

# UTAH.

The following pages present the statistics of drainage for Utah collected at the census of 1920. The figures relate to conditions on January 1, 1920, except where indicated otherwise. No census of drainage has been taken heretofore, so there are no comparable figures for previous years. The data relate to the artificial drainage of land in farms, and of other land that ultimately will be used for agricultural purposes. The organized drainage enterprises include considerable areas of unimproved land not yet in farms. The

statistics for drainage on farms were collected in the general census of agriculture, while the statistics for drainage enterprises were obtained in a special canvass of those enterprises. Since drainage on farms may be either inside or outside an organized enterprise, and the drains that each individual owner installs upon his own farm may be either supplemental to or entirely independent of the works installed by an enterprise, the figures for the two parts of the drainage census are presented separately.

TABLE 1.—SUMMARY FOR THE STATE: 1920.

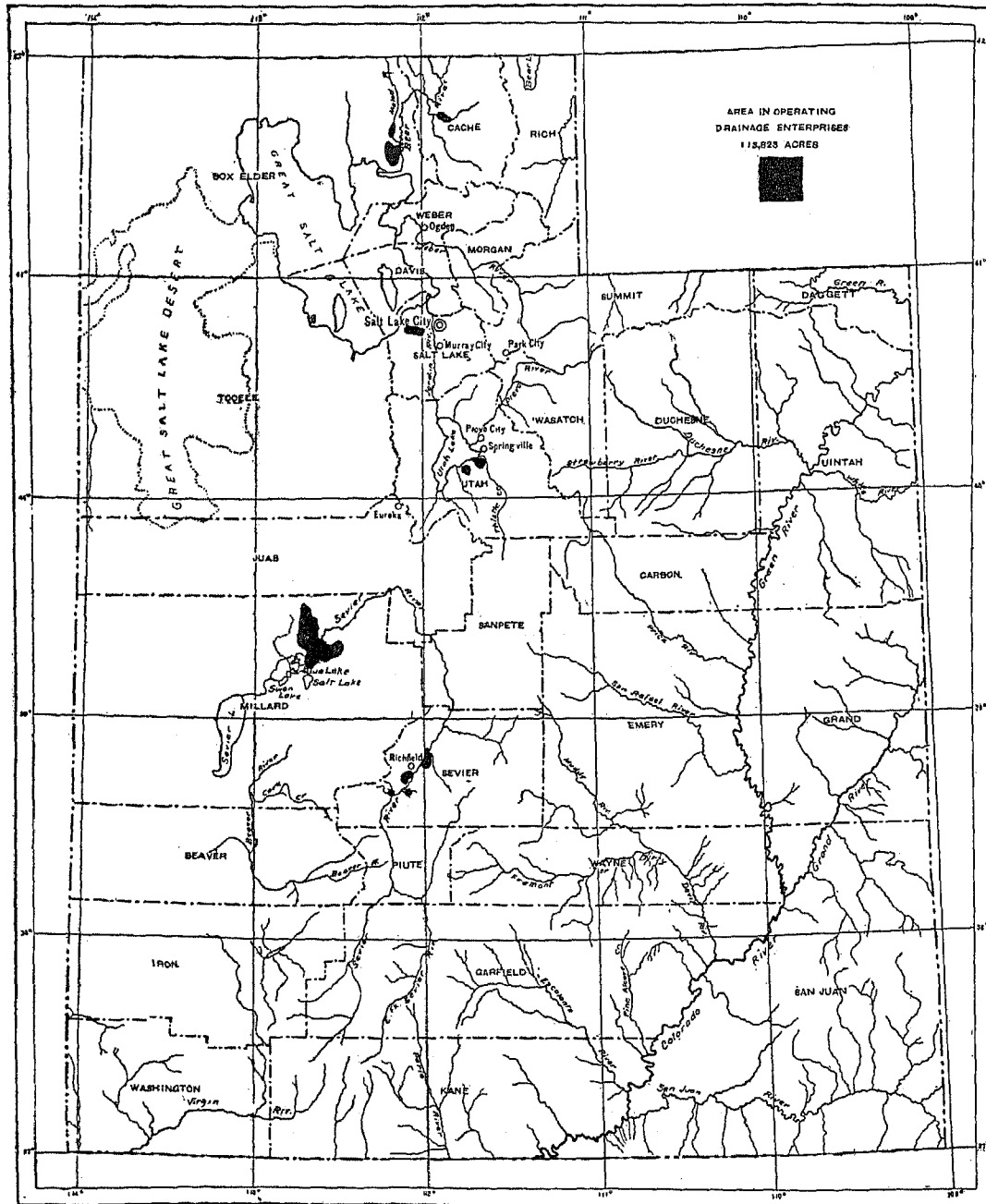
ITEM.	Amount.	Per cent of total.
<b>DRAINAGE ON FARMS.</b>		
Number of all farms in the state.....	25,662	100.0
Farms reporting land having drainage.....	2,729	10.6
Farms reporting land needing drainage.....	3,085	12.0
All land in farms.....acres..	5,050,410	100.0
Improved land in farms.....acres..	1,715,380	34.0
Farm land reported as provided with drainage.....acres..	74,316	1.5
Farm land reported as needing drainage.....acres..	165,926	3.3
Needing drainage only.....acres..	74,786	1.5
Needing drainage and clearing.....acres..	91,140	1.8
<b>DRAINAGE ENTERPRISES.</b>		
Approximate land area of the state.....acres..	52,597,760	100.0
All land in operating drainage enterprises.....acres..	113,823	0.2
Improved land.....acres..	97,314	0.2
Per cent of all improved land in farms.....	5.7	
Unimproved land <sup>1</sup> .....acres..	16,509	( <sup>2</sup> )
Swampy, subject to overflow, seeped, or alkali.....acres..	88,181	0.2
Suffering a loss of crops from defective drainage.....acres..	76,803	0.1
Improved land prior to drainage.....acres..	89,394	0.2
Increase since drainage began.....acres..	7,920	( <sup>2</sup> )
Land in nonoperating enterprises.....acres..	20,731	( <sup>2</sup> )
Open ditches in operating enterprises.....miles..	124.8	100.0
Completed.....miles..	120.3	96.4
Additional under construction.....miles..	4.5	3.6
Tile drains in operating enterprises.....miles..	1,376.7	100.0
Completed.....miles..	599.1	43.5
Additional under construction.....miles..	777.6	56.5
Total capital invested in and required for completion of operating enterprises.....	\$2,870,773	100.0
Capital invested in these enterprises to Dec. 31, 1919.....	1,005,473	35.0
Additional capital required to complete these enterprises.....	1,865,300	65.0
Average cost per acre when completed.....	25.22	

<sup>1</sup>No timber or cut-over land reported.

<sup>2</sup>Less than one-tenth of 1 per cent.

# UTAH

APPROXIMATE LOCATION AND AREA OF OPERATING DRAINAGE ENTERPRISES.



**Operating and nonoperating enterprises.**—In most of the tables that follow, statistics are given for operating enterprises only. These enterprises, as already defined, include both those which have completed their drainage works and those with such works under construction; among the latter might be any that had completed the original plan of reclamation some years ago, but were constructing extensions or enlargements on January 1, 1920. The nonoperating enterprises have a legal existence, though they have not yet accomplished any drainage. They may include districts that on the census date had completed their plans, sold bonds to cover the cost of the undertakings, and let contracts for the construction work, and also districts that had just been established by decree of the county commissioners and were still subject to considerable change in area, plan of drainage works, and cost.

TABLE 2.—LAND AND CAPITAL INVESTED IN ALL ENTERPRISES, CLASSIFIED AS BETWEEN OPERATING AND NONOPERATING ENTERPRISES: 1920.

CLASS.	LAND.		CAPITAL. <sup>1</sup>		
	Acreage.	Per cent of total.	To Dec. 31, 1919.		Additional required to complete.
			Amount.	Per cent of total.	
All organized enterprises...	134,554	100.0	\$1,014,973	100.0	\$2,512,800
Operating enterprises.....	113,823	84.6	1,005,473	99.1	1,865,300
With works completed.....	23,993	17.8	495,007	48.8	.....
With works under construction.	89,830	66.8	510,466	50.3	1,865,300
Nonoperating enterprises.....	20,731	15.4	9,500	0.9	647,500

<sup>1</sup> The inquiry asked for the "total cost of the enterprise to Dec. 31, 1919," and for an "estimate of additional investment to complete."

**Location of enterprises.**—All of the drainage enterprises in Utah lie in the central and north central part of the state, and all are within the rim of the Great Basin.

TABLE 3.—LAND AND CAPITAL INVESTED IN ALL ENTERPRISES, CLASSIFIED BY DRAINAGE BASIN: 1920.

DRAINAGE BASIN.	LAND.		CAPITAL.		
	Acreage.	Per cent of total.	To Dec. 31, 1919.		Additional required to complete.
			Amount.	Per cent of total.	
All organized enterprises...	134,554	100.0	\$1,014,973	100.0	\$2,512,800
Operating enterprises.....	113,823	84.6	1,005,473	99.1	1,865,300
Sevier River.....	88,281	65.6	641,973	63.3	1,720,300
Great Salt Lake.....	25,542	19.0	303,500	35.8	145,000
Nonoperating enterprises.....	20,731	15.4	9,500	0.9	647,500
Sevier River.....	14,872	11.1	7,500	0.7	492,500
Great Salt Lake.....	5,859	4.3	2,000	0.2	155,000

**Condition of land in enterprises.**—The enterprises have been organized almost entirely to drain and pro-

tect land injured or threatened with water-logging and the concentration of salts, commonly called alkali, in the surface soil as a result of irrigation.

For the state, 275 acres of irrigated land in drainage enterprises are reported as not having needed drainage but as having been included and assessed merely as being responsible for damage to the other lands.

The usual purpose of an organized enterprise is merely to provide adequate outlets into which the landowners of the district may drain their farms, and to afford relief from overflows for the district as a unit. Therefore, the fact that an enterprise which has completed the construction of the drainage works authorized contains land still swampy, subject to overflow, seeped, or alkali, or land that suffers damage to crops, does not show that the improvement works are inadequate.

TABLE 4.—LAND IN ALL ENTERPRISES, CLASSIFIED BY CONDITION: 1920.

CONDITION OF LAND.	OPERATING ENTERPRISES.				Non-operating enterprises (acres).
	Total.		Works completed (acres).	Works under construction (acres).	
	Acreage.	Per cent of all land.			
All land in enterprises .....	113,823	100.0	23,993	89,830	20,731
Improved land .....	97,314	85.5	18,349	78,965	17,678
Unimproved land <sup>1</sup> .....	16,509	14.5	5,644	10,865	3,055
Swampy, seeped, or alkali .....	88,181	77.5	6,476	81,705	20,309
Suffering a loss of crops .....	76,803	67.5	2,277	74,526	17,999

<sup>1</sup> No timber or cut-over land reported.

**Size of enterprises.**—The average area included in the 17 operating drainage enterprises in Utah is 6,695 acres; only 3 of them comprise as much as 10,000 acres each. The average area in the 6 nonoperating enterprises is 3,455 acres. None of the enterprises embraces land in more than one county, and there is no overlapping of the enterprises in this state.

TABLE 5.—LAND IN OPERATING ENTERPRISES, CLASSIFIED BY SIZE OF AREA ASSESSED: 1920.

SIZE GROUP.	Land in enterprises (acres).	ASSESSED AREA.	
		Acreage.	Per cent of total.
All operating enterprises.....	113,823	113,823	100.0
500 to 999 acres.....	1,749	1,749	1.5
1,000 to 4,999 acres.....	29,104	29,104	25.6
5,000 to 9,999 acres.....	5,280	5,280	4.6
10,000 to 49,999 acres.....	77,690	77,690	68.3

**Character of enterprises.**—All the drainage enterprises in Utah, except commercial and private undertakings, are operating now (Jan. 1, 1920) under the

only general drainage law of the state. This is chapter 41, approved March 19, 1919, which was made applicable to all drainage districts formed under earlier laws.

This law provides for the establishment of drainage districts by the board of county commissioners, upon petition from a majority of the owners of land in the proposed district who must own at least one-third of the acreage to be affected, or from not less than one-third of the owners who must hold a majority of the acreage. The drainage works are laid out, constructed, and maintained by a board of supervisors consisting of three competent persons appointed by the county commissioners. The cost of the enterprise is apportioned against the tracts of land in the district by the supervisors, in proportion to the benefits each will receive, proper allowance being made also for any damages that will be caused. The supervisors report annually to the commissioners concerning all work done, all money collected, and all expenditures made; they also report semiannually at meetings of the residents of the district, during the progress of construction. For a district comprising land in more than one county, proceedings are held in that county in which the greatest portion is situated. No land in one drainage district may be included in a second district without the consent of the board of supervisors of the first district.

The petition must describe the boundaries of the district and state the general plan of drainage. The boundaries may be amended by the county commissioners when, after public hearing upon the petition, they establish the district and appoint the supervisors. Investigation is made by the supervisors, who then report to the commissioners regarding the practicability of the enterprise. If they report that the total cost will exceed the benefits, the district is abandoned at the cost of the petitioners. If they report favorably, the district boundaries are fixed by the commissioners, after public hearing if additional land is included except by consent of the owners of that land. The apportionment of costs is equalized and confirmed by the county commissioners, after hearing all complaints regarding the assessments. The supervisors may issue bonds to pay for the construction work, running not less than 5 nor more than 40 years, if the issue is approved by vote of the landowners in the district.

The first general drainage law of this state was that of April 16, 1896 (ch. 132), authorizing the establishment of drainage districts upon petition from 50 or more persons, constituting a majority of the owners of the land to be affected. The districts were to be controlled by 3 or 5 directors elected by the freeholders of the district; the costs were to be paid by an assessment spread uniformly upon all the land in the district. This law was amended March 14, 1907 (ch. 108), to require that the petition be signed by only a majority of the owners holding title to a major part

of the land, and to apportion the cost in proportion to the benefits. The supreme court of Utah declared this law unconstitutional, in 1911, because it did not provide opportunity for the owners to show that their land would not be benefited or was not assessed equitably. The main provisions of the law of March 21, 1913 (ch. 95), which was amended March 22, 1915 (ch. 114), were similar to those of the present law.

TABLE 6.—LAND AND CAPITAL INVESTED IN ALL ENTERPRISES, CLASSIFIED BY CHARACTER OF ENTERPRISE: 1920.

CHARACTER OF ENTERPRISE.	LAND.		CAPITAL.		
	Acreage.	Per cent of total.	To Dec. 31, 1919.		Additional required to complete.
			Amount.	Per cent of total.	
All organized enterprises...	134,554	100.0	\$1,014,973	100.0	\$2,512,800
Operating enterprises.....	113,823	84.6	1,005,473	99.1	1,865,300
Drainage districts.....	103,519	78.4	776,516	76.5	1,865,300
Laws of 1907, ch. 108.....	750	0.6	3,500	0.3	.....
Laws of 1913, ch. 95.....	102,341	76.0	709,016	69.3	1,813,300
Laws of 1919, ch. 41.....	2,428	1.8	65,000	6.4	52,000
Commercial developments <sup>1</sup> .....	8,304	6.2	228,957	22.6	.....
Nonoperating enterprises.....	20,731	15.4	9,500	0.9	647,500
Drainage districts.....	20,731	15.4	9,500	0.9	647,500
Laws of 1913, ch. 95.....	16,219	12.0	7,000	0.7	460,000
Laws of 1919, ch. 41.....	4,512	3.4	2,500	0.2	187,500

<sup>1</sup> Includes 1,050 acres under individual ownership.

**Drainage works.**—The total works completed by drainage enterprises to December 31, 1919, comprised 120.3 miles of open ditches, 599.1 miles of tile drains, and 2 miles of accessory levees; the additional lengths under construction were 4.5 miles of open ditches and 777.6 miles of tile drains. These figures do not include drains or levees installed by individual farm owners supplemental to the works of the drainage enterprises, nor the works of flood-protection or levee districts that had not undertaken the construction of ditches or tile drains. Some of the districts, however, are installing drainage systems planned in such detail as is intended to accomplish complete drainage of the land without requiring any supplemental drains to be installed by the individual owners. Pumping is used for draining only 1,400 acres in drainage enterprises in Utah, and then only part time, in seasons of flood.

TABLE 7.—LAND AND CAPITAL INVESTED IN OPERATING ENTERPRISES, CLASSIFIED BY KIND OF DRAINAGE WORKS: 1920.

KIND OF WORKS.	LAND.		CAPITAL.		
	Acreage.	Per cent of total.	To Dec. 31, 1919.		Additional required to complete.
			Amount.	Per cent of total.	
All kinds.....	113,823	100.0	\$1,005,473	100.0	\$1,865,300
Open ditches only.....	1,050	0.9	10,000	1.0	.....
Tile drains only.....	4,321	3.8	113,550	11.3	27,500
Open ditches and tile drains <sup>1</sup> ...	108,452	95.3	881,923	87.7	1,837,800

<sup>1</sup> Includes 2,700 acres having open ditches, tile drains, and levees.



The average depth of the main or outlet ditch was reported for each enterprise. The maximum reported for any enterprise in the state and the maximum in each county are shown in line 14 of County Table II. The maximum length, width, and depth of outlet shown in that table for any county may not refer to the same enterprise.

In County Table II, line 15 shows the mean depth of branch ditches (open ditches only), which is a very crude indication of the depth of soil drainage that may be obtained in the enterprises as determined by the depth of outlet provided for farm drains. The mean depth was computed by giving each separate depth a weight in proportion to the acreage it serves. As most enterprises reported depths in whole numbers only, the occasional decimals were omitted in making these computations.

TABLE 8.—LAND IN OPERATING ENTERPRISES, CLASSIFIED BY AVERAGE DEPTH OF BRANCH DITCHES: 1920.

DEPTH OF BRANCH DITCHES.	Acreage.	Per cent of total.
All operating enterprises.....	113,823	100.0
3.0 to 3.9 feet.....	1,050	0.9
4.0 to 4.9 feet.....	13,590	11.9
5.0 to 5.9 feet.....	4,551	4.0
6.0 to 6.9 feet.....	79,210	69.6
7.0 to 7.9 feet.....	3,022	2.7
Not reporting branches.....	12,397	10.9

**Maintenance of works.**—The first drainage law of Utah (1896) authorized the levy of taxes in a drainage district for maintenance purposes. The present law (1919) repeats the provision in earlier laws that the board of supervisors shall make annually an estimate of the money to be raised in the district, including the expense of maintaining the drains and other works, which is levied against the land in proportion to the benefits to the various tracts. The drainage districts that have completed construction report that the drains are maintained by district forces, except for one small district which reports that the drains are not being maintained.

**Date of organization.**—The progress in drainage development is shown only roughly by the dates of the organization of the enterprises, which are the dates when the districts were established by the county commissioners, since there may be a period of a year or more between the decree of establishment and the beginning of actual construction, and since the work of construction may occupy several years in a large district. It was not practicable, however, for the census to secure data as to the time of the begin-

ning or the completion of the drainage works. Under the date of organization are tabulated the entire area, works, and capital of each enterprise, even including extensions made after the original plan of reclamation was completed.

TABLE 9.—LAND IN OPERATING ENTERPRISES, CLASSIFIED BY DATE ENTERPRISE WAS ORGANIZED: 1920.

DATE OF ORGANIZATION.	LAND.		ASSESSED AREA.	
	Acreage.	Per cent of total.	Acreage.	Per cent of total.
All operating enterprises.....	113,823	100.0	113,823	100.0
1905 to 1909.....	750	0.7	750	0.7
1910 to 1914.....	9,380	8.2	9,380	8.2
1915 to 1919.....	103,693	91.1	103,693	91.1

TABLE 10.—CAPITAL INVESTED IN OPERATING ENTERPRISES, CLASSIFIED BY DATE ENTERPRISE WAS ORGANIZED: 1920.

DATE OF ORGANIZATION.	CAPITAL.		
	To Dec. 31, 1919.		Additional required to complete.
	Amount.	Per cent of total.	
All operating enterprises.....	\$1,005,473	100.0	\$1,865,300
1905 to 1909.....	3,500	0.3	.....
1910 to 1914.....	120,000	12.0	150,000
1915 to 1919.....	881,973	87.7	1,715,300

TABLE 11.—DRAINS AND LEVEES (COMPLETED AND UNDER CONSTRUCTION) IN OPERATING ENTERPRISES, CLASSIFIED BY DATE ENTERPRISE WAS ORGANIZED: 1920.

DATE OF ORGANIZATION.	DITCHES.		TILE.		LEVEES.	
	Miles.	Per cent of total.	Miles.	Per cent of total.	Miles.	Per cent of total.
All drains and levees.....	124.8	100.0	1,376.7	100.0	2.0	100.0
1905 to 1909.....	.....	.....	0.6	0.1	.....	.....
1910 to 1914.....	15.2	12.2	63.5	4.6	.....	.....
1915 to 1919.....	109.6	87.8	1,312.6	95.3	2.0	100.0

**Crops.**—The principal crops grown upon the drained land in drainage enterprises are alfalfa, sugar beets, grain, and hay other than alfalfa. Data were not secured to show the part of each enterprise planted to any crop, so the enterprises have been classified according to the principal crop, and the total area of improved land is shown thus classified in County Table II. No data were secured at the general census of agriculture to separate the crops grown upon land drained artificially from those produced upon land drained naturally.

## DRAINAGE—UTAH.

COUNTY TABLE I.—DRAINAGE ON FARMS: 1920.

	THE STATE.	Box Elder.	Cache.	Carbon.	Davis.	Duchesne.	Juab.
1 Number of all farms in the state or county .....	25,662	1,859	2,242	235	1,172	1,248	419
2 Farms reporting land having drainage.....	2,729	502	164	12	338	16	14
3 Farms reporting land needing drainage.....	3,085	174	198	19	206	254	11
4 Farms in drainage and levee districts.....	791	151	43	.....	8	14	.....
<b>LAND AND FARM AREA.</b>							
5 Approximate land area of the state or county.....acres..	52,597,760	3,484,160	744,960	951,680	176,000	2,090,240	2,176,640
6 All land in farms.....acres..	5,050,410	542,348	317,698	35,899	98,732	252,031	105,741
7 Improved land in farms.....acres..	1,715,380	219,657	183,654	12,117	52,029	96,697	49,761
8 Woodland in farms.....acres..	212,762	11,047	25,373	2,312	6,320	12,006	3,659
9 Other unimproved land in farms.....acres..	3,122,268	311,644	108,671	21,470	40,383	143,328	52,331
10 Farm land reported as provided with drainage.....acres..	74,316	24,342	3,541	877	5,816	803	873
11 Farm land reported as needing drainage.....acres..	105,926	20,153	3,854	617	5,502	9,738	541
12 Drainage only.....acres..	74,786	17,880	3,071	128	5,323	5,988	231
13 Drainage and clearing.....acres..	91,140	2,273	183	489	174	3,750	310

	Millard.	Salt Lake.	Sanpete.	Sevier.	Summit.	Utah.	Weber.	All other counties. <sup>1</sup>
1 Number of all farms in the county .....	1,038	2,438	1,813	1,108	521	3,237	1,087	6,645
2 Farms reporting land having drainage.....	86	254	70	239	12	506	436	80
3 Farms reporting land needing drainage.....	102	245	200	113	128	444	329	662
4 Farms in drainage and levee districts.....	57	94	35	187	1	127	57	17
<b>LAND AND FARM AREA.</b>								
5 Approximate land area of the county.....acres..	4,199,040	483,840	1,034,240	1,265,920	1,196,800	1,301,760	346,240	33,146,240
6 All land in farms.....acres..	185,197	317,281	391,007	113,005	271,778	318,133	259,560	1,841,994
7 Improved land in farms.....acres..	91,685	92,447	138,552	66,960	38,807	135,996	66,855	470,173
8 Woodland in farms.....acres..	1,502	24,913	12,154	2,808	26,266	7,043	12,924	64,435
9 Other unimproved land in farms.....acres..	92,010	199,921	240,301	43,237	206,705	175,094	179,787	1,307,386
10 Farm land reported as provided with drainage.....acres..	5,274	3,483	785	7,822	768	10,076	7,266	2,590
11 Farm land reported as needing drainage.....acres..	8,714	9,677	7,540	4,110	3,821	10,738	8,091	72,830
12 Drainage only.....acres..	4,493	3,630	6,089	3,946	761	8,656	4,434	9,551
13 Drainage and clearing.....acres..	4,221	6,047	1,451	164	3,060	2,082	3,657	63,279

<sup>1</sup> No drainage on farms reported in Grand, Piute, Rich, and Wayne Counties.

## DRAINAGE—UTAH.

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COUNTY TABLE II.—OPERATING DRAINAGE ENTERPRISES: 1920.

		THE STATE.	Box Elder.	Millard.	Salt Lake.	Sevier.	Other counties. <sup>1</sup>
<b>LAND AREA.</b>							
1	Approximate land area of the state or county.....	acres.. 52,597,760	3,484,160	4,190,040	583,849	1,265,920	2,046,720
2	All land in operating drainage enterprises.....	acres.. 113,823	12,690	76,634	4,080	11,647	8,772
3	Improved land.....	acres.. 97,314	7,245	76,634	200	6,485	6,750
4	Per cent of all improved land in farms.....	5.7	3.3	88.5	0.2	9.7	2.1
5	Unimproved land <sup>2</sup> .....	acres.. 16,509	5,445	.....	3,880	5,162	2,022
6	Swampy, seeped, or alkali, in enterprises.....	acres.. 88,181	4,000	74,357	3,880	3,922	2,022
7	Suffering a loss of crops from defective drainage.....	acres.. 76,803	.....	74,357	200	1,246	1,000
8	Assessed acreage.....	113,823	12,690	76,634	4,080	11,647	8,772
9	Excess over all land in operating enterprises.....	acres.. ..	.....	.....	.....	.....	.....
<b>DRAINAGE WORKS.</b>							
10	Open ditches:						
11	Completed.....	miles.. 120.3	15.0	89.6	0.5	1.2	14.0
12	Additional under construction.....	miles.. 4.5	.....	.....	4.5	.....	.....
13	Maximum completed in any enterprise.....	miles.. 58.8	8.0	58.8	0.5	1.0	7.0
14	Maximum width at bottom of ditch <sup>3</sup> .....	feet.. 24	20	24	12	6	8
15	Maximum of average depths of outlet ditches <sup>4</sup> .....	feet.. 15.0	15.0	7.0	3.5	6.0	7.0
16	Mean depth of branch ditches <sup>5</sup> .....	feet.. 5.7	3.9	5.9	6.0	.....	5.7
17	Tile drains:						
18	Completed.....	miles.. 599.1	206.6	37.0	.....	81.5	74.0
19	Additional under construction.....	miles.. 777.6	.....	653.0	55.0	38.1	31.5
20	Maximum completed in any enterprise.....	miles.. 206.0	206.0	92.0	.....	42.0	.....
21	Maximum size of tile <sup>6</sup> .....	inches.. 24	18	20	.....	24	.....
22	Accessory levees and dikes:						
23	Completed.....	miles.. 2.0	.....	.....	.....	.....	2.0
24	Additional under construction.....	miles.. ..	.....	.....	.....	.....	.....
25	Area drained by open ditches only <sup>7</sup> .....	acres.. 1,050	1,050	.....	.....	.....	.....
26	Length of these ditches.....	miles.. 7.0	7.0	.....	.....	.....	.....
27	Average length per acre.....	feet.. 35.2	35.2	.....	.....	.....	.....
28	Area drained by tile only <sup>8</sup> .....	acres.. 4,321	750	.....	.....	3,571	.....
29	Length of these tile.....	miles.. 38.2	0.6	.....	.....	37.6	.....
30	Average length per acre.....	feet.. 46.7	4.2	.....	.....	55.6	.....
31	Area drained by open ditches and tile <sup>9</sup> .....	acres.. 1,08,452	10,800	76,634	4,080	8,076	8,772
32	Length of these drains.....	miles.. 1,456.3	214.0	979.6	5.0	83.2	174.5
33	Average length per acre.....	feet.. 70.9	103.8	67.5	6.5	54.4	151.7
34	Length of the accessory levees.....	miles.. 2.0	.....	.....	.....	.....	2.0
<b>DEVELOPMENT OF LAND.</b>							
35	Improved land in operating enterprises, 1920.....	acres.. 97,314	7,245	76,634	200	6,485	6,750
36	Improved land prior to drainage.....	acres.. 89,394	2,880	76,634	200	6,351	3,320
37	Increase since drainage.....	acres.. 7,920	4,356	.....	.....	134	3,430
38	Per cent of increase.....	8.9	150.7	.....	.....	2.1	103.3
39	Per cent increase is of all improved land in farms, 1920.....	0.5	2.0	.....	.....	0.2	1.1
40	Unimproved land, 1920 <sup>2</sup> .....	acres.. 16,509	5,445	.....	3,880	5,162	2,022
41	Unimproved land prior to drainage <sup>2</sup> .....	acres.. 24,429	9,401	.....	3,880	5,296	5,452
42	Decrease since drainage.....	acres.. 7,920	4,356	.....	.....	134	3,430
43	Per cent of decrease.....	32.4	44.4	.....	.....	2.5	62.9
44	Swampy, seeped, or alkali, 1920.....	acres.. 88,181	4,000	74,357	3,880	3,922	2,022
45	Swampy, seeped, or alkali prior to drainage.....	acres.. 104,592	9,800	76,634	3,980	5,776	8,502
46	Decrease since drainage.....	acres.. 16,411	5,800	2,277	.....	1,854	6,480
47	Per cent of decrease.....	15.7	59.2	3.0	.....	32.1	76.2
<b>CAPITAL INVESTED AND COST PER ACRE.</b>							
48	Total capital invested in and required for completion of operating enterprises.....	dollars.. 2,870,773	188,500	2,028,957	80,000	333,316	240,000
49	Capital invested in these enterprises to Dec. 31, 1919.....	dollars.. 1,005,473	188,500	428,157	5,000	213,816	170,000
50	Additional capital required to complete these enterprises.....	dollars.. 1,865,300	.....	1,600,800	75,000	119,500	70,000
51	Average cost per acre when completed.....	dollars.. 25.22	14.85	26.48	19.61	28.62	27.36
52	Enterprises constructing open ditches only.....	dollars.. 10,000	10,000	.....	.....	.....	.....
53	Average cost per acre when completed.....	dollars.. 9.52	9.52	.....	.....	.....	.....
54	Enterprises constructing tile drains only.....	dollars.. 141,050	3,500	.....	.....	137,550	.....
55	Average cost per acre when completed.....	dollars.. 32.64	4.67	.....	.....	38.52	.....
56	Enterprises constructing open ditches and tile drains.....	dollars.. 2,719,723	175,000	2,028,957	80,000	195,766	240,000
57	Average cost per acre when completed.....	dollars.. 25.08	16.07	26.48	19.61	24.24	27.36
<b>CROPS.</b>							
58	Improved land in enterprises reporting—						
59	Alfalfa as principal crop on drained land.....	acres.. 80,884	.....	76,634	200	.....	4,050
60	Sugar beets as principal crop on drained land.....	acres.. 14,630	5,445	.....	.....	6,485	2,700
61	Other crops as principal ones on drained land.....	acres.. 1,800	1,800	.....	.....	.....	.....

<sup>1</sup> Includes only Cache and Utah Counties.<sup>2</sup> No timber or cut-over land reported.<sup>3</sup> When works under construction have been completed.<sup>4</sup> Includes 2,700 acres having open ditches, tile drains, and levees.<sup>5</sup> Includes cost of 2 miles of accessory levees.

## WASHINGTON.

The following tables present the statistics of drainage for Washington collected at the census of 1920. The figures relate to conditions on January 1, 1920, except where indicated otherwise. No census of drainage has been taken heretofore, so there are no comparable figures for previous years. The data relate to the artificial drainage of land in farms, and of other land that ultimately will be used for agricultural purposes. The organized drainage enterprises include considerable areas of unimproved land not yet

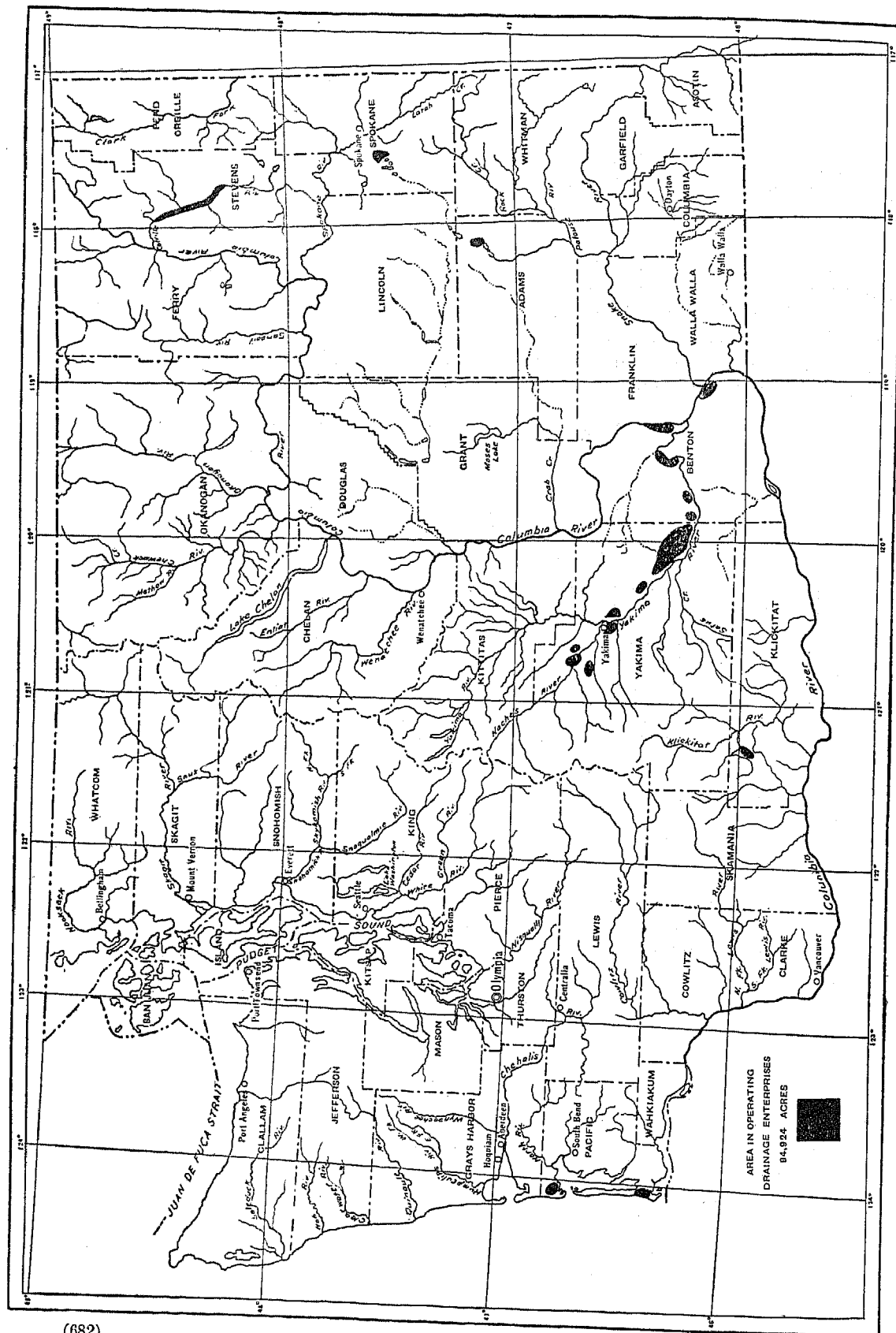
in farms. The statistics for drainage on farms were collected in the general census of agriculture, while the statistics for drainage enterprises were obtained in a special canvass of those enterprises. Since drainage on farms may be either inside or outside an organized enterprise, and the drains that each individual owner installs upon his own farm may be either supplemental to or entirely independent of the works installed by an enterprise, the figures for the two parts of the drainage census are presented separately.

TABLE 1.—SUMMARY FOR THE STATE: 1920.

ITEM.	Amount.	Per cent of total.
<b>DRAINAGE ON FARMS.</b>		
Number of all farms in the state.....	66,288	100.0
Farms reporting land having drainage.....	10,020	15.1
Farms reporting land needing drainage.....	14,323	21.6
All land in farms.....acres..	13,244,720	100.0
Improved land in farms.....acres..	7,129,343	53.8
Farm land reported as provided with drainage.....acres..	274,696	2.1
Farm land reported as needing drainage.....acres..	576,005	4.3
Needing drainage only.....acres..	45,206	0.3
Needing drainage and clearing.....acres..	530,799	4.0
<b>DRAINAGE ENTERPRISES.</b>		
Approximate land area of the state.....acres..	42,775,040	100.0
All land in operating drainage enterprises.....acres..	94,924	0.2
Improved land.....acres..	81,886	0.2
Per cent of all improved land in farms.....	1.1	
Timber and cut-over land.....acres..	850	( <sup>1</sup> )
Other unimproved land.....acres..	12,188	( <sup>1</sup> )
Swampy, subject to overflow, seeped, or alkali.....acres..	10,873	( <sup>1</sup> )
Suffering a loss of crops from defective drainage.....acres..	8,996	( <sup>1</sup> )
Improved land prior to drainage.....acres..	49,748	0.1
Increase since drainage began.....acres..	32,138	0.1
Land in nonoperating enterprises.....acres..	4,865	( <sup>1</sup> )
Open ditches in operating enterprises.....miles..	169.8	100.0
Completed.....miles..	162.4	95.6
Additional under construction.....miles..	7.4	4.4
Tile drains in operating enterprises.....miles..	83.7	100.0
Completed.....miles..	83.0	99.2
Additional under construction.....miles..	0.7	0.8
Total capital invested in and required for completion of operating enterprises.....	\$1,436,419	100.0
Capital invested in these enterprises to Dec. 31, 1919.....	1,397,419	97.3
Additional capital required to complete these enterprises.....	39,000	2.7
Average cost per acre when completed.....	15.13	

<sup>1</sup> Less than one-tenth of 1 per cent.

