	5,272,363	4,842,062	.....	78,127	32,939	250,986
58	Per cent of increase, 1910-1920	6.0	—44.2	.....	.....	277.6	239.6	6.2
59	Average cost per acre based on estimated final cost and area included in enterprises in 1920 ... dollars	21.59	11.34	33.87	26.91	35.24	24.11	6.33
60	Average cost per acre based on estimated final cost and area included in enterprises in 1910 ... dollars	15.52	21.79	19.87	.....	8.36	9.74	3.41

[1] Part of Union County annexed in 1902.

[2] Parts of Crook County were taken to form Jefferson County in 1915 and Deschutes County in 1916.

COUNTY TABLE.—ACREAGE IRRIGATED, 1919 AND 1909; AND ACREAGE IN ENTERPRISES, IRRIGATION WORKS, AND CAPITAL INVESTED IN IRRIGATION ENTERPRISES, 1920 AND 1910—Continued.

[A minus sign (—) denotes decrease.]

		Harney.	Hood River.[1]	Jackson.	Jefferson.[2]	Josephine.	Klamath.	Lake.
1	Number of all farms in 1920	569	878	1,726	572	727	992	549
2	Number of farms irrigated in 1919	295	811	754	53	419	508	256
3	Per cent of all farms	50.1	92.4	43.8	9.3	57.6	51.2	46.6
4	Number of farms irrigated in 1909	256	464	426	.....	401	266	198
5	Per cent of increase, 1909-1919	15.2	74.8	77.0	.....	4.5	91.0	29.3
	LAND AND FARM AREA.							
6	Approximate land area ... acres	6,357,120	345,600	1,788,160	1,138,560	1,047,680	3,839,360	5,068,800
7	All land in farms ... acres	524,678	38,075	312,936	440,926	97,299	357,333	526,218
8	Improved land in farms ... acres	176,934	19,664	92,310	132,812	29,537	152,742	183,396
9	Area irrigated in 1919 ... acres	119,429	19,765	24,602	3,320	14,903	90,993	99,220
10	Per cent of improved land in farms	67.5	100.5	26.0	2.5	50.5	59.6	54.1
11	Area irrigated in 1909 ... acres	129,135	8,071	12,239	.....	12,866	46,975	57,078
12	Per cent of increase, 1909-1919	—7.5	144.9	96.1	.....	15.8	93.7	73.8
13	Area enterprises were capable of irrigating in 1920 ... acres	157,568	21,101	34,931	3,943	18,294	135,449	149,467
14	Area enterprises were capable of irrigating in 1910 ... acres	136,621	14,150	17,978	.....	14,503	62,785	59,612
15	Per cent of increase, 1910-1920	15.3	49.1	94.3	.....	26.1	115.7	150.7
16	Area included in enterprises in 1920 ... acres	224,391	39,660	107,195	6,171	25,127	239,478	183,997
17	Area included in enterprises in 1910 ... acres	561,548	48,964	82,427	.....	24,059	208,105	273,546
18	Per cent of increase, 1910-1920	—60.1	—19.0	30.0	.....	4.4	15.1	—32.7
19	Area of irrigated land reported as available for settlement ... acres	2,000	15,060	2,200	.....	394	2,000	.....
	IRRIGATION WORKS.							
	Independent enterprises:							
20	Number, 1920	328	77	345	51	309	90	149
21	Number, 1910	238	75	276	.....	269	52	171
	Main ditches:							
22	Number, 1920	299	72	363	62	292	115	153
23	Number, 1910	143	61	245	.....	221	42	133
24	Length, 1920 ... miles	*413	88	537	82	311	237	267
25	Length, 1910 ... miles	306	86	305	.....	220	162	247
26	Capacity, 1920 ... second-feet	1,752	435	1,048	117	952	3,135	2,767
27	Capacity, 1910 ... second-feet	1,826	369	1,748	.....	931	2,964	2,212
	Laterals:							
28	Number, 1920	278	86	124	10	49	255	181
29	Number, 1910	227	59	53	.....	35	69	99
30	Length, 1920 ... miles	153	132	100	3	20	321	98
31	Length, 1910 ... miles	151	68	57	.....	17	160	54
	Reservoirs:							
32	Number, 1920	32	5	23	1	24	14	17
33	Number, 1910	28	13	25	.....	19	8	17
34	Capacity, 1920 ... acre-feet	132,765	13	35,871	700	11	926,361	77,513
35	Capacity, 1910 ... acre-feet	363,140	5	45,907	.....	7	181,274	64,901
	Flowing wells:							
36	Number, 1920	32	3	.....	.....	3	1	9
37	Number, 1910	25	.....	2	.....	1	20	.....
38	Capacity, 1920 ... gallons per minute	179	10	.....	.....	10,000	35	572
39	Capacity, 1910 ... gallons per minute	54	.....	225	.....	17	2,720	.....
	Pumped wells:							
40	Number, 1920	5	1	12	1	11	2	1
41	Number, 1910	1	1	14	.....	11	.....	.....
42	Capacity, 1920 ... gallons per minute	1,650	17	10,133	15	1,366	1,600	200
43	Capacity, 1910 ... gallons per minute	400	100	5,533	.....	2,200	.....	.....
	Pumping plants:							
44	Number, 1920	9	5	51	6	51	31	6
45	Number, 1910	2	2	21	.....	32	2	.....
46	Engine capacity, 1920 ... horsepower	38	26	345	9	378	1,303	171
47	Engine capacity, 1910 ... horsepower	10	10	165	.....	168	224	.....
48	Pump capacity, 1920 ... gallons per minute	1,815	755	18,410	240	19,737	62,475	2,296
49	Pump capacity, 1910 ... gallons per minute	496	231	19,086	.....	9,881	9,720	.....
50	Average lift, 1920 ... feet	18	70	28	10	24	26	44
	CAPITAL INVESTED.							
51	Capital invested to Jan. 1, 1920 ... dollars	1,280,776	807,142	1,462,938	84,300	265,575	3,802,551	3,504,761
52	Capital invested to July 1, 1910 ... dollars	410,980	361,714	457,936	.....	239,327	1,910,580	769,906
53	Per cent of increase, 1910-1920	211.6	123.1	219.5	.....	11.0	99.0	355.2
54	Average cost per acre based on area enterprises were capable of supplying with water in 1920 ... dollars	8.13	38.25	41.88	21.38	14.52	28.07	23.45
55	Average cost per acre based on area enterprises were capable of supplying with water in 1910 ... dollars	3.01	25.56	25.47	.....	16.50	30.43	12.92
	ESTIMATED FINAL COST.							
56	Estimated final cost of existing enterprises in 1920 ... dollars	2,036,296	1,174,817	4,807,783	85,943	285,645	5,566,847	3,896,381
57	Estimated final cost of existing enterprises in 1910 ... dollars	2,501,989	392,214	1,770,936	.....	239,327	5,110,580	7,338,681
58	Per cent of increase, 1910-1920	—18.6	199.5	171.5	.....	19.4	8.9	—46.9
59	Average cost per acre based on estimated final cost and area included in enterprises in 1920 ... dollars	9.08	29.62	44.85	13.93	11.37	23.25	21.18
60	Average cost per acre based on estimated final cost and area included in enterprises in 1910 ... dollars	4.46	8.01	21.48	.....	9.95	24.56	26.83

[1] Organized from part of Wasco County in 1908.

[2] Organized from part of Crook County in 1915.

COUNTY TABLE.—ACREAGE IRRIGATED, 1919 AND 1909; AND ACREAGE IN ENTERPRISES, IRRIGATION WORKS, AND CAPITAL INVESTED IN IRRIGATION ENTERPRISES, 1920 AND 1910—Continued.

[A minus sign (—) denotes decrease. Per cent not shown when base is less than 100.]

		Malheur.	Morrow.	Umatilla.	Union.[1]	Wallowa.	Wasco.[2]	Wheeler.	All other counties.
1	Number of all farms in 1920	1,322	692	2,353	1,279	1,149	1,339	339	29,498
2	Number of farms irrigated in 1919	946	191	1,129	469	427	267	137	24
3	Per cent of all farms	71.6	27.6	48.5	36.7	37.2	19.9	38.2	0.1
4	Number of farms irrigated in 1909	622	143	695	432	295	88	194	90
5	Per cent of increase, 1909-1919	52.1	33.6	67.7	8.6	45.7	.....	—25.5	.....
	LAND AND FARM AREA.								
6	Approximate land area ....acres..	6,325,120	1,296,000	2,949,920	1,284,480	2,028,160	1,499,520	1,090,560	15,359,360
7	All land in farms ....acres..	465,851	781,613	1,075,490	441,735	524,929	728,226	485,178	3,746,331
8	Improved land in farms ....acres..	129,365	290,290	631,660	178,921	141,404	213,553	40,164	1,732,757
9	Area irrigated in 1919 ....acres..	109,463	10,691	56,050	52,183	52,445	9,382	7,475	7,492
10	Per cent of improved land in farms	84.6	3.5	9.0	29.9	37.1	4.4	18.6	0.4
11	Area irrigated in 1909 ....acres..	67,626	7,541	31,022	35,831	39,370	5,793	6,253	982
12	Per cent of increase, 1909-1919	61.9	35.0	80.7	48.4	33.2	64.5	19.5	653.8
13	Area enterprises were capable of irrigating in 1920 ....acres..	143,286	15,561	91,543	61,444	56,601	13,611	5,692	9,015
14	Area enterprises were capable of irrigating in 1910 ....acres..	79,219	8,116	50,213	37,260	42,855	5,989	6,985	1,379
15	Per cent of increase, 1910-1920	80.9	91.7	82.3	64.9	32.1	127.3	24.5	553.7
16	Area included in enterprises in 1920 ....acres..	219,475	19,941	104,015	89,414	64,513	48,742	11,995	9,886
17	Area included in enterprises in 1910 ....acres..	208,025	14,997	94,169	45,517	54,692	17,276	9,414	102,502
18	Per cent of increase, 1910-1920	5.5	33.5	10.5	52.5	18.0	182.1	16.9	—90.6
19	Area of irrigated land reported as available for settlement ..acres..	10,000	.....	6,000	.....	.....	34,000	.....	.....
	IRRIGATION WORKS.								
	Independent enterprises:								
20	Number, 1920	354	199	497	311	239	148	158	101
21	Number, 1910	330	121	281	225	160	79	164	86
	Main ditches:								
22	Number, 1920	496	110	375	362	295	144	185	62
23	Number, 1910	311	148	278	164	144	83	206	51
24	Length, 1920 ....miles..	920	124	416	404	337	160	179	48
25	Length, 1910 ....miles..	645	123	350	255	249	62	164	40
26	Capacity, 1920 ....second-feet..	4,013	551	1,932	1,381	1,398	328	271	161
27	Capacity, 1910 ....second-feet..	4,168	542	2,267	7,062	1,913	199	490	164
	Laterals:								
28	Number, 1920	86	50	507	197	160	90	40	26
29	Number, 1910	271	94	263	159	62	106	64	64
30	Length, 1920 ....miles..	82	45	175	97	87	99	16	5
31	Length, 1910 ....miles..	350	27	254	87	56	26	15	2
	Reservoirs:								
32	Number, 1920	43	.....	8	1	7	10	1	7
33	Number, 1910	42	2	19	1	1	2	1	3
34	Capacity, 1920 ....acre-feet..	217,979	.....	69,790	20	205,490	1	2,400	3
35	Capacity, 1910 ....acre-feet..	188,443	1	54,154	1	12,500	1	1,120	3
	Flowing wells:								
36	Number, 1920	4	.....	3	.....	.....	1	.....	.....
37	Number, 1910	.....	.....	.....	.....	.....	.....	.....	.....
38	Capacity, 1920 ....gallons per minute..	787	.....	.....	.....	.....	70	.....	.....
39	Capacity, 1910 ....gallons per minute..	.....	.....	.....	.....	.....	.....	.....	.....
	Pumped wells:								
40	Number, 1920	5	.....	94	20	.....	20	.....	19
41	Number, 1910	.....	3	29	12	.....	5	.....	7
42	Capacity, 1920 ....gallons per minute..	835	.....	19,496	4,203	.....	516	.....	1,794
43	Capacity, 1910 ....gallons per minute..	.....	220	7,892	2,045	.....	450	.....	930
	Pumping plants:								
44	Number, 1920	117	2	103	34	5	41	21	41
45	Number, 1910	29	4	39	22	2	15	6	28
46	Engine capacity, 1920 ....horsepower..	7,409	22	582	186	26	273	299	316
47	Engine capacity, 1910 ....horsepower..	410	24	259	96	56	169	49	707
48	Pump capacity, 1920 ....gallons per minute..	294,620	1,700	23,671	10,578	665	8,974	14,195	19,831
49	Pump capacity, 1910 ....gallons per minute..	26,513	1,125	10,849	4,136	850	3,856	4,940	12,089
50	Average lift, 1920 ....feet..	27	18	26	12	32	49	21	26
	CAPITAL INVESTED.								
51	Capital invested to Jan. 1, 1920 ....dollars..	4,057,273	1,393,045	3,309,599	260,912	497,791	488,627	159,590	293,396
52	Capital invested to July 1, 1910 ....dollars..	2,692,636	187,716	2,019,161	136,204	198,064	96,167	76,305	103,945
53	Per cent of increase, 1910-1920	99.6	642.1	63.9	91.6	151.3	408.0	109.1	183.9
54	Average cost per acre based on area enterprises were capable of supplying with water in 1920 ....dollars..	28.32	89.52	36.15	4.25	8.79	35.75	18.38	32.55
55	Average cost per acre based on area enterprises were capable of supplying with water in 1910 ....dollars..	25.66	23.13	40.21	3.66	4.62	16.06	10.93	74.94
	ESTIMATED FINAL COST.								
56	Estimated final cost of existing enterprises in 1920 ....dollars..	4,835,543	1,628,878	4,428,916	262,522	616,531	998,752	167,495	314,746
57	Estimated final cost of existing enterprises in 1910 ....dollars..	5,057,171	187,716	2,593,287	136,204	211,114	96,167	76,305	3,028,370
58	Per cent of increase, 1910-1920	—4.4	767.7	70.8	92.7	193.0	938.6	119.5	—89.6
59	Average cost per acre based on estimated final cost and area included in enterprises in 1920 ....dollars..	22.03	81.68	42.56	3.78	9.59	20.49	15.22	32.49
60	Average cost per acre based on estimated final cost and area included in enterprises in 1910 ....dollars..	24.31	12.57	27.54	2.99	3.86	5.57	8.11	25.94

[1] Part annexed to Baker County in 1902.

[2] Part taken to form Hood River County in 1908.

SOUTH DAKOTA.

INTRODUCTION.

The following pages present the statistics of irrigation for the state of South Dakota collected at the census of 1920. Statistics of acreage irrigated, of acreage, yield, and value of crops grown on irrigated land, and of cost of operation and maintenance relate to the year 1919; other items relate to the year 1920. Throughout the report figures for the census of 1910 are given for purposes of comparison; and, for the purpose of showing the historical development of irrigation, items which have been reported in censuses previous to 1910 are presented.

Statistics of number of farms irrigated and of acreage, yield, and value of crops grown on irrigated land were collected in the general census of agriculture. All other statistics were obtained in a special canvass of irrigation enterprises.

TABLE 1.—SUMMARY FOR THE STATE: 1920 AND 1910.

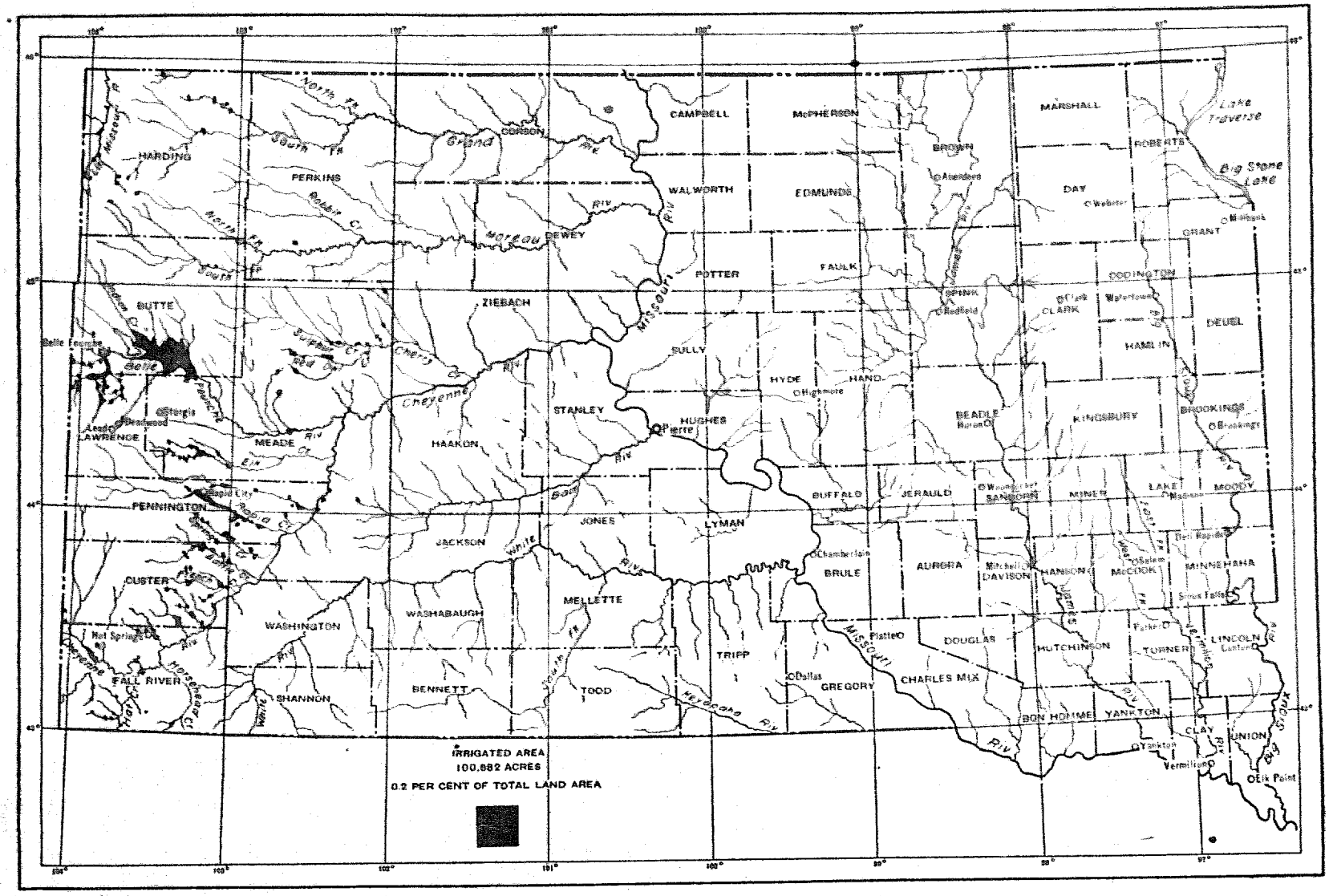
ITEM.	CENSUS OF—		INCREASE.[1]	
	1920	1910	Amount.	Per cent.
Number of all farms	74,637	77,644	−3,007	−3.9
Approximate land area of the state ... acres	49,195,520	49,195,520	.....	.....
All land in farms ... acres	34,636,491	26,016,892	8,619,599	33.1
Improved land in farms ... acres	18,199,250	15,827,208	2,372,042	15.0
Number of farms irrigated	1,198	500	698	139.6
Area irrigated ... acres	100,682	63,248	37,434	59.2
Area enterprises were capable of irrigating ... acres	150,914	128,481	22,433	17.5
Area included in enterprises ... acres	188,382	201,625	−13,243	−6.6
Per cent irrigated:				
Number of all farms	1.6	0.6	1.0	.....
Approximate land area of the state	0.2	0.1	0.1	.....
Land in farms	0.3	0.2	0.1	.....
Improved land in farms	0.6	0.4	0.2	.....
Excess of area enterprises were capable of irrigating over area irrigated ... acres	50,232	65,233	−15,001	−23.0
Excess of area included in enterprises over area irrigated ... acres	87,700	138,377	−50,677	−36.6
Capital invested	$5,465,248	$3,043,140	$2,422,108	79.6
Average per acre enterprises were capable of irrigating	$36.21	$23.69	$12.52	52.8
Estimated final cost of existing enterprises	$5,500,748	$3,800,556	$1,700,192	44.7
Average per acre included in enterprises	$29.20	$18.85	$10.35	54.9
Average cost of operation and maintenance per acre	$1.26	$0.64	$0.62	96.9
IRRIGATION WORKS.				
Number of enterprises	292	395	−103	−26.1
Number of main ditches	370	348	22	6.3
Length of main ditches ... miles	653	631	22	3.5
Capacity of main ditches ... second-feet	5,427	3,598	1,829	50.8
Number of lateral ditches	632	332	300	90.4
Length of lateral ditches ... miles	605	625	−20	−3.2
Number of reservoirs	119	314	−195	−62.1
Capacity of reservoirs ... acre-feet	212,264	216,205	−3,941	−1.8
Number of flowing wells	4	42	−38	.....
Capacity of flowing wells ... gallons per minute	2,750	14,382	−11,632	−80.9
Number of pumped wells	1	4	−3	.....
Capacity of pumped wells ... gallons per minute	800	24	776	.....
Number of pumping plants	25	8	17	.....
Engine capacity ... horsepower	498	63	435	.....
Pump capacity ... gallons per minute	23,320	5,289	18,031	340.9
Average lift ... feet	21	(2)	21	.....

[1] A minus sign (−) denotes decrease. Per cent not shown when base is less than 100.

[2] Not reported in 1910.

SOUTH DAKOTA

Approximate Location and Extent of Irrigated Land



CLIMATIC CONDITIONS.

South Dakota lies in the semiarid region, the normal annual precipitation at the eastern border being between 20 and 25 inches, and at the western border about 15 inches. For the western half of the state it averages about 17 inches, and more than 80 per cent of this occurs during the growing season. In the Black Hills the precipitation is higher than in the surrounding territory, but in that section there is little arable land.

The average precipitation for the state in 1919 was slightly above normal, but in the north central and northwestern parts of the state there was a deficiency during the latter part of the growing season.

Crops are grown throughout the state without irrigation, but in the extreme western counties considerable areas are irrigated.

WATER SUPPLY FOR IRRIGATION.

The streams of western South Dakota are all tributaries of the Missouri, which flows across the state from north to south about midway of the state.

The Little Missouri flows across the northwest corner of the state, in a northerly direction. It is a typical plains stream with a flood flow in early summer and a very limited supply of water in the late summer.

The Belle Fourche rises in eastern Wyoming and flows into South Dakota around the northern base of the Black Hills and discharges into Cheyenne River. It receives many tributaries from the Black Hills as well as from the north. The United States Reclamation Service has built a large reservoir near the town of Belle Fourche to store flood waters. This reservoir supplies water to more than half of the irrigated land in the state.

Cheyenne River also rises in eastern Wyoming and flows into South Dakota. It skirts the southern base of the Black Hills, from which it receives many tributaries. Proposals for storing the flood waters of this stream, as has been done on the Belle Fourche, have been investigated, but they have not been carried out.

White River lies south of the Cheyenne and Moreau River lies north of the Cheyenne. These are plains streams that supply little water in late summer, and have been little used for irrigation. Here, as on the other streams, water is available for storage, if economically feasible projects can be found.

In western South Dakota there are many drainage channels that carry water only after storms or when snows are melting, and the state has enacted laws to encourage the construction of reservoirs in such channels to store water for irrigation.

South Dakota has many artesian wells, but most of these are in the valleys of the Missouri and the James where rainfall is sufficient for the growing of crops.

FARMS AND ACREAGE IRRIGATED.

TABLE 2.—NUMBER OF FARMS AND ACREAGE IRRIGATED: 1890 TO 1920.

CENSUS YEAR.	FARMS IRRIGATED.			AREA IRRIGATED.				
	Number.	Per cent of increase.[1]	Per cent of all farms.	Acres.	Per cent of increase.	Per cent of total land area.	Per cent of land in farms.	Per cent of improved land in farms.
1920	1,196	139.6	1.6	100,682	59.2	0.2	0.3	0.6
1910	500	−17.5	0.6	63,248	44.8	0.1	0.2	0.4
1900	606	220.6	1.2	43,676	177.9	0.1	0.2	0.4
1890	189	.....	0.4	15,717	.....	(2)	0.1	0.2

[1] A minus sign (−) denotes decrease.
[2] Less than one-tenth of 1 per cent.

TABLE 3.—ACREAGE, CLASSIFIED BY DATE OF BEGINNING OF ENTERPRISES SUPPLYING WATER FOR IRRIGATION.

DATE OF BEGINNING.	Number of enterprises.	Area included in enterprises, 1920 (acres).	AREA IRRIGATED IN 1919.		Area enterprises were capable of irrigating in 1920 (acres).
			Acres.	Per cent of acreage in enterprises.	
Total	292	188,382	100,682	53.4	150,914
1870-1879	22	14,495	11,362	78.6	12,435
1880-1889	43	17,692	11,441	64.7	13,215
1890-1899	39	7,906	2,965	37.5	5,391
1900-1904	35	104,773	58,579	55.9	87,539
1905-1909	80	21,791	8,927	41.0	18,368
1910-1914	51	13,471	5,633	41.8	8,220
1915-1919	16	2,604	1,125	43.2	2,036
Not reported	15	5,650	718	12.7	3,219

TABLE 4.—ACREAGE, CLASSIFIED BY SOURCE OF WATER SUPPLY: 1919 AND 1909.

CLASS.	AREA IRRIGATED (ACRES).				Area enterprises were capable of irrigating in 1920 (acres).	Area included in enterprises, 1920 (acres).
	1919	1909	Increase.[1]			
			Amount.	Per cent.		
Total	100,682	63,248	37,434	59.2	150,914	188,382
Streams, gravity	92,493	47,122	45,369	96.3	139,476	166,199
Streams, pumped	889	540	329	60.9	3,211	4,308
Wells, pumped	.....	8	−8	−100.0	.....	.....
Wells, flowing	130	1,448	−1,318	−91.0	130	250
Lakes, gravity	170	200	−30	−15.0	300	520
Springs	326	395	−69	−17.5	326	956
Stored storm water	2,312	13,535	−11,223	−82.9	7,652	11,907
Streams, gravity, and pumped wells	500	(2)	500	.....	1,000	1,000
Streams, gravity, and flowing wells	20	(2)	20	.....	40	160
Other mixed	3,804	(2)	3,804	.....	7,779	9,162

[1] A minus sign (−) denotes decrease. [2] Not included in classification in 1910.

ACREAGE, BY CHARACTER OF ENTERPRISE.

Early legislation in South Dakota relating to organization for supplying water for irrigation all referred to the development of artesian wells. A law of 1890 provided for the organization of artesian well companies; another dated 1891 provided for the sinking of artesian wells by civil townships and the supplying of water for rentals; and another law passed in 1893 provided for the sinking of wells by counties, the counties bearing one-fourth of the expense, and the land benefited three-fourths. The small area reported

in Table 4 as irrigated from artesian wells indicates that these laws have not been effective, at least so far as irrigation is concerned.

An irrigation district law was enacted in 1917, but no irrigation districts were reported in 1920.

South Dakota accepted the conditions of the Federal Carey Act (act of Aug. 18, 1894) in 1909, but no Carey Act enterprises were reported in 1920.

The United States Reclamation Service has one project in the state.

TABLE 5.—ACREAGE, CLASSIFIED BY CHARACTER OF ENTERPRISE: 1920 AND 1910.

ITEM AND CLASS.	CENSUS OF—		INCREASE.[1]	
	1920	1910	Acres.	Per cent.
ACREAGE IRRIGATED.				
Total	100,682	63,248	37,434	59.2
Individual and partnership	31,664	37,684	−6,020	−16.0
Cooperative	10,080	13,601	−3,521	−25.9
Commercial	2,280	6,200	−4,020	−63.8
U. S. Reclamation Service	56,638	5,613	51,025	909.1
U. S. Indian Service	20	50	−30	−60.0
ACREAGE ENTERPRISES WERE CAPABLE OF IRRIGATING.				
Total	150,914	128,481	22,433	17.5
Individual and partnership	56,032	55,820	212	0.4
Cooperative	10,615	18,243	−7,628	−41.8
Commercial	1,600	6,800	−5,200	−76.5
U. S. Reclamation Service	82,592	47,568	35,024	73.6
U. S. Indian Service	75	50	25	50.0
ACREAGE INCLUDED IN ENTERPRISES.				
Total	188,382	201,625	−13,243	−6.6
Individual and partnership	76,683	69,971	6,712	9.6
Cooperative	11,410	22,687	−11,277	−49.7
Commercial	2,280	6,900	−4,620	−67.0
U. S. Reclamation Service	97,594	101,967	−4,033	−4.0
U. S. Indian Service	75	100	−25	−25.0

[1] A minus sign (−) denotes decrease.

ACREAGE, BY CHARACTER OF WATER RIGHTS.

The laws of South Dakota relating to water rights are summarized in the following paragraphs:

The state of South Dakota was created in 1889 from a part of Dakota territory. In 1881 Dakota territory enacted the following general declaration regarding rights to water:

"Any person or persons, corporation or company, who may have or hold a possessory right or title to any mineral or agricultural lands within the limits of this state shall be entitled to the usual enjoyment of the waters of the streams or creeks in said state for mining, milling, agricultural, or domestic purposes; provided, that the right to such use shall not interfere with any prior right or claim to such waters when the law has been complied with in doing the necessary work." The same law provided for securing rights of way over the lands lying between the streams and the places of use, and for the posting and filing of notices of intended appropriations.

In 1905 South Dakota adopted a new water law. This law provided that "all the waters within the limits of the state from all sources of water supply belong to the public and, except as to navigable waters, are subject to appropriation for beneficial use." It created the office of state engineer, provided that parties wishing to acquire rights must apply to the engineer for permits to appropriate water; for the submitting of proof of completion of works and the issuing of certificates of completion; and for the submitting of proof of use of water and the issuing of licenses defining the rights acquired.

This law provided also that the state engineer should make surveys and collect the information necessary for the adjudication of rights acquired previous to the passage of the act; that, on the advice of the engineer, the attorney general of the state should intervene in suits relating to water rights or initiate such suits; and that when suits were brought in the courts the courts should call on the engineer to make surveys of the streams in question at the expense of the litigants.

The supreme court of the state has held this law unconstitutional so far as it interferes with vested riparian rights and so far as it relates to participation in adjudication by the state engineer at the expense of litigants. (St. Germain Irrigating Ditch Co. v. Hawthorne Ditch Co., 32 S. D., 260.)

Under this decision riparian rights seem to be paramount in South Dakota.

TABLE 6.—ACREAGE IRRIGATED, CLASSIFIED BY CHARACTER OF RIGHTS UNDER WHICH WATER IS RECEIVED: 1919 AND 1909.

CLASS.	1919		1909, per cent of total.
	Acres.	Per cent of total.	
Total	100,682	100.0	100.0
Appropriation and use	1,774	1.8	21.2
Notice filed and posted	62,054	61.6	35.0
Adjudicated by court	7,651	7.6	14.8
Permit from state	17,500	17.4	7.4
Certificate or license from state	8,612	8.6	17.5
Riparian rights	1,509	1.6	3.6
Underground	130	0.1	(1)
Other and mixed	190	0.2	(1)
Not reported	1,172	1.2	(1)

[1] All land for which the class of water rights was not reported was included in "Appropriation and use."

ACREAGE, BY DRAINAGE BASIN.

The report of a special census taken in 1902 presented all data by drainage basins rather than by counties. The results of the census of 1920 have been tabulated on the same basis, and the data for 1902 are presented for purposes of comparison. For no other census have the results been tabulated in this form. The acreage reported for each drainage basin in 1919 comprises all the irrigated land in that drainage basin, including that watered from springs and wells. In the 1902 results the acreages irrigated from springs and wells were not reported for the smaller tributary streams, but the acreages for the tributaries were included in those reported for the main streams. This area is so small, however, that the comparison of the areas reported for the tributary streams is not seriously affected.

TABLE 7.—ACREAGE IRRIGATED, CLASSIFIED BY DRAINAGE BASIN: 1919 AND 1902.

DRAINAGE BASIN.	AREA IRRIGATED (ACRES).			Area included in enterprises, 1920 (acres).	Area enterprises were capable of irrigating in 1920 (acres).
	1919	1902	Per cent of increase.[1]		
Total	100,682	53,137	89.5	188,382	150,914
Missouri River and tributaries	100,682	53,137	89.5	188,382	150,914
Missouri River direct	.....	.....	.....	600	150
Cheyenne River[2]	99,333	49,547	100.5	176,715	143,847
Little Missouri River	640	700	−8.6	4,133	3,323
Moreau River	305	335	−9.0	3,094	1,721
Other tributaries of Missouri River	404	[3] 2,555	−84.2	3,840	1,873

[1] A minus sign (−) denotes decrease. [2] Includes Belle Fourche River.
[3] Includes springs and wells.

CAPITAL INVESTED AND COST OF OPERATION AND MAINTENANCE.

TABLE 8.—CAPITAL INVESTED IN IRRIGATION ENTERPRISES: 1890 TO 1920.

CENSUS YEAR.	Amount.	Per cent of increase.	AVERAGE PER ACRE.	
			Amount.	Per cent of increase.
1920	$5,465,248	79.6	$36.21	52.8
1910	3,043,140	968.7	23.69	263.3
1900	284,747	345.1	6.52	60.2
1890	63,968	.....	4.07	.....

TABLE 9.—CAPITAL INVESTED, CLASSIFIED BY DATE OF BEGINNING.

DATE OF BEGINNING.	Amount.	Per cent of total.	Average per acre.
Total	$5,465,248	100.0	$36.21
1870–1879	261,476	4.8	21.03
1880–1889	149,465	2.7	11.31
1890–1899	94,851	1.7	16.96
1900–1904	4,543,349	83.1	51.90
1905–1909	221,514	4.1	12.06
1910–1914	106,127	1.9	12.91
1915–1919	63,308	1.2	27.10
Not reported	25,158	0.5	7.84

TABLE 10.—CAPITAL INVESTED, 1920, AND COST OF OPERATION AND MAINTENANCE, 1919, CLASSIFIED BY SOURCE OF WATER SUPPLY.

[When water is pumped, cost of operation and maintenance includes cost of fuel and attendance.]

CLASS.	CAPITAL INVESTED, 1920.			OPERATION AND MAINTENANCE, 1919.	
	Amount.	Per cent of total.	Average per acre.	Area for which cost is reported (acres).	Average cost per acre.[1]
Total	$5,465,248	100.0	$36.21	88,329	$1.26
Streams, gravity	5,122,271	93.7	39.26	83,672	1.21
Streams, pumped	93,340	1.7	29.07	807	4.03
Wells, flowing	5,000	0.1	38.46	.....	.....
Lakes, gravity	2,100	(2)	7.00	.....	.....
Springs	18,421	0.3	56.51	31	17.74
Stored storm water	155,121	2.8	20.27	1,203	2.78
Streams, gravity, and pumped wells	3,000	0.1	3.00	.....	.....
Streams, gravity, and flowing wells	480	(2)	12.00	.....	.....
Other mixed	65,515	1.2	8.42	2,616	1.14

[1] Based on area irrigated in 1919. [2] Less than one-tenth of 1 per cent.

TABLE 11.—CAPITAL INVESTED, CLASSIFIED BY DRAINAGE BASIN: 1920 AND 1902.

DRAINAGE BASIN.	1920	1902	INCREASE.	
			Amount.	Per cent.[1]
Total	$5,465,248	$381,569	$5,083,679	.....
Missouri River and tributaries	5,465,248	381,569	5,083,679	.....
Missouri River direct	3,512	.....	3,512	.....
Cheyenne River[2]	5,277,782	325,657	4,952,125	.....
Little Missouri River	55,818	3,740	52,078	.....
Moreau River	40,927	3,731	37,196	996.9
Other tributaries of Missouri River	87,209	[3] 48,441	38,768	80.0

[1] Per cent not shown when more than 1,000.
[2] Includes Belle Fourche River.
[3] Includes springs and wells.

TABLE 12.—CAPITAL INVESTED, 1920, AND COST OF OPERATION AND MAINTENANCE, 1919, CLASSIFIED BY CHARACTER OF ENTERPRISE.

[When water is pumped, cost of operation and maintenance includes cost of fuel and attendance.]

CLASS.	CAPITAL INVESTED, 1920.		OPERATION AND MAINTENANCE, 1919.	
	Amount.	Per cent of total.	Area for which cost is reported (acres).	Average cost per acre.[1]
Total	$5,465,248	100.0	88,329	$1.26
Individual and partnership	743,880	13.6	20,711	1.29
Cooperative	240,690	4.4	8,689	0.66
Commercial	15,658	0.3	2,289	0.61
U. S. Reclamation Service	4,464,790	81.7	56,628	1.37
U. S. Indian Service	1,500	(2)	20	2.50

[1] Based on area irrigated in 1919. [2] Less than one-tenth of 1 per cent.

DRAINAGE OF IRRIGATED LAND.

The acreages reported in Table 13 relate to lands within the boundaries of irrigation projects, and do not include lands within the vicinity of these projects. "Additional acreage needing drainage" includes all lands so reported by the owners of the enterprises, and includes lands producing partial crops as well as those wholly unproductive.

TABLE 13.—ACREAGE WITHIN IRRIGATION ENTERPRISES FOR WHICH DRAINS HAVE BEEN INSTALLED AND ADDITIONAL ACREAGE IN NEED OF DRAINAGE: 1920.

Number of enterprises reporting land drained or needing drainage	17
Acreage included in enterprises reporting land drained or needing drainage	196,129
Acreage for which drains have been installed	2,199
Additional acreage needing drainage	4,714
Per cent that acreage for which drains have been installed is of total acreage included in enterprises reporting drainage	2.0
Per cent that acreage for which drains have been installed is of total acreage included in irrigation enterprises in the state	1.1
Per cent that acreage for which drains have been installed plus that needing drainage is of total acreage included in irrigation enterprises in the state	3.6

QUANTITY OF WATER USED.

The quantity of water used in 1919 was reported on only part of the irrigation schedules, and the figures given vary greatly. In order that proper values may be assigned to the figures given, those representing measurements and those representing estimates are reported separately in Table 14. While the data are incomplete, the reports represent sufficient acreages to serve as bases for reliable averages.

TABLE 14.—QUANTITY OF WATER USED IN 1919.

ITEM.	Total.	Measured.	Not measured.
Average volume of water entering canals ..second-feet	581	171	410
Area irrigated in 1919 .....acres	69,286	56,938	12,348
Average number of acres per second-foot	119	333	30
Total quantity of water entering canals .....acre-feet	168,186	121,487	46,699
Area irrigated in 1919 .....acres	67,366	56,638	10,728
Average quantity per acre .....acre-feet	2.5	2.1	4.4
Total quantity of water delivered .....acre-feet	83,574	81,568	2,006
Area irrigated in 1919 .....acres	59,613	56,638	2,980
Average quantity per acre .....acre-feet	1.4	1.4	0.7

IRRIGATION WORKS.

TABLE 15.—IRRIGATION WORKS, CLASSIFIED BY DATE OF BEGINNING.

DATE OF BEGINNING.	Number of diverting dams.	Number of storage dams.	MAIN DITCHES.			LATERAL DITCHES.		RESERVOIRS.	
			Number.	Capacity (second-feet).	Length (miles).	Number.	Length (miles).	Number.	Capacity (acre-feet).
Total	207	182	370	5,427	653	632	605	119	212,264
1870-1879	20	2	22	1,701	78	26	12		
1880-1889	30	3	40	481	99	65	19	4	92
1890-1899	22	6	32	370	51	84	42	4	700
1900-1904	33	54	41	1,813	165	92	361	15	205,404
1905-1909	55	75	117	390	141	239	136	60	4,127
1910-1914	38	31	73	613	75	86	30	27	1,840
1915-1919	11	6	17	51	19	30	1	7	100
Not reported	8	5	19	8	25	10	4	2	1

DATE OF BEGINNING.	Pipe lines, length (miles).	FLOWING WELLS.		PUMPED WELLS.		PUMPING PLANTS.			
		Number.	Capacity (gallons per minute).	Number.	Capacity (gallons per minute).	Number.	Engine capacity (horse-power).	Pumps.	
								Number.	Capacity (gallons per minute).
Total	7.2	4	2,750	1	800	25	498	25	23,320
1870-1879		1	500						
1880-1889	0.2					2	40	2	5,000
1890-1899	0.2	1	650						
1900-1904	5.5	1	800			1	20	1	600
1905-1909	0.8					6	66	6	3,940
1910-1914	0.5	1	800	1	800	10	233	10	7,450
1915-1919						5	139	5	6,330
Not reported						1		1	

TABLE 16.—IRRIGATION WORKS, CLASSIFIED BY CHARACTER OF ENTERPRISE: 1920

CLASS.	Number of diverting dams.	Number of storage dams.	MAIN DITCHES.			LATERAL DITCHES.		RESERVOIRS.	
			Number.	Capacity (second-feet).	Length (miles).	Number.	Length (miles).	Number.	Capacity (acre-feet).
Total	207	182	370	5,427	653	632	605	119	212,264
Individual and partnership	199	181	354	2,114	442	599	201	118	8,494
Cooperative	5		6	1,678	65	21	4		
Commercial	1		1	35	8				
U. S. Reclamation Service	1	1	8	1,600	137	12	400	1	203,770
U. S. Indian Service	1		1		1				

CLASS.	Pipe lines, length (miles).	FLOWING WELLS.		PUMPED WELLS.		PUMPING PLANTS.			
		Number.	Capacity (gallons per minute).	Number.	Capacity (gallons per minute).	Number.	Engine capacity (horse-power).	Pumps.	
								Number.	Capacity (gallons per minute).
Total	7.2	4	2,750	1	800	25	498	25	23,320
Individual and partnership	1.3	4	2,750	1	800	25	498	25	23,320
Cooperative									
Commercial									
U. S. Reclamation Service	5.9								
U. S. Indian Service									

TABLE 17.—IRRIGATION WORKS, CLASSIFIED BY DRAINAGE BASIN: 1920.

