MICHIGAN.

The following pages present the statistics of drainage for Michigan collected at the census of 1920. The figures relate to conditions on January 1, 1920, except where indicated otherwise. Drainage work done by organized enterprises before 1897, when the present county drain law was enacted, is not included. 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 timber 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.

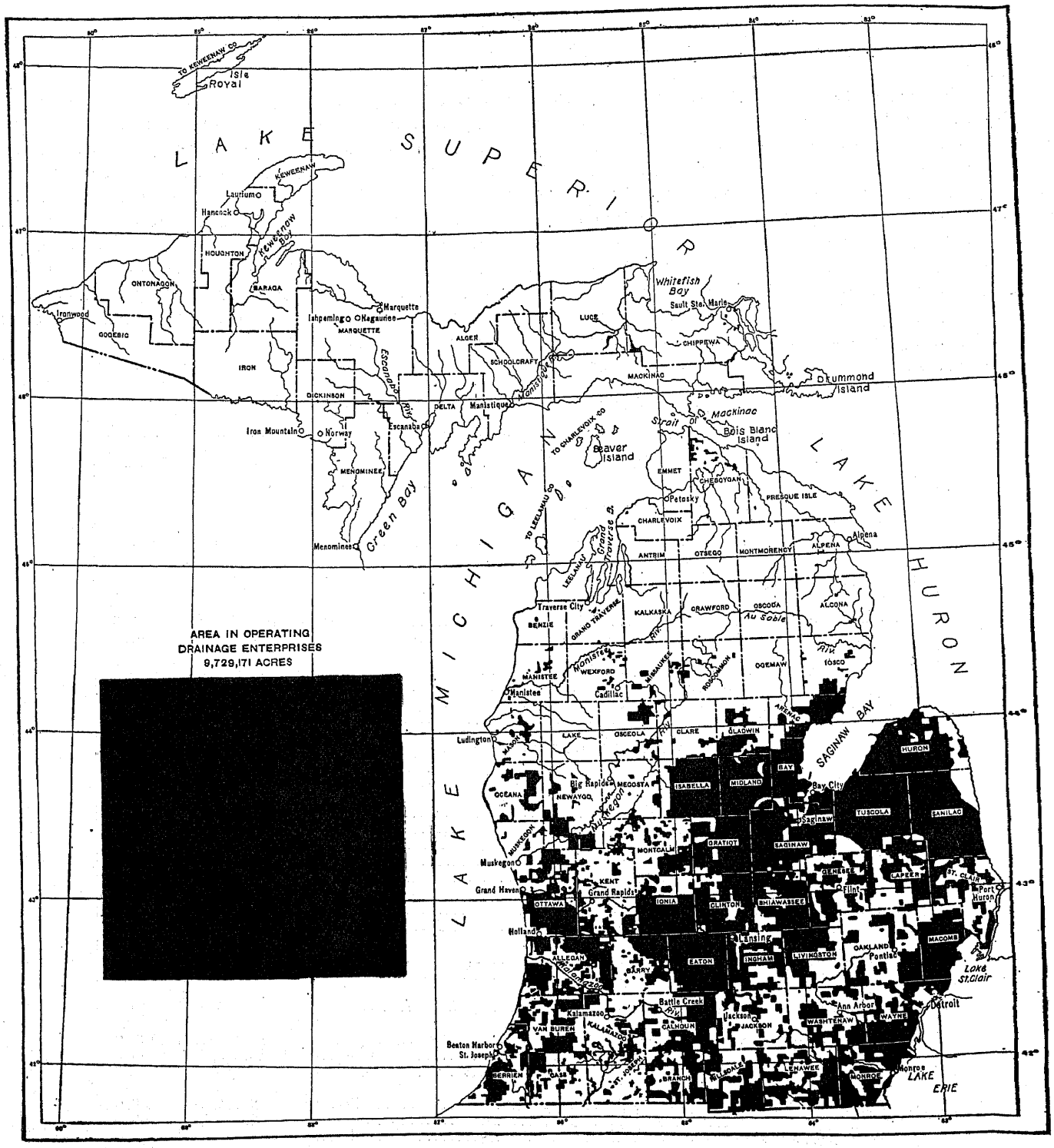
TABLE 1.—SUMMARY FOR THE STATE: 1920.

ITEM.	Amount.	Per cent of total.
DRAINAGE ON FARMS.		
Number of all farms in the state	196, 447	100.0
Farms reporting land having drainage	66, 948	34.1
Farms reporting land needing drainage	64, 310	32.7
All land in farms ... acres	19, 032, 961	100.0
Improved land in farms ... acres	12, 925, 521	67.9
Farm land reported as provided with drainage ... acres	3, 156, 632	16.6
Farm land reported as needing drainage ... acres	2, 070, 387	10.9
Needing drainage only ... acres	579, 813	3.0
Needing drainage and clearing ... acres	1, 490, 574	7.8
DRAINAGE ENTERPRISES		
Approximate land area of the state ... acres	36, 787, 200	100.0
All land in operating drainage enterprises ... acres	9, 729, 171	26.4
Improved land ... acres	7, 182, 352	19.5
Per cent of all improved land in farms	55.6	.....
Timber and cut-over land ... acres	2, 195, 562	6.0
Other unimproved land ... acres	351, 257	1.0
Swampy, subject to overflow, seeped, or alkali ... acres	1, 020, 207	2.8
Suffering a loss of crops from defective drainage ... acres	692, 224	1.9
Improved land prior to drainage ... acres	2, 046, 613	5.6
Increase since drainage began ... acres	5, 135, 739	14.0
Land in nonoperating enterprises ... acres	25, 508	(1)
Open ditches in operating enterprises ... miles	16, 142.2	100.0
Completed ... miles	16, 023.8	99.3
Additional under construction ... miles	118.4	0.7
Tile drains in operating enterprises ... miles	2, 182.3	100.0
Completed ... miles	2, 173.9	99.6
Additional under construction ... miles	8.4	0.4
Total capital invested in and required for completion of operating enterprises	$25, 048, 980	100.0
Capital invested in these enterprises to Dec. 31, 1919	24, 683, 715	98.5
Additional capital required to complete these enterprises	365, 265	1.5
Average cost per acre when completed	2.57	.....

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

MICHIGAN

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. They may include those that on the census date had completed their plans, sold bonds to cover the cost of the undertaking, and let contracts for the construction work, and also others 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.[1]		
			To Dec. 31, 1919.		
	Acreage.	Per cent of total.	Amount.	Per cent of total.	Additional required to complete.
All organized enterprises	9,754,679	100.0	$24,686,729	100.0	$537,645
Operating enterprises	9,729,171	99.7	24,683,715	100.0	365,265
With works completed	9,511,555	97.5	24,100,929	97.6	.....
With works under construction	217,616	2.2	582,786	2.4	365,265
Nonoperating enterprises	25,508	0.3	3,014	(2)	172,380

[1] The inquiry asked for the "total cost of the enterprise to Dec. 31, 1919," and for an "estimate of additional investment to complete."
[2] Less than one-tenth of 1 per cent.

Location of enterprises.—The drainage enterprises in Michigan are located almost entirely in the 47 southern counties which comprise approximately two-thirds of the southern peninsula. The division between the southern section in which a large part of the land has been included in drainage enterprises and the northern section where little drainage has been done is remarkably sharp, as shown by the map on page 2.

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

DRAINAGE BASIN.	LAND.		CAPITAL.		
			To Dec. 31, 1919.		
	Acreage.	Per cent of total.	Amount.	Per cent of total.	Additional required to complete.
All organized enterprises	9,754,679	100.0	$24,686,729	100.0	$537,645
Operating enterprises	9,729,171	99.7	24,683,715	100.0	365,265
Lake Superior	18,424	0.2	66,731	0.3	.....
Lake Michigan	3,937,263	40.4	9,058,920	36.7	74,943
Lake Huron	4,133,145	42.4	11,948,569	48.4	221,174
Lake Erie	1,640,339	16.8	3,609,495	14.6	69,148
Nonoperating enterprises	25,508	0.3	3,014	(1)	172,380
Lake Michigan	17,755	0.2	2,532	(1)	80,620
Lake Huron	6,065	0.1	482	(1)	83,500
Lake Erie	1,688	(1)	.....	.....	8,260

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

Condition of land in enterprises.—The greater number of enterprises was reported as organized to reclaim or improve land that was swampy or too wet for profitable cultivation. The smaller number, located mainly in the southwestern part of the state, was reported as intended to secure relief for land subject to overflow by stream floods. Prior to undertaking the drainage improvements, approximately 21 per cent of the total area in drainage enterprises was improved land and 70 per cent timbered or cut-over, while about 49 per cent was reported as being then swampy, subject to overflow, or too wet for cultivation.

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 drainage 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 all land.			
All land in enterprises	9,729,171	100.0	9,511,555	217,616	25,508
Improved land	7,182,352	73.8	7,015,644	166,708	8,245
Timber and cut-over land	2,195,562	22.6	2,149,652	45,910	15,039
Other unimproved land	351,257	3.6	346,259	4,998	2,224
Swampy or subject to overflow	1,020,207	10.5	987,216	32,991	12,316
Suffering a loss of crops	692,224	7.1	676,337	15,887	1,458

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 10,453 operating drainage enterprises are counted in Michigan, from 1897 to 1919, with an average area of 1,508 acres assessed. There are 4,196 of these enterprises embracing less than 500 acres each, 5,970 between 500 and 5,000 acres, and 287 of 5,000 acres or over.

The assessed acreage exceeds the land in enterprises by 6,037,307 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 acreage, deduction was made for the amount of overlapping with enterprises organized previously, to determine the acreage to be tabulated as land in enterprises.

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	9,729,171	15,766,478	100.0
Less than 200 acres	109,428	155,089	1.0
200 to 499 acres	648,405	967,221	6.1
500 to 999 acres	1,232,901	1,849,136	11.7
1,000 to 4,999 acres	5,359,782	7,902,024	50.1
5,000 to 9,999 acres	2,059,229	3,251,318	20.6
10,000 to 49,999 acres	199,256	1,072,885	6.8
50,000 to 99,999 acres	120,170	568,205	3.6

Character of enterprises.—Nearly all the drainage enterprises in Michigan for which statistics are given, except the few commercial land developments and private undertakings by individual owners, are county drains established in accordance with the provisions of the general drainage law approved June 2, 1897 (act 254). That statute repealed all previous drainage laws of the state, but drains previously established under act 227 of 1885 might be completed under it.

The census did not undertake to secure information relating to the drains established before 1897, in Michigan, because the records regarding them were very fragmentary or entirely lacking, except in a few counties. The statistics do include, however, as shown by Table 6, figures for drains established in that year under the earlier law.

The drainage law of 1897, as amended, provides for a county drain commissioner to be elected every two years by the qualified electors, in every organized county in the state. This commissioner is to have jurisdiction over all drains within his county, but drains affecting land in more than one county are under joint jurisdiction of the commissioners of all those counties. Appointment of a special drain commissioner, in case the elected commissioner has an interest in the assessment of benefits, is authorized by statutes of 1901 (act 27) and 1917 (act 109).

An application for a drain must be signed by not less than one-half the freeholders through whose land the drain will pass. The necessity and public utility of the enterprise are determined by the township board or boards of the township or townships in which the drain is to be located, after public hearing. Upon favorable finding, a survey is made by the drain commissioner or a surveyor employed by him, and if the improvement is found practicable the commissioner issues a first order of determination establishing the location and dimensions of the drain. Appeal from this order may be taken to the probate court of the county, and an engineer appointed by the state highway commissioner investigates and decides the necessity and route for the drain. Land for right of way is secured by release or by condemnation proceedings before the probate court. Damages are determined by three special commissioners appointed by the court or, upon demand, by a jury. Final order of determination is issued by the drain commissioner when right of way has been obtained, defining the special assessment district that shall bear the cost of the undertaking. The cost is apportioned according to benefits assessed by the drain commissioner and determined by him at public hearing. Any township may be assessed for benefits to public health and welfare or for benefits to highways. The assessments are subject to review by three disinterested freeholders appointed by the probate court. The award of damages to each landowner is deducted from his assessment of benefits. Contracts for construction are let by the drain commissioner. The number of installments in which the landowners shall pay their assessments is determined by the drain commissioner, who is authorized by an act of March 18, 1919 (No. 16), to issue bonds for not exceeding 10 years if the number of installments exceeds three. For a drain to be located or to affect land in more than one county, application may be filed with the drain commissioner of any county affected. Proceedings are similar to those for a drain in only one county, but are under the joint control of the drain commissioners of all the counties affected. Also, the necessity for the drain is determined by the drain commissioners instead of by the township boards; in case of disagreement, the state highway commissioner decides.

As originally enacted, the drainage law provided for appointment of the county drain commissioner by the county board of supervisors. The petition for a drain then required the signatures of 10 or more freeholders of the township or townships, including at least 3 liable to assessment for the drain.

Before 1909, the necessity for the drain was determined by the drain commissioner instead of by the township board, and appeals regarding apportionment of benefits were decided by that board.

A few other statutes relating to drainage have been enacted since 1897, which do not affect the character of enterprises as described.

A law of June 20, 1885 (act 227), provided for township and county drain commissioners, the former to be elected and the latter to be appointed by the county board of supervisors. The jurisdiction of the township commissioners was limited to drains located wholly within their respective townships and not affecting land in any other township. The county commissioners were given concurrent jurisdiction with township commissioners for drains wholly within one township, and jurisdiction over the other drains in the county. Drains were located upon petition from five or more freeholders, at least one of whom owned land liable to be assessed for benefits. The drain commissioner determined the necessity and

location for the drain, apportioned the cost, and let contracts for construction. Right of way was secured by voluntary release or by proceedings before the probate court. Drains located or benefiting land in more than one county were under the joint control of the drain commissioners for the counties affected. This act was repealed by the drainage law of 1897.

The first general drainage law of this state was enacted in 1839 (ch. 80), providing means for one landowner to secure drainage outlet across the land of an objecting owner through application to a justice of the peace and payment of damages assessed by a jury. An act of 1847 (No. 104) authorized each board of county commissioners to appoint three drainage commissioners to secure the drainage of the marshes and lowland of the county. The plans and estimates for each project must be approved by the county court. The cost was apportioned by the commissioners against the land to be benefited, subject to review by three appraisers and confirmation by the court. In 1859 it was provided (act 178) that the drainage commissioners should make surveys for drainage upon petition from 10 resident freeholders. These and other drainage laws were repealed by that of 1897.

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. Amount.	To Dec. 31, 1919. Per cent of total.	Additional required to complete.
All organized enterprises	9,754,679	100.0	$24,686,729	100.0	$537,645
Operating enterprises	9,729,171	99.7	24,683,715	100.0	365,265
County drains	9,706,891	99.5	24,434,715	99.0	365,265
Laws of 1885, act 227	53,273	0.5	65,242	0.3	.....
Laws of 1897, act 254	9,649,302	98.9	24,363,246	98.7	361,765
Not reported	4,316	(1)	6,227	(1)	3,500
Commercial developments	10,960	0.1	199,500	0.8	.....
Individual ownerships	11,320	0.1	49,500	0.2	.....
Nonoperating enterprises	25,508	0.3	3,014	(1)	172,380
County drains, laws of 1897	25,508	0.3	3,014	(1)	172,380

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

Drainage works.—The total works completed by the drainage enterprises to December 31, 1919, comprised 16,023.8 miles of open ditches, 2,173.9 miles of tile drains, and 33.1 miles of accessory levees; the additional lengths under construction were 118.4 miles of ditches and 8.4 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 are three pumping districts for land drainage among the enterprises in Michigan, which have completed construction. The pumping plants are equipped with 7 centrifugal pumps of 62,000 gallons per minute total capacity and are operated by steam power.

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. Amount.	To Dec. 31, 1919. Per cent of total.	Additional required to complete.
All kinds	9,729,171	100.0	$24,683,715	100.0	$365,265
Open ditches only	8,541,556	87.8	18,698,883	75.8	342,612
Open ditches and levees	2,000	(1)	176,284	0.7	.....
Tile drains only	318,514	3.3	2,270,188	9.2	16,868
Open ditches and tile drains	867,101	8.9	3,538,360	14.3	5,785

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

TABLE 8.—LAND AND CAPITAL INVESTED IN OPERATING ENTERPRISES, CLASSIFIED BY TYPE OF DRAINAGE: 1920.

TYPE OF DRAINAGE.	LAND.		CAPITAL.		
	Acreage.	Per cent of total.	To Dec. 31, 1919. Amount.	To Dec. 31, 1919. Per cent of total.	Additional required to complete.
All operating enterprises	9,729,171	100.0	$24,683,715	100.0	$365,265
Gravity drainage only	9,718,471	99.9	24,513,276	99.3	365,265
All drainage by pumping	1,100	(1)	22,139	0.1	.....
Part gravity and part pumping	9,600	0.1	148,300	0.6	.....
Total area served by pumps	10,100	0.1	.....	.....	.....

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

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 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, 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 over were omitted, as it seemed 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 4.2 instead of 4.3 feet.

TABLE 9.—LAND IN OPERATING ENTERPRISES, CLASSIFIED BY AVERAGE DEPTH OF BRANCH DITCHES: 1920.

DEPTH OF BRANCH DITCHES.	Acreage.	Per cent of total.
All operating enterprises	9,729,171	100.0
Less than 3 feet	89,345	0.9
3.0 to 3.9 feet	472,542	4.9
4.0 to 4.9 feet	773,674	8.0
5.0 to 5.9 feet	337,024	3.5
6.0 to 6.9 feet	125,383	1.3
7.0 to 7.9 feet	115,603	1.2
8.0 to 8.9 feet	15,500	0.2
9.0 to 9.9 feet	2,844	(1)
10 feet and more	1,280	(1)
Not reporting branches	7,795,976	80.1

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

Maintenance of works.—For cleaning out, deepening, widening, and straightening county drains in this state, proceedings are similar to those for securing construction of a new drain, the cost being paid by the land benefited by this work. The petition for cleaning out a drain requires only the signatures of five freeholders of the township or townships in which the drain is located, one or more of whom shall own land liable to be assessed. However, an act of May 10, 1917 (No. 316), provides that upon written request from one or more taxpayers on any drain the county drain commissioner, where he deems that an emergency exists threatening crops or property, may expend not more than 10 per cent of the original cost of the drain.

For cleaning out, deepening, widening, and extending a drain previously constructed in more than one county, application shall be made, according to a statute of May 3, 1919 (act 162), by freeholders numbering at least 10 per cent of those assessed for construction of the drain and who shall be owners of land that was assessed for the construction.

TABLE 10.—LAND AND CAPITAL INVESTED IN OPERATING ENTERPRISES, CLASSIFIED BY METHOD OF MAINTENANCE: 1920.

METHOD OF MAINTENANCE.	LAND.		CAPITAL.		
			To Dec. 31, 1919.		Additional required to complete.
	Acreage.	Per cent of total.	Amount.	Per cent of total.	
All operating enterprises	9,729,171	100.0	$24,683,715	100.0	$365,265
By district forces	3,200	(1)	44,261	0.2	1,790
By contract	1,872,052	19.2	4,768,980	19.3	38,964
By landowners	9,280	0.1	169,490	0.7	.....
No maintenance provided	7,243,624	74.5	18,781,212	76.1	286,393
Not reporting	601,015	6.2	919,772	3.7	38,118

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

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 drains were established by the county drain 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 any extensions made after the original plan of drainage was completed.

TABLE 11.—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	9,729,171	100.0	15,766,478	100.0
1897 to 1899	1,151,668	11.8	1,463,231	9.3
1900 to 1904	2,763,584	28.4	3,846,251	24.4
1905 to 1909	2,358,660	24.2	3,886,383	24.6
1910 to 1914	1,900,100	19.5	3,499,884	22.2
1915 to 1919	1,535,174	15.8	3,043,271	19.3
Not reported	19,985	0.2	27,458	0.2

TABLE 12.—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	$24,683,715	100.0	$365,265
1897 to 1899	2,017,054	8.2	.....
1900 to 1904	5,724,176	23.2	.....
1905 to 1909	5,543,364	22.5	.....
1910 to 1914	5,315,603	21.5	.....
1915 to 1919	6,013,764	24.4	365,265
Not reported	69,754	0.3	.....

TABLE 13.—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	16,142.2	100.0	2,182.3	100.0	33.1	100.0
1897 to 1899	1,637.2	10.1	84.4	3.9	6.0	18.1
1900 to 1904	4,542.3	28.1	274.9	12.6	27.0	81.6
1905 to 1909	4,330.9	26.8	321.1	14.7	0.1	0.3
1910 to 1914	3,373.8	20.9	746.7	34.2	.....	.....
1915 to 1919	2,224.0	13.8	750.8	34.4	.....	.....
Not reported	34.0	0.2	4.4	0.2	.....	.....

Crops.—The principal crops grown upon the drained land in drainage enterprises are wheat, corn, 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.	Alcona.	Allegan.	Alpena.	Arenac.	Barry.	Bay.	Berrien.	Branch.
1	Number of all farms in the state or county	196,447	932	5,734	1,275	1,392	3,313	3,216	5,443	3,222
2	Farms reporting land having drainage	66,948	26	982	39	195	158	1,854	469	1,333
3	Farms reporting land needing drainage	64,310	228	889	541	299	170	1,270	174	1,309
4	Farms in drainage and levee districts	23,356	4	369	3	29	7	458	95	566
	LAND AND FARM AREA.									
5	Approximate land area of the state or county ... acres	36,787,200	437,760	533,120	373,760	239,360	355,840	283,520	364,160	318,080
6	All land in farms ... acres	19,032,961	131,388	436,616	153,729	135,334	332,369	227,932	326,690	308,805
7	Improved land in farms ... acres	12,925,521	49,577	327,395	63,237	72,851	245,983	167,998	262,917	227,781
8	Woodland in farms ... acres	3,217,000	32,998	46,849	50,243	49,220	42,617	43,725	32,633	27,123
9	Other unimproved land in farms ... acres	2,890,440	48,813	62,372	40,249	13,263	43,769	16,209	31,140	53,901
10	Farm land reported as provided with drainage ... acres	3,156,632	878	26,686	766	8,225	4,376	92,782	23,802	42,281
11	Farm land reported as needing drainage ... acres	2,070,387	16,399	19,738	28,770	14,199	2,765	37,434	2,656	32,587
12	Drainage only ... acres	579,813	1,582	6,004	7,364	3,888	1,126	7,948	855	18,649
13	Drainage and clearing ... acres	1,490,574	14,817	13,734	21,406	10,311	1,639	29,486	1,801	13,938

		Calhoun.	Cass.	Cheboygan.	Chippewa.	Clare.	Clinton.	Delta.	Eaton.	Genesee.
1	Number of all farms in the county	3,646	2,572	1,186	1,569	1,248	3,323	1,395	3,719	3,639
2	Farms reporting land having drainage	928	82	37	73	187	1,932	139	2,621	2,391
3	Farms reporting land needing drainage	1,067	158	253	578	823	1,407	531	1,674	2,020
4	Farms in drainage and levee districts	477	43	1	2	25	944	31	1,028	513
	LAND AND FARM AREA.									
5	Approximate land area of the county ... acres	443,520	315,520	464,000	1,006,720	372,480	365,440	748,160	365,440	419,200
6	All land in farms ... acres	407,958	286,991	127,197	185,202	186,581	343,965	142,137	342,500	368,520
7	Improved land in farms ... acres	301,566	219,426	55,937	105,870	65,801	275,734	53,021	263,959	291,624
8	Woodland in farms ... acres	38,449	38,302	38,921	68,783	67,610	47,496	53,821	32,351	38,336
9	Other unimproved land in farms ... acres	67,943	29,263	32,339	10,549	53,170	20,735	35,295	46,190	38,560
10	Farm land reported as provided with drainage ... acres	30,337	1,759	899	3,282	5,225	84,362	2,851	123,106	151,901
11	Farm land reported as needing drainage ... acres	28,105	3,803	13,581	28,840	69,183	31,584	22,939	37,343	54,353
12	Drainage only ... acres	14,328	1,933	323	1,368	2,144	12,828	2,859	16,049	18,474
13	Drainage and clearing ... acres	13,777	1,870	13,258	27,472	67,039	18,756	20,080	21,294	35,879

		Gladwin.	Grand Traverse.	Gratiot.	Hillsdale.	Houghton.	Huron.	Ingham.	Ionia.	Iosco.	Isabella.
1	Number of all farms in the county	1,452	1,725	3,859	4,025	1,741	4,604	3,224	3,223	929	3,333
2	Farms reporting land having drainage	566	82	2,813	2,755	134	1,267	2,295	1,552	170	1,701
3	Farms reporting land needing drainage	843	332	2,287	1,974	225	1,419	1,541	1,403	429	1,995
4	Farms in drainage and levee districts	461	10	2,196	773	2	808	562	401	44	1,118
	LAND AND FARM AREA.										
5	Approximate land area of the county ... acres	332,160	298,880	370,560	382,080	652,160	546,560	353,920	370,560	364,800	366,080
6	All land in farms ... acres	154,633	170,188	328,074	362,815	134,790	480,088	323,196	344,102	121,694	316,771
7	Improved land in farms ... acres	73,001	113,852	251,326	283,071	56,798	383,584	238,492	266,698	49,673	211,812
8	Woodland in farms ... acres	30,763	35,000	37,116	38,190	55,812	38,687	31,482	34,877	36,920	34,524
9	Other unimproved land in farms ... acres	50,869	21,336	39,632	41,554	22,180	58,717	53,222	42,527	35,101	70,435
10	Farm land reported as provided with drainage ... acres	28,697	1,001	127,510	127,028	3,654	83,953	98,700	63,963	5,890	62,330
11	Farm land reported as needing drainage ... acres	49,127	5,494	79,440	38,048	13,396	43,456	43,840	29,905	27,324	62,680
12	Drainage only ... acres	631	1,082	33,508	17,352	660	2,689	27,466	12,578	1,723	12,882
13	Drainage and clearing ... acres	48,496	4,412	45,932	20,696	12,736	40,767	16,374	17,327	25,601	49,798

		Jackson.	Kalamazoo.	Kent.	Lapeer.	Leelanau.	Lenawee.	Livingston.	Macomb.	Manistee.	Marquette.
1	Number of all farms in the county	3,544	3,161	5,605	3,614	1,347	5,080	2,632	3,570	1,499	846
2	Farms reporting land having drainage	1,103	543	1,424	1,897	28	4,136	1,119	2,510	149	49
3	Farms reporting land needing drainage	1,335	442	1,580	1,778	252	2,678	633	1,121	378	157
4	Farms in drainage and levee districts	253	143	285	587	.....	1,088	110	553	8	1
	LAND AND FARM AREA.										
5	Approximate land area of the county ... acres	452,480	359,680	550,400	426,240	216,320	475,520	363,520	302,080	359,680	1,196,800
6	All land in farms ... acres	411,677	311,934	469,924	395,932	165,399	456,708	333,339	272,357	147,569	88,450
7	Improved land in farms ... acres	295,871	247,905	352,740	291,706	90,825	370,047	231,346	221,453	85,292	27,944
8	Woodland in farms ... acres	43,733	27,565	66,204	43,022	60,657	46,186	41,135	30,006	41,233	43,140
9	Other unimproved land in farms ... acres	72,073	36,464	50,980	61,204	13,917	40,475	60,858	20,898	21,044	17,366
10	Farm land reported as provided with drainage ... acres	31,241	12,991	32,156	86,678	639	240,797	40,228	129,008	1,877	899
11	Farm land reported as needing drainage ... acres	35,968	13,099	33,485	52,005	14,799	66,930	20,053	21,332	9,915	8,459
12	Drainage only ... acres	21,920	4,865	12,636	15,358	1,608	27,822	14,418	8,687	1,796	893
13	Drainage and clearing ... acres	14,048	8,234	20,849	36,647	13,191	39,108	5,635	12,645	8,119	7,566

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

		Mason.	Mecosta.	Menominee.	Midland.	Missaukee.	Monroe.	Montcalm.	Montmorency.	Muskegon.
1	Number of all farms in the county	2,011	2,676	2,106	2,163	1,359	4,108	4,493	421	2,036
2	Farms reporting land having drainage	711	267	63	1,292	79	3,442	965	40	760
3	Farms reporting land needing drainage	822	1,255	1,358	1,449	524	1,870	1,890	242	699
4	Farms in drainage and levee districts	228	94	3	1,215	79	693	532	.....	354
	LAND AND FARM AREA.									
5	Approximate land area of the county ... acres	316,160	365,440	675,840	338,560	372,480	366,720	463,360	359,040	322,560
6	All land in farms ... acres	183,428	281,574	222,353	202,927	168,710	318,845	396,333	55,212	173,518
7	Improved land in farms ... acres	108,180	165,492	85,305	108,762	78,386	271,485	269,145	22,801	107,679
8	Woodland in farms ... acres	46,145	51,011	68,063	29,809	26,030	30,245	54,681	26,811	38,830
9	Other unimproved land in farms ... acres	29,103	65,071	68,985	64,356	64,294	17,115	72,507	5,600	27,009
10	Farm land reported as provided with drainage ... acres	19,784	4,823	1,079	53,870	11,100	201,397	27,289	1,407	39,184
11	Farm land reported as needing drainage ... acres	28,640	40,111	53,321	72,019	34,942	48,840	45,515	17,277	23,492
12	Drainage only ... acres	2,307	5,601	1,979	13,591	1,486	28,999	11,139	917	3,794
13	Drainage and clearing ... acres	26,333	34,510	51,342	58,428	33,456	19,841	34,376	16,360	19,698

		Newaygo.	Oakland.	Oceana.	Ogemaw.	Ontonagon.	Osceola.	Ottawa.	Roscommon.	Saginaw.	St. Clair.
1	Number of all farms in the county	2,836	4,035	2,357	1,281	917	2,310	4,296	267	5,143	4,159
2	Farms reporting land having drainage	681	1,757	188	19	30	292	1,738	13	1,634	1,659
3	Farms reporting land needing drainage	1,060	1,646	43	575	111	993	885	125	1,221	1,135
4	Farms in drainage and levee districts	250	301	22	6	.....	63	411	8	924	553
	LAND AND FARM AREA.										
5	Approximate land area of the county ... acres	544,640	567,040	347,520	371,200	853,120	369,280	361,600	344,320	529,920	454,400
6	All land in farms ... acres	317,091	462,018	231,030	166,463	80,170	259,130	308,872	51,349	429,649	395,921
7	Improved land in farms ... acres	167,559	340,567	150,118	67,052	25,025	147,382	238,248	10,419	317,270	311,491
8	Woodland in farms ... acres	87,853	55,840	48,347	72,995	44,433	42,884	29,446	31,115	53,335	46,912
9	Other unimproved land in farms ... acres	61,679	65,611	32,565	26,416	10,712	68,864	41,178	9,815	59,044	37,518
10	Farm land reported as provided with drainage ... acres	25,834	66,741	5,176	2,177	510	7,354	71,682	586	90,120	126,975
11	Farm land reported as needing drainage ... acres	34,215	38,074	773	32,925	3,012	31,451	17,099	32,048	48,759	31,810
12	Drainage only ... acres	5,995	19,078	585	723	27	4,205	7,057	2,011	19,853	9,196
13	Drainage and clearing ... acres	28,220	18,996	188	32,202	2,985	27,246	10,042	30,037	28,906	22,614

		St. Joseph.	Sanilac.	Shiawassee.	Tuscola.	Van Buren.	Washtenaw.	Wayne.	Wexford.	All other counties.[1]
1	Number of all farms in the county	2,436	5,112	3,359	4,658	4,662	3,550	3,858	1,583	12,418
2	Farms reporting land having drainage	108	2,148	2,107	2,467	872	1,210	2,378	37	252
3	Farms reporting land needing drainage	161	1,242	1,555	1,979	594	954	1,038	511	2,171
4	Farms in drainage and levee districts	17	729	746	871	238	237	742	21	21
	LAND AND FARM AREA.									
5	Approximate land area of the county ... acres	321,920	624,640	356,480	529,280	394,880	450,560	396,800	369,280	8,873,600
6	All land in farms ... acres	292,038	549,839	320,616	445,260	341,089	421,211	262,294	146,712	1,314,855
7	Improved land in farms ... acres	234,521	454,204	258,781	335,519	266,009	318,748	213,443	88,408	569,409
8	Woodland in farms ... acres	23,981	39,759	26,816	43,913	40,312	46,286	30,333	29,169	485,917
9	Other unimproved land in farms ... acres	33,536	55,876	35,019	65,828	34,768	56,177	18,518	29,135	259,529
10	Farm land reported as provided with drainage ... acres	4,810	168,750	109,115	129,591	22,476	67,819	108,978	738	4,509
11	Farm land reported as needing drainage ... acres	3,543	37,324	40,414	59,606	14,193	23,636	30,969	17,636	95,709
12	Drainage only ... acres	1,896	9,196	25,794	20,313	3,954	13,271	20,029	504	8,017
13	Drainage and clearing ... acres	1,647	28,128	14,620	39,293	10,239	10,365	10,940	17,132	87,692

[1] No drainage on farms reported in Luce County.

COUNTY TABLE II.—OPERATING DRAINAGE ENTERPRISES: 1920.

		The State.	Allegan.	Arenac.	Barry.	Bay.	Berrien.	Branch.	Calhoun.	Cass.
	LAND AREA.									
1	Approximate land area of the state or county ... acres	36,787,200	533,120	239,360	355,840	283,520	364,160	318,080	443,520	315,520
2	All land in operating drainage enterprises ... acres	9,729,171	312,915	143,734	143,508	241,501	122,877	148,460	252,397	64,027
3	Improved land ... acres	7,182,352	298,843	[1] 58,386	116,347	160,748	97,743	77,102	191,570	44,870
4	Per cent of all improved land in farms	55.6	91.3	80.1	47.3	95.7	37.2	33.8	63.5	20.4
5	Timber and cut-over land ... acres	2,195,562	14,072	85,348	16,729	79,740	1,093	7,449	36,550	5,074
6	Other unimproved land ... acres	351,257			10,432	1,013	24,041	63,909	24,277	14,083
7	Swampy or subject to overflow, in enterprises ... acres	1,020,207	6,324	17,893	10,410		225	322	38,350	3,213
8	Suffering a loss of crops from defective drainage ... acres	692,224	3,932	3,051	10,290	1,954		228	25,555	
9	Assessed acreage	15,766,478	496,959	149,294	189,913	274,099	135,087	157,271	323,377	78,019
10	Excess over all land in operating enterprises ... acres	6,037,307	184,044	5,560	46,405	32,598	12,210	8,811	70,980	13,992
	DRAINAGE WORKS.									
	Open ditches:									
11	Completed ... miles	16,023.8	465.6	203.2	116.4	425.9	217.7	257.4	245.0	81.0
12	Additional under construction ... miles	118.4	0.9	0.9						2.5
13	Maximum completed in any enterprise ... miles	75.0	10.0	10.1	13.7	11.4	4.4	7.4	14.6	19.1
14	Maximum width at bottom of ditch [2] ... feet	70	40	30	22	60	10	18	16	30
15	Maximum of average depths of outlet ditches [2] ... feet	13.0	9.0	7.0	8.5	11.1	10.0	9.5	10.0	9.0
16	Mean depth of branch ditches [2] ... feet	4.3	4.1	4.0	4.0	4.2	5.5	3.2	5.0	3.0
	Tile drains:									
17	Completed ... miles	2,173.9	13.2	0.3	44.3	1.1	71.4	100.6	47.4	2.8
18	Additional under construction ... miles	8.4	0.3		0.1					
19	Maximum completed in any enterprise ... miles	10.5	1.3	0.3	10.5	0.7	10.0	4.9	2.5	0.9
20	Maximum size of tile [2] ... inches	48	18	12	24	20	36	28	20	18
	Accessory levees and dikes:									
21	Completed ... miles	33.1						0.1		
22	Additional under construction ... miles									
	Pumping plants:									
23	Engine capacity ... horsepower	1,065								
24	Pump capacity ... gallons per minute	62,000								
25	Area served by pumps ... acres	10,100								
26	Area drained by open ditches only [2] ... acres	8,541,556	301,173	142,614	119,129	237,501	93,862	90,909	226,105	60,542
27	Length of these ditches ... miles	14,725.0	445.4	202.0	100.5	421.0	193.0	212.3	205.9	77.5
28	Average length per acre ... feet	9.1	7.8	7.5	4.5	9.4	10.9	12.3	4.8	6.8
29	Area having open ditches and levees [2] ... acres	[3] 2,000						1,000		
30	Length of these ditches ... miles	93.6						4.6		
31	Average length per acre ... feet							24.3		
32	Length of accessory levees ... miles	33.1						0.1		
33	Area drained by tile only [2] ... acres	318,514	2,281		8,460		15,292	22,955	6,971	320
34	Length of these tile ... miles	1,303.7	5.2		17.4		52.9	68.6	28.9	0.5
35	Average length per acre ... feet	21.6	12.0		10.9		18.3	15.8	21.9	8.3
36	Area drained by open ditches and tile [2] ... acres	867,101	9,461	1,120	15,919	4,000	13,723	33,596	19,321	3,165
37	Length of these drains ... miles	2,202.2	29.4	2.4	42.9	6.0	46.2	72.5	57.6	8.3
38	Average length per acre ... feet	13.4	16.4	11.3	14.2	7.9	17.8	11.4	15.7	13.8
	DEVELOPMENT OF LAND.									
39	Improved land in operating enterprises, 1920 ... acres	7,182,352	298,843	[1] 58,386	116,347	160,748	97,743	77,102	191,570	44,870
40	Improved land prior to drainage ... acres	2,046,613	236,165	[4] 47,975	60,524	148,293	61,291	38,830	2,277	36,411
41	Increase since drainage ... acres	5,135,739	62,678	10,411	55,823	12,455	36,452	38,272	189,293	8,459
42	Per cent of increase [5]	250.9	26.5	21.7	92.2	8.4	59.5	98.6		23.2
43	Per cent increase is of all improved land in farms, 1920	39.7	19.1	14.3	22.7	7.4	13.9	16.8	62.8	3.9
44	Timber and cut-over land, 1920 ... acres	2,195,562	14,072	85,348	16,729	79,740	1,093	7,449	36,550	5,074
45	Timber and cut-over land prior to drainage ... acres	6,809,213	76,750	95,759	23,165	91,397	23,120	36,607	185,348	12,743
46	Decrease since drainage ... acres	4,613,651	62,678	10,411	6,436	11,657	22,027	29,158	148,798	7,669
47	Per cent of decrease	67.8	81.7	10.9	27.8	12.8	95.3	79.7	80.3	60.2
48	Other unimproved land, 1920 ... acres	351,257			10,432	1,013	24,041	63,909	24,277	14,083
49	Other unimproved land prior to drainage ... acres	873,345			59,819	1,811	38,466	73,023	64,772	14,873
50	Decrease since drainage ... acres	522,088			49,387	798	14,425	9,114	40,495	790
51	Per cent of decrease	59.8			82.6	44.1	37.5	12.5	62.5	5.3
52	Swampy or subject to overflow, 1920 ... acres	1,020,207	6,324	17,893	10,410		225	322	38,350	3,213
53	Swampy or subject to overflow prior to drainage ... acres	4,763,016	65,240	36,400	58,862	9,649	18,542	58,544	84,695	16,737
54	Decrease since drainage ... acres	3,742,809	58,916	18,507	48,452	9,649	18,317	58,222	46,345	13,524
55	Per cent of decrease	78.6	90.3	50.8	82.3	100.0	98.8	99.4	54.7	80.8
	CAPITAL INVESTED AND COST PER ACRE.									
56	Total capital invested in and required for completion of operating enterprises ... dollars	25,048,980	416,121	475,212	198,350	500,910	315,540	515,941	421,011	158,793
57	Capital invested in these enterprises to Dec. 31, 1919 ... dollars	24,683,715	414,461	473,012	197,771	500,910	315,540	515,941	421,011	150,293
58	Additional capital required to complete these enterprises ... dollars	365,265	1,660	2,200	579					8,500
59	Average cost per acre when completed ... dollars	2.57	1.33	3.31	1.38	2.07	2.57	3.48	1.67	2.48
60	Enterprises constructing open ditches only ... dollars	19,041,495	386,987	473,111	121,104	488,210	216,521	239,883	267,842	148,683
61	Average cost per acre when completed ... dollars	2.23	1.28	3.32	1.02	2.06	2.31	2.64	1.18	2.46
62	Enterprises constructing open ditches and levees ... dollars	176,284						7,984		
63	Average cost per acre when completed ... dollars	88.14						7.98		
64	Enterprises constructing tile drains only ... dollars	2,287,056	6,143		29,964		49,855	124,064	41,847	556
65	Average cost per acre when completed ... dollars	7.18	2.69		3.54		3.26	5.40	6.00	1.74
66	Enterprises constructing open ditches and tile drains ... dollars	3,544,145	22,991	2,101	47,282	12,700	49,164	144,010	111,322	9,554
67	Average cost per acre when completed ... dollars	4.09	2.43	1.88	2.97	3.18	3.58	4.29	5.76	3.02
	CROPS.									
	Improved land in enterprises reporting—									
68	Wheat as principal crop on drained land ... acres	2,669,222	5,889					6,252	189,824	
69	Corn as principal crop on drained land ... acres	1,525,685	212,621		106,348			70,804	1,746	
70	Sugar beets as principal crop on drained land ... acres	1,140,880				28,994				
71	Peas and beans (dried) as principal crops on drained land ... acres	616,142		58,386		131,754				
72	Hay as principal crop on drained land ... acres	456,601	42,828		7,783					
73	Vegetables as principal crop on drained land ... acres	272,843	27,674							
74	Potatoes as principal crop on drained land ... acres	119,909								
75	Oats as principal crop on drained land ... acres	10,032	570		2,216			46		
76	Rye as principal crop on drained land ... acres	7,516								
77	Other crops as principal ones on drained land ... acres	351,835	8,977				97,743			44,870
78	Not reporting principal crop on drained land ... acres	11,687	284							

[1] Office estimate; the reported figures exceed the improved acreage in all farms in the county as determined by the census of agriculture.
[2] When works under construction have been completed.
[3] Additional area reported under "open ditches only."
[4] The reported figures have been reduced by the same acreage as the improved land, 1920.
[5] Per cent not shown when more than 1,000.

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

		Cheboygan.	Chippewa.	Clare.	Clinton.	Eaton.	Genesee.	Gladwin.	Gratiot.	Hillsdale.
	LAND AREA.									
1	Approximate land area of the county ... acres	464,000	1,006,720	372,480	365,440	365,440	419,200	332,160	370,560	382,080
2	All land in operating drainage enterprises ... acres	22,483	15,424	21,164	272,709	347,032	188,943	124,029	324,969	197,849
3	Improved land ... acres	13,915	5,508	13,215	187,269	261,989	136,149	68,182	249,338	185,366
4	Per cent of all improved land in farms	24.9	5.2	20.1	67.9	99.3	46.7	93.4	99.2	65.5
5	Timber and cut-over land ... acres	8,568	9,916	7,949	85,440	85,043	52,443	55,847	75,631	6,889
6	Other unimproved land ... acres						351			5,594
7	Swampy or subject to overflow, in enterprises ... acres	4,021	6,750	7,640	28,948	41,544	24,061	23,302	28,147	3,956
8	Suffering a loss of crops from defective drainage ... acres	490		3,854	27,219	41,997	23,461	17,762	17,416	2,392
9	Assessed acreage	26,403	15,424	21,164	818,623	949,278	315,400	124,534	793,808	204,390
10	Excess over all land in operating enterprises ... acres	3,920			545,914	602,246	126,457	505	468,839	6,541
	DRAINAGE WORKS.									
	Open ditches:									
11	Completed ... miles	29.8	15.7	43.0	546.7	447.5	342.6	224.4	798.5	174.1
12	Additional under construction ... miles	0.4					0.4			
13	Maximum completed in any enterprise ... miles	3.7	6.5	4.2	20.5	27.7	14.5	9.7	23.0	7.5
14	Maximum width at bottom of ditch[1] ... feet	14	18	8	45	30	30	10	60	30
15	Maximum of average depths of outlet ditches[1] ... feet	5.0	7.0	6.0	11.0	12.0	8.0	6.7	12.1	6.5
16	Mean depth of branch ditches[1] ... feet		7.0	3.6	3.8	4.9	4.5	4.2	4.8	3.8
	Tile drains:									
17	Completed ... miles			3.8	97.1	185.7	106.9	0.9	174.3	173.8
18	Additional under construction ... miles					2.3				
19	Maximum completed in any enterprise ... miles			0.9	4.6	7.1	3.5	0.6	4.8	5.5
20	Maximum size of tile[1] ... inches			12	24	36	24	18	27	24
	Accessory levees and dikes:									
21	Completed ... miles									
22	Additional under construction ... miles									
	Pumping plants:									
23	Engine capacity ... horsepower									
24	Pump capacity ... gallons per minute									
25	Area served by pumps ... acres									
26	Area drained by open ditches only[1] ... acres	22,483	15,424	18,607	225,436	294,285	124,607	123,375	309,998	95,304
27	Length of these ditches ... miles	30.2	15.7	38.4	488.6	372.9	269.2	223.5	735.1	101.6
28	Average length per acre ... feet	7.1	5.4	10.9	11.4	6.7	11.4	9.6	12.5	5.6
29	Area having open ditches and levees[1] ... acres									
30	Length of these ditches ... miles									
31	Average length per acre ... feet									
32	Length of accessory levees ... miles									
33	Area drained by tile only[1] ... acres			919	11,033	14,116	15,420	59	2,830	33,863
34	Length of these tile ... miles			2.3	40.5	123.0	57.4	0.6	127.3	98.4
35	Average length per acre ... feet			13.2	19.4	46.0	19.7	53.7	237.5	15.3
36	Area drained by open ditches and tile[1] ... acres			1,638	36,240	38,631	48,916	595	12,141	68,682
37	Length of these drains ... miles			6.1	114.7	139.6	123.3	1.2	110.4	147.9
38	Average length per acre ... feet			19.7	16.7	19.1	13.3	10.6	48.0	11.4
	DEVELOPMENT OF LAND.									
39	Improved land in operating enterprises, 1920 ... acres	13,915	5,508	13,215	187,269	261,989	136,149	68,182	249,338	185,366
40	Improved land prior to drainage ... acres	7,116	1,827	7,520	268	622	39,925	35,982		95,427
41	Increase since drainage ... acres	6,799	3,681	5,695	187,001	261,367	96,224	32,200	249,338	89,939
42	Per cent of increase[2]	95.5	201.5	75.7			241.0	89.5		94.2
43	Per cent increase is of all improved land in farms, 1920	12.2	3.5	8.7	67.8	99.0	33.0	44.1	99.2	31.8
44	Timber and cut-over land, 1920 ... acres	8,568	9,916	7,949	85,440	85,043	52,443	55,847	75,631	6,889
45	Timber and cut-over land prior to drainage ... acres	15,367	13,597	13,644	272,174	346,218	148,432	88,047	324,969	19,371
46	Decrease since drainage ... acres	6,799	3,681	5,695	186,734	261,175	95,989	32,200	249,338	12,482
47	Per cent of decrease	44.2	27.1	41.7	68.6	75.4	64.7	36.6	76.7	64.4
48	Other unimproved land, 1920 ... acres						351			5,594
49	Other unimproved land prior to drainage ... acres				267	192	586			83,051
50	Decrease since drainage ... acres				267	192	235			77,457
51	Per cent of decrease				100.0	100.0	40.1			93.3
52	Swampy or subject to overflow, 1920 ... acres	4,021	6,750	7,640	28,948	41,544	24,061	23,302	28,147	3,956
53	Swampy or subject to overflow prior to drainage ... acres	14,095	13,308	11,974	101,387	103,745	101,758	31,766	289,209	82,164
54	Decrease since drainage ... acres	10,074	6,558	4,334	72,439	62,201	77,697	8,464	261,062	78,208
55	Per cent of decrease	71.5	49.3	36.2	71.4	60.0	76.4	26.6	90.3	95.2
	CAPITAL INVESTED AND COST PER ACRE.									
56	Total capital invested in and required for completion of operating enterprises ... dollars	23,994	36,731	66,261	1,026,932	1,065,948	705,917	366,320	1,506,847	587,573
57	Capital invested in these enterprises to Dec. 31, 1919 ... dollars	23,594	36,731	66,261	1,026,932	1,058,638	704,672	366,320	1,506,847	587,573
58	Additional capital required to complete these enterprises ... dollars	400				7,310	1,245			
59	Average cost per acre when completed ... dollars	1.07	2.38	3.13	3.77	3.07	3.74	2.95	4.64	2.97
60	Enterprises constructing open ditches only ... dollars	23,994	36,731	54,626	759,416	604,811	292,735	362,051	1,055,296	197,868
61	Average cost per acre when completed ... dollars	1.07	2.38	2.94	3.37	2.06	2.35	2.93	3.40	2.08
62	Enterprises constructing open ditches and levees ... dollars									
63	Average cost per acre when completed ... dollars									
64	Enterprises constructing tile drains only ... dollars			3,889	66,380	187,730	148,707	929	243,043	162,785
65	Average cost per acre when completed ... dollars			4.23	6.02	13.30	9.64	15.75	85.88	4.81
66	Enterprises constructing open ditches and tile drains ... dollars			7,746	201,136	273,407	264,475	3,340	208,508	226,920
67	Average cost per acre when completed ... dollars			4.73	5.55	7.08	5.41	5.61	17.17	3.30
	CROPS.									
	Improved land in enterprises reporting—									
68	Wheat as principal crop on drained land ... acres		2,529		77,122	261,259	123,875			184,469
69	Corn as principal crop on drained land ... acres				461	618				
70	Sugar beets as principal crop on drained land ... acres				108,482					
71	Peas and beans (dried) as principal crops on drained land ... acres			13,215			2,880		244,558	122
72	Hay as principal crop on drained land ... acres	13,915	2,979			112		68,182	4,600	
73	Vegetables as principal crop on drained land ... acres									
74	Potatoes as principal crop on drained land ... acres									
75	Oats as principal crop on drained land ... acres									
76	Rye as principal crop on drained land ... acres									
77	Other crops as principal ones on drained land ... acres				84		9,394			
78	Not reporting principal crop on drained land ... acres				1,120				180	775

[1] When works under construction have been completed.

[2] Per cent not shown when more than 1,000.

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

		Huron.	Ingham.	Ionia.	Iosco.	Isabella.	Jackson.	Kalamazoo.	Kent.	Lapeer.
	LAND AREA.									
1	Approximate land area of the county ... acres	546,560	353,920	370,560	364,800	366,080	452,480	359,680	550,400	426,240
2	All land in operating drainage enterprises ... acres	430,219	222,114	286,153	31,974	307,024	76,139	79,511	145,370	238,235
3	Improved land ... acres	[1] 357,924	177,928	228,743	14,348	[1] 201,061	61,747	61,329	143,084	168,308
4	Per cent of all improved land in farms	93.3	74.6	85.8	28.9	94.9	20.9	24.7	40.6	57.7
5	Timber and cut-over land ... acres	72,295	9,905	43,188	14,731	105,963	4,273	10,653	55	69,638
6	Other unimproved land ... acres	.....	34,281	14,222	2,895	.....	10,119	7,529	2,231	289
7	Swampy or subject to overflow, in enterprises ... acres	5,939	33,929	28,618	13,450	63,895	9,437	5,715	1,572	25,258
8	Suffering a loss of crops from defective drainage ... acres	5,547	33,701	28,618	5,070	22,200	9,381	5,208	139	22,480
9	Assessed acreage	709,772	694,839	307,072	43,444	319,071	82,190	107,421	250,397	365,038
10	Excess over all land in operating enterprises ... acres	279,553	472,725	20,919	11,470	12,047	6,051	27,910	105,027	126,803
	DRAINAGE WORKS.									
	Open ditches:									
11	Completed ... miles	651.1	322.1	243.4	32.1	289.5	112.6	145.5	206.2	372.2
12	Additional under construction ... miles	7.4	.....	.....	.....	.....	.....	2.6	1.7	7.1
13	Maximum completed in any enterprise ... miles	17.5	11.4	13.7	4.4	10.2	5.1	7.5	10.0	10.1
14	Maximum width at bottom of ditch [2] ... feet	35	25	30	20	20	8	30	30	40
15	Maximum of average depths of outlet ditches [2] ... feet	8.0	10.0	9.0	7.0	7.2	10.0	10.0	9.0	10.0
16	Mean depth of branch ditches [2] ... feet	5.1	4.2	4.5	3.0	4.3	4.0	5.4	3.5	4.1
	Tile drains:									
17	Completed ... miles	.....	154.6	98.8	0.2	277.3	10.5	4.0	14.1	20.2
18	Additional under construction ... miles	.....	.....	.....	.....	.....	.....	.....	.....	0.2
19	Maximum completed in any enterprise ... miles	.....	4.9	6.9	0.2	7.4	0.9	0.8	1.5	1.6
20	Maximum size of tile [2] ... inches	.....	48	36	12	27	24	48	36	16
	Accessory levees and dikes:									
21	Completed ... miles	.....	.....	.....	.....	.....	.....	.....	.....	.....
22	Additional under construction ... miles	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Pumping plants:									
23	Engine capacity ... horsepower	.....	.....	.....	.....	.....	.....	.....	.....	.....
24	Pump capacity ... gallons per minute	.....	.....	.....	.....	.....	.....	.....	.....	.....
25	Area served by pumps ... acres	.....	.....	.....	.....	.....	.....	.....	.....	.....
26	Area drained by open ditches only [2] ... acres	430,219	160,423	221,038	31,214	135,417	57,371	73,064	128,721	224,100
27	Length of these ditches ... miles	658.5	243.8	204.4	31.0	137.3	94.9	135.8	180.0	362.2
28	Average length per acre ... feet	8.1	8.0	4.9	5.2	5.4	8.7	9.8	7.4	8.5
29	Area having open ditches and levees [2] ... acres	.....	.....	.....	.....	.....	.....	.....	.....	.....
30	Length of these ditches ... miles	.....	.....	.....	.....	.....	.....	.....	.....	.....
31	Average length per acre ... feet	.....	.....	.....	.....	.....	.....	.....	.....	.....
32	Length of accessory levees ... miles	.....	.....	.....	.....	.....	.....	.....	.....	.....
33	Area drained by tile only [2] ... acres	.....	13,970	32,346	.....	38,218	3,498	320	2,631	3,165
34	Length of these tile ... miles	.....	96.6	75.7	.....	146.8	5.3	0.2	5.9	12.4
35	Average length per acre ... feet	.....	36.5	12.4	.....	20.3	8.0	3.3	11.8	20.7
36	Area drained by open ditches and tile [2] ... acres	.....	47,721	32,769	760	133,389	15,270	6,127	14,018	10,970
37	Length of these drains ... miles	.....	136.3	62.1	1.3	282.7	22.9	16.1	36.1	25.1
38	Average length per acre ... feet	.....	15.1	10.0	9.0	11.2	7.9	13.9	13.6	12.1
	DEVELOPMENT OF LAND.									
39	Improved land in operating enterprises, 1920 ... acres	[1] 357,924	177,928	228,743	14,348	[1] 201,061	61,747	61,329	143,084	168,308
40	Improved land prior to drainage ... acres	.....	132,017	142,179	9,363	[3] 153,351	51,070	25,473	127,596	16,484
41	Increase since drainage ... acres	357,924	45,911	86,564	4,985	47,710	10,677	35,856	15,488	151,824
42	Per cent of increase	.....	34.8	60.9	53.2	31.1	20.9	140.8	12.1	921.0
43	Per cent increase is of all improved land in farms, 1920	93.3	19.3	32.5	10.0	22.5	3.6	14.5	4.4	52.0
44	Timber and cut-over land, 1920 ... acres	72,295	9,905	43,188	14,731	105,963	4,273	10,653	55	69,638
45	Timber and cut-over land prior to drainage ... acres	430,219	27,001	129,752	18,672	153,673	8,029	15,661	55	220,904
46	Decrease since drainage ... acres	357,924	17,096	86,564	3,941	47,710	3,756	5,008	.....	151,266
47	Per cent of decrease	83.2	63.3	66.7	21.1	31.0	46.8	32.0	.....	68.5
48	Other unimproved land, 1920 ... acres	.....	34,281	14,222	2,895	.....	10,119	7,529	2,231	289
49	Other unimproved land prior to drainage ... acres	.....	63,096	14,222	3,939	.....	17,040	38,377	17,719	847
50	Decrease since drainage ... acres	.....	28,815	.....	1,044	.....	6,921	30,848	15,488	558
51	Per cent of decrease	.....	45.7	.....	26.5	.....	40.6	80.4	87.4	65.9
52	Swampy or subject to overflow, 1920 ... acres	5,939	33,929	28,618	13,450	63,895	9,437	5,715	1,572	25,258
53	Swampy or subject to overflow prior to drainage ... acres	335,752	66,544	114,196	19,179	126,126	17,077	35,857	20,711	124,366
54	Decrease since drainage ... acres	329,813	32,615	85,578	5,729	62,231	7,640	30,142	19,139	99,108
55	Per cent of decrease	98.2	49.0	74.9	29.9	49.3	44.7	84.1	92.4	79.7
	CAPITAL INVESTED AND COST PER ACRE.									
56	Total capital invested in and required for completion of operating enterprises ... dollars	1,211,974	875,515	539,859	65,428	785,943	115,338	178,098	271,543	573,742
57	Capital invested in these enterprises to Dec. 31, 1919 ... dollars	1,180,924	875,515	539,859	65,428	785,943	115,338	167,351	241,543	566,317
58	Additional capital required to complete these enterprises ... dollars	31,050	.....	.....	.....	.....	.....	10,747	30,000	7,425
59	Average cost per acre when completed ... dollars	2.82	3.94	1.89	2.05	2.56	1.51	2.24	1.87	2.41
60	Enterprises constructing open ditches only ... dollars	1,211,974	322,084	336,709	52,694	163,750	84,201	155,330	204,778	521,372
61	Average cost per acre when completed ... dollars	2.82	2.01	1.52	1.69	1.21	1.47	2.13	1.59	2.33
62	Enterprises constructing open ditches and levees ... dollars	.....	.....	.....	.....	.....	.....	.....	.....	.....
63	Average cost per acre when completed ... dollars	.....	.....	.....	.....	.....	.....	.....	.....	.....
64	Enterprises constructing tile drains only ... dollars	.....	283,644	102,573	.....	197,453	9,447	604	34,947	18,455
65	Average cost per acre when completed ... dollars	.....	20.30	3.17	.....	5.17	2.70	1.89	13.28	5.83
66	Enterprises constructing open ditches and tile drains ... dollars	.....	269,787	100,577	12,734	424,740	21,690	22,164	31,818	33,915
67	Average cost per acre when completed ... dollars	.....	5.65	3.07	16.76	3.18	1.42	3.62	2.27	3.09
	CROPS.									
	Improved land in enterprises reporting—									
68	Wheat as principal crop on drained land ... acres	.....	10,411	1,440	.....	.....	1,390	539	.....	168,308
69	Corn as principal crop on drained land ... acres	.....	166,905	227,303	.....	.....	48,418	39,935	138,280	.....
70	Sugar beets as principal crop on drained land ... acres	357,924	.....	.....	.....	.....	.....	.....	.....	.....
71	Peas and beans (dried) as principal crops on drained land ... acres	.....	.....	.....	.....	200,984	.....	.....	.....	.....
72	Hay as principal crop on drained land ... acres	.....	612	.....	14,348	.....	9,588	6,567	1,689	.....
73	Vegetables as principal crop on drained land ... acres	.....	.....	.....	.....	.....	.....	1,794	1,180	.....
74	Potatoes as principal crop on drained land ... acres	.....	.....	.....	.....	77	2,351	140	.....	.....
75	Oats as principal crop on drained land ... acres	.....	.....	.....	.....	.....	.....	1,467	.....	.....
76	Rye as principal crop on drained land ... acres	.....	.....	.....	.....	.....	.....	.....	.....	.....
77	Other crops as principal ones on drained land ... acres	.....	.....	.....	.....	.....	.....	10,887	1,935	.....
78	Not reporting principal crop on drained land ... acres	.....	.....	.....	.....	.....	.....	.....	.....	.....

[1] Office estimate; the reported figures exceed the improved acreage in all farms in the county as determined by the census of agriculture.
[2] When works under construction have been completed.
[3] The reported figures have been reduced by the same acreage as the improved land, 1920.

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

		Lenawee.	Livingston.	Macomb.	Manistee.	Mason.	Mecosta.	Midland.	Missaukee.	Monroe.	Montcalm.
	LAND AREA.										
1	Approximate land area of the county ... acres	475,520	363,520	302,080	359,680	316,160	365,440	338,560	372,480	366,720	463,360
2	All land in operating drainage enterprises ... acres	275,535	213,481	256,359	12,128	26,333	23,590	326,690	26,802	251,387	153,513
3	Improved land ... acres	245,775	173,083	[1] 208,052	6,885	18,431	21,563	101,210	10,388	215,029	110,816
4	Per cent of all improved land in farms	66.4	74.8	93.9	8.1	17.0	13.0	93.1	13.3	79.2	41.2
5	Timber and cut-over land ... acres	29,760	17,853	48,101	5,243	7,878	2,027	225,480	16,414	32,314	39,894
6	Other unimproved land ... acres	.....	22,545	206	.....	24	.....	.....	.....	4,044	2,803
7	Swampy or subject to overflow, in enterprises ... acres	30,199	23,719	21,178	4,047	9,456	4,584	89,842	8,228	23,525	29,103
8	Suffering a loss of crops from defective drainage ... acres	27,823	42,638	206	2,090	1,367	2,668	156	1,065	32,281	13,995
9	Assessed acreage	568,882	249,667	303,572	12,128	26,755	31,910	415,628	26,862	564,982	205,161
10	Excess over all land in operating enterprises ... acres	293,347	36,186	47,213	.....	422	8,320	88,938	60	313,595	51,648
	DRAINAGE WORKS.										
	Open ditches:										
11	Completed ... miles	465.6	245.2	348.2	29.8	94.3	41.4	608.1	60.7	627.3	241.0
12	Additional under construction ... miles	9.3	.....	0.4	4.5	.....	.....	3.7	0.7	1.1	.....
13	Maximum completed in any enterprise ... miles	10.9	10.9	10.2	7.6	9.4	4.2	16.4	17.0	18.9	21.5
14	Maximum width at bottom of ditch [2] ... feet	15	30	30	12	10	8	40	12	25	16
15	Maximum of average depths of outlet ditches [2] ... feet	10.0	9.0	8.0	4.0	5.5	7.8	8.2	5.0	10.0	7.5
16	Mean depth of branch ditches [2] ... feet	4.2	5.5	3.4	3.0	3.6	3.5	4.5	3.6	.....	3.9
	Tile drains:										
17	Completed ... miles	233.3	65.2	12.1	0.3	0.4	1.7	58.0	0.2	24.1	10.7
18	Additional under construction ... miles	1.9	.....	0.3	.....	.....	.....	.....	1.4	.....	.....
19	Maximum completed in any enterprise ... miles	3.2	4.2	4.0	0.2	0.4	1.3	6.9	0.2	2.6	2.0
20	Maximum size of tile [2] ... inches	32	20	24	15	.....	24	15	15	20	18
	Accessory levees and dikes:										
21	Completed ... miles	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
22	Additional under construction ... miles	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Pumping plants:										
23	Engine capacity ... horsepower	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
24	Pump capacity ... gallons per minute	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
25	Area served by pumps ... acres	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
26	Area drained by open ditches only [2] ... acres	198,117	153,527	216,800	11,352	26,292	22,258	286,514	26,205	243,887	129,880
27	Length of these ditches ... miles	414.8	164.5	338.0	33.8	94.3	39.3	530.8	58.1	622.6	201.5
28	Average length per acre ... feet	11.1	5.7	8.2	15.7	18.9	9.3	9.8	11.7	13.5	8.2
29	Area having open ditches and levees [2] ... acres	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
30	Length of these ditches ... miles	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
31	Average length per acre ... feet	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
32	Length of accessory levees ... miles	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
33	Area drained by tile only [2] ... acres	34,158	6,021	4,611	.....	41	480	6,185	.....	4,890	2,026
34	Length of these tile ... miles	170.7	19.6	4.2	.....	0.4	1.3	35.9	.....	20.4	2.2
35	Average length per acre ... feet	26.4	17.2	4.8	.....	51.5	14.3	30.6	.....	22.0	5.7
36	Area drained by open ditches and tile [2] ... acres	43,260	53,933	34,948	776	.....	852	33,991	597	2,610	21,607
37	Length of these drains ... miles	124.6	126.3	18.8	0.8	.....	2.5	103.1	4.9	9.5	48.0
38	Average length per acre ... feet	15.2	12.4	2.8	5.4	.....	15.5	16.0	43.3	19.2	11.7
	DEVELOPMENT OF LAND.										
39	Improved land in operating enterprises, 1920 ... acres	245,775	173,083	[1] 208,052	6,885	18,431	21,563	101,210	10,388	215,029	110,816
40	Improved land prior to drainage ... acres	916	633	800	2,946	5,269	20,138	49,429	4,751	1,910	42,631
41	Increase since drainage ... acres	244,859	172,450	207,252	3,939	13,162	1,425	51,781	5,637	213,119	68,185
42	Per cent of increase [3]	.....	.....	.....	133.7	249.8	7.1	104.8	118.6	.....	159.9
43	Per cent increase is of all improved land in farms, 1920	66.2	74.5	93.6	4.6	12.2	0.9	47.6	7.2	78.5	25.3
44	Timber and cut-over land, 1920 ... acres	29,760	17,853	48,101	5,243	7,878	2,027	225,480	16,414	32,314	39,894
45	Timber and cut-over land prior to drainage ... acres	254,249	134,160	254,993	9,182	21,040	3,452	277,261	22,051	189,383	108,079
46	Decrease since drainage ... acres	224,489	116,307	206,892	3,939	13,162	1,425	51,781	5,637	157,069	68,185
47	Per cent of decrease	88.3	86.7	81.1	42.9	62.6	41.3	18.7	25.6	82.9	63.1
48	Other unimproved land, 1920 ... acres	.....	22,545	206	.....	24	.....	.....	.....	4,044	2,803
49	Other unimproved land prior to drainage ... acres	20,370	78,683	566	.....	24	.....	.....	.....	60,094	2,803
50	Decrease since drainage ... acres	20,370	56,143	360	.....	.....	.....	.....	.....	56,050	.....
51	Per cent of decrease	100.0	71.3	63.6	.....	.....	.....	.....	.....	93.3	.....
52	Swampy or subject to overflow, 1920 ... acres	30,199	23,719	21,178	4,047	9,456	4,584	89,842	8,228	23,525	29,103
53	Swampy or subject to overflow prior to drainage ... acres	195,491	59,688	141,109	9,182	14,989	11,384	228,063	18,630	209,472	119,008
54	Decrease since drainage ... acres	165,292	35,969	119,931	5,135	5,533	6,800	138,221	10,402	185,947	89,905
55	Per cent of decrease	84.6	60.3	85.0	55.9	36.9	59.7	60.6	55.8	88.8	75.5
	CAPITAL INVESTED AND COST PER ACRE.										
56	Total capital invested in and required for completion of operating enterprises ... dollars	946,798	487,860	396,849	31,610	88,803	54,863	1,029,181	64,498	479,937	276,104
57	Capital invested in these enterprises to Dec. 31, 1919 ... dollars	923,653	487,860	396,849	23,610	88,803	54,863	994,167	61,698	479,737	276,104
58	Additional capital required to complete these enterprises ... dollars	23,145	.....	.....	8,000	.....	.....	35,014	2,800	200	.....
59	Average cost per acre when completed ... dollars	3.44	2.29	1.55	2.61	3.37	2.33	3.15	2.41	1.91	1.80
60	Enterprises constructing open ditches only ... dollars	482,193	245,113	364,282	29,620	88,515	48,661	830,323	58,976	454,154	197,115
61	Average cost per acre when completed ... dollars	2.43	1.60	1.68	2.61	3.37	2.19	2.90	2.25	1.86	1.52
62	Enterprises constructing open ditches and levees ... dollars	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
63	Average cost per acre when completed ... dollars	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
64	Enterprises constructing tile drains only ... dollars	261,739	41,476	18,594	.....	288	2,987	37,317	.....	20,434	6,468
65	Average cost per acre when completed ... dollars	7.66	6.89	4.03	.....	7.02	6.22	6.03	.....	4.18	3.19
66	Enterprises constructing open ditches and tile drains ... dollars	202,866	201,271	13,973	1,990	.....	3,215	161,541	5,522	5,349	72,521
67	Average cost per acre when completed ... dollars	4.69	3.73	0.40	2.56	.....	3.77	4.75	9.25	2.05	3.36
	CROPS.										
	Improved land in enterprises reporting—										
68	Wheat as principal crop on drained land ... acres	107,848	172,256	147,778	.....	.....	.....	.....	.....	169,910	4,792
69	Corn as principal crop on drained land ... acres	91,464	827	.....	.....	312	12,448	.....	.....	15,788	28,731
70	Sugar beets as principal crop on drained land ... acres	24,535	.....	49,349	.....	.....	.....	.....	.....	.....	1,073
71	Peas and beans (dried) as principal crops on drained land ... acres	.....	.....	.....	.....	.....	.....	101,210	.....	.....	21,310
72	Hay as principal crop on drained land ... acres	.....	.....	.....	6,885	18,112	9,115	.....	9,765	.....	20,922
73	Vegetables as principal crop on drained land ... acres	.....	.....	720	.....	.....	.....	.....	.....	14,210	4,189
74	Potatoes as principal crop on drained land ... acres	21,928	.....	10,205	.....	7	.....	.....	623	15,121	17,014
75	Oats as principal crop on drained land ... acres	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
76	Rye as principal crop on drained land ... acres	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
77	Other crops as principal ones on drained land ... acres	.....	.....	.....	.....	.....	.....	.....	.....	.....	7,762
78	Not reporting principal crop on drained land ... acres	.....	.....	.....	.....	.....	.....	.....	.....	.....	5,023

[1] Office estimate; the reported figures exceed the improved acreage in all farms in the county as determined by the census of agriculture.
[2] When works under construction have been completed.
[3] Per cent not shown when more than 1,000.

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

		Muskegon.	Newaygo.	Oakland.	Oceana.	Osceola.	Ottawa.	Roscommon.	Saginaw.	St. Clair.
	LAND AREA.									
1	Approximate land area of the county ... acres	322,560	544,640	567,040	347,520	369,280	361,600	344,320	529,920	454,400
2	All land in operating drainage enterprises ... acres	85,919	116,695	179,541	84,587	48,829	252,928	8,360	444,570	194,825
3	Improved land ... acres	77,417	81,258	132,131	37,116	33,214	[1] 215,456	820	[1] 300,819	142,705
4	Per cent of all improved land in farms	71.9	48.5	38.8	24.7	22.5	90.4	7.9	94.8	45.8
5	Timber and cut-over land ... acres	8,146	35,437	47,410	47,063	15,615	37,472	2,436	143,751	52,120
6	Other unimproved land ... acres	356			408			5,104		
7	Swampy or subject to overflow, in enterprises ... acres	4,371	45,072	19,137	9,067	16,912	13,796	3,504	48,229	11,809
8	Suffering a loss of crops from defective drainage ... acres	3,306	6,575	244	1,743	7,075	1,516	120	40,241	1,622
9	Assessed acreage	88,589	116,695	213,739	85,903	48,829	386,806	8,360	998,319	290,383
10	Excess over all land in operating enterprises ... acres	2,670		34,198	1,316		133,878		553,749	95,558
	DRAINAGE WORKS.									
	Open ditches:									
11	Completed ... miles	146.8	157.8	249.8	79.5	78.7	388.9	14.4	975.9	410.3
12	Additional under construction ... miles	0.7		3.7			0.1	3.2	5.4	3.1
13	Maximum completed in any enterprise ... miles	10.6	9.7	16.9	8.1	10.1	8.2	4.5	75.0	8.0
14	Maximum width at bottom of ditch [2] ... feet	10	20	25	20	18	30	10	70	40
15	Maximum of average depths of outlet ditches [2] ... feet	5.0	8.0	6.0	6.0	5.5	7.0	5.0	10.0	10.0
16	Mean depth of branch ditches [2] ... feet	3.0	4.4	5.2	3.8	3.5	4.0	4.0	3.6	3.2
	Tile drains:									
17	Completed ... miles	2.5	6.1	17.4	3.5	0.3	1.5		8.2	
18	Additional under construction ... miles			0.5					0.9	0.1
19	Maximum completed in any enterprise ... miles	0.7	1.1	1.5	0.7	0.3	0.6		1.4	
20	Maximum size of tile [2] ... inches	18	20	30	24	8	24		18	6
	Accessory levees and dikes:									
21	Completed ... miles								33.0	
22	Additional under construction ... miles									
	Pumping plants:									
23	Engine capacity ... horsepower								1,060	
24	Pump capacity ... gallons per minute								60,000	
25	Area served by pumps ... acres								10,000	
26	Area drained by open ditches only [3] ... acres	83,946	109,212	147,416	81,923	48,659	250,404	8,360	443,440	193,885
27	Length of these ditches ... miles	142.4	146.2	227.3	76.3	78.7	383.0	17.6	890.8	413.0
28	Average length per acre ... feet	9.0	7.1	8.1	4.9	8.5	8.1	11.1	10.6	11.2
29	Area having open ditches and levees [3] ... acres								[3] 1,000	
30	Length of these ditches ... miles								89.0	
31	Average length per acre ... feet									
32	Length of accessory levees ... miles								33.0	
33	Area drained by tile only [2] ... acres	80	1,763	13,093	154	170	230		[3] 55	
34	Length of these tile ... miles	0.3	2.9	9.3	1.1	0.3	0.6		8.5	
35	Average length per acre ... feet	19.8	8.7	3.8	37.7	9.3	13.8			
36	Area drained by open ditches and tile [2] ... acres	1,893	5,720	19,032	2,510		2,294		[3] 75	940
37	Length of these drains ... miles	7.3	14.8	34.8	5.6		6.9		2.1	0.5
38	Average length per acre ... feet	20.4	13.7	9.7	11.8		15.9			2.8
	DEVELOPMENT OF LAND.									
39	Improved land in operating enterprises, 1920 ... acres	77,417	81,258	132,131	37,116	33,214	[1] 215,456	820	[1] 300,819	142,705
40	Improved land prior to drainage ... acres	73,284	72,916	376	24,629	27,151	166,487			
41	Increase since drainage ... acres	4,133	8,342	131,755	12,487	6,063	48,969	820	300,819	142,705
42	Per cent of increase [4]	5.6	11.4		50.7	22.3	29.4			
43	Per cent increase is of all improved land in farms, 1920	3.8	5.0	38.7	8.3	4.1	20.6	7.9	94.8	45.8
44	Timber and cut-over land, 1920 ... acres	8,146	35,437	47,410	47,063	15,615	37,472	2,436	143,751	52,120
45	Timber and cut-over land prior to drainage ... acres	12,208	43,779	179,165	59,450	21,678	86,441	2,776	443,570	194,825
46	Decrease since drainage ... acres	4,062	8,342	131,755	12,387	6,063	48,969	340	299,819	142,705
47	Per cent of decrease	33.3	19.1	73.5	20.8	28.0	56.7	12.2	67.6	73.2
48	Other unimproved land, 1920 ... acres	356			408			5,104		
49	Other unimproved land prior to drainage ... acres	427			508			5,584	1,000	
50	Decrease since drainage ... acres	71			100			480	1,000	
51	Per cent of decrease	16.6			19.7			8.6		
52	Swampy or subject to overflow, 1920 ... acres	4,371	45,072	19,137	9,067	16,912	13,796	3,504	48,229	11,809
53	Swampy or subject to overflow prior to drainage ... acres	22,263	75,246	56,664	26,164	25,356	148,585	8,784	242,367	102,040
54	Decrease since drainage ... acres	17,892	30,174	37,527	17,097	8,444	134,789	5,280	194,138	90,231
55	Per cent of decrease	80.4	40.1	66.2	65.3	33.3	90.7	60.1	80.1	88.4
	CAPITAL INVESTED AND COST PER ACRE.									
56	Total capital invested in and required for completion of operating enterprises ... dollars	92,498	155,830	382,647	93,641	84,744	285,763	14,925	1,547,635	408,033
57	Capital invested in these enterprises to Dec. 31, 1919 ... dollars	90,748	155,830	371,331	93,641	84,744	285,666	11,425	1,525,615	395,198
58	Additional capital required to complete these enterprises ... dollars	1,750		11,316			97	3,500	22,020	12,835
59	Average cost per acre when completed ... dollars	1.08	1.34	2.13	1.11	1.74	1.13	1.79	3.48	2.09
60	Enterprises constructing open ditches only ... dollars	87,185	140,046	269,032	85,022	84,485	281,641	14,925	1,353,465	406,733
61	Average cost per acre when completed ... dollars	1.04	1.28	1.82	1.04	1.74	1.12	1.79	3.05	2.10
62	Enterprises constructing open ditches and levees ... dollars								168,300	
63	Average cost per acre when completed ... dollars									
64	Enterprises constructing tile drains only ... dollars	227	4,568	37,403	349	259	290		23,189	
65	Average cost per acre when completed ... dollars	2.84	2.59	2.86	2.27	1.52	1.26			
66	Enterprises constructing open ditches and tile drains ... dollars	5,086	11,216	76,212	8,270		3,832		2,681	1,300
67	Average cost per acre when completed ... dollars	2.69	1.96	4.00	3.29		1.67			1.38
	CROPS.									
	Improved land in enterprises reporting—									
68	Wheat as principal crop on drained land ... acres			65,095			29,696		73,713	
69	Corn as principal crop on drained land ... acres	955	39,360		2,427		89,592		3,160	139,855
70	Sugar beets as principal crop on drained land ... acres					25,094			62,743	385
71	Peas and beans (dried) as principal crops on drained land ... acres		2,695			8,120			75,588	
72	Hay as principal crop on drained land ... acres	76,462	38,940		34,934			820	55,012	
73	Vegetables as principal crop on drained land ... acres			49,305			85,095		29,541	2,465
74	Potatoes as principal crop on drained land ... acres			6,018					422	
75	Oats as principal crop on drained land ... acres				18					
76	Rye as principal crop on drained land ... acres						7,122			
77	Other crops as principal ones on drained land ... acres			11,713			3,951		640	
78	Not reporting principal crop on drained land ... acres									

[1] Office estimate; the reported figures exceed the improved acreage in all farms in the county as determined by the census of agriculture.
[2] When works under construction have been completed.
[3] Additional area reported under "open ditches only."
[4] Per cent not shown when more than 1,000.