APPROXIMATE LOCATION AND AREA OF OPERATING DRAINAGE ENTERPRISES.



**Operating and nonoperating enterprises.**—In most of the tables that follow, statistics are given for operating enterprises only. These include both those which have completed their drainage works and those with such works under construction. The nonoperating enterprises have a legal existence, though they have not yet accomplished any drainage. They may include districts that on the census date had completed their plans, sold bonds to finance the undertakings, and let contracts for the construction work, and also districts for which decree of establishment had just been issued and which were still subject to considerable change in area, plan of drainage works, and cost.

TABLE 2.—LAND AND CAPITAL INVESTED IN ALL ENTERPRISES, CLASSIFIED AS BETWEEN OPERATING AND NONOPERATING ENTERPRISES: 1920.

CLASS.	LAND.		CAPITAL. <sup>1</sup>		
	Acreage.	Per cent of total.	To Dec. 31, 1919.		Additional required to complete.
			Amount.	Per cent of total.	
All organized enterprises....	99,789	100.0	\$1,442,419	100.0	\$114,000
Operating enterprises.....	94,924	95.1	1,397,419	96.9	39,000
With works completed.....	90,084	90.3	1,370,809	95.5	.....
With works under construction	4,840	4.8	20,610	1.4	39,000
Nonoperating enterprises.....	4,865	4.9	45,000	3.1	75,000

<sup>1</sup> The inquiry asked for the "total cost of the enterprise to Dec. 31, 1919," and for an "estimate of additional investment to complete."

**Location of enterprises.**—The great part of the drainage enterprises lies in the Yakima Valley, in the south central part of the state, though there are some enterprises to drain lands subject to overflow along Clark Fork and Colville River in the northeast corner and a very few to drain wet and swampy lands in the south and southwest parts of the state. There are no drainage enterprises in the region tributary to Puget Sound.

TABLE 3.—LAND AND CAPITAL INVESTED IN ALL ENTERPRISES, CLASSIFIED BY DRAINAGE BASIN: 1920.

DRAINAGE BASIN.	LAND.		CAPITAL.		
	Acreage.	Per cent of total.	To Dec. 31, 1919.		Additional required to complete.
			Amount.	Per cent of total.	
All organized enterprises..	99,789	100.0	\$1,442,419	100.0	\$114,000
Operating enterprises.....	94,924	95.1	1,397,419	96.9	39,000
Pacific Ocean.....	4,200	4.2	37,044	2.6	10,000
Columbia River and Snake River.....	30,965	31.0	336,500	23.3	.....
Yakima River.....	59,759	59.9	1,023,875	71.0	29,000
Non operating enterprises.....	4,865	4.9	45,000	3.1	75,000
Yakima River.....	4,865	4.9	45,000	3.1	75,000

**Condition of land in enterprises.**—All the enterprises in Benton and Yakima Counties are within the boundaries of the United States Reclamation Service projects. They are for the drainage and protection of lands injured or threatened with seepage and the concentration of salts, commonly called alkali, in the surface soil as a result of irrigation.

In Benton County, 5,800 acres of irrigated land in drainage enterprises are reported as not having needed drainage, but as having been included and assessed merely as responsible for damage to the other lands.

The usual purpose of an organized enterprise is merely to provide adequate outlets into which the landowners of the district may drain their farms and to afford relief from overflows for the district as a unit. Therefore, the fact that an enterprise which has completed the construction of the drainage works authorized contains land still swampy, subject to overflow, seeped, or alkali, or land that suffers damage to crops, does not show that the improvement works are inadequate.

TABLE 4.—LAND IN ALL ENTERPRISES, CLASSIFIED BY CONDITION: 1920.

CONDITION OF LAND.	OPERATING ENTERPRISES.				Non-operating enterprises (acres).
	Total.		Works completed (acres).	Works under construction (acres).	
	Acreage.	Per cent of all land.			
All land in enterprises.....	94,924	100.0	90,084	4,840	4,865
Improved land.....	81,886	86.3	78,271	3,615	3,174
Timber and cut-over land.....	850	0.9	250	600	.....
Other unimproved land.....	12,188	12.8	11,563	625	1,691
Swampy, seeped, or alkali.....	10,873	11.5	9,743	1,130	1,416
Suffering a loss of crops.....	8,999	9.5	7,971	1,025	.....

**Size of enterprises.**—Presentation of the statistics by counties requires that an enterprise located in more than one county be divided, and the part in each county be considered a separate enterprise. In this way, 52 operating drainage enterprises are counted in Washington, with an average area of 2,029 acres assessed. Just 26 of them comprise between 1,000 and 5,000 acres each. The assessed acreage exceeds the land in enterprises by 10,553 acres, which is the amount of overlapping. The land in enterprises and the assessed acreage on each line of Table 5 refer to the same enterprises. From the total area of each enterprise, designated as the assessed area, the net amount of overlapping with enterprises organized previously was deducted, to determine the area to be tabulated as land in enterprise.

TABLE 5.—LAND IN OPERATING ENTERPRISES, CLASSIFIED BY SIZE OF AREA ASSESSED: 1920.

SIZE GROUP.	Land in enterprises (acres).	ASSESSED AREA.	
		Acreage.	Per cent of total.
All operating enterprises.....	94,924	105,477	100.0
Less than 200 acres.....		322	0.3
200 to 499 acres.....	822	1,625	1.5
500 to 999 acres.....	6,830	9,161	8.7
1,000 to 4,999 acres.....	45,723	52,820	50.1
5,000 to 9,999 acres.....	19,649	19,649	18.6
10,000 to 49,999 acres.....	21,900	21,900	20.8

**Character of enterprises.**—The drainage enterprises in Washington are known as drainage districts, diking and drainage districts, and drainage improvement districts, varying slightly in character but all organized under general drainage laws of the state.

Drainage districts are incorporated under an act of March 20, 1895 (ch. 115), and may comprise any portion of a county having five or more inhabitants or freeholders. They are established by the county commissioners upon petition from owners of a major part of the acreage and after favorable vote of the qualified voters residing in the proposed district. Each district must be conducive to the public health, convenience, and welfare; must increase the public revenue; must have sufficient outlet for drainage; and must cost less than the estimated benefits to be derived. A board of three elected drainage commissioners has exclusive charge of construction and maintenance for all drainage systems within the district. The cost of the enterprise is apportioned against the land in proportion to benefits. The plan of drainage and the assessments of benefits and damages to each landowner are prepared by the drainage commissioners and are submitted to the superior court of the county with petition that the works be constructed. After public hearing the benefits and damages are determined by jury, subject to appeal to the supreme court of the state. The district may issue bonds for 5 to 10 years upon petition from a majority of the landowners.

Diking and drainage districts, comprising portions of two or more counties and containing 100 or more inhabitants, are formed under an act of March 20, 1909 (ch. 225). Each is established by the state commissioner of public lands and the commissioners of the counties affected in joint meeting. The districts must be conducive to the public health, convenience, and welfare; must increase the public revenue; and must be of benefit to a majority of the land included. The petition for establishment must be signed by 100 freeholders in the proposed district or by a majority in each county when the total number is less than 200. The enterprise must be approved

in each county by vote of the qualified electors resident in the district. The cost of the undertaking is assessed against the land in proportion to the benefits that will be derived. A board of five elected district commissioners prepares the plan of drainage, makes the assessments, and secures construction of the works. Appeals regarding assessments may be taken to the superior court of the county and thence to the supreme court of the state. Bonds may be issued by the district for not exceeding 10 years.

The drainage improvement districts have been organized under acts of March 8, 1901 (ch. 66), and March 24, 1913 (ch. 176), when the landowners did not wish to incorporate as drainage districts or were too few. The later act repealed the earlier one. These districts are established by the county commissioners, who are the executive board for all such districts in the county. Petition for establishment may be made by one landowner, and the county engineer must report that the proposed work is feasible. The drainage plan, estimate of cost, and schedule of property that will be damaged are made by the county engineer, subject to modification by the commissioners at public hearing. If an award of damages is not acceptable to the landowner, condemnation proceedings are instituted. After the drainage works are constructed the cost is apportioned against all property benefited, including cities and irrigation systems, in proportion to the benefits. For a district in more than one county the petition is filed in each county; the engineers examine the project together, but report separately for their respective counties; the hearings are held and contracts are let by the boards of county commissioners acting jointly.

No enterprises were reported as diking districts, established under the act of 1895 (ch. 117), or as local improvement districts within irrigation districts under an act of 1917 (ch. 162). The diking districts, similar to drainage districts in method of organization, in 1907 were authorized to improve water courses flowing through or within the districts, and to construct all ditches necessary to protect the land or preserve the dikes. The local improvement districts may be established by the directors of the irrigation districts for drainage or other local improvements. A petition must be signed by the holders of title to one-fourth the acreage to be assessed. The enterprise will be managed by the directors of the irrigation district, and the cost assessed against the land in proportion to benefits.

Private drains may be established by the superior court of any county under an act of March 14, 1899 (ch. 125), when one landowner can not secure drainage except across the land of an objecting owner. After

investigation by the county surveyor and two other viewers, public hearing is held and the court awards damages which must be paid by the petitioners before beginning construction. An act of March 20, 1913 (ch. 133), provides that one owner may secure a private way of necessity across land of another by proceedings the same as for condemnation of private property by railroads.

The many amendments to the drainage laws enumerated, dealing with the details of procedure, powers of officials, extension and abandonment of drainage enterprises, are not mentioned herein and do not affect the types of organization as described above. All state, school, and granted lands are subject to assessment for drainage improvements like other lands.

Washington Territory was organized in 1854, and was admitted as a state in 1889. In 1858 a law was passed generally similar to that of 1899 for establishing private ditches. Acts of 1875 and 1883 were somewhat similar to the act of 1913 for drainage improvement districts. The first state legislature enacted a drainage law (approved Mar. 19, 1890) generally similar to that of 1913 authorizing drainage improvement districts. This was declared unconstitutional by the supreme court of the state in 1893 and 1894, as providing for taking private property without just compensation.

TABLE 6.—LAND AND CAPITAL INVESTED IN ALL ENTERPRISES, CLASSIFIED BY CHARACTER OF ENTERPRISE: 1920.

CHARACTER OF ENTERPRISE.	LAND.		CAPITAL.		
	Acreage.	Per cent of total.	To Dec. 31, 1919.		Additional required to complete.
			Amount.	Per cent of total.	
All organized enterprises....	99,789	100.0	\$1,442,419	100.0	\$114,000
Operating enterprises.....	94,924	95.1	1,397,419	96.9	39,000
Drainage districts.....	23,100	23.1	161,634	11.2	.....
Diking and drainage districts..	5,000	5.0	45,560	3.4	.....
Drainage improvement districts.....	66,824	67.0	1,187,285	82.3	39,000
Law of 1901.....	31,991	32.1	342,194	23.7	.....
Law of 1913 <sup>1</sup> .....	34,833	34.9	845,091	58.6	39,000
Nonoperating enterprises.....	4,865	4.9	45,000	3.1	75,000
Drainage improvement districts.....	4,865	4.9	45,000	3.1	75,000

<sup>1</sup> Includes 1,100 acres under individual ownership.

**Drainage works.**—The total works completed by drainage enterprises to December 31, 1919, comprised 162.4 miles of open ditches and 83 miles of tile drains. The additional lengths under construction were 7.4 miles of open ditches, 0.7 mile of tile drains, and 1 mile of accessory levees. These figures do not include drains or levees installed by individual farm owners supplemental to the works of the enterprises, nor the works of flood-protection or levee districts that had not undertaken the construction of ditches or

tile drains. There are no pumping districts among the operating drainage enterprises in Washington, though there are 2,745 acres in nonoperating enterprises that will be drained, according to the plans, partly by gravity and partly by pumping.

TABLE 7.—LAND AND CAPITAL INVESTED IN OPERATING ENTERPRISES, CLASSIFIED BY KIND OF DRAINAGE WORKS: 1920.

KIND OF WORKS.	LAND.		CAPITAL.		
	Acreage.	Per cent of total.	To Dec. 31, 1919.		Additional required to complete.
			Amount.	Per cent of total.	
All kinds.....	94,924	100.0	\$1,397,419	100.0	\$39,000
Open ditches only <sup>1</sup> .....	64,405	67.8	592,445	42.4	12,000
Open ditches and tile drains.....	25,147	26.5	612,659	43.8	27,000
Tile drains only.....	5,372	5.7	192,315	13.8	.....

<sup>1</sup> Includes 1,000 acres that will have open ditches and levees

The average depth of the main or outlet ditch was reported for each enterprise. The maximum depth of outlet reported for any enterprise in the state and the maximum in each county are shown in line 15 of County Table II. The maximum length, width, and depth of outlet shown in that table for any county may not refer to the same enterprise.

In County Table II, line 16 shows the mean depth of branch ditches (open ditches only), which is a very crude indication of the depth of soil drainage that may be obtained in the enterprises as determined by the depth of outlet provided for farm drains. The mean depth was computed by giving each separate depth a weight in proportion to the acreage it serves. As most enterprises reported depths in whole numbers only, the occasional decimals were omitted in making these computations. Depths less than 3 feet were omitted; to include this group, computed as 3 feet, would show the mean depth for the state 5.3 instead of 5.4 feet.

TABLE 8.—LAND IN OPERATING ENTERPRISES, CLASSIFIED BY AVERAGE DEPTH OF BRANCH DITCHES: 1920.

DEPTH OF BRANCH DITCHES.	Acreage.	Per cent of total.
All operating enterprises.....	94,924	100.0
Less than 3 feet.....	553	0.6
3.0 to 3.9 feet.....	7,358	7.7
4.0 to 4.9 feet.....	9,263	9.8
5.0 to 5.9 feet.....	13,147	13.7
6.0 to 6.9 feet.....	23,523	24.9
7.0 to 7.9 feet.....	10,262	10.8
Not reporting branches.....	30,818	32.5

**Maintenance of works.**—The commissioners of the drainage districts are required by law to make an estimate each year of the expense for maintenance and repair of the drainage system during the succeeding year, which is assessed against the lands in the district in like proportion as the original assessment of



benefits. The commissioners of diking and drainage districts are required to levy an annual tax upon all the property in the district for maintenance of the improvement works, to be levied and collected in like manner as provided by law for levying and collecting school district taxes. The supervisors of drainage improvement districts must make annually an estimate of maintenance expenses, from which the county commissioners levy the assessment apportioned in the same manner as that to pay the cost of construction, though the basis of apportionment may be changed by the commissioners upon petition and after public hearing. The works of each local improvement district are kept in repair by the directors of the irrigation district the same as the irrigation works, but the expenses are paid from the operation and maintenance fund of that local improvement district, which is provided by special assessment against the lands in the local improvement district. No maintenance was reported for some completed districts established under laws requiring the officials to keep the drains in repair. Possibly this is due to the construction work being completed so recently that no expenses have been incurred for repair work.

TABLE 9.—LAND AND CAPITAL INVESTED IN OPERATING ENTERPRISES, CLASSIFIED BY METHOD OF MAINTENANCE: 1920.

METHOD OF MAINTENANCE.	LAND.		CAPITAL.		
	Acreage.	Per cent of total.	To Dec. 31, 1919.		Additional required to complete.
			Amount.	Per cent of total.	
All operating enterprises.....	94,924	100.0	\$1,397,419	100.0	\$39,000
By district forces.....	85,859	90.5	1,224,419	87.6	39,000
No maintenance provided <sup>1</sup> .....	9,065	9.5	173,000	12.4	.....

<sup>1</sup> Includes 1,100 acres maintained by landowners.

**Date of organization.**—The progress in drainage is shown only roughly by the dates of the organization of the enterprises, which are the dates when the districts were established by the county commissioners, since there may be a period of a year or more between the decree of establishment and the beginning of actual construction and since the work of construction may occupy several years in a large district. It was not practicable, however, for the census to secure data as to the time of the beginning or the completion of the drainage works. Under the date of organization are tabulated the entire area, works, and capital of each enterprise, even including extensions made after the original plan of reclamation was com-

pleted. No drainage enterprises were reported as organized in Washington earlier than 1900.

TABLE 10.—LAND IN OPERATING ENTERPRISES, CLASSIFIED BY DATE ENTERPRISE WAS ORGANIZED: 1920.

DATE OF ORGANIZATION.	LAND.		AREA ASSESSED.	
	Acreage.	Per cent of total.	Acreage.	Per cent of total.
All operating enterprises.....	94,924	100.0	105,477	100.0
1900 to 1904.....	3,200	3.4	3,200	3.0
1905 to 1909.....	39,966	42.1	39,966	37.9
1910 to 1914.....	30,761	32.4	35,304	33.5
1915 to 1919.....	14,497	15.3	20,507	19.4
Not reported.....	6,500	6.8	6,500	6.2

TABLE 11.—CAPITAL INVESTED IN OPERATING ENTERPRISES, CLASSIFIED BY DATE ENTERPRISE WAS ORGANIZED: 1920.

DATE OF ORGANIZATION.	CAPITAL.		
	To Dec. 31, 1919.		Additional required to complete.
	Amount.	Per cent of total.	
All operating enterprises.....	\$1,397,419	100.0	\$39,000
1900 to 1904.....	26,634	1.9	.....
1905 to 1909.....	352,850	25.2	.....
1910 to 1914.....	594,937	42.6	.....
1915 to 1919.....	382,998	27.4	39,000
Not reported.....	40,000	2.9	.....

TABLE 12.—DRAINS AND LEVEES (COMPLETED AND UNDER CONSTRUCTION) IN OPERATING ENTERPRISES, CLASSIFIED BY DATE ENTERPRISE WAS ORGANIZED: 1920.

DATE OF ORGANIZATION.	DITCHES.		TILE.		LEVEES.	
	Miles.	Per cent of total.	Miles.	Per cent of total.	Miles.	Per cent of total.
All drains and levees.....	169.8	100.0	83.7	100.0	1.0	100.0
1900 to 1904.....	4.5	2.7	.....	.....	.....	.....
1905 to 1909.....	65.8	38.8	6.0	7.2	.....	.....
1910 to 1914.....	68.5	40.3	38.9	46.5	.....	.....
1915 to 1919.....	26.0	15.3	38.8	46.3	1.0	100.0
Not reported.....	5.0	2.9	.....	.....	.....	.....

**Crops.**—The principal crops grown upon the drained land in drainage enterprises are alfalfa, hay other than alfalfa, and wheat. Data were not secured to show the part of each enterprise planted to any crop, so the enterprises have been classified according to the principal crop, and the total area of improved land is shown thus classified, in County Table II. No data were secured at the general census of agriculture to separate the crops grown upon land drained artificially from those produced upon land drained naturally.

## DRAINAGE—WASHINGTON.

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COUNTY TABLE I.—DRAINAGE ON FARMS: 1920.

		THE STATE.	Adams.	Chelan.	Clallam.	Clarke.	Cowlitz.	Grant.	Grays Harbor.
1	Number of all farms in the state or county.....	66,288	1,084	2,065	607	3,066	1,066	1,110	1,064
2	Farms reporting land having drainage.....	10,020	2	42	167	275	89	6	93
3	Farms reporting land needing drainage.....	14,323	2	116	337	880	587	10	245
4	Farms in drainage and levee districts.....	2,680	4	11	2	26	56	1	6
<b>LAND AND FARM AREA.</b>									
5	Approximate land area of the state or county.....acres..	42,775,040	1,223,680	1,856,000	1,104,640	406,760	737,920	1,740,800	1,196,180
6	All land in farms.....acres..	13,244,720	338,395	235,621	58,043	194,309	110,259	743,518	94,767
7	Improved land in farms.....acres..	7,123,343	727,876	65,810	20,132	75,673	27,994	413,758	28,798
8	Woodland in farms.....acres..	1,513,061	2,243	55,817	29,776	66,974	46,604	6,305	43,402
9	Other unimproved land in farms.....acres..	4,302,316	208,276	113,994	8,135	51,662	35,661	323,455	22,567
10	Farm land reported as provided with drainage.....acres..	274,606	1,260	947	3,563	5,035	5,179	815	1,578
11	Farm land reported as needing drainage.....acres..	576,005	235	3,836	18,799	37,875	28,467	855	10,060
12	Drainage only.....acres..	45,206	105	348	1,838	2,065	2,320	550	1,844
13	Drainage and clearing.....acres..	530,799	130	3,488	16,961	35,810	26,137	305	8,716
		Island.	Jefferson.	King.	Kitsap.	Kittitas.	Klickitat.	Lewis.	Lincoln.
1	Number of all farms in the county.....	763	348	3,801	1,535	928	1,177	3,030	1,860
2	Farms reporting land having drainage.....	271	92	1,048	541	129	45	653	33
3	Farms reporting land needing drainage.....	296	118	1,156	612	196	89	1,261	38
4	Farms in drainage and levee districts.....	53	4	192	44	2	23	24	7
<b>LAND AND FARM AREA.</b>									
5	Approximate land area of the county.....acres..	133,120	1,155,200	1,351,040	237,440	1,490,560	1,168,900	1,516,160	1,473,280
6	All land in farms.....acres..	51,932	35,917	151,562	45,853	215,915	562,331	226,162	1,329,405
7	Improved land in farms.....acres..	17,127	8,457	68,272	13,411	65,984	190,616	79,322	832,678
8	Woodland in farms.....acres..	25,858	17,903	47,391	22,856	36,074	89,044	89,281	64,578
9	Other unimproved land in farms.....acres..	8,937	9,557	35,899	7,618	83,860	232,671	57,559	432,149
10	Farm land reported as provided with drainage.....acres..	6,791	3,218	20,177	3,259	4,027	3,950	16,338	1,805
11	Farm land reported as needing drainage.....acres..	11,183	10,728	29,206	8,547	10,274	5,141	54,323	2,519
12	Drainage only.....acres..	2,379	758	3,537	798	1,881	1,211	2,065	1,358
13	Drainage and clearing.....acres..	8,804	9,970	25,669	7,749	8,393	3,930	52,268	1,161
		Mason.	Okanogan.	Pacific.	Pend Oreille.	Pierce.	San Juan.	Skagit.	Snohomish.
1	Number of all farms in the county.....	483	2,556	453	586	3,159	535	2,401	3,095
2	Farms reporting land having drainage.....	115	43	131	75	948	209	849	945
3	Farms reporting land needing drainage.....	207	321	215	301	1,028	214	615	1,185
4	Farms in drainage and levee districts.....		2	54	34	142	1	513	240
<b>LAND AND FARM AREA.</b>									
5	Approximate land area of the county.....acres..	595,200	3,341,440	572,800	871,040	1,088,640	113,920	1,135,360	1,320,960
6	All land in farms.....acres..	40,867	689,796	48,804	119,496	118,754	68,513	136,350	151,584
7	Improved land in farms.....acres..	8,373	212,497	10,509	42,621	41,953	18,922	78,243	63,410
8	Woodland in farms.....acres..	22,946	113,747	19,058	59,103	40,328	30,859	38,769	63,727
9	Other unimproved land in farms.....acres..	9,548	363,552	19,237	17,472	36,473	18,732	24,338	44,447
10	Farm land reported as provided with drainage.....acres..	1,805	907	3,186	2,551	13,323	5,915	37,694	18,539
11	Farm land reported as needing drainage.....acres..	19,670	15,201	12,874	25,959	21,064	11,870	19,790	32,349
12	Drainage only.....acres..	504	906	1,627	1,255	2,272	967	2,177	2,625
13	Drainage and clearing.....acres..	10,166	14,295	11,247	24,704	19,422	10,903	17,613	29,724
		Spokane.	Stevens.	Thurston.	Wahkium.	Walla Walla.	Whatecom.	Yakima.	All other counties. <sup>1</sup>
1	Number of all farms in the county.....	4,830	2,727	1,490	373	1,502	3,369	5,755	9,140
2	Farms reporting land having drainage.....	265	194	194	128	39	990	1,330	49
3	Farms reporting land needing drainage.....	658	850	412	129	30	1,861	122	232
4	Farms in drainage and levee districts.....	30	45	68	86	17	109	875	10
<b>LAND AND FARM AREA.</b>									
5	Approximate land area of the county.....acres..	1,123,840	1,003,200	453,760	170,880	809,600	1,332,480	3,237,760	8,214,400
6	All land in farms.....acres..	811,206	472,490	140,040	33,209	703,251	177,742	479,629	4,060,965
7	Improved land in farms.....acres..	449,537	139,391	45,953	8,577	474,161	73,673	261,806	2,548,449
8	Woodland in farms.....acres..	207,468	245,544	48,438	16,294	14,120	56,595	15,224	186,425
9	Other unimproved land in farms.....acres..	154,201	87,555	45,649	8,338	214,970	47,474	202,539	1,326,091
10	Farm land reported as provided with drainage.....acres..	16,375	7,685	4,852	3,044	1,468	23,316	54,558	1,036
11	Farm land reported as needing drainage.....acres..	25,235	73,681	17,728	2,938	546	61,223	2,894	9,305
12	Drainage only.....acres..	1,689	1,307	2,163	412	251	2,998	912	594
13	Drainage and clearing.....acres..	23,546	72,374	15,565	2,526	295	58,235	1,982	8,711

<sup>1</sup>No drainage reported in Asotin, Douglas, Franklin, Garfield, and Skamania Counties.

## DRAINAGE—WASHINGTON.

COUNTY TABLE II.—OPERATING DRAINAGE ENTERPRISES: 1920.

		THE STATE.	Benton.	Klickitat.	Pacific.	Stevens.	Yakima.	Other counties. <sup>1</sup>
<b>LAND AREA.</b>								
1	Approximate land area of the state or county.....acres.	42,775,040	1,069,440	1,168,000	572,800	1,603,200	3,237,760	2,347,620
2	All land in operating drainage enterprises.....acres.	94,924	10,340	4,965	4,200	15,000	55,919	4,500
3	Improved land.....acres.	81,886	9,715	4,468	2,960	13,750	47,593	3,400
4	Per cent of all improved land in farms.....	1.1	4.8	2.3	28.2	9.9	18.2	0.8
5	Timber and cut-over land.....acres.	850			600	250		
6	Other unimproved land.....acres.	12,188	625	497	640	1,000	8,326	1,100
7	Swampy, seeped, or alkali, in enterprises.....acres.	10,873	914	497	640	1,000	7,222	600
8	Suffering a loss of crops from defective drainage.....acres.	8,996	725		600	938	6,783	
9	Assessed acreage.....	105,477	10,340	4,965	3,200	15,000	66,472	5,500
10	Excess over all land in operating enterprises.....acres.	10,553					10,553	
<b>DRAINAGE WORKS.</b>								
<b>Open ditches:</b>								
11	Completed.....miles.	162.4	7.9	12.0	4.5	26.0	86.5	25.5
12	Additional under construction.....miles.	7.4	3.9					3.5
13	Maximum completed in any enterprise.....miles.	18.0	3.0	12.0	4.5	18.0	13.9	11.0
14	Maximum width at bottom of ditch.....feet.	40	6	30	10	40	5	14
15	Maximum of average depths of outlet ditches.....feet.	10.0	7.0	8.0	3.5	9.0	10.0	10.0
16	Mean depth of branch ditches.....feet.	5.4	4.5	6.0	3.0		5.6	3.3
<b>Tile drains:</b>								
17	Completed.....miles.	83.0					82.0	1.0
18	Additional under construction.....miles.	0.7	0.7					
19	Maximum completed in any enterprise.....miles.	14.1					14.1	1.0
20	Maximum size of tile.....inches.	32					32	8
<b>Accessory levees and dikes:</b>								
21	Completed.....miles.							
22	Under construction.....miles.	1.0			1.0			
23	Area drained by open ditches only.....acres.	64,405	7,890	4,965	4,200	15,000	28,950	3,400
24	Length of these ditches.....miles.	108.9	6.8	12.0	4.5	26.0	41.6	18.0
25	Average length per acre.....feet.	8.9	4.6	12.8	5.7	9.2	7.6	28.0
26	Length of the accessory levees.....miles.	1.0			1.0			
27	Area drained by tile only.....acres.	5,372					5,372	
28	Length of these tile.....miles.	28.2					28.2	
29	Average length per acre.....feet.	27.7					27.7	
30	Area drained by both ditches and tile.....acres.	25,147	2,450				21,597	1,100
31	Length of these drains.....miles.	116.4	5.7				98.7	12.0
32	Average length per acre.....feet.	24.4	12.3				24.1	57.6
<b>DEVELOPMENT OF LAND.</b>								
33	Improved land in operating enterprises, 1920.....acres.	81,886	9,715	4,468	2,960	13,750	47,593	3,400
34	Improved land prior to drainage.....acres.	49,748	9,715	497			39,536	
35	Increase since drainage.....acres.	32,138		3,971	2,960	13,750	8,057	3,400
36	Per cent of increase.....	64.6		799.0			20.4	
37	Per cent increase is of all improved land in farms, 1920.....	0.5		2.1	28.2	9.9	3.1	0.8
38	Timber and cut-over land, 1920.....acres.	850			600	250		
39	Timber and cut-over land prior to drainage.....acres.	1,500			1,000	500		
40	Decrease since drainage.....acres.	650			400	250		
41	Per cent of decrease.....	43.3			40.0	50.0		
42	Other unimproved land, 1920.....acres.	12,188	625	497	640	1,000	8,326	1,100
43	Other unimproved land prior to drainage.....acres.	43,676	625	4,468	3,200	14,500	16,883	4,500
44	Decrease since drainage.....acres.	31,488		3,971	2,560	13,500	8,057	3,400
45	Per cent of decrease.....	72.1		88.9	80.0	93.1	49.2	75.6
46	Swampy, seeped, or alkali, 1920.....acres.	10,873	914	497	640	1,000	7,222	600
47	Swampy, seeped, or alkali, prior to drainage.....acres.	38,871	2,803	4,468	3,200	9,000	16,500	2,900
48	Decrease since drainage.....acres.	27,998	1,889	3,971	2,560	8,000	9,278	2,300
49	Per cent of decrease.....	72.0	67.4	88.9	80.0	88.9	56.2	79.3
<b>CAPITAL INVESTED AND COST PER ACRE.</b>								
50	Total capital invested in and required for completion of operating enterprises.....dollars.	1,436,419	79,200	123,000	47,044	118,500	1,013,675	55,000
51	Capital invested in these enterprises to Dec. 31, 1919.....dollars.	1,397,419	50,200	123,000	37,044	118,500	1,013,675	55,000
52	Additional capital required to complete these enterprises.....dollars.	39,000	29,000		10,000			
53	Average cost per acre when completed.....dollars.	15.13	7.66	24.77	11.20	7.90	16.13	12.22
54	Enterprises constructing open ditches only.....dollars.	604,445	46,700	123,000	47,044	118,500	244,201	25,000
55	Average cost per acre when completed.....dollars.	9.39	5.92	24.77	11.20	7.90	8.44	7.35
56	Enterprises constructing tile drains only.....dollars.	192,315					192,315	
57	Average cost per acre when completed.....dollars.	35.80					35.80	
58	Enterprises constructing both open ditches and tile drains.....dollars.	639,659	32,500				577,159	30,000
59	Average cost per acre when completed.....dollars.	25.44	13.27				26.72	27.27
<b>CROPS.</b>								
<b>Improved land in enterprises reporting—</b>								
60	Alfalfa as principal crop on drained land.....acres.	52,418	4,825				47,593	
61	Hay (except alfalfa) as principal crop on drained land.....acres.	19,710						
62	Wheat as principal crop on drained land.....acres.	4,468		4,468	2,560	13,750		3,400
63	Not reporting principal crop on drained land.....acres.	5,290	4,800		400			

<sup>1</sup> Includes only Adams and Spokane Counties.<sup>2</sup> When works under construction have been completed.<sup>3</sup> Includes 1,000 acres having open ditches and levees.<sup>4</sup> Per cent not shown when more than 1,000.<sup>5</sup> Includes cost of 1 mile of levees.

# WISCONSIN.

The following pages present the statistics of drainage for Wisconsin collected at the census of 1920. The figures relate to conditions on January 1, 1920, except where indicated otherwise. No census of drainage has been taken heretofore, so there are no comparable figures for previous years. The data relate to the artificial drainage of land in farms and of other land that ultimately will be used for agricultural purposes. The organized drainage enterprises may include considerable areas of timbered and other unimproved

land not yet in farms. The statistics for drainage on farms were collected in the general census of agriculture, while the statistics for drainage enterprises were obtained in a special canvass of those enterprises. Since drainage on farms may be either inside or outside an organized enterprise, and the drains that each individual owner installs upon his own farm may be either supplemental to or entirely independent of the works installed by an enterprise, the figures for the two parts of the drainage census are presented separately.

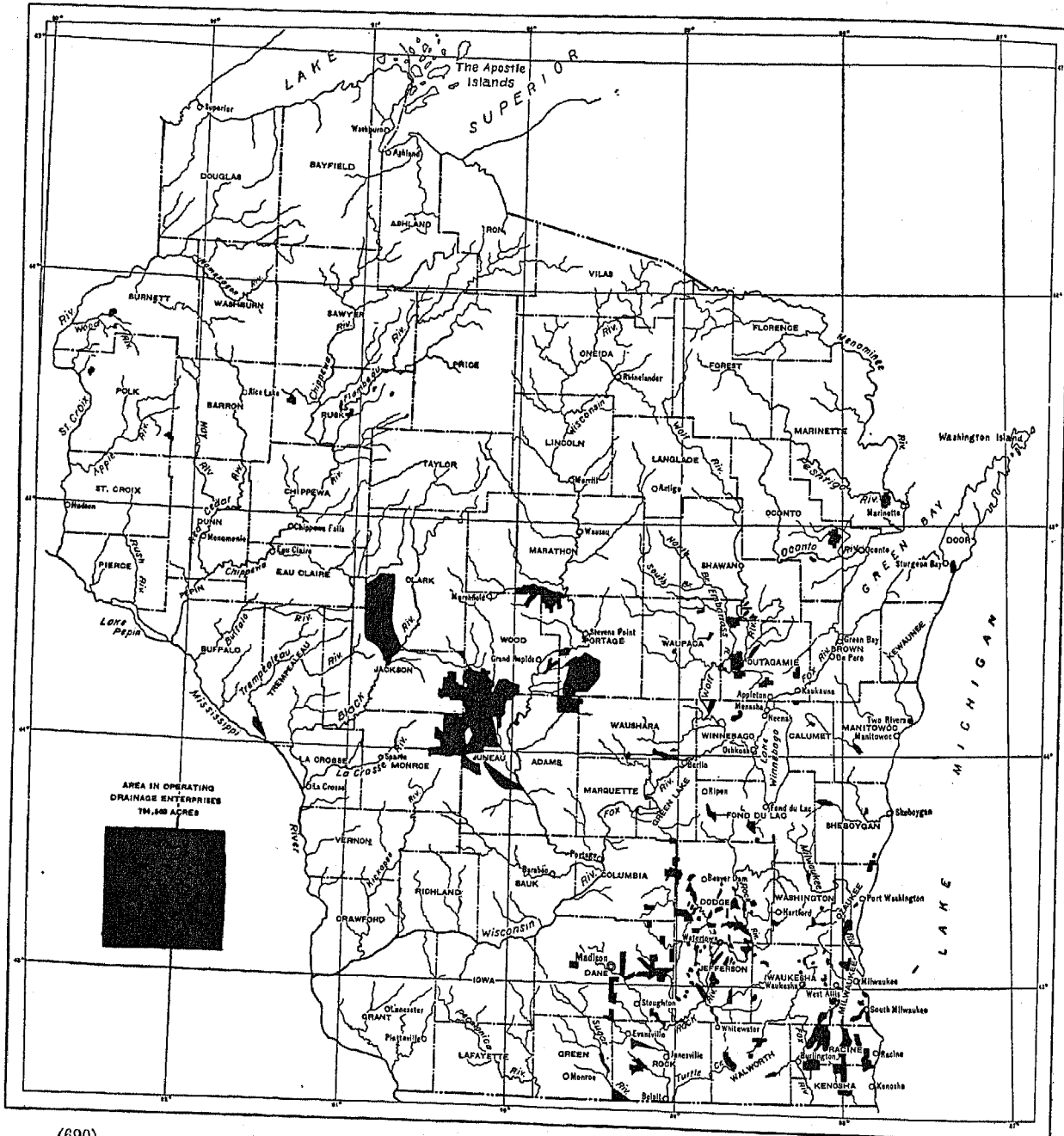
TABLE 1.—SUMMARY FOR THE STATE: 1920.