DRAINAGE BASIN.	Number of diverting dams.	Number of storage dams.	MAIN DITCHES.			LATERAL DITCHES.		RESERVOIRS.	
			Number.	Capacity (second-feet).	Length (miles).	Number.	Length (miles).	Number.	Capacity (acre-feet).
Total	207	182	370	5,427	653	632	605	119	212,264
Missouri River and tributaries	207	182	370	5,427	653	632	605	119	212,264
Missouri River direct			1	3	3				
Cheyenne River[1]	182	95	297	5,219	566	511	580	64	205,941
Little Missouri River	9	16	26	90	34	24	13	19	2,263
Moreau River	3	55	29	33	24	26	4	19	2,262
Other tributaries of Missouri River	13	16	17	91	24	71	8	17	1,778

DRAINAGE BASIN.	Pipe lines, length (miles).	FLOWING WELLS.		PUMPED WELLS.		PUMPING PLANTS.				
		Number.	Capacity (gallons per minute).	Number.	Capacity (gallons per minute).	Number.	Engine capacity (horse-power).	Pumps.		Average lift (feet).
								Number.	Capacity (gallons per minute).	
Total	7.2	4	2,750	1	800	25	498	25	23,320	21
Missouri River and tributaries	7.2	4	2,750	1	800	25	498	25	23,320	21
Missouri River direct						1	40	1	1,500	25
Cheyenne River[1]	6.8	4	2,750	1	800	14	172	14	9,550	15
Little Missouri River	0.1					4	175	4	8,000	32
Moreau River	0.3					3	60	3	1,800	20
Other tributaries of Missouri River						3	50	3	2,470	19

[1] Includes Belle Fourche River.

CROPS.

TABLE 18.—ACREAGE, YIELD, AND VALUE OF PRINCIPAL CROPS GROWN ON IRRIGATED LAND, AND COMPARISONS WITH TOTALS FOR THE STATE: 1919 AND 1909.

[Totals for the state, used in making comparisons, are shown in state bulletin on agriculture.]

	Crop.	Area harvested.					Quantity harvested.					
		1919		1909				1919		1909		
		Acres.	Per cent of total for state.	Acres.	Per cent of total for state.	Per cent of increase.[1]	Unit.	Amount.	Per cent of total for state.	Amount.	Per cent of total for state.	Per cent of increase.[1]
	Cereals:											
1	Corn	2,176	0.1	1,166	0.1	86.6	Bu.	39,667	0.1	25,476	(2)	55.7
2	Oats	3,026	0.2	2,526	0.2	19.8	Bu.	71,692	0.1	91,045	0.2	−21.3
3	Winter wheat	759	0.6	1,329	(2)	781.6	Bu.	7,335	0.6	25,590	0.1	449.7
4	Spring wheat	10,049	0.3				Bu.	133,341	0.4			
5	Barley	1,026	0.1	317	(2)	223.7	Bu.	17,841	0.1	6,086	(2)	193.1
	Other grains and seeds:											
6	Clover and alfalfa seed[3]	1,040	3.3	(4)			Bu.	2,358	4.3	(4)		
	Hay and forage:											
7	Timothy alone	539	0.5	1,927	1.1	−72.0	Tons	566	0.4	3,352	1.3	−83.1
8	Timothy and clover mixed	1,269	3.0	2,116	1.6	−6.0	Tons	1,953	2.2	3,189	1.5	−38.8
9	Alfalfa	38,519	8.3	19,005	15.1	265.0	Tons	74,193	9.7	28,520	18.5	160.1
10	Small grains cut for hay	1,708	1.6	(4)			Tons	1,720	2.3	(4)		
11	Wild, salt, or prairie grasses	3,825	0.1	17,652	0.6	−78.3	Tons	3,026	0.1	20,334	0.7	−85.1
	Vegetables:											
12	Potatoes	413	0.7	429	0.9	−5.9	Bu.	35,065	1.2	35,666	1.0	−1.7
	Miscellaneous:											
13	Sugar beets grown for sugar	1,052	95.1	(4)			Tons	11,782	98.6	(4)		

	Crop.	Average yield per acre, 1919.						Value.				
		Unit.	For state.	On non-irrigated land.	On irrigated land.			1919		1909		Per cent of increase.[1]
					Average.	Per cent of average for state.	Per cent of average on non-irrigated land.	Amount.	Per cent of total for state.	Amount.	Per cent of total for state.	
	Cereals:											
1	Corn	Bu.	23.1	25.1	18.2	72.5	72.5	$51,567	0.1	$17,532	0.1	194.1
2	Oats	Bu.	27.5	27.8	23.7	85.3	85.3	53,769	0.1	42,035	0.3	27.9
3	Winter wheat	Bu.	9.3	9.3	16.0	167.5	167.5	16,357	0.6	21,100	(2)	
4	Spring wheat	Bu.	7.9	7.9	12.2	154.4	154.4	297,350	0.4			
5	Barley	Bu.	17.0	17.0	17.4	102.4	102.4	21,409	0.1	3,143	(2)	581.2
	Other grains and seeds:											
6	Clover and alfalfa seed[3]	Bu.	1.8	1.7	2.3	127.8	135.3	53,055	4.3	(4)		
	Hay and forage:											
7	Timothy alone	Tons	1.13	1.14	1.05	92.9	92.1	8,490	0.4	25,290	2.0	−66.4
8	Timothy and clover mixed	Tons	1.31	1.32	0.98	74.8	74.3	33,201	2.2	21,229	1.8	56.4
9	Alfalfa	Tons	1.65	1.63	1.93	117.0	118.4	1,595,150	9.7	160,414	17.4	894.4
10	Small grains cut for hay	Tons	0.69	0.69	1.01	146.4	146.4	28,380	2.3	(4)		
11	Wild, salt, or prairie grasses	Tons	0.74	0.74	0.79	106.8	106.8	39,338	0.1	145,667	1.3	−73.0
	Vegetables:											
12	Potatoes	Bu.	49.2	49.0	84.9	172.6	173.3	87,662	1.2	25,049	1.3	250.0
	Miscellaneous:											
13	Sugar beets grown for sugar	Tons	10.81	3.17	11.20	103.6	353.3	117,820	98.6	(4)		

[1] A minus sign (−) denotes decrease. Per cent not shown when more than 1,000.
[2] Less than one-tenth of 1 per cent.
[3] Not including red clover seed.
[4] Not reported in 1909 because of small acreage.

COUNTY TABLE.—ACREAGE IRRIGATED, 1919 AND 1909; AND ACREAGE IN ENTERPRISES, IRRIGATION WORKS, AND CAPITAL INVESTED IN IRRIGATION ENTERPRISES, 1920 AND 1910.

[A minus sign (−) denotes decrease. Per cent not shown when base is less than 100.]

		THE STATE.	Butte.[1]	Custer.	Fall River.	Harding.[1]	Lawrence.	Meade.	Pennington.	Perkins.[1]	All other counties.
1	Number of all farms in 1920	74,637	1,005	646	913	997	449	1,722	1,128	1,560	66,497
2	Number of farms irrigated in 1919	1,198	564	34	22	20	114	39	395	6	4
3	Per cent of all farms	1.6	56.1	5.3	2.7	2.2	25.4	2.3	35.0	0.4	(2)
4	Number of farms irrigated in 1909	509	96	89	40	28	89	45	83	9	41
5	Per cent of increase, 1909-1919	139.6									
	LAND AND FARM AREA.										
6	Approximate land area ... acres	49,195,520	1,464,960	1,006,720	1,123,840	1,718,400	510,080	2,294,240	1,766,880	1,864,960	37,487,360
7	All land in farms ... acres	34,635,491	722,023	407,060	653,294	1,237,028	147,544	1,280,497	1,046,432	1,265,406	27,787,117
8	Improved land in farms ... acres	18,199,250	98,367	53,416	136,594	160,467	48,213	202,562	167,629	202,061	17,292,911
9	Area irrigated in 1919 ... acres	100,662	57,856	5,527	2,891	928	6,219	9,969	16,994	222	76
10	Per cent of improved land in farms	0.6	58.5	10.3	2.2	0.9	12.9	4.9	10.1	0.1	(2)
11	Area irrigated in 1909 ... acres	63,248	14,378	7,820	4,633	3,315	3,355	7,949	19,465	897	1,438
12	Per cent of increase, 1909-1919	59.2	302.4	−29.3	−37.6	−72.0	85.4	25.4	−12.7	−75.3	−94.7
13	Area enterprises were capable of irrigating in 1920 ... acres	150,914	82,073	9,018	7,358	5,442	8,516	15,233	22,029	892	365
14	Area enterprises were capable of irrigating in 1910 ... acres	128,491	59,684	11,315	9,858	4,598	4,882	9,922	25,598	1,370	1,459
15	Per cent of increase, 1910-1920	17.5	37.5	−20.3	−25.4	18.4	81.9	53.5	−13.9	−35.6	−75.1
16	Area included in enterprises in 1920 ... acres	198,382	89,353	11,080	11,778	8,415	14,261	26,873	23,730	2,009	813
17	Area included in enterprises in 1910 ... acres	201,625	118,100	15,263	11,746	5,170	5,285	12,138	31,034	1,370	1,461
18	Per cent of increase, 1910-1920	−6.6	−24.4	−27.4	0.3	62.8	169.8	121.4	−23.5	50.3	−44.4
	IRRIGATION WORKS.										
	Independent enterprises:										
19	Number, 1920	292	21	61	24	42	48	43	40	19	3
20	Number, 1910	395	42	92	36	23	24	60	68	10	40
	Main ditches:										
21	Number, 1920	370	30	71	32	51	53	71	44	15	3
22	Number, 1910	343	41	84	31	29	21	50	62	9	21
23	Length, 1920 ... miles	653	161	81	58	65	73	80	96	13	6
24	Length, 1910 ... miles	631	177	97	63	42	31	67	126	14	14
25	Capacity, 1920 ... second-feet	5,427	1,968	317	107	115	322	655	1,904	90	9
26	Capacity, 1910 ... second-feet	3,598	1,852	380	198	68	194	219	596	172	39
	Laterals:										
27	Number, 1920	632	18	151	50	66	41	99	159	29	25
28	Number, 1910	332	23	80	49	11	52	56	41	20	.....
29	Length, 1920 ... miles	605	348	51	25	16	13	90	54	8	.....
30	Length, 1910 ... miles	625	462	39	11	3	14	35	28	8	.....
	Reservoirs:										
31	Number, 1920	119	13	19	10	42	2	19	4	9	.....
32	Number, 1910	314	52	62	42	30	3	62	43	11	3
33	Capacity, 1920 ... acre-feet	212,264	204,586	959	189	5,107	46	294	87	1,216	.....
34	Capacity, 1910 ... acre-feet	216,205	202,406	863	1,472	2,392	632	7,791	569	95	35
	Flowing wells:										
35	Number, 1920	4	.....	.....	.....	.....	4	.....	.....	.....	.....
36	Number, 1910	42	2	.....	.....	3	.....	.....	.....	.....	37
37	Capacity, 1920 ... gallons per minute	2,750	.....	.....	.....	.....	2,750	.....	.....	.....	.....
38	Capacity, 1910 ... gallons per minute	14,382	22	.....	.....	350	.....	.....	.....	.....	13,530
	Pumped wells:										
39	Number, 1920	1	.....	.....	.....	.....	.....	.....	1	.....	.....
40	Number, 1910	4	.....	.....	1	.....	.....	2	1	.....	.....
41	Capacity, 1920 ... gallons per minute	800	.....	.....	.....	.....	.....	.....	800	.....	.....
42	Capacity, 1910 ... gallons per minute	24	.....	.....	10	.....	.....	10	4	.....	.....
	Pumping plants:										
43	Number, 1920	25	3	3	2	5	.....	2	4	4	2
44	Number, 1910	8	.....	.....	4	.....	.....	2	2	.....	.....
45	Engine capacity, 1920 ... horsepower	498	21	28	30	187	.....	30	64	66	72
46	Engine capacity, 1910 ... horsepower	63	.....	.....	49	.....	.....	2	12	.....	.....
47	Pump capacity, 1920 ... gallons per minute	23,320	1,750	2,170	1,000	8,470	.....	1,900	2,730	1,600	3,500
48	Pump capacity, 1910 ... gallons per minute	5,289	.....	.....	4,975	.....	.....	10	304	.....	.....
49	Average lift, 1920 ... feet	21	16	14	28	27	.....	12	13	28	24
	CAPITAL INVESTED.										
50	Capital invested to Jan. 1, 1920 ... dollars	5,465,248	4,349,699	118,391	107,076	137,540	70,794	453,344	182,314	35,270	10,800
51	Capital invested to July 1, 1910 ... dollars	3,043,140	2,554,828	64,058	93,926	62,054	30,428	58,961	130,315	12,817	35,733
52	Per cent of increase, 1910-1920	79.6	70.3	85.0	14.0	121.6	132.4	668.9	39.9	175.2	−69.8
53	Average cost per acre based on area enterprises were capable of supplying with water in 1920 ... dollars	36.21	53.00	13.14	14.55	25.27	8.30	29.76	8.28	39.99	29.75
54	Average cost per acre based on area enterprises were capable of supplying with water in 1910 ... dollars	23.69	42.81	5.66	9.53	13.50	6.30	5.94	5.09	9.26	24.51
	ESTIMATED FINAL COST.										
55	Estimated final cost of existing enterprises in 1920 ... dollars	5,500,748	4,350,849	127,951	107,276	149,540	70,794	490,894	185,264	37,470	10,800
56	Estimated final cost of existing enterprises in 1910 ... dollars	3,800,556	3,312,244	64,058	93,926	62,054	30,428	58,961	130,315	12,817	35,733
57	Per cent of increase, 1910-1920	44.7	31.4	99.7	14.2	141.0	132.4	731.7	42.2	192.3	−69.8
58	Average cost per acre based on estimated final cost and area included in enterprises in 1920 ... dollars	22.20	48.69	11.55	9.11	17.77	4.96	17.15	7.30	18.20	13.28
59	Average cost per acre based on estimated final cost and area included in enterprises in 1910 ... dollars	18.85	28.05	4.20	8.00	12.00	5.76	4.86	4.20	9.36	24.47

[1] Perkins and Harding Counties organized from parts of Butte County in 1909.
[2] Less than one-tenth of 1 per cent.

TEXAS.

INTRODUCTION.

The following pages present the statistics of irrigation for the state of Texas collected at the census of 1920. Statistics of acreage irrigated, of acreage, yield, and value of crops grown on irrigated land, and of cost of operation and maintenance relate to the year 1919; other items relate to the year 1920. Throughout the report figures for the census of 1910 are given for purposes of comparison; and, for the purpose of showing the historical development of irrigation, items which have been reported in censuses previous to 1910 are presented. Statistics of number of farms irrigated and of acreage, yield, and value of crops grown on irrigated land were collected in the general census of agriculture. All other statistics were obtained in a special canvass of irrigation enterprises.

In the reports of the Thirteenth Census the returns for the counties where irrigation is limited to rice growing and those for the remainder of the state were presented separately. In this report this separation is not made, except that in the last column of the county table at the end of the report totals for rice growing are given.

TABLE 1.—SUMMARY FOR THE STATE: 1920 AND 1910.

ITEM.	CENSUS OF—		INCREASE.[1]	
	1920	1910	Amount.	Per cent.
Number of all farms	436,033	417,770	18,263	4.4
Approximate land area of the state ... acres	167,934,720	167,934,720	.....	.....
All land in farms ... acres	114,020,621	112,435,067	1,585,554	1.4
Improved land in farms ... acres	31,227,503	27,360,666	3,866,837	14.1
Number of farms irrigated	5,974	5,238	736	14.1
Area irrigated ... acres	586,120	451,130	134,990	29.9
Area enterprises were capable of irrigating ... acres	1,150,542	690,991	459,551	66.5
Area included in enterprises ... acres	1,687,447	1,253,173	434,274	34.7
Per cent irrigated:				
Number of all farms	1.4	1.3	0.1	.....
Approximate land area of the state	0.3	0.3	.....	.....
Land in farms	0.5	0.4	0.1	.....
Improved land in farms	1.9	1.6	0.3	.....
Excess of area enterprises were capable of irrigating over area irrigated ... acres	564,422	239,861	324,561	135.3
Excess of area included in enterprises over area irrigated ... acres	1,101,327	802,043	299,284	37.3
Area of irrigated land reported as available for settlement ... acres	346,446	(2)	.....	.....
Capital invested	$35,072,739	$13,487,347	$21,585,392	160.0
Average per acre enterprises were capable of irrigating	$30.48	$19.52	$10.96	56.1
Estimated final cost of existing enterprises	$39,860,871	$14,754,172	$25,106,699	170.2
Average per acre included in enterprises	$23.62	$11.77	$11.85	100.7
Average cost of operation and maintenance per acre	$6.92	$3.25	$3.67	112.9
IRRIGATION WORKS.				
Number of enterprises	1,371	2,772	−1,401	−50.5
Number of main ditches	820	861	−41	−4.8
Length of main ditches ... miles	1,524	1,479	45	3.0
Capacity of main ditches ... second-feet	23,261	12,818	10,443	81.5
Number of lateral ditches	2,022	832	1,190	143.0
Length of lateral ditches ... miles	2,949	1,224	1,725	140.9
Number of reservoirs	368	309	59	19.1
Capacity of reservoirs ... acre-feet	392,999	74,361	318,638	428.5
Number of flowing wells	135	123	12	9.8
Capacity of flowing wells ... gallons per minute	62,364	37,019	25,345	68.5
Number of pumped wells	901	1,912	−1,011	−52.9
Capacity of pumped wells ... gallons per minute	538,565	567,126	−28,561	−5.0
Number of pumping plants	1,369	2,359	−990	−41.9
Engine capacity ... horsepower	80,511	69,094	11,417	16.5
Pump capacity ... gallons per minute	6,825,998	5,362,665	1,463,333	27.3
Average lift ... feet	45	(2)	45	.....

[1] A minus sign (−) denotes decrease.

[2] Not reported in 1910.

TEXAS

APPROXIMATE LOCATION AND EXTENT OF IRRIGATED LAND.

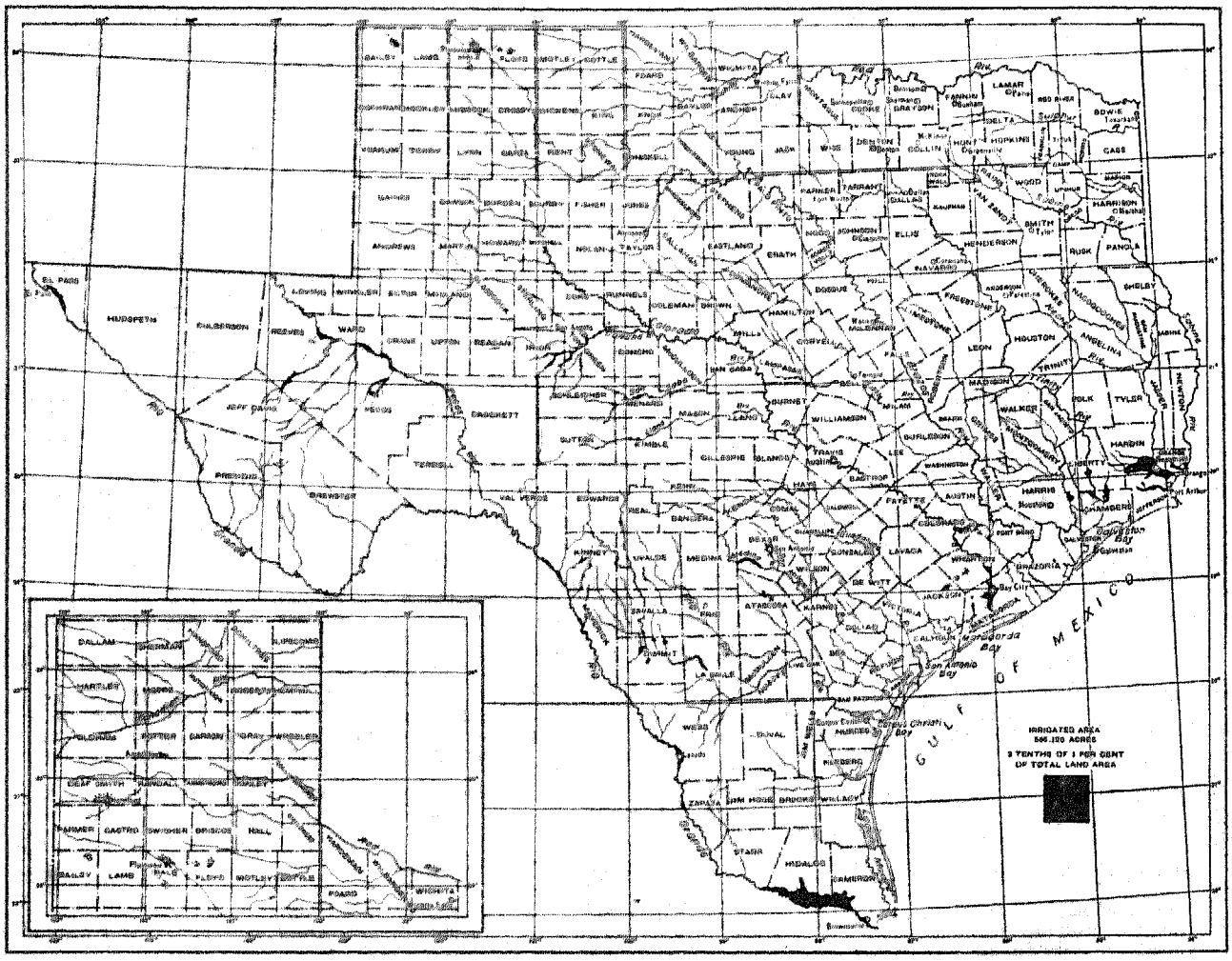


TABLE 4.—ACREAGE, CLASSIFIED BY SOURCE OF WATER SUPPLY: 1919 AND 1909.

CLASS.	AREA IRRIGATED (ACRES).				Area enterprises were capable of irrigating in 1920 (acres).	Area included in enterprises, 1920 (acres).
	1919	1909	Increase.[1]			
			Amount.	Per cent.		
Total	586,120	451,130	134,990	29.9	1,150,542	1,687,447
Streams, gravity	73,982	75,296	−1,314	−2.0	142,782	232,375
Streams, pumped	421,538	297,578	123,960	41.7	819,794	1,185,420
Streams, pumped and gravity	350	(2)	350	.....	600	1,000
Wells, pumped	39,483	54,052	−14,569	−27.0	76,929	106,382
Wells, flowing	3,256	3,730	−474	−12.7	6,291	7,905
Wells, flowing and pumped	1,727	(2)	1,727	.....	3,428	8,414
Lakes, pumped	597	458	139	30.3	7,895	8,057
Springs	8,686	13,068	−4,382	−33.5	11,332	11,499
Stored storm water	11,572	6,748	4,824	71.5	54,737	62,715
Sewage	260	(2)	260	.....	260	650
Streams, gravity, and pumped wells	454	(2)	454	.....	778	1,128
Streams, gravity, and flowing wells	45	(2)	45	.....	55	55
Other mixed	24,170	(2)	24,170	.....	31,661	61,842

[1] A minus sign (−) denotes decrease. [2] Not included in classification in 1919.

ACREAGE, BY CHARACTER OF ENTERPRISE.

In 1852 the state of Texas enacted a law providing for the regulation of community ditches by the commissioners' courts of the counties, according to "ancient usage and the laws of the state"; and providing also for the regulation by the same courts of all irrigation works belonging to two or more persons.

TABLE 5.—ACREAGE, CLASSIFIED BY CHARACTER OF ENTERPRISE: 1920 AND 1910.

ITEM AND CLASS.	CENSUS OF—		INCREASE.[1]	
	1920	1910	Acres.	Per cent.
ACREAGE IRRIGATED.				
Total	586,120	451,130	134,990	29.9
Individual and partnership	110,680	49,657	61,023	122.9
Cooperative	103,378	130,011	−26,633	−20.5
Irrigation district	88,571	(2)	88,571	.....
Commercial	262,892	271,462	−8,570	−3.2
U. S. Reclamation Service	20,284	(2)	20,284	.....
State	65	(2)	65	.....
City	250	(2)	250	.....
ACREAGE ENTERPRISES WERE CAPABLE OF IRRIGATING.				
Total	1,150,542	690,991	459,551	66.5
Individual and partnership	216,351	65,286	151,065	231.4
Cooperative	255,304	183,411	72,893	39.7
Irrigation district	170,548	(2)	170,548	.....
Commercial	481,899	442,294	39,605	9.0
U. S. Reclamation Service	25,070	(2)	25,070	.....
State	120	(2)	120	.....
City	250	(2)	250	.....
ACREAGE INCLUDED IN ENTERPRISES.				
Total	1,687,447	1,253,173	434,274	34.7
Individual and partnership	328,661	104,044	224,417	215.7
Cooperative	294,761	279,969	14,792	5.3
Irrigation district	266,674	(2)	266,674	.....
Commercial	738,685	869,160	−130,475	−15.0
U. S. Reclamation Service	58,106	(2)	58,106	.....
State	120	(2)	120	.....
City	640	(2)	640	.....

[1] A minus sign (−) denotes decrease. [2] Not included in classification in 1910.

A law enacted in 1875 granted subsidies of state land to canal companies, but this law was repealed in 1882. A law of 1887 included among the purposes for which corporations may be organized the "construction and maintenance of canals for the purposes of irrigation, navigation, or manufacturing"; and an act of 1895 authorized the incorporation of canal companies to build irrigation works, sell water rights, and supply water for rates. In addition to passing these general laws several companies were chartered by the legislature in 1866, and at subsequent dates. All of these laws seem to contemplate the organization of commercial enterprises, as defined on page 3.

An irrigation district law was enacted in 1905, and since that time laws providing for the organization and management of "water improvement districts" have been enacted. These are, in effect, irrigation districts, and all data relating to them are included in those reported for districts in Table 5.

The United States Reclamation law has been extended to Texas, and a part of one project lies in the state.

The Federal Carey Act (act of Aug. 18, 1894) does not apply to Texas.

ACREAGE, BY CHARACTER OF WATER RIGHTS.

The laws of Texas relating to water rights are summarized in the following paragraphs:

Without any formal declaration of the right to take water from the streams of the state, the legislature of Texas in 1852 and at subsequent dates recognized this right by providing for the control of ditches by the commissioners' courts of the counties, and by chartering companies and granting rights to take water from certain streams. By an act of October 1, 1866, a company was given the right to divert three-fourths of all the water in Guadalupe River. In the same year another company was given the right to divert two-thirds of all the water in San Marcos River, and another company was given the right to divert one-fourth of all the water forming the Rio Grande.

In 1895 there was enacted the first general law making a declaration on the subject of water rights. This declaration was as follows:

"The unappropriated waters of the ordinary flow or underflow of every running or flowing river or natural stream, and the storm or rain waters of every river or natural stream, canyon, ravine, depression, or watershed within those portions of the state of Texas in which by reason of the insufficient rainfall, irrigation is beneficial for agricultural purposes, are hereby declared to be the property of the public, and may be acquired by appropriation for the uses and purposes and in the manner as hereinafter provided."

This law provided, however, that water might not be diverted from its natural course to the detriment of riparian owners without their consent, except after condemnation. All persons having previously appropriated water and those making appropriations in the future were required to file statements of their claims with the county clerks.

In 1913 a law was enacted that made the law permitting the appropriation of water applicable to the whole state, created the state board of water engineers, and gave to this board supervision over the waters of the state.

All parties claiming rights to water were required to file statements of their claims with the board, parties wishing to acquire rights were required to apply to the board for permits, and the taking of water from streams without a permit was made illegal.

The original law gave the board no authority to define rights acquired previous to the creation of the board, but this authority was given to the board in 1917. When the board has completed an adjudication it issues certificates to all parties setting forth their rights.

TABLE 11.—CAPITAL INVESTED, CLASSIFIED BY DRAINAGE BASIN: 1920 AND 1902.

DRAINAGE BASIN.	1920	1902	INCREASE.	
			Amount.	Per cent.[1]
Total	$35,072,739	[2] $1,579,118	$33,493,621	.....
Rio Grande River and tributaries	18,925,769	1,052,480	17,873,289	.....
Rio Grande River direct	16,208,058	408,100	15,799,958	.....
Pecos River	2,219,595	451,945	1,768,550	392.1
Las Moras Creek	192,566	7,925	184,641	.....
Other tributaries of Rio Grande River	305,550	[3] 125,410	180,140	143.6
Tributaries of Gulf of Mexico	15,707,698	501,272	15,206,426	.....
Nueces River	1,326,555	56,808	1,269,747	.....
San Antonio River	5,087,542	63,765	5,023,777	.....
Colorado River	3,560,916	154,529	3,406,387	.....
Brazos River	369,543	25,443	344,100	.....
Trinity River	1,743,621	(4)	1,743,621	.....
Neches River	1,596,770	(4)	1,596,770	.....
Sabine River	345,935	(4)	345,935	.....
Other Gulf streams	1,476,816	[3] 200,727	1,276,089	635.7
Canadian River	69,472	4,500	64,972	.....
Red River	369,800	2,250	367,550	.....

[1] Per cent not shown when more than 1,000.
[2] Includes $18,816 for springs and wells not reported by drainage basins.
[3] Includes springs and wells.
[4] Not reported separately in 1902.

TABLE 12.—CAPITAL INVESTED, 1920, AND COST OF OPERATION AND MAINTENANCE, 1919, CLASSIFIED BY CHARACTER OF ENTERPRISE.

[When water is pumped, cost of operation and maintenance includes cost of fuel and attendance.]

CLASS.	CAPITAL INVESTED, 1920.		OPERATION AND MAINTENANCE, 1919.	
	Amount.	Per cent of total.	Area for which cost is reported (acres).	Average cost per acre.[1]
Total	$35,072,739	100.0	558,395	$6.92
Individual and partnership	8,256,568	23.5	88,008	8.10
Cooperative	3,821,844	10.9	162,764	6.76
Irrigation district	5,449,142	15.5	88,371	6.44
Commercial	13,825,409	39.4	258,614	7.05
U. S. Reclamation Service	3,673,476	10.5	20,284	2.90
State	6,802	(2)	65	27.69
City	39,498	0.1	.....	.....

[1] Based on area irrigated in 1919. [2] Less than one-tenth of 1 per cent.

DRAINAGE OF IRRIGATED LAND.

The acreages reported in Table 13 relate to lands within the boundaries of irrigation projects, and do not include lands within the vicinity of these projects. "Additional acreage needing drainage" includes all lands so reported by the owners of the enterprises, and includes lands producing partial crops as well as those wholly unproductive.

TABLE 13.—ACREAGE WITHIN IRRIGATION ENTERPRISES FOR WHICH DRAINS HAVE BEEN INSTALLED AND ADDITIONAL ACREAGE IN NEED OF DRAINAGE: 1920.

Number of enterprises reporting land drained or needing drainage	166
Acreage included in enterprises reporting land drained or needing drainage	650,822
Acreage for which drains have been installed	272,437
Additional acreage needing drainage	154,532
Per cent that acreage for which drains have been installed is of total acreage included in enterprises reporting drainage	41.9
Per cent that acreage for which drains have been installed is of total acreage included in irrigation enterprises in the state	16.1
Per cent that acreage for which drains have been installed plus that needing drainage is of total acreage included in irrigation enterprises in the state	25.3

QUANTITY OF WATER USED.

The quantity of water used in 1919 was reported on only part of the irrigation schedules, and the figures given vary greatly. In order that proper values may be assigned to the figures given, those representing measurements and those representing estimates are reported separately in Table 14. While the data are incomplete, the reports represent sufficient acreages to serve as bases for reliable averages.

TABLE 14.—QUANTITY OF WATER USED IN 1919.

ITEM.	Total.	Measured.	Not measured.
Average volume of water entering canals, second-feet	5,835	817	5,018
Area irrigated in 1919 ..... acres	171,716	45,001	126,715
Average number of acres per second-foot	29	55	25
Total quantity of water entering canals, acre-feet	1,586,840	204,919	1,381,921
Area irrigated in 1919 ..... acres	247,619	47,325	200,294
Average quantity per acre ..... acre-feet	6.4	4.3	6.9
Total quantity of water delivered ..... acre-feet	385,540	100,869	284,671
Area irrigated in 1919 ..... acres	167,005	48,533	118,472
Average quantity per acre ..... acre-feet	2.3	2.1	2.4

IRRIGATION WORKS.

TABLE 15.—IRRIGATION WORKS, CLASSIFIED BY DATE OF BEGINNING.

DATE OF BEGINNING.	Number of diverting dams.	Number of storage dams.	MAIN DITCHES.			LATERAL DITCHES.		RESERVOIRS.	
			Number.	Capacity (second-feet).	Length (miles).	Number.	Length (miles).	Number.	Capacity (acre-feet).
Total	165	134	820	23,261	1,524	2,022	2,949	368	392,999
1860-1869		2							
1870-1879	17	6	22	875	122	416	270	4	23,307
1880-1889	7	7	22	570	56	98	47	4	
1890-1899	24	9	34	1,234	108	58	72	8	28,069
1900-1904	21	8	72	5,449	275	169	358	13	31,365
1905-1909	21	31	191	6,887	285	268	964	50	12,837
1910-1914	45	36	303	4,741	396	377	993	91	287,357
1915-1919	22	27	197	2,297	191	365	215	70	8,634
Not reported	8	8	69	1,208	91	113	30	128	1,390

DATE OF BEGINNING.	Pipe lines, length (miles).	FLOWING WELLS.		PUMPED WELLS.		PUMPING PLANTS.			
		Number.	Capacity (gallons per minute).	Number.	Capacity (gallons per minute).	Number.	Engine capacity (horse-power).	Pumps.	
								Number.	Capacity (gallons per minute).
Total	157.1	135	62,364	901	538,565	1,369	80,511	1,641	6,825,998
1860-1869						1	30	1	
1870-1879	0.1					1	12	1	360
1880-1889	0.4			4		19	81	19	4,679
1890-1899	1.6	2		3	30	30	4,939	42	1,719,189
1900-1904	16.5	11	3,130	49	19,150	114	18,647	156	1,544,926
1905-1909	14.0	16	12,290	116	62,622	210	19,271	265	1,655,729
1910-1914	26.1	37	18,734	278	135,239	432	16,345	498	957,544
1915-1919	9.0	26	14,626	284	204,449	360	13,399	492	622,485
Not reported	89.4	43	14,070	176	57,075	211	7,769	266	341,767

TABLE 16.—IRRIGATION WORKS, CLASSIFIED BY CHARACTER OF ENTERPRISE: 1920.

CLASS.	Number of diverting dams.	Number of storage dams.	MAIN DITCHES.			LATERAL DITCHES.		RESERVOIRS.	
			Number.	Capacity (second-feet).	Length (miles).	Number.	Length (miles).	Number.	Capacity (acre-feet).
Total	165	134	820	23,261	1,524	2,022	2,949	368	392,999
Individual and partnership	138	108	688	6,324	649	1,498	991	345	40,482
Cooperative	10	14	49	2,039	163	174	431	13	14,217
Irrigation district	9	6	15	4,294	180	33	430	3	2,000
Commercial	7	5	64	9,807	490	302	1,097	7	336,700
U. S. Reclamation Service	1	1	3	774	40				
State			1	3	2	15			
City									

CLASS.	Pipe lines, length (miles).	FLOWING WELLS.		PUMPED WELLS.		PUMPING PLANTS.			
		Number.	Capacity (gallons per minute).	Number.	Capacity (gallons per minute).	Number.	Engine capacity (horse-power).	Pumps.	
								Number.	Capacity (gallons per minute).
Total	157.1	135	62,364	901	538,565	1,369	80,511	1,641	6,825,998
Individual and partnership	143.1	127	58,350	869	528,283	1,288	39,081	1,461	1,482,618
Cooperative	10.9	8	4,014	3	1,630	30	11,012	46	945,650
Irrigation district						9	6,695	29	857,600
Commercial	3.0			17	15,652	42	23,758	103	3,538,250
U. S. Reclamation Service	0.1					1	15	1	900
State				1	1,000	1	40	1	1,000
City									

TABLE 17.—IRRIGATION WORKS, CLASSIFIED BY DRAINAGE BASIN: 1920.

DRAINAGE BASIN.	Number of diverting dams.	Number of storage dams.	MAIN DITCHES.			LATERAL DITCHES.		RESERVOIRS.	
			Number.	Capacity (second-feet).	Length (miles).	Number.	Length (miles).	Number.	Capacity (acre-feet).
Total	165	134	820	23,261	1,524	2,022	2,949	368	392,999
Rio Grande River and tributaries	44	33	154	12,530	641	875	1,671	74	87,169
Rio Grande River direct	11	19	81	9,319	365	361	1,275	46	24,999
Pecos River	26	9	61	2,725	257	241	313	24	62,165
Las Moras Creek	2	1	4	75	8	260	67	.....	.....
Other tributaries of Rio Grande River	5	4	8	411	11	13	16	4	5
Tributaries of Gulf of Mexico	108	99	612	10,618	828	978	1,202	292	297,826
Nueces River	54	29	85	163	96	139	42	223	1,987
San Antonio River	4	16	50	1,782	60	80	82	24	260,346
Colorado River	46	53	244	3,925	324	333	639	30	8,092
Brazos River	.....	2	155	287	130	270	136	3	800
Trinity River	.....	1	6	1,022	77	47	102	1	25,000
Neches River	.....	.....	7	1,380	40	30	77	.....	.....
Sabine River	.....	.....	9	481	42	27	33	.....	.....
Other Gulf streams	4	4	56	1,578	59	52	91	11	1,601
Canadian River	.....	.....	4	4	2	8	2	.....	.....
Red River	13	2	50	109	53	161	74	2	8,004

DRAINAGE BASIN.	Pipe lines, length (miles).	FLOWING WELLS.		PUMPED WELLS.		PUMPING PLANTS.				
		Number.	Capacity (gallons per minute).	Number.	Capacity (gallons per minute).	Number.	Engine capacity (horse-power).	Pumps.		Average lift (feet).
								Number.	Capacity (gallons per minute).	
Total	157.1	135	62,364	901	538,565	1,369	80,511	1,641	6,825,998	45
Rio Grande River and tributaries	41.1	15	9,110	49	23,872	151	22,560	232	2,414,876	.....
Rio Grande River direct	40.5	.....	.....	5	2,025	105	21,779	172	2,383,251	50
Pecos River	0.6	14	9,050	42	21,509	39	719	53	28,253	53
Las Moras Creek	.....	.....	.....	.....	.....	1	6	1	250	20
Other tributaries of Rio Grande River	.....	1	60	2	338	6	56	6	3,122	56
Tributaries of Gulf of Mexico	115.8	118	50,754	803	464,943	1,157	54,456	1,346	4,358,862	41
Nueces River	92.6	81	26,065	275	72,937	321	6,533	342	160,472	47
San Antonio River	10.9	25	15,465	43	12,864	77	1,438	80	31,039	39
Colorado River	8.5	3	5,400	57	30,667	311	13,500	359	912,048	30
Brazos River	2.2	3	3,500	150	136,332	166	6,276	175	153,585	63
Trinity River	1.5	.....	.....	.....	.....	11	7,688	20	445,100	34
Neches River	.....	.....	.....	.....	.....	6	5,850	23	1,929,500	24
Sabine River	.....	.....	.....	.....	.....	9	1,855	16	187,000	14
Other Gulf streams	1	6	324	278	212,143	256	11,316	331	540,118	42
Canadian River	2	.....	.....	3	2,000	3	115	3	2,000	80
Red River	.....	2	2,500	46	47,750	58	3,380	60	50,260	81

CROPS.

TABLE 18.—ACREAGE, YIELD, AND VALUE OF CROPS GROWN ON IRRIGATED LAND, AND COMPARISONS WITH TOTALS FOR THE STATE: 1919 AND 1909.

[Totals for the state, used in making comparisons, are shown in state bulletin on agriculture.]