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

		St. Joseph.	Sanilac.	Shiawassee.	Tuscola.	Van Buren.	Washtenaw.	Wayne.	Wexford.	Other counties.[1]
	LAND AREA.									
1	Approximate land area of the county ... acres	321,920	624,640	356,480	529,280	394,880	450,560	396,800	369,280	2,907,520
2	All land in operating drainage enterprises ... acres	31,151	540,607	281,166	487,423	173,508	191,596	259,667	10,254	10,967
3	Improved land ... acres	21,426	[2] 436,414	199,941	331,924	137,308	164,291	162,850	7,787	7,231
4	Per cent of all improved land in farms	9.1	96.1	77.3	98.9	51.6	51.5	76.3	8.8	1.6
5	Timber and cut-over land ... acres	7,730	103,128	80,925	143,874	4,561	26,615	47,167	734	1,932
6	Other unimproved land ... acres	1,995	1,065	300	11,625	31,639	690	49,650	1,733	1,804
7	Swampy or subject to overflow, in enterprises ... acres	3,452	27,752	29,752	18,981	390	16,385	72,546	261	1,991
8	Suffering a loss of crops from defective drainage ... acres	3,440	27,595	21,176	48,996		45,731	46,243		367
9	Assessed acreage	39,977	843,961	584,026	837,194	182,686	268,899	388,322	14,489	11,467
10	Excess over all land in operating enterprises ... acres	8,826	303,354	302,860	349,771	9,178	77,303	128,655	4,235	500
	DRAINAGE WORKS.									
	Open ditches:									
11	Completed ... miles	104.8	1,156.9	501.4	736.0	266.7	267.3	644.8	33.3	39.7
12	Additional under construction ... miles		2.1		42.2		3.9	10.4		
13	Maximum completed in any enterprise ... miles	9.8	25.6	14.9	23.2	25.2	10.0	20.5	9.7	13.1
14	Maximum width at bottom of ditch[3] ... feet	16	25	40	70	30	30	30	12	14
15	Maximum of average depths of outlet ditches[3] ... feet	9.5	8.0	10.0	13.0	10.0	8.0	8.0	3.0	7.0
16	Mean depth of branch ditches[3] ... feet	5.2	3.9	3.3	5.1	3.9	4.1		3.0	6.1
	Tile drains:									
17	Completed ... miles	6.5	0.5	64.1	2.0	10.8	28.8	8.8	0.1	0.5
18	Additional under construction ... miles	0.4								
19	Maximum completed in any enterprise ... miles	1.1	0.5	3.5	0.9	1.1	2.7	2.8	0.1	0.3
20	Maximum size of tile[3] ... inches	24	12	24	18	24	27	30		10
	Accessory levees and dikes:									
21	Completed ... miles									
22	Additional under construction ... miles									
	Pumping plants:									
23	Engine capacity ... horsepower							5		
24	Pump capacity ... gallons per minute							2,000		
25	Area served by pumps ... acres							100		
26	Area drained by open ditches only[3] ... acres	24,831	540,502	249,737	485,853	159,872	168,420	246,347	10,154	10,842
27	Length of these ditches ... miles	83.9	1,159.0	441.7	778.2	250.0	253.7	632.5	32.8	39.5
28	Average length per acre ... feet	17.8	11.3	9.3	8.5	8.3	8.0	13.6	17.1	19.2
29	Area having open ditches and levees[3] ... acres									
30	Length of these ditches ... miles									
31	Average length per acre ... feet									
32	Length of accessory levees ... miles									
33	Area drained by tile only[3] ... acres	161	105	6,036	1,570	1,969	4,813	1,136		100
34	Length of these tile ... miles	1.2	0.5	31.0	2.0	4.3	16.8	4.0		0.3
35	Average length per acre ... feet	39.4	25.1	27.1	6.7	11.5	18.4	18.6		15.8
36	Area drained by open ditches and tile[3] ... acres	6,159		25,393		11,667	18,363	12,184	100	25
37	Length of these drains ... miles	26.6		92.8		23.2	29.5	27.5	0.6	0.4
38	Average length per acre ... feet	22.8		19.3		10.5	8.5	11.9	31.7	84.5
	DEVELOPMENT OF LAND.									
39	Improved land in operating enterprises, 1920 ... acres	21,426	[2] 436,414	199,941	331,924	137,308	164,291	162,850	7,787	7,231
40	Improved land prior to drainage ... acres	3,534		1,759		62,700	552	2,975	1,339	1,502
41	Increase since drainage ... acres	17,892	436,414	198,182	331,924	74,608	163,739	159,875	6,448	5,729
42	Per cent of increase[4]	506.3				119.0			481.6	381.4
43	Per cent increase is of all improved land in farms, 1920	7.6	96.1	76.6	98.9	28.0	51.4	74.9	7.3	1.2
44	Timber and cut-over land, 1920 ... acres	7,730	103,128	80,925	143,874	4,561	26,615	47,167	734	1,932
45	Timber and cut-over land prior to drainage ... acres	25,408	539,340	278,672	475,798	50,098	189,346	135,835	734	5,566
46	Decrease since drainage ... acres	17,678	436,212	197,747	331,924	45,537	162,731	88,668		3,634
47	Per cent of decrease	69.6	80.9	71.0	69.8	90.9	85.9	65.3		65.3
48	Other unimproved land, 1920 ... acres	1,995	1,065	300	11,625	31,639	690	49,650	1,733	1,804
49	Other unimproved land prior to drainage ... acres	2,209	1,267	735	11,625	60,710	1,698	120,857	8,181	3,899
50	Decrease since drainage ... acres	214	202	435		29,071	1,008	71,207	6,448	2,095
51	Per cent of decrease	9.7	15.9	59.2		47.9	59.4	58.9	78.8	53.7
52	Swampy or subject to overflow, 1920 ... acres	3,452	27,752	29,752	18,981	390	16,385	72,546	261	1,991
53	Swampy or subject to overflow prior to drainage ... acres	21,629	400,351	88,739	302,199	28,332	34,068	199,269	8,286	7,775
54	Decrease since drainage ... acres	18,177	372,599	58,987	283,218	27,942	17,683	126,723	8,025	5,784
55	Per cent of decrease	84.0	93.1	66.5	93.7	98.6	51.9	63.6	96.9	74.4
	CAPITAL INVESTED AND COST PER ACRE.									
56	Total capital invested in and required for completion of operating enterprises ... dollars	149,348	1,374,641	917,107	1,428,963	380,957	394,502	411,151	18,295	45,956
57	Capital invested in these enterprises to Dec. 31, 1919 ... dollars	149,348	1,372,961	917,107	1,301,398	380,957	383,280	408,146	18,295	45,956
58	Additional capital required to complete these enterprises ... dollars		1,680		127,565		11,222	3,005		
59	Average cost per acre when completed ... dollars	4.79	2.54	3.26	2.93	2.20	2.06	1.58	1.78	4.19
60	Enterprises constructing open ditches only ... dollars	128,756	1,373,241	708,764	1,425,277	351,910	307,444	378,957	17,862	45,037
61	Average cost per acre when completed ... dollars	5.19	2.54	2.84	2.93	2.20	1.83	1.54	1.76	4.15
62	Enterprises constructing open ditches and levees ... dollars									
63	Average cost per acre when completed ... dollars									
64	Enterprises constructing tile drains only ... dollars	1,273	1,400	57,219	3,686	9,291	33,496	11,229		859
65	Average cost per acre when completed ... dollars	7.91	13.33	9.48	2.35	4.72	6.96	9.88		8.59
66	Enterprises constructing open ditches and tile drains ... dollars	19,319		151,124		19,756	53,562	20,965	433	60
67	Average cost per acre when completed ... dollars	3.14		5.95		1.69	2.92	1.72	4.33	2.40
	CROPS.									
	Improved land in enterprises reporting—									
68	Wheat as principal crop on drained land ... acres	6,167	436,142	794	149,241		164,003	108,480		
69	Corn as principal crop on drained land ... acres	7,069		80,258						
70	Sugar beets as principal crop on drained land ... acres		272	118,889	118,172		288			
71	Peas and beans (dried) as principal crops on drained land ... acres									
72	Hay as principal crop on drained land ... acres								7,600	4,831
73	Vegetables as principal crop on drained land ... acres					5,460		51,210		
74	Potatoes as principal crop on drained land ... acres	3,329			42,674					
75	Oats as principal crop on drained land ... acres	4,341						1,374		
76	Rye as principal crop on drained land ... acres	394								
77	Other crops as principal ones on drained land ... acres	126			21,837	131,848		68		
78	Not reporting principal crop on drained land ... acres							1,718	187	2,400

[1] Includes only Alcona, Alpena, Benzie, Charlevoix, Emmet, Grand Traverse, Luce, and Presque Isle Counties.
[2] Office estimate; the reported figures exceed the improved acreage in all farms in the county as determined by the census of agriculture.
[3] When works under construction have been completed.
[4] Per cent not shown when more than 1,000.

MINNESOTA.

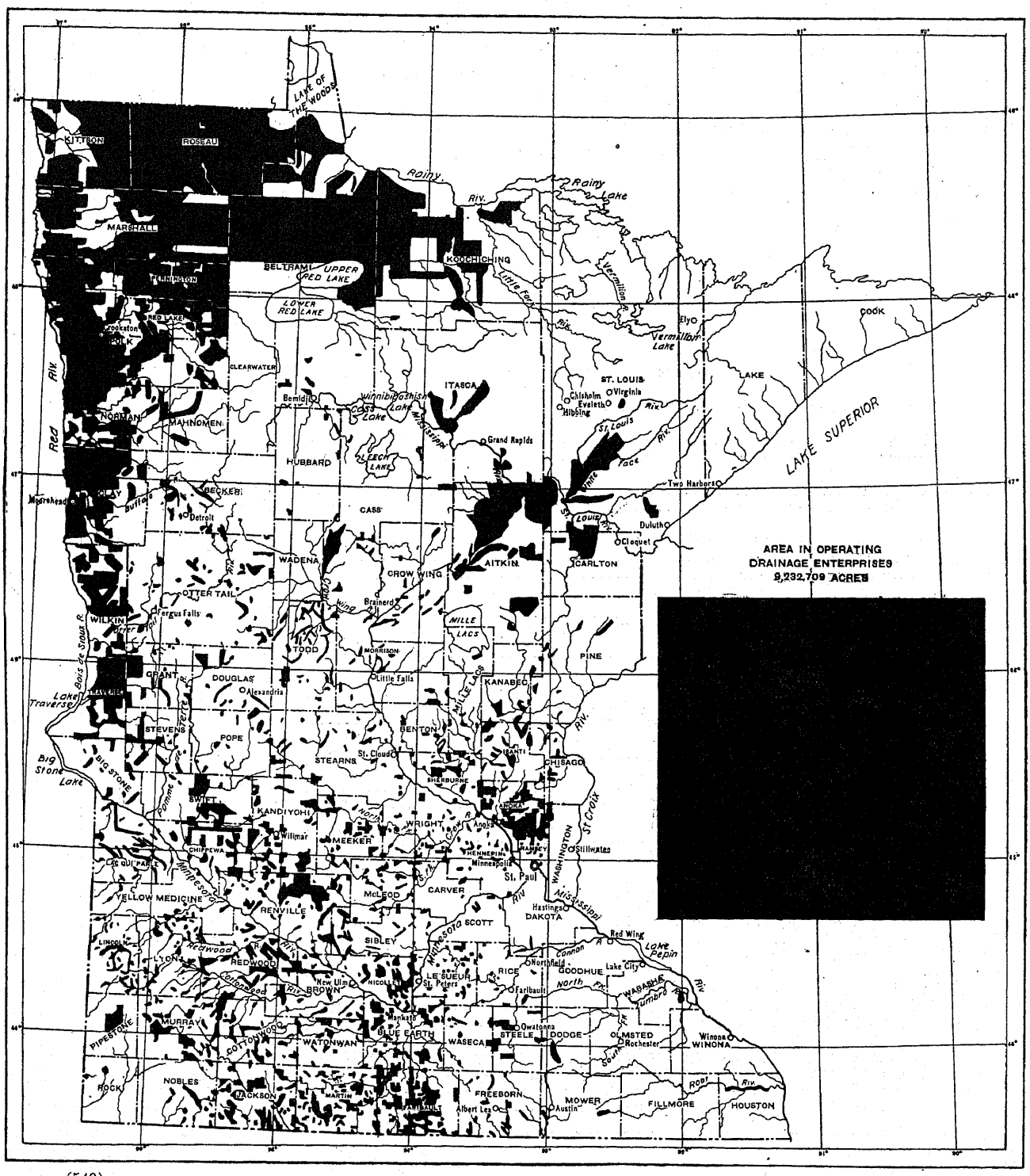
The following pages present the statistics of drainage for Minnesota collected at the census of 1920. The figures relate to conditions on January 1, 1920, except where indicated otherwise. No census of drainage has been taken heretofore, so there are no comparable figures for previous years. The data 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 timber 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.
DRAINAGE ON FARMS.		
Number of all farms in the state	178,478	100.0
Farms reporting land having drainage	53,011	29.7
Farms reporting land needing drainage	73,905	41.4
All land in farms ... acres	30,221,758	100.0
Improved land in farms ... acres	21,481,710	71.1
Farm land reported as provided with drainage ... acres	2,993,034	9.9
Farm land reported as needing drainage ... acres	3,504,574	11.6
Needing drainage only ... acres	1,801,457	6.0
Needing drainage and clearing ... acres	1,703,117	5.6
DRAINAGE ENTERPRISES.		
Approximate land area of the state ... acres	51,749,120	100.0
All land in operating drainage enterprises ... acres	9,232,709	17.8
Improved land ... acres	3,818,490	7.4
Per cent of all improved land in farms	17.8	.....
Timber and cut-over land ... acres	1,370,023	2.6
Other unimproved land ... acres	4,044,196	7.8
Swampy, subject to overflow, seeped, or alkali ... acres	1,193,136	2.3
Suffering a loss of crops from defective drainage ... acres	471,094	0.9
Improved land prior to drainage ... acres	1,722,875	3.3
Increase since drainage began ... acres	2,095,615	4.0
Land in nonoperating enterprises ... acres	130,235	0.3
Open ditches in operating enterprises ... miles	14,823.1	100.0
Completed ... miles	14,657.0	98.9
Additional under construction ... miles	166.1	1.1
Tile drains in operating enterprises ... miles	6,387.3	100.0
Completed ... miles	5,924.6	92.8
Additional under construction ... miles	462.7	7.2
Total capital invested in and required for completion of operating enterprises	$44,183,838	100.0
Capital invested in these enterprises to Dec. 31, 1919	42,017,447	95.1
Additional capital required to complete these enterprises	2,166,391	4.9
Average cost per acre when completed	4.79	.....

MINNESOTA

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 or improvement 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 enterprises 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 others for which the orders 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.[1]		
	Acreage.	Per cent of total.	To Dec. 31, 1919. Amount.	To Dec. 31, 1919. Per cent of total.	Additional required to complete.
All organized enterprises	9,362,944	100.0	$42,089,304	100.0	$5,095,002
Operating enterprises	9,232,709	98.6	42,017,447	99.8	2,166,391
With works completed	8,552,900	91.3	36,764,850	87.3	.....
With works under construction	679,809	7.3	5,252,597	12.5	2,166,391
Nonoperating enterprises	130,235	1.4	71,857	0.2	2,928,611

[1] 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 drainage enterprises in Minnesota are spread rather generally over the state. The largest enterprises are located in the northwestern part; those in the central and southern sections are greater in number and of smaller average size. There is less land in drainage enterprises in the north central part than in the other sections mentioned, and there is very little in the northeastern part and in the southeastern corner, as shown by the map on page 2.

Nearly three-fourths of the area in the enterprises is drained through Red River and Lake of the Woods, and finally into Hudson Bay, as is shown by Table 3; almost one-fourth is drained through the Mississippi and its tributaries to the Gulf of Mexico; less than 4 per cent is drained, by way of Lake Superior, to St. Lawrence River. For enterprises in the Mississippi drainage basin, however, the capital invested is nearly two-thirds of the total.

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. Amount.	To Dec. 31, 1919. Per cent of total.	Additional required to complete.
All organized enterprises	9,362,944	100.0	$42,089,304	100.0	$5,095,002
Operating enterprises	9,232,709	98.6	42,017,447	99.8	2,166,391
Big Sioux River	22,937	0.2	455,460	1.1	73,338
Missouri River	24,946	0.3	655,542	1.6	.....
Des Moines River	121,097	1.3	3,105,037	7.4	294,219
Cedar River	15,905	0.2	223,549	0.5	52,500
St. Croix River	140,154	1.5	665,007	1.6	.....
Minnesota River	815,340	8.7	16,042,816	38.1	1,188,591
Mississippi River	1,020,106	10.9	5,580,657	13.3	125,643
Red River	5,387,452	57.5	11,110,573	26.4	239,900
Lake of the Woods	1,368,366	14.6	2,927,292	7.0	187,200
Lake Superior	316,406	3.4	1,251,514	3.0	5,000
Nonoperating enterprises	130,235	1.4	71,857	0.2	2,928,611
Big Sioux River	999	(1)	.....	.....	46,475
Cedar River	1,609	(1)	2,316	(1)	85,000
Minnesota River	80,211	0.9	62,637	0.1	2,395,968
Mississippi River	3,791	(1)	4,420	(1)	163,702
Red River	15,312	0.2	2,484	(1)	79,700
Lake Superior	28,313	0.3	.....	.....	157,766

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

Condition of land in enterprises.—Approximately 83 per cent of the drainage enterprises in the state, embracing about 76 per cent of the area of all those enterprises, were reported as organized for the purpose of reclaiming or improving land swampy or generally too wet for profitable cultivation, while practically all the other enterprises were reported as established to prevent overflow of the land by stream floods.

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

CONDITION OF LAND.	OPERATING ENTERPRISES.				Nonoperating enterprises (acres).
	Total. Acreage.	Total. Per cent of all land.	Works completed (acres).	Works under construction (acres).	
All land in enterprises	9,232,709	100.0	8,552,900	679,809	130,235
Improved land	3,818,490	41.4	3,701,524	116,966	34,494
Timber and cut-over land	1,370,023	14.8	1,103,858	266,165	7,158
Other unimproved land	4,044,196	43.8	3,747,518	296,678	88,583
Swampy or subject to overflow	1,193,136	12.9	1,022,667	170,471	78,922
Suffering a loss of crops	471,094	5.1	464,469	6,625	981

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.

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 2,340 operating drainage enterprises are counted in Minnesota, with an average area of 4,263 acres assessed. There are 858 enterprises of less than 500 acres each, and 24 of 50,000 acres or larger.

The assessed acreage exceeds the land in enterprises by 741,953 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 acreage, deduction was made for the amount of overlapping with enterprises organized previously, to determine the acreage to be tabulated as land in enterprises.

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	9,232,709	9,974,662	100.0
Less than 200 acres	35,877	36,177	0.4
200 to 499 acres	188,974	191,751	1.9
500 to 999 acres	303,215	307,812	3.1
1,000 to 4,999 acres	1,335,447	1,385,737	13.9
5,000 to 9,999 acres	1,155,678	1,250,804	12.5
10,000 to 49,999 acres	4,150,542	4,630,974	46.4
50,000 to 99,999 acres	848,414	944,845	9.5
100,000 to 499,999 acres	1,214,562	1,226,562	12.3

Character of enterprises.—Most of the drainage enterprises in Minnesota are county ditches established by orders of the boards of county commissioners, or judicial ditches established by orders of the district courts of the state. The term ditch is defined to include drains of tile and other drainage works. There are also some ditches constructed by or under the control of the state.

County ditches and judicial ditches are generally similar in method of establishment; if proceedings are before the county board the enterprise is a county ditch, and if before the district court the enterprise is a judicial ditch. The county board now has jurisdiction only when the ditch is to benefit land wholly within the county. The district court has concurrent jurisdiction for ditches in one county, and exclusive jurisdiction for ditches in two or more counties within the district. For a ditch in more than one judicial district, proceedings may be in either district.

The law governing county and judicial ditches is the act of April 18, 1905 (ch. 230), as found in chapter 44 of the General Statutes of Minnesota, 1913, and amended to date. A petition for establishment must be filed with the county auditor if for a county ditch, or with the clerk of the district court if for a judicial ditch. It must be signed by eight owners of land to be benefited by the ditch, or by 25 per cent of all the owners of that land, or by the supervisor of any township or the officers of any city or village, or by the authorized agent of any public institution, corporation, or railroad whose land will be benefited, or by the state board of control. Plans and estimates for drainage are made by an engineer appointed by the county board or by the judge of the court, and damages and benefits are assessed by three viewers appointed by the same authority. The order of establishment is issued by the board or the judge after a public hearing upon the petition, the plans, and the assessments, if the enterprise will be of public utility and if the benefits will exceed the cost. Appeals may be taken regarding damages and benefits, to the district court regarding county ditches and to jury trial regarding judicial ditches. The division of the cost among the counties, for a judicial ditch, is made by the judge of the court. Contracts for construction are let by the county auditor, or the county auditors in the case of a judicial ditch, with the chairman of the county board and the clerk of court of the county in which the proceedings are pending. The cost is apportioned in each county by the county auditor according to the benefits confirmed. Bonds for drainage may be issued by the county board, to run not more than 20 years.

The establishment and control of ditches for land drainage by the county commissioners first was authorized in 1883 (ch. 108). A petition for establishment was required from one or more owners of land to be benefited; damages and benefits were assessed by viewers appointed by the commissioners; ditches in two or more counties were established by joint action of the commissioners of those counties. A similar statute of 1887 (ch. 97) contained the additional provision that county bonds might be issued for drainage. A preliminary investigation by an engineer was required before the viewers were appointed, by the drainage law of 1901 (ch. 258), which repealed the earlier laws. Establishment of judicial ditches by the district courts, in case the ditches were to be located in more than one county, was provided by the act of 1905 (ch. 230), which superseded the law of 1901. Judicial ditches wholly within one county were

authorized in 1907 (ch. 448), and this provision continues in the act of 1909 (ch. 469) which repealed that of 1907 and amended that of 1905. Originally, the law of 1905 required 6 signers to the petition. The acts of 1907 and 1909 required only one, but that of 1917 (ch. 441) has increased the number to eight or one-fourth of all affected, except that only two are needed if all the drains will be of tile and will connect with a public ditch.

State ditches now are established in accordance with an act of April 25, 1919 (ch. 471), in much the same manner as judicial ditches. This statute creates a Department of Drainage and Waters, and abolishes the state Drainage Commission created by act of April 26, 1907 (ch. 470), consisting of the governor, the state auditor, and the secretary of state. The method of procedure is very similar to that prescribed by the earlier law. A petition for establishment, accompanied by plans and estimates for the work, is submitted by the commissioner of drainage and waters to the district court of the county in which all or a part of the ditch will be located. Assessments of damages and benefits are made by viewers, two appointed by the court and one by the commissioner. After public hearing, the court may establish the ditch. Construction and maintenance of the works are under control of the Department, the cost being borne by state, private, and other land in proportion to the benefits.

State ditches to be made at state expense were authorized in 1893, when $100,000 was appropriated for improving watercourses in certain counties in the Red River Valley. The amount was increased by $50,000 two years later. A board of state drainage commissioners to be appointed by the governor was authorized in 1897, to have control of all state drainage ditches, and to report their condition to the county commissioners who were charged with the maintenance of those ditches within their respective counties. A state Drainage Commission was created in 1901 (ch. 90) with authority to construct ditches.

Town ditches may be established by the town boards of supervisors, under authority of an act of March 29, 1909 (ch. 127), as amended. A petition must be signed by one or more persons or corporations owning land that probably will be benefited. The supervisors view the land and assess damages and benefits, or they appoint an engineer and viewers. Contracts for construction are let by the town board. The costs are advanced by the petitioners, who are reimbursed from tax levies made by the town board according to the benefits.

Drainage and flood control districts may be established under an act of April 23, 1917 (ch. 442), and drainage and conservancy districts under an act of September 22, 1919 (ch. 13, extra session), but no such districts were reported. Each act provides for establishment of the enterprises as corporate bodies by the district courts, upon petition, and vests the executive authority in a board of three or five directors appointed by the court.

The first drainage law of Minnesota was enacted August 3, 1858 (ch. 73), providing that persons might associate together for draining land and enjoy corporate rights. An act of March 1, 1866 (ch. 27), provided for securing drainage across the land of an objecting owner, by application to a justice of the peace and determination by jury of the necessity for the drain and of benefits and damages to accrue. The establishment of public drains by the town supervisors was authorized by acts of 1887 (ch. 99) and 1889 (ch. 168). A great many other laws have been enacted relating to drainage, but those noted show the character of the enterprises reported.

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

CHARACTER OF ENTERPRISE.	LAND.		CAPITAL.		
			To Dec. 31, 1919.		Additional required to complete.
	Acreage.	Per cent of total.	Amount.	Per cent of total.	
All organized enterprises	9,362,944	100.0	$42,089,304	100.0	$5,095,002
Operating enterprises	9,232,709	98.6	42,017,447	99.8	2,166,391
County ditches	4,384,341	46.8	22,213,139	52.8	766,565
Laws of 1883, ch. 108	5,965	0.1	28,183	0.1	.....
Laws of 1887, ch. 97	466,900	5.0	744,952	1.8	.....
Laws of 1901, ch. 258	679,307	7.3	1,862,226	4.4	.....
Laws of 1905, ch. 230 [1]	3,223,092	34.4	19,291,661	45.8	766,565
Laws of 1907, ch. 448	4,532	(2)	154,895	0.4	.....
Laws of 1917, ch. 441	4,545	(2)	131,222	0.3	.....
Judicial ditches	4,030,424	43.0	18,701,396	44.4	1,399,826
Laws of 1883, ch. 108	118,249	1.2	165,385	0.4	.....
Laws of 1887, ch. 97	14,916	0.2	24,794	0.1	.....
Laws of 1901, ch. 258	148,625	1.6	552,795	1.3	35,329
Laws of 1905, ch. 230	3,662,517	39.1	17,460,556	41.5	1,364,497
Laws of 1907, ch. 448	91,117	1.0	497,866	1.2	.....
State ditches	817,944	8.7	1,102,912	2.6	.....
Laws of 1893, ch. 221	30,053	0.3	40,982	0.1	.....
Laws of 1901, ch. 90	30,056	0.3	26,287	0.1	.....
Laws of 1907, ch. 470	757,835	8.1	1,035,643	2.5	.....
Nonoperating enterprises	130,235	1.4	71,857	0.2	2,928,611
County ditches	72,566	0.8	53,829	0.1	1,871,564
Laws of 1905, ch. 230 [3]	70,952	0.8	52,472	0.1	1,794,377
Laws of 1917, ch. 441	1,614	(2)	1,357	(2)	77,187
Judicial ditches	57,669	0.6	18,028	(2)	1,057,047
Laws of 1905, ch. 230	57,669	0.6	18,028	(2)	1,057,047

[1] Includes 800 acres under individual ownership.
[2] Less than one-tenth of 1 per cent.
[3] Includes 423 acres organized as a town ditch.

Drainage works.—The total works completed by the drainage enterprises to December 31, 1919, comprised 14,657.0 miles of open ditches, 5,924.6 miles of tile drains, and 0.1 mile of accessory levees; the additional lengths under construction were 166.1 miles of ditches, 462.7 miles of tile drains, and 0.3 mile 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 no pumping district for land drainage among the enterprises in Minnesota.

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. Amount.	To Dec. 31, 1919. Per cent of total.	Additional required to complete.
All kinds	9,232,709	100.0	$42,017,447	100.0	$2,166,391
Open ditches only	8,440,167	91.4	22,753,563	54.2	485,426
Tile drains only	271,118	2.9	7,193,827	17.1	197,721
Open ditches and tile drains[1]	521,424	5.6	12,070,057	28.7	1,483,244

[1] Includes 4,642 acres constructing also 0.4 mile of levee.

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 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, 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 as it seemed they did not represent so well the average depths of outlet provided for all the farms in those districts; to include these groups, computed as 3 feet and 10 feet, respectively, would show the mean depth for the state 4.8 instead of 4.9 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	9,232,709	100.0
Less than 3 feet	373,377	4.0
3.0 to 3.9 feet	941,199	10.2
4.0 to 4.9 feet	1,234,445	13.4
5.0 to 5.9 feet	2,086,744	22.6
6.0 to 6.9 feet	1,427,882	15.5
7.0 to 7.9 feet	327,146	3.5
8.0 to 8.9 feet	57,034	0.6
9.0 to 9.9 feet	3,296	(1)
10 feet and more	77,929	0.8
Not reporting branches	2,703,657	29.3

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

Maintenance of works.—The county board of each county is required to keep in proper repair and free from obstruction, after original construction has been completed, all public drainage ditches or parts of such ditches located within the county, according to an act of April 24, 1915 (ch. 300). The cost is to be paid from the funds to the credit of the ditch so repaired, or, in case those funds are not sufficient, by assessments against the land assessed for original construction of the ditch and in proportion to the original assessment of benefits. The cost of maintenance for any state ditch is to be apportioned according to benefits specially assessed by viewers appointed by the county board, against the land benefited by the construction of the ditch and of any lateral or spur ditch. If the cost of the repairs for any ditch exceeds 25 per cent of the cost of original construction, bonds may be issued. It was provided in 1917 (ch. 441) that in all counties where county and judicial ditches have been constructed costing in the aggregate $50,000 or more, the county board shall appoint a county ditch inspector who shall examine all those ditches at least twice each season and report to the board what repairs or improvements are needed.

The maintenance of county and judicial ditches by the county boards was required by the original act of 1905 (ch. 230). An act of 1909 (ch. 207) provided that the Department of Drainage and Waters might repair or improve state ditches, and might require that any part of the cost be paid by the county, town, or individuals to be benefited by the 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. Amount.	To Dec. 31, 1919. Per cent of total.	Additional required to complete.
All operating enterprises	9,232,709	100.0	$42,017,447	100.0	$2,166,391
By district forces	308,107	3.3	4,154,450	9.9	229,500
By contract	678,139	7.3	8,585,995	20.4	496,006
By method not specified	4,746	0.1	60,712	0.1	.....
No maintenance provided	8,003,874	86.7	28,471,873	67.8	1,430,885
Not reported	237,843	2.6	744,417	1.8	10,000

Date of organization.—The progress of development in drainage is shown only roughly by the dates of the organization of the enterprises, which are the dates when the ditches were established by the county boards or district courts, since there may be a period of a year or more between the order of establishment and the beginning of actual construction, and since the work of construction may occupy several years in a large enterprise. 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	9,232,709	100.0	9,974,662	100.0
1880 to 1889	11,626	0.1	11,626	0.1
1890 to 1899	319,941	3.5	323,131	3.2
1900 to 1904	883,427	9.6	971,117	9.7
1905 to 1909	2,370,214	25.7	2,551,295	25.6
1910 to 1914	3,867,415	41.9	4,012,870	40.2
1915 to 1919	1,765,875	19.1	2,090,412	21.0
Not reported	14,211	0.2	14,211	0.1

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	$42,017,447	100.0	$2,166,391
1880 to 1889	88,643	0.2	
1890 to 1899	481,097	1.1	
1900 to 1904	1,673,222	4.0	
1905 to 1909	7,525,768	17.9	17,408
1910 to 1914	13,421,995	31.9	198,200
1915 to 1919	18,747,547	44.6	1,948,218
Not reported	79,175	0.2	2,565

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	14,823.1	100.0	6,387.3	100.0	0.4	100.0
1880 to 1889	48.9	0.3				
1890 to 1899	483.1	3.3	15.7	0.2		
1900 to 1904	1,459.1	9.8	16.0	0.3		
1905 to 1909	4,382.8	29.6	606.4	9.5		
1910 to 1914	4,625.5	31.2	1,760.9	27.6		
1915 to 1919	3,799.1	25.6	3,976.5	62.3	0.4	100.0
Not reported	24.6	0.2	11.8	0.2		

Crops.—The principal crops grown upon the drained land in the drainage enterprises are wheat, 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.

COUNTY TABLE I.—DRAINAGE ON FARMS: 1920.

		THE STATE.	Aitkin.	Anoka.	Becker.	Beltrami.	Benton.	Big Stone.	Blue Earth.	Brown.
1	Number of all farms in the state or county	178,478	1,945	1,589	2,631	3,065	1,561	1,026	2,954	1,976
2	Farms reporting land having drainage	53,011	287	513	589	721	451	191	1,836	884
3	Farms reporting land needing drainage	73,905	1,054	576	1,551	1,470	682	316	1,984	1,083
4	Farms in drainage and levee districts	16,421	168	265	103	708	37	35	441	368
	LAND AND FARM AREA.									
5	Approximate land area of the state or county ... acres	51,749,120	1,171,200	293,760	863,360	2,446,080	259,200	314,240	487,680	391,680
6	All land in farms ... acres	30,221,758	231,221	213,990	454,338	459,487	219,888	287,527	440,386	369,113
7	Improved land in farms ... acres	21,481,710	61,864	121,603	250,946	89,821	126,949	251,992	355,374	290,808
8	Woodland in farms ... acres	4,482,656	95,445	59,698	140,413	228,348	51,984	5,086	33,001	19,100
9	Other unimproved land in farms ... acres	4,257,392	73,912	32,689	62,979	141,318	40,955	30,449	52,011	59,205
10	Farm land reported as provided with drainage ... acres	2,993,034	13,341	22,124	14,100	58,377	17,529	11,723	99,629	38,078
11	Farm land reported as needing drainage ... acres	3,504,574	77,588	26,332	84,349	156,097	36,701	13,576	69,818	39,385
12	Drainage only ... acres	1,801,457	14,241	7,241	19,161	17,627	4,072	12,838	59,204	37,308
13	Drainage and clearing ... acres	1,703,117	63,347	19,091	65,188	138,470	32,629	738	10,614	2,077

		Carlton.	Carver.	Cass.	Chippewa.	Chisago.	Clay.	Clearwater.	Cottonwood.	Crow Wing.
1	Number of all farms in the county	1,917	2,009	1,579	1,624	2,236	1,948	1,253	1,801	1,281
2	Farms reporting land having drainage	95	1,283	182	646	692	345	84	1,134	130
3	Farms reporting land needing drainage	702	999	603	658	888	560	256	862	776
4	Farms in drainage and levee districts	47	157	73	283	176	125	111	224	79
	LAND AND FARM AREA.									
5	Approximate land area of the county ... acres	554,880	240,640	1,346,560	378,240	273,280	667,520	652,160	409,600	676,480
6	All land in farms ... acres	185,199	218,382	240,733	355,036	243,819	580,717	203,168	380,043	190,100
7	Improved land in farms ... acres	54,854	138,654	74,537	317,263	125,788	505,336	65,648	344,590	68,435
8	Woodland in farms ... acres	70,501	41,430	101,143	7,329	83,185	24,366	97,991	6,613	77,312
9	Other unimproved land in farms ... acres	59,844	38,298	65,053	30,444	34,846	51,015	39,529	28,840	44,353
10	Farm land reported as provided with drainage ... acres	2,400	28,651	8,091	32,275	15,432	35,220	2,397	84,453	4,622
11	Farm land reported as needing drainage ... acres	35,673	28,825	50,826	32,120	30,205	21,934	16,418	41,837	59,940
12	Drainage only ... acres	1,763	12,895	4,886	31,312	7,238	11,862	8,617	40,961	2,785
13	Drainage and clearing ... acres	33,910	15,930	45,940	808	22,967	10,072	7,801	876	57,155

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

		Dakota.	Dodge.	Douglas.	Faribault.	Fillmore.	Freeborn.	Goodhue.	Grant.	Hennepin.	Hubbard.
1	Number of all farms in the county	2,373	1,636	2,505	2,358	3,177	2,574	3,128	1,317	3,954	1,252
2	Farms reporting land having drainage	153	203	1,020	1,867	58	1,626	70	503	1,035	61
3	Farms reporting land needing drainage	412	403	1,458	1,458	160	2,059	515	659	1,522	414
4	Farms in drainage and levee districts	27	39	222	852	1	292	11	65	158	23
	LAND AND FARM AREA.										
5	Approximate land area of the county ... acres	383,360	281,600	414,720	460,160	555,520	470,400	490,880	353,920	361,600	613,120
6	All land in farms ... acres	324,708	247,027	372,869	430,461	506,850	413,988	457,795	319,290	271,762	191,996
7	Improved land in farms ... acres	258,581	209,445	242,629	361,478	376,279	315,445	347,792	284,049	186,755	80,323
8	Woodland in farms ... acres	36,347	13,464	64,409	18,541	85,324	20,563	49,359	6,542	51,823	79,434
9	Other unimproved land in farms ... acres	29,780	24,118	65,831	50,442	45,247	77,980	60,644	28,699	33,184	32,239
10	Farm land reported as provided with drainage ... acres	3,554	10,999	22,290	176,974	3,676	77,597	1,453	16,897	15,640	2,265
11	Farm land reported as needing drainage ... acres	19,315	13,841	47,839	86,969	4,761	97,435	10,661	16,097	33,003	31,891
12	Drainage only ... acres	11,573	11,238	18,466	81,188	3,465	80,176	4,638	14,567	8,178	1,633
13	Drainage and clearing ... acres	7,742	2,603	29,373	5,781	1,296	17,259	6,023	1,530	24,825	30,258

		Isanti.	Itasca.	Jackson.	Kanabec.	Kandiyohi.	Kittson.	Koochiching.	Lac qui Parle.	Le Sueur.
1	Number of all farms in the county	2,212	1,436	2,218	1,568	2,432	1,409	944	2,008	2,269
2	Farms reporting land having drainage	600	71	1,467	355	902	177	143	783	851
3	Farms reporting land needing drainage	1,003	733	1,234	444	1,609	427	647	930	1,131
4	Farms in drainage and levee districts	242	56	799	132	444	70	104	183	56
	LAND AND FARM AREA.									
5	Approximate land area of the county ... acres	282,880	1,747,200	449,280	341,760	512,640	711,040	2,010,240	505,600	298,240
6	All land in farms ... acres	256,010	168,976	424,792	182,311	464,941	442,939	152,507	464,784	264,814
7	Improved land in farms ... acres	138,810	33,637	372,670	67,535	360,306	342,087	22,450	419,986	178,913
8	Woodland in farms ... acres	70,083	106,916	9,710	80,003	23,707	43,814	93,231	8,794	35,225
9	Other unimproved land in farms ... acres	47,117	28,423	42,412	34,773	80,928	57,038	36,826	36,004	50,676
10	Farm land reported as provided with drainage ... acres	12,032	2,468	110,293	9,252	29,730	55,413	4,850	27,897	22,966
11	Farm land reported as needing drainage ... acres	30,169	62,768	77,482	16,642	67,963	32,400	70,919	27,051	31,637
12	Drainage only ... acres	10,671	4,000	67,152	2,915	55,612	2,497	1,586	26,717	13,184
13	Drainage and clearing ... acres	19,498	58,768	10,330	13,727	12,351	29,903	69,333	334	18,453

		Lincoln.	Lyon.	McLeod.	Mahnomen.	Marshall.	Martin.	Meeker.	Mille Lacs.	Morrison.	Mower.
1	Number of all farms in the county	1,468	1,816	2,447	590	2,697	2,435	2,460	1,898	3,095	2,364
2	Farms reporting land having drainage	567	934	1,538	92	602	2,025	760	357	350	486
3	Farms reporting land needing drainage	633	811	1,500	413	877	1,564	1,029	729	820	657
4	Farms in drainage and levee districts	77	242	137	13	553	933	79	104	102	16
	LAND AND FARM AREA.										
5	Approximate land area of the county ... acres	342,400	453,120	317,440	366,080	1,144,320	460,160	397,440	373,120	731,520	455,040
6	All land in farms ... acres	305,315	409,218	299,131	133,499	734,432	437,329	364,960	178,550	440,013	404,092
7	Improved land in farms ... acres	270,732	358,206	252,606	82,218	523,383	372,380	280,664	79,548	228,139	354,636
8	Woodland in farms ... acres	4,417	8,452	19,085	23,347	81,635	9,389	28,601	70,223	137,388	16,486
9	Other unimproved land in farms ... acres	30,166	42,560	27,440	27,934	129,414	55,560	55,695	28,779	74,486	32,970
10	Farm land reported as provided with drainage ... acres	21,195	64,173	47,434	4,711	109,896	187,232	20,937	10,882	11,409	23,358
11	Farm land reported as needing drainage ... acres	21,425	46,683	40,726	27,554	89,984	82,842	40,398	33,488	41,545	26,695
12	Drainage only ... acres	20,847	45,876	29,356	9,316	28,570	78,109	24,973	3,025	7,794	22,187
13	Drainage and clearing ... acres	578	807	10,870	18,238	61,414	4,733	15,425	30,463	33,751	4,508

		Murray.	Nicollet.	Nobles.	Norman.	Olmsted.	Otter Tail.	Pennington.	Pine.	Pipestone.	Polk.
1	Number of all farms in the county	1,876	1,497	2,018	1,940	2,287	6,627	1,221	3,088	1,187	4,200
2	Farms reporting land having drainage	1,175	718	1,029	591	100	1,928	448	447	164	1,196
3	Farms reporting land needing drainage	1,104	896	831	370	392	3,119	351	1,418	199	1,412
4	Farms in drainage and levee districts	377	124	208	292	12	415	403	80	49	713
	LAND AND FARM AREA.										
5	Approximate land area of the county ... acres	450,560	283,520	462,080	550,400	426,240	1,304,960	388,480	904,320	300,160	1,266,560
6	All land in farms ... acres	415,872	267,521	437,608	489,358	376,221	1,095,739	284,688	333,418	276,371	1,069,155
7	Improved land in farms ... acres	384,616	212,407	402,236	401,179	303,723	683,406	194,473	121,901	248,105	842,208
8	Woodland in farms ... acres	4,000	21,740	7,951	33,340	39,453	276,118	39,158	93,746	1,887	112,040
9	Other unimproved land in farms ... acres	27,256	33,374	27,421	54,839	33,045	136,215	51,057	117,771	26,379	114,907
10	Farm land reported as provided with drainage ... acres	86,583	37,274	70,900	122,092	2,208	44,840	76,909	10,533	7,763	184,731
11	Farm land reported as needing drainage ... acres	45,397	36,694	41,054	16,958	9,940	119,323	40,804	62,068	8,122	85,350
12	Drainage only ... acres	43,482	31,291	37,108	6,412	5,700	35,754	20,629	5,412	7,421	33,284
13	Drainage and clearing ... acres	1,915	5,403	3,946	10,546	4,240	83,569	20,175	56,656	701	52,066

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

		Pope.	Ramsey.	Red Lake.	Redwood.	Renville.	Rice.	Rock.	Roseau.	St. Louis.
1	Number of all farms in the county	1,802	983	907	2,548	3,049	2,416	1,307	1,854	4,271
2	Farms reporting land having drainage	452	36	115	1,390	1,463	467	315	500	623
3	Farms reporting land needing drainage	819	67	277	1,577	1,916	992	454	557	1,900
4	Farms in drainage and levee districts	52	13	102	487	237	94	12	442	190
	LAND AND FARM AREA.									
5	Approximate land area of the county ... acres	443,520	103,040	276,480	563,840	625,920	316,800	314,880	1,068,800	4,161,920
6	All land in farms ... acres	381,128	52,498	224,729	525,074	585,156	297,038	292,804	416,294	402,351
7	Improved land in farms ... acres	288,254	36,195	159,586	449,906	511,771	217,241	267,541	212,214	93,471
8	Woodland in farms ... acres	16,260	9,761	43,101	10,581	23,912	22,041	5,194	90,517	210,620
9	Other unimproved land in farms ... acres	76,614	6,542	22,042	64,587	49,473	57,756	20,069	113,563	98,260
10	Farm land reported as provided with drainage ... acres	10,234	700	19,035	76,069	68,484	10,281	16,151	90,446	17,545
11	Farm land reported as needing drainage ... acres	22,966	3,591	34,036	79,427	72,501	24,554	20,511	61,262	103,559
12	Drainage only ... acres	19,359	1,312	10,626	73,946	71,117	14,277	19,661	12,523	10,218
13	Drainage and clearing ... acres	3,607	2,279	23,410	5,481	1,384	10,277	850	48,739	93,341

		Scott.	Sherburne.	Sibley.	Stearns.	Steele.	Stevens.	Swift.	Todd.	Traverse.
1	Number of all farms in the county	1,628	1,400	2,111	4,598	1,860	1,163	1,781	3,521	1,035
2	Farms reporting land having drainage	459	294	953	953	956	444	518	715	156
3	Farms reporting land needing drainage	710	503	1,208	1,363	1,328	536	832	856	130
4	Farms in drainage and levee districts	55	192	301	191	157	129	333	335	116
	LAND AND FARM AREA.									
5	Approximate land area of the county ... acres	234,240	286,720	374,400	871,680	275,840	360,960	474,240	612,480	363,520
6	All land in farms ... acres	210,218	224,929	355,809	780,899	259,215	316,008	447,789	474,951	321,002
7	Improved land in farms ... acres	120,194	127,894	273,705	499,223	213,245	279,283	391,029	243,393	300,530
8	Woodland in farms ... acres	38,740	56,401	27,870	162,081	12,611	3,419	7,855	135,567	5,120
9	Other unimproved land in farms ... acres	51,284	40,634	54,234	119,595	33,359	33,306	48,905	95,991	15,352
10	Farm land reported as provided with drainage ... acres	8,770	10,705	35,410	31,881	35,471	33,286	33,838	22,421	16,843
11	Farm land reported as needing drainage ... acres	23,108	23,980	49,548	54,917	43,632	24,233	41,039	30,371	7,608
12	Drainage only ... acres	8,321	5,512	42,733	32,292	35,917	19,533	38,014	7,512	7,283
13	Drainage and clearing ... acres	14,787	18,468	6,815	22,625	7,715	4,700	3,025	22,859	325

		Wadena.	Waseca.	Washington.	Watonwan.	Wilkin.	Winona.	Wright.	Yellow Medicine.	All other counties.[1]
1	Number of all farms in the county	1,326	1,609	2,014	1,402	1,163	2,150	3,937	2,109	4,158
2	Farms reporting land having drainage	318	1,006	155	1,001	178	13	1,405	589	21
3	Farms reporting land needing drainage	619	1,179	482	947	64	47	1,622	1,077	480
4	Farms in drainage and levee districts	133	123	34	151	167	2	100	155	13
	LAND AND FARM AREA.									
5	Approximate land area of the county ... acres	344,320	275,840	254,080	277,760	476,800	407,680	442,240	479,360	3,013,120
6	All land in farms ... acres	206,503	248,191	221,953	259,566	402,139	373,215	403,305	458,050	696,487
7	Improved land in farms ... acres	102,323	193,270	156,859	225,999	389,687	233,241	260,300	388,729	406,229
8	Woodland in farms ... acres	69,640	13,543	40,414	4,606	2,671	111,730	71,876	11,924	205,911
9	Other unimproved land in farms ... acres	34,540	41,378	24,680	28,961	9,781	28,244	71,129	57,397	84,347
10	Farm land reported as provided with drainage ... acres	14,416	39,312	3,650	83,867	26,199	509	24,007	23,263	493
11	Farm land reported as needing drainage ... acres	41,749	49,566	13,250	54,838	4,985	1,367	46,776	40,607	13,076
12	Drainage only ... acres	4,654	37,582	5,504	53,139	4,573	673	14,358	39,655	650
13	Drainage and clearing ... acres	37,095	11,984	7,746	1,699	412	694	32,418	952	12,426

[1] No drainage on farms reported in Wabasha County.

COUNTY TABLE II.—OPERATING DRAINAGE ENTERPRISES: 1920.

		The State.	Aitkin.	Anoka.	Becker.	Beltrami.	Benton.	Big Stone.	Blue Earth.
	LAND AREA.								
1	Approximate land area of the state or county ... acres	51,749,120	1,171,200	293,760	863,360	2,446,080	259,200	314,240	487,680
2	All land in operating drainage enterprises ... acres	9,232,709	419,680	68,891	17,235	1,211,754	7,979	10,111	54,548
3	Improved land ... acres	3,818,490	[1] 36,058	26,459	8,412	[1] 37,604	4,310	5,918	49,638
4	Per cent of all improved land in farms	17.8	58.3	21.8	3.4	41.9	3.4	2.3	14.0
5	Timber and cut-over land ... acres	1,370,023	115,255	1,384	200	574,444	316	...	...
6	Other unimproved land ... acres	4,044,196	268,367	41,048	8,623	599,706	3,353	4,193	4,910
7	Swampy or subject to overflow, in enterprises ... acres	1,193,136	31,557	7,959	6,042	17,818	153	589	...
8	Suffering a loss of crops from defective drainage ... acres	471,094	25,157	7,839	1,196	35,653	...	1,371	...
9	Assessed acreage ... acres	9,974,662	419,680	68,891	17,701	1,211,754	7,979	10,111	54,548
10	Excess over all land in operating enterprises ... acres	741,953	...	...	466	...	...	...	...
	DRAINAGE WORKS.								
	Open ditches:								
11	Completed ... miles	14,657.0	530.0	303.4	104.8	1,635.5	62.3	34.4	93.0
12	Additional under construction ... miles	166.1	...	...	...	32.0	0.7	...	2.0
13	Maximum completed in any enterprise ... miles	216.0	80.0	23.0	27.4	216.0	11.0	8.1	20.0
14	Maximum width at bottom of ditch [2] ... feet	72	20	15	12	35	12	8	16
15	Maximum of average depths of outlet ditches [2] ... feet	24.0	8.0	8.0	10.0	8.0	5.0	6.0	9.0
16	Mean depth of branch ditches [2] ... feet	4.9	5.6	3.5	4.2	5.0	3.3	...	4.5
	Tile drains:								
17	Completed ... miles	5,924.6	...	5.7	0.1	...	...	42.7	243.0
18	Additional under construction ... miles	462.7	...	...	...	...	...	...	6.0
19	Maximum completed in any enterprise ... miles	153.0	...	2.0	0.1	...	...	13.5	16.0
20	Maximum size of tile [2] ... inches	48	...	36	36	...	...	36	42
	Accessory levees and dikes:								
21	Completed ... miles	0.1	...	...	...	...	...	...	...
22	Additional under construction ... miles	0.3	...	...	...	...	...	...	...
23	Area drained by open ditches only [2] ... acres	8,440,167	419,680	63,881	16,545	1,211,754	7,979	5,528	9,847
24	Length of these ditches ... miles	13,432.0	530.0	278.6	99.3	1,667.5	63.0	27.4	69.0
25	Average length per acre ... feet	8.4	6.7	23.0	31.7	7.3	41.7	26.2	37.0
26	Area drained by tile only [2] ... acres	271,118	...	396	...	...	...	2,902	34,192
27	Length of these tile ... miles	2,816.1	...	2.0	...	...	...	31.6	209.0
28	Average length per acre ... feet	54.8	...	26.7	...	...	...	57.5	32.3
29	Area drained by open ditches and tile [2] ... acres	[3] 521,424	...	4,614	690	...	...	1,681	10,509
30	Length of these drains ... miles	4,962.3	...	28.5	5.6	...	...	18.1	66.0
31	Average length per acre ... feet	50.2	...	32.6	42.9	...	...	56.9	33.2
	DEVELOPMENT OF LAND.								
32	Improved land in operating enterprises, 1920 ... acres	3,818,490	[1] 36,058	26,459	8,412	[1] 37,604	4,310	5,918	49,638
33	Improved land prior to drainage ... acres	1,722,875	[4] 9,079	9,097	2,273	...	1,134	2,923	3,273
34	Increase since drainage ... acres	2,095,615	26,979	17,362	6,139	37,604	3,176	2,995	46,365
35	Per cent of increase [5]	121.6	297.2	190.9	270.1	...	280.1	102.5	...
36	Per cent increase is of all improved land in farms, 1920	9.8	43.6	14.3	2.4	41.9	2.5	1.2	13.0
37	Timber and cut-over land, 1920 ... acres	1,370,023	115,255	1,384	200	574,444	316	...	...
38	Timber and cut-over land prior to drainage ... acres	1,473,820	117,489	1,656	214	581,444	952	...	...
39	Decrease since drainage ... acres	103,797	2,234	272	14	7,000	636	...	...
40	Per cent of decrease	7.0	1.9	16.4	6.5	1.2	66.8	...	...
41	Other unimproved land, 1920 ... acres	4,044,196	268,367	41,048	8,623	599,706	3,353	4,193	4,910
42	Other unimproved land prior to drainage ... acres	6,036,014	293,112	58,138	14,748	630,310	5,893	7,188	51,275
43	Decrease since drainage ... acres	1,991,818	24,745	17,090	6,125	30,604	2,540	2,995	46,365
44	Per cent of decrease	33.0	8.4	29.4	41.5	4.9	43.1	41.7	90.4
45	Swampy or subject to overflow, 1920 ... acres	1,193,136	31,557	7,959	6,042	17,818	153	589	...
46	Swampy or subject to overflow prior to drainage ... acres	4,634,641	168,468	37,128	16,603	154,889	4,116	5,702	43,043
47	Decrease since drainage ... acres	3,441,505	136,911	29,169	10,561	137,071	3,963	5,113	43,043
48	Per cent of decrease	74.3	81.3	78.6	63.6	88.5	96.3	89.7	100.0
	CAPITAL INVESTED AND COST PER ACRE.								
49	Total capital invested in and required for completion of operating enterprises ... dollars	44,183,838	966,046	315,585	162,025	3,106,371	64,753	204,470	964,858
50	Capital invested in these enterprises to Dec. 31, 1919 ... dollars	42,017,447	966,046	315,585	162,025	2,994,371	63,127	204,470	953,768
51	Additional capital required to complete these enterprises ... dollars	2,166,391	...	...	...	112,000	1,626	...	11,090
52	Average cost per acre when completed ... dollars	4.79	2.30	4.58	9.40	2.56	8.12	20.22	17.69
53	Enterprises constructing open ditches only ... dollars	23,238,989	966,046	231,607	154,334	3,106,371	64,753	86,325	55,766
54	Average cost per acre when completed ... dollars	2.75	2.30	3.63	9.33	2.56	8.12	15.62	5.66
55	Enterprises constructing tile drains only ... dollars	7,391,548	...	8,837	...	...	...	62,885	657,744
56	Average cost per acre when completed ... dollars	27.26	...	22.32	...	...	...	21.67	19.24
57	Enterprises constructing open ditches and tile drains ... dollars	[6] 13,553,301	...	75,141	7,691	...	...	55,260	251,348
58	Average cost per acre when completed ... dollars	25.99	...	16.29	11.15	...	...	32.87	23.92
	CROPS.								
	Improved land in enterprises reporting—								
59	Wheat as principal crop on drained land ... acres	1,774,205	...	215	5,435	...	...	5,918	...
60	Hay as principal crop on drained land ... acres	940,935	36,058	24,654	2,977	37,604	3,910	...	7,804
61	Corn as principal crop on drained land ... acres	927,801	...	1,046	...	...	400	...	41,834
62	Oats as principal crop on drained land ... acres	[7] 166,239	...	245	...	...	...	...	...
63	Potatoes as principal crop on drained land ... acres	[8] 5,939	...	299	...	...	...	...	...
64	Flax as principal crop on drained land ... acres	2,184	...	...	...	...	...	...	...
65	Not reporting principal crop on drained land ... acres	1,187	...	...	...	...	...	...	...

[1] Office estimate; the reported figures exceed the improved acreage in all farms in the county as determined by the census of agriculture.
[2] When works under construction have been completed.
[3] Includes 4,642 acres constructing also 0.4 mile of levee.
[4] The reported figures have been reduced in proportion to the reduction made in improved land, 1920.
[5] Per cent not shown when more than 1,000.
[6] Includes cost of 0.4 mile of levee.
[7] Includes 4,892 acres reporting barley as principal crop.
[8] Includes 499 acres reporting sugar beets as principal crop.

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

		Brown.	Carlton.	Carver.	Cass.	Chippewa.	Chisago.	Clay.	Cottonwood.	Crow Wing.
	LAND AREA.									
1	Approximate land area of the county ... acres	391,680	554,880	240,640	1,346,560	378,240	273,280	667,520	409,600	676,480
2	All land in operating drainage enterprises ... acres	27,538	42,500	6,282	71,871	50,782	17,368	379,975	33,524	24,402
3	Improved land ... acres	15,310	6,326	3,140	14,137	39,329	8,782	248,830	26,121	12,551
4	Per cent of all improved land in farms	5.3	11.5	2.3	19.0	12.4	7.0	49.2	7.6	18.3
5	Timber and cut-over land ... acres	33	5,381	99	23,900	...	3,054	4,092	...	2,789
6	Other unimproved land ... acres	12,195	30,793	3,043	33,834	11,453	5,532	127,053	7,403	9,062
7	Swampy or subject to overflow, in enterprises ... acres	3,961	9,520	1,637	...	1,672	1,238	76,878	3,892	328
8	Suffering a loss of crops from defective drainage ... acres	7,394	...	281	...	2,567	1,167	14,275	525	...
9	Assessed acreage	27,538	42,500	6,282	71,871	50,782	17,368	379,975	33,524	24,402
10	Excess over all land in operating enterprises ... acres	...	...	...	...	...	...	...	...	...
	DRAINAGE WORKS.									
	Open ditches:									
11	Completed ... miles	137.9	54.0	52.8	166.0	175.6	74.5	244.5	11.0	105.0
12	Additional under construction ... miles	...	...	2.3	...	...	...	...	...	...
13	Maximum completed in any enterprise ... miles	19.7	37.0	11.6	30.0	42.6	8.0	21.6	5.0	20.0
14	Maximum width at bottom of ditch [1] ... feet	12	20	20	12	20	10	20	8	12
15	Maximum of average depths of outlet ditches [1] ... feet	10.0	8.0	5.0	7.0	10.0	8.0	8.5	8.6	7.0
16	Mean depth of branch ditches [1] ... feet	4.3	5.8	3.1	5.0	3.1	4.0	4.1	4.9	3.6
	Tile drains:									
17	Completed ... miles	184.5	...	8.7	...	149.7	...	1.0	319.4	...
18	Additional under construction ... miles	43.8	...	1.7	...	...	...	...	28.6	...
19	Maximum completed in any enterprise ... miles	42.7	...	3.7	...	59.4	...	1.0	33.8	...
20	Maximum size of tile [1] ... inches	36	...	24	...	30	...	18	48	...
	Accessory levees and dikes:									
21	Completed ... miles	...	...	...	...	...	...	...	...	...
22	Additional under construction ... miles	0.3	...	...	...	...	...	...	...	...
23	Area drained by open ditches only [1] ... acres	9,894	42,500	5,242	71,871	12,365	17,368	376,020	1,093	24,402
24	Length of these ditches ... miles	98.6	54.0	47.3	166.0	90.2	74.5	236.7	5.0	105.0
25	Average length per acre ... feet	52.6	6.7	47.6	12.2	38.5	22.6	3.3	24.2	22.7
26	Area drained by tile only [1] ... acres	6,336	...	156	...	23,527	...	...	15,078	...
27	Length of these tile ... miles	113.2	...	3.1	...	113.9	...	...	191.8	...
28	Average length per acre ... feet	94.3	...	104.9	...	25.6	...	...	67.2	...
29	Area drained by open ditches and tile [1] ... acres	11,308	...	884	...	14,890	...	3,955	17,353	...
30	Length of these drains ... miles	154.4	...	15.1	...	121.2	...	8.8	162.2	...
31	Average length per acre ... feet	72.1	...	90.2	...	43.0	...	11.7	49.4	...
	DEVELOPMENT OF LAND.									
32	Improved land in operating enterprises, 1920 ... acres	15,310	6,326	3,140	14,137	39,329	8,782	248,830	26,121	12,551
33	Improved land prior to drainage ... acres	8,910	3,949	614	...	23,576	2,569	121,358	10,114	4,059
34	Increase since drainage ... acres	6,400	2,377	2,526	14,137	15,753	6,213	127,472	16,007	8,492
35	Per cent of increase	71.8	60.2	411.4	...	66.8	241.8	105.0	158.3	209.2
36	Per cent increase is of all improved land in farms, 1920	2.2	4.3	1.8	19.0	5.0	4.9	25.2	4.6	12.4
37	Timber and cut-over land, 1920 ... acres	33	5,381	99	23,900	...	3,054	4,092	...	2,789
38	Timber and cut-over land prior to drainage ... acres	33	5,633	170	24,572	...	3,054	4,508	...	4,255
39	Decrease since drainage ... acres	...	252	71	672	...	...	416	...	1,466
40	Per cent of decrease	...	4.5	41.8	2.7	...	...	9.2	...	34.5
41	Other unimproved land, 1920 ... acres	12,195	30,793	3,043	33,834	11,453	5,532	127,053	7,403	9,062
42	Other unimproved land prior to drainage ... acres	18,595	32,918	5,498	47,299	27,206	11,745	254,109	23,410	16,088
43	Decrease since drainage ... acres	6,400	2,125	2,455	13,465	15,753	6,213	127,056	16,007	7,026
44	Per cent of decrease	34.4	6.5	44.7	28.5	57.9	52.9	50.0	68.4	43.7
45	Swampy or subject to overflow, 1920 ... acres	3,961	9,520	1,637	...	1,672	1,238	76,878	3,892	328
46	Swampy or subject to overflow prior to drainage ... acres	10,555	26,568	6,253	63,317	16,571	8,906	168,989	13,299	11,246
47	Decrease since drainage ... acres	6,594	17,048	4,616	63,317	14,899	7,668	92,111	9,407	10,918
48	Per cent of decrease	62.5	64.2	73.8	100.0	89.9	86.1	54.5	70.7	97.1
	CAPITAL INVESTED AND COST PER ACRE.									
49	Total capital invested in and required for completion of operating enterprises ... dollars	692,574	135,012	136,079	268,696	1,036,955	94,962	712,787	952,231	93,973
50	Capital invested in these enterprises to Dec. 31, 1919 ... dollars	560,195	135,012	117,579	268,696	1,036,955	94,962	712,787	844,801	93,973
51	Additional capital required to complete these enterprises ... dollars	132,379	...	18,500	...	...	...	...	107,430	...
52	Average cost per acre when completed ... dollars	25.15	3.18	21.66	3.74	20.42	5.47	1.88	28.40	3.85
53	Enterprises constructing open ditches only ... dollars	111,204	135,012	85,337	268,696	83,635	94,962	698,212	16,329	93,973
54	Average cost per acre when completed ... dollars	11.24	3.18	16.28	3.74	6.76	5.47	1.86	14.94	3.85
55	Enterprises constructing tile drains only ... dollars	236,319	...	16,831	...	510,630	...	...	395,732	...
56	Average cost per acre when completed ... dollars	37.30	...	107.89	...	21.70	...	...	26.25	...
57	Enterprises constructing open ditches and tile drains ... dollars	345,051	...	33,911	...	442,690	...	14,575	540,170	...
58	Average cost per acre when completed ... dollars	30.51	...	38.36	...	29.73	...	3.69	31.13	...
	CROPS.									
	Improved land in enterprises reporting—									
59	Wheat as principal crop on drained land ... acres	...	...	...	...	39,329	...	29,067	...	...
60	Hay as principal crop on drained land ... acres	297	6,326	423	14,137	...	8,782	99,548	...	8,399
61	Corn as principal crop on drained land ... acres	15,013	...	2,717	...	...	...	...	26,121	4,152
62	Oats as principal crop on drained land ... acres	...	...	...	...	...	...	120,215	...	...
63	Potatoes as principal crop on drained land ... acres	...	...	...	...	...	...	...	...	...
64	Flax as principal crop on drained land ... acres	...	...	...	...	...	...	...	...	...
65	Not reporting principal crop on drained land ... acres	...	...	...	...	...	...	...	...	...

[1] When works under construction have been completed.

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

		Dodge.	Douglas.	Faribault.	Freeborn.	Grant.	Hennepin.	Hubbard.	Isanti.	Itasca.
	LAND AREA.									
1	Approximate land area of the county ... acres	281,600	414,720	460,160	470,400	353,920	361,600	613,120	282,880	1,747,200
2	All land in operating drainage enterprises ... acres	13,902	30,677	118,685	19,084	60,365	13,375	14,302	19,168	99,527
3	Improved land ... acres	7,028	16,752	101,504	11,403	60,365	8,030	3,305	9,615	.....
4	Per cent of all improved land in farms	3.4	6.9	28.1	3.6	21.3	4.3	4.1	6.9	.....
5	Timber and cut-over land ... acres	.....	.....	.....	236	.....	1,292	5,173	4,937	34,051
6	Other unimproved land ... acres	6,874	13,925	17,181	7,445	.....	4,053	5,824	4,616	65,476
7	Swampy or subject to overflow, in enterprises ... acres	.....	.....	15,959	4,914	.....	2,629	3,560	1,031	.....
8	Suffering a loss of crops from defective drainage ... acres	.....	.....	7,166	511	.....	2,532	.....	.....	.....
9	Assessed acreage	13,902	30,677	118,685	19,084	60,365	13,375	14,302	19,168	99,527
10	Excess over all land in operating enterprises ... acres	.....	.....	.....	.....	.....	.....	.....	.....	.....
	DRAINAGE WORKS.									
	Open ditches:									
11	Completed ... miles	37.0	132.6	129.5	95.4	62.6	94.9	31.0	111.5	97.0
12	Additional under construction ... miles	.....	.....	.....	.....	.....	1.3	.....	.....	.....
13	Maximum completed in any enterprise ... miles	33.0	28.9	27.9	12.0	10.6	7.8	7.0	11.0	36.0
14	Maximum width at bottom of ditch [1] ... feet	10	16	40	25	18	30	16	16	8
15	Maximum of average depths of outlet ditches [1] ... feet	5.0	14.0	9.7	12.0	9.0	5.0	5.0	9.0	8.0
16	Mean depth of branch ditches [1] ... feet	4.0	3.8	7.5	6.0	4.4	3.4	3.4	4.7	5.8
	Tile drains:									
17	Completed ... miles	10.0	11.5	616.0	17.9	53.5	0.4	.....	.....	.....
18	Additional under construction ... miles	.....	.....	23.8	11.3	.....	0.2	.....	.....	.....
19	Maximum completed in any enterprise ... miles	10.0	11.1	49.1	10.1	16.2	0.2	.....	.....	.....
20	Maximum size of tile [1] ... inches	36	24	36	34	32	24	.....	.....	.....
	Accessory levees and dikes:									
21	Completed ... miles	.....	.....	.....	.....	.....	.....	.....	.....	.....
22	Additional under construction ... miles	.....	.....	.....	.....	.....	.....	.....	.....	.....
23	Area drained by open ditches only [1] ... acres	770	29,371	14,339	14,209	50,079	13,097	14,302	19,168	99,527
24	Length of these ditches ... miles	4.0	122.2	32.3	74.6	56.2	89.9	31.0	111.5	97.0
25	Average length per acre ... feet	27.4	22.0	11.9	27.7	5.9	36.2	11.4	30.7	5.1
26	Area drained by tile only [1] ... acres	.....	.....	36,646	.....	9,819	.....	.....	.....	.....
27	Length of these tile ... miles	.....	.....	244.3	.....	52.7	.....	.....	.....	.....
28	Average length per acre ... feet	.....	.....	35.2	.....	28.3	.....	.....	.....	.....
29	Area drained by open ditches and tile [1] ... acres	13,132	1,306	67,700	4,875	467	278	.....	.....	.....
30	Length of these drains ... miles	43.0	21.9	492.7	50.0	7.2	6.9	.....	.....	.....
31	Average length per acre ... feet	17.3	88.5	38.4	54.2	81.4	131.1	.....	.....	.....
	DEVELOPMENT OF LAND.									
32	Improved land in operating enterprises, 1920 ... acres	7,028	16,752	101,504	11,403	60,365	8,030	3,305	9,615	.....
33	Improved land prior to drainage ... acres	1,970	10,771	63,042	3,232	45,869	6,096	.....	3,330	.....
34	Increase since drainage ... acres	5,058	5,981	38,462	8,171	14,496	1,934	3,305	6,285	.....
35	Per cent of increase	256.8	55.5	61.0	252.8	31.6	31.7	.....	188.7	.....
36	Per cent increase is of all improved land in farms, 1920	2.4	2.5	10.6	2.6	5.1	1.0	4.1	4.5	.....
37	Timber and cut-over land, 1920 ... acres	.....	.....	.....	236	.....	1,292	5,173	4,937	34,051
38	Timber and cut-over land prior to drainage ... acres	.....	.....	.....	358	.....	1,623	6,897	6,270	34,051
39	Decrease since drainage ... acres	.....	.....	.....	122	.....	331	1,724	1,333	.....
40	Per cent of decrease	.....	.....	.....	34.1	.....	20.4	25.0	21.3	.....
41	Other unimproved land, 1920 ... acres	6,874	13,925	17,181	7,445	.....	4,053	5,824	4,616	65,476
42	Other unimproved land prior to drainage ... acres	11,932	19,906	55,643	15,494	14,496	5,656	7,405	9,568	65,476
43	Decrease since drainage ... acres	5,058	5,981	38,462	8,049	14,496	1,603	1,581	4,952	.....
44	Per cent of decrease	42.4	30.0	69.1	51.9	100.0	28.3	21.4	51.8	.....
45	Swampy or subject to overflow, 1920 ... acres	.....	.....	15,959	4,914	.....	2,629	3,560	1,031	.....
46	Swampy or subject to overflow prior to drainage ... acres	6,409	10,509	47,111	18,954	.....	4,636	14,302	9,746	99,527
47	Decrease since drainage ... acres	6,409	10,509	31,152	14,040	.....	2,007	10,742	8,715	99,527
48	Per cent of decrease	100.0	100.0	66.1	74.1	.....	43.3	75.1	89.4	100.0
	CAPITAL INVESTED AND COST PER ACRE.									
49	Total capital invested in and required for completion of operating enterprises ... dollars	55,960	197,536	2,317,116	313,283	584,823	237,777	30,887	194,885	241,490
50	Capital invested in these enterprises to Dec. 31, 1919 ... dollars	55,960	197,536	2,191,616	265,283	584,823	227,277	30,887	194,885	241,490
51	Additional capital required to complete these enterprises ... dollars	.....	.....	125,500	48,000	.....	10,500	.....	.....	.....
52	Average cost per acre when completed ... dollars	4.03	6.44	19.52	16.42	9.69	17.78	2.16	10.17	2.43
53	Enterprises constructing open ditches only ... dollars	8,500	158,132	88,823	155,915	112,506	214,787	30,887	194,885	241,490
54	Average cost per acre when completed ... dollars	11.04	5.38	6.19	10.97	2.25	16.40	2.16	10.17	2.43
55	Enterprises constructing tile drains only ... dollars	.....	.....	642,854	.....	464,166	.....	.....	.....	.....
56	Average cost per acre when completed ... dollars	.....	.....	17.54	.....	47.27	.....	.....	.....	.....
57	Enterprises constructing open ditches and tile drains ... dollars	47,460	39,404	1,585,439	157,368	8,151	22,990	.....	.....	.....
58	Average cost per acre when completed ... dollars	3.61	30.17	23.42	32.28	17.45	82.70	.....	.....	.....
	CROPS.									
	Improved land in enterprises reporting—									
59	Wheat as principal crop on drained land ... acres	.....	.....	.....	.....	60,365	404	.....	.....	.....
60	Hay as principal crop on drained land ... acres	7,028	16,752	1,823	340	.....	322	3,305	9,070	.....
61	Corn as principal crop on drained land ... acres	.....	.....	96,905	11,063	.....	7,280	.....	.....	.....
62	Oats as principal crop on drained land ... acres	.....	.....	2,776	.....	.....	.....	.....	.....	.....
63	Potatoes as principal crop on drained land ... acres	.....	.....	.....	.....	.....	24	.....	545	.....
64	Flax as principal crop on drained land ... acres	.....	.....	.....	.....	.....	.....	.....	.....	.....
65	Not reporting principal crop on drained land ... acres	.....	.....	.....	.....	.....	.....	.....	.....	.....

[1] When works under construction have been completed.

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

		Jackson.	Kanabec.	Kandiyohi.	Kittson.	Koochiching.	Lac qui Parle.	Le Sueur.	Lincoln.	Lyon.
	LAND AREA.									
1	Approximate land area of the county ... acres	449,280	341,760	512,640	711,040	2,010,240	505,600	298,240	342,400	453,120
2	All land in operating drainage enterprises ... acres	65,147	16,539	66,279	498,294	707,496	26,567	16,721	14,490	31,765
3	Improved land ... acres	56,193	8,303	60,023	[1] 275,330	14,146	20,109	10,711	11,128	22,507
4	Per cent of all improved land in farms	15.1	12.3	16.7	80.5	63.0	4.8	6.0	4.1	6.3
5	Timber and cut-over land ... acres		2,713		27,756	176,875				
6	Other unimproved land ... acres	8,954	5,523	6,256	195,208	516,475	6,458	6,010	3,362	9,258
7	Swampy or subject to overflow, in enterprises ... acres	7,897	785	889	12,773	399,119	899	2,336	2,465	5,580
8	Suffering a loss of crops from defective drainage ... acres	3,895		386	14,740		1,496	6,987	493	925
9	Assessed acreage	65,147	16,539	66,279	498,294	707,496	26,567	17,492	14,490	31,765
10	Excess over all land in operating enterprises ... acres							771		
	DRAINAGE WORKS.									
	Open ditches:									
11	Completed ... miles	70.4	76.0	320.4	395.0	542.0	226.0	168.8	132.2	54.5
12	Additional under construction ... miles			3.5		25.0				1.3
13	Maximum completed in any enterprise ... miles	18.0	18.0	52.0	43.6	86.0	46.4	13.5	17.0	8.6
14	Maximum width at bottom of ditch [2] ... feet	8	16	14	60	20	18	30	20	12
15	Maximum of average depths of outlet ditches [2] ... feet	9.8	7.0	12.9	10.0	7.0	12.0	6.3	8.5	8.7
16	Mean depth of branch ditches [2] ... feet	5.3	4.1	4.4	4.5	5.2	3.4	5.1	4.4	5.5
	Tile drains:									
17	Completed ... miles	652.1		70.3			111.4	0.2	62.9	303.1
18	Additional under construction ... miles	17.3		12.7					22.1	42.3
19	Maximum completed in any enterprise ... miles	56.8		21.0			17.0	0.2	12.7	19.8
20	Maximum size of tile [2] ... inches	36		24			36	16	30	36
	Accessory levees and dikes:									
21	Completed ... miles									0.1
22	Additional under construction ... miles									
23	Area drained by open ditches only [2] ... acres		16,539	52,602	498,294	707,496	12,553	16,430	2,489	5,538
24	Length of these ditches ... miles		73.0	276.6	395.0	567.0	120.3	167.5	38.9	36.7
25	Average length per acre ... feet		24.3	27.8	4.2	4.2	50.6	53.8	82.5	35.0
26	Area drained by tile only [2] ... acres	17,920		1,958			3,086		1,081	16,176
27	Length of these tile ... miles	236.7		32.2			59.9		23.3	251.1
28	Average length per acre ... feet	69.7		86.8			102.5		113.8	82.0
29	Area drained by open ditches and tile [2] ... acres	47,227		11,719			10,928	291	10,920	10,051
30	Length of these drains ... miles	503.1		98.1			157.2	1.5	155.0	113.4
31	Average length per acre ... feet	56.2		44.2			76.0	27.2	74.9	59.6
	DEVELOPMENT OF LAND.									
32	Improved land in operating enterprises, 1920 ... acres	56,193	8,303	60,023	[1] 275,330	14,146	20,109	10,711	11,128	22,507
33	Improved land prior to drainage ... acres	19,077	2,859	30,336	[3] 160,169		12,545	5,794	1,546	9,146
34	Increase since drainage ... acres	37,116	5,444	29,687	115,161	14,146	7,564	4,917	9,582	13,361
35	Per cent of increase	194.6	190.4	97.9	71.9		60.3	84.9	619.8	146.1
36	Per cent increase is of all improved land in farms, 1920	10.0	8.1	8.2	33.7	63.0	1.8	2.7	3.5	3.7
37	Timber and cut-over land, 1920 ... acres		2,713		27,756	176,875				
38	Timber and cut-over land prior to drainage ... acres		3,093		53,707	176,875				
39	Decrease since drainage ... acres		380		25,951					
40	Per cent of decrease		12.3		48.3					
41	Other unimproved land, 1920 ... acres	8,954	5,523	6,256	195,208	516,475	6,458	6,010	3,362	9,258
42	Other unimproved land prior to drainage ... acres	46,070	10,587	35,943	284,418	530,621	14,022	10,927	12,944	22,619
43	Decrease since drainage ... acres	37,116	5,064	29,687	89,210	14,146	7,564	4,917	9,582	13,361
44	Per cent of decrease	80.6	47.8	82.6	31.4	2.7	53.9	45.0	74.0	59.1
45	Swampy or subject to overflow, 1920 ... acres	7,897	785	889	12,773	399,119	899	2,336	2,465	5,580
46	Swampy or subject to overflow prior to drainage ... acres	28,787	7,432	30,311	97,981	707,496	9,829	5,061	12,433	13,804
47	Decrease since drainage ... acres	20,890	6,647	29,422	85,208	308,377	8,930	2,725	9,968	8,224
48	Per cent of decrease	72.6	89.4	97.1	87.0	43.6	90.9	53.8	80.2	59.6
	CAPITAL INVESTED AND COST PER ACRE.									
49	Total capital invested in and required for completion of operating enterprises ... dollars	1,624,563	105,760	687,928	758,425	1,356,438	738,907	238,951	389,256	989,480
50	Capital invested in these enterprises to Dec. 31, 1919 ... dollars	1,555,157	105,760	632,583	758,425	1,281,238	738,907	238,951	348,352	870,872
51	Additional capital required to complete these enterprises ... dollars	69,406		55,345		75,200			40,904	118,608
52	Average cost per acre when completed ... dollars	24.94	6.39	10.38	1.52	1.92	27.81	14.29	26.86	31.15
53	Enterprises constructing open ditches only ... dollars		105,760	356,789	758,425	1,356,438	214,045	226,178	51,304	68,699
54	Average cost per acre when completed ... dollars		6.39	6.78	1.52	1.92	17.05	13.77	20.61	12.41
55	Enterprises constructing tile drains only ... dollars	578,332		96,585			103,256		52,663	525,911
56	Average cost per acre when completed ... dollars	32.27		49.33			33.46		48.72	32.51
57	Enterprises constructing open ditches and tile drains ... dollars	1,046,231		234,554			421,606	12,773	285,289	394,870
58	Average cost per acre when completed ... dollars	22.15		20.01			38.58	43.89	26.13	39.29
	CROPS.									
	Improved land in enterprises reporting—									
59	Wheat as principal crop on drained land ... acres			11,688	275,330					
60	Hay as principal crop on drained land ... acres		8,303			14,146	20	2,970		
61	Corn as principal crop on drained land ... acres	56,193		48,335			20,089	7,741	9,503	22,507
62	Oats as principal crop on drained land ... acres									
63	Potatoes as principal crop on drained land ... acres									
64	Flax as principal crop on drained land ... acres								1,318	
65	Not reporting principal crop on drained land ... acres								307	

[1] Office estimate; the reported figures are 98 per cent of the improved acreage in all farms in the county as determined by the census of agriculture.
[2] When works under construction have been completed.
[3] The reported figures have been reduced in proportion to the reduction made in improved land, 1920.