ITEM.	Amount.	Per cent of total.
<b>DRAINAGE ON FARMS.</b>		
Number of all farms in the state.....	189,295	100.0
Farms reporting land having drainage.....	21,838	11.5
Farms reporting land needing drainage.....	52,228	27.6
All land in farms.....acres..	22,148,223	100.0
Improved land in farms.....acres..	12,452,216	56.2
Farm land reported as provided with drainage.....acres..	658,411	3.0
Farm land reported as needing drainage.....acres..	1,839,273	8.3
Needing drainage only.....acres..	461,612	2.1
Needing drainage and clearing.....acres..	1,377,661	6.2
<b>DRAINAGE ENTERPRISES.</b>		
Approximate land area of the state.....acres..	35,363,840	100.0
All land in operating drainage enterprises.....acres..	794,569	2.2
Improved land.....acres..	254,504	0.7
Per cent of all improved land in farms.....	2.0	
Timber and cut-over land.....acres..	177,744	0.5
Other unimproved land.....acres..	362,321	1.0
Swampy, subject to overflow, seeped, or alkali.....acres..	130,111	0.4
Suffering a loss of crops from defective drainage.....acres..	9,848	( <sup>1</sup> )
Improved land prior to drainage.....acres..	50,071	0.1
Increase since drainage began.....acres..	204,433	0.6
Land in nonoperating enterprises.....acres..	19,000	0.1
Open ditches in operating enterprises.....miles..	1,779.3	100.0
Completed.....miles..	1,691.3	95.1
Additional under construction.....miles..	88.0	4.9
Tile drains in operating enterprises.....miles..	251.4	100.0
Completed.....miles..	211.3	84.0
Additional under construction.....miles..	40.1	16.0
Total capital invested in and required for completion of operating enterprises..	\$4,564,625	100.0
Capital invested in these enterprises to Dec. 31, 1919.....	4,163,055	91.2
Additional capital required to complete these enterprises.....	401,570	8.8
Average cost per acre when completed.....	5.74	

<sup>1</sup> Less than one-tenth of 1 per cent

# WISCONSIN

APPROXIMATE LOCATION AND AREA OF OPERATING DRAINAGE ENTERPRISES.



**Operating and nonoperating enterprises.**—In most of the tables that follow, statistics are given for operating enterprises only. These enterprises, as already defined, include both those which have completed their drainage works and those with such works under construction; among the latter may be some that had completed the original plan of reclamation several years ago but were constructing extensions or enlargements on January 1, 1920. The nonoperating enterprises have a legal existence, though they have not yet accomplished any drainage. They may include districts that on the census date had completed their plans, sold bonds to cover the cost of the undertakings, and let contracts for the construction work, and also districts that had just been established by decrees of the courts and were still subject to considerable change in area, plan of drainage works, and cost.

TABLE 2.—LAND AND CAPITAL INVESTED IN ALL ENTERPRISES, CLASSIFIED AS BETWEEN OPERATING AND NONOPERATING ENTERPRISES: 1920.

CLASS.	LAND.		CAPITAL. <sup>1</sup>		
	Acreage.	Per cent of total.	To Dec. 31, 1919.		Additional required to complete.
			Amount.	Per cent of total.	
All organized enterprises.....	813,569	100.0	\$4,168,055	100.0	\$512,570
Operating enterprises.....	794,569	97.7	4,163,055	99.9	401,570
With works completed.....	572,208	70.3	3,203,944	77.0	.....
With works under construction..	222,361	27.3	954,111	22.9	401,570
Nonoperating enterprises.....	19,000	2.3	5,000	0.1	111,000

<sup>1</sup> The inquiry asked for the "total cost of the enterprise to Dec. 31, 1919," and for an "estimate of additional investment to complete."

**Location of enterprises.**—More than 60 per cent of the acreage in operating drainage enterprises in Wisconsin is located in a group of seven counties near the center of the state, and most of the other land in such enterprises is in the southeastern counties. There are comparatively few operating enterprises in the northern third of the state and none in the southwestern corner.

TABLE 3.—LAND AND CAPITAL INVESTED IN ALL ENTERPRISES, CLASSIFIED BY DRAINAGE BASIN: 1920.

DRAINAGE BASIN.	LAND.		CAPITAL.		
	Acreage.	Per cent of total.	To Dec. 31, 1919.		Additional required to complete.
			Amount.	Per cent of total.	
All organized enterprises.....	813,569	100.0	\$4,168,055	100.0	\$512,570
Operating enterprises.....	794,569	97.7	4,163,055	99.9	401,570
Illinois River.....	57,351	7.0	381,130	9.1	.....
Rock River.....	110,814	13.6	667,670	16.0	43,000
Wisconsin River.....	370,016	45.5	1,914,833	45.9	37,600
Chippewa River.....	5,614	0.7	75,414	1.8	13,000
St. Croix River.....	5,080	0.6	23,678	0.6	.....
Mississippi River.....	138,037	17.0	219,500	5.3	115,000
Lake Michigan.....	107,637	13.2	890,530	21.1	192,970
Nonoperating enterprises.....	19,000	2.3	5,000	0.1	111,000
Rock River.....	5,000	0.6	1,500	.....	56,000
Wisconsin River.....	10,500	1.3	.....	.....	30,000
Lake Michigan.....	3,500	0.4	3,500	0.1	25,000

**Condition of land in enterprises.**—The drainage enterprises in Wisconsin have been organized in most part for the reclamation of swamp or marsh land or for the improvement of areas that were usually too wet for most profitable cultivation. The tracts generally are near or bordering the smaller streams of the state.

The usual purpose of an organized enterprise is merely to provide adequate outlets into which the landowners of the district may drain their farms, and to afford relief from overflow for the district as a unit. Therefore, the fact that an enterprise which has completed the construction of the drainage works authorized contains land still swampy or subject to overflow, or land that suffers damage to crops, does not show that the improvement works are inadequate.

TABLE 4.—LAND IN ALL ENTERPRISES, CLASSIFIED BY CONDITION: 1920.

CONDITION OF LAND.	OPERATING ENTERPRISES.				Nonoperating enterprises (acres).
	Total.		Works completed (acres).	Works under construction (acres).	
	Acreage.	Per cent of total.			
All land in enterprises.....	794,569	100.0	572,208	222,361	19,000
Improved land.....	254,504	32.0	220,908	33,596	260
Timber and cut-over land.....	177,744	22.4	84,280	93,464	3,325
Other unimproved land.....	362,321	45.6	267,020	95,301	15,395
Swampy or subject to overflow.....	130,111	16.4	68,908	61,203	18,300
Suffering a loss of crops.....	9,848	1.2	9,774	74	

**Size of enterprises.**—Presentation of the statistics by counties requires that an enterprise located in more than one county be divided, and the part in each county be considered a separate enterprise. In this way, 290 operating drainage enterprises are counted in Wisconsin, with an average area of 2,740 acres each. There are 29 such enterprises of 5,000 acres or more each, 118 of between 500 and 5,000 acres, and 143 of less than 500 acres each. There is no overlapping of the enterprises in this state.

TABLE 5.—LAND IN OPERATING ENTERPRISES, CLASSIFIED BY SIZE OF AREA ASSESSED: 1920.

SIZE GROUP	Land in enterprises (acres).	ASSESSED AREA.	
		Acreage.	Per cent of total.
All operating enterprises.....	794,569	794,569	100.0
Less than 200 acres.....	5,800	5,800	0.7
200 to 499 acres.....	26,010	26,010	3.3
500 to 999 acres.....	27,975	27,975	3.5
1,000 to 4,999 acres.....	168,051	168,051	21.1
5,000 to 9,999 acres.....	75,427	75,427	9.5
10,000 to 49,999 acres.....	228,426	228,426	28.7
50,000 to 99,999 acres.....	262,880	262,880	33.1

**Character of enterprises.**—All drainage enterprises in Wisconsin, except commercial and private undertakings and districts formed by special acts of the legislature, are either drainage districts operating

under the drainage district law of July 15, 1919 (ch. 557), or "drainages" operating under the farm drainage law of June 27, 1919 (ch. 446). These statutes repealed the earlier laws of the state providing for the formation of drainage enterprises, except so far as might be necessary or expedient to complete undertakings already begun, and all drainage district works and town drains constructed under earlier laws are to be maintained under the new drainage district law and farm drainage law, respectively.

A drainage district is established, according to the law of 1919, by the circuit court of any county in which all or a part of the district is situated, after receipt of a petition from the owners of a major part of the land in the proposed district or from a majority of the owners representing one-third or more of the land. Three drainage commissioners for each district are appointed by the court to investigate as to the feasibility and public utility of the proposed work and, when the district has been established, to administer its affairs. The cost of drainage is assessed against the land in proportion to the benefits that will accrue to the various tracts, but that for any part of the work may be assessed against the particular land or corporation to be benefited by that part. If the cost will exceed the benefits, the enterprise is abandoned, unless one or more petitioners agree to pay the excess and furnish security therefor. The commissioners' preliminary report must include a report from the state chief engineer regarding the practicability and completeness of the proposed plan of improvement and a report from the college of agriculture of the University of Wisconsin regarding the character of the soils and the value of the land for agriculture. If the enterprise will affect any navigable stream, the plan must be approved by the state railroad commission. The plan of drainage improvement and the assessments of damages and of benefits are made by the drainage commissioners. The plan of drainage must be approved or disapproved by the state chief engineer. The court holds public hearings upon the petition for establishment, upon the commissioners' preliminary report, and upon their final report presenting plans, cost estimate, and assessments. The commissioners may issue bonds or notes of the district to finance the work. Subdistricts may be formed within any drainage district, by the circuit court, upon petition and after public hearing; the cost is to be assessed by the commissioners of the original drainage district against the land to be benefited.

Very nearly all the drainage districts in Wisconsin were established under the drainage district law of April 23, 1891 (ch. 401), and the revision of June 17, 1905 (ch. 419). Each of those statutes provided that the districts should be organized by the circuit courts and be administered by three commissioners for each district, and that the cost should be assessed in proportion to the anticipated benefits. The requirements

for establishment and the method of organization were much like those of the new drainage district law, but neither of the earlier statutes included any provisions similar to those now requiring that reports upon the proposed work and upon the value of the land be secured from the state chief engineer and the college of agriculture.

A "drainage" under the 1919 statute is established by the county court upon petition from the owners of a major part of the land affected or from a majority of the owners controlling one-third or more of that land, or upon petition from a majority of the town board or boards of supervisors of the town or towns in which the land is situated. All "drainages" are administered by the farm drainage board of the county, composed of three residents appointed by the court when the first petition for a "drainage" is filed. This drainage board makes a preliminary investigation as to the practicability and public utility of the project and, after the "drainage" has been established by decree of the court, prepares the plan of drainage, assesses damages and benefits against the tracts of land, and lets contracts for construction. Public hearings are held by the county court upon the drainage board's preliminary report before the "drainage" is established, and later upon the assessments of damages and of benefits. With its earlier report the drainage board must submit, if the "drainage" will comprise more than 200 acres, a report from the state chief engineer regarding the sufficiency of the proposed work and one from the college of agriculture concerning the character of the soil and the value of the land. The final plan of drainage must be approved by the state chief engineer. The cost of the enterprise may exceed the estimated benefits only if the petitioners give security to cover the excess. The drainage board may issue notes or bonds to finance the work of each "drainage."

Town drains established under laws of March 9, 1871 (ch. 64), and of June 25, 1913 (ch. 579), were in general similar to the "drainages" to be established under the present farm drainage law. Petition for a drain was addressed to the town board of supervisors, which performed approximately the same functions as now are prescribed for the county court and the farm drainage board. For a drain to benefit land within a city or village, petition was addressed to the officials of the city or village, who would appoint a committee to investigate and to construct the drain if the project was approved. The cost was apportioned against the land in proportion to the benefits, and the law of 1871 permitted the landowners to perform the work of construction. No supervision over individual projects was exercised by the state, corresponding to what now is done in requiring reports from the state chief engineer and the college of agriculture.

The first drainage law of this state was enacted in 1852, providing means for one landowner to secure



drainage outlet across the land of an objecting owner, if necessary, through petition to a justice of the peace. A somewhat similar act of 1880 provided for proceedings under the county and circuit courts; an act of 1887 provided for proceedings under the town supervisors. A statute of 1862 (ch. 398) authorized the establishment and construction of county drains by the county board of supervisors upon petition from one or more landowners, damages and benefits being assessed by the supervisors. As amended (Revised Statutes of 1917, sec. 1381) that law authorizes the construction of drains by the county or town boards of supervisors for the benefit of land owned by the counties or towns.

There have been many amendments to the drainage laws mentioned herein, but they have not affected the general form of organization described.

TABLE 6.—LAND AND CAPITAL INVESTED IN ALL ENTERPRISES, CLASSIFIED BY CHARACTER OF ENTERPRISE: 1920.

CHARACTER OF ENTERPRISE.	LAND.		CAPITAL.			
	Acreage.	Per cent of total.	To Dec. 31, 1919.		Additional required to complete.	
			Amount.	Per cent of total.		
All organized enterprises.....	813,569	100.0	\$4,168,055	100.0	\$512,570	
Operating enterprises.....	794,569	97.7	4,163,055	99.9	401,570	
Drainage districts.....	684,888	84.2	3,460,032	83.0	346,820	
Laws of 1891, ch. 401.....	206,183	36.4	1,373,060	32.9	35,000	
Laws of 1905, ch. 419.....	379,705	46.7	2,041,972	49.0	311,220	
Special acts.....	9,000	1.1	45,000	1.1		
"Drainages".....	105,601	13.0	664,423	15.9	54,750	
Laws of 1871, ch. 64.....	49,619	6.1	186,664	4.5	750	
Laws of 1913, ch. 579.....	53,140	6.5	449,152	10.8	54,000	
Laws of 1919, ch. 446.....	2,842	0.3	28,607	0.7		
Other <sup>1</sup> .....	4,080	0.5	38,600	0.9		
Nonoperating enterprises.....	19,000	2.3	5,000	0.1	111,000	
Drainage districts.....	19,000	2.3	5,000	0.1	111,000	
Laws of 1905, ch. 419.....	15,500	1.9	1,500		86,000	
Laws of 1919, ch. 557.....	3,500	0.4	3,500	0.1	25,000	

<sup>1</sup> Includes one commercial development, one individual ownership, and one enterprise not reporting character.

**Drainage works.**—The total works completed by drainage enterprises to December 31, 1919, comprised 1,691.3 miles of open ditches, 211.3 miles of tile drains, and 7.7 miles of accessory levees; the additional lengths under construction were 88.0 miles of open ditches, 40.1 miles of tile drains, and 2.5 miles of levees. These figures do not include drains or levees installed by individual farm owners supplemental to the works of the enterprises, nor the works of flood-protection or levee districts that had not undertaken the construction of ditches or tile drains. There is one drainage district in Wisconsin, comprising 6,597 acres, drained partly by pumping, having one centrifugal pump operated by steam engines of 150 horsepower.

The average depth of the main or outlet ditch was reported for each enterprise. The maximum depth of outlet reported for any enterprise in the state and the maximum in each county are shown in line 15 of County Table II. The maximum length, width, and depth of outlet shown in that table for any county may not refer to the same enterprise.

County Table II, line 16, shows the mean depth of branch ditches (open ditches only), which is a very crude indication of the depth of soil drainage that may be obtained in the enterprises, as determined by the depth of outlet provided for farm drains. The mean depth was computed by giving each separate depth a weight in proportion to the acreage it serves. As most enterprises reported depths in whole numbers only, the occasional decimals were omitted in making these computations. Depths less than 3 feet and those 10 feet and greater were omitted, because it seemed that they did not represent so well the average depths of outlet provided for all the farms in those districts. To include both of these groups, computed as 3 feet and 10 feet, respectively, would show the mean depth for the state 7.0 instead of 6.5 feet.

TABLE 7.—LAND AND CAPITAL INVESTED IN OPERATING ENTERPRISES, CLASSIFIED BY KIND OF DRAINAGE WORKS: 1920.

KIND OF WORKS.	LAND.		CAPITAL.			
	Acreage.	Per cent of total.	To Dec. 31, 1919.		Additional required to complete.	
			Amount.	Per cent of total.		
All kinds.....	794,569	100.0	\$4,163,055	100.0	\$401,570	
Open ditches only.....	657,668	82.8	2,942,667	70.7	279,350	
Open ditches and levees.....	27,584	3.5	282,666	6.8		
Tile drains only.....	2,958	0.4	59,770	1.4		
Open ditches and tile drains.....	102,359	12.9	834,952	20.1	72,220	
Open ditches, tile drains, and levees.....	4,000	0.5	43,000	1.0	50,000	

TABLE 8.—LAND IN OPERATING ENTERPRISES, CLASSIFIED BY AVERAGE DEPTH OF BRANCH DITCHES: 1920.

DEPTH OF BRANCH DITCHES.	Acreage.	Per cent of total.
All operating enterprises.....	794,569	100.0
Less than 3 feet.....	520	0.1
3.0 to 3.9 feet.....	17,069	2.2
4.0 to 4.9 feet.....	72,816	9.2
5.0 to 5.9 feet.....	25,622	3.2
6.0 to 6.9 feet.....	186,683	23.5
7.0 to 7.9 feet.....	79,349	10.0
8.0 to 8.9 feet.....	217,735	27.4
9.0 to 9.9 feet.....	15,000	2.3
10 feet and more.....	88,900	10.5
Not reporting branches.....	92,275	11.6

**Maintenance of works.**—The drainage district law of 1919 requires that the commissioners of each drainage district file with the circuit court each year a report including a statement of what repairs will be necessary during the coming year and an assessment to cover the necessary repairs, maintenance, and incidental expenses. The court hears all objections and determines the amounts of assessment. The laws of 1891 and 1905 also authorized the levy of assessments for maintenance of the drains.

The farm drainage law requires the farm drainage board of each county to report annually to the county court regarding each "drainage" under its control, including a statement of the repairs needed in the ensuing year and an assessment to cover the cost of maintenance apportioned according to the confirmed benefits. The court hears objections to the report before confirming the assessment. The town drain



law of 1913 authorized the town supervisors to levy assessments for repair purposes, and that of 1871 required each landowner affected to keep in repair the section of drain assigned to him by the town supervisors.

TABLE 9.—LAND AND CAPITAL INVESTED IN OPERATING ENTERPRISES, CLASSIFIED BY METHOD OF MAINTENANCE: 1920.

METHOD OF MAINTENANCE.	LAND.		CAPITAL.		
	Acreage.	Per cent of total.	To Dec. 31, 1919.		Additional required to complete.
			Amount.	Per cent of total.	
All operating enterprises.....	794,569	100.0	\$4,163,055	100.0	\$401,570
By district forces.....	181,416	22.8	1,038,827	25.0	2,750
By contract.....	349,886	44.0	2,109,393	50.7	30,000
By landowners.....	29,256	3.7	68,523	1.6	.....
By method not specified.....	14,800	1.9	152,047	3.7	.....
No maintenance provided.....	212,215	26.7	744,585	17.9	339,220
Not reporting.....	6,931	0.9	48,780	1.2	20,000

**Date of organization.**—The progress in drainage development is shown only roughly by the dates of the organization of the enterprises, which are the dates when the districts were established by the courts or the town boards of supervisors, since there may be a period of a year or more between the decree of establishment and the beginning of actual construction and since the work of construction might occupy some years in a large district. It was not practicable, however, for the census to secure data as to the time of the beginning or the completion of the drainage works.

TABLE 10.—LAND IN OPERATING ENTERPRISES, CLASSIFIED BY DATE ENTERPRISE WAS ORGANIZED: 1920.

DATE OF ORGANIZATION.	LAND.		AREA ASSESSED.	
	Acreage.	Per cent of total.	Acreage.	Per cent of total.
All operating enterprises.....	794,569	100.0	794,569	100.0
1870 to 1879.....	695	0.1	695	0.1
1880 to 1889.....	16,158	2.0	16,158	2.0
1890 to 1899.....	5,173	0.7	5,173	0.7
1900 to 1904.....	294,978	37.1	294,978	37.1
1905 to 1909.....	145,692	18.3	145,692	18.3
1910 to 1914.....	111,102	14.0	111,102	14.0
1915 to 1919.....	218,424	27.5	218,424	27.5
Not reported.....	2,347	0.3	2,347	0.3

Under the date of organization are tabulated the entire area, works, and capital of each enterprise, even including extensions made after the original plan of reclamation was completed.

TABLE 11.—CAPITAL INVESTED IN OPERATING ENTERPRISES, CLASSIFIED BY DATE ENTERPRISE WAS ORGANIZED: 1920.

DATE OF ORGANIZATION.	CAPITAL INVESTED.		
	To Dec. 31, 1919.		Additional required to complete.
	Amount.	Per cent of total.	
All operating enterprises.....	\$4,163,055	100.0	\$401,570
1870 to 1879.....	2,800	0.1	.....
1880 to 1889.....	65,966	1.6	.....
1890 to 1899.....	9,063	0.2	.....
1900 to 1904.....	1,314,577	31.6	36,350
1905 to 1909.....	1,042,098	25.0	.....
1910 to 1914.....	744,494	17.9	.....
1915 to 1919.....	963,693	23.1	385,220
Not reported.....	20,364	0.5	.....

TABLE 12.—DRAINS AND LEVEES (COMPLETED AND UNDER CONSTRUCTION) IN OPERATING ENTERPRISES, CLASSIFIED BY DATE ENTERPRISE WAS ORGANIZED: 1920.

DATE OF ORGANIZATION.	DITCHES.		TILE.		LEVEES.	
	Miles.	Per cent of total.	Miles.	Per cent of total.	Miles.	Per cent of total.
All drains and levees.....	1,779.3	100.0	251.4	100.0	10.2	100.0
1870 to 1879.....	9.5	0.5	.....	.....	.....	.....
1880 to 1889.....	59.7	3.4	.....	.....	.....	.....
1890 to 1899.....	26.3	1.5	.....	.....	.....	.....
1900 to 1904.....	551.6	31.0	.....	.....	.....	.....
1905 to 1909.....	455.6	25.6	19.5	7.8	2.6	25.5
1910 to 1914.....	311.3	17.5	19.0	7.6	5.1	50.0
1915 to 1919.....	357.0	20.1	211.6	84.2	2.5	24.6
Not reported.....	8.8	0.5	1.3	0.5	.....	.....

**Crops.**—The principal crops grown upon the drained land in drainage enterprises are hay and corn. Data were not secured to show the part of each enterprise planted to any crop, so the enterprises have been classified according to the principal crop, and the total area of improved land is shown thus classified in County Table II. No data were secured at the general census of agriculture to separate the crops grown upon land drained artificially from those produced upon land drained naturally.

## DRAINAGE—WISCONSIN.

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COUNTY TABLE I.—DRAINAGE ON FARMS: 1920.

		THE STATE.	Adams.	Ashland.	Barron.	Bayfield.	Brown.	Buffalo.	Burnett.	Calumet.
1	Number of all farms in the state or county.....	189,295	1,557	1,131	4,516	1,791	3,498	2,089	1,872	2,087
2	Farms reporting land having drainage.....	21,838	87	32	117	252	517	51	145	255
3	Farms reporting land needing drainage.....	52,228	259	447	1,028	323	1,200	313	695	386
4	Farms in drainage and levee districts.....	3,693	34	2	22	.....	19	3	29	20
LAND AND FARM AREA.										
5	Approximate land area of the state or county.....acres..	35,363,840	437,760	692,480	566,400	961,930	338,560	439,680	550,400	207,360
6	All land in farms.....acres..	22,148,223	304,575	108,270	449,565	172,496	304,745	418,261	236,886	194,623
7	Improved land in farms.....acres..	12,452,216	148,135	36,253	208,936	50,389	207,027	202,321	79,611	145,005
8	Woodland in farms.....acres..	5,401,910	111,264	56,659	121,719	82,071	47,859	151,650	117,520	19,979
9	Other unimproved land in farms.....acres..	4,294,097	45,173	15,358	118,910	40,036	49,859	64,290	39,755	29,639
10	Farm land reported as provided with drainage.....acres..	658,411	7,827	665	2,477	5,466	12,761	1,099	4,035	5,660
11	Farm land reported as needing drainage.....acres..	1,839,273	13,245	27,845	41,158	15,835	30,678	8,019	33,012	7,084
12	Drainage only.....acres..	461,612	5,325	879	3,733	658	6,012	2,154	6,217	3,903
13	Drainage and clearing.....acres..	1,377,661	7,920	26,966	37,425	15,177	24,566	5,865	26,795	3,121

		Chip-pewa.	Clark.	Colum-bia.	Dane.	Dodge.	Door.	Douglas.	Dunn.	Eau Claire.	Fond du Lac.
1	Number of all farms in the county.....	3,729	5,116	3,320	6,217	4,633	2,396	1,557	3,566	2,368	4,190
2	Farms reporting land having drainage.....	123	188	436	721	1,051	181	55	123	91	535
3	Farms reporting land needing drainage.....	1,459	1,530	906	1,604	1,193	626	1,001	729	511	1,005
4	Farms in drainage and levee districts.....	22	32	231	177	187	11	3	36	17	77
LAND AND FARM AREA.											
5	Approximate land area of the county.....acres..	664,960	779,520	497,920	769,280	574,080	300,160	855,680	556,160	408,320	464,640
6	All land in farms.....acres..	457,998	476,377	463,639	721,156	522,217	264,126	154,671	490,044	307,346	446,710
7	Improved land in farms.....acres..	227,691	195,802	301,889	512,269	374,939	149,557	40,428	265,693	194,467	321,182
8	Woodland in farms.....acres..	130,048	137,131	66,362	85,501	36,202	79,959	69,791	150,406	68,504	32,672
9	Other unimproved land in farms.....acres..	100,259	143,444	95,388	123,386	111,076	34,610	44,452	73,946	44,375	92,856
10	Farm land reported as provided with drainage.....acres..	2,349	4,864	11,344	16,859	22,152	2,986	1,012	2,685	1,846	14,782
11	Farm land reported as needing drainage.....acres..	70,001	72,922	32,867	34,919	30,395	17,112	63,343	26,392	17,603	20,393
12	Drainage only.....acres..	6,411	5,128	18,285	24,215	21,689	3,566	1,089	3,432	2,030	12,744
13	Drainage and clearing.....acres..	63,590	67,794	14,582	10,704	8,706	13,516	62,254	22,960	15,573	7,649

		Forest.	Green.	Green Lake.	Iowa.	Jackson.	Jefferson.	Juneau.	Keno-sha.	Kewau-nee.	Lafay-ette.
1	Number of all farms in the county.....	535	2,330	1,507	2,527	2,577	3,263	2,479	1,383	2,065	2,360
2	Farms reporting land having drainage.....	6	219	131	67	87	1,022	537	861	455	107
3	Farms reporting land needing drainage.....	167	385	346	140	746	1,186	915	797	1,007	250
4	Farms in drainage and levee districts.....	.....	14	39	2	32	187	291	99	11	1
LAND AND FARM AREA.											
5	Approximate land area of the county.....acres..	650,880	379,520	230,400	499,840	633,600	353,280	513,280	180,480	215,680	410,880
6	All land in farms.....acres..	56,029	344,542	213,518	460,938	389,345	331,204	327,561	153,832	210,584	373,121
7	Improved land in farms.....acres..	16,950	270,680	141,371	254,424	190,401	218,129	171,114	112,255	146,626	272,481
8	Woodland in farms.....acres..	24,695	35,290	21,469	85,004	128,098	43,622	95,359	15,471	33,937	35,308
9	Other unimproved land in farms.....acres..	14,384	38,572	50,678	121,510	70,846	69,453	61,086	28,106	30,021	65,332
10	Farm land reported as provided with drainage.....acres..	637	6,835	4,422	1,069	4,621	23,459	35,627	39,804	14,083	2,803
11	Farm land reported as needing drainage.....acres..	10,703	9,210	10,904	3,400	37,328	31,875	39,698	24,636	21,768	5,843
12	Drainage only.....acres..	562	5,328	5,187	1,910	7,138	18,740	11,528	15,949	6,057	3,045
13	Drainage and clearing.....acres..	10,141	3,882	5,617	1,490	30,190	13,135	28,170	8,687	15,711	2,798

## DRAINAGE—WISCONSIN.

COUNTY TABLE I.—DRAINAGE ON FARMS: 1920—Continued.

		Mani- towoc.	Mar- athon.	Mari- nette.	Mar- quette.	Mil- waukee.	Monroe.	Oconto.	Outa- gamie.	Ozau- kee.	Pepin.
1	Number of all farms in the county.....	3,904	6,058	2,531	1,432	2,574	3,519	3,114	3,746	1,727	1,034
2	Farms reporting land having drainage.....	1,464	60	181	222	1,167	181	242	761	617	35
3	Farms reporting land needing drainage.....	1,630	1,961	1,506	420	780	533	1,325	1,307	874	75
4	Farms in drainage and levee districts.....	109	6	112	18	184	131	40	45	90	4
<b>LAND AND FARM AREA.</b>											
5	Approximate land area of the county.....acres..	385,280	994,560	905,600	292,480	150,400	599,680	715,520	413,440	149,120	151,040
6	All land in farms.....acres..	358,511	950,959	275,738	271,317	111,033	408,553	310,037	347,824	141,115	140,288
7	Improved land in farms.....acres..	251,176	242,357	107,444	133,773	90,258	231,049	151,639	236,561	107,739	75,088
8	Woodland in farms.....acres..	54,581	243,986	79,096	85,306	12,921	155,752	90,551	44,915	12,092	48,316
9	Other unimproved land in farms.....acres..	52,754	164,616	89,198	52,238	7,554	81,752	61,847	66,348	21,284	16,254
10	Farm land reported as provided with drainage.....acres..	34,705	1,688	5,735	8,287	22,542	8,494	9,581	26,772	13,477	1,077
11	Farm land reported as needing drainage.....acres..	29,564	93,246	84,384	17,069	12,176	18,765	58,135	47,510	14,718	2,030
12	Drainage only.....acres..	14,690	6,249	5,563	8,169	5,592	7,887	8,213	17,819	6,795	106
13	Drainage and clearing.....acres..	14,874	87,997	78,821	9,800	6,584	10,878	44,922	30,191	7,923	1,924
		Polk.	Portage.	Price.	Racine.	Rich- land.	Rock.	Rusk.	Sauk.	Sha- wano.	Sheboy- gan.
1	Number of all farms in the county.....	4,058	3,326	1,935	2,215	2,533	3,660	1,946	3,697	3,977	3,664
2	Farms reporting land having drainage.....	103	312	46	1,619	116	335	44	200	303	1,262
3	Farms reporting land needing drainage.....	1,196	534	1,272	1,170	305	702	794	578	1,393	1,630
4	Farms in drainage and levee districts.....	56	251	3	473	6	64	55	4	13	30
<b>LAND AND FARM AREA.</b>											
5	Approximate land area of the county.....acres..	598,400	519,680	818,560	207,360	377,600	458,240	592,000	538,880	741,120	333,440
6	All land in farms.....acres..	434,216	427,913	161,894	195,953	361,450	427,083	184,213	494,925	431,614	311,332
7	Improved land in farms.....acres..	185,140	250,287	40,387	146,456	180,824	343,328	46,676	279,878	193,770	226,784
8	Woodland in farms.....acres..	186,044	103,858	71,921	20,969	132,623	38,825	24,518	135,662	140,511	42,561
9	Other unimproved land in farms.....acres..	63,032	73,708	49,586	28,538	42,003	44,930	113,019	79,385	97,333	42,037
10	Farm land reported as provided with drainage.....acres..	2,157	31,913	598	71,843	1,044	11,876	596	4,521	6,456	34,208
11	Farm land reported as needing drainage.....acres..	46,595	26,059	66,150	30,557	6,405	22,206	27,886	12,603	44,823	27,400
12	Drainage only.....acres..	5,969	3,244	1,430	18,781	2,887	12,727	2,281	6,822	11,283	13,395
13	Drainage and clearing.....acres..	40,626	22,815	64,720	11,776	3,518	9,479	26,605	5,781	33,540	14,005
		Trem- peleau.	Wal- worth.	Wash- burn.	Wash- ington.	Wau- kesha.	Wau- paca.	Wau- shara.	Winne- bago.	Wood.	All other counties. <sup>1</sup>
1	Number of all farms in the county.....	3,138	2,779	1,380	2,799	3,406	3,770	2,468	2,711	3,066	26,469
2	Farms reporting land having drainage.....	98	560	23	623	1,075	345	190	709	350	137
3	Farms reporting land needing drainage.....	576	972	422	1,129	306	1,142	372	1,023	893	4,271
4	Farms in drainage and levee districts.....	10	59	.....	87	.....	62	18	44	108	13
<b>LAND AND FARM AREA.</b>											
5	Approximate land area of the county.....acres..	478,720	358,400	534,400	275,840	351,380	485,760	413,440	293,760	517,760	7,578,880
6	All land in farms.....acres..	461,525	330,011	178,298	264,351	333,519	420,206	363,417	256,327	321,907	3,356,325
7	Improved land in farms.....acres..	270,239	239,308	57,827	174,486	227,310	236,807	233,745	186,332	137,063	1,705,807
8	Woodland in farms.....acres..	135,507	38,037	71,401	38,230	52,073	92,965	84,493	25,511	79,030	970,046
9	Other unimproved land in farms.....acres..	55,719	52,666	49,070	51,635	54,136	90,434	45,179	44,484	105,814	680,382
10	Farm land reported as provided with drainage.....acres..	1,293	16,020	633	9,339	18,202	7,473	6,595	21,468	22,876	2,189
11	Farm land reported as needing drainage.....acres..	14,644	26,322	27,953	20,584	5,659	32,364	11,908	24,778	44,836	188,056
12	Drainage only.....acres..	6,331	18,959	4,100	13,144	2,863	12,993	4,636	14,639	8,358	14,183
13	Drainage and clearing.....acres..	8,313	7,363	23,853	7,440	2,796	19,371	7,272	10,139	36,478	173,873

<sup>1</sup> No drainage on farms reported in Crawford, Florence, Grant, Iron, La Crosse, Langlade, Lincoln, Oneida, Pierce, St. Croix, Sawyer, Taylor, Vernon, and Vilas Counties.

## DRAINAGE—WISCONSIN.

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COUNTY TABLE II.—OPERATING DRAINAGE ENTERPRISES: 1920.