	CROP.	AREA HARVESTED.					QUANTITY HARVESTED.					
		1919		1909				1919		1909		
		Acres.	Per cent of total for state.	Acres.	Per cent of total for state.	Per cent of increase.[1]	Unit.	Amount.	Per cent of total for state.	Amount.	Per cent of total for state.	Per cent of increase.[1]
	Cereals:											
1	Corn	36,736	0.8	9,068	0.2	305.1	Bu.	1,267,132	1.1	191,474	0.3	539.4
2	Oats	3,494	0.2	2,496	0.5	40.0	Bu.	53,[illegible]	0.1	66,015	0.9	−19.2
3	Winter wheat	6,146	0.3	1,386	0.4	344.4	Bu.	90,535	0.2	26,681	1.1	239.3
	Other grains and seeds:											
4	Kafir, milo, etc	6,310	0.4	1,154	0.2	446.8	Bu.	209,459	0.5	28,449	0.5	599.7
5	Dry beans, navy, etc	694	7.6	(2)			Bu.	6,784	10.0	(2)		
	Hay and forage:											
6	Alfalfa	19,455	33.4	13,778	24.9	41.2	Tons	55,544	40.5	43,771	44.7	26.9
7	Other tame or cultivated grasses	4,612	1.8	5,009	1.9	−7.9	Tons	8,790	2.3	6,055	2.8	32.1
8	Small grains cut for hay	1,145	0.7	(2)			Tons	1,244	0.6	(2)		
9	Wild, salt, or prairie grasses	690	0.4	593	0.3	16.4	Tons	691	0.3	773	0.4	−10.6
10	Corn cut for forage	582	0.5	(2)			Tons	631	0.9	(2)		
11	Kafir, sorghum, etc., for forage	11,817	0.8	(2)			Tons	26,570	1.1	(2)		
	Vegetables:											
12	Potatoes (Irish or white)	553	2.0	961	2.7	−42.5	Bu.	35,317	2.1	90,089	4.0	−60.8
13	Sweet potatoes and yams	603	0.9	(2)			Bu.	59,223	1.0	(2)		
14	Cabbages	1,976	45.6	1,416	51.7	39.5						
15	Onions	942	15.1	1,842	35.6	−48.9						
16	Beans (green)	478	34.6	(2)								
17	Tomatoes	614	10.4	(2)								
	Miscellaneous:											
18	Rough rice	164,301	99.9	(2)			Bu.	5,297,169	99.8	(2)		
19	Broom corn	12,199	30.7	(2)			Lbs.	3,144,047	36.9	(2)		
20	Cotton	22,906	0.2	7,474	0.1	194.4	Bales	8,537	0.3	2,299	0.1	271.3

	CROP.	AVERAGE YIELD PER ACRE, 1919.						VALUE.				
		Unit.	For state.	On non-irrigated land.	On irrigated land.			1919		1909		Per cent of increase.[1]
					Average.	Per cent of average for state.	Per cent of average on non-irrigated land.	Amount.	Per cent of total for state.	Amount.	Per cent of total for state.	
	Cereals:											
1	Corn	Bu.	22.8	22.7	32.9	144.3	144.9	$1,629,628	1.1	$162,467	0.3	903.1
2	Oats	Bu.	34.3	34.4	15.4	44.8	44.8	43,116	0.1	38,668	1.0	11.5
3	Winter wheat	Bu.	15.1	15.1	14.7	97.4	97.4	187,497	0.2	23,498	0.8	700.6
	Other grains and seeds:											
4	Kafir, milo, etc	Bu.	24.6	24.6	31.8	129.3	129.3	290,328	0.5	19,612	0.5	
5	Dry beans, navy, etc	Bu.	7.4	7.2	9.8	132.4	136.1	29,836	10.0	(2)		
	Hay and forage:											
6	Alfalfa	Tons	2.35	2.10	2.85	121.3	135.7	1,638,548	40.5	598,911	44.7	173.6
7	Other tame or cultivated grasses	Tons	1.46	1.46	1.91	130.8	130.8	262,170	2.3	80,490	3.0	151.3
8	Small grains cut for hay	Tons	1.15	1.15	1.09	94.8	94.8	29,836	0.6	(2)		
9	Wild, salt, or prairie grasses	Tons	1.18	1.18	1.00	84.7	84.7	12,784	0.3	10,743	0.7	19.0
10	Corn cut for forage	Tons	0.61	0.61	1.08	177.0	177.0	11,989	0.9	(2)		
11	Kafir, sorghum, etc., for forage	Tons	1.65	1.65	2.25	136.4	136.4	504,830	1.1	(2)		
	Vegetables:											
12	Potatoes (Irish or white)	Bu.	62.6	62.6	63.9	102.1	102.1	79,441	2.1	81,602	4.4	−2.0
13	Sweet potatoes and yams	Bu.	85.7	85.6	98.2	114.6	114.7	106,601	1.0	(2)		
14	Cabbages							394,883	54.5	142,671	37.6	174.9
15	Onions							424,753	16.0	297,499	36.2	42.8
16	Beans (green)							74,620	43.6	(2)		
17	Tomatoes							176,800	14.6	(2)		
	Miscellaneous:											
18	Rough rice	Bu.	32.3	(3)	32.2	100.0	(3)	14,832,073	99.8	(2)		
19	Broom corn	Lbs.	359.4	331.8	421.7	117.3	127.1	257,202	36.0	(2)		
20	Cotton	Bales	0.26	0.26	0.39	150.0	150.0	1,476,901	0.3	143,157	0.9	931.7

[1] A minus sign (−) denotes decrease. Per cent not shown when more than 1,000.
[2] Not reported in 1909.
[3] Acreage too small to use as a base for a just average.

COUNTY TABLE.—ACREAGE IRRIGATED, 1919 AND 1909; AND ACREAGE IN ENTERPRISES, IRRIGATION WORKS, AND CAPITAL INVESTED IN IRRIGATION ENTERPRISES, 1920 AND 1910.

[A minus sign (—) denotes decrease. Per cent not shown when base is less than 100 or when per cent is more than 1,000.]

		THE STATE.	Atascosa.	Bailey.	Bexar.	Brazoria.	Brewster.	Cameron.[1]	Chambers.	Colorado.
1	Number of all farms in 1920	436,033	1,534	79	3,205	2,074	163	1,507	506	2,469
2	Number of farms irrigated in 1919	5,974	94	24	174	3	17	871	146	120
3	Per cent of all farms	1.4	6.1	30.4	5.4	0.1	10.4	57.8	28.9	4.9
4	Number of farms irrigated in 1909	5,238			175	9		314	99	57
5	Per cent of increase, 1909-1919	14.1			—0.6					
	LAND AND FARM AREA.									
6	Approximate land area ... acres	167,934,720	860,120	659,200	808,320	857,600	3,798,400	896,640	395,520	622,080
7	All land in farms ... acres	114,020,621	379,296	352,142	376,218	303,037	1,772,086	299,279	179,430	457,296
8	Improved land in farms ... acres	31,227,503	127,520	13,553	234,287	165,150	9,511	83,121	51,321	169,846
9	Area irrigated in 1919 ... acres	586,120	2,312	2,195	12,923	350	596	60,008	29,200	15,321
10	Per cent of improved land in farms	1.9	1.8	16.2	5.5	0.2	6.3	72.2	56.9	9.0
11	Area irrigated in 1909 ... acres	451,130			4,690	1,972	17	29,439	27,375	7,503
12	Per cent of increase, 1909-1919	29.9			175.8	—82.3			6.7	104.2
13	Area enterprises were capable of irrigating in 1920 ... acres	1,150,542	4,067	3,555	57,736	1,000	873	120,948	38,700	19,378
14	Area enterprises were capable of irrigating in 1910 ... acres	690,997			7,122	2,700	17	115,363	27,950	10,435
15	Per cent of increase, 1910-1920	66.5			710.7	—63.0			38.5	85.7
16	Area included in enterprises in 1920 ... acres	1,687,447	6,445	4,680	59,055	1,000	1,087	178,414	72,200	45,287
17	Area included in enterprises in 1910 ... acres	1,253,173			9,498	5,150	32	156,349	70,450	13,501
18	Per cent of increase, 1910-1920	34.7			525.7	—80.6			2.5	235.4
19	Area of irrigated land reported as available for settlement ... acres	346,446						50,568		
	IRRIGATION WORKS.									
	Independent enterprises:									
20	Number, 1920	1,371	35	24	43	1	16	17	4	31
21	Number, 1910	2,772			36	8		26	8	46
	Main ditches:									
22	Number, 1920	820	23	26	24	1	9	21	4	10
23	Number, 1910	861			10	6	3	32	5	18
24	Length, 1920 ... miles	1,524	44	24	53	2	6	140	55	36
25	Length, 1910 ... miles	1,479			30	7	1	158	41	22
26	Capacity, 1920 ... second-feet	23,261	25	50	1,702	1	132	3,435	865	523
27	Capacity, 1910 ... second-feet	12,818			1,153		2	3,099		
	Laterals:									
28	Number, 1920	2,022	34	52	44			92	24	39
29	Number, 1910	832			7		1	112	28	11
30	Length, 1920 ... miles	2,949	16	26	74			456	66	42
31	Length, 1910 ... miles	1,224			6		2	241	61	13
	Reservoirs:									
32	Number, 1920	368	21		11		16	3	1	1
33	Number, 1910	309			16	5	3	16	1	2
34	Capacity, 1920 ... acre-feet	392,999	46		260,316		15	1,501	25,000	
35	Capacity, 1910 ... acre-feet	74,361			6,364	1,565	2	32,964	61	
	Flowing wells:									
36	Number, 1920	135	40		23		1			
37	Number, 1910	123			21			2		
38	Capacity, 1920 ... gallons per minute	62,264	16,540		15,410		60			
39	Capacity, 1910 ... gallons per minute	37,019			11,983			90		
	Pumped wells:									
40	Number, 1920	901	10	27	22		15	1		39
41	Number, 1910	1,912			18	3	7	12		65
42	Capacity, 1920 ... gallons per minute	538,565	7,700	24,150	10,820		964	25		25,850
43	Capacity, 1910 ... gallons per minute	567,126			11,207	2,600	114	5,175		39,620
	Pumping plants:									
44	Number, 1920	1,369	11	24	31	1	15	23	7	44
45	Number, 1910	2,309			24	9	7	39	6	60
46	Engine capacity, 1920 ... horsepower	80,511	141	585	693	125	153	5,847	4,672	4,164
47	Engine capacity, 1910 ... horsepower	60,094			461	530	13	3,538	2,931	2,629
48	Pump capacity, 1920 ... gallons per minute	6,825,998	8,900	24,150	14,220	12,000	6,538	887,212	309,200	328,750
49	Pump capacity, 1910 ... gallons per minute	5,362,665			17,710	48,800	114	607,610	296,133	135,120
50	Average lift, 1920 ... feet	45	51	24	31	14	46	15	25	50
	CAPITAL INVESTED.									
51	Capital invested to Jan. 1, 1920 ... dollars	35,072,739	142,168	73,900	4,946,566	10,010	80,955	3,108,489	1,008,802	523,925
52	Capital invested to July 1, 1910 ... dollars	13,487,347			221,236	59,252	6,950	2,024,500	593,410	178,503
53	Per cent of increase, 1910-1920	160.0				—83.1			70.0	193.5
54	Average cost per acre based on area enterprises were capable of supplying with water in 1920 ... dollars	30.48	34.96	20.79	85.68	10.01	92.73	25.70	26.07	27.04
55	Average cost per acre based on area enterprises were capable of supplying with water in 1910 ... dollars	19.52			31.06	21.95	408.82	17.55	21.23	17.11
	ESTIMATED FINAL COST.									
56	Estimated final cost of existing enterprises in 1920 ... dollars	39,860,871	146,218	73,900	5,446,566	10,010	90,655	4,098,489	1,008,802	523,925
57	Estimated final cost of existing enterprises in 1910 ... dollars	14,754,172			221,236	59,252	6,950	2,518,199	593,410	178,503
58	Per cent of increase, 1910-1920	170.2				—83.1			70.0	193.5
59	Average cost per acre based on estimated final cost and area included in enterprises in 1920 ... dollars	23.62	22.69	15.79	92.23	10.01	83.40	22.97	13.97	11.57
60	Average cost per acre based on estimated final cost and area included in enterprises in 1910 ... dollars	11.77			23.44	11.51	217.19	16.11	8.42	13.22

[1] Part taken to form part of Willacy County in 1911.

COUNTY TABLE.—ACREAGE IRRIGATED, 1919 AND 1909; AND ACREAGE IN ENTERPRISES, IRRIGATION WORKS, AND CAPITAL INVESTED IN IRRIGATION ENTERPRISES, 1920 AND 1910—Continued.

[A minus sign (—) denotes decrease. Per cent not shown when base is less than 100 or when per cent is more than 1,000.]

		Deaf Smith.	Dimmit.	El Paso.[1]	Floyd.	Frio	Galveston.	Hale.	Hardeman.	Harris.
1	Number of all farms in 1920	382	365	542	1,299	720	723	1,031	1,077	2,880
2	Number of farms irrigated in 1919	43	256	476	47	24	7	59	2	60
3	Per cent of all farms	11.3	56.8	87.8	3.6	3.3	0.3	5.7	0.2	2.1
4	Number of farms irrigated in 1909		94	446			9		2	99
5	Per cent of increase, 1909-1919									
	LAND AND FARM AREA.									
6	Approximate land area ... acres	991,360	879,400	390,720	647,040	719,360	252,800	663,040	487,040	1,058,160
7	All land in farms ... acres	695,075	207,885	217,367	490,731	581,407	102,332	581,713	366,152	379,292
8	Improved land in farms ... acres	83,989	23,172	39,119	242,822	112,926	27,900	233,880	166,237	216,879
9	Area irrigated in 1919 ... acres	6,483	5,397	20,259	1,497	655	393	3,325		8,099
10	Per cent of improved land in farms	7.7	23.3	67.3	0.6	0.6	0.7	1.4		3.7
11	Area irrigated in 1909 ... acres		3,327	23,308			2,309	5	4,040	25,725
12	Per cent of increase, 1909-1919		62.2				—91.9			—69.0
13	Area enterprises were capable of irrigating in 1920 ... acres	11,345	10,480	25,005	4,877	1,247	340	8,728	1,940	11,600
14	Area enterprises were capable of irrigating in 1910 ... acres		5,618	25,324			3,195	5	4,040	26,760
15	Per cent of increase, 1910-1920		86.5				—89.4		—74.3	—56.9
16	Area included in enterprises in 1920 ... acres	13,341	19,792	58,005	5,585	2,369	440	10,192	8,212	16,090
17	Area included in enterprises in 1910 ... acres		9,934	35,287			3,985	5	5,075	27,980
18	Per cent of increase, 1910-1920		99.2				—89.0		61.8	—42.8
19	Area of irrigated land reported as available for settlement ... acres		1,250	25,000						
	IRRIGATION WORKS.									
	Independent enterprises:									
20	Number, 1920	43	146	2	47	24	2	58	2	1
21	Number, 1910		76	63			6		2	31
	Main ditches:									
22	Number, 1920	46	7	4	48	4		64	2	1
23	Number, 1910		37	21			5		2	16
24	Length, 1920 ... miles	43	3	40	48	1		52	8	5
25	Length, 1910 ... miles		34	73			8		11	21
26	Capacity, 1920 ... second-feet	94	39	774	94	10		113	12	266
27	Capacity, 1910 ... second-feet		197	2,327					60	
	Laterals:									
28	Number, 1920	141	2		94			112	12	5
29	Number, 1910		5	20						11
30	Length, 1920 ... miles	70	2		47	1		56		35
31	Length, 1910 ... miles		4	44						36
	Reservoirs:									
32	Number, 1920		153			17		1	2	
33	Number, 1910		63	1			1		2	3
34	Capacity, 1920 ... acre-feet		1,690			23		800	8,604	
35	Capacity, 1910 ... acre-feet		295	2			1		5	335
	Flowing wells:									
36	Number, 1920	2	27			4				
37	Number, 1910		42							1
38	Capacity, 1920 ... gallons per minute	2,500	6,625			1,300				
39	Capacity, 1910 ... gallons per minute		17,368							30
	Pumped wells:									
40	Number, 1920	44	178		48	37	3	68		
41	Number, 1910		48	61			2	1		36
42	Capacity, 1920 ... gallons per minute	46,250	48,450		43,250	7,606	2,216	62,797		
43	Capacity, 1910 ... gallons per minute		24,760	37,190			6,000	50		35,000
	Pumping plants:									
44	Number, 1920	43	181		47	27	2	65		1
45	Number, 1910		52	65			6	1		36
46	Engine capacity, 1920 ... horsepower	2,340	3,831		1,950	306	82	3,212		2,400
47	Engine capacity, 1910 ... horsepower		692	878			695	5		3,390
48	Pump capacity, 1920 ... gallons per minute	48,750	74,900		43,250	8,945	2,216	62,987		120,000
49	Pump capacity, 1910 ... gallons per minute		30,712	48,240			27,100	50		155,250
50	Average lift, 1920 ... feet	79	39		91	63	41	76		50
	CAPITAL INVESTED.									
51	Capital invested to Jan. 1, 1920 ... dollars	290,300	578,670	3,670,550	154,100	147,800	20,190	280,630	62,600	150,000
52	Capital invested to July 1, 1910 ... dollars		243,678	282,390			72,476	125	75,850	948,600
53	Per cent of increase, 1910-1920		138.1				—72.2		—18.3	—82.3
54	Average cost per acre based on area enterprises were capable of supplying with water in 1920 ... dollars	25.59	55.22	146.79	31.60	118.52	59.35	32.15	59.62	13.64
55	Average cost per acre based on area enterprises were capable of supplying with water in 1910 ... dollars		43.27	11.16			22.68	25.00	18.77	31.71
	ESTIMATED FINAL COST.									
56	Estimated final cost of existing enterprises in 1920 ... dollars	290,300	611,720	5,320,550	154,100	149,300	20,190	280,630	62,600	150,000
57	Estimated final cost of existing enterprises in 1910 ... dollars		243,678	282,390			72,476	125	75,850	948,600
58	Per cent of increase, 1910-1920		151.7				—72.2		—18.3	—82.3
59	Average cost per acre based on estimated final cost and area included in enterprises in 1920 ... dollars	21.76	30.91	91.55	27.59	44.32	45.86	27.62	7.35	9.32
60	Average cost per acre based on estimated final cost and area included in enterprises in 1910 ... dollars		24.47	8.01			18.19	25.00	14.95	30.33

[1] Parts taken to form Culberson County in 1911 and Hudspeth County in 1917.

COUNTY TABLE.—ACREAGE IRRIGATED, 1919 AND 1909; AND ACREAGE IN ENTERPRISES, IRRIGATION WORKS, AND CAPITAL INVESTED IN IRRIGATION ENTERPRISES, 1920 AND 1910—Continued.

[A minus sign (−) denotes decrease. Per cent not shown when base is less than 100 or when per cent is more than 1,000.]

		Hidalgo [1]	Irion.	Jackson.	Jefferson.	Jeff Davis.	Kimble.	Kinney.	La Salle.	Liberty.
1	Number of all farms in 1920	1,727	136	1,485	419	62	372	98	280	1,314
2	Number of farms irrigated in 1919	1,131	64	45	274	18	68	9	65	12
3	Per cent of all farms	65.5	47.1	3.0	65.4	29.0	18.3	9.2	23.2	0.9
4	Number of farms irrigated in 1909	278	31	74	160	.....	59	16	58	5
5	Per cent of increase, 1909–1919	.....	.....	.....	71.3	.....	.....	.....	.....	.....
	LAND AND FARM AREA.									
6	Approximate land area ... acres	1,042,560	638,720	571,520	588,800	1,448,320	832,640	839,680	999,040	742,400
7	All land in farms ... acres	394,874	[2] 846,014	398,771	130,230	927,451	672,596	595,500	595,010	199,957
8	Improved land in farms ... acres	99,822	7,604	126,964	93,435	1,085	26,143	13,066	40,401	73,449
9	Area irrigated in 1919 ... acres	180,532	2,133	6,074	74,002	1,210	290	1,844	2,531	13,500
10	Per cent of improved land in farms	180.8	28.1	4.8	79.2	111.5	1.1	14.1	6.3	18.4
11	Area irrigated in 1909 ... acres	21,648	1,511	11,167	75,983	186	2,297	3,359	2,165	1,030
12	Per cent of increase, 1909–1919	.....	41.2	−45.6	−2.6	550.5	−87.4	−45.1	16.9	.....
13	Area enterprises were capable of irrigating in 1920 ... acres	388,538	2,062	6,749	97,100	1,351	2,964	2,969	5,292	14,000
14	Area enterprises were capable of irrigating in 1910 ... acres	71,327	1,562	10,293	92,918	236	2,569	3,359	3,022	4,870
15	Per cent of increase, 1910–1920	.....	32.0	−34.4	4.5	472.5	15.4	−11.6	75.1	187.5
16	Area included in enterprises in 1920 ... acres	424,538	2,417	8,584	174,000	2,034	4,763	4,034	6,574	24,000
17	Area included in enterprises in 1910 ... acres	222,569	1,662	14,995	99,822	731	9,885	3,634	15,640	5,470
18	Per cent of increase, 1910–1920	.....	45.4	−42.8	74.3	178.2	−51.8	11.0	−58.0	338.8
19	Area of irrigated land reported as available for settlement ... acres	29,000	.....	.....	11,100	.....	.....	1,450	.....	500
	IRRIGATION WORKS.									
	Independent enterprises:									
20	Number, 1920	9	15	44	18	12	52	6	38	2
21	Number, 1910	12	11	78	160	.....	32	15	54	7
	Main ditches:									
22	Number, 1920	10	24	10	19	9	37	5	2	2
23	Number, 1910	12	11	23	22	10	24	13	37	3
24	Length, 1920 ... miles	141	22	7	57	3	23	13	2	22
25	Length, 1910 ... miles	99	13	21	133	4	39	21	16	4
26	Capacity, 1920 ... second-feet	3,191	59	315	1,936	10	101	103	3	157
27	Capacity, 1910 ... second-feet	1,911	44	.....	.....	19	141	42	158	.....
	Laterals:									
28	Number, 1920	134	66	18	40	.....	5	269	.....	23
29	Number, 1910	146	1	6	29	16	27	31	.....	.....
30	Length, 1920 ... miles	765	15	9	89	.....	1	77	.....	36
31	Length, 1910 ... miles	173	2	2	154	1	17	14	.....	.....
	Reservoirs:									
32	Number, 1920	3	1	.....	1	8	2	.....	6	.....
33	Number, 1910	5	3	4	4	7	2	2	18	.....
34	Capacity, 1920 ... acre-feet	3,400	.....	.....	500	.....	5	.....	13	.....
35	Capacity, 1910 ... acre-feet	2,627	22	86	144	48	4	70	219	.....
	Flowing wells:									
36	Number, 1920	.....	.....	.....	.....	.....	.....	.....	2	.....
37	Number, 1910	.....	.....	.....	.....	.....	.....	.....	2	.....
38	Capacity, 1920 ... gallons per minute	.....	.....	.....	.....	.....	.....	.....	1,000	.....
39	Capacity, 1910 ... gallons per minute	.....	.....	.....	.....	.....	.....	.....	21	.....
	Pumped wells:									
40	Number, 1920	.....	1	48	.....	7	.....	.....	.....	.....
41	Number, 1910	3	.....	75	1	4	.....	2	10	5
42	Capacity, 1920 ... gallons per minute	.....	1,500	40,600	.....	3,180	.....	.....	.....	.....
43	Capacity, 1910 ... gallons per minute	81	.....	90,000	11	370	.....	30	760	45,500
	Pumping plants:									
44	Number, 1920	10	12	44	19	11	37	2	43	3
45	Number, 1910	23	7	84	24	5	13	2	53	7
46	Engine capacity, 1920 ... horsepower	11,110	181	1,868	6,770	148	571	256	1,184	3,000
47	Engine capacity, 1910 ... horsepower	3,767	98	3,366	9,526	15	257	3	1,131	1,060
48	Pump capacity, 1920 ... gallons per minute	1,366,576	17,800	54,160	2,039,600	4,450	10,910	20,250	45,250	135,000
49	Pump capacity, 1910 ... gallons per minute	355,589	11,531	119,449	1,170,010	420	12,338	30	30,582	65,100
50	Average lift, 1920 ... feet	21	19	58	15	70	27	29	23	56
	CAPITAL INVESTED.									
51	Capital invested to Jan. 1, 1920 ... dollars	8,024,550	53,400	236,189	1,785,400	59,098	86,381	383,118	155,450	732,779
52	Capital invested to July 1, 1910 ... dollars	1,961,992	17,090	265,525	1,210,787	7,050	62,790	11,676	117,559	71,500
53	Per cent of increase, 1910–1920	.....	212.5	−11.0	47.5	738.3	37.6	.....	32.2	924.9
54	Average cost per acre based on area enterprises were capable of supplying with water in 1920 ... dollars	20.65	25.90	35.00	18.39	43.74	29.14	129.04	29.37	52.34
55	Average cost per acre based on area enterprises were capable of supplying with water in 1910 ... dollars	27.51	10.94	25.80	13.03	29.87	24.44	3.48	38.90	14.68
	ESTIMATED FINAL COST.									
56	Estimated final cost of existing enterprises in 1920 ... dollars	9,349,550	53,600	236,189	1,815,400	59,098	88,131	383,118	155,450	732,779
57	Estimated final cost of existing enterprises in 1910 ... dollars	2,342,318	17,090	265,525	1,210,787	7,050	62,790	11,676	117,559	71,500
58	Per cent of increase, 1910–1920	.....	213.6	−11.0	49.9	738.3	40.4	.....	32.2	924.9
59	Average cost per acre based on estimated final cost and area included in enterprises in 1920 ... dollars	22.02	22.18	27.52	10.43	29.06	18.50	94.97	23.65	30.53
60	Average cost per acre based on estimated final cost and area included in enterprises in 1910 ... dollars	10.52	10.28	17.71	12.13	9.64	6.35	3.21	7.52	13.07

[1] Parts taken to form parts of Brooks and Willacy Counties in 1911.

[2] The excess of farm acreage over approximate land area is due to the fact that the entire acreage of a farm is tabulated as in the county where the operator resides, even though part of the farm may be situated in an adjoining county.

COUNTY TABLE.—ACREAGE IRRIGATED, 1919 AND 1909; AND ACREAGE IN ENTERPRISES, IRRIGATION WORKS, AND CAPITAL INVESTED IN IRRIGATION ENTERPRISES, 1920 AND 1910—Continued.

[A minus sign (—) denotes decrease. Per cent not shown when base is less than 100 or when per cent is more than 1,000.]

		Loving.	Maverick.	Maverick.	Menard.	Orange.	Pecos.	Presidio.	Real [1]	Reeves.	Runnels.
1	Number of all farms in 1920	14	1,616	66	368	311	297	192	260	206	2,023
2	Number of farms irrigated in 1919	7	126	36	85	115	134	31	37	153	18
3	Per cent of all farms	50.0	7.8	54.5	27.6	37.0	44.7	20.4	14.2	74.3	0.9
4	Number of farms irrigated in 1909	12	212	8	52	62	2	43		63	
5	Per cent of increase, 1909-1919		—40.6								
	LAND AND FARM AREA.										
6	Approximate land area ... acres	481,920	727,040	800,640	584,960	232,320	2,645,760	2,439,680	336,160	1,779,840	630,120
7	All land in farms ... acres	172,323	406,587	131,521	512,431	64,872	2,331,822	1,212,914	359,814	1,030,716	531,469
8	Improved land in farms ... acres	456	221,676	4,242	29,414	26,071	16,943	6,723	15,952	16,385	234,498
9	Area irrigated in 1919 ... acres	400	33,510	2,653	5,093	12,822	22,312	2,150	452	13,286	467
10	Per cent of improved land in farms	87.7	15.1	62.5	24.5	49.2	139.1	32.0	2.8	81.1	0.2
11	Area irrigated in 1909 ... acres	1,040	60,934	1,166	3,499	10,515	2,300	855		13,966	372
12	Per cent of increase, 1909-1919	—61.5	—44.9	127.5	43.0	21.9	870.1	151.5		—5.0	25.5
13	Area enterprises were capable of irrigating in 1920 ... acres	500	66,200	3,913	6,564	20,598	60,453	1,850	3,227	28,553	901
14	Area enterprises were capable of irrigating in 1910 ... acres	5,551	86,216	2,345	3,847	12,515	2,300	887		17,376	463
15	Per cent of increase, 1910-1920	—91.0	—23.2	66.9	70.6	65.9		108.6		18.3	94.6
16	Area included in enterprises in 1920 ... acres	3,000	164,875	6,513	7,120	24,468	68,653	2,550	3,274	26,066	1,325
17	Area included in enterprises in 1910 ... acres	30,061	130,304	2,545	5,449	26,945	35,600	897		44,958	515
18	Per cent of increase, 1910-1920	—90.0	26.5	155.9	30.9	—6.1	92.8	184.3		—41.9	198.1
19	Area of irrigated land reported as available for settlement ... acres	2,600	90,175	2,730		8,588	28,580	300		9,960	
	IRRIGATION WORKS.										
	Independent enterprises:										
20	Number, 1920	1	15	5	55	8	16	3	19	28	17
21	Number, 1910	4	37	7	19	11	2	9		16	
	Main ditches:										
22	Number, 1920	1	20	7	27	9	18	6	21	24	13
23	Number, 1910	4	29	4	17	9	2	3		12	3
24	Length, 1920 ... miles	2	111	5	28	42	135	13	24	53	5
25	Length, 1910 ... miles	9	114	3	21	28	13	3		62	2
26	Capacity, 1920 ... second-feet	9	1,772	60	254	451	1,372	28	23	399	29
27	Capacity, 1910 ... second-feet	557		24	145		37	16		297	4
	Laterals:										
28	Number, 1920	2	55	28	13	27	85	12	11	139	4
29	Number, 1910	4	86	3	2	21	9	6		107	
30	Length, 1920 ... miles	1	105	32	428	33	212	5	7	47	1
31	Length, 1910 ... miles	7	142	1	4	27	11	2		75	
	Reservoirs:										
32	Number, 1920		1		1		3			1	5
33	Number, 1910							1		5	10
34	Capacity, 1920 ... acre-feet		3		100		56,000			6,155	931
35	Capacity, 1910 ... acre-feet							1		5,002	187
	Flowing wells:										
36	Number, 1920		2				9			3	
37	Number, 1910									2	
38	Capacity, 1920 ... gallons per minute		120				7,200			1,850	
39	Capacity, 1910 ... gallons per minute									600	
	Pumped wells:										
40	Number, 1920		8		3		1			22	
41	Number, 1910		14			2		1		7	32
42	Capacity, 1920 ... gallons per minute		8,700		1,040		1,200			16,465	
43	Capacity, 1910 ... gallons per minute		10,858			15,000		7		2,150	396
	Pumping plants:										
44	Number, 1920	1	20	7	50	9	1		1	17	15
45	Number, 1910	2	42	4	15	11		1		10	49
46	Engine capacity, 1920 ... horsepower	40	4,676	540	987	1,835	20		3	459	262
47	Engine capacity, 1910 ... horsepower	54	8,373	458	604	1,501		1		111	102
48	Pump capacity, 1920 ... gallons per minute	4,000	442,700	15,600	30,095	187,000	1,200		200	18,065	9,850
49	Pump capacity, 1910 ... gallons per minute	8,700	915,600	18,250	27,350	208,700		7		5,558	4,977
50	Average lift, 1920 ... feet	15	26	50	24	14	42		40	41	29
	CAPITAL INVESTED.										
51	Capital invested to Jan. 1, 1920 ... dollars	5,000	1,323,942	68,078	108,273	345,935	1,180,335	10,300	13,700	581,475	41,650
52	Capital invested to July 1, 1910 ... dollars	9,785	1,402,239	24,198	61,258	171,684	50,950	2,800		211,910	10,040
53	Per cent of increase, 1910-1920	—48.9	—5.7	181.3	76.5	101.5		332.0		174.4	314.8
54	Average cost per acre based on area enterprises were capable of supplying with water in 1920 ... dollars	10.00	19.99	17.40	16.19	16.87	19.52	5.57	4.25	28.29	46.23
55	Average cost per acre based on area enterprises were capable of supplying with water in 1910 ... dollars	1.76	16.28	10.32	15.92	13.72	15.44	2.82		12.19	21.68
	ESTIMATED FINAL COST.										
56	Estimated final cost of existing enterprises in 1920 ... dollars	5,000	1,323,942	68,078	108,273	348,935	1,298,535	10,300	13,700	587,575	41,850
57	Estimated final cost of existing enterprises in 1910 ... dollars	190,285	1,402,239	24,198	61,258	171,684	75,950	6,000		211,910	10,040
58	Per cent of increase, 1910-1920	—97.4	—5.7	181.3	76.8	103.2		71.7		177.3	316.8
59	Average cost per acre based on estimated final cost and area included in enterprises in 1920 ... dollars	1.67	8.02	10.45	15.21	14.26	18.91	4.04	4.18	22.54	27.26
60	Average cost per acre based on estimated final cost and area included in enterprises in 1910 ... dollars	6.33	10.77	9.51	11.26	6.50	2.13	3.69		4.72	19.50

[1] Organized from parts of Bandera, Edwards, and Kerr Counties in 1913.

COUNTY TABLE.—ACREAGE IRRIGATED, 1919 AND 1909; AND ACREAGE IN ENTERPRISES, IRRIGATION WORKS, AND CAPITAL INVESTED IN IRRIGATION ENTERPRISES, 1920 AND 1910—Continued.

[A minus sign (−) denotes decrease. Per cent not shown when base is less than 100.]

		San Saba.	Tom Green.	Uvalde.	Val Verde.	Ward.	Webb.	Wharton.	Zavalla.	All other counties.	Total for rice growing.
1	Number of all farms in 1920	1,268	690	706	285	238	257	2,967	239	397,911	.....
2	Number of farms irrigated in 1919	45	107	7	101	182	87	146	228	225	5,957
3	Per cent of all farms	3.5	15.7	1.0	35.4	76.5	33.9	4.9	95.4	0.1	.....
4	Number of farms irrigated in 1909	50	102	16	59	178	76	282	32	2,013	1,088
5	Per cent of increase, 1909–1919	.....	4.9	.....	.....	2.2	.....	−48.2	.....	−88.9	447.5
	LAND AND FARM AREA.										
6	Approximate land area ... acres	714,240	930,560	1,016,960	1,973,120	529,280	2,060,160	711,680	862,720	125,463,680	.....
7	All land in farms ... acres	570,216	750,662	1,222,589	1,699,287	349,476	971,850	438,068	655,164	88,049,730	.....
8	Improved land in farms ... acres	120,490	95,530	101,988	7,059	19,051	21,698	245,952	18,974	27,558,162	.....
9	Area irrigated in 1919 ... acres	95	7,103	484	2,475	20,000	7,480	19,516	1,642	3,410	212,498
10	Per cent of improved land in farms	0.1	7.4	0.5	35.1	105.0	34.5	7.9	8.7	(1)	.....
11	Area irrigated in 1909 ... acres	2,022	6,227	1,676	2,416	16,406	4,186	53,990	1,021	19,962	286,847
12	Per cent of increase, 1909–1919	−95.3	14.1	−71.1	2.4	21.9	78.7	−63.8	60.8	−82.9	−25.9
13	Area enterprises were capable of irrigating in 1920 ... acres	2,221	10,040	2,032	3,550	37,000	13,143	40,623	4,645	11,275	315,598
14	Area enterprises were capable of irrigating in 1910 ... acres	2,379	6,703	1,676	4,036	28,712	5,625	63,613	1,818	25,242	350,350
15	Per cent of increase, 1910–1920	−6.6	49.8	21.2	−12.0	28.9	133.7	−36.1	155.5	−55.3	−9.9
16	Area included in enterprises in 1920 ... acres	2,395	14,718	2,032	4,660	71,500	31,736	75,612	5,933	16,789	606,466
17	Area included in enterprises in 1910 ... acres	3,135	7,372	4,380	4,036	105,012	10,677	91,632	3,440	35,630	499,474
18	Per cent of increase, 1910–1920	−23.6	99.6	−53.6	15.5	−31.9	197.2	−17.5	72.5	−52.9	21.4
19	Area of irrigated land reported as available for settlement ... acres	.....	.....	.....	2,125	49,600	.....	31,000	.....	1,900	.....
	IRRIGATION WORKS.										
	Independent enterprises:										
20	Number, 1920	31	50	5	2	3	58	138	36	189	264
21	Number, 1910	38	30	17	5	6	62	199	19	1,020	611
	Main ditches:										
22	Number, 1920	18	54	4	3	4	20	29	19	111	105
23	Number, 1910	32	26	12	9	7	57	78	11	242	225
24	Length, 1920 ... miles	10	53	9	11	61	12	45	8	47	382
25	Length, 1910 ... miles	19	43	11	22	65	54	125	9	120	538
26	Capacity, 1920 ... second-feet	30	348	18	408	925	1,666	1,076	35	325	7,392
27	Capacity, 1910 ... second-feet	280	110	67	160	1,306	165	.....	44	453	.....
	Laterals:										
28	Number, 1920	13	92	1	13	9	51	25	86	150	256
29	Number, 1910	4	16	12	21	12	.....	21	.....	57	216
30	Length, 1920 ... miles	3	25	.....	16	52	6	41	12	40	456
31	Length, 1910 ... miles	1	9	5	13	68	.....	57	.....	32	502
	Reservoirs:										
32	Number, 1920	.....	11	.....	.....	.....	45	1	18	35	5
33	Number, 1910	4	2	.....	1	.....	9	1	9	109	21
34	Capacity, 1920 ... acre-feet	.....	6,750	.....	.....	.....	20,248	100	65	1,334	25,603
35	Capacity, 1910 ... acre-feet	307	1,320	.....	1	.....	196	120	90	22,325	2,310
	Flowing wells:										
36	Number, 1920	.....	.....	.....	.....	.....	.....	1	8	11	3
37	Number, 1910	.....	.....	.....	.....	.....	.....	.....	11	42	1
38	Capacity, 1920 ... gallons per minute	.....	.....	.....	.....	.....	.....	1,000	1,000	8,159	1,120
39	Capacity, 1910 ... gallons per minute	.....	.....	.....	.....	.....	.....	.....	3,500	3,377	80
	Pumped wells:										
40	Number, 1920	.....	7	1	.....	.....	9	192	37	73	290
41	Number, 1910	1	1	4	1	7	.....	278	6	1,205	500
42	Capacity, 1920 ... gallons per minute	.....	632	50	.....	.....	2,975	160,817	7,942	13,297	238,183
43	Capacity, 1910 ... gallons per minute	15	45	180	60	2,714	.....	150,000	4,750	82,477	445,495
	Pumping plants:										
44	Number, 1920	32	48	2	.....	.....	68	173	37	184	323
45	Number, 1910	32	23	3	1	7	15	268	10	1,302	575
46	Engine capacity, 1920 ... horsepower	616	1,105	20	.....	.....	3,885	6,531	809	3,114	36,143
47	Engine capacity, 1910 ... horsepower	675	573	58	8	66	2,850	12,346	249	6,240	48,179
48	Pump capacity, 1920 ... gallons per minute	16,570	57,020	410	.....	.....	86,950	185,442	20,692	105,042	3,816,068
49	Pump capacity, 1910 ... gallons per minute	23,908	38,199	1,700	60	2,714	87,341	625,797	11,350	252,477	3,907,380
50	Average lift, 1920 ... feet	40	29	38	.....	.....	72	38	91	39	40
	CAPITAL INVESTED.										
51	Capital invested to Jan. 1, 1920 ... dollars	117,250	401,194	28,550	275,000	370,000	1,098,640	1,543,808	160,850	635,943	7,680,370
52	Capital invested to July 1, 1910 ... dollars	49,527	97,732	16,149	122,138	780,282	263,312	889,174	49,456	941,484	6,140,639
53	Per cent of increase, 1910–1920	136.8	310.5	76.8	125.2	−52.6	317.2	73.6	225.2	−32.5	25.1
54	Average cost per acre based on area enterprises were capable of supplying with water in 1920 ... dollars	52.79	39.96	14.05	77.46	10.00	83.59	38.00	34.63	56.40	24.34
55	Average cost per acre based on area enterprises were capable of supplying with water in 1910 ... dollars	20.82	14.58	9.64	30.26	27.18	46.81	13.98	27.20	37.30	17.53
	ESTIMATED FINAL COST.										
56	Estimated final cost of existing enterprises in 1920 ... dollars	117,271	402,194	28,550	315,000	370,000	1,139,702	1,574,608	160,850	645,848	7,744,770
57	Estimated final cost of existing enterprises in 1910 ... dollars	49,527	97,732	16,149	122,138	950,282	263,312	889,174	49,456	955,194	6,140,639
58	Per cent of increase, 1910–1920	136.8	311.5	76.8	157.9	−61.1	332.8	77.1	225.2	−32.4	26.1
59	Average cost per acre based on estimated final cost and area included in enterprises in 1920 ... dollars	48.96	27.33	14.05	67.60	5.17	35.91	20.82	27.11	38.47	12.77
60	Average cost per acre based on estimated final cost and area included in enterprises in 1910 ... dollars	15.80	13.26	3.09	30.26	9.05	24.66	9.70	14.38	26.81	12.29

[1] Less than one-tenth of 1 per cent.

UTAH.

INTRODUCTION.

The following pages present the statistics of irrigation for the state of Utah collected at the census of 1920. Statistics of acreage irrigated, of acreage, yield, and value of crops grown on irrigated land, and of cost of operation and maintenance relate to the year 1919; other items relate to the year 1920. Throughout the report figures for the census of 1910 are given for purposes of comparison; and, for the purpose of showing the historical development of irrigation, items which have been reported in censuses previous to 1910 are presented.

Statistics of number of farms irrigated and of acreage, yield, and value of crops grown on irrigated land were collected in the general census of agriculture. All other statistics were obtained in a special canvass of irrigation enterprises.

TABLE 1.—SUMMARY FOR THE STATE: 1920 AND 1910.