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

		McLeod.	Mahnomen.	Marshall.	Martin.	Meeker.	Mille Lacs.	Morrison.	Mower.
	LAND AREA.								
1	Approximate land area of the county ... acres	317,440	366,080	1,144,320	460,160	397,440	373,120	731,520	455,040
2	All land in operating drainage enterprises ... acres	14,072	36,724	771,421	67,965	21,227	7,172	33,080	4,771
3	Improved land ... acres	7,834	16,031	[1] 487,137	53,351	14,268	4,153	20,362	1,670
4	Per cent of all improved land in farms	3.1	19.5	93.1	14.3	5.1	5.2	8.9	0.5
5	Timber and cut-over land ... acres	233	1,448	154,858	...	189	578	2,309	48
6	Other unimproved land ... acres	6,005	19,245	129,426	14,614	6,770	2,441	10,409	3,053
7	Swampy or subject to overflow, in enterprises ... acres	3,868	13,714	30,856	7,105	2,591	277	1,506	426
8	Suffering a loss of crops from defective drainage ... acres	562	257	61,094	10,183	2,943	...	...	75
9	Assessed acreage	14,495	36,724	1,150,927	67,965	21,227	7,172	33,080	4,771
10	Excess over all land in operating enterprises ... acres	423	...	379,506	...	...	...	...	...
	DRAINAGE WORKS.								
	Open ditches:								
11	Completed ... miles	96.6	41.1	834.5	82.7	128.6	42.0	117.2	5.1
12	Additional under construction ... miles	...	53.3	...	...	...	...	0.8	...
13	Maximum completed in any enterprise ... miles	9.8	15.8	110.0	13.9	12.0	12.0	13.0	5.1
14	Maximum width at bottom of ditch [2] ... feet	16	12	40	14	24	8	10	16
15	Maximum of average depths of outlet ditches [2] ... feet	10.0	6.4	10.0	13.0	10.0	6.0	6.0	6.2
16	Mean depth of branch ditches [2] ... feet	4.2	4.8	4.9	7.2	4.7	3.4	3.2	...
	Tile drains:								
17	Completed ... miles	51.3	...	...	718.8	16.9	...	...	13.5
18	Additional under construction ... miles	1.0	...	...	16.0	...	...	...	0.8
19	Maximum completed in any enterprise ... miles	12.0	...	...	51.9	6.0	...	...	7.5
20	Maximum size of tile [2] ... inches	24	...	...	36	24	...	...	30
	Accessory levees and dikes:								
21	Completed ... miles	...	...	...	...	...	...	...	...
22	Additional under construction ... miles	...	...	...	...	...	...	...	...
23	Area drained by open ditches only [2] ... acres	8,757	36,724	771,421	2,166	19,785	7,172	33,080	...
24	Length of these ditches ... miles	70.5	94.4	834.5	18.3	127.6	42.0	118.0	...
25	Average length per acre ... feet	42.5	13.6	5.7	44.6	34.1	30.9	18.8	...
26	Area drained by tile only [2] ... acres	1,404	...	...	23,136	1,318	...	...	1,021
27	Length of these tile ... miles	14.3	...	...	343.6	14.9	...	...	6.7
28	Average length per acre ... feet	53.8	...	...	78.4	59.7	...	...	34.6
29	Area drained by open ditches and tile [2] ... acres	3,911	...	...	42,663	124	...	...	3,750
30	Length of these drains ... miles	64.1	...	...	455.6	3.0	...	...	12.7
31	Average length per acre ... feet	86.5	...	...	56.4	127.7	...	...	17.9
	DEVELOPMENT OF LAND.								
32	Improved land in operating enterprises, 1920 ... acres	7,834	16,031	[1] 487,137	53,351	14,268	4,153	20,362	1,670
33	Improved land prior to drainage ... acres	1,325	12,668	[3] 243,568	23,316	3,849	1,222	5,545	429
34	Increase since drainage ... acres	6,509	3,363	243,569	30,035	10,419	2,931	14,817	1,241
35	Per cent of increase	491.2	26.5	100.0	128.8	270.7	239.9	267.2	289.3
36	Per cent increase is of all improved land in farms, 1920	2.6	4.1	46.5	8.1	3.7	3.7	6.5	0.3
37	Timber and cut-over land, 1920 ... acres	233	1,448	154,858	...	189	578	2,309	48
38	Timber and cut-over land prior to drainage ... acres	491	1,448	173,430	...	245	1,027	5,120	48
39	Decrease since drainage ... acres	258	...	18,572	...	56	449	2,811	...
40	Per cent of decrease	52.5	...	10.7	...	22.9	43.7	54.9	...
41	Other unimproved land, 1920 ... acres	6,005	19,245	129,426	14,614	6,770	2,441	10,409	3,053
42	Other unimproved land prior to drainage ... acres	12,256	22,608	354,423	44,649	17,133	4,923	22,415	4,294
43	Decrease since drainage ... acres	6,251	3,363	224,997	30,035	10,363	2,482	12,006	1,241
44	Per cent of decrease	51.0	14.9	63.5	67.3	60.5	50.4	53.6	28.9
45	Swampy or subject to overflow, 1920 ... acres	3,868	13,714	30,856	7,105	2,591	277	1,506	426
46	Swampy or subject to overflow prior to drainage ... acres	14,072	20,696	331,708	37,486	11,702	3,608	14,641	4,771
47	Decrease since drainage ... acres	10,204	6,982	300,852	30,381	9,111	3,331	13,135	4,345
48	Per cent of decrease	72.5	33.7	90.7	81.0	77.9	92.3	89.7	91.1
	CAPITAL INVESTED AND COST PER ACRE.								
49	Total capital invested in and required for completion of operating enterprises ... dollars	285,992	267,573	2,069,234	1,857,548	249,787	34,192	99,019	85,020
50	Capital invested in these enterprises to Dec. 31, 1919 ... dollars	283,506	92,573	2,069,234	1,793,548	249,787	34,192	96,019	77,520
51	Additional capital required to complete these enterprises ... dollars	2,486	175,000	...	64,000	...	...	3,000	7,500
52	Average cost per acre when completed ... dollars	20.32	7.29	2.68	27.33	11.77	4.77	2.99	17.82
53	Enterprises constructing open ditches only ... dollars	105,950	267,573	2,069,234	23,552	217,332	34,192	99,019	...
54	Average cost per acre when completed ... dollars	12.10	7.29	2.68	10.87	10.98	4.77	2.99	...
55	Enterprises constructing tile drains only ... dollars	28,298	...	...	760,448	28,804	...	...	34,619
56	Average cost per acre when completed ... dollars	20.16	...	...	32.87	21.85	...	...	33.91
57	Enterprises constructing open ditches and tile drains ... dollars	151,744	...	...	1,073,548	3,651	...	...	50,401
58	Average cost per acre when completed ... dollars	38.80	...	...	25.16	29.44	...	...	13.44
	CROPS.								
	Improved land in enterprises reporting—								
59	Wheat as principal crop on drained land ... acres	1,576	2,849	487,137	...	232	...	...	...
60	Hay as principal crop on drained land ... acres	27	...	...	31	4,525	3,765	12,451	...
61	Corn as principal crop on drained land ... acres	6,231	...	...	52,821	9,511	...	4,040	...
62	Oats as principal crop on drained land ... acres	...	13,182	...	...	...	...	...	1,670
63	Potatoes as principal crop on drained land ... acres	...	...	...	499	...	388	3,871	...
64	Flax as principal crop on drained land ... acres	...	...	...	...	...	...	...	...
65	Not reporting principal crop on drained land ... acres	...	...	...	...	...	...	...	...

[1] Office estimate; the reported figures exceed the improved acreage in all farms in the county as determined by the census of agriculture.
[2] When works under construction have been completed.
[3] The reported figures have been reduced in proportion to the reduction made in improved land, 1920.

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

		Murray.	Nicollet.	Nobles.	Norman.	Otter Tail.	Pennington.	Pine.	Pipestone.	Polk.
	LAND AREA.									
1	Approximate land area of the county ... acres	450,560	283,520	462,080	550,400	1,304,960	388,480	904,320	300,160	1,266,560
2	All land in operating drainage enterprises ... acres	44,984	28,666	16,734	280,024	50,555	349,624	16,227	14,834	837,261
3	Improved land ... acres	35,225	16,053	12,069	166,386	25,384	[1] 186,319	8,636	14,092	557,509
4	Per cent of all improved land in farms	9.2	7.6	3.0	41.5	3.7	95.8	7.1	5.7	66.2
5	Timber and cut-over land ... acres	...	337	...	...	1,961	22,173	1,075	...	28,336
6	Other unimproved land ... acres	9,759	12,276	4,665	113,638	23,210	141,132	6,516	742	251,416
7	Swampy or subject to overflow, in enterprises ... acres	4,928	5,253	3,035	...	17,147	66,288	812	...	153,481
8	Suffering a loss of crops from defective drainage ... acres	4,623	13,911	17	...	3,201	15,684	791	...	37,876
9	Assessed acreage	44,984	30,746	16,734	280,024	50,555	449,778	16,227	14,834	1,016,453
10	Excess over all land in operating enterprises ... acres	...	2,080	...	...	...	100,154	...	...	179,192
	DRAINAGE WORKS.									
	Open ditches:									
11	Completed ... miles	78.5	142.7	31.0	314.8	241.2	371.2	51.0	5.1	801.7
12	Additional under construction ... miles	...	0.5	...	...	...	...	...	...	4.9
13	Maximum completed in any enterprise ... miles	19.8	14.7	6.2	57.0	14.7	38.6	12.0	5.1	23.6
14	Maximum width at bottom of ditch [2] ... feet	40	20	10	16	20	12	12	10	24
15	Maximum of average depths of outlet ditches [2] ... feet	9.2	13.0	9.0	24.0	10.0	6.5	5.0	6.0	9.2
16	Mean depth of branch ditches [2] ... feet	5.8	3.4	5.1	6.0	3.4	8.9	3.0	8.0	4.3
	Tile drains:									
17	Completed ... miles	488.6	36.7	137.6	0.5	23.2	...	...	43.2	...
18	Additional under construction ... miles	33.6	3.0	10.2	...	...	...	...	21.6	0.1
19	Maximum completed in any enterprise ... miles	28.4	10.2	64.5	0.5	8.2	...	...	43.2	...
20	Maximum size of tile [2] ... inches	36	28	42	15	24	...	...	32	24
	Accessory levees and dikes:									
21	Completed ... miles	...	...	...	...	...	...	...	...	...
22	Additional under construction ... miles	...	...	...	...	...	...	...	...	...
23	Area drained by open ditches only [2] ... acres	9,358	23,996	3,713	278,593	41,037	349,624	16,227	...	833,953
24	Length of these ditches ... miles	48.5	141.3	19.5	314.3	177.6	371.2	51.0	...	804.4
25	Average length per acre ... feet	27.4	31.1	27.7	6.0	22.9	5.6	16.6	...	5.1
26	Area drained by tile only [2] ... acres	19,045	3,350	4,173	...	49	...	...	...	...
27	Length of these tile ... miles	327.0	18.4	58.3	...	1.3	...	...	...	...
28	Average length per acre ... feet	90.7	29.0	73.8	...	140.1	...	...	...	...
29	Area drained by open ditches and tile [2] ... acres	16,581	1,320	8,848	1,431	9,469	...	...	14,834	3,308
30	Length of these drains ... miles	225.2	23.2	101.0	1.0	85.5	...	...	69.9	2.3
31	Average length per acre ... feet	71.7	92.8	60.3	3.7	47.7	...	...	24.9	3.7
	DEVELOPMENT OF LAND.									
32	Improved land in operating enterprises, 1920 ... acres	35,225	16,053	12,069	166,386	25,384	[1] 186,319	8,636	14,092	557,509
33	Improved land prior to drainage ... acres	13,664	9,292	5,819	...	8,506	[3] 86,763	2,811	11,126	233,989
34	Increase since drainage ... acres	21,561	6,761	6,250	166,386	16,878	99,556	5,825	2,966	323,520
35	Per cent of increase	157.8	72.8	107.4	...	198.4	114.7	207.2	26.7	138.3
36	Per cent increase is of all improved land in farms, 1920	5.6	3.2	1.6	41.5	2.5	51.2	4.8	1.2	38.4
37	Timber and cut-over land, 1920 ... acres	...	337	...	...	1,961	22,173	1,075	...	28,336
38	Timber and cut-over land prior to drainage ... acres	...	355	...	...	3,325	33,624	1,179	...	41,630
39	Decrease since drainage ... acres	...	18	...	...	1,364	11,451	104	...	13,294
40	Per cent of decrease	...	5.1	...	...	41.0	34.1	8.8	...	31.9
41	Other unimproved land, 1920 ... acres	9,759	12,276	4,665	113,638	23,210	141,132	6,516	742	251,416
42	Other unimproved land prior to drainage ... acres	31,320	19,019	10,915	280,024	38,724	229,237	12,237	3,708	561,642
43	Decrease since drainage ... acres	21,561	6,743	6,250	166,386	15,514	88,105	5,721	2,966	310,226
44	Per cent of decrease	68.8	35.5	57.3	59.4	40.1	38.4	46.8	80.0	55.2
45	Swampy or subject to overflow, 1920 ... acres	4,928	5,253	3,035	...	17,147	66,288	812	...	153,481
46	Swampy or subject to overflow prior to drainage ... acres	17,052	10,091	8,473	280,024	45,143	132,016	8,000	3,708	307,184
47	Decrease since drainage ... acres	12,124	4,838	5,438	280,024	27,996	65,728	7,188	3,708	153,703
48	Per cent of decrease	71.1	47.9	64.2	100.0	62.0	49.8	89.9	100.0	50.0
	CAPITAL INVESTED AND COST PER ACRE.									
49	Total capital invested in and required for completion of operating enterprises ... dollars	1,448,271	342,445	545,660	670,666	316,154	603,019	89,274	269,175	1,111,537
50	Capital invested in these enterprises to Dec. 31, 1919 ... dollars	1,343,220	332,762	510,331	670,666	316,154	603,019	89,274	219,175	1,102,337
51	Additional capital required to complete these enterprises ... dollars	105,051	9,683	35,329	...	...	...	...	50,000	9,200
52	Average cost per acre when completed ... dollars	32.20	11.95	32.61	2.40	6.25	1.72	5.50	18.15	1.33
53	Enterprises constructing open ditches only ... dollars	82,565	205,586	40,329	668,755	188,449	603,019	89,274	...	1,104,959
54	Average cost per acre when completed ... dollars	8.82	8.57	10.86	2.40	4.59	1.72	5.50	...	1.32
55	Enterprises constructing tile drains only ... dollars	823,622	71,370	130,834	...	2,159	...	...	...	...
56	Average cost per acre when completed ... dollars	43.25	21.30	31.35	...	44.06	...	...	...	...
57	Enterprises constructing open ditches and tile drains ... dollars	542,084	65,489	374,497	1,911	125,546	...	...	269,175	6,578
58	Average cost per acre when completed ... dollars	32.69	49.61	42.33	1.34	13.26	...	...	18.15	1.99
	CROPS.									
	Improved land in enterprises reporting—									
59	Wheat as principal crop on drained land ... acres	...	...	...	165,738	228	67,540	...	...	...
60	Hay as principal crop on drained land ... acres	...	4,256	...	...	25,156	113,903	8,636	...	237,600
61	Corn as principal crop on drained land ... acres	34,425	11,497	12,069	648	...	...	...	14,092	319,909
62	Oats as principal crop on drained land ... acres	...	300	...	...	...	4,876	...	...	...
63	Potatoes as principal crop on drained land ... acres	...	...	...	...	...	...	...	...	...
64	Flax as principal crop on drained land ... acres	...	...	...	...	...	...	...	...	...
65	Not reporting principal crop on drained land ... acres	800	...	...	...	...	...	...	...	...

[1] Office estimate; the reported figures exceed the improved acreage in all farms in the county as determined by the census of agriculture.
[2] When works under construction have been completed.
[3] The reported figures have been reduced in proportion to the reduction made in improved land, 1920.

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

		Pope.	Ramsey.	Red Lake.	Red-wood.	Renville.	Rice.	Roseau.	St. Louis.	Sher-burne.
	LAND AREA.									
1	Approximate land area of the county ... acres	443,520	103,040	276,480	563,840	625,920	316,800	1,068,800	4,161,920	286,720
2	All land in operating drainage enterprises ... acres	11,402	4,172	146,649	65,146	89,579	4,909	1,036,824	217,689	20,597
3	Improved land ... acres	7,676	1,866	77,468	40,844	61,816	3,078	[1] 210,948	23,134	11,674
4	Per cent of all improved land in farms	2.7	5.2	48.5	9.1	12.1	1.4	99.4	24.7	9.1
5	Timber and cut-over land ... acres	208	231	5,802	20	29	...	132,944	22,172	1,280
6	Other unimproved land ... acres	3,518	2,075	63,379	24,282	27,734	1,831	692,932	172,383	7,643
7	Swampy or subject to overflow, in enterprises ... acres	979	1,654	31,198	9,859	16,021	...	71,028	61,433	737
8	Suffering a loss of crops from defective drainage ... acres	1,484	282	5,665	15,738	17,408	1,183	99,739	903	...
9	Assessed acreage	11,402	4,172	172,553	65,146	93,785	4,909	1,036,824	217,689	20,597
10	Excess over all land in operating enterprisess ... acres	...	...	25,904	...	4,206	...	...	...	...
	DRAINAGE WORKS.									
	Open ditches:									
11	Completed ... miles	69.4	37.4	158.4	174.4	343.9	43.8	1,091.1	654.8	140.0
12	Additional under construction ... miles	0.1	5.1	...	2.7	0.3	...	...	3.2	...
13	Maximum completed in any enterprise ... miles	11.7	8.1	20.6	34.0	23.6	9.7	212.1	150.0	25.0
14	Maximum width at bottom of ditch [2] ... feet	20	8	12	24	25	20	60	24	6
15	Maximum of average depths of outlet ditches [2] ... feet	14.0	6.0	5.5	12.0	13.0	5.5	10.0	10.0	7.0
16	Mean depth of branch ditches [2] ... feet	3.8	3.5	3.7	4.3	4.0	4.0	5.0	5.5	3.6
	Tile drains:									
17	Completed ... miles	7.1	0.8	...	479.8	332.4	7.3	...	...	5.8
18	Additional under construction ... miles	0.6	...	...	63.8	38.3	...	...	...	1.0
19	Maximum completed in any enterprise ... miles	6.5	0.4	...	38.6	76.5	6.0	...	...	2.0
20	Maximum size of tile [2] ... inches	24	24	...	36	42	16	...	...	36
	Accessory levees and dikes:									
21	Completed ... miles	...	...	...	...	...	...	...	...	...
22	Additional under construction ... miles	...	...	...	...	...	...	...	...	...
23	Area drained by open ditches only [2] ... acres	10,822	3,885	146,649	3,403	47,257	3,237	1,036,824	217,689	16,465
24	Length of these ditches ... miles	67.9	40.2	158.4	25.7	261.3	33.4	1,091.1	658.0	105.0
25	Average length per acre ... feet	33.1	54.6	5.7	39.9	29.2	54.5	5.6	16.0	33.7
26	Area drained by tile only [2] ... acres	403	...	...	12,427	4,589	...	...	...	130
27	Length of these tile ... miles	6.5	...	...	154.6	58.4	...	...	...	2.0
28	Average length per acre ... feet	85.2	...	...	65.7	67.2	...	...	...	81.2
29	Area drained by open ditches and tile [2] ... acres	177	287	...	49,316	37,733	1,672	...	...	4,002
30	Length of these drains ... miles	2.8	3.1	...	540.4	395.2	17.7	...	...	39.8
31	Average length per acre ... feet	83.5	57.0	...	57.9	55.3	55.9	...	...	52.5
	DEVELOPMENT OF LAND.									
32	Improved land in operating enterprises, 1920 ... acres	7,676	1,866	77,468	40,844	61,816	3,078	[1] 210,948	23,134	11,674
33	Improved land prior to drainage ... acres	4,016	463	34,971	16,997	45,591	1,778	[3] 49,075	4,959	2,916
34	Increase since drainage ... acres	3,660	1,403	42,497	23,847	16,225	1,300	161,873	18,175	8,758
35	Per cent of increase	91.1	303.0	121.5	140.3	35.6	73.1	329.8	366.5	300.3
36	Per cent increase is of all improved land in farms, 1920	1.3	3.9	26.6	5.3	3.2	0.6	76.3	19.4	6.8
37	Timber and cut-over land, 1920 ... acres	208	231	5,802	20	29	...	132,944	22,172	1,280
38	Timber and cut-over land prior to drainage ... acres	726	371	9,629	31	94	...	132,944	24,227	2,759
39	Decrease since drainage ... acres	518	140	3,827	11	65	...	...	2,055	1,479
40	Per cent of decrease	71.3	37.7	39.7	35.5	69.1	...	...	8.5	53.6
41	Other unimproved land, 1920 ... acres	3,518	2,075	63,379	24,282	27,734	1,831	692,932	172,383	7,643
42	Other unimproved land prior to drainage ... acres	6,660	3,338	102,049	48,118	43,894	3,131	854,805	188,503	14,922
43	Decrease since drainage ... acres	3,142	1,263	38,670	23,836	16,160	1,300	161,873	16,120	7,279
44	Per cent of decrease	47.2	37.8	37.9	49.5	36.8	41.5	18.9	8.6	48.8
45	Swampy or subject to overflow, 1920 ... acres	979	1,654	31,198	9,859	16,021	...	71,028	61,433	737
46	Swampy or subject to overflow prior to drainage ... acres	5,055	4,059	54,131	24,386	38,561	1,401	829,458	186,209	9,937
47	Decrease since drainage ... acres	4,076	2,405	22,933	14,527	22,540	1,401	758,430	124,776	9,200
48	Per cent of decrease	80.6	59.3	42.4	59.6	58.5	100.0	91.4	67.0	92.6
	CAPITAL INVESTED AND COST PER ACRE.									
49	Total capital invested in and required for completion of operating enterprises ... dollars	124,912	86,857	188,572	1,895,940	1,875,171	102,191	1,768,122	1,033,797	176,302
50	Capital invested in these enterprises to Dec. 31, 1919 ... dollars	123,112	71,357	188,572	1,597,448	1,774,271	102,191	1,768,122	1,028,797	174,602
51	Additional capital required to complete these enterprises ... dollars	1,800	15,500	...	298,492	100,900	...	...	5,000	1,700
52	Average cost per acre when completed ... dollars	10.96	20.82	1.29	29.10	20.93	20.82	1.71	4.75	8.56
53	Enterprises constructing open ditches only ... dollars	100,064	77,020	188,572	39,372	418,130	52,880	1,768,122	1,033,797	100,083
54	Average cost per acre when completed ... dollars	9.25	19.82	1.29	11.57	8.85	16.34	1.71	4.75	6.08
55	Enterprises constructing tile drains only ... dollars	17,235	...	...	344,928	141,681	...	...	...	3,032
56	Average cost per acre when completed ... dollars	42.77	...	...	27.76	30.87	...	...	...	23.32
57	Enterprises constructing open ditches and tile drains ... dollars	7,613	9,837	...	1,511,640	1,315,360	49,311	...	...	73,187
58	Average cost per acre when completed ... dollars	43.01	34.28	...	30.65	34.86	29.49	...	...	18.29
	CROPS.									
	Improved land in enterprises reporting—									
59	Wheat as principal crop on drained land ... acres	5,950	...	4,859	...	60,773	...	210,948	...	...
60	Hay as principal crop on drained land ... acres	1,691	1,113	55,570	2,927	...	602	...	23,134	11,400
61	Corn as principal crop on drained land ... acres	...	26	...	37,917	1,043	2,476	...	...	130
62	Oats as principal crop on drained land ... acres	...	513	17,039	...	...	...	...	...	...
63	Potatoes as principal crop on drained land ... acres	...	169	...	...	...	...	...	...	144
64	Flax as principal crop on drained land ... acres	...	...	...	...	...	...	...	...	...
65	Not reporting principal crop on drained land ... acres	35	45	...	...	...	...	...	...	...

[1] Office estimate; the reported figures exceed the improved acreage in all farms in the county as determined by the census of agriculture.
[2] When works under construction have been completed.
[3] The reported figures have been reduced in proportion to the reduction made in improved land, 1920.

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

		Sibley.	Stearns.	Steele.	Stevens.	Swift.	Todd.	Traverse.	Wabasha.
	LAND AREA.								
1	Approximate land area of the county ... acres	374,400	871,680	275,840	360,960	474,240	612,480	363,520	346,240
2	All land in operating drainage enterprises ... acres	21,357	26,283	17,679	44,232	65,840	46,785	171,595	7,527
3	Improved land ... acres	9,837	21,760	12,373	26,857	50,429	18,394	156,906	4,892
4	Per cent of all improved land in farms	3.6	4.4	5.8	9.6	12.9	7.6	52.2	2.2
5	Timber and cut-over land ... acres	266	441						151
6	Other unimproved land ... acres	11,254	4,082	5,306	17,375	15,411	28,391	14,689	2,484
7	Swampy or subject to overflow, in enterprises ... acres	7,421	2,094		4,604	2,369			1,129
8	Suffering a loss of crops from defective drainage ... acres	2,038	1,215		1,599	3,599		22,441	
9	Assessed acreage	21,357	26,283	17,679	44,232	65,840	46,785	171,595	7,527
10	Excess over all land in operating enterprises ... acres								
	DRAINAGE WORKS.								
	Open ditches:								
11	Completed ... miles	201.3	197.4	81.0	99.8	100.6	359.2	194.9	2.5
12	Additional under construction ... miles	2.2			21.4		0.8		
13	Maximum completed in any enterprise ... miles	14.9	20.0	28.0	19.8	29.7	33.0	21.6	2.5
14	Maximum width at bottom of ditch [1] ... feet	20	10	20	20	50	20	16	30
15	Maximum of average depths of outlet ditches [1] ... feet	13.0	10.0	7.0	15.0	14.0	9.0	11.0	15.0
16	Mean depth of branch ditches [1] ... feet	3.7	4.0	3.9	5.0	5.1	3.3	3.4	
	Tile drains:								
17	Completed ... miles	9.2	9.5	32.0	89.2	270.7	1.0	3.1	
18	Additional under construction ... miles	50.8			4.2				
19	Maximum completed in any enterprise ... miles	3.1	3.0	17.0	18.3	153.0	1.0	1.6	
20	Maximum size of tile [1] ... inches	24	24	28	48	30	20	14	
	Accessory levees and dikes:								
21	Completed ... miles								
22	Additional under construction ... miles								
23	Area drained by open ditches only [1] ... acres	17,429	25,164	12,014	9,709	35,062	46,385	170,208	7,527
24	Length of these ditches ... miles	186.5	196.4	75.0	56.9	60.9	358.0	192.5	2.5
25	Average length per acre ... feet	56.5	41.2	33.0	30.9	9.2	40.8	6.0	1.8
26	Area drained by tile only [1] ... acres	474	884	2,172	11,479	4,247		712	
27	Length of these tile ... miles	6.2	6.5	14.0	45.4	41.0		1.6	
28	Average length per acre ... feet	69.1	38.8	34.0	20.9	51.0		11.9	
29	Area drained by open ditches and tile [1] ... acres	3,454	235	3,493	23,044	26,531	400	675	
30	Length of these drains ... miles	70.8	4.0	24.0	112.3	269.4	3.0	3.9	
31	Average length per acre ... feet	108.2	89.9	36.3	25.7	53.6	39.6	30.5	
	DEVELOPMENT OF LAND.								
32	Improved land in operating enterprises, 1920 ... acres	9,837	21,760	12,373	26,857	50,429	18,394	156,906	4,892
33	Improved land prior to drainage ... acres	2,152	8,179	1,688	15,060	26,000		153,606	1,505
34	Increase since drainage ... acres	7,685	13,581	10,685	11,797	24,429	18,394	3,300	3,387
35	Per cent of increase	357.1	166.0	633.0	78.3	94.0		2.1	225.0
36	Per cent increase is of all improved land in farms, 1920	2.8	2.7	5.0	4.2	6.2	7.6	1.1	1.5
37	Timber and cut-over land, 1920 ... acres	266	441						151
38	Timber and cut-over land prior to drainage ... acres	603	532			221	1,076		151
39	Decrease since drainage ... acres	337	91			221	1,076		
40	Per cent of decrease	55.9	17.1			100.0	100.0		
41	Other unimproved land, 1920 ... acres	11,254	4,082	5,306	17,375	15,411	28,391	14,689	2,484
42	Other unimproved land prior to drainage ... acres	18,602	17,572	15,991	29,172	39,619	45,709	17,989	5,871
43	Decrease since drainage ... acres	7,348	13,490	10,685	11,797	24,208	17,318	3,300	3,387
44	Per cent of decrease	39.5	76.8	66.8	40.4	61.1	37.9	18.3	57.7
45	Swampy or subject to overflow, 1920 ... acres	7,421	2,094		4,604	2,369			1,129
46	Swampy or subject to overflow prior to drainage ... acres	21,302	12,312	13,407	22,069	28,818	44,500		6,022
47	Decrease since drainage ... acres	13,881	10,218	13,407	17,465	26,449	44,500		4,893
48	Per cent of decrease	65.2	83.0	100.0	79.1	91.8	100.0		81.3
	CAPITAL INVESTED AND COST PER ACRE.								
49	Total capital invested in and required for completion of operating enterprises ... dollars	442,906	275,221	212,619	599,836	1,064,494	318,492	297,428	14,694
50	Capital invested in these enterprises to Dec. 31, 1919 ... dollars	207,622	275,221	212,619	564,136	1,064,494	318,492	297,428	14,694
51	Additional capital required to complete these enterprises ... dollars	235,284			35,700				
52	Average cost per acre when completed ... dollars	20.74	10.47	12.03	13.56	16.17	6.81	1.73	1.95
53	Enterprises constructing open ditches only ... dollars	177,863	240,556	107,901	157,652	228,608	313,889	292,907	14,694
54	Average cost per acre when completed ... dollars	10.21	9.56	8.98	16.24	6.52	6.77	1.72	1.95
55	Enterprises constructing tile drains only ... dollars	12,357	28,965	38,868	139,189	101,876		3,348	
56	Average cost per acre when completed ... dollars	26.07	32.77	17.90	12.13	23.99		4.70	
57	Enterprises constructing open ditches and tile drains ... dollars	252,686	5,700	65,850	302,995	734,010	4,603	1,173	
58	Average cost per acre when completed ... dollars	73.16	24.26	18.85	13.15	27.67	11.51	1.74	
	CROPS.								
	Improved land in enterprises reporting—								
59	Wheat as principal crop on drained land ... acres	3,646	10,256		26,857	50,429		156,906	
60	Hay as principal crop on drained land ... acres			7,574			18,394		
61	Corn as principal crop on drained land ... acres	6,191	11,504	4,799					
62	Oats as principal crop on drained land ... acres								[2] 4,892
63	Potatoes as principal crop on drained land ... acres								
64	Flax as principal crop on drained land ... acres								
65	Not reporting principal crop on drained land ... acres								

[1] When works under construction have been completed.

[2] Barley.

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

		Wadena.	Waseca.	Washington.	Watonwan.	Wilkin.	Wright.	Yellow Medicine.	Other counties.[1]
	LAND AREA.								
1	Approximate land area of the county ... acres	344,320	275,840	254,080	277,760	476,800	442,240	479,360	1,297,280
2	All land in operating drainage enterprises ... acres	51,937	10,076	8,804	15,158	237,948	13,362	12,775	12,220
3	Improved land ... acres	17,109	6,007	4,557	13,906	146,620	7,756	8,495	8,232
4	Per cent of all improved land in farms	16.7	3.1	2.9	6.2	37.6	3.0	2.2	1.0
5	Timber and cut-over land ... acres	2,707		850		4,029	852		516
6	Other unimproved land ... acres	32,121	4,069	3,397	1,252	87,299	4,754	4,280	3,472
7	Swampy or subject to overflow, in enterprises ... acres			2,765		36,713	1,652	2,978	3,135
8	Suffering a loss of crops from defective drainage ... acres			474		6,231	1,690	1,181	451
9	Assessed acreage	51,937	10,076	8,804	15,158	287,199	13,362	12,775	12,220
10	Excess over all land in operating enterprises ... acres					49,251			
	DRAINAGE WORKS.								
	Open ditches:								
11	Completed ... miles	172.8	59.0	25.5	20.0	283.2	94.2	31.9	74.0
12	Additional under construction ... miles	0.2				1.1		0.4	1.0
13	Maximum completed in any enterprise ... miles	30.0	12.0	12.5	6.0	40.5	11.0	7.7	19.6
14	Maximum width at bottom of ditch [2] ... feet	20	12	10	10	20	20	12	72
15	Maximum of average depths of outlet ditches [2] ... feet	6.0	6.0	7.2	7.0	8.0	9.0	8.4	10.8
16	Mean depth of branch ditches [2] ... feet	3.4	3.1	4.3	4.9	3.9	3.6	4.3	4.7
	Tile drains:								
17	Completed ... miles			6.0	182.0		24.0	51.5	18.8
18	Additional under construction ... miles							7.9	
19	Maximum completed in any enterprise ... miles			6.0	40.0		8.0	11.0	10.5
20	Maximum size of tile [2] ... inches			18	36		28	30	42
	Accessory levees and dikes:								
21	Completed ... miles								
22	Additional under construction ... miles								
23	Area drained by open ditches only [2] ... acres	51,937	10,076	8,110		237,948	11,125	3,986	8,878
24	Length of these ditches ... miles	173.0	59.0	23.5		284.3	81.7	24.6	74.3
25	Average length per acre ... feet	17.6	30.9	15.3		6.3	38.8	32.6	44.2
26	Area drained by tile only [2] ... acres				6,549		158	4,125	
27	Length of these tile ... miles				87.0		1.0	42.6	
28	Average length per acre ... feet				70.1		33.4	54.5	
29	Area drained by open ditches and tile [2] ... acres			694	8,609		2,079	4,664	3,342
30	Length of these drains ... miles			8.0	115.0		35.5	24.5	19.5
31	Average length per acre ... feet			60.9	70.5		90.2	27.7	30.8
	DEVELOPMENT OF LAND.								
32	Improved land in operating enterprises, 1920 ... acres	17,109	6,007	4,557	13,906	146,620	7,756	8,495	8,232
33	Improved land prior to drainage ... acres		574	571	398	104,150	1,540	597	3,487
34	Increase since drainage ... acres	17,109	5,433	3,986	13,508	42,470	6,216	7,898	4,745
35	Per cent of increase [3]		946.5	698.1		40.8	403.6		136.1
36	Per cent increase is of all improved land in farms, 1920	16.7	2.8	2.5	6.0	10.9	2.4	2.0	0.6
37	Timber and cut-over land, 1920 ... acres	2,707		850		4,029	852		516
38	Timber and cut-over land prior to drainage ... acres	3,761		1,409		4,868	969		673
39	Decrease since drainage ... acres	1,054		559		839	117		157
40	Per cent of decrease	28.0		39.7		17.2	12.1		23.3
41	Other unimproved land, 1920 ... acres	32,121	4,069	3,397	1,252	87,299	4,754	4,280	3,472
42	Other unimproved land prior to drainage ... acres	48,176	9,502	6,824	14,760	128,930	10,853	12,178	8,060
43	Decrease since drainage ... acres	16,055	5,433	3,427	13,508	41,631	6,099	7,898	4,588
44	Per cent of decrease	33.3	57.2	50.2	91.5	32.3	56.2	64.9	56.9
45	Swampy or subject to overflow, 1920 ... acres			2,765		36,713	1,652	2,978	3,135
46	Swampy or subject to overflow prior to drainage ... acres	50,607	8,902	8,804	10,600	95,339	7,320	12,346	8,740
47	Decrease since drainage ... acres	50,607	8,902	6,039	10,600	58,626	5,668	9,368	5,605
48	Per cent of decrease	100.0	100.0	68.6	100.0	61.5	77.4	75.9	64.1
	CAPITAL INVESTED AND COST PER ACRE.								
49	Total capital invested in and required for completion of operating enterprises ... dollars	164,543	81,715	58,217	450,516	741,575	217,897	227,128	449,285
50	Capital invested in these enterprises to Dec. 31, 1919 ... dollars	164,543	81,715	58,217	450,516	721,575	217,897	212,850	399,285
51	Additional capital required to complete these enterprises ... dollars					20,000		14,278	50,000
52	Average cost per acre when completed ... dollars	3.17	8.11	6.61	29.72	3.12	16.31	17.78	36.77
53	Enterprises constructing open ditches only ... dollars	164,543	81,715	41,490		741,575	138,614	19,474	343,555
54	Average cost per acre when completed ... dollars	3.17	8.11	5.12		3.12	12.46	4.89	38.70
55	Enterprises constructing tile drains only ... dollars				196,416		3,656	127,098	
56	Average cost per acre when completed ... dollars				29.99		23.14	30.81	
57	Enterprises constructing open ditches and tile drains ... dollars			16,727	254,100		75,627	80,556	105,730
58	Average cost per acre when completed ... dollars			24.10	29.52		36.38	17.27	31.64
	CROPS.								
	Improved land in enterprises reporting—								
59	Wheat as principal crop on drained land ... acres					89,485	1,045		
60	Hay as principal crop on drained land ... acres	17,109	6,007	3,812	2,529	57,135	4,757	568	1,265
61	Corn as principal crop on drained land ... acres			745	11,377		1,954	7,061	6,436
62	Oats as principal crop on drained land ... acres								531
63	Potatoes as principal crop on drained land ... acres								
64	Flax as principal crop on drained land ... acres							866	
65	Not reporting principal crop on drained land ... acres								

[1] Includes only Dakota, Houston, Rock, and Scott Counties.
[2] When works under construction have been completed.
[3] Per cent not shown when more than 1,000.

MISSISSIPPI.

The following pages present the statistics of drainage for Mississippi 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 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.

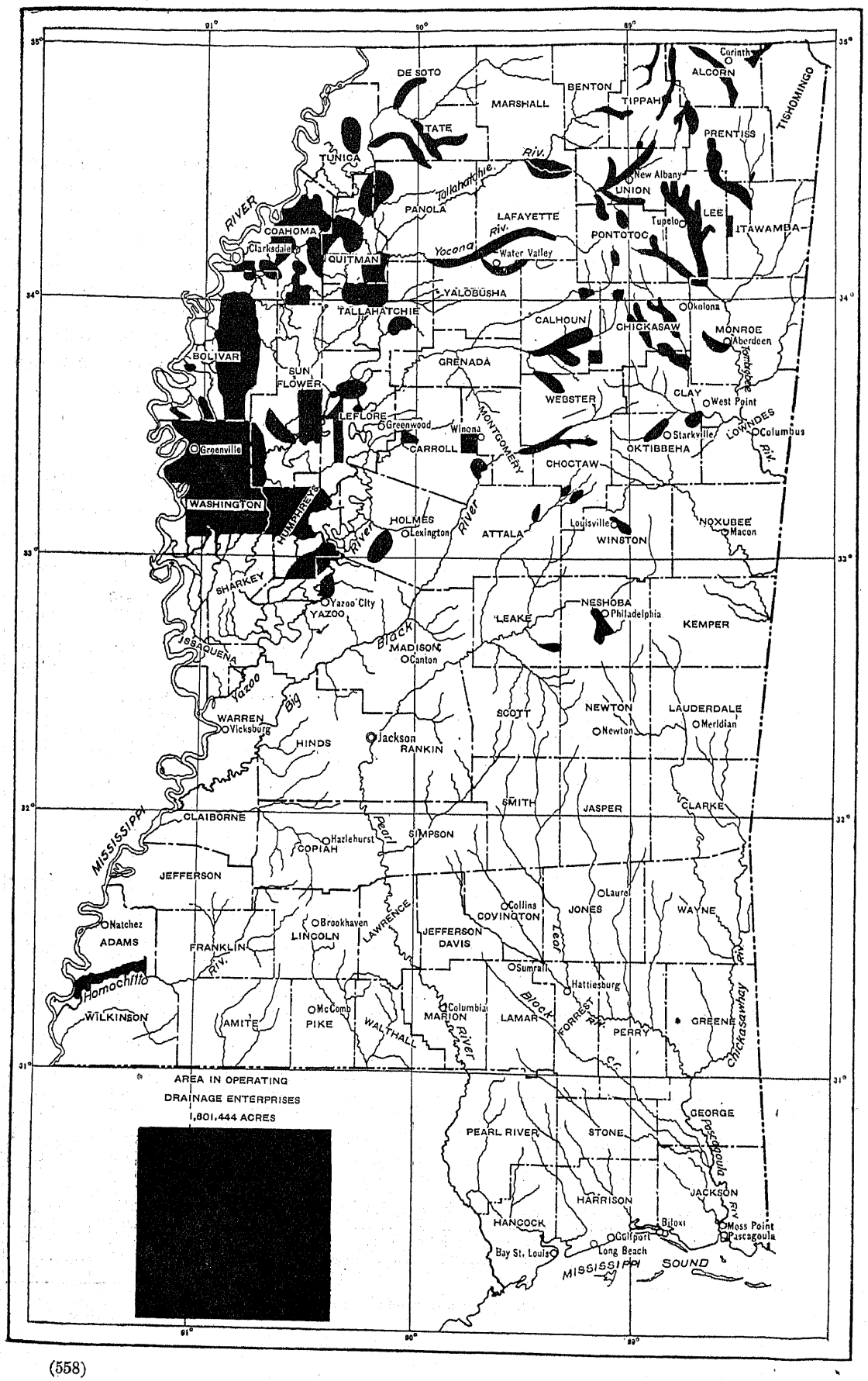
TABLE 1.—SUMMARY FOR THE STATE: 1920.

ITEM.	Amount.	Per cent of total.
DRAINAGE ON FARMS.		
Number of all farms in the state	272,101	100.0
Farms reporting land having drainage	34,926	12.8
Farms reporting land needing drainage	29,872	11.0
All land in farms ... acres	18,196,979	100.0
Improved land in farms ... acres	9,325,677	51.2
Farm land reported as provided with drainage ... acres	825,878	4.5
Farm land reported as needing drainage ... acres	1,455,534	8.0
Needing drainage only ... acres	151,179	0.8
Needing drainage and clearing ... acres	1,304,355	7.2
DRAINAGE ENTERPRISES.		
Approximate land area of the state ... acres	29,671,680	100.0
All land in operating drainage enterprises ... acres	1,601,444	5.4
Improved land ... acres	941,239	3.2
Per cent of all improved land in farms	10.1	.....
Timber and cut-over land ... acres	631,964	2.1
Other unimproved land ... acres	28,241	0.1
Swampy, subject to overflow, seeped, or alkali ... acres	261,126	0.9
Suffering a loss of crops from defective drainage ... acres	12,207	(1)
Improved land prior to drainage ... acres	506,828	1.7
Increase since drainage began ... acres	434,411	1.5
Land in nonoperating enterprises ... acres	277,557	0.9
Open ditches in operating enterprises ... miles	2,038.7	100.0
Completed ... miles	1,815.1	89.0
Additional under construction ... miles	223.6	11.0
Tile drains in operating enterprises ... miles	293.0	100.0
Completed ... miles	238.8	81.5
Additional under construction ... miles	54.2	18.5
Total capital invested in and required for completion of operating enterprises	$8,561,264	100.0
Capital invested in these enterprises to Dec. 31, 1919	7,076,164	82.7
Additional capital required to complete these enterprises	1,485,100	17.3
Average cost per acre when completed	5.35	.....

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

MISSISSIPPI

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 for which the order 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.[1]		
	Acreage.	Per cent of total.	To Dec. 31, 1919. Amount.	To Dec. 31, 1919. Per cent of total.	Additional required to complete.
All organized enterprises	1,879,001	100.0	$7,192,907	100.0	$4,060,333
Operating enterprises	1,601,444	85.2	7,076,164	98.4	1,485,100
With works completed	1,175,776	62.6	5,522,944	76.8	.....
With works under construction	425,668	22.7	1,553,220	21.6	1,485,100
Nonoperating enterprises	277,557	14.8	116,743	1.6	2,575,233

[1] 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.—Practically all of the drainage enterprises are in the northern half of the state, and about three-fourths of the land in such enterprises is situated in 10 counties near Mississippi River.

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. Amount.	To Dec. 31, 1919. Per cent of total.	Additional required to complete.
All organized enterprises	1,879,001	100.0	$7,192,907	100.0	$4,060,333
Operating enterprises	1,601,444	85.2	7,076,164	98.4	1,485,100
Pearl River	24,027	1.3	192,300	2.7	85,000
Tombigbee River	131,554	7.0	837,034	11.6	.....
Yazoo River	1,355,499	72.1	5,687,607	79.1	1,397,100
Tennessee River	3,900	0.2	34,000	0.5	.....
Mississippi River	86,464	4.6	325,223	4.5	3,000
Nonoperating enterprises	277,557	14.8	116,743	1.6	2,575,233
Pearl River	6,102	0.3	6,081	0.1	90,959
Pascagoula River	4,583	0.2	4,700	0.1	81,300
Tombigbee River	11,828	0.6	6,750	0.1	105,500
Yazoo River	235,447	12.5	87,212	1.2	2,201,883
Mississippi River	7,462	0.4	10,800	0.2	48,800
Gulf of Mexico	12,135	0.6	1,200	(1)	46,791

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

For both operating and nonoperating enterprises, approximately 85 per cent of the acreage is drained into Yazoo River.

Condition of land in enterprises.—The drainage enterprises in the region between Yazoo and Mississippi Rivers are principally for the reclamation of level swamp areas. This region is of alluvial formation, and was subject to inundation by overflow from the Mississippi until construction of the extensive system of levees along that stream. Storm run-off from the higher rolling land on the east also overflowed parts of the delta land. The characteristic high banks of the natural watercourses greatly interfere with drainage of the surface water into the channels that exist. In the counties east of Yazoo River, the drainage problem generally is one of relieving the bottom land along the streams from overflow by floods of short duration.

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. Acreage.	Total. Per cent of all land.	Works completed (acres).	Works under construction (acres).	
All land in enterprises	1,601,444	100.0	1,175,776	425,668	277,557
Improved land	941,239	58.8	768,105	173,134	107,852
Timber and cut-over land	631,964	39.5	383,633	248,331	137,496
Other unimproved land	28,241	1.8	24,038	4,203	32,209
Swampy or subject to overflow	261,126	16.3	210,422	50,704	108,211
Suffering a loss of crops	12,207	0.8	7,167	5,040	948

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, 167 operating drainage enterprises are counted in Mississippi, with an average area of 9,608 acres assessed. The assessed acreage exceeds the land in enterprises by 3,040 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 acreage, deduction was made for the amount of overlapping with enterprises organized previously, to determine the acreage to be tabulated as land in enterprises.

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	1,601,444	1,604,484	100.0
200 to 499 acres	1,894	1,894	0.1
500 to 999 acres	8,989	9,789	0.6
1,000 to 4,999 acres	199,000	201,240	12.5
5,000 to 9,999 acres	157,416	157,416	9.8
10,000 to 49,999 acres	664,285	664,285	41.4
50,000 to 99,999 acres	320,400	320,400	20.0
100,000 to 499,999 acres	249,460	249,460	15.5

Character of enterprises.—The drainage enterprises in Mississippi are swamp land districts and drainage districts established by the county boards of supervisors, by the chancery courts, or by county boards of drainage commissioners in accordance with the general drainage laws of the state, and private undertakings by individual landowners.

Swamp land districts for the reclamation of wet, swamp, or overflowed land are formed in accordance with an act of February 19, 1902 (ch. 70), which now forms sections 371 to 391 (ch. 17) of the Mississippi Code of 1906 of the public statute laws. A petition for establishment, signed by a majority of the resident landowners owning at least one-third of the land to be drained, is filed with the board of supervisors of the county where the proposed district is situated. Three commissioners named in the petition determine what land will be drained by the same system of connecting channels, and the county supervisors may decree the district established. A special tax upon the district is levied by the supervisors, not exceeding 50 cents per acre in any year, and when a sufficient amount has been collected the commissioners let contracts for constructing the drains. Right of way may be obtained by condemnation. Upon petition from one-third of the landowners, the county supervisors may issue bonds in anticipation of the full amount of taxes authorized to be levied for not exceeding 30 years.

Drainage districts may be established by the county boards of supervisors under a law of March 1, 1912 (ch. 195), or under one of March 16, 1912 (ch. 198). The former act, as amended, requires that a petition for establishment be signed by 10 per cent of the landowners in the proposed district. The supervisors appoint an engineer, and may appoint three temporary commissioners also, to make a report as to the land that will be benefited and the probable cost of the drainage improvements. Hearings are held upon the petition and upon the engineer's report, before the supervisors decree the district established. The executive officers of the enterprise are three commissioners appointed by the board of supervisors, though the selection may be determined by petition signed by a majority of the landowners. The plan of drainage works and the assessments of damages and benefits are made by the commissioners, the assessments being subject to confirmation by the board of supervisors and to appeal to the chancery court. The assessments for cost are made by the county supervisors against the real property in the district, in proportion to the benefits. Bonds may be issued by the commissioners to run not more than 30 years. For a district in more than one county, proceedings are before the chancery court instead of the county supervisors. Subdistricts may be formed in accordance with an act of February 26, 1914 (ch. 269), wholly or partly within a drainage district organized under the act of March 1, 1912 (ch. 195). The manner of establishment is similar to that for an original district, but the petition must be signed by one-third of the landowners owning a majority of the acreage or by a majority of the owners owning a third of the acreage or real property. The commissioners of the main district serve also for the subdistrict. An independent district may be formed wholly or partly within another district, under the statute of 1914, upon petition similar to that required for a subdistrict.

The establishment of a drainage district under the act of March 16, 1912 (ch. 198), requires a petition to the county supervisors from a majority of the resident landowners who shall own one-third of the land. Three commissioners named in the petition are the officers of the district to determine the plan of drainage and to assess damages if any are claimed. The cost of construction has been paid by a uniform tax upon the land benefited. However, three-fourths of the owners holding half or more of the land may petition for assessments according to benefits, and then the commissioners must divide the land into five classes to be assessed, per acre, in the ratio 5:4:3:2:1. Public hearings are held upon the petition and upon the commissioners' plan of improvement, and appeals regarding classification of the land may be taken to the chancery court. Rights of way may be condemned. Bonds may be issued upon petition from a majority of the landowners owning a majority of the acreage, to be paid by special tax levies not exceeding $1 per acre in any year.

Drainage districts under the chancery courts, except intercounty districts formed under the act of March 1, 1912, are established in accordance with a law of April 12, 1906 (ch. 132), which is now chapter 39 of the Mississippi Code of 1906. This statute as amended provides for a board of three drainage commissioners for the county, to be elected by the drainage taxpayers of the county, if 20 per cent of the owners of real property affected by constructed or proposed drainage works petition for such commissioners. Before 1916, this board was elected by the county supervisors when petition for the first drainage district had been approved by the chancery court. Petition for a district

under this law must be filed with the chancery court of the county containing the greatest part of the proposed district, signed by a majority of the landowners owning at least one-third of the land to be affected or by one-third of the owners holding a majority of the acreage. The drainage commissioners investigate regarding the practicability of the project, and after public hearing upon their report the chancery court may decree the district established. The commissioners determine the plan of drainage, and assess damages and benefits subject to confirmation by the court after public hearing. Rights of way may be secured as in eminent domain cases. Bonds may be issued by the commissioners, payable in 1 to 20 years.

An act of March 13, 1912 (ch. 197), also provides for a county board of three drainage commissioners for each county embracing all or a part of one or more drainage districts, to have jurisdiction over all such districts within the county organized under this act. These commissioners are appointed by the chancellors of the chancery districts. Petition for establishment of the drainage district must be signed by 10 per cent of the landowners of the proposed district, in number, acreage, or value, and be filed with the clerk of the chancery court of the county containing the greater part of that district. If the petition is sufficient, the county drainage commissioners refer it to three district drainage commissioners whom they appoint to investigate regarding the feasibility and utility of the project. The district is established by the county drainage commissioners after public hearing upon the district commissioners' report, if the proposed work will be beneficial to the landowners. The county drainage commissioners are the corporate authority of the district. The cost of the enterprise is apportioned against the tracts of land in proportion to benefits. Damages and benefits are assessed by the district commissioners and confirmed by the county drainage commissioners, subject to appeal to the chancery court. Rights of way may be obtained by proceedings before the courts of eminent domain. Bonds may be issued by the county commissioners for not exceeding 30 years.

A private drain may be constructed across land of an objecting owner, if necessary, by petition to the county supervisors and payment of damages assessed, under an act of March 15, 1918 (ch. 206).

The first drainage law of Mississippi was passed in 1886, applicable only in Lee County, authorizing the county supervisors to drain swamp and overflowed land upon petition from the owners of a majority of the acreage. A law of February 11, 1898 (ch. 39), authorized the issue of bonds for reclamation work upon petition from landowners, by counties having authority to levy taxes on swamp and overflowed land. An act of March 6, 1900, applicable in all counties, was similar to the swamp land district act of 1902, which repealed both the act of 1900 and that of 1898. A few counties were excepted from the provisions of chapter 39 of the Code of 1906 until 1912. Of the many amendments to the drainage laws of the state, the few that affect the character of the enterprises have been incorporated in the foregoing statement.

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. Amount.	To Dec. 31, 1919. Per cent of total.	Additional required to complete.
All organized enterprises	1,879,001	100.0	$7,192,907	100.0	$4,060,333
Operating enterprises	1,601,444	85.2	7,076,164	98.4	1,485,100
Swamp land districts:					
Code of 1906, ch. 17	305,018	16.2	1,221,609	17.0	3,000
Drainage districts:					
Code of 1906, ch. 39	540,567	28.8	2,652,761	36.9	68,000
Laws of 1912, ch. 195	652,202	34.7	2,330,078	32.4	1,056,500
Laws of 1912, ch. 197	41,498	2.2	291,216	4.0	95,600
Laws of 1912, ch. 198	5,409	0.3	49,500	0.7	.....
Individual ownerships	56,750	3.0	531,000	7.4	262,000
Nonoperating enterprises	277,557	14.8	116,743	1.6	2,575,233
Drainage districts:					
Code of 1906, ch. 39	31,062	1.7	19,800	0.3	254,800
Laws of 1912, ch. 195	240,753	12.8	92,481	1.3	2,244,895
Laws of 1912, ch. 197	5,742	0.3	4,462	0.1	75,538

Drainage works.—The total works completed by the drainage enterprises to December 31, 1919, comprised 1,815.1 miles of open ditches, 238.8 miles of tile drains, and 6.7 miles of accessory levees; the additional lengths under construction were 223.6 miles of ditches, 54.2 miles of tile drains, and 36.8 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 pumping district for land drainage among the enterprises under construction in Mississippi. Part of the drainage water from 44,000 acres is to be removed by two centrifugal pumps of 78,000 gallons per minute capacity, operated by internal-combustion engines capable of developing 250 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. Amount.	To Dec. 31, 1919. Per cent of total.	Additional required to complete.
All kinds	1,601,444	100.0	$7,076,164	100.0	$1,485,100
Open ditches only	1,274,464	79.6	5,846,352	82.6	974,600
Open ditches and levees	279,230	17.4	768,812	10.9	368,500
Open ditches and tile drains[1]	47,750	3.0	461,000	6.5	142,000

[1] Includes 8,300 acres drained by tile only.

TABLE 8.—LAND AND CAPITAL INVESTED IN OPERATING ENTERPRISES, CLASSIFIED BY TYPE OF DRAINAGE: 1920.

TYPE OF DRAINAGE.	LAND.		CAPITAL.		
			To Dec. 31, 1919.		
	Acreage.	Per cent of total.	Amount.	Per cent of total.	Additional required to complete.
All operating enterprises	1,601,444	100.0	$7,076,164	100.0	$1,485,100
Gravity drainage only	1,504,044	93.9	6,691,064	94.6	1,160,100
Part gravity and part pumping	97,400	6.1	385,100	5.4	325,000
Total area served by pumps	44,000	2.7	.....	.....	.....

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 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 and those 10 feet and greater were omitted as it seemed they do not represent so well the average depths of outlet provided for all the farms in those districts; to include these groups, computed as 3 feet and 10 feet, respectively, would show the mean depth for the state 6.9 instead of 6.8 feet.

TABLE 9.—LAND IN OPERATING ENTERPRISES, CLASSIFIED BY AVERAGE DEPTH OF BRANCH DITCHES: 1920.

DEPTH OF BRANCH DITCHES.	Acreage.	Per cent of total.
All operating enterprises	1,601,444	100.0
Less than 3 feet	2,000	0.1
3.0 to 3.9 feet	30,600	1.9
4.0 to 4.9 feet	41,758	2.6
5.0 to 5.9 feet	43,248	2.7
6.0 to 6.9 feet	413,980	25.9
7.0 to 7.9 feet	127,365	8.0
8.0 to 8.9 feet	471,362	29.4
9.0 to 9.9 feet	.....	.....
10 feet and more	65,000	4.1
Not reporting branches	406,131	25.4

Maintenance of works.—The statutes provide for maintenance of the improvement works of all the public drainage enterprises in Mississippi. The county supervisors are charged with protecting and keeping in repair the drainage works of swamp land districts organized under chapter 17 of the Code of 1906, and are authorized to levy assessments against the districts to pay for that work. The commissioners of drainage districts established under chapters 195 and 198 of the laws of 1912 are authorized to borrow money to pay for maintenance of the drainage works, payment to be made from taxes levied against the districts by county supervisors. In districts under chapter 195, notice and hearing must be given before any levy is made; in those under chapter 198, the levy must not exceed 25 cents per acre in any year. Chapter 39 of the Code of 1906 provides that the boards of drainage commissioners may do any and all acts necessary in repairing and maintaining any drain or other work for which they have been appointed, and may make additional assessments to pay the cost involved. For districts formed in accordance with chapter 197 of the laws of 1912, the district drainage commissioners may, with the approval of the county board of drainage commissioners, do anything necessary for repairing and maintaining the works of the district, and the county supervisors shall levy taxes against the districts each year, if requested by the drainage commissioners, to pay for the maintenance work. The county board of drainage commissioners supervises the maintenance of the districts in case there are no district drainage commissioners.

TABLE 10.—LAND AND CAPITAL INVESTED IN OPERATING ENTERPRISES, CLASSIFIED BY METHOD OF MAINTENANCE: 1920.

METHOD OF MAINTENANCE.	LAND.		CAPITAL.		
			To Dec. 31, 1919.		
	Acreage.	Per cent of total.	Amount.	Per cent of total.	Additional required to complete.
All operating enterprises	1,601,444	100.0	$7,076,164	100.0	$1,485,100
By district forces	778,767	48.6	3,295,081	46.6	1,009,600
By contract	460,185	28.7	2,151,353	30.4	20,000
By landowners	45,920	2.9	481,000	6.8	242,000
No maintenance provided	316,572	19.8	1,148,730	16.2	213,500

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 by the county supervisors or drainage 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 any extensions made after the original plan of reclamation was completed.

TABLE 11.—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	1,601,444	100.0	1,604,484	100.0
1890 to 1899	3,950	0.2	3,950	0.2
1900 to 1904	11,929	0.7	11,929	0.7
1905 to 1909	244,013	15.2	246,053	15.3
1910 to 1914	907,062	56.6	907,062	56.5
1915 to 1919	434,490	27.1	435,490	27.1

TABLE 12.—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	$7,076,164	100.0	$1,485,100
1890 to 1899	96,000	1.4	56,000
1900 to 1904	208,000	2.9	50,000
1905 to 1909	878,090	12.4	26,000
1910 to 1914	4,211,398	59.5	180,000
1915 to 1919	1,682,676	23.8	1,173,100

TABLE 13.—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	2,038.7	100.0	293.0	100.0	43.5	100.0
1890 to 1899	20.0	1.0	32.0	10.9	.....	.....
1900 to 1904	52.0	2.6	52.0	17.7	.....	.....
1905 to 1909	234.5	11.5	93.0	31.7	.....	.....
1910 to 1914	1,143.3	56.1	84.0	28.7	6.5	14.9
1915 to 1919	588.9	28.9	32.0	10.9	37.0	85.1

Crops.—The principal crops grown upon the drained land in the drainage enterprises are cotton 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.

COUNTY TABLE I.—DRAINAGE ON FARMS: 1920.

		THE STATE.	Alcorn.	Amite.	Attala.	Benton.	Bolivar.	Calhoun.	Carroll.	Chickasaw.
1	Number of all farms in the state or county	272,101	2,901	3,148	4,024	1,904	12,808	3,266	3,963	3,055
2	Farms reporting land having drainage	34,926	1,090	259	242	260	2,265	424	273	593
3	Farms reporting land needing drainage	29,872	927	657	1,052	268	166	698	153	335
4	Farms in drainage and levee districts	13,496	335	1	26	62	1,673	343	66	155
	LAND AND FARM AREA.									
5	Approximate land area of the state or county ... acres	29,671,680	247,040	456,960	457,600	253,440	562,560	370,560	399,360	320,640
6	All land in farms ... acres	18,196,979	198,752	287,305	385,388	201,077	326,311	281,401	341,306	241,907
7	Improved land in farms ... acres	9,325,677	91,553	126,201	184,716	70,215	291,324	112,329	168,718	140,597
8	Woodland in farms ... acres	7,014,898	92,553	145,169	141,721	89,346	29,041	126,478	116,222	63,651
9	Other unimproved land in farms ... acres	1,856,404	14,646	15,935	58,951	41,516	5,946	42,594	56,366	37,659
10	Farm land reported as provided with drainage ... acres	825,878	32,972	9,785	6,004	4,435	47,668	14,239	13,090	17,466
11	Farm land reported as needing drainage ... acres	1,455,534	37,618	46,279	49,440	12,615	2,348	41,538	14,578	13,565
12	Drainage only ... acres	151,179	3,349	1,988	5,368	1,360	1,385	1,406	6,979	1,905
13	Drainage and clearing ... acres	1,304,355	34,269	44,291	44,072	11,255	963	40,132	7,599	11,660

		Choctaw.	Claiborne.	Clay.	Coahoma.	Copiah.	Covington.	De Soto.	Harrison.	Hinds.	Holmes.	Humphreys.
1	Number of all farms in the county	2,188	2,154	2,793	8,628	4,349	2,151	4,858	720	5,951	6,240	3,695
2	Farms reporting land having drainage	335	144	254	888	101	51	128	36	555	1,176	379
3	Farms reporting land needing drainage	702	321	83	57	200	215	210	55	812	244	33
4	Farms in drainage and levee districts	126	7	4	701	1	.....	32	4	.....	13	372
	LAND AND FARM AREA.											
5	Approximate land area of the county ... acres	264,960	312,960	261,120	339,200	492,160	262,400	304,000	364,800	549,120	480,640	261,120
6	All land in farms ... acres	228,010	244,556	180,737	212,023	377,399	179,288	229,480	55,746	391,016	353,399	122,445
7	Improved land in farms ... acres	75,416	113,488	127,641	185,614	210,712	68,127	173,794	11,578	269,816	212,052	97,452
8	Woodland in farms ... acres	124,750	102,384	48,431	25,767	146,031	107,783	37,383	37,032	73,565	98,951	21,870
9	Other unimproved land in farms ... acres	27,844	28,684	4,665	642	20,656	3,378	18,303	7,136	47,635	42,396	3,123
10	Farm land reported as provided with drainage ... acres	9,496	2,238	7,345	15,662	1,930	539	2,757	648	7,766	18,265	8,874
11	Farm land reported as needing drainage ... acres	52,790	13,692	5,224	3,923	12,226	9,054	6,117	1,797	30,341	10,805	5,292
12	Drainage only ... acres	3,384	2,631	860	561	996	350	104	345	2,401	1,744	26
13	Drainage and clearing ... acres	49,406	11,061	4,364	3,362	11,230	8,704	6,013	1,452	27,940	9,061	5,266

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

		Issaquena.	Itawamba.	Jackson.	Jasper.	Jones.	Lafayette.	Lauderdale.	Leake.	Lee.	Leflore.	Lowndes
1	Number of all farms in the county	1,914	3,064	688	2,790	2,666	3,388	3,076	3,492	4,768	5,967	3,020
2	Farms reporting land having drainage	800	991	23	137	295	36	163	206	1,322	961	198
3	Farms reporting land needing drainage	396	1,463	49	326	1,191	292	159	863	450	200	317
4	Farms in drainage and levee districts	787	186	.....	1	5	41	.....	34	597	502	3
	LAND AND FARM AREA.											
5	Approximate land area of the county ... acres	259,840	338,560	454,400	426,880	445,440	424,960	448,000	368,640	286,720	366,080	319,360
6	All land in farms ... acres	96,379	261,029	97,078	274,615	229,259	310,373	271,573	264,502	238,358	209,976	246,537
7	Improved land in farms ... acres	54,697	90,701	14,566	100,211	76,400	129,967	109,730	108,461	149,002	166,733	159,947
8	Woodland in farms ... acres	38,388	137,392	55,662	150,194	131,876	127,563	131,614	108,097	49,464	37,168	69,680
9	Other unimproved land in farms ... acres	3,294	32,936	26,850	24,210	20,983	52,843	30,229	47,944	39,892	6,075	16,910
10	Farm land reported as provided with drainage ... acres	16,805	12,935	517	1,078	1,621	1,377	1,794	2,675	27,385	24,092	6,795
11	Farm land reported as needing drainage ... acres	15,835	51,606	4,198	14,812	62,466	13,645	6,473	42,730	13,366	18,807	21,402
12	Drainage only ... acres	7,650	1,116	18	1,558	865	1,497	1,975	4,144	459	3,878	5,796
13	Drainage and clearing ... acres	8,185	50,490	4,180	13,254	61,601	12,148	4,498	38,586	12,907	14,929	15,606

		Madison.	Monroe.	Montgomery.	Neshoba.	Newton.	Noxubee.	Oktibbeha.	Panola.	Perry.	Pike.	Pontotoc.
1	Number of all farms in the county	5,260	5,026	1,988	3,054	3,237	4,242	2,816	4,900	834	2,689	3,934
2	Farms reporting land having drainage	36	436	289	831	561	375	224	211	48	558	1,697
3	Farms reporting land needing drainage	279	594	268	805	956	199	384	494	111	764	967
4	Farms in drainage and levee districts	.....	8	31	87	3	.....	20	186	.....	138	585
	LAND AND FARM AREA.											
5	Approximate land area of the county ... acres	464,000	492,800	254,720	359,040	363,520	436,480	292,480	445,440	412,160	260,480	316,160
6	All land in farms ... acres	347,366	395,013	197,696	240,694	283,054	303,740	217,188	320,654	90,774	207,995	274,007
7	Improved land in farms ... acres	249,767	205,431	88,830	103,552	128,963	210,844	128,028	202,567	22,306	85,912	139,805
8	Woodland in farms ... acres	62,207	168,416	73,321	117,027	140,024	75,016	73,584	81,513	51,056	118,239	87,540
9	Other unimproved land in farms ... acres	35,392	21,166	35,545	20,115	14,067	17,880	15,576	36,574	17,412	3,844	46,662
10	Farm land reported as provided with drainage ... acres	2,453	13,429	11,453	14,784	8,772	13,487	7,402	4,946	515	13,824	37,475
11	Farm land reported as needing drainage ... acres	9,070	34,741	15,306	25,148	44,862	15,694	22,771	22,984	4,526	20,815	37,509
12	Drainage only ... acres	4,527	6,781	4,713	2,952	5,276	4,169	2,564	2,496	50	635	5,421
13	Drainage and clearing ... acres	4,543	27,960	10,593	22,196	39,586	11,525	20,207	20,488	4,476	20,180	32,088

		Prentiss.	Quitman.	Rankin.	Scott.	Sharkey.	Simpson.	Smith.	Sunflower.	Tallahatchie.	Tate.	Tippah.
1	Number of all farms in the county	3,144	4,315	3,231	2,248	3,142	2,522	2,695	9,668	6,495	3,955	2,702
2	Farms reporting land having drainage	1,431	139	109	67	807	658	561	3,116	549	170	497
3	Farms reporting land needing drainage	993	204	520	383	77	776	736	146	387	166	300
4	Farms in drainage and levee districts	410	92	2	8	828	1	.....	836	2	89	249
	LAND AND FARM AREA.											
5	Approximate land area of the county ... acres	261,760	252,800	506,240	382,080	270,080	368,000	400,640	431,360	402,560	256,000	285,440
6	All land in farms ... acres	219,708	123,590	296,455	207,357	78,936	187,350	227,734	261,519	281,743	194,587	256,480
7	Improved land in farms ... acres	100,678	102,128	134,238	92,220	68,724	82,927	91,206	220,497	174,478	138,753	107,222
8	Woodland in farms ... acres	89,218	19,768	133,436	98,449	9,766	94,801	116,525	38,074	58,849	33,701	110,354
9	Other unimproved land in farms ... acres	29,812	1,694	28,781	16,688	446	9,622	20,003	2,948	48,416	22,133	38,904
10	Farm land reported as provided with drainage ... acres	26,816	1,537	4,210	852	16,681	16,166	9,438	67,929	12,815	6,253	10,833
11	Farm land reported as needing drainage ... acres	23,392	9,179	43,204	17,657	4,665	42,072	30,423	6,996	7,445	4,497	9,003
12	Drainage only ... acres	2,131	605	7,317	2,506	368	1,161	3,220	1,322	595	400	655
13	Drainage and clearing ... acres	21,261	8,574	35,887	15,151	4,297	40,911	27,203	5,674	6,850	4,097	8,348

		Tishomingo.	Tunica.	Union.	Washington.	Wayne.	Webster.	Wilkinson.	Winston.	Yalobusha.	Yazoo.	All other counties.[1]
1	Number of all farms in the county	2,250	4,936	3,519	9,281	1,828	2,221	2,436	2,814	2,594	6,663	37,833
2	Farms reporting land having drainage	412	805	1,350	2,863	147	453	118	117	504	97	105
3	Farms reporting land needing drainage	559	154	1,225	145	225	377	244	823	828	19	1,870
4	Farms in drainage and levee districts	.....	859	488	2,292	2	83	.....	14	63	.....	43
	LAND AND FARM AREA.											
5	Approximate land area of the county ... acres	273,920	267,520	263,680	462,720	519,680	266,240	426,880	382,080	313,600	579,200	6,902,400
6	All land in farms ... acres	189,089	164,449	224,685	316,932	196,384	215,809	234,868	259,745	238,755	409,532	3,195,866
7	Improved land in farms ... acres	65,158	117,239	109,132	230,317	57,017	86,259	107,760	101,325	102,813	243,581	1,334,242
8	Woodland in farms ... acres	113,671	33,632	69,642	69,319	132,996	105,006	98,309	131,906	92,716	132,913	1,518,678
9	Other unimproved land in farms ... acres	10,260	13,578	45,911	17,296	6,371	24,544	28,799	26,514	43,226	33,038	342,946
10	Farm land reported as provided with drainage ... acres	7,313	21,585	34,210	86,118	3,316	12,997	8,934	2,482	23,429	3,794	1,377
11	Farm land reported as needing drainage ... acres	24,517	19,022	25,461	24,373	15,071	30,169	17,509	58,336	47,675	848	106,012
12	Drainage only ... acres	2,107	4,647	1,245	4,788	399	1,689	503	1,706	4,274	405	3,454
13	Drainage and clearing ... acres	22,410	14,375	24,216	19,585	14,672	28,480	17,006	56,630	43,401	443	102,558

[1] No drainage on farms reported in Adams, Clarke, Greene, Jefferson Davis, Marion, Pearl River, Walthall, and Warren Counties.

COUNTY TABLE II.—OPERATING DRAINAGE ENTERPRISES: 1920.

		THE STATE.	Adams.	Alcorn.	Attala.	Benton.	Bolivar.	Calhoun.	Carroll.	Chickasaw.
	LAND AREA.									
1	Approximate land area of the state or county ... acres	29,671,680	272,640	247,040	457,600	253,440	562,560	370,560	399,360	320,640
2	All land in operating drainage enterprises ... acres	1,601,444	29,183	26,883	4,798	4,000	184,896	29,852	8,200	22,218
3	Improved land ... acres	941,239	5,253	13,102	1,919	1,600	125,386	12,972	6,960	19,052
4	Per cent of all improved land in farms	10.1	6.4	14.3	1.0	2.3	43.0	11.5	4.1	13.6
5	Timber and cut-over land ... acres	631,964	23,930	13,781	2,879	2,400	44,426	16,880	1,240	3,166
6	Other unimproved land ... acres	28,241					15,084			
7	Swampy or subject to overflow, in enterprises ... acres	261,126	29,183	26,600	2,880		19,950			170
8	Suffering a loss of crops from defective drainage ... acres	12,207					5,040			
9	Assessed acreage	1,604,484	29,183	26,883	4,798	4,000	184,896	29,852	8,200	22,218
10	Excess over all land in operating enterprises ... acres	3,040								
	DRAINAGE WORKS.									
	Open ditches:									
11	Completed ... miles	1,815.1	3.8	66.2	10.0	8.5	139.7	31.0	9.8	54.5
12	Additional under construction ... miles	223.6	1.2				16.8			
13	Maximum completed in any enterprise ... miles	121.0	3.8	38.0	10.0	8.5	50.0	12.0	7.5	15.0
14	Maximum width at bottom of ditch [1] ... feet	120	8	20	21	8	60	30	30	20
15	Maximum of average depths of outlet ditches [1] ... feet	20.0	19.0	9.0	15.0	8.0	11.0	10.0	15.0	8.0
16	Mean depth of branch ditches [1] ... feet	6.8		6.0			5.7	7.0		5.3
	Tile drains:									
17	Completed ... miles	238.8					80.0			
18	Additional under construction ... miles	54.2					3.5			
19	Maximum completed in any enterprise ... miles	80.0					80.0			
20	Maximum size of tile [1] ... inches	36					36			
	Accessory levees and dikes:									
21	Completed ... miles	6.7								
22	Additional under construction ... miles	36.8								
	Pumping plants:									
23	Engine capacity ... horsepower	250								
24	Pump capacity ... gallons per minute	78,000								
25	Area served by pumps ... acres	44,000								
26	Area drained by open ditches only [1] ... acres	1,274,464	29,183	26,883	4,798	4,000	171,596	29,852	8,200	22,218
27	Length of these ditches ... miles	1,685.1	5.0	66.2	10.0	8.5	114.5	31.0	9.8	54.5
28	Average length per acre ... feet	7.0	0.9	13.0	11.0	11.2	3.5	5.5	6.3	13.0
29	Area having open ditches and levees [1] ... acres	279,230								
30	Length of these ditches ... miles	259.1								
31	Average length per acre ... feet	4.9								
32	Length of the accessory levees ... miles	43.5								
33	Area drained by open ditches and tile [1] ... acres	[2] 47,750					13,300			
34	Length of these drains ... miles	337.5					125.5			
35	Average length per acre ... feet	42.8					49.8			
	DEVELOPMENT OF LAND.									
36	Improved land in operating enterprises, 1920 ... acres	941,239	5,253	13,102	1,919	1,600	125,386	12,972	6,960	19,052
37	Improved land prior to drainage ... acres	506,828	5,253	4,542	960	800	74,568	3,963	3,100	13,142
38	Increase since drainage ... acres	434,411		8,560	959	800	50,818	9,009	3,860	5,910
39	Per cent of increase	85.7		188.5	99.9	100.0	68.1	227.3	124.5	45.0
40	Per cent increase is of all improved land in farms, 1920	4.7		9.3	0.5	1.1	17.4	8.0	2.3	4.2
41	Timber and cut-over land, 1920 ... acres	631,964	23,930	13,781	2,879	2,400	44,426	16,880	1,240	3,166
42	Timber and cut-over land prior to drainage ... acres	1,012,215	23,930	22,341	3,838	3,200	52,159	25,889	2,580	8,348
43	Decrease since drainage ... acres	380,251		8,560	959	800	7,733	9,009	1,340	5,182
44	Per cent of decrease	37.6		38.3	25.0	25.0	14.8	34.8	51.9	62.1
45	Other unimproved land, 1920 ... acres	28,241					15,084			
46	Other unimproved land prior to drainage ... acres	82,401					58,169		2,520	728
47	Decrease since drainage ... acres	54,160					43,085		2,520	728
48	Per cent of decrease	65.7					74.1		100.0	100.0
49	Swampy or subject to overflow, 1920 ... acres	261,126	29,183	26,600	2,880		19,950			170
50	Swampy or subject to overflow, prior to drainage ... acres	627,415	29,183	26,883	4,798	4,000	68,925		840	1,492
51	Decrease since drainage ... acres	366,289		283	1,918	4,000	48,975		840	1,322
52	Per cent of decrease	58.4		1.1	40.0	100.0	71.1		100.0	88.6
	CAPITAL INVESTED AND COST PER ACRE.									
53	Total capital invested in and required for completion of operating enterprises ... dollars	8,561,264	20,650	131,220	30,000	23,500	1,022,473	148,000	32,000	214,500
54	Capital invested in these enterprises to Dec. 31, 1919 ... dollars	7,076,164	17,650	131,220	30,000	23,500	843,473	148,000	32,000	214,500
55	Additional capital required to complete these enterprises ... dollars	1,485,100	3,000				179,000			
56	Average cost per acre when completed ... dollars	5.35	0.71	4.88	6.25	5.88	5.53	4.96	3.90	9.65
57	Enterprises constructing open ditches only ... dollars	6,820,952	20,650	131,220	30,000	23,500	778,473	148,000	32,000	214,500
58	Average cost per acre when completed ... dollars	5.35	0.71	4.88	6.25	5.88	4.54	4.96	3.90	9.65
59	Enterprises constructing open ditches and levees ... dollars	1,137,312								
60	Average cost per acre when completed ... dollars	4.07								
61	Enterprises constructing open ditches and tile drains ... dollars	[3] 603,000					244,000			
62	Average cost per acre when completed ... dollars	12.63					18.35			
	CROPS.									
	Improved land in enterprises reporting—									
63	Cotton as principal crop on drained land ... acres	804,391	5,253	1,920	1,919		124,528	6,000	3,600	19,052
64	Corn as principal crop on drained land ... acres	136,848		11,182		1,600	858	6,972	3,360	

[1] When works under construction have been completed. [2] Includes 8,300 acres drained by tile only. [3] Includes cost of 2 enterprises constructing 112 miles of tile only.

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

		Choctaw.	Clay.	Coahoma.	De Soto.	Holmes.	Humphreys.	Itawamba.	Lafayette.	Lee.	Leflore.
	LAND AREA.										
1	Approximate land area of the county ... acres	264,960	261,120	339,200	304,000	480,640	261,120	338,560	424,960	286,720	366,080
2	All land in operating drainage enterprises ... acres	14,975	12,293	172,000	5,500	25,000	158,500	9,097	18,839	49,234	34,007
3	Improved land ... acres	6,433	7,236	138,171	1,650	17,500	81,550	5,708	10,205	44,989	24,383
4	Per cent of all improved land in farms	8.5	5.7	74.4	0.9	8.3	83.7	6.3	7.9	30.2	14.6
5	Timber and cut-over land ... acres	6,274	5,057	33,829	3,850	7,500	76,950	3,389	8,634	4,245	9,624
6	Other unimproved land ... acres	2,268									
7	Swampy or subject to overflow, in enterprises ... acres			9,798				9,097		49,234	
8	Suffering a loss of crops from defective drainage ... acres			6,259							
9	Assessed acreage	14,975	12,293	175,040	5,500	25,000	158,500	9,097	18,839	49,234	34,007
10	Excess over all land in operating enterprises ... acres			3,040							
	DRAINAGE WORKS.										
	Open ditches:										
11	Completed ... miles	40.6	20.5	213.8	14.0	8.0	130.6	18.0	19.0	92.6	43.0
12	Additional under construction ... miles			1.2		8.0					
13	Maximum completed in any enterprise ... miles	15.0	14.0	36.0	14.0	8.0	117.0	9.0	11.0	11.0	11.5
14	Maximum width at bottom of ditch [1] ... feet	15	25	30	8	30	20	10	20	40	25
15	Maximum of average depths of outlet ditches [1] ... feet	10.0	6.0	20.0	3.0	10.0	12.0	10.0	14.0	15.0	10.0
16	Mean depth of branch ditches [1] ... feet			6.5			8.0			8.0	4.6
	Tile drains:										
17	Completed ... miles			150.2							
18	Additional under construction ... miles			47.3							
19	Maximum completed in any enterprise ... miles			50.0							
20	Maximum size of tile [1] ... inches			36							
	Accessory levees and dikes:										
21	Completed ... miles						3.6				
22	Additional under construction ... miles										
	Pumping plants:										
23	Engine capacity ... horsepower										
24	Pump capacity ... gallons per minute										
25	Area served by pumps ... acres										
26	Area drained by open ditches only [1] ... acres	14,975	12,293	144,850	5,500	25,000		9,097	18,839	49,234	34,007
27	Length of these ditches ... miles	40.6	20.5	169.5	14.0	16.0		18.0	19.0	92.6	43.0
28	Average length per acre ... feet	14.3	8.8	6.2	13.4	3.4		10.4	5.3	9.9	6.7
29	Area having open ditches and levees [1] ... acres						158,500				
30	Length of these ditches ... miles						130.6				
31	Average length per acre ... feet						4.4				
32	Length of the accessory levees ... miles						3.6				
33	Area drained by open ditches and tile [1] ... acres			27,150							
34	Length of these drains ... miles			243.0							
35	Average length per acre ... feet			47.3							
	DEVELOPMENT OF LAND.										
36	Improved land in operating enterprises, 1920 ... acres	6,433	7,236	138,171	1,650	17,500	81,550	5,708	10,205	44,989	24,383
37	Improved land prior to drainage ... acres	1,497	6,006	69,089	1,100	12,500	38,535	633	6,876	28,036	4,101
38	Increase since drainage ... acres	4,936	1,230	69,082	550	5,000	43,015	5,075	3,329	16,953	20,282
39	Per cent of increase	329.7	20.5	100.0	50.0	40.0	111.6	801.7	48.4	60.5	494.6
40	Per cent increase is of all improved land in farms, 1920	6.5	1.0	37.2	0.3	2.4	44.1	5.6	2.6	11.4	12.2
41	Timber and cut-over land, 1920 ... acres	6,274	5,057	33,829	3,850	7,500	76,950	3,389	8,634	4,245	9,624
42	Timber and cut-over land prior to drainage ... acres	9,138	6,287	102,521	4,400	12,500	119,965	8,464	11,963	21,198	29,906
43	Decrease since drainage ... acres	2,864	1,230	68,692	550	5,000	43,015	5,075	3,329	16,953	20,282
44	Per cent of decrease	31.3	19.6	67.0	12.5	40.0	35.9	60.0	27.8	80.0	67.8
45	Other unimproved land, 1920 ... acres	2,268									
46	Other unimproved land prior to drainage ... acres	4,340		390							
47	Decrease since drainage ... acres	2,072		390							
48	Per cent of decrease	47.7		100.0							
49	Swampy or subject to overflow, 1920 ... acres			9,798				9,097		49,234	
50	Swampy or subject to overflow prior to drainage ... acres			46,836				9,097		49,234	23,039
51	Decrease since drainage ... acres			37,038							23,039
52	Per cent of decrease			79.1							100.0
	CAPITAL INVESTED AND COST PER ACRE.										
53	Total capital invested in and required for completion of operating enterprises ... dollars	100,209	62,500	985,822	12,000	110,000	528,000	68,732	176,076	276,644	139,380
54	Capital invested in these enterprises to Dec. 31, 1919 ... dollars	100,209	62,500	899,822	12,000	50,000	528,000	68,732	162,676	276,644	139,380
55	Additional capital required to complete these enterprises ... dollars			86,000		60,000			13,400		
56	Average cost per acre when completed ... dollars	6.69	5.08	5.73	2.18	4.40	3.33	7.56	9.35	5.62	4.10
57	Enterprises constructing open ditches only ... dollars	100,209	62,500	665,822	12,000	110,000		68,732	176,076	276,644	139,380
58	Average cost per acre when completed ... dollars	6.69	5.08	4.60	2.18	4.40		7.56	9.35	5.62	4.10
59	Enterprises constructing open ditches and levees ... dollars						528,000				
60	Average cost per acre when completed ... dollars						3.33				
61	Enterprises constructing open ditches and tile drains ... dollars			320,000							
62	Average cost per acre when completed ... dollars			11.79							
	CROPS.										
	Improved land in enterprises reporting—										
63	Cotton as principal crop on drained land ... acres	6,433	7,236	136,809	1,650	17,500	81,550	5,708	8,270	36,689	24,383
64	Corn as principal crop on drained land ... acres			1,362					1,935	8,300	

[1] When works under construction have been completed.