		THE STATE.	Adams.	Clark.	Colum- bia.	Dane.	Dodge.	Door.	Fond du Lac.
<b>LAND AREA.</b>									
1	Approximate land area of the state or county.....	acres.. 35,363,840	437,790	779,520	497,920	769,280	574,080	300,160	464,640
2	All land in operating drainage enterprises.....	acres.. 794,569	16,390	98,000	4,668	39,239	21,597	4,000	5,935
3	Improved land.....	acres.. 254,504	9,834	9,800	2,204	6,535	4,482	600	1,778
4	Per cent of all improved land in farms.....	2.0	6.6	5.6	0.7	1.3	1.2	0.4	0.6
5	Timber and cut-over land.....	acres.. 177,744	4,098	68,600			108	800	389
6	Other unimproved land.....	acres.. 362,321	2,458	19,600	2,464	32,704	17,007	2,600	3,768
7	Swampy or subject to overflow, in enterprises.....	acres.. 130,111	2,458	49,000	985	6,896	3,291	1,000	925
8	Suffering a loss of crops from defective drainage.....	acres.. 9,848	983		28	30	290		25
9	Assessed acreage.....	794,569	16,390	98,000	4,668	39,239	21,597	4,000	5,935
10	Excess over all land in operating enterprises.....	acres..							
<b>DRAINAGE WORKS.</b>									
11	Open ditches:								
12	Completed.....	miles.. 1,691.3	50.3	23.3	24.2	114.0	103.0	1.1	28.6
13	Additional under construction.....	miles.. 88.0		46.7		5.8		0.9	
14	Maximum completed in any enterprise.....	miles.. 144.5	50.3	23.3	7.0	26.0	10.5	1.1	4.0
15	Maximum width at bottom of ditch <sup>1</sup> .....	feet.. 60	16	10	8	24	8	3	40
16	Maximum of average depths of outlet ditches <sup>1</sup> .....	feet.. 13.0	8.0	6.0	10.0	10.0	10.0	4.0	7.0
17	Mean depth of branch ditches <sup>1</sup> .....	feet.. 6.5	8.0	6.0	5.1	5.0	3.7		7.0
18	Tile drains:								
19	Completed.....	miles.. 211.3				97.0	3.7		0.3
20	Additional under construction.....	miles.. 48.1				7.3		5.5	
21	Maximum completed in any enterprise.....	miles.. 48.0				48.0	1.2		0.3
22	Maximum size of tile <sup>1</sup> .....	inches.. 30				24	24		12
23	Accessory levees and dikes:								
24	Completed.....	miles.. 7.7							
25	Additional under construction.....	miles.. 2.5							
26	Pumping plants:								
27	Engine capacity.....	horsepower.. 150							
28	Pump capacity.....	gallons per minute..							
29	Area served by pumps.....	acres.. 6,597							
30	Area drained by open ditches only <sup>1</sup> .....	acres.. 657,668	16,390	98,000	4,668	25,398	19,259		5,485
31	Length of these ditches.....	miles.. 1,462.6	50.3	70.0	24.2	88.2	93.0		26.3
32	Average length per acre.....	feet.. 11.7	16.2	3.8	27.4	18.3	25.5		25.3
33	Area having open ditches and levees <sup>1</sup> .....	acres.. 27,584							
34	Length of these ditches.....	miles.. 79.1							
35	Average length per acre.....	feet.. 15.1							
36	Length of the accessory levees.....	miles.. 7.7							
37	Area drained by tile only <sup>1</sup> .....	acres.. 2,958				1,270	60		
38	Length of these tile.....	miles.. 97.2				83.0	1.0		
39	Average length per acre.....	feet.. 173.5				345.1	88.0		
40	Area drained by open ditches and tile <sup>1</sup> .....	acres.. 102,359				12,571	2,278	4,000	450
41	Length of these drains.....	miles.. 347.6				52.9	12.7	7.5	2.6
42	Average length per acre.....	feet.. 17.9				22.2	29.4	9.9	30.5
43	Area having open ditches, tile drains, and levees <sup>1</sup> .....	acres.. 4,000							
44	Length of these drains.....	miles.. 44.2							
45	Average length per acre.....	feet.. 58.3							
46	Length of the accessory levees.....	miles.. 2.5							
<b>DEVELOPMENT OF LAND.</b>									
47	Improved land in operating enterprises, 1920.....	acres.. 254,504	9,834	9,800	2,204	6,535	4,482	600	1,778
48	Improved land prior to drainage.....	acres.. 50,071		9,800		1,333	398		761
49	Increase since drainage.....	acres.. 204,433	9,834		2,204	5,202	4,084	600	1,017
50	Per cent of increase.....	408.3				390.2			133.6
51	Per cent increase is of all improved land in farms, 1920.....	1.6	6.6		0.7	1.0	1.1	0.4	0.8
52	Timber and cut-over land, 1920.....	acres.. 177,744	4,098	68,600			108	800	389
53	Timber and cut-over land prior to drainage.....	acres.. 231,732	12,292	68,600		1,220	144	800	389
54	Decrease since drainage.....	acres.. 53,988	8,194			1,220	36		
55	Per cent of decrease.....	23.8	66.7			100.0	25.0		
56	Other unimproved land, 1920.....	acres.. 362,321	2,458	19,600	2,464	32,704	17,007	2,600	3,768
57	Other unimproved land prior to drainage.....	acres.. 312,766	4,098	19,600	4,668	36,686	21,055	3,200	4,785
58	Decrease since drainage.....	acres.. 150,445	1,640		2,204	3,932	4,048	600	1,017
59	Per cent of decrease.....	29.3	40.0		47.2	10.9	19.2	18.8	21.3
60	Swampy or subject to overflow, 1920.....	acres.. 130,111	2,458	49,000	985	6,896	3,291	1,000	925
61	Swampy or subject to overflow prior to drainage.....	acres.. 701,307	16,390	68,600	4,668	37,779	21,357	2,400	5,333
62	Decrease since drainage.....	acres.. 571,196	13,932	19,600	3,683	30,883	18,066	1,400	4,408
63	Per cent of decrease.....	81.4	85.0	28.6	78.9	81.7	84.6	58.3	82.7
<b>CAPITAL INVESTED AND COST PER ACRE.</b>									
64	Total capital invested in and required for completion of operating enterprises.....	dollars.. 4,564,625	98,000	159,000	41,352	346,313	95,545	28,000	72,066
65	Capital invested in these enterprises to Dec. 31, 1919.....	dollars.. 4,163,055	98,000	44,000	41,352	326,313	95,545	3,000	72,066
66	Additional capital required to complete these enterprises.....	dollars.. 401,570		115,000		20,000		25,000	
67	Average cost per acre when completed.....	dollars.. 5.74	5.98	1.62	8.86	8.83	4.42	7.00	12.14
68	Enterprises constructing open ditches only.....	dollars.. 3,222,017	98,000	159,000	41,352	190,607	52,755		65,500
69	Average cost per acre when completed.....	dollars.. 4.90	5.98	1.62	8.86	7.50	2.74		11.94
70	Enterprises constructing open ditches and levees.....	dollars.. 282,666							
71	Average cost per acre when completed.....	dollars.. 10.25							
72	Enterprises constructing tile drains only.....	dollars.. 59,770				33,000	1,000		
73	Average cost per acre when completed.....	dollars.. 26.21				25.98	16.67		
74	Enterprises constructing open ditches and tile drains.....	dollars.. 907,172				122,706	41,790	28,000	6,557
75	Average cost per acre when completed.....	dollars.. 8.86				9.76	18.35	7.00	14.57
76	Enterprises constructing open ditches, tile drains, and levees.....	dollars.. 93,000							
77	Average cost per acre when completed.....	dollars.. 23.23							
<b>CROPS.</b>									
78	Improved land in enterprises reporting—								
79	Hay as principal crop on drained land.....	acres.. 97,966	9,834		1,606	2,744		600	306
80	Corn as principal crop on drained land.....	acres.. 97,075			38	2,121	3,802		932
81	Small grains as principal crop on drained land.....	acres.. 24,066			560	200			
82	Vegetables as principal crop on drained land.....	acres.. 2,647				1,470			
83	Other crops as principal ones on drained land.....	acres.. 19,590							
84	Not reporting principal crop on drained land.....	acres.. 13,160		9,800					540

<sup>1</sup> When works under construction have been completed.

## DRAINAGE—WISCONSIN.

COUNTY TABLE II.—OPERATING DRAINAGE ENTERPRISES: 1920—Continued.

		Jackson.	Jefferson.	Juneau.	Kenosha.	Marathon.	Milwaukee.	Monroe.	Oconto.
<b>LAND AREA.</b>									
1	Approximate land area of the county .....	633,600	353,280	513,280	180,480	994,560	150,400	599,680	715,520
2	All land in operating drainage enterprises .....	46,760	17,461	133,297	11,803	11,679	8,392	61,100	4,300
3	Improved land .....	4,140	5,630	27,904	10,277	2,336	7,355	27,641	2,000
4	Per cent of all improved land in farms .....	2.2	2.6	18.3	9.2	1.0	8.1	12.0	1.3
5	Timber and cut-over land .....	15,264	18	38,069	280	8,175	21,472	490	490
6	Other unimproved land .....	27,356	11,813	67,324	1,526	1,168	1,037	11,987	1,810
7	Swampy or subject to overflow, in enterprises .....		1,436	7,014	1,004			29,158	770
8	Suffering a loss of crops from defective drainage .....		204	445				1,102	
9	Assessed acreage .....	46,760	17,461	133,297	11,803	11,679	8,392	61,100	4,300
10	Excess over all land in operating enterprises .....								
<b>DRAINAGE WORKS.</b>									
11	Open ditches: Completed .....	25.2	93.4	289.3	14.5	19.0	49.2	80.3	12.3
12	Additional under construction .....	4.8		9.2				0.8	4.9
13	Maximum completed in any enterprise .....	13.0	5.0	144.5	7.0	19.0	8.5	50.8	11.3
14	Maximum width at bottom of ditch <sup>1</sup> .....	30	8	40	30	60	18	20	10
15	Maximum of average depths of outlet ditches .....	10.0	7.0	10.0	9.0	8.0	9.0	10.0	6.5
16	Mean depth of branch ditches <sup>1</sup> .....	7.0	3.2	6.1	7.0	7.0		7.4	5.7
17	Tile drains: Completed .....		8.2		10.0		4.8		
18	Additional under construction .....				0.7				1.0
19	Maximum completed in any enterprise .....		3.5		4.2		2.3		
20	Maximum size of tile <sup>1</sup> .....		18		30		20		
21	Accessory levees and dikes: Completed .....			0.8					
22	Additional under construction .....								
23	Pumping plants: Engine capacity .....								
24	Pump capacity .....								
25	Area served by pumps .....								
26	Area drained by open ditches only <sup>1</sup> .....	46,760	16,337	128,357	40	11,679	7,332	61,100	600
27	Length of these ditches .....	30.0	88.4	282.5	0.5	19.0	47.2	81.1	1.0
28	Average length per acre .....	3.4	28.6	11.6	68.0	8.6	34.0	7.0	8.8
29	Area having open ditches and levees <sup>1</sup> .....			4,940					
30	Length of these ditches .....			16.0					
31	Average length per acre .....			17.1					
32	Length of the accessory levees .....			0.8					
33	Area drained by tile only <sup>1</sup> .....		230				820		
34	Length of these tile .....		2.9				3.8		
35	Average length per acre .....		66.6				24.5		
36	Area drained by open ditches and tile <sup>1</sup> .....		894		11,768		240		3,700
37	Length of these drains .....		10.3		24.7		3.0		17.2
38	Average length per acre .....		60.8		11.1		66.0		24.5
39	Area having open ditches, tile drains, and levees <sup>1</sup> .....								
40	Length of these drains .....								
41	Average length per acre .....								
42	Length of the accessory levees .....								
<b>DEVELOPMENT OF LAND.</b>									
43	Improved land in operating enterprises, 1920 .....	4,140	5,630	27,904	10,277	2,336	7,355	27,641	2,000
44	Improved land prior to drainage .....	2,600	50	3,271	4			3,384	1,480
45	Increase since drainage .....	1,640	5,580	24,633	10,273	2,336	7,355	24,257	520
46	Per cent of increase <sup>1</sup> .....	65.6	753.1	753.1				716.8	35.1
47	Per cent increase is of all improved land in farms, 1920 .....	0.9	2.6	14.4	9.2	1.0	8.1	10.5	0.3
48	Timber and cut-over land, 1920 .....	15,264	18	38,069		8,175		21,472	490
49	Timber and cut-over land prior to drainage .....	15,264	18	41,309	280	10,511		45,844	490
50	Decrease since drainage .....			3,240	280	2,336		23,872	
51	Per cent of decrease .....			7.8	100.0	22.2		52.6	
52	Other unimproved land, 1920 .....	27,356	11,813	67,324	1,526	1,168	1,037	11,987	1,810
53	Other unimproved land prior to drainage .....	28,996	17,393	88,717	11,519	1,168	8,392	12,872	2,330
54	Decrease since drainage .....	1,640	5,580	21,393	9,993		7,355	385	520
55	Per cent of decrease .....	5.7	32.1	24.1	86.8		87.6	3.1	22.3
56	Swampy or subject to overflow, 1920 .....		1,436	7,014	1,004			29,158	770
57	Swampy or subject to overflow prior to drainage .....	28,996	17,461	129,540	11,519	11,679	8,392	57,100	2,420
58	Decrease since drainage .....	28,996	16,025	119,526	10,515	11,679	8,392	27,942	1,650
59	Per cent of decrease .....	100.0	91.8	94.5	91.3	100.0	100.0	48.9	68.2
<b>CAPITAL INVESTED AND COST PER ACRE.</b>									
60	Total capital invested in and required for completion of operating enterprises .....	113,570	47,187	761,004	100,100	53,200	110,120	167,039	44,232
61	Capital invested in these enterprises to Dec. 31, 1919 .....	101,800	47,187	739,100	100,100	53,200	110,120	165,113	30,012
62	Additional capital required to complete these enterprises .....	11,770		21,904				1,926	14,220
63	Average cost per acre when completed .....	2.43	2.70	5.71	8.48	4.56	13.12	2.73	10.29
64	Enterprises constructing open ditches only .....	113,570	29,334	711,504	400	53,200	95,141	167,039	312
65	Average cost per acre when completed .....	2.43	1.80	5.54	10.00	4.56	12.98	2.73	0.52
66	Enterprises constructing open ditches and levees .....			49,500					
67	Average cost per acre when completed .....			10.02					
68	Enterprises constructing tile drains only .....		4,753				6,479		
69	Average cost per acre when completed .....		20.67				7.90		
70	Enterprises constructing open ditches and tile drains .....		13,100		99,700		8,500		43,920
71	Average cost per acre when completed .....		14.65		8.48		35.42		11.87
72	Enterprises constructing open ditches, tile drains, and levees .....								
73	Average cost per acre when completed .....								
<b>CROPS.</b>									
74	Improved land in enterprises reporting—								
75	Hay as principal crop on drained land .....	1,640	181	8,905		2,336		23,622	160
76	Corn as principal crop on drained land .....		5,129	1,500	10,249		6,345	4,000	
77	Small grains as principal crop on drained land .....			15,050					
78	Vegetables as principal crop on drained land .....				28				
79	Other crops as principal ones on drained land .....			2,449			910		
80	Not reporting principal crop on drained land .....	2,500	320				100	19	1,850

<sup>1</sup> When works under construction have been completed.<sup>1</sup> Per cent not shown when more than 1,000.

## DRAINAGE—WISCONSIN.

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COUNTY TABLE II.—OPERATING DRAINAGE ENTERPRISES: 1920—Continued.

		Outa- gamie.	Ozaukee.	Portage.	Racine.	Rock.	Rusk.	Shawano.	Sheboy- gan.	
LAND AREA.										
1	Approximate land area of the county .....	acres..	413,440	149,120	519,680	207,360	458,240	592,000	741,120	333,440
2	All land in operating drainage enterprises.....	acres..	18,365	5,960	67,567	61,847	15,792	5,174	4,600	7,106
3	Improved land.....	acres..	5,468	4,462	21,734	47,265	5,372	1,104	2,970	561
4	Per cent of all improved land in farms.....		2.3	4.1	8.7	32.3	1.6	2.4	1.5	0.2
5	Timber and cut-over land.....	acres..	649	928		2,920		174		3,206
6	Other unimproved land.....	acres..	12,188	570	45,833	11,662	10,420	3,896	1,630	3,339
7	Swampy or subject to overflow, in enterprises.....	acres..	530		5,500	5,562	4,656	712	720	4,000
8	Suffering a loss of crops from defective drainage.....	acres..			5,500	414	72			
9	Assessed acreage.....		18,365	5,960	67,567	61,847	15,792	5,174	4,600	7,106
10	Excess over all land in operating enterprises.....	acres..								
DRAINAGE WORKS.										
11	Open ditches:									
12	Completed.....	miles..	68.4	23.7	153.4	95.3	30.5	17.6	16.0	23.4
13	Additional under construction.....	miles..	6.6	1.0					1.1	6.2
14	Maximum completed in any enterprise.....	miles..	23.4	4.9	108.0	37.5	9.0	5.8	5.0	18.8
15	Maximum width at bottom of ditch <sup>1</sup> .....	feet..	6	25	60	30	20	2	6	36
16	Maximum of average depths of outlet ditches <sup>1</sup> .....	feet..	8.0	8.0	8.0	12.0	8.0	9.0	8.0	12.0
17	Mean depth of branch ditches <sup>1</sup> .....	feet..	4.3	6.6	7.8	7.0	5.9	3.0		7.0
18	Tile drains:									
19	Completed.....	miles..		2.1		31.7		36.1		4.4
20	Additional under construction.....	miles..	14.2			0.4		11.0		
21	Maximum completed in any enterprise.....	miles..		1.1		10.3		26.7		2.0
22	Maximum size of tile <sup>1</sup> .....	inches..	16	15		24		16		15
23	Accessory levees and dikes:									
24	Completed.....	miles..	1.0							
25	Additional under construction.....	miles..	2.5							
26	Pumping plants:									
27	Engine capacity.....	horsepower..								
28	Pump capacity.....	gallons per minute..								
29	Area served by pumps.....	acres..								
30	Area drained by open ditches only <sup>1</sup> .....	acres..	12,618	4,238	67,567	7,000	15,792	1,028	4,600	6,580
31	Length of these ditches.....	miles..	38.2	19.8	153.4	7.0	30.5	7.5	17.1	28.0
32	Average length per acre.....	feet..	16.0	24.7	12.0	5.3	10.2	38.5	19.6	22.5
33	Area having open ditches and levees <sup>1</sup> .....	acres..	1,687							
34	Length of these ditches.....	miles..	6.8							
35	Average length per acre.....	feet..	21.3							
36	Length of the accessory levees.....	miles..	1.0							
37	Area drained by tile only <sup>1</sup> .....	acres..		22						276
38	Length of these tile.....	miles..		1.0						4.0
39	Average length per acre.....	feet..		240.0						76.5
40	Area drained by open ditches and tile <sup>1</sup> .....	acres..		1,700		54,847		4,146		250
41	Length of these drains.....	miles..		6.0		120.4		37.2		2.0
42	Average length per acre.....	feet..		18.6		11.6		72.8		42.2
43	Area having open ditches, tile drains, and levees <sup>1</sup> .....	acres..	4,000							
44	Length of these drains.....	miles..	44.2							
45	Average length per acre.....	feet..	55.3							
46	Length of the accessory levees.....	miles..	2.5							
DEVELOPMENT OF LAND.										
47	Improved land in operating enterprises, 1920.....	acres..	5,468	4,462	21,734	47,265	5,372	1,104	2,970	561
48	Improved land prior to drainage.....	acres..	1,463	278		22,276	43	105	1,120	25
49	Increase since drainage.....	acres..	4,005	4,184	21,734	24,989	5,329	999	1,850	536
50	Per cent of increase <sup>1</sup> .....		273.8			112.2		951.4	165.2	
51	Per cent increase is of all improved land in farms, 1920.....		1.7	3.9	8.7	17.1	1.6	2.1	1.0	0.2
52	Timber and cut-over land, 1920.....	acres..	649	928		2,920		174		3,206
53	Timber and cut-over land prior to drainage.....	acres..	2,905	1,202	7,746	2,920		174		3,387
54	Decrease since drainage.....	acres..	2,256	274	7,746					181
55	Per cent of decrease.....		77.7	22.8	100.0					5.3
56	Other unimproved land, 1920.....	acres..	12,188	570	45,833	11,662	10,420	3,896	1,630	3,339
57	Other unimproved land prior to drainage.....	acres..	13,937	4,480	59,821	36,651	15,749	4,895	3,480	3,094
58	Decrease since drainage.....	acres..	1,749	3,910	13,988	24,989	5,329	999	1,850	535
59	Per cent of decrease.....		12.5	87.3	23.4	68.2	33.8	20.4	53.2	9.6
60	Swampy or subject to overflow, 1920.....	acres..	530		5,500	5,562	4,656	712	720	4,000
61	Swampy or subject to overflow prior to drainage.....	acres..	11,088	5,960	67,567	49,907	15,792	3,740	4,600	7,106
62	Decrease since drainage.....	acres..	10,558	5,960	62,067	44,345	11,136	3,028	3,880	3,106
63	Per cent of decrease.....		95.2	100.0	91.9	88.9	70.5	81.0	84.3	43.7
CAPITAL INVESTED AND COST PER ACRE.										
64	Total capital invested in and required for completion of operating enterprises.....	dollars..	167,540	63,160	441,920	406,000	88,375	82,516	10,490	260,033
65	Capital invested in these enterprises to Dec. 31, 1919.....	dollars..	117,540	60,160	441,920	406,000	88,375	69,516	9,740	135,033
66	Additional capital required to complete these enterprises.....	dollars..	50,000	3,000				13,000	750	125,000
67	Average cost per acre when completed.....	dollars..	9.15	10.60	6.54	6.56	5.60	15.95	2.28	36.59
68	Enterprises constructing open ditches only.....	dollars..	59,574	24,660	441,920	35,000	88,375	7,617	10,490	238,960
69	Average cost per acre when completed.....	dollars..	4.75	5.82	6.54	5.00	5.60	7.41	2.28	36.51
70	Enterprises constructing open ditches and levees.....	dollars..	14,666							
71	Average cost per acre when completed.....	dollars..	8.69							
72	Enterprises constructing tile drains only.....	dollars..		1,000						8,683
73	Average cost per acre when completed.....	dollars..		45.45						31.28
74	Enterprises constructing open ditches and tile drains.....	dollars..		37,500		371,000		74,899		12,500
75	Average cost per acre when completed.....	dollars..		22.06		6.76		18.07		50.00
76	Enterprises constructing open ditches, tile drains, and levees.....	dollars..	93,000							
77	Average cost per acre when completed.....	dollars..	23.25							
CROPS.										
78	Improved land in enterprises reporting—									
79	Hay as principal crop on drained land.....	acres..	4,068	1,575	20,054			865	1,570	150
80	Corn as principal crop on drained land.....	acres..		2,987		39,713	5,372			411
81	Small grains as principal crop on drained land.....	acres..			1,080					
82	Vegetables as principal crop on drained land.....	acres..						239		
83	Other crops as principal ones on drained land.....	acres..	1,400		600	7,552				
84	Not reporting principal crop on drained land.....	acres..								

<sup>1</sup> When works under construction have been completed.

\* Per cent not shown when more than 1,000.

## DRAINAGE—WISCONSIN.

COUNTY TABLE II.—OPERATING DRAINAGE ENTERPRISES: 1920—Continued.

		Trem- pealeau	Wal- worth.	Washing- ton.	Wauke- sha.	Wau- shara.	Winne- bago.	Wood.	Other counties. <sup>1</sup>	
LAND AREA.										
1	Approximate land area of the county.....	acres..	478,720	358,400	275,840	351,360	413,440	293,760	517,760	5,087,360
2	All land in operating drainage enterprises.....	acres..	4,301	8,910	4,500	7,848	7,240	6,246	64,343	20,209
3	Improved land.....	acres..	430	4,048	330	4,757	456	3,710	18,911	10,410
4	Per cent of all improved land in farms.....	per cent.	0.2	1.7	0.2	2.1	0.2	2.0	13.8	0.5
5	Timber and cut-over land.....	acres..	2,581		2,825	419	190		4,536	1,833
6	Other unimproved land.....	acres..	1,290	4,862	1,345	2,672	6,594	2,536	40,896	7,966
7	Swampy or subject to overflow, in enterprises.....	acres..				501	794			3,199
8	Suffering a loss of crops from defective drainage.....	acres..				288	57			440
9	Assessed acreage.....	acres..	4,301	8,910	4,500	7,848	7,240	6,246	64,343	20,209
10	Excess over all land in operating enterprises.....	acres..								
DRAINAGE WORKS.										
11	Open ditches: Completed.....	miles..	7.3	23.3	20.5	35.1	16.9	10.0	137.0	85.2
12	Additional under construction.....	miles..								
13	Maximum completed in any enterprise.....	miles..	7.3	11.2	7.5	10.0	9.0	6.0	47.0	15.0
14	Maximum width at bottom of ditch.....	feet..	30	20	25	20	16	10	60	30
15	Maximum of average depths of outlet ditches.....	feet..	6.0	9.0	8.0	8.0	8.0	7.0	10.0	10.0
16	Mean depth of branch ditches.....	feet..	6.0	7.0	7.0	4.9	8.0		7.1	5.0
17	Tile drains: Completed.....	miles..		7.5	0.5	5.0				
18	Additional under construction.....	miles..								
19	Maximum completed in any enterprise.....	miles..		6.0	0.5	5.0				
20	Maximum size of tile.....	inches..		14	8	10				
21	Accessory levees and dikes: Completed.....	miles..	4.8						0.8	0.3
22	Additional under construction.....	miles..								
23	Pumping plants: Engine capacity.....	horsepower..	( <sup>2</sup> )							150
24	Pump capacity.....	gallons per minute..	( <sup>2</sup> )							
25	Area served by pumps.....	acres..	4,301							2,296
26	Area drained by open ditches only.....	acres..		4,810	4,300	6,348	7,240	6,246	49,983	17,913
27	Length of these ditches.....	miles..		14.7	19.5	25.1	16.9	10.0	90.0	83.2
28	Average length per acre.....	feet..		16.1	23.9	20.9	12.3	8.5	9.5	24.5
29	Area having open ditches and levees.....	acres..	4,301						14,360	2,296
30	Length of these ditches.....	miles..	7.3						47.0	2.0
31	Average length per acre.....	feet..	9.0						17.3	4.6
32	Length of the accessory levees.....	miles..	4.8						0.8	0.3
33	Area drained by tile only.....	acres..		280						
34	Length of these tile.....	miles..		1.5						
35	Average length per acre.....	feet..		28.3						
36	Area drained by open ditches and tile.....	acres..		8,820	200	1,500				
37	Length of these drains.....	miles..		14.6	1.5	15.0				
38	Average length per acre.....	feet..		20.2	39.6	52.8				
39	Area having open ditches, tile drains, and levees.....	acres..								
40	Length of these drains.....	miles..								
41	Average length per acre.....	feet..								
42	Length of the accessory levees.....	miles..								
DEVELOPMENT OF LAND.										
43	Improved land, in operating enterprises, 1920.....	acres..	430	4,048	330	4,757	456	3,710	18,911	10,410
44	Improved land prior to drainage.....	acres..		130	40				200	1,410
45	Increase since drainage.....	acres..	430	2,918	290	4,757	456	3,710	18,711	9,000
46	Per cent of increase.....	per cent.			725.0					638.3
47	Per cent increase is of all improved land in farms, 1920.....	per cent.	0.2	1.6	0.2	2.1	0.2	2.0	13.7	0.4
48	Timber and cut-over land, 1920.....	acres..	2,581		2,825	419	190		4,536	1,833
49	Timber and cut-over land prior to drainage.....	acres..	2,581		2,975	1,169	570		7,279	2,163
50	Decrease since drainage.....	acres..			150	750	380		2,743	330
51	Per cent of decrease.....	per cent.			5.0	64.2	66.7		37.7	15.3
52	Other unimproved land, 1920.....	acres..	1,290	4,862	1,345	2,672	6,594	2,536	40,896	7,966
53	Other unimproved land prior to drainage.....	acres..	1,720	8,780	1,485	6,679	6,670	6,246	56,864	16,636
54	Decrease since drainage.....	acres..	430	3,918	140	4,007	76	3,710	15,968	8,670
55	Per cent of decrease.....	per cent.	25.0	44.6	9.4	60.0	1.1	59.4	28.1	52.1
56	Swampy or subject to overflow, 1920.....	acres..				501	794			3,199
57	Swampy or subject to overflow prior to drainage.....	acres..	4,301	8,910	4,500	7,848	7,240	6,246	59,807	16,061
58	Decrease since drainage.....	acres..	4,301	8,910	4,500	7,347	6,446	6,246	59,807	12,882
59	Per cent of decrease.....	per cent.	100.0	100.0	100.0	93.6	89.0	100.0	100.0	80.1
CAPITAL INVESTED AND COST PER ACRE.										
60	Total capital invested in and required for completion of operating enterprises.....	dollars..	50,000	63,465	64,500	44,835	27,000	20,400	394,200	143,463
61	Capital invested in these enterprises to Dec. 31, 1919.....	dollars..	50,000	63,465	64,500	44,835	27,000	20,400	394,200	143,463
62	Additional capital required to complete these enterprises.....	dollars..								
63	Average cost per acre when completed.....	dollars..	11.63	7.12	14.33	5.71	3.73	3.27	6.13	7.10
64	Enterprises constructing open ditches only.....	dollars..		33,560	59,500	27,835	27,000	20,400	250,700	118,463
65	Average cost per acre when completed.....	dollars..		6.98	13.84	4.38	3.73	3.27	5.02	6.61
66	Enterprises constructing open ditches and levees.....	dollars..	50,000						143,500	25,000
67	Average cost per acre when completed.....	dollars..	11.63						9.99	10.89
68	Enterprises constructing tile drains only.....	dollars..		4,905						
69	Average cost per acre when completed.....	dollars..		17.52						
70	Enterprises constructing open ditches and tile drains.....	dollars..		25,000	5,000	17,000				
71	Average cost per acre when completed.....	dollars..		6.54	25.00	11.33				
72	Enterprises constructing open ditches, tile drains, and levees.....	dollars..								
73	Average cost per acre when completed.....	dollars..								
CROPS.										
74	Improved land in enterprises reporting—									
75	Hay as principal crop on drained land.....	acres..	430			311	456	882	8,265	6,736
76	Corn as principal crop on drained land.....	acres..		4,048	330	3,698		2,828		3,674
77	Small grains as principal crop on drained land.....	acres..				750			5,026	
78	Vegetables as principal crop on drained land.....	acres..								
79	Other crops as principal ones on drained land.....	acres..							5,620	
80	Not reporting principal crop on drained land.....	acres..								

<sup>1</sup> Includes only Barron, Brown, Buffalo, Burnett, Calumet, Green, Green Lake, Manitowoc, Marinette, Polk, and Waupaca Counties.<sup>2</sup> When works under construction have been completed.<sup>3</sup> Pumping plant located in Buffalo County.<sup>4</sup> Per cent not shown when more than 1,000



## WYOMING.

The following pages present the statistics of drainage for Wyoming collected at the census of 1920. The figures relate to conditions on January 1, 1920, except where indicated otherwise. No census of drainage has been taken heretofore, so there are no comparable figures for previous years. The data relate to the artificial drainage of land in farms, and of other land that ultimately will be used for agricultural purposes. The organized drainage enterprises may include areas of unimproved land not yet in farms. The statistics

for drainage on farms were collected in the general census of agriculture, while the statistics for drainage enterprises were obtained in a special canvass of those enterprises. Since drainage on farms may be either inside or outside an organized enterprise, and the drains that each individual owner installs upon his own farm may be either supplemental to or entirely independent of the works installed by an enterprise, the figures for the two parts of the drainage census are presented separately.

TABLE 1.—SUMMARY FOR THE STATE: 1920.

ITEM.	Amount.	Per cent of total.
<b>DRAINAGE ON FARMS.</b>		
Number of all farms in the state.....	15,748	100.0
Farms reporting land having drainage.....	433	2.7
Farms reporting land needing drainage.....	1,127	7.2
All land in farms.....acres..	11,809,351	100.0
Improved land in farms.....acres..	2,102,005	17.8
Farm land reported as provided with drainage.....acres..	35,654	0.3
Farm land reported as needing drainage.....acres..	69,066	0.6
Needing drainage only.....acres..	23,837	0.2
Needing drainage and clearing.....acres..	45,229	0.4
<b>DRAINAGE ENTERPRISES.</b>		
Approximate land area of the state.....acres..	62,430,720	100.0
All land in operating drainage enterprises.....acres..	95,474	0.2
Improved land.....acres..	84,846	0.1
Per cent of all improved land in farms.....	4.0	
Unimproved land <sup>1</sup> .....acres..	10,628	( <sup>2</sup> )
Swampy, subject to overflow, seeped, or alkali.....acres..	20,785	( <sup>2</sup> )
Suffering a loss of crops from defective drainage.....acres..	6,595	( <sup>2</sup> )
Improved land prior to drainage.....acres..	83,206	0.1
Increase since drainage began.....acres..	1,640	( <sup>2</sup> )
Land in nonoperating enterprises.....acres..	11,567	( <sup>2</sup> )
Open ditches in operating enterprises.....miles..	26.4	100.0
Completed.....miles..	25.1	95.1
Additional under construction.....miles..	1.3	4.9
Tile drains in operating enterprises.....miles..	186.0	100.0
Completed.....miles..	114.2	61.4
Additional under construction.....miles..	71.8	38.6
Total capital invested in and required for completion of operating enterprises..	\$1,667,367	100.0
Capital invested in these enterprises to Dec. 31, 1919.....	1,175,962	70.5
Additional capital required to complete these enterprises.....	491,405	29.5
Average cost per acre when completed.....	17.46	

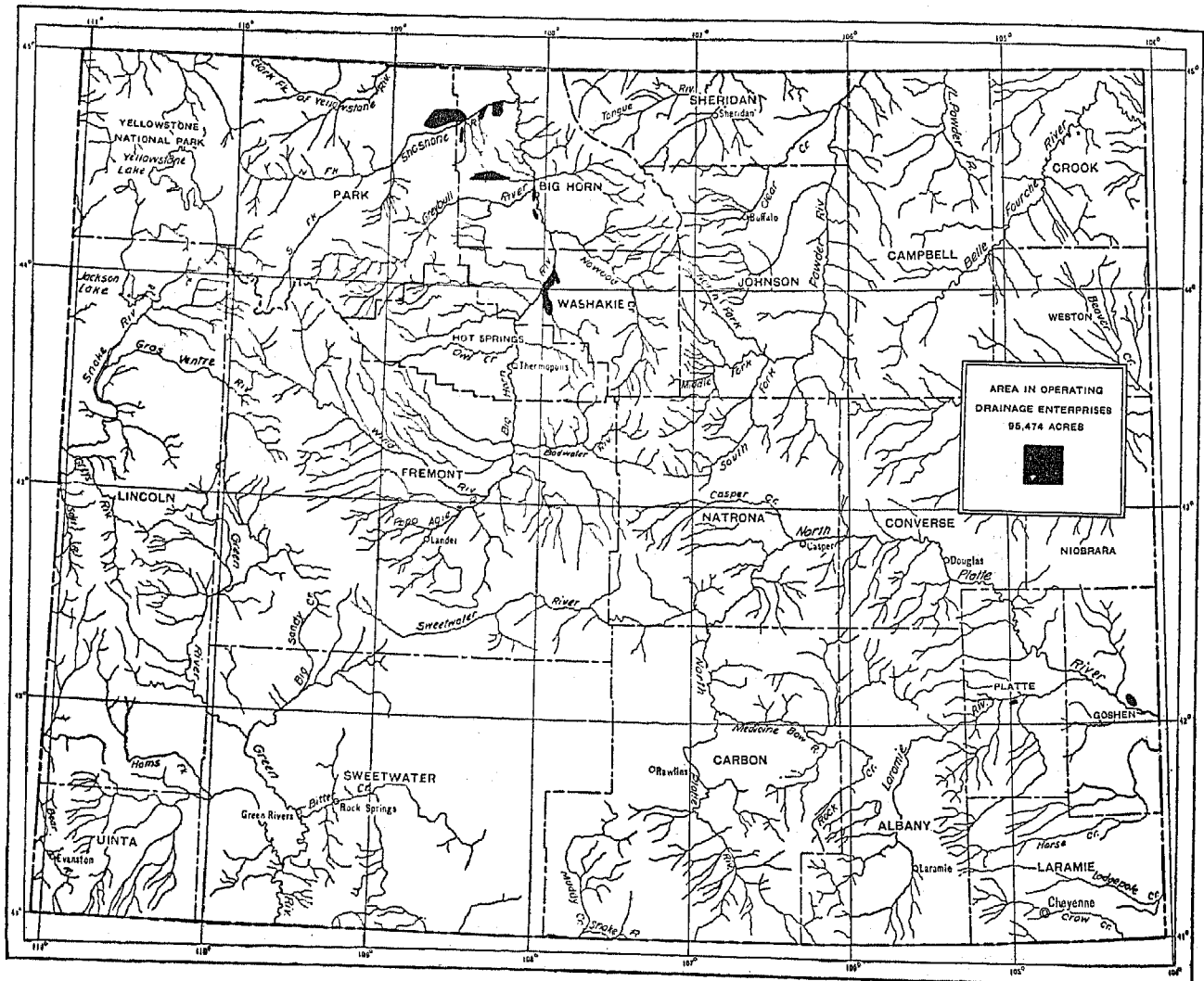
<sup>1</sup> No timber or cut-over land reported.

<sup>2</sup> Less than one-tenth of 1 per cent.



# WYOMING

APPROXIMATE LOCATION AND AREA OF OPERATING DRAINAGE ENTERPRISES.



Operating and nonoperating enterprises.—In most of the tables that follow, statistics are given for operating enterprises only. These enterprises, as already defined, include both those which have completed their drainage works and those with such works under construction; among the latter may be some that had completed the original plan of reclamation several years ago but were constructing extensions or enlargements on January 1, 1920. The nonoperating enterprises have a legal existence, though they have not yet accomplished any drainage. They may include districts that on the census date had completed their plans, sold bonds to cover the cost of the undertakings, and let contracts for the construction work, and also districts that had just been established and were still subject to considerable change in area, plan of drainage works, and cost.

TABLE 2.—LAND AND CAPITAL INVESTED IN ALL ENTERPRISES, CLASSIFIED AS BETWEEN OPERATING AND NONOPERATING ENTERPRISES: 1920.

CLASS.	LAND.		CAPITAL. <sup>1</sup>		
	Acreage.	Per cent of total.	To Dec. 31, 1919.		Additional required to complete.
			Amount.	Per cent of total.	
All organized enterprises.....	107,041	100.0	\$1,182,362	100.0	\$901,873
Operating enterprises.....	95,474	89.2	1,175,962	99.5	491,405
With works completed.....	11,740	11.0	32,231	2.7	.....
With works under construction.....	83,734	78.2	1,143,731	96.7	491,405
Nonoperating enterprises.....	11,567	10.8	6,400	0.5	410,468

<sup>1</sup> The inquiry asked for the "total cost of the enterprise to Dec. 31, 1919," and for an "estimate of additional investment to complete."

Location of enterprises.—Of the total area in operating drainage enterprises in Wyoming, 44 per cent is situated in Big Horn County, and nearly all is in the valley of Big Horn River in the north central part of the state. There are two enterprises in the eastern part, and a very small one in Fremont County.

TABLE 3.—LAND AND CAPITAL INVESTED IN ALL ENTERPRISES, CLASSIFIED BY DRAINAGE BASIN: 1920.

DRAINAGE BASIN.	LAND.		CAPITAL.		
	Acreage.	Per cent of total.	To Dec. 31, 1919.		Additional required to complete.
			Amount.	Per cent of total.	
All organized enterprises.....	107,041	100.0	\$1,182,362	100.0	\$901,873
Operating enterprises.....	95,474	89.2	1,175,962	99.5	491,405
Platte River.....	3,264	3.0	18,896	1.6	4,224
Big Horn River.....	92,210	86.1	1,157,066	97.9	487,181
Nonoperating enterprises.....	11,567	10.8	6,400	0.5	410,468
Big Horn River.....	11,567	10.8	6,400	0.5	410,468

Condition of land in enterprises.—All the drainage enterprises in this state are reported as organized for the purpose of draining or protecting land injured or threatened with water-logging or the concentration of salts, commonly called alkali, in the surface soil as a result of irrigation. For the state, 19,622 acres of land in drainage districts are reported as not having needed drainage, but as having been assessed merely for contributing to the injury of the other land.