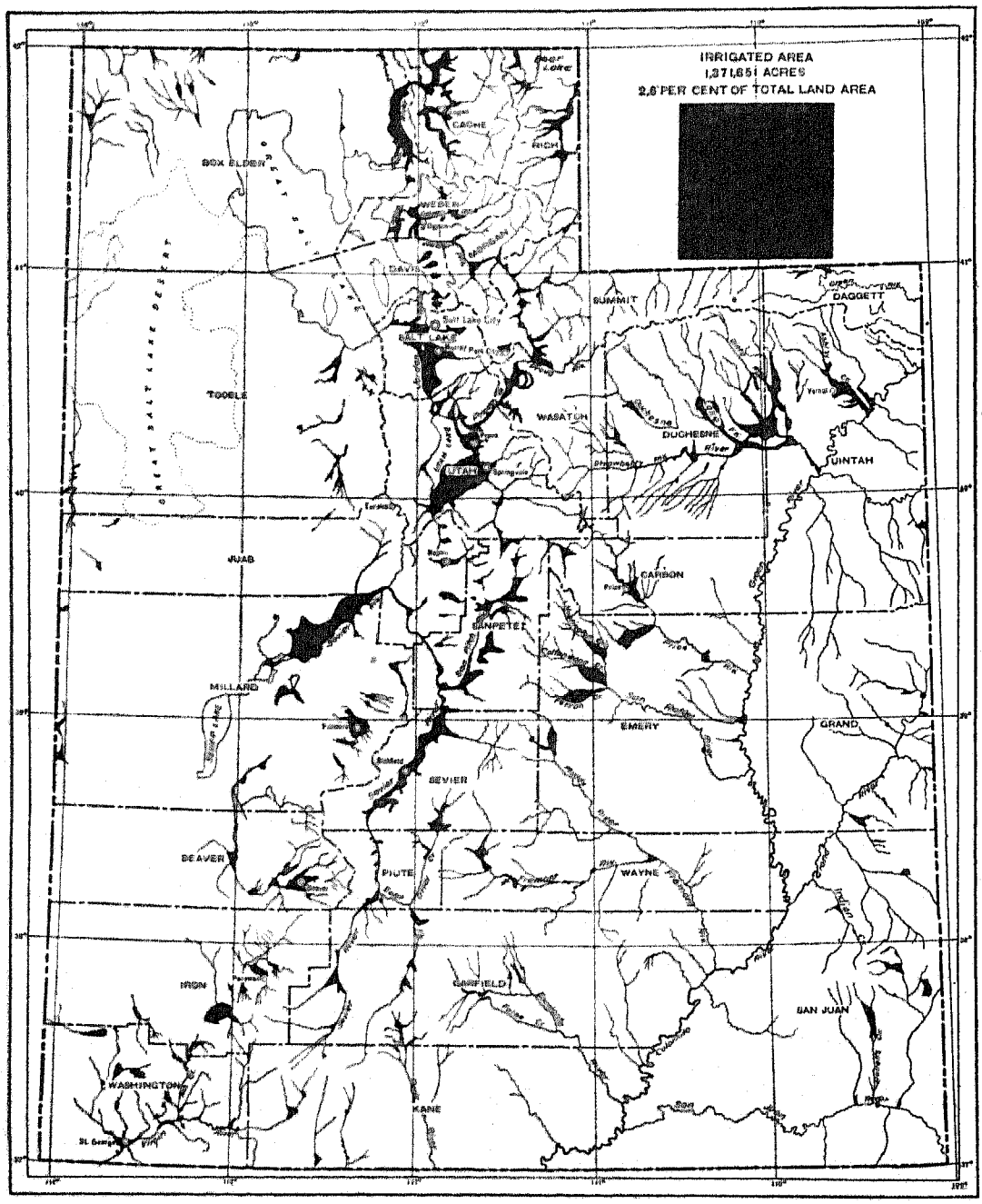
ITEM.	CENSUS OF—		INCREASE.[1]	
	1920	1910	Amount.	Per cent.
Number of all farms	25,662	21,676	3,986	18.4
Approximate land area of the state ... acres	52,597,760	52,597,760	.....	.....
All land in farms ... acres	5,050,410	3,397,699	1,652,711	48.6
Improved land in farms ... acres	1,715,380	1,368,211	347,169	25.4
Number of farms irrigated	22,218	19,709	2,509	12.7
Area irrigated ... acres	1,371,651	999,410	372,241	37.2
Area enterprises were capable of irrigating ... acres	1,700,550	1,250,246	450,304	36.0
Area included in enterprises ... acres	2,359,244	1,947,625	411,619	21.1
Per cent irrigated:				
Number of all farms	86.6	90.9	−4.3	.....
Approximate land area of the state	2.6	1.9	0.7	.....
Land in farms	27.2	29.4	−2.2	.....
Improved land in farms	80.0	73.0	7.0	.....
Excess of area enterprises were capable of irrigating over area irrigated ... acres	328,899	250,836	78,063	31.1
Excess of area included in enterprises over area irrigated ... acres	658,694	948,215	−289,521	−30.5
Area of irrigated land reported as available for settlement ... acres	189,563	(2)	.....	.....
Capital invested	$32,037,351	$14,028,717	$18,008,634	128.4
Average per acre enterprises were capable of irrigating	$18.84	$11.22	$7.62	67.9
Estimated final cost of existing enterprises	$33,835,641	$17,840,775	$15,994,866	89.7
Average per acre included in enterprises	$14.34	$9.16	$5.18	56.6
Average cost of operation and maintenance per acre	$1.08	$0.65	$0.43	66.2
IRRIGATION WORKS.				
Number of enterprises	2,403	2,472	−69	−2.8
Number of main ditches	2,381	2,495	−114	−4.6
Length of main ditches ... miles	6,343	5,887	456	7.7
Capacity of main ditches ... second-feet	29,447	25,081	4,366	17.4
Number of lateral ditches	4,068	1,357	2,711	199.8
Length of lateral ditches ... miles	5,334	1,822	3,512	192.8
Number of reservoirs	476	480	−4	−0.8
Capacity of reservoirs ... acre-feet	1,600,505	588,317	1,012,188	172.0
Number of flowing wells	1,256	1,138	118	10.4
Capacity of flowing wells ... gallons per minute	96,371	42,794	53,577	125.2
Number of pumped wells	192	27	165	.....
Capacity of pumped wells ... gallons per minute	39,059	4,827	34,232	709.2
Number of pumping plants	250	69	181	.....
Engine capacity ... horsepower	11,392	2,143	9,249	431.6
Pump capacity ... gallons per minute	783,588	315,057	468,531	148.7
Average lift ... feet	25	(2)	25	.....

[1] A minus sign (−) denotes decrease. Per cent not shown when base is less than 100.

[2] Not reported in 1910.

UTAH

APPROXIMATE LOCATION AND EXTENT OF IRRIGATED LAND.



CLIMATIC CONDITIONS.

The climatic conditions determining the necessity for irrigation are the amount and seasonal distribution of precipitation, especially rainfall, and, to a lesser extent, temperature and wind movement.

The surface of the central, eastern, and southern parts of the state is mountainous, with high plateaus and stream valleys interspersed between the ranges of mountains. The west central and northwestern parts of the state lie within the Great Basin, the bed of the ancient Lake Bonneville, and here the surface consists of extensive level plains, with occasional small ranges of mountains and hills or isolated peaks.

The whole state may be classed as arid, since only on the high mountains does the annual precipitation amount to 20 inches.

On the Wasatch and Uinta Mountains in the north central part of the state and on the divide between Virgin River and the Great Basin in the southwestern part of the state the annual precipitation exceeds 20 inches.

Immediately surrounding each of these sections lies a belt that receives from 15 to 20 inches of precipitation annually, and beyond that is a zone receiving from 10 to 15 inches. About one-third of the area of the state, divided about equally between the west central and the eastern parts of the state, receives less than 10 inches of precipitation annually, and in the Great Salt Lake Desert the annual precipitation is less than 5 inches.

In all of the valleys of the state the land slopes up from the central drainage channels toward the mountains, and the rainfall on the higher lands near the mountains is greater than that in the valleys, and on the higher lands crops, especially the cereals, are grown without irrigation. It is very common for farmers to have home farms on which crops are grown under irrigation and additional land above the canals on which crops are grown without irrigation.

Throughout the state the precipitation is fairly well distributed throughout the year, although it is slightly heavier in the winter than in the summer, the snowfall in the mountains being heavy and remaining well into the summer.

Precipitation in 1919 was much below the normal, and this condition was aggravated by a great deficiency in the summer months, that was offset to some extent by heavy rains in the fall. The drought was felt to some extent in May, but was much more pronounced in June and July, being accompanied by low humidities and high wind movement. Pastures, ranges, and dry-land crops suffered severely, and in many places irrigation water became scarce. On the whole, the season was unfavorable to the production of the best crops, although the fall rains helped late crops.

WATER SUPPLY FOR IRRIGATION.

The area of the state of Utah is about equally divided between the drainage basin of Colorado River and its tributaries and the great interior basin, which has no outlet to the sea. The eastern and extreme southern parts of the state are drained by the Colorado and its tributaries, while the northern and western parts of the state are within the Great Basin.

Green and Grand Rivers unite to form Colorado River in the southeastern part of Utah. Green River rises in northwestern Wyoming, enters Utah from Wyoming, flows across the northeastern corner of Utah, makes a short loop in Colorado, and returns to Utah. It flows in a southerly direction through eastern Utah roughly parallel to the eastern boundary and receives tributaries from Colorado on the east and from the Wasatch Mountains on the west. Green River itself flows in deep canyons most of its course in Utah, and the same is true of its tributaries from the east. Its principal tributaries from the west—Duchesne and Price Rivers—flow through large valleys and are utilized to a considerable extent for irrigation.

Grand River enters Utah from Colorado about midway of the eastern boundary of the state, and Colorado River leaves the state about midway of the southern boundary of the state. Both of these streams flow in deep canyons and are not used for irrigation to any considerable extent, although they carry large volumes of water.

Virgin River, a tributary of Colorado River, provides a small supply of water for irrigation in the southwestern corner of the state.

The larger part of the irrigated land of the state lies in the Great Salt Lake drainage basin, the water supply coming principally from streams draining the Wasatch and Uinta Mountains and flowing into Utah Lake and Great Salt Lake. Of these Bear River rises in the Uinta Mountains in Utah, flows north into Wyoming, crosses and recrosses from Wyoming into Utah, makes a loop into Idaho, returns to Utah, and discharges into the northern end of Great Salt Lake. It is used for irrigation to some extent throughout its course and supplies a large area in northern Utah. Its tributaries also serve considerable areas.

From the Wasatch Mountains many short streams flow into Great Salt Lake and Utah Lake, and these water the older irrigated areas of the state.

Southwest of the Great Salt Lake drainage basin lies the drainage basin of Sevier River, and other streams that rise in the high lands of southern Utah, and flow out into the deserts and discharge into lakes or are lost.

In most of the valleys of the state artesian water is found and is used for irrigation, and in the valleys of the Great Basin there appears to be much ground water that can be obtained by pumping.

FARMS AND ACREAGE IRRIGATED.

TABLE 2.—NUMBER OF FARMS AND ACREAGE IRRIGATED: 1890 TO 1920.

CENSUS YEAR.	FARMS IRRIGATED.			AREA IRRIGATED.				
	Number.	Per cent of increase.	Per cent of all farms.	Acres.	Per cent of increase.	Per cent of total land area.	Per cent of land in farms.	Per cent of improved land in farms.
1920	22,218	12.7	86.6	1,371,651	37.2	2.6	27.2	80.0
1910	19,709	10.6	90.9	999,410	58.8	1.9	20.4	73.0
1900	17,824	84.3	92.5	629,293	138.8	1.2	15.3	61.0
1890	9,724		92.5	263,473		0.5	20.0	48.1

TABLE 3.—ACREAGE, CLASSIFIED BY DATE OF BEGINNING OF ENTERPRISES SUPPLYING WATER FOR IRRIGATION.

DATE OF BEGINNING.	Number of enterprises.	Area included in enterprises, 1920 (acres).	AREA IRRIGATED IN 1919.		Area enterprises were capable of irrigating in 1920 (acres).
			Acres.	Per cent of area in enterprises.	
Total	2,493	2,359,244	1,371,651	58.1	1,700,550
Before 1860	157	131,071	106,132	81.0	118,958
1860-1869	256	165,414	144,957	87.6	150,919
1870-1879	268	247,868	201,849	81.4	222,904
1880-1889	389	474,566	300,415	63.3	334,983
1890-1899	296	184,637	113,386	61.6	125,678
1900-1904	127	124,565	81,407	65.4	91,590
1905-1909	171	551,435	250,648	45.3	494,876
1910-1914	179	257,123	67,466	26.2	121,504
1915-1919	205	149,239	44,939	30.1	64,172
Not reported	355	73,836	61,061	82.7	66,595

TABLE 4.—ACREAGE, CLASSIFIED BY SOURCE OF WATER SUPPLY: 1919 AND 1909.

CLASS.	AREA IRRIGATED (ACRES).				Area enterprises were capable of irrigating in 1920 (acres).	Area included in enterprises, 1920 (acres).
	1919	1909	Increase.[1]			
			Amount.	Per cent.		
Total	1,371,651	999,410	372,241	37.2	1,700,550	2,359,244
Streams, gravity	1,105,691	954,800	150,891	15.8	1,389,171	1,917,751
Streams, pumped	10,389	2,559	7,830	306.0	16,575	76,187
Streams, pumped and gravity	30	(2)			200	350
Wells, pumped	7,308	300	7,008		12,941	12,503
Wells, flowing	4,908	4,100	808	19.7	5,706	10,252
Wells, flowing and pumped	178	(2)			261	331
Lakes, pumped	11,400				19,000	24,400
Lakes, gravity	15,218	1,671	13,547	810.7	16,165	17,285
Springs	41,310	35,412	5,898	16.7	45,126	69,378
Stored storm water	977	568	409	72.0	1,620	2,230
City water	25	(2)			25	25
Streams, gravity, and pumped wells	125	(2)			233	233
Streams, gravity, and flowing wells	537	(2)			595	793
Other mixed	173,495	(2)			201,841	229,324
Other and not reported	40	(2)			71	102

[1] A minus sign (−) denotes decrease. Per cent not shown when more than 1,000.
[2] Not included in classification in 1910.

ACREAGE, BY CHARACTER OF ENTERPRISE.

Utah enacted the original irrigation district law in the United States in 1865, which did not, however, contain the provision for issuing bonds, which is the most important feature of present-day irrigation district laws. Many districts were organized under this law, but they were short-lived. A district law providing for the issuing of bonds was enacted in 1909, but little has been done under this law. Some of the land served by the United States Reclamation Service has been organized into irrigation districts, but this land is credited to the Reclamation Service in Table 5, because the Government built the works and still controls them to a large extent. The Reclamation Service also supplies stored water to land in other enterprises under the terms of the Warren Act (act of Congress, Feb. 21, 1911) and under special agreements.

The state of Utah accepted the terms of the Federal Carey Act (act of Congress, Aug. 18, 1894) in 1897, but little has been done under this act.

TABLE 5.—ACREAGE, CLASSIFIED BY CHARACTER OF ENTERPRISE: 1920 AND 1910.

ITEM AND CLASS.	CENSUS OF—		INCREASE.[1]	
	1920	1910	Amount.	Per cent.
ACREAGE IRRIGATED.				
Total	1,371,651	999,410	372,241	37.2
Individual and partnership	166,887	222,448	−55,561	−25.0
Cooperative	1,014,649	687,260	327,389	47.6
Irrigation district	21,143	8,455	12,688	150.1
Carey Act	16,000	5,000	11,000	220.0
Commercial	70,911	64,727	6,184	9.6
U. S. Reclamation Service	[2] 29,285		29,285	
U. S. Indian Service	25,270	11,520	13,750	119.4
City	24,206	(2)	24,206	
Other	3,300	(2)	3,300	
ACREAGE ENTERPRISES WERE CAPABLE OF IRRIGATING.				
Total	1,700,550	1,250,246	450,304	36.0
Individual and partnership	195,858	257,266	−61,408	−23.9
Cooperative	1,225,084	790,855	434,229	54.9
Irrigation district	24,023	8,455	15,568	184.1
Carey Act	35,000	20,000	15,000	75.0
Commercial	91,833	87,070	4,763	5.5
U. S. Reclamation Service	[2] 50,030		50,030	
U. S. Indian Service	49,870	86,600	−36,730	−42.4
City	25,552	(2)	25,552	
Other	3,300	(2)	3,300	
ACREAGE INCLUDED IN ENTERPRISES.				
Total	2,359,244	1,947,625	411,619	21.1
Individual and partnership	261,720	376,502	−114,782	−30.5
Cooperative	1,736,863	1,259,351	477,512	37.9
Irrigation district	27,933	10,802	17,131	158.6
Carey Act	38,000	43,000	−5,000	−11.6
Commercial	147,933	151,970	−4,037	−2.7
U. S. Reclamation Service	[2] 60,030		60,030	
U. S. Indian Service	55,870	106,000	−50,130	−47.3
City	27,595	(2)	27,595	
Other	3,300	(2)	3,300	

[1] A minus sign (−) denotes decrease.
[2] Does not include about 23,000 acres to which stored water is supplied under Warren Act.
[3] Not included in classification in 1910.

ACREAGE, BY CHARACTER OF WATER RIGHTS.

The laws of Utah relating to water rights are summarized in the following paragraphs:

The organic act of the territory of Utah, enacted in 1851, did not mention the subject of irrigation, but the territorial legislature disposed of water rights by direct grant and also delegated this power to the county courts of the several counties. Many such grants were made both by the legislature and by the county courts in some counties.

The act of February 20, 1880, provided for the recording of vested rights to the use of water and for regulating their exercise. The county selectmen were made water commissioners for their respective counties and were empowered to hear and determine all claims to the use of water, and to issue certificates showing their findings. No suits were to be maintained in the courts until the commissioners had acted, but appeal might be taken to the courts.

The constitution of the state of Utah, adopted in 1896, declares (Art. XVII) that "all existing rights to any waters of this state for any useful or beneficial purpose are hereby recognized and confirmed."

The act of March 11, 1897, provided that any party desiring to appropriate water should post a notice at the intended point of diversion and in the nearest post office and should file a copy of the notice in the county records.

The act of March 12, 1903, provided that parties wishing to appropriate water should apply to the state engineer for permits, and for the issuing of certificates by the state engineer when works have been completed and water used in accordance with the terms of the permits.

The same act provided a special procedure for the adjudication of water rights. The state engineer was to make surveys and collect information regarding rights, and submit reports to the appropriate district courts. The courts were to determine rights on the basis of these reports and any testimony they might take. This act is still in force, but has not been utilized to any large extent. Many rights have been adjudicated in ordinary suits between claimants.

Riparian rights are not recognized in Utah.

TABLE 6.—ACREAGE IRRIGATED, CLASSIFIED BY CHARACTER OF RIGHTS UNDER WHICH WATER IS RECEIVED: 1919 AND 1909.

CLASS.	1919		1909, per cent of total.
	Acres.	Per cent of total.	
Total	1,371,651	100.0	100.0
Appropriation and use	469,944	34.3	51.5
Notice filed and posted	171,955	12.5	6.2
Adjudicated by court	581,080	42.4	35.1
Permit from state	56,061	4.1	3.9
Certificate or license from state	66,778	4.9	3.2
Underground	8,631	0.6	(1)
Other and mixed	4,077	0.3	(1)
Not reported	13,125	0.9	(1)

[1] All land for which the class of water rights was not reported was included in "Appropriation and use."

ACREAGE, BY DRAINAGE BASIN.

The report of a special census taken in 1902 presented all data by drainage basins rather than by counties. The results of the census of 1920 have been tabulated on the same basis, and the data for 1902 are presented for purposes of comparison. For no other census have the results been tabulated in this form. The acreage reported for each drainage basin in 1919 comprises all the irrigated land in that drainage basin, including that watered from springs and wells. In the 1902 results the acreages irrigated from springs and wells were not reported for the smaller tributary streams, but the acreages for the tributaries were included in those reported for the main streams. This area is so small, however, that the comparison of the areas reported for the tributary streams is not seriously affected.

TABLE 7.—ACREAGE IRRIGATED, CLASSIFIED BY DRAINAGE BASIN: 1919 AND 1902

DRAINAGE BASIN.	AREA IRRIGATED (ACRES).			Area included in enterprises, 1920 (acres).	Area enterprises were capable of irrigating in 1920 (acres).
	1919	1902	Per cent of increase.[1]		
Total	1,371,651	713,627	92.2	2,330,244	1,700,550
Tributaries of Great Salt Lake	570,868	402,406	41.9	836,075	680,285
Bear River and tributaries	202,981	141,616	43.1	272,109	218,097
Bear River direct	104,731	48,360	115.7	161,328	117,523
Little Bear River	46,541	39,592	20.6	48,258	46,890
Malad River	1,149	(2)	.....	1,995	1,149
Other tributaries of Bear River	50,220	[3] 54,464	−7.8	60,479	52,435
Weber River and tributaries	97,589	80,355	21.4	149,081	112,981
Weber River direct	44,726	41,967	6.6	83,796	49,341
Ogden River	21,884	22,373	−2.2	27,097	26,952
East Canyon Creek	6,202	4,314	43.5	6,538	6,488
Other tributaries of Weber River	24,777	[3] 11,601	113.6	31,650	30,320
Jordan River and Utah Lake and tributaries	270,568	190,435	39.0	414,894	329,205
Jordan River direct	48,052	32,401	48.3	90,495	55,720
Big Cottonwood Creek	10,994	8,813	24.7	13,207	12,271
Little Cottonwood Creek	12,144	7,673	58.3	16,698	16,691
American Fork River	19,146	20,446	−6.4	20,371	20,341
Provo River	54,782	36,939	48.3	62,705	56,672
Hobble Creek	5,620	18,424	−69.5	6,589	5,946
Spanish Fork River	61,434	25,778	138.4	96,176	85,142
Other tributaries of Jordan River and Utah Lake	58,429	[3] 31,961	82.8	108,655	78,582
Sevier River and tributaries	325,718	131,948	148.5	630,464	402,207
Sevier River direct	253,651	89,257	139.3	351,553	226,199
San Pitch River	77,618	42,502	82.6	105,519	78,348
Otter Creek	7,299	5,209	38.6	7,845	7,269
South Fork	18,325	3,495	424.3	32,620	19,159
Other tributaries of Sevier River	68,837	[3] 20,534	235.2	132,947	71,991
Green River and tributaries	280,877	53,924	420.8	510,426	285,012
Green River direct	2,541	1,372	85.2	3,629	3,026
Ashley Fork River	26,767	15,934	68.2	44,067	44,067
Duchesne River	138,448	(2)	.....	222,689	217,409
Price River	23,514	6,621	259.6	37,191	24,348
San Rafael River	77,290	21,546	258.7	95,028	30,028
Other tributaries of Green River	12,002	[3] 8,551	40.2	17,802	15,802
Grand River and tributaries	9,740	[3] 3,843	153.4	24,615	18,529
Colorado River and tributaries	71,939	34,845	106.5	171,054	62,959
Fremont River	20,513	12,201	68.9	42,005	34,005
Virgin River	27,196	10,741	152.4	82,486	35,595
San Juan River	9,554	(2)	.....	26,646	14,158
Other tributaries of Colorado River	8,786	[3] 8,403	4.6	19,953	9,101
Independent streams	112,499	87,545	28.5	189,590	146,889
Beaver River	28,732	15,589	84.2	53,720	46,469
Coal Creek	27,206	2,845	856.3	60,891	33,932
Deep Creek	1,983	1,515	30.9	4,326	3,446
Grouse Creek	3,469	980	260.4	4,599	3,619
Other independent streams	51,609	[3] 66,596	−22.3	62,045	59,442

[1] A minus sign (−) denotes decrease.
[2] Included in "Other tributaries" in 1902.
[3] Includes springs and wells.

CAPITAL INVESTED AND COST OF OPERATION AND MAINTENANCE.

TABLE 8.—CAPITAL INVESTED IN IRRIGATION ENTERPRISES: 1890 TO 1920.

CENSUS YEAR.	Amount.	Per cent of increase.	AVERAGE PER ACRE.	
			Amount.	Per cent of increase.[1]
1920	$32,037,391	128.4	$18.84	67.9
1910	14,028,717	199.2	11.22	20.4
1900	5,865,392	111.0	9.32	−11.7
1890	2,780,000	.....	10.55	.....

[1] A minus sign (−) denotes decrease.

TABLE 9.—CAPITAL INVESTED, CLASSIFIED BY DATE OF BEGINNING.

DATE OF BEGINNING.	Amount.	Per cent of total.	Average per acre.
Total	$32,037,351	100.0	$18.84
Before 1860	1,883,633	5.9	15.84
1860-1869	1,639,394	5.1	10.93
1870-1879	2,495,342	7.8	11.19
1880-1889	4,728,292	14.8	14.12
1890-1899	2,332,321	7.3	18.65
1900-1904	807,149	2.5	8.81
1905-1909	10,322,803	32.2	25.50
1910-1914	5,115,678	16.0	42.09
1915-1919	1,863,298	5.8	29.04
Not reported	850,451	2.6	12.77

TABLE 10.—CAPITAL INVESTED, 1920, AND COST OF OPERATION AND MAINTENANCE, 1919, CLASSIFIED BY SOURCE OF WATER SUPPLY.

[When water is pumped, cost of operation and maintenance includes cost of fuel and attendance.]

CLASS.	CAPITAL INVESTED, 1920.			OPERATION AND MAINTENANCE, 1919.	
	Amount.	Per cent of total.	Average per acre.	Area for which cost is reported (acres).	Average cost per acre.[1]
Total	$32,037,351	100.0	$18.84	1,122,456	$1.08
Streams, gravity	26,502,462	82.7	19.20	910,594	1.01
Streams, pumped	733,077	2.3	44.23	7,444	5.16
Streams, pumped and gravity	5,100	(2)	25.50	.....	.....
Wells, pumped	153,691	0.5	11.83	6,212	2.08
Wells, flowing	167,152	0.5	29.29	756	1.79
Wells, flowing and pumped	18,571	0.1	71.15	27	9.48
Lakes, pumped	565,699	1.8	29.74	26,400	3.58
Lakes, gravity	75,281	0.2	4.65	13,877	0.25
Springs	869,214	2.7	19.26	25,858	0.75
Stored storm water	81,803	0.3	50.59	857	2.23
City water	800	(2)	32.00	.....	.....
Streams, gravity, and pumped wells	22,600	0.1	94.42	85	2.94
Streams, gravity, and flowing wells	11,822	(2)	19.87	203	0.49
Other mixed	2,828,242	8.8	14.01	136,126	0.94
Other and not reported	2,736	(2)	38.54	17	1.76

[1] Based on area irrigated in 1919.
[2] Less than one-tenth of 1 per cent.

TABLE 11.—CAPITAL INVESTED, CLASSIFIED BY DRAINAGE BASIN: 1920 AND 1902.

DRAINAGE BASIN.	1920	1902	INCREASE.[1]	
			Amount.	Per cent.
Total	$32,037,351	$7,303,607	$24,733,744	338.7
Tributaries of Great Salt Lake	14,102,303	5,017,457	9,084,936	181.1
Bear River and tributaries	3,430,663	2,397,638	1,033,025	43.1
Bear River direct	2,150,603	2,062,254	88,349	4.3
Little Bear River	720,363	163,170	557,193	341.5
Malad River	18,097	(2)	.....	.....
Other tributaries of Bear River	541,600	[3] 172,214	369,386	214.5
Weber River and tributaries	2,106,048	796,837	1,309,211	164.3
Weber River direct	1,353,323	549,432	803,891	146.3
Ogden River	423,755	168,406	255,349	151.6
East Canyon Creek	74,010	22,890	51,120	223.3
Other tributaries of Weber River	254,960	[3] 56,109	198,851	354.4
Jordan River and Utah Lake and tributaries	8,565,082	1,822,982	6,742,700	369.9
Jordan River direct	746,826	753,160	−6,254	−0.8
Big Cottonwood Creek	315,563	45,590	269,973	592.2
Little Cottonwood Creek	226,221	25,825	200,396	776.0
American Fork River	302,449	162,130	140,319	86.5
Provo River	985,979	328,691	657,288	200.0
Hobble Creek	41,024	32,588	8,436	25.9
Spanish Fork River	4,126,999	123,930	4,003,069	.....
Other tributaries of Jordan River and Utah Lake	1,820,611	[3] 351,128	1,469,483	418.5
Sevier River and tributaries	9,599,826	808,872	8,790,954	.....
Sevier River direct	7,002,349	443,032	6,559,317	.....
San Pitch River	1,142,510	228,536	913,974	399.9
Otter Creek	151,850	18,355	133,495	727.3
South Fork	372,626	15,650	356,976	.....
Other tributaries of Sevier River	849,501	[3] 103,299	737,202	713.7

[1] A minus sign (−) denotes decrease. Per cent not shown when more than 1,000.
[2] Included in "Other tributaries" in 1902.
[3] Includes springs and wells.

TABLE 11.—CAPITAL INVESTED, CLASSIFIED BY DRAINAGE BASIN: 1920 AND 1902—Continued.

DRAINAGE BASIN.	1920	1902	INCREASE.[1]	
			Amount.	Per cent.
Green River and tributaries	$4,154,660	$508,374	$3,646,286	717.2
Green River direct	376,325	26,150	350,175	.....
Ashley Fork River	374,140	57,835	316,305	546.9
Duchesne River	2,428,174	(2)	.....	.....
Price River	458,725	41,719	417,006	999.6
San Rafael River	288,100	295,850	−7,750	−2.6
Other tributaries of Green River	229,196	[3] 86,820	142,376	164.0
Grand River and tributaries	219,489	13,760	205,729	.....
Colorado River and tributaries	2,203,203	441,845	1,761,358	398.6
Fremont River	567,050	189,380	377,670	199.4
Virgin River	1,257,981	155,515	1,102,466	708.9
San Juan River	206,458	(2)	.....	.....
Other tributaries of Colorado River	171,714	[3] 96,950	74,764	77.1
Independent streams	1,847,770	513,299	1,334,471	260.0
Beaver River	842,305	65,325	776,980	.....
Coal Creek	179,171	7,076	172,095	.....
Deep Creek	8,844	6,692	2,152	32.2
Grouse Creek	28,338	2,850	25,488	894.3
Other independent streams	789,112	[3] 431,356	357,756	82.9

[1] A minus sign (−) denotes decrease. Per cent not shown when more than 1,000.
[2] Included in "Other tributaries" in 1902.
[3] Includes springs and wells.

In classifying capital invested by type of enterprise (Table 12) the average capital invested per acre is not presented, for the reason that it is not possible to compute this correctly. The United States Reclamation Service supplies stored water to enterprises controlled by agencies of most of the other classes shown in the table and a part of its expenditure is properly chargeable to those lands; but it is not possible to tell how much should be so charged or how it should be distributed among the various classes.

TABLE 12.—CAPITAL INVESTED, 1920, AND COST OF OPERATION AND MAINTENANCE, 1919, CLASSIFIED BY CHARACTER OF ENTERPRISE.

[When water is pumped, cost of operation and maintenance includes cost of fuel and attendance.]

CLASS.	CAPITAL INVESTED, 1920.		OPERATION AND MAINTENANCE, 1919.	
	Amount.	Per cent of total.	Area for which cost is reported (acres).	Average cost per acre.[1]
Total	$32,037,351	100.0	1,122,456	$1.08
Individual and partnership	2,736,804	8.6	64,612	2.43
Cooperative	20,254,212	63.2	895,509	0.87
Irrigation district	265,484	0.8	19,143	0.71
Carey Act	1,323,779	4.1	16,000	0.60
Commercial	2,374,991	7.4	70,431	2.71
U. S. Reclamation Service	3,567,057	11.1	29,255	1.30
U. S. Indian Service	765,354	2.4	.....	.....
City	729,090	2.3	24,206	1.06
Other	20,580	0.1	3,300	0.33

[1] Based on area irrigated in 1919.

DRAINAGE OF IRRIGATED LAND.

The acreages reported in Table 13 relate to lands within the boundaries of irrigation projects, and do not include lands within the vicinity of these projects. "Additional acreage needing drainage" includes all lands so reported by the owners of the enterprises, and includes lands producing partial crops as well as those wholly unproductive.

TABLE 13.—ACREAGE WITHIN IRRIGATION ENTERPRISES FOR WHICH DRAINS HAVE BEEN INSTALLED AND ADDITIONAL ACREAGE IN NEED OF DRAINAGE: 1920.

Number of enterprises reporting land drained or needing drainage	143
Acreage included in enterprises reporting land drained or needing drainage	566,212
Acreage for which drains have been installed	85,448
Additional acreage needing drainage	91,976
Per cent that acreage for which drains have been installed is of total acreage included in enterprises reporting drainage	17.0
Per cent that acreage for which drains have been installed is of total acreage included in irrigation enterprises in the state	3.6
Per cent that acreage for which drains have been installed plus that needing drainage is of total acreage included in irrigation enterprises in the state	7.5

QUANTITY OF WATER USED.

The quantity of water used in 1919 was reported on only part of the irrigation schedules, and the figures given vary greatly. In order that proper values may be assigned to the figures given, those representing measurements and those representing estimates are reported separately in Table 14. While the data are incomplete, the reports represent sufficient acreages to serve as bases for reliable averages.

TABLE 14.—QUANTITY OF WATER USED IN 1919.

ITEM.	Total.	Measured.	Not measured.
Average volume entering canals ..... second-feet	48,629	15,106	33,523
Area irrigated in 1919 ..... acres	937,243	720,715	216,528
Average number of acres per second-foot	19	48	6
Total quantity entering canals ..... acre-feet	3,354,223	2,708,931	645,292
Area irrigated in 1919 ..... acres	982,544	770,348	212,196
Average quantity per acre ..... acre-feet	3.6	3.5	4.0
Total quantity of water delivered ..... acre-feet	1,718,769	728,360	990,409
Area irrigated in 1919 ..... acres	353,424	188,496	164,918
Average quantity per acre ..... acre-feet	4.9	3.9	6.0

IRRIGATION WORKS.

TABLE 15.—IRRIGATION WORKS, CLASSIFIED BY DATE OF BEGINNING.

DATE OF BEGINNING.	Number of diverting dams.	Number of storage dams.	MAIN DITCHES.			LATERAL DITCHES.		RESERVOIRS.	
			Number.	Capacity (second-feet).	Length (miles).	Number.	Length (miles).	Number.	Capacity (acre-feet).
Total	1,479	307	2,381	29,447	6,343	4,068	5,334	476	1,600,505
Before 1860	168	18	204	1,723	412	673	592	32	3,636
1860-1869	205	9	366	3,145	711	615	539	22	30,558
1870-1879	245	29	317	3,556	927	796	644	25	8,059
1880-1889	311	127	449	6,042	1,354	827	768	71	72,112
1890-1899	190	26	315	2,490	736	289	286	50	47,447
1900-1904	34	9	114	2,047	291	136	157	34	16,089
1905-1909	170	31	177	6,114	812	490	1,687	48	668,990
1910-1914	63	16	147	2,423	459	277	1,205	74	446,384
1915-1919	66	38	117	1,313	250	85	149	32	288,066
Not reported	27	4	175	684	391	80	87	64	2,170

DATE OF BEGINNING.	Pipe lines, length (miles).	FLOWING WELLS.		PUMPED WELLS.		PUMPING PLANTS.			
								PUMPS.	
		Number.	Capacity (gallons per minute).	Number.	Capacity (gallons per minute).	Number.	Engine capacity (horse-power).	Number.	Capacity (gallons per minute).
Total	154.7	1,256	96,371	192	39,059	230	11,392	291	783,588
Before 1860	22.1	15	1,915	7	2,210	15	134	18	7,989
1860-1869	5.0	14	177	2	550	5	34	5	4,600
1870-1879	22.8	9	137			3	1,940	9	6,490
1880-1889	41.8	38	6,162			4	1,960	9	326,630
1890-1899	13.4	109	3,649	15	2,228	12	50	19	1,378
1900-1904	2.5	126	6,356	6	1,620	10	120	11	6,740
1905-1909	10.2	248	24,162	19	3,880	22	1,969	28	83,202
1910-1914	9.8	122	8,955	34	8,782	43	3,489	51	60,435
1915-1919	9.0	168	17,833	71	16,883	104	2,332	112	106,875
Not reported	18.1	407	26,634	38	2,906	32	362	35	9,330

TABLE 16.—IRRIGATION WORKS, CLASSIFIED BY CHARACTER OF ENTERPRISE: 1920.

CLASS.	Number of diverting dams.	Number of storage dams.	MAIN DITCHES.			LATERAL DITCHES.		RESERVOIRS.	
			Number.	Capacity (second-feet).	Length (miles).	Number.	Length (miles).	Number.	Capacity (acre-feet).
Total	1,479	307	2,381	29,447	6,343	4,068	5,334	476	1,600,505
Individual and partnership	408	48	1,423	4,627	2,077	323	966	315	46,231
Cooperative	1,017	241	877	21,502	3,758	3,294	3,514	143	763,299
Irrigation district	37	5	33	292	53	27	53	5	293,972
Carey Act	1	1	1	300	7	20	95	2	252,500
Commercial	6	2	14	1,236	236	49	78	2	27,000
U. S. Reclamation Service	1	2	3	320	28	35	71	1	250,000
U. S. Indian Service	2		12	3	93	204	292		
City	7	8	17	425	60	129	175	10	503
Other and not reported			1	22	1				

TABLE 16.—IRRIGATION WORKS, CLASSIFIED BY CHARACTER OF ENTERPRISE: 1920—Continued.

CLASS.	Pipe lines, length (miles).	FLOWING WELLS.		PUMPED WELLS.		PUMPING PLANTS.			
		Number.	Capacity (gallons per minute).	Number.	Capacity (gallons per minute).	Number.	Engine capacity (horse-power).	Pumps.	
								Number.	Capacity (gallons per minute).
Total	154.7	1,256	96,371	192	39,059	250	11,392	291	783,588
Individual and partnership	68.8	1,092	75,999	181	31,829	220	2,540	231	106,943
Cooperative	73.1	164	20,372	11	7,230	26	3,502	40	267,145
Commercial	3.6					3	4,350	12	27,000
Irrigation districts	1.2								
City	8.0					1	1,000	8	382,500

TABLE 17.—IRRIGATION WORKS, CLASSIFIED BY DRAINAGE BASIN: 1920.

DRAINAGE BASIN.	Number of diverting dams.	Number of storage dams.	MAIN DITCHES.			LATERAL DITCHES.		RESERVOIRS.	
			Number.	Capacity (second-feet).	Length (miles).	Number.	Length (miles).	Number.	Capacity (acre-feet).
Total	1,479	307	2,381	29,447	6,343	4,068	5,334	476	1,600,505
Tributaries of Great Salt Lake	576	71	1,057	13,165	2,435	1,672	2,068	164	568,177
Bear River and tributaries	118	17	319	4,253	781	479	320	48	2,026
Bear River direct	8	1	40	2,264	322	17	74	2	
Little Bear River	47	6	104	1,074	195	395	183	4	4
Malad River	2	1	3	13	10			1	2
Other tributaries of Bear River	61	9	172	902	254	67	63	41	2,020
Weber River and tributaries	256	18	391	2,823	570	146	106	52	30,794
Weber River direct	72	1	101	1,417	181	53	46	5	22
Ogden River	27		73	480	109	57	29	4	4
East Canyon Creek	38	1	40	179	49	5	5	2	28,004
Other tributaries of Weber River	119	16	177	747	231	31	26	41	2,764
Jordan River and Utah Lake and tributaries	202	36	347	6,089	1,084	1,047	1,642	64	535,357
Jordan River direct	14	4	20	1,151	296	101	26	3	600
Big Cottonwood Creek	32	3	27	228	58	160	31	4	300
Little Cottonwood Creek	21	1	36	650	60	50	45	1	750
American Fork River	27		23	70	43	63	130	4	
Provo River	31	11	99	1,752	304	416	262	21	6,681
Hobble Creek	1		13	31	9	10	4	1	2
Spanish Fork River	12	6	46	1,358	93	95	202	8	502,116
Other tributaries of Jordan River and Utah Lake	54	11	83	849	221	152	942	22	24,908
Sevier River and tributaries	95	50	321	7,762	1,391	903	1,195	63	869,405
Sevier River direct	23	13	44	4,693	468	330	508	14	741,900
San Pitch River	26	20	80	970	372	254	401	21	30,698
Otter Creek	2	3	12	86	42	24	9	3	3,900
South Fork	9		32	381	114	65	42	2	24,015
Other tributaries of Sevier River	35	14	153	1,632	395	230	235	23	68,892
Green River and tributaries	414	11	239	4,047	1,047	775	1,404	15	51,919
Green River direct	2		10	71	29	12			
Ashley Fork River	109		18	113	75	8	15		
Duchesne River	156	8	106	2,416	543	306	771	7	41,871
Price River	13	1	54	636	161	37	34	2	1,248
San Rafael River	11	2	30	591	170	401	570	6	8,800
Other tributaries of Green River	123		21	220	69	11	14		
Grand River and tributaries	36	5	80	296	132	44	24	6	13,152
Colorado River and tributaries	240	129	303	1,693	570	229	219	56	25,542
Fremont River	148	117	43	548	121	87	65	13	4,078
Virgin River	85	7	164	645	263	89	86	21	19,655
San Juan River	16	4	38	332	75	32	47	11	1,485
Other tributaries of Colorado River	11	1	58	168	111	21	21	11	324
Independent streams	98	41	381	2,494	768	445	424	172	72,310
Beaver River	36	14	128	775	210	196	229	9	40,555
Coal Creek	22	2	58	1,158	136	97	63	63	967
Deep Creek	3		21	50	36			2	
Grouse Creek	14	3	29	35	45			1	10
Other independent streams	23	22	145	476	341	152	132	97	30,778

TABLE 17.—IRRIGATION WORKS, CLASSIFIED BY DRAINAGE BASIN: 1920—Continued.

DRAINAGE BASIN.	Pipe lines, length (miles).	FLOWING WELLS.		PUMPED WELLS.		PUMPING PLANTS.				
		Number.	Capacity (gallons per minute).	Number.	Capacity (gallons per minute).	Number.	Engine capacity (horse-power).	Pumps. Number	Pumps. Capacity (gallons per minute).	Average lift (feet).
Total	154.7	1,236	96,371	192	30,659	230	11,382	294	783,508	25
Tributaries of Great Salt Lake	100.3	395	34,780	68	16,967	137	9,917	167	698,245	38
Bear River and tributaries	14.7	114	5,167	37	11,597	97	2,443	102	103,370	42
Bear River direct	1.2			2	902	26	1,675	29	74,955	41
Little Bear River	2.0	20	3,025			4	50	4	3,740	18
Malad River		2	219							
Other tributaries of Bear River	11.5	93	1,921	35	10,695	67	715	70	24,725	44
Weber River and tributaries	8.2	33	1,258	6	1,640	23	232	25	27,140	16
Weber River direct	1.3	12	388			9	196	10	6,615	14
Ogden River	1.8	9	320	1	230	1	7	1	230	33
Other tributaries of Weber River	5.1	12	650	5	1,410	13	129	14	20,300	17
Jordan River and Utah Lake and tributaries	77.4	248	28,255	5	2,830	17	7,242	39	525,730	38
Jordan River direct	0.3	9	130			5	4,300	20	325,500	19
Big Cottonwood Creek	2.0	9	92			1	1	1	500	25
American Fork River	2.2	27	2,665	1	900	3	23	3	1,620	21
Provo River	1.2	61	11,714	1	830	1	20	1	900	45
Hobble Creek		18	766	1		1	6	1		14
Spanish Fork River	9.8	21	1,390							
Other tributaries of Jordan River and Utah Lake	61.9	103	11,496	2	1,100	6	2,892	13	154,900	65
Sevier River and tributaries	9.0	258	38,863	3	178	8	117	10	18,318	30
Sevier River direct	1.9	184	27,127			1		2	11,200	
San Pitch River	3.4	16	3	1	150	1	5	1	450	4
Otter Creek		6	112							
Other tributaries of Sevier River	3.7	52	11,621	2	28	6	112	7	6,618	35
Green River and tributaries	0.9			1	1,350	10	545	13	39,315	29
Green River direct	0.3			1	1,350	8	537	10	11,580	26
Duchesne River						1		2	27,000	70
Price River	0.6									
Other tributaries of Green River						1	8	1	735	19
Grand River and tributaries	0.6					10	212	10	17,812	19
Colorado River and tributaries	11.4	6	196	3	1,500	3	32	3	900	80
Fremont River	1.0									
Virgin River	3.2	4	106	3	1,500	3	32	3	900	80
San Juan River	7.0	2	90							
Other tributaries of Colorado River	0.2									
Independent streams	32.5	597	22,532	117	19,964	82	569	85	20,998	14
Beaver River	1.5	1		11	3,610	9	91	9	4,010	21
Coal Creek	0.7	135	9,955	41	10,500	20	270	24	10,400	47
Grouse Creek				1	265	1	6	3	265	240
Other independent streams	30.3	461	12,577	64	5,589	52	202	52	6,323	9

COUNTY TABLE.—ACREAGE IRRIGATED, 1919 AND 1909; AND ACREAGE IN ENTERPRISES, IRRIGATION WORKS, AND CAPITAL INVESTED IN IRRIGATION ENTERPRISES, 1920 AND 1910—Continued.