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

		Marshall.	Monroe.	Neshoba.	Oktibbeha.	Panola.	Pontotoc.	Prentiss.	Quitman.	Sunflower.	Tallahatchie.
	LAND AREA.										
1	Approximate land area of the county ... acres	440,960	492,800	359,040	292,480	445,440	316,160	261,760	252,800	431,360	402,560
2	All land in operating drainage enterprises ... acres	8,740	6,262	11,418	12,150	19,934	17,109	18,844	72,647	90,460	26,300
3	Improved land ... acres	2,185	5,572	400	5,798	11,820	13,576	10,144	30,284	55,449	11,700
4	Per cent of all improved land in farms	1.3	2.7	0.4	4.5	5.8	9.7	10.1	29.7	25.1	6.7
5	Timber and cut-over land ... acres	6,555	690	11,018	4,282	8,114	3,533	8,700	41,790	35,011	9,600
6	Other unimproved land ... acres				2,070				573		5,000
7	Swampy or subject to overflow, in enterprises ... acres		6,262	5,709	4,009	1,000		6,878	1,023	35,011	2,500
8	Suffering a loss of crops from defective drainage ... acres								300		
9	Assessed acreage	8,740	6,262	11,418	12,150	19,934	17,109	18,844	72,647	90,460	26,300
10	Excess over all land in operating enterprises ... acres										
	DRAINAGE WORKS.										
	Open ditches:										
11	Completed ... miles	9.5	17.0	9.9	23.0	23.0	45.5	52.5	61.7	110.0	4.9
12	Additional under construction ... miles	3.2		8.1		11.2		3.4	38.9		5.1
13	Maximum completed in any enterprise ... miles	9.5	10.0	9.9	17.0	22.2	12.5	8.1	44.4	32.0	4.0
14	Maximum width at bottom of ditch [1] ... feet	24	26	40	20	35	20	18	35	120	100
15	Maximum of average depths of outlet ditches [1] ... feet	18.0	12.0	10.0	9.0	8.0	9.0	10.0	11.0	14.0	12.0
16	Mean depth of branch ditches [1] ... feet			8.0	4.7	6.9	8.0	7.0	6.7	6.8	7.0
	Tile drains:										
17	Completed ... miles								2.0		6.6
18	Additional under construction ... miles										3.4
19	Maximum completed in any enterprise ... miles								2.0		6.6
20	Maximum size of tile [1] ... inches								20		30
	Accessory levees and dikes:										
21	Completed ... miles										
22	Additional under construction ... miles					5.0			25.5		2.5
	Pumping plants:										
23	Engine capacity ... horsepower										
24	Pump capacity ... gallons per minute										
25	Area served by pumps ... acres										
26	Area drained by open ditches only [1] ... acres	8,740	6,262	11,418	12,150	1,600	17,109	18,844	10,711	90,460	10,000
27	Length of these ditches ... miles	12.7	17.0	18.0	23.0	2.2	45.5	55.9	15.1	110.0	4.0
28	Average length per acre ... feet	7.7	14.3	8.3	10.0	7.3	14.0	15.7	7.4	6.4	2.1
29	Area having open ditches and levees [1] ... acres					18,334			58,936		12,000
30	Length of these ditches ... miles					32.0			78.5		6.0
31	Average length per acre ... feet					9.2			7.0		2.6
32	Length of the accessory levees ... miles					5.0			25.5		2.5
33	Area drained by open ditches and tile [1] ... acres								3,000		4,300
34	Length of these drains ... miles								9.0		10.0
35	Average length per acre ... feet								15.8		12.3
	DEVELOPMENT OF LAND.										
36	Improved land in operating enterprises, 1920 ... acres	2,185	5,572	400	5,798	11,820	13,576	10,144	30,284	55,449	11,700
37	Improved land prior to drainage ... acres	2,185	5,365	400	3,893	7,782	7,656	7,258	21,252	24,438	11,220
38	Increase since drainage ... acres		207		1,905	4,038	5,920	2,886	9,032	31,011	480
39	Per cent of increase		3.9		48.9	51.9	77.3	39.8	42.5	126.9	4.3
40	Per cent increase is of all improved land in farms, 1920		0.1		1.5	2.0	4.2	2.9	8.8	14.1	0.3
41	Timber and cut-over land, 1920 ... acres	6,555	690	11,018	4,282	8,114	3,533	8,700	41,790	35,011	9,600
42	Timber and cut-over land prior to drainage ... acres	6,555	897	11,018	5,497	10,277	9,453	11,586	48,137	66,022	10,080
43	Decrease since drainage ... acres		207		1,215	2,163	5,920	2,886	6,347	31,011	480
44	Per cent of decrease		23.1		22.1	21.0	62.6	24.9	13.2	47.0	4.8
45	Other unimproved land, 1920 ... acres				2,070				573		5,000
46	Other unimproved land prior to drainage ... acres				2,760	1,875			3,258		5,000
47	Decrease since drainage ... acres				690	1,875			2,685		
48	Per cent of decrease				25.0	100.0			82.4		
49	Swampy or subject to overflow, 1920 ... acres		6,262	5,709	4,009	1,000		6,878	1,023	35,011	2,500
50	Swampy or subject to overflow, prior to drainage ... acres		6,262	11,418	12,150	2,875		18,844	38,610	66,022	19,380
51	Decrease since drainage ... acres			5,709	8,141	1,875		11,966	37,587	31,011	16,880
52	Per cent of decrease			50.0	67.0	65.2		63.5	97.4	47.0	87.1
	CAPITAL INVESTED AND COST PER ACRE.										
53	Total capital invested in and required for completion of operating enterprises ... dollars	76,240	43,500	180,000	60,000	130,375	122,582	134,919	380,012	490,056	94,300
54	Capital invested in these enterprises to Dec. 31, 1919 ... dollars	61,040	43,500	95,000	60,000	73,375	122,582	134,919	150,012	490,056	45,300
55	Additional capital required to complete these enterprises ... dollars	15,200		85,000		57,000			230,000		49,000
56	Average cost per acre when completed ... dollars	8.72	6.95	15.76	4.94	6.54	7.16	7.16	5.23	5.42	3.59
57	Enterprises constructing open ditches only ... dollars	76,240	43,500	180,000	60,000	20,375	122,582	134,919	57,312	490,056	30,000
58	Average cost per acre when completed ... dollars	8.72	6.95	15.76	4.94	12.73	7.16	7.16	5.35	5.42	3.00
59	Enterprises constructing open ditches and levees ... dollars					110,000			298,700		49,300
60	Average cost per acre when completed ... dollars					6.00			5.07		4.11
61	Enterprises constructing open ditches and tile drains ... dollars								24,000		15,000
62	Average cost per acre when completed ... dollars								8.00		3.49
	CROPS.										
	Improved land in enterprises reporting—										
63	Cotton as principal crop on drained land ... acres		5,572	400	5,798	11,820	5,686		11,857	55,449	11,700
64	Corn as principal crop on drained land ... acres	2,185					7,890	10,144	18,427		

[1] When works under construction have been completed.

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

		Tate.	Tippah.	Tunica.	Union.	Washington.	Webster.	Yalobusha.	Yazoo.	Other counties.[1]
	LAND AREA.									
1	Approximate land area of the county ... acres	256,000	285,440	267,520	263,680	462,720	266,240	313,600	579,200	1,279,360
2	All land in operating drainage enterprises ... acres	34,030	12,537	18,960	29,919	358,140	4,950	14,900	25,500	9,169
3	Improved land ... acres	15,721	9,036	3,161	15,805	198,909	2,618	6,720	14,100	4,172
4	Per cent of all improved land in farms	11.3	8.4	2.7	14.5	86.4	3.0	6.5	5.8	1.1
5	Timber and cut-over land ... acres	15,063	3,501	15,799	14,114	159,231	2,332	8,180	11,400	4,997
6	Other unimproved land ... acres	3,246								
7	Swampy or subject to overflow, in enterprises ... acres	4,006	700	65	890	44,961				1,200
8	Suffering a loss of crops from defective drainage ... acres	608								
9	Assessed acreage	34,030	12,537	18,960	29,919	358,140	4,950	14,900	25,500	9,169
10	Excess over all land in operating enterprises ... acres									
	DRAINAGE WORKS.									
	Open ditches:									
11	Completed ... miles	47.2	57.0	6.6	72.6	292.7	10.0	14.6	5.4	28.4
12	Additional under construction ... miles	3.8		2.0		112.3		8.4		
13	Maximum completed in any enterprise ... miles	18.0	15.0	3.3	26.0	121.0	6.0	8.5	3.4	8.4
14	Maximum width at bottom of ditch [2] ... feet	60	24	35	30	120	15	35	16	20
15	Maximum of average depths of outlet ditches [2] ... feet	10.0	9.0	9.0	10.0	10.0	10.0	8.0	10.0	9.0
16	Mean depth of branch ditches [2] ... feet		5.0	7.6		7.0		5.0	8.0	
	Tile drains:									
17	Completed ... miles									
18	Additional under construction ... miles									
19	Maximum completed in any enterprise ... miles									
20	Maximum size of tile [2] ... inches									
	Accessory levees and dikes:									
21	Completed ... miles			2.7					0.4	
22	Additional under construction ... miles			3.8						
	Pumping plants:									
23	Engine capacity ... horsepower					250				
24	Pump capacity ... gallons per minute					78,000				
25	Area served by pumps ... acres					44,000				
26	Area drained by open ditches only [2] ... acres	34,030	12,537		29,919	358,140	4,950	14,900	13,000	9,169
27	Length of these ditches ... miles	51.0	57.0		72.6	405.0	10.0	23.0	2.0	28.4
28	Average length per acre ... feet	7.9	24.0		12.8	6.0	10.7	8.2	0.8	16.4
29	Area having open ditches and levees [2] ... acres			18,960					12,500	
30	Length of these ditches ... miles			8.6					3.4	
31	Average length per acre ... feet			2.4					1.4	
32	Length of the accessory levees ... miles			6.5					0.4	
33	Area drained by open ditches and tile [2] ... acres									
34	Length of these drains ... miles									
35	Average length per acre ... feet									
	DEVELOPMENT OF LAND.									
36	Improved land in operating enterprises, 1920 ... acres	15,721	9,036	3,161	15,805	198,909	2,618	6,720	14,100	4,172
37	Improved land prior to drainage ... acres	6,046	3,947	2,291	6,080	97,248	2,419	6,720	13,475	2,452
38	Increase since drainage ... acres	9,675	5,089	870	9,725	101,661	199		625	1,720
39	Per cent of increase	160.0	128.9	38.0	160.0	104.5	8.2		4.6	70.1
40	Per cent increase is of all improved land in farms, 1920	7.0	4.7	0.7	8.9	44.1	0.2		0.3	0.5
41	Timber and cut-over land, 1920 ... acres	15,063	3,501	15,799	14,114	159,231	2,332	8,180	11,400	4,997
42	Timber and cut-over land prior to drainage ... acres	24,738	8,507	16,637	23,839	260,892	2,531	8,180	12,025	6,717
43	Decrease since drainage ... acres	9,675	5,006	838	9,725	101,661	199		625	1,720
44	Per cent of decrease	39.1	58.8	5.0	40.8	39.0	7.9		5.2	25.6
45	Other unimproved land, 1920 ... acres	3,246								
46	Other unimproved land prior to drainage ... acres	3,246	83	32						
47	Decrease since drainage ... acres		83	32						
48	Per cent of decrease		100.0	100.0						
49	Swampy or subject to overflow, 1920 ... acres	4,006	700	65	890	44,961				1,200
50	Swampy or subject to overflow, prior to drainage ... acres	20,030	1,010	903	1,616	158,618				5,350
51	Decrease since drainage ... acres	16,024	310	838	726	113,657				4,150
52	Per cent of decrease	80.0	30.7	92.8	44.9	71.7				77.6
	CAPITAL INVESTED AND COST PER ACRE.									
53	Total capital invested in and required for completion of operating enterprises ... dollars	184,000	99,476	124,312	202,200	1,921,229	22,919	114,000	31,000	58,438
54	Capital invested in these enterprises to Dec. 31, 1919 ... dollars	169,000	99,476	54,812	202,200	1,368,229	22,919	54,000	31,000	58,438
55	Additional capital required to complete these enterprises ... dollars	15,000		79,500		553,000		60,000		
56	Average cost per acre when completed ... dollars	5.41	7.93	7.08	6.76	5.36	4.63	7.65	1.22	6.37
57	Enterprises constructing open ditches only ... dollars	184,000	99,476		202,200	1,921,229	22,919	114,000	14,000	58,438
58	Average cost per acre when completed ... dollars	5.41	7.93		6.76	5.36	4.63	7.65	1.08	6.37
59	Enterprises constructing open ditches and levees ... dollars			134,312					17,000	
60	Average cost per acre when completed ... dollars			7.08					1.36	
61	Enterprises constructing open ditches and tile drains ... dollars									
62	Average cost per acre when completed ... dollars									
	CROPS.									
	Improved land in enterprises reporting—									
63	Cotton as principal crop on drained land ... acres	15,721		3,161		161,897	2,618	6,720	14,100	3,392
64	Corn as principal crop on drained land ... acres		9,036		15,805	37,012				780

[1] Includes only Leake, Montgomery, Tishomingo, and Winston Counties.

[2] When works under construction have been completed.

MISSOURI.

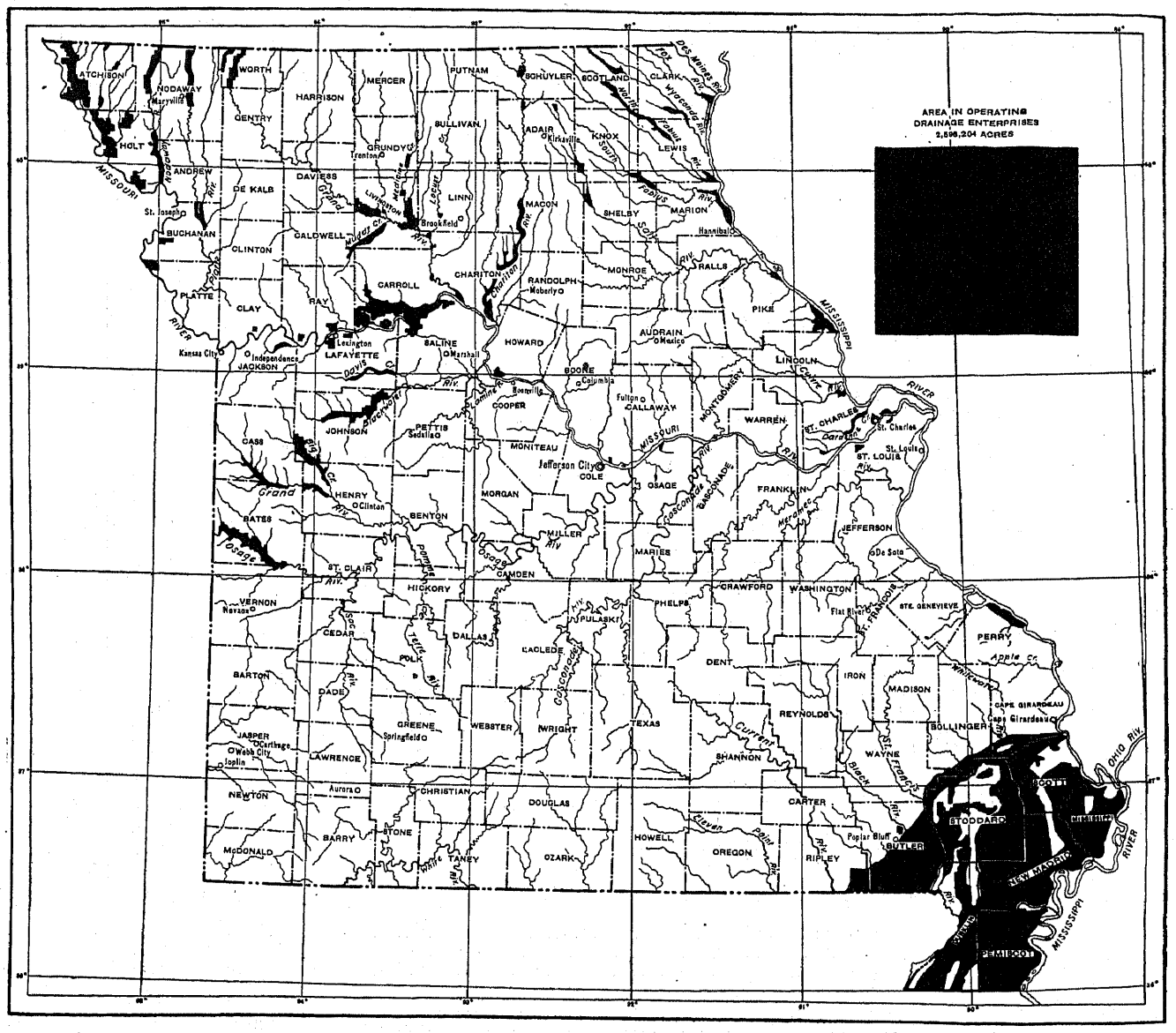
The following pages present the statistics of drainage for Missouri collected at the census of 1920. The figures relate to conditions on January 1, 1920, except where indicated otherwise. No census of drainage has been taken heretofore, so there are no comparable figures for previous years. The data 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 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.
DRAINAGE ON FARMS.		
Number of all farms in the state	263,004	100.0
Farms reporting land having drainage	11,917	4.5
Farms reporting land needing drainage	19,572	7.4
All land in farms ... acres	34,774,679	100.0
Improved land in farms ... acres	24,832,966	71.4
Farm land reported as provided with drainage ... acres	859,663	2.5
Farm land reported as needing drainage ... acres	830,693	2.4
Needing drainage only ... acres	163,178	0.5
Needing drainage and clearing ... acres	667,515	1.9
DRAINAGE ENTERPRISES.		
Approximate land area of the state ... acres	43,985,280	100.0
All land in operating drainage enterprises ... acres	2,596,204	5.9
Improved land ... acres	1,474,302	3.4
Per cent of all improved land in farms	5.9	.....
Timber and cut-over land ... acres	1,074,860	2.4
Other unimproved land ... acres	47,042	0.1
Swampy, subject to overflow, seeped, or alkali ... acres	454,360	1.0
Suffering a loss of crops from defective drainage ... acres	242,258	0.6
Improved land prior to drainage ... acres	760,796	1.7
Increase since drainage began ... acres	713,506	1.6
Land in nonoperating enterprises ... acres	384,061	0.9
Open ditches in operating enterprises ... miles	3,899.1	100.0
Completed ... miles	3,438.7	88.2
Additional under construction ... miles	460.4	11.8
Tile drains in operating enterprises ... miles	44.7	100.0
Completed ... miles	38.8	86.8
Additional under construction ... miles	5.9	13.2
Total capital invested in and required for completion of operating enterprises	$24,749,735	100.0
Capital invested in these enterprises to Dec. 31, 1919	20,723,128	83.7
Additional capital required to complete these enterprises	4,026,607	16.3
Average cost per acre when completed	9.53	.....

MISSOURI

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 court decree 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.[1]		
	Acreage.	Per cent of total.	To Dec. 31, 1919. Amount.	To Dec. 31, 1919. Per cent of total.	Additional required to complete.
All organized enterprises	2,980,265	100.0	$20,889,328	100.0	$10,178,401
Operating enterprises	2,596,204	87.1	20,723,128	99.2	4,026,607
With works completed	1,858,945	62.4	13,294,035	63.6	----------
With works under construction	737,259	24.7	7,429,093	35.6	4,026,607
Nonoperating enterprises	384,061	12.9	166,200	0.8	6,151,794

[1] 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.—Two-thirds of the area in drainage enterprises in Missouri is in the southeast corner of the state. Southeast of a line passing about 6 miles west of Cape Girardeau and Poplar Bluff, approximately 70 per cent of all the land is in drainage enterprises. This region, except Mississippi and Scott Counties and the east corner of New Madrid County, is drained southwesterly through Arkansas.

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. Amount.	To Dec. 31, 1919. Per cent of total.	Additional required to complete.
All organized enterprises	2,980,265	100.0	$20,889,328	100.0	$10,178,401
Operating enterprises	2,596,204	87.1	20,723,128	99.2	4,026,607
Mississippi River	702,824	23.6	6,317,435	30.2	300,250
Black River	262,376	8.8	1,354,932	6.5	1,000,000
St. Francis River	1,173,030	39.4	9,313,035	44.6	2,089,317
Missouri River	367,151	12.3	2,550,495	12.2	373,865
Osage River	90,823	3.0	1,187,231	5.7	263,175
Nonoperating enterprises	384,061	12.9	166,200	0.8	6,151,794
Mississippi River	45,714	1.5	9,600	(1)	316,670
St. Francis River	48,835	1.6	8,600	(1)	428,369
Missouri River	289,512	9.7	148,000	0.7	5,406,755

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

Almost all the other land in drainage enterprises is situated in the northwestern part of the state, some along Mississippi River and its smaller tributaries but more on the streams flowing into the Missouri.

Condition of land in enterprises.—In the southeastern part of Missouri, except as artificial drainage has been accomplished, the area in drainage enterprises is mostly typical southern swamp land which in its virgin state was covered generally with timber. Considerable protection against overflow from the Mississippi is afforded by levees along that river, but the natural drainage channels are extremely crooked and obstructed, and have high banks from which the land slopes away to wide swampy tracts.

In the northern and western parts of the state, the area in drainage enterprises is generally the bottom land between the hills, subject to inundation by stream floods. A considerably greater part was under some degree of cultivation before the drainage enterprises were organized than was the case in the southeastern counties.

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. Acreage.	Total. Per cent of all land.	Works completed (acres).	Works under construction (acres).	
All land in enterprises	2,596,204	100.0	1,858,945	737,259	384,061
Improved land	1,474,302	56.8	1,207,730	266,572	265,063
Timber and cut-over land	1,074,860	41.4	610,296	464,564	77,268
Other unimproved land	47,042	1.8	40,919	6,123	41,730
Swampy or subject to overflow	454,360	17.5	200,972	253,388	270,382
Suffering a loss of crops	242,258	9.3	123,210	119,048	17,917

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, 238 operating drainage enterprises are counted in Missouri, with an average area of 13,046 acres assessed. The assessed acreage exceeds the land in enterprises by 508,685 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 acreage, deduction was made for the amount of overlapping with enterprises organized previously, to determine the acreage to be tabulated as land in enterprises.

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	2,596,204	3,104,889	100.0
Less than 200 acres	177	177	(1)
200 to 499 acres	1,058	1,058	(1)
500 to 999 acres	10,901	13,154	0.4
1,000 to 4,999 acres	217,559	239,414	7.7
5,000 to 9,999 acres	302,068	341,884	11.0
10,000 to 49,999 acres	1,306,271	1,557,927	50.2
50,000 to 99,999 acres	503,793	546,213	17.6
100,000 to 499,999 acres	254,377	405,062	13.0

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

Character of enterprises.—The drainage enterprises in Missouri are nearly all drainage districts established by the circuit courts and the county courts, in accordance with the general drainage laws of the state. The few other drainage enterprises include levee districts, county drains, and enterprises under individual ownership, including some in which two or more farm owners cooperated without organizing under any law. The statutes relating to the establishment of drains and levees have been amended many times, and now form chapter 41 of the Revised Statutes of Missouri, 1909.

Drainage districts may be established by the circuit courts for the reclamation of swamp, wet, or overflowed land for agricultural or sanitary purposes, under the provisions of Article I, of chapter 41 of the Revised Statutes. Levee districts may be established by the circuit courts for the reclamation and protection of land from overflow and other water, for agricultural or sanitary purposes, under Article IX of that chapter. Both of these articles were newly written and reenacted in 1913, Article I on March 24 and Article IX on April 7.

The circuit court drainage districts are formed, according to the existing statute, by the owners of a majority of the acreage signing and filing with the clerk of the circuit court articles of association containing a petition for the establishment of the district described therein. The district is declared a public corporation if the court, after public hearing, approves the petition. The officers of the district are five supervisors elected by the landowners voting in proportion to their acreages. The plan of reclamation works is determined by the supervisors. Damages and benefits are assessed by three commissioners appointed by the court. After public hearing upon the commissioners' report, the court may amend the assessments, subject to appeal, and must confirm the report or dissolve the district according to whether the benefits will be greater or less than the cost of reclamation. The supervisors construct the reclamation works of the district, by letting contracts or otherwise. They may issue bonds of the district for not exceeding 90 per cent of the taxes levied to pay the cost of the enterprise, which is apportioned according to the benefits. For a district located in two or more counties, the articles of association are filed in the circuit court of the county containing the greater part of the district. The period of incorporation may be extended upon petition from the landowners.

Circuit court levee districts are organized in a manner similar to circuit court drainage districts. The duties and powers of the supervisors are like those of the supervisors of the drainage districts, but the provisions regarding levy of taxes and amount of bond issue are not identical.

The drainage districts established by the county courts now are governed by Articles III and IV of chapter 41, Revised Statutes of 1909, as amended. Article IV was entirely rewritten by an act of May 29, 1919. Levee districts may be established by the county courts in accordance with Article X of the same chapter.

Each drainage district organized under Article III is established by the county court of the county containing the greater part of the land in the proposed district, after receipt of a petition from the owners of a major part of the land or from a majority of the owners representing one-third or more of the land to be drained. The enterprise is administered by three commissioners appointed by the court, who investigate the practicability of the project and, if the benefits will exceed the cost, prepare plans for the improvement works. The commissioners assess damages, and apportion the cost against the tracts of land in proportion to the benefits that will accrue. The court holds hearings upon the petition and upon the commissioners' report, and may change the boundaries of the district, the awards of damages, and the assessments of benefits before confirming the report. The commissioners may issue notes or bonds of the district to secure funds for financing the undertaking.

The present form of Article IV provides that drainage districts may be established by the county courts upon petition from one or more interested landowners, whenever the proposed drainage will be of public benefit. The court appoints three viewers and an engineer to report upon the practicability and utility of the proposed undertaking, and may establish the district after public hearing upon this report. Then three viewers and an engineer again are appointed to prepare the complete plan of drainage and to assess damages and benefits against the land to be affected. These assessments are confirmed by the court, after public hearing, with such amendments as are deemed equitable. Appeals regarding damages awarded may be taken to the circuit court. The assessments of cost, apportioned like the assessments of benefits, are payable in such installments as the court may determine, and bonds may be issued by the court in an amount not exceeding the assessments of cost.

County drains may be established, under Article V of the chapter on drains and levees, without being incorporated as districts, by petition to the county court from a majority in interest of the resident owners of any body of swamp or overflowed land. If the court approves the petition, two commissioners are appointed to act with the county surveyor in examining the land to be drained, in preparing a plan of improvement, and in assessing the amounts of damages and of benefits. After confirmation of the commissioners' report, the court acts as the executive officer of the enterprise.

Levee districts may be organized by the county courts, according to Article X, to protect land subject to overflow by rivers, after notice published by the court or by any interested landholder. A board of three directors is appointed by the court to prepare plans for the necessary protection works, and to construct and maintain the works if the landowners vote to complete the undertaking. The cost of construction is apportioned according to benefits determined by the county assessor, subject to appeal to the county board of equalization. Right of way is secured by agreement with the owners of the land taken or by condemnation proceedings. The directors may issue notes or bonds of the district for money borrowed for district purposes. Extension of the district to include all land benefited may be made by the court upon petition from the directors and after public hearing.

No enterprises are reported as organized under Article II, VI, VII, or VIII. Article II provides for organizing into a drainage district any county owning swamp or overflowed land donated by the state for reclamation purposes. Upon petition from a majority of the taxpaying citizens, the county court shall declare the county established as a drainage district according to Article I, and shall perform the duties therein prescribed for the supervisors of the district. Construction work is to be put under contract, payable in the swamp and overflowed land of the county at not less than $1.25 per acre. Articles VI and VII were repealed by an act of March 27, 1913, which provides for the drainage of wet or overflowed land by individuals without forming drainage districts. Owners of land that must be drained across the property of other owners may petition either the county court or the circuit court to appoint commissioners to consider the location of the necessary drain and to assess damages and benefits. After public hearing and confirmation of the commissioners' report, and after payment of damages has been made or offered, the court may let contract for construction of the drain or levee and charge the cost to the landowners in proportion to the benefits assessed. Article VIII provides for the organization of sanitary drainage districts lying partly within a city of 300,000 inhabitants or more, under the circuit courts.

When Congress, in 1850, had given the swamp and overflowed land to the states in which it was located, Missouri undertook to encourage the development of that land. In 1851 laws were enacted to provide for the reclamation and sale of the swamp land in 10 southeastern counties of the state, by commissioners designated by the legislature, and to grant the swamp and overflowed land elsewhere to the counties in which it was situated. In 1853 the swamp land in the southeastern counties was given to those counties for reclamation. A number of statutes were enacted to encourage the counties in developing the land that had been given to them. A department of land reclamation was created by an act of March 25, 1913, in charge of a land reclamation commissioner appointed by the governor of the state. The commissioner's duties include diffusing information regarding the benefits to be derived from drainage and giving assistance in formulating plans for drainage work.

An act of March 13, 1867, authorized the county courts to condemn land for drainage purposes, and provided that commissioners should be appointed to assess damages and benefits. This seems to have been the first drainage law of Missouri to apportion the cost according to benefits. The drainage of land upon petition from the landowners apparently first was provided by an act of March 3, 1869. The first law authorizing the establishment of drainage districts with corporate powers was that of April 26, 1879, providing for articles of association to be filed with the circuit court and for proceedings not unlike those under the present circuit court drainage act (Art. I, ch. 41, Rev. Stat. 1909). The incorporation of drainage districts by county courts was first authorized by an act of April 1, 1893.

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

CHARACTER OF ENTERPRISE.	LAND.		CAPITAL.		
			To Dec. 31, 1919.		Additional required to complete.
	Acreage.	Per cent of total.	Amount.	Per cent of total.	
All organized enterprises	2,980,265	100.0	$20,889,328	100.0	$10,178,401
Operating enterprises	2,596,204	87.1	20,723,128	99.2	4,026,607
Circuit court districts	1,070,738	35.9	13,362,764	64.0	2,538,040
Art. I, ch. 41, Rev. Stat. 1909	1,001,996	33.6	12,170,764	58.3	2,234,040
Art. IX, ch. 41, Rev. Stat. 1909	68,742	2.3	1,192,000	5.7	304,000
County court districts	1,514,530	50.8	7,290,164	34.9	1,467,567
Art. III, ch. 41, Rev. Stat. 1909	200,217	6.7	534,673	2.6	8,625
Art. IV, ch. 41, Rev. Stat. 1909	1,312,265	44.0	6,751,491	32.3	1,453,942
Art. X, ch. 41, Rev. Stat. 1909	2,048	0.1	4,000	(1)	5,000
County drains	1,040	(1)	1,500	(1)	.....
Art. V, ch. 41, Rev. Stat. 1909	1,040	(1)	1,500	(1)	.....
Individual ownerships	9,896	0.3	68,700	0.3	21,000
Nonoperating enterprises	384,061	12.9	166,200	0.8	6,151,794
Circuit court districts	318,476	10.7	161,000	0.8	5,752,884
Art. I, ch. 41, Rev. Stat. 1909	318,476	10.7	161,000	0.8	5,752,884
County court districts	62,085	2.1	3,200	(1)	365,410
Art. IV, ch. 41, Rev. Stat. 1909	62,085	2.1	3,200	(1)	365,410
Individual ownerships	3,500	0.1	2,000	(1)	33,500

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

Drainage works.—The total works completed by the drainage enterprises to December 31, 1919, comprised 3,438.7 miles of open ditches, 38.8 miles of tile drains, and 456.9 miles of accessory levees; the additional lengths under construction were 460.4 miles of open ditches, 5.9 miles of tile drains, and 74.9 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 are 11 pumping districts among the operating drainage enterprises in Missouri, and 4 among the non-operating enterprises.

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. Amount.	To Dec. 31, 1919. Per cent of total.	Additional required to complete.
All kinds	2,596,204	100.0	$20,723,128	100.0	$4,026,607
Open ditches only	1,612,085	62.1	11,468,524	55.3	1,974,142
Open ditches and levees	883,432	34.0	7,276,025	35.1	1,939,040
Tile drains only	760	(1)	11,250	0.1	6,250
Open ditches and tile drains	46,240	1.8	466,230	2.2	19,000
Tile drains and levees	7,000	0.3	14,000	0.1	.....
Open ditches, tile drains, and levees	46,687	1.8	1,487,099	7.2	88,175

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

TABLE 8.—LAND AND CAPITAL INVESTED IN OPERATING ENTERPRISES, CLASSIFIED BY TYPE OF DRAINAGE: 1920.

TYPE OF DRAINAGE.	LAND.		CAPITAL.		
	Acreage.	Per cent of total.	To Dec. 31, 1919. Amount.	To Dec. 31, 1919. Per cent of total.	Additional required to complete.
All operating enterprises	2,596,204	100.0	$20,723,128	100.0	$4,026,607
Gravity drainage only	2,518,898	97.0	18,462,298	89.1	4,006,607
All drainage by pumping	.....	.....	.....	.....	.....
Part gravity and part pumping	77,306	3.0	2,260,830	10.9	20,000
Total area served by pumps	70,308	2.7	.....	.....	.....

TABLE 9.—DRAINAGE PUMPING PLANTS IN OPERATING ENTERPRISES, CLASSIFIED BY KIND OF POWER: 1920.

KIND OF POWER.	ENGINE CAPACITY.		PUMP CAPACITY.		AREA SERVED.	
	Horsepower.	Per cent of total.	Gallons per minute.	Per cent of total.	Acreage.	Per cent of total.
All enterprises	2,785	100.0	552,000	100.0	70,308	100.0
Steam	1,910	68.6	407,000	73.7	57,298	81.5
Electric	500	18.0	75,000	13.6	4,010	5.7
Internal-combustion	375	13.5	70,000	12.7	9,000	12.8

TABLE 10.—DRAINAGE PUMPING PLANTS IN OPERATING ENTERPRISES, CLASSIFIED BY KIND OF PUMPS: 1920.

KIND OF PUMP.	PUMPS.			ENGINE CAPACITY.		AREA SERVED.	
	Number.	Capacity. Gallons per minute.	Capacity. Per cent of total.	Horsepower.	Per cent of total.	Acreage.	Per cent of total.
All enterprises	14	552,000	100.0	2,785	100.0	70,308	100.0
Centrifugal	13	545,000	98.7	2,725	97.8	69,308	98.6
Rotary	1	7,000	1.3	60	2.2	1,000	1.4

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 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 and those 10 feet and more were omitted, because it seemed they did not represent so well the average depth of outlet provided for all the farms in those districts; to include these groups, computed as 3 feet and 10 feet, respectively, would show the mean depth for the state 7.2 instead of 7.0 feet.

TABLE 11.—LAND IN OPERATING ENTERPRISES, CLASSIFIED BY AVERAGE DEPTH OF BRANCH DITCHES: 1920.

DEPTH OF BRANCH DITCHES.	Acreage.	Per cent of total.
All operating enterprises	2,596,204	100.0
Less than 3 feet	29,617	1.1
3.0 to 3.9 feet	40,432	1.6
4.0 to 4.9 feet	111,656	4.3
5.0 to 5.9 feet	150,483	5.8
6.0 to 6.9 feet	163,886	6.3
7.0 to 7.9 feet	544,976	21.0
8.0 to 8.9 feet	827,407	31.9
9.0 to 9.9 feet	68,121	2.6
10 feet and more	203,195	7.8
Not reporting branches	456,431	17.6

Maintenance of works.—The circuit court drainage act (Art. I, ch. 41, Rev. Stat. 1909) and the circuit court levee act (Art. IX) authorize the boards of supervisors of the districts to maintain the improvement works of their respective districts in good condition, and to appoint ditch overseers or inspectors to

have charge of that work. Each board is authorized also to levy annually a tax for maintenance purposes, to be apportioned like and not to exceed 10 per cent of the net assessments of benefits for construction. The commissioners of drainage districts organized under Article III of the statutes relating to drains and levees are authorized to make repairs to the improvement works and to levy assessments therefor. However, if the cost will exceed the equivalent of 30 cents per acre on all the land benefited, the commissioners must file petition and the county court, after public hearing, determines what work shall be done and the amount of benefits to be assessed against each tract of land. Article IV directs that the county court appoint annually a ditch overseer to inspect and to keep in repair all ditches in the county established under this article. For the cost of maintenance the court may levy annually a tax not exceeding 10 per cent of the cost of construction, to be apportioned like the assessments of benefits for construction. Drains established under Article V are to be kept in repair by the county court, the cost to be paid by the land benefited in such proportion and in such manner as the court may prescribe.

TABLE 12.—LAND AND CAPITAL INVESTED IN OPERATING ENTERPRISES, CLASSIFIED BY METHOD OF MAINTENANCE: 1920.

METHOD OF MAINTENANCE.	LAND.		CAPITAL.		
			To Dec. 31, 1919.		Additional required to complete.
	Acreage.	Per cent of total.	Amount.	Per cent of total.	
All operating enterprises	2,596,204	100.0	$20,723,128	100.0	$4,026,607
By district forces	1,155,656	44.5	9,556,320	46.1	153,500
By contract	383,522	14.8	3,791,283	18.3	192,500
By landowners	254,539	9.8	1,692,915	8.2	40,000
By method not specified	142,831	5.5	1,425,256	6.9	57,625
No maintenance provided	165,584	6.4	802,364	3.9	594,150
Not reported	494,072	19.0	3,454,990	16.7	2,988,832

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, 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 reclamation was completed.

TABLE 13.—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	2,596,204	100.0	3,104,889	100.0
1880 to 1889	1,040	(1)	1,040	(1)
1890 to 1899	209,889	8.1	212,829	6.9
1900 to 1904	348,941	13.4	400,221	12.9
1905 to 1909	1,163,447	44.8	1,354,072	43.6
1910 to 1914	706,508	27.2	935,848	30.1
1915 to 1919	159,643	6.1	194,143	6.3
Not reported	6,736	0.3	6,736	0.2

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

TABLE 14.—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	$20,723,128	100.0	$4,026,607
1880 to 1889	1,500	(1)	.....
1890 to 1899	592,995	2.9	.....
1900 to 1904	1,875,095	9.0	235,710
1905 to 1909	10,063,182	48.6	641,380
1910 to 1914	6,829,206	33.0	2,139,427
1915 to 1919	1,313,150	6.3	989,090
Not reported	48,000	0.2	21,000

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

TABLE 15.—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	3,899.1	100.0	44.7	100.0	531.8	100.0
1880 to 1889	5.0	0.1	.....	.....	.....	.....
1890 to 1899	245.5	6.3	.....	.....	13.8	2.6
1900 to 1904	441.8	11.3	10.0	22.4	40.3	7.6
1905 to 1909	1,633.4	41.9	.....	.....	191.7	36.0
1910 to 1914	1,186.7	30.4	24.3	54.4	217.4	40.9
1915 to 1919	366.7	9.4	7.4	16.6	55.9	10.5
Not reported	20.0	0.5	3.0	6.7	12.7	2.4

Crops.—The principal crops grown upon the drained land in drainage enterprises are corn, cotton, 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.

County Table I.—DRAINAGE ON FARMS: 1920.

		The State.	Adair.	Andrew.	Atchison.	Audrain.	Barton.	Bates.	Benton.	Bollinger.
1	Number of all farms in the state or county	263,004	2,453	2,334	1,541	2,521	2,362	3,500	2,157	2,226
2	Farms reporting land having drainage	11,917	53	135	380	21	64	193	13	32
3	Farms reporting land needing drainage	19,572	154	82	115	120	125	193	47	191
4	Farms in drainage and levee districts	7,743	6	2	194	11	2	105	.....	13
	LAND AND FARM AREA.									
5	Approximate land area of the state or county ... acres	43,985,280	365,440	273,920	337,920	438,400	381,440	556,800	476,800	389,760
6	All land in farms ... acres	34,774,679	326,387	258,973	308,224	418,834	334,647	510,067	368,029	289,879
7	Improved land in farms ... acres	24,832,966	265,708	215,606	287,910	381,592	304,550	443,245	199,021	155,334
8	Woodland in farms ... acres	8,553,857	51,765	33,136	15,235	30,990	20,774	43,326	145,196	130,775
9	Other unimproved land in farms ... acres	1,387,856	8,914	10,231	5,079	6,252	9,323	23,496	23,812	3,770
10	Farm land reported as provided with drainage ... acres	859,663	3,134	3,769	31,397	1,496	1,645	10,262	795	1,044
11	Farm land reported as needing drainage ... acres	830,693	5,192	1,910	6,271	3,287	2,688	8,652	1,581	5,868
12	Drainage only ... acres	163,178	541	1,058	5,033	140	381	2,252	15	383
13	Drainage and clearing ... acres	667,515	4,651	852	1,238	3,147	2,307	6,400	1,566	5,485

		Boone.	Buchanan.	Butler.	Caldwell.	Callaway.	Camden.	Cape Girardeau.	Carroll.	Cass.
1	Number of all farms in the county	3,325	2,627	2,105	1,963	3,284	1,739	2,661	3,077	3,036
2	Farms reporting land having drainage	10	106	154	75	11	11	141	388	148
3	Farms reporting land needing drainage	205	104	569	61	66	134	186	75	278
4	Farms in drainage and levee districts	4	16	426	30	2	1	76	247	59
	LAND AND FARM AREA.									
5	Approximate land area of the county ... acres	440,320	261,120	447,360	277,120	517,120	439,680	371,200	449,920	461,440
6	All land in farms ... acres	404,637	238,542	209,340	264,513	476,351	309,482	340,968	413,347	417,564
7	Improved land in farms ... acres	327,301	186,407	105,269	241,278	344,458	103,789	230,275	379,495	357,538
8	Woodland in farms ... acres	61,385	37,741	86,741	18,012	113,559	197,546	105,304	24,395	40,951
9	Other unimproved land in farms ... acres	15,951	14,394	17,330	5,223	18,334	8,147	5,389	9,457	19,075
10	Farm land reported as provided with drainage ... acres	1,260	2,956	6,545	2,364	663	579	21,690	40,842	5,168
11	Farm land reported as needing drainage ... acres	4,989	2,719	36,933	1,380	1,911	5,263	11,144	5,453	9,598
12	Drainage only ... acres	100	972	4,899	176	231	122	2,415	2,627	2,617
13	Drainage and clearing ... acres	4,889	1,747	32,034	1,204	1,680	5,141	8,729	2,826	6,981

		Cedar.	Chariton.	Clark.	Clay.	Clinton.	Cole.	Cooper.	Daviess.	Dunklin.
1	Number of all farms in the county	2,448	3,426	1,908	1,973	1,576	1,621	2,419	2,731	3,033
2	Farms reporting land having drainage	126	138	156	21	73	25	46	60	920
3	Farms reporting land needing drainage	208	146	102	99	71	98	52	246	519
4	Farms in drainage and levee districts	2	42	144	18	.....	.....	3	9	972
	LAND AND FARM AREA.									
5	Approximate land area of the county ... acres	318,720	491,520	318,720	257,280	270,720	248,960	357,120	360,960	339,200
6	All land in farms ... acres	284,142	445,102	290,472	236,581	255,448	232,481	331,699	345,189	186,900
7	Improved land in farms ... acres	199,880	386,055	216,622	201,678	233,944	140,846	272,882	272,171	160,094
8	Woodland in farms ... acres	68,790	46,103	43,349	25,772	16,922	79,878	51,080	45,213	24,187
9	Other unimproved land in farms ... acres	15,472	12,944	30,501	9,131	4,582	11,757	7,737	27,805	2,619
10	Farm land reported as provided with drainage ... acres	2,667	17,721	15,599	2,029	3,462	1,745	1,267	1,840	41,682
11	Farm land reported as needing drainage ... acres	4,731	5,581	4,075	2,163	1,478	2,462	1,345	7,982	17,768
12	Drainage only ... acres	2,043	2,252	2,238	102	1,183	129	948	2,697	3,581
13	Drainage and clearing ... acres	2,688	3,329	1,837	2,061	295	2,333	397	5,285	14,187

		Gasconade.	Gentry.	Grundy.	Harrison.	Henry.	Holt.	Howard.	Jackson.	Jasper.
1	Number of all farms in the county	1,768	2,269	1,915	3,135	3,098	1,814	1,698	3,345	2,786
2	Farms reporting land having drainage	20	22	32	19	98	172	45	189	77
3	Farms reporting land needing drainage	451	63	163	184	160	57	23	71	100
4	Farms in drainage and levee districts	2	1	13	7	66	168	6	23	1
	LAND AND FARM AREA.									
5	Approximate land area of the county ... acres	328,960	313,600	277,120	461,440	476,160	285,440	299,520	390,400	406,400
6	All land in farms ... acres	300,700	302,056	271,495	438,184	432,719	253,653	265,679	312,321	328,793
7	Improved land in farms ... acres	129,672	256,195	217,478	372,930	371,637	226,937	202,581	257,122	260,493
8	Woodland in farms ... acres	159,797	32,778	38,788	46,599	47,921	17,243	53,834	39,848	36,992
9	Other unimproved land in farms ... acres	11,231	13,083	15,229	18,655	13,161	9,473	9,264	15,351	31,308
10	Farm land reported as provided with drainage ... acres	506	875	4,572	1,890	4,867	18,811	2,827	9,836	1,939
11	Farm land reported as needing drainage ... acres	13,164	1,378	10,142	8,578	7,320	3,004	370	1,817	2,251
12	Drainage only ... acres	112	505	5,266	4,327	2,599	1,930	148	502	372
13	Drainage and clearing ... acres	13,052	873	4,876	4,251	4,721	1,074	222	1,315	1,879

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

		Johnson.	Knox.	Lafayette.	Lewis.	Lincoln.	Linn.	Livingston.	Macon.	Marion.
1	Number of all farms in the county	3,590	1,880	2,807	1,878	2,540	2,513	2,316	3,759	1,623
2	Farms reporting land having drainage	82	32	592	61	73	52	97	60	65
3	Farms reporting land needing drainage	36	86	201	232	148	319	46	460	92
4	Farms in drainage and levee districts	69	20	27	31	33	14	57	29	34
	LAND AND FARM AREA.									
5	Approximate land area of the county ... acres	531,840	328,960	391,680	322,560	388,480	400,640	339,840	517,760	279,040
6	All land in farms ... acres	496,643	302,841	357,077	305,155	343,706	380,560	304,474	480,514	246,164
7	Improved land in farms ... acres	437,752	262,247	324,038	243,210	255,015	324,864	253,365	403,868	190,457
8	Woodland in farms ... acres	45,990	33,054	23,636	51,342	77,866	42,871	36,772	67,704	38,076
9	Other unimproved land in farms ... acres	12,901	7,540	9,403	10,603	10,819	12,825	14,337	8,942	17,631
10	Farm land reported as provided with drainage ... acres	5,493	2,030	35,864	6,645	10,351	4,749	6,719	3,504	6,898
11	Farm land reported as needing drainage ... acres	1,631	2,538	10,989	6,942	7,192	13,145	3,793	18,603	6,994
12	Drainage only ... acres	248	320	8,702	424	1,948	5,557	2,768	3,479	3,817
13	Drainage and clearing ... acres	1,383	2,218	2,287	6,518	5,244	7,588	1,025	15,124	3,177

		Miller.	Mississippi.	Morgan.	New Madrid.	Nodaway.	Osage.	Pemiscot.	Perry.	Pettis.
1	Number of all farms in the county	2,194	1,184	1,858	2,052	3,657	1,979	2,533	1,972	2,797
2	Farms reporting land having drainage	38	434	23	579	488	15	911	41	196
3	Farms reporting land needing drainage	152	134	157	711	266	65	309	309	45
4	Farms in drainage and levee districts	1	455	1	933	116	19	945	68	1
	LAND AND FARM AREA.									
5	Approximate land area of the county ... acres	379,520	264,320	392,960	417,280	557,440	379,520	291,840	295,680	438,400
6	All land in farms ... acres	336,663	187,266	272,692	243,303	546,068	349,060	132,574	264,228	409,041
7	Improved land in farms ... acres	164,258	156,279	154,520	195,362	502,989	159,648	118,359	163,909	345,897
8	Woodland in farms ... acres	162,067	16,430	108,317	41,667	31,270	154,138	10,489	91,686	49,664
9	Other unimproved land in farms ... acres	10,338	14,557	9,855	6,274	11,809	35,274	3,726	8,633	13,480
10	Farm land reported as provided with drainage ... acres	708	56,640	649	51,618	23,683	569	39,749	1,788	22,088
11	Farm land reported as needing drainage ... acres	4,320	11,486	5,397	58,535	9,725	2,104	14,181	9,091	2,530
12	Drainage only ... acres	266	2,279	256	27,801	6,043	400	7,488	773	1,195
13	Drainage and clearing ... acres	4,054	9,207	5,141	30,734	3,682	1,704	6,693	8,318	1,335

		Pike.	Platte.	Putnam.	Randolph.	Ray.	Ripley.	St. Charles.	St. Clair.	St. Francois.	St. Louis.
1	Number of all farms in the county	2,681	2,021	2,153	2,380	2,541	1,638	2,165	2,649	1,266	3,735
2	Farms reporting land having drainage	93	152	44	60	204	125	156	47	3	137
3	Farms reporting land needing drainage	147	125	69	176	50	382	336	255	84	66
4	Farms in drainage and levee districts	48	11	.....	9	67	149	56	.....	.....	7
	LAND AND FARM AREA.										
5	Approximate land area of the county ... acres	417,920	265,600	330,880	314,240	361,600	401,280	342,400	451,840	293,120	311,680
6	All land in farms ... acres	385,501	247,449	312,978	286,546	304,684	186,726	308,424	378,878	182,974	226,595
7	Improved land in farms ... acres	294,004	187,222	259,820	231,989	264,170	87,978	229,965	242,853	99,976	177,487
8	Woodland in farms ... acres	73,246	53,650	41,231	44,846	28,054	94,906	63,539	114,885	75,711	40,952
9	Other unimproved land in farms ... acres	18,251	6,577	11,927	9,711	12,460	3,842	14,920	21,140	7,287	8,156
10	Farm land reported as provided with drainage ... acres	8,394	3,882	1,589	2,785	12,971	2,753	21,635	1,234	1,544	6,328
11	Farm land reported as needing drainage ... acres	10,839	3,140	2,184	4,848	1,656	16,124	8,567	9,712	1,893	1,206
12	Drainage only ... acres	2,463	1,588	183	1,502	591	409	2,496	2,137	29	624
13	Drainage and clearing ... acres	8,376	1,552	2,001	3,346	1,065	15,715	6,071	7,575	1,864	582

		Saline.	Scotland.	Scott.	Shelby.	Stoddard.	Sullivan.	Vernon.	Webster.	Worth.	All other counties.[1]
1	Number of all farms in the county	3,024	1,800	1,432	2,195	3,685	2,660	3,267	2,697	1,215	88,794
2	Farms reporting land having drainage	583	97	648	49	899	49	177	24	50	307
3	Farms reporting land needing drainage	275	80	186	23	716	103	272	256	55	6,630
4	Farms in drainage and levee districts	54	90	580	37	1,039	15	4	.....	9	44
	LAND AND FARM AREA.										
5	Approximate land area of the county ... acres	482,560	280,960	268,160	325,760	521,600	415,360	536,960	374,400	169,600	17,113,600
6	All land in farms ... acres	424,702	268,843	202,403	301,155	347,974	388,429	464,069	314,505	162,744	11,717,679
7	Improved land in farms ... acres	368,505	231,115	174,634	261,434	267,405	340,483	397,497	201,737	144,165	6,806,497
8	Woodland in farms ... acres	35,940	30,050	24,924	34,823	72,728	34,028	52,212	104,561	13,345	4,405,262
9	Other unimproved land in farms ... acres	20,257	7,678	2,845	4,898	7,841	13,918	14,360	8,207	5,234	505,920
10	Farm land reported as provided with drainage ... acres	58,173	4,661	80,629	2,805	80,250	2,745	7,190	1,459	1,514	7,633
11	Farm land reported as needing drainage ... acres	8,947	4,014	11,394	1,183	38,499	4,375	9,219	9,518	2,569	281,162
12	Drainage only ... acres	4,669	854	1,961	745	1,885	3,601	1,750	4	1,150	5,877
13	Drainage and clearing ... acres	4,278	3,160	9,433	438	36,614	774	7,469	9,514	1,419	275,285

[1] No drainage on farms reported in Carter, Douglas, McDonald, Ozark, Stone, or Wright Counties.

County Table II.—OPERATING DRAINAGE ENTERPRISES: 1920.

		The State.	Adair.	Atchison.	Bates.	Bollinger.	Butler.	Cape Girardeau.	Carroll.
	LAND AREA.								
1	Approximate land area of the state or county ... acres	43,985,280	365,440	337,920	556,800	389,760	447,360	371,200	449,920
2	All land in operating drainage enterprises ... acres	2,596,204	8,800	46,982	49,626	33,765	232,800	37,236	52,224
3	Improved land ... acres	1,474,302	7,200	43,364	24,813	1,712	63,800	23,477	45,038
4	Per cent of all improved land in farms	5.9	2.7	15.1	5.6	1.1	60.6	10.2	11.9
5	Timber and cut-over land ... acres	1,074,860	1,000	98	11,808	32,053	169,000	13,759	2,184
6	Other unimproved land ... acres	47,042	600	3,520	13,005				5,002
7	Swampy or subject to overflow, in enterprises ... acres	454,360		10,987	6,276	31,621	103,700	1,151	
8	Suffering a loss of crops from defective drainage ... acres	242,258	525	9,444	1,046	1,284	36,210		225
9	Assessed acreage	3,104,889	8,800	46,982	49,626	33,765	232,800	37,236	72,464
10	Excess over all land in operating enterprises ... acres	508,685							20,240
	DRAINAGE WORKS.								
	Open ditches:								
11	Completed ... miles	3,438.7	12.3	103.8	39.5	9.4	177.4	71.9	78.6
12	Additional under construction ... miles	460.4	4.7	6.4	5.3		168.4		
13	Maximum completed in any enterprise ... miles	179.3	10.0	45.0	33.5	9.4	90.0	71.9	42.0
14	Maximum width at bottom of ditch [1] ... feet	125	20	30	60	80	55	11	60
15	Maximum of average depths of outlet ditches [1] ... feet	22.0	14.0	11.4	16.0	17.0	10.0	14.0	15.0
16	Mean depth of branch ditches [1] ... feet	7.0		6.4	8.0		7.5	8.0	7.8
	Tile drains:								
17	Completed ... miles	38.8							6.1
18	Additional under construction ... miles	5.9							2.9
19	Maximum completed in any enterprise ... miles	15.0							3.0
20	Maximum size of tile [1] ... inches	30							18
	Accessory levees and dikes:								
21	Completed ... miles	456.9		8.2		11.6	49.9	34.6	10.3
22	Additional under construction ... miles	74.9		4.5			26.6		2.1
	Pumping plants:								
23	Engine capacity ... horsepower	2,785		125					
24	Pump capacity ... gallons per minute	552,000		30,000					
25	Area served by pumps ... acres	70,308		3,000					
26	Area drained by open ditches only [1] ... acres	1,612,085	8,800	5,587	49,626		25,800		9,800
27	Length of these ditches ... miles	2,480.3	17.0	19.8	44.8		47.8		31.6
28	Average length per acre ... feet	8.1	10.2	18.7	4.8		9.8		17.0
29	Area having open ditches and levees [1] ... acres	883,432		41,395		33,765	207,000	37,236	2,908
30	Length of these ditches ... miles	1,278.3		90.4		9.4	298.0	71.9	4.5
31	Average length per acre ... feet	7.6		11.5		1.5	7.6	10.2	8.2
32	Length of the accessory levees ... miles	481.7		12.7		11.6	76.5	34.6	5.2
33	Area drained by tile only [1] ... acres	760							
34	Length of these tile ... miles	4.0							
35	Average length per acre ... feet	27.8							
36	Area having tile and levees [1] ... acres	7,000							7,000
37	Length of these tile ... miles	3.0							3.0
38	Average length per acre ... feet	2.3							2.3
39	Length of the accessory levees ... miles	2.5							2.5
40	Area drained by open ditches and tile [1] ... acres	46,240							31,680
41	Length of these drains ... miles	88.9							45.0
42	Average length per acre ... feet	10.2							7.5
43	Area having open ditches, tile, and levees [1] ... acres	46,687							836
44	Length of these drains ... miles	89.3							3.5
45	Average length per acre ... feet	10.1							22.1
46	Length of the accessory levees ... miles	47.6							4.7
	DEVELOPMENT OF LAND.								
47	Improved land in operating enterprises, 1920 ... acres	1,474,302	7,200	43,364	24,813	1,712	63,800	23,477	45,038
48	Improved land prior to drainage ... acres	760,796	2,300	36,081	3,138	1,688	39,200	1,862	34,356
49	Increase since drainage ... acres	713,506	4,900	7,283	21,675	24	24,600	21,615	10,682
50	Per cent of increase [2]	93.8	213.0	20.2	690.7	1.4	62.8		31.1
51	Per cent increase is of all improved land in farms, 1920	2.9	1.8	2.5	4.9	(3)	23.4	9.4	2.8
52	Timber and cut-over land, 1920 ... acres	1,074,860	1,000	98	11,808	32,053	169,000	13,759	2,184
53	Timber and cut-over land prior to drainage ... acres	1,646,297	3,800	1,418	11,808	32,077	193,600	35,374	8,156
54	Decrease since drainage ... acres	571,437	2,800	1,320		24	24,600	21,615	5,972
55	Per cent of decrease	34.7	73.7	93.1		0.1	12.7	61.1	73.2
56	Other unimproved land, 1920 ... acres	47,042	600	3,520	13,005				5,002
57	Other unimproved land prior to drainage ... acres	189,111	2,700	9,483	34,680				9,712
58	Decrease since drainage ... acres	142,069	2,100	5,963	21,675				4,710
59	Per cent of decrease	75.1	77.8	62.9	62.5				48.5
60	Swampy or subject to overflow, 1920 ... acres	454,360		10,987	6,276	31,621	103,700	1,151	
61	Swampy or subject to overflow, prior to drainage ... acres	2,013,704	2,100	27,099	49,626	32,077	211,940	35,374	25,006
62	Decrease since drainage ... acres	1,559,344	2,100	16,112	43,350	456	108,240	34,223	25,006
63	Per cent of decrease	77.4	100.0	59.5	87.4	1.4	51.1	96.7	100.0
	CAPITAL INVESTED AND COST PER ACRE.								
64	Total capital invested in and required for completion of operating enterprises ... dollars	24,749,735	70,328	512,988	700,108	5,000	2,264,672	374,000	348,700
65	Capital invested in these enterprises to Dec. 31, 1919 ... dollars	20,723,128	53,328	386,748	625,797	5,000	1,264,672	374,000	328,700
66	Additional capital required to complete these enterprises ... dollars	4,026,607	17,000	126,240	74,311		1,000,000		20,000
67	Average cost per acre when completed ... dollars	9.53	7.99	10.92	14.11	0.15	9.73	10.04	6.68
68	Enterprises constructing open ditches only ... dollars	13,442,666	70,328	55,488	700,108		117,672		54,000
69	Average cost per acre when completed ... dollars	8.34	7.99	9.93	14.11		4.56		5.51
70	Enterprises constructing open ditches and levees ... dollars	9,215,065		457,500		5,000	2,147,000	374,000	10,700
71	Average cost per acre when completed ... dollars	10.43		11.05		0.15	10.37	10.04	3.68
72	Enterprises constructing tile drains only ... dollars	17,500							
73	Average cost per acre when completed ... dollars	23.03							
74	Enterprises constructing tile drains and levees ... dollars	14,000							14,000
75	Average cost per acre when completed ... dollars	2.00							2.00
76	Enterprises constructing open ditches and tile drains ... dollars	485,230							230,000
77	Average cost per acre when completed ... dollars	10.49							7.26
78	Enterprises constructing open ditches, tile drains, and levees ... dollars	1,575,274							40,000
79	Average cost per acre when completed ... dollars	33.74							47.85
	CROPS.								
	Improved land in enterprises reporting—								
80	Corn as principal crop on drained land ... acres	980,387	7,200	43,364	24,813	1,712	63,800	23,477	31,540
81	Cotton as principal crop on drained land ... acres	250,681							
82	Wheat as principal crop on drained land ... acres	243,234							13,498

[1] When works under construction have been completed. [2] Per cent not shown when more than 1,000. [3] Less than one-tenth of 1 per cent.

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

		Cass.	Chariton.	Clark.	Dunklin.	Henry.	Holt.	Johnson.	Knox.
	LAND AREA.								
1	Approximate land area of the county ... acres	461,440	491,520	318,720	339,200	476,160	285,440	531,840	328,960
2	All land in operating drainage enterprises ... acres	13,180	49,554	25,474	250,483	11,407	41,708	34,657	6,811
3	Improved land ... acres	6,590	41,170	21,344	150,143	10,266	40,259	28,235	3,481
4	Per cent of all improved land in farms	1.8	10.7	9.9	93.8	2.8	17.7	6.4	1.3
5	Timber and cut-over land ... acres	6,590	8,130	1,890	100,340	1,141	744	6,422	2,467
6	Other unimproved land ... acres		254	2,240			705		863
7	Swampy or subject to overflow, in enterprises ... acres	13,180	254	3,627	58,983		1,676		98
8	Suffering a loss of crops from defective drainage ... acres	2,197	4,878	3,625	14,287		2,223		
9	Assessed acreage	13,180	49,554	25,474	250,483	11,407	41,708	34,657	6,811
10	Excess over all land in operating enterprises ... acres								
	DRAINAGE WORKS.								
	Open ditches:								
11	Completed ... miles	12.2	53.2	44.7	300.6	26.5	67.8	89.8	12.8
12	Additional under construction ... miles	11.6					1.4	3.4	
13	Maximum completed in any enterprise ... miles	12.2	33.0	15.7	88.7	15.3	31.7	49.0	4.9
14	Maximum width at bottom of ditch [1] ... feet	25	30	70	123	18	100	30	75
15	Maximum of average depths of outlet ditches [1] ... feet	16.0	16.0	14.0	9.0	14.0	12.0	18.0	14.0
16	Mean depth of branch ditches [1] ... feet	8.0	5.9	4.5	7.2	3.0	5.2	3.5	7.8
	Tile drains:								
17	Completed ... miles			0.6	0.7				
18	Additional under construction ... miles							0.8	
19	Maximum completed in any enterprise ... miles			0.6	0.7				
20	Maximum size of tile [1] ... inches			12	20				
	Accessory levees and dikes:								
21	Completed ... miles			19.0	66.0	3.0	12.7	3.0	
22	Additional under construction ... miles							0.7	
	Pumping plants:								
23	Engine capacity ... horsepower			550					
24	Pump capacity ... gallons per minute			100,000					
25	Area served by pumps ... acres			6,100					
26	Area drained by open ditches only [1] ... acres	13,180	49,554	8,874	136,512	6,971	18,208	26,845	6,811
27	Length of these ditches ... miles	23.8	53.2	19.0	175.3	11.2	37.5	62.0	12.8
28	Average length per acre ... feet	9.5	5.7	11.3	6.8	8.5	10.9	12.2	9.9
29	Area having open ditches and levees [1] ... acres			10,500	113,171	4,436	23,500	3,208	
30	Length of these ditches ... miles			15.7	122.6	15.3	31.7	11.2	
31	Average length per acre ... feet			7.9	5.7	18.2	7.1	18.4	
32	Length of the accessory levees ... miles			13.0	66.0	3.0	12.7	3.0	
33	Area drained by tile only [1] ... acres								
34	Length of these tile ... miles								
35	Average length per acre ... feet								
36	Area having tile and levees [1] ... acres								
37	Length of these tile ... miles								
38	Average length per acre ... feet								
39	Length of the accessory levees ... miles								
40	Area drained by open ditches and tile [1] ... acres				800				
41	Length of these drains ... miles				3.4				
42	Average length per acre ... feet				22.4				
43	Area having open ditches, tile, and levees [1] ... acres			6,100				4,604	
44	Length of these drains ... miles			10.6				20.8	
45	Average length per acre ... feet			9.2				23.9	
46	Length of the accessory levees ... miles			6.0				0.7	
	DEVELOPMENT OF LAND.								
47	Improved land in operating enterprises, 1920 ... acres	6,590	41,170	21,344	150,143	10,266	40,259	28,235	3,481
48	Improved land prior to drainage ... acres	6,590	24,790	14,130	105,201	3,834	27,925	10,599	1,380
49	Increase since drainage ... acres		16,380	7,214	44,942	6,432	12,334	17,636	2,101
50	Per cent of increase		66.1	51.1	42.7	167.8	44.2	166.4	152.2
51	Per cent increase is of all improved land in farms, 1920		4.2	3.3	28.1	1.7	5.4	4.0	0.8
52	Timber and cut-over land, 1920 ... acres	6,590	8,130	1,890	100,340	1,141	744	6,422	2,467
53	Timber and cut-over land prior to drainage ... acres	6,590	16,260	3,436	145,282	2,630	1,792	9,355	2,820
54	Decrease since drainage ... acres		8,130	1,546	44,942	1,489	1,048	2,933	353
55	Per cent of decrease		50.0	45.0	30.9	56.6	58.5	31.4	12.5
56	Other unimproved land, 1920 ... acres		254	2,240			705		863
57	Other unimproved land prior to drainage ... acres		8,504	7,908		4,943	11,991	14,703	2,611
58	Decrease since drainage ... acres		8,250	5,668		4,943	11,286	14,703	1,748
59	Per cent of decrease		97.0	71.7		100.0	94.1	100.0	66.9
60	Swampy or subject to overflow, 1920 ... acres	13,180	254	3,627	58,983		1,676		98
61	Swampy or subject to overflow, prior to drainage ... acres	13,180	49,554	16,397	141,918	10,520	34,449	20,688	3,421
62	Decrease since drainage ... acres		49,300	12,770	82,935	10,520	32,773	20,688	3,323
63	Per cent of decrease		99.5	77.9	58.4	100.0	95.1	100.0	97.1
	CAPITAL INVESTED AND COST PER ACRE.								
64	Total capital invested in and required for completion of operating enterprises ... dollars	341,892	270,420	444,378	1,147,685	139,353	398,850	351,553	55,082
65	Capital invested in these enterprises to Dec. 31, 1919 ... dollars	181,203	270,420	444,378	1,147,685	139,353	397,850	323,378	55,082
66	Additional capital required to complete these enterprises ... dollars	160,689					1,000	28,175	
67	Average cost per acre when completed ... dollars	25.94	5.46	17.44	4.58	12.22	9.56	10.14	8.09
68	Enterprises constructing open ditches only ... dollars	341,892	270,420	81,378	430,639	90,804	212,000	190,000	55,082
69	Average cost per acre when completed ... dollars	25.94	5.46	9.17	3.15	13.03	11.64	7.08	8.09
70	Enterprises constructing open ditches and levees ... dollars			180,000	706,816	48,549	186,850	35,109	
71	Average cost per acre when completed ... dollars			17.14	6.25	10.94	7.95	10.94	
72	Enterprises constructing tile drains only ... dollars								
73	Average cost per acre when completed ... dollars								
74	Enterprises constructing tile drains and levees ... dollars								
75	Average cost per acre when completed ... dollars								
76	Enterprises constructing open ditches and tile drains ... dollars				10,230				
77	Average cost per acre when completed ... dollars				12.79				
78	Enterprises constructing open ditches, tile drains, and levees ... dollars			183,000				126,444	
79	Average cost per acre when completed ... dollars			30.00				27.46	
	CROPS.								
	Improved land in enterprises reporting—								
80	Corn as principal crop on drained land ... acres	6,590	39,180	19,919	1,106		40,259		3,481
81	Cotton as principal crop on drained land ... acres				149,037				
82	Wheat as principal crop on drained land ... acres		1,990	1,425		10,266		28,235	

[1] When works under construction have been completed.

County Table II.—OPERATING DRAINAGE ENTERPRISES: 1920—Continued.

		Lafayette.	Lewis.	Lincoln.	Livingston.	Macon.	Marion.	Mississippi.	New Madrid.	Nodaway.
	LAND AREA.									
1	Approximate land area of the county ... acres	391,680	322,560	388,480	339,840	517,760	279,040	264,320	417,280	557,440
2	All land in operating drainage enterprises ... acres	12,079	16,125	16,800	48,207	17,244	23,794	204,845	371,287	16,208
3	Improved land ... acres	10,871	14,040	16,050	39,165	8,622	20,084	130,575	190,039	14,624
4	Per cent of all improved land in farms	3.4	5.8	6.3	15.5	2.1	10.5	83.6	97.3	2.9
5	Timber and cut-over land ... acres	1,208	1,747	750	9,042	1,724	2,052	73,314	181,248	1,584
6	Other unimproved land ... acres		338			6,898	1,658	956		
7	Swampy or subject to overflow, in enterprises ... acres	381	172	750	27,243	1,724		35,275	57,169	36
8	Suffering a loss of crops from defective drainage ... acres		453		5,323	86	1,436	31,846	20,512	208
9	Assessed acreage	12,079	16,125	16,800	48,207	17,244	23,794	338,235	650,953	16,208
10	Excess over all land in operating enterprises ... acres							133,390	279,666	
	DRAINAGE WORKS.									
	Open ditches:									
11	Completed ... miles	23.1	32.7	29.2	74.7	19.0	17.7	210.5	698.6	36.2
12	Additional under construction ... miles							23.3	27.2	
13	Maximum completed in any enterprise ... miles	9.5	10.0	19.2	14.1	19.0	7.5	55.0	126.5	17.0
14	Maximum width at bottom of ditch [1] ... feet	8	75	30	25	125	40	45	122	60
15	Maximum of average depths of outlet ditches [1] ... feet	8.0	14.0	18.0	12.0	22.0	11.0	16.0	12.0	13.0
16	Mean depth of branch ditches [1] ... feet	3.0	7.0	3.9	3.6	8.0	5.5	8.1	6.4	4.0
	Tile drains:									
17	Completed ... miles		1.3				26.9	2.8		
18	Additional under construction ... miles							1.7		
19	Maximum completed in any enterprise ... miles		1.0				15.0	1.5		
20	Maximum size of tile [1] ... inches		14				30	22		
	Accessory levees and dikes:									
21	Completed ... miles	1.2	8.4	24.0			23.6	20.8	45.7	
22	Additional under construction ... miles				6.0			9.1	7.7	
	Pumping plants:									
23	Engine capacity ... horsepower		(2)	(3)			1,500			
24	Pump capacity ... gallons per minute		(2)	(3)			225,000			
25	Area served by pumps ... acres		6,984	15,000			23,794			
26	Area drained by open ditches only [1] ... acres	6,950	9,141		40,653	17,244		197,521	247,105	16,208
27	Length of these ditches ... miles	21.5	24.1		60.6	19.0		209.5	608.0	36.2
28	Average length per acre ... feet	16.3	13.9		7.9	5.8		5.6	13.0	11.8
29	Area having open ditches and levees [1] ... acres	5,129		16,800	7,554			(4)	124,182	
30	Length of these ditches ... miles	1.6		29.2	14.1			6.8	117.8	
31	Average length per acre ... feet	1.6		9.2	9.9				5.0	
32	Length of the accessory levees [1] ... miles	1.2		24.0	6.0			29.7	53.4	
33	Area drained by tile only [1] ... acres							760		
34	Length of these tile ... miles							4.0		
35	Average length per acre ... feet							27.8		
36	Area having tile and levees [1] ... acres									
37	Length of these tile ... miles									
38	Average length per acre ... feet									
39	Length of the accessory levees ... miles									
40	Area drained by open ditches and tile [1] ... acres						4,010			
41	Length of these drains ... miles						22.5			
42	Average length per acre ... feet						29.6			
43	Area having open ditches, tile, and levees [1] ... acres		6,984				19,784	6,564		
44	Length of these drains ... miles		9.9				22.1	18.0		
45	Average length per acre ... feet		7.5				5.9	14.5		
46	Length of the accessory levees ... miles		8.4				23.6	0.2		
	DEVELOPMENT OF LAND.									
47	Improved land in operating enterprises, 1920 ... acres	10,871	14,040	16,050	39,165	8,622	20,084	130,575	190,039	14,624
48	Improved land prior to drainage ... acres	10,871	7,172	5,460	38,036	1,724	7,125	61,991	77,511	13,813
49	Increase since drainage ... acres		6,868	10,590	1,129	6,898	12,959	68,584	112,528	811
50	Per cent of increase		95.8	194.0	3.0	400.1	181.9	110.6	145.2	5.9
51	Per cent increase is of all improved land in farms, 1920		2.8	4.2	0.4	1.7	6.8	43.9	57.6	0.2
52	Timber and cut-over land, 1920 ... acres	1,208	1,747	750	9,042	1,724	2,052	73,314	181,248	1,584
53	Timber and cut-over land prior to drainage ... acres	1,208	4,017	7,590	10,171	1,724	7,265	138,073	293,776	2,395
54	Decrease since drainage ... acres		2,270	6,840	1,129		5,213	64,759	112,528	811
55	Per cent of decrease		56.5	90.1	11.1		71.8	46.9	38.3	33.9
56	Other unimproved land, 1920 ... acres		338			6,898	1,658	956		
57	Other unimproved land prior to drainage ... acres		4,936	3,750		13,796	9,404	4,781		
58	Decrease since drainage ... acres		4,598	3,750		6,898	7,746	3,825		
59	Per cent of decrease		93.2	100.0		50.0	82.4	80.0		
60	Swampy or subject to overflow, 1920 ... acres	381	172	750	27,243	1,724		35,275	57,169	36
61	Swampy or subject to overflow prior to drainage ... acres	12,079	16,125	12,870	43,386	17,244	23,794	126,955	263,087	16,062
62	Decrease since drainage ... acres	11,698	15,953	12,120	16,143	15,520	23,794	91,680	205,918	16,026
63	Per cent of decrease	96.8	98.9	94.2	37.2	90.0	100.0	72.2	78.3	99.8
	CAPITAL INVESTED AND COST PER ACRE.									
64	Total capital invested in and required for completion of operating enterprises ... dollars	50,965	396,113	273,400	326,710	140,000	919,605	1,679,300	3,976,150	130,000
65	Capital invested in these enterprises to Dec. 31, 1919 ... dollars	50,965	396,113	273,400	278,710	140,000	919,605	1,435,050	3,640,650	130,000
66	Additional capital required to complete these enterprises ... dollars				48,000			244,250	335,500	
67	Average cost per acre when completed ... dollars	4.22	24.57	16.27	6.78	8.12	38.65	8.20	10.71	8.02
68	Enterprises constructing open ditches only ... dollars	37,137	119,888		166,710	140,000		1,067,800	3,080,150	130,000
69	Average cost per acre when completed ... dollars	5.34	13.12		4.10	8.12		5.41	12.46	8.02
70	Enterprises constructing open ditches and levees ... dollars	13,828		273,400	160,000			454,000	896,000	
71	Average cost per acre when completed ... dollars	2.70		16.27	21.18				7.22	
72	Enterprises constructing tile drains only ... dollars							17,500		
73	Average cost per acre when completed ... dollars							23.03		
74	Enterprises constructing tile drains and levees ... dollars									
75	Average cost per acre when completed ... dollars									
76	Enterprises constructing open ditches and tile drains ... dollars						150,000			
77	Average cost per acre when completed ... dollars						37.41			
78	Enterprises constructing open ditches, tile drains, and levees ... dollars		276,225				769,605	140,000		
79	Average cost per acre when completed ... dollars		39.55				38.90	21.33		
	CROPS.									
	Improved land in enterprises reporting—									
80	Corn as principal crop on drained land ... acres	10,871	8,419	1,800	33,500	8,622		74,085	154,239	14,624
81	Cotton as principal crop on drained land ... acres								29,800	
82	Wheat as principal crop on drained land ... acres		5,621	14,250	5,665		20,084	56,490	6,000	

[1] When works under construction have been completed.
[2] Pump located in Marion County.
[3] Pump located in Pike County.
[4] Included in area drained by open ditches only.

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

		Pemiscot.	Perry.	Pike.	Platte.	Ray.	Ripley.	St. Charles.	St. Louis.
	LAND AREA.								
1	Approximate land area of the county ... acres	291,840	295,680	417,920	265,600	361,600	401,280	342,400	311,680
2	All land in operating drainage enterprises ... acres	270,118	25,000	14,430	4,914	7,448	29,576	18,275	4,509
3	Improved land ... acres	81,641	22,000	8,608	4,914	6,897	17,745	17,070	4,509
4	Per cent of all improved land in farms	69.0	13.4	2.9	2.6	2.6	20.2	7.4	2.5
5	Timber and cut-over land ... acres	188,477	3,000	5,822			11,831	1,138	
6	Other unimproved land ... acres					551		67	
7	Swampy or subject to overflow, in enterprises ... acres			5,400		551	7,394	2,100	
8	Suffering a loss of crops from defective drainage ... acres	71,815				248	4,436	49	
9	Assessed acreage	270,118	25,000	14,430	4,914	7,448	29,576	18,275	4,509
10	Excess over all land in operating enterprises ... acres								
	DRAINAGE WORKS.								
	Open ditches:								
11	Completed ... miles	246.8	20.0	17.7	3.2	17.8	31.2	18.7	14.5
12	Additional under construction ... miles	116.0						0.4	
13	Maximum completed in any enterprise ... miles	130.1	20.0	10.7	3.2	11.0	11.1	8.1	10.0
14	Maximum width at bottom of ditch [1] ... feet	123	20	30	12	40	30	32	14
15	Maximum of average depths of outlet ditches [1] ... feet	12.0	8.0	18.0	12.0	10.0	7.5	20.0	9.0
16	Mean depth of branch ditches [1] ... feet	7.4	6.0	4.0		4.0	6.1		4.0
	Tile drains:								
17	Completed ... miles								
18	Additional under construction ... miles								
19	Maximum completed in any enterprise ... miles								
20	Maximum size of tile [1] ... inches								
	Accessory levees and dikes:								
21	Completed ... miles	20.0	10.0	33.3		1.3			
22	Additional under construction ... miles			2.2					
	Pumping plants:								
23	Engine capacity ... horsepower			550					
24	Pump capacity ... gallons per minute			190,000					
25	Area served by pumps ... acres			14,430					
26	Area drained by open ditches only [1] ... acres	191,508			4,914	1,938	29,576	18,275	4,509
27	Length of these ditches ... miles	232.7			3.2	6.8	31.2	19.1	14.5
28	Average length per acre ... feet	6.4			3.4	18.5	5.6	5.5	17.0
29	Area having open ditches and levees [1] ... acres	78,610	25,000	14,430		5,510			
30	Length of these ditches ... miles	130.1	20.0	17.7		11.0			
31	Average length per acre ... feet	8.7	4.2	6.5		10.5			
32	Length of the accessory levees ... miles	20.0	10.0	35.5		1.3			
33	Area drained by tile only [1] ... acres								
34	Length of these tile ... miles								
35	Average length per acre ... feet								
36	Area having tile and levees [1] ... acres								
37	Length of these tile ... miles								
38	Average length per acre ... feet								
39	Length of the accessory levees ... miles								
40	Area drained by open ditches and tile [1] ... acres								
41	Length of these drains ... miles								
42	Average length per acre ... feet								
43	Area having open ditches, tile, and levees [1] ... acres								
44	Length of these drains ... miles								
45	Average length per acre ... feet								
46	Length of the accessory levees ... miles								
	DEVELOPMENT OF LAND.								
47	Improved land in operating enterprises, 1920 ... acres	81,641	22,000	8,608	4,914	6,897	17,745	17,070	4,509
48	Improved land prior to drainage ... acres	40,660	22,000	2,708	2,457	2,128	11,831	12,829	2,615
49	Increase since drainage ... acres	40,981		5,900	2,457	4,769	5,914	4,241	1,894
50	Per cent of increase	100.8		217.9	100.0	224.1	50.0	33.1	72.4
51	Per cent increase is of all improved land in farms, 1920	34.6		2.0	1.3	1.8	6.7	1.8	1.1
52	Timber and cut-over land, 1920 ... acres	188,477	3,000	5,822			11,831	1,138	
53	Timber and cut-over land prior to drainage ... acres	229,458	3,000	9,615		97	17,745	1,138	792
54	Decrease since drainage ... acres	40,981		3,793		97	5,914		792
55	Per cent of decrease	17.9		39.4		100.0	33.3		100.0
56	Other unimproved land, 1920 ... acres					551		67	
57	Other unimproved land prior to drainage ... acres			2,107	2,457	5,223		4,308	1,102
58	Decrease since drainage ... acres			2,107	2,457	4,672		4,241	1,102
59	Per cent of decrease			100.0	100.0	89.5		98.4	100.0
60	Swampy or subject to overflow, 1920 ... acres			5,400		551	7,394	2,100	
61	Swampy or subject to overflow prior to drainage ... acres	267,760	17,500	11,722	4,914	5,611	17,745	3,750	3,907
62	Decrease since drainage ... acres	267,760	17,500	6,322	4,914	5,060	10,351	1,650	3,907
63	Per cent of decrease	100.0	100.0	53.9	100.0	90.2	58.3	44.0	100.0
	CAPITAL INVESTED AND COST PER ACRE.								
64	Total capital invested in and required for completion of operating enterprises ... dollars	3,624,505	122,000	504,600	15,000	77,175	90,260	80,339	39,294
65	Capital invested in these enterprises to Dec. 31, 1919 ... dollars	2,359,988	122,000	484,600	15,000	77,175	90,260	79,339	39,294
66	Additional capital required to complete these enterprises ... dollars	1,264,517		20,000				1,000	
67	Average cost per acre when completed ... dollars	13.42	4.88	34.97	3.05	10.36	3.05	4.40	8.71
68	Enterprises constructing open ditches only ... dollars	2,416,505			15,000	24,785	90,260	80,339	39,294
69	Average cost per acre when completed ... dollars	12.62			3.05	12.79	3.05	4.40	8.71
70	Enterprises constructing open ditches and levees ... dollars	1,208,000	122,000	504,600		52,390			
71	Average cost per acre when completed ... dollars	15.37	4.88	34.97		9.51			
72	Enterprises constructing tile drains only ... dollars								
73	Average cost per acre when completed ... dollars								
74	Enterprises constructing tile drains and levees ... dollars								
75	Average cost per acre when completed ... dollars								
76	Enterprises constructing open ditches and tile drains ... dollars								
77	Average cost per acre when completed ... dollars								
78	Enterprises constructing open ditches, tile drains, and levees ... dollars								
79	Average cost per acre when completed ... dollars								
	CROPS.								
	Improved land in enterprises reporting—								
80	Corn as principal crop on drained land ... acres	9,797	22,000	600	4,914	4,959	17,745		
81	Cotton as principal crop on drained land ... acres	71,844							
82	Wheat as principal crop on drained land ... acres			8,008		1,938		17,070	4,509

[1] When works under construction have been completed.