The usual purpose of an organized enterprise is merely to provide adequate outlets into which the landowners of the district may drain their farms and to afford relief from overflows for the district as a unit. Therefore the fact that an enterprise which has completed the construction of the drainage works authorized contains land still swampy, subject to overflow, seeped, or alkali, or that suffers damage to crops, does not show that the improvement works are inadequate.

TABLE 4.—LAND IN ALL ENTERPRISES, CLASSIFIED BY CONDITION: 1920.

CONDITION OF LAND.	OPERATING ENTERPRISES.				Non-operating enterprises (acres).
	Total.		Works completed (acres).	Works under construction (acres).	
	Acreage.	Per cent of all land.			
All land in enterprises.....	95,474	100.0	11,740	83,734	11,567
Improved land.....	84,846	88.9	11,140	73,706	7,513
Unimproved land <sup>1</sup> .....	10,628	11.1	600	10,028	4,054
Swampy, seeped, or alkali.....	20,785	21.8	2,700	18,085	6,554
Suffering a loss of crops.....	6,595	6.9	2,165	4,430	1,000

<sup>1</sup> No timber or cut-over land reported.

Size of enterprises.—Presentation of the statistics by counties requires that an enterprise located in more than one county be divided, and the part in each county be considered a separate enterprise. In this way 15 operating drainage enterprises are counted in Wyoming, with an average area of 6,365 acres. There is no overlapping of the enterprises in this state.

TABLE 5.—LAND IN OPERATING ENTERPRISES, CLASSIFIED BY SIZE OF AREA ASSESSED: 1920.

SIZE GROUP.	Land in enterprises (acres).	ASSESSED AREA.	
		Acreage.	Per cent of total.
All operating enterprises.....	95,474	95,474	100.0
Less than 200 acres.....	140	140	0.1
200 to 499 acres.....	500	500	0.5
500 to 999 acres.....	21,514	21,514	22.5
1,000 to 4,999 acres.....	27,400	27,400	28.7
5,000 to 9,999 acres.....	45,920	45,920	48.1
10,000 to 49,999 acres.....	.....	.....	.....

**Character of enterprises.**—The drainage enterprises in Wyoming comprise drainage districts organized under the general drainage law approved March 1, 1911 (ch. 95), irrigation projects of the United States Reclamation Service, and two very small enterprises under the United States Indian Service and under individual ownership, respectively.

Drainage districts under the statute of 1911 are established by the district court of any county in which a part of the land to be affected is located. The district may comprise separated areas, if the court finds that drainage of all parts will be of public benefit and can be accomplished most economically as one undertaking. A petition for establishment must be signed by a majority of the owners representing at least one-third of the acreage, or by the owners of more than one-half the acreage in the proposed district. A preliminary investigation as to the practicability, public utility, probable benefits, and cost of the project is made by three commissioners appointed by the court. These commissioners become the executive officers of the district when it is established, to prepare the plan of improvement works, to assess damages and benefits to the property in the district, and to secure construction of the drainage works. The court holds public hearings to determine the sufficiency of the petition before appointing the commissioners, to discuss the preliminary report of the commissioners before establishing the district, and to consider objections to the commissioners' final report before approving the work and confirming the assessments of benefits and damages. Appeals regarding the assessments may be taken to the supreme court of the state. Bonds of the district may be issued by the commissioners.

TABLE 6.—LAND AND CAPITAL INVESTED IN ALL ENTERPRISES, CLASSIFIED BY CHARACTER OF ENTERPRISE: 1920.

CHARACTER OF ENTERPRISE.	LAND.		CAPITAL.		
	Acreage.	Per cent of total.	To Dec. 31, 1919.		Additional required to complete.
			Amount.	Per cent of total.	
All drainage enterprises.....	107,041	100.0	\$1,182,362	100.0	\$901,873
Operating enterprises.....	95,474	89.2	1,175,962	99.5	491,405
Drainage districts.....	60,834	56.8	638,662	54.0	491,405
U. S. Reclamation projects <sup>1</sup> .....	34,640	32.4	537,300	45.4	.....
Nonoperating enterprises.....	11,567	10.8	6,400	0.5	410,468
Drainage districts.....	11,567	10.8	6,400	0.5	410,468

<sup>1</sup> Includes 140 acres under U. S. Indian Service and 500 acres under individual ownership.

The United States Reclamation Service may provide drainage and protection for the land in its irrigation projects as it may deem necessary. An act of the legislature, February 27, 1919 (ch. 142), author-

izes cooperation between drainage and irrigation districts and the United States Reclamation Service in the construction of drainage and irrigation works.

An amendment to the drainage law, made March 5, 1915 (ch. 155), does not affect the character of those enterprises as described, and is the only other law of the state relating to drainage enterprises.

**Drainage works.**—The total works completed by drainage enterprises to December 31, 1919, comprised 25.1 miles of open ditches and 114.2 miles of tile drains; the additional lengths under construction were 1.3 miles of open ditches and 71.8 miles of tile drains. These figures do not include drains installed by individual farm owners supplemental to the works of the enterprises. There are no pumping districts for land drainage in the state.

TABLE 7.—LAND AND CAPITAL INVESTED IN OPERATING ENTERPRISES, CLASSIFIED BY KIND OF DRAINAGE WORKS: 1920.

KIND OF WORKS.	LAND.		CAPITAL.		
	Acreage.	Per cent of total.	To Dec. 31, 1919.		Additional required to complete.
			Amount.	Per cent of total.	
All kinds.....	95,474	100.0	\$1,175,962	100.0	\$491,405
Open ditches only.....	3,404	3.6	25,127	2.1	4,224
Tile drains only.....	54,650	57.2	590,039	50.2	269,133
Open ditches and tile drains.....	37,420	39.2	560,796	47.7	218,048

The average depth of the main or outlet ditch was reported for each enterprise. The maximum reported for any enterprise in the state and the maximum in each county are shown in line 14 of County Table II. The maximum length, width, and depth of outlet shown in that table for any county may not refer to the same enterprise.

In County Table II, line 15 shows the mean depth of branch ditches (open ditches only), which is a very crude indication of the depth of soil drainage that may be obtained in the enterprises as determined by the depth of outlet provided for farm drains. The mean depth was computed by giving each separate depth a weight in proportion to the acreage it serves. As most enterprises reported depths in whole numbers only, the occasional decimals were omitted in making these computations.

TABLE 8.—LAND IN OPERATING ENTERPRISES, CLASSIFIED BY AVERAGE DEPTH OF BRANCH DITCHES: 1920.

DEPTH OF BRANCH DITCHES.	Acreage.	Per cent of total.
All operating enterprises.....	95,474	100.0
4.0 to 4.9 feet.....	500	0.5
8.0 to 8.9 feet.....	34,000	35.6
Not reporting branches.....	60,974	63.9

# DRAINAGE—WYOMING.

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**Maintenance of works.**—The drainage law of 1911 provides for the maintenance of the drainage districts by the district commissioners, and authorizes assessments for such work to be levied against the land in the same proportion as the cost of original construction. It requires the commissioners to submit to the court each year a report stating the probable needs of the district for the next fiscal year, which is confirmed by the court at a hearing to determine objections.

**TABLE 9.—LAND AND CAPITAL INVESTED IN OPERATING ENTERPRISES, CLASSIFIED BY METHOD OF MAINTENANCE: 1920.**

METHOD OF MAINTENANCE.	LAND.		CAPITAL.		
	Acreage.	Per cent of total.	To Dec. 31, 1919.		Additional required to complete.
			Amount.	Per cent of total.	
All operating enterprises.....	95,474	100.0	\$1,175,962	100.0	\$491,495
By district forces.....	45,390	47.5	697,300	59.3	259,775
By contract.....	8,400	8.8	8,000	0.7	.....
By method not specified.....	3,000	3.1	70,000	6.0	30,000
No maintenance provided.....	30,984	32.5	294,662	25.1	181,630
Not reported.....	7,700	8.1	106,000	9.0	20,000

**Date of organization.**—The progress in drainage development is shown only roughly by the dates of the organization of the enterprises, which are the dates when the districts were established by the district courts, since there may be a period of a year or more between the decree of establishment and the beginning of actual construction, and since the work of construction may occupy several years in a large district. It was not practicable, however, for the census to secure data as to the time of the beginning or the completion of the drainage works. Under the date of organization are tabulated the entire area, works, and capital of each enterprise, even including any extensions made after the original plan of drainage was completed.

**TABLE 10.—LAND IN OPERATING ENTERPRISES, CLASSIFIED BY DATE ENTERPRISE WAS ORGANIZED: 1920.**

DATE OF ORGANIZATION.	LAND.		AREA ASSESSED.	
	Acreage.	Per cent of total.	Acreage.	Per cent of total.
All operating enterprises.....	95,474	100.0	95,474	100.0
1910 to 1914.....	50,000	64.7	50,000	64.7
1915 to 1919.....	45,474	35.3	45,474	35.3

**TABLE 11.—CAPITAL INVESTED IN OPERATING ENTERPRISES, CLASSIFIED BY DATE ENTERPRISE WAS ORGANIZED: 1920.**

DATE OF ORGANIZATION.	CAPITAL.		
	To Dec. 31, 1919.		Additional required to complete.
	Amount.	Per cent of total.	
All operating enterprises.....	\$1,175,962	100.0	\$491,495
1910 to 1914.....	684,069	58.2	231,775
1915 to 1919.....	491,893	41.8	259,630

**TABLE 12.—DRAINS (COMPLETED AND UNDER CONSTRUCTION) IN OPERATING ENTERPRISES, CLASSIFIED BY DATE ENTERPRISE WAS ORGANIZED: 1920.**

DATE OF ORGANIZATION.	DITCHES.		TILE.	
	Miles.	Per cent of total.	Miles.	Per cent of total.
All drains.....	26.4	100.0	186.0	100.0
1910 to 1914.....	23.0	75.8	105.0	56.5
1915 to 1919.....	6.4	24.2	81.0	43.5

**Crops.**—The principal crops grown upon the drained land in drainage enterprises are alfalfa and sugar beets. Data were not secured to show the part of each enterprise planted to any crop, so the enterprises have been classified according to the principal crop, and the total area of improved land is shown thus classified, in County Table II. No data were secured at the general census of agriculture to separate the crops grown upon land drained artificially from those produced upon land drained naturally.

**COUNTY TABLE I.—DRAINAGE ON FARMS: 1920.**

	THE STATE.	Big Horn.	Carbon.	Fremont.	Johnson.
1 Number of all farms in the state or county.....	15,748	998	413	969	624
2 Farms reporting land having drainage.....	453	108	7	20	8
3 Farms reporting land needing drainage.....	1,127	276	13	115	19
4 Farms in drainage and levee districts.....	337	139	.....	9	.....
<b>LAND AND FARM AREA.</b>					
5 Approximate land area of the state or county.....acres..	162,430,720	1,990,400	5,124,480	7,847,040	2,664,960
6 All land in farms.....acres..	11,809,351	190,445	843,520	449,331	472,611
7 Improved land in farms.....acres..	2,102,065	93,661	102,113	120,291	71,232
8 Woodland in farms.....acres..	421,806	7,830	14,566	8,750	5,163
9 Other unimproved land in farms.....acres..	9,285,540	88,954	726,841	320,290	396,216
10 Farmland reported as provided with drainage.....acres..	35,654	7,505	525	743	996
11 Farmland reported as needing drainage.....acres..	69,066	16,138	802	6,458	1,905
12 Drainage only.....acres..	23,837	10,992	377	3,266	735
13 Drainage and clearing.....acres..	45,229	5,146	425	3,163	550

<sup>1</sup> Includes 1,886,720 acres in Yellowstone National Park.

## DRAINAGE—WYOMING.

COUNTY TABLE I.—DRAINAGE ON FARMS: 1920—Continued.

		Lincoln.	Park.	Platte.	Sheridan.	Washakie.	All other counties. <sup>1</sup>
1	Number of all farms in the county.....	923	839	1,146	972	318	8,546
2	Farms reporting land having drainage.....	8	204	10	18	34	16
3	Farms reporting land needing drainage.....	218	166	25	87	65	143
4	Farms in drainage and levee districts.....		161	5	2	29	2
<b>LAND AND FARM AREA.</b>							
5	Approximate land area of the county.....acres..	5,724,800	3,332,480	1,330,000	1,647,360	1,434,240	29,418,240
6	All land in farms.....acres..	441,212	283,193	974,429	625,796	93,379	7,432,435
7	Improved land in farms.....acres..	182,091	89,683	180,303	113,385	37,607	1,111,639
8	Woodland in farms.....acres..	10,025	7,613	60,577	8,741	3,354	295,187
9	Other unimproved land in farms.....acres..	249,096	188,897	733,549	503,670	52,418	6,025,609
10	Farm land reported as provided with drainage.....acres..	917	16,155	2,288	763	4,818	1,034
11	Farm land reported as needing drainage.....acres..	16,793	2,678	798	2,165	2,919	19,010
12	Drainage only.....acres..	998	2,534	682	691	1,621	1,992
13	Drainage and clearing.....acres..	15,795	144	116	1,574	1,298	17,018

<sup>1</sup> No drainage on farms reported in Campbell, Converse, Crook, Hot Springs, Natrona, Niobrara, and Weston Counties.

COUNTY TABLE II.—OPERATING DRAINAGE ENTERPRISES: 1920.

		THE STATE.	Big Horn.	Park.	Washakie.	Other counties. <sup>1</sup>
<b>LAND AREA.</b>						
1	Approximate land area of the state or county.....acres..	42,430,720	1,990,400	3,332,480	1,434,240	10,806,080
2	All land in operating drainage enterprises.....acres..	95,474	41,750	29,920	20,400	3,404
3	Improved land.....acres..	84,846	33,022	29,920	17,600	3,404
4	Per cent of all improved land in farms.....	4.0	36.2	33.4	46.8	0.7
5	Unimproved land.....acres..	10,628	7,828		2,800	
6	Swampy, seeped, or alkali, in enterprises.....acres..	20,785	18,787	598	1,400	
7	Suffering a loss of crops from defective drainage.....acres..	6,505	4,357	598	1,500	140
8	Assessed acreage.....	95,474	41,750	29,920	20,400	3,404
9	Excess over all land in operating enterprises.....acres..					
<b>DRAINAGE WORKS.</b>						
10	Open ditches:					
11	Completed.....miles.....	25.1	2.5	17.0		5.0
12	Additional under construction.....miles.....	1.3	0.8			0.5
13	Maximum completed in any enterprise.....miles.....	17.6	2.4	17.0		3.0
14	Maximum width at bottom of ditch.....feet.....	6	4	4		6
15	Maximum of average depths of outlet ditches.....feet.....	12.0	8.5	8.5		12.0
16	Mean depth of branch ditches.....feet.....	7.9	8.0	8.0		4.0
17	Tile drains:					
18	Completed.....miles.....	114.2	43.9	47.1	23.2	
19	Additional under construction.....miles.....	71.8	32.9	27.7	11.2	
20	Maximum completed in any enterprise.....miles.....	47.1	16.0	47.1	16.0	
21	Maximum size of tile.....inches.....	24	24	18	18	
22	Area drained by open ditches only.....acres.....	3,404				3,404
23	Length of these ditches.....miles.....	5.5				5.5
24	Average length per acre.....feet.....	8.5				8.5
25	Area drained by tile only.....acres.....	54,650	34,250		20,400	
26	Length of these tile.....miles.....	93.1	58.7		34.4	
27	Average length per acre.....feet.....	9.0	8.0		8.9	
28	Area drained by open ditches and tile.....acres.....	37,420	7,500	29,920		
29	Length of these drains.....miles.....	113.8	21.4	42.4		
30	Average length per acre.....feet.....	16.1	15.1	16.3		
<b>DEVELOPMENT OF LAND.</b>						
31	Improved land in operating enterprises, 1920.....acres.....	84,846	33,022	29,920	17,600	3,404
32	Improved land prior to drainage.....acres.....	83,206	33,022	29,920	16,100	3,264
33	Increase since drainage.....acres.....	1,640			1,500	140
34	Per cent of increase.....	2.0			9.3	4.3
35	Per cent increase is of all improved land in farms, 1920.....	0.1			4.0	( <sup>2</sup> )
36	Unimproved land, 1920.....acres.....	10,628	7,828		2,800	
37	Unimproved land prior to drainage.....acres.....	12,268	7,828		4,300	140
38	Decrease since drainage.....acres.....	1,640			1,500	140
39	Per cent of decrease.....	13.4			34.9	100.0
40	Swampy, seeped, or alkali, 1920.....acres.....	20,785	18,787	598	1,400	
41	Swampy, seeped, or alkali prior to drainage.....acres.....	71,809	27,185	29,920	11,300	3,404
42	Decrease since drainage.....acres.....	51,024	8,398	29,322	9,900	3,404
43	Per cent of decrease.....	71.1	30.9	98.0	87.6	100.0
<b>CAPITAL INVESTED AND COST PER ACRE.</b>						
44	Total capital invested in and required for completion of operating enterprises.....dollars.....	1,667,367	727,433	632,583	278,000	29,351
45	Capital invested in these enterprises to Dec. 31, 1919.....dollars.....	1,175,962	550,027	442,808	158,000	25,127
46	Additional capital required to complete these enterprises.....dollars.....	491,405	177,406	189,775	120,000	4,224
47	Average cost per acre when completed.....dollars.....	17.46	17.42	21.14	13.63	8.62
48	Enterprises constructing open ditches only.....dollars.....	29,351				29,351
49	Average cost per acre when completed.....dollars.....	8.62				8.62
50	Enterprises constructing open ditches and tile drains.....dollars.....	778,844	146,261	632,583		
51	Average cost per acre when completed.....dollars.....	20.81	19.50	21.14		
52	Enterprises constructing tile drains only.....dollars.....	859,172	581,172		278,000	
53	Average cost per acre when completed.....dollars.....	15.72	16.97		13.63	
<b>CROPS.</b>						
54	Improved land in enterprises reporting—					
55	Alfalfa as principal crop on drained land.....acres.....	54,364	4,080	20,920	17,600	2,764
56	Sugar beets as principal crop on drained land.....acres.....	15,742	15,742			
57	Hay (except alfalfa) as principal crop on drained land.....acres.....	2,600	2,100			500
58	Not reporting principal crop on drained land.....acres.....	12,140	12,000			140

<sup>1</sup> Includes only Fremont, Goshen, and Platte Counties.<sup>2</sup> Includes 1,886,720 acres in Yellowstone National Park.<sup>3</sup> No timber or cut-over land reported.<sup>4</sup> When works under construction have been completed.<sup>5</sup> Less than one-tenth of 1 per cent.

## OTHER STATES.

The following pages present the statistics of drainage collected at the census of 1920 for those states not covered by the foregoing sections for separate states. Statistics for drainage on farms were collected by the census enumerators in all the states. Figures for organized drainage enterprises are given here for Arizona, Nevada, New Mexico, Oklahoma, and Oregon. The totals for these five states together are given in Tables 1 to 12 following, classified as the totals for individual states have been classified in the foregoing pages. Because no operating enterprises of a public nature for draining land for agriculture were found in Alabama, Virginia, and West

Virginia, those states have been omitted entirely from the census of drainage enterprises, except that the character of the public drainage enterprises authorized by law is stated on page 710. Before the census was begun, it was determined that very little drainage of land for agriculture had been undertaken by organized enterprises in most of the northeastern states, and that concerning the work which had been done sufficient information could not be secured to be of value for census purposes. Therefore, no attempt was made to canvass drainage enterprises in the region from Maine to and including Pennsylvania, Maryland, and Delaware.

TABLE 1.—SUMMARY FOR THESE STATES: 1920.

ITEM.	Amount.	Per cent of total.
<b>DRAINAGE ON FARMS.</b>		
Number of all farms in the states included <sup>1</sup> .....	1,454,769	100.0
Farms reporting land having drainage.....	124,195	8.5
Farms reporting land needing drainage.....	190,181	13.1
All land in farms..... acres..	189,042,653	100.0
Improved land in farms..... acres..	87,408,893	46.2
Farm land reported as provided with drainage..... acres..	3,357,899	1.8
Farm land reported as needing drainage..... acres..	6,045,287	3.2
Needing drainage only..... acres..	1,085,224	0.6
Needing drainage and clearing..... acres..	4,960,063	2.6
<b>DRAINAGE ENTERPRISES.</b>		
Approximate land area of the states included <sup>2</sup> ..... acres..	327,139,200	100.0
All land in operating drainage enterprises..... acres..	211,949	0.1
Improved land..... acres..	150,172	( <sup>3</sup> )
Per cent of all improved land in farms.....	0.2	( <sup>3</sup> )
Timber and cut-over land..... acres..	3,305	( <sup>3</sup> )
Other unimproved land..... acres..	58,472	( <sup>3</sup> )
Swampy, subject to overflow, seeped, or alkali..... acres..	30,243	( <sup>3</sup> )
Suffering a loss of crops from defective drainage..... acres..	35,581	( <sup>3</sup> )
Improved land prior to drainage..... acres..	111,942	( <sup>3</sup> )
Increase since drainage began..... acres..	38,230	( <sup>3</sup> )
Land in nonoperating enterprises..... acres..	32,345	( <sup>3</sup> )
Open ditches in operating enterprises..... miles..	193.4	100.0
Completed..... miles..	191.8	99.2
Additional under construction..... miles..	1.6	0.8
Tile drains in operating enterprises..... miles..	365.3	100.0
Completed..... miles..	300.2	82.2
Additional under construction..... miles..	65.1	17.8
Total capital invested in and required for completion of operating enterprises..	\$4,327,987	100.0
Capital invested in these enterprises to December 31, 1919.....	2,519,487	58.2
Additional capital required to complete these enterprises.....	1,808,500	41.8
Average cost per acre when completed.....	20.42	

<sup>1</sup> Comprises Alabama, Arizona, Connecticut, Delaware, District of Columbia, Maine, Maryland, Massachusetts, Nevada, New Hampshire, New Jersey, New Mexico, New York, Oklahoma, Oregon, Pennsylvania, Rhode Island, Vermont, Virginia, and West Virginia.

<sup>2</sup> Comprises Arizona, Nevada, New Mexico, Oklahoma, and Oregon.

<sup>3</sup> Less than one-tenth of 1 per cent.

**Operating and nonoperating enterprises.**—In Nevada and Oregon the drainage enterprises have completed construction of the drainage works, while in Arizona, New Mexico, and Oklahoma are enterprises that have completed the works authorized and others with works under construction. Nonoperating enterprises were reported only in Arizona.

**TABLE 2.—LAND AND CAPITAL INVESTED IN ALL ENTERPRISES, CLASSIFIED AS BETWEEN OPERATING AND NONOPERATING ENTERPRISES: 1920.**

CLASS.	LAND.		CAPITAL. <sup>1</sup>			
	Acreage.	Per cent of total.	To Dec. 31, 1919.		Additional required to complete.	
			Amount.	Per cent of total.		
All organized enterprises.....	244,294	100.0	\$2,519,987	100.0	\$2,493,500	
Operating enterprises.....	211,949	86.8	2,519,487	100.0	1,808,500	
With works completed.....	61,499	25.2	857,430	34.0	1,808,500	
With works under construction.	150,450	61.6	1,662,057	66.0		
Nonoperating enterprises.....	32,345	13.2	500	( <sup>2</sup> )	685,000	

<sup>1</sup> The inquiry asked for "the total cost of the enterprise to Dec. 31, 1919," and for an "estimate of additional investment to complete."

<sup>2</sup> Less than one-tenth of 1 per cent.

**Location of enterprises.**—The operating drainage enterprises for which statistics are given in the following pages are located in Graham, Maricopa, and Yuma Counties, Ariz.; in Churchill County, Nev.; in Chaves, Dona Ana, and Eddy Counties, N. Mex.; in Canadian, Kay, Johnston, and Muskogee Counties, Okla.; and in Malheur County, Oreg. The locations are indicated approximately on the map following page 346. The nonoperating enterprises are located in Maricopa and Sierra Counties, Ariz.

**TABLE 3.—LAND AND CAPITAL INVESTED IN ALL ENTERPRISES, CLASSIFIED BY DRAINAGE BASIN: 1920.**

DRAINAGE BASIN.	LAND.		CAPITAL.			
	Acreage.	Per cent of total.	To Dec. 31, 1919.		Additional required to complete.	
			Amount.	Per cent of total.		
All organized enterprises.....	244,294	100.0	\$2,519,987	100.0	\$2,493,500	
Operating enterprises.....	211,949	86.8	2,519,487	100.0	1,808,500	
Snake River.....	4,000	1.6	200,000	7.9	.....	
Gila River.....	9,640	3.9	101,425	4.0	.....	
Colorado River.....	30,000	12.3	313,000	12.4	612,000	
Great Basin.....	15,940	6.5	117,851	4.7	.....	
Pecos River.....	66,210	27.1	1,135,796	45.1	195,500	
Rio Grande.....	74,000	30.3	575,000	22.8	1,000,000	
Red River.....	6,000	2.5	44,500	1.8	.....	
Canadian River.....	2,600	1.2	4,250	0.2	1,000	
Arkansas River.....	3,250	1.3	27,665	1.1	.....	
Nonoperating enterprises.....	32,345	13.2	500	( <sup>1</sup> )	685,000	
Gila River.....	25,345	10.4	500	( <sup>1</sup> )	535,000	
Rio Grande.....	7,000	2.9	.....	.....	150,000	

<sup>1</sup> Less than one-tenth of 1 per cent.

**Condition of land in enterprises.**—The enterprises in Oklahoma were reported as organized to drain land subject to overflow from streams after storm periods, while all the enterprises in the other states were established for draining or protecting land injured or threatened by seepage or the accumulation of alkali in the surface soil as a result of irrigation.

In Arizona, Nevada, and New Mexico, 100,329 acres in projects of the United States Reclamation Service were reported as not to have needed drainage or protection, but to have been assessed for drainage merely on account of being responsible for injury to the other land. This acreage is not included in the statistics given for drainage enterprises.

The usual purpose of an organized enterprise is merely to provide adequate outlets into which the landowners of the district may drain their farms and to afford relief from overflow for the district as a unit. Therefore the fact that an enterprise which has completed the construction of the drainage works authorized contains land still swampy or subject to overflow, or land that suffers damage to crops, does not show that the improvement works are inadequate.

**TABLE 4.—LAND IN ALL ENTERPRISES, CLASSIFIED BY CONDITION: 1920.**

CONDITION OF LAND.	OPERATING ENTERPRISES.				Non-operating enterprises (acres).
	Total.		Works completed (acres).	Works under construction (acres).	
	Acreage.	Per cent of all land.			
All land in enterprises.....	211,949	100.0	61,499	150,450	32,345
Improved land.....	150,172	70.9	47,730	102,442	24,026
Timber and cut-over land.....	3,395	1.6	3,025	280	.....
Other unimproved land.....	58,472	27.6	10,744	47,728	8,319
Swampy, subject to overflow, seeped, or alkali.....	30,243	14.3	8,571	21,672	1,069
Suffering a loss of crops.....	35,581	16.8	10,261	25,320	2,224

**Size of enterprises.**—Presentation of the statistics by counties requires that an enterprise located in more than one county be divided, and the part in each county be considered a separate enterprise. In this way, 18 operating drainage enterprises are counted in the five states named, with an average area of 11,775 acres. There are 3 enterprises having less than 1,000 acres each, 10 between 1,000 and 10,000 acres, and 5 having more than 10,000 acres each. There is no overlapping of the enterprises in any of these states.

**TABLE 5.—LAND IN OPERATING ENTERPRISES, CLASSIFIED BY SIZE OF AREA ASSESSED: 1920.**

SIZE GROUP.	Land in enterprises (acres).	ASSESSED AREA.	
		Acreage.	Per cent of total.
All operating enterprises.....	211,949	211,949	100.0
200 to 499 acres.....	400	400	0.2
500 to 999 acres.....	1,330	1,330	0.7
1,000 to 4,999 acres.....	9,000	9,000	4.2
5,000 to 9,999 acres.....	49,579	49,579	23.4
10,000 to 49,999 acres.....	77,580	77,580	36.6
50,000 to 99,999 acres.....	74,000	74,000	34.9

**Character of enterprises.**—The enterprises in the states being considered here are drainage districts in Arizona, New Mexico, Oklahoma, and Oregon; projects of the United States Reclamation Service in



Arizona, Nevada, and New Mexico; one small undertaking by an incorporated town in Arizona; and one enterprise under individual ownership in Oklahoma.

The drainage districts in Arizona are organized under Chapter 5, Title 55, Civil Code, Revised Statutes of Arizona, 1913. That chapter authorizes the establishment of drainage districts by the boards of county supervisors in which the proposed districts are situated, upon petition from five or more owners of agricultural land to be benefited, if approved by the landowning voters of the district. These voters elect three directors to manage the enterprise. The cost of the drainage is paid by ad valorem taxes upon the real property in the district or, as authorized by an amendment of March 14, 1917 (ch. 57), according to benefits assessed against the land. In apportioning the benefits, no parcel of land is to be assessed less than one unit nor more than five units. The districts are financed by bonds issued for 11 to 20 years, authorized by vote of the electors and tested by proceedings in the superior court of the county. This statute was first enacted May 16, 1912 (ch. 38).

The drainage districts in New Mexico are organized under an act of June 14, 1912 (ch. 84). The statute provides that districts for the drainage of land for agriculture may be established by the district courts upon petition from a majority of the adult owners representing one-third of the area to be benefited. A district may comprise separated tracts of land. A preliminary investigation of the project is made by three commissioners appointed by the court. When the decree of establishment has been issued, these commissioners become the officers of the district to complete the plan of drainage, determine the boundaries of the district, assess benefits and damages, and secure construction of the works. The cost of the enterprise is apportioned against the land in proportion to the benefits. Public hearings are held upon the petition, the commissioners' preliminary report, and their final report with plan and assessments. Appeal regarding the confirmation of the final report may be taken to the state supreme court. Bonds of the district may be issued by the commissioners to finance the work. A state law of March 6, 1917 (ch. 22), authorizes the establishment of drainage districts in projects of the United States Reclamation Service, but no enterprises were reported as organized under that law. The act provides for establishment by the county commissioners upon petition from a majority of the resident owners representing one-third of the land in the proposed district, subject to vote of the landowners. The affairs of the district are to be administered by elected directors. The cost is to be apportioned according to benefits, and the enterprise may be financed by issuing bonds.

The drainage districts in Oklahoma are organized under an act approved May 29, 1908 (ch. 30). As amended to the census date, the law provides that the

districts may be established by the boards of county commissioners on petition from five or more landowners to be assessed for the improvement. A district shall be established upon petition from 50 per cent of the owners or from the resident owners of 50 per cent of the land. A preliminary survey and report are made by viewers appointed by the commissioners. The final plan of drainage works and the assessments of damages and benefits are made by viewers appointed by the judge of the district court of the county, and are equalized and confirmed by the county commissioners. The cost is apportioned according to the confirmed benefits. Public hearings are held by the commissioners upon the preliminary and final reports of the viewers. Appeals regarding assessments may be taken to the district court. Contracts for construction are let by a surveyor appointed by the commissioners. Bonds of the district may be issued by the commissioners.

Drainage districts in Oregon may be organized under an act of February 26, 1915 (ch. 340), which authorizes the establishment of such districts by the county courts upon petition from the record owners of 50 per cent of any contiguous body of swamp, wet, or overflowed land. Each district is governed by three supervisors elected by the landowners; each owner has one vote for each acre he owns in the district. After the plan of reclamation is prepared, benefits and damages are assessed against all land to be affected, by three commissioners appointed by the court. The cost is apportioned according to the benefits confirmed by the court at public hearing. The district may issue bonds running for 20 years. An act of February 23, 1911 (ch. 172), provides that three or more persons may incorporate as a district improvement company for draining land, by filing with the secretary of state and the county clerk articles of incorporation which must specify the land to be improved. All expenditures must be authorized and the plan of reclamation must be approved by the owners of the land to be improved. The corporation has power of eminent domain, and may issue bonds for 20 years. An act of February 21, 1889, authorized the county courts, except in five counties, to establish drainage districts upon petition from one-half the owners representing one-third of the land to be benefited. Trustees for the district were to be named by the petitioners. The act later was made applicable in all counties, and the proportion of landowners required to sign the petition was reduced. Right-of-way for a private drain across the land of an objecting owner may be secured through application to the county court and payment of damages assessed, under an act of October 24, 1868.

While no organized drainage enterprise was reported in Nevada except that by the United States Reclamation Service, the formation of drainage districts in that state is authorized by an act of March 31, 1913 (ch. 281). Such districts may be established by the



boards of county commissioners, upon petition from a majority of the owners controlling not less than one-third of the acreage to be benefited, or from one-third of the owners controlling a major part of the acreage, and after public hearing. To govern each district, the county commissioners appoint three supervisors and an engineer, who prepare the plan of drainage, assess benefits and damages, and secure construction of the works. The cost of the enterprise is apportioned according to the benefits as equalized by the county commissioners. The board of supervisors may issue bonds to mature in not more than 20 years, if approved by vote of the landowners.

TABLE 6.—LAND AND CAPITAL INVESTED IN ALL ENTERPRISES, CLASSIFIED BY CHARACTER OF ENTERPRISE: 1920.

CHARACTER OF ENTERPRISE.	LAND.		CAPITAL.		
	Acreage.	Per cent of total.	To Dec. 31, 1919.		Additional required to complete.
			Total.	Per cent of total.	
All organized enterprises.....	244,204	100.0	\$2,519,987	100.0	\$2,493,500
Operating enterprises.....	211,949	86.8	2,519,487	100.0	1,808,500
Drainage districts <sup>1</sup> .....	84,478	34.6	1,377,032	54.6	196,500
U. S. Reclamation Service <sup>2</sup> .....	127,471	52.2	1,142,455	45.3	1,612,000
Nonoperating enterprises.....	32,345	13.2	500	(3)	685,000
Drainage districts.....	25,345	10.4	500	(3)	535,000
U. S. Reclamation Service.....	7,000	2.9	.....	.....	150,000

<sup>1</sup> Includes 640 acres organized as a town drain.

<sup>2</sup> Includes 2,500 acres under individual ownership.

<sup>3</sup> Less than one-tenth of 1 per cent.

Alabama has two general drainage laws, though no public drainage enterprises. The statute of March 4, 1915 (No. 167), authorizes the establishment of drainage districts as corporate bodies by the courts of probate of the counties in which the districts are located, for the drainage of farm, wet, swamp, or overflowed land. A petition for the district must be signed by a majority, in either number or acreage, of the landowners to be assessed. When the district has been established, the court appoints three viewers to make the plan of drainage and to assess damages and benefits. Thereafter, the district is controlled by three commissioners appointed by the court. The cost is apportioned against the land according to the benefits. Bonds may be issued if the average cost will be 50 cents or more per acre. Drainage and flood protection districts for public health and welfare in counties containing cities of 50,000 to 125,000 population may be established as political subdivisions by the courts of county commissioners according to an act of September 30, 1919 (No. 742). The petition for establishment may be signed by a majority of the landowners affected, in number or acreage, or by a majority of the qualified voters of the district. An engineer appointed by the court makes a preliminary investigation and, after the district is established, the final plan of improvement and the assessments of benefits and damages. The court lets contract for construction and apportions the cost according to the benefits. Bonds may be issued if the average cost

will exceed \$1 per acre and if approved by a majority of the voters of the district.

Virginia enacted a law March 14, 1906 (ch. 188), authorizing the establishment of drainage districts by the circuit courts, but no enterprises in the state organized under that or succeeding drainage laws had begun actual construction by January 1, 1920. The statute of 1906 provided that upon petition from more than five landowners the court should hold a hearing and, by its commissioner in chancery, determine the size of the ditch and assess benefits and damages. Upon establishing the district, the court should appoint a commissioner to collect the assessments and let contract for the work. This act has been superseded by later statutes. An act of March 17, 1910 (ch. 312), provided for the establishment of drainage districts by the county circuit courts. It was amended and reenacted March 12, 1912 (ch. 159), and again March 27, 1914 (ch. 332). The three statutes are alike in their main provisions. A petition for the district must be signed by a majority of the resident landowners in the proposed district, or by the owners of three-fifths of the land. The district will not be established except upon favorable report from the viewers appointed by the court. After establishment, the viewers prepare the plan of drainage, divide the land into five classes according to benefits, and assess damages. When the plans, classification, and assessments have been approved, the court appoints a board of commissioners to have charge of the district. The cost is apportioned according to the classification of the land, the rates per acre being in the ratio 5:4:3:2:1. Bonds may be issued if the cost exceeds 25 cents per acre. An act of March 31, 1848 (ch. 110), authorized the courts of common pleas to condemn right of way for a private drain across the land of an owner who refused permission, the applicant first paying damages as assessed by jury or, since 1871 (ch. 205), by commissioners appointed by the court.