[A minus sign (−) denotes decrease. Per cent not shown when more than 1,000.]

		Grand.	Iron.	Juab.	Kane.	Millard.	Morgan.	Piute.[1]	Rich.[2]	Salt Lake.	San Juan.
1	Number of all farms in 1920	114	646	419	229	1,038	239	246	224	2,438	405
2	Number of farms irrigated in 1919	89	512	305	172	941	232	224	204	1,564	203
3	Per cent of all farms	78.1	79.3	72.8	75.1	90.7	97.1	91.1	91.1	64.2	50.1
4	Number of farms irrigated in 1909	126	317	333	118	689	240	193	212	2,048	139
5	Per cent of increase, 1909–1919	−29.4	61.5	−8.4	45.8	36.6	−3.3	16.1	.....	−23.6	46.0
	LAND AND FARM AREA.										
6	Approximate land area ... acres	2,362,880	2,083,840	2,176,640	2,697,600	4,199,040	400,640	488,320	659,840	483,840	4,967,040
7	All land in farms ... acres	42,656	278,671	195,741	71,851	185,197	117,230	35,093	236,971	317,281	167,739
8	Improved land in farms ... acres	8,191	46,765	49,751	12,309	91,685	15,925	16,730	48,813	92,447	33,491
9	Area irrigated in 1919 ... acres	5,865	32,096	10,008	4,088	137,980	12,242	8,514	42,913	102,051	13,469
10	Per cent of improved land in farms	71.6	68.6	20.1	33.2	150.5	76.9	50.9	87.9	110.4	40.2
11	Area irrigated in 1909 ... acres	6,759	11,624	14,216	3,220	48,992	11,309	13,262	63,030	82,710	8,915
12	Per cent of increase, 1909–1919	−13.2	175.9	−29.6	27.0	181.6	8.3	−35.8	.....	23.4	51.1
13	Area enterprises were capable of irrigating in 1920 ... acres	9,664	38,858	12,372	4,409	209,694	13,506	10,258	43,503	125,194	23,283
14	Area enterprises were capable of irrigating in 1910 ... acres	8,723	12,321	16,949	2,330	91,788	11,606	15,406	68,780	100,555	9,336
15	Per cent of increase, 1910–1920	10.8	215.4	−27.0	54.2	128.5	16.4	−33.4	.....	24.5	149.4
16	Area included in enterprises in 1920 ... acres	11,010	98,475	14,767	7,114	373,926	13,809	10,938	50,238	176,122	40,511
17	Area included in enterprises in 1910 ... acres	22,372	19,652	21,699	6,633	241,922	12,058	51,253	89,791	121,452	21,254
18	Per cent of increase, 1910–1920	−50.8	401.1	−32.2	7.3	54.6	14.5	−78.7	.....	45.0	90.6
19	Area of irrigated land reported as available for settlement ... acres	.....	.....	.....	45	29,116	.....	.....	.....	20,505	4,715
	IRRIGATION WORKS.										
	Independent enterprises:										
20	Number, 1920	37	86	27	25	66	95	22	37	135	42
21	Number, 1910	56	47	43	7	47	77	39	48	112	75
	Main ditches:										
22	Number, 1920	51	75	30	27	77	114	36	59	129	69
23	Number, 1910	51	31	47	33	50	94	51	60	95	47
24	Length, 1920 ... miles	76	164	67	46	439	156	75	180	520	134
25	Length, 1910 ... miles	84	58	101	42	282	134	154	186	298	77
26	Capacity, 1920 ... second-feet	150	1,242	156	89	3,560	748	722	1,205	2,530	475
27	Capacity, 1910 ... second-feet	270	144	376	168	1,437	432	694	769	1,746	252
	Laterals:										
28	Number, 1920	10	103	73	9	151	52	120	11	383	66
29	Number, 1910	16	8	31	4	52	35	13	39	89	2
30	Length, 1920 ... miles	8	67	58	8	384	26	35	30	926	63
31	Length, 1910 ... miles	18	9	30	6	154	18	13	66	123	1
	Reservoirs:										
32	Number, 1920	3	66	3	9	21	3	3	4	14	14
33	Number, 1910	.....	21	5	11	12	7	3	12	5	12
34	Capacity, 1920 ... acre-feet	2,752	9,968	3,100	218	672,617	104	55,000	52	3,051	11,885
35	Capacity, 1910 ... acre-feet	.....	2,229	79	199	173,518	74	131,040	10,531	932	292
	Flowing wells:										
36	Number, 1920	.....	139	11	.....	178	.....	.....	.....	20	2
37	Number, 1910	.....	86	6	.....	.....	.....	10	.....	68	10
38	Capacity, 1920 ... gallons per minute	.....	10,061	342	.....	28,955	.....	.....	.....	222	90
39	Capacity, 1910 ... gallons per minute	.....	2,137	100	.....	.....	.....	3,600	.....	1,910	774
	Pumped wells:										
40	Number, 1920	.....	41	1	.....	.....	.....	.....	.....	1	.....
41	Number, 1910	.....	.....	.....	.....	1	.....	.....	.....	2	1
42	Capacity, 1920 ... gallons per minute	.....	10,500	28	.....	.....	.....	.....	.....	.....	.....
43	Capacity, 1910 ... gallons per minute	.....	.....	.....	.....	116	.....	.....	.....	67	200
	Pumping plants:										
44	Number, 1920	11	21	3	.....	1	.....	.....	2	9	.....
45	Number, 1910	19	.....	.....	.....	1	.....	.....	.....	2	1
46	Engine capacity, 1920 ... horsepower	227	272	28	.....	.....	.....	.....	46	4,323	.....
47	Engine capacity, 1910 ... horsepower	464	.....	.....	.....	2	.....	.....	.....	3	15
48	Pump capacity, 1920 ... gallons per minute	17,812	10,400	2,468	.....	11,250	.....	.....	3,300	524,900	.....
49	Pump capacity, 1910 ... gallons per minute	31,057	.....	.....	.....	116	.....	.....	.....	67	200
50	Average lift, 1920 ... feet	18	56	40	.....	.....	.....	.....	40	34	.....
	CAPITAL INVESTED.										
51	Capital invested to Jan. 1, 1920 ... dollars	167,511	854,295	562,667	150,188	5,148,282	147,278	253,668	319,225	2,096,530	259,287
52	Capital invested to July 1, 1910 ... dollars	133,699	41,569	156,298	63,664	1,654,652	53,197	312,310	268,005	1,817,542	78,337
53	Per cent of increase, 1910–1920	25.3	.....	260.0	138.2	211.1	176.9	−18.8	19.1	15.3	231.0
54	Average cost per acre based on area enterprises were capable of supplying with water in 1920 ... dollars	17.33	21.99	45.48	33.61	24.55	10.90	24.73	7.34	16.75	11.14
55	Average cost per acre based on area enterprises were capable of supplying with water in 1910 ... dollars	15.33	3.37	9.22	18.94	18.03	4.58	20.27	3.90	18.08	8.39
	ESTIMATED FINAL COST.										
56	Estimated final cost of existing enterprises in 1920 ... dollars	218,211	882,370	564,667	152,688	5,210,992	147,278	255,168	319,225	2,154,030	319,162
57	Estimated final cost of existing enterprises in 1910 ... dollars	133,699	44,468	156,298	65,397	2,088,652	53,197	450,648	268,005	1,827,542	90,337
58	Per cent of increase, 1910–1920	63.2	.....	261.3	133.5	149.5	177.0	−43.4	19.1	17.9	253.3
59	Average cost per acre based on estimated final cost and area included in enterprises in 1920 ... dollars	19.82	8.96	38.39	21.46	13.94	10.67	23.33	6.35	12.23	7.88
60	Average cost per acre based on estimated final cost and area included in enterprises in 1910 ... dollars	5.98	2.26	7.20	9.86	8.63	4.41	8.79	2.98	15.05	4.25

[1] Part of Piute County annexed to Sevier County in 1902.

[2] Part of Summit County annexed in 1917.

COUNTY TABLE.—ACREAGE IRRIGATED, 1919 AND 1909; AND ACREAGE IN ENTERPRISES, IRRIGATION WORKS, AND CAPITAL INVESTED IN IRRIGATION ENTERPRISES, 1920 AND 1910—Continued.

[A minus sign (−) denotes decrease.]

		Sanpete.	Sevier.[1]	Summit.[2]	Tooele.	Uintah.[3]	Utah.	Wasatch.[4]	Washington.	Wayne.	Weber.
1	Number of all farms in 1920	1,813	1,108	521	417	859	3,267	507	739	272	1,687
2	Number of farms irrigated in 1919	1,646	1,097	485	305	805	2,990	487	667	264	1,595
3	Per cent of all farms	90.8	96.5	93.1	73.1	93.5	92.4	96.1	90.4	97.1	92.8
4	Number of farms irrigated in 1909	1,650	1,034	396	272	588	2,717	946	568	235	1,396
5	Per cent of increase, 1909–1919	−0.2	3.4		12.1		10.0		17.4	12.3	12.2
	LAND AND FARM AREA.										
6	Approximate land area ... acres	1,034,240	1,265,920	1,196,800	4,383,360	2,748,160	1,301,760	746,880	1,377,600	1,524,000	346,240
7	All land in farms ... acres	391,007	113,065	271,778	163,275	126,151	318,133	150,536	127,899	33,551	259,666
8	Improved land in farms ... acres	138,552	66,960	38,807	49,570	54,407	135,996	25,132	29,023	14,265	66,855
9	Area irrigated in 1919 ... acres	90,153	68,835	32,139	9,652	80,789	138,143	22,797	20,835	16,198	56,973
10	Per cent of improved land in farms	65.1	102.8	82.8	19.5	148.5	101.6	90.7	71.8	113.5	85.2
11	Area irrigated in 1909 ... acres	88,949	51,622	37,245	12,318	48,469	80,886	20,431	18,686	13,842	47,505
12	Per cent of increase, 1909–1919	1.3	33.4		−21.6		53.7		11.5	17.0	19.9
13	Area enterprises were capable of irrigating in 1920 ... acres	91,885	69,178	32,394	11,453	127,787	173,487	22,992	29,077	18,690	70,846
14	Area enterprises were capable of irrigating in 1910 ... acres	90,389	52,425	39,313	13,606	130,850	192,926	49,539	24,682	15,980	48,131
15	Per cent of increase, 1910–1920	1.7	32.0		−15.8		68.6		17.9	17.0	47.2
16	Area included in enterprises in 1920 ... acres	127,708	81,548	34,795	17,405	147,698	203,065	24,893	43,387	19,690	105,897
17	Area included in enterprises in 1910 ... acres	133,589	68,993	46,312	18,523	186,886	127,020	106,841	67,081	34,617	56,169
18	Per cent of increase, 1910–1920	−4.4	18.2		−6.0		59.9		−35.9	−43.8	88.6
19	Area of irrigated land reported as available for settlement ... acres		2,556			1,100	27,664		6,845	500	
	IRRIGATION WORKS.										
	Independent enterprises:										
20	Number, 1920	91	82	122	60	42	216	48	126	29	135
21	Number, 1910	106	78	173	77	66	299	162	105	39	107
	Main ditches:										
22	Number, 1920	93	73	158	55	54	146	62	137	37	129
23	Number, 1910	177	49	173	70	90	226	105	138	49	75
24	Length, 1920 ... miles	429	312	232	144	295	381	161	226	97	212
25	Length, 1910 ... miles	394	234	277	168	371	460	305	263	141	192
26	Capacity, 1920 ... second-feet	1,159	1,979	665	146	996	2,725	766	527	174	1,517
27	Capacity, 1910 ... second-feet	1,639	1,390	635	239	3,136	1,730	1,365	437	364	683
	Laterals:										
28	Number, 1920	262	288	24	29	58	449	212	79	59	72
29	Number, 1910	118	44	138	36	160	70	38	17	17	50
30	Length, 1920 ... miles	497	274	28	49	137	624	89	89	19	69
31	Length, 1910 ... miles	139	55	58	28	384	135	56	15	21	106
	Reservoirs:										
32	Number, 1920	23	16	15	16		32	16	18	10	33
33	Number, 1910	30	17	22	37	5	56	17	16	13	26
34	Capacity, 1920 ... acre-feet	30,708	87,779	1,810	21		527,735	3,581	10,054	4,003	30,280
35	Capacity, 1910 ... acre-feet	33,816	11,925	498	443	464	48,612	1,484	44,242	14,274	320
	Flowing wells:										
36	Number, 1920	33	46		80		220				33
37	Number, 1910	156	162		102		195				50
38	Capacity, 1920 ... gallons per minute	505	9,395		4,362		27,729				1,355
39	Capacity, 1910 ... gallons per minute	4,070	5,125		2,102		9,315				1,607
	Pumped wells:										
40	Number, 1920	1	1		7	1	4		3		6
41	Number, 1910										
42	Capacity, 1920 ... gallons per minute	150			200	1,350	2,330		1,500		1,040
43	Capacity, 1910 ... gallons per minute										
	Pumping plants:										
44	Number, 1920	1	3	1		4	8		2		22
45	Number, 1910					3	5		3		1
46	Engine capacity, 1920 ... horsepower	5	84	6		92	2,919		30		225
47	Engine capacity, 1910 ... horsepower					54	955		102		75
48	Pump capacity, 1920 ... gallons per minute	450	4,150	900		3,350	30,830		900		26,245
49	Pump capacity, 1910 ... gallons per minute					3,700	202,900		2,830		8,700
50	Average lift, 1920 ... feet	4	32	12		20	43		20		17
	CAPITAL INVESTED.										
51	Capital invested to Jan. 1, 1920 ... dollars	1,288,443	2,083,537	229,639	136,263	1,488,111	5,880,832	410,198	576,824	453,600	1,756,652
52	Capital invested to July 1, 1910 ... dollars	630,936	404,501	143,499	165,573	938,437	1,868,232	442,162	372,362	113,935	465,690
53	Per cent of increase, 1910–1920	104.2	415.1		−17.7		214.8		54.9	298.1	270.3
54	Average cost per acre based on area enterprises were capable of supplying with water in 1920 ... dollars	14.02	30.12	7.09	11.90	11.65	33.90	17.92	19.84	24.27	24.80
55	Average cost per acre based on area enterprises were capable of supplying with water in 1910 ... dollars	6.98	7.72	3.65	12.17	7.18	18.15	8.93	15.10	7.13	9.62
	ESTIMATED FINAL COST.										
56	Estimated final cost of existing enterprises in 1920 ... dollars	1,248,933	2,298,437	262,839	136,263	1,711,468	6,010,982	450,198	628,774	467,200	1,764,392
57	Estimated final cost of existing enterprises in 1910 ... dollars	638,214	404,501	143,499	165,579	995,635	4,613,461	525,965	507,362	146,925	462,690
58	Per cent of increase, 1910–1920	104.6	448.6		−17.7		31.5		23.9	218.0	281.0
59	Average cost per acre based on estimated final cost and area included in enterprises in 1920 ... dollars	10.55	27.08	6.98	7.83	11.59	29.88	18.09	14.49	23.73	16.66
60	Average cost per acre based on estimated final cost and area included in enterprises in 1910 ... dollars	4.93	5.86	3.10	8.94	5.33	36.32	4.92	7.56	4.24	8.25

[1] Part of Piute County annexed to Sevier County in 1902.
[2] Part annexed to Rich County in 1917; part of Uintah County annexed to Summit County in 1917.
[3] Parts annexed to Duchesne and Summit Counties in 1917; part taken to form Daggett County in 1918.
[4] Part taken to form Duchesne County in 1915.

WASHINGTON.

INTRODUCTION.

The following pages present the statistics of irrigation for the state of Washington collected at the census of 1920. Statistics of acreage irrigated, of acreage, yield, and value of crops grown on irrigated land, and of cost of operation and maintenance relate to the year 1919; other items relate to the year 1920. Throughout the report figures for the census of 1910 are given for purposes of comparison; and, for the purpose of showing the historical development of irrigation, items which have been reported in censuses previous to 1910 are presented.

Statistics of number of farms irrigated and of acreage, yield, and value of crops grown on irrigated land were collected in the general census of agriculture. All other statistics were obtained in a special canvass of irrigation enterprises.

TABLE 1.—SUMMARY FOR THE STATE: 1920 AND 1910.

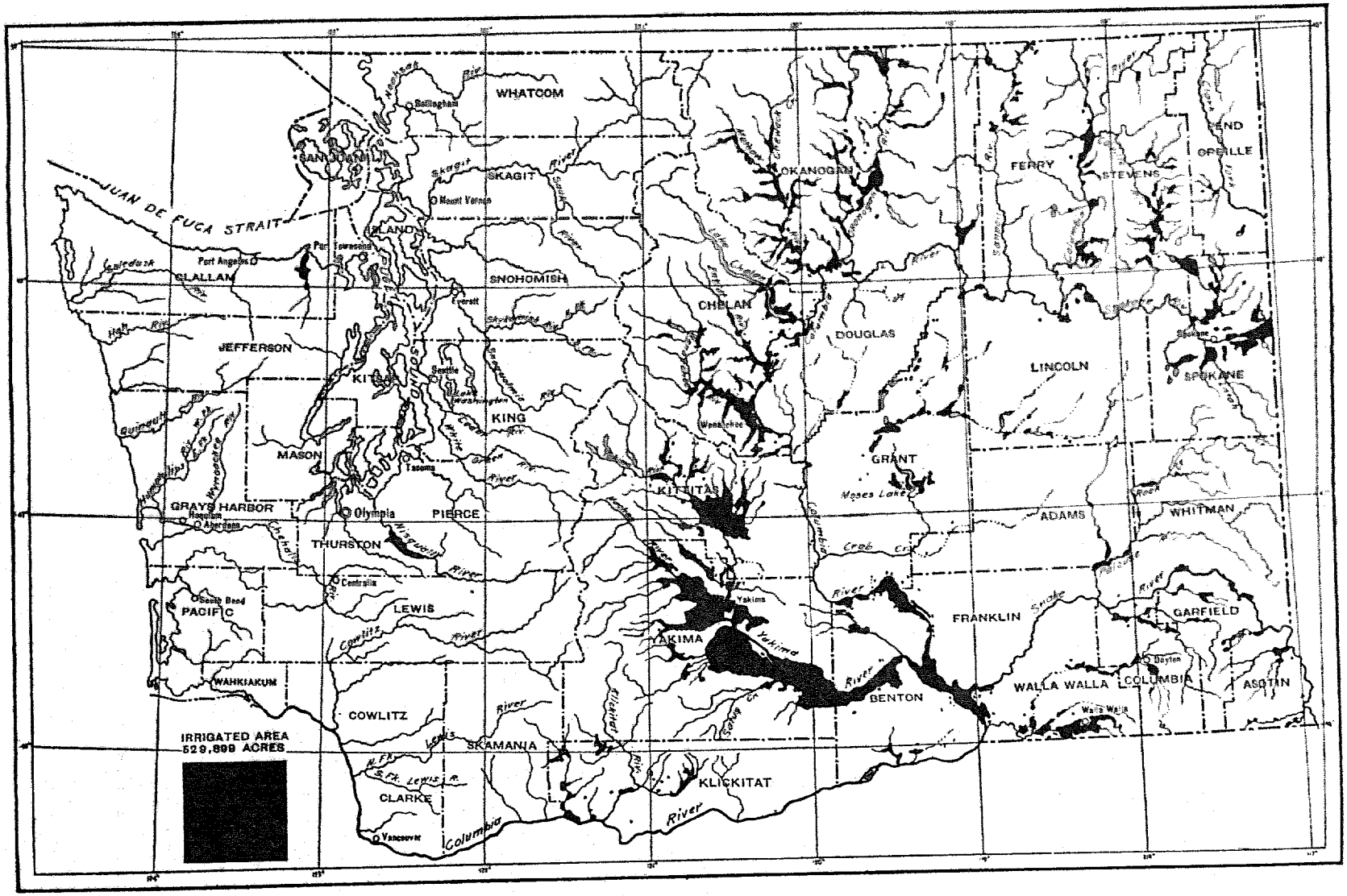
ITEM.	CENSUS OF—		INCREASE.[1]	
	1920	1910	Amount.	Per cent.
Number of all farms	66,318	56,192	10,126	18.0
Approximate land area of the state ... acres	42,775,040	42,775,040	.....	.....
All land in farms ... acres	13,219,053	11,712,235	1,506,818	12.9
Improved land in farms ... acres	7,129,343	6,373,311	756,032	10.6
Number of farms irrigated	13,271	7,664	5,607	73.2
Area irrigated ... acres	529,899	334,378	195,521	58.5
Area enterprises were capable of irrigating ... acres	637,151	470,514	166,637	35.4
Area included in enterprises ... acres	836,795	817,032	19,763	2.4
Per cent irrigated:				
Number of all farms	20.0	13.6	6.4	.....
Approximate land area of the state	1.2	0.8	0.4	.....
Land in farms	4.0	2.9	1.1	.....
Improved land in farms	7.4	5.2	2.2	.....
Excess of area enterprises were capable of irrigating over area irrigated ... acres	107,252	136,136	−28,884	−21.2
Excess of area included in enterprises over area irrigated ... acres	306,896	482,654	−175,758	−36.4
Area of irrigated land reported as available for settlement ... acres	61,738	(2)	.....	.....
Capital invested	$29,299,011	$16,219,149	$13,079,862	80.6
Average per acre enterprises were capable of irrigating	$45.98	$34.47	$11.51	33.4
Estimated final cost of existing enterprises	$37,684,591	$22,322,856	$15,361,735	68.8
Average per acre included in enterprises	$45.03	$27.32	$17.71	64.8
Average cost of operation and maintenance per acre	$3.45	$3.08	$0.37	12.0
IRRIGATION WORKS.				
Number of enterprises	2,692	1,934	758	39.2
Number of main ditches	1,873	1,600	273	17.1
Length of main ditches ... miles	3,851	2,594	1,257	48.5
Capacity of main ditches ... second-feet	16,242	13,178	3,064	23.3
Number of lateral ditches	3,179	1,180	1,999	169.4
Length of lateral ditches ... miles	1,764	1,298	466	35.9
Number of reservoirs	205	156	49	31.4
Capacity of reservoirs ... acre-feet	477,789	121,543	356,246	293.1
Number of flowing wells	60	55	5	.....
Capacity of flowing wells ... gallons per minute	14,925	18,926	−4,001	−21.1
Number of pumped wells	520	128	392	306.3
Capacity of pumped wells ... gallons per minute	227,744	60,220	167,524	278.2
Number of pumping plants	978	391	587	150.1
Engine capacity ... horsepower	22,929	13,847	9,082	65.6
Pump capacity ... gallons per minute	636,552	365,411	271,141	74.2
Average lift ... feet	60	(2)	60	.....

[1] A minus sign (−) denotes decrease. Per cent not shown when base is less than 100.

[2] Not reported in 1910.

WASHINGTON

APPROXIMATE LOCATION AND EXTENT OF IRRIGATED LAND.



CLIMATIC CONDITIONS.

With reference to climatic conditions and the necessity for irrigation, the state of Washington may be divided into three fairly distinct zones—humid, arid, and semiarid.

West of the Cascade Mountains there is a heavy annual precipitation, varying from 21 to 55 inches in the valleys and from 55 inches upward in the mountains. In this section of the state there is a fairly well-defined wet season, more than 80 per cent of the precipitation occurring between October 15 and May 15, or the winter season. July and August are the driest months, the average precipitation for each of these months at many points being less than 1 inch. This creates a necessity for irrigation if crops not capable of withstanding considerable periods of drought are to be grown during the late summer months. However, only small areas are irrigated in this part of the state.

Immediately east of the Cascades and between them and Columbia River lies the arid section of the state. The rainfall at the summit of the Cascades is very heavy, but in the valleys, extending from the mountains to the Columbia, it varies from 12 to 6 inches per annum, and irrigation is necessary to the growing of crops. Most of the irrigated land in the state lies in this section.

East of the Columbia River lies the great wheat belt of Washington, where the annual rainfall varies from 13 to 25 inches. In this section most of the precipitation occurs in the fall, winter, and spring, leaving a dry summer season for the grain harvest. In this section there is little irrigation, although the desire to diversify crops has led to the consideration of many plans for irrigating large areas. These plans have not, however, advanced far enough to enter into the tabulation.

Weather conditions in 1919 were peculiarly unfavorable. The meteorologist of the United States Weather Bureau for the Washington section, in his annual summary, makes the following statement regarding the year 1919:

> The most striking features of the weather in the year 1919 were the heavy rains, melting snows, and consequent freshets of January, a cold and backward spring, an unusually long and excessive drought in which the precipitation was deficient from April to November, periods of hot and desiccating winds in June and July * * *.
>
> The snowfall of the season of 1918–19 was so much lighter in the mountains than the average that the irrigation supply proved inadequate at some projects, owing largely to the unusual demands of an excessively dry and hot summer. During the growing season there was even a less supply of rain than in the preceding year, which had also a noteworthy scarcity of precipitation.
>
> From an agricultural point of view the year was hardly a successful one, but there was an unprecedented crop of unusually fine apples.

WATER SUPPLY FOR IRRIGATION.

West of the Cascade Mountains the streams flowing from these mountains and the Olympic Mountains to the Pacific Ocean and Puget Sound and to Columbia River furnish an ample supply of water for the small amount of irrigation required.

The streams most used for irrigation are those heading on the eastern slope of the Cascade Mountains and flowing into the Columbia. The precipitation on the Cascades is very heavy, affording a large supply of water, and there are many lakes on the headwaters of the rivers, affording opportunity for storing the flood water. The larger streams in this section, named in the order in which they enter the Columbia, from south to north, are the Klickitat, Yakima, Wenatchee, Entiat, Chelan, Methow, and Okanogan. While the building of storage reservoirs on these streams has been begun, there is opportunity for much additional storage. The streams named supply water to about 80 per cent of the total irrigated acreage of the state, Yakima River and tributaries alone supplying about 64 per cent of the total acreage.

East of Columbia River the principal streams entering the Columbia from the east, named in order from south to north, are the following: Walla Walla River, rising in the Blue Mountains in eastern Washington and Oregon; Snake River, rising in western Wyoming, flowing across the state of Idaho, and forming the eastern boundary of Oregon and Washington for nearly 200 miles; Spokane River, rising in Idaho; Colville River, rising in eastern Washington; and Clark Fork, rising in western Montana, flowing across northern Idaho and through northeastern Washington, and entering Columbia River just north of the international boundary. In this section of the state crops are grown without irrigation, and the water supply is not all utilized.

The Columbia itself enters the state from Canada near the northeast corner of the state and drains a large area in western Montana, northern Idaho, and southern Canada before entering Washington. Throughout most of its course the Columbia flows in a deep channel far below the level of the adjoining land and is not used to a large extent for irrigation.

The acreages irrigated from the various streams of the state and their tributaries are given in Table 7.

The extent of the supply of underground water has not been determined. Of the 60 flowing wells reported as being used for irrigation, two-thirds are in the vicinity of the confluence of Columbia and Snake Rivers. Pumped wells are more generally distributed, but nearly one-half of those reported are located in Benton and Grant Counties

FARMS AND ACREAGE IRRIGATED.

TABLE 2.—NUMBER OF FARMS AND ACREAGE IRRIGATED: 1890 TO 1920.

CENSUS YEAR.	FARMS IRRIGATED.			AREA IRRIGATED.				
	Number.	Per cent of increase.	Per cent of all farms.	Acres.	Per cent of increase.	Per cent of total land area.	Per cent of land in farms.	Per cent of improved land in farms.
1920	13,271	73.2	20.0	529,899	58.5	1.2	4.0	7.4
1910	7,664	118.2	13.6	334,378	146.8	0.8	2.9	5.2
1900	3,513	235.9	10.6	135,470	177.6	0.3	1.6	3.9
1890	1,046	.....	5.8	48,799	.....	0.1	1.2	2.7

TABLE 3.—ACREAGE, CLASSIFIED BY DATE OF BEGINNING OF ENTERPRISES SUPPLYING WATER FOR IRRIGATION.

DATE OF BEGINNING.	Number of enterprises.	Area included in enterprises, 1920 (acres).	AREA IRRIGATED IN 1919.		Area enterprises were capable of irrigating in 1920 (acres).
			Acres.	Per cent of acreage in enterprises.	
Total	2,692	836,795	529,899	63.3	637,151
Before 1860	7	1,066	461	43.2	806
1860-1869	10	998	798	80.0	887
1870-1879	89	24,619	22,650	92.0	23,602
1880-1889	226	79,276	65,791	83.0	68,546
1890-1899	315	208,625	126,350	60.7	145,662
1900-1904	274	59,942	42,534	71.0	49,136
1905-1909	343	278,907	175,365	62.9	217,215
1910-1914	483	85,461	30,663	35.9	50,788
1915-1919	427	49,737	24,466	49.2	38,771
Not reported	518	48,744	40,794	83.7	41,798

TABLE 4.—ACREAGE, CLASSIFIED BY SOURCE OF WATER SUPPLY: 1919 AND 1909.

CLASS.	AREA IRRIGATED (ACRES).				Area enterprises were capable of irrigating in 1920 (acres).	Area included in enterprises, 1920 (acres).
	1919	1909	Increase.[1]			
			Amount.	Per cent.		
Total	529,899	334,378	195,521	58.5	637,151	836,795
Streams, gravity	352,199	301,341	50,858	16.9	416,769	550,325
Streams, pumped	26,244	9,085	17,159	188.9	49,545	71,150
Streams, pumped and gravity	92,702	(2)	.....	.....	95,745	114,773
Wells, pumped	17,504	5,437	12,067	221.9	19,938	24,763
Wells, flowing	1,671	3,227	−1,556	−48.2	2,843	3,654
Wells, flowing and pumped	1,490	(2)	.....	.....	1,490	1,794
Lakes, gravity	3,442	4,698	−1,256	−26.7	3,979	5,562
Lakes, pumped	4,662	6,084	−1,422	−23.4	4,888	6,294
Springs	7,899	4,237	3,662	87.0	9,559	15,393
Stored storm water	129	299	−170	−56.9	141	151
City water	42	(2)	.....	.....	21	52
Streams, gravity, and pumped wells	2,415	(2)	.....	.....	4,069	4,674
Streams, gravity, and flowing wells	441	(2)	.....	.....	443	592
Other mixed	19,927	(2)	.....	.....	27,654	37,491
Other and not reported	62	(2)	.....	.....	67	127

[1] A minus sign (−) denotes decrease. [2] Not included in classification in 1910.

ACREAGE, BY CHARACTER OF ENTERPRISE.

The original irrigation district law in Washington was enacted by the first state legislature, in 1890, and it has been amended from time to time since that date. Generally, in Washington, irrigation districts have not built irrigation works, but have been organized to take over works built by other agencies. Some of the larger commercial enterprises reported in 1910 have been taken over by districts, and this accounts for the decrease in the acreage reported for commercial enterprises. Most of the land served by the United States Reclamation Service has been organized into districts, but the acreage is credited to the Reclamation Service because the Government constructed the works and still controls them to a large extent. The Reclamation Service also supplies stored water to land in other enterprises under the "Warren Act" (act of Congress, Feb. 21, 1911), and other special arrangements.

The state of Washington accepted the conditions of the Federal Carey Act (act of Congress, Aug. 18, 1894) in 1895, but nothing has been accomplished under this law.

The small acreage credited to the state belongs to state institutions and does not represent a scheme of state construction of irrigation works.

TABLE 5.—ACREAGE, CLASSIFIED BY CHARACTER OF ENTERPRISE: 1920 AND 1910.

ITEM AND CLASS.	CENSUS OF—		INCREASE.[1]	
	1920	1910	Acres.	Per cent.
ACREAGE IRRIGATED.				
Total	529,899	334,378	195,521	58.5
Individual and partnership	142,215	95,655	46,560	48.7
Cooperative	93,192	81,122	12,070	14.9
Irrigation district	79,918	.....	79,918	.....
Commercial	21,705	66,911	−45,206	−67.6
U. S. Reclamation Service	[2] 122,869	55,690	67,179	120.6
U. S. Indian Service	69,510	35,000	34,510	98.6
State	200	(3)	200	.....
Other and mixed	290	(3)	290	.....
ACREAGE ENTERPRISES WERE CAPABLE OF IRRIGATING.				
Total	637,151	470,514	166,637	35.4
Individual and partnership	169,457	117,145	52,312	44.7
Cooperative	104,699	90,805	13,894	15.3
Irrigation district	118,009	.....	118,009	.....
Commercial	31,652	138,064	−106,412	−77.1
U. S. Reclamation Service	[2] 135,119	74,500	60,619	81.4
U. S. Indian Service	77,710	50,000	27,710	55.4
State	200	(3)	200	.....
Other and mixed	305	(3)	305	.....
ACREAGE INCLUDED IN ENTERPRISES.				
Total	836,795	817,032	19,763	2.4
Individual and partnership	226,671	192,310	34,361	17.9
Cooperative	118,539	115,410	3,129	2.7
Irrigation district	134,641	.....	134,641	.....
Commercial	75,292	266,216	−190,924	−71.7
U. S. Reclamation Service	[2] 152,947	143,096	9,851	6.9
U. S. Indian Service	128,200	100,000	28,200	28.2
State	200	(3)	200	.....
Other and mixed	305	(3)	305	.....

[1] A minus sign (−) denotes decrease.
[2] Does not include about 100,000 acres to which stored water is supplied.
[3] Not included in classification in 1910.

ACREAGE, BY CHARACTER OF WATER RIGHTS.

Rights to water from streams and other sources are subject to control by the states. The laws of the state of Washington relating to water rights are summarized in the following paragraphs:

The territory of Washington was organized in 1853, and the state of Washington was admitted to the Union in 1889. During the territorial period no general legislation relating to irrigation was enacted.

The constitution of the state, ratified October 1, 1889, declared that "The use of the waters of this state for irrigation, mining, and manufacturing purposes shall be deemed a public use."—(Art. XXI.)

The first state legislature enacted a law requiring each party claiming any right to water to file with the clerk of the district court before June 1, 1890, a sworn statement of his claim; and requiring also that any party wishing to take water from a stream or lake after the passage of the law should file a statement and a map setting forth his claim. This law was in effect until 1917.

The law just referred to, enacted by the first legislature, provided that after June 1, 1890, any party interested might apply to the superior court of the county to have the rights to water from any source adjudicated, and that on such application the court should proceed with the adjudication, if he should "deem it practicable." A law approved March 17, 1917, provided a new procedure for the adjudication of water rights. Water rights may also be defined in ordinary suits between rival claimants.

The law of March 17, 1917, provided that any party wishing to acquire a right to water must make application to the state hydraulic engineer for a permit. When work has been completed in accordance with a permit issued by the state hydraulic engineer, that official issues a certificate setting forth the right that has been acquired.

The irrigation law passed by the first state legislature provided that riparian owners were entitled to use any water, not otherwise appropriated, for the purpose of irrigation, "to the full extent of the soil for agricultural purposes," and that riparian rights might be condemned.

TABLE 6.—ACREAGE IRRIGATED, CLASSIFIED BY CHARACTER OF RIGHTS UNDER WHICH WATER IS RECEIVED: 1919 AND 1909.

CLASS.	1919		1909, per cent of total.
	Acres.	Per cent of total.	
Total	529,899	100.0	100.0
Appropriation and use	196,700	37.1	54.5
Notice filed and posted	169,831	32.0	29.3
Adjudicated by court	56,309	10.6	7.6
Permit from state	39,608	7.5	(1)
Certificate or license from state	17,406	3.3	(1)
Riparian rights	17,095	3.2	5.2
Underground	20,359	3.9	(2)
Other and mixed	561	0.1	(2)
Not reported	11,530	2.2	(2)

[1] In 1910 there was no provision of law for permits or certificates from the state. Small areas were incorrectly reported in these classes.
[2] All land for which the class of water rights was not reported was included in "Appropriation and use."

ACREAGE, BY DRAINAGE BASIN.

The report of a special census taken in 1902 presented all data by drainage basins rather than by counties. The results of the census of 1920 have been tabulated on the same basis, and the data for 1902 are presented for purposes of comparison. For no other census have the results been tabulated in this form. The acreage reported for each drainage basin in 1919 comprises all the irrigated land in that drainage basin, including that watered from springs and wells. In the 1902 results the acreages irrigated from springs and wells were not reported for the smaller tributary streams, but the acreages for the tributary streams were included in those reported for the main streams. This area is so small, however, that the comparison of the areas reported for the tributary streams is not seriously affected.

TABLE 7.—ACREAGE IRRIGATED, CLASSIFIED BY DRAINAGE BASIN: 1919 AND 1902.

DRAINAGE BASIN.	AREA IRRIGATED (ACRES).			Area included in enterprises, 1920 (acres).	Area enterprises were capable of irrigating in 1920 (acres).
	1919	1902	Per cent of increase.[1]		
Total	529,899	154,962	242.0	836,795	637,151
Columbia River and tributaries.	521,462	153,937	238.8	816,266	621,458
Columbia River direct	24,471	584	.....	49,209	32,492
Clark Fork	306	(2)	.....	1,431	1,064
Colville River	6,960	310	.....	18,200	13,993
Spokane River	16,453	210	.....	40,391	21,675
Okanogan River and tributaries	20,583	2,257	812.0	42,042	30,261
Okanogan River direct	2,357	14	.....	3,708	2,899
Salmon Creek	6,729	1,095	514.5	11,478	11,238
Other tributaries of Okanogan River	11,497	[3] 1,148	901.5	26,856	16,124
Methow River	12,579	1,675	651.0	24,017	16,529
Entiat River	2,054	2,919	−29.6	2,652	2,251
Wenatchee River	23,734	3,285	622.5	39,288	34,568
Crab Creek	6,088	1,937	214.3	10,400	8,048
Yakima River and tributaries	337,293	121,705	177.1	436,797	353,044
Yakima River direct	254,262	66,371	283.1	345,373	269,103
Wilson Creek	11,297	6,613	70.8	12,042	11,807
Naches River	19,864	20,232	−1.8	21,656	20,284
Ahtanum Creek	9,287	3,849	141.3	9,982	9,342
Other tributaries of Yakima River	42,583	[3] 24,640	72.8	47,744	43,048
Snake River and tributaries.	11,788	4,968	137.3	36,295	30,269
Snake River direct	4,047	100	.....	24,233	20,130
Grande Ronde River	66	(2)	.....	138	126
Asotin Creek	3,051	3,225	−5.4	4,051	4,051
Pataha River	1,480	619	139.1	2,362	2,209
Palouse River	1,735	508	241.5	3,645	2,020
Other tributaries of Snake River	1,409	[3] 516	173.1	1,866	1,733
Walla Walla River	22,270	6,328	251.9	36,157	29,965
Klickitat River	12,332	372	.....	19,241	13,440
White Salmon River	6,247	912	585.0	11,958	7,277
Other tributaries of Columbia River	18,304	[3] 6,475	182.7	48,188	25,982
Independent streams	8,437	1,025	723.1	20,529	15,693
Dungeness River	6,160	685	799.3	12,660	9,860
McDowell Creek	.....	200	.....	.....	.....
Other independent streams	2,277	[3] 140	.....	7,869	5,833

[1] A minus sign (−) denotes decrease. Per cent not shown when more than 1,000.
[2] Not reported separately in 1902.
[3] Includes springs and wells.

CAPITAL INVESTED AND COST OF OPERATION AND MAINTENANCE.

TABLE 8.—CAPITAL INVESTED IN IRRIGATION ENTERPRISES: 1890 TO 1920.

CENSUS YEAR.	Amount.	Per cent of increase.	AVERAGE PER ACRE.	
			Amount.	Per cent of increase.
1920	$29,299,011	80.6	$45.98	33.4
1910	16,219,149	841.7	34.47	171.2
1900	1,722,369	775.8	12.71	215.4
1890	196,660	.....	4.03	.....

TABLE 9.—CAPITAL INVESTED, CLASSIFIED BY DATE OF BEGINNING.

DATE OF BEGINNING.	Amount.	Per cent of total.	Average per acre.
Total	$29,299,011	100.0	$45.98
Before 1860	37,112	0.1	46.04
1860-1869	15,300	0.1	17.25
1870-1879	102,262	0.3	4.33
1880-1889	1,098,045	3.7	16.02
1890-1899	4,743,934	16.2	32.58
1900-1904	2,823,289	9.6	57.46
1905-1909	12,153,628	41.5	55.95
1910-1914	5,535,131	18.9	103.99
1915-1919	1,935,660	6.6	49.93
Not reported	854,650	2.9	20.45

TABLE 10.—CAPITAL INVESTED, 1920, AND COST OF OPERATION AND MAINTENANCE, 1919, CLASSIFIED BY SOURCE OF WATER SUPPLY.