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

		Saline.	Scotland.	Scott.	Shelby.	Stoddard.	Wayne.	Worth.	Other counties.[1]
	LAND AREA.								
1	Approximate land area of the county ... acres	482,560	280,960	268,160	325,760	521,600	496,000	169,600	3,862,400
2	All land in operating drainage enterprises ... acres	7,184	15,110	154,335	9,697	375,037	9,000	7,013	23,262
3	Improved land ... acres	6,713	6,867	116,441	7,453	194,315	900	3,156	20,111
4	Per cent of all improved land in farms	1.8	3.0	66.7	2.9	72.7	0.9	2.2	0.7
5	Timber and cut-over land ... acres	471	3,445	37,894	2,244	180,722	8,100	351	1,070
6	Other unimproved land ... acres		4,798					3,506	2,081
7	Swampy or subject to overflow, in enterprises ... acres	471	1,300	1,950		62,837	8,100	5,961	3,993
8	Suffering a loss of crops from defective drainage ... acres			5,662	7,966	13,959	450		1,865
9	Assessed acreage	7,184	15,110	229,724	9,697	375,037	9,000	7,013	23,262
10	Excess over all land in operating enterprises ... acres			75,389					
	DRAINAGE WORKS.								
	Open ditches:								
11	Completed ... miles	21.3	37.5	245.2	12.7	459.5	0.5	2.3	47.6
12	Additional under construction ... miles			3.1		48.4	22.2	15.1	3.5
13	Maximum completed in any enterprise ... miles	6.5	17.5	55.7	10.2	179.3	0.5	2.3	10.8
14	Maximum width at bottom of ditch [2] ... feet	35	18	60	75	81	40	22	60
15	Maximum of average depths of outlet ditches [2] ... feet	8.0	9.0	15.0	14.5	12.0	12.0	15.0	12.0
16	Mean depth of branch ditches [2] ... feet	4.0		7.3	7.0	7.2	8.0	7.0	6.6
	Tile drains:								
17	Completed ... miles								0.4
18	Additional under construction ... miles			0.5					
19	Maximum completed in any enterprise ... miles								0.2
20	Maximum size of tile [2] ... inches								12
	Accessory levees and dikes:								
21	Completed ... miles	9.4		25.0	10.2	0.5			5.2
22	Additional under construction ... miles					5.4	2.6		8.0
	Pumping plants:								
23	Engine capacity ... horsepower	60							
24	Pump capacity ... gallons per minute	7,000							
25	Area served by pumps ... acres	1,000							
26	Area drained by open ditches only [2] ... acres		15,110	70,359	1,200	347,537		7,013	18,756
27	Length of these ditches ... miles		37.5	100.1	2.5	444.4		17.4	36.2
28	Average length per acre ... feet		13.1	7.5	11.0	6.8		13.1	10.2
29	Area having open ditches and levees [2] ... acres	7,184		74,226	8,497	27,500	9,000		2,691
30	Length of these ditches ... miles	21.3		130.7	10.2	63.5	22.7		10.9
31	Average length per acre ... feet	15.7		9.3	6.3	12.2	13.3		21.4
32	Length of the accessory levees ... miles	9.4		25.0	10.2	5.9	2.6		9.2
33	Area drained by tile only [2] ... acres								
34	Length of these tile ... miles								
35	Average length per acre ... feet								
36	Area having tile and levees [2] ... acres								
37	Length of these tile ... miles								
38	Average length per acre ... feet								
39	Length of the accessory levees ... miles								
40	Area drained by open ditches and tile [2] ... acres			9,750					
41	Length of these drains ... miles			18.0					
42	Average length per acre ... feet			9.7					
43	Area having open ditches, tile, and levees [2] ... acres								1,815
44	Length of these drains ... miles								4.4
45	Average length per acre ... feet								12.8
46	Length of the accessory levees ... miles								4.0
	DEVELOPMENT OF LAND.								
47	Improved land in operating enterprises, 1920 ... acres	6,713	6,867	116,441	7,453	194,315	900	3,156	20,111
48	Improved land prior to drainage ... acres	4,343	4,533	29,354	480	71,309	900	3,156	12,716
49	Increase since drainage ... acres	2,370	2,334	87,087	6,973	123,006			7,395
50	Per cent of increase [3]	54.6	51.5	296.7		172.5			58.2
51	Per cent increase is of all improved land in farms, 1920	0.6	1.0	49.9	2.7	46.0			0.3
52	Timber and cut-over land, 1920 ... acres	471	3,445	37,894	2,244	180,722	8,100	351	1,070
53	Timber and cut-over land prior to drainage ... acres	471	5,288	120,680	3,274	303,728	8,100	351	1,943
54	Decrease since drainage ... acres		1,843	82,786	1,030	123,006			873
55	Per cent of decrease		34.9	68.6	31.5	40.5			44.9
56	Other unimproved land, 1920 ... acres		4,798					3,506	2,081
57	Other unimproved land prior to drainage ... acres	2,370	5,289	4,301	5,943			3,506	8,603
58	Decrease since drainage ... acres	2,370	491	4,301	5,943				6,522
59	Per cent of decrease	100.0	9.3	100.0	100.0				75.8
60	Swampy or subject to overflow, 1920 ... acres	471	1,300	1,950		62,837	8,100	5,961	3,993
61	Swampy or subject to overflow prior to drainage ... acres	3,927	15,110	114,947	6,723	303,728	8,100	5,961	17,348
62	Decrease since drainage ... acres	3,456	13,810	112,997	6,723	240,891			13,355
63	Per cent of decrease	88.0	91.4	98.3	100.0	79.3			77.0
	CAPITAL INVESTED AND COST PER ACRE.								
64	Total capital invested in and required for completion of operating enterprises ... dollars	82,542	144,324	1,008,981	90,588	2,996,940	155,000	170,000	230,935
65	Capital invested in these enterprises to Dec. 31, 1919 ... dollars	82,542	144,324	989,981	90,588	2,659,540	3,100	16,000	207,310
66	Additional capital required to complete these enterprises ... dollars			19,000		337,400	151,900	154,000	23,625
67	Average cost per acre when completed ... dollars	11.49	9.55	6.54	9.34	7.99	17.22	24.24	9.93
68	Enterprises constructing open ditches only ... dollars		144,324	227,517	18,588	2,644,623		170,000	159,935
69	Average cost per acre when completed ... dollars		9.55	3.23	15.49	7.61		24.24	8.53
70	Enterprises constructing open ditches and levees ... dollars	82,542		686,464	72,000	352,317	155,000		31,000
71	Average cost per acre when completed ... dollars	11.49		9.25	8.47	12.81	17.22		11.52
72	Enterprises constructing tile drains only ... dollars								
73	Average cost per acre when completed ... dollars								
74	Enterprises constructing open ditches and tile drains ... dollars			95,000					
75	Average cost per acre when completed ... dollars			9.74					
76	Enterprises constructing tile drains and levees ... dollars								
77	Average cost per acre when completed ... dollars								
78	Enterprises constructing open ditches, tile drains, and levees ... dollars								40,000
79	Average cost per acre when completed ... dollars								22.04
	CROPS.								
	Improved land in enterprises reporting—								
80	Corn as principal crop on drained land ... acres	4,241	6,867	76,371	7,453	194,315	900	3,156	14,468
81	Cotton as principal crop on drained land ... acres								
82	Wheat as principal crop on drained land ... acres	2,472		40,070					5,643

[1] Includes only Andrew, Buchanan, Caldwell, Callaway, Clay, Grundy, Howard, Jackson, Linn, Osage, Putnam, and Schuyler Counties.
[2] When works under construction have been completed.
[3] Per cent not shown when more than 1,000.

MONTANA.

The following pages present the statistics of drainage for Montana 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.

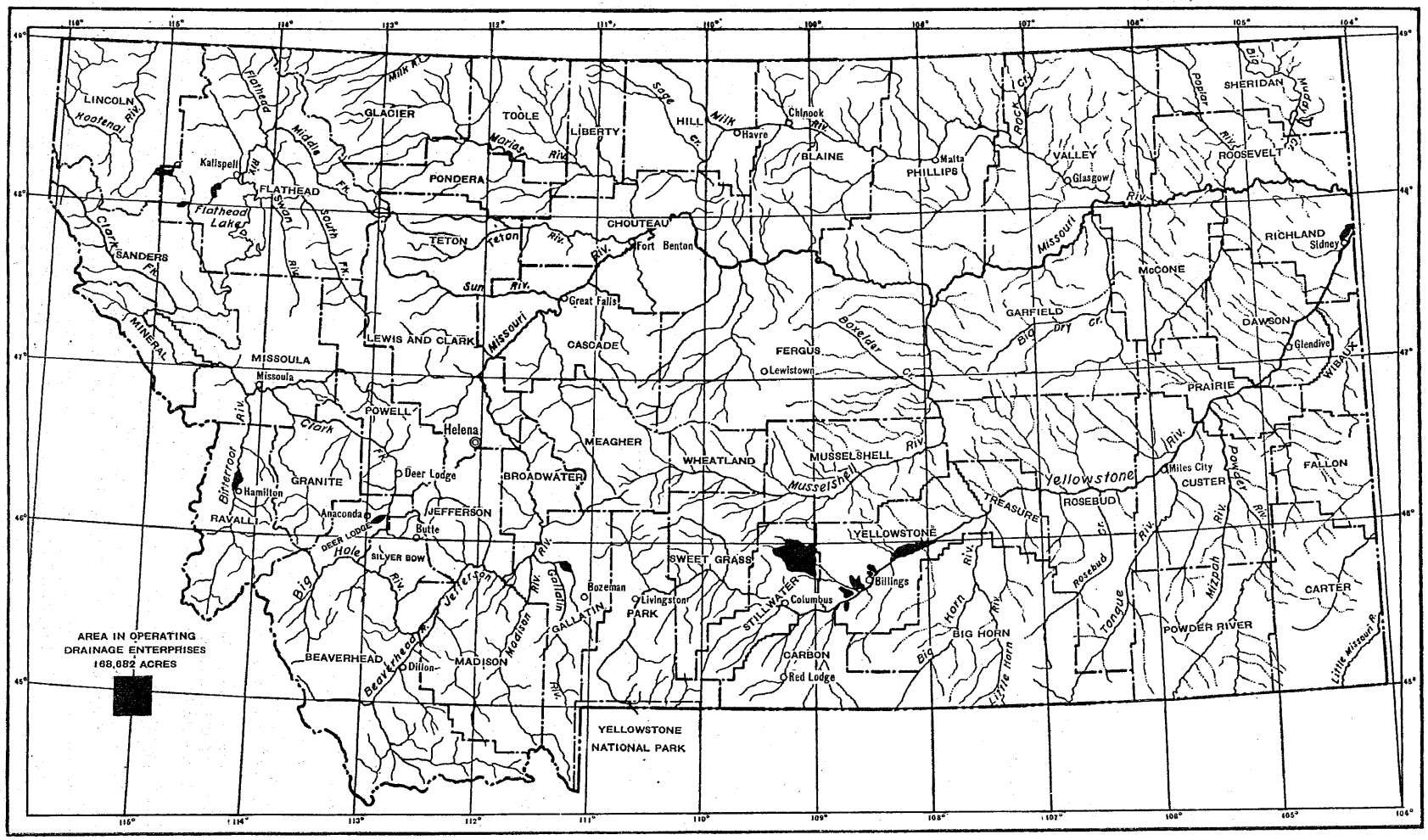
ITEM.	Amount.	Per cent of total.
DRAINAGE ON FARMS.		
Number of all farms in the state	57,677	100.0
Farms reporting land having drainage	756	1.3
Farms reporting land needing drainage	1,728	3.0
All land in farms ... acres	35,070,656	100.0
Improved land in farms ... acres	11,007,278	31.4
Farm land reported as provided with drainage ... acres	51,146	0.1
Farm land reported as needing drainage ... acres	113,293	0.3
Needing drainage only ... acres	36,342	0.1
Needing drainage and clearing ... acres	76,951	0.2
DRAINAGE ENTERPRISES.		
Approximate land area of the state ... acres	93,523,840	100.0
All land in operating drainage enterprises ... acres	168,682	0.2
Improved land ... acres	141,252	0.2
Per cent of all improved land in farms	1.3	.....
Unimproved land[1] ... acres	27,430	(2)
Swampy, subject to overflow, seeped, or alkali ... acres	19,630	(2)
Suffering a loss of crops from defective drainage ... acres	21,964	(2)
Improved land prior to drainage ... acres	107,645	0.1
Increase since drainage began ... acres	33,607	(2)
Land in nonoperating enterprises ... acres	.....	.....
Open ditches in operating enterprises ... miles	103.4	100.0
Completed ... miles	102.1	98.7
Additional under construction ... miles	1.3	1.3
Tile drains in operating enterprises ... miles	86.9	100.0
Completed ... miles	50.7	58.3
Additional under construction ... miles	36.2	41.7
Total capital invested in and required for completion of operating enterprises	$846,466	100.0
Capital invested in these enterprises to Dec. 31, 1919	664,990	78.6
Additional capital required to complete these enterprises	181,476	21.4
Average cost per acre when completed	5.02	.....

[1] No timber or cut-over land reported.

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

MONTANA

APPROXIMATE LOCATION AND AREA OF OPERATING DRAINAGE ENTERPRISES.



Operating and nonoperating enterprises.—In the tables that follow, statistics are given for operating enterprises only, as no nonoperating drainage enterprises were found in Montana. The operating enterprises, as already defined, include both those that 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 drainage works some years ago but were constructing extensions or enlargements on January 1, 1920.

TABLE 2.—LAND AND CAPITAL INVESTED IN ALL ENTERPRISES, CLASSIFIED AS BETWEEN WORKS COMPLETED AND WORKS UNDER CONSTRUCTION: 1920.

CLASS.	LAND.		CAPITAL.[1]		
	Acreage.	Per cent of total.	To Dec. 31, 1919. Amount.	To Dec. 31, 1919. Per cent of total.	Additional required to complete.
All operating enterprises[2]	168,682	100.0	$664,990	100.0	$181,476
With works completed	44,682	26.5	393,969	59.2	.....
With works under construction	124,000	73.5	271,021	40.8	181,476

[1] The inquiry asked for the "total cost of the enterprise to Dec. 31, 1919," and for an "estimate of additional investment to complete."
[2] No nonoperating enterprises in Montana.

Location of enterprises.—Of the 17 drainage enterprises in Montana, 8 are situated in Yellowstone County, in the south-central part of the state, 6 are west of the Continental Divide, and the 3 others are in Gallatin, Richland, and Stillwater Counties.

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. Amount.	To Dec. 31, 1919. Per cent of total.	Additional required to complete.
All operating enterprises[1]	168,682	100.0	$664,990	100.0	$181,476
Clarks Fork	6,700	4.0	22,766	3.4	.....
Kootenai River	7,650	4.5	127,000	19.1	.....
Yellowstone River	149,332	88.5	510,974	76.8	181,476
Missouri River	5,000	3.0	4,250	0.6	.....

[1] No nonoperating enterprises in Montana.

Condition of land in enterprises.—With one exception, all the enterprises east of the Continental Divide are for the drainage and protection of land damaged or threatened with water-logging and the concentration of salts, commonly called alkali, in the surface soil as a result of irrigation. The enterprises on the Pacific slope are reported as all for the drainage and protection of land that was swampy or subject to overflow by stream floods.

For the state, 3,930 acres in drainage districts and 61,831 acres in United States Reclamation Service projects are reported as not having needed drainage, or not expected to receive drainage or protection from the improvement works authorized, but as having been assessed merely as being responsible for damage to the other land. This acreage in the United States Reclamation Service projects has been omitted from the tabulations in this bulletin.

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.[1]			
	Total. Acreage.	Total. Per cent of all land.	Works completed (acres).	Works under construction (acres).
All land in enterprises	168,682	100.0	44,682	124,000
Improved land	141,252	83.7	38,642	102,610
Unimproved land[2]	27,430	16.3	6,040	21,390
Swampy, subject to overflow, seeped, etc.	19,630	11.6	1,640	17,990
Suffering a loss of crops	21,964	13.0	3,004	18,960

[1] No nonoperating enterprises in Montana.
[2] No timber or cut-over land reported.

Size of enterprises.—The average area included in the 17 drainage enterprises in Montana is 9,922 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.	ASSESSED AREA. Per cent of total.
All operating enterprises	168,682	168,682	100.0
500 to 999 acres	1,307	1,307	0.8
1,000 to 4,999 acres	23,711	23,711	14.1
5,000 to 9,999 acres	19,664	19,664	11.7
10,000 to 49,999 acres	24,000	24,000	14.2
50,000 to 99,999 acres	.....	.....	.....
100,000 to 499,999 acres	100,000	100,000	59.3

Character of enterprises.—Most of the drainage enterprises organized under the state laws were established in accordance with the law of March 7, 1905 (ch. 106). That law provided for a county drain commissioner, with duties generally the same as provided in the law of March 11, 1915 (ch. 147), and for a very similar method of organizing drainage districts. Amendments made in 1907 and 1909 did not affect the form of organization.

The drainage law of 1915 provides for the appointment of a county drain commissioner by the board of county commissioners, to have jurisdiction over all established drains in his county. A petition for a drain must be signed by not less than ten freeholders of the county, including at least five (or at least half when the whole number is five or less) who own land liable for assessment for the proposed improvement. The tracts of land and the cities, towns, counties, railways, and irrigation ditches assessed for the construction of a drain comprise the drainage district. Land liable to become water-logged may be included. Damages and inconvenience caused by seepage and waste water from irrigation ditches and higher land are to be considered in apportioning the cost, which is borne by the various parts of the district in proportion to the benefits that will be conferred.

A first order of determination for the drainage district is issued by the drain commissioner if his preliminary examination indicates that the enterprise is practicable; the final order of determination is issued when right of way for the drain has been secured. The plan of drainage is determined by the drain commissioner, who lets contract for construction. Damages for right of way are awarded by a board of special commissioners appointed by the district court. If this board decides that the drain is unnecessary, proceedings for establishing the drain are dismissed at the applicants' expense. Appeal from this board's award may be taken to the district court for jury trial. Apportionment of the cost is made by the drain commissioner, subject to review by a board appointed by the district court and to further appeal for jury trial. This board of review may add to the district or eliminate any part of it. Public hearings are held upon the petition for commissioners to determine damages and upon the drain commissioner's apportionment of cost. Damages awarded each individual are deducted from the assessment of cost made against him. The number of installments for collecting the drainage taxes, which must not extend more than 10 years, is determined by the drain commissioner. Payments for damages, services, and materials are made by warrants drawn upon the funds of the district, but those for land and for damages in excess of benefits will be paid from general county funds, which will be reimbursed by the district.

Petition for a drain to be located or to confer benefits in more than one county may be filed in either county affected. The drain commissioners act jointly, but after they apportion the total cost between the counties each makes the apportionment within his own county.

Drainage and protection against seepage and alkali for land in projects of the United States Reclamation Service may be provided by that service as such improvement works are deemed necessary.

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. Amount.	To Dec. 31, 1919. Per cent of total.	Additional required to complete.
All operating enterprises [1]	168,682	100.0	$664,990	100.0	$181,476
Drainage districts	129,432	76.7	208,173	31.3	104,043
Laws of 1905, ch. 106	29,432	17.4	183,150	27.5	.....
Laws of 1915, ch. 147	100,000	59.3	25,023	3.8	104,043
U. S. Reclamation Service	25,600	15.2	322,567	48.5	77,433
Individual ownership [2]	13,650	8.1	134,250	20.2	.....

[1] No nonoperating enterprises in Montana.
[2] Includes 1,000 acres in commercial development.

Drainage works.—The total works completed by drainage enterprises to December 31, 1919, comprised 102.1 miles of open ditches and 50.7 miles of tile drains; the additional lengths under construction were 1.3 miles of open ditches and 36.2 miles of tile drains. These figures do not include drains installed by individual farm owners supplemental to the works of the enterprises. No levees or dikes have been built or authorized by any of the drainage 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. Amount.	To Dec. 31, 1919. Per cent of total.	Additional required to complete.
All kinds	168,682	100.0	$664,990	100.0	$181,476
Open ditches only	42,082	24.9	314,400	47.3	.....
Open ditches and tile drains [1]	126,600	75.1	350,590	52.7	181,476

[1] Includes 1,000 acres drained by tile only.

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. Depths less than 3 feet were

omitted; to include this group, computed as 3 feet, would show the mean depth for the state 6.0 instead of 6.3 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	168,682	100.0
Less than 3 feet	3,650	2.2
3.0 to 3.9 feet	.....	.....
4.0 to 4.9 feet	5,000	3.0
5.0 to 5.9 feet	4,000	2.4
6.0 to 6.9 feet	.....	.....
7.0 to 7.9 feet	24,000	14.2
Not reporting branches	132,032	78.3

Maintenance of works.—The drainage law of 1915 requires the county drain commissioner to keep the drains under his supervision in proper repair, and to include in his annual report to the board of county commissioners an estimate of the funds that will be required during the ensuing year for inspection and maintenance of each drain. The assessment for maintenance and repair shall not exceed in any year 5 per cent of the cost of original construction. The cost of the maintenance work is assessed against the parts of the district according to the benefits that will accrue, though this may be different from the apportionment of the cost of original construction. If the total cost for any maintenance work is estimated to exceed the funds available for that drain, application must be filed and a special assessment levied, in most respects the same as for establishing a new drain.

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

METHOD OF MAINTENANCE.	LAND.		CAPITAL.		
			To Dec. 31, 1919.		Additional required to complete.
	Acreage.	Per cent of total.	Amount.	Per cent of total.	
All operating enterprises	168,682	100.0	$664,990	100.0	$181,476
By district forces	25,600	15.2	322,567	48.5	77,433
By contract	23,732	14.1	163,384	24.6	.....
No maintenance provided [1]	10,350	6.1	55,250	8.3	.....
Not reporting	109,000	64.6	123,789	18.6	104,043

[1] Includes 3,650 acres maintained by landowners.

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 drain 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 of 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 reclamation 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	168,682	100.0	168,682	100.0
1905 to 1909	21,533	12.8	21,533	12.8
1910 to 1914	30,499	18.1	30,499	18.1
1915 to 1919	104,000	61.7	104,000	61.7
Not reported [1]	12,650	7.5	12,650	7.5

[1] All under individual ownership.

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	$664,990	100.0	$181,476
1905 to 1909	105,248	15.8	.....
1910 to 1914	67,136	10.1	.....
1915 to 1919	284,787	42.8	181,476
Not reported [1]	207,819	31.3	.....

[1] All under individual ownership.

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	103.4	100.0	86.9	100.0
1905 to 1909	24.0	23.2	.....	.....
1910 to 1914	11.2	10.8	82.0	94.4
1915 to 1919	20.7	20.0	3.8	4.4
Not reported [1]	47.5	45.9	1.1	1.3

[1] All under individual ownership.

Crops.—The principal crops grown upon the drained land in drainage enterprises are wheat, alfalfa, 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.

COUNTY TABLE I.—DRAINAGE ON FARMS: 1920.

		THE STATE.	Beaverhead.	Blaine.	Carbon.	Deer Lodge.	Flathead.
1	Number of all farms in the state or county	57,677	642	1,761	1,353	202	1,923
2	Farms reporting land having drainage	756	9	4	35	57	111
3	Farms reporting land needing drainage	1,728	39	9	79	11	410
4	Farms in drainage and levee districts	336	.....	.....	3	50	23
	LAND AND FARM AREA.						
5	Approximate land area of the state or county ... acres	93,523,840	3,620,480	2,706,560	1,318,400	476,800	3,909,760
6	All land in farms ... acres	35,070,656	637,009	1,159,056	446,386	58,484	470,283
7	Improved land in farms ... acres	11,007,278	270,603	291,431	178,503	24,210	179,201
8	Woodland in farms ... acres	1,646,462	7,142	11,334	17,644	3,143	127,244
9	Other unimproved land in farms ... acres	22,416,916	359,264	856,291	250,239	31,131	163,838
10	Farm land reported as provided with drainage ... acres	51,146	977	950	1,145	1,127	7,898
11	Farm land reported as needing drainage ... acres	113,293	2,025	432	3,316	733	24,598
12	Drainage only ... acres	36,342	1,231	167	1,805	360	1,297
13	Drainage and clearing ... acres	76,951	794	265	1,511	373	23,301

		Gallatin.	Granite.	Jefferson.	Lincoln.	Madison.	Missoula.
1	Number of all farms in the county	1,349	354	555	341	901	1,323
2	Farms reporting land having drainage	48	12	6	34	11	39
3	Farms reporting land needing drainage	109	60	17	59	57	83
4	Farms in drainage and levee districts	12	.....	.....	1	1	2
	LAND AND FARM AREA.						
5	Approximate land area of the county ... acres	1,604,480	1,098,880	1,044,480	2,319,360	2,318,080	2,030,720
6	All land in farms ... acres	783,189	254,148	281,494	65,050	564,516	388,408
7	Improved land in farms ... acres	350,776	72,336	80,933	16,894	168,635	173,031
8	Woodland in farms ... acres	35,261	30,961	4,421	33,979	11,162	72,897
9	Other unimproved land in farms ... acres	397,152	150,851	196,140	14,177	384,719	142,480
10	Farm land reported as provided with drainage ... acres	5,881	1,407	870	1,324	546	4,628
11	Farm land reported as needing drainage ... acres	6,587	4,914	348	4,095	6,316	6,126
12	Drainage only ... acres	3,687	373	208	361	4,755	515
13	Drainage and clearing ... acres	2,900	4,541	140	3,734	1,561	5,611

		Phillips.	Powell.	Ravalli.	Richland.	Yellowstone.	All other counties.[1]
1	Number of all farms in the county	1,914	476	1,231	1,577	2,211	39,564
2	Farms reporting land having drainage	7	13	42	7	260	61
3	Farms reporting land needing drainage	7	51	180	46	147	364
4	Farms in drainage and levee districts	.....	2	6	1	222	13
	LAND AND FARM AREA.						
5	Approximate land area of the county ... acres	3,313,920	1,490,560	1,530,240	1,345,920	1,671,040	61,724,160
6	All land in farms ... acres	1,084,725	520,065	245,965	812,194	1,067,425	26,232,259
7	Improved land in farms ... acres	227,811	125,924	114,473	311,006	333,174	8,088,337
8	Woodland in farms ... acres	6,239	73,902	43,480	11,242	268,423	887,988
9	Other unimproved land in farms ... acres	850,675	320,239	88,012	489,946	465,828	17,255,934
10	Farm land reported as provided with drainage ... acres	780	2,642	1,190	1,047	15,592	3,142
11	Farm land reported as needing drainage ... acres	311	4,026	7,335	2,806	3,955	35,370
12	Drainage only ... acres	210	1,681	903	1,425	3,339	14,025
13	Drainage and clearing ... acres	101	2,345	6,432	1,381	616	21,345

[1] No drainage on farms reported in Carter, Chouteau, Custer, Garfield, Hill, Liberty, Pondera, Powder River, Prairie, Roosevelt, Sheridan, Stillwater, Valley, Wheatland, and Wibaux Counties.

COUNTY TABLE II.—OPERATING DRAINAGE ENTERPRISES: 1920.

		The State.	Deer Lodge, Flathead, Lincoln, and Ravalli.	Gallatin, Richland, and Stillwater.	Yellowstone.
	LAND AREA.				
1	Approximate land area of the state or county ... acres	93,523,840	8,236,160	4,087,680	1,671,040
2	All land in operating drainage enterprises ... acres	168,682	14,350	106,600	47,732
3	Improved land ... acres	141,252	9,150	89,170	42,932
4	Per cent of all improved land in farms	1.3	2.7	9.5	12.9
5	Unimproved land [1] ... acres	27,430	5,200	17,430	4,800
6	Swampy, subject to overflow, seeped, or alkali land, in enterprises ... acres	19,630	800	17,430	1,400
7	Suffering a loss of crops from defective drainage ... acres	21,964	300	21,664	.....
8	Assessed acreage	168,682	14,350	106,600	47,732
9	Excess over all land in enterprises ... acres	.....	.....	.....	.....
	DRAINAGE WORKS.				
	Open ditches:				
10	Completed ... miles	102.1	45.7	15.2	41.2
11	Additional under construction ... miles	1.3	.....	1.3	.....
12	Maximum completed in any enterprise ... miles	20.0	20.0	8.5	16.0
13	Maximum width at bottom of ditch [2] ... feet	25	25	8	10
14	Maximum of average depths of outlet ditches [2] ... feet	12.0	10.0	9.0	12.0
15	Mean depth of branch ditches [2] ... feet	6.3	5.0	4.0	7.0
	Tile drains:				
16	Completed ... miles	50.7	0.8	1.1	48.8
17	Additional under construction ... miles	36.2	.....	3.8	32.4
18	Maximum completed in any enterprise ... miles	48.8	0.8	3.8	48.8
19	Maximum size of tile [2] ... inches	24	24	20	20
20	Area drained by open ditches only [2] ... acres	42,082	13,350	5,000	23,732
21	Length of these ditches ... miles	79.4	45.7	8.5	25.2
22	Average length per acre ... feet	10.0	18.1	9.0	5.6
23	Area drained by open ditches and tile [2] ... acres	[3] 126,600	1,000	101,600	24,000
24	Length of these drains ... miles	110.9	0.8	12.9	97.2
25	Average length per acre ... feet	4.6	4.2	0.7	21.4
	DEVELOPMENT OF LAND.				
26	Improved land in operating enterprises, 1920 ... acres	141,252	9,150	89,170	49,932
27	Improved land prior to drainage ... acres	107,645	3,000	83,410	21,235
28	Increase since drainage ... acres	33,607	6,150	5,760	21,697
29	Per cent of increase	31.2	205.0	6.9	102.2
30	Per cent increase is of all improved land in farms, 1920	0.3	1.8	0.6	6.5
31	Unimproved land, 1920 ... acres	27,430	5,200	17,430	4,800
32	Unimproved land prior to drainage ... acres	61,037	11,350	23,190	26,497
33	Decrease since drainage ... acres	33,607	6,150	5,760	21,697
34	Per cent of decrease	55.1	54.2	24.8	81.9
35	Swampy, subject to overflow, seeped, or alkali land, 1920 ... acres	19,630	800	17,430	1,400
36	Swampy, subject to overflow, etc., prior to drainage ... acres	55,470	12,683	23,190	19,597
37	Decrease since drainage ... acres	35,840	11,883	5,760	18,197
38	Per cent of decrease	64.6	93.7	24.8	92.9
	CAPITAL INVESTED AND COST PER ACRE.				
39	Total capital invested in and required for completion of operating enterprises ... dollars	846,466	149,766	209,885	486,815
40	Capital invested in these enterprises to Dec. 31, 1919 ... dollars	664,990	149,766	105,842	409,382
41	Additional capital required to complete these enterprises ... dollars	181,476	.....	104,043	77,433
42	Average cost per acre when completed ... dollars	5.02	10.44	1.97	10.20
43	Enterprises constructing open ditches only ... dollars	314,400	146,766	4,250	163,384
44	Average cost per acre when completed ... dollars	7.47	10.99	0.85	6.88
45	Enterprises constructing open ditches and tile drains ... dollars	[4] 532,066	3,000	205,635	323,431
46	Average cost per acre when completed ... dollars	4.20	3.00	2.02	13.48
	CROPS.				
	Improved land in enterprises reporting—				
47	Wheat as principal crop on drained land ... acres	107,142	.....	83,410	23,732
48	Alfalfa as principal crop on drained land ... acres	20,800	.....	1,600	19,200
49	Hay (except alfalfa) as principal crop on drained land ... acres	12,310	8,150	4,160	.....
50	Other grain as principal crop on drained land ... acres	1,000	1,000	.....	.....

[1] No timber or cut-over land reported.
[2] When works under construction have been completed.
[3] Includes 1,000 acres drained by tile only.
[4] Includes one enterprise drained by tile only.

NEBRASKA.

The following pages present the statistics of drainage for Nebraska 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.

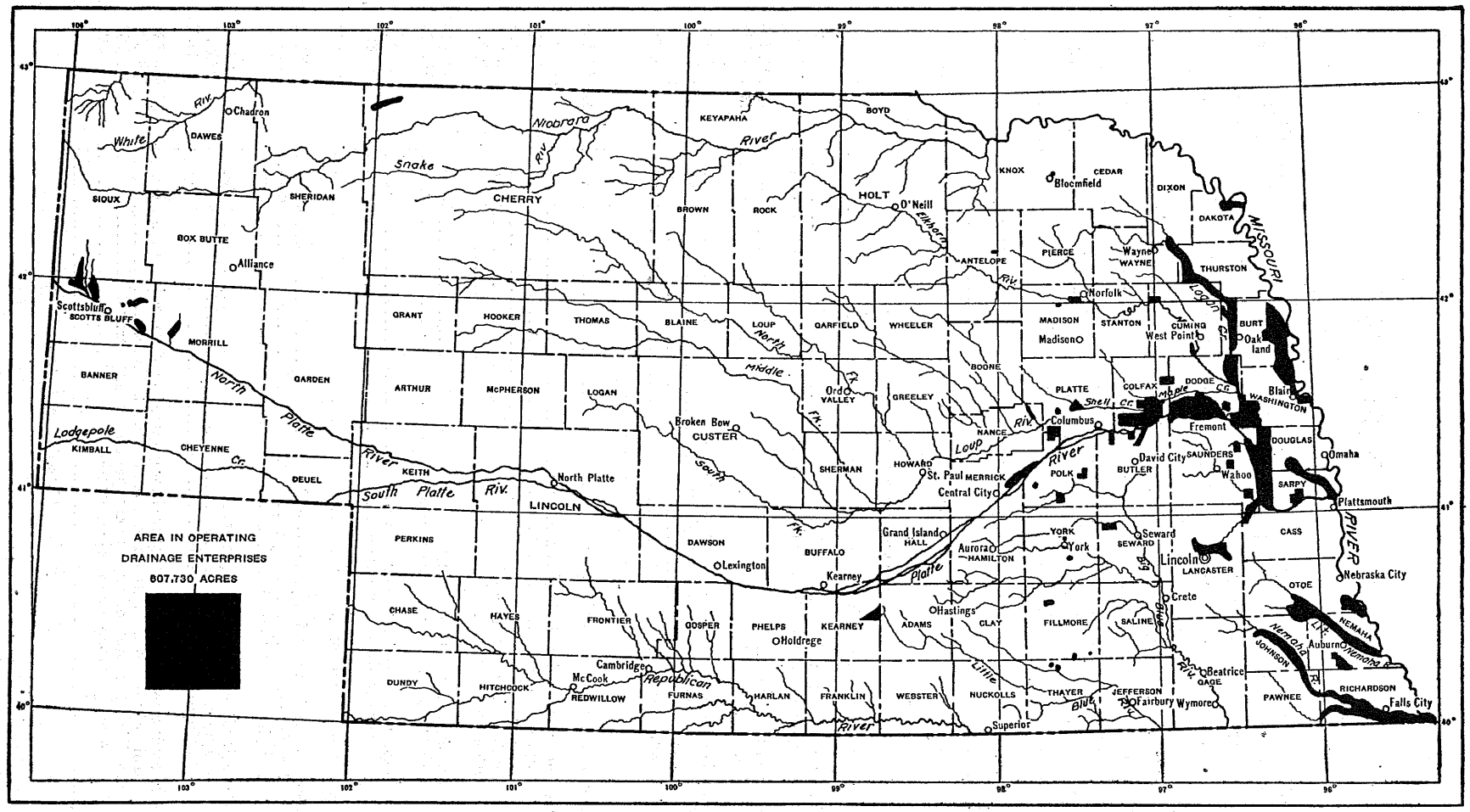
TABLE 1.—SUMMARY FOR THE STATE: 1920.

ITEM.	Amount.	Per cent of total.
DRAINAGE ON FARMS.		
Number of all farms in the state	124,417	100.0
Farms reporting land having drainage	2,356	1.9
Farms reporting land needing drainage	2,963	2.4
All land in farms ... acres	42,225,475	100.0
Improved land in farms ... acres	23,109,624	54.7
Farm land reported as provided with drainage ... acres	214,428	0.5
Farm land reported as needing drainage ... acres	145,818	0.3
Needing drainage only ... acres	115,425	0.3
Needing drainage and clearing ... acres	30,393	0.1
DRAINAGE ENTERPRISES.		
Approximate land area of the state ... acres	49,157,120	100.0
All land in operating drainage enterprises ... acres	607,730	1.2
Improved land ... acres	551,517	1.1
Per cent of all improved land in farms	2.4	.....
Timber and cut-over land ... acres	6,342	(1)
Other unimproved land ... acres	49,871	0.1
Swampy, subject to overflow, seeped, or alkali ... acres	14,019	(1)
Suffering a loss of crops from defective drainage ... acres	19,575	(1)
Improved land prior to drainage ... acres	292,621	0.6
Increase since drainage began ... acres	258,896	0.5
Land in nonoperating enterprises ... acres	25,836	0.1
Open ditches in operating enterprises ... miles	753.2	100.0
Completed ... miles	734.5	97.5
Additional under construction ... miles	18.7	2.5
Tile drains in operating enterprises ... miles	373.6	100.0
Completed ... miles	359.4	96.2
Additional under construction ... miles	14.2	3.8
Total capital invested in and required for completion of operating enterprises	$4,886,681	100.0
Capital invested in these enterprises to Dec. 31, 1919	4,588,578	93.9
Additional capital required to complete these enterprises	298,103	6.1
Average cost per acre when completed	8.04	.....

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

NEBRASKA

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.[1]		
	Acreage.	Per cent of total.	To Dec. 31, 1919. Amount.	To Dec. 31, 1919. Per cent of total.	Additional required to complete.
All organized enterprises	633,566	100.0	$4,588,578	100.0	$821,841
Operating enterprises	607,730	95.9	4,588,578	100.0	298,103
With works completed	565,222	89.2	4,121,486	89.8	.....
With works under construction	42,508	6.7	467,092	10.2	298,103
Nonoperating enterprises	25,836	4.1	.....	.....	523,738

[1] 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 greater part of the drainage enterprises in Nebraska are situated in the eastern quarter of the state, in the counties bordering or near the Platte and Missouri Rivers. In the central and western sections there is very little land organized in drainage enterprises except a few undertakings on the North Platte in the extreme west end of the state.

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. Amount.	To Dec. 31, 1919. Per cent of total.	Additional required to complete.
All organized enterprises	633,566	100.0	$4,588,578	100.0	$821,841
Operating enterprises	607,730	95.9	4,588,578	100.0	298,103
Missouri River	205,432	32.4	2,529,479	55.1	.....
Kansas River	9,260	1.5	41,570	0.9	.....
Platte River	393,038	62.0	2,017,529	44.0	298,103
Nonoperating enterprises	25,836	4.1	.....	.....	523,738
Missouri River	12,504	2.0	.....	.....	377,038
Kansas River	3,152	0.5	.....	.....	10,700
Platte River	10,180	1.6	.....	.....	136,000

Condition of land in enterprises.—About half the total number of the drainage enterprises, comprising a considerably greater portion of the total area in the enterprises, are reported as organized to obtain relief from overflow. Nearly an equal number of smaller enterprises are reported as needing drainage to relieve a generally wet or swampy condition that made cultivation impossible or unprofitable. The enterprises in the west end of the state are for the drainage of land injured by seepage or water-logging as a result of irrigation.

For the state, 78,312 acres of irrigated land were reported as not having needed drainage but as having been assessed as being responsible for injury to the other land. This acreage is omitted from the statistics given in this bulletin.

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, seeped, 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. Acreage.	Total. Per cent of all land.	Works completed (acres).	Works under construction (acres).	
All land in enterprises	607,730	100.0	565,222	42,508	25,836
Improved land	551,517	90.8	514,438	37,079	5,853
Timber and cut-over land	6,342	1.0	6,342	.....	267
Other unimproved land	49,871	8.2	44,442	5,429	19,716
Swampy, seeped, or subject to overflow	14,019	2.3	10,616	3,403	21,636
Suffering a loss of crops	19,575	3.2	16,751	2,824	4,700

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, 123 operating drainage enterprises are counted in Nebraska, with an average area of 5,760 acres assessed. Of this number, 16 comprise 10,000 acres or more each, 63 comprise 1,000 to 5,000 acres, and 5 are smaller than 500 acres each. The assessed acreage exceeds the land in enterprises by 100,720 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 enterprises.

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	607,730	708,450	100.0
Less than 200 acres	320	320	(1)
200 to 499 acres	760	1,200	0.2
500 to 999 acres	14,570	14,570	2.1
1,000 to 4,999 acres	143,052	173,192	24.4
5,000 to 9,999 acres	110,106	115,106	16.2
10,000 to 49,999 acres	210,422	275,562	38.9
50,000 to 99,999 acres	128,500	128,500	18.1

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

Character of enterprises.—The drainage enterprises of Nebraska are county drains and drainage districts organized under the general drainage laws of the state, irrigation projects of the United States Reclamation Service, and some drainage undertakings by private owners. The present drainage laws form chapter 19 of the Revised Statutes of Nebraska, 1913, as amended.

The state board of irrigation, highways, and drainage was given jurisdiction in drainage matters, and the act of April 1, 1913 (ch. 25), required that all plans for proposed drainage districts should be approved by that board before contract was let or construction begun. The board was authorized, upon request, to prepare and to furnish at cost plans and specifications for any proposed drainage work. The same provisions are contained in the act of April 19, 1919 (ch. 190), adopting a Civil Administrative Code, by which a department of public works was created and given the powers previously vested in the state board of irrigation, highways, and drainage.

County drains are established under laws of February 28, 1881 (ch. 51), and April 10, 1911 (ch. 140). The later act repealed and reenacted much of the earlier law, but the following provisions are practically alike in both. The drains are established by orders of the county boards of the counties in which the enterprises are located. Upon petition from one or more owners of land to be benefited, the county board investigates the practicability and public utility of a proposed improvement. If they find for the project, the county surveyor or an engineer makes surveys, plans, and estimates for the work and apportions a number of linear feet of drain and cubic yards of excavation to each parcel of land, road, and railroad according to the benefits that each will receive. At public hearing the board considers the public utility of the enterprise, the practicability of the plan of drainage, the apportionment of the benefits, and the claims for compensation on account of damages. Appeals may be taken to the district court of the county. Construction of the works is secured by contracts let by the county board, and is supervised by an engineer appointed by them. For a drain to be located in more than one county, the petition must be filed in each of the counties and the county boards act jointly. The cost is assessed against the properties in proportion to the benefits, and collected like general taxes. The act of 1911 authorizes the boards to issue bonds for drainage to be paid in not more than 10 annual installments.

County drains, as here classified, include those established under an act of April 11, 1903 (ch. 115). This act provided for drains to be established in each instance upon petition from one or more owners of the land to be drained. Each enterprise was established and controlled by a drainage board consisting of one member selected by the petitioners, one by the county board, and a third by the other two. The assessments of benefits and of damages were made by the drainage board, who also let contracts for construction. The cost was apportioned according to benefits, and each landowner might pay his part in labor. This statute was repealed by act of April 8, 1911 (ch. 142), which provides for establishment and control of these drains by the county board, therein designated as the drainage supervisors, instead of by a separate drainage board for each enterprise. Damages and benefits are to be assessed by three appraisers appointed by the supervisors. No enterprises were reported under the act of 1911.

Drainage districts have been organized under laws of April 2, 1903 (ch. 116), March 29, 1905 (ch. 161), and March 27, 1907 (ch. 153). The act of 1905 repealed that of 1903, to which it was similar, each authorizing the formation of drainage districts by proceedings before the district courts of the counties in which the proposed drainage districts are situated. Articles of association must be signed by a majority in interest of the owners of any contiguous body of swamp or overflowed land, and filed with the district court of the county containing the greatest part of the drainage district. The court may establish the district after public hearing, and exclude any land that will not be benefited. The corporate authority of the district is a board of supervisors elected by the landowners voting each in proportion to his acreage. The cost of the drainage is paid in proportion to benefits assessed against private and corporate land, including railroads and public highways, by the engineer employed by the supervisors to plan the drainage improvements. The tract to receive greatest benefits is rated 100 per cent, and the other tracts in proportion. The assessments are subject to confirmation by the supervisors and to further appeal to the district court. Subdistricts within a drainage district may be formed by proceedings similar to those described, upon petition from one or more owners of land that will be benefited. The supervisors of the main district are the officers of the subdistricts.

Drainage districts under the law of 1907 (ch. 153) are established by vote of the landowners in each district. A petition for organization must describe the proposed district and be signed by 10 or more owners of land in the district, or by a fourth of the owners when the total number is less than 20. The county board may amend the boundaries of the district and determine the number of directors that will form the executive board of the enterprise. Establishment of the district and election of the directors is determined by a majority vote of the landowners, including private, public, and municipal corporations, each having one vote for each acre of his holdings in the district. The directors determine the plan of drainage, apportion the benefits that will accrue to the various tracts of land, and secure construction of the works. The tract to receive least benefit is rated one, and the others are rated higher in proportion. Determination of benefits may be appealed to the district court of the county. Damages are determined by agreement or by eminent domain proceedings. An act of April 7, 1911 (ch. 145), requires that the plan of drainage and estimate of cost must be approved by vote of the landowners before construction is undertaken, and that no indebtedness shall be incurred in excess of the total estimated cost. After such approval the directors shall not make any changes in the plans that will increase the estimated cost more than 15 per cent. The cost is assessed according to the benefits. Bonds may be issued when the sum needed is $5,000 or more, to be paid in not more than 20 annual installments. For a district in more than one county, the proceedings are in the county having the largest acreage in the district.

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

CHARACTER OF ENTERPRISE.	LAND.		CAPITAL.		
			To Dec. 31, 1919.		
	Acreage.	Per cent of total.	Amount.	Per cent of total.	Additional required to complete.
All organized enterprises	633,566	100.0	$4,588,578	100.0	$821,841
Operating enterprises	607,730	95.9	4,588,578	100.0	298,103
County drains	195,260	30.8	530,798	11.6	2,000
Laws of 1881, ch. 51	183,380	28.9	490,203	10.7	.....
Laws of 1903, ch. 115	9,480	1.5	35,195	0.8	1,000
Laws of 1911, ch. 140	2,400	0.4	5,400	0.1	1,000
Drainage districts	396,512	62.6	3,549,382	77.4	55,293
Laws of 1903, ch. 116	2,611	0.4	24,000	0.5	.....
Laws of 1905, ch. 161	224,879	35.5	1,611,219	35.1	9,000
Laws of 1907, ch. 153	169,022	26.7	1,914,163	41.7	46,293
U. S. Reclamation Service	8,688	1.4	355,048	7.7	240,810
Individual ownership [1]	7,270	1.1	153,350	3.3	.....
Nonoperating enterprises	25,836	4.1	.....	.....	523,738
County drains	1,600	0.3	.....	.....	5,600
Laws of 1911, ch. 140	1,600	0.3	.....	.....	5,600
Drainage districts	24,236	3.8	.....	.....	518,138
Laws of 1905, ch. 161	9,776	1.5	.....	.....	330,638
Laws of 1907, ch. 153	14,460	2.3	.....	.....	187,500

[1] Includes two commercial development enterprises.

No enterprises were reported as organized under the drainage law approved February 19, 1877, which is in effect on the census date. It authorizes the owners of wet or overflowed land to form incorporated companies to secure drainage.

The United States Reclamation Service may provide drainage as needed for any land in its irrigation projects. Each irrigation district organized under the laws of Nebraska is required, by act of April 17, 1915 (ch. 69), to provide drainage for all land within the district that is subirrigated from any cause not the fault of the owner or lessee of the land.

The first general drainage law of Nebraska was passed March 3, 1873. It provided for drainage by the county board on petition from a majority of the resident owners of the land to be affected. The cost was apportioned by the board in proportion to the benefits. This statute was repealed by the act of February 28, 1881 (ch. 51). An act of March 23, 1893 (ch. 39), provided for the establishment of a private drain across the land of an objecting owner by decree of the county court. This act was repealed by that of 1903 (ch. 115), which later was superseded by the one of 1911 (ch. 142).

A considerable number of amendments have been made to the various drainage laws, but those that affect the character of the enterprises as described have been indicated in the foregoing paragraphs.

Drainage works.—The total works completed by drainage enterprises to December 31, 1919, comprised 734.5 miles of open ditches, 359.4 miles of tile drains, and 26.8 miles of accessory levees; the additional lengths under construction were 18.7 miles of open ditches, 14.2 miles of tile drains, and 2.8 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 are no pumping districts among the drainage enterprises in this state.

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

KIND OF WORKS.	LAND.		CAPITAL.		
			To Dec. 31, 1919.		
	Acreage.	Per cent of total.	Amount.	Per cent of total.	Additional required to complete.
All kinds	607,730	100.0	$4,588,578	100.0	$298,103
Open ditches only	445,431	73.3	2,980,949	65.0	54,000
Open ditches and levees	138,551	22.8	1,007,231	22.0	3,293
Tile drains only	6,020	1.0	143,000	3.1	.....
Open ditches and tile drains	17,728	2.9	457,398	10.0	240,810

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 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 this group, computed as 10 feet, would show the mean depth for the state 6.4 instead of 6.1 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	607,730	100.0
Less than 3 feet	.....	.....
3.0 to 3.9 feet	5,120	0.8
4.0 to 4.9 feet	29,100	4.8
5.0 to 5.9 feet	48,101	7.9
6.0 to 6.9 feet	173,400	28.5
7.0 to 7.9 feet	77,454	12.7
8.0 to 8.9 feet	39,628	6.5
9.0 to 9.9 feet	.....	.....
10 feet and more	31,431	5.2
Not reporting branches	203,496	33.5

Maintenance of works.—The county drain law of 1881 (ch. 51), as amended, authorizes the county board to create a county ditch fund, to consist of taxes collected from county levies and of unexpended balances in special ditch funds, to be used for maintenance of the drainage ditches of the county. An act of April 10, 1911 (ch. 141), provides for cleaning out the drains constructed under the law of 1881, by petition and proceedings similar to those prescribed for establishing a new drain. Owners or tenants of land through which runs a watercourse or ditch are required to clean it out at least once each year, between March 1 and April 15, by a law of April 8, 1911 (ch. 143).

The supervisors of each drainage district organized under the act of 1905 (ch. 161) are authorized to keep the works of the district in repair, and for defraying the cost may levy assessments against the land apportioned like the cost of original construction. The directors of districts organized under the act of 1907 (ch. 153) may maintain the drainage works of the enterprise, and assessments therefor are apportioned according to the benefits determined for constructing the works.

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

METHOD OF MAINTENANCE.	LAND.		CAPITAL.		
			To Dec. 31, 1919.		Additional required to complete.
	Acreage.	Per cent of total.	Amount.	Per cent of total.	
All operating enterprises	607,730	100.0	$4,588,578	100.0	$298,103
By district forces	192,160	31.6	1,943,893	42.4	249,103
By contract	169,306	27.9	849,474	18.5	22,000
By method not specified	11,651	1.9	51,200	1.1	.....
No maintenance provided	230,043	37.9	1,734,330	37.8	26,000
Not reported	4,570	0.8	9,681	0.2	1,000

Date of organization.—The progress in drainage development is shown only roughly by the dates of the organization of enterprises, which are the dates when the drains or districts were established by the county boards or the district courts, since there may be a period of one or more years 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.

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	607,730	100.0	708,450	100.0
1880 to 1889	20,940	3.4	20,940	3.0
1890 to 1899	96,362	15.9	100,762	14.2
1900 to 1904	34,095	5.6	55,907	7.9
1905 to 1909	271,626	44.7	282,646	39.9
1910 to 1914	109,420	18.0	172,908	24.4
1915 to 1919	75,287	12.4	75,287	10.6

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	$4,588,578	100.0	$298,103
1880 to 1889	36,992	0.8	.....
1890 to 1899	189,831	4.1	.....
1900 to 1904	201,704	4.4	.....
1905 to 1909	2,238,344	48.8	285,810
1910 to 1914	1,440,754	31.4	2,000
1915 to 1919	480,953	10.5	10,293

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.	753.2	100.0	373.6	100.0	29.6	100.0
1880 to 1889	33.6	4.5	.....	.....	1.5	5.1
1890 to 1899	77.0	10.2	.....	.....	.....	.....
1900 to 1904	35.3	4.7	1.7	0.5	.....	.....
1905 to 1909	324.6	43.1	124.7	33.4	13.1	44.3
1910 to 1914	179.8	23.9	246.7	66.0	14.5	49.0
1915 to 1919	102.9	13.7	0.5	0.1	0.5	1.7

Crops.—The principal crops grown upon the drained land in drainage enterprises are corn, small grains, 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.	Burt.	Butler.	Cass.	Cedar.	Cherry.	Clay.	Colfax.
1	Number of all farms in the state or county	124,417	1,417	1,850	1,946	2,064	1,664	1,791	1,392
2	Farms reporting land having drainage	2,356	183	61	35	59	70	35	100
3	Farms reporting land needing drainage	2,963	166	43	82	50	89	105	29
4	Farms in drainage and levee districts	1,064	104	34	3	2	6	11	80
	LAND AND FARM AREA.								
5	Approximate land area of the state or county ... acres	49,157,120	304,000	373,120	344,320	470,400	3,826,560	370,560	259,200
6	All land in farms ... acres	42,225,475	263,631	352,176	319,177	430,452	2,981,685	351,436	251,405
7	Improved land in farms ... acres	23,109,624	245,739	319,428	280,706	367,547	591,881	313,843	219,479
8	Woodland in farms ... acres	900,933	7,534	6,658	22,244	11,732	13,023	6,012	3,044
9	Other unimproved land in farms ... acres	18,214,918	10,358	26,090	16,227	51,173	2,376,781	31,581	28,882
10	Farm land reported as provided with drainage ... acres	214,428	17,489	5,469	977	2,469	21,975	897	7,841
11	Farm land reported as needing drainage ... acres	145,818	9,278	808	1,782	2,892	12,681	3,605	3,423
12	Drainage only ... acres	115,425	6,566	781	384	2,432	12,246	3,487	790
13	Drainage and clearing ... acres	30,393	2,712	27	1,398	460	435	118	2,633

		Cuming.	Custer.	Dakota.	Dawson.	Dixon.	Dodge.	Douglas.	Fillmore.
1	Number of all farms in the county	1,859	3,708	740	1,934	1,441	1,794	1,709	1,975
2	Farms reporting land having drainage	65	3	28	18	70	197	38	68
3	Farms reporting land needing drainage	71	8	25	37	48	95	102	152
4	Farms in drainage and levee districts	26	.....	15	6	2	131	33	20
	LAND AND FARM AREA.								
5	Approximate land area of the county ... acres	369,280	1,656,320	161,920	630,400	302,080	339,840	211,840	368,640
6	All land in farms ... acres	359,527	1,495,095	141,859	570,874	274,689	322,428	174,418	350,989
7	Improved land in farms ... acres	318,176	766,939	117,892	377,185	235,274	298,238	157,327	319,880
8	Woodland in farms ... acres	10,218	25,709	10,664	5,313	15,382	9,273	8,674	3,569
9	Other unimproved land in farms ... acres	31,133	702,447	13,303	188,376	24,033	14,917	8,417	27,540
10	Farm land reported as provided with drainage ... acres	3,084	1,720	2,727	1,549	2,454	17,632	2,172	4,259
11	Farm land reported as needing drainage ... acres	3,779	254	582	1,767	1,902	4,869	2,436	3,960
12	Drainage only ... acres	2,884	154	368	1,525	1,588	3,765	1,139	3,241
13	Drainage and clearing ... acres	895	100	214	242	314	1,104	1,297	719

		Garden.	Garfield.	Grant.	Hall.	Hamilton.	Holt.	Howard.	Jefferson.
1	Number of all farms in the county	714	490	151	1,556	1,882	2,263	1,523	1,827
2	Farms reporting land having drainage	3	33	16	14	24	118	19	5
3	Farms reporting land needing drainage	3	33	29	26	61	113	32	87
4	Farms in drainage and levee districts	1	2	12	.....	11	3	.....	.....
	LAND AND FARM AREA.								
5	Approximate land area of the county ... acres	1,079,680	368,000	499,200	337,920	344,320	1,531,520	359,040	369,920
6	All land in farms ... acres	884,328	313,139	561,794	313,008	338,187	1,335,144	347,125	351,184
7	Improved land in farms ... acres	226,316	110,295	59,823	269,461	305,769	741,869	238,357	266,631
8	Woodland in farms ... acres	213	7,236	2,234	5,616	1,961	34,769	5,584	14,387
9	Other unimproved land in farms ... acres	657,799	195,608	499,737	37,931	30,457	558,506	103,184	70,166
10	Farm land reported as provided with drainage ... acres	530	5,213	12,729	594	1,063	18,703	833	1,917
11	Farm land reported as needing drainage ... acres	325	3,116	8,190	682	1,304	16,086	1,080	1,935
12	Drainage only ... acres	325	2,965	8,190	663	1,212	14,768	1,035	145
13	Drainage and clearing ... acres	.....	151	.....	19	92	1,318	45	1,790

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

		Johnson.	Keith.	Lancaster.	Lincoln.	Madison.	Merrick.	Nance.	Nemaha.
1	Number of all farms in the county	1,167	673	3,259	2,024	1,647	1,364	1,102	1,524
2	Farms reporting land having drainage	65	12	67	36	41	72	13	73
3	Farms reporting land needing drainage	12	10	69	51	58	49	19	42
4	Farms in drainage and levee districts	54	11	30	20	9	57	9	42
	LAND AND FARM AREA.								
5	Approximate land area of the county ... acres	239,360	683,520	545,920	1,623,040	368,640	296,320	285,440	248,960
6	All land in farms ... acres	206,424	614,842	507,636	1,383,879	323,335	274,940	257,080	237,021
7	Improved land in farms ... acres	188,081	218,703	449,223	512,778	280,880	223,436	195,969	209,709
8	Woodland in farms ... acres	11,483	2,641	13,638	11,802	9,155	7,677	9,323	18,661
9	Other unimproved land in farms ... acres	6,860	393,498	44,775	859,299	33,300	43,827	51,788	8,651
10	Farm land reported as provided with drainage ... acres	5,526	888	3,742	3,542	2,262	7,935	1,555	5,560
11	Farm land reported as needing drainage ... acres	328	401	1,686	4,734	3,398	3,718	550	2,319
12	Drainage only ... acres	269	401	1,204	4,320	2,296	3,118	245	1,486
13	Drainage and clearing ... acres	59	.....	482	414	1,102	600	305	833

		Otoe.	Platte.	Polk.	Richardson.	Rock.	Sarpy.	Saunders.	Scotts Bluff.
1	Number of all farms in the county	2,253	2,131	1,476	1,974	553	979	2,697	1,391
2	Farms reporting land having drainage	225	12	14	32	14	31	32	35
3	Farms reporting land needing drainage	183	6	22	41	19	42	65	68
4	Farms in drainage and levee districts	94	3	12	18	.....	31	24	24
	LAND AND FARM AREA.								
5	Approximate land area of the county ... acres	387,840	430,720	275,200	348,800	642,560	153,600	483,840	462,720
6	All land in farms ... acres	375,290	413,744	266,937	319,820	461,064	136,114	458,228	281,492
7	Improved land in farms ... acres	336,878	366,247	234,127	262,030	193,729	120,894	413,568	157,176
8	Woodland in farms ... acres	21,262	13,746	6,543	25,268	6,885	9,496	11,195	5,446
9	Other unimproved land in farms ... acres	17,150	33,751	26,267	32,522	260,450	5,724	33,465	118,870
10	Farm land reported as provided with drainage ... acres	10,967	504	815	2,209	5,436	1,885	1,279	3,419
11	Farm land reported as needing drainage ... acres	2,851	120	540	1,802	1,609	1,864	2,223	4,251
12	Drainage only ... acres	1,948	115	503	856	652	1,181	1,613	3,946
13	Drainage and clearing ... acres	903	5	37	946	957	683	610	305

		Seward.	Sheridan.	Thurston.	Washington.	Wayne.	Webster.	York.	All other counties.[1]
1	Number of all farms in the county	2,130	1,063	1,105	1,488	1,287	1,530	2,042	49,868
2	Farms reporting land having drainage	37	9	38	51	24	7	42	112
3	Farms reporting land needing drainage	71	4	33	71	9	8	114	411
4	Farms in drainage and levee districts	16	1	19	31	.....	5	15	37
	LAND AND FARM AREA.								
5	Approximate land area of the county ... acres	367,360	1,580,160	247,680	243,200	288,000	369,920	368,000	23,338,240
6	All land in farms ... acres	345,869	1,339,444	190,529	229,626	248,107	341,294	346,540	19,582,470
7	Improved land in farms ... acres	305,923	309,624	177,374	204,830	239,449	261,886	318,376	9,780,679
8	Woodland in farms ... acres	11,116	26,468	10,644	14,218	1,669	17,325	5,164	399,059
9	Other unimproved land in farms ... acres	28,830	1,003,352	2,511	10,578	6,989	62,083	23,000	9,402,732
10	Farm land reported as provided with drainage ... acres	1,277	1,790	3,832	4,577	1,269	4,726	1,211	3,926
11	Farm land reported as needing drainage ... acres	1,618	1,336	1,846	2,700	315	813	2,925	15,135
12	Drainage only ... acres	1,397	1,336	370	2,205	315	678	2,901	11,417
13	Drainage and clearing ... acres	221	.....	1,476	495	.....	135	24	3,718

[1] No drainage on farms reported in Arthur, Banner, Boone, Chase, Cheyenne, Dawes, Deuel, Harlan, Hayes, Hooker, Kimball, Loup, Morrill, Phelps, Pierce, Thomas, and Wheeler Counties.

COUNTY TABLE II.—OPERATING DRAINAGE ENTERPRISES: 1920.

		THE STATE.	Burt.	Butler.	Colfax.	Cuming.	Dakota.	Dodge.	Douglas.
	LAND AREA.								
1	Approximate land area of the state or county ... acres..	49,157,120	304,000	373,120	259,200	369,280	161,920	339,840	211,840
2	All land in operating drainage enterprises ... acres..	607,730	78,992	10,840	46,340	11,100	7,300	122,760	49,250
3	Improved land ... acres..	551,517	60,161	10,840	41,860	8,100	6,570	122,440	48,350
4	Per cent of all improved land in farms ...	2.4	24.5	3.4	19.1	2.5	5.6	41.1	30.7
5	Timber and cut-over land ... acres..	6,342						320	900
6	Other unimproved land ... acres..	49,871	18,831		4,480	3,000	730		
7	Swampy, seeped, or subject to overflow, in enterprises ... acres..	14,019	494						
8	Suffering a loss of crops from defective drainage ... acres..	19,575	4,621		160	300	146	2,190	900
9	Assessed acreage ...	708,450	170,712	10,840	46,340	11,100	7,300	122,760	49,250
10	Excess over all land in operating enterprises ... acres..	100,720	91,720						
	DRAINAGE WORKS.								
	Open ditches:								
11	Completed ... miles..	734.5	109.8	9.3	30.2	10.8	6.5	77.6	49.2
12	Additional under construction ... miles..	18.7	1.0						
13	Maximum completed in any enterprise ... miles..	80.0	80.0	3.5	8.5	5.0	6.5	55.0	41.7
14	Maximum width at bottom of ditch[1] ... feet..	100	100	10	20	15	30	20	40
15	Maximum of average depths of outlet ditches[1] ... feet..	18.0	15.0	7.0	12.0	14.0	15.0	12.0	12.0
16	Mean depth of branch ditches[1] ... feet..	6.1	3.2					6.3	6.0
	Tile drains:								
17	Completed ... miles..	359.4	152.2					206.0	
18	Additional under construction ... miles..	14.2							
19	Maximum completed in any enterprise ... miles..	100.0	100.0					96.0	
20	Maximum size of tile[1] ... inches..	48	12					12	
	Accessory levees and dikes:								
21	Completed ... miles..	26.8	10.0						
22	Additional under construction ... miles..	2.8							
23	Area drained by open ditches only[1] ... acres..	445,431	22,552	10,840	46,340	11,100	7,300	119,640	49,250
24	Length of these ditches ... miles..	528.9	28.3	9.3	30.2	10.8	6.5	77.6	49.2
25	Average length per acre ... feet..	6.3	6.6	4.5	3.4	5.1	4.7	3.4	5.3
26	Area having open ditches and levees[1] ... acres..	138,551	51,000						
27	Length of these ditches ... miles..	177.9	80.0						
28	Average length per acre ... feet..	6.8	8.3						
29	Length of the accessory levees ... miles..	29.6	10.0						
30	Area drained by tile only[1] ... acres..	6,020	2,400					3,120	
31	Length of these tile ... miles..	356.5	150.0					206.0	
32	Average length per acre ... feet..	312.7	330.0					348.6	
33	Area drained by open ditches and tile[1] ... acres..	17,728	3,040						
34	Length of these drains ... miles..	63.5	4.7						
35	Average length per acre ... feet..	18.9	8.2						
	DEVELOPMENT OF LAND.								
36	Improved land in operating enterprises, 1920 ... acres..	551,517	60,161	10,840	41,860	8,100	6,570	122,440	48,350
37	Improved land prior to drainage ... acres..	292,621	27,557	5,400	40,160	3,350	5,475	38,960	48,350
38	Increase since drainage ... acres..	258,896	32,604	5,440	1,700	4,750	1,095	83,480	
39	Per cent of increase ...	88.5	118.3	100.7	4.2	141.8	20.0	214.3	
40	Per cent increase is of all improved land in farms, 1920 ...	1.1	13.3	1.7	0.8	1.5	0.9	28.0	
41	Timber and cut-over land, 1920 ... acres..	6,342						320	900
42	Timber and cut-over land prior to drainage ... acres..	8,797						320	900
43	Decrease since drainage ... acres..	2,455							
44	Per cent of decrease ...	27.9							
45	Other unimproved land, 1920 ... acres..	49,871	18,831		4,480	3,000	730		
46	Other unimproved land prior to drainage ... acres..	306,312	51,435	5,440	6,180	7,750	1,825	83,480	
47	Decrease since drainage ... acres..	256,441	32,604	5,440	1,700	4,750	1,095	83,480	
48	Per cent of decrease ...	83.7	63.4	100.0	27.5	61.3	60.0	100.0	
49	Swampy, seeped, or subject to overflow, 1920 ... acres..	14,019	494						
50	Swampy, seeped, or subject to overflow prior to drainage ... acres..	395,253	25,143	8,640	42,308	10,940	5,475	115,248	5,150
51	Decrease since drainage ... acres..	381,234	24,649	8,640	42,308	10,940	5,475	115,248	5,150
52	Per cent of decrease ...	96.5	98.0	100.0	100.0	100.0	100.0	100.0	100.0
	CAPITAL INVESTED AND COST PER ACRE.								
53	Total capital invested in and required for completion of operating enterprises ... dollars..	4,886,681	850,605	62,257	90,092	56,506	196,165	481,075	259,607
54	Capital invested in these enterprises to Dec. 31, 1919 ... dollars..	4,588,578	825,605	62,257	90,092	56,506	196,165	481,075	259,607
55	Additional capital required to complete these enterprises ... dollars..	298,103	25,000						
56	Average cost per acre when completed ... dollars..	8.04	10.77	5.74	1.94	5.09	26.87	3.92	5.27
57	Enterprises constructing open ditches only ... dollars..	3,034,949	361,335	62,257	90,092	56,506	196,165	398,075	259,607
58	Average cost per acre when completed ... dollars..	6.81	16.02	5.74	1.94	5.09	26.87	3.33	5.27
59	Enterprises constructing open ditches and levees ... dollars..	1,010,524	425,037						
60	Average cost per acre when completed ... dollars..	7.29	8.33						
61	Enterprises constructing tile drains only ... dollars..	143,000	57,500					83,000	
62	Average cost per acre when completed ... dollars..	23.75	23.96					26.60	
63	Enterprises constructing open ditches and tile drains ... dollars..	698,208	6,733						
64	Average cost per acre when completed ... dollars..	39.38	2.21						
	CROPS.								
	Improved land in enterprises reporting—								
65	Corn as principal crop on drained land ... acres..	495,683	38,866	10,840	41,860	3,000	6,570	120,440	48,350
66	Small grains as principal crop on drained land ... acres..	21,795	21,295						
67	Sugar beets as principal crop on drained land ... acres..	[2] 21,084							
68	Hay as principal crop on drained land ... acres..	12,955				5,100		2,000	

[1] When works under construction have been completed.

[2] Includes 4,800 acres reporting vegetables as principal crop on drained land.

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

		Johnson.	Kearney.	Lancaster.	Merrick.	Nemaha.	Otoe.	Pawnee.	Richardson.
	LAND AREA.								
1	Approximate land area of the county ... acres	239,360	330,240	545,920	296,320	248,960	387,840	275,840	348,800
2	All land in operating drainage enterprises ... acres	18,260	9,000	8,000	13,000	20,134	16,437	5,731	35,838
3	Improved land ... acres	18,260	7,650	7,000	12,500	18,121	16,437	5,158	27,581
4	Per cent of all improved land in farms	9.7	3.0	1.6	5.6	8.6	4.9	2.5	10.5
5	Timber and cut-over land ... acres					2,013			2,269
6	Other unimproved land ... acres		1,350	1,000	500			573	5,988
7	Swampy, seeped, or subject to overflow, in enterprises ... acres		720						6,577
8	Suffering a loss of crops from defective drainage ... acres	825	720			1,306			2,235
9	Assessed acreage	18,260	9,000	8,000	13,000	20,134	16,437	5,731	35,838
10	Excess over all land in operating enterprises ... acres								
	DRAINAGE WORKS.								
	Open ditches:								
11	Completed ... miles	30.0	1.3	7.0	6.2	55.0	22.0	14.0	50.5
12	Additional under construction ... miles				4.3				
13	Maximum completed in any enterprise ... miles	25.0	1.3	5.0	4.2	42.0	20.0	14.0	38.0
14	Maximum width at bottom of ditch[1] ... feet	28	45	12	5	30	28	12	25
15	Maximum of average depths of outlet ditches[1] ... feet	15.0	5.0	10.0	5.0	18.0	15.0	18.0	18.0
16	Mean depth of branch ditches[1] ... feet	5.0		4.0		7.5	5.0		6.7
	Tile drains:								
17	Completed ... miles								
18	Additional under construction ... miles								
19	Maximum completed in any enterprise ... miles								
20	Maximum size of tile[1] ... inches								
	Accessory levees and dikes:								
21	Completed ... miles	0.5	0.2				1.5		1.3
22	Additional under construction ... miles								
23	Area drained by open ditches only[1] ... acres	16,500		8,000	13,000	20,134	2,107	5,731	3,677
24	Length of these ditches ... miles	25.0		7.0	10.5	55.0	2.0	14.0	8.0
25	Average length per acre ... feet	8.0		4.6	4.3	14.4	5.0	12.0	11.5
26	Area having open ditches and levees[1] ... acres	1,760	9,000				14,330		32,161
27	Length of these ditches ... miles	5.0	1.3				20.0		42.5
28	Average length per acre ... feet	15.0	0.8				7.4		7.0
29	Length of the accessory levees ... miles	0.5	0.2				1.5		1.3
30	Area drained by tile only[1] ... acres								
31	Length of these tile ... miles								
32	Average length per acre ... feet								
33	Area drained by open ditches and tile[1] ... acres								
34	Length of these drains ... miles								
35	Average length per acre ... feet								
	DEVELOPMENT OF LAND.								
36	Improved land in operating enterprises, 1920 ... acres	18,260	7,650	7,000	12,500	18,121	16,437	5,158	27,581
37	Improved land prior to drainage ... acres	10,010	5,400	3,000	12,200	10,068	421	2,865	10,764
38	Increase since drainage ... acres	8,250	2,250	4,000	300	8,053	16,016	2,293	16,817
39	Per cent of increase[2]	82.4	41.7	133.3	2.5	80.0		80.0	156.2
40	Per cent increase is of all improved land in farms, 1920	4.4	0.9	0.9	0.1	3.8	4.8	1.1	6.4
41	Timber and cut-over land, 1920 ... acres					2,013			2,269
42	Timber and cut-over land prior to drainage ... acres	1,650				2,013		573	2,269
43	Decrease since drainage ... acres	1,650						573	
44	Per cent of decrease	100.0						100.0	
45	Other unimproved land, 1920 ... acres		1,350	1,000	500			573	5,988
46	Other unimproved land prior to drainage ... acres	6,600	3,600	5,000	800	8,053	16,016	2,293	22,805
47	Decrease since drainage ... acres	6,600	2,250	4,000	300	8,053	16,016	1,720	16,817
48	Per cent of decrease	100.0	62.5	80.0	37.5	100.0	100.0	75.0	73.7
49	Swampy, seeped, or subject to overflow, 1920 ... acres		720						6,577
50	Swampy, seeped, or subject to overflow prior to drainage ... acres	8,360	2,700	3,000	13,000	10,217	16,016	5,731	25,011
51	Decrease since drainage ... acres	8,360	1,980	3,000	13,000	10,217	16,016	5,731	18,434
52	Per cent of decrease	100.0	73.3	100.0	100.0	100.0	100.0	100.0	73.7
	CAPITAL INVESTED AND COST PER ACRE.								
53	Total capital invested in and required for completion of operating enterprises ... dollars	208,559	9,600	35,500	19,250	346,000	195,889	60,000	339,124
54	Capital invested in these enterprises to Dec. 31, 1919 ... dollars	208,559	9,600	35,500	12,250	346,000	195,889	60,000	339,124
55	Additional capital required to complete these enterprises ... dollars				7,000				
56	Average cost per acre when completed ... dollars	11.42	1.07	4.44	1.48	17.18	11.92	10.47	9.46
57	Enterprises constructing open ditches only ... dollars	176,415		35,500	19,250	346,000	3,033	60,000	86,124
58	Average cost per acre when completed ... dollars	10.69		4.44	1.48	17.18	1.44	10.47	23.42
59	Enterprises constructing open ditches and levees ... dollars	32,144	9,600				192,856		253,000
60	Average cost per acre when completed ... dollars	18.26	1.07				13.46		7.87
61	Enterprises constructing tile drains only ... dollars								
62	Average cost per acre when completed ... dollars								
63	Enterprises constructing open ditches and tile drains ... dollars								
64	Average cost per acre when completed ... dollars								
	CROPS.								
	Improved land in enterprises reporting—								
65	Corn as principal crop on drained land ... acres	18,260	7,650	3,000	12,000	18,121	16,437	5,158	27,581
66	Small grains as principal crop on drained land ... acres								
67	Sugar beets as principal crop on drained land ... acres			4,000					
68	Hay as principal crop on drained land ... acres				500				

[1] When works under construction have been completed.

[2] Per cent not shown when more than 1,000.