West Virginia has no organized drainage enterprises, though a general drainage law was enacted February 24, 1917 (ch. 26). The act provides that drainage, levee, and reclamation districts for the drainage of farm, wet, and overflowed land may be established by the circuit courts upon petition from three or more owners of real property in the proposed district, after preliminary investigation and public hearing. Three supervisors to manage the enterprise are elected by the landowners, who vote in proportion to their acreage assessed. Benefits and damages are assessed by appraisers appointed by the court, subject to confirmation at public hearing and to appeal for jury trial. The cost is apportioned according to the benefits, and the district may issue bonds to mature within 15 years. The legal code of West Virginia, in 1868, provided that right-of-way for a private drain across the land of an objecting owner might be se-

cured by application to the circuit court and payment of damages.

**Drainage works.**—The total works completed by drainage enterprises to December 31, 1919, comprised 191.8 miles of open ditches, 300.2 miles of tile drains, and 31.0 miles of levees; the additional lengths under construction were 1.6 miles of open ditches and 65.1 miles of tile drains. These figures do not include drains or levees installed by individual farm owners supplemental to the works of the enterprises, nor the works of flood-protection or levee districts that had not undertaken the construction of ditches or tile drains. There is one pumping district, in Arizona, in which all the drainage from 25,000 acres is removed by 2 screw pumps of 33,660 gallons per minute total capacity, which are operated by internal combustion engines capable of developing 175 horsepower.

TABLE 7.—LAND AND CAPITAL INVESTED IN OPERATING ENTERPRISES, CLASSIFIED BY KIND OF DRAINAGE WORKS: 1920.

KIND OF WORKS.	LAND.		CAPITAL.		
	Acreage.	Per cent of total.	To Dec. 31, 1919.		Additional required to complete.
			Amount.	Per cent of total.	
All kinds.....	211,949	100.0	\$2,519,487	100.0	\$1,808,500
Open ditches only.....	95,150	44.9	701,340	27.8	1,001,000
Open ditches and levees.....	30,000	14.2	357,500	14.2	612,000
Tile drains only.....	38,778	18.3	797,682	31.7	53,000
Open ditches and tile drains.....	48,021	22.7	682,955	26.3	142,500

The average depth of the main or outlet ditch was reported for each enterprise. The maximum reported for any enterprise in each state and the maximum in each county are shown in line 15 of County Table II. The maximum length, width, and depth of outlet shown in that table for any county may not refer to the same enterprise.

In County Table II, line 16 shows the mean depth of branch ditches (open ditches only), which is a very crude indication of the depth of soil drainage that may be obtained in the enterprises as determined by the depth of outlet provided for farm drains. The mean depth was computed by giving each separate depth a weight in proportion to the acreage it serves. As most enterprises reported depths in whole numbers only, the occasional decimals were omitted in making these computations. Depths of 10 feet and more were omitted, as they seemed not to represent so well the average depths of outlet provided for all the farms in the districts. To include all the enterprises reporting branch ditches would show the mean depth for the five states 10.0 instead of 8.0 feet.

TABLE 8.—LAND IN OPERATING ENTERPRISES, CLASSIFIED BY AVERAGE DEPTH OF BRANCH DITCHES: 1920.

DEPTH OF BRANCH DITCHES.	Acreage.	Per cent of total.
All operating enterprises.....	211,949	100.0
9.0 to 9.9 feet.....	30,000	14.2
10 feet and more.....	85,031	40.1
Not reporting branches.....	96,918	45.7

**Maintenance of works.**—The drainage law of Arizona requires the directors of each drainage district to keep the works of the district in repair, and to include in their annual estimate of drainage taxes the probable cost of the repairs apportioned in the same manner as the cost of construction. The commissioners or directors of the districts in New Mexico are required to make annual estimates of funds needed for maintenance and repairs, which are to be apportioned like the cost of construction or last assessment of benefits but are reviewed by the court at public hearing before confirmation. The Oklahoma statute provides for a drainage commissioner to be appointed, who shall inspect the drains from time to time. Each landowner must keep the drains through his land free from vegetation, and the cost of other repair work not due to wilfulness or to negligence of some owner is assessed against all the district in proportion to the benefits assessed for original construction. The supervisors of drainage districts in Oregon are authorized to levy taxes for maintenance apportioned like the cost of original construction of the works. The drainage laws of Alabama (1915), Nevada, Virginia, and West Virginia provide for the maintenance and repair of the drainage works by the administrative boards of the districts, the cost of this work to be apportioned like the cost of original construction.

The drainage works installed by the United States Reclamation Service on its irrigation projects are maintained as a part of the irrigation works.

TABLE 9.—LAND AND CAPITAL INVESTED IN OPERATING ENTERPRISES, CLASSIFIED BY METHOD OF MAINTENANCE: 1920.

METHOD OF MAINTENANCE.	LAND.		CAPITAL.		
	Acreage.	Per cent of total.	To Dec. 31, 1919.		Additional required to complete.
			Amount.	Per cent of total.	
All operating enterprises.....	211,949	100.0	\$2,519,487	100.0	\$1,808,500
By district forces.....	176,221	83.1	2,225,221	88.3	1,807,500
By method not specified.....	7,658	3.6	100,000	4.0	.....
By landowners.....	2,500	1.2	7,824	0.3	.....
No maintenance provided.....	2,500	1.2	4,000	0.2	.....
Not reporting.....	23,000	10.9	182,442	7.2	1,000

**Date of organization.**—The progress in drainage development is shown only roughly by the dates of the organization of the enterprises, which are the dates when the districts were established by the county boards or the designated courts, since there may be a period of a year or more between the decree of establishment and the beginning of actual construction, and since the work of construction may occupy several years in a large district. It was not practicable, however, for the census to secure data as to the time of the beginning or the completion of the drainage works. Under the date of organization are tabulated the entire area, works, and capital of each enterprise, even including extensions made after the original plan of reclamation was completed.

## AGRICULTURE.

TABLE 10.—LAND IN OPERATING ENTERPRISES, CLASSIFIED BY DATE ENTERPRISE WAS ORGANIZED: 1920.

DATE OF ORGANIZATION.	LAND.		AREA ASSESSED.	
	Acreage.	Per cent of total.	Acreage.	Per cent of total.
All operating enterprises.....	211,949	100.0	211,949	100.0
1905 to 1909.....	21,940	10.3	21,940	10.3
1910 to 1914.....	64,059	30.2	64,059	30.2
1915 to 1919.....	111,540	52.6	111,540	52.6
Not reported.....	14,410	6.8	14,410	6.8

TABLE 11.—CAPITAL INVESTED IN OPERATING ENTERPRISES, CLASSIFIED BY DATE ENTERPRISE WAS ORGANIZED: 1920.

DATE OF ORGANIZATION.	CAPITAL.		
	To Dec. 31, 1919.		Additional required to complete.
	Amount.	Per cent of total.	
All operating enterprises.....	\$2,519,487	100.0	\$1,808,500
1905 to 1909.....	162,351	6.4	143,000
1910 to 1914.....	1,096,582	43.5	1,613,000
1915 to 1919.....	1,103,074	43.8	52,500
Not reported.....	157,500	6.3	

TABLE 12.—DRAINS AND LEVEES (COMPLETED AND UNDER CONSTRUCTION) IN OPERATING ENTERPRISES, CLASSIFIED BY DATE ENTERPRISE WAS ORGANIZED: 1920.

DATE OF ORGANIZATION.	DITCHES.		TILE.		LEVEES.	
	Miles.	Per cent of total.	Miles.	Per cent of total.	Miles.	Per cent of total.
All drains and levees.....	193.4	100.0	365.3	100.0	31.0	100.0
1905 to 1909.....	119.7	61.9	3.6	1.0	5.0	16.1
1910 to 1914.....	16.2	8.4	300.7	82.3	26.0	83.9
1915 to 1919.....	46.7	24.1	18.0	4.9		
Not reported.....	10.8	5.6	43.0	11.8		

Crops.—The principal crops grown upon the drained land in drainage enterprises were reported as cotton in Arizona, cotton and corn in Oklahoma, and alfalfa in Nevada, New Mexico, and Oregon. Statistics were not secured to show the part of each enterprise planted to any crop, so the enterprises have been classified according to the principal crop, and the total area of improved land is shown thus classified in County Table II. No data were secured at the general census of agriculture to separate the crops grown upon land drained artificially from those produced upon land drained naturally.

## DRAINAGE.

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## COUNTY TABLE I.—DRAINAGE ON FARMS: 1920.

## ALABAMA.

		THE STATE.	Anniston.	Baldwin.	Barbour.	Bibb.	Blount.	Bullock.	Butler.
1	Number of all farms in the state or county.....	236,099	2,481	2,122	4,268	1,844	4,019	3,700	3,427
2	Farms reporting land having drainage.....	19,967	218	50	187	225	419	90	89
3	Farms reporting land needing drainage.....	36,511	119	557	233	363	937	445	362
4	Farms in drainage and levee districts.....	352	2	3	1	1	6	7	1
<b>LAND AND FARM AREA.</b>									
5	Approximate land area of the state or county.....acres..	32,818,560	373,760	1,020,800	583,680	465,760	415,360	300,400	488,320
6	All land in farms.....acres..	19,576,856	249,502	216,499	371,066	159,463	289,156	236,553	332,654
7	Improved land in farms.....acres..	9,893,467	121,359	54,541	218,258	61,566	125,652	177,044	154,957
8	Woodland in farms.....acres..	8,301,177	118,659	147,675	106,270	90,224	153,661	55,751	152,496
9	Other unimproved land in farms.....acres..	1,382,212	9,484	14,283	46,555	7,673	9,803	25,758	25,200
10	Farm land reported as provided with drainage.....acres..	415,293	9,651	3,467	8,158	2,325	3,958	1,541	893
11	Farm land reported as needing drainage.....acres..	1,610,656	12,634	40,139	12,768	23,121	26,702	13,456	19,512
12	Drainage only.....acres..	150,028	1,971	4,711	1,462	5,130	915	2,856	777
13	Drainage and clearing.....acres..	1,460,628	10,663	35,428	11,286	17,991	25,787	10,610	18,735

		Calhoun.	Chambers.	Cherokee.	Chilton.	Choctaw.	Clay.	Cleburne.	Colbert.
1	Number of all farms in the county.....	3,521	4,915	3,717	3,443	3,035	3,576	2,235	3,018
2	Farms reporting land having drainage.....	190	966	464	166	69	1,048	149	69
3	Farms reporting land needing drainage.....	719	1,560	999	1,010	281	1,123	567	469
4	Farms in drainage and levee districts.....	2	33	36	15	1	7	1	2
<b>LAND AND FARM AREA.</b>									
5	Approximate land area of the county.....acres..	354,540	331,630	369,289	450,320	506,450	392,960	364,160	395,520
6	All land in farms.....acres..	240,591	313,049	259,682	236,654	310,993	213,023	189,520	225,218
7	Improved land in farms.....acres..	129,041	185,325	131,011	107,422	115,483	117,422	67,916	122,630
8	Woodland in farms.....acres..	106,111	85,326	126,586	123,284	173,667	164,274	113,187	92,496
9	Other unimproved land in farms.....acres..	14,439	32,196	12,385	3,968	22,423	21,327	8,417	10,093
10	Farm land reported as provided with drainage.....acres..	2,779	30,359	4,750	2,244	737	8,677	1,728	778
11	Farm land reported as needing drainage.....acres..	24,709	48,108	38,632	31,653	19,113	37,183	22,919	22,543
12	Drainage only.....acres..	883	6,811	1,644	829	1,214	2,477	621	1,208
13	Drainage and clearing.....acres..	23,826	41,297	37,288	30,824	17,899	34,712	22,298	21,335

		Cook.	Covington.	Dale.	Dallas.	DeKalb.	Elmore.	Escambia.	Fayette.
1	Number of all farms in the county.....	1,950	4,264	3,438	7,124	5,636	3,729	2,069	3,832
2	Farms reporting land having drainage.....	475	63	42	597	319	351	88	634
3	Farms reporting land needing drainage.....	985	396	294	691	1,229	514	369	810
4	Farms in drainage and levee districts.....	2	1	1	11				2
<b>LAND AND FARM AREA.</b>									
5	Approximate land area of the county.....acres..	419,200	666,880	360,320	612,480	503,040	408,320	612,480	344,960
6	All land in farms.....acres..	219,885	387,940	314,998	461,273	380,979	310,126	168,021	252,954
7	Improved land in farms.....acres..	11,222	172,570	171,185	263,528	184,715	144,806	67,359	120,923
8	Woodland in farms.....acres..	108,662	265,800	126,498	111,513	185,473	136,620	85,336	122,173
9	Other unimproved land in farms.....acres..	20,881	9,570	17,315	26,232	10,791	28,700	15,326	9,858
10	Farm land reported as provided with drainage.....acres..	4,259	635	757	21,103	6,886	6,013	956	3,477
11	Farm land reported as needing drainage.....acres..	31,671	67,122	7,986	25,156	39,376	20,679	20,859	13,469
12	Drainage only.....acres..	2,662	819	421	5,169	3,194	1,090	135	837
13	Drainage and clearing.....acres..	29,009	66,303	7,565	19,987	36,182	19,639	20,724	12,632

		Geneva.	Greene.	Hale.	Houston.	Jackson.	Lamar.	Lawrence.	Lowndes.
1	Number of all farms in the county.....	4,065	3,139	3,816	4,612	5,584	2,762	4,535	5,118
2	Farms reporting land having drainage.....	172	89	642	263	284	1,259	227	1,046
3	Farms reporting land needing drainage.....	647	109	717	484	323	1,050	429	255
4	Farms in drainage and levee districts.....		2	1	4	6	99		2
<b>LAND AND FARM AREA.</b>									
5	Approximate land area of the county.....acres..	369,920	406,460	412,440	370,560	729,600	384,640	445,000	472,960
6	All land in farms.....acres..	292,784	299,651	267,920	320,801	428,391	286,126	312,636	292,465
7	Improved land in farms.....acres..	174,717	156,749	158,659	211,208	197,911	96,517	181,064	183,386
8	Woodland in farms.....acres..	111,447	86,975	78,019	97,064	194,718	130,064	112,708	56,261
9	Other unimproved land in farms.....acres..	6,620	21,920	31,262	11,629	35,765	39,545	18,864	52,848
10	Farm land reported as provided with drainage.....acres..	1,212	6,628	17,926	3,061	6,041	28,268	4,144	31,695
11	Farm land reported as needing drainage.....acres..	33,615	17,010	37,068	19,161	12,891	35,067	14,242	23,723
12	Drainage only.....acres..	2,838	2,182	4,452	1,626	5,337	6,082	1,774	8,421
13	Drainage and clearing.....acres..	30,777	14,828	32,616	17,535	7,534	29,045	12,468	15,302

## AGRICULTURE.

COUNTY TABLE I.—DRAINAGE ON FARMS: 1920—Continued.

ALABAMA—Continued.

		Macon.	Madison.	Marengo.	Marion.	Marshall.	Mobile.	Monroe.	Montgomery.
1	Number of all farms in the county.....	3,950	6,158	6,004	3,531	5,399	1,240	4,437	4,550
2	Farms reporting land having drainage.....	848	368	743	687	69	51	58	121
3	Farms reporting land needing drainage.....	899	459	351	1,323	628	120	309	519
4	Farms in drainage and levee districts.....	2	5	1	1	24	1	1	5
<b>LAND AND FARM AREA.</b>									
5	Approximate land area of the county.....acres..	392,060	519,040	618,240	475,520	385,280	784,640	647,080	512,640
6	All land in farms.....acres..	218,836	372,906	479,616	324,046	322,323	106,572	411,548	293,728
7	Improved land in farms.....acres..	145,092	249,495	271,903	119,407	170,621	38,004	169,088	210,599
8	Woodland in farms.....acres..	57,099	100,460	159,940	196,735	140,675	55,329	221,502	52,395
9	Other unimproved land in farms.....acres..	16,045	22,951	47,773	7,904	11,027	13,239	20,958	30,534
10	Farm land reported as provided with drainage.....acres..	25,814	7,546	20,355	8,336	935	2,298	2,318	7,302
11	Farm land reported as needing drainage.....acres..	32,141	9,678	20,916	70,002	13,035	7,714	41,392	26,894
12	Drainage only.....acres..	6,971	1,793	5,766	904	245	827	2,447	9,398
13	Drainage and clearing.....acres..	25,170	7,885	15,150	69,098	12,790	6,887	38,945	16,996
		Morgan.	Perry.	Pickens.	Pike.	Randolph.	Russell.	St. Clair.	Shelby.
1	Number of all farms in the county.....	4,344	4,302	3,321	4,472	4,181	3,306	2,706	2,469
2	Farms reporting land having drainage.....	414	146	730	138	829	403	57	221
3	Farms reporting land needing drainage.....	815	156	742	753	476	897	379	639
4	Farms in drainage and levee districts.....	6	.....	1	2	.....	1	.....	2
<b>LAND AND FARM AREA.</b>									
5	Approximate land area of the county.....acres..	375,680	471,680	560,000	429,440	377,600	419,200	414,720	524,160
6	All land in farms.....acres..	270,571	343,963	320,250	342,427	285,978	271,962	235,231	204,738
7	Improved land in farms.....acres..	154,111	179,357	130,085	217,308	137,557	109,961	99,462	98,475
8	Woodland in farms.....acres..	109,592	115,207	150,644	87,610	118,533	79,764	127,282	100,955
9	Other unimproved land in farms.....acres..	6,868	49,399	33,521	37,509	29,888	22,237	8,487	6,308
10	Farm land reported as provided with drainage.....acres..	7,799	5,501	10,283	2,556	12,982	7,656	610	3,330
11	Farm land reported as needing drainage.....acres..	22,660	12,731	45,340	27,028	9,493	43,778	18,215	19,732
12	Drainage only.....acres..	8,836	1,956	1,652	1,564	1,540	2,935	112	1,037
13	Drainage and clearing.....acres..	18,824	10,775	43,697	26,064	7,953	40,843	18,103	18,675
		Sumter.	Talladega.	Tallahassee.	Tuscaloosa.	Walker.	Wilcox.	Winston.	All other counties. <sup>1</sup>
1	Number of all farms in the county.....	3,747	4,115	3,940	4,335	2,949	5,461	2,172	40,931
2	Farms reporting land having drainage.....	410	85	1,219	426	192	157	258	236
3	Farms reporting land needing drainage.....	490	308	1,277	798	480	271	267	3,120
4	Farms in drainage and levee districts.....	2	3	7	3	16	.....	.....	26
<b>LAND AND FARM AREA.</b>									
5	Approximate land area of the county.....acres..	581,120	488,200	488,320	861,440	506,880	573,440	403,200	6,039,940
6	All land in farms.....acres..	361,428	278,586	359,475	399,572	233,547	324,630	219,933	3,539,121
7	Improved land in farms.....acres..	213,875	167,490	172,170	148,096	86,191	203,313	71,204	1,732,065
8	Woodland in farms.....acres..	112,783	97,798	141,632	226,868	142,827	91,780	144,073	1,590,003
9	Other unimproved land in farms.....acres..	34,770	13,298	45,673	24,608	4,529	29,532	4,666	217,023
10	Farm land reported as provided with drainage.....acres..	14,281	1,982	15,346	5,520	2,289	4,580	6,485	3,647
11	Farm land reported as needing drainage.....acres..	60,836	9,257	48,355	41,690	12,542	17,767	11,370	188,124
12	Drainage only.....acres..	6,858	742	2,591	2,694	746	5,995	305	5,141
13	Drainage and clearing.....acres..	53,978	8,515	45,764	38,996	11,796	13,772	11,071	182,983

<sup>1</sup> Drainage on farms was reported in all counties in Alabama.

## ARIZONA.

		THE STATE.	Cochise.	Graham.	Maricopa.	Pima.	All other counties. <sup>1</sup>
1	Number of all farms in the state or county.....	9,975	1,251	870	3,930	434	3,490
2	Farms reporting land having drainage.....	241	52	54	29	73	33
3	Farms reporting land needing drainage.....	435	110	26	34	71	194
4	Farms in drainage and levee districts.....	28	.....	2	20	.....	6
<b>LAND AND FARM AREA.</b>							
5	Approximate land area of the state or county.....acres..	72,838,400	3,948,800	2,063,200	5,690,240	6,083,200	54,152,960
6	All land in farms.....acres..	5,802,126	998,242	165,691	802,396	413,278	3,422,519
7	Improved land in farms.....acres..	712,803	120,229	38,632	279,334	35,785	238,823
8	Woodland in farms.....acres..	523,648	51,700	1,324	5,689	296	464,689
9	Other unimproved land in farms.....acres..	4,565,675	826,313	125,735	517,423	377,197	2,719,007
10	Farm land reported as provided with drainage.....acres..	9,651	1,596	2,320	3,328	849	1,553
11	Farm land reported as needing drainage.....acres..	41,951	27,434	789	2,280	2,084	9,364
12	Drainage only.....acres..	9,596	4,380	459	1,365	1,457	1,935
13	Drainage and clearing.....acres..	32,355	23,054	330	915	627	7,429

<sup>1</sup> No drainage on farms reported in Apache and Greenlee Counties.

## DRAINAGE.

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COUNTY TABLE I.—DRAINAGE ON FARMS: 1920—Continued.

## CONNECTICUT.

	THE STATE.	Fairfield.	Hartford.	Litchfield.	New Haven.	New London.	Windham.	All other counties. <sup>1</sup>
1 Number of all farms in the state or county.....	22,655	3,874	4,700	3,041	2,687	2,747	2,217	3,399
2 Farms reporting land having drainage.....	1,263	212	468	146	151	83	83	60
3 Farms reporting land needing drainage.....	2,639	497	660	408	440	264	342	228
4 Farms in drainage and levee districts.....	30	6	10	4	4	2	2	8
<b>LAND AND FARM AREA.</b>								
5 Approximate land area of the state or county.....acres..	3,084,800	403,840	466,560	592,000	385,920	421,760	330,000	494,720
6 All land in farms.....acres..	1,898,980	225,660	293,967	376,650	188,167	287,576	220,204	306,807
7 Improved land in farms.....acres..	701,086	108,393	142,506	135,616	75,880	79,839	70,471	88,381
8 Woodland in farms.....acres..	683,719	65,271	88,506	127,477	62,059	107,629	98,570	137,117
9 Other unimproved land in farms.....acres..	514,175	52,065	62,955	113,557	50,228	100,108	51,153	81,309
10 Farm land reported as provided with drainage.....acres..	14,646	2,749	5,553	1,657	1,469	1,922	795	501
11 Farm land reported as needing drainage.....acres..	56,462	8,302	10,654	9,105	7,541	8,405	8,624	3,831
12 Drainage only.....acres..	14,430	2,858	3,380	2,107	1,916	1,314	1,573	1,282
13 Drainage and clearing.....acres..	42,032	5,444	7,274	6,998	5,625	7,091	7,051	2,549

<sup>1</sup> Drainage on farms was reported in all counties in Connecticut.

## DELAWARE.

	THE STATE.	Kent.	New Castle.	Sussex.
1 Number of all farms in the state or county.....	10,140	2,911	1,825	5,404
2 Farms reporting land having drainage.....	4,246	1,540	573	2,133
3 Farms reporting land needing drainage.....	2,488	620	534	1,334
4 Farms in drainage and levee districts.....	1,321	766	10	545
<b>LAND AND FARM AREA.</b>				
5 Approximate land area of the state or county.....acres..	1,257,600	394,880	278,400	584,320
6 All land in farms.....acres..	944,511	315,141	215,857	413,513
7 Improved land in farms.....acres..	653,052	224,486	162,302	266,264
8 Woodland in farms.....acres..	222,658	65,839	27,140	129,679
9 Other unimproved land in farms.....acres..	68,801	24,816	26,415	17,570
10 Farm land reported as provided with drainage.....acres..	185,831	71,086	18,003	96,742
11 Farm land reported as needing drainage.....acres..	68,969	13,383	12,811	42,775
12 Drainage only.....acres..	7,967	1,467	2,948	3,552
13 Drainage and clearing.....acres..	61,002	11,916	9,863	39,223

## DISTRICT OF COLUMBIA.

[All the statistics for drainage on farms for the District of Columbia appear in State Table I, page 372.]

## MAINE.

	THE STATE.	Andros-coggin.	Aroos-took.	Cumber-land.	Franklin.	Hancock.	Kenne-bec.	Knox.
1 Number of all farms in the state or county.....	48,227	2,235	6,741	3,740	1,849	2,442	4,442	1,427
2 Farms reporting land having drainage.....	2,068	144	87	312	34	73	145	72
3 Farms reporting land needing drainage.....	5,425	277	560	489	97	219	696	159
4 Farms in drainage and levee districts.....	25	1	4	4	3	3	1	1
<b>LAND AND FARM AREA.</b>								
5 Approximate land area of the state or county.....acres..	19,132,800	293,750	4,129,920	545,920	1,144,960	974,080	562,560	224,640
6 All land in farms.....acres..	5,425,968	211,954	850,208	319,776	274,808	229,184	430,020	124,010
7 Improved land in farms.....acres..	1,977,329	90,481	450,763	129,454	96,294	44,806	173,835	34,048
8 Woodland in farms.....acres..	2,447,567	74,571	299,409	135,358	138,552	138,824	155,043	56,057
9 Other unimproved land in farms.....acres..	1,001,042	46,900	100,036	54,964	39,662	45,464	161,142	33,905
10 Farm land reported as provided with drainage.....acres..	26,302	2,189	667	4,291	263	761	1,884	703
11 Farm land reported as needing drainage.....acres..	142,633	5,604	21,125	10,373	2,173	5,914	14,681	3,267
12 Drainage only.....acres..	19,930	1,300	1,946	1,312	516	721	1,930	461
13 Drainage and clearing.....acres..	122,123	4,304	19,180	9,061	1,657	5,193	12,751	2,746

	Lincoln.	Oxford.	Penob-scot.	Piscata-quis.	Sagada-hoc.	Somer-set.	Waldo.	Wash-ington.	York.
1 Number of all farms in the county.....	2,024	3,078	5,188	1,424	852	3,646	3,234	2,561	3,344
2 Farms reporting land having drainage.....	97	292	182	42	119	102	243	62	152
3 Farms reporting land needing drainage.....	301	322	481	179	103	354	471	438	249
4 Farms in drainage and levee districts.....	7	7	1	4	4	4	4	3	1
<b>LAND AND FARM AREA.</b>									
5 Approximate land area of the county.....acres..	202,480	1,267,200	2,085,120	2,412,800	160,000	2,325,120	463,360	1,617,020	632,960
6 All land in farms.....acres..	184,998	434,089	591,275	218,668	95,866	500,383	359,983	272,153	327,693
7 Improved land in farms.....acres..	51,524	134,722	219,485	67,880	33,908	180,315	117,424	56,347	95,961
8 Woodland in farms.....acres..	90,150	238,612	253,910	117,001	35,166	223,243	154,443	163,720	187,238
9 Other unimproved land in farms.....acres..	43,324	61,655	117,880	33,787	26,832	90,825	88,116	52,086	64,464
10 Farm land reported as provided with drainage.....acres..	975	2,000	2,364	526	1,570	1,793	3,629	686	2,061
11 Farm land reported as needing drainage.....acres..	6,414	5,769	15,102	4,756	2,232	9,848	10,000	17,061	7,795
12 Drainage only.....acres..	1,207	2,025	1,884	559	586	1,180	2,026	1,069	1,208
13 Drainage and clearing.....acres..	5,207	3,744	13,218	4,197	1,646	8,666	7,974	15,992	6,587

COUNTY TABLE I.—DRAINAGE ON FARMS: 1920—Continued.

## MARYLAND.

		THE STATE.	Allegany.	Anne Arundel.	Baltimore.	Caroline.	Carroll.	Cecil.	Charles.
1	Number of all farms in the state or county.....	47,908	999	1,965	3,587	2,071	3,518	1,740	1,965
2	Farms reporting land having drainage.....	6,911	82	92	198	812	395	153	133
3	Farms reporting land needing drainage.....	6,658	296	381	281	563	421	165	346
4	Farms in drainage and levee districts.....	272	1	4	1	9	.....	.....	3
LAND AND FARM AREA.									
5	Approximate land area of the state or county..... acres..	6,362,240	283,520	272,040	386,560	204,160	286,080	241,280	296,960
6	All land in farms..... acres..	4,757,969	152,974	179,133	280,618	174,225	273,777	187,501	235,476
7	Improved land in farms..... acres..	3,136,728	64,074	115,569	196,212	120,613	207,683	132,604	118,301
8	Woodland in farms..... acres..	1,327,221	77,998	51,034	66,334	47,711	39,815	37,994	105,475
9	Other unimproved land in farms..... acres..	294,050	10,902	11,630	18,072	5,901	26,329	16,873	11,700
10	Farm land reported as provided with drainage..... acres..	249,799	1,139	2,497	1,748	32,687	2,249	4,092	4,344
11	Farm land reported as needing drainage..... acres..	184,820	10,509	13,781	3,176	15,134	4,890	3,882	18,838
12	Drainage only..... acres..	33,267	1,156	2,170	879	2,816	1,552	1,706	2,370
13	Drainage and clearing..... acres..	151,553	9,404	11,611	2,297	12,318	3,338	2,176	16,468
		Dorchester.	Frederick.	Garrett.	Hartford.	Howard.	Kent.	Montgomery.	Prince Georges.
1	Number of all farms in the county.....	2,019	3,817	1,810	2,399	1,297	1,032	2,145	2,457
2	Farms reporting land having drainage.....	889	483	198	133	105	32	182	150
3	Farms reporting land needing drainage.....	564	622	359	359	83	42	224	490
4	Farms in drainage and levee districts.....	6	2	1	.....	1	5	17	3
LAND AND FARM AREA.									
5	Approximate land area of the county..... acres..	368,640	424,320	438,400	282,880	160,000	180,480	333,440	308,480
6	All land in farms..... acres..	291,808	364,625	244,754	219,089	142,400	165,800	260,405	228,723
7	Improved land in farms..... acres..	117,094	293,509	112,811	154,905	104,682	132,726	198,728	143,438
8	Woodland in farms..... acres..	64,528	55,417	109,401	54,414	30,050	21,068	52,920	73,286
9	Other unimproved land in farms..... acres..	29,186	15,569	22,542	9,770	7,668	11,466	7,757	11,999
10	Farm land reported as provided with drainage..... acres..	48,450	5,868	2,990	1,097	1,650	869	3,889	3,301
11	Farm land reported as needing drainage..... acres..	14,476	7,286	10,404	8,449	1,419	766	6,871	15,354
12	Drainage only..... acres..	1,093	2,578	2,782	2,009	353	430	1,127	3,355
13	Drainage and clearing..... acres..	13,467	4,705	7,682	6,440	1,066	336	5,744	11,999
		Queen Annes.	St. Marys.	Somerset.	Talbot.	Washington.	Wicomico.	Worcester.	All other counties. <sup>1</sup>
1	Number of all farms in the county.....	1,409	1,790	1,820	1,205	2,544	2,504	2,334	1,461
2	Farms reporting land having drainage.....	438	211	652	106	95	809	551	12
3	Farms reporting land needing drainage.....	210	353	347	81	129	178	185	30
4	Farms in drainage and levee districts.....	13	.....	191	1	1	2	10	1
LAND AND FARM AREA.									
5	Approximate land area of the county..... acres..	233,600	237,440	211,840	171,520	293,760	237,440	316,800	192,000
6	All land in farms..... acres..	214,378	190,387	131,253	160,450	239,298	167,840	206,826	136,299
7	Improved land in farms..... acres..	163,915	93,438	70,766	115,753	189,847	98,350	114,867	76,073
8	Woodland in farms..... acres..	39,551	84,849	45,376	37,239	37,691	57,069	81,785	54,176
9	Other unimproved land in farms..... acres..	10,912	12,100	15,121	7,458	11,760	11,781	10,474	6,050
10	Farm land reported as provided with drainage..... acres..	30,475	7,080	30,461	5,613	1,047	31,124	26,987	142
11	Farm land reported as needing drainage..... acres..	5,474	12,505	13,641	2,187	1,367	5,864	7,641	795
12	Drainage only..... acres..	622	1,431	1,363	57	735	738	1,730	299
13	Drainage and clearing..... acres..	4,852	11,074	12,278	2,130	632	5,126	5,911	496

<sup>1</sup> Drainage on farms was reported in all counties in Maryland.

## MASSACHUSETTS.

		THE STATE.	Barnstable.	Berkshire.	Bristol.	Essex.	Franklin.
1	Number of all farms in the state or county.....	32,061	675	2,359	3,770	2,966	2,784
2	Farms reporting land having drainage.....	2,955	174	86	163	309	241
3	Farms reporting land needing drainage.....	4,112	51	178	625	402	301
4	Farms in drainage and levee districts.....	138	7	.....	13	7	4
LAND AND FARM AREA.							
5	Approximate land area of the state or county..... acres..	5,144,960	261,760	618,240	362,880	318,080	446,080
6	All land in farms..... acres..	2,494,477	47,679	356,264	177,761	148,541	271,460
7	Improved land in farms..... acres..	908,834	13,619	139,744	68,061	64,429	75,307
8	Woodland in farms..... acres..	1,030,386	26,863	138,891	71,661	45,227	118,121
9	Other unimproved land in farms..... acres..	555,257	7,197	77,629	38,039	38,885	78,032
10	Farm land reported as provided with drainage..... acres..	39,022	1,430	1,746	2,828	3,346	2,237
11	Farm land reported as needing drainage..... acres..	89,883	423	5,968	12,716	7,178	4,366
12	Drainage only..... acres..	21,212	120	2,093	1,437	2,289	1,360
13	Drainage and clearing..... acres..	59,671	303	3,875	11,279	4,889	8,036

		Hampden.	Hampshire.	Middlesex.	Norfolk.	Plymouth.	Worcester.	All other counties. <sup>1</sup>
1	Number of all farms in the county.....	2,068	2,979	4,446	1,404	2,171	6,132	247
2	Farms reporting land having drainage.....	110	87	718	92	349	597	29
3	Farms reporting land needing drainage.....	246	111	777	236	356	800	23
4	Farms in drainage and levee districts.....	7	2	14	13	46	19	6
LAND AND FARM AREA.								
5	Approximate land area of the county..... acres..	407,040	374,400	532,480	259,840	432,000	995,840	136,320
6	All land in farms..... acres..	211,143	267,068	257,165	75,786	122,707	517,610	41,853
7	Improved land in farms..... acres..	73,825	90,083	117,290	30,183	44,101	181,167	11,025
8	Woodland in farms..... acres..	160,695	122,225	91,897	31,973	63,990	204,404	14,430
9	Other unimproved land in farms..... acres..	36,623	54,760	47,978	13,630	14,616	132,030	15,880
10	Farm land reported as provided with drainage..... acres..	1,202	1,519	8,280	1,121	6,074	8,054	585
11	Farm land reported as needing drainage..... acres..	5,370	3,425	13,734	4,846	7,504	14,597	726
12	Drainage only..... acres..	1,467	1,867	4,175	1,026	1,414	3,800	164
13	Drainage and clearing..... acres..	3,903	1,553	9,559	3,820	6,000	10,797	562

<sup>1</sup> Drainage on farms was reported in all counties in Massachusetts.



## DRAINAGE.

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COUNTY TABLE I.—DRAINAGE ON FARMS: 1920—Continued.

## NEVADA.

		THE STATE.	Churchill.	Douglas.	Elko.	Eureka.
1	Number of all farms in the state or county.....	3,163	498	129	543	60
2	Farms reporting land having drainage.....	385	223	18	10	5
3	Farms reporting land needing drainage.....	321	187	10	15	2
4	Farms in drainage and levee districts.....	232	182		4	1
<b>LAND AND FARM AREA.</b>						
5	Approximate land area of the state or county.....acres..	70,285,440	3,232,000	469,120	10,917,760	2,660,480
6	All land in farms.....acres..	2,357,163	108,307	119,211	718,102	86,197
7	Improved land in farms.....acres..	594,741	35,870	27,277	183,721	25,121
8	Woodland in farms.....acres..	28,637	1,651	11,703	6,530	230
9	Other unimproved land in farms.....acres..	1,733,785	70,786	80,231	527,851	60,846
10	Farm land reported as provided with drainage.....acres..	46,252	21,847	787	1,118	1,929
11	Farm land reported as needing drainage.....acres..	59,739	10,845	691	2,895	490
12	Drainage only.....acres..	38,095	2,643	391	155	100
13	Drainage and clearing.....acres..	21,644	8,202	300	2,650	300

		Humboldt.	Lincoln.	Nye.	Pershing.	Washoe.	All other counties. <sup>1</sup>
1	Number of all farms in the county.....	132	145	152	115	481	908
2	Farms reporting land having drainage.....	1	14	9	54	38	13
3	Farms reporting land needing drainage.....	1	19	12	10	20	45
4	Farms in drainage and levee districts.....				41		4
<b>LAND AND FARM AREA.</b>							
5	Approximate land area of the county.....acres..	6,274,560	6,727,040	11,708,160	3,873,920	4,000,640	20,421,760
6	All land in farms.....acres..	393,865	31,105	95,002	130,968	230,052	444,354
7	Improved land in farms.....acres..	70,788	9,264	19,759	50,141	45,036	121,764
8	Woodland in farms.....acres..	494		1,097	200	2,449	4,283
9	Other unimproved land in farms.....acres..	316,583	21,841	74,146	80,627	182,567	318,307
10	Farm land reported as provided with drainage.....acres..	1,000	677	1,397	15,275	1,428	794
11	Farm land reported as needing drainage.....acres..	28,000	1,735	1,713	462	5,235	7,853
12	Drainage only.....acres..	24,000	995	946	25	3,816	5,024
13	Drainage and clearing.....acres..	4,000	740	767	437	1,419	2,829

<sup>1</sup> No drainage on farms reported in Clark and Storey Counties.