[When water is pumped, cost of operation and maintenance includes cost of fuel and attendance.]

CLASS.	CAPITAL INVESTED, 1920.			OPERATION AND MAINTENANCE, 1919.	
	Amount.	Per cent of total.	Average per acre.	Area for which cost is reported (acres).	Average cost per acre.[1]
Total	$29,299,011	100.0	$45.98	465,758	$3.45
Streams, gravity	18,764,090	64.0	45.02	208,809	2.49
Streams, pumped	2,605,718	8.9	52.59	23,129	11.16
Streams, pumped and gravity	3,827,148	13.1	39.97	92,574	1.99
Wells, pumped	1,633,134	5.6	84.91	16,158	12.71
Wells, flowing	114,300	0.4	40.20	1,076	2.03
Wells, flowing and pumped	56,500	0.2	37.92	1,490	1.86
Lakes, pumped	455,631	1.6	114.51	2,976	13.05
Lakes, gravity	257,797	0.9	52.74	4,371	3.96
Springs	507,103	1.7	53.05	4,857	7.08
Stored storm water	5,985	(2)	42.45	65	11.85
City water	383	(2)	18.14	.....	.....
Streams, gravity, and pumped wells	237,150	0.8	58.28	2,158	20.70
Streams, gravity, and flowing wells	22,522	0.1	50.84	324	4.97
Other mixed	811,163	2.8	29.33	7,681	6.14
Not reported	450	(2)	6.72	.....	.....

[1] Based on area irrigated in 1919.
[2] Less than one-tenth of 1 per cent.

TABLE 11.—CAPITAL INVESTED, CLASSIFIED BY DRAINAGE BASIN: 1920 AND 1902.

DRAINAGE BASIN.	1920	1902	INCREASE.[1]	
			Amount.	Per cent.
Total	$29,299,011	$2,330,758	$26,968,253	.....
Columbia River and tributaries	28,990,618	2,319,513	26,671,105	.....
Columbia River direct	2,229,066	5,200	2,223,866	.....
Clark Fork	7,293	(2)	7,293	.....
Colville River	486,747	938	485,809	.....
Spokane River	1,637,743	2,994	1,634,749	.....
Okanogan River and tributaries	2,259,018	12,374	2,246,644	.....
Okanogan River direct	227,290	369	226,930	.....
Salmon Creek	1,069,972	5,085	1,064,887	.....
Other tributaries of Okanogan River	961,756	[3] 6,929	954,827	.....
Methow River	483,809	20,825	462,984	.....
Entiat River	73,889	17,150	56,739	330.8
Wenatchee River	1,868,541	95,755	1,772,786	.....
Crab Creek	359,050	5,415	353,635	.....
Yakima River and tributaries	14,849,689	1,988,555	12,861,134	654.3
Yakima River direct	13,912,737	1,580,195	12,332,542	780.4
Wilson Creek	45,875	17,925	27,950	155.9
Naches River	458,027	276,223	181,804	65.8
Ahtanum Creek	88,443	14,950	73,493	491.6
Other tributaries of Yakima River	344,617	[3] 79,262	265,355	334.8
Snake River and tributaries	1,398,296	109,853	1,288,443	.....
Snake River direct	471,772	1,080	470,692	.....
Grande Ronde River	5,562	(2)	5,562	.....
Asotin Creek	606,084	94,100	511,984	544.1
Palouse River	47,085	1,905	45,180	.....
Paloose River	175,190	2,810	172,380	.....
Other tributaries of Snake River	92,603	[3] 9,958	82,725	830.8
Walla Walla River	890,980	27,022	863,958	.....
Klickitat River	64,423	1,882	62,541	.....
White Salmon River	91,786	6,700	85,086	.....
Other tributaries of Columbia River	1,790,288	44,850	1,745,438	.....
Independent streams	308,393	11,245	297,148	.....
Dungeness River	94,010	8,000	86,010	.....
McDowell Creek	.....	2,000	—2,000	.....
Other independent streams	214,383	[3] 1,245	213,138	.....

[1] A minus sign (—) denotes decrease. Per cent not shown when more than 1,000.
[2] Not reported separately in 1902.
[3] Includes springs and wells.

In classifying capital invested by type of enterprise (Table 12) the average capital invested per acre is not presented, for the reason that the United States Reclamation Service supplies stored water to enterprises controlled by agencies of most of the other classes shown in the table, and a part of its expenditure is properly chargeable to those lands; but it is not possible to distribute this among the classes, because the area receiving water varies from season to season.

TABLE 12.—CAPITAL INVESTED, 1920, AND COST OF OPERATION AND MAINTENANCE, 1919, CLASSIFIED BY CHARACTER OF ENTERPRISE.

[When water is pumped, cost of operation and maintenance includes cost of fuel and attendance.]

CLASS.	CAPITAL INVESTED, 1920.		OPERATION AND MAINTENANCE, 1919.	
	Amount.	Per cent of total.	Area for which cost is reported (acres).	Average cost per acre.[1]
Total	$29,299,011	100.0	465,758	$3.45
Individual and partnership	4,732,706	16.2	84,405	6.02
Cooperative	3,949,896	13.5	87,791	2.38
Irrigation district	6,112,628	20.9	79,618	5.73
Commercial	2,341,428	8.0	21,585	5.96
U. S. Reclamation Service	10,441,145	35.6	122,849	1.89
U. S. Indian Service	1,658,040	5.7	69,510	1.03
State	55,668	0.2	.....	.....
Other	7,500	(2)	.....	.....

[1] Based on area irrigated in 1919.
[2] Less than one-tenth of 1 per cent.

DRAINAGE OF IRRIGATED LAND.

The acreages reported in Table 13 relate to lands within the boundaries of irrigation projects, and do not include lands within the vicinity of these projects. "Additional acreage needing drainage" includes all lands so reported by the owners of the enterprises, and includes lands producing partial crops as well as those wholly unproductive.

TABLE 13.—ACREAGE WITHIN IRRIGATION ENTERPRISES FOR WHICH DRAINS HAVE BEEN INSTALLED AND ADDITIONAL ACREAGE IN NEED OF DRAINAGE: 1920.

Number of enterprises reporting land drained or needing drainage	103
Acreage included in enterprises reporting land drained or needing drainage	218,763
Acreage for which drains have been installed	79,168
Additional acreage needing drainage	43,461
Per cent that acreage for which drains have been installed is of total acreage included in enterprises reporting drainage	36.2
Per cent that acreage for which drains have been installed is of total acreage included in irrigation enterprises in the state	9.5
Per cent that acreage for which drains have been installed plus that needing drainage is of total acreage included in irrigation enterprises in the state	14.6

QUANTITY OF WATER USED.

The quantity of water used in 1919 was reported on only part of the irrigation schedules, and the figures given vary greatly. In order that proper values may be assigned to the figures given, those representing measurements and those representing estimates are reported separately in Table 14. While the data are incomplete, the reports represent sufficient acreages to serve as bases for reliable averages.

TABLE 14.—QUANTITY OF WATER USED IN 1919.

ITEM.	Total.	Measured.	Not measured.
Average volume entering canals ....second-feet	8,827	4,827	4,000
Area irrigated in 1919 ....acres	376,270	280,363	95,907
Average number of acres per second-foot	43	58	24
Total quantity entering canals ....acre-feet	2,168,818	1,513,616	*655,202
Area irrigated in 1919 ....acres	341,569	264,558	77,011
Average quantity per acre ....acre-feet	6.3	5.7	8.5
Total quantity of water delivered ....acre-feet	594,479	139,232	455,247
Area irrigated in 1919 ....acres	174,989	77,235	97,754
Average quantity per acre ....acre-feet	3.4	1.8	4.6

IRRIGATION WORKS.

TABLE 15.—IRRIGATION WORKS, CLASSIFIED BY DATE OF BEGINNING.

DATE OF BEGINNING.	Number of diverting dams.	Number of storage dams.	MAIN DITCHES.			LATERAL DITCHES.		RESERVOIRS.	
			Number.	Capacity (second-feet).	Length (miles).	Number.	Length (miles).	Number.	Capacity (acre-feet).
Total	579	115	1,873	16,242	3,851	3,179	1,764	205	477,789
Before 1860	1		6	11	3				
1860-1869	5		12	51	14	56	4		
1870-1879	33		92	512	120	85	4	1	10
1880-1889	58	7	234	2,243	429	138	63	8	1,510
1890-1899	122	21	321	3,993	550	1,466	325	25	861
1900-1904	78	11	241	1,814	392	167	37	20	4,752
1905-1909	97	30	232	3,999	529	729	1,172	59	68,191
1910-1914	53	25	234	1,235	316	348	57	55	390,416
1915-1919	43	11	166	1,241	256	144	79	30	10,849
Not reported	95	10	335	1,143	1,242	46	23	7	1,200

DATE OF BEGINNING.	Pipe lines, length (miles).	FLOWING WELLS.		PUMPED WELLS.		PUMPING PLANTS.			
		Number.	Capacity (gallons per minute).	Number.	Capacity (gallons per minute).	Number.	Engine capacity (horse-power).	Pumps.	
								Number.	Capacity (gallons per minute).
Total	790.0	60	14,925	520	227,744	975	22,929	1,059	636,552
Before 1860	1.7			2	1,050	3	72	3	980
1860-1869	0.5								
1870-1879	1.1			2	500	3	20	3	1,000
1880-1889	16.0			1	470	7	116	9	5,230
1890-1899	63.8	7	1,150	14	2,265	31	278	33	25,105
1900-1904	44.1	4	1,075	21	5,886	50	757	50	16,819
1905-1909	373.3	3	1,000	72	63,736	148	12,411	190	302,486
1910-1914	143.5	17	1,980	186	83,117	316	4,705	344	131,465
1915-1919	109.9	8	5,460	142	36,585	286	3,332	296	106,929
Not reported	36.1	21	4,260	80	34,135	131	1,238	131	46,538

TABLE 16.—IRRIGATION WORKS, CLASSIFIED BY CHARACTER OF ENTERPRISE: 1920.

CLASS.	Number of diverting dams.	Number of storage dams.	MAIN DITCHES.			LATERAL DITCHES.		RESERVOIRS.	
			Number.	Capacity (second-feet).	Length (miles).	Number.	Length (miles).	Number.	Capacity (acre-feet).
Total	579	115	1,873	16,242	3,851	3,179	1,764	205	477,789
Individual and partnership	498	87	1,694	6,611	2,578	2,307	229	171	4,647
Cooperative	48	8	108	2,777	522	250	272	10	12,050
Irrigation district	20	3	35	2,347	424	232	130	5	7,984
Commercial	6	8	14	1,061	118	12	50	9	9,607
U. S. Indian Service	3	1	9	1,720	83	26	192	1	3,500
U. S. Reclamation Service	3	8	11	1,716	124	350	890	7	440,000
State								2	1
Other and not reported	1		2	10	2	2	1		

CLASS.	Pipe lines, length (miles).	FLOWING WELLS.		PUMPED WELLS.		PUMPING PLANTS.			
		Number.	Capacity (gallons per minute).	Number.	Capacity (gallons per minute).	Number.	Engine capacity (horse-power).	Pumps.	
								Number.	Capacity (gallons per minute).
Total	790.0	60	14,925	520	227,744	975	22,929	1,059	636,552
Individual and partnership	355.5	60	14,925	484	164,586	914	10,290	965	347,349
Cooperative	131.3			26	60,138	29	4,048	40	97,138
Irrigation district	93.5			1	1,500	14	3,935	23	31,295
Commercial	73.3			6	870	10	1,771	11	78,520
U. S. Indian Service	2.3								
U. S. Reclamation Service	129.4					4	2,735	14	62,200
State	2.8			3	650	2	85	4	18,650
Other and not reported	1.9					2	65	2	1,400

TABLE 17.—IRRIGATION WORKS, CLASSIFIED BY DRAINAGE BASIN: 1920.

DRAINAGE BASIN.	Number of diverting dams.	Number of storage dams.	MAIN DITCHES. Number.	MAIN DITCHES. Capacity (second-feet).	MAIN DITCHES. Length (miles).	LATERAL DITCHES. Number.	LATERAL DITCHES. Length (miles).	RESERVOIRS. Number.	RESERVOIRS. Capacity (acre-feet).
Total	579	115	1,873	16,242	3,851	3,179	1,764	205	477,789
Columbia River and tributaries	570	113	1,858	15,607	3,801	3,086	1,718	198	477,785
Columbia River direct	9	18	95	630	154	174	44	38	1,529
Clark Fork	5	1	23	99	12	1	.....	3	50
Colville River	40	1	101	393	174	131	21	3	.....
Spokane River	15	8	61	802	101	74	134	31	5,662
Okanogan River and tributaries	12	11	124	552	158	69	132	19	24,136
Okanogan River direct	1	3	39	45	24	25	4	8	2,211
Salmon Creek (Concomully)	1	3	15	143	32	3	67	5	16,550
Other tributaries of Okanogan River	10	5	70	364	102	41	61	6	5,375
Methow River	32	11	166	1,230	231	59	45	19	209
Entiat River	5	1	32	85	41	.....	.....	.....	.....
Wenatchee River	41	6	87	553	195	66	18	8	2,000
Crab Creek	24	9	67	100	34	18	9	10	4,501
Yakima River and tributaries	105	10	459	7,486	1,070	477	1,156	10	423,810
Yakima River direct	17	7	88	4,823	473	446	1,079	7	423,800
Wilson Creek	.....	.....	50	163	62	6	5	1	10
Naches River	.....	.....	63	724	113	7	21	.....	.....
Ahtanum Creek	3	.....	49	180	82	3	1	.....	.....
Other tributaries of Yakima River	81	3	209	1,596	340	15	50	2	.....
Snake River and tributaries	48	9	115	1,075	120	261	17	9	107
Snake River direct	1	2	25	427	36	187	5	4	5
Grande Ronde River	4	.....	7	11	8	.....	.....	.....	.....
Asotin Creek	2	1	1	1	.....	1	.....	1	100
Pataha River	10	.....	33	377	24	31	1	1	.....
Palouse River	13	5	21	219	31	42	11	2	4
Other tributaries of Snake River	18	1	28	40	21	.....	.....	1	.....
Walla Walla River	135	7	242	1,049	1,065	1,574	93	4	.....
Klickitat River	19	.....	30	352	66	17	4	.....	.....
White Salmon River	19	3	28	478	99	21	15	3	.....
Other tributaries of Columbia River	41	18	228	723	281	144	30	41	15,781
Independent streams	9	2	15	635	50	93	46	7	4
Dungeness River	6	.....	7	570	36	75	32	.....	.....
Other independent streams	3	2	8	65	14	18	14	7	4

DRAINAGE BASIN.	Pipe lines, length (miles).	FLOWING WELLS. Number.	FLOWING WELLS. Capacity (gallons per minute).	PUMPED WELLS. Number.	PUMPED WELLS. Capacity (gallons per minute).	PUMPING PLANTS. Number.	PUMPING PLANTS. Engine capacity (horse-power).	PUMPS. Number.	PUMPS. Capacity (gallons per minute).	Average lift (feet).
Total	799.0	60	14,925	520	227,744	975	22,929	1,059	636,552	60
Columbia River and tributaries	785.9	59	14,925	517	227,624	968	22,901	1,050	635,735	67
Columbia River direct	162.2	8	4,390	166	58,223	323	6,451	347	231,463	67
Clark Fork	1.0	.....	.....	.....	.....	.....	.....	.....	.....	.....
Colville River	14.6	.....	.....	1	40	5	23	5	8,480	55
Spokane River	132.7	.....	.....	47	58,504	83	3,476	93	68,643	79
Okanogan River and tributaries	20.9	.....	.....	48	13,278	111	1,599	119	47,993	40
Okanogan River direct	14.9	.....	.....	44	12,428	97	930	104	38,258	40
Salmon Creek (Concomully)	0.6	.....	.....	.....	.....	5	607	6	7,385	58
Other tributaries of Okanogan River	5.4	.....	.....	4	850	9	62	9	2,350	26
Methow River	4.8	1	.....	2	115	9	44	9	1,318	56
Entiat River	1.5	.....	.....	.....	.....	4	18	4	310	59
Wenatchee River	26.0	.....	.....	7	1,300	40	337	40	21,114	67
Crab Creek	34.9	3	60	111	36,285	137	2,321	145	66,270	65
Yakima River and tributaries	161.1	3	285	45	9,680	74	3,492	87	78,975	38
Yakima River direct	154.6	3	285	41	7,870	66	3,447	78	75,715	39
Wilson Creek	1.0	.....	.....	.....	.....	.....	.....	.....	.....	.....
Naches River	4.1	.....	.....	1	335	2	8	3	1,285	55
Ahtanum Creek	.....	.....	.....	1	125	1	2	1	125	18
Other tributaries of Yakima River	1.4	.....	.....	2	1,350	5	35	5	1,850	18
Snake River and tributaries	94.1	8	1,100	37	13,365	64	3,559	74	47,849	46
Snake River direct	33.6	.....	.....	35	13,015	50	3,186	58	33,177	46
Grande Ronde River	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Asotin Creek	48.0	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pataha River	1.0	.....	.....	2	350	3	37	3	3,250	53
Palouse River	1.4	8	1,100	.....	.....	2	40	3	4,400	16
Other tributaries of Snake River	10.1	.....	.....	.....	.....	9	296	10	7,022	52
Walla Walla River	56.4	33	6,080	36	32,510	53	681	62	20,840	21
Klickitat River	2.5	.....	.....	.....	.....	5	26	5	3,875	28
White Salmon River	2.5	.....	.....	2	24	4	42	4	320	83
Other tributaries of Columbia River	76.7	3	3,010	15	4,300	54	832	56	38,315	97
Independent streams	4.1	1	.....	3	120	9	28	9	817	54
Dungeness River	1.0	.....	.....	.....	.....	.....	.....	.....	.....	.....
McDowell Creek	3.1	.....	.....	.....	.....	.....	.....	.....	.....	.....
Other independent streams	.....	1	.....	3	120	9	28	9	817	54

CROPS.

TABLE 18.—ACREAGE, YIELD, AND VALUE OF CROPS GROWN ON IRRIGATED LAND, AND COMPARISONS WITH TOTALS FOR THE STATE: 1919 AND 1909.

[Totals for the state, used in making comparisons, are shown in state bulletin on agriculture.]

	Crop.	Area harvested. 1919 Acres.	Area harvested. 1919 Per cent of total for state.	Area harvested. 1909 Acres.	Area harvested. 1909 Per cent of total for state.	Area harvested. Per cent of increase.[1]	Quantity harvested. Unit.	Quantity harvested. 1919 Amount.	Quantity harvested. 1919 Per cent of total for state.	Quantity harvested. 1909 Amount.	Quantity harvested. 1909 Per cent of total for state.	Quantity harvested. Per cent of increase.[1]
	Cereals:											
1	Corn	13,263	38.1	2,464	9.5	438.3	Bu.	487,154	54.0	87,357	15.5	457.7
2	Oats	7,215	3.8	6,690	2.5	7.8	Bu.	337,056	4.2	330,587	2.5	2.0
3	Winter wheat	8,236	0.7	6,720	0.3	553.7	Bu.	154,116	0.6	188,855	0.5	70.6
4	Spring wheat	35,694	2.7				Bu.	923,493	5.4			
5	Barley	5,761	6.8	1,738	1.0	231.5	Bu.	193,568	8.6	49,143	0.8	293.9
6	Rye	544	1.3	(2)			Bu.	5,646	2.4	(2)		
	Hay and forage:											
7	Timothy alone	8,142	16.1	17,326	19.6	−53.0	Tons	15,466	19.5	33,642	23.5	−54.0
8	Timothy and clover mixed	8,647	6.0	7,704	6.4	12.2	Tons	18,140	5.9	20,991	8.3	−13.6
9	Clover alone	2,254	12.7	794	7.3	183.9	Tons	4,128	11.1	2,136	9.7	93.3
10	Alfalfa	148,409	64.9	74,496	78.5	99.2	Tons	494,066	75.3	296,614	82.9	66.6
11	Other tame grasses	17,014	32.7	1,054	3.6		Tons	35,054	38.6	1,625	3.8	
12	Small grains cut for hay	11,650	2.4	5,340	1.5	118.2	Tons	15,214	2.8	9,417	1.9	61.6
13	Wild, salt, or prairie grasses	1,047	3.5	2,800	9.9	−62.6	Tons	2,075	6.2	4,891	16.0	−57.6
14	Corn cut for forage	2,001	8.1	(2)			Tons	6,046	14.8	(2)		
15	Silage crops	2,645	11.7	(2)			Tons	23,762	15.3	(2)		
16	Root crops for forage	628	8.5	(2)			Tons	2,619	3.9	(2)		
	Vegetables:											
17	Potatoes	8,186	14.8	9,178	15.9	−10.8	Bu.	1,526,353	26.0	1,532,915	20.0	−0.4
	Fruits:											
18	Grapes	[3] 118,892	25.4	(2)			Lbs.	1,410,072	35.6	(2)		
19	Apples	[4] 4,633,119	58.2	(2)			Bu.	15,823,446	70.4	(2)		
20	Peaches	[4] 455,526	70.2	(2)			Bu.	1,259,176	81.5	(2)		
21	Pears	[4] 530,834	61.2	(2)			Bu.	1,236,330	71.5	(2)		
22	Plums and prunes	[4] 75,084	8.6	(2)			Bu.	127,042	16.2	(2)		
	Miscellaneous:											
23	Sugar beets grown for sugar	4,635	86.4	246	19.4		Tons	40,286	86.8	244	3.7	
24	Red clover seed	897	77.3	(2)			Bu.	3,925	89.2	(2)		
25	Hops	507	44.9	(2)			Lbs.	870,769	53.9	(2)		

	Crop.	Average yield per acre, 1919. Unit.	For state.	On non-irrigated land.	On irrigated land. Average.	On irrigated land. Per cent of average for state.	On irrigated land. Per cent of average on non-irrigated land.	Value. 1919 Amount.	Value. 1919 Per cent of total for state.	Value. 1909 Amount.	Value. 1909 Per cent of total for state.	Value. Per cent of increase.[1]
	Cereals:											
1	Corn	Bu.	25.9	19.3	36.7	141.7	191.1	$876,877	54.0	$65,965	16.3	
2	Oats	Bu.	42.1	41.9	46.7	110.9	111.4	337,056	4.2	163,948	2.8	105.6
3	Winter wheat	Bu.	21.1	21.1	18.7	85.3	85.3	324,201	0.6	173,221	0.5	
4	Spring wheat	Bu.	13.0	12.6	25.9	199.2	205.6	2,013,215	5.4			
5	Barley	Bu.	26.6	26.1	33.6	126.3	128.7	290,352	8.6	30,474	0.9	852.8
6	Rye	Bu.	5.5	5.4	10.4	189.1	192.6	11,292	2.5	(2)		
	Hay and forage:											
7	Timothy alone	Tons	1.6	1.5	1.9	118.8	126.7	463,980	19.5	536,944	24.8	−13.6
8	Timothy and clover mixed	Tons	2.1	2.1	2.1	100.0	100.0	444,430	5.9	325,758	9.0	36.4
9	Clover alone	Tons	2.1	2.1	1.8	85.7	85.7	99,072	11.1	25,684	8.7	285.7
10	Alfalfa	Tons	2.9	2.0	3.3	113.8	143.5	11,857,584	75.3	3,156,699	86.1	275.6
11	Other tame grasses	Tons	1.7	1.6	2.1	143.5	131.2	735,378	38.1	22,325	3.7	
12	Small grains cut for hay	Tons	1.1	1.1	1.3	118.2	118.2	418,385	2.8	123,354	2.0	239.2
13	Wild, salt, or prairie grasses	Tons	1.1	1.1	2.0	181.8	181.8	39,425	6.3	65,124	21.9	−39.5
14	Corn cut for forage	Tons	1.6	1.5	3.0	187.5	200.0	78,598	14.8			
15	Silage crops	Tons	6.9	6.6	9.0	130.4	136.4	261,382	15.3			
16	Root crops for forage	Tons	9.0	9.5	4.2	46.7	44.2	55,104	3.9			
	Vegetables:											
17	Potatoes	Bu.	106.4	92.5	186.5	175.2	201.7	3,205,341	26.0	505,887	16.9	533.6
	Fruits:											
18	Grapes	Lbs.	[5] 8.5	[5] 7.3	[5] 11.9	140.0	163.0	112,806	35.6	(2)		
19	Apples	Bu.	[6] 2.8	[6] 1.7	[6] 3.4	121.4	170.0	13,697,378	46.9	(2)		
20	Peaches	Bu.	[6] 2.4	[6] 1.5	[6] 2.8	116.7	186.7	2,707,228	81.5	(2)		
21	Pears	Bu.	[6] 2.0	[6] 1.5	[6] 2.3	115.0	153.3	580,118	19.2	(2)		
22	Plums and prunes	Bu.	[6] 0.9	[6] 0.8	[6] 1.7	188.9	212.5	247,732	16.2	(2)		
	Miscellaneous:											
23	Sugar beets grown for sugar	Tons	8.6	8.4	8.7	101.2	103.6	435,089	86.8	1,755	4.6	
24	Red clover seed	Bu.	3.8	1.8	4.4	115.8	244.4	117,750	89.2	(2)		
25	Hops	Lbs.	1,431.1	1,197.7	1,717.5	120.0	143.4	391,846	53.9	(2)		

[1] A minus sign (—) denotes decrease. *Per cent not shown when more than 1,000.*
[2] Not reported separately in 1909.
[3] Number of vines of bearing age.
[4] Number of trees of bearing age.
[5] Yield per vine.
[6] Yield per tree.

COUNTY TABLE.—ACREAGE IRRIGATED, 1919 AND 1909; AND ACREAGE IN ENTERPRISES, IRRIGATION WORKS, AND CAPITAL INVESTED IN IRRIGATION ENTERPRISES, 1920 AND 1910.

[A minus sign (−) denotes decrease. Per cent not shown when base is less than 100.]

		THE STATE.	Adams.	Asotin.	Benton.	Chelan.	Clallam.	Columbia.
1	Number of all farms in 1920	66,288	1,084	578	1,519	2,095	607	622
2	Number of farms irrigated in 1919	13,271	8	279	1,294	1,704	125	93
3	Per cent of all farms	20.0	0.7	48.3	85.2	81.3	20.6	15.0
4	Number of farms irrigated in 1909	7,664	20	238	768	1,189	77	56
5	Per cent of increase, 1909–1919	73.2	.....	17.2	68.5	43.3	.....	.....
	LAND AND FARM AREA.							
6	Approximate land area ... acres	42,775,040	1,223,680	387,840	1,069,440	1,856,000	1,104,640	549,120
7	All land in farms ... acres	13,244,720	938,395	259,233	371,811	235,621	58,043	326,330
8	Improved land in farms ... acres	7,129,343	727,876	96,464	201,678	65,810	20,132	192,613
9	Area irrigated in 1919 ... acres	529,899	943	3,474	39,272	38,894	6,160	2,168
10	Per cent of improved land in farms	7.4	0.1	3.6	19.5	59.1	30.6	1.1
11	Area irrigated in 1909 ... acres	334,378	1,523	3,179	23,457	23,620	4,265	2,174
12	Per cent of increase, 1909–1919	58.5	−38.1	9.3	67.6	64.7	44.4	−0.3
13	Area enterprises were capable of irrigating in 1920 ... acres	637,151	1,342	4,559	48,851	50,502	9,860	3,063
14	Area enterprises were capable of irrigating in 1910 ... acres	470,514	1,655	5,373	50,653	27,979	4,405	2,797
15	Per cent of increase, 1910–1920	35.4	−18.9	−15.1	−3.6	80.5	123.8	9.5
16	Area included in enterprises in 1920 ... acres	826,795	1,737	4,684	72,015	65,324	12,660	3,532
17	Area included in enterprises in 1910 ... acres	817,032	5,123	9,844	87,384	53,497	9,975	3,922
18	Per cent of increase, 1910–1920	2.4	−66.1	−52.4	−17.6	22.1	26.9	−9.9
19	Area of irrigated land reported as available for settlement ... acres	61,738	.....	.....	15,756	3,750	2,500	.....
	IRRIGATION WORKS.							
	Independent enterprises:							
20	Number, 1920	2,692	26	21	146	379	7	52
21	Number, 1910	1,934	19	22	74	260	7	42
	Main ditches:							
22	Number, 1920	1,873	27	17	30	207	7	43
23	Number, 1910	1,600	12	18	50	227	7	43
24	Length, 1920 ... miles	3,851	19	16	151	394	36	36
25	Length, 1910 ... miles	2,594	24	40	138	357	17	36
26	Capacity, 1920 ... second-feet	16,242	203	39	982	1,100	570	697
27	Capacity, 1910 ... second-feet	13,178	185	76	1,099	1,219	281	211
	Laterals:							
28	Number, 1920	3,179	27	1	111	89	75	44
29	Number, 1910	1,180	8	10	70	132	19	30
30	Length, 1920 ... miles	1,764	8	.....	185	30	32	15
31	Length, 1910 ... miles	1,298	7	64	119	122	19	4
	Reservoirs:							
32	Number, 1920	205	4	1	.....	36	.....	1
33	Number, 1910	156	1	3	2	36	.....	.....
34	Capacity, 1920 ... acre-feet	477,789	4	100	.....	11,481	.....	1
35	Capacity, 1910 ... acre-feet	121,543	10,000	1,160	.....	12,748	.....	.....
	Flowing wells:							
36	Number, 1920	69	6	.....	7	1	.....	.....
37	Number, 1910	53	.....	.....	4	.....	.....	.....
38	Capacity, 1920 ... gallons per minute	14,925	160	.....	6,200	10	.....	.....
39	Capacity, 1910 ... gallons per minute	18,926	.....	.....	1,290	.....	.....	.....
	Pumped wells:							
40	Number, 1920	320	7	.....	101	13	.....	4
41	Number, 1910	128	5	.....	31	8	.....	1
42	Capacity, 1920 ... gallons per minute	227,744	5,160	.....	38,807	1,775	.....	130
43	Capacity, 1910 ... gallons per minute	60,220	1,873	.....	10,158	564	.....	1,500
	Pumping plants:							
44	Number, 1920	975	12	1	144	138	.....	7
45	Number, 1910	391	8	1	84	54	.....	3
46	Engine capacity, 1920 ... horsepower	22,929	143	5	4,555	1,415	.....	23
47	Engine capacity, 1910 ... horsepower	13,847	133	2	5,894	2,624	.....	58
48	Pump capacity, 1920 ... gallons per minute	636,552	10,042	200	163,628	45,853	.....	355
49	Pump capacity, 1910 ... gallons per minute	365,411	3,223	42	147,059	14,777	.....	1,620
50	Average lift, 1920 ... feet	60	28	8	37	86	.....	18
	CAPITAL INVESTED.							
51	Capital invested to Jan. 1, 1920 ... dollars	29,299,011	77,350	627,165	2,387,113	3,503,670	94,010	61,447
52	Capital invested to July 1, 1910 ... dollars	16,219,149	171,946	1,662,958	3,211,493	889,152	18,900	16,027
53	Per cent of increase, 1910–1920	80.6	−55.0	−62.3	−25.7	294.0	397.4	283.4
54	Average cost per acre based on area enterprises were capable of supplying with water in 1920 ... dollars	45.98	57.64	137.57	48.86	69.38	9.53	20.06
55	Average cost per acre based on area enterprises were capable of supplying with water in 1910 ... dollars	34.47	103.89	309.50	63.40	31.78	4.29	5.73
	ESTIMATED FINAL COST.							
56	Estimated final cost of existing enterprises in 1920 ... dollars	37,684,591	87,750	627,165	3,040,479	4,080,090	97,010	64,947
57	Estimated final cost of existing enterprises in 1910 ... dollars	22,322,856	171,946	1,662,958	3,565,877	1,340,835	18,900	16,027
58	Per cent of increase, 1910–1920	68.8	−49.0	−62.3	−14.7	204.3	413.3	305.2
59	Average cost per acre based on estimated final cost and area included in enterprises in 1920 ... dollars	45.03	50.52	133.90	42.22	62.46	7.66	18.39
60	Average cost per acre based on estimated final cost and area included in enterprises in 1910 ... dollars	27.32	33.56	168.93	40.81	25.06	1.89	4.09

COUNTY TABLE.—ACREAGE IRRIGATED, 1919 AND 1909; AND ACREAGE IN ENTERPRISES, IRRIGATION WORKS, AND CAPITAL INVESTED IN IRRIGATION ENTERPRISES, 1920 AND 1910—Continued.

[A minus sign (—) denotes decrease. Per cent not shown when base is less than 100 or when per cent is more than 1,000.]

		Douglas.	Ferry.	Franklin.	Garfield.	Grant.	Kittitas.	Klickitat.	Lincoln.
1	Number of all farms in 1920	1,622	730	414	413	1,110	928	1,177	1,860
2	Number of farms irrigated in 1919	314	61	78	25	185	737	164	83
3	Per cent of all farms	19.3	8.4	18.8	6.0	16.7	79.4	13.9	4.5
4	Number of farms irrigated in 1909	146	20	21	54	49	639	169	77
5	Per cent of increase, 1909–1919	115.1					15.3	—3.0	
	LAND AND FARM AREA.								
6	Approximate land area ... acres	1,143,680	1,420,800	771,840	444,160	1,749,800	1,496,960	1,198,000	1,475,200
7	All land in farms ... acres	892,223	152,888	436,056	314,182	743,518	215,918	562,331	1,329,495
8	Improved land in farms ... acres	367,325	36,618	255,636	159,252	413,758	95,964	199,616	892,678
9	Area irrigated in 1919 ... acres	4,822	791	2,253	963	7,545	81,967	18,978	2,221
10	Per cent of improved land in farms	0.8	2.2	0.9	0.6	1.8	85.4	10.0	0.3
11	Area irrigated in 1909 ... acres	3,317	397	830	1,316	3,230	68,892	4,681	2,217
12	Per cent of increase, 1909–1919	45.4	99.2	171.4	—32.9	133.6	19.0	305.4	0.2
13	Area enterprises were capable of irrigating in 1920 ... acres	4,928	2,253	10,014	1,552	9,302	93,552	21,950	2,928
14	Area enterprises were capable of irrigating in 1910 ... acres	8,365	4,258	1,276	1,729	8,501	72,348	7,491	2,404
15	Per cent of increase, 1910–1920	—41.0	—47.1	684.8	—10.2	9.4	15.5	195.3	18.1
16	Area included in enterprises in 1920 ... acres	8,756	7,421	14,208	1,698	12,806	87,775	23,315	3,291
17	Area included in enterprises in 1910 ... acres	12,826	5,271	2,113	2,293	14,456	92,949	14,590	2,935
18	Per cent of increase, 1910–1920	—31.7	40.8	575.2	—25.6	—11.4	—5.6	73.8	12.1
19	Area of irrigated land reported as available for settlement ... acres	1,693		10,500				500	
	IRRIGATION WORKS.								
	Independent enterprises:								
20	Number, 1920	86	45	48	26	172	223	93	54
21	Number, 1910	45	20	21	47	43	257	115	48
	Main ditches:								
22	Number, 1920	14	29	4	26	79	212	67	37
23	Number, 1910	33	20	8	42	22	206	87	41
24	Length, 1920 ... miles	15	31	8	17	37	389	173	24
25	Length, 1910 ... miles	31	24	7	41	41	287	108	31
26	Capacity, 1920 ... second-feet	48	119	121	97	113	1,788	842	63
27	Capacity, 1910 ... second-feet	49	129	44	120	97	1,520	596	92
	Laterals:								
28	Number, 1920	20	6	25	2	29	25	38	63
29	Number, 1910	26	4		5	22	143	65	24
30	Length, 1920 ... miles	11	1	2	1	8	41	19	7
31	Length, 1910 ... miles	5	1		1	17	56	23	3
	Reservoirs:								
32	Number, 1920	8	2	2	1	18	7	18	1
33	Number, 1910	4	1		2	10	3	11	3
34	Capacity, 1920 ... acre-feet		151	2		4,519	284,910	415	
35	Capacity, 1910 ... acre-feet	39	790		1	84	35,000	12	
	Flowing wells:								
36	Number, 1920	2	1						
37	Number, 1910	2				2		1	
38	Capacity, 1920 ... gallons per minute	190	1,000						
39	Capacity, 1910 ... gallons per minute	25				7		14	
	Pumped wells:								
40	Number, 1920	22	3	31	1	132	1	2	9
41	Number, 1910	1	1	5		14		12	5
42	Capacity, 1920 ... gallons per minute	6,865	1,000	13,080	250	29,779	200	24	3,785
43	Capacity, 1910 ... gallons per minute	850	13	1,845		2,606		278	450
	Pumping plants:								
44	Number, 1920	55	3	56	7	104	9	12	20
45	Number, 1910	18	2	22	3	26	3	10	8
46	Engine capacity, 1920 ... horsepower	1,452	9	1,100	242	3,084	193	104	301
47	Engine capacity, 1910 ... horsepower	406	12	298	90	417	207	45	194
48	Pump capacity, 1920 ... gallons per minute	38,760	135	36,478	7,750	76,924	12,575	6,190	11,805
49	Pump capacity, 1910 ... gallons per minute	12,713	278	12,335	2,650	23,765	11,700	919	3,170
50	Average lift, 1920 ... feet	95	12	48	76	79	24	46	63
	CAPITAL INVESTED.								
51	Capital invested to Jan. 1, 1920 ... dollars	382,300	66,050	362,300	22,700	1,192,729	4,678,707	198,501	87,431
52	Capital invested to July 1, 1910 ... dollars	488,941	37,406	36,561	23,503	196,510	691,168	73,434	28,434
53	Per cent of increase, 1910–1920	—21.8	76.6	891.2	39.1	606.3	585.9	170.3	207.5
54	Average cost per acre based on area enterprises were capable of supplying with water in 1920 ... dollars	77.44	29.32	36.19	21.67	128.22	36.60	9.29	30.81
55	Average cost per acre based on area enterprises were capable of supplying with water in 1910 ... dollars	58.45	8.78	28.65	13.60	19.59	9.42	9.84	11.83
	ESTIMATED FINAL COST.								
56	Estimated final cost of existing enterprises in 1920 ... dollars	402,008	66,950	637,300	28,000	1,201,729	5,998,707	206,851	88,431
57	Estimated final cost of existing enterprises in 1910 ... dollars	488,941	37,406	36,561	23,503	196,510	691,168	89,434	28,434
58	Per cent of increase, 1910–1920	—17.8	79.0		22.2	579.7	767.4	131.3	211.0
59	Average cost per acre based on estimated final cost and area included in enterprises in 1920 ... dollars	45.91	9.02	44.67	21.20	194.65	67.32	8.49	26.97
60	Average cost per acre based on estimated final cost and area included in enterprises in 1910 ... dollars	38.12	7.10	17.30	10.29	13.35	7.33	6.13	9.69

COUNTY TABLE.—ACREAGE IRRIGATED, 1919 AND 1909; AND ACREAGE IN ENTERPRISES, IRRIGATION WORKS, AND CAPITAL INVESTED IN IRRIGATION ENTERPRISES, 1920 AND 1910—Continued.

[A minus sign (—) denotes decrease. Per cent not shown when base is less than 100 or when per cent is more than 1,000.]