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

		Sarpy.	Saunders.	Scotts Bluff.	Sioux.	Thurston.	Washington.	Wayne.	Other counties.[1]
	LAND AREA.								
1	Approximate land area of the county ... acres	153,600	483,840	462,720	1,315,200	247,680	243,200	288,000	9,484,800
2	All land in operating drainage enterprises ... acres	32,850	30,960	16,124	4,344	12,300	25,840	6,240	26,090
3	Improved land ... acres	32,050	29,040	14,110	3,904	12,300	22,760	6,240	20,085
4	Per cent of all improved land in farms	26.5	7.0	9.0	3.6	6.9	11.1	2.6	0.5
5	Timber and cut-over land ... acres	200	280				80		280
6	Other unimproved land ... acres	600	1,640	2,014	440		3,000		5,725
7	Swampy, seeped, or subject to overflow, in enterprises ... acres	600		1,579	2,369		400		1,280
8	Suffering a loss of crops from defective drainage ... acres	1,090	768	1,232	87	475	560		1,960
9	Assessed acreage	32,850	30,960	16,124	4,344	12,300	34,840	6,240	26,090
10	Excess over all land in operating enterprises ... acres						9,000		
	DRAINAGE WORKS.								
	Open ditches:								
11	Completed ... miles	54.6	15.9	49.3	5.9	18.0	32.6	3.3	75.5
12	Additional under construction ... miles	1.7		8.9	2.8				
13	Maximum completed in any enterprise ... miles	22.5	7.5	23.4	5.9	8.0	21.0	3.3	15.0
14	Maximum width at bottom of ditch [2] ... feet	40	27	20	20	16	100	15	20
15	Maximum of average depths of outlet ditches [2] ... feet	12.0	12.0	9.0	9.0	17.0	12.0	15.0	15.0
16	Mean depth of branch ditches [2] ... feet	5.4	4.0	5.7	7.0	8.0	6.6	8.0	5.1
	Tile drains:								
17	Completed ... miles			0.5					0.7
18	Additional under construction ... miles			13.0	1.2				
19	Maximum completed in any enterprise ... miles			0.5					0.5
20	Maximum size of tile [2] ... inches			48					24
	Accessory levees and dikes:								
21	Completed ... miles	2.0	9.8				1.5		
22	Additional under construction ... miles	2.5	0.3						
23	Area drained by open ditches only [2] ... acres	25,150	9,360	7,780		12,300	24,840	6,240	23,590
24	Length of these ditches ... miles	36.3	8.1	25.5		18.0	31.3	3.3	73.0
25	Average length per acre ... feet	7.6	4.6	17.3		7.7	6.7	2.8	16.3
26	Area having open ditches and levees [2] ... acres	7,700	21,600				1,000		
27	Length of these ditches ... miles	20.0	7.8				1.3		
28	Average length per acre ... feet	13.7	1.9				6.9		
29	Length of the accessory levees ... miles	4.5	10.1				1.5		
30	Area drained by tile only [2] ... acres								500
31	Length of these tile ... miles								0.5
32	Average length per acre ... feet								5.3
33	Area drained by open ditches and tile [2] ... acres			8,344	4,344				2,000
34	Length of these drains ... miles			46.2	9.9				2.7
35	Average length per acre ... feet			29.2	12.0				7.1
	DEVELOPMENT OF LAND.								
36	Improved land in operating enterprises, 1920 ... acres	32,050	29,040	14,110	3,904	12,300	22,760	6,240	20,085
37	Improved land prior to drainage ... acres	10,400	15,270	8,915	3,475	5,120	16,340	2,496	6,625
38	Increase since drainage ... acres	21,650	13,770	5,195	429	7,180	6,420	3,744	13,460
39	Per cent of increase	208.2	90.2	58.3	12.3	140.2	39.3	150.0	203.2
40	Per cent increase is of all improved land in farms, 1920	17.9	3.3	3.3	0.4	4.0	3.1	1.6	0.3
41	Timber and cut-over land, 1920 ... acres	200	280				80		280
42	Timber and cut-over land prior to drainage ... acres	200	280				80		512
43	Decrease since drainage ... acres								232
44	Per cent of decrease								45.3
45	Other unimproved land, 1920 ... acres	600	1,640	2,014	440		3,000		5,725
46	Other unimproved land prior to drainage ... acres	22,250	15,410	7,209	869	7,180	9,420	3,744	18,953
47	Decrease since drainage ... acres	21,650	13,770	5,195	429	7,180	6,420	3,744	13,228
48	Per cent of decrease	97.3	89.4	72.1	49.4	100.0	68.2	100.0	69.8
49	Swampy, seeped, or subject to overflow, 1920 ... acres	600		1,579	2,369		400		1,280
50	Swampy, seeped, or subject to overflow prior to drainage ... acres	24,250	13,550	5,464	4,344	8,300	18,960	3,744	19,702
51	Decrease since drainage ... acres	23,650	13,550	3,885	1,975	8,300	18,560	3,744	18,422
52	Per cent of decrease	97.5	100.0	71.1	45.5	100.0	97.9	100.0	93.5
	CAPITAL INVESTED AND COST PER ACRE.								
53	Total capital invested in and required for completion of operating enterprises ... dollars	266,177	58,696	560,800	198,058	180,100	203,874	6,800	201,947
54	Capital invested in these enterprises to Dec. 31, 1919 ... dollars	262,177	57,403	380,000	118,048	180,100	203,874	6,800	201,947
55	Additional capital required to complete these enterprises ... dollars	4,000	1,293	180,800	80,010				
56	Average cost per acre when completed ... dollars	8.10	1.90	34.78	45.59	14.64	7.89	1.09	7.74
57	Enterprises constructing open ditches only ... dollars	217,247	18,759	73,000		180,100	194,854	6,800	193,830
58	Average cost per acre when completed ... dollars	8.64	2.00	9.38		14.64	7.84	1.09	8.22
59	Enterprises constructing open ditches and levees ... dollars	48,930	39,937				9,020		
60	Average cost per acre when completed ... dollars	6.35	1.85				9.02		
61	Enterprises constructing tile drains only ... dollars								2,500
62	Average cost per acre when completed ... dollars								5.00
63	Enterprises constructing open ditches and tile drains ... dollars			487,800	198,058				5,617
64	Average cost per acre when completed ... dollars			58.46	45.59				2.81
	CROPS.								
	Improved land in enterprises reporting—								
65	Corn as principal crop on drained land ... acres	32,050	29,040			12,300	22,760	6,240	15,160
66	Small grains as principal crop on drained land ... acres								500
67	Sugar beets as principal crop on drained land ... acres			10,880	3,904				2,300
68	Hay as principal crop on drained land ... acres			3,230					2,125

[1] Includes only Antelope, Cass, Cherry, Dixon, Fillmore, Knox, Madison, Morrill, Nance, Platte, Polk, Seward, Thayer, and York Counties.
[2] When works under construction have been completed.

NORTH CAROLINA.

The following pages present the statistics of drainage for North Carolina 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 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.

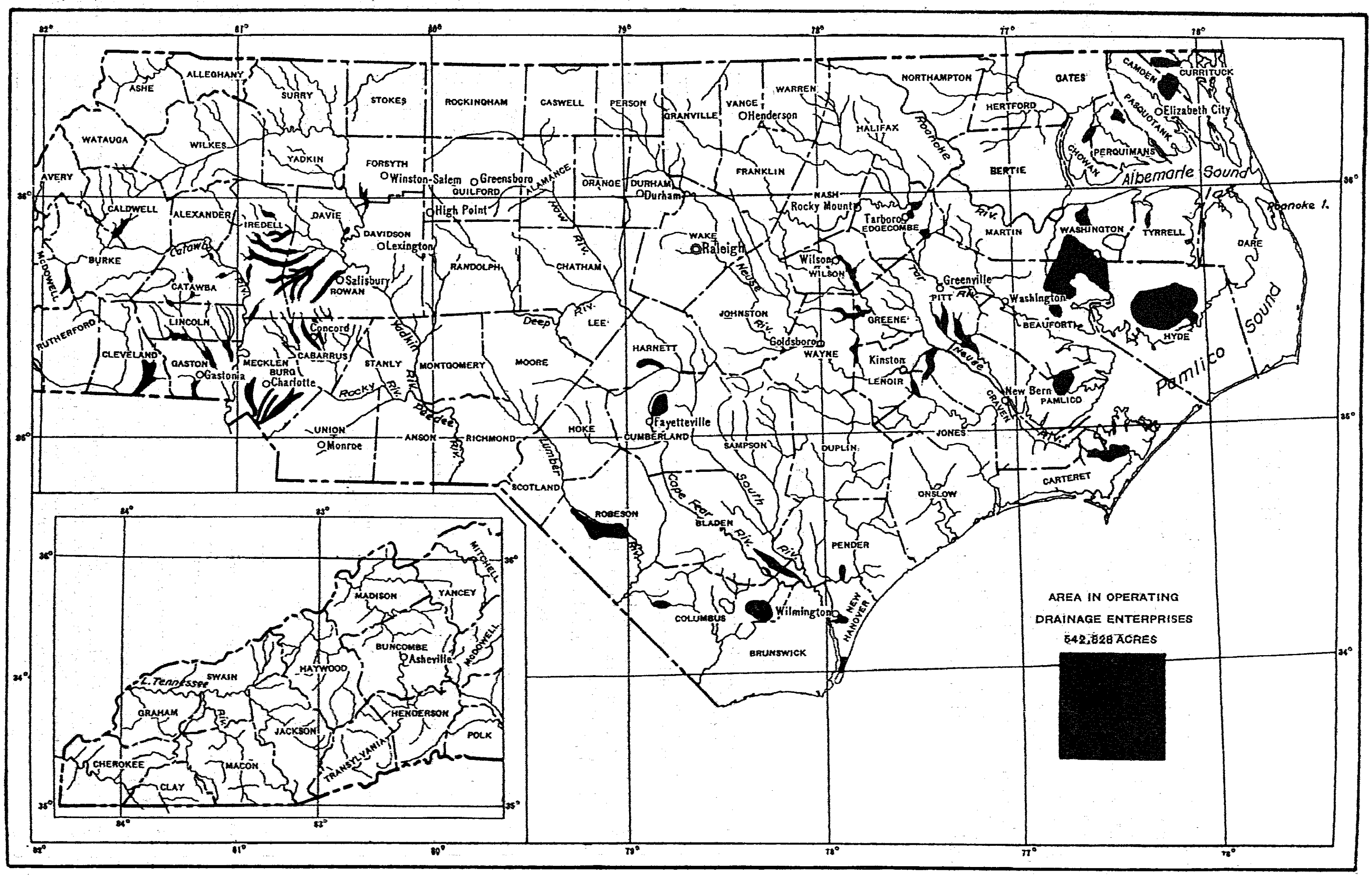
TABLE 1.—SUMMARY FOR THE STATE: 1920.

ITEM.	Amount.	Per cent of total.
DRAINAGE ON FARMS.		
Number of all farms in the state	269,763	100.0
Farms reporting land having drainage	45,246	16.8
Farms reporting land needing drainage	42,247	15.7
All land in farms ... acres	20,021,736	100.0
Improved land in farms ... acres	8,198,409	40.9
Farm land reported as provided with drainage ... acres	1,066,933	5.3
Farm land reported as needing drainage ... acres	1,925,343	9.6
Needing drainage only ... acres	189,401	0.9
Needing drainage and clearing ... acres	1,735,942	8.7
DRAINAGE ENTERPRISES.		
Approximate land area of the state ... acres	31,193,600	100.0
All land in operating drainage enterprises ... acres	542,828	1.7
Improved land ... acres	204,928	0.7
Per cent of all improved land in farms	2.5	.....
Timber and cut-over land ... acres	244,576	0.8
Other unimproved land ... acres	93,324	0.3
Swampy, subject to overflow, seeped, or alkali ... acres	77,494	0.2
Suffering a loss of crops from defective drainage ... acres	12,771	(1)
Improved land prior to drainage ... acres	84,714	0.3
Increase since drainage began ... acres	120,214	0.4
Land in nonoperating enterprises ... acres	.....	.....
Open ditches in operating enterprises ... miles	1,539.1	100.0
Completed ... miles	1,171.3	76.1
Additional under construction ... miles	367.8	23.9
Tile drains in operating enterprises ... miles	.....	.....
Completed ... miles	.....	.....
Additional under construction ... miles	.....	.....
Total capital invested in and required for completion of operating enterprises	$4,526,018	100.0
Capital invested in these enterprises to Dec. 31, 1919	3,623,518	80.1
Additional capital required to complete these enterprises	902,500	19.9
Average cost per acre when completed	8.34	.....

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

NORTH CAROLINA

APPROXIMATE LOCATION AND AREA OF OPERATING DRAINAGE ENTERPRISES.



Operating and nonoperating enterprises.—In the tables that follow, statistics are given for operating enterprises only, as no nonoperating drainage enterprises were found in North Carolina. The operating enterprises, as already defined, include both those that 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 drainage works some years ago but were constructing extensions or enlargements on January 1, 1920.

TABLE 2.—LAND AND CAPITAL INVESTED IN ALL ENTERPRISES, CLASSIFIED AS BETWEEN WORKS COMPLETED AND WORKS UNDER CONSTRUCTION: 1920.

CLASS.	LAND.		CAPITAL.[1]		
			To Dec. 31, 1919.		
	Acreage.	Per cent of total.	Amount.	Per cent of total.	Additional required to complete.
All operating enterprises[2]	542,828	100.0	$3,623,518	100.0	$902,500
With works completed	440,657	81.2	3,075,018	84.9	.....
With works under construction	102,171	18.8	548,500	15.1	902,500

[1] The inquiry asked for the "total cost of the enterprise to Dec. 31, 1919," and for an "estimate of additional investment to complete."
[2] No nonoperating enterprises in North Carolina.

Location of enterprises.—The greater part of the land in drainage enterprises in North Carolina is in the northeastern part of the state. Of the total of 542,828 acres, 475,914 acres, or 87.7 per cent, are in the Coastal Plain region, and only 66,914 acres, or 12.3 per cent, are in the Piedmont section. On the peninsula between Albemarle Sound and Pamlico River are 227,482 acres, or 41.9 per cent of the state total.

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

DRAINAGE BASIN.	LAND.		CAPITAL.		
			To Dec. 31, 1919.		
	Acreage.	Per cent of total.	Amount.	Per cent of total.	Additional required to complete.
All operating enterprises[1]	542,828	100.0	$3,623,518	100.0	$902,500
Pamlico River	116,655	21.5	642,600	17.7	440,000
Neuse River	28,499	5.3	339,000	9.4	3,000
Cape Fear River	72,472	13.4	448,500	12.4	.....
Peedee River	59,369	10.9	593,545	16.4	19,500
Santee River	46,145	8.5	439,351	12.1	.....
Atlantic Ocean	219,688	40.5	1,160,522	32.0	440,000

[1] No nonoperating enterprises in North Carolina.

Condition of land in enterprises.—In the Coastal Plain region the drainage enterprises are for the reclamation of broad areas that are mostly timbered or cut-over swamp land. In the region of Albemarle and Pamlico Sounds much of the land surface is practically flat and only slightly above sea level. In the Piedmont section of the state the drainage problem is that of preventing damage by overflow from stream floods of short duration, and the enterprises are generally narrow strips forming the overflowed bottom land between the hills.

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.[1]			
	Total.		Works completed (acres).	Works under construction (acres).
	Acreage.	Per cent of all land.		
All land in enterprises	542,828	100.0	440,657	102,171
Improved land	204,928	37.8	198,509	6,419
Timber and cut-over land	244,576	45.1	179,934	64,642
Other unimproved land	93,324	17.2	62,214	31,110
Swampy or subject to overflow	77,494	14.3	25,089	52,405
Suffering a loss of crops	12,771	2.4	11,897	874

[1] No nonoperating enterprises in North Carolina.

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 104 drainage enterprises are counted in North Carolina, with an average area of 5,312 acres assessed. The assessed acreage exceeds the land in enterprises by 9,600 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 acreage, deduction was made for the amount of overlapping with enterprises organized previously, to determine the acreage to be tabulated as land in enterprises.

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	542,828	552,428	100.0
Less than 200 acres	120	120	(1)
200 to 499 acres	2,997	2,997	0.5
500 to 999 acres	15,928	15,928	2.9
1,000 to 4,999 acres	93,226	96,026	17.4
5,000 to 9,999 acres	64,917	71,717	13.0
10,000 to 49,999 acres	265,640	265,640	48.1
50,000 to 99,999 acres	.....	.....	.....
100,000 to 499,999 acres	100,000	100,000	18.1

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

Character of enterprises.—The drainage enterprises in North Carolina comprise drainage districts, county drains, incorporated ditches, commercial land development companies, and private undertakings by individual landowners. The drainage districts, county drains, and incorporated ditches have been established under general laws and local or special acts intended to promote the reclamation and improvement of land that is wet or subject to overflow.

There are 81 drainage districts organized under the general drainage law of March 5, 1909 (ch. 442). Such districts are established by the superior courts of the counties in which they are situated. The petition for establishment must be signed by a majority of the resident landowners or by the owners of three-fifths of the land in the proposed district. Three disinterested viewers are appointed by the clerk of the court to report regarding the practicability of the project and the proper boundaries of the district, which must include no land that will not be benefited. If the report recommends against establishment, the petition is dismissed. After the decree of establishment has been issued the viewers prepare plans for the drainage works, assess damages, and divide the land into five classes according to the benefits that will accrue to the various tracts. Public hearings are held by the clerk of the court upon the viewers' reports, before the district is established and after the assessment of damages and the classification of the lands. From the clerk's determinations regarding damages and classification, appeals may be taken to the superior court. Three drainage commissioners are appointed by the clerk of the court, after being elected by the landowners. The drainage works are constructed by the commissioners, who apportion the cost according to the classification of the land. The five classes are assessed, per acre, in the ratio 5:4:3:2:1. If the average cost is less than 25 cents per acre, the assessments are collected in one installment; if it exceeds 25 cents per acre, the drainage commissioners may issue bonds of the district, payable in 3 to 12 years, in an amount not exceeding the unpaid assessments. Districts in more than one county are under the jurisdiction of the court with which the petition is filed. Subdistricts may be organized within any drainage district, in the same manner as main districts.

A drainage district of 3,000 acres has been formed under the general drainage law of March 6, 1905 (ch. 541). Upon petition from a majority of the owners of land adjacent to and on both sides of the creek or branch the county commissioners declare the district established. Each owner then is required to clean out the watercourse through or abutting his property, or the work will be done and the cost assessed against him. One district of 1,700 acres was created by a special act of the legislature.

The county drains are organized under local laws. All but one of the enterprises in Mecklenburg County have been formed under an act of March 3, 1911 (ch. 538), applying in only that county. The law created a county drainage commission to secure such drainage improvements in the county as might seem advantageous. The land to be benefited by each drain is divided by the commission into five classes, and the cost is assessed in the same manner as provided in the drainage district law of 1909. Hearing on the classification is held by the commission, from whose determinations appeal may be taken to the superior court of the county. Damages for lands condemned are determined as in railroad condemnation cases. Plans for the works are prepared and contracts for construction are let by the commission. Assessments are levied annually until the works are paid for, at not to exceed $5 per acre. Bonds for drainage work may be issued for the commission, not to exceed $15,000.

One county drain has been established, to benefit 600 acres, under an act of February 27, 1885 (ch. 149), effective in only Rowan, Davidson, Davie, and Catawba Counties. Upon petition from a majority of the owners of land on any one of the streams in the county, five drainage commissioners are appointed by the county commissioners. The drainage commissioners estimate each owner's acreage that will be affected, and the owners then furnish laborers, each in proportion to his acreage and the wetness of his land, to work under overseers appointed by the commissioners.

Incorporated ditches may be established by the superior courts of the counties, under an act of April 10, 1869 (ch. 164). Petition is filed by a landowner who desires drainage and can secure outlet only across the land of another owner who also will be benefited by the drain. Commissioners are appointed by the court to determine the location and size of the drain and the proportion of cost to be paid by each owner benefited. The drain will not be established if the estimated cost exceeds three-fourths of the value of the land to be benefited, if the lower lands will not be increased 25 per cent in value, or if the owners of one-half in value of the land to be affected do not consent. A statute of 1795, also, provided for any landowner needing to secure drainage outlet across the property of an objecting owner. As amended that law requires a petition to the clerk of the superior court, who will appoint commissioners to assess the damages that the petitioner must pay before he may construct the drain.

Many amendments to the laws enumerated above have been made, but without affecting the forms of the enterprises or the methods of organization as described. A large number of local and special laws have been enacted, for which no enterprises were reported.

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. Amount.	To Dec. 31, 1919. Per cent of total.	Additional required to complete.
All operating enterprises[1]	542,828	100.0	$3,623,518	100.0	$902,500
Drainage districts	458,396	84.4	3,161,317	87.2	484,500
County drains	17,724	3.3	113,101	3.1	.....
Incorporated ditches	6,857	1.3	34,100	0.9	.....
Commercial developments	30,976	5.7	170,000	4.7	415,000
Individual ownerships	28,875	5.3	145,000	4.0	3,000

[1] No nonoperating enterprises in North Carolina.

Drainage works.—The total works completed by drainage enterprises to December 31, 1919, comprised 1,171.3 miles of open ditches and 33.5 miles of accessory levees; the additional lengths under construction were 367.8 miles of ditches only. 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 for land drainage in North Carolina. All the drainage water from 100,000 acres is removed by 16 centrifugal pumps of 1,000,000 gallons per minute capacity, operated by steam engines capable of developing 1,000 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. Amount.	To Dec. 31, 1919. Per cent of total.	Additional required to complete.
All kinds	542,828	100.0	$3,623,518	100.0	$902,500
Open ditches only	435,295	80.2	2,827,144	78.0	902,500
Open ditches and levees	107,533	19.8	796,374	22.0	.....

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 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, 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; to include this group, computed as 10 feet, would show the mean depth for the state 7.5 instead of 6.7 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	542,828	100.0
4.0 to 4.9 feet	16,380	3.0
5.0 to 5.9 feet	41,092	7.6
6.0 to 6.9 feet	101,094	18.6
7.0 to 7.9 feet	104,795	19.3
8.0 to 8.9 feet	44,940	8.3
9.0 to 9.9 feet	47,929	8.8
10 feet and more	105,300	19.4
Not reporting branches	81,298	15.0

Maintenance of works.—The law of 1909, as amended, requires that in each drainage district the original assessment for cost of construction shall include an amount estimated to be sufficient for keeping the works in repair for three years. The drainage commissioners are authorized also to levy special assessments for maintenance purposes, apportioned like the cost of construction, whenever deemed necessary by the commissioners. For maintenance of works constructed by the Mecklenburg County drainage commission, under the act of 1911, that commission may levy assessments apportioned like those for construction.

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. Amount.	To Dec. 31, 1919. Per cent of total.	Additional required to complete.
All operating enterprises	542,828	100.0	$3,623,518	100.0	$902,500
By district forces	9,406	1.7	147,471	4.1	.....
By contract	160,101	29.5	1,090,054	30.1	13,500
By landowners	28,810	5.3	299,995	8.3	.....
Method not stated	8,350	1.5	79,000	2.2	.....
No maintenance provided	295,421	54.4	1,827,998	50.4	514,000
Not reporting	40,740	7.5	179,000	4.9	375,000

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 court or other designated officials, 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 reclamation 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	542,828	100.0	552,428	100.0
Before 1860	1,650	0.3	1,650	0.3
1880 to 1889	2,507	0.5	2,507	0.5
1905 to 1909	51,553	9.5	51,553	9.3
1910 to 1914	347,661	64.0	357,261	64.7
1915 to 1919	139,457	25.7	139,457	25.2

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	$3,623,518	100.0	$902,500
Before 1860	10,000	0.3	.....
1880 to 1889	10,000	0.3	.....
1905 to 1909	327,500	9.0	.....
1910 to 1914	2,329,767	49.0	6,000
1915 to 1919	946,251	41.4	896,500

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

DATE OF ORGANIZATION.	DITCHES.		LEVEES.	
	Miles.	Per cent of total.	Miles.	Per cent of total.
All drains and levees	1,539.1	100.0	33.5	100.0
Before 1860	6.0	0.4	.....	.....
1880 to 1889	5.0	0.3	.....	.....
1905 to 1909	111.7	7.3	2.5	7.5
1910 to 1914	758.6	49.3	31.0	92.5
1915 to 1919	657.8	42.7	.....	.....

Crops.—The principal crops grown upon the drained land in drainage enterprises are corn and cotton. 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.	Alamance.	Alleghany.	Anson.	Ashe.	Beaufort.	Bertie.	Bladen.
1	Number of all farms in the state or county	269,763	2,705	1,409	3,706	3,407	3,228	3,340	2,452
2	Farms reporting land having drainage	45,246	65	90	187	515	2,250	1,341	1,223
3	Farms reporting land needing drainage	42,247	242	99	592	989	1,739	1,000	1,040
4	Farms in drainage and levee districts	1,881	3	.....	9	1	261	2	49
	LAND AND FARM AREA.								
5	Approximate land area of the state or county ... acres	31,193,600	314,880	149,760	355,840	273,280	537,600	449,920	624,640
6	All land in farms ... acres	20,021,736	239,175	138,908	251,975	260,765	218,828	233,242	249,916
7	Improved land in farms ... acres	8,198,409	100,776	91,789	112,352	158,051	79,403	87,284	68,177
8	Woodland in farms ... acres	10,299,547	119,583	45,286	121,717	87,744	134,311	137,446	163,196
9	Other unimproved land in farms ... acres	1,523,780	18,816	1,833	17,906	14,970	5,114	8,512	18,543
10	Farm land reported as provided with drainage ... acres	1,066,933	707	715	2,152	3,877	57,455	22,698	30,434
11	Farm land reported as needing drainage ... acres	1,925,343	1,613	1,114	24,142	23,123	100,164	28,855	71,506
12	Drainage only ... acres	189,401	89	382	1,408	1,345	1,039	1,779	6,238
13	Drainage and clearing ... acres	1,735,942	1,524	732	22,734	21,778	99,125	27,076	65,268

		Brunswick.	Buncombe.	Burke.	Cabarrus.	Caldwell.	Camden.	Carteret.	Catawba.	Chowan.
1	Number of all farms in the county	1,417	3,701	2,194	2,427	1,972	875	858	2,916	1,028
2	Farms reporting land having drainage	592	138	184	113	88	659	102	188	610
3	Farms reporting land needing drainage	861	160	197	84	110	206	80	118	386
4	Farms in drainage and levee districts	.....	.....	7	3	19	20	.....	28	1
	LAND AND FARM AREA.									
5	Approximate land area of the county ... acres	505,600	408,960	341,760	249,600	301,440	140,800	366,720	261,120	105,600
6	All land in farms ... acres	209,959	266,134	195,202	206,903	183,636	52,845	69,464	217,463	77,253
7	Improved land in farms ... acres	28,554	129,467	58,461	101,873	61,264	35,384	17,304	113,685	33,973
8	Woodland in farms ... acres	164,810	126,615	117,774	73,906	113,788	17,206	42,189	80,192	41,288
9	Other unimproved land in farms ... acres	16,595	10,052	18,967	31,124	8,584	255	9,971	23,586	1,992
10	Farm land reported as provided with drainage ... acres	13,309	2,749	1,652	1,895	893	25,826	4,691	1,554	15,966
11	Farm land reported as needing drainage ... acres	66,138	3,454	5,474	1,214	2,511	5,674	16,085	627	16,810
12	Drainage only ... acres	13,878	231	313	786	556	90	4,015	265	681
13	Drainage and clearing ... acres	52,260	3,223	5,161	428	1,955	5,584	12,070	362	16,129

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

		Clay.	Cleveland.	Columbus.	Craven.	Cumberland.	Currituck.	Davidson.	Davie.	Duplin.
1	Number of all farms in the county	808	4,016	3,580	2,598	3,100	984	3,770	1,768	4,686
2	Farms reporting land having drainage	125	142	2,695	1,134	706	266	504	130	2,538
3	Farms reporting land needing drainage	61	112	2,428	582	604	212	669	144	1,453
4	Farms in drainage and levee districts	.....	77	37	1	5	13	6	.....	2
	LAND AND FARM AREA.									
5	Approximate land area of the county ... acres	140,800	317,440	597,120	422,400	428,800	186,880	364,160	165,120	505,600
6	All land in farms ... acres	71,130	252,539	284,184	149,899	233,840	88,843	311,746	151,713	314,600
7	Improved land in farms ... acres	24,876	132,425	78,693	59,701	92,196	50,589	128,542	67,690	98,638
8	Woodland in farms ... acres	40,871	89,431	180,640	72,587	130,864	29,875	130,689	56,856	195,236
9	Other unimproved land in farms ... acres	5,383	30,683	24,851	17,611	10,780	8,379	52,515	27,167	20,726
10	Farm land reported as provided with drainage ... acres	987	4,735	58,397	21,782	18,620	15,957	3,873	1,426	54,984
11	Farm land reported as needing drainage ... acres	386	1,455	130,123	37,428	42,262	7,034	21,191	1,686	86,421
12	Drainage only ... acres	307	341	10,479	6,424	3,609	185	1,277	755	3,924
13	Drainage and clearing ... acres	79	1,114	119,644	31,004	38,653	6,849	19,914	931	82,497

		Edgecombe.	Forsyth.	Franklin.	Gaston.	Gates.	Graham.	Granville.	Greene.	Guilford.
1	Number of all farms in the county	3,840	2,849	4,226	2,339	1,583	746	3,503	2,740	4,021
2	Farms reporting land having drainage	1,765	155	8	148	589	48	87	229	63
3	Farms reporting land needing drainage	648	186	429	121	370	75	123	10	172
4	Farms in drainage and levee districts	1	23	3	28	4	.....	.....	79	1
	LAND AND FARM AREA.									
5	Approximate land area of the county ... acres	325,760	240,640	299,520	232,320	229,760	190,720	321,920	161,280	442,240
6	All land in farms ... acres	256,842	209,604	223,615	178,346	125,075	63,112	298,604	126,754	350,659
7	Improved land in farms ... acres	138,733	94,389	105,608	87,300	49,140	17,457	112,556	67,447	145,795
8	Woodland in farms ... acres	108,749	95,255	102,428	63,656	65,778	43,191	151,469	56,056	165,551
9	Other unimproved land in farms ... acres	9,360	19,960	15,579	27,390	10,157	2,464	34,579	3,251	39,313
10	Farm land reported as provided with drainage ... acres	61,838	1,437	5,006	1,939	15,488	705	3,598	4,516	837
11	Farm land reported as needing drainage ... acres	39,539	2,131	18,124	1,901	13,033	924	5,892	208	3,773
12	Drainage only ... acres	3,488	1,234	592	705	2,079	248	818	140	1,293
13	Drainage and clearing ... acres	36,051	897	17,532	1,196	10,954	676	5,074	68	2,480

		Halifax.	Harnett.	Haywood.	Henderson.	Hertford.	Hoke.	Hyde.	Iredell.	Jackson.
1	Number of all farms in the county	4,671	3,378	2,074	1,973	2,084	1,496	1,148	4,115	1,852
2	Farms reporting land having drainage	463	525	89	148	954	237	491	217	108
3	Farms reporting land needing drainage	833	1,046	238	93	649	153	201	234	157
4	Farms in drainage and levee districts	9	5	.....	.....	1	.....	38	166	.....
	LAND AND FARM AREA.									
5	Approximate land area of the county ... acres	432,640	376,320	349,440	229,120	218,240	266,880	394,880	376,320	316,160
6	All land in farms ... acres	334,803	239,746	172,268	148,741	185,516	99,543	80,675	347,747	148,588
7	Improved land in farms ... acres	152,328	90,947	81,796	53,150	66,289	52,655	37,060	160,738	49,777
8	Woodland in farms ... acres	155,880	142,809	83,086	67,434	114,475	36,402	32,270	151,888	85,525
9	Other unimproved land in farms ... acres	26,595	5,990	7,386	28,157	4,752	10,486	11,345	35,121	13,286
10	Farm land reported as provided with drainage ... acres	17,634	6,221	781	3,297	18,633	4,117	15,697	2,461	832
11	Farm land reported as needing drainage ... acres	46,832	46,646	8,108	1,948	24,285	5,937	75,265	2,564	5,446
12	Drainage only ... acres	4,490	1,409	273	573	387	337	50,117	1,246	297
13	Drainage and clearing ... acres	42,342	45,237	7,835	1,375	23,898	5,600	25,148	1,318	5,149

		Johnston.	Jones.	Lee.	Lenoir.	Madison.	Martin.	Mecklenburg.	Moore.	Nash.
1	Number of all farms in the county	7,026	1,540	1,465	3,162	2,935	2,515	4,344	2,176	4,451
2	Farms reporting land having drainage	1,267	62	85	1,502	107	274	183	97	322
3	Farms reporting land needing drainage	1,315	67	260	546	82	293	600	158	485
4	Farms in drainage and levee districts	2	.....	.....	11	.....	1	24	.....	13
	LAND AND FARM AREA.									
5	Approximate land area of the county ... acres	516,480	266,880	167,040	249,600	279,040	280,320	382,080	408,960	375,040
6	All land in farms ... acres	396,438	156,634	121,006	189,153	213,290	191,404	288,105	229,597	241,948
7	Improved land in farms ... acres	177,433	52,868	37,077	90,322	106,249	79,360	151,447	57,820	108,272
8	Woodland in farms ... acres	212,552	97,692	80,793	93,247	97,260	106,055	90,898	161,799	126,119
9	Other unimproved land in farms ... acres	6,453	6,074	3,136	5,584	9,781	5,989	45,760	9,978	7,557
10	Farm land reported as provided with drainage ... acres	16,649	1,648	746	47,556	685	14,076	2,115	779	8,797
11	Farm land reported as needing drainage ... acres	43,718	6,949	16,891	28,804	1,266	18,892	10,036	10,052	17,094
12	Drainage only ... acres	2,988	241	533	8,663	55	4,655	2,015	388	694
13	Drainage and clearing ... acres	40,730	6,708	16,358	20,141	1,211	14,237	8,021	9,664	16,400

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

		New Hanover.	Northampton.	Onslow.	Pamlico.	Pasquotank.	Pender.	Perquimans.	Pitt.	Randolph.
1	Number of all farms in the county	323	3,501	2,179	1,316	1,360	1,886	1,462	5,937	3,871
2	Farms reporting land having drainage	60	1,128	740	811	730	349	778	2,022	63
3	Farms reporting land needing drainage	84	358	412	450	188	705	289	1,124	394
4	Farms in drainage and levee districts	1	5	.....	344	.....	10	8	27	.....
	LAND AND FARM AREA.									
5	Approximate land area of the county ... acres	138,240	322,560	475,520	224,000	142,720	521,600	161,280	401,280	513,920
6	All land in farms ... acres	17,926	222,418	193,176	85,382	84,469	178,981	86,360	293,062	405,320
7	Improved land in farms ... acres	6,137	104,841	54,196	35,170	51,065	44,003	48,463	146,327	132,242
8	Woodland in farms ... acres	9,864	105,156	133,804	42,169	29,878	128,585	37,222	137,350	242,732
9	Other unimproved land in farms ... acres	1,925	12,421	5,176	8,043	3,526	6,393	675	9,385	30,346
10	Farm land reported as provided with drainage ... acres	1,244	21,526	15,650	20,213	26,709	10,240	24,847	52,706	773
11	Farm land reported as needing drainage ... acres	2,996	11,479	26,463	22,936	9,147	54,311	8,972	63,627	20,498
12	Drainage only ... acres	216	1,591	413	111	156	1,452	88	3,057	488
13	Drainage and clearing ... acres	2,780	9,888	26,050	22,825	8,991	52,859	8,884	60,570	20,010

		Richmond.	Robeson.	Rowan.	Sampson.	Scotland.	Stanly.	Transylvania.	Tyrrell.	Union.
1	Number of all farms in the county	1,797	6,564	3,474	5,771	1,830	2,519	799	643	4,820
2	Farms reporting land having drainage	25	2,980	268	1,809	659	211	184	257	564
3	Farms reporting land needing drainage	215	1,841	219	2,264	191	83	65	152	1,093
4	Farms in drainage and levee districts	1	97	103	1	.....	2	.....	164	.....
	LAND AND FARM AREA.									
5	Approximate land area of the county ... acres	333,440	633,600	312,960	567,040	223,360	266,240	242,560	249,600	361,600
6	All land in farms ... acres	164,521	400,228	296,408	427,493	114,942	207,205	69,984	54,440	347,939
7	Improved land in farms ... acres	77,593	209,367	145,063	148,867	75,822	87,549	19,383	18,610	156,443
8	Woodland in farms ... acres	76,519	161,363	118,042	257,246	35,112	103,197	43,283	34,910	160,533
9	Other unimproved land in farms ... acres	10,409	29,498	33,303	21,380	4,008	16,465	7,318	920	30,963
10	Farm land reported as provided with drainage ... acres	589	93,052	2,136	36,346	18,931	10,432	4,893	5,762	9,732
11	Farm land reported as needing drainage ... acres	11,196	89,045	4,174	123,085	11,810	2,222	1,986	4,516	35,808
12	Drainage only ... acres	342	6,570	759	6,437	756	685	843	411	3,451
13	Drainage and clearing ... acres	10,854	82,475	3,415	116,648	11,054	1,537	1,143	4,105	32,357

		Warren.	Washington.	Watauga.	Wayne.	Wilkes.	Wilson.	Yadkin.	All other counties.[1]
1	Number of all farms in the county	3,169	1,110	2,020	5,030	4,971	4,439	2,646	55,129
2	Farms reporting land having drainage	85	321	249	1,689	370	1,271	164	651
3	Farms reporting land needing drainage	502	92	805	689	846	859	40	4,575
4	Farms in drainage and levee districts	.....	3	2	61	.....	26	.....	73
	LAND AND FARM AREA.								
5	Approximate land area of the county ... acres	272,000	209,280	193,920	365,440	470,400	238,720	207,360	6,299,520
6	All land in farms ... acres	195,381	73,866	171,935	281,591	369,084	185,029	202,321	4,344,300
7	Improved land in farms ... acres	81,031	35,422	84,138	140,009	109,865	98,641	78,920	1,574,082
8	Woodland in farms ... acres	102,572	34,470	82,933	122,696	211,939	82,780	95,544	2,407,237
9	Other unimproved land in farms ... acres	11,778	3,974	4,864	18,886	47,280	3,608	27,857	362,981
11	Farm land reported as provided with drainage ... acres	1,075	8,794	1,980	35,765	2,142	28,025	2,390	5,559
12	Farm land reported as needing drainage ... acres	28,365	3,415	25,942	19,168	22,974	18,944	792	148,724
13	Drainage only ... acres	715	53	1,073	1,121	822	1,067	233	6,137
14	Drainage and clearing ... acres	27,650	3,362	24,869	18,047	22,152	17,877	559	142,587

[1] No drainage on farms reported in Orange and Person Counties.

COUNTY TABLE II.—OPERATING DRAINAGE ENTERPRISES: 1920.

		THE STATE.	Beaufort.	Bladen.	Camden.	Carteret.	Cleveland.	Columbus.
	LAND AREA.							
1	Approximate land area of the state or county ... acres	31,193,600	537,600	624,640	140,800	366,720	317,440	597,120
2	All land in operating drainage enterprises ... acres	542,828	59,629	7,533	11,914	33,000	14,622	34,000
3	Improved land ... acres	204,928	24,803	6,731	2,979	150	10,967	5,300
4	Per cent of all improved land in farms	2.5	31.2	9.9	8.4	0.9	8.3	6.7
5	Timber and cut-over land ... acres	244,576	34,826	802	8,935	4,950	...	28,700
6	Other unimproved land ... acres	93,324	...	...	...	27,900	3,655	...
7	Swampy or subject to overflow, in enterprises ... acres	77,494	3,000	...	...	32,850	2,193	...
8	Suffering a loss of crops from defective drainage ... acres	12,771	...	...	...	...	2,193	...
9	Assessed acreage	552,428	59,629	7,533	11,914	33,000	14,622	34,000
10	Excess over all land in operating enterprises ... acres	9,600	...	...	...	...	...	...
	DRAINAGE WORKS.							
	Open ditches:							
11	Completed ... miles	1,171.3	107.6	24.5	8.0	41.2	24.0	61.0
12	Additional under construction ... miles	367.8	8.0	...	...	233.8	...	...
13	Maximum completed in any enterprise ... miles	110.0	42.5	10.0	8.0	41.2	24.0	42.0
14	Maximum width at bottom of ditch [1] ... feet	70	46	28	30	8	35	14
15	Maximum of average depths of outlet ditches [1] ... feet	14.0	10.0	8.0	7.0	8.0	10.0	14.0
16	Mean depth of branch ditches [1] ... feet	6.7	8.0	4.1	7.0	6.0	8.0	8.2
	Accessory levees and dikes:							
17	Completed ... miles	33.5	...	3.5	...	...	...	...
18	Additional under construction ... miles	...	...	...	...	...	...	...
	Pumping plants:							
19	Engine capacity ... horsepower	1,000	...	...	...	...	...	...
20	Pump capacity ... gallons per minute	1,000,000	...	...	...	...	...	...
21	Area served by pumps ... acres	100,000	...	...	...	...	...	...
22	Area drained by open ditches only [1] ... acres	435,295	59,629	...	11,914	33,000	14,622	34,000
23	Length of the ditches ... miles	1,404.6	115.6	...	8.0	275.0	24.0	61.0
24	Average length per acre ... feet	17.0	10.2	...	3.5	44.0	8.7	9.5
25	Area having open ditches and levees [1] ... acres	107,533	...	7,533	...	...	...	...
26	Length of the ditches ... miles	134.5	...	24.5	...	...	...	...
27	Average length per acre ... feet	6.6	...	17.2	...	...	...	...
28	Length of the accessory levees ... miles	33.5	...	3.5	...	...	...	...
	DEVELOPMENT OF LAND.							
29	Improved land in operating enterprises, 1920 ... acres	204,928	24,803	6,731	2,979	150	10,967	5,300
30	Improved land prior to drainage ... acres	84,714	5,819	838	2,383	...	...	3,000
31	Increase since drainage ... acres	120,214	18,984	5,893	596	150	10,967	2,300
32	Per cent of increase	141.9	326.2	703.2	25.0	...	...	76.7
33	Per cent increase is of all improved land in farms, 1920	1.5	23.9	8.6	1.7	0.9	8.3	2.9
34	Timber and cut-over land, 1920 ... acres	244,576	34,826	802	8,935	4,950	...	28,700
35	Timber and cut-over land prior to drainage ... acres	311,626	52,010	6,695	9,531	4,950	...	31,000
36	Decrease since drainage ... acres	67,050	17,184	5,893	596	...	...	2,300
37	Per cent of decrease	21.5	33.0	88.0	6.3	...	...	7.4
38	Other unimproved land, 1920 ... acres	93,324	...	...	...	27,900	3,655	...
39	Other unimproved land prior to drainage ... acres	146,488	1,800	...	...	28,050	14,622	...
40	Decrease since drainage ... acres	53,164	1,800	...	...	150	10,967	...
41	Per cent of decrease	36.3	100.0	...	...	0.5	75.0	...
42	Swampy or subject to overflow, 1920 ... acres	77,494	3,000	...	...	32,850	2,193	...
43	Swampy or subject to overflow prior to drainage ... acres	311,110	33,000	5,700	5,957	33,000	14,622	28,000
44	Decrease since drainage ... acres	233,616	30,000	5,700	5,957	150	12,429	28,000
45	Per cent of decrease	75.1	90.9	100.0	100.0	0.5	85.0	100.0
	CAPITAL INVESTED AND COST PER ACRE.							
46	Total capital invested in and required for completion of operating enterprises ... dollars	4,526,018	333,250	61,000	30,000	395,000	75,000	232,000
47	Capital invested in these enterprises to Dec. 31, 1919 ... dollars	3,623,518	304,250	61,000	30,000	65,000	75,000	232,000
48	Additional capital required to complete these enterprises ... dollars	902,500	29,000	...	...	330,000	...	...
49	Average cost per acre when completed ... dollars	8.34	5.59	8.10	2.52	11.97	5.13	6.82
50	Enterprises constructing open ditches only ... dollars	3,729,644	333,250	...	30,000	395,000	75,000	232,000
51	Average cost per acre when completed ... dollars	8.57	5.59	...	2.52	11.97	5.13	6.82
52	Enterprises constructing open ditches and levees ... dollars	796,374	...	61,000	...	...	...	...
53	Average cost per acre when completed ... dollars	7.41	...	8.10	...	...	...	...
	CROPS.							
	Improved land in enterprises reporting—							
54	Corn as principal crop on drained land ... acres	183,658	21,803	6,731	2,979	150	10,967	5,300
55	Cotton as principal crop on drained land ... acres	19,678	3,000	...	...	...	...	...
56	Other crops as principal ones on drained land ... acres	[2] 1,592	...	...	...	...	...	...

[1] When works under construction have been completed.

[2] Includes 242 acres not reporting principal crop.

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

		Craven.	Cumberland.	Currituck.	Edgecombe.	Harnett.	Hyde.	Iredell.	Lenoir.
	LAND AREA.								
1	Approximate land area of the county ... acres	422,400	428,800	186,880	325,760	376,320	394,880	376,320	249,600
2	All land in operating drainage enterprises ... acres	7,800	23,000	25,915	4,857	6,730	128,529	8,679	4,833
3	Improved land ... acres	2,190	13,800	8,579	4,857	5,048	33,728	7,509	2,376
4	Per cent of all improved land in farms	3.7	15.0	17.0	3.5	5.6	91.0	4.7	2.6
5	Timber and cut-over land ... acres	5,610	9,200	17,336			42,671	591	2,457
6	Other unimproved land ... acres					1,682	52,130	579	
7	Swampy or subject to overflow, in enterprises ... acres	380			251		28,636	1,874	
8	Suffering a loss of crops from defective drainage ... acres	19			251			1,831	
9	Assessed acreage	7,800	23,000	25,915	4,857	6,730	131,329	8,679	4,833
10	Excess over all land in operating enterprises ... acres						2,800		
	DRAINAGE WORKS.								
	Open ditches:								
11	Completed ... miles	18.5	37.0	30.0	14.0	15.0	125.6	90.0	11.7
12	Additional under construction ... miles						95.3	4.2	
13	Maximum completed in any enterprise ... miles	10.5	37.0	22.0	6.0	15.0	110.0	15.5	8.0
14	Maximum width at bottom of ditch[1] ... feet	30	16	30	20	14	70	35	30
15	Maximum of average depths of outlet ditches[1] ... feet	8.0	6.0	7.0	12.0	10.0	10.0	9.0	8.0
16	Mean depth of branch ditches[1] ... feet	5.9	6.0	5.9		4.0	7.7	7.2	5.0
	Accessory levees and dikes:								
17	Completed ... miles						30.0		
18	Additional under construction ... miles								
	Pumping plants:								
19	Engine capacity ... horsepower						1,000		
20	Pump capacity ... gallons per minute						1,000,000		
21	Area served by pumps ... acres						100,000		
22	Area drained by open ditches only[1] ... acres	7,800	23,000	25,915	4,857	6,730	28,529	8,679	4,833
23	Length of the ditches ... miles	18.5	37.0	30.0	14.0	15.0	110.9	94.2	11.7
24	Average length per acre ... feet	12.5	8.5	6.1	15.2	11.8	20.5	57.3	12.8
25	Area having open ditches and levees[1] ... acres						100,000		
26	Length of the ditches ... miles						110.0		
27	Average length per acre ... feet						5.8		
28	Length of the accessory levees ... miles						30.0		
	DEVELOPMENT OF LAND.								
29	Improved land in operating enterprises, 1920 ... acres	2,190	13,800	8,579	4,857	5,048	33,728	7,509	2,376
30	Improved land prior to drainage ... acres	1,600	9,200	7,283	1,525	4,038	25,185	2,895	1,642
31	Increase since drainage ... acres	590	4,600	1,296	3,332	1,010	8,543	4,614	734
32	Per cent of increase	36.9	50.0	17.8	218.5	25.0	33.9	159.4	44.7
33	Per cent increase is of all improved land in farms, 1920	1.0	5.0	2.6	2.4	1.1	23.1	2.9	0.8
34	Timber and cut-over land, 1920 ... acres	5,610	9,200	17,336			42,671	591	2,457
35	Timber and cut-over land prior to drainage ... acres	6,200	13,800	18,632			51,214	1,660	3,191
36	Decrease since drainage ... acres	590	4,600	1,296			8,543	1,069	734
37	Per cent of decrease	9.5	33.3	7.0			16.7	64.4	23.0
38	Other unimproved land, 1920 ... acres					1,682	52,130	579	
39	Other unimproved land prior to drainage ... acres				3,332	2,692	52,130	4,124	
40	Decrease since drainage ... acres				3,332	1,010		3,545	
41	Per cent of decrease				100.0	37.5		86.0	
42	Swampy or subject to overflow, 1920 ... acres	380			251		28,636	1,874	
43	Swampy or subject to overflow prior to drainage ... acres	7,800			4,332	3,365	75,622	3,935	4,000
44	Decrease since drainage ... acres	7,420			4,081	3,365	46,986	2,061	4,000
45	Per cent of decrease	95.1			94.2	100.0	62.1	52.4	100.0
	CAPITAL INVESTED AND COST PER ACRE.								
46	Total capital invested in and required for completion of operating enterprises ... dollars	89,000	76,500	73,000	30,000	30,000	1,215,272	197,225	32,500
47	Capital invested in these enterprises to Dec. 31, 1919 ... dollars	89,000	76,500	73,000	30,000	30,000	800,272	183,725	32,500
48	Additional capital required to complete these enterprises ... dollars						415,000	13,500	
49	Average cost per acre when completed ... dollars	11.41	3.33	2.82	6.18	4.46	9.46	22.72	6.72
50	Enterprises constructing open ditches only ... dollars	89,000	76,500	73,000	30,000	30,000	479,898	197,225	32,500
51	Average cost per acre when completed ... dollars	11.41	3.33	2.82	6.18	4.46	16.82	22.72	6.72
52	Enterprises constructing open ditches and levees ... dollars						735,374		
53	Average cost per acre when completed ... dollars						7.35		
	CROPS.								
	Improved land in enterprises reporting—								
54	Corn as principal crop on drained land ... acres	2,190	13,800	8,579	4,157		33,728	7,509	2,376
55	Cotton as principal crop on drained land ... acres				700	5,048			
56	Other crops as principal ones on drained land ... acres								

[1] When works under construction have been completed.

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

		Mecklenburg.	Pamlico.	Perquimans.	Pitt.	Robeson.	Rowan.	Washington.	Other counties.[1]
	LAND AREA.								
1	Approximate land area of the county ... acres	382,080	224,000	161,280	401,280	633,600	312,960	209,280	23,523,840
2	All land in operating drainage enterprises ... acres	17,224	19,875	8,300	6,200	32,600	7,027	38,444	42,117
3	Improved land ... acres	14,358	867	8,300	1,760	9,780	5,151	5,617	30,078
4	Per cent of all improved land in farms	9.5	2.5	17.1	1.2	4.7	3.6	15.9	2.3
5	Timber and cut-over land ... acres	484	19,008		4,440	22,820	960	32,827	7,959
6	Other unimproved land ... acres	2,382					916		4,080
7	Swampy or subject to overflow, in enterprises ... acres	1,133			250		1,200	1,251	4,476
8	Suffering a loss of crops from defective drainage ... acres	1,247		1,500	171		1,174	251	4,134
9	Assessed acreage	17,224	19,875	8,300	6,200	32,600	7,027	45,244	42,117
10	Excess over all land in operating enterprises ... acres							6,800	
	DRAINAGE WORKS.								
	Open ditches:								
11	Completed ... miles	50.0	25.0	14.0	20.0	55.0	63.0	88.6	247.6
12	Additional under construction ... miles							25.4	1.1
13	Maximum completed in any enterprise ... miles	14.0	20.0	10.0	11.5	55.0	12.0	58.0	14.0
14	Maximum width at bottom of ditch [2] ... feet	36	20	30	30	22	50	46	40
15	Maximum of average depths of outlet ditches [2] ... feet	9.0	9.0	11.0	8.0	8.0	11.0	8.5	14.0
16	Mean depth of branch ditches [2] ... feet	8.0	6.8		7.0	6.0	6.5	9.1	5.5
	Accessory levees and dikes:								
17	Completed ... miles								
18	Additional under construction ... miles								
	Pumping plants:								
19	Engine capacity ... horsepower								
20	Pump capacity ... gallons per minute								
21	Area served by pumps ... acres								
22	Area drained by open ditches only [2] ... acres	17,224	19,875	8,300	6,200	32,600	7,027	38,444	42,117
23	Length of the ditches ... miles	50.0	25.0	14.0	20.0	55.0	63.0	114.0	248.7
24	Average length per acre ... feet	15.3	6.6	8.9	17.0	8.9	47.3	15.7	31.2
25	Area having open ditches and levees [2] ... acres								
26	Length of the ditches ... miles								
27	Average length per acre ... feet								
28	Length of the accessory levees ... miles								
	DEVELOPMENT OF LAND.								
29	Improved land in operating enterprises, 1920 ... acres	14,358	867	8,300	1,760	9,780	5,151	5,617	30,078
30	Improved land prior to drainage ... acres	1,470		3,530	150	6,520	681	1,136	5,819
31	Increase since drainage ... acres	12,888	867	4,770	1,610	3,260	4,470	4,481	24,259
32	Per cent of increase [3]	876.7		135.1		50.0	656.4	394.5	416.9
33	Per cent increase is of all improved land in farms, 1920	8.5	2.5	9.8	1.1	1.6	3.1	12.7	1.9
34	Timber and cut-over land, 1920 ... acres	484	19,008		4,440	22,820	960	32,827	7,959
35	Timber and cut-over land prior to drainage ... acres	3,043	19,875	4,770	6,050	26,080	1,593	37,308	14,024
36	Decrease since drainage ... acres	2,559	867	4,770	1,610	3,260	633	4,481	6,065
37	Per cent of decrease	84.1	4.4	100.0	26.6	12.5	39.7	12.0	43.2
38	Other unimproved land, 1920 ... acres	2,382					916		4,080
39	Other unimproved land prior to drainage ... acres	12,711					4,753		22,274
40	Decrease since drainage ... acres	10,329					3,837		18,194
41	Per cent of decrease	81.3					80.7		81.7
42	Swampy or subject to overflow, 1920 ... acres	1,133			250		1,200	1,251	4,476
43	Swampy or subject to overflow prior to drainage ... acres	16,308	16,000		5,200		3,210	24,151	26,908
44	Decrease since drainage ... acres	15,175	16,000		4,950		2,010	22,900	22,432
45	Per cent of decrease	93.1	100.0		95.2		62.6	94.8	83.4
	CAPITAL INVESTED AND COST PER ACRE.								
46	Total capital invested in and required for completion of operating enterprises ... dollars	115,101	96,000	45,625	77,600	165,000	129,026	440,352	587,567
47	Capital invested in these enterprises to Dec. 31, 1919 ... dollars	115,101	96,000	45,625	77,600	165,000	129,026	334,352	578,567
48	Additional capital required to complete these enterprises ... dollars							106,000	9,000
49	Average cost per acre when completed ... dollars	6.68	4.83	5.50	12.52	5.06	18.36	11.45	13.95
50	Enterprises constructing open ditches only ... dollars	115,101	96,000	45,625	77,600	165,000	129,026	440,352	587,567
51	Average cost per acre when completed ... dollars	6.68	4.83	5.50	12.52	5.06	18.36	11.45	13.95
52	Enterprises constructing open ditches and levees ... dollars								
53	Average cost per acre when completed ... dollars								
	CROPS.								
	Improved land in enterprises reporting—								
54	Corn as principal crop on drained land ... acres	14,358	867	8,300	960		5,151	5,617	28,136
55	Cotton as principal crop on drained land ... acres				800	9,780			350
56	Other crops as principal ones on drained land ... acres								[4] 1,592

[1] Includes Alexander, Burke, Cabarrus, Caldwell, Catawba, Chowan, Davidson, Forsyth, Gaston, Greene, Jones, Lincoln, McDowell, New Hanover, Pender, Tyrrell, Wayne, and Wilson Counties.
[2] When works under construction have been completed.
[3] Per cent not shown when more than 1,000.
[4] Includes 242 acres not reporting principal crop.

NORTH DAKOTA.

The following pages present the statistics of drainage for North Dakota 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 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.

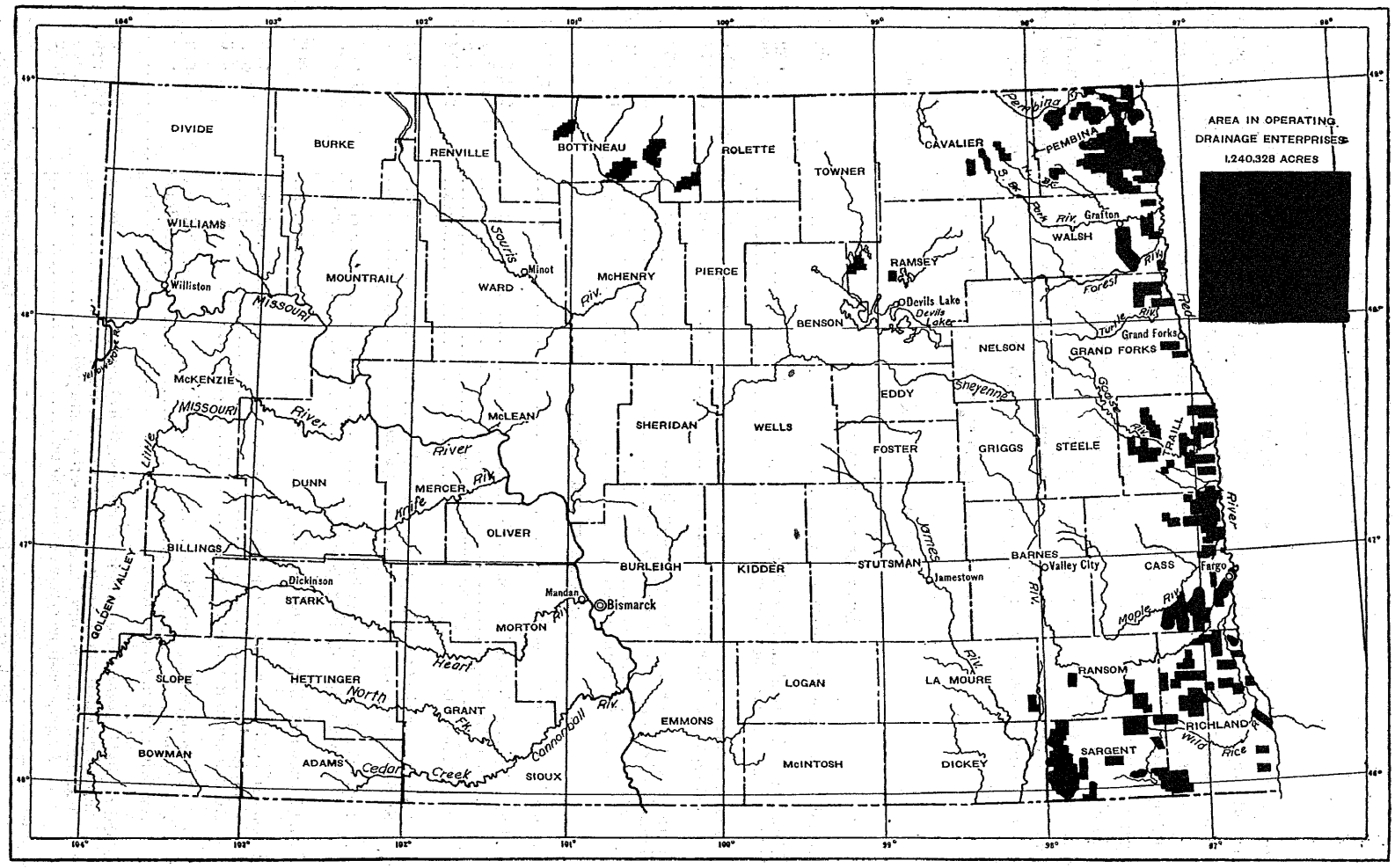
ITEM.	Amount.	Per cent of total.
DRAINAGE ON FARMS.		
Number of all farms in the state	77,690	100.0
Farms reporting land having drainage	682	0.9
Farms reporting land needing drainage	2,669	3.4
All land in farms ... acres	36,214,751	100.0
Improved land in farms ... acres	24,563,178	67.8
Farm land reported as provided with drainage ... acres	89,054	0.2
Farm land reported as needing drainage ... acres	211,305	0.6
Needing drainage only ... acres	53,161	0.1
Needing drainage and clearing ... acres	158,144	0.4
DRAINAGE ENTERPRISES.		
Approximate land area of the state ... acres	44,917,120	100.0
All land in operating drainage enterprises ... acres	1,240,328	2.8
Improved land ... acres	1,026,574	2.3
Per cent of all improved land in farms	4.2	
Unimproved land [1] ... acres	213,754	0.5
Swampy, subject to overflow, seeped, or alkali ... acres	12,332	(2)
Suffering a loss of crops from defective drainage ... acres	4,819	(2)
Improved land prior to drainage ... acres	691,005	1.5
Increase since drainage began ... acres	335,569	0.7
Land in nonoperating enterprises ... acres	8,000	(2)
Open ditches in operating enterprises ... miles	712.3	100.0
Completed ... miles	708.3	99.4
Additional under construction ... miles	4.0	0.6
Tile drains in operating enterprises ... miles	9.3	100.0
Completed ... miles	9.3	100.0
Additional under construction ... miles		
Total capital invested in and required for completion of operating enterprises	$2,261,449	100.0
Capital invested in these enterprises to Dec. 31, 1919	2,208,049	97.6
Additional capital required to complete these enterprises	53,400	2.4
Average cost per acre when completed	1.82	

[1] No timber or cut-over land reported.

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

NORTH DAKOTA

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 the drain 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.[1]		
			To Dec. 31, 1919.		Additional required to complete.
	Acreage.	Per cent of total.	Amount.	Per cent of total.	
All organized enterprises	1,248,328	100.0	$2,208,049	100.0	$77,723
Operating enterprises	1,240,328	99.4	2,208,049	100.0	53,400
With works completed	1,100,044	88.1	1,863,788	84.4	.....
With works under construction	140,284	11.2	344,261	15.6	53,400
Nonoperating enterprises	8,000	0.6	.....	.....	24,323

[1] 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 but a small part of the area in drainage enterprises in North Dakota is in the extreme eastern part of the state, in the broad belt of comparatively level land which borders Red River. A small area in La Moure County is drained through James River to the Missouri, and the enterprises in Bottineau County are drained through Souris River.

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

DRAINAGE BASIN.	LAND.		CAPITAL.		
			To Dec. 31, 1919.		Additional required to complete.
	Acreage.	Per cent of total.	Amount.	Per cent of total.	
All organized enterprises	1,248,328	100.0	$2,208,049	100.0	$77,723
Operating enterprises	1,240,328	99.4	2,208,049	100.0	53,400
Missouri River	3,300	0.3	22,500	1.0	.....
Red River	1,187,233	95.1	2,014,453	91.2	53,400
Souris River	49,795	4.0	171,096	7.8	.....
Nonoperating enterprises	8,000	0.6	.....	.....	24,323
Red River	8,000	0.6	.....	.....	24,323

Condition of land in enterprises.—The purpose of the drainage enterprises in this state has been the reclamation and improvement of swampy land or land subject to overflow. None of the enterprises is for the drainage of irrigated land. The natural channels of the streams tributary to Red River where they cross the level bottom land are not adequate to carry the run-off from storms and from melting snow on the hills to the west. Many of the well-defined channels of small and moderate size practically disappear at short distances below the foot of the hills, so the waters are spread over considerable areas until artificial channels are provided. The drainage of this valley as a whole is rendered specially difficult by the northward course of Red River, which may be ice-bound north of the Canadian boundary while higher temperatures in Minnesota and the Dakotas are melting the snow and causing that stream to overflow.

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 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 all land.			
All land in enterprises	1,240,328	100.0	1,100,044	140,284	8,000
Improved land	1,026,574	82.8	920,304	106,270	5,334
Unimproved land[1]	213,754	17.2	179,740	34,014	2,666
Swampy or subject to overflow	12,332	1.0	12,332	.....	2,000
Suffering a loss of crops	4,819	0.4	4,819	.....	.....

[1] 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 137 operating drainage enterprises are counted in North Dakota, with an average area of 9,053 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	1,240,328	1,240,328	100.0
500 to 999 acres	640	640	0.1
1,000 to 4,999 acres	148,680	148,680	12.0
5,000 to 9,999 acres	358,390	358,390	28.9
10,000 to 49,999 acres	501,377	501,377	40.4
50,000 to 99,999 acres	231,241	231,241	18.6

Character of enterprises.—All the drainage enterprises in North Dakota are county drains under the control of the county board of drain commissioners. This board of three freeholders is appointed by the board of county commissioners upon their own volition or upon petition from interested landowners.

The board of drain commissioners may establish drains for wet land whenever such drains will be conducive to public health, convenience, and welfare. If the chief object sought is to drain land to be used for agricultural purposes, a petition for the drain must be signed by six or more freeholders whose property will be affected. Plans, specifications, and estimates are prepared by a surveyor employed by the drain commissioners, who hold a public hearing upon the surveyor's report. The drain is established if sufficient cause for the petition is shown and if the cost of the proposed drain will not exceed the benefits to be derived, provided two-thirds of the landowners who would be subject to assessment do not petition against establishment. Appeal from the decision establishing a drain may be taken to the district court for trial without jury. The cost of the enterprise is assessed against the tracts of land in proportion to the benefits they will receive. Counties, cities, towns, and railroads are assessed if they will be benefited.

Damages for rights of way are determined by jury in the district court, or by the court or a referee if jury trial is waived. Assessments of benefits are made by the board of drain commissioners and reviewed by them at a public hearing. An appeal from these assessments, or for review of the location and design of any drain, may be made to the state engineer by two-thirds of the landowners affected by the drain. Contracts for construction are let by the drain commissioners. Bonds to finance the enterprise may be issued by the board of county commissioners, to run not more than 15 years and to be paid only from the assessments levied for the drain. When a drain is to be located in more than one county, the petition is presented to the board of drain commissioners in each county affected, and all those boards act jointly.

The present county drainage law of North Dakota was enacted March 8, 1895 (ch. 51), but has been amended many times. The principal amendments relate to the number of signatures on the petition (1903), to appeals from decisions of the drain commissioners (1911 and 1915), and to the time of payment of bonds (1901 and 1907). The first general drainage law of the state was enacted March 18, 1893 (ch. 55). It provided for the appointment of a county board of drain commissioners and for a method of establishing county drains generally similar to that provided in the law of 1895, which repealed the earlier statute. Only one enterprise, of 3,520 acres, was reported as organized under the law of 1893.

Township drains may be established by the board of supervisors of any township under a law of March 12, 1915 (ch. 124), as amended March 3, 1919 (ch. 114). These are under the control of the township supervisors. The cost is paid from the township funds if the cost does not exceed $3,000 and if the enterprise is approved by a majority vote of the people of the township; otherwise the cost is assessed in proportion to benefits. No enterprises were reported as organized under this law.

An act of March 13, 1919 (ch. 115), created a flood-control commission, consisting of the dean of the state agricultural college, the dean of the state school of mines, the state engineer, and two citizens appointed by the governor, to make surveys and plans for controlling floods.

Laws authorizing the establishment of public drains by boards of county commissioners and by boards of township supervisors, upon petition of one or more owners of land to be affected, were enacted by the legislature of Dakota territory in 1883. Viewers were appointed to locate the drains and to assess damages and benefits, the costs being assessed against the lands in proportion to the benefits.

Drainage works.—The total works completed by drainage enterprises to December 31, 1919, comprised 708.3 miles of open ditches, 9.3 miles of tile drains, and 2.1 miles of accessory levees; the additional works under construction were 4.0 miles of open ditches. 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. There are no pumping districts in the state.

TABLE 6.—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	1,240,328	100.0	$2,208,049	100.0	$53,400
Open ditches only	1,217,028	98.1	2,146,758	97.2	53,400
Open ditches and levees	9,600	0.8	12,368	0.6	.....
Tile drains only	10,820	0.9	42,908	1.9	.....
Open ditches and tile drains	2,880	0.2	6,015	0.3	.....

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. Depths less than 3 feet were omitted; to include this group, computed as 3 feet, would not change the mean depth for the state, 3.7 feet.

TABLE 7.—LAND IN OPERATING ENTERPRISES, CLASSIFIED BY AVERAGE DEPTH OF BRANCH DITCHES: 1920.

DEPTH OF BRANCH DITCHES.	Acreage.	Per cent of total.
All operating enterprises	1,240,328	100.0
Less than 3 feet	15,600	1.2
3.0 to 3.9 feet	96,200	7.8
4.0 to 4.9 feet	227,124	18.3
Not reporting branches	901,404	72.7

Maintenance of works.—The drainage law of 1895 provided that all drains constructed under that act should be kept in good repair by the board of county commissioners, and the existing statutes have made that provision applicable to the improvements established under any drainage law of the state. In the case of a drain that is situated in more than one county, the board of county commissioners of each county affected is required to keep in good condition the portion of the drain that is situated in that county. However, systematic maintenance was reported for enterprises embracing a total of only 82,080 acres, representing an investment of $82,459, the work being done by contract.

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 drain 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, including extensions made after the original plan of reclamation was completed.

TABLE 8.—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	1,240,328	100.0	1,240,328	100.0
1890 to 1899	87,340	7.0	87,340	7.0
1900 to 1904	176,055	14.2	176,055	14.2
1905 to 1909	611,659	49.3	611,659	49.3
1910 to 1914	61,380	5.0	61,380	5.0
1915 to 1919	303,894	24.5	303,894	24.5

TABLE 9.—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	$2,208,049	100.0	$53,400
1890 to 1899	154,061	7.0	.....
1900 to 1904	183,657	8.3	.....
1905 to 1909	965,459	43.7	.....
1910 to 1914	70,940	3.2	.....
1915 to 1919	833,932	37.8	53,400

TABLE 10.—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.[1]	Miles.	Per cent of total.[1]
All drains and levees	712.3	100.0	9.3	100.0	2.1	100.0
1890 to 1899	63.3	8.9	.....	.....	0.1	.....
1900 to 1904	90.5	12.7	.....	.....	2.0	.....
1905 to 1909	334.8	47.0	0.3	.....	.....	.....
1910 to 1914	32.7	4.6	.....	.....	.....	.....
1915 to 1919	191.0	26.8	9.0	.....	.....	.....

[1] Per cent not shown when base is less than 100.

Crops.—The principal crop grown upon the drained land was reported as wheat for most of the drainage enterprises, though hay was so reported for a small part of them. 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. Information was not obtained 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.	Bottineau.	Cass.	Emmons.	Grand Forks.	Griggs.	Mountrail.	Pembina.
1	Number of all farms in the state or county	77,690	2,203	2,374	1,449	2,007	963	2,000	1,795
2	Farms reporting land having drainage	682	148	77	67	10	7	5	44
3	Farms reporting land needing drainage	2,669	165	141	75	145	50	107	225
4	Farms in drainage and levee districts	341	61	65	.....	3	5	3	41
	LAND AND FARM AREA.								
5	Approximate land area of the state or county ... acres	44,917,120	1,075,840	1,128,320	1,000,320	917,120	458,880	1,224,960	714,880
6	All land in farms ... acres	36,214,751	939,149	1,000,011	837,636	819,400	427,025	826,026	640,390
7	Improved land in farms ... acres	24,563,178	794,709	944,239	487,208	719,576	336,038	414,843	567,404
8	Woodland in farms ... acres	679,836	36,745	18,399	11,247	23,838	4,130	8,521	51,811
9	Other unimproved land in farms ... acres	10,971,737	107,695	37,373	339,181	75,986	86,857	402,662	21,175
10	Farm land reported as provided with drainage ... acres	89,054	11,674	19,908	9,337	1,532	950	605	10,598
11	Farm land reported as needing drainage ... acres	211,305	16,266	4,394	7,848	7,524	2,483	16,407	15,638
12	Drainage only ... acres	53,161	1,284	2,077	7,848	2,494	1,132	97	168
13	Drainage and clearing ... acres	158,144	14,982	2,317	.....	5,030	1,351	16,310	15,470

		Ramsey.	Ransom.	Richland.	Rolette.	Sargent.	Steele.	Stutsman.	Traill.	All other counties.[1]
1	Number of all farms in the county	1,401	1,343	2,298	1,267	1,321	987	2,487	1,263	52,532
2	Farms reporting land having drainage	6	17	44	46	79	7	6	53	66
3	Farms reporting land needing drainage	14	4	119	80	206	3	258	23	1,054
4	Farms in drainage and levee districts	4	1	26	1	76	2	.....	38	15
	LAND AND FARM AREA.									
5	Approximate land area of the county ... acres	771,200	550,400	919,680	587,520	547,200	458,880	1,460,480	553,600	32,547,840
6	All land in farms ... acres	715,903	474,077	829,295	498,443	494,179	432,116	1,200,738	517,311	25,563,052
7	Improved land in farms ... acres	627,766	405,315	736,962	348,320	430,758	380,954	836,901	466,032	16,066,153
8	Woodland in farms ... acres	4,972	14,385	15,525	53,411	2,906	8,351	12,141	13,116	400,338
9	Other unimproved land in farms ... acres	83,165	54,377	76,808	96,712	60,515	42,811	351,696	38,163	9,096,561
10	Farm land reported as provided with drainage ... acres	525	1,569	5,476	961	8,048	525	627	13,131	3,588
11	Farm land reported as needing drainage ... acres	992	210	4,702	5,882	7,471	192	11,480	1,774	108,042
12	Drainage only ... acres	992	210	2,606	1,376	7,318	170	7,519	1,429	16,441
13	Drainage and clearing ... acres	.....	.....	2,096	4,506	153	22	3,961	345	91,601

[1] No drainage on farms reported in Billings, Bowman, Burleigh, Dunn, Foster, Golden Valley, Grant, Kidder, Logan, McHenry, Mercer, and Oliver Counties.

COUNTY TABLE II.—OPERATING DRAINAGE ENTERPRISES: 1920.

		THE STATE.	Bottineau.	Cass.	Cavalier.	Grand Forks.	La Moure.
	LAND AREA.						
1	Approximate land area of the state or county ... acres	44,917,120	1,075,840	1,128,320	956,160	917,120	734,080
2	All land in operating drainage enterprises ... acres	1,240,328	49,795	201,580	12,700	47,000	3,300
3	Improved land ... acres	1,026,574	32,000	155,135	4,019	40,586	2,640
4	Per cent of all improved land in farms	4.2	4.0	16.4	0.5	5.6	0.5
5	Unimproved land [1] ... acres	213,754	17,795	46,445	8,681	6,414	660
6	Swampy or subject to overflow, in enterprises ... acres	12,332		960			
7	Suffering a loss of crops from defective drainage ... acres	4,819					
8	Assessed acreage	1,240,328	49,795	201,580	12,700	47,000	3,300
9	Excess over all land in operating enterprises ... acres						
	DRAINAGE WORKS.						
	Open ditches:						
10	Completed ... miles	708.3	44.0	177.3	12.0	25.8	
11	Additional under construction ... miles	4.0		1.5			
12	Maximum completed in any enterprise ... miles	45.1	20.0	15.6	5.0	10.2	
13	Maximum width at bottom of ditch [2] ... feet	80	80	29	6	12	
14	Maximum of average depths of outlet ditches [2] ... feet	14.0	6.0	14.0	5.0	6.0	
15	Mean depth of branch ditches [2] ... feet	3.7					
	Tile drains:						
16	Completed ... miles	9.3					4.5
17	Additional under construction ... miles						
18	Maximum completed in any enterprise ... miles	4.5					4.5
19	Maximum size of tile [2] ... inches	22					22
	Accessory levees and dikes:						
20	Completed ... miles	2.1					
21	Additional under construction ... miles						
22	Area drained by open ditches only [2] ... acres	1,217,028	49,795	201,580	12,700	47,000	
23	Length of these ditches ... miles	706.0	44.0	178.8	12.0	25.8	
24	Average length per acre ... feet	3.1	4.7	4.7	5.0	2.9	
25	Area having both open ditches and levees [2] ... acres	9,600					
26	Length of these ditches ... miles	4.0					
27	Average length per acre ... feet	2.2					
28	Length of the accessory levees ... miles	2.1					
29	Area drained by tile only [2] ... acres	10,820					3,300
30	Length of these tile ... miles	9.0					4.5
31	Average length per acre ... feet	4.4					7.2
32	Area drained by open ditches and tile [2] ... acres	2,880					
33	Length of these drains ... miles	2.6					
34	Average length per acre ... feet	4.8					
	DEVELOPMENT OF LAND.						
35	Improved land in operating enterprises, 1920 ... acres	1,026,574	32,000	155,135	4,019	40,586	2,640
36	Improved land prior to drainage ... acres	691,005	26,000	115,764	3,473	28,548	2,475
37	Increase since drainage ... acres	335,569	6,000	39,371	546	12,038	165
38	Per cent of increase	48.6	23.1	34.0	15.7	42.2	6.7
39	Per cent increase is of all improved land in farms, 1920	1.4	0.8	4.2	0.1	1.7	(3)
40	Unimproved land, 1920 ... acres	213,754	17,795	46,445	8,681	6,414	660
41	Unimproved land prior to drainage ... acres	549,323	23,795	85,816	9,227	18,452	825
42	Decrease since drainage ... acres	335,569	6,000	39,371	546	12,038	165
43	Per cent of decrease	61.1	25.2	45.9	5.9	65.2	20.0
44	Swampy or subject to overflow, 1920 ... acres	12,332		960			
45	Swampy or subject to overflow prior to drainage ... acres	619,159	26,659	120,086	9,653	21,660	1,650
46	Decrease since drainage ... acres	606,827	26,659	119,126	9,653	21,660	1,650
47	Per cent of decrease	98.0	100.0	99.2	100.0	100.0	100.0
	CAPITAL INVESTED AND COST PER ACRE.						
48	Total capital invested in and required for completion of operating enterprises ... dollars	2,261,449	171,096	837,690	15,785	49,894	22,500
49	Capital invested in these enterprises to Dec. 31, 1919 ... dollars	2,208,049	171,096	806,690	15,785	49,894	22,500
50	Additional capital required to complete these enterprises ... dollars	53,400		31,000			
51	Average cost per acre, when completed ... dollars	1.82	3.44	4.16	1.24	1.06	6.82
52	Enterprises constructing open ditches only ... dollars	2,200,158	171,096	837,690	15,785	49,894	
53	Average cost per acre, when completed ... dollars	1.81	3.44	4.16	1.24	1.06	
54	Enterprises constructing open ditches and levees ... dollars	12,368					
55	Average cost per acre, when completed ... dollars	1.29					
56	Enterprises constructing tile drains only ... dollars	42,908					22,500
57	Average cost per acre, when completed ... dollars	3.97					6.82
58	Enterprises constructing open ditches and tile drains ... dollars	6,015					
59	Average cost per acre, when completed ... dollars	2.09					
	CROPS.						
	Improved land in enterprises reporting—						
60	Wheat as principal crop on drained land ... acres	1,000,389	24,000	155,135		40,586	2,640
61	Hay and forage as principal crop on drained land ... acres	26,185	8,000		4,019		

[1] No timber or cut-over land reported. [2] When works under construction have been completed. [3] Less than one-tenth of 1 per cent.

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

		Pembina.	Ramsey.	Ransom.	Richland.	Sargent.	Traill.	Walsh.
	LAND AREA.							
1	Approximate land area of the county ... acres	714,880	771,200	550,400	919,680	547,200	553,600	820,480
2	All land in operating drainage enterprises ... acres	280,800	12,715	23,640	204,063	205,655	145,460	53,620
3	Improved land ... acres	256,778	11,443	14,120	171,911	162,151	126,527	49,264
4	Per cent of all improved land in farms	45.3	1.8	3.5	23.3	37.6	27.1	7.6
5	Unimproved land [1] ... acres	24,022	1,272	9,520	32,152	43,504	18,933	4,356
6	Swampy or subject to overflow, in enterprises ... acres	512			5,980		4,880	
7	Suffering a loss of crops from defective drainage ... acres				4,179		640	
8	Assessed acreage	280,800	12,715	23,640	204,063	205,655	145,460	53,620
9	Excess over all land in operating enterprises ... acres							
	DRAINAGE WORKS.							
	Open ditches:							
10	Completed ... miles	145.8	4.0	14.5	102.2	76.6	87.1	19.0
11	Additional under construction ... miles					2.5		
12	Maximum completed in any enterprise ... miles	24.0	2.5	6.5	12.5	45.1	8.5	7.0
13	Maximum width at bottom of ditch [2] ... feet	24	9	12	17	16	10	14
14	Maximum of average depths of outlet ditches [2] ... feet	7.0	4.0	5.0	10.0	8.0	8.0	4.7
15	Mean depth of branch ditches [2] ... feet	3.6		3.0	3.5	4.0		3.0
	Tile drains:							
16	Completed ... miles					4.8		
17	Additional under construction ... miles							
18	Maximum completed in any enterprise ... miles					4.5		
19	Maximum size of tile [2] ... inches					18		
	Accessory levees and dikes:							
20	Completed ... miles	2.1						
21	Additional under construction ... miles							
22	Area drained by open ditches only [2] ... acres	271,200	12,715	23,640	204,063	195,255	145,460	53,620
23	Length of these ditches ... miles	141.8	4.0	14.5	102.2	76.8	87.1	19.0
24	Average length per acre ... feet	2.8	1.7	3.2	2.6	2.1	3.2	1.9
25	Area having both open ditches and levees [2] ... acres	9,600						
26	Length of these ditches ... miles	4.0						
27	Average length per acre ... feet	2.2						
28	Length of the accessory levees ... miles	2.1						
29	Area drained by tile only [2] ... acres					7,520		
30	Length of these tile ... miles					4.5		
31	Average length per acre ... feet					3.2		
32	Area drained by open ditches and tile [2] ... acres					2,880		
33	Length of these drains ... miles					2.6		
34	Average length per acre ... feet					4.8		
	DEVELOPMENT OF LAND.							
35	Improved land in operating enterprises, 1920 ... acres	256,778	11,443	14,120	171,911	162,151	126,527	49,264
36	Improved land prior to drainage ... acres	179,720	3,075	9,550	124,962	57,412	100,406	39,620
37	Increase since drainage ... acres	77,058	8,368	4,570	46,949	104,739	26,121	9,644
38	Per cent of increase	42.9	272.1	47.9	37.6	182.4	26.0	24.3
39	Per cent increase is of all improved land in farms, 1920	13.6	1.3	1.1	6.4	24.3	5.6	1.5
40	Unimproved land, 1920 [1] ... acres	24,022	1,272	9,520	32,152	43,504	18,933	4,356
41	Unimproved land prior to drainage [1] ... acres	101,080	9,640	14,090	79,101	148,243	45,054	14,000
42	Decrease since drainage ... acres	77,058	8,368	4,570	46,949	104,739	26,121	9,644
43	Per cent of decrease	76.2	86.8	32.4	59.4	70.7	58.0	68.9
44	Swampy or subject to overflow, 1920 ... acres	512			5,980		4,880	
45	Swampy or subject to overflow prior to drainage ... acres	95,031	9,640	20,000	126,308	102,906	63,326	22,240
46	Decrease since drainage ... acres	94,519	9,640	20,000	120,328	102,906	58,446	22,240
47	Per cent of decrease	99.5	100.0	100.0	95.3	100.0	92.3	100.0
	CAPITAL INVESTED AND COST PER ACRE.							
48	Total capital invested in and required for completion of operating enterprises ... dollars	297,282	6,553	45,930	265,608	285,839	224,671	38,601
49	Capital invested in these enterprises to Dec. 31, 1919 ... dollars	297,282	6,553	45,930	265,608	263,439	224,671	38,601
50	Additional capital required to complete these enterprises ... dollars					22,400		
51	Average cost per acre, when completed ... dollars	1.06	0.52	1.94	1.30	1.39	1.54	0.72
52	Enterprises constructing open ditches only ... dollars	284,914	6,553	45,930	265,608	259,416	224,671	38,601
53	Average cost per acre, when completed ... dollars	1.05	0.52	1.94	1.30	1.33	1.54	0.72
54	Enterprises constructing open ditches and levees ... dollars	12,368						
55	Average cost per acre, when completed ... dollars	1.29						
56	Enterprises constructing tile drains only ... dollars					20,408		
57	Average cost per acre, when completed ... dollars					2.71		
58	Enterprises constructing open ditches and tile drains ... dollars					6,015		
59	Average cost per acre, when completed ... dollars					2.09		
	CROPS.							
	Improved land in enterprises reporting—							
60	Wheat as principal crop on drained land ... acres	256,778	11,443	6,900	166,911	160,205	126,527	49,264
61	Hay and forage as principal crop on drained land ... acres			7,220	5,000	1,946		

[1] No timber or cut-over land reported.