## NEW HAMPSHIRE.

		THE STATE.	Belknap.	Carroll.	Cheshire.	Grafton.
1	Number of all farms in the state or county.....	20,523	1,348	1,520	1,625	2,884
2	Farms reporting land having drainage.....	1,013	36	58	83	87
3	Farms reporting land needing drainage.....	1,794	75	100	146	190
4	Farms in drainage and levee districts.....	16			8	
<b>LAND AND FARM AREA.</b>						
5	Approximate land area of the state or county.....acres..	5,779,840	254,060	611,200	465,920	1,106,560
6	All land in farms.....acres..	2,603,806	169,327	267,253	221,298	462,410
7	Improved land in farms.....acres..	762,902	34,377	45,431	53,678	131,827
8	Woodland in farms.....acres..	1,296,838	76,013	137,062	121,570	240,255
9	Other unimproved land in farms.....acres..	601,066	53,927	24,760	46,050	90,351
10	Farm land reported as provided with drainage.....acres..	11,777	522	569	844	879
11	Farm land reported as needing drainage.....acres..	40,783	1,244	2,720	8,306	3,902
12	Drainage only.....acres..	9,914	591	491	1,037	1,066
13	Drainage and clearing.....acres..	30,869	653	2,229	7,269	2,836

		Hillsborough.	Merrimack.	Rockingham.	Strafford.	All other counties. <sup>1</sup>
1	Number of all farms in the county.....	2,563	2,837	3,438	1,421	2,887
2	Farms reporting land having drainage.....	205	161	236	89	58
3	Farms reporting land needing drainage.....	181	266	386	293	157
4	Farms in drainage and levee districts.....	1	2	3	1	1
<b>LAND AND FARM AREA.</b>						
5	Approximate land area of the county.....acres..	572,800	596,480	442,240	242,560	1,488,000
6	All land in farms.....acres..	306,991	367,690	273,361	151,989	443,671
7	Improved land in farms.....acres..	77,286	84,678	86,336	41,436	143,453
8	Woodland in farms.....acres..	140,473	175,725	138,737	69,686	200,437
9	Other unimproved land in farms.....acres..	89,232	107,797	48,288	40,967	99,681
10	Farm land reported as provided with drainage.....acres..	2,186	1,556	3,335	1,375	511
11	Farm land reported as needing drainage.....acres..	2,587	4,518	9,455	4,141	3,820
12	Drainage only.....acres..	1,137	1,630	2,468	590	894
13	Drainage and clearing.....acres..	1,450	2,888	6,987	3,551	2,926

<sup>1</sup> Drainage on farms was reported in all counties in New Hampshire.



COUNTY TABLE I.—DRAINAGE ON FARMS: 1920—Continued.

## NEW JERSEY.

		THE STATE.	Bergen.	Burlington.	Camden.	Cape May.	Cumberland.	Gloucester.	Mercer.
1	Number of all farms in the state or county .....	29,702	1,012	2,172	1,035	629	3,094	2,319	1,330
2	Farms reporting land having drainage .....	4,903	94	1,081	138	31	152	404	190
3	Farms reporting land needing drainage .....	3,423	152	334	79	27	132	338	99
4	Farms in drainage and levee districts .....	136	7	8	1	1	47	16	1
LAND AND FARM AREA.									
5	Approximate land area of the state or county .....	4,808,960	151,680	521,600	142,080	160,600	320,000	212,480	144,640
6	All land in farms .....	2,282,585	37,108	271,235	50,889	46,493	141,714	132,186	107,768
7	Improved land in farms .....	1,555,607	21,789	153,678	39,442	18,582	90,676	97,990	88,416
8	Woodland in farms .....	454,768	8,258	90,099	7,677	15,626	25,334	20,623	12,174
9	Other unimproved land in farms .....	272,210	7,061	27,458	3,770	12,285	25,704	13,573	7,178
10	Farm land reported as provided with drainage .....	174,260	1,920	54,963	4,527	775	7,410	8,394	7,317
11	Farm land reported as needing drainage .....	77,881	1,861	8,951	1,515	1,217	5,853	5,703	1,632
12	Drainage only .....	29,193	741	5,549	779	107	1,266	669	1,167
13	Drainage and clearing .....	48,688	1,120	3,402	736	1,110	4,587	5,031	665

		Middlesex.	Monmouth.	Morris.	Ocean.	Salem.	Somerset.	Sussex.	Warren.	All other counties. <sup>1</sup>
1	Number of all farms in the county .....	1,353	2,445	1,333	666	1,802	1,454	1,503	1,686	5,859
2	Farms reporting land having drainage .....	386	963	176	64	710	208	98	108	102
3	Farms reporting land needing drainage .....	206	384	287	34	377	113	167	222	477
4	Farms in drainage and levee districts .....	1	7	3	3	31	1	5	1	8
LAND AND FARM AREA.										
5	Approximate land area of the county .....	199,680	306,560	304,000	407,680	219,520	195,200	338,560	231,680	944,000
6	All land in farms .....	94,996	175,140	123,590	49,172	155,172	137,036	214,409	176,895	368,782
7	Improved land in farms .....	70,318	132,037	71,814	23,768	113,013	113,021	136,945	127,782	256,336
8	Woodland in farms .....	18,701	27,485	34,369	16,196	18,435	15,466	42,009	29,557	72,169
9	Other unimproved land in farms .....	5,977	15,618	17,407	9,208	23,724	8,559	34,855	19,556	40,277
10	Farm land reported as provided with drainage .....	12,615	30,796	3,951	3,502	24,010	7,465	1,570	3,640	905
11	Farm land reported as needing drainage .....	4,679	6,420	6,252	1,392	8,218	1,829	4,990	6,140	11,032
12	Drainage only .....	1,662	2,889	2,243	213	2,994	904	2,308	3,794	1,908
13	Drainage and clearing .....	3,017	3,531	4,009	1,179	5,224	925	2,682	2,346	9,124

<sup>1</sup> Drainage on farms was reported in all counties in New Jersey.

## NEW MEXICO.

		THE STATE.	Chaves.	Colfax.	Curry.	Dona Ana.	Eddy.	Guadalupe.	Mora.
1	Number of all farms in the state or county.....	29,844	744	1,052	1,174	1,054	785	982	1,911
2	Farms reporting land having drainage.....	1,294	108	11	1	227	21	50	50
3	Farms reporting land needing drainage.....	998	13	34	1	319	36	7	32
4	Farms in drainage and levee districts.....	484	62	5		248	16		2
LAND AND FARM AREA.									
5	Approximate land area of the state or county.....acres..	78,401,920	3,866,880	2,430,720	899,840	2,445,440	2,716,800	1,939,840	1,584,000
6	All land in farms.....acres..	24,409,033	1,924,179	1,952,760	740,969	195,316	794,543	986,406	1,013,981
7	Improved land in farms.....acres..	1,717,224	50,450	111,293	176,871	42,104	52,311	31,441	106,995
8	Woodland in farms.....acres..	1,817,460	16,123	205,190	8,773	7,653	1,608	53,507	105,449
9	Other unimproved land in farms.....acres..	20,874,949	1,857,606	1,636,277	556,325	145,490	740,624	901,458	801,537
10	Farm land reported as provided with drainage.....acres..	47,311	13,198	883	1,029	14,128	2,738	650	634
11	Farm land reported as needing drainage.....acres..	49,102	1,185	4,836	101	12,614	1,713	2,448	5,707
12	Drainage only.....acres..	29,016	740	4,719	101	5,109	1,478	2,428	4,789
13	Drainage and clearing.....acres..	20,086	445	117		7,505	235	20	913

		Rio Arriba.	San Juan.	San Miguel.	Sandoval.	Sierra.	Socorro.	Taos.	All other counties. <sup>1</sup>
1	Number of all farms in the county.....	2,063	874	1,643	1,110	395	1,191	1,116	13,750
2	Farms reporting land having drainage.....	380	38	151	43	28	46	121	19
3	Farms reporting land needing drainage.....	145	63	39	42	26	140	13	88
4	Farms in drainage and levee districts.....	1	7	95	1		10		37
LAND AND FARM AREA.									
5	Approximate land area of the county.....acres..	3,757,440	3,504,040	3,132,160	2,477,440	1,995,520	9,644,800	1,441,280	36,565,120
6	All land in farms.....acres..	394,881	78,877	1,452,379	135,595	330,372	1,180,546	84,873	13,173,456
7	Improved land in farms.....acres..	41,625	30,231	55,534	24,258	7,712	32,770	23,497	927,072
8	Woodland in farms.....acres..	66,074	6,226	426,590	20,080	11,648	313,955	19,243	555,335
9	Other unimproved land in farms.....acres..	257,182	42,420	967,249	91,257	311,512	833,821	42,133	11,691,049
10	Farm land reported as provided with drainage.....acres..	6,387	721	1,260	811	541	673	2,978	731
11	Farm land reported as needing drainage.....acres..	5,002	1,445	2,003	973	810	2,612	2,466	5,097
12	Drainage only.....acres..	1,902	1,094	1,087	194	244	1,310	10	3,811
13	Drainage and clearing.....acres..	3,100	351	1,006	779	566	1,302	2,456	1,286

<sup>1</sup> No drainage on farms reported in Hidalgo, Lea, Lincoln, Luna, Roosevelt, Santa Fe, Torrance, and Valencia Counties.

## DRAINAGE.

719

COUNTY TABLE I.—DRAINAGE ON FARMS: 1920—Continued.

## NEW YORK.

		The State.	Albany.	Allegany.	Broome.	Cattaraugus.	Cayuga.	Chautauque.	Che-mung.
1	Number of all farms in the state or county.....	193,195	2,946	4,405	3,594	5,905	4,297	7,100	1,945
2	Farms reporting land having drainage.....	33,986	375	216	134	585	2,930	960	117
3	Farms reporting land needing drainage.....	38,523	385	508	533	827	2,293	1,348	278
4	Farms in drainage and levee districts.....	1,447	4	13	14	86	38	39	14
<b>LAND AND FARM AREA.</b>									
5	Approximate land area of the state or county.....acres..	30,498,580	337,280	670,080	451,200	859,520	449,920	684,160	260,490
6	All land in farms.....acres..	20,632,803	278,231	566,280	384,832	645,088	396,264	593,608	208,813
7	Improved land in farms.....acres..	13,158,781	207,472	331,572	251,995	342,882	311,729	361,344	150,256
8	Woodland in farms.....acres..	4,100,567	43,177	116,205	90,741	161,760	45,499	118,623	45,566
9	Other unimproved land in farms.....acres..	3,313,455	27,582	118,503	42,096	140,446	39,036	113,639	12,971
10	Farm land reported as provided with drainage.....acres..	1,180,423	8,246	2,790	3,234	19,115	143,423	15,282	1,489
11	Farm land reported as needing drainage.....acres..	779,487	5,162	11,442	10,721	21,901	46,225	29,188	3,977
12	Drainage only.....acres..	318,865	2,447	2,410	3,645	7,250	24,814	7,686	2,433
13	Drainage and clearing.....acres..	460,602	2,715	9,032	7,076	14,651	21,411	21,602	1,544

		Che-mung.	Clinton.	Colum-bia.	Cort-land.	De-la-ware.	Dutch-ess.	Erie.	Essex.	Frank-lin.
1	Number of all farms in the county.....	3,838	3,402	2,580	2,315	4,613	3,114	7,486	1,978	3,299
2	Farms reporting land having drainage.....	185	241	225	127	195	327	1,291	72	226
3	Farms reporting land needing drainage.....	671	296	317	319	370	607	1,375	352	490
4	Farms in drainage and levee districts.....	5	4	2	2	9	6	24	1	.....
<b>LAND AND FARM AREA.</b>										
5	Approximate land area of the county.....acres..	572,160	671,360	412,160	321,920	927,360	515,840	661,760	1,175,040	1,073,920
6	All land in farms.....acres..	512,586	445,629	340,387	282,382	745,026	436,730	538,652	310,506	408,135
7	Improved land in farms.....acres..	314,730	187,581	250,457	185,925	422,014	299,859	395,364	114,265	178,956
8	Woodland in farms.....acres..	100,832	116,175	56,699	57,096	220,683	80,544	76,325	135,412	85,713
9	Other unimproved land in farms.....acres..	97,024	141,873	33,231	39,361	102,329	56,327	66,363	60,919	143,466
10	Farm land reported as provided with drainage.....acres..	2,244	9,715	3,387	1,430	2,824	7,856	36,015	1,331	8,617
11	Farm land reported as needing drainage.....acres..	12,437	8,848	4,914	5,669	6,624	13,387	20,637	10,178	13,446
12	Drainage only.....acres..	5,188	1,016	2,294	3,049	2,896	6,653	8,322	1,330	2,295
13	Drainage and clearing.....acres..	7,249	7,832	2,620	2,620	3,788	6,734	12,315	8,848	11,151

		Fulton.	Genesee.	Greene.	Herki-mer.	Jeffer-son.	Lewis.	Living-ston.	Madi-son.	Monroe.
1	Number of all farms in the county.....	1,773	2,885	2,248	2,649	5,151	2,952	2,899	3,507	5,174
2	Farms reporting land having drainage.....	112	511	164	267	368	287	1,199	550	1,594
3	Farms reporting land needing drainage.....	243	501	187	475	798	617	773	697	1,166
4	Farms in drainage and levee districts.....	1	14	3	7	3	3	77	123	62
<b>LAND AND FARM AREA.</b>										
5	Approximate land area of the county.....acres..	330,240	317,440	411,520	933,760	815,360	812,800	403,840	416,000	424,320
6	All land in farms.....acres..	196,260	276,617	282,749	334,277	696,145	437,208	353,170	362,459	359,877
7	Improved land in farms.....acres..	88,858	219,248	164,162	230,825	453,252	223,637	278,622	249,562	315,083
8	Woodland in farms.....acres..	67,032	30,847	88,128	51,012	81,244	100,680	51,978	53,413	31,247
9	Other unimproved land in farms.....acres..	40,370	26,522	30,459	62,440	161,649	112,891	22,570	59,484	13,547
10	Farm land reported as provided with drainage.....acres..	2,145	16,695	2,615	6,514	23,964	7,976	48,784	13,446	45,279
11	Farm land reported as needing drainage.....acres..	4,732	10,619	2,633	8,542	18,269	15,992	17,118	13,578	16,394
12	Drainage only.....acres..	2,494	5,812	1,400	4,863	7,167	4,413	8,818	5,644	7,929
13	Drainage and clearing.....acres..	2,238	4,807	1,233	3,679	11,153	11,579	8,360	7,934	8,465

		Mont-gomery.	Niagara.	Oneida.	Onon-daga.	Ontario.	Orange.	Orleans.	Oswego.	Otsego.
1	Number of all farms in the county.....	2,015	4,068	6,233	5,652	4,062	3,591	2,579	5,539	4,770
2	Farms reporting land having drainage.....	886	1,150	1,174	1,627	2,412	856	522	1,015	278
3	Farms reporting land needing drainage.....	475	470	1,469	1,368	1,684	934	687	1,798	858
4	Farms in drainage and levee districts.....	55	389	25	36	38	9	145	35	18
<b>LAND AND FARM AREA.</b>										
5	Approximate land area of the county.....acres..	254,720	334,080	800,000	490,840	415,360	533,760	253,440	618,240	645,760
6	All land in farms.....acres..	227,035	289,091	611,634	429,881	368,940	350,268	230,877	462,522	573,287
7	Improved land in farms.....acres..	183,346	265,431	379,557	334,712	296,566	290,405	196,664	271,502	388,679
8	Woodland in farms.....acres..	24,120	16,459	97,524	47,135	48,568	59,880	16,772	100,325	117,134
9	Other unimproved land in farms.....acres..	19,569	7,801	134,553	48,034	23,806	59,983	17,441	90,695	67,474
10	Farm land reported as provided with drainage.....acres..	25,721	73,337	24,904	52,239	104,332	18,491	19,337	18,211	3,378
11	Farm land reported as needing drainage.....acres..	6,537	4,685	33,147	21,742	34,609	25,139	12,823	37,145	11,654
12	Drainage only.....acres..	3,910	1,084	15,589	10,747	19,034	8,616	2,265	13,461	6,194
13	Drainage and clearing.....acres..	2,627	3,601	17,558	10,995	15,575	16,523	10,658	23,454	5,460

## AGRICULTURE.

COUNTY TABLE I.—DRAINAGE ON FARMS: 1920—Continued.

NEW YORK—Continued.

		Putnam.	Rensselaer.	St. Lawrence.	Saratoga.	Schenectady.	Schoharie.	Schuyler.	Seneca.	Steuben.
1	Number of all farms in the county.....	787	3,078	7,652	3,178	983	2,791	1,039	1,857	6,132
2	Farms reporting land having drainage.....	58	408	888	555	149	160	524	1,478	330
3	Farms reporting land needing drainage.....	213	668	1,876	571	102	314	507	922	992
4	Farms in drainage and levee districts.....	4	6	11	10	1	21	2	14	11
<b>LAND AND FARM AREA.</b>										
5	Approximate land area of the county.....acres..	149,120	424,320	1,728,640	526,720	131,840	410,880	215,040	215,040	894,720
6	All land in farms.....acres..	113,010	307,630	1,047,151	336,846	102,542	344,841	176,002	188,210	759,364
7	Improved land in farms.....acres..	45,875	199,536	486,105	200,961	75,769	234,750	132,932	180,286	527,134
8	Woodland in farms.....acres..	40,864	65,800	188,493	76,013	14,210	66,176	28,163	18,807	158,717
9	Other unimproved land in farms.....acres..	26,471	42,294	372,553	59,872	12,563	43,915	14,907	9,117	73,513
10	Farm land reported as provided with drainage.....acres..	1,319	7,174	44,252	16,970	4,230	2,004	21,557	104,395	6,241
11	Farm land reported as needing drainage.....acres..	4,402	8,461	66,074	10,263	1,427	3,297	9,903	17,360	18,949
12	Drainage only.....acres..	1,583	5,052	19,868	4,294	623	2,013	3,476	7,051	6,751
13	Drainage and clearing.....acres..	2,819	3,409	46,206	5,969	804	1,284	6,427	10,309	12,189

		Tioga.	Tompkins.	Ulster.	Washington.	Wayne.	Westchester.	Wyoming.	Yates.	All other counties. <sup>1</sup>
1	Number of all farms in the county.....	2,541	2,550	4,311	3,334	4,980	1,538	3,165	2,041	10,404
2	Farms reporting land having drainage.....	119	989	400	342	1,824	200	835	1,308	159
3	Farms reporting land needing drainage.....	371	848	693	611	1,196	218	1,185	660	527
4	Farms in drainage and levee districts.....	9	4	7	11	16	2	4	2	8
<b>LAND AND FARM AREA.</b>										
5	Approximate land area of the county.....acres..	332,800	304,640	727,680	535,680	383,360	286,720	384,640	219,520	3,362,560
6	All land in farms.....acres..	281,272	253,781	408,798	434,187	348,205	104,022	349,728	198,613	945,087
7	Improved land in farms.....acres..	194,101	186,967	200,250	298,408	283,888	58,521	231,948	156,956	418,082
8	Woodland in farms.....acres..	55,819	35,592	149,604	92,366	32,471	22,627	58,262	30,081	385,034
9	Other unimproved land in farms.....acres..	28,352	28,222	58,944	43,393	29,846	22,874	59,518	11,576	141,071
10	Farm land reported as provided with drainage.....acres..	1,247	40,170	6,576	7,946	48,570	4,631	29,067	57,538	2,190
11	Farm land reported as needing drainage.....acres..	7,101	18,350	10,929	9,929	19,189	3,950	22,948	14,730	12,029
12	Drainage only.....acres..	3,276	10,569	4,525	5,044	8,356	2,169	9,065	7,286	3,906
13	Drainage and clearing.....acres..	3,825	7,781	6,404	4,285	10,833	1,791	13,883	7,444	8,033

<sup>1</sup> No drainage on farms reported in New York County.

## OKLAHOMA.

		THE STATE.	Beaver.	Canadian.	Cherokee.	Cleveland.	Delaware.	Garvin.	Grady.
1	Number of all farms in the state or county.....	191,988	2,518	2,269	2,753	2,216	2,176	3,523	3,484
2	Farms reporting land having drainage.....	2,032	1	23	245	20	43	35	16
3	Farms reporting land needing drainage.....	8,065	3	31	341	19	127	93	9
4	Farms in drainage and levee districts.....	834	1	23	1	13	.....	7	8
<b>LAND AND FARM AREA.</b>									
5	Approximate land area of the state or county.....acres..	44,424,960	1,160,320	570,240	506,240	354,560	508,160	525,440	711,680
6	All land in farms.....acres..	31,951,934	1,099,058	491,675	221,658	200,397	251,671	437,827	573,272
7	Improved land in farms.....acres..	18,125,321	508,103	349,052	121,463	171,483	138,207	283,454	388,763
8	Woodland in farms.....acres..	4,206,171	6,653	27,503	78,848	73,698	104,662	81,976	75,765
9	Other unimproved land in farms.....acres..	9,620,442	584,302	103,120	21,347	55,216	8,802	72,397	108,744
10	Farm land reported as provided with drainage.....acres..	107,014	900	2,391	608	766	4,757	1,650	1,292
11	Farm land reported as needing drainage.....acres..	265,786	320	1,320	7,628	432	2,553	2,900	578
12	Drainage only.....acres..	39,788	.....	763	1,023	70	385	287	408
13	Drainage and clearing.....acres..	225,998	320	557	6,905	302	2,168	2,613	170

		Grant.	Johnston.	Kay.	Kingfisher.	Kiowa.	LeFlore.	Lincoln.	McCur-tain.
1	Number of all farms in the county.....	2,713	2,385	2,595	2,463	2,880	4,931	4,545	4,511
2	Farms reporting land having drainage.....	19	25	22	8	19	78	191	25
3	Farms reporting land needing drainage.....	5	192	31	140	29	725	167	734
4	Farms in drainage and levee districts.....	18	22	15	12	6	3	170	6
<b>LAND AND FARM AREA.</b>									
5	Approximate land area of the county.....acres..	636,160	421,120	597,760	569,600	679,680	1,032,960	613,760	1,214,080
6	All land in farms.....acres..	618,072	313,083	554,326	501,691	578,366	343,661	561,515	813,018
7	Improved land in farms.....acres..	460,851	150,231	403,131	352,854	348,026	203,877	308,742	160,877
8	Woodland in farms.....acres..	6,522	81,588	16,593	48,053	6,896	115,356	167,282	142,632
9	Other unimproved land in farms.....acres..	151,599	81,264	134,602	100,784	223,444	24,428	85,491	9,509
10	Farm land reported as provided with drainage.....acres..	1,123	1,102	989	1,121	590	1,728	12,316	537
11	Farm land reported as needing drainage.....acres..	172	9,688	2,020	6,316	2,129	22,271	5,317	21,139
12	Drainage only.....acres..	172	175	1,010	916	1,774	896	985	903
13	Drainage and clearing.....acres..	.....	9,513	1,010	5,400	355	21,375	4,332	20,236

## DRAINAGE.

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COUNTY TABLE I.—DRAINAGE ON FARMS: 1920—Continued.

OKLAHOMA—Continued.

	McIntosh.	Mayes.	Murray.	Muskogee.	Oklahoma.	Oklahoma.	Oklahoma.	Oklahoma.	Oklahoma.	Pittsburg.
1 Number of all farms in the county.....	3,449	2,223	1,159	3,531	3,416	2,960	1,865	1,380	3,517	
2 Farms reporting land having drainage.....	87	9	16	26	143	63	19	41	45	
3 Farms reporting land needing drainage.....	60	245	7	111	178	160	26	13	212	
4 Farms in drainage and levee districts.....			1	8		45	1	1		
<b>LAND AND FARM AREA.</b>										
5 Approximate land area of the county.....acres..	453,120	432,640	271,360	529,960	298,720	458,880	446,080	1,457,280	876,800	
6 All land in farms.....acres..	303,754	282,725	198,556	347,884	328,551	402,543	209,062	542,923	446,555	
7 Improved land in farms.....acres..	223,044	196,018	82,993	260,461	207,651	234,639	126,854	177,031	214,208	
8 Woodland in farms.....acres..	53,439	46,484	23,884	42,078	79,792	121,730	39,723	128,407	155,838	
9 Other unimproved land in farms.....acres..	26,371	40,223	92,079	45,345	41,598	46,174	42,485	237,495	76,509	
10 Farm land reported as provided with drainage.....acres..	1,785	544	1,056	582	1,607	2,963	785	26,685	8,685	
11 Farm land reported as needing drainage.....acres..	1,554	7,450	355	3,267	4,954	5,154	779	383	12,222	
12 Drainage only.....acres..	105	2,311	290	1,735	619	1,659	71	60	1,743	
13 Drainage and clearing.....acres..	1,449	5,139	155	1,562	4,335	3,495	708	325	10,479	

	Pontotoc.	Pottawatomie.	Seminole.	Sequoyah.	Tillman.	Tulsa.	Wagoner.	All other counties.
1 Number of all farms in the county.....	3,057	4,531	3,507	3,540	2,269	1,625	2,453	100,914
2 Farms reporting land having drainage.....	14	350	55	21	8	8	58	198
3 Farms reporting land needing drainage.....	180	380	247	176	4	54	82	3,284
4 Farms in drainage and levee districts.....		318	27	42	4	3	44	35
<b>LAND AND FARM AREA.</b>								
5 Approximate land area of the county.....acres..	465,920	597,520	405,120	443,520	544,000	374,400	348,800	25,918,080
6 All land in farms.....acres..	318,162	453,270	300,470	237,144	450,064	223,367	281,566	19,474,328
7 Improved land in farms.....acres..	193,780	275,329	182,027	168,847	326,196	162,706	205,565	10,537,958
8 Woodland in farms.....acres..	74,010	125,096	110,603	59,582	8,187	30,796	35,268	2,037,317
9 Other unimproved land in farms.....acres..	50,372	52,845	7,840	5,715	115,701	29,865	40,733	6,899,053
10 Farm land reported as provided with drainage.....acres..	600	15,023	1,496	1,122	672	533	4,903	5,801
11 Farm land reported as needing drainage.....acres..	5,184	10,888	5,328	5,313	235	1,583	2,484	113,538
12 Drainage only.....acres..	122	1,865	715	1,793	185	518	266	16,064
13 Drainage and clearing.....acres..	5,062	9,023	4,613	3,520	50	1,065	2,218	97,484

<sup>1</sup> No drainage on farms reported in Blaine, Cimarron, Jefferson, Love, and Pawnee Counties.

## OREGON.

	THE STATE.	Baker.	Benton.	Clackamas.	Clatsop.	Columbia.	Coos.	Curry.	Douglas.	Grant.
1 Number of all farms in the state or county.....	50,206	1,509	1,320	3,836	418	991	1,178	339	2,275	728
2 Farms reporting land having drainage.....	6,618	42	192	806	59	129	411	15	193	24
3 Farms reporting land needing drainage.....	9,862	202	182	1,217	150	366	570	26	358	162
4 Farms in drainage and levee districts.....	573	3	4	6	37	23	68	1	12	6
<b>LAND AND FARM AREA.</b>										
5 Approximate land area of the state or county.....acres..	61,188,480	1,975,040	440,320	1,195,520	525,440	423,680	1,041,920	1,031,680	3,194,240	2,892,800
6 All land in farms.....acres..	13,542,315	493,145	233,427	285,910	52,017	89,889	206,565	103,057	566,305	750,160
7 Improved land in farms.....acres..	4,013,851	163,817	103,175	118,658	14,179	36,539	16,855	136,553	74,729	74,729
8 Woodland in farms.....acres..	2,302,596	47,464	75,235	86,035	22,839	39,312	89,649	39,653	271,414	82,450
9 Other unimproved land in farms.....acres..	6,318,871	282,364	55,017	81,217	14,999	28,395	80,386	49,749	158,338	532,951
10 Farm land reported as provided with drainage.....acres..	229,582	1,027	8,633	14,133	1,580	1,041	10,679	544	5,176	824
11 Farm land reported as needing drainage.....acres..	471,396	6,535	13,316	43,683	9,903	18,358	31,715	1,928	17,302	6,791
12 Drainage only.....acres..	75,063	1,535	2,416	1,748	1,201	2,945	3,457	156	1,686	411
13 Drainage and clearing.....acres..	396,333	5,180	10,509	41,935	8,702	16,013	28,268	1,772	15,616	6,380

	Harney.	Hood River.	Jackson.	Josephine.	Klamath.	Lake.	Lane.	Lincoln.	Linn.	Malheur.
1 Number of all farms in the county.....	589	878	1,720	727	932	549	3,279	767	3,041	1,322
2 Farms reporting land having drainage.....	10	177	125	85	123	2	417	43	331	79
3 Farms reporting land needing drainage.....	41	96	273	194	141	39	1,137	95	946	14
4 Farms in drainage and levee districts.....	11	1	12	5	96	6	9	5	16	55
<b>LAND AND FARM AREA.</b>										
5 Approximate land area of the county.....acres..	6,337,120	345,600	1,788,160	1,047,680	3,839,360	5,068,800	2,935,680	645,120	1,415,120	6,325,120
6 All land in farms.....acres..	528,678	38,075	312,936	97,299	357,333	523,218	496,917	118,758	472,469	465,851
7 Improved land in farms.....acres..	178,934	19,064	92,310	29,537	152,742	183,396	172,952	19,046	258,591	129,365
8 Woodland in farms.....acres..	20,689	9,541	113,445	55,804	56,792	65,849	157,323	60,175	115,064	6,232
9 Other unimproved land in farms.....acres..	327,055	8,870	107,181	11,958	147,799	276,973	166,642	38,637	98,814	330,254
10 Farm land reported as provided with drainage.....acres..	10,397	1,431	2,643	1,523	13,764	28,100	11,834	933	13,403	7,327
11 Farm land reported as needing drainage.....acres..	11,680	2,021	12,269	10,869	11,888	18,480	57,190	3,815	47,245	288
12 Drainage only.....acres..	1,523	146	188	1,408	8,661	19,167	10,967	281	9,472	77
13 Drainage and clearing.....acres..	10,157	1,875	12,081	9,461	3,227	8,322	40,223	3,534	37,773	211

## AGRICULTURE.

COUNTY TABLE I.—DRAINAGE ON FARMS: 1920—Continued.

## OREGON—Continued.

	Marion.	Mult-nomah.	Polk.	Tilla-mook.	Uma-tilla.	Union.	Wallowa.	Wash-ington.	Yamhill.	All other counties. <sup>1</sup>
1 Number of all farms in the county.....	3,681	1,828	1,781	797	2,353	1,279	1,149	3,090	2,592	5,188
2 Farms reporting land having drainage.....	832	163	401	111	77	54	29	1,153	462	23
3 Farms reporting land needing drainage.....	776	201	580	303	89	71	83	926	542	72
4 Farms in drainage and levee districts.....	62	8	11	32	30	21	3	24	2	4
<b>LAND AND FARM AREA.</b>										
5 Approximate land area of the county.....acres..	763,520	277,760	453,760	720,000	2,049,920	1,284,480	2,028,160	467,840	456,960	10,167,680
6 All land in farms.....acres..	367,788	100,495	239,621	61,827	1,075,400	441,735	624,029	223,406	256,184	4,030,824
7 Improved land in farms.....acres..	214,653	46,148	137,949	26,663	621,660	178,021	141,404	121,325	139,025	1,365,588
8 Woodland in farms.....acres..	65,130	23,653	75,002	40,491	90,490	83,975	78,765	65,439	73,025	271,631
9 Other unimproved land in farms.....acres..	58,005	30,694	26,670	24,673	363,250	179,739	303,860	36,042	44,134	2,306,606
10 Farm land reported as provided with drainage.....acres..	27,030	5,127	13,134	2,012	1,267	4,179	919	26,419	13,330	568
11 Farm land reported as needing drainage.....acres..	28,223	10,300	33,494	11,996	2,836	2,572	2,223	26,258	24,113	3,466
12 Drainage only.....acres..	4,429	2,529	3,139	1,497	393	712	740	2,178	941	240
13 Drainage and clearing.....acres..	23,794	7,771	30,355	10,499	2,443	1,860	1,483	24,080	23,172	3,226

<sup>1</sup> No drainage on farms reported in Sherman County.

## PENNSYLVANIA.

	THE STATE.	Adams.	Allegheny.	Armstrong.	Beaver.	Bedford.	Berks.	Bradford.
1 Number of all farms in the state or county.....	202,250	3,451	3,972	3,771	2,514	3,462	6,089	5,290
2 Farms reporting land having drainage.....	22,750	711	224	106	54	430	196	565
3 Farms reporting land needing drainage.....	27,265	455	207	40	35	980	296	194
4 Farms in drainage and levee districts.....	238	1	7	.....	.....	1	1	8
<b>LAND AND FARM AREA.</b>								
5 Approximate land area of the state or county.....acres..	28,692,480	337,920	464,000	417,920	274,560	656,640	553,600	732,800
6 All land in farms.....acres..	17,657,513	279,163	252,553	323,878	219,813	459,841	427,053	610,361
7 Improved land in farms.....acres..	11,847,719	218,288	192,113	241,601	168,318	253,123	354,810	440,164
8 Woodland in farms.....acres..	4,043,602	43,599	37,160	59,363	38,487	178,904	47,686	122,212
9 Other unimproved land in farms.....acres..	1,765,892	17,276	23,274	22,914	23,008	27,809	24,557	47,985
10 Farm land reported as provided with drainage.....acres..	318,955	8,048	4,257	1,157	700	4,729	1,471	6,940
11 Farm land reported as needing drainage.....acres..	654,690	5,104	3,176	673	630	29,810	2,263	2,553
12 Drainage only.....acres..	157,852	2,036	1,108	653	383	5,190	1,390	2,422
13 Drainage and clearing.....acres..	396,838	3,068	2,068	20	247	24,611	873	131
	Bucks.	Butler.	Cambria.	Centre.	Chester.	Clarion.	Clearfield.	Clinton.
1 Number of all farms in the county.....	5,714	5,274	2,398	2,295	5,508	2,931	3,158	1,065
2 Farms reporting land having drainage.....	273	1,000	304	281	483	737	61	115
3 Farms reporting land needing drainage.....	353	1,290	450	446	627	626	31	151
4 Farms in drainage and levee districts.....	6	2	10	6	24	3	.....	4
<b>LAND AND FARM AREA.</b>								
5 Approximate land area of the county.....acres..	389,120	505,000	458,880	733,440	497,280	384,640	730,880	561,920
6 All land in farms.....acres..	332,530	410,555	198,644	268,250	424,016	272,426	238,778	115,370
7 Improved land in farms.....acres..	274,302	295,634	114,841	175,301	343,785	179,881	137,224	60,472
8 Woodland in farms.....acres..	38,501	78,710	58,076	75,573	52,471	68,052	80,754	48,686
9 Other unimproved land in farms.....acres..	19,727	30,211	25,027	17,376	27,760	24,493	20,800	6,202
10 Farm land reported as provided with drainage.....acres..	4,313	12,844	3,134	3,375	3,976	12,225	544	1,288
11 Farm land reported as needing drainage.....acres..	3,222	22,504	11,401	7,349	6,506	12,191	294	2,340
12 Drainage only.....acres..	1,466	7,910	2,302	3,353	3,024	4,031	289	685
13 Drainage and clearing.....acres..	1,756	14,594	9,099	3,996	3,482	8,100	5	1,654
	Columbia.	Craw-ford.	Cumber-land.	Dauphin.	Delaware.	Elk.	Erie.	Fayette.
1 Number of all farms in the county.....	2,603	6,521	3,115	2,517	1,287	856	5,485	3,267
2 Farms reporting land having drainage.....	507	1,203	181	269	88	59	1,253	878
3 Farms reporting land needing drainage.....	592	1,739	132	310	183	139	1,287	832
4 Farms in drainage and levee districts.....	4	.....	11	2	6	2	60	.....
<b>LAND AND FARM AREA.</b>								
5 Approximate land area of the county.....acres..	306,560	664,320	337,920	334,080	118,400	515,840	499,840	509,440
6 All land in farms.....acres..	216,060	509,444	264,097	217,785	75,835	65,470	438,524	281,934
7 Improved land in farms.....acres..	156,636	341,133	222,000	170,213	59,580	28,778	255,597	179,333
8 Woodland in farms.....acres..	51,842	118,658	28,147	37,827	9,908	20,003	75,265	76,003
9 Other unimproved land in farms.....acres..	8,682	109,653	13,890	9,745	6,347	10,094	107,662	26,588
10 Farm land reported as provided with drainage.....acres..	6,080	18,042	1,991	2,066	780	586	26,741	5,845
11 Farm land reported as needing drainage.....acres..	11,405	42,728	1,841	2,935	2,457	4,971	29,983	5,929
12 Drainage only.....acres..	1,008	10,245	1,001	964	1,259	1,190	8,214	2,029
13 Drainage and clearing.....acres..	9,502	32,483	280	1,971	1,198	3,781	21,769	3,900

## DRAINAGE.

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COUNTY TABLE I.—DRAINAGE ON FARMS: 1920—Continued.