		Okanogan.	Spokane.	Stevens.[1]	Walla Walla.	Whitman.	Yakima.	Other counties.[2]
1	Number of all farms in 1920	2,856	4,830	2,727	1,502	2,957	5,755	30,901
2	Number of farms irrigated in 1919	1,103	775	18	654	14	5,354	203
3	Per cent of all farms	38.6	16.0	0.7	43.5	0.5	93.0	0.6
4	Number of farms irrigated in 1909	397	287	126	273	46	2,951	61
5	Per cent of increase, 1909-1919	177.8	170.0	.....	139.6	.....	81.4	.....
	LAND AND FARM AREA.							
6	Approximate land area ... acres	3,341,440	1,123,840	1,603,200	809,600	1,349,120	3,237,760	15,466,240
7	All land in farms ... acres	669,796	811,206	472,490	703,251	1,252,485	479,629	1,900,909
8	Improved land in farms ... acres	212,497	449,537	139,391	474,161	1,093,579	261,866	701,922
9	Area irrigated in 1919 ... acres	35,899	16,154	8,990	23,575	2,099	230,033	2,778
10	Per cent of improved land in farms	16.9	3.6	6.4	5.0	0.2	87.8	.....
11	Area irrigated in 1909 ... acres	15,238	12,143	3,510	10,008	1,377	148,630	394
12	Per cent of increase, 1909-1919	135.6	33.0	.....	135.6	52.4	54.8	.....
13	Area enterprises were capable of irrigating in 1920 ... acres	52,315	20,995	18,238	39,040	2,536	242,726	7,315
14	Area enterprises were capable of irrigating in 1910 ... acres	31,670	17,140	13,235	20,954	1,705	186,050	557
15	Per cent of increase, 1910-1920	65.2	22.5	.....	86.3	48.7	30.5	.....
16	Area included in enterprises in 1920 ... acres	71,760	39,458	28,605	45,303	4,138	309,235	10,014
17	Area included in enterprises in 1910 ... acres	53,012	52,330	15,510	39,622	3,057	381,455	887
18	Per cent of increase, 1910-1920	35.4	—24.6	.....	14.3	35.4	—6.7	.....
19	Area of irrigated land reported as available for settlement ... acres	7,995	3,638	575	9,587	.....	3,334	2,000
	IRRIGATION WORKS.							
	Independent enterprises:							
20	Number, 1920	383	107	199	280	29	252	54
21	Number, 1910	255	55	91	136	36	280	61
	Main ditches:							
22	Number, 1920	306	49	179	237	20	238	35
23	Number, 1910	238	50	91	100	36	242	26
24	Length, 1920 ... miles	421	94	240	1,069	27	624	30
25	Length, 1910 ... miles	321	124	133	140	30	564	8
26	Capacity, 1920 ... second-feet	1,851	782	477	959	48	5,152	191
27	Capacity, 1910 ... second-feet	1,845	625	374	913	68	3,615	14
	Laterals:							
28	Number, 1920	149	84	181	1,813	19	360	19
29	Number, 1910	171	44	78	68	14	247	.....
30	Length, 1920 ... miles	186	136	29	79	4	956	20
31	Length, 1910 ... miles	96	93	10	105	4	546	.....
	Reservoirs:							
32	Number, 1920	49	32	7	5	.....	3	10
33	Number, 1910	38	18	3	10	2	2	7
34	Capacity, 1920 ... acre-feet	30,789	5,663	800	.....	.....	39,000	54
35	Capacity, 1910 ... acre-feet	25,727	1,536	20	4	11	34,500	1
	Flowing wells:							
36	Number, 1920	1	.....	.....	33	5	3	1
37	Number, 1910	.....	5	.....	13	.....	27	1
38	Capacity, 1920 ... gallons per minute	.....	.....	.....	6,080	1,000	285	.....
39	Capacity, 1910 ... gallons per minute	.....	1	.....	12,502	.....	5,069	18
	Pumped wells:							
40	Number, 1920	52	49	2	45	.....	43	3
41	Number, 1910	2	30	.....	1	.....	9	3
42	Capacity, 1920 ... gallons per minute	13,613	58,646	45	36,240	.....	8,225	120
43	Capacity, 1910 ... gallons per minute	188	33,929	.....	4,500	.....	1,382	84
	Pumping plants:							
44	Number, 1920	131	75	9	65	11	51	11
45	Number, 1910	25	32	2	30	6	18	19
46	Engine capacity, 1920 ... horsepower	1,885	3,316	41	2,775	340	1,735	151
47	Engine capacity, 1910 ... horsepower	209	1,633	23	1,152	63	270	37
48	Pump capacity, 1920 ... gallons per minute	54,461	79,688	9,156	25,885	8,434	47,002	1,303
49	Pump capacity, 1910 ... gallons per minute	9,983	42,646	275	62,987	2,179	11,812	1,248
50	Average lift, 1920 ... feet	43	83	48	24	56	38	.....
	CAPITAL INVESTED.							
51	Capital invested to Jan. 1, 1920 ... dollars	2,874,338	1,668,838	641,580	990,667	225,933	8,897,058	248,934
52	Capital invested to July 1, 1910 ... dollars	1,119,447	946,207	244,466	1,166,120	53,720	5,159,024	23,632
53	Per cent of increase, 1910-1920	156.8	76.4	.....	—15.0	320.6	72.4	.....
54	Average cost per acre based on area enterprises were capable of supplying with water in 1920 ... dollars	54.94	79.49	35.18	25.38	89.09	36.65	34.03
55	Average cost per acre based on area enterprises were capable of supplying with water in 1910 ... dollars	35.35	55.21	18.47	55.65	31.51	27.73	42.43
	ESTIMATED FINAL COST.							
56	Estimated final cost of existing enterprises in 1920 ... dollars	4,797,308	2,699,388	1,002,330	1,340,767	237,533	10,670,024	291,734
57	Estimated final cost of existing enterprises in 1910 ... dollars	1,229,118	946,207	244,466	1,393,370	53,720	10,078,743	23,632
58	Per cent of increase, 1910-1920	290.3	185.2	.....	—3.8	342.2	5.9	.....
59	Average cost per acre based on estimated final cost and area included in enterprises in 1920 ... dollars	66.85	68.41	35.04	29.60	57.40	34.50	29.13
60	Average cost per acre based on estimated final cost and area included in enterprises in 1910 ... dollars	23.19	18.08	15.76	35.17	17.57	30.41	26.64

[1] Part taken to form Pend Oreille County in 1911.

[2] Includes Clarke, Jefferson, King, Kitsap, Lewis, Pend Oreille, Pierce, Skagit, Skamania, Thurston, and Whatcom Counties. No irrigation is reported for the other counties of the state.

WYOMING.

INTRODUCTION.

The following pages present the statistics of irrigation for the state of Wyoming collected at the census of 1920. Statistics of acreage irrigated, of acreage, yield, and value of crops grown on irrigated land, and of cost of operation and maintenance relate to the year 1919; other items relate to the year 1920. Throughout the report figures for the census of 1910 are given for purposes of comparison; and, for the purpose of showing the historical development of irrigation, items which have been reported in censuses previous to 1910 are presented.

Statistics of number of farms irrigated and of acreage, yield, and value of crops grown on irrigated land were collected in the general census of agriculture. All other statistics were obtained in a special canvass of irrigation enterprises.

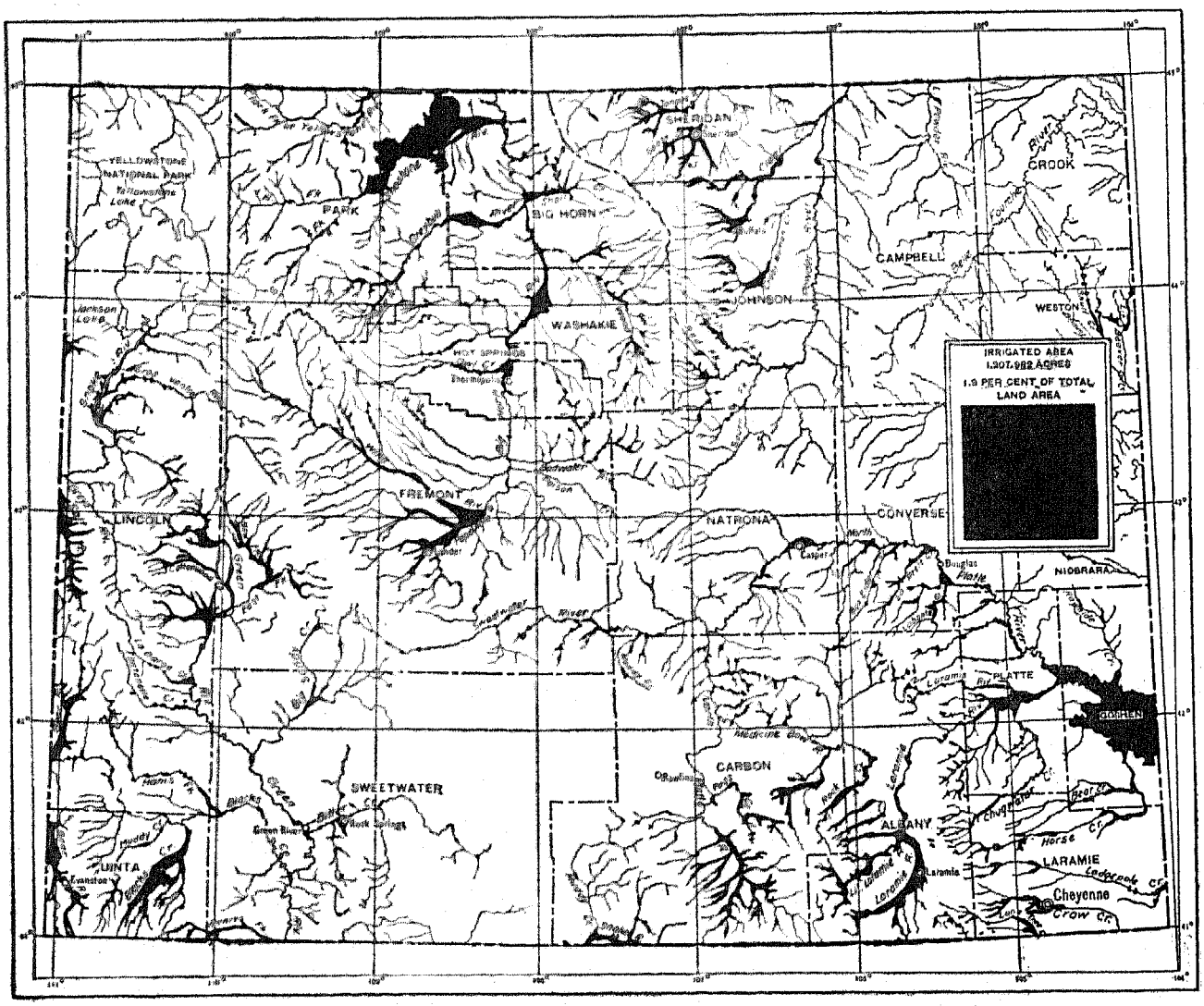
TABLE 1.—SUMMARY FOR THE STATE: 1920 AND 1910.

ITEM.	CENSUS OF—		INCREASE.[1]	
	1920	1910	Amount.	Per cent.
Number of all farms	15,748	10,987	4,761	43.3
Approximate land area of the state ... acres	62,430,720	62,460,160	[2] −29,440	(3)
All land in farms ... acres	11,809,351	8,543,010	3,266,341	38.2
Improved land in farms ... acres	2,102,005	1,256,160	845,845	67.3
Number of farms irrigated	6,449	6,297	152	2.4
Area irrigated ... acres	1,207,982	1,133,302	74,680	6.6
Area enterprises were capable of irrigating ... acres	1,831,039	1,639,510	191,529	11.7
Area included in enterprises ... acres	2,564,668	2,224,298	340,370	15.3
Per cent irrigated:				
Number of all farms	41.0	57.3	−16.3	.....
Approximate land area of the state	1.9	1.8	0.1	.....
Land in farms	10.2	13.3	−3.1	.....
Improved land in farms	57.5	90.2	−32.7	.....
Excess of area enterprises were capable of irrigating over area irrigated ... acres	623,057	506,208	116,849	23.1
Excess of area included in enterprises over area irrigated ... acres	1,356,686	1,090,996	265,690	24.4
Area of irrigated land reported as available for settlement ... acres	197,326	(4)	.....	.....
Capital invested	$34,326,328	$17,700,980	$16,625,348	93.9
Average per acre enterprises were capable of irrigating	$18.75	$10.80	$7.95	73.6
Estimated final cost of existing enterprises	$51,500,288	$20,425,890	$31,074,398	152.1
Average per acre included in enterprises	$20.08	$9.18	$10.90	118.7
Average cost of operation and maintenance per acre	$1.04	$0.86	$0.18	20.9
IRRIGATION WORKS.				
Number of enterprises	3,564	5,577	−2,013	−36.1
Number of main ditches	5,007	5,593	−586	−10.5
Length of main ditches ... miles	9,517	10,933	−1,416	−13.0
Capacity of main ditches ... second-feet	39,009	42,630	−3,621	−8.5
Number of lateral ditches	2,777	2,340	437	18.7
Length of lateral ditches ... miles	2,534	2,298	236	10.3
Number of reservoirs	374	414	−40	−9.7
Capacity of reservoirs ... acre-feet	2,911,748	2,550,937	360,811	14.1
Number of flowing wells	7	2	5	.....
Capacity of flowing wells ... gallons per minute	46	250	−204	−81.6
Number of pumped wells	16	3	13	.....
Capacity of pumped wells ... gallons per minute	8,020	835	7,185	860.5
Number of pumping plants	57	34	23	.....
Engine capacity ... horsepower	1,304	705	599	85.0
Pump capacity ... gallons per minute	39,725	142,529	−102,804	−72.1
Average lift ... feet	31	(4)	31	.....

[1] A minus sign (−) denotes decrease. Per cent not shown when base is less than 100.
[2] Decrease due to building of Pathfinder and Shoshone Reservoirs.
[3] Less than one-tenth of 1 per cent decrease.
[4] Not reported in 1910.

WYOMING

APPROXIMATE LOCATION AND EXTENT OF IRRIGATED LAND.



CLIMATIC CONDITIONS.

The surface of Wyoming consists of high, rolling prairies broken by mountain ranges. The main ranges of the Rocky Mountains pass through the state forming the Continental Divide, while many broken ranges occur, cutting the state into many more or less isolated valleys. The broken topography produces a variety in climatic conditions.

Except for small areas in the high mountains, no part of the state receives more than 20 inches of precipitation in normal years. Along the eastern border of the state the normal annual precipitation is from 15 to 20 inches and crops are grown without irrigation. Immediately west of this, and occupying nearly one-half the area of the state, is a wide zone in which the normal precipitation is from 10 to 15 inches. In this section there is little agriculture except in the stream valleys where irrigation is practiced. The grazing of cattle and sheep on the natural grasses forms the principal industry.

In the southwest part of the state is a large section—the Red Desert—where the precipitation is less than 10 inches and the same condition prevails in the Big Horn Basin in the northern part of the state.

In the valleys of the extreme western part of the state the normal annual precipitation varies from about 10 inches in the Green River Valley to about 18 inches in Jackson's Hole, near Yellowstone Park.

The year 1919 was the driest on record, except 1902. During the first eight months of the year, which includes the growing season for crops, the precipitation was only about one-half the normal. In many places dry-farm crops were a total failure, and in many sections irrigated crops suffered because of shortage of water.

WATER SUPPLY FOR IRRIGATION.

Since Wyoming lies along the Continental Divide, the rivers rising in its mountains flow into adjoining states on all four sides. Crossing the eastern border to South Dakota and Nebraska are Belle Fourche, Cheyenne, and North Platte Rivers, and Lodgepole Creek. Flowing to the south are only small streams except Green River; while from the south the state receives the North Platte and the Laramie. Bear River and Snake River flow to the west into Idaho; and to the north into Montana flow Yellowstone, Clark Fork of the Yellowstone, Big Horn, Tongue, Powder, and Little Missouri Rivers and many smaller streams.

The streams flowing to the east, except the North Platte, do not carry large volumes of water except in flood periods, and they flow through a country where crops can be grown with some success without irrigation. Storage is necessary if these streams are to be used extensively for irrigation.

The North Platte rises in north central Colorado, flows in a northerly direction about half way across Wyoming, turns abruptly to the east, and flows in a southeasterly direction to the Wyoming-Nebraska line. Throughout most of its course in Wyoming the North Platte flows through a rough mountainous country where there is little opportunity to use its water for irrigation. Its principal tributaries in Wyoming are the Medicine Bow, coming from the east; the Sweetwater, coming from the west, and the Laramie, coming from the south. Just below the mouth of the Sweetwater the United States Reclamation Service has built the Pathfinder Reservoir, having a capacity of about 1,000,000 acre-feet, which is about two-thirds of the average total annual discharge of the river at that point. Since a large part of the annual discharge is used as it comes, this reservoir has sufficient capacity to control the flow of the stream except in years of abnormal flood discharge. Water is diverted from both sides of the North Platte about 30 miles west of the Wyoming-Nebraska line, for use on lands in both states. The canal on the south side is under construction, and much additional land will be irrigated from the North Platte in that section. Stored water from Pathfinder Reservoir is supplied to a large area under private canals, mainly in Nebraska.

Laramie River, a tributary of the North Platte, like the main stream, rises in the mountains of northern Colorado and flows into Wyoming. Some of its waters are diverted from its drainage basin into the tributaries of the South Platte in Colorado, and there are large projects on the stream in Wyoming. Litigation between the parties taking water from the stream in Colorado and in Wyoming is pending in the United States Supreme Court.

Very little land is irrigated from the streams along the southern border of the state. The country is largely rough and undeveloped, and far from transportation. Green River rises in high mountains that receive a very heavy snowfall, and carries a large volume of unused water, but the valleys through which it flows are undeveloped and lack transportation facilities. Green River is one of the principal tributaries of Colorado River, and possible storage and use of its water is being studied in connection with the whole Colorado River System.

Bear River, which rises in Utah, flows into Wyoming and crosses and recrosses into Utah and Idaho, and finally discharges into Great Salt Lake, flows principally through high mountain valleys in Wyoming. It is not susceptible of much larger use in Wyoming.

Snake River rises in the southern part of Yellowstone National Park, and some of its headwater tributaries rise in very close proximity to those of Green River. There is not much opportunity to use this river in Wyoming as its course is through high mountain valleys. Jackson Lake lies along the course of Snake River, and is used as a reservoir to store flood water for use along the course of the river in Idaho.

Yellowstone River rises in the mountains to the southeast of Yellowstone National Park, flows into Yellowstone Lake within the park, and thence into Montana. There is practically no opportunity to use this stream for irrigation in Wyoming.

Big Horn River and its tributaries drain the whole north central part of Wyoming. Their headwaters rise in the mountains southeast of Yellowstone National Park, near those of Green, Snake, and Yellowstone Rivers. The larger of the tributaries are Wind, Greybull, and Shoshone Rivers. All of these streams are used for irrigation, but only on the Shoshone has provision been made for storing the flood waters on a large scale. On that stream the United States Reclamation Service has built the Shoshone Reservoir, which has a capacity of 456,600 acre-feet. This is less than one-half of the average annual run-off of the river at this point, and there is opportunity for additional storage.

The other streams flowing north into Montana flow through the high plains, where there is little irrigation and where some crops can be grown in most years without irrigation.

The supply of water in streams has met the demands for irrigation so far and there has been little attempt to develop ground water.

FARMS AND ACREAGE IRRIGATED.

TABLE 2.—NUMBER OF FARMS AND ACREAGE IRRIGATED: 1890 TO 1920.

CENSUS YEAR.	FARMS IRRIGATED.			AREA IRRIGATED.				
	Number.	Per cent of increase.	Per cent of all farms.	Acres.	Per cent of increase.	Per cent of total land area.	Per cent of land in farms.	Per cent of improved land in farms.
1920	6,449	2.4	41.0	1,207,982	6.6	1.9	19.2	57.5
1910	6,297	69.2	57.3	1,133,302	87.1	1.8	13.3	96.2
1900	3,721	94.1	61.1	605,878	163.5	1.0	7.5	76.5
1890	1,917	.....	61.3	229,676	.....	0.4	12.5	48.2

TABLE 3.—ACREAGE, CLASSIFIED BY DATE OF BEGINNING OF ENTERPRISES SUPPLYING WATER FOR IRRIGATION.

DATE OF BEGINNING.	Number of enterprises.	Area included in enterprises, 1920 (acres).	AREA IRRIGATED IN 1919.		Area enterprises were capable of irrigating in 1920 (acres).
			Acres.	Per cent of acreage in enterprises.	
Total	3,564	2,564,668	1,207,982	47.1	1,831,039
Before 1860	2	640	320	50.0	320
1860-1869	14	10,066	9,288	92.3	9,880
1870-1879	152	141,117	77,228	54.7	104,503
1880-1889	931	703,056	406,196	57.9	518,857
1890-1899	613	395,655	229,300	60.5	357,220
1900-1904	596	330,746	163,543	49.4	268,831
1905-1909	442	519,421	169,976	32.7	337,299
1910-1914	366	146,116	58,288	39.5	97,492
1915-1919	252	216,385	18,642	8.6	53,627
Not reported	226	108,327	68,201	62.0	85,029

TABLE 4.—ACREAGE, CLASSIFIED BY SOURCE OF WATER SUPPLY: 1919 AND 1909.

CLASS.	AREA IRRIGATED (ACRES).				Area enterprises were capable of irrigating in 1920 (acres).	Area included in enterprises, 1920 (acres).
	1919	1909	Increase.[1]			
			Amount.	Per cent.		
Total	1,207,982	1,133,302	74,680	6.6	1,831,039	2,564,668
Streams, gravity	1,155,596	1,112,234	43,362	3.9	1,707,269	2,417,882
Streams, pumped	1,525	1,540	−15	−1.0	3,448	4,700
Wells, pumped	147	75	72	.....	148	148
Wells, flowing	19	64	−45	.....	40	65
Lakes, gravity	355	120	235	195.8	381	545
Springs	5,985	5,008	977	19.5	10,268	12,327
Stored storm water	10,852	14,261	−3,409	−23.9	46,728	51,822
Streams, gravity, and pumped wells	400	(2)	400	.....	634	854
Other mixed	33,043	(2)	33,043	.....	62,063	76,065
Other and not reported	60	(2)	60	.....	60	60

[1] A minus sign (−) denotes decrease. Per cent not shown when base is less than 100.
[2] Not included in classification in 1910.

ACREAGE, BY CHARACTER OF ENTERPRISE.

Wyoming accepted the conditions of the Federal Carey Act (act of Congress, Aug. 18, 1894), in 1895. The original act granted to each of the states containing arid land 1,000,000 acres, and an amendment granted to Wyoming an additional area of 1,000,000 acres.

TABLE 5.—ACREAGE, CLASSIFIED BY CHARACTER OF ENTERPRISE: 1920 AND 1910.

ITEM AND CLASS.	CENSUS OF—		INCREASE.[1]	
	1920	1910	Acres.	Per cent.
ACREAGE IRRIGATED.				
Total	1,207,982	1,133,302	74,680	6.6
Individual and partnership	724,620	813,823	−89,203	−11.0
Cooperative	286,702	116,317	170,385	146.5
Irrigation district	22,935	11,800	11,135	94.4
Carey Act	36,230	86,252	−50,022	−58.0
Commercial	57,800	87,935	−30,135	−34.3
U. S. Reclamation Service	53,555	12,905	40,650	315.0
U. S. Indian Service	22,000	4,270	17,730	415.2
State	2,120	(2)	2,120	.....
City	2,020	(2)	2,020	.....
ACREAGE ENTERPRISES WERE CAPABLE OF IRRIGATING.				
Total	1,831,039	1,639,510	191,529	11.7
Individual and partnership	1,008,379	1,024,137	−15,758	−1.5
Cooperative	432,956	165,476	267,480	161.6
Irrigation district	54,017	27,050	26,967	99.7
Carey Act	72,215	205,974	−133,759	−64.9
Commercial	121,310	133,305	−11,995	−9.0
U. S. Reclamation Service	93,022	34,869	58,153	166.8
U. S. Indian Service	45,000	48,699	−3,699	−7.6
State	2,120	(2)	2,120	.....
City	2,020	(2)	2,020	.....
ACREAGE INCLUDED IN ENTERPRISES.				
Total	2,564,668	2,224,298	340,370	15.3
Individual and partnership	1,339,116	1,153,378	185,738	16.1
Cooperative	532,206	189,894	342,312	180.3
Irrigation district	56,617	27,050	29,567	109.3
Carey Act	98,190	426,472	−328,282	−77.0
Commercial	146,478	195,967	−49,489	−25.3
U. S. Reclamation Service	299,799	167,890	131,909	78.6
U. S. Indian Service	87,940	63,657	24,283	38.1
State	2,155	(2)	2,155	.....
City	2,177	(2)	2,177	.....

[1] A minus sign (−) denotes decrease.
[2] Not included in classification in 1910.

An irrigation district law was enacted in 1907. This law has been utilized both for the financing of new enterprises and for buying in enterprises originally organized in some other form.

The areas reported under United States Reclamation Service in Table 5 include land watered by a Carey Act enterprise supplied under contract.

ACREAGE, BY CHARACTER OF WATER RIGHTS.

The laws of Wyoming relating to water rights are summarized in the following paragraphs:

Wyoming was organized as a territory in 1868 and the first territorial legislature adopted the common law of England so far as it was "not inapplicable." The supreme court of the state has held that this enactment did not establish in Wyoming the common law of riparian rights, since it is "unsuited to our requirements and necessities" (Moyer *v.* Preston, 6 Wyo. 308).

In 1875 the territory enacted a law providing that persons holding land along any stream were entitled to use the water for irrigation and to the right of way for canals over the land of others.

In 1886 there was enacted a law to regulate the use of water for irrigation and other purposes. It divided the territory into districts, gave the district courts jurisdiction over water rights, required all parties claiming rights to water to file statements of their claims with the clerks of the proper courts, required all parties wishing to acquire rights to file statements before beginning construction of works, and provided that whenever any party interested in any ditch, canal, or reservoir desired a determination of the priority of rights to water from the source from which water was obtained, he might apply to the proper district court for an adjudication.

The law of 1886 declared "The water of every natural stream not heretofore appropriated within this territory is hereby declared to be the property of the public, and the same is dedicated to the use of the people, subject to appropriation as herein provided."

Wyoming was admitted to the Union as a state in 1890, and the constitution of the state contained the following general declarations regarding water:

"The water of all natural streams, springs, lakes, or other collections of still water within the boundaries of the state are hereby declared to be the property of the state." (Art. 8, sec. 1.)

"Priority of appropriation for beneficial uses shall give the better right. No appropriation shall be denied except when such denial is demanded by the public interests." (Art. 8, sec. 3.)

The constitution provided also for the office of state engineer, and a board of control of which the engineer is president, to which was assigned "supervision of the waters of the state and of their appropriation, distribution, and diversion."

The first state legislature enacted the laws necessary to the carrying out of the constitutional provisions referred to, and the system adopted at that time is still in effect.

Persons wishing to acquire rights are required to make application to the state engineer for permits and are to submit proof of the completion of irrigation works in accordance with the permits, and the board of control is to issue certificates defining the rights acquired.

Rights previously acquired are adjudicated by the board of control, and certificates defining rights in accordance with the decisions of the board are issued.

Many suits attacking the law of 1890 have been decided by the state supreme court, and the law has been upheld by the court.

TABLE 6.—ACREAGE IRRIGATED, CLASSIFIED BY CHARACTER OF RIGHTS UNDER WHICH WATER IS RECEIVED: 1919 AND 1909.

CLASS.	1919		1909, per cent of total.
	Acres.	Per cent of total.	
Total	1,267,982	100.0	100.0
Appropriation and use	25,662	2.1	8.7
Notice filed and posted	69,792	5.6	6.8
Adjudicated by court	162,186	13.4	4.3
Permit from state	466,626	38.6	28.3
Certificate or license from state	457,638	37.8	37.9
Underground	276	(1)	(2)
Other and mixed	−657	0.1	(2)
Not reported	35,345	2.9	(2)

[1] Less than one-tenth of 1 per cent.
[2] All land for which the class of water rights was not reported was included in "Appropriation and use."

ACREAGE, BY DRAINAGE BASIN.

The report of a special census taken in 1902 presented all data by drainage basins rather than by counties. The results of the census of 1920 have been tabulated on the same basis, and the data for 1902 are presented for purposes of comparison. For no other census have the results been tabulated in this form. The acreage reported for each drainage basin in 1919 comprises all the irrigated land in that drainage basin, including that watered from springs and wells. In the 1902 results the acreages irrigated from springs and wells were not reported for the smaller tributary streams, but the acreages for the tributaries were included in those reported for the main streams.

TABLE 7.—ACREAGE IRRIGATED, CLASSIFIED BY DRAINAGE BASIN: 1919 AND 1902.

DRAINAGE BASIN.	AREA IRRIGATED (ACRES).			Area included in enterprises, 1920 (acres).	Area enterprises were capable of irrigating in 1920 (acres).
	1919	1902	Per cent of increase.[1]		
Total	1,267,982	773,111	50.2	2,004,668	1,831,639
Missouri River drainage	869,845	580,651	49.8	1,860,249	1,308,458
Clark Fork (of Yellowstone) and tributaries	8,897	4,567	94.8	15,640	14,121
Clark Fork direct	3,686	2,860	28.9	5,329	5,312
Tributaries of Clark Fork	5,211	[2] 1,707	205.3	10,271	8,809
Big Horn River and tributaries	307,846	113,873	170.3	799,201	468,198
Big Horn River direct	42,799	2,502		70,208	66,945
Pupo Agie River	22,073	14,240	55.0	34,723	34,375
Wind River	43,629	5,757		223,338	77,122
Poison Creek	3	2,600	−99.8	10	10
Owl Creek	11,629	6,559	77.0	14,546	12,601
No Wood Creek	15,616	10,097	52.4	26,193	22,699
Greybull River	49,251	35,352	38.5	82,543	79,134
Shell Creek	11,955	4,319	176.8	24,005	22,496
Shoshone River	95,001	26,211	261.4	217,908	134,421
Little Horn River	1,498	4,761	−79.4	11,359	4,340
Other tributaries of Big Horn River	11,639	[2] 2,936	296.7	39,237	24,404
Tongue River and tributaries	43,629	35,629	20.8	69,167	59,290
Tongue River direct	9,895	7,285	34.6	11,079	10,771
Goose Creek	27,627	20,693	33.8	43,817	37,749
Other tributaries of Tongue River	5,500	[2] 7,653	−27.2	13,671	10,770
Powder River and tributaries	88,963	64,357	38.1	132,985	112,340
Powder River direct	2,465			4,975	4,902
East Fork Creek	3,341	2,610	28.0	4,271	3,385
Crazy Woman Creek	21,865	6,950	216.0	29,694	24,151
Clear Creek	50,048	47,801	6.0	71,569	62,735
Other tributaries of Powder River	10,484	[2] 6,996	49.9	32,495	16,107
Little Missouri River	60	[2] 165	−63.6	60	60
Tributaries of Cheyenne River	7,872	14,231	−44.9	16,818	11,531
Belle Fourche River	1,366	3,170	−56.2	5,054	3,621
South Fork	5,996	7,996	−25.2	11,764	7,849
Other tributaries of Cheyenne River		212	−100.0		

[1] A minus sign (−) denotes decrease. Per cent not shown when more than 1,000.
[2] Includes springs and wells.

TABLE 7.—ACREAGE IRRIGATED, CLASSIFIED BY DRAINAGE BASIN: 1919 AND 1902—Continued.

DRAINAGE BASIN.	AREA IRRIGATED (ACRES). 1919	1902	Per cent of increase.[1]	Area included in enterprises, 1920 (acres).	Area enterprises were capable of irrigating in 1920 (acres).
Missouri River drainage—Con.					
Niobrara River	445	[2] 975	−54.4	445	445
North Platte River and tributaries	462,993	336,840	19.6	888,419	628,233
North Platte River direct	56,794	39,570	43.5	120,195	76,966
Beaver Creek	2,621	7,370	−64.4	3,666	3,185
Grand Encampment Creek	7,053	6,622	6.5	10,173	7,293
Spring Creek	13,123	7,679	70.9	18,792	18,177
Sage Creek	375	1,634	−77.1	570	570
Pass Creek	8,557	8,390	2.0	12,500	11,375
Medicine Bow River	54,590	40,661	34.0	139,598	67,193
Sweetwater River	5,448	11,403	−52.2	14,196	10,593
Muddy Creek	657	1,525	−56.9	1,112	677
Box Elder Creek	4,648	4,740	−1.9	7,916	7,696
La Prele Creek	9,193	4,524	101.2	24,697	15,690
Labonte Creek	4,376	3,639	20.3	6,525	5,756
Laramie River and tributaries	149,999	138,176	8.6	368,928	291,993
Laramie River direct	72,400	57,335	26.3	171,554	122,956
Little Laramie River	30,850	53,105	−41.9	42,852	35,144
Sybille Creek	6,183	7,234	−14.5	9,539	8,044
North Laramie River	6,838	5,721	19.9	20,144	11,749
Chugwater Creek	5,914	3,997	51.4	9,853	9,258
Other tributaries of Laramie River	27,784	[2] 10,874	155.5	113,006	106,842
Rawhide Creek	2,045	4,187	−51.2	3,051	2,481
Horse Creek	28,369	15,524	82.7	71,188	20,702
Other tributaries of North Platte River	[2] 55,325	[2] 41,196	34.3	89,831	68,977
Tributaries of South Platte River	9,304	9,898	−9.8	21,553	14,220
Lodgepole Creek	1,775	3,694	−51.9	10,184	3,694
Crow Creek	2,580	3,643	−29.2	5,590	4,867
Lone Tree Creek	1,960	1,444	35.7	2,040	1,965
Cache la Poudre River	3,489	1,077	224.0	3,739	3,694
Other tributaries of South Platte River	.....	[2] 30	−100.0	.....	.....
Other tributaries of Missouri River	.....	[2] 50	−100.0	.....	.....
Colorado River drainage	211,597	118,566	78.4	473,116	353,731
Green River and tributaries	211,597	118,566	78.4	473,116	353,731
Green River direct	20,285	11,351	78.7	32,492	25,694
New Fork	27,743	10,975	152.8	53,918	43,614
Horse Creek	15,520	6,569	136.3	21,670	19,453
Cottonwood Creek	17,437	4,673	272.7	32,317	29,283
South Piney Creek	11,923	16,179	−26.3	30,924	26,397
La Barge Creek	5,459	5,655	−8.0	11,700	7,725
Fontenelle Creek	4,428	3,241	36.6	5,558	5,033
Bitter Creek	2,395	1,405	70.5	12,495	11,447
Blacks Creek	65,980	28,129	134.5	173,970	104,305
Henrys Fork	8,293	6,813	21.8	25,940	23,694
Little Snake River	13,463	17,363	−22.5	18,058	16,358
Other tributaries of Green River	18,571	[2] 6,803	173.0	51,794	38,388
Great Salt Lake drainage	63,665	32,764	94.3	91,842	82,470
Bear River and tributaries	63,665	32,764	94.3	91,842	82,470
Bear River direct	37,306	25,160	48.3	49,027	45,412
Tributaries of Bear River	26,359	[2] 7,604	246.6	42,815	37,058
Columbia River drainage	62,965	41,156	53.0	104,362	86,400
Snake River and tributaries	62,965	41,156	53.0	104,362	86,400
Snake River direct	912	1,050	−13.1	2,202	1,879
Gros Ventre River	6,718	3,523	90.7	9,866	7,493
Little Gros Ventre River	6,243	3,599	73.5	9,157	6,997
Salt River	34,338	22,570	52.1	57,288	46,234
Tributaries of Pierre River	.....	5,372	−100.0	.....	.....
Other tributaries of Snake River	14,754	[2] 5,036	193.0	25,849	23,797

[1] A minus sign (−) denotes decrease. Per cent not shown when more than 1,000.
[2] Includes springs and wells.

CAPITAL INVESTED AND COST OF OPERATION AND MAINTENANCE.

TABLE 8.—CAPITAL INVESTED IN IRRIGATION ENTERPRISES: 1890 TO 1920.

CENSUS YEAR.	Amount.	Per cent of increase.	AVERAGE PER ACRE. Amount.	Per cent of increase.
1920	$34,326,328	93.9	$19.06	94.5
1910	17,700,980	345.5	10.40	64.6
1900	3,973,165	377.9	6.56	81.2
1890	831,427	.....	3.62	.....

TABLE 9.—CAPITAL INVESTED, CLASSIFIED BY DATE OF BEGINNING.

DATE OF BEGINNING.	Amount.	Per cent of total.	Average per acre.
Total	$34,326,328	100.0	$18.75
Before 1860	1,250	(1)	3.91
1860-1869	45,731	0.1	4.63
1870-1879	978,368	2.9	9.36
1880-1889	5,459,654	15.9	10.52
1890-1899	3,109,641	9.1	9.22
1900-1904	4,844,972	14.1	16.21
1905-1909	14,962,407	43.6	45.71
1910-1914	1,621,916	4.7	16.64
1915-1919	2,337,484	6.8	43.59
Not reported	964,905	2.8	11.62

[1] Less than one-tenth of 1 per cent.

TABLE 10.—CAPITAL INVESTED, 1920, AND COST OF OPERATION AND MAINTENANCE, 1919, CLASSIFIED BY SOURCE OF WATER SUPPLY.

[When water is pumped, cost of operation and maintenance includes cost of fuel and attendance.]

CLASS.	CAPITAL INVESTED, 1920. Amount.	Per cent of total.	Average per acre.	OPERATION AND MAINTENANCE, 1919. Area for which cost is reported (acres).	Average cost per acre.[1]
Total	$34,326,328	100.0	$18.75	869,581	$1.04
Streams, gravity	33,025,460	96.2	19.34	826,086	1.03
Streams, pumped	99,914	0.3	28.98	985	9.91
Wells, pumped	10,460	(2)	70.68	122	7.79
Wells, flowing	4,630	(2)	115.75	12	9.58
Lakes, gravity	4,935	(2)	12.95	60	0.83
Springs	66,299	0.2	6.46	2,983	0.60
Stored storm water	407,055	1.2	8.71	10,055	0.73
Streams, gravity, and pumped wells	16,770	(2)	26.45	125	1.20
Other mixed	690,705	2.0	11.13	29,153	1.25
Other and not reported	100	(2)	1.67	.....	.....

[1] Based on area irrigated in 1919. [2] Less than one-tenth of 1 per cent.

TABLE 11.—CAPITAL INVESTED, CLASSIFIED BY DRAINAGE BASIN: 1920 AND 1902.

DRAINAGE BASIN.	1920	1902	INCREASE.[1] Amount.	Per cent.
Total	$34,326,328	$4,701,049	$29,625,279	630.2
Missouri River drainage	29,818,236	3,901,748	25,916,488	664.2
Clark Fork (of Yellowstone) and tributaries	117,292	40,475	76,817	189.8
Clark Fork direct	55,402	26,150	29,252	111.9
Tributaries of Clark Fork	61,890	[2] 14,325	47,565	332.0
Big Horn River and tributaries	14,330,800	919,433	13,411,367	.....
Big Horn River direct	1,295,576	22,000	1,273,576	.....
Pepo Agie River	349,546	72,264	277,282	383.7
Wind River	2,101,819	17,904	2,083,915	.....
Poison Creek	1,000	18,700	−17,700	−94.7
Owl Creek	52,915	40,154	12,761	31.8
No Wood Creek	161,588	81,978	79,610	97.1
Greybull River	503,184	204,604	298,580	145.9
Shell Creek	380,420	32,730	347,690	.....
Shoshone River	8,702,480	378,278	8,324,202	.....
Little Horn River	35,000	31,695	3,305	10.4
Other tributaries of Big Horn River	747,272	[2] 19,126	728,146	.....
Tongue River and tributaries	811,125	218,405	592,720	271.4
Tongue River direct	125,555	50,750	74,805	147.4
Goose Creek	563,518	127,100	436,418	343.4
Other tributaries of Tongue River	122,052	[2] 40,555	81,497	201.0
Powder River and tributaries	1,159,996	285,084	874,912	306.9
Powder River direct	152,100	.....	152,100	.....
Red Fork Creek	78,500	12,800	65,700	513.3
Crazy Woman Creek	127,791	22,275	105,516	473.7
Clear Creek	553,465	189,375	364,090	192.3
Other tributaries of Powder River	248,140	[2] 60,634	187,506	309.2
Little Missouri River	726	[2] 950	−224	−23.6
Tributaries of Cheyenne River	242,886	102,877	140,009	136.1
Belle Fourche River	76,066	50,165	25,901	51.6
South Fork	166,820	49,272	117,548	238.6
Other tributaries of Cheyenne River	.....	[2] 3,440	−3,440	−100.0
Niobrara River	10,565	[2] 4,200	6,365	151.5

[1] A minus sign (−) denotes decrease. Per cent not shown when more than 1,000.
[2] Includes springs and wells.

TABLE 11.—CAPITAL INVESTED, CLASSIFIED BY DRAINAGE BASIN: 1920 AND 1902—Continued.

DRAINAGE BASIN.	1920	1902	INCREASE.[1] Amount.	INCREASE.[1] Per cent.
Missouri River drainage—Con.				
North Platte River and tributaries	12,931,901	2,227,217	10,704,684	480.6
North Platte River direct	5,920,923	306,084	5,614,839	.....
Beaver Creek	37,497	51,168	−13,671	−26.7
Grand Encampment Creek	72,692	50,828	21,864	43.0
Spring Creek	184,290	38,496	145,794	378.7
Sage Creek	4,395	13,790	−9,584	−69.5
Pass Creek	50,051	41,877	8,174	19.5
Medicine Bow River	346,664	244,287	102,377	41.9
Sweetwater River	87,322	54,701	32,621	59.6
Muddy Creek	7,770	6,546	1,224	18.7
Box Elder Creek	104,676	37,655	67,021	178.0
La Prele Creek	327,411	37,500	289,911	773.1
Labonte Creek	71,826	32,640	39,186	120.1
Laramie River and tributaries	4,334,896	888,096	3,446,800	388.1
Laramie River direct	923,041	661,206	261,835	39.6
Little Laramie River	48,753	119,122	−70,369	−59.1
Sybille Creek	65,041	32,200	32,841	102.0
North Laramie River	396,708	13,886	382,822	.....
Chugwater Creek	83,155	30,945	52,210	168.7
Other tributaries of Laramie River	2,818,198	[2] 30,737	2,787,461	.....
Rawhide Creek	27,330	49,445	−22,115	−44.7
Horse Creek	536,475	132,847	403,628	303.8
Other tributaries of North Platte River	847,872	[2] 241,257	576,615	239.0
Tributaries of South Platte River	212,945	102,937	110,008	106.9
Lodgepole Creek	89,037	39,500	49,537	125.4
Crow Creek	48,919	43,925	4,994	11.4
Lone Tree Creek	36,173	17,380	18,793	108.1
Cache la Poudre River	38,816	1,997	36,819	.....
Other tributaries of South Platte River	.....	[2] 105	−105	−100.0
Other tributaries of Missouri River	.....	[2] 200	−200	−100.0
Colorado River drainage	3,064,797	579,190	2,485,607	429.2
Green River and tributaries	3,064,797	579,190	2,485,607	429.2
Green River direct	176,841	37,750	139,091	368.1
New Fork	293,043	27,283	265,760	975.3
Horse Creek	51,163	13,350	37,813	282.2
Cottonwood Creek	456,827	11,000	445,827	.....
South Piney Creek	85,728	38,761	46,967	121.2
La Barge Creek	39,150	20,365	18,785	92.2
Fontenelle Creek	33,000	9,777	23,223	237.5
Bitter Creek	93,158	4,500	88,658	.....
Blacks Creek	566,776	68,296	498,480	729.9
Henrys Fork	77,320	11,291	66,029	584.8
Little Snake River	274,302	325,107	−50,805	−15.6
Other tributaries of Green River	923,489	[2] 17,740	905,749	.....
Great Salt Lake drainage	679,405	118,340	561,065	474.1
Bear River and tributaries	679,405	118,340	561,065	474.1
Bear River direct	294,588	87,355	207,233	237.2
Tributaries of Bear River	384,817	[2] 30,985	353,832	.....
Columbia River drainage	763,890	101,771	662,119	650.6
Snake River and tributaries	763,890	101,771	662,119	650.6
Snake River direct	500,202	8,570	491,632	.....
Gros Ventre River	31,225	14,802	16,423	111.0
Little Gros Ventre River	18,746	13,330	5,416	40.6
Salt River	149,267	41,724	107,543	257.6
Tributaries of Pierre River	.....	12,595	−12,595	−100.0
Other tributaries of Snake River	64,510	[2] 10,750	53,760	500.1

[1] A minus sign (−) denotes decrease. Per cent not shown when more than 1,000.
[2] Includes springs and wells.