[2] When works under construction have been completed.

OHIO.

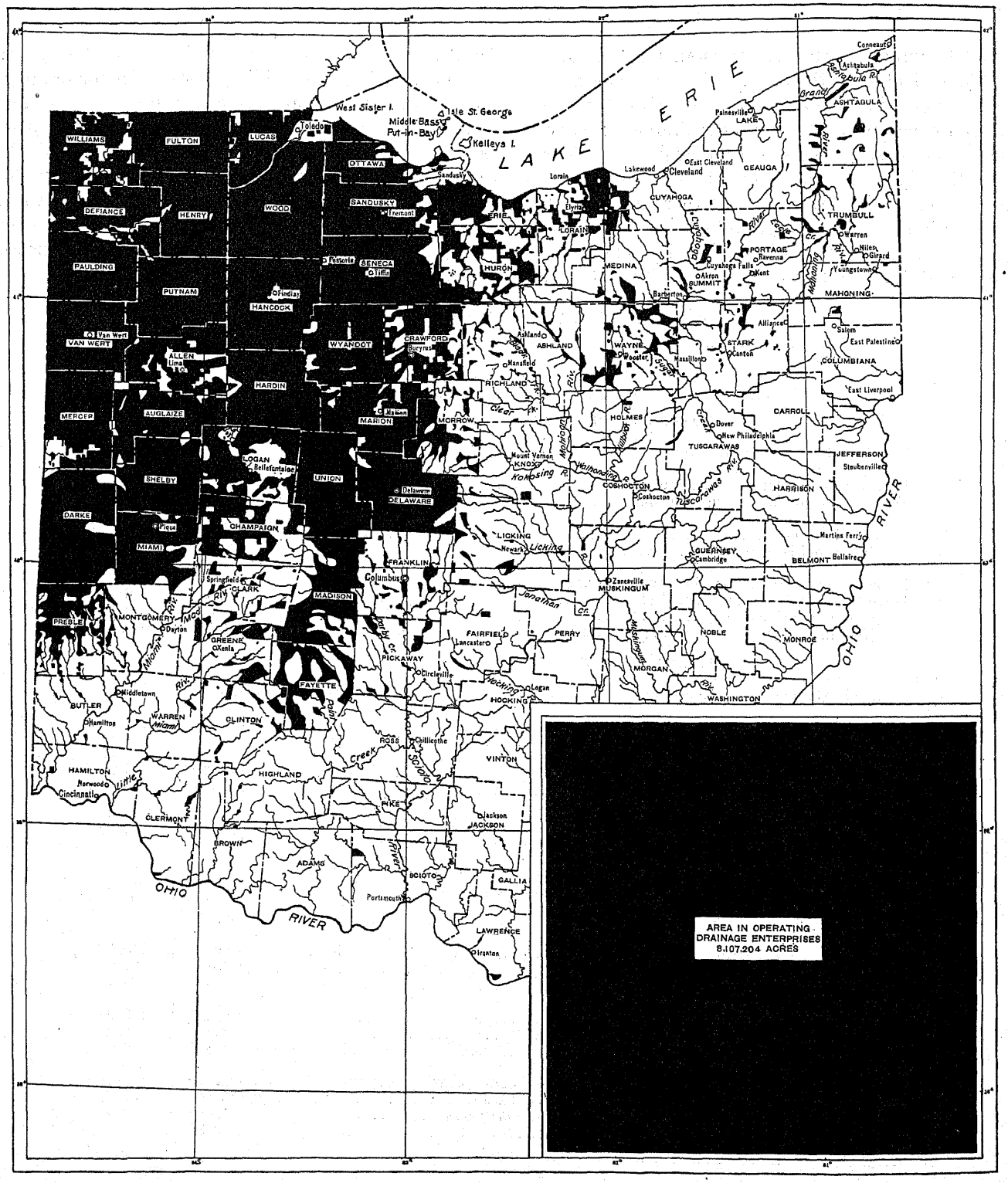
The following pages present the statistics of drainage for Ohio collected at the census of 1920. The figures relate to conditions on January 1, 1920, except where indicated otherwise. No census of drainage has been taken heretofore, so there are no comparable figures for previous years. The data relate to the artificial drainage of land in farms, and of other land that ultimately will be used for agricultural purposes. The organized drainage enterprises might 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.
DRAINAGE ON FARMS.		
Number of all farms in the state	256, 695	100.0
Farms reporting land having drainage	130, 117	50.7
Farms reporting land needing drainage	85, 326	33.2
All land in farms ... acres	23, 515, 888	100.0
Improved land in farms ... acres	18, 542, 353	78.9
Farm land reported as provided with drainage ... acres	7, 365, 532	31.3
Farm land reported as needing drainage ... acres	2, 014, 889	8.6
Needing drainage only ... acres	886, 557	3.8
Needing drainage and clearing ... acres	1, 128, 332	4.8
DRAINAGE ENTERPRISES.		
Approximate land area of the state ... acres	26, 073, 600	100.0
All land in operating drainage enterprises ... acres	8, 107, 204	31.1
Improved land ... acres	6, 707, 328	25.7
Per cent of all improved land in farms	36.2	.....
Timber and cut-over land ... acres	956, 894	3.7
Other unimproved land ... acres	442, 982	1.7
Swampy, subject to overflow, seeped, or alkali ... acres	247, 273	0.9
Suffering a loss of crops from defective drainage ... acres	141, 481	0.5
Improved land prior to drainage ... acres	3, 955, 220	15.2
Increase since drainage began ... acres	2, 752, 108	10.6
Land in nonoperating enterprises ... acres	40, 342	0.2
Open ditches in operating enterprises ... miles	24, 997.4	100.0
Completed ... miles	24, 984.0	99.9
Additional under construction ... miles	13.4	0.1
Tile drains in operating enterprises ... miles	9, 213.6	100.0
Completed ... miles	9, 205.3	99.9
Additional under construction ... miles	8.3	0.1
Total capital invested in and required for completion of operating enterprises	$30, 771, 620	100.0
Capital invested in these enterprises to Dec. 31, 1919	30, 680, 145	99.7
Additional capital required to complete these enterprises	91, 475	0.3
Average cost per acre when completed	3.80	.....

OHIO

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 some that on the census date had completed their plans, sold bonds to cover the cost of the undertakings, and let contracts for construction work, and also others for which orders 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.[1]		
	Acreage.	Per cent of total.	To Dec. 31, 1919. Amount.	To Dec. 31, 1919. Per cent of total.	Additional required to complete.
All organized enterprises	8,147,546	100.0	$30,707,863	100.0	$397,396
Operating enterprises	8,107,204	99.5	30,680,145	99.9	91,475
With works completed	8,093,994	99.3	30,636,857	99.8	.....
With works under construction	13,210	0.2	43,288	0.1	91,475
Nonoperating enterprises	40,342	0.5	27,718	0.1	305,921

[1] 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.—A very large part of the northwest quarter of Ohio has been included in organized drainage enterprises. A large acreage in the southwest quarter also has been included in such enterprises, and a considerable amount in the northeast section, but almost none in the southeast part of the state. The approximate location and extent of the enterprises are shown by the map on page 2.

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. Amount.	To Dec. 31, 1919. Per cent of total.	Additional required to complete.
All organized enterprises	8,147,546	100.0	$30,707,863	100.0	$397,396
Operating enterprises	8,107,204	99.5	30,680,145	99.9	91,475
Wabash River	122,660	1.5	621,880	2.0	.....
Miami River	1,304,841	16.0	5,838,633	19.0	39,570
Scioto River	1,556,510	19.1	4,461,241	14.5	1,630
Ohio River	277,550	3.4	1,385,843	4.5	9,908
Lake Erie	4,845,643	59.5	18,372,548	59.8	40,367
Nonoperating enterprises	40,342	0.5	27,718	0.1	305,921
Miami River	3,456	(1)	2,297	(1)	5,951
Scioto River	4,804	0.1	3,494	(1)	40,639
Ohio River	272	(1)	3,316	(1)	2,848
Lake Erie	31,810	0.4	18,611	0.1	256,483

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

Condition of land in enterprises.—Approximately seven-eighths of the operating drainage enterprises, in number and in acreage, were reported as organized for the reclamation or improvement of land generally swampy or too wet for cultivation with profit; most of the others were reported as organized for securing protection against overflow by stream floods. The estimates of the condition of the land before drainage show 50 per cent of the total area in the enterprises to have been improved, and 37 per cent timbered or cut-over; the area reported as having been swampy, wet, or subject to overflow is 39 per cent of the total area in the 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 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 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. Acreage.	Total. Per cent of all land.	Works completed (acres).	Works under construction (acres).	
All land in enterprises	8,107,204	100.0	8,093,994	13,210	40,342
Improved land	6,707,328	82.7	6,697,080	10,248	24,375
Timber and cut-over land	956,894	11.8	955,107	1,787	4,363
Other unimproved land	442,982	5.5	441,807	1,175	11,604
Swampy or subject to overflow	247,273	3.1	243,962	3,311	19,776
Suffering a loss of crops	141,481	1.7	140,059	1,422	7,603

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 as a separate enterprise. In this way 24,871 operating drainage enterprises are counted in Ohio, with an average area of 943 acres assessed. Of this number, 191 comprise 10,000 acres or more each; 5,372 others comprise 1,000 acres or more; and 19,308 embrace less than 1,000 acres each, of which 6,231 are smaller than 200 acres.

The assessed acreage exceeds the land in enterprises by 15,357,608 acres, which is the amount of overlapping and probably represents largely reassessments for enlarging, extending, or reconstructing ditches. 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 enterprises. The amount of overlapping

could be only estimated, however, in a great number of cases, so for many of the northwestern counties the figures for land in enterprises are only rough approximations.

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	8,107,204	23,464,812	100.0
Less than 200 acres	418,913	658,953	2.8
200 to 499 acres	1,274,879	2,495,996	10.6
500 to 999 acres	1,625,720	3,928,812	16.7
1,000 to 4,999 acres	3,288,121	9,615,229	41.0
5,000 to 9,999 acres	823,323	2,850,517	12.1
10,000 to 49,999 acres	571,127	3,152,280	13.4
50,000 to 99,999 acres	105,121	763,025	3.3

Character of enterprises.—Most of the drainage enterprises in Ohio are county ditches established according to an act passed April 12, 1871. There are also considerable numbers of county ditches, joint county ditches, and township ditches established under other drainage laws of the state, and a very few interstate county ditches and large undertakings by individual landowners. These "ditches" include all forms of drains and watercourses constructed or improved under the provisions of the laws. An act passed June 19, 1919, codifies all the ditch laws of the state and repeals the earlier forms without changing the general character of the enterprises.

The law of 1919 provides that ditches or drains may be established by the board of county commissioners of the county in which is situated the land that will be affected by the proposed improvement, upon petition from one or more owners of such land, from the trustees of a township, or from any public corporation, board, or institution. A preliminary survey and estimates are made by the county engineer, and public hearing upon the petition then is held by the county commissioners. The drain is established upon finding that it is necessary or will be advantageous. Claims for damages are determined by the commissioners. Final orders of the board are subject to appeal to the common pleas court. The drainage plan and the apportionment of cost are made by the engineer. The cost is assessed against the land in proportion to benefits; the assessments are equalized and confirmed by the commissioners, and then are appealable to the common pleas court. The assessments are to be paid in 10 semiannual installments. Construction of the drainage works is under the supervision of the county engineer. The commissioners may issue bonds to finance the improvement. If petition for the drain is signed by the county commissioners, the proceedings for establishment are in charge of the court of common pleas. If the land to be affected by a drain is situated in more than one county, the commissioners of the counties affected act upon the petition jointly. The act provides that right of way for a private drain across the land of an objecting owner may be obtained through petition to the trustees of the township and payment of the damages awarded by them.

An act of March 24, 1859, authorized the establishment of ditches by the county commissioners upon petition from one or more landowners. It provided that damages claimed should be determined by the probate court, and that the construction work should be allotted to the landowners, in proportion to benefits, by an engineer appointed by the commissioners. Contracts for unfinished work were let by the county auditor. An act of March 27, 1861, was substantially similar.

The act of April 12, 1871, superseded all earlier county ditch laws and remained in effect until 1919. The ditches were established by order of the county commissioners of the county in which the ditch was located. Ditches in more than one county were established by joint action of the commissioners of the counties affected. Petition for a ditch had to be made by one or more owners of land to be benefited, and public hearing be held before the enterprise was established. Plans and estimates for the work were made by the county surveyor or by an engineer appointed by the commissioners. Claims for damages were determined by the commissioners, subject to appeal to the probate court. Construction of the drain was apportioned among the landowners in proportion to benefits, by the commissioners; contracts for work not performed by the owners were let by the county auditor. The costs were paid by the county, which was reimbursed by taxes levied against the land benefited. The issue of bonds for drainage was authorized by an act of April 29, 1873, and an act of April 20, 1881, required that the engineer should make assessments of the total cost for consideration with his plans and estimates.

Joint county ditches providing drainage for land in more than one county are specially authorized by an act of June 12, 1911. The petition for establishment under this law must be signed by 50 or more interested persons. Establishment is ordered by the joint action of the commissioners of the counties affected. Plans and estimates for the improvement are made by the county surveyors jointly. The cost is apportioned among the counties by joint action of the county boards, and each county surveyor makes the assessments against the land in his county. Claims for damages are determined and contracts for construction are let by the county boards jointly. Each county may issue joint county ditch bonds to run not longer than 20 years.

Interstate county ditches, which will benefit land in an adjoining state also, are authorized by an act of

March 21, 1887. Upon petition from one or more landowners the county commissioners may meet jointly with the county officials of the adjoining state to consider the petition, to locate the improvement, and to apportion the costs between the states. The ditch then is constructed and the cost apportioned as for a county drain wholly within this state. Damages allowed are paid from the county fund. An act of 1898 authorizes the boards of county commissioners to enter into agreements with county officials in adjoining states to secure drainage outlets in those states or to provide such outlet facilities for land in those states.

Township ditches have been established under several statutes. The act of February 24, 1853, authorized the establishment of public ditches by the township trustees upon petition from one or more owners of land that would be benefited and after investigation of the necessity for the drain, subject to appeal to the probate judge. Damages were determined by the trustees, who also apportioned the work of construction to the landowners benefited. An act of May 1, 1862, also provided for the establishment of public drains by the township trustees upon petition from one or more landowners. Damages claimed were determined by jury in the probate court. The cost was apportioned by the trustees according to benefits, and each landowner might pay his assessment in labor. An act of May 6, 1868, was similar to that of May 1, 1862.

The greater part of the township ditches were established under an act of April 18, 1874, which was in effect until 1919. This law authorized the establishment of ditches by the township trustees upon application from one or more owners of land adjacent to the proposed drain, after public hearing. Plans for the improvement were made and claims for damages were determined by the trustees, who also apportioned the work of construction among the landowners according to benefits. Appeals from decisions of the trustees regarding the utility or location of the ditch and the awards of damages might be taken to the probate court for jury trial. For work not performed within the specified time, contract was let by the trustees and the cost was charged to the delinquent landowners. Ditches in two or more townships might be established by joint action of the trustees of those townships, under an act of April 19, 1898. A great many amendments to the act of 1874 have been made, but the character of the enterprises has not been changed.

The first general drainage law of Ohio was an act of February 8, 1847, authorizing the establishment of drains by the county commissioners upon petition from one or more interested landowners. Viewers were appointed to locate the ditch and assess damages. By an amendment in 1851, the viewers also assessed benefits against the land. When the petitioners had paid the damages and constructed the ditch, they might collect the benefits as confirmed by the commissioners. A township ditch law of May 1, 1854, was similar to that of February 24, 1853. Both of these laws were repealed by the county ditch law of March 24, 1859. An act of March 2, 1853, authorized the county commissioners to drain the swamp land granted to the state by Congress, payment to be made from funds realized from the sale of that land. This act was repealed April 13, 1894. No drainage enterprises were reported as organized under these and other acts relating to drainage, including the conservancy act of February 17, 1914. Conservancy districts are established by courts of common pleas upon petition from 500 freeholders in the proposed district, or from a majority of all in number, acreage, or value. The officers are three directors appointed by the court.

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. Amount.	To Dec. 31, 1919. Per cent of total.	Additional required to complete.
All organized enterprises	8,147,546	100.0	$30,707,863	100.0	$397,396
Operating enterprises	8,107,204	99.5	30,680,145	99.9	91,475
County ditches	7,719,293	94.7	29,283,427	95.4	83,099
Act of Mar. 24, 1859	257,382	3.2	358,710	1.2	.....
Act of Mar. 27, 1861	804,999	9.9	1,565,324	5.1	.....
Act of Apr. 12, 1871	6,656,912	81.7	27,359,393	89.1	83,099
Joint county ditches	78,803	1.0	442,013	1.4	8,376
Interstate county ditches	5,474	0.1	44,459	0.1	.....
Township ditches	192,993	2.4	564,463	1.8	.....
Act of Feb. 24, 1853	960	(1)	860	(1)	.....
Act of May 1, 1862	2,895	(1)	8,768	(1)	.....
Act of May 6, 1868	11,344	0.1	25,627	0.1	.....
Act of Apr. 18, 1874	177,794	2.2	529,208	1.7	.....
Individual ownership	7,736	0.1	138,875	0.5	.....
Not identified	102,905	1.3	206,908	0.7	.....
Act of 1881	100,990	1.2	182,926	0.6	.....
Not reporting	1,915	(1)	23,982	0.1	.....
Nonoperating enterprises	40,342	0.5	27,718	0.1	305,921
County ditches	40,342	0.5	27,718	0.1	305,921
Act of Apr. 12, 1871	16,275	0.2	19,497	0.1	196,588
Act of June 12, 1911	24,067	0.3	8,221	(1)	109,333

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

Drainage works.—The total works completed by drainage enterprises to December 31, 1919, comprised 24,984.0 miles of open ditches, 9,205.3 miles of tile drains, and 9.6 miles of accessory levees; the additional lengths under construction were 13.4 miles of open ditches, 8.3 miles of tile drains, and 4.0 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 open ditches or tile drains. It is possible that some duplication of open ditches is included, by reason of reconstruction work being reported as new work, though every effort was made to avoid or eliminate such duplication.

There are four small pumping districts among the operating drainage enterprises in this state. The total acreage served by pumps, wholly or partly, is 1,755 acres; the total capacities of the pumps and engines are 3,600 gallons per minute and 125 horsepower, respectively.

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

KIND OF WORKS.	LAND.		CAPITAL.		
			To Dec. 31, 1919.		
	Acreage.	Per cent of total.	Amount.	Per cent of total.	Additional required to complete.
All kinds	8,107,204	100.0	$30,680,145	100.0	$91,475
Open ditches only	4,738,114	58.4	15,357,021	50.1	3,610
Open ditches and levees	7,078	0.1	25,080	0.1	25,000
Tile drains only	1,139,856	14.1	5,993,113	19.5	4,585
Open ditches and tile drains	2,219,770	27.4	9,226,931	30.1	58,280
Open ditches, tile drains, and levees	2,386	(1)	78,000	0.3	.....

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

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 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 this group, computed as 3 feet, would show the mean depth for the state 3.8 instead of 3.9 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	8,107,204	100.0
Less than 3 feet	342,681	4.2
3.0 to 3.9 feet	792,424	9.8
4.0 to 4.9 feet	569,745	7.0
5.0 to 5.9 feet	291,340	3.6
6.0 to 6.9 feet	150,733	1.9
7.0 to 7.9 feet	1,692	(1)
8.0 to 8.9 feet	9,535	0.1
Not reporting branches	5,949,054	73.4

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

Maintenance of works.—The act of June 19, 1919, provides that county ditches constructed under that and earlier acts are to be maintained by the county commissioners of the respective counties. The cost is to be assessed against the land in the same ratio as the cost for original construction. If there be no record of the original apportionment, however, a new assessment of benefits shall be made the same as for constructing a new improvement, such assessment being subject to appeal as for a new drain. Joint county ditches are to be maintained by joint action of the county commissioners concerned.

The county drain law of 1871 authorized the election of a township ditch supervisor by the electors of each township, to keep the ditches in repair, and the township ditch law of 1874 authorized the township trustees to keep the ditches in repair. An act of April 2, 1906, required that the township ditch supervisor divide the county and township ditches into sections which he should allot to the various landowners, corporate roads, railroads, townships, and counties according to benefits. If any person or corporation failed to keep his allotted section in good repair, the supervisor was authorized to let contract for the work and the cost would be placed upon the tax roll. Provision also was made in the statutes for undertaking repair of ditches by proceedings like those for constructing new ditches, and the information secured in the canvass indicates that this method was generally followed.

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

METHOD OF MAINTENANCE.	LAND.		CAPITAL.		
			To Dec. 31, 1919.		
	Acreage.	Per cent of total.	Amount.	Per cent of total.	Additional required to complete.
All operating enterprises	8,107,204	100.0	$30,680,145	100.0	$91,475
By district forces	30,172	0.4	85,599	0.3	9,908
By contract	1,990,206	24.5	7,780,408	25.4	810
By method not specified	28,956	0.4	73,215	0.2	.....
By landowners	23,216	0.3	122,245	0.4	.....
No maintenance provided	5,912,990	72.9	22,232,863	72.5	80,157
Not reported	121,664	1.5	385,815	1.3	600

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 ditches were established by the county commissioners or township trustees, 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 enterprise. 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.

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	8,107,204	100.0	23,464,812	100.0
Before 1860	89,203	1.1	90,003	0.4
1860 to 1869	721,132	8.9	864,879	3.7
1870 to 1879	1,411,044	17.4	2,665,032	11.4
1880 to 1889	2,219,818	27.4	5,008,785	21.3
1890 to 1899	1,405,162	17.3	5,710,986	24.3
1900 to 1904	563,795	7.0	2,956,124	12.6
1905 to 1909	751,494	9.3	2,971,538	12.7
1910 to 1914	493,418	6.1	1,802,952	7.7
1915 to 1919	449,782	5.5	1,377,043	5.9
Not reported	2,356	(1)	17,470	0.1

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

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	$30,680,145	100.0	$91,475
Before 1860	154,702	0.5	.....
1860 to 1869	1,276,392	4.2	.....
1870 to 1879	4,218,515	13.7	.....
1880 to 1889	6,624,473	21.6	.....
1890 to 1899	5,609,118	18.3	810
1900 to 1904	2,941,011	9.6	.....
1905 to 1909	4,158,050	13.6	.....
1910 to 1914	2,920,876	9.5	.....
1915 to 1919	2,749,993	9.0	90,665
Not reported	27,015	0.1	.....

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	24,997.4	100.0	9,213.6	100.0	13.6	100.0
Before 1860	160.2	0.6	4.2	(1)	.....	.....
1860 to 1869	2,202.7	8.8	46.5	0.5	.....	.....
1870 to 1879	4,778.0	19.1	316.4	3.4	.....	.....
1880 to 1889	7,168.0	28.7	1,285.9	14.0	0.5	3.7
1890 to 1899	5,067.5	20.3	2,056.0	22.3	.....	.....
1900 to 1904	1,890.2	7.6	1,413.5	15.3	6.5	47.8
1905 to 1909	1,903.1	7.6	1,850.2	20.1	0.3	2.2
1910 to 1914	1,068.0	4.3	1,265.7	13.7	1.5	11.0
1915 to 1919	736.9	2.9	967.5	10.5	4.8	35.3
Not reported	22.8	0.1	7.7	0.1	.....	.....

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

Crops.—The principal crops grown upon the drained land in drainage enterprises are corn, wheat, and hay. 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.	Adams.	Allen.	Ashland.	Ashtabula.	Athens.	Auglaize.	Belmont.
1	Number of all farms in the state or county	256,695	3,650	2,909	2,512	4,801	2,503	2,626	3,566
2	Farms reporting land having drainage	130,117	48	2,721	1,403	1,100	162	2,341	142
3	Farms reporting land needing drainage	85,326	212	1,687	934	1,027	195	1,734	349
4	Farms in drainage and levee districts	7,315	.....	14	40	92	.....	70	.....
	LAND AND FARM AREA.								
5	Approximate land area of the state or county ... acres	26,073,600	349,440	259,840	269,440	462,720	311,680	254,080	339,200
6	All land in farms ... acres	23,515,888	321,892	241,488	252,142	381,320	256,974	240,568	307,934
7	Improved land in farms ... acres	18,542,353	214,375	205,577	190,956	252,635	187,906	203,146	235,708
8	Woodland in farms ... acres	3,198,929	83,942	31,357	36,579	68,750	42,792	30,837	37,345
9	Other unimproved land in farms ... acres	1,774,606	23,575	4,554	24,607	59,935	26,276	6,585	34,881
10	Farm land reported as provided with drainage ... acres	7,365,532	1,121	173,347	48,699	22,374	2,240	162,293	1,617
11	Farm land reported as needing drainage ... acres	2,014,889	2,771	42,715	22,082	30,348	4,631	42,672	4,135
12	Drainage only ... acres	886,557	605	17,333	13,338	7,361	1,281	13,253	1,397
13	Drainage and clearing ... acres	1,128,332	2,166	25,382	8,744	22,987	3,350	29,419	2,738

		Brown.	Butler.	Carroll.	Champaign.	Clark.	Clermont.	Clinton.	Columbiana.	Coshocton.
1	Number of all farms in the county	3,890	2,534	1,990	2,481	2,487	3,803	2,411	3,586	2,951
2	Farms reporting land having drainage	526	1,178	247	1,543	1,548	168	1,619	1,411	591
3	Farms reporting land needing drainage	429	729	470	766	790	208	804	1,204	624
4	Farms in drainage and levee districts	14	18	.....	218	46	76	26	18	11
	LAND AND FARM AREA.									
5	Approximate land area of the county ... acres	307,840	289,280	247,680	269,440	260,480	297,600	263,040	341,760	357,120
6	All land in farms ... acres	302,391	272,248	229,597	258,168	241,540	276,070	256,686	288,847	337,542
7	Improved land in farms ... acres	263,652	216,656	171,631	221,010	204,277	230,319	231,732	213,157	259,156
8	Woodland in farms ... acres	23,860	26,562	32,484	24,349	19,083	24,118	19,896	40,255	46,481
9	Other unimproved land in farms ... acres	14,879	29,030	25,482	12,809	18,180	21,633	5,058	35,435	31,905
10	Farm land reported as provided with drainage ... acres	26,956	52,676	2,867	117,490	100,562	8,253	129,658	29,900	8,452
11	Farm land reported as needing drainage ... acres	5,067	18,998	8,853	20,894	18,668	2,229	14,668	22,504	9,376
12	Drainage only ... acres	519	13,074	5,546	6,537	7,778	323	4,891	11,216	5,752
13	Drainage and clearing ... acres	4,548	5,924	3,307	14,357	10,890	1,906	9,777	11,288	3,624

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

		Crawford.	Cuyahoga.	Darke.	Defiance.	Delaware.	Erie.	Fairfield.	Fayette.	Franklin.
1	Number of all farms in the county	2,415	3,375	5,456	2,522	2,922	1,883	3,437	1,787	3,778
2	Farms reporting land having drainage	2,275	1,196	4,870	2,002	2,445	1,363	2,391	1,623	3,033
3	Farms reporting land needing drainage	1,487	568	2,394	1,304	1,569	568	1,180	675	1,095
4	Farms in drainage and levee districts	78	139	84	203	474	73	136	129	61
	LAND AND FARM AREA.									
5	Approximate land area of the county ... acres	261,760	296,320	375,040	259,200	284,800	163,840	316,800	264,320	330,880
6	All land in farms ... acres	241,332	173,742	370,661	243,593	275,734	140,771	307,007	249,700	296,733
7	Improved land in farms ... acres	201,748	113,700	330,473	195,583	229,560	117,102	263,868	235,262	265,116
8	Woodland in farms ... acres	32,107	28,969	33,256	37,708	39,588	12,395	28,208	11,661	19,363
9	Other unimproved land in farms ... acres	7,477	31,073	6,932	10,302	6,586	11,274	14,931	2,777	12,254
10	Farm land reported as provided with drainage ... acres	148,022	22,627	280,280	114,728	136,563	65,773	130,930	176,246	189,062
11	Farm land reported as needing drainage ... acres	40,814	9,568	33,583	30,818	51,807	13,721	21,943	18,866	26,107
12	Drainage only ... acres	14,508	3,280	7,050	8,941	28,419	9,951	11,345	9,767	13,243
13	Drainage and clearing ... acres	26,306	6,288	26,533	21,877	23,388	3,770	10,598	9,099	12,864

		Fulton.	Gallia.	Geauga.	Greene.	Guernsey.	Hamilton.	Hancock.	Hardin.	Harrison.
1	Number of all farms in the county	3,156	2,963	2,576	2,373	3,079	3,741	3,214	3,052	2,039
2	Farms reporting land having drainage	2,929	275	739	1,454	300	270	3,024	2,887	341
3	Farms reporting land needing drainage	1,726	490	914	529	434	161	1,986	1,672	466
4	Farms in drainage and levee districts	478	2	44	58	.....	5	1	301	1
	LAND AND FARM AREA.									
5	Approximate land area of the county ... acres	259,200	287,360	266,240	265,600	331,520	260,480	342,400	302,720	256,640
6	All land in farms ... acres	248,052	265,536	232,818	247,759	308,943	183,776	317,894	289,727	238,887
7	Improved land in farms ... acres	210,611	196,936	119,586	213,797	249,804	140,431	272,711	245,764	186,517
8	Woodland in farms ... acres	29,794	42,854	47,524	22,901	42,230	17,784	37,676	34,143	29,893
9	Other unimproved land in farms ... acres	7,647	25,746	65,708	11,061	16,909	25,561	7,507	9,820	22,477
10	Farm land reported as provided with drainage ... acres	168,120	4,713	10,967	103,728	6,122	5,897	225,267	218,802	6,378
11	Farm land reported as needing drainage ... acres	42,603	10,708	27,854	11,256	11,405	2,746	54,423	49,527	8,956
12	Drainage only ... acres	19,133	4,729	8,723	4,726	5,797	1,694	21,609	16,696	4,539
13	Drainage and clearing ... acres	23,470	5,979	19,131	6,530	5,608	1,052	32,814	32,831	4,417

		Henry.	Highland.	Hocking.	Holmes.	Huron.	Jackson.	Jefferson.	Knox.	Lake.
1	Number of all farms in the county	2,891	3,338	1,753	2,546	2,728	2,054	1,866	3,108	1,771
2	Farms reporting land having drainage	2,623	1,163	228	770	1,798	264	38	1,217	767
3	Farms reporting land needing drainage	1,534	516	428	610	708	244	131	1,148	478
4	Farms in drainage and levee districts	14	45	1	4	82	6	.....	7	100
	LAND AND FARM AREA.									
5	Approximate land area of the county ... acres	264,960	351,360	263,040	267,520	316,160	258,560	260,480	328,320	154,240
6	All land in farms ... acres	253,093	346,283	208,674	258,743	283,224	229,203	214,930	322,509	115,819
7	Improved land in farms ... acres	222,539	296,186	135,754	194,824	221,146	161,413	142,094	257,974	77,721
8	Woodland in farms ... acres	23,159	39,138	50,298	44,116	34,318	45,669	40,784	40,210	21,326
9	Other unimproved land in farms ... acres	7,395	10,959	22,622	19,803	27,760	22,121	32,052	24,325	16,772
10	Farm land reported as provided with drainage ... acres	191,095	53,118	5,774	10,978	96,483	6,755	355	41,993	18,543
11	Farm land reported as needing drainage ... acres	31,580	10,702	8,192	9,515	17,603	16,919	2,240	23,538	10,498
12	Drainage only ... acres	13,274	3,111	1,603	7,011	7,203	6,668	697	13,407	4,752
13	Drainage and clearing ... acres	18,306	7,591	6,589	2,504	10,400	10,251	1,543	10,131	5,746

		Lawrence.	Licking.	Logan.	Lorain.	Lucas.	Madison.	Mahoning.	Marion.	Medina.
1	Number of all farms in the county	2,430	4,138	2,825	3,425	2,744	1,769	2,555	1,997	3,018
2	Farms reporting land having drainage	129	2,423	2,212	1,942	1,214	1,432	1,043	1,896	1,829
3	Farms reporting land needing drainage	590	1,885	1,212	987	508	694	863	959	1,543
4	Farms in drainage and levee districts	13	49	225	228	192	140	17	15	83
	LAND AND FARM AREA.									
5	Approximate land area of the county ... acres	283,520	428,160	288,640	318,080	218,880	318,080	273,280	261,760	278,400
6	All land in farms ... acres	194,910	405,111	274,008	278,195	152,759	289,550	209,056	243,373	249,572
7	Improved land in farms ... acres	128,241	336,594	221,877	209,119	126,991	261,094	135,712	216,995	178,097
8	Woodland in farms ... acres	45,017	43,965	33,977	34,950	16,354	21,937	35,427	21,223	43,400
9	Other unimproved land in farms ... acres	21,652	24,552	18,154	34,126	9,414	6,519	37,917	5,155	28,075
10	Farm land reported as provided with drainage ... acres	2,516	116,315	142,831	61,687	54,262	203,352	21,867	194,221	55,164
11	Farm land reported as needing drainage ... acres	14,228	49,522	34,815	22,747	10,261	33,252	26,224	25,168	32,492
12	Drainage only ... acres	1,948	28,019	14,950	8,778	4,602	13,442	12,892	11,864	11,950
13	Drainage and clearing ... acres	12,280	21,503	19,865	13,969	5,659	14,810	13,332	13,304	20,542

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

		Meigs.	Mercer.	Miami.	Monroe.	Montgomery.	Morgan.	Morrow.	Muskingum.	Noble.
1	Number of all farms in the county	2,833	3,040	3,260	3,062	4,460	2,378	2,570	3,688	2,576
2	Farms reporting land having drainage	258	2,871	2,568	23	3,072	213	2,362	527	84
3	Farms reporting land needing drainage	426	1,741	925	279	1,276	350	1,898	803	182
4	Farms in drainage and levee districts	.....	70	231	.....	94	1	87	6	3
	LAND AND FARM AREA.									
5	Approximate land area of the county ... acres	263,680	288,000	261,120	286,720	291,200	257,280	257,920	424,960	255,360
6	All land in farms ... acres	247,377	276,716	247,273	267,944	260,307	249,034	239,345	392,152	241,906
7	Improved land in farms ... acres	170,185	236,650	217,956	190,589	221,331	198,213	187,461	324,151	204,370
8	Woodland in farms ... acres	49,056	34,223	16,785	52,798	21,903	33,783	44,213	51,906	27,235
9	Other unimproved land in farms ... acres	28,136	5,843	12,532	24,557	17,073	17,038	7,671	16,095	10,301
10	Farm land reported as provided with drainage ... acres	3,144	193,128	155,869	367	119,301	2,733	106,770	8,529	1,152
11	Farm land reported as needing drainage ... acres	5,523	39,976	15,307	3,877	25,237	5,874	53,858	14,066	3,043
12	Drainage only ... acres	2,449	17,985	6,401	179	13,466	2,782	24,708	5,015	1,042
13	Drainage and clearing ... acres	3,074	21,991	8,906	3,698	11,771	3,092	29,150	9,051	2,001

		Ottawa.	Paulding.	Perry.	Pickaway.	Pike.	Portage.	Preble.	Putnam.	Richland.
1	Number of all farms in the county	2,010	2,414	2,355	2,151	1,940	3,406	3,095	3,232	3,125
2	Farms reporting land having drainage	1,494	2,225	527	1,748	104	1,809	2,666	3,114	2,008
3	Farms reporting land needing drainage	925	1,217	398	833	163	1,742	1,462	2,091	1,338
4	Farms in drainage and levee districts	74	21	32	53	9	126	649	249	25
	LAND AND FARM AREA.									
5	Approximate land area of the county ... acres	172,800	264,320	255,360	313,600	273,920	333,440	266,240	308,480	321,920
6	All land in farms ... acres	138,750	246,265	218,578	308,497	229,343	286,070	263,918	292,620	299,138
7	Improved land in farms ... acres	117,214	220,913	162,287	285,124	123,165	181,419	217,971	259,691	232,453
8	Woodland in farms ... acres	11,966	19,751	28,967	15,013	82,728	48,329	28,681	28,114	46,056
9	Other unimproved land in farms ... acres	9,570	5,601	27,324	8,360	23,450	56,322	17,266	4,815	20,629
10	Farm land reported as provided with drainage ... acres	77,111	184,356	18,528	179,660	2,775	33,946	162,170	233,253	90,489
11	Farm land reported as needing drainage ... acres	16,915	35,398	8,211	19,680	6,749	39,856	30,863	46,697	24,108
12	Drainage only ... acres	7,988	18,837	4,903	9,884	3,245	14,821	14,045	22,437	9,800
13	Drainage and clearing ... acres	8,927	16,561	3,308	9,796	3,504	25,035	16,818	24,260	14,308

		Ross.	Sandusky.	Scioto.	Seneca.	Shelby.	Stark.	Summit.	Trumbull.	Tuscarawas.
1	Number of all farms in the county	2,949	2,713	2,762	3,113	2,624	4,628	2,529	3,911	3,264
2	Farms reporting land having drainage	855	2,270	180	2,210	2,356	2,164	1,136	1,220	900
3	Farms reporting land needing drainage	862	1,428	330	1,357	1,432	1,831	1,126	1,138	859
4	Farms in drainage and levee districts	14	4	9	222	68	161	15	28	29
	LAND AND FARM AREA.									
5	Approximate land area of the county ... acres	427,520	264,320	398,720	352,000	264,320	362,240	261,120	405,120	355,200
6	All land in farms ... acres	384,328	240,257	283,237	332,132	245,769	328,911	204,210	330,510	312,604
7	Improved land in farms ... acres	272,680	202,451	127,250	279,747	210,359	264,306	147,856	207,909	247,849
8	Woodland in farms ... acres	82,479	20,829	122,059	38,135	24,983	33,465	32,718	61,776	41,442
9	Other unimproved land in farms ... acres	29,169	16,977	33,928	14,250	10,427	31,140	23,636	60,825	23,313
10	Farm land reported as provided with drainage ... acres	57,962	140,076	6,596	136,688	172,283	55,086	26,534	27,202	15,533
11	Farm land reported as needing drainage ... acres	23,701	42,132	14,974	32,339	34,165	30,858	23,569	37,687	14,648
12	Drainage only ... acres	6,698	26,978	1,217	11,796	15,044	16,192	9,726	16,366	8,531
13	Drainage and clearing ... acres	17,003	15,154	13,757	20,543	19,121	14,666	13,843	21,321	6,117

		Union.	Van Wert.	Vinton.	Warren.	Washington.	Wayne.	Williams.	Wood.	Wyandot.
1	Number of all farms in the county	2,736	2,879	1,598	2,584	4,204	3,944	2,810	4,164	2,264
2	Farms reporting land having drainage	2,400	2,802	144	948	154	2,502	2,601	2,361	2,088
3	Farms reporting land needing drainage	1,448	1,809	181	403	209	1,703	1,959	1,363	1,421
4	Farms in drainage and levee districts	130	11	1	15	1	126	283	242	95
	LAND AND FARM AREA.									
5	Approximate land area of the county ... acres	285,440	259,840	263,680	264,320	403,200	356,480	263,040	391,680	259,840
6	All land in farms ... acres	263,830	252,450	193,108	250,348	368,064	333,949	257,685	356,882	245,297
7	Improved land in farms ... acres	227,016	224,192	118,874	199,255	242,079	268,129	207,475	316,979	211,971
8	Woodland in farms ... acres	27,844	24,704	50,215	30,203	67,333	46,371	28,914	30,266	21,674
9	Other unimproved land in farms ... acres	8,970	3,554	24,019	20,890	58,652	19,449	21,296	9,637	11,652
10	Farm land reported as provided with drainage ... acres	176,124	206,702	2,823	40,361	1,795	75,237	144,642	166,778	159,790
11	Farm land reported as needing drainage ... acres	47,715	38,357	2,915	6,152	2,791	38,629	42,420	36,723	33,064
12	Drainage only ... acres	26,382	15,774	1,934	2,409	1,119	18,561	16,919	22,981	12,418
13	Drainage and clearing ... acres	21,333	22,583	981	3,743	1,672	20,068	25,501	13,742	20,646

COUNTY TABLE II.—OPERATING DRAINAGE ENTERPRISES: 1920.

		The State.	Allen.	Ashland.	Ashtabula.	Auglaize.	Champaign.	Clark.	Clinton.	Crawford.
	LAND AREA.									
1	Approximate land area of the state or county ... acres	26,073,600	259,840	269,440	462,720	254,080	269,440	260,480	263,040	261,760
2	All land in operating drainage enterprises ... acres	8,107,204	225,015	9,189	18,962	240,934	156,191	19,505	20,040	145,097
3	Improved land ... acres	6,707,328	175,350	7,867	9,081	[1] 201,399	145,464	13,949	20,040	123,753
4	Per cent of all improved land in farms	36.2	85.3	4.1	3.6	99.1	65.8	6.8	8.6	61.3
5	Timber and cut-over land ... acres	956,894	35,833	264	3,269	32,595	8,113	297	...	10,543
6	Other unimproved land ... acres	442,982	13,832	1,058	6,612	6,940	2,614	5,259	...	10,801
7	Swampy or subject to overflow, in enterprises ... acres	247,273	24,724	1,192	1,442	27,753	2,555	784	...	895
8	Suffering a loss of crops from defective drainage ... acres	141,481	7,857	1,192	394	23,634	2,363	783	...	186
9	Assessed acreage	23,464,812	468,980	13,190	18,962	515,318	210,953	29,754	20,040	152,998
10	Excess over all land in operating enterprises ... acres	15,357,608	243,965	4,001	...	274,384	54,762	10,249	...	7,901
	DRAINAGE WORKS.									
	Open ditches:									
11	Completed ... miles	24,984.0	527.3	49.1	48.4	437.6	150.8	65.2	15.4	399.9
12	Additional under construction ... miles	13.4	2.9	...	...	...	1.2	...	...	...
13	Maximum completed in any enterprise ... miles	44.1	10.0	12.6	4.1	23.2	13.2	7.0	6.6	9.3
14	Maximum width at bottom of ditch [2] ... feet	125	12	6	6	12	36	35	4	30
15	Maximum of average depths of outlet ditches [2] ... feet	18.0	8.5	10.0	5.5	12.0	17.0	8.0	7.0	18.0
16	Mean depth of branch ditches [2] ... feet	3.9	3.9	6.2	3.0	4.0	4.7	3.4	5.9	3.7
	Tile drains:									
17	Completed ... miles	9,205.3	161.3	1.4	1.2	346.7	147.4	47.7	27.5	380.3
18	Additional under construction ... miles	8.3	0.6	...	...	1.6	1.1	...	...	...
19	Maximum completed in any enterprise ... miles	50.0	4.8	0.5	0.8	16.6	3.9	2.5	3.3	5.0
20	Maximum size of tile [2] ... inches	60	27	9	18	48	32	24	27	30
	Accessory levees and dikes:									
21	Completed ... miles	9.6	...	...	...	...	...	1.2	...	...
22	Additional under construction ... miles	4.0	...	...	...	...	...	...	...	...
	Pumping plants:									
23	Engine capacity ... horsepower	125	...	...	...	...	...	...	...	...
24	Pump capacity ... gallons per minute	3,600	...	...	...	...	...	...	...	...
25	Area served by pumps ... acres	1,755	...	...	...	...	...	...	...	...
26	Area drained by open ditches only [2] ... acres	4,738,114	132,171	8,280	18,779	92,987	70,004	6,860	...	48,389
27	Length of these ditches ... miles	19,924.4	354.8	48.2	48.2	231.1	96.1	41.6	...	222.6
28	Average length per acre ... feet	22.2	14.2	30.7	13.6	13.1	7.2	32.0	...	24.3
29	Area having open ditches and levees [2] ... acres	7,078	...	...	...	...	...	1,000	...	...
30	Length of these ditches ... miles	11.1	...	...	...	...	...	1.5	...	...
31	Average length per acre ... feet	8.3	...	...	...	...	...	7.9	...	...
32	Length of the accessory levees ... miles	6.8	...	...	...	...	...	1.2	...	...
33	Area drained by tile only [2] ... acres	1,139,856	13,092	209	57	26,825	26,911	4,404	5,871	46,369
34	Length of these tile ... miles	5,274.7	65.9	1.2	0.4	205.7	72.6	23.9	14.4	261.2
35	Average length per acre ... feet	24.4	26.6	30.3	37.1	40.5	14.2	28.7	13.0	29.7
36	Area drained by open ditches and tile [2] ... acres	2,219,770	79,752	700	126	121,122	59,276	7,241	14,169	50,339
37	Length of these drains ... miles	8,933.4	271.4	1.1	1.0	349.1	131.8	45.9	28.5	296.4
38	Average length per acre ... feet	21.2	18.0	8.3	41.9	15.2	11.7	33.5	10.6	31.1
39	Area having open ditches, tile drains, and levees [2] ... acres	2,386	...	...	...	...	...	...	...	...
40	Length of these drains ... miles	67.4	...	...	...	...	...	...	...	...
41	Average length per acre ... feet	149.2	...	...	...	...	...	...	...	...
42	Length of the accessory levees ... miles	6.8	...	...	...	...	...	...	...	...
	DEVELOPMENT OF LAND.									
43	Improved land in operating enterprises, 1920 ... acres	6,707,328	175,350	7,867	9,081	[1] 201,399	145,464	13,949	20,040	123,753
44	Improved land prior to drainage ... acres	3,955,220	70,648	4,653	8,121	[3] 159,105	110,542	10,360	18,329	50,488
45	Increase since drainage ... acres	2,752,108	104,702	3,214	960	42,294	34,922	3,589	1,711	73,265
46	Per cent of increase	69.6	148.2	69.1	11.8	26.6	31.6	34.6	9.3	145.1
47	Per cent increase is of all improved land in farms, 1920	14.8	50.9	1.7	0.4	20.8	15.8	1.8	0.7	36.3
48	Timber and cut-over land, 1920 ... acres	956,894	35,833	264	3,269	32,595	8,113	297	...	10,543
49	Timber and cut-over land prior to drainage ... acres	3,079,180	133,933	1,594	3,319	69,581	13,381	1,929	695	17,859
50	Decrease since drainage ... acres	2,122,286	98,100	1,330	50	36,986	5,268	1,632	695	7,316
51	Per cent of decrease	68.9	73.2	83.4	1.5	53.2	39.4	84.6	100.0	41.0
52	Other unimproved land, 1920 ... acres	442,982	13,832	1,058	6,612	6,940	2,614	5,259	...	10,801
53	Other unimproved land prior to drainage ... acres	1,072,804	20,434	2,942	7,522	12,248	32,268	7,216	1,016	76,750
54	Decrease since drainage ... acres	629,822	6,602	1,884	910	5,308	29,654	1,957	1,016	65,949
55	Per cent of decrease	58.7	32.3	64.0	12.1	43.3	91.9	27.1	100.0	85.9
56	Swampy or subject to overflow, 1920 ... acres	247,273	24,724	1,192	1,442	27,753	2,555	784	...	895
57	Swampy or subject to overflow prior to drainage ... acres	3,126,885	158,960	4,463	16,610	105,070	54,253	2,663	9,862	81,634
58	Decrease since drainage ... acres	2,879,612	134,236	3,271	15,168	77,317	51,698	1,879	9,862	80,739
59	Per cent of decrease	92.1	84.4	73.3	91.3	73.6	95.3	70.6	100.0	98.9
	CAPITAL INVESTED AND COST PER ACRE.									
60	Total capital invested in and required for completion of operating enterprises ... dollars	30,771,620	600,915	58,700	71,989	1,012,994	533,092	133,225	39,251	632,076
61	Capital invested in these enterprises to Dec. 31, 1919 ... dollars	30,680,145	581,915	58,700	71,989	1,009,034	521,301	133,225	39,251	632,076
62	Additional capital required to complete these enterprises ... dollars	91,475	19,000	...	...	3,960	11,791	...	...	...
63	Average cost per acre when completed ... dollars	3.80	2.67	6.39	3.80	4.20	3.41	6.83	1.96	4.36
64	Enterprises constructing open ditches only ... dollars	15,360,631	214,464	56,316	66,544	213,828	235,820	41,344	...	89,657
65	Average cost per acre when completed ... dollars	3.24	1.62	6.80	3.54	2.30	3.37	6.03	...	1.85
66	Enterprises constructing open ditches and levees ... dollars	50,080	...	...	...	...	...	9,267	...	...
67	Average cost per acre when completed ... dollars	7.08	...	...	...	...	...	9.27	...	...
68	Enterprises constructing tile drains only ... dollars	5,997,698	78,062	897	298	273,796	90,697	28,239	16,073	337,242
69	Average cost per acre when completed ... dollars	5.26	5.96	4.29	5.23	10.21	3.37	6.41	2.74	7.27
70	Enterprises constructing open ditches and tile drains ... dollars	9,285,211	308,389	1,487	5,147	525,370	206,575	54,375	23,178	205,177
71	Average cost per acre when completed ... dollars	4.18	3.87	2.12	40.85	4.34	3.48	7.51	1.64	4.08
72	Enterprises constructing open ditches, tile drains, and levees ... dollars	78,000	...	...	...	...	...	...	...	...
73	Average cost per acre when completed ... dollars	32.69	...	...	...	...	...	...	...	...
	CROPS.									
	Improved land in enterprises reporting—									
74	Corn as principal crop on drained land ... acres	6,309,143	168,810	...	...	201,399	138,719	13,915	20,040	114,594
75	Wheat as principal crop on drained land ... acres	248,186	6,351	...	...	...	1,621	...	...	2,445
76	Hay as principal crop on drained land ... acres	126,815	...	7,867	9,081	...	...	...	...	5,944
77	Vegetables as principal crop on drained land ... acres	14,883	...	...	...	...	417	34	...	...
78	Oats as principal crop on drained land ... acres	4,741	...	...	...	...	4,707	...	...	...
79	Other crops as principal ones on drained land ... acres	201	...	...	...	...	...	...	...	...
80	Not reporting principal crop on drained land ... acres	3,359	189	...	...	...	...	...	...	770

[1] Office estimate; the figures reported exceed the improved acreage in all farms in the county as determined by the census of agriculture.
[2] When works under construction have been completed.
[3] The figures reported have been reduced by the same acreage as the improved land, 1920.

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

		Cuyahoga.	Darke.	Defiance.	Delaware.	Erie.	Fairfield.	Fayette.	Franklin.	Fulton.
	LAND AREA.									
1	Approximate land area of the county ... acres	296,320	375,040	259,200	284,800	163,840	316,800	264,320	330,880	259,200
2	All land in operating drainage enterprises ... acres	8,519	346,125	250,267	272,530	102,251	5,655	96,478	33,045	257,047
3	Improved land ... acres	6,284	[1] 314,643	[1] 194,430	[1] 227,865	99,804	5,405	89,195	25,121	[1] 208,640
4	Per cent of all improved land in farms	5.5	95.2	99.4	99.3	85.2	2.0	37.9	9.5	99.1
5	Timber and cut-over land ... acres	496	31,482	47,301	40,597	644	250	7,283	1,329	47,594
6	Other unimproved land ... acres	1,739	.....	8,536	4,068	1,803	.....	.....	6,595	813
7	Swampy or subject to overflow, in enterprises ... acres	240	4,353	2,433	2,591	1,696	.....	1,777	512	3,191
8	Suffering a loss of crops from defective drainage ... acres	90	4,365	2,405	2,567	.....	.....	1,590	452	3,191
9	Assessed acreage	12,234	842,868	843,361	426,090	149,381	5,655	96,478	45,051	1,513,486
10	Excess over all land in operating enterprises ... acres	3,715	496,743	593,094	153,560	47,130	.....	.....	12,006	1,256,439
	DRAINAGE WORKS.									
	Open ditches:									
11	Completed ... miles	54.4	534.0	1,075.2	249.3	274.2	14.7	48.4	67.3	1,616.7
12	Additional under construction ... miles	1.1	.....	.....	.....	.....	.....	.....	0.3	.....
13	Maximum completed in any enterprise ... miles	11.0	15.0	28.1	14.5	11.0	8.0	9.7	5.0	20.2
14	Maximum width at bottom of ditch [2] ... feet	16	60	16	10	20	65	6	50	25
15	Maximum of average depths of outlet ditches [2] ... feet	4.5	10.0	7.4	6.0	12.0	9.0	8.0	5.5	8.5
16	Mean depth of branch ditches [2] ... feet	3.0	4.6	3.3	3.0	3.3	6.0	.....	3.0	4.0
	Tile drains:									
17	Completed ... miles	.....	559.5	104.5	371.7	36.6	1.4	220.1	39.9	244.6
18	Additional under construction ... miles	1.3	.....	.....	0.8	.....	.....	.....	.....	.....
19	Maximum completed in any enterprise ... miles	.....	5.3	10.0	6.8	2.4	1.0	7.2	2.6	7.1
20	Maximum size of tile [2] ... inches	.....	24	30	30	18	15	24	48	20
	Accessory levees and dikes:									
21	Completed ... miles	.....	.....	.....	.....	.....	.....	.....	.....	.....
22	Additional under construction ... miles	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Pumping plants:									
23	Engine capacity ... horsepower	.....	.....	.....	.....	.....	.....	.....	.....	.....
24	Pump capacity ... gallons per minute	.....	.....	.....	.....	.....	.....	.....	.....	.....
25	Area served by pumps ... acres	.....	.....	.....	.....	.....	.....	.....	.....	.....
26	Area drained by open ditches only [2] ... acres	8,219	113,654	235,135	62,131	86,487	4,560	8,615	21,284	194,713
27	Length of these ditches ... miles	53.8	338.6	867.7	137.3	245.5	14.7	20.5	64.2	1,248.1
28	Average length per acre ... feet	34.6	15.7	19.5	11.7	15.0	17.0	12.6	15.9	33.8
29	Area having open ditches and levees [2] ... acres	.....	.....	.....	.....	.....	.....	.....	.....	.....
30	Length of these ditches ... miles	.....	.....	.....	.....	.....	.....	.....	.....	.....
31	Average length per acre ... feet	.....	.....	.....	.....	.....	.....	.....	.....	.....
32	Length of the accessory levees ... miles	.....	.....	.....	.....	.....	.....	.....	.....	.....
33	Area drained by tile only [2] ... acres	.....	56,860	([3])	70,358	5,481	1,095	58,822	9,394	7,893
34	Length of these tile ... miles	.....	277.3	19.9	180.4	20.7	1.4	178.9	32.2	104.7
35	Average length per acre ... feet	.....	25.7	.....	13.5	19.9	6.8	16.1	18.1	70.0
36	Area drained by open ditches and tile [2] ... acres	300	175,611	[4] 15,132	140,041	10,283	.....	29,041	2,367	54,441
37	Length of these drains ... miles	3.0	477.6	292.1	304.1	44.6	.....	69.1	11.1	508.5
38	Average length per acre ... feet	52.8	14.4	.....	11.5	22.9	.....	12.6	24.8	49.3
39	Area having open ditches, tile drains, and levees [2] ... 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	6,284	[1] 314,643	[1] 194,430	[1] 227,865	99,804	5,405	89,195	25,121	[1] 208,640
44	Improved land prior to drainage ... acres	4,170	[5] 221,459	[5] 68,402	[5] 140,154	80,939	2,901	82,502	19,968	[5] 118,380
45	Increase since drainage ... acres	2,114	93,184	126,028	87,711	18,865	2,504	6,693	5,153	90,260
46	Per cent of increase	50.7	42.1	184.2	62.6	23.3	86.3	8.1	25.8	76.2
47	Per cent increase is of all improved land in farms, 1920	1.9	28.2	64.4	38.2	16.1	0.9	2.8	1.9	42.9
48	Timber and cut-over land, 1920 ... acres	496	31,482	47,301	40,597	644	250	7,283	1,329	47,594
49	Timber and cut-over land prior to drainage ... acres	969	124,666	157,437	119,939	7,597	675	11,801	4,661	124,336
50	Decrease since drainage ... acres	473	93,184	110,136	79,342	6,953	425	4,518	3,332	76,742
51	Per cent of decrease	48.8	74.7	70.0	66.2	91.5	63.0	38.3	71.5	61.7
52	Other unimproved land, 1920 ... acres	1,739	.....	8,536	4,068	1,803	.....	.....	6,595	813
53	Other unimproved land prior to drainage ... acres	3,380	.....	24,428	12,437	13,715	2,079	2,175	8,416	14,331
54	Decrease since drainage ... acres	1,641	.....	15,892	8,369	11,912	2,079	2,175	1,821	13,518
55	Per cent of decrease	48.6	.....	65.1	67.3	86.9	100.0	100.0	21.6	94.3
56	Swampy or subject to overflow, 1920 ... acres	240	4,353	2,433	2,591	1,696	.....	1,777	512	3,191
57	Swampy or subject to overflow prior to drainage ... acres	6,135	108,186	42,810	41,220	52,289	2,029	94,303	2,510	55,851
58	Decrease since drainage ... acres	5,895	103,833	40,377	38,629	50,593	2,029	92,526	1,998	52,660
59	Per cent of decrease	96.1	96.0	94.3	93.7	96.8	100.0	98.1	79.6	94.3
	CAPITAL INVESTED AND COST PER ACRE.									
60	Total capital invested in and required for completion of operating enterprises ... dollars	64,872	2,000,095	651,468	617,685	250,199	99,364	274,691	120,982	1,012,672
61	Capital invested in these enterprises to Dec. 31, 1919 ... dollars	53,872	2,000,095	651,468	616,455	250,199	99,364	274,691	120,582	1,012,672
62	Additional capital required to complete these enterprises ... dollars	11,000	.....	.....	1,230	.....	.....	.....	400	.....
63	Average cost per acre when completed ... dollars	7.61	5.78	2.60	2.27	2.45	17.57	2.85	3.66	3.94
64	Enterprises constructing open ditches only ... dollars	50,872	551,942	437,309	100,887	194,438	97,083	7,428	61,698	576,044
65	Average cost per acre when completed ... dollars	6.19	4.86	1.86	1.62	2.25	21.29	0.86	2.90	2.96
66	Enterprises constructing open ditches and levees ... dollars	.....	.....	.....	.....	.....	.....	.....	.....	.....
67	Average cost per acre when completed ... dollars	.....	.....	.....	.....	.....	.....	.....	.....	.....
68	Enterprises constructing tile drains only ... dollars	.....	450,495	19,457	167,703	21,283	2,281	167,405	44,990	102,030
69	Average cost per acre when completed ... dollars	.....	7.92	.....	2.38	3.88	2.08	2.85	4.79	12.93
70	Enterprises constructing open ditches and tile drains ... dollars	14,000	997,658	194,702	349,095	34,478	.....	99,858	14,294	334,598
71	Average cost per acre when completed ... dollars	46.67	5.68	.....	2.49	3.35	.....	3.44	6.04	6.15
72	Enterprises constructing open ditches, tile drains, and levees ... dollars	.....	.....	.....	.....	.....	.....	.....	.....	.....
73	Average cost per acre when completed ... dollars	.....	.....	.....	.....	.....	.....	.....	.....	.....
	CROPS.									
	Improved land in enterprises reporting—									
74	Corn as principal crop on drained land ... acres	.....	314,643	194,430	227,865	99,783	5,405	89,195	24,679	208,640
75	Wheat as principal crop on drained land ... acres	.....	.....	.....	.....	21	.....	.....	.....	.....
76	Hay as principal crop on drained land ... acres	6,284	.....	.....	.....	.....	.....	.....	67	.....
77	Vegetables as principal crop on drained land ... acres	.....	.....	.....	.....	.....	.....	.....	375	.....
78	Oats as principal crop on drained land ... acres	.....	.....	.....	.....	.....	.....	.....	.....	.....
79	Other crops as principal ones on drained land ... acres	.....	.....	.....	.....	.....	.....	.....	.....	.....
80	Not reporting principal crop on drained land ... acres	.....	.....	.....	.....	.....	.....	.....	.....	.....

[1] Office estimate; the figures reported exceed the improved acreage in all farms in the county as determined by the census of agriculture.
[2] When works under construction have been completed.
[3] Area reported under "open ditches and tile."
[4] Additional area reported under "open ditches only."
[5] The figures reported have been reduced by the same acreage as the improved land, 1920.

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

		Greene.	Hancock.	Hardin.	Henry.	Huron.	Licking.	Logan.	Lorain.	Lucas.
	LAND AREA.									
1	Approximate land area of the county ... acres	265,600	342,400	302,720	264,960	316,160	428,160	288,640	318,080	218,880
2	All land in operating drainage enterprises ... acres	46,685	341,627	299,610	262,707	92,411	19,305	175,061	113,761	205,244
3	Improved land ... acres	43,660	[1] 270,205	[1] 245,442	[1] 220,591	90,575	16,987	172,258	64,001	[1] 124,644
4	Per cent of all improved land in farms	20.4	99.1	99.9	99.1	41.0	5.0	77.6	30.6	98.2
5	Timber and cut-over land ... acres	2,232	35,919	36,639	42,116	839	1,050	2,539	14,443	61,776
6	Other unimproved land ... acres	793	35,503	17,529	.....	997	1,268	264	35,317	18,824
7	Swampy or subject to overflow, in enterprises ... acres	832	26,906	5,311	32	316	2,162	1,246	4,281	13,877
8	Suffering a loss of crops from defective drainage ... acres	772	18	244	.....	111	2,162	1,175	133	13,863
9	Assessed acreage	97,825	2,060,025	891,290	1,963,587	92,471	23,809	268,271	160,827	589,405
10	Excess over all land in operating enterprises ... acres	51,140	1,718,398	591,680	1,700,880	60	4,504	93,210	47,066	384,161
	DRAINAGE WORKS.									
	Open ditches:									
11	Completed ... miles	76.4	969.1	537.9	2,109.1	249.3	17.2	393.8	731.0	569.1
12	Additional under construction ... miles	.....	.....	.....	1.0	.....	.....	0.5	.....	.....
13	Maximum completed in any enterprise ... miles	7.7	12.9	19.4	30.0	10.6	2.9	10.8	44.1	30.0
14	Maximum width at bottom of ditch [2] ... feet	18	12	36	20	30	5	20	20	40
15	Maximum of average depths of outlet ditches [2] ... feet	8.0	8.3	14.0	8.0	10.0	4.0	15.0	6.0	10.0
16	Mean depth of branch ditches [2] ... feet	.....	4.3	4.2	3.9	3.5	3.0	4.1	3.1	5.3
	Tile drains:									
17	Completed ... miles	39.1	627.2	588.1	22.5	107.9	40.4	470.8	22.0	68.7
18	Additional under construction ... miles	.....	.....	.....	.....	.....	.....	0.7	.....	.....
19	Maximum completed in any enterprise ... miles	3.7	5.8	9.0	3.0	3.0	3.0	7.0	2.6	50.0
20	Maximum size of tile [2] ... inches	24	27	24	42	24	28	30	24	60
	Accessory levees and dikes:									
21	Completed ... miles	.....	.....	.....	.....	.....	.....	0.8	.....	6.8
22	Additional under construction ... miles	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Pumping plants:									
23	Engine capacity ... horsepower	.....	.....	.....	.....	.....	.....	.....	.....	100
24	Pump capacity ... gallons per minute	.....	.....	.....	.....	.....	.....	.....	.....	3,100
25	Area served by pumps ... acres	.....	.....	.....	.....	.....	.....	.....	.....	1,500
26	Area drained by open ditches only [2] ... acres	23,121	195,310	191,531	260,187	40,595	7,702	72,675	108,999	200,823
27	Length of these ditches ... miles	69.1	567.5	326.5	2,074.7	155.9	11.7	229.8	703.6	554.8
28	Average length per acre ... feet	15.8	15.3	9.0	42.1	20.3	8.0	16.7	34.1	14.6
29	Area having open ditches and levees [2] ... acres	.....	.....	.....	.....	.....	.....	1,612	.....	.....
30	Length of these ditches ... miles	.....	.....	.....	.....	.....	.....	4.3	.....	.....
31	Average length per acre ... feet	.....	.....	.....	.....	.....	.....	14.1	.....	.....
32	Length of the accessory levees ... miles	.....	.....	.....	.....	.....	.....	0.8	.....	.....
33	Area drained by tile only [2] ... acres	12,768	[3] 10,003	24,812	[3] 490	11,733	6,942	47,677	1,244	512
34	Length of these tile ... miles	24.2	362.2	333.6	10.7	45.4	32.4	275.0	11.3	3.1
35	Average length per acre ... feet	10.0	.....	71.0	.....	20.4	24.6	30.5	48.0	32.0
36	Area drained by open ditches and tile [2] ... acres	10,796	136,314	83,267	[3] 2,030	40,083	4,661	53,097	3,518	1,523
37	Length of these drains ... miles	22.2	666.6	465.9	47.2	155.9	13.5	356.7	38.1	12.5
38	Average length per acre ... feet	10.9	25.8	29.5	.....	20.5	15.3	35.5	57.2	43.3
39	Area having open ditches, tile drains, and levees [2] ... acres	.....	.....	.....	.....	.....	.....	.....	.....	2,386
40	Length of these drains ... miles	.....	.....	.....	.....	.....	.....	.....	.....	67.4
41	Average length per acre ... feet	.....	.....	.....	.....	.....	.....	.....	.....	149.2
42	Length of the accessory levees ... miles	.....	.....	.....	.....	.....	.....	.....	.....	6.8
	DEVELOPMENT OF LAND.									
43	Improved land in operating enterprises, 1920 ... acres	43,660	[1] 270,205	[1] 245,442	[1] 220,591	90,575	16,987	172,258	64,001	[1] 124,644
44	Improved land prior to drainage ... acres	42,577	[4] 26,157	[4] 167,419	[4] 92,153	67,597	9,198	67,331	28,483	[4] 51,993
45	Increase since drainage ... acres	1,083	244,048	78,023	128,438	22,978	7,789	104,927	35,518	72,651
46	Per cent of increase	2.5	933.0	46.6	139.4	34.0	84.7	155.8	124.7	139.7
47	Per cent increase is of all improved land in farms, 1920	0.5	89.5	31.7	57.7	10.4	2.3	47.3	17.0	57.2
48	Timber and cut-over land, 1920 ... acres	2,232	35,919	36,639	42,116	839	1,050	2,539	14,443	61,776
49	Timber and cut-over land prior to drainage ... acres	2,881	276,776	102,937	169,599	9,835	4,804	107,155	26,100	122,902
50	Decrease since drainage ... acres	649	240,857	66,298	127,483	8,996	3,754	104,616	11,657	61,126
51	Per cent of decrease	22.5	87.0	64.4	75.2	91.5	78.1	97.6	44.7	49.7
52	Other unimproved land, 1920 ... acres	793	35,503	17,529	.....	997	1,268	264	35,317	18,824
53	Other unimproved land prior to drainage ... acres	1,227	38,694	29,254	955	14,979	5,303	575	59,178	30,349
54	Decrease since drainage ... acres	434	3,191	11,725	955	13,982	4,035	311	23,861	11,525
55	Per cent of decrease	35.4	8.2	40.1	100.0	93.3	76.1	54.1	40.3	38.0
56	Swampy or subject to overflow, 1920 ... acres	832	26,906	5,311	32	316	2,162	1,246	4,281	13,877
57	Swampy or subject to overflow prior to drainage ... acres	3,286	289,937	103,239	44,000	36,469	9,712	35,739	113,217	46,249
58	Decrease since drainage ... acres	2,454	263,031	97,928	43,968	36,153	7,550	34,493	108,936	32,372
59	Per cent of decrease	74.7	90.7	94.9	99.9	99.1	77.7	96.5	96.2	70.0
	CAPITAL INVESTED AND COST PER ACRE.									
60	Total capital invested in and required for completion of operating enterprises ... dollars	114,190	1,527,173	1,128,506	1,799,959	335,825	75,749	874,267	456,376	565,851
61	Capital invested in these enterprises to Dec. 31, 1919 ... dollars	114,190	1,527,173	1,128,506	1,799,149	335,825	75,749	873,048	456,376	565,851
62	Additional capital required to complete these enterprises ... dollars	.....	.....	.....	810	.....	.....	1,219	.....	.....
63	Average cost per acre when completed ... dollars	2.45	4.47	3.77	6.85	3.63	3.92	4.99	4.01	2.76
64	Enterprises constructing open ditches only ... dollars	51,998	494,289	411,310	1,736,764	149,516	8,226	270,219	393,914	467,714
65	Average cost per acre when completed ... dollars	2.25	2.53	2.15	6.68	3.68	1.07	3.72	3.61	2.33
66	Enterprises constructing open ditches and levees ... dollars	.....	.....	.....	.....	.....	.....	3,195	.....	.....
67	Average cost per acre when completed ... dollars	.....	.....	.....	.....	.....	.....	1.98	.....	.....
68	Enterprises constructing tile drains only ... dollars	35,674	402,999	298,113	14,736	39,392	46,899	285,785	22,627	4,387
69	Average cost per acre when completed ... dollars	2.79	.....	12.01	.....	3.36	6.76	5.99	18.19	8.57
70	Enterprises constructing open ditches and tile drains ... dollars	26,518	629,885	419,083	48,459	146,917	20,624	315,068	39,835	15,750
71	Average cost per acre when completed ... dollars	2.46	4.62	5.03	.....	3.67	4.42	5.93	11.32	10.34
72	Enterprises constructing open ditches, tile drains, and levees ... dollars	.....	.....	.....	.....	.....	.....	.....	.....	78,000
73	Average cost per acre when completed ... dollars	.....	.....	.....	.....	.....	.....	.....	.....	32.69
	CROPS.									
	Improved land in enterprises reporting—									
74	Corn as principal crop on drained land ... acres	43,660	269,708	242,003	220,591	89,647	16,987	172,258	1,670	122,058
75	Wheat as principal crop on drained land ... acres	.....	.....	2,962	.....	82	.....	.....	3,600	.....
76	Hay as principal crop on drained land ... acres	.....	.....	.....	.....	846	.....	.....	58,731	.....
77	Vegetables as principal crop on drained land ... acres	.....	.....	.....	.....	.....	.....	.....	.....	2,586
78	Oats as principal crop on drained land ... acres	.....	.....	.....	.....	.....	.....	.....	.....	.....
79	Other crops as principal ones on drained land ... acres	.....	.....	.....	.....	.....	.....	.....	.....	.....
80	Not reporting principal crop on drained land ... acres	.....	497	477	.....	.....	.....	.....	.....	.....

[1] Office estimate; the figures reported exceed the improved acreage in all farms in the county as determined by the census of agriculture.
[2] When works under construction have been completed.
[3] Additional area reported under "open ditches only."
[4] The figures reported have been reduced by the same acreage as the improved land, 1920.

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

		Madison.	Marion.	Medina.	Mercer.	Miami.	Montgomery.	Morrow.	Ottawa.	Paulding.
	LAND AREA.									
1	Approximate land area of the county ... acres	318,080	261,760	278,400	288,000	261,120	291,200	257,920	172,800	264,320
2	All land in operating drainage enterprises ... acres	236,431	237,580	17,859	250,853	225,720	10,482	111,111	154,402	262,911
3	Improved land ... acres	214,306	174,142	10,753	[1] 222,988	202,613	9,308	97,763	[1] 110,177	[1] 219,885
4	Per cent of all improved land in farms	82.1	80.3	6.0	94.2	93.0	4.2	52.2	94.0	99.5
5	Timber and cut-over land ... acres	14,528	24,142	1,729	27,865	668	776	5,913	40,240	41,012
6	Other unimproved land ... acres	7,597	39,296	5,377	.....	22,439	398	7,435	3,985	2,014
7	Swampy or subject to overflow, in enterprises ... acres	15	5,057	130	5,619	536	152	7,454	690	8,230
8	Suffering a loss of crops from defective drainage ... acres	64	4,828	109	5,359	28	84	5,820	.....	4,923
9	Assessed acreage ... acres	252,359	465,385	19,544	515,191	281,021	11,008	325,012	441,699	1,131,331
10	Excess over all land in operating enterprises ... acres	15,928	227,805	1,685	264,338	55,301	526	213,901	287,297	868,420
	DRAINAGE WORKS.									
	Open ditches:									
11	Completed ... miles	261.8	407.7	44.5	569.6	153.3	10.5	104.6	652.8	1,551.8
12	Additional under construction ... miles	.....	.....	.....	.....	.....	.....	.....	.....	.....
13	Maximum completed in any enterprise ... miles	10.0	10.7	4.6	33.3	8.5	3.8	9.2	19.6	21.0
14	Maximum width at bottom of ditch [2] ... feet	12	12	24	125	18	13	9	40	15
15	Maximum of average depths of outlet ditches [2] ... feet	7.0	12.0	10.0	13.9	7.0	7.0	8.0	8.1	11.0
16	Mean depth of branch ditches [2] ... feet	3.6	3.0	3.0	4.3	3.9	.....	3.3	4.4	4.1
	Tile drains:									
17	Completed ... miles	515.5	488.3	0.8	190.4	490.3	27.3	138.1	4.0	78.7
18	Additional under construction ... miles	.....	.....	.....	.....	.....	.....	.....	.....	.....
19	Maximum completed in any enterprise ... miles	16.5	11.2	0.3	4.0	6.3	2.4	4.4	1.4	3.4
20	Maximum size of tile [2] ... inches	24	27	8	42	42	27	24	12	30
	Accessory levees and dikes:									
21	Completed ... miles	.....	.....	.....	.....	.....	.....	.....	0.3	.....
22	Additional under construction ... miles	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Pumping plants:									
23	Engine capacity ... horsepower	.....	.....	.....	.....	.....	.....	.....	25	.....
24	Pump capacity ... gallons per minute	.....	.....	.....	.....	.....	.....	.....	500	.....
25	Area served by pumps ... acres	.....	.....	.....	.....	.....	.....	.....	255	.....
26	Area drained by open ditches only [2] ... acres	37,532	58,752	17,648	148,960	79,100	4,359	26,349	153,255	248,130
27	Length of these ditches ... miles	101.7	141.4	42.8	431.7	86.0	10.5	42.7	650.6	1,465.4
28	Average length per acre ... feet	14.3	12.7	12.8	15.3	5.7	12.7	8.6	22.4	31.2
29	Area having open ditches and levees [2] ... acres	.....	.....	.....	.....	.....	.....	.....	350	.....
30	Length of these ditches ... miles	.....	.....	.....	.....	.....	.....	.....	0.5	.....
31	Average length per acre ... feet	.....	.....	.....	.....	.....	.....	.....	7.5	.....
32	Length of the accessory levees ... miles	.....	.....	.....	.....	.....	.....	.....	0.3	.....
33	Area drained by tile only [2] ... acres	74,759	60,405	20	36,606	78,368	6,123	25,079	227	[3] 330
34	Length of these tile ... miles	250.9	288.0	0.3	123.0	337.8	27.3	66.8	1.9	39.3
35	Average length per acre ... feet	17.7	25.2	79.2	17.7	22.8	23.5	14.1	44.2	.....
36	Area drained by open ditches and tile [2] ... acres	124,140	118,423	191	65,287	68,252	.....	59,683	570	14,451
37	Length of these drains ... miles	424.7	466.6	2.2	205.3	219.8	.....	133.2	3.8	125.8
38	Average length per acre ... feet	18.1	20.8	60.8	16.6	17.0	.....	11.8	35.2	46.0
39	Area having open ditches, tile drains, and levees [2] ... 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	214,306	174,142	10,753	[1] 222,988	202,613	9,308	97,763	[1] 110,177	[1] 219,885
44	Improved land prior to drainage ... acres	120,773	98,609	7,173	[4] 159,035	200,834	8,829	66,263	[4] 70,297	[4] 75,811
45	Increase since drainage ... acres	93,533	75,533	3,580	63,953	1,779	479	31,500	39,880	144,074
46	Per cent of increase	77.4	76.6	49.9	40.2	0.9	5.4	47.5	56.7	190.0
47	Per cent increase is of all improved land in farms, 1920	35.8	34.8	2.0	27.0	0.8	0.2	16.8	34.0	65.2
48	Timber and cut-over land, 1920 ... acres	14,528	24,142	1,729	27,865	668	776	5,913	40,240	41,012
49	Timber and cut-over land prior to drainage ... acres	68,515	87,721	2,273	91,818	2,015	1,165	18,578	41,025	184,142
50	Decrease since drainage ... acres	53,987	63,579	544	63,953	1,347	389	12,665	785	143,130
51	Per cent of decrease	78.8	72.5	23.9	69.7	66.8	33.4	68.2	1.9	77.7
52	Other unimproved land, 1920 ... acres	7,597	39,296	5,377	.....	22,439	398	7,435	3,985	2,014
53	Other unimproved land prior to drainage ... acres	47,143	51,250	8,413	.....	22,871	488	26,270	43,080	2,958
54	Decrease since drainage ... acres	39,546	11,954	3,036	.....	432	90	18,835	39,095	944
55	Per cent of decrease	83.9	23.3	36.1	.....	1.9	18.4	71.7	90.7	31.9
56	Swampy or subject to overflow, 1920 ... acres	15	5,057	130	5,619	536	152	7,454	690	8,230
57	Swampy or subject to overflow prior to drainage ... acres	94,970	45,730	15,819	65,502	8,994	793	29,205	69,491	94,289
58	Decrease since drainage ... acres	94,955	40,673	15,689	59,883	8,458	641	21,751	68,801	86,059
59	Per cent of decrease	100.0	88.9	99.2	91.4	94.0	80.8	74.5	99.0	91.3
	CAPITAL INVESTED AND COST PER ACRE.									
60	Total capital invested in and required for completion of operating enterprises ... dollars	686,563	706,480	65,430	898,792	884,625	54,685	224,268	441,719	1,037,071
61	Capital invested in these enterprises to Dec. 31, 1919 ... dollars	686,563	706,480	65,430	898,792	884,625	54,685	224,268	441,719	1,037,071
62	Additional capital required to complete these enterprises ... dollars	.....	.....	.....	.....	.....	.....	.....	.....	.....
63	Average cost per acre when completed ... dollars	2.90	2.97	3.66	3.58	3.92	5.22	2.02	2.86	3.94
64	Enterprises constructing open ditches only ... dollars	62,355	87,765	63,560	501,455	128,729	9,535	24,304	433,240	910,592
65	Average cost per acre when completed ... dollars	1.66	1.49	3.60	3.37	1.63	2.19	0.92	2.83	3.67
66	Enterprises constructing open ditches and levees ... dollars	.....	.....	.....	.....	.....	.....	.....	5,600	.....
67	Average cost per acre when completed ... dollars	.....	.....	.....	.....	.....	.....	.....	16.00	.....
68	Enterprises constructing tile drains only ... dollars	248,930	252,894	392	161,235	460,957	45,150	70,389	771	43,844
69	Average cost per acre when completed ... dollars	3.33	4.19	19.60	4.40	5.88	7.37	2.81	3.40	.....
70	Enterprises constructing open ditches and tile drains ... dollars	375,278	365,821	1,478	236,102	294,939	.....	129,575	2,108	82,635
71	Average cost per acre when completed ... dollars	3.02	3.09	7.74	3.62	4.32	.....	2.17	3.70	5.72
72	Enterprises constructing open ditches, tile drains, and levees ... dollars	.....	.....	.....	.....	.....	.....	.....	.....	.....
73	Average cost per acre when completed ... dollars	.....	.....	.....	.....	.....	.....	.....	.....	.....
	CROPS.									
	Improved land in enterprises reporting—									
74	Corn as principal crop on drained land ... acres	210,722	174,142	.....	222,988	202,399	9,308	97,763	14,877	219,187
75	Wheat as principal crop on drained land ... acres	3,584	.....	435	.....	.....	.....	.....	95,117	.....
76	Hay as principal crop on drained land ... acres	.....	.....	10,318	.....	.....	.....	.....	171	.....
77	Vegetables as principal crop on drained land ... acres	.....	.....	.....	.....	.....	.....	.....	.....	.....
78	Oats as principal crop on drained land ... acres	.....	.....	.....	.....	34	.....	.....	.....	.....
79	Other crops as principal ones on drained land ... acres	.....	.....	.....	.....	.....	.....	.....	12	.....
80	Not reporting principal crop on drained land ... acres	.....	.....	.....	.....	180	.....	.....	.....	698

[1] Office estimate; the figures reported exceed the improved acreage in all farms in the county as determined by the census of agriculture.
[2] When works under construction have been completed.
[3] Additional area reported under "open ditches only."
[4] The figures reported have been reduced by the same acreage as the improved land, 1920.