## PENNSYLVANIA—Continued.

		Franklin.	Fulton.	Greene.	Huntingdon.	Indiana.	Jefferson.	Juniata.	Lackawanna.
1	Number of all farms in the county.....	3,884	1,350	3,168	2,111	3,935	2,947	1,672	1,698
2	Farms reporting land having drainage.....	314	45	99	251	806	499	181	152
3	Farms reporting land needing drainage.....	231	339	226	519	1,069	663	270	502
4	Farms in drainage and levee districts.....	2	1	.....	14	6	1	.....	5
LAND AND FARM AREA.									
5	Approximate land area of the county..... acres..	480,640	257,920	367,360	587,520	530,560	426,240	250,880	288,640
6	All land in farms..... acres..	404,506	185,169	348,940	325,840	392,939	243,716	172,102	134,486
7	Improved land in farms..... acres..	288,460	109,566	300,840	172,682	277,956	154,062	99,739	63,460
8	Woodland in farms..... acres..	76,495	76,457	37,993	127,424	90,112	66,203	64,267	30,266
9	Other unimproved land in farms..... acres..	39,551	8,146	10,107	25,734	24,871	23,451	8,106	40,760
10	Farm land reported as provided with drainage..... acres..	2,942	611	1,444	2,825	12,855	5,937	1,736	1,544
11	Farm land reported as needing drainage..... acres..	3,559	10,019	4,695	11,255	21,108	15,890	4,119	9,486
12	Drainage only..... acres..	2,165	872	1,147	3,187	5,064	3,482	946	1,578
13	Drainage and clearing..... acres..	1,394	9,147	3,548	8,068	16,044	12,408	3,173	8,070

		Lancaster.	Lawrence.	Lebanon.	Lehigh.	Luzerne.	Lycoming.	McKean.	Mercer.	Mifflin.
1	Number of all farms in the county.....	11,307	2,494	2,372	2,959	2,965	3,273	1,680	4,499	1,108
2	Farms reporting land having drainage.....	175	863	211	126	304	552	94	2,277	176
3	Farms reporting land needing drainage.....	276	479	165	221	552	830	315	1,835	186
4	Farms in drainage and levee districts.....	3	.....	1	.....	1	6	1	4	.....
LAND AND FARM AREA.										
5	Approximate land area of the county..... acres..	602,240	230,400	230,400	229,160	570,880	780,800	631,680	448,000	254,720
6	All land in farms..... acres..	534,776	180,097	160,687	150,397	222,448	329,825	152,340	378,490	130,971
7	Improved land in farms..... acres..	409,662	131,685	142,552	154,456	127,471	198,081	67,469	245,636	87,695
8	Woodland in farms..... acres..	48,417	23,047	13,295	16,868	70,849	112,094	43,035	62,048	34,261
9	Other unimproved land in farms..... acres..	36,697	31,365	10,260	8,073	24,028	18,650	41,896	70,776	9,015
10	Farm land reported as provided with drainage..... acres..	1,072	19,496	1,980	577	3,089	5,146	936	45,719	1,713
11	Farm land reported as needing drainage..... acres..	2,009	8,853	1,424	1,467	10,231	13,364	11,905	40,226	2,021
12	Drainage only..... acres..	743	6,709	644	1,043	2,749	2,944	990	20,028	791
13	Drainage and clearing..... acres..	1,266	2,344	780	824	7,482	10,420	10,915	20,198	1,230

		Montgomery.	Montour.	Northumberland.	Perry.	Schuylkill.	Snyder.	Somerset.	Sullivan.	Susquehanna.
1	Number of all farms in the county.....	4,840	774	2,589	2,105	2,813	1,753	3,630	836	3,526
2	Farms reporting land having drainage.....	216	288	621	308	229	450	1,056	71	40
3	Farms reporting land needing drainage.....	287	189	472	343	109	194	1,140	225	192
4	Farms in drainage and levee districts.....	4	1	1	1	.....	4	4	2	.....
LAND AND FARM AREA.										
5	Approximate land area of the county..... acres..	309,760	83,200	290,560	360,960	497,280	199,040	661,760	293,120	527,360
6	All land in farms..... acres..	244,033	76,636	211,533	231,315	200,849	147,307	444,148	87,151	446,229
7	Improved land in farms..... acres..	212,124	59,539	163,368	139,864	138,592	108,741	234,798	35,699	279,061
8	Woodland in farms..... acres..	19,563	13,063	41,198	79,978	59,044	34,398	166,798	28,011	113,857
9	Other unimproved land in farms..... acres..	13,246	3,404	6,067	11,473	12,813	4,258	42,652	23,441	52,411
10	Farm land reported as provided with drainage..... acres..	2,407	7,901	7,027	2,815	1,700	5,023	16,783	666	968
11	Farm land reported as needing drainage..... acres..	2,889	3,108	6,130	3,639	980	1,589	29,098	8,404	2,599
12	Drainage only..... acres..	1,513	993	1,705	959	496	659	8,083	630	1,289
13	Drainage and clearing..... acres..	1,376	2,115	4,425	2,680	484	930	21,015	7,774	1,310

		Tioga.	Union.	Venango.	Warren.	Washington.	Westmoreland.	Wyoming.	York.	All other counties. <sup>1</sup>
1	Number of all farms in the county.....	3,702	1,411	2,369	2,353	4,482	5,593	1,543	7,818	14,378
2	Farms reporting land having drainage.....	193	334	455	154	276	483	58	467	288
3	Farms reporting land needing drainage.....	732	185	417	440	410	467	232	519	1,139
4	Farms in drainage and levee districts.....	3	1	2	3	7	3	.....	2	12
LAND AND FARM AREA.										
5	Approximate land area of the county..... acres..	730,880	195,200	423,040	577,280	551,680	664,960	254,080	577,920	3,349,760
6	All land in farms..... acres..	449,428	109,370	218,872	230,483	474,460	486,160	180,859	513,789	1,448,970
7	Improved land in farms..... acres..	282,419	86,243	127,735	102,675	339,630	351,862	94,977	414,595	679,270
8	Woodland in farms..... acres..	109,129	18,580	67,323	87,371	45,346	91,945	42,831	77,355	512,312
9	Other unimproved land in farms..... acres..	61,880	4,541	23,820	30,439	27,484	42,353	23,051	21,830	258,888
10	Farm land reported as provided with drainage..... acres..	2,321	4,427	7,050	2,131	2,968	8,490	533	2,743	2,288
11	Farm land reported as needing drainage..... acres..	17,693	2,687	12,685	14,771	6,896	7,927	3,464	4,133	42,431
12	Drainage only..... acres..	4,894	981	5,626	1,423	1,281	2,799	1,050	1,473	4,390
13	Drainage and clearing..... acres..	12,799	1,706	7,059	13,348	5,615	5,128	2,414	2,660	38,041

<sup>1</sup> Drainage on farms was reported in all counties in Pennsylvania.

## AGRICULTURE.

COUNTY TABLE I.—DRAINAGE ON FARMS: 1920—Continued.

## RHODE ISLAND.

	THE STATE.	Newport.	Providence.	All other counties. <sup>1</sup>
1 Number of all farms in the state or county.....	4,083	823	1,639	1,621
2 Farms reporting land having drainage.....	116	28	52	36
3 Farms reporting land needing drainage.....	359	69	131	159
4 Farms in drainage and levee districts.....	2	1	.....	1
<b>LAND AND FARM AREA.</b>				
5 Approximate land area of the state or county..... acres..	682,880	72,960	275,200	334,720
6 All land in farms..... acres..	331,600	42,639	122,825	166,136
7 Improved land in farms..... acres..	132,855	29,794	41,646	61,415
8 Woodland in farms..... acres..	130,462	7,412	50,489	72,561
9 Other unimproved land in farms..... acres..	68,283	5,433	30,690	32,160
10 Farm land reported as provided with drainage..... acres..	2,403	607	1,233	563
11 Farm land reported as needing drainage..... acres..	8,174	1,430	2,810	3,934
12 Drainage only..... acres..	2,240	594	859	757
13 Drainage and clearing..... acres..	5,934	836	1,921	3,177

<sup>1</sup> Drainage on farms was reported in all counties in Rhode Island.

## VERMONT.

	THE STATE.	Addison.	Bennington.	Caledonia.	Chittenden.	Franklin.	Grand Isle.
1 Number of all farms in the state or county.....	29,075	2,375	1,366	2,313	1,992	2,444	501
2 Farms reporting land having drainage.....	1,728	124	63	89	104	261	160
3 Farms reporting land needing drainage.....	3,042	137	112	191	120	392	138
4 Farms in drainage and levee districts.....	35	6	1	1	7	1	5
<b>LAND AND FARM AREA.</b>							
5 Approximate land area of the state or county..... acres..	5,839,360	483,840	423,040	395,520	347,520	417,280	53,120
6 All land in farms..... acres..	4,235,811	373,122	207,234	339,548	280,868	359,249	48,013
7 Improved land in farms..... acres..	1,691,695	217,796	81,691	129,997	140,453	150,287	33,141
8 Woodland in farms..... acres..	1,428,309	93,250	77,291	118,514	71,075	97,788	7,598
9 Other unimproved land in farms..... acres..	1,115,907	62,076	48,252	91,037	69,340	111,174	7,274
10 Farm land reported as provided with drainage..... acres..	35,649	5,377	2,309	1,122	1,943	6,221	6,696
11 Farm land reported as needing drainage..... acres..	68,612	4,342	1,898	3,377	3,452	13,286	3,328
12 Drainage only..... acres..	19,265	1,297	949	1,218	1,625	2,295	1,850
13 Drainage and clearing..... acres..	49,647	3,045	949	2,159	1,857	10,991	1,878

	Orange.	Orleans.	Rutland.	Washington.	Windham.	Windsor.	All other counties. <sup>1</sup>
1 Number of all farms in the county.....	2,687	2,543	2,649	2,564	2,103	3,268	2,270
2 Farms reporting land having drainage.....	103	166	212	79	121	182	64
3 Farms reporting land needing drainage.....	414	272	263	260	211	288	244
4 Farms in drainage and levee districts.....	.....	1	4	2	.....	1	6
<b>LAND AND FARM AREA.</b>							
5 Approximate land area of the county..... acres..	432,640	440,320	583,040	460,160	508,800	606,720	687,360
6 All land in farms..... acres..	378,431	368,105	436,558	316,799	331,638	467,601	328,645
7 Improved land in farms..... acres..	123,939	173,646	165,368	106,639	96,904	159,310	112,304
8 Woodland in farms..... acres..	126,413	120,399	148,339	115,939	137,629	166,750	147,274
9 Other unimproved land in farms..... acres..	128,019	74,060	122,851	94,171	97,105	141,541	69,007
10 Farm land reported as provided with drainage..... acres..	1,858	2,080	3,661	765	1,179	1,936	502
11 Farm land reported as needing drainage..... acres..	8,790	6,784	4,682	5,801	3,901	2,953	6,198
12 Drainage only..... acres..	2,682	1,172	1,489	781	956	1,684	1,267
13 Drainage and clearing..... acres..	6,208	5,612	3,193	5,020	3,035	1,269	4,931

<sup>1</sup> Drainage on farms was reported in all counties in Vermont.

## VIRGINIA.

	THE STATE.	Accomac.	Albemarle.	Alleghany.	Appomattox.	Augusta.	Bedford.	Bland.
1 Number of all farms in the state or county.....	186,242	3,206	3,165	621	1,329	3,759	4,245	778
2 Farms reporting land having drainage.....	9,899	832	197	20	58	162	71	51
3 Farms reporting land needing drainage.....	27,740	97	406	20	167	279	380	348
4 Farms in drainage and levee districts.....	140	1	23	3	.....	.....	.....	8
<b>LAND AND FARM AREA.</b>								
5 Approximate land area of the state or county..... acres..	25,767,680	321,280	478,080	292,480	218,880	641,020	506,240	230,400
6 All land in farms..... acres..	18,561,112	156,788	388,941	95,795	169,239	415,425	420,455	121,726
7 Improved land in farms..... acres..	9,460,492	79,397	215,880	31,643	72,068	290,401	231,813	61,457
8 Woodland in farms..... acres..	7,907,352	70,506	150,333	62,357	84,197	104,154	155,699	57,914
9 Other unimproved land in farms..... acres..	1,193,268	6,885	22,728	1,795	12,374	11,870	32,943	2,355
10 Farm land reported as provided with drainage..... acres..	225,068	16,447	3,636	549	564	2,817	1,404	536
11 Farm land reported as needing drainage..... acres..	1,172,580	1,271	15,135	458	7,763	4,347	9,252	19,330
12 Drainage only..... acres..	77,192	209	483	294	813	811	536	1,062
13 Drainage and clearing..... acres..	1,095,388	1,062	14,652	164	6,950	3,536	8,716	18,268



## DRAINAGE.

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COUNTY TABLE I.—DRAINAGE ON FARMS: 1920—Continued.

VIRGINIA—Continued.

		Botetourt.	Brunswick.	Buckingham.	Campbell.	Caroline.	Carroll.	Charles City.	Charlotte.
1	Number of all farms in the county.....	1,666	2,842	2,273	2,686	2,595	3,569	614	2,752
2	Farms reporting land having drainage.....	53	167	67	142	17	133	14	22
3	Farms reporting land needing drainage.....	14	471	323	482	726	692	195	162
4	Farms in drainage and levee districts.....	1				6	1		
<b>LAND AND FARM AREA.</b>									
5	Approximate land area of the county.....acres..	350,720	356,480	373,760	333,280	338,560	238,120	120,320	317,440
6	All land in farms.....acres..	187,137	266,010	263,225	275,677	267,444	278,624	73,811	265,114
7	Improved land in farms.....acres..	107,356	163,623	98,669	117,653	101,569	173,467	28,615	160,638
8	Woodland in farms.....acres..	75,159	151,150	151,108	131,978	119,338	96,463	40,559	140,617
9	Other unimproved land in farms.....acres..	4,601	11,231	13,448	26,076	46,597	8,754	4,637	24,459
10	Farm land reported as provided with drainage.....acres..	1,063	2,646	1,275	1,273	503	1,594	1,821	716
11	Farm land reported as needing drainage.....acres..	175	27,662	20,494	13,764	30,804	23,369	5,871	4,176
12	Drainage only.....acres..	131	1,528	430	1,335	2,440	1,041	430	1,159
13	Drainage and clearing.....acres..	43	26,134	19,914	12,429	28,364	22,328	5,451	3,017

		Chesterfield.	Culpeper.	Cumberland.	Dinwiddie.	Elizabeth City.	Fairfax.	Fauquier.	Fluvanna.
1	Number of all farms in the county.....	1,827	1,719	1,314	2,165	297	2,253	2,640	1,419
2	Farms reporting land having drainage.....	48	69	30	28	243	65	123	40
3	Farms reporting land needing drainage.....	396	111	496	85	99	128	161	233
4	Farms in drainage and levee districts.....						1		5
<b>LAND AND FARM AREA.</b>									
5	Approximate land area of the county.....acres..	299,820	245,760	187,539	331,520	34,560	266,880	426,240	182,406
6	All land in farms.....acres..	172,064	269,549	160,399	226,436	15,665	174,163	379,779	151,967
7	Improved land in farms.....acres..	59,279	147,859	65,822	71,860	9,616	102,298	279,563	58,087
8	Woodland in farms.....acres..	101,888	59,298	77,330	132,765	4,461	65,367	92,397	70,436
9	Other unimproved land in farms.....acres..	10,897	2,412	16,247	21,811	1,588	6,498	7,819	14,264
10	Farm land reported as provided with drainage.....acres..	2,168	1,804	604	533	737	799	6,859	1,067
11	Farm land reported as needing drainage.....acres..	28,782	4,064	32,890	3,841	2,051	2,730	8,685	14,852
12	Drainage only.....acres..	950	945	919	245	448	269	3,067	747
13	Drainage and clearing.....acres..	27,832	3,119	31,980	3,595	1,603	2,461	4,728	14,106

		Franklin.	Gloucester.	Gooseland.	Grayson.	Greene.	Halifax.	Hanover.	Henrico.
1	Number of all farms in the county.....	4,205	1,911	1,349	2,625	834	5,745	2,647	1,666
2	Farms reporting land having drainage.....	190	22	61	201	125	30	161	69
3	Farms reporting land needing drainage.....	1,553	39	42	1,199	143	1,622	863	168
4	Farms in drainage and levee districts.....	6	1	9	6			4	4
<b>LAND AND FARM AREA.</b>									
5	Approximate land area of the county.....acres..	446,080	142,720	183,680	272,000	99,200	520,960	327,680	163,840
6	All land in farms.....acres..	398,845	92,395	141,639	249,896	82,153	485,726	243,999	114,069
7	Improved land in farms.....acres..	171,445	45,068	60,065	163,973	47,165	226,807	108,634	55,917
8	Woodland in farms.....acres..	180,445	43,749	66,355	80,742	28,528	223,251	117,324	51,510
9	Other unimproved land in farms.....acres..	46,955	3,658	14,649	5,181	6,460	35,668	19,641	6,582
10	Farm land reported as provided with drainage.....acres..	1,325	813	2,233	2,844	2,116	1,328	1,975	2,332
11	Farm land reported as needing drainage.....acres..	48,889	454	23,001	32,458	3,277	37,080	32,812	5,254
12	Drainage only.....acres..	1,514	131	328	449	269	3,840	1,751	1,645
13	Drainage and clearing.....acres..	47,375	353	22,675	32,009	3,068	34,140	31,161	3,409

		Highland.	Isle of Wight.	LANCASTER.	London.	Madison.	Mathews.	Mecklenburg.	Nansemond.
1	Number of all farms in the county.....	744	1,779	1,258	1,962	1,354	1,385	4,376	2,133
2	Farms reporting land having drainage.....	58	293	13	94	167	599	341	145
3	Farms reporting land needing drainage.....	152	411	24	293	193	496	380	291
4	Farms in drainage and levee districts.....				7		1		4
<b>LAND AND FARM AREA.</b>									
5	Approximate land area of the county.....acres..	270,680	200,960	83,200	332,160	207,360	60,160	428,160	269,440
6	All land in farms.....acres..	197,484	152,367	57,923	305,906	170,235	40,091	368,262	165,936
7	Improved land in farms.....acres..	82,439	63,968	27,880	247,673	107,525	29,352	162,351	70,538
8	Woodland in farms.....acres..	87,366	67,792	26,651	54,095	57,368	14,581	189,254	89,737
9	Other unimproved land in farms.....acres..	27,679	20,607	3,392	4,138	5,342	2,158	16,787	5,641
10	Farm land reported as provided with drainage.....acres..	1,128	4,585	682	1,960	2,481	11,430	5,787	3,683
11	Farm land reported as needing drainage.....acres..	5,693	11,806	2,369	12,138	5,829	7,704	12,533	14,680
12	Drainage only.....acres..	492	658	215	1,649	343	3,645	1,044	442
13	Drainage and clearing.....acres..	5,201	11,258	2,154	11,089	5,486	4,659	11,479	14,488



## AGRICULTURE.

COUNTY TABLE I.—DRAINAGE ON FARMS: 1920—Continued.

## VIRGINIA—Continued.

		Nelson.	Norfolk.	Northampton.	Northumberland.	Notto-way.	Orange.	Page.	Patriok.
1	Number of all farms in the county.....	2,066	1,316	1,259	1,534	1,058	1,394	1,280	2,844
2	Farms reporting land having drainage.....	85	890	140	60	73	142	61	60
3	Farms reporting land needing drainage.....	78	463	201	95	255	81	49	86
4	Farms in drainage and levee districts.....	1	4	.....	1	1	2	.....	.....
<b>LAND AND FARM AREA.</b>									
5	Approximate land area of the county.....acres..	302,720	257,280	152,960	131,200	198,400	229,760	206,080	310,400
6	All land in farms.....acres..	240,442	103,211	82,892	92,532	126,407	177,155	133,103	252,812
7	Improved land in farms.....acres..	99,543	62,547	47,998	46,164	37,834	106,273	73,017	97,782
8	Woodland in farms.....acres..	117,730	32,465	28,901	39,836	70,585	63,039	59,461	126,767
9	Other unimproved land in farms.....acres..	23,169	8,199	5,993	6,532	17,988	7,843	9,625	28,263
10	Farm land reported as provided with drainage.....acres..	831	44,492	3,516	1,389	1,811	2,643	616	592
11	Farm land reported as needing drainage.....acres..	448	20,329	5,103	1,555	12,553	3,305	478	414
12	Drainage only.....acres..	241	1,626	1,489	224	1,578	862	369	187
13	Drainage and clearing.....acres..	207	18,703	3,614	1,331	10,975	2,443	109	227

		Pittsylvan.	Powhatan.	Prince Edward.	Prince George.	Prince William.	Princess Anne.	Roanoke.	Russell.	Scott.
1	Number of all farms in the county.....	7,025	1,048	1,843	1,014	1,271	1,317	1,681	2,557	3,696
2	Farms reporting land having drainage.....	97	39	60	162	67	540	62	41	70
3	Farms reporting land needing drainage.....	959	539	126	198	498	194	43	59	387
4	Farms in drainage and levee districts.....	1	4	1	.....	.....	.....	.....	2	.....
<b>LAND AND FARM AREA.</b>										
5	Approximate land area of the county.....acres..	647,680	174,720	227,840	188,032	220,800	178,560	189,440	317,440	347,520
6	All land in farms.....acres..	582,496	125,641	177,522	119,895	162,245	94,544	130,089	292,535	279,536
7	Improved land in farms.....acres..	269,741	47,117	71,373	53,315	97,592	60,325	75,338	196,709	164,058
8	Woodland in farms.....acres..	267,717	67,178	92,288	60,983	59,167	28,734	52,621	81,615	107,825
9	Other unimproved land in farms.....acres..	45,038	11,346	13,861	5,597	5,486	5,485	2,130	14,211	7,953
10	Farm land reported as provided with drainage.....acres..	1,775	1,330	1,151	2,677	1,485	20,192	550	554	638
11	Farm land reported as needing drainage.....acres..	14,993	40,172	3,055	8,460	25,508	6,398	432	1,559	12,137
12	Drainage only.....acres..	2,557	1,703	938	1,530	1,334	204	108	458	989
13	Drainage and clearing.....acres..	12,436	38,469	2,117	6,930	24,174	6,194	324	1,101	11,148

		Shenandoah.	Southampton.	Spotsylvania.	Sussex.	Tazewell.	Warren.	Westmoreland.	York.	All other counties. <sup>1</sup>
1	Number of all farms in the county.....	2,388	3,550	1,668	1,433	1,602	772	1,455	894	52,712
2	Farms reporting land having drainage.....	58	841	121	168	94	78	56	135	498
3	Farms reporting land needing drainage.....	140	714	748	645	274	119	441	215	5,942
4	Farms in drainage and levee districts.....	7	4	4	2	1	1	.....	.....	13
<b>LAND AND FARM AREA.</b>										
5	Approximate land area of the county.....acres..	326,400	386,560	263,080	320,600	330,840	138,240	161,280	87,040	8,279,168
6	All land in farms.....acres..	220,984	295,787	170,705	197,553	252,247	122,752	122,112	38,616	5,559,740
7	Improved land in farms.....acres..	139,003	119,519	71,076	69,321	119,590	78,441	60,384	16,913	2,897,020
8	Woodland in farms.....acres..	68,631	171,393	96,592	124,447	88,046	39,956	56,810	19,477	2,311,155
9	Other unimproved land in farms.....acres..	12,750	4,875	9,037	3,785	44,611	4,355	4,918	2,226	351,565
10	Farm land reported as provided with drainage.....acres..	724	13,580	1,605	3,092	1,731	959	4,058	2,027	6,953
11	Farm land reported as needing drainage.....acres..	4,500	46,307	33,003	34,802	8,201	2,784	17,851	4,919	324,290
12	Drainage only.....acres..	790	805	3,229	2,225	1,097	730	80	117	13,239
13	Drainage and clearing.....acres..	3,710	45,502	29,774	32,677	7,104	2,048	17,771	4,802	811,051

<sup>1</sup> No drainage on farms reported in Pulaski County nor in Alexandria, Buena Vista, Clifton Forge, Danville, Fredericksburg, Hopewell, Lynchburg, Radford, and Suffolk cities.

## WEST VIRGINIA.

		THE STATE.	Barbour.	Greenbrier.	Hampshire.	Hardy.	Harrison.	Jackson.
1	Number of all farms in the state or county.....	87,289	1,837	2,439	1,663	1,228	2,271	2,798
2	Farms reporting land having drainage.....	1,949	78	87	63	84	55	70
3	Farms reporting land needing drainage.....	10,304	373	419	344	183	174	245
4	Farms in drainage and levee districts.....	33	.....	1	5	2	1	1
<b>LAND AND FARM AREA.</b>								
5	Approximate land area of the state or county.....acres..	15,374,080	222,720	638,720	414,720	367,360	266,240	295,040
6	All land in farms.....acres..	9,569,790	175,956	314,830	322,380	269,689	232,981	283,710
7	Improved land in farms.....acres..	5,520,308	130,879	149,038	134,645	104,257	200,992	204,108
8	Woodland in farms.....acres..	3,469,444	35,533	136,129	163,694	153,171	23,174	61,475
9	Other unimproved land in farms.....acres..	580,038	9,554	29,663	24,041	12,261	8,815	18,127
10	Farm land reported as provided with drainage.....acres..	38,464	1,304	1,885	1,090	2,225	1,048	809
11	Farm land reported as needing drainage.....acres..	310,868	7,813	14,351	15,551	10,139	4,335	4,032
12	Drainage only.....acres..	32,253	1,915	3,214	859	1,311	524	613
13	Drainage and clearing.....acres..	278,615	5,898	11,137	14,692	8,828	3,811	3,419

## DRAINAGE.

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COUNTY TABLE I.—DRAINAGE ON FARMS: 1920—Continued.

## WEST VIRGINIA—Continued.

		Lewis.	Marshall.	Mason.	Mercer.	Mineral.	Monroe.	Nicholas.
1	Number of all farms in the county.....	1,644	1,712	2,415	1,927	769	1,834	1,670
2	Farms reporting land having drainage.....	121	14	121	58	78	63	35
3	Farms reporting land needing drainage.....	223	11	282	202	239	126	304
4	Farms in drainage and levee districts.....				1	1	3	
<b>LAND AND FARM AREA.</b>								
5	Approximate land area of the county.....acres..	251,520	198,400	304,000	268,160	223,360	292,480	435,200
6	All land in farms.....acres..	233,198	178,961	258,044	187,845	170,645	236,776	153,726
7	Improved land in farms.....acres..	179,966	128,243	181,016	109,166	70,755	140,747	83,873
8	Woodland in farms.....acres..	49,123	38,623	62,276	81,650	83,451	80,773	62,136
9	Other unimproved land in farms.....acres..	4,109	12,095	14,752	6,629	16,439	15,256	7,717
10	Farm land reported as provided with drainage.....acres..	1,214	606	9,147	994	2,481	872	1,299
11	Farm land reported as needing drainage.....acres..	5,244	211	8,794	7,562	13,123	2,147	8,237
12	Drainage only.....acres..	982	33	3,007	536	1,584	1,419	1,262
13	Drainage and clearing.....acres..	4,262	178	5,787	7,026	11,539	728	6,975

		Ohio.	Pocahontas.	Preston.	Putnam.	Randolph.	Upshur.	Wood.	All other counties. <sup>1</sup>
1	Number of all farms in the county.....	516	1,283	2,406	1,956	1,774	2,148	2,472	59,527
2	Farms reporting land having drainage.....	26	65	99	34	132	190	54	422
3	Farms reporting land needing drainage.....	10	57	238	380	305	787	417	4,981
4	Farms in drainage and levee districts.....						1	5	12
<b>LAND AND FARM AREA.</b>									
5	Approximate land area of the county.....acres..	68,480	578,560	416,000	215,040	663,040	224,640	232,960	8,787,440
6	All land in farms.....acres..	46,085	266,346	274,984	182,341	302,327	183,636	196,516	6,084,804
7	Improved land in farms.....acres..	37,762	92,174	151,721	117,807	134,865	126,563	142,948	2,907,763
8	Woodland in farms.....acres..	5,616	140,689	95,850	61,967	132,154	44,429	47,247	1,804,894
9	Other unimproved land in farms.....acres..	2,707	33,483	27,413	2,567	15,308	12,644	6,321	300,137
10	Farm land reported as provided with drainage.....acres..	676	817	926	949	2,487	1,964	593	5,127
11	Farm land reported as needing drainage.....acres..	205	1,048	5,470	13,137	11,112	15,044	7,441	155,872
12	Drainage only.....acres..	123	626	1,876	1,145	2,420	1,767	552	6,485
13	Drainage and clearing.....acres..	82	422	3,594	11,092	8,692	13,277	6,889	149,387

<sup>1</sup> No drainage on farms reported in Logan, McDowell, and Wyoming Counties.

COUNTY TABLE II.—OPERATING DRAINAGE ENTERPRISES: 1920.<sup>1</sup>

		ARIZONA.				NEW MEXICO.				OKLAHOMA.		
		THE STATE.	Graham.	Mari-copa.	Yuma.	THE STATE.	Chaves.	Dona Ana.	Eddy.	THE STATE.	Johnston.	Other counties. <sup>2</sup>
LAND AREA.												
1	Approximate land area of the state or county.....acres.	72,838,400	2,963,200	5,690,240	6,391,680	78,401,920	3,866,880	2,445,440	2,716,800	44,424,960	421,120	1,688,960
2	All land in operating drainage enterprises.....acres.	39,640	640	9,000	30,000	140,219	53,983	74,000	12,236	12,150	6,000	6,150
3	Improved land.....acres.	36,880	640	7,740	28,500	92,477	46,843	37,000	8,634	8,845	3,600	5,245
4	Per cent of all improved land in farms.....	5.2	1.7	2.8	69.6	5.4	92.9	87.8	18.5	( <sup>3</sup> )	2.4	0.5
5	Timber and cut-over land.....acres.	2,760		1,260	1,500	47,742	7,140	37,000	3,602	3,305	2,400	905
6	Other unimproved land.....acres.	2,760		1,260	1,500	47,742	7,140	37,000	3,602	3,305	2,400	905
7	Swampy or subject to overflow, in enterprises.....acres.	2,160		1,260	900	20,572	1,352	18,500	720	2,250	1,800	450
8	Suffering a loss of crops from defective drainage.....acres.	2,160		1,260	900	24,420		24,420		1,838	900	938
9	Assessed acreage.....	39,640	640	9,000	30,000	140,219	53,983	74,000	12,236	12,150	6,000	6,150
10	Excess over all land in operating enterprises.....acres.											
DRAINAGE WORKS.												
11	Open ditches: Completed.....miles.	32.6		8.5	24.1	124.0	7.4	100.0	16.6	18.6	8.5	10.1
12	Additional under construction.....miles.									1.6		1.6
13	Maximum completed in any enterprise.....miles.	24.1		8.5	24.1	100.0	5.4	100.0	6.0	8.5	8.5	4.0
14	Maximum width at bottom of ditch.....feet.	24		8	24	12	8	12	10	100	15	100
15	Maximum of average depths of outlet ditches.....feet.	8.0		8.0	8.0	10.0	8.0	10.0	10.0	30.0	30.0	8.0
16	Mean depth of branch ditches.....feet.	8.0			8.0							
17	Tile drains: Completed.....miles.	1.0	1.0			282.2	263.8		18.4			
18	Additional under construction.....miles.					65.1	58.4		6.7			
19	Maximum completed in any enterprise.....miles.	1.0	1.0			120.1	120.1		14.8			
20	Maximum size of tile.....inches.	12	12			30	30		24			
21	Accessory levees and dikes: Completed.....miles.	26.0			26.0					5.0	5.0	
22	Additional under construction.....miles.											
23	Pumping plants: Engine capacity.....horsepower.	175			175							
24	Pump capacity.....gallons per minute.	33,600			33,600							
25	Area served by pumps.....acres.	25,000			25,000							
26	Area drained by open ditches only.....acres.	9,000		9,000		74,000		74,000		6,150		6,150
27	Length of these ditches.....miles.	8.5		8.5		100.0		100.0		11.7		11.7
28	Average length per acre.....feet.	5.0		5.0		7.1		7.1		10.0		10.0
29	Area having open ditches and levees.....acres.	30,000			30,000					6,000	6,000	
30	Length of these ditches.....miles.	24.1			24.1					8.5	8.5	
31	Average length per acre.....feet.	4.2			4.2					7.5	7.5	
32	Length of the accessory levees.....miles.	26.0			26.0					5.0	5.0	
33	Area drained by tile only.....acres.	640	640			34,138	34,138					
34	Length of these tile.....miles.	1.0	1.0			199.7	199.7					
35	Average length per acre.....feet.	8.3	8.3			30.9	30.9					
36	Area drained by open ditches and tile.....acres.					32,081	19,845		12,236			
37	Length of these drains.....miles.					171.6	129.9		41.7			
38	Average length per acre.....feet.					28.2	34.6		18.0			
DEVELOPMENT OF LAND.												
39	Improved land in operating enterprises, 1920.....acres.	36,880	640	7,740	28,500	92,477	46,843	37,000	8,634	8,845	3,600	5,245
40	Improved land prior to drainage.....acres.	19,112	512	3,000	15,000	77,265	35,404	37,000	4,861	3,595	600	2,995
41	Increase since drainage.....acres.	17,768	128	4,740	13,500	15,212	11,439		3,773	5,250	3,000	2,250
42	Per cent of increase.....	93.0	25.0	115.0	90.0	19.7	32.3		77.6	146.0	500.0	75.1
43	Per cent increase is of all improved land in farms, 1920.....	2.5	0.3	1.5	33.0	0.9	22.7		7.2	( <sup>3</sup> )	2.0	0.2
44	Timber and cut-over land, 1920.....acres.									3,305	2,400	905
45	Timber and cut-over land prior to drainage.....acres.									6,930	5,400	1,530
46	Decrease since drainage.....acres.									3,625	3,000	625
47	Per cent of decrease.....									52.3	55.6	40.8
48	Other unimproved land, 1920.....acres.	2,760		1,260	1,500	47,742	7,140	37,000	3,602			
49	Other unimproved land prior to drainage.....acres.	20,528	128	5,400	15,000	62,954	18,579	37,000	7,975	1,625		1,625
50	Decrease since drainage.....acres.	17,768	128	4,140	13,500	15,212	11,439		3,773	1,625		1,625
51	Per cent of decrease.....	86.6	100.0	76.7	90.0	24.2	61.6		51.2	100.0		100.0
52	Swampy or subject to overflow, 1920.....acres.	2,160		1,260	900	20,572	1,352	18,500	720	2,250	1,800	450
53	Swampy or subject to overflow prior to drainage.....acres.	6,428	128	5,400	900	44,919	2,705	37,000	5,214	7,050	3,600	3,450
54	Decrease since drainage.....acres.	4,268	128	4,140		24,347	1,353	18,500	4,494	4,800	1,800	3,000
55	Per cent of decrease.....	66.4	100.0	76.7		54.2	50.0	50.0	86.2	68.1	50.0	87.0
CAPITAL INVESTED AND COST PER ACRE.												
56	Total capital invested in and required for completion of operating enterprises.....dollars.	1,026,425	7,000	94,425	925,000	2,906,296	1,093,692	1,575,000	237,604	77,415	44,500	32,915
57	Capital invested in these enterprises to Dec. 31, 1919.....dollars.	414,425	7,000	94,425	313,000	1,710,796	924,442	575,000	211,354	76,415	44,500	31,915
58	Additional capital required to complete these enterprises.....dollars.	612,000			612,000	1,195,500	169,250	1,000,000	26,250	1,000		1,000
59	Average cost per acre when completed.....dollars.	25.89	10.94	10.49	30.83	20.73	20.25	21.28	19.42	6.37	7.42	5.35
60	Enterprises constructing open ditches only.....dollars.	94,425		94,425		1,575,000		1,575,000		32,915		32,915
61	Average cost per acre when completed.....dollars.	10.49		10.49		21.28		21.28		5.35		5.35
62	Enterprises constructing open ditches and levees.....dollars.	925,000			925,000					44,500	44,500	
63	Average cost per acre when completed.....dollars.	30.83			30.83					7.42	7.42	
64	Enterprises constructing tile drains only.....dollars.	7,000	7,000			643,692	643,692					
65	Average cost per acre when completed.....dollars.	10.94	10.94			18.86	18.86					
66	Enterprises constructing open ditches and tile drains.....dollars.					687,604	450,000		237,604			
67	Average cost per acre when completed.....dollars.					21.43	22.68		19.42			
CROPS.												
68	Improved land in enterprises reporting—											
69	Alfalfa as principal crop on drained land.....acres.	640	640			85,603	39,069	37,000	8,634			
70	Cotton as principal crop on drained land.....acres.	36,240		7,740	28,500					3,600	3,000	
71	Grain as principal crop on drained land.....acres.					6,874	6,874			750		750
72	Corn as principal crop on drained land.....acres.									2,500		2,500
	Hay as principal crop on drained land.....acres.									1,995		1,995

<sup>1</sup> Churchill County, Nev., and Malheur County, Oreg., comprise all the enterprises in those states, and the statistics are given in State Table V, p. 379.<sup>2</sup> Includes only Canadian, Kay, and Muskogee Counties.<sup>3</sup> Less than one-tenth of 1 per cent.<sup>4</sup> When works under construction have been completed.