In classifying capital invested by type of enterprise (Table 12) the average capital invested per acre is not presented, for the reason that it is not possible to compute this correctly. The United States Reclamation Service supplies stored water from reservoirs in Wyoming to enterprises controlled by agencies of most of the other classes shown in the table, in Nebraska and Idaho, as well as in Wyoming, and a part of its expenditure is properly chargeable to those lands; but it is not possible to tell how much should be so charged or how it should be distributed among the various classes.

TABLE 12.—CAPITAL INVESTED, 1920, AND COST OF OPERATION AND MAINTENANCE, 1919, CLASSIFIED BY CHARACTER OF ENTERPRISE.

[When water is pumped, cost of operation and maintenance includes cost of fuel and attendance.]

CLASS.	CAPITAL INVESTED, 1920. Amount.	CAPITAL INVESTED, 1920. Per cent of total.	OPERATION AND MAINTENANCE, 1919. Area for which cost is reported (acres).	OPERATION AND MAINTENANCE, 1919. Average cost per acre.[1]
Total	$34,320,328	100.0	960,581	$1.04
Individual and partnership	8,738,886	25.5	439,726	1.04
Cooperative	6,701,990	19.5	244,642	0.95
Irrigation district	1,441,312	4.2	21,417	0.77
Carey Act	2,434,791	7.1	33,765	1.34
Commercial	799,562	2.3	58,390	0.35
U. S. Reclamation Service	12,983,870	37.5	50,631	1.87
U. S. Indian Service	1,329,897	3.9	22,960	1.19
State	15,950	(2)	1,140	0.61
City	9,980	(2)	20	142.50

[1] Based on area irrigated in 1919. [2] Less than one-tenth of 1 per cent.

DRAINAGE OF IRRIGATED LAND.

The acreages reported in Table 13 relate to lands within the boundaries of irrigation projects, and do not include lands within the vicinity of these projects. "Additional acreage needing drainage" includes all lands so reported by the owners of the enterprises, and includes lands producing partial crops as well as those wholly unproductive.

TABLE 13.—ACREAGE WITHIN IRRIGATION ENTERPRISES FOR WHICH DRAINS HAVE BEEN INSTALLED AND ADDITIONAL ACREAGE IN NEED OF DRAINAGE: 1920.

Number of enterprises reporting land drained or needing drainage	144
Acreage included in enterprises reporting land drained or needing drainage	313,347
Acreage for which drains have been installed	68,096
Additional acreage needing drainage	75,183
Per cent that acreage for which drains have been installed is of total acreage included in enterprises reporting drainage	13.3
Per cent that acreage for which drains have been installed is of total acreage included in irrigation enterprises in the state	2.7
Per cent that acreage for which drains have been installed plus that needing drainage is of total acreage included in irrigation enterprises in the state	5.6

QUANTITY OF WATER USED.

The quantity of water used in 1919 was reported on only part of the irrigation schedules, and the figures given vary greatly. In order that proper values may be assigned to the figures given, those representing measurements and those representing estimates are reported separately in Table 14. While the data are incomplete, the reports represent sufficient acreages to serve as bases for reliable averages.

TABLE 14.—QUANTITY OF WATER USED IN 1919.

ITEM.	Total.	Measured.	Not measured.
Average volume of water entering canals, second-feet	9,890	3,706	6,184
Area irrigated in 1919 ... acres	454,613	226,539	228,076
Average number of acres per second-foot	46	62	37
Total quantity of water entering canals ... acre-feet	1,319,560	491,047	828,513
Area irrigated in 1919 ... acres	543,265	229,729	314,536
Average quantity per acre ... acre-feet	2.4	2.1	2.6
Total quantity of water delivered ... acre-feet	393,985	274,200	119,785
Area irrigated in 1919 ... acres	186,323	128,021	58,302
Average quantity per acre ... acre-feet	2.1	2.1	2.1

IRRIGATION WORKS.

TABLE 15.—IRRIGATION WORKS, CLASSIFIED BY DATE OF BEGINNING.

DATE OF BEGINNING.	Number of diverting dams.	Number of storage dams.	MAIN DITCHES.			LATERAL DITCHES.		RESERVOIRS.	
			Number.	Capacity (second-feet).	Length (miles).	Number.	Length (miles).	Number.	Capacity (acre-feet).
Total	2,066	301	5,007	39,009	9,517	2,777	2,534	374	2,911,748
Before 1860	1		2	2	2				
1860–1869	16		24	135	55	1	10		
1870–1879	96	10	327	1,617	538	24	24	16	11,952
1880–1889	679	46	1,557	9,540	2,720	815	682	55	156,152
1890–1899	383	32	910	7,189	1,753	695	537	31	7,507
1900–1904	311	46	718	6,111	1,474	224	176	62	983,034
1905–1909	219	62	526	8,422	1,290	673	856	102	1,718,235
1910–1914	163	69	498	2,947	791	152	99	61	26,052
1915–1919	103	41	290	2,131	525	123	82	34	8,075
Not reported	95	15	245	915	369	70	68	13	741

DATE OF BEGINNING.	Pipe lines, length (miles).	FLOWING WELLS.		PUMPED WELLS.		PUMPING PLANTS.			
		Number.	Capacity (gallons per minute).	Number.	Capacity (gallons per minute).	Number.	Engine capacity (horse-power).	Pumps.	
								Number.	Capacity (gallons per minute).
Total	17.9	7	46	16	8,020	57	1,304	70	39,725
Before 1860									
1860–1869									
1870–1879	1.9	2		1		1	8	1	
1880–1889	1.1	1		4	3,000	5	185	5	8,200
1890–1899	3.6					2	40	2	3,470
1900–1904	2.9			3	2,500	8	324	9	3,720
1905–1909	4.2					4	81	4	6,050
1910–1914	0.8			2	1,435	17	483	17	11,652
1915–1919	0.2	2	40	3	185	11	91	14	4,776
Not reported	4.1	2	6	3	900	9	92	18	1,857

TABLE 16.—IRRIGATION WORKS, CLASSIFIED BY CHARACTER OF ENTERPRISE: 1920.

CLASS.	Number of diverting dams.	Number of storage dams.	MAIN DITCHES.			LATERAL DITCHES.		RESERVOIRS.	
			Number.	Capacity (second-feet).	Length (miles).	Number.	Length (miles).	Number.	Capacity (acre-feet).
Total	2,066	301	5,007	39,009	9,517	2,777	2,534	374	2,911,748
Individual and partnership	1,942	267	4,782	24,387	7,808	2,050	1,073	333	70,733
Cooperative	95	17	180	8,702	1,181	287	534	13	86,803
Irrigation district	2	1	7	708	160	20	70	2	43,947
Carey Act	7	6	14	1,298	133	40	149	10	67,466
Commercial	11	3	13	1,543	187	68	221	8	266,002
U. S. Reclamation Service	2	5	4	2,345	93	281	473	6	2,376,385
U. S. Indian Service									
State	7	1	6	20	7	31	14	1	411
City		1	1	6	8			1	1

CLASS.	Pipe lines, length (miles).	FLOWING WELLS.		PUMPED WELLS.		PUMPING PLANTS.			
		Number.	Capacity (gallons per minute).	Number.	Capacity (gallons per minute).	Number.	Engine capacity (horse-power).	Pumps.	
								Number.	Capacity (gallons per minute).
Total	17.9	7	46	16	8,020	57	1,304	70	39,725
Individual and partnership	11.7	7	46	16	8,020	55	1,239	57	39,725
Cooperative	2.6					1	15	11	
Irrigation district	0.5								
Carey Act									
Commercial	0.1								
U. S. Reclamation Service	1.9								
U. S. Indian Service									
State	0.8								
City	0.3					1	50	2	

TABLE 17.—IRRIGATION WORKS, CLASSIFIED BY DRAINAGE BASIN: 1920.

DRAINAGE BASIN.	Number of diverting dams.	Number of storage dams.	MAIN DITCHES.			LATERAL DITCHES.		RESERVOIRS.	
			Number.	Capacity (second-feet).	Length (miles).	Number.	Length (miles).	Number.	Capacity (acre-feet).
Total	2,068	391	5,007	39,009	9,517	2,777	2,534	374	2,941,748
Missouri River drainage	1,546	252	3,429	27,977	6,671	1,730	1,932	321	2,699,372
Clark Fork (of Yellowstone) and tributaries	4		58	214	80	6	7	4	2,704
Clark Fork direct			4	38	12	2	6		
Tributaries of Clark Fork	4		54	176	68	4	1	4	2,704
Big Horn River and tributaries	296	30	752	8,202	2,029	494	696	70	466,867
Big Horn River direct	10	1	27	712	147	30	47	1	2
Pono Agie River	37		122	665	270	50	64	1	112
Wind River	7	1	93	1,065	283	12	13	2	2,050
Poison Creek			1					1	3
Owl Creek	6		12	279	40	12	16	1	275
No Wood Creek	21	5	94	298	267	8	5	4	68
Greybull River	46	1	100	1,276	327	20	71	4	181
Shell Creek	31	5	53	433	147	10	29	3	1,037
Shoshone River	28	9	64	3,079	327	254	448	17	460,866
Little Horn River	2		7	49	42	15	1	1	25
Other tributaries of Big Horn River	68	8	164	379	247	67	41	28	1,716
Tongue River and tributaries	160	25	201	1,534	452	112	98	27	11,227
Tongue River direct	20		23	339	101	48	7		
Goose Creek	91	21	99	874	229	50	58	16	10,570
Other tributaries of Tongue River	49	4	79	301	122	35	33	11	657
Powder River and tributaries	135	19	234	2,569	656	72	122	15	4,062
Powder River direct	1		1	72	17	1	3		
Red Fork Creek	19		25	60	50	1	1		
Crazy Woman Creek	17	2	49	525	113	18	10	4	37
Clear Creek	46	9	83	1,498	312	45	94	3	3,290
Other tributaries of Powder River	52	8	66	384	164	13	14	8	636
Little Missouri River		1	1		1				
Tributaries of Cheyenne River	71	40	118	1,262	160	245	98	39	6,479
Belle Fourche River	24	25	49	397	73	108	19	26	2,435
South Fork	47	15	69	866	91	137	79	13	4,046
Niobrara River	3	2	7	8	4				
North Platte River and tributaries	865	113	1,923	13,878	3,082	763	898	161	1,544,370
North Platte River direct	24	4	78	3,134	260	197	197	2	1,070,005
Beaver Creek	12	2	20	50	62	1	1	3	673
Grand Encampment Creek	13	1	31	106	52	7	7	1	130
Spring Creek	3	2	48	343	79	63	45	3	3,396
Sage Creek	2		4	3	4				
Pass Creek	3		54	283	84	18	8	1	2,009
Medicine Bow River	112	13	283	927	414	68	58	9	7,439
Sweetwater River	42	1	85	174	141	37	29	9	2,474
Muddy Creek	1		5	12	7				
Box Elder Creek	13	3	38	44	68	8	16	3	36
La Prele Creek	11	3	47	326	81	13	62	2	25,012
Laramie River and tributaries	359	40	634	5,033	906	150	334	48	396,091
Laramie River direct	40	7	69	1,718	287	26	228	7	283,350
Little Laramie River	42		98	435	141	20	15		
Sybille Creek	98	11	122	297	119	4	3	10	260
North Laramie River	101	6	128	462	68	9	15	6	8,039
Chugwater Creek	37	10	100	152	107	10		8	254
Other tributaries of Laramie River	40	6	197	2,960	189	8	73	17	124,698
Rawhide Creek	13	2	13	42	13	33	9	2	46
Horse Creek	46	26	121	774	169	32	41	20	27,335
Other tributaries of North Platte River	172	16	445	1,063	663	135	75	33	14,559
Tributaries of South Platte River	42	22	155	429	191	36	13	25	3,863
Lodgepole Creek	9	11	33	250	47	28	13	7	2,933
Crow Creek	8	4	53	115	47	8		7	473
Lone Tree Creek	16	4	34	35	12			6	710
Cache la Poudre River	9	3	35	3	85			5	47
Colorado River drainage	361	40	1,019	7,495	1,908	823	502	40	24,772
Green River and tributaries	361	49	1,019	7,495	1,908	823	502	40	24,772
Green River direct	23	1	56	1,493	171	14	9	2	114
New Fork	9	2	79	1,011	244	133	86	1	
Horse Creek	6		41	403	82				
Cottonwood Creek	19		83	485	131	125	75		
South Piney Creek	26	1	110	221	163	233	116		
La Barge Creek	22		19	131	44	6	2		
Fontenelle Creek	20		24	73	55	8	6		
Bitter Creek	3	1	21	25	28	1	4	13	1,168
Blacks Creek	156	9	325	1,867	532	54	114	11	3,339
Henrys Fork	45	22	110	301	143	74	43	2	25
Little Snake River	8		58	289	127	4	1	2	456
Other tributaries of Green River	24	4	94	1,296	241	71	64	5	19,739
Great Salt Lake drainage	54	7	219	1,336	380	59	40	11	324
Bear River and tributaries	54	7	219	1,336	380	59	40	11	324
Bear River direct	11		83	703	170	13	7		
Tributaries of Bear River	43	7	153	633	210	46	33	11	324
Columbia River drainage	105	2	340	2,221	558	145	59	2	847,000
Snake River and tributaries	105	2	340	2,221	558	145	59	2	847,000
Snake River direct	1		9	42	12	10		1	847,000
Gros Ventre River	20		29	118	64	1	1		
Little Gros Ventre River	14		32	103	50				
Salt River	50	2	169	1,355	297	116	54	1	60
Other tributaries of Snake River	20		101	613	135	18	4		

TABLE 17.—IRRIGATION WORKS, CLASSIFIED BY DRAINAGE BASIN: 1920—Continued.

DRAINAGE BASIN.	Pipe lines, length (miles).	FLOWING WELLS.		PUMPED WELLS.		PUMPING PLANTS.				
		Number.	Capacity (gallons per minute).	Number.	Capacity (gallons per minute).	Number.	Engine capacity (horsepower).	Pumps.		Average lift (feet).
								Number.	Capacity (gallons per minute).	
Total	17.9	7	46	16	8,020	57	1,304	70	39,725	31
Missouri River drainage	13.7	5	46	16	8,020	54	1,260	65	38,220	31
Big Horn River and tributaries	9.9	1		1	950	18	368	22	9,950	40
Big Horn River direct	4.4			1	950	14	319	17	6,990	43
Popo Agie River	2.0					1	3	1	175	12
Owl Creek	0.1									
No Wood Creek	0.2					1	26	1	1,200	58
Shell Creek	0.2									
Shoshone River	2.5									
Little Horn River	0.5									
Other tributaries of Big Horn River		1				2	20	3	1,585	10
Tongue River and tributaries	0.2			2		2	75	2	4,700	30
Tongue River direct										
Goose Creek						1	50	1	3,000	38
Other tributaries of Tongue River	0.2			2		1	25	1	1,700	22
Powder River and tributaries	0.3	2	6	1	5	6	349	6	1,305	51
Powder River direct						2	24	2	900	26
Clear Creek	0.3					2	298	2	200	54
Other tributaries of Powder River		2	6	1	5	2	27	2	205	70
Tributaries of Cheyenne River	0.2			1	2,000	5	119	5	4,491	18
Belle Fourche River				1	2,000	4	103	4	3,391	20
South Fork	0.2					1	16	1	1,100	10
North Platte River and tributaries	3.1	2	40	9	4,330	21	329	28	17,089	22
North Platte River direct	0.2			2	3,180	11	240	11	14,602	25
Grand Encampment Creek	0.1									
Spring Creek		1		2		1		1		
Medicine Bow River	1.0			3		5	33	12	787	18
Muddy Creek	0.5									
Box Elder Creek		1	40							
Laramie River and tributaries	0.4			2	1,150	3	6	3	1,650	13
Laramie River direct	0.3					1		1	500	10
North Laramie River				1	700	1		1	700	16
Chugwater Creek				1	450	1	6	1	450	
Other tributaries of Laramie River	0.1									
Horse Creek	0.1									
Other tributaries of North Platte River	0.3					1	50	1		20
Tributaries of South Platte River				2	735	2	20	2	735	12
Lodgepole Creek				2	735	2	20	2	735	12
Colorado River drainage	0.2	2				3	44	5	1,505	34
Green River and tributaries	0.2	2				3	44	5	1,505	34
Green River direct	0.1					2	22	4	1,505	39
Bitter Creek		2								
Little Snake River	0.1									
Other tributaries of Green River						1	22	1		24
Great Salt Lake drainage	4.0									
Bear River and tributaries	4.0									
Bear River direct	2.0									
Other tributaries of Bear River	2.0									

CROPS.

TABLE 18.—ACREAGE, YIELD, AND VALUE OF PRINCIPAL CROPS GROWN ON IRRIGATED LAND, AND COMPARISONS WITH TOTALS FOR THE STATE: 1919 AND 1909.

[Totals for the state, used in making comparisons, are shown in state bulletin on agriculture.]

	Crop.	Area harvested.					Quantity harvested.					
		1919		1909				1919		1909		
		Acres.	Per cent of total for state.	Acres.	Per cent of total for state.	Per cent of increase.[1]	Unit.	Amount.	Per cent of total for state.	Amount.	Per cent of total for state.	Per cent of increase.[1]
	Cereals:											
1	Corn	2,738	7.1	1,170	12.7	132.8	Bu.	51,630	15.2	25,207	14.3	104.9
2	Oats	23,684	49.4	76,392	61.5	-69.0	Bu.	512,282	50.9	2,175,268	64.7	-76.4
3	Winter wheat	2,496	7.2	26,326	62.7	63.1	Bu.	32,515	17.4	490,490	66.4	35.7
4	Spring wheat	40,470	27.5				Bu.	633,056	50.8			
5	Barley	3,030	28.9	4,989	38.2	-37.8	Bu.	58,741	50.8	132,699	38.5	-47.9
6	Rye	541	1.3	375	24.7	44.3	Bu.	4,415	2.3	6,121	39.9	-27.9
	Other grains and seeds:											
7	Clover and alfalfa seed[2]	2,390	53.1	(3)			Bu.	7,564	47.9	(3)		
	Hay and forage:											
8	Timothy alone	18,645	64.3	18,365	62.1	2.1	Tons	19,524	63.9	28,136	63.9	-33.1
9	Timothy and clover mixed	25,601	75.9	4,086	50.7	526.6	Tons	32,359	77.2	8,169	49.9	297.1
10	Clover alone	1,638	42.6	242	67.2	576.9	Tons	1,811	65.9	598	72.5	202.9
11	Alfalfa	176,205	53.4	162,447	65.3	8.5	Tons	284,423	55.3	379,933	65.5	-25.1
12	Other tame grasses	59,923	76.1	83,456	72.0	-28.0	Tons	67,484	79.7	97,849	71.9	-31.5
13	Annual legumes cut for hay	778	33.7	4,930	25.2	100.0	Tons	1,011	54.0	5,035	24.5	49.9
14	Small grains cut for hay	9,681	9.0				Tons	7,160	14.4			
15	Wild, salt, or prairie grasses	142,750	62.9	189,271	73.0	-24.6	Tons	125,168	67.1	182,633	79.8	-38.2
16	Silage crops	653	34.5	(3)			Tons	3,737	58.7	(3)		
17	Corn cut for forage	951	2.8	(3)			Tons	2,317	9.4	(3)		
	Vegetables:											
18	Potatoes	4,532	38.4	4,708	37.2	-4.9	Bu.	532,511	62.5	620,667	66.9	-14.2
	Miscellaneous:											
19	Sugar beets grown for sugar	2,714	27.3	1,109	30.1	146.7	Tons	23,067	27.8	11,195	34.6	106.0

	Crop.	Average yield per acre, 1919.					Value.				
					On irrigated land.		1919		1909		
		Unit.	For state.	On non-irrigated land.	Average.	Per cent of average for state.	Per cent of average on non-irrigated land.	Amount.	Per cent of total for state.	Amount.	Per cent of total for state.	Per cent of increase.[1]
	Cereals:											
1	Corn	Bu.	10.1	9.4	18.9	187.1	201.1	$83,334	13.3	$15,118	14.0	443.8
2	Oats	Bu.	17.2	14.1	21.6	125.6	153.2	563,488	50.2	1,312,932	71.3	-56.7
3	Winter wheat	Bu.	5.9	5.3	14.4	244.1	271.7	76,708	17.4	460,493	66.4	220.4
4	Spring wheat	Bu.	8.4	5.7	15.6	185.7	273.7	1,361,312	50.8			
5	Barley	Bu.	14.5	11.7	19.0	131.0	162.4	91,969	50.8	83,213	65.4	2.1
6	Rye	Bu.	4.6	4.5	8.2	178.3	178.3	7,726	2.5	4,190	33.3	34.6
	Other grains and seeds:											
7	Clover and alfalfa seed[2]	Bu.	3.5	3.9	3.2	91.4	82.1	144,006	47.9	(3)		
	Hay and forage:											
8	Timothy alone	Tons	0.97	0.90	1.01	104.1	112.2	430,424	63.9	708,267	61.0	103.0
9	Timothy and clover mixed	Tons	1.24	1.17	1.26	101.6	107.7	776,616	77.3	71,810	54.1	981.5
10	Clover alone	Tons	1.04	1.00	1.11	106.7	111.0	36,220	45.0	2,990	34.6	
11	Alfalfa	Tons	1.56	1.49	1.62	103.2	108.1	6,541,729	55.3	2,924,617	39.1	123.9
12	Other tame grasses	Tons	0.89	0.73	0.93	104.5	124.0	1,044,646	79.7	698,658	64.6	71.6
13	Annual legumes cut for hay	Tons	0.80	0.54	1.30	162.5	240.7	28,260	54.0	32,741	26.3	221.5
14	Small grains cut for hay	Tons	0.49	0.46	0.79	161.2	171.7	135,390	14.4			
15	Wild, salt, or prairie grasses	Tons	0.76	0.68	0.81	106.6	119.1	2,723,948	67.1	1,394,260	77.7	97.2
16	Silage crops	Tons	5.38	4.88	5.80	107.8	118.9	37,820	58.7	(3)		
17	Corn cut for forage	Tons	0.73	0.68	2.44	334.2	358.8	34,755	9.4	(3)		
	Vegetables:											
18	Potatoes	Bu.	72.2	43.9	117.5	162.7	267.7	1,251,433	62.6	930,972	60.7	267.5
	Miscellaneous:											
19	Sugar beets grown for sugar	Tons	9.76	10.24	8.50	87.1	83.0	242,294	23.8	54,779	35.8	367.8

[1] A minus sign (-) denotes decrease.

[2] Not including red clover seed.

[3] Not reported separately in 1909.

COUNTY TABLE.—ACREAGE IRRIGATED, 1919 AND 1909; AND ACREAGE IN ENTERPRISES, IRRIGATION WORKS, AND CAPITAL INVESTED IN IRRIGATION ENTERPRISES, 1920 AND 1910.

[A minus sign (−) denotes decrease.]

		THE STATE.	Albany.	Big Horn.[1]	Campbell.[2]	Carbon.	Converse.[3]	Crook.[3]
1	Number of all farms in 1920	15,748	441	998	1,072	413	864	1,093
2	Number of farms irrigated in 1919	6,449	280	952	8	313	157	21
3	Per cent of all farms	41.0	63.5	95.4	0.7	75.8	18.2	1.9
4	Number of farms irrigated in 1909	6,297	339	1,018	.....	442	219	80
5	Per cent of increase, 1909–1919	2.4	−17.4	.....	.....	−29.2	.....	.....
	LAND AND FARM AREA.							
6	Approximate land area ....acres	[4] 62,420,720	2,815,360	1,990,400	3,047,040	5,124,480	2,645,120	1,834,240
7	All land in farms ....acres	11,899,351	847,732	190,445	860,748	843,520	770,484	919,975
8	Improved land in farms ....acres	2,102,005	119,815	93,661	98,289	102,113	71,885	126,607
9	Area irrigated in 1919 ....acres	1,207,982	114,248	108,754	1,066	121,293	30,821	951
10	Per cent of improved land in farms	57.5	95.4	116.1	1.1	118.8	42.9	0.8
11	Area irrigated in 1909 ....acres	1,133,392	151,926	93,779	.....	131,749	40,607	6,712
12	Per cent of increase, 1909–1919	6.6	−24.8	.....	.....	−7.9	.....	.....
13	Area enterprises were capable of irrigating in 1920 ....acres	1,831,039	218,270	161,341	2,220	150,485	43,818	1,089
14	Area enterprises were capable of irrigating in 1910 ....acres	1,639,540	221,225	195,094	.....	163,394	52,150	8,017
15	Per cent of increase, 1910–1920	11.7	−1.3	.....	.....	−7.9	.....	.....
16	Area included in enterprises in 1920 ....acres	2,564,668	332,455	213,937	3,278	193,532	53,592	1,925
17	Area included in enterprises in 1910 ....acres	2,224,298	355,033	237,003	.....	191,486	85,713	11,038
18	Per cent of increase, 1910–1920	15.3	−6.4	.....	.....	1.1	.....	.....
19	Area of irrigated land reported as available for settlement ....acres	197,326	1,000	19,900	.....	4,500	.....	.....
	IRRIGATION WORKS.							
	Independent enterprises:							
20	Number, 1920	3,564	303	198	19	380	118	29
21	Number, 1910	5,577	436	430	.....	629	336	94
	Main ditches:							
22	Number, 1920	5,607	587	178	20	642	174	30
23	Number, 1910	5,593	487	418	.....	640	336	80
24	Length, 1920 ....miles	9,517	781	594	29	1,065	366	36
25	Length, 1910 ....miles	10,933	1,057	1,388	.....	1,005	485	91
26	Capacity, 1920 ....second-feet	39,009	4,669	2,904	109	3,057	2,259	350
27	Capacity, 1910 ....second-feet	42,630	6,831	5,124	.....	3,801	1,364	257
	Laterals:							
28	Number, 1920	2,777	103	114	8	156	53	41
29	Number, 1910	2,340	290	100	.....	173	87	73
30	Length, 1920 ....miles	2,534	142	206	5	121	115	7
31	Length, 1910 ....miles	2,298	588	140	.....	142	62	28
	Reservoirs:							
32	Number, 1920	374	30	12	14	25	10	13
33	Number, 1910	414	33	15	.....	36	23	52
34	Capacity, 1920 ....acre-feet	2,911,748	132,114	2,293	2,438	[5] 10,336	20,798	56
35	Capacity, 1910 ....acre-feet	2,550,937	372,888	1,060	.....	38,973	37,353	1,916
	Flowing wells:							
36	Number, 1920	7	.....	.....	.....	1	1	.....
37	Number, 1910	2	.....	.....	.....	1	.....	.....
38	Capacity, 1920 ....gallons per minute	46	.....	.....	.....	.....	40	.....
39	Capacity, 1910 ....gallons per minute	250	.....	.....	.....	100	.....	.....
	Pumped wells:							
40	Number, 1920	16	.....	1	2	5	1	.....
41	Number, 1910	3	.....	.....	.....	.....	.....	.....
42	Capacity, 1920 ....gallons per minute	8,620	.....	900	2,005	.....	180	.....
43	Capacity, 1910 ....gallons per minute	835	.....	.....	.....	.....	.....	.....
	Pumping plants:							
44	Number, 1920	57	.....	6	2	6	3	3
45	Number, 1910	34	.....	9	.....	2	2	1
46	Engine capacity, 1920 ....horsepower	1,364	.....	202	82	40	51	23
47	Engine capacity, 1910 ....horsepower	705	.....	143	.....	21	312	1
48	Pump capacity, 1920 ....gallons per minute	39,725	.....	2,250	2,005	1,287	1,782	1,391
49	Pump capacity, 1910 ....gallons per minute	142,529	.....	6,690	.....	1,500	123,560	7
50	Average lift, 1920 ....feet	31	.....	14	70	17	35	13
	CAPITAL INVESTED.							
51	Capital invested to Jan. 1, 1920 ....dollars	34,326,228	3,975,710	4,495,690	85,100	[5] 1,193,535	862,217	20,912
52	Capital invested to July 1, 1910 ....dollars	17,700,980	2,682,679	2,310,660	.....	737,851	1,729,140	86,578
53	Per cent of increase, 1910–1920	93.9	48.2	.....	.....	61.8	.....	.....
54	Average cost per acre based on area enterprises were capable of supplying with water in 1920 ....dollars	18.75	18.21	27.86	38.33	7.93	19.68	12.38
55	Average cost per acre based on area enterprises were capable of supplying with water in 1910 ....dollars	10.80	12.13	11.84	.....	4.52	33.15	10.80
	ESTIMATED FINAL COST.							
56	Estimated final cost of existing enterprises in 1920 ....dollars	51,500,288	3,998,180	6,104,440	88,100	[5] 1,253,535	914,867	20,912
57	Estimated final cost of existing enterprises in 1910 ....dollars	20,425,890	4,114,567	2,379,693	.....	738,776	2,264,508	86,578
58	Per cent of increase, 1910–1920	152.1	−2.8	.....	.....	69.7	.....	.....
59	Average cost per acre based on estimated final cost and area included in enterprises in 1920 ....dollars	20.08	12.03	28.53	26.88	6.48	17.07	10.86
60	Average cost per acre based on estimated final cost and area included in enterprises in 1910 ....dollars	9.18	11.59	10.00	.....	3.86	26.42	7.84

[1] Part taken to form Park County in 1911; parts taken to form parts of Hot Springs and Washakie Counties in 1913.
[2] Campbell County formed from parts of Crook and Weston Counties in 1913.
[3] Part taken to form Niobrara County in 1913.
[4] Includes 1,886,720 acres in Yellowstone National Park.
[5] Entire capacity and cost of Pathfinder Reservoir reported in Natrona County although reservoir lies in Carbon and Natrona Counties. Incorrectly reported in Laramie County in 1910.

COUNTY TABLE.—ACREAGE IRRIGATED, 1919 AND 1909; AND ACREAGE IN ENTERPRISES, IRRIGATION WORKS, AND CAPITAL INVESTED IN IRRIGATION ENTERPRISES, 1920 AND 1910—Continued.

[A minus sign (—) denotes decrease.]

		Fremont.[1]	Goshen.[2]	Hot Springs.[3]	Johnson.	Laramie.[4]	Lincoln.[5]	Natrona.
1	Number of all farms in 1920	959	1,041	197	624	1,178	923	193
2	Number of farms irrigated in 1919	227	224	127	227	64	749	70
3	Per cent of all farms	23.3	21.4	64.5	36.4	5.4	81.1	36.4
4	Number of farms irrigated in 1909	610			247	377		183
5	Per cent of increase, 1909-1919				—8.1			—71.6
	LAND AND FARM AREA.							
6	Approximate land area ... acres	7,947,040	1,399,040	1,296,000	2,664,960	1,716,960	5,724,800	3,498,880
7	All land in farms ... acres	449,331	636,778	111,309	472,611	1,098,343	481,212	220,002
8	Improved land in farms ... acres	120,204	265,765	24,644	71,202	240,830	162,661	14,265
9	Area irrigated in 1919 ... acres	115,667	55,481	13,443	63,383	24,165	168,428	10,362
10	Per cent of improved land in farms	96.7	27.9	46.7	89.0	9.8	92.5	72.7
11	Area irrigated in 1909 ... acres	78,783			54,838	122,671		22,408
12	Per cent of increase, 1909-1919				15.6			—53.8
13	Area enterprises were capable of irrigating in 1920 ... acres	197,406	83,142	21,125	92,933	29,990	245,723	14,920
14	Area enterprises were capable of irrigating in 1910 ... acres	170,946			78,[illegible]	166,909		29,235
15	Per cent of increase, 1910-1920				10.1			—49.0
16	Area included in enterprises in 1920 ... acres	379,472	138,452	23,333	97,930	50,760	288,057	21,912
17	Area included in enterprises in 1910 ... acres	211,854			104,492	177,252		38,837
18	Per cent of increase, 1910-1920				—6.4			—43.5
19	Area of irrigated land reported as available for settlement ... acres	72,440	27,433				1,213	
	IRRIGATION WORKS.							
	Independent enterprises:							
20	Number, 1920	385	69	72	150	90	588	61
21	Number, 1910	396			271	482		275
	Main ditches:							
22	Number, 1920	494	193	52	174	212	820	84
23	Number, 1910	384			224	459		277
24	Length, 1920 ... miles	1,148	236	180	513	260	1,410	143
25	Length, 1910 ... miles	892			529	827		334
26	Capacity, 1920 ... second-feet	4,323	1,803	431	1,724	618	5,299	235
27	Capacity, 1910 ... second-feet	3,449			2,050	5,852		1,049
	Laterals:							
28	Number, 1920	342	130	15	68	47	620	6
29	Number, 1910	136			39	280		230
30	Length, 1920 ... miles	228	125	19	113	18	308	14
31	Length, 1910 ... miles	250			31	270		114
	Reservoirs:							
32	Number, 1920	31	30	9	8	28	14	17
33	Number, 1910	10			6	60		52
34	Capacity, 1920 ... acre-feet	6,314	27,728	498	3,871	[6] 3,932	847,718	[6] 1,081,264
35	Capacity, 1910 ... acre-feet	2,168			3,125	1,196,215		6,119
	Flowing wells:							
36	Number, 1920	1						
37	Number, 1910							
38	Capacity, 1920 ... gallons per minute							
39	Capacity, 1910 ... gallons per minute							
	Pumped wells:							
40	Number, 1920					2		
41	Number, 1910	1						
42	Capacity, 1920 ... gallons per minute			50		735		3,030
43	Capacity, 1910 ... gallons per minute	120						
	Pumping plants:							
44	Number, 1920	3		6	3	2		4
45	Number, 1910	2			3	3		5
46	Engine capacity, 1920 ... horsepower	82		58	49	39		166
47	Engine capacity, 1910 ... horsepower	13			31	66		70
48	Pump capacity, 1920 ... gallons per minute	2,480		4,020	1,100	735		8,550
49	Pump capacity, 1910 ... gallons per minute	340			1,455	3,278		3,211
50	Average lift, 1920 ... feet	90		26	34	12		19
	CAPITAL INVESTED.							
51	Capital invested to Jan. 1, 1920 ... dollars	3,784,769	3,690,421	141,456	861,860	[6] 267,853	1,094,282	[6] 2,207,123
52	Capital invested to July 1, 1910 ... dollars	1,490,028			552,315	2,467,260		291,416
53	Per cent of increase, 1910-1920				56.0			[6] 656.8
54	Average cost per acre based on area enterprises were capable of supplying with water in 1920 ... dollars	19.17	43.23	6.70	19.39	8.93	(7)	(7)
55	Average cost per acre based on area enterprises were capable of supplying with water in 1910 ... dollars	8.43			7.34	14.78		6.88
	ESTIMATED FINAL COST.							
56	Estimated final cost of existing enterprises in 1920 ... dollars	11,648,044	6,596,992	146,450	878,336	[6] 268,833	1,741,382	[6] 2,208,139
57	Estimated final cost of existing enterprises in 1910 ... dollars	1,122,491			552,315	3,129,090		291,416
58	Per cent of increase, 1910-1920				59.0			[6] 656.3
59	Average cost per acre based on estimated final cost and area included in enterprises in 1920 ... dollars	31.44	47.65	6.28	8.98	5.31	(7)	(7)
60	Average cost per acre based on estimated final cost and area included in enterprises in 1910 ... dollars	5.30			5.29	17.71		5.47

[1] Part taken to form part of Hot Springs County in 1913.
[2] Formed from part of Laramie County in 1913.
[3] Formed from parts of Big Horn, Fremont, and Park Counties in 1913.
[4] Parts taken to form Goshen and Platte Counties in 1913.
[5] Formed from part of Uinta County in 1913.
[6] Entire capacity and cost of Pathfinder Reservoir reported in Natrona County although reservoir lies in Carbon and Natrona Counties. Incorrectly reported in Laramie County in 1910.
[7] Average not shown because most of land served by storage works lies in another state.

COUNTY TABLE.—ACREAGE IRRIGATED, 1919 AND 1909; AND ACREAGE IN ENTERPRISES, IRRIGATION WORKS, AND CAPITAL INVESTED IN IRRIGATION ENTERPRISES, 1920 AND 1910—Continued.

[A minus sign (−) denotes decrease.]

		Niobrara.[1]	Park.[2]	Platte.[3]	Sheridan.	Sweetwater.	Uinta.[4]	Washakie.[5]	Weston.[6]
1	Number of all farms in 1920	739	839	1,146	972	139	408	318	721
2	Number of farms irrigated in 1919	2	736	404	420	90	339	275	42
3	Per cent of all farms	0.3	90.1	35.3	43.2	64.7	83.0	86.5	5.8
4	Number of farms irrigated in 1909		692		679	135	1,123		43
5	Per cent of increase, 1909-1919				−38.1	−33.3			
	LAND AND FARM AREA.								
6	Approximate land area ... acres	1,666,560	3,332,480	1,360,000	1,647,360	6,716,800	1,340,160	1,434,240	1,537,920
7	All land in farms ... acres	633,708	286,193	974,429	625,796	61,245	324,475	93,379	747,576
8	Improved land in farms ... acres	69,614	89,683	180,303	113,385	13,938	56,551	37,607	68,616
9	Area irrigated in 1919 ... acres	756	77,527	66,753	68,311	14,010	102,695	41,179	6,263
10	Per cent of improved land in farms	1.3	86.4	37.0	60.2	100.5	181.6	109.5	9.1
11	Area irrigated in 1909 ... acres		58,853		94,141	10,798	280,020		6,577
12	Per cent of increase, 1909-1919				−27.4	29.7			
13	Area enterprises were capable of irrigating in 1920 ... acres	1,102	121,465	108,639	90,198	46,805	148,553	50,597	8,618
14	Area enterprises were capable of irrigating in 1910 ... acres		108,478		114,285	22,667	303,704		8,076
15	Per cent of increase, 1910-1920				−21.1	106.5			
16	Area included in enterprises in 1920 ... acres	1,427	180,716	131,362	108,667	57,591	222,643	60,549	12,542
17	Area included in enterprises in 1910 ... acres		265,255		117,563	90,614	330,103		10,075
18	Per cent of increase, 1910-1920				−7.6	−36.4			
19	Area of irrigated land reported as available for settlement ... acres			46,000		20,480	1,140	3,200	
	IRRIGATION WORKS.								
	Independent enterprises:								
20	Number, 1920	7	202	178	203	82	308	70	54
21	Number, 1910		313		526	107	1,306		48
	Main ditches:								
22	Number, 1920	15	175	289	239	127	437	84	71
23	Number, 1910		302		537	102	1,296		51
24	Length, 1920 ... miles	17	561	451	606	212	701	189	109
25	Length, 1910 ... miles		813		939	151	2,369		73
26	Capacity, 1920 ... second-feet	161	2,668	1,869	2,189	606	2,474	559	699
27	Capacity, 1910 ... second-feet		3,870		2,111	1,269	5,381		222
	Laterals:								
28	Number, 1920		228	293	131	76	53	22	198
29	Number, 1910		77		252	15	634		34
30	Length, 1920 ... miles		348	289	106	61	116	35	88
31	Length, 1910 ... miles		103		240	5	316		9
	Reservoirs:								
32	Number, 1920	4	24	24	28	26	9	2	16
33	Number, 1910		12		78	13	7		17
34	Capacity, 1920 ... acre-feet	457	463,641	270,895	11,252	19,505	2,864	60	3,724
35	Capacity, 1910 ... acre-feet		461,020		2,361	24,716	406,699		924
	Flowing wells:								
36	Number, 1920				2	2			
37	Number, 1910						1		
38	Capacity, 1920 ... gallons per minute				6				
39	Capacity, 1910 ... gallons per minute						150		
	Pumped wells:								
40	Number, 1920			3	2				
41	Number, 1910				1	1			
42	Capacity, 1920 ... gallons per minute			1,150					
43	Capacity, 1910 ... gallons per minute				660	55			
	Pumping plants:								
44	Number, 1920			8	4	3		1	1
45	Number, 1910		1		2	2	1		1
46	Engine capacity, 1920 ... horsepower			72	373	44		26	16
47	Engine capacity, 1910 ... horsepower		1		18	16	1		6
48	Pump capacity, 1920 ... gallons per minute			5,120	4,900	1,505		1,200	1,100
49	Pump capacity, 1910 ... gallons per minute		6		1,360	855	17		250
50	Average lift, 1920 ... feet			21	42	39		58	10
	CAPITAL INVESTED.								
51	Capital invested to Jan. 1, 1920 ... dollars	23,195	5,640,280	1,642,905	1,096,497	892,577	729,264	859,652	170,920
52	Capital invested to July 1, 1910 ... dollars		4,233,566		550,599	129,949	867,634		52,101
53	Per cent of increase, 1910-1920				99.1	586.9			
54	Average cost per acre based on area enterprises were capable of supplying with water in 1920 ... dollars	21.05	46.44	15.12	12.16	19.07	4.91	16.99	19.83
55	Average cost per acre based on area enterprises were capable of supplying with water in 1910 ... dollars		39.03		4.82	5.73	2.86		6.45
	ESTIMATED FINAL COST.								
56	Estimated final cost of existing enterprises in 1920 ... dollars	27,170	9,862,433	1,907,605	1,046,157	910,727	744,354	921,952	219,560
57	Estimated final cost of existing enterprises in 1910 ... dollars		4,233,566		550,599	129,949	869,101		52,101
58	Per cent of increase, 1910-1920				88.9	600.8			
59	Average cost per acre based on estimated final cost and area included in enterprises in 1920 ... dollars	19.04	54.57	14.52	9.57	15.81	3.34	15.28	17.51
60	Average cost per acre based on estimated final cost and area included in enterprises in 1910 ... dollars		15.96		4.68	1.43	2.63		5.17

[1] Formed from part of Converse County in 1912.
[2] Formed from part of Big Horn County in 1911; part taken to form part of Hot Springs County in 1913.
[3] Formed from part of Laramie County in 1913.
[4] Part taken to form Lincoln County in 1913.
[5] Formed from part of Big Horn County in 1913.
[6] Part taken to form Campbell County in 1913.