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

		Pickaway.	Portage.	Preble.	Putnam.	Richland.	Sandusky.	Seneca.	Shelby.	Stark.
	LAND AREA.									
1	Approximate land area of the county ... acres	313,600	333,440	266,240	308,480	321,920	264,320	352,000	264,320	362,240
2	All land in operating drainage enterprises ... acres	24,101	10,274	110,615	308,374	22,763	250,307	327,618	247,498	14,639
3	Improved land ... acres	20,680	2,508	106,606	253,803	18,411	186,005	[1] 273,028	[1] 207,043	8,621
4	Per cent of all improved land in farms	7.3	1.4	48.9	97.7	7.9	91.9	97.6	98.4	3.3
5	Timber and cut-over land ... acres	1,534	1,317	4,009	39,510	2,555	25,976	37,759	28,987	39
6	Other unimproved land ... acres	1,887	6,449	.....	15,061	1,797	38,326	16,831	11,468	5,979
7	Swampy or subject to overflow, in enterprises ... acres	2,049	2,381	4,105	34,614	1,620	1,126	1,940	5,208	667
8	Suffering a loss of crops from defective drainage ... acres	1,240	.....	4,068	4,520	1,175	150	700	4,327	573
9	Assessed acreage ...	32,095	11,836	119,570	1,598,583	35,190	508,883	423,775	369,776	18,966
10	Excess over all land in operating enterprises ... acres	7,994	1,562	8,955	1,290,209	12,427	258,576	96,157	122,278	4,327
	DRAINAGE WORKS.									
	Open ditches:									
11	Completed ... miles	32.1	84.8	48.4	1,339.9	53.9	851.2	775.3	357.3	167.9
12	Additional under construction ... miles	.....	.....	.....	.....	1.9	.....	.....	2.7	.....
13	Maximum completed in any enterprise ... miles	12.4	9.6	5.2	13.8	5.1	17.2	12.0	13.2	14.9
14	Maximum width at bottom of ditch [2] ... feet	18	12	10	30	30	40	30	18	12
15	Maximum of average depths of outlet ditches [2] ... feet	5.0	8.0	6.5	10.0	8.0	8.5	8.1	10.0	8.0
16	Mean depth of branch ditches [2] ... feet	.....	4.0	3.7	3.9	3.3	3.3	3.5	.....	4.0
	Tile drains:									
17	Completed ... miles	37.5	0.2	464.0	229.3	24.5	31.8	148.9	312.5	11.3
18	Additional under construction ... miles	.....	.....	.....	.....	1.6	.....	.....	.....	.....
19	Maximum completed in any enterprise ... miles	9.1	0.2	4.1	4.0	3.4	1.6	6.0	6.1	1.9
20	Maximum size of tile [2] ... inches	20	8	27	27	30	30	24	34	30
	Accessory levees and dikes:									
21	Completed ... miles	.....	.....	.....	.....	.....	.....	.....	.....	.....
22	Additional under construction ... miles	.....	.....	.....	.....	.....	.....	.....	4.0	.....
	Pumping plants:									
23	Engine capacity ... horsepower	.....	.....	.....	.....	.....	.....	.....	.....	.....
24	Pump capacity ... gallons per minute	.....	.....	.....	.....	.....	.....	.....	.....	.....
25	Area served by pumps ... acres	.....	.....	.....	.....	.....	.....	.....	.....	.....
26	Area drained by open ditches only [2] ... acres	13,299	9,725	10,256	245,239	11,955	230,389	203,074	84,351	9,800
27	Length of these ditches ... miles	28.5	79.7	12.1	1,169.2	49.6	806.4	629.4	235.5	108.8
28	Average length per acre ... feet	11.3	43.3	6.2	25.2	21.9	18.5	16.4	14.7	58.6
29	Area having open ditches and levees [2] ... acres	.....	.....	.....	.....	.....	.....	.....	2,500	.....
30	Length of these ditches ... miles	.....	.....	.....	.....	.....	.....	.....	4.0	.....
31	Average length per acre ... feet	.....	.....	.....	.....	.....	.....	.....	8.4	.....
32	Length of the accessory levees ... miles	.....	.....	.....	.....	.....	.....	.....	4.0	.....
33	Area drained by tile only [2] ... acres	9,254	.....	72,020	17,185	5,547	3,322	44,047	63,100	274
34	Length of these tile ... miles	33.4	.....	392.6	120.6	13.4	18.0	85.3	194.6	2.4
35	Average length per acre ... feet	19.1	.....	28.8	37.1	12.8	28.6	10.2	16.3	46.2
36	Area drained by open ditches and tile [2] ... acres	1,548	549	28,339	45,950	5,261	16,596	80,497	97,547	4,565
37	Length of these drains ... miles	7.7	5.3	107.7	279.4	18.9	58.6	209.5	238.4	68.0
38	Average length per acre ... feet	26.3	51.0	20.1	32.1	19.0	18.6	13.7	12.9	78.7
39	Area having open ditches, tile drains, and levees [2] ... 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	20,680	2,508	106,606	253,803	18,411	186,005	[1] 273,028	[1] 207,043	8,621
44	Improved land prior to drainage ... acres	14,873	255	82,481	53,477	12,371	121,434	[3] 216,228	[3] 180,704	315
45	Increase since drainage ... acres	5,807	2,253	24,125	200,326	6,040	64,571	56,800	26,339	8,306
46	Per cent of increase [4]	39.0	883.5	29.2	374.6	48.8	53.2	26.3	14.6	.....
47	Per cent increase is of all improved land in farms, 1920	2.0	1.2	11.1	77.1	2.6	31.9	20.3	12.5	3.1
48	Timber and cut-over land, 1920 ... acres	1,534	1,317	4,009	39,510	2,555	25,976	37,759	28,987	39
49	Timber and cut-over land prior to drainage ... acres	4,037	1,539	28,134	236,623	4,290	50,358	42,009	47,516	1,252
50	Decrease since drainage ... acres	2,503	222	24,125	197,113	1,735	24,382	4,250	18,529	1,213
51	Per cent of decrease	62.0	14.4	85.8	83.3	40.4	48.4	10.1	39.0	96.9
52	Other unimproved land, 1920 ... acres	1,887	6,449	.....	15,061	1,797	38,326	16,831	11,468	5,979
53	Other unimproved land prior to drainage ... acres	5,191	8,480	.....	18,274	6,102	78,515	69,381	19,278	13,072
54	Decrease since drainage ... acres	3,304	2,031	.....	3,213	4,305	40,189	52,550	7,810	7,093
55	Per cent of decrease	63.6	24.0	.....	17.6	70.6	51.2	75.7	40.5	54.3
56	Swampy or subject to overflow, 1920 ... acres	2,049	2,381	4,105	34,614	1,620	1,126	1,940	5,208	667
57	Swampy or subject to overflow prior to drainage ... acres	8,695	8,781	44,377	245,587	6,690	220,912	145,734	9,874	13,986
58	Decrease since drainage ... acres	6,646	6,400	40,272	210,973	5,070	219,786	143,794	4,666	13,319
59	Per cent of decrease	76.4	72.9	90.7	85.9	75.8	99.5	98.7	47.3	95.2
	CAPITAL INVESTED AND COST PER ACRE.									
60	Total capital invested in and required for completion of operating enterprises ... dollars	69,721	89,474	541,954	1,756,335	127,259	620,742	704,352	853,282	168,044
61	Capital invested in these enterprises to Dec. 31, 1919 ... dollars	69,721	89,474	541,954	1,756,335	117,351	620,742	704,352	828,282	168,044
62	Additional capital required to complete these enterprises ... dollars	.....	.....	.....	.....	9,908	.....	.....	25,000	.....
63	Average cost per acre when completed ... dollars	2.89	8.71	4.90	5.70	5.59	2.48	2.15	3.45	11.48
64	Enterprises constructing open ditches only ... dollars	26,311	83,622	21,383	1,161,772	70,037	540,038	422,385	223,140	83,172
65	Average cost per acre when completed ... dollars	1.98	8.60	2.08	4.74	5.86	2.34	2.08	2.65	8.49
66	Enterprises constructing open ditches and levees ... dollars	.....	.....	.....	.....	.....	.....	.....	30,000	.....
67	Average cost per acre when completed ... dollars	.....	.....	.....	.....	.....	.....	.....	12.00	.....
68	Enterprises constructing tile drains only ... dollars	35,698	.....	375,937	145,204	22,608	20,694	117,781	275,078	8,312
69	Average cost per acre when completed ... dollars	3.86	.....	5.22	8.45	4.08	6.23	2.67	4.36	30.34
70	Enterprises constructing open ditches and tile drains ... dollars	7,712	5,852	144,634	449,359	34,614	60,010	164,186	325,064	76,560
71	Average cost per acre when completed ... dollars	4.98	10.66	5.10	9.78	6.58	3.62	2.04	3.33	16.77
72	Enterprises constructing open ditches, tile drains, and levees ... dollars	.....	.....	.....	.....	.....	.....	.....	.....	.....
73	Average cost per acre when completed ... dollars	.....	.....	.....	.....	.....	.....	.....	.....	.....
	CROPS.									
	Improved land in enterprises reporting—									
74	Corn as principal crop on drained land ... acres	20,680	1,239	106,442	253,624	1,509	160,157	222,671	207,043	3,045
75	Wheat as principal crop on drained land ... acres	.....	.....	164	.....	16,902	18,524	49,959	.....	225
76	Hay as principal crop on drained land ... acres	.....	.....	.....	.....	.....	7,324	398	.....	.....
77	Vegetables as principal crop on drained land ... acres	.....	1,269	.....	.....	.....	.....	.....	.....	5,348
78	Oats as principal crop on drained land ... acres	.....	.....	.....	.....	.....	.....	.....	.....	.....
79	Other crops as principal ones on drained land ... acres	.....	.....	.....	.....	.....	.....	.....	.....	.....
80	Not reporting principal crop on drained land ... acres	.....	.....	.....	179	.....	.....	.....	.....	3

[1] Office estimate; the figures reported exceed the improved acreage in all farms in the county as determined by the census of agriculture.
[2] When works under construction have been completed.
[3] The figures reported have been reduced by the same acreage as the improved land, 1920.
[4] Per cent not shown when more than 1,000.

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

		Summit.	Trumbull.	Union.	Van Wert.	Wayne.	Williams.	Wood.	Wyandot.	Other counties.[1]
	LAND AREA.									
1	Approximate land area of the county ... acres	261,120	405,120	285,440	259,840	356,480	263,040	391,680	259,840	5,584,000
2	All land in operating drainage enterprises ... acres	17,126	15,331	269,139	257,527	61,661	236,911	389,390	244,500	28,820
3	Improved land ... acres	11,988	6,478	219,286	[2] 220,721	51,054	[2] 198,444	[2] 314,841	[2] 205,752	23,471
4	Per cent of all improved land in farms	8.1	3.1	96.6	98.5	19.0	95.6	99.3	97.1	0.7
5	Timber and cut-over land ... acres	1,184	2,352	25,567	36,806	2,843	31,353	74,391	17,282	1,114
6	Other unimproved land ... acres	3,954	6,501	24,286	.....	7,764	7,114	158	21,466	4,235
7	Swampy or subject to overflow, in enterprises ... acres	107	2,159	56	8,951	11,128	2,383	7,773	229	1,793
8	Suffering a loss of crops from defective drainage ... acres	.....	490	48	8,567	10,059	2,203	7,773	4,102	724
9	Assessed acreage	34,661	21,947	607,580	1,531,134	101,476	311,670	2,373,332	380,564	28,915
10	Excess over all land in operating enterprises ... acres	17,535	6,616	338,441	1,273,607	39,815	74,759	1,983,942	136,064	95
	DRAINAGE WORKS.									
	Open ditches:									
11	Completed ... miles	70.7	86.8	310.1	1,252.0	275.0	678.5	3,072.5	382.5	107.7
12	Additional under construction ... miles	.....	.....	.....	.....	.....	.....	.....	1.8	.....
13	Maximum completed in any enterprise ... miles	24.9	4.6	15.0	41.6	16.9	38.4	25.3	8.1	9.0
14	Maximum width at bottom of ditch [3] ... feet	35	12	20	15	40	35	40	16	70
15	Maximum of average depths of outlet ditches [3] ... feet	6.0	6.0	18.0	9.8	12.0	11.0	11.0	10.0	9.0
16	Mean depth of branch ditches [3] ... feet	3.8	3.4	3.1	3.6	5.2	3.3	4.5	3.5	4.6
	Tile drains:									
17	Completed ... miles	.....	4.9	587.8	209.7	6.1	179.1	81.5	254.0	10.3
18	Additional under construction ... miles	.....	.....	.....	.....	.....	.....	.....	0.6	.....
19	Maximum completed in any enterprise ... miles	.....	1.6	4.3	6.0	1.1	8.2	5.0	5.4	1.5
20	Maximum size of tile [3] ... inches	.....	24	28	48	18	30	42	27	22
	Accessory levees and dikes:									
21	Completed ... miles	.....	.....	0.5	.....	.....	.....	.....	.....	.....
22	Additional under construction ... miles	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Pumping plants:									
23	Engine capacity ... horsepower	.....	.....	.....	.....	.....	.....	.....	.....	.....
24	Pump capacity ... gallons per minute	.....	.....	.....	.....	.....	.....	.....	.....	.....
25	Area served by pumps ... acres	.....	.....	.....	.....	.....	.....	.....	.....	.....
26	Area drained by open ditches only [3] ... acres	17,126	13,447	23,380	180,083	57,403	127,492	380,332	107,105	26,362
27	Length of these ditches ... miles	70.7	75.1	58.1	947.5	266.8	445.4	2,894.0	243.0	105.2
28	Average length per acre ... feet	21.8	29.5	13.1	27.8	24.5	18.4	40.2	12.0	21.1
29	Area having open ditches and levees [3] ... acres	.....	.....	1,616	.....	.....	.....	.....	.....	.....
30	Length of these ditches ... miles	.....	.....	0.8	.....	.....	.....	.....	.....	.....
31	Average length per acre ... feet	.....	.....	2.6	.....	.....	.....	.....	.....	.....
32	Length of the accessory levees ... miles	.....	.....	0.5	.....	.....	.....	.....	.....	.....
33	Area drained by tile only [3] ... acres	.....	.....	79,060	28,260	[4] 20	33,634	([5])	50,568	1,826
34	Length of these tile ... miles	.....	.....	329.4	115.7	2.7	69.8	37.6	157.6	7.6
35	Average length per acre ... feet	.....	.....	22.0	21.6	.....	11.0	.....	16.5	22.0
36	Area drained by open ditches and tile [3] ... acres	.....	1,884	165,083	49,184	4,238	75,785	[4] 9,058	86,827	632
37	Length of these drains ... miles	.....	16.6	509.6	398.5	11.6	342.4	222.4	238.3	5.2
38	Average length per acre ... feet	.....	46.5	16.3	42.8	14.5	23.9	.....	14.5	43.4
39	Area having open ditches, tile drains, and levees [3] ... 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	11,988	6,478	219,286	[2] 220,721	51,054	[2] 198,444	[2] 314,841	[2] 205,752	23,471
44	Improved land prior to drainage ... acres	6,712	3,151	170,201	[6] 122,965	32,311	[6] 145,854	[6] 129,836	[6] 116,049	14,350
45	Increase since drainage ... acres	5,276	3,327	49,085	97,756	18,743	52,590	185,005	89,703	9,121
46	Per cent of increase	78.6	105.6	28.8	79.5	58.0	36.1	142.5	77.3	63.6
47	Per cent increase is of all improved land in farms, 1920	3.6	1.6	21.6	43.6	7.0	25.3	58.4	42.3	0.3
48	Timber and cut-over land, 1920 ... acres	1,184	2,352	25,567	36,806	2,843	31,353	74,391	17,282	1,114
49	Timber and cut-over land prior to drainage ... acres	2,459	3,493	38,393	134,562	8,716	75,827	256,176	24,777	4,406
50	Decrease since drainage ... acres	1,275	1,141	12,826	97,756	5,873	44,474	181,785	7,495	3,292
51	Per cent of decrease	51.9	32.7	33.4	72.6	67.4	58.7	71.0	30.2	74.7
52	Other unimproved land, 1920 ... acres	3,954	6,501	24,286	.....	7,764	7,114	158	21,466	4,235
53	Other unimproved land prior to drainage ... acres	7,955	8,687	60,545	.....	20,634	15,230	3,378	103,674	10,064
54	Decrease since drainage ... acres	4,001	2,186	36,259	.....	12,870	8,116	3,220	82,208	5,829
55	Per cent of decrease	50.3	25.2	59.9	.....	62.4	53.3	95.3	79.3	57.9
56	Swampy or subject to overflow, 1920 ... acres	107	2,159	56	8,951	11,128	2,383	7,773	229	1,793
57	Swampy or subject to overflow prior to drainage ... acres	16,049	9,813	96,379	95,419	29,885	17,150	166,151	30,726	15,188
58	Decrease since drainage ... acres	15,942	7,654	96,323	86,468	18,757	14,767	158,378	30,497	13,395
59	Per cent of decrease	99.3	78.0	99.9	90.6	62.8	86.1	95.3	99.3	88.2
	CAPITAL INVESTED AND COST PER ACRE.									
60	Total capital invested in and required for completion of operating enterprises ... dollars	99,888	85,196	705,535	1,544,952	319,263	512,940	1,723,397	566,244	231,243
61	Capital invested in these enterprises to Dec. 31, 1919 ... dollars	99,888	85,196	705,535	1,544,952	319,263	512,940	1,723,397	559,087	231,243
62	Additional capital required to complete these enterprises ... dollars	.....	.....	.....	.....	.....	.....	.....	7,157	.....
63	Average cost per acre when completed ... dollars	5.83	5.56	2.62	6.00	5.18	2.17	4.43	2.32	8.02
64	Enterprises constructing open ditches only ... dollars	99,888	63,467	34,312	870,038	297,896	222,818	1,571,201	148,962	219,530
65	Average cost per acre when completed ... dollars	5.83	4.72	1.47	4.83	5.19	1.74	4.13	1.39	8.33
66	Enterprises constructing open ditches and levees ... dollars	.....	.....	2,018	.....	.....	.....	.....	.....	.....
67	Average cost per acre when completed ... dollars	.....	.....	1.25	.....	.....	.....	.....	.....	.....
68	Enterprises constructing tile drains only ... dollars	.....	.....	264,331	191,335	5,748	72,492	32,276	186,217	7,865
69	Average cost per acre when completed ... dollars	.....	.....	3.34	6.77	.....	2.16	.....	3.68	4.31
70	Enterprises constructing open ditches and tile drains ... dollars	.....	21,729	404,874	483,579	15,619	218,130	119,920	231,065	3,848
71	Average cost per acre when completed ... dollars	.....	11.53	2.45	9.83	3.69	2.88	.....	2.66	6.09
72	Enterprises constructing open ditches, tile drains, and levees ... dollars	.....	.....	.....	.....	.....	.....	.....	.....	.....
73	Average cost per acre when completed ... dollars	.....	.....	.....	.....	.....	.....	.....	.....	.....
	CROPS.									
	Improved land in enterprises reporting—									
74	Corn as principal crop on drained land ... acres	67	234	219,234	220,721	516	198,201	314,841	205,328	21,506
75	Wheat as principal crop on drained land ... acres	.....	.....	52	.....	45,718	.....	.....	424	.....
76	Hay as principal crop on drained land ... acres	11,510	6,055	.....	.....	11	243	.....	.....	1,965
77	Vegetables as principal crop on drained land ... acres	45	.....	.....	.....	4,809	.....	.....	.....	.....
78	Oats as principal crop on drained land ... acres	.....	.....	.....	.....	.....	.....	.....	.....	.....
79	Other crops as principal ones on drained land ... acres	.....	189	.....	.....	.....	.....	.....	.....	.....
80	Not reporting principal crop on drained land ... acres	366	.....	.....	.....	.....	.....	.....	.....	.....

[1] Includes only Brown, Butler, Clermont, Geauga, Hamilton, Highland, Holmes, Jackson, Knox, Lawrence, Mahoning, Muskingum, Perry, Pike, Ross, Scioto, Tuscarawas, and Warren Counties.
[2] Office estimate; the figures reported exceed the improved acreage in all farms in the county as determined by the census of agriculture.
[3] When works under construction have been completed.
[4] Additional area reported under "open ditches only."
[5] Area reported under "open ditches and tile."
[6] The figures reported have been reduced by the same acreage as the improved land, 1920.

SOUTH CAROLINA.

The following pages present the statistics of drainage for South Carolina 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 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.

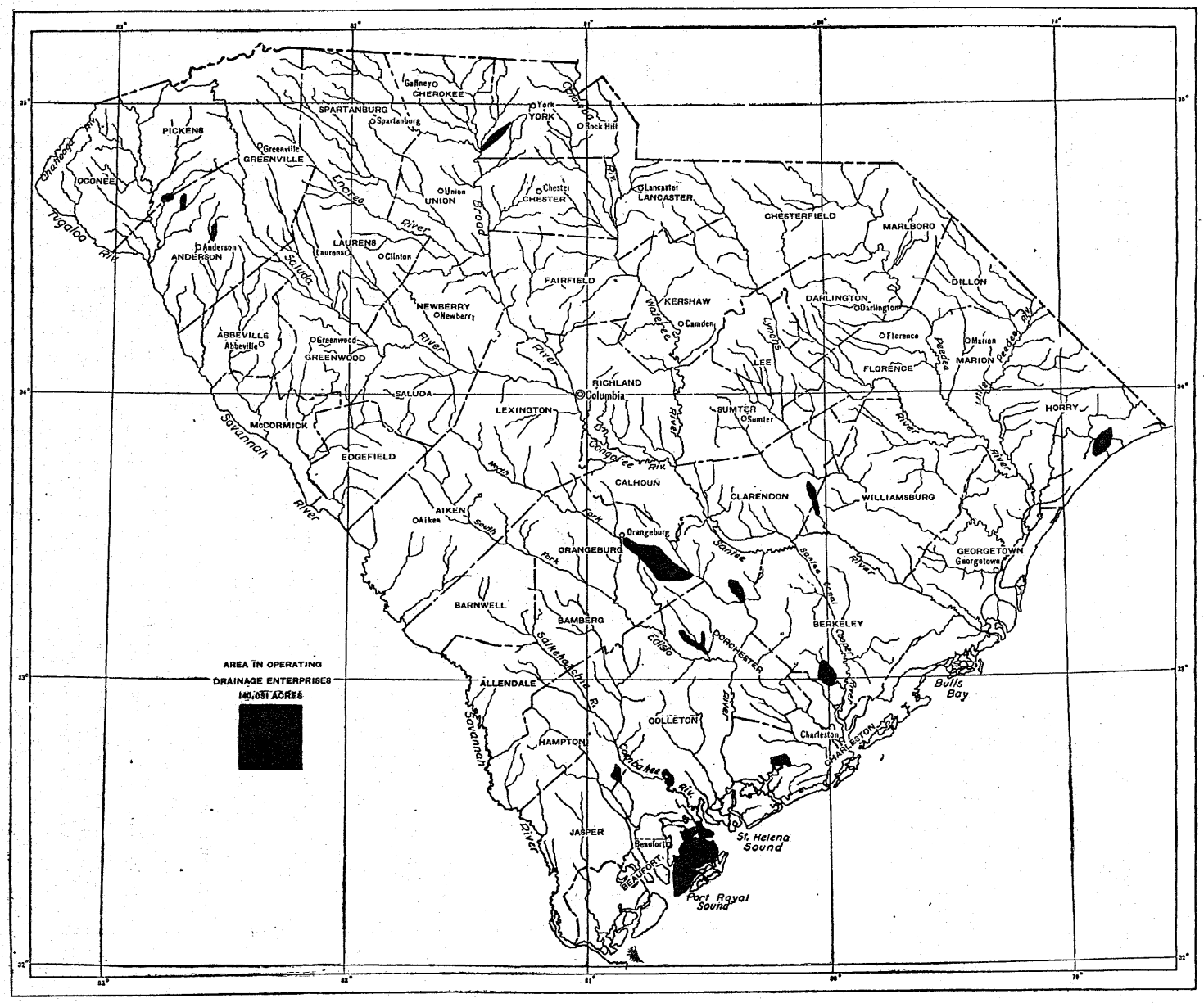
TABLE 1.—SUMMARY FOR THE STATE: 1920.

ITEM.	Amount.	Per cent of total.
DRAINAGE ON FARMS.		
Number of all farms in the state	192,693	100.0
Farms reporting land having drainage	26,993	14.0
Farms reporting land needing drainage	24,508	12.7
All land in farms ... acres	12,426,675	100.0
Improved land in farms ... acres	6,184,159	49.8
Farm land reported as provided with drainage ... acres	676,152	5.4
Farm land reported as needing drainage ... acres	1,341,903	10.8
Needing drainage only ... acres	125,548	1.0
Needing drainage and clearing ... acres	1,216,355	9.8
DRAINAGE ENTERPRISES.		
Approximate land area of the state ... acres	19,516,800	100.0
All land in operating drainage enterprises ... acres	140,031	0.7
Improved land ... acres	59,075	0.3
Per cent of all improved land in farms	1.0	.....
Timber and cut-over land ... acres	64,955	0.3
Other unimproved land ... acres	16,001	0.1
Swampy, subject to overflow, seeped, or alkali ... acres	18,206	(1)
Suffering a loss of crops from defective drainage ... acres	3,093	(1)
Improved land prior to drainage ... acres	51,349	0.3
Increase since drainage began ... acres	7,726	(1)
Land in nonoperating enterprises ... acres	4,206	(1)
Open ditches in operating enterprises ... miles	350.4	100.0
Completed ... miles	262.7	75.0
Additional under construction ... miles	87.7	25.0
Tile drains in operating enterprises ... miles	262.5	100.0
Completed ... miles	101.5	38.7
Additional under construction ... miles	161.0	61.3
Total capital invested in and required for completion of operating enterprises	$936,514	100.0
Capital invested in these enterprises to Dec. 31, 1919	582,183	62.2
Additional capital required to complete these enterprises	354,331	37.8
Average cost per acre when completed	6.69	.....

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

SOUTH CAROLINA

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.[1]		
			To Dec. 31, 1919.		
	Acreage.	Per cent of total.	Amount.	Per cent of total.	Additional required to complete.
All organized enterprises	144,237	100.0	$583,083	100.0	$445,845
Operating enterprises	140,031	97.1	582,183	99.8	354,331
With works completed	24,864	17.2	198,370	34.0	
With works under construction	115,167	79.8	383,813	65.8	354,331
Nonoperating enterprises	4,206	2.9	900	0.2	91,514

[1] 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.—Most of the land in drainage enterprises in South Carolina is in the southeastern quarter of the state, though there are small areas in such enterprises in the northeastern and the northwestern parts.

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

DRAINAGE BASIN.	LAND.		CAPITAL.		
			To Dec. 31, 1919.		
	Acreage.	Per cent of total.	Amount.	Per cent of total.	Additional required to complete.
All organized enterprises	144,237	100.0	$583,083	100.0	$445,845
Operating enterprises	140,031	97.1	582,183	99.8	354,331
Santee River	11,007	7.6	56,937	9.8	42,726
Edisto River	43,816	30.4	36,219	6.2	155,000
Savannah River	3,408	2.4	74,651	12.8	4,505
Atlantic Ocean	81,800	56.7	414,376	71.1	152,100
Nonoperating enterprises	4,206	2.9	900	0.2	91,514
Santee River	1,436	1.0	300	0.1	40,000
Savannah River	500	0.3	600	0.1	32,400
Atlantic Ocean	2,270	1.6			19,114

Condition of land in enterprises.—The drainage enterprises in the Coastal Plain counties, comprising all but four of the counties in which operating enterprises are located, are mostly for the purpose of reclaiming swamp land or improving level areas that generally are too wet for farming with profit. In the Piedmont section the drainage enterprises are for the protection or drainage of land subject to overflow by stream floods.

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 lands 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 all land.			
All land in enterprises	140,031	100.0	24,864	115,167	4,206
Improved land	59,075	42.2	7,099	51,976	976
Timber and cut-over land	64,955	46.4	10,667	54,288	1,548
Other unimproved land	16,001	11.4	7,098	8,903	1,682
Swampy or subject to overflow	18,206	13.0	704	17,502	4,106
Suffering a loss of crops	3,093	2.2		3,093	

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 17 operating drainage enterprises are counted in South Carolina, with an average area of 8,237 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	140,031	140,031	100.0
Less than 200 acres	40	40	
200 to 499 acres			
500 to 999 acres	2,198	2,198	1.6
1,000 to 4,999 acres	19,793	19,793	14.1
5,000 to 9,999 acres	20,400	20,400	14.6
10,000 to 49,999 acres	40,000	40,000	28.6
50,000 to 99,999 acres	57,600	57,600	41.1

Character of enterprises.—The drainage enterprises in South Carolina comprise districts formed in accordance with the drainage district laws of 1911 and 1912 and the sanitary and drainage district law of 1907, also undertakings by individual farm owners.

Drainage districts under the law of February 18, 1911 (act No. 54), are established by the clerk of the court of common pleas of the county in which all or a part of the proposed district is situated. A petition for establishment must be signed by a majority of the resident landowners or the owners of a major part of the land to be included. A preliminary investigation and report regarding the public utility of the undertaking are made by three viewers appointed by the clerk of the court. Public hearing is held upon the petition; then the boundaries of the district are fixed, or proceedings are dismissed at the cost of the county. The viewers prepare the plan of drainage, make awards of damages, and divide the land into five classes according to the benefits that the various tracts will receive; their report is reviewed by the clerk of the court at public hearing before it is confirmed. The cost of land taken for right of way is determined by jury trial. To secure construction of the drains and otherwise administer the affairs of the district, the clerk of the court appoints three drainage commissioners who previously have been elected by the landowners. The cost of the enterprise is assessed according to the classification of the land, the rates per acre being in the ratio 5:4:3:2:1. The district may issue bonds if the cost will exceed an average of 25 cents per acre on all the land. Originally, 22 counties were excepted from the operation of this law, but later the law was made applicable in all counties.

Each drainage district under act No. 411 of 1912 is established by a board of three disinterested drainage commissioners, who are appointed by the board of county commissioners upon receipt of a petition signed by two-thirds of the owners of land adjacent to the creek, swamp, or branch that those owners desire to open or improve for drainage. The drainage commissioners make a preliminary survey and estimate of cost for the work deemed practicable, and hold hearings upon their report. If they find the project should be undertaken, and two-thirds of the landowners sign a second petition to have the works constructed, the drainage commissioners complete the plans and specifications for the improvements, secure construction of the works, and divide the land in the district into three classes according to the anticipated drainage benefits. The cost is assessed according to the classification of the land, the rates per acre being in the ratio 5 : 4 : 3. The drainage commissioners may levy annually not exceeding $5 per acre until the cost of drainage has been paid. By act No. 120 of 1919, bonds of the district may be issued. Land may be condemned for right of way for the drains.

Sanitary and drainage districts are organized in accordance with act No. 247 approved February 13, 1907. The governor of the state, upon request and with the advice and consent of the senator and representatives from any county, or a majority of them, shall appoint a sanitary and drainage commission for that county with authority regarding sanitary, agricultural, and public utility drainage. The commission has control over all public drains outside of incorporated cities and towns, with power to make surveys, alterations, and improvements, to require persons to drain their land and to keep their drains in repair, and to do any and all work for drainage purposes. Each commission is required to report annually to the general assembly, and all money appropriated for the commission is required to be paid by the county treasurer from the proceeds of general county or township taxes authorized by the general assembly.

The first general drainage law of South Carolina was an act of December 20, 1856 (ch. 4307), which is still in effect, authorizing the formation of drainage corporations by two-thirds of the owners of the land to be drained, who must hold two-thirds of that acreage, signing articles of agreement to be filed in the office of the clerk of the county in which the land is situated. No enterprises were reported as organized under that law. There are also a number of other statutes providing for land drainage, each of which was made applicable in only one or a few counties, for which no enterprises were reported. A law enacted December 22, 1891, provides for securing a drainage outlet by one landowner across the property of an objecting owner, when necessary, the damages being determined by a board of referees.

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

CHARACTER OF ENTERPRISE.	LAND.		CAPITAL.		
			To Dec. 31, 1919.		
	Acreage.	Per cent of total.	Amount.	Per cent of total.	Additional required to complete.
All organized enterprises	144,237	100.0	$583,083	100.0	$445,845
Operating enterprises	140,031	97.1	582,183	99.8	354,331
Drainage districts	57,231	39.7	155,807	26.7	202,231
Law of 1911, act No. 54	45,823	31.8	61,156	10.5	185,726
Law of 1912, act No. 411	11,408	7.9	94,651	16.2	16,505
Sanitary and drainage districts	57,600	39.9	10,376	1.8	5,100
Individual ownership	25,200	17.5	416,000	71.3	147,000
Nonoperating enterprises	4,206	2.9	900	0.2	91,514
Drainage districts	4,206	2.9	900	0.2	91,514
Law of 1911, act No. 54	1,436	1.0	300	0.1	40,000
Law of 1912, act No. 411	2,770	1.9	600	0.1	51,514

Drainage works.—The total works completed by drainage enterprises to December 31, 1919, comprised 262.7 miles of open ditches, 101.5 miles of tile drains, and 12.0 miles of accessory levees; the additional lengths under construction were 87.7 miles of ditches, 161.0 miles of tile drains, and 30.0 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. However, all the tile drains shown are in drainage enterprises under individual ownership.

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

KIND OF WORKS.	LAND.		CAPITAL		
			To Dec. 31, 1919.		Additional required to complete.
	Acreage.	Per cent of total.	Amount.	Per cent of total.	
All kinds	140,031	100.0	$582,183	100.0	$354,331
Open ditches only	130,831	93.4	319,183	54.8	207,331
Open ditches, tile drains, and levees	9,200	6.6	263,000	45.2	147,000

There are two drainage enterprises in South Carolina in which 2,940 acres are drained by pumping part of the time. The pumping plants operate four centrifugal pumps of 44,600 gallons per minute total capacity, the plants being capable of developing 40 horsepower by steam and 115 horsepower by internal-combustion engines.

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 4.3 instead of 5.2 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	140,031	100.0
Less than 3 feet	57,600	41.1
3.0 to 3.9 feet	17,800	12.7
4.0 to 4.9 feet	2,000	1.4
5.0 to 5.9 feet	9,388	6.7
6.0 to 6.9 feet	45,400	32.4
7.0 to 7.9 feet	3,007	2.1
8.0 to 8.9 feet	2,020	1.4
Not reporting branches	2,816	2.0

Maintenance of works.—The drainage district law of 1911 provides that it shall be the duty of the board of drainage commissioners to keep the works of the district in good repair, and for this purpose they may levy an assessment against the land benefited by the construction of the improvement in the same manner and in the same proportion as the original assessment was made. The drainage district law of 1912 does not provide for maintenance. Sanitary and drainage districts organized under the statute of 1907 are maintained by the commissioners appointed in accordance with that law, the cost of repairs being paid by taxation authorized by the general assembly the same as for original construction of improvements.

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

METHOD OF MAINTENANCE.	LAND.		CAPITAL.		
			To Dec. 31, 1919.		Additional required to complete.
	Acreage.	Per cent of total.	Amount.	Per cent of total.	
All operating enterprises	140,031	100.0	$582,183	100.0	$354,331
By district forces	58,988	42.1	41,527	7.1	6,949
By contract	11,007	7.9	56,937	9.8	42,726
By landowners	21,016	15.0	392,219	67.4	147,000
No maintenance provided	2,020	1.4	43,500	7.5	2,656
Not reported	47,000	33.6	48,000	8.2	155,000

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, the drainage commissioners, or the governor of the state, 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.

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	140,031	100.0	140,031	100.0
1910 to 1914[1]	18,473	13.2	18,473	13.2
1915 to 1919	121,558	86.8	121,558	86.8

[1] Includes one enterprise organized prior to 1910.

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	$582,183	100.0	$354,331
1910 to 1914[1]	411,656	70.7	82,822
1915 to 1919	170,527	29.3	271,509

[1] Includes one enterprise organized prior to 1910.

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.	350.4	100.0	262.5	100.0	42.0	100.0
1910 to 1914[1]	191.0	54.5	75.0	28.6	30.0	71.4
1915 to 1919	159.4	45.5	187.5	71.4	12.0	28.6

[1] Includes one enterprise organized prior to 1910.

Crops.—The principal crops grown upon the drained land in drainage enterprises are cotton 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.

COUNTY TABLE I.—DRAINAGE ON FARMS: 1920.

		THE STATE.	Abbeville.	Allendale.	Bamberg.	Beaufort.	Berkeley.	Calhoun.	Charleston.	Cherokee.
1	Number of all farms in the state or county	192,693	4,469	1,764	2,543	3,168	2,691	2,901	3,850	3,286
2	Farms reporting land having drainage	26,993	97	255	1,035	798	505	121	1,695	40
3	Farms reporting land needing drainage	24,508	274	164	997	574	759	158	1,118	457
4	Farms in drainage and levee districts	1,071	.....	81	58	176	3	82	15	2
	LAND AND FARM AREA.									
5	Approximate land area of the state or county ... acres	19,516,800	326,400	278,400	240,000	449,280	792,320	250,240	568,320	238,720
6	All land in farms ... acres	12,426,675	260,265	151,187	169,929	152,350	237,572	166,172	212,539	193,005
7	Improved land in farms ... acres	6,184,159	145,126	97,354	105,645	69,212	67,311	98,873	85,267	99,681
8	Woodland in farms ... acres	5,302,575	68,257	52,835	53,531	69,468	162,845	54,182	106,662	78,676
9	Other unimproved land in farms ... acres	939,941	46,882	998	10,753	13,670	7,416	13,117	20,610	14,648
10	Farm land reported as provided with drainage ... acres	676,152	958	7,855	16,814	18,677	10,572	2,133	47,305	543
11	Farm land reported as needing drainage ... acres	1,341,903	6,262	8,043	26,291	44,412	50,869	10,725	79,643	12,576
12	Drainage only ... acres	125,548	302	1,638	746	5,586	9,397	1,326	16,361	799
13	Drainage and clearing ... acres	1,216,355	5,960	6,405	25,545	38,826	41,472	9,399	63,282	11,777

		Chesterfield.	Clarendon.	Colleton.	Darlington.	Dillon.	Dorchester.	Fairfield.	Florence.	Georgetown.
1	Number of all farms in the county	4,487	5,058	3,976	4,923	3,440	2,260	3,980	5,321	1,834
2	Farms reporting land having drainage	775	760	1,193	1,975	960	828	63	2,465	619
3	Farms reporting land needing drainage	1,355	702	1,252	701	945	499	12	1,210	567
4	Farms in drainage and levee districts	6	2	5	54	2	.....	.....	.....	.....
	LAND AND FARM AREA.									
5	Approximate land area of the county ... acres	535,680	450,560	720,640	387,200	301,440	392,320	451,840	447,360	529,920
6	All land in farms ... acres	319,892	235,509	401,190	277,343	177,671	205,798	342,522	300,966	227,632
7	Improved land in farms ... acres	148,264	145,045	141,057	167,567	103,414	71,072	167,525	146,810	38,429
8	Woodland in farms ... acres	164,756	85,242	231,938	94,831	68,669	125,120	138,016	147,861	150,465
9	Other unimproved land in farms ... acres	6,872	5,222	28,195	14,945	5,588	9,606	36,981	6,295	38,738
10	Farm land reported as provided with drainage ... acres	7,750	23,636	32,193	51,881	28,041	24,712	1,980	56,525	17,163
11	Farm land reported as needing drainage ... acres	72,663	40,066	130,119	17,707	21,900	37,617	352	47,633	85,831
12	Drainage only ... acres	5,369	2,125	16,661	2,453	2,024	7,440	70	4,703	6,036
13	Drainage and clearing ... acres	67,294	37,941	113,458	15,254	19,876	30,177	282	42,930	79,795

		Greenville.	Hampton.	Horry.	Jasper.	Kershaw.	Lancaster.	Laurens.	Lee.	Lexington.
1	Number of all farms in the county	6,762	2,003	4,687	1,281	3,664	3,724	6,068	4,217	4,816
2	Farms reporting land having drainage	57	648	3,034	365	30	72	242	849	813
3	Farms reporting land needing drainage	169	596	2,574	222	411	194	352	155	855
4	Farms in drainage and levee districts	.....	4	40	.....	10	.....	.....	248	5
	LAND AND FARM AREA.									
5	Approximate land area of the county ... acres	487,040	328,320	741,120	381,440	430,720	329,600	441,600	260,480	498,560
6	All land in farms ... acres	366,288	175,484	443,509	174,573	263,486	255,399	359,895	196,779	378,680
7	Improved land in farms ... acres	186,515	88,029	108,771	39,500	125,963	115,631	201,535	126,458	155,141
8	Woodland in farms ... acres	137,849	77,316	319,463	117,665	124,784	106,653	107,470	67,224	208,138
9	Other unimproved land in farms ... acres	41,924	10,139	15,275	17,408	12,739	33,115	50,890	3,097	15,401
10	Farm land reported as provided with drainage ... acres	724	27,635	66,806	28,226	2,537	847	7,197	14,944	15,669
11	Farm land reported as needing drainage ... acres	2,144	39,355	162,107	74,952	31,579	3,193	8,368	5,402	53,067
12	Drainage only ... acres	343	1,525	6,048	391	2,235	666	674	333	788
13	Drainage and clearing ... acres	1,801	37,830	156,059	74,561	29,344	2,527	7,694	5,069	52,279

		Marion.	Marlboro.	Oconee.	Orangeburg.	Richland.	Saluda.	Spartanburg.	Sumter.	Williamsburg.	All other counties.[1]
1	Number of all farms in the county	2,579	4,477	4,183	8,558	3,889	3,917	8,260	4,897	5,964	48,796
2	Farms reporting land having drainage	1,357	1,400	44	1,603	325	285	312	892	348	133
3	Farms reporting land needing drainage	555	775	318	937	478	455	698	591	845	1,584
4	Farms in drainage and levee districts	2	1	.....	23	234	.....	.....	7	4	7
	LAND AND FARM AREA.										
5	Approximate land area of the county ... acres	338,560	332,160	416,000	723,840	480,640	278,400	489,600	367,360	593,280	4,237,440
6	All land in farms ... acres	160,492	214,328	267,890	496,306	277,192	245,631	408,181	265,759	340,488	3,104,773
7	Improved land in farms ... acres	80,629	140,989	120,258	288,227	130,623	130,394	247,594	167,457	151,533	1,681,260
8	Woodland in farms ... acres	72,881	70,141	129,836	187,248	131,524	106,200	130,812	86,194	180,082	1,087,741
9	Other unimproved land in farms ... acres	6,982	3,198	17,796	20,831	15,045	9,037	29,775	12,108	8,873	335,772
10	Farm land reported as provided with drainage ... acres	32,951	40,512	504	30,857	7,305	9,122	7,191	25,847	7,044	1,496
11	Farm land reported as needing drainage ... acres	21,952	21,016	12,015	27,009	39,935	10,697	15,001	21,874	36,954	62,574
12	Drainage only ... acres	1,323	1,489	563	9,468	2,682	447	1,880	3,004	4,713	3,940
13	Drainage and clearing ... acres	20,629	19,527	11,452	17,541	37,253	10,250	13,121	18,870	32,241	58,634

[1] No drainage on farms reported in Chester County.

COUNTY TABLE II.—OPERATING DRAINAGE ENTERPRISES: 1920.

			THE STATE.	Beaufort.	Clarendon.	Orangeburg.	Other counties.[1]
	LAND AREA.						
1	Approximate land area of the state or county	acres	19,516,800	449,280	450,560	723,840	5,792,640
2	All land in operating drainage enterprises	acres	140,031	57,600	4,300	42,816	35,315
3	Improved land	acres	59,075	34,560	344	13,408	10,763
4	Per cent of all improved land in farms		1.0	49.9	0.2	4.7	0.8
5	Timber and cut-over land	acres	64,955	17,280	3,956	28,845	14,874
6	Other unimproved land	acres	16,001	5,760	.....	563	9,678
7	Swampy or subject to overflow in enterprises	acres	18,206	5,760	.....	8,704	3,742
8	Suffering a loss of crops from defective drainage	acres	3,093	2,304	.....	704	85
9	Assessed acreage		140,031	57,600	4,300	42,816	35,315
10	Excess over all land in operating enterprises	acres	.....	.....	.....	.....	.....
	DRAINAGE WORKS.						
	Open ditches:						
11	Completed	miles	262.7	20.6	2.4	13.4	226.3
12	Additional under construction	miles	87.7	5.1	1.6	68.6	12.4
13	Maximum completed in any enterprise	miles	100.0	20.6	2.4	9.4	100.0
14	Maximum width at bottom of ditch [2]	feet	28	2	18	20	28
15	Maximum of average depths of outlet ditches [2]	feet	10.0	3.0	7.0	8.0	10.0
16	Mean depth of branch ditches [2]	feet	5.2	.....	5.0	6.0	4.5
	Tile drains:						
17	Completed	miles	101.5	.....	.....	.....	101.5
18	Additional under construction	miles	161.0	.....	.....	.....	161.0
19	Maximum completed in any enterprise	miles	64.0	.....	.....	.....	64.0
20	Maximum size of tile [2]	inches	24	.....	.....	.....	24
	Accessory levees and dikes:						
21	Completed	miles	12.0	.....	.....	.....	12.0
22	Additional under construction	miles	30.0	.....	.....	.....	30.0
	Pumping plants:						
23	Engine capacity	horsepower	155	.....	.....	.....	155
24	Pump capacity	gallons per minute	44,600	.....	.....	.....	44,600
25	Area served by pumps	acres	2,940	.....	.....	.....	2,940
26	Area drained by open ditches only [2]	acres	130,831	57,600	4,300	42,816	26,115
27	Length of these ditches	miles	235.4	25.7	4.0	82.0	123.7
28	Average length per acre	feet	9.5	2.4	4.9	10.1	25.0
29	Area having open ditches, tile drains, and levees [2]	acres	9,200	.....	.....	.....	9,200
30	Length of these drains	miles	377.5	.....	.....	.....	377.5
31	Average length per acre	feet	216.7	.....	.....	.....	216.7
32	Length of the accessory levees	miles	42.0	.....	.....	.....	42.0
	DEVELOPMENT OF LAND.						
33	Improved land in operating enterprises, 1920	acres	59,075	34,560	344	13,408	10,763
34	Improved land prior to drainage	acres	51,349	34,560	.....	12,845	3,944
35	Increase since drainage	acres	7,726	.....	344	563	6,819
36	Per cent of increase		15.0	.....	.....	4.4	172.9
37	Per cent increase is of all improved land in farms, 1920		0.1	.....	0.2	0.2	0.5
38	Timber and cut-over land, 1920	acres	64,955	17,280	3,956	28,845	14,874
39	Timber and cut-over land prior to drainage	acres	68,691	17,280	4,300	29,126	17,985
40	Decrease since drainage	acres	3,736	.....	344	281	3,111
41	Per cent of decrease		5.4	.....	8.0	1.0	17.3
42	Other unimproved land, 1920	acres	16,001	5,760	.....	563	9,678
43	Other unimproved land prior to drainage	acres	19,991	5,760	.....	845	13,386
44	Decrease since drainage	acres	3,990	.....	.....	282	3,708
45	Per cent of decrease		20.0	.....	.....	33.4	27.7
46	Swampy or subject to overflow, 1920	acres	18,206	5,760	.....	8,704	3,742
47	Swampy or subject to overflow prior to drainage	acres	91,354	57,600	3,870	9,971	19,913
48	Decrease since drainage	acres	73,148	51,840	3,870	1,267	16,171
49	Per cent of decrease		80.1	90.0	100.0	12.7	81.2
	CAPITAL INVESTED AND COST PER ACRE.						
50	Total capital invested in and required for completion of operating enterprises	dollars	936,514	15,476	12,000	179,219	729,819
51	Capital invested in these enterprises to Dec. 31, 1919	dollars	582,183	10,376	4,000	24,219	543,588
52	Additional capital required to complete these enterprises	dollars	354,331	5,100	8,000	155,000	186,231
53	Average cost per acre when completed	dollars	6.69	0.27	2.79	4.19	20.67
54	Enterprises constructing open ditches only	dollars	526,514	15,476	12,000	179,219	319,819
55	Average cost per acre when completed	dollars	4.02	0.27	2.79	4.19	12.25
56	Enterprises constructing open ditches, tile drains, and levees	dollars	410,000	.....	.....	.....	410,000
57	Average cost per acre when completed	dollars	44.57	.....	.....	.....	44.57
	CROPS.						
	Improved land in enterprises reporting—						
58	Cotton as principal crop on drained land	acres	51,308	34,560	.....	13,408	3,340
59	Corn as principal crop on drained land	acres	3,035	.....	344	.....	2,691
60	Vegetables as principal crop on drained land [3]	acres	2,352	.....	.....	.....	2,352
61	Other crops as principal ones on drained land	acres	2,380	.....	.....	.....	2,380

[1] Includes only Anderson, Berkeley, Charleston, Colleton, Dorchester, Hampton, Horry, Oconee, Pickens, Williamsburg, and York Counties.
[2] When works under construction have been completed.
[3] Includes 1,120 acres of potatoes.

SOUTH DAKOTA.

The following tables present the statistics of drainage for South Dakota 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.

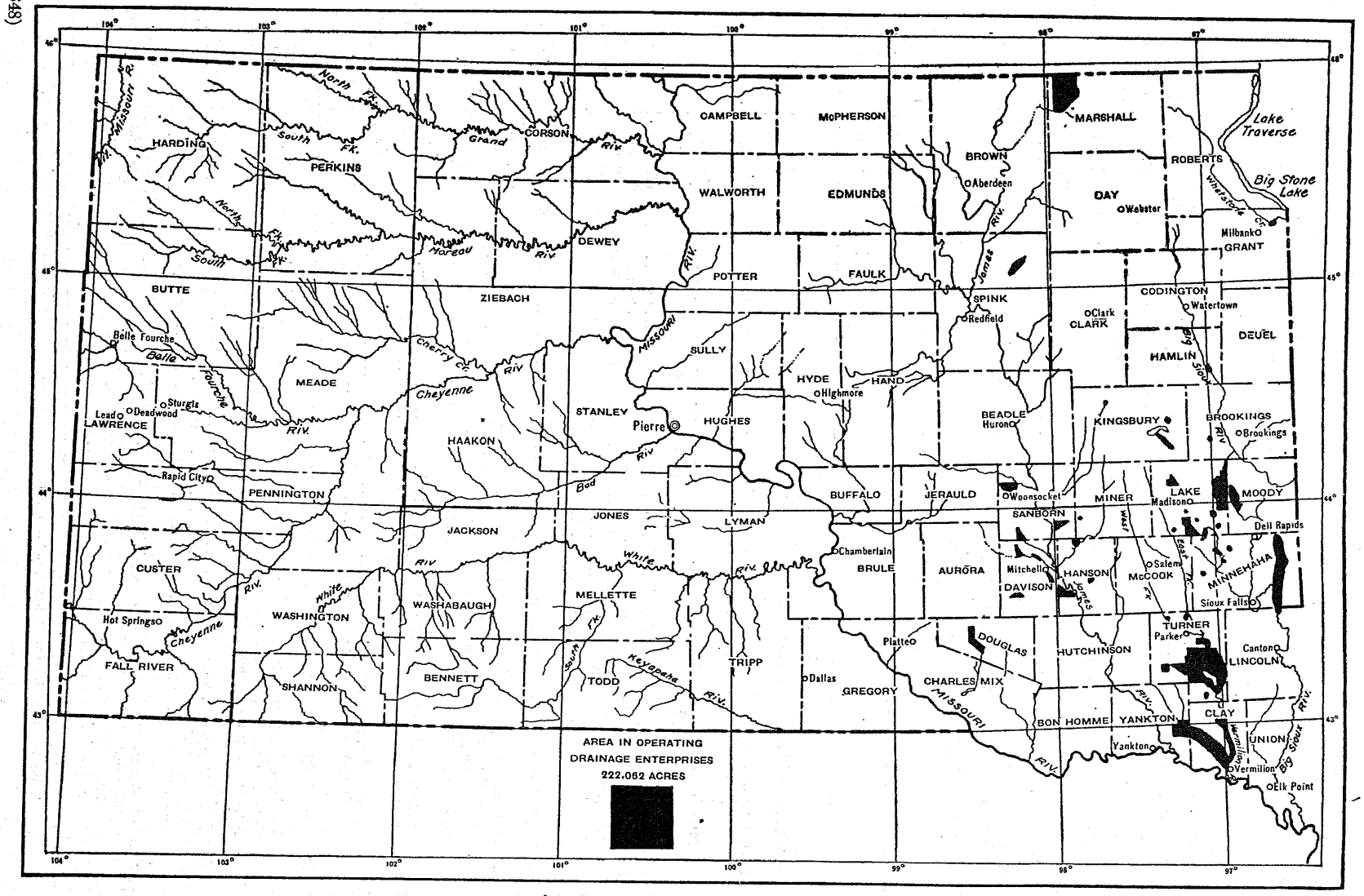
ITEM.	Amount.	Per cent of total.
DRAINAGE ON FARMS.		
Number of all farms in the state	74,637	100.0
Farms reporting land having drainage	4,077	5.5
Farms reporting land needing drainage	11,828	15.8
All land in farms ... acres	34,636,491	100.0
Improved land in farms ... acres	18,199,250	52.5
Farm land reported as provided with drainage ... acres	161.371	0.5
Farm land reported as needing drainage ... acres	446,915	1.3
Needing drainage only ... acres	356,049	1.0
Needing drainage and clearing ... acres	90,866	0.3
DRAINAGE ENTERPRISES.		
Approximate land area of the state ... acres	49,195,520	100.0
All land in operating drainage enterprises ... acres	222,062	0.5
Improved land ... acres	178,540	0.4
Per cent of all improved land in farms	1.0	.....
Unimproved land[1] ... acres	43,522	0.1
Swampy, subject to overflow, seeped, or alkali ... acres	6,067	(2)
Suffering a loss of crops from defective drainage ... acres	481	(2)
Improved land prior to drainage ... acres	98,724	0.2
Increase since drainage began ... acres	79,816	0.2
Land in nonoperating enterprises ... acres	.....	.....
Open ditches in operating enterprises ... miles	245.9	100.0
Completed ... miles	237.8	96.7
Additional under construction ... miles	8.1	3.3
Tile drains in operating enterprises ... miles	212.9	100.0
Completed ... miles	179.3	84.2
Additional under construction ... miles	33.6	15.8
Total capital invested in and required for completion of operating enterprises	$1,732,729	100.0
Capital invested in these enterprises to Dec. 31, 1919	1,461,063	84.3
Additional capital required to complete these enterprises	271,666	15.7
Average cost per acre when completed	7.80	.....

[1] Only 4 acres of timber or cut-over land reported.

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

SOUTH DAKOTA

APPROXIMATE LOCATION AND AREA OF OPERATING DRAINAGE ENTERPRISES.



Operating and nonoperating enterprises.—In the tables that follow, statistics are given for operating enterprises only, as no nonoperating drainage enterprises were found in South Dakota. The operating enterprises, as already defined, include both those that 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 several years ago but were constructing extensions or enlargements on January 1, 1920.

TABLE 2.—LAND AND CAPITAL INVESTED IN ALL ENTERPRISES, CLASSIFIED AS BETWEEN WORKS COMPLETED AND WORKS UNDER CONSTRUCTION: 1920.

CLASS.	LAND.		CAPITAL.[1]		
	Acreage.	Per cent of total.	To Dec. 31, 1919. Amount.	To Dec. 31, 1919. Per cent of total.	Additional required to complete.
All operating enterprises[2]	222,062	100.0	$1,461,063	100.0	$271,666
With works completed	124,132	55.9	942,757	64.5	.....
With works under construction	97,930	44.1	518,306	35.5	271,666

[1] The inquiry asked for the "total cost of the enterprise to Dec. 31, 1919," and for an "estimate of additional investment to complete."
[2] No nonoperating enterprises in South Dakota.

Location of enterprises.—All the enterprises in South Dakota are situated east of Missouri River, and most of them are in the southeastern part of the state. Nearly all the land in the enterprises is drained through tributaries of the Missouri.

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. Amount.	To Dec. 31, 1919. Per cent of total.	Additional required to complete.
All operating enterprises[1]	222,062	100.0	$1,461,063	100.0	$271,666
Big Sioux River	59,078	26.6	656,961	45.0	192,760
Missouri River	162,489	73.2	800,709	54.8	78,906
Minnesota River	495	0.2	3,393	0.2	.....

[1] No nonoperating enterprises in South Dakota.

Condition of land in enterprises.—The drainage enterprises in this state generally are reported to have been organized for the improvement of agricultural land that was wet, swampy, or subject to overflow, though a major part of the acreage included in the enterprises was unimproved before drainage was provided. Only 640 acres were reported as timbered or cut-over before drainage, and only 4 acres as timbered on January 1, 1920.

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 lands 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.[1]			
	Total. Acreage.	Total. Per cent of all land.	Works completed (acres).	Works under construction (acres).
All land in enterprises	222,062	100.0	124,132	97,930
Improved land	178,540	80.4	110,374	68,166
Unimproved land[2]	43,522	19.6	13,758	29,764
Swampy or subject to overflow	6,067	2.7	3,801	2,266
Suffering a loss of crops	481	0.2	481	.....

[1] No nonoperating enterprises in South Dakota.
[2] Only 4 acres of 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, 90 drainage enterprises are counted in South Dakota, with an average area of 2,602 acres assessed. The assessed acreage exceeds the land in enterprises by 12,139 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 acreage, deduction was made for the amount of overlapping with enterprises organized previously, to determine the acreage to be tabulated as land in enterprises.

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	222,062	234,201	100.0
Less than 200 acres	519	519	0.2
200 to 499 acres	10,027	10,027	4.3
500 to 999 acres	13,495	13,495	5.8
1,000 to 4,999 acres	56,007	68,146	29.1
5,000 to 9,999 acres	17,788	17,788	7.6
10,000 to 49,999 acres	124,226	124,226	53.0

Character of enterprises.—All the drainage enterprises in this state are county drains organized under the drainage law of March 7, 1905 (ch. 98), or that of February 21, 1907 (ch. 134). The later act did not specifically repeal the earlier one, but the principal provisions of the two are nearly identical. The state constitution declares that the drainage of agricultural land is a public purpose (art. 21, sec. 6, adopted 1906).

The county drains are established by the board of county commissioners upon petition from one or more owners of land that will be affected, if the proposed drainage will be of public benefit or necessary for draining agricultural land. The county commissioners inspect the route of the proposed improvement, and may have a survey made and determine the location of the drain. Public hearing upon the petition is held by the commissioners, who then dismiss the petition or establish the drain and fix the damages to be paid for any injury to land or property that will be caused by the work. The cost of the drainage is paid by the land, railroads, towns, and townships in proportion to the benefits to be received as determined by the county commissioners. Appeals from the determination of the commissioners may be taken to the circuit court of the county. Construction of the drain is secured by the commissioners, who may issue bonds payable in not more than 20 years from the special assessments against the property benefited. An act of February 26, 1909 (ch. 102), requires that the county commissioners make their examination of the route of a proposed drain in company with the state engineer, who shall have supervision of the survey and of the design and construction of the works.

Drains in two or more counties are under the jurisdiction of the board of commissioners of the county containing the greatest part of drainage area, if not more than one county contains as much as 3,000 acres of that area, according to an act of March 10, 1917 (ch. 208). When two or more counties each embrace more than 3,000 acres of land to be affected by the same drain, the boards of commissioners of all those counties have joint jurisdiction. Before 1917, for drains in more than one county the petition must have been signed by owners of land in each county affected, and the boards of commissioners of those counties acted jointly.

Drains to be established by mutual agreement are authorized by the laws of both 1905 and 1907. The owners of the land to be drained may file with the county auditor a written agreement, duly acknowledged, stating the location for the drain and the apportionment of damages and benefits. The county commissioners then will have the drain constructed in accordance with the agreement if they deem the enterprise will be of advantage to the landowners.

The formation of drainage districts in South Dakota to secure cooperation with similar districts in neighboring states, when such cooperation is desired in obtaining drainage and protection against floods, is authorized by a statute of February 24, 1917 (ch. 209). The districts are to be established by the circuit court of the county, upon petition from 50 or more residents and freeholders in the territory to be embraced in the district, or from the county commissioners. A board of three members to govern the district is appointed by the commissioners. Provision is made for a district situated in two or more counties. No enterprises were reported as organized under this law.

Laws authorizing the establishment of public drains by the boards of county commissioners and by the boards of township supervisors, upon petition from one or more landowners, were enacted by the legislature of Dakota territory in 1883. Viewers were appointed to assess damages and benefits, the cost being apportioned according to the benefits. The South Dakota statute of March 10, 1897 (ch. 76), enacted a new law similar in its main provisions to the territorial drainage laws, which were repealed. No enterprises were reported under any of these statutes.

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

CHARACTER OF ENTERPRISE.	LAND.		CAPITAL.		
			To Dec. 31, 1919.		Additional required to complete.
	Acreage.	Per cent of total.	Amount.	Per cent of total.	
All operating enterprises[1]	222,062	100.0	$1,461,063	100.0	$271,666
County drains	222,062	100.0	1,461,063	100.0	271,666
Laws of 1905, ch. 98	56,796	25.6	265,113	18.1	.....
Laws of 1907, ch. 134	165,266	74.4	1,195,950	81.9	271,666

[1] No nonoperating enterprises in South Dakota.

Drainage works.—The total works completed by the drainage enterprises to December 31, 1919, comprised 237.8 miles of open ditches, 179.3 miles of tile drains, and 2.4 miles of accessory levees; the additional lengths under construction were 8.1 miles of open ditches and 33.6 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 are no pumping districts for land drainage in South Dakota.

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

KIND OF WORKS.	LAND.		CAPITAL.		
			To Dec. 31, 1919.		Additional required to complete.
	Acreage.	Per cent of total.	Amount.	Per cent of total.	
All kinds	222,062	100.0	$1,461,063	100.0	$271,666
Open ditches only	145,834	65.7	822,864	56.3	68,906
Open ditches and levees	4,120	1.9	9,447	0.6	.....
Tile drains only	30,764	13.9	312,803	21.4	47,460
Open ditches and tile drains	40,664	18.3	313,239	21.4	155,300
Open ditches, tile drains, and levees	680	0.3	2,710	0.2	.....

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	222,062	100.0
3.0 to 3.9 feet	23,035	10.4
4.0 to 4.9 feet	18,995	8.6
5.0 to 5.9 feet	.....	.....
6.0 to 6.9 feet	47,520	21.4
7.0 to 7.9 feet	1,500	0.7
Not reporting branches	131,012	59.0

Maintenance of works.—The drainage laws of 1905 and 1907 provide that assessments for maintenance of the drainage works may be made by the county commissioners upon petition from an interested landowner, to be apportioned in the same manner as the assessments for construction. The later statute provides also that all drains constructed under any law of the state, except as otherwise may be provided, shall be under control of the county commissioners who must keep the drains in good repair. Each part of a drain situated in more than one county is under the charge of the commissioners of the county in which the part is located. The works of drainage districts under the statute of 1917 are to be maintained by joint agreement in the same manner as prescribed for construction, but in the absence of such agreement are to be maintained like county drains under the law of 1907.

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

METHOD OF MAINTENANCE.	LAND.		CAPITAL.		
			To Dec. 31, 1919.		Additional required to complete.
	Acreage.	Per cent of total.	Amount.	Per cent of total.	
All operating enterprises	222,062	100.0	$1,461,063	100.0	$271,666
By district forces	56,159	25.3	589,824	40.4	192,760
By contract	5,663	2.6	60,685	4.2	.....
No maintenance provided	160,240	72.2	810,554	55.5	78,906

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 drains 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 enterprise. 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 reclamation 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	222,062	100.0	234,201	100.0
1905 to 1909	59,446	26.8	59,446	25.4
1910 to 1914	40,365	18.2	52,504	22.4
1915 to 1919	122,251	55.1	122,251	52.2

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	$1,461,063	100.0	$271,666
1905 to 1909	230,876	15.8	.....
1910 to 1914	454,928	31.1	35,000
1915 to 1919	775,259	53.1	236,666

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	245.9	100.0	212.9	100.0	2.4	100.0
1905 to 1909	79.4	32.3	16.0	7.5	1.8	75.0
1910 to 1914	103.4	42.0	29.8	14.0	0.6	25.0
1915 to 1919	63.1	25.7	167.1	78.5	.....	.....

Crops.—The principal crops grown upon the drained land in drainage enterprises are corn 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.

County Table I.—DRAINAGE ON FARMS: 1920.

		The State.	Beadle.	Bon Homme.	Brookings.	Butte.	Clark.	Clay.	Davison.
1	Number of all farms in the state or county	74,637	1,716	1,394	1,891	1,005	1,519	1,237	981
2	Farms reporting land having drainage	4,077	12	84	114	16	31	187	98
3	Farms reporting land needing drainage	11,828	330	305	415	78	435	106	279
4	Farms in drainage and levee districts	1,028	3	5	14	12	3	20	8
	LAND AND FARM AREA.								
5	Approximate land area of the state or county ... acres	49,195,520	800,000	366,720	506,240	1,464,960	623,360	257,920	276,480
6	All land in farms ... acres	34,636,491	705,066	353,250	472,237	722,033	521,769	236,428	261,137
7	Improved land in farms ... acres	18,199,250	529,398	271,598	415,125	88,367	453,557	219,839	212,470
8	Woodland in farms ... acres	536,183	3,831	7,059	6,041	32,737	3,339	5,881	3,282
9	Other unimproved land in farms ... acres	15,901,058	171,837	74,593	51,071	600,929	64,873	10,708	45,385
10	Farm land reported as provided with drainage ... acres	161,371	577	2,980	3,296	526	560	14,160	4,771
11	Farm land reported as needing drainage ... acres	446,915	15,595	5,187	13,859	1,712	16,970	7,412	10,629
12	Drainage only ... acres	356,049	15,375	4,794	12,404	1,664	15,752	7,412	9,403
13	Drainage and clearing ... acres	90,866	220	393	1,455	48	1,218	.....	1,226

		Day.	Deuel.	Douglas.	Grant.	Hamlin.	Hanson.	Hutchinson.	Jones.	Kingsbury.
1	Number of all farms in the county	1,995	1,160	912	1,347	1,054	879	1,553	484	1,597
2	Farms reporting land having drainage	205	184	42	151	54	175	162	1	205
3	Farms reporting land needing drainage	759	417	239	276	162	411	374	2	490
4	Farms in drainage and levee districts	18	26	30	36	26	101	22	.....	44
	LAND AND FARM AREA.									
5	Approximate land area of the county ... acres	679,040	404,480	278,400	442,240	332,800	276,480	522,880	628,480	520,960
6	All land in farms ... acres	632,055	343,731	254,178	384,687	303,724	254,745	501,336	499,456	487,685
7	Improved land in farms ... acres	506,462	284,402	182,129	302,064	270,836	206,080	402,399	177,884	450,258
8	Woodland in farms ... acres	9,819	3,245	4,000	5,303	1,927	2,591	5,486	13,832	7,089
9	Other unimproved land in farms ... acres	115,774	56,084	68,049	77,320	30,961	46,074	93,451	307,740	30,338
10	Farm land reported as provided with drainage ... acres	3,577	7,801	1,198	4,505	3,887	7,836	8,252	1,750	5,910
11	Farm land reported as needing drainage ... acres	24,790	12,280	5,523	5,616	4,783	15,973	8,626	140	11,127
12	Drainage only ... acres	23,636	12,050	5,404	5,121	4,705	15,432	8,306	.....	10,779
13	Drainage and clearing ... acres	1,154	230	119	495	78	541	320	140	348

		Lake.	Lincoln.	McCook.	Marshall.	Meade.	Miner.	Minnehaha.	Moody.	Roberts.
1	Number of all farms in the county	1,285	1,755	1,253	1,269	1,722	1,153	2,294	1,245	2,194
2	Farms reporting land having drainage	314	188	167	96	3	51	287	145	117
3	Farms reporting land needing drainage	644	280	462	368	52	320	555	331	604
4	Farms in drainage and levee districts	103	114	15	54	6	2	79	17	30
	LAND AND FARM AREA.									
5	Approximate land area of the county ... acres	359,680	367,360	366,720	568,960	2,234,240	363,520	521,600	337,280	711,040
6	All land in farms ... acres	332,597	355,027	321,796	495,059	1,380,497	337,128	488,764	306,761	617,408
7	Improved land in farms ... acres	291,323	329,760	277,539	415,035	202,562	267,596	431,239	257,003	508,795
8	Woodland in farms ... acres	3,545	5,816	2,951	20,880	20,547	2,994	9,262	7,727	5,370
9	Other unimproved land in farms ... acres	37,729	19,451	41,306	59,144	1,157,388	66,538	48,263	42,031	103,243
10	Farm land reported as provided with drainage ... acres	8,500	8,559	2,868	6,738	580	1,926	7,599	6,186	4,544
11	Farm land reported as needing drainage ... acres	18,200	10,306	11,362	20,874	5,771	8,992	14,914	11,441	19,562
12	Drainage only ... acres	17,437	9,800	10,212	8,764	130	8,843	13,001	10,609	16,764
13	Drainage and clearing ... acres	763	506	1,150	12,110	5,641	149	1,913	832	2,798

		Sanborn.	Spink.	Tripp.	Turner.	Union.	Walworth.	Yankton.	All other counties.[1]
1	Number of all farms in the county	1,021	1,874	1,856	1,862	1,421	653	1,520	29,536
2	Farms reporting land having drainage	92	25	7	482	79	1	213	89
3	Farms reporting land needing drainage	633	78	38	661	280	123	191	1,130
4	Farms in drainage and levee districts	20	19	.....	184	5	.....	8	4
	LAND AND FARM AREA.								
5	Approximate land area of the county ... acres	368,640	967,040	1,042,560	394,880	289,280	474,880	334,720	31,111,680
6	All land in farms ... acres	327,638	864,006	776,607	382,292	249,883	371,791	314,306	19,781,414
7	Improved land in farms ... acres	233,905	794,095	388,260	334,230	229,572	222,118	235,707	7,807,643
8	Woodland in farms ... acres	2,282	7,211	6,385	4,748	7,447	6,710	8,164	298,682
9	Other unimproved land in farms ... acres	91,451	62,700	381,962	43,314	12,864	142,963	70,435	11,675,089
10	Farm land reported as provided with drainage ... acres	5,627	2,631	690	20,094	2,640	540	6,959	3,104
11	Farm land reported as needing drainage ... acres	40,209	2,329	2,194	16,300	10,981	14,353	7,405	71,500
12	Drainage only ... acres	35,350	2,066	2,194	15,143	6,462	958	5,008	41,071
13	Drainage and clearing ... acres	4,859	263	.....	1,157	4,519	13,395	2,397	30,429

[1] No drainage on farms reported in Armstrong, Brown, Buffalo, Campbell, Corson, Edmunds, Gregory, Haakon, Harding, Hughes, Hyde, Jackson, Lyman, McPherson, Mellette, Perkins, Shannon, Stanley, Sully, Todd, Washabaugh, and Ziebach Counties.

COUNTY TABLE II.—OPERATING DRAINAGE ENTERPRISES: 1920.

		THE STATE.	Brookings.	Clay.	Davison.	Douglas.	Hanson.	Kingsbury.	Lake.
	LAND AREA.								
1	Approximate land area of the state or county.....acres..	49,195,520	506,240	257,920	276,480	278,400	276,480	520,960	359,680
2	All land in operating drainage enterprises.....acres..	222,062	1,200	39,829	6,138	7,120	3,640	1,930	28,240
3	Improved land.....acres..	178,540	1,080	38,829	5,463	4,984	3,071	1,778	22,451
4	Per cent of all improved land in farms.....	1.0	0.3	17.7	2.6	2.7	1.5	0.4	7.7
5	Unimproved land.....acres..	[1]43,522	120	1,000	675	2,136	569	152	5,789
6	Swampy or subject to overflow, in enterprises.....acres..	6,067	120	136	125	35	32	45	1,666
7	Suffering a loss of crops from defective drainage.....acres..	481	.....	.....	40	25	42	.....	.....
8	Assessed acreage.....	234,201	1,200	51,968	6,138	7,120	3,640	1,930	28,240
9	Excess over all land in operating enterprises.....acres..	12,139	.....	12,139	.....	.....	.....	.....	.....
	DRAINAGE WORKS.								
	Open ditches:								
10	Completed.....miles..	237.8	4.3	37.0	22.8	11.5	0.8	32.1	9.5
11	Additional under construction.....miles..	8.1	.....	.....	.....	.....	.....	.....	.....
12	Maximum completed in any enterprise.....miles..	28.6	4.3	10.5	10.7	6.5	0.8	28.6	5.5
13	Maximum width at bottom of ditch [2].....feet..	100	2	75	6	5	2	10	10
14	Maximum of average depths of outlet ditches [2].....feet..	10.5	6.6	10.5	6.0	5.0	1.8	9.0	8.5
15	Mean depth of branch ditches [2].....feet..	4.8	.....	.....	.....	3.0	.....	6.1	4.0
	Tile drains:								
16	Completed.....miles..	179.3	.....	.....	19.0	0.2	7.6	3.0	82.8
17	Additional under construction.....miles..	33.6	.....	.....	.....	.....	.....	.....	20.7
18	Maximum completed in any enterprise.....miles..	25.9	.....	.....	12.1	0.2	5.5	3.0	25.9
19	Maximum size of tile [2].....inches..	36	.....	.....	28	20	24	24	36
	Accessory levees and dikes:								
20	Completed.....miles..	2.4	.....	.....	.....	.....	.....	.....	.....
21	Additional under construction.....miles..	.....	.....	.....	.....	.....	.....	.....	.....
22	Area drained by open ditches only [3].....acres..	[3]149,954	1,200	39,829	3,223	3,520	.....	430	.....
23	Length of these ditches.....miles..	177.2	4.3	37.0	17.2	6.5	.....	3.5	.....
24	Average length per acre.....feet..	6.2	18.9	4.9	28.2	9.8	.....	43.0	.....
25	Area drained by tile only [2].....acres..	30,764	.....	.....	2,155	.....	1,340	.....	9,030
26	Length of these tile.....miles..	116.0	.....	.....	6.9	.....	2.1	.....	47.1
27	Average length per acre.....feet..	19.9	.....	.....	16.9	.....	8.3	.....	27.5
28	Area drained by open ditches and tile [2].....acres..	[4]41,344	.....	.....	760	3,600	2,300	1,500	19,210
29	Length of these drains.....miles..	165.6	.....	.....	17.7	5.2	6.3	31.6	65.9
30	Average length per acre.....feet..	21.1	.....	.....	123.0	7.6	14.5	111.2	18.1
	DEVELOPMENT OF LAND.								
31	Improved land in operating enterprises, 1920.....acres..	178,540	1,080	38,829	5,463	4,984	3,071	1,778	22,451
32	Improved land prior to drainage.....acres..	98,724	.....	3,304	.....	3,912	1,616	825	19,694
33	Increase since drainage.....acres..	79,816	1,080	35,525	5,463	1,072	1,455	953	2,757
34	Per cent of increase [5].....	80.8	.....	.....	.....	27.4	90.0	115.5	14.0
35	Per cent increase is of all improved land in farms, 1920.....	0.4	0.3	16.2	2.6	0.6	0.7	0.2	0.9
36	Unimproved land, 1920.....acres..	[1]43,522	120	1,000	675	2,136	569	152	5,789
37	Unimproved land prior to drainage.....acres..	[1]123,338	1,200	36,525	6,138	3,208	2,024	1,105	8,546
38	Decrease since drainage.....acres..	79,816	1,080	35,525	5,463	1,072	1,455	953	2,757
39	Per cent of decrease.....	64.7	90.0	97.3	89.0	33.4	71.9	86.2	32.3
40	Swampy or subject to overflow, 1920.....acres..	6,067	120	136	125	35	32	45	1,666
41	Swampy or subject to overflow prior to drainage.....acres..	141,491	600	34,194	6,138	1,248	952	1,190	21,390
42	Decrease since drainage.....acres..	135,424	480	34,058	6,013	1,213	920	1,145	19,724
43	Per cent of decrease.....	95.7	80.0	99.6	98.0	97.2	96.6	96.2	92.2
	CAPITAL INVESTED AND COST PER ACRE.								
44	Total capital invested in and required for completion of operating enterprises.....dollars..	1,732,729	1,776	333,136	66,420	24,000	27,000	67,058	363,832
45	Capital invested in these enterprises to Dec. 31, 1919.....dollars..	1,461,063	1,776	333,136	66,420	24,000	27,000	67,058	246,072
46	Additional capital required to complete these enterprises....dollars..	271,666	.....	.....	.....	.....	.....	.....	117,760
47	Average cost per acre when completed.....dollars..	7.80	1.48	8.36	10.82	3.37	7.42	34.75	12.88
48	Enterprises constructing open ditches only.....dollars..	[6]901,217	1,776	333,136	35,913	13,000	.....	3,550	.....
49	Average cost per acre when completed.....dollars..	6.01	1.48	8.36	11.14	3.69	.....	8.26	.....
50	Enterprises constructing tile drains only.....dollars..	360,263	.....	.....	19,230	.....	7,000	.....	130,345
51	Average cost per acre when completed.....dollars..	11.71	.....	.....	8.92	.....	5.22	.....	14.43
52	Enterprises constructing open ditches and tile drains.....dollars..	[7]471,249	.....	.....	11,277	11,000	20,000	63,508	233,487
53	Average cost per acre when completed.....dollars..	11.40	.....	.....	14.84	3.06	8.70	42.34	12.15
	CROPS.								
	Improved land in enterprises reporting—								
54	Corn as principal crop on drained land.....acres..	148,804	1,080	38,829	5,463	4,984	3,039	.....	22,451
55	Wheat as principal crop on drained land.....acres..	27,926	.....	.....	.....	.....	.....	.....	.....
56	Barley as principal crop on drained land.....acres..	1,810	.....	.....	.....	.....	32	1,778	.....

[1] Only 4 acres of timber or cut-over land reported for 1920, and 640 acres prior to drainage.
[2] When works under construction have been completed.
[3] Includes one enterprise constructing also 1.8 miles of levee.
[4] Includes one enterprise constructing also 0.6 mile of levee.
[5] Per cent not shown when more than 1,000.
[6] Includes cost of 1.8 miles of levee.
[7] Includes cost of 0.6 miles of levee.

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

		Marshall.	Minnehaha.	Moody.	Sanborn.	Spink.	Turner.	Yankton.	Other counties.[1]
	LAND AREA.								
1	Approximate land area of the county ... acres	568,960	521,600	337,280	368,640	967,040	394,880	334,720	1,587,200
2	All land in operating drainage enterprises ... acres	47,520	21,444	6,000	9,700	3,197	32,270	12,085	1,749
3	Improved land ... acres	23,760	20,083	5,400	9,700	3,101	25,347	12,085	1,408
4	Per cent of all improved land in farms	5.7	4.7	2.1	4.1	0.4	7.6	5.1	0.1
5	Unimproved land ... acres	23,760	1,361	600	.....	96	6,923	.....	341
6	Swampy or subject to overflow, in enterprises ... acres	.....	81	600	.....	.....	2,729	.....	498
7	Suffering a loss of crops from defective drainage ... acres	.....	.....	.....	.....	.....	53	.....	321
8	Assessed acreage	47,520	21,444	6,000	9,700	3,197	32,270	12,085	1,749
9	Excess over all land in operating enterprises ... acres	.....	.....	.....	.....	.....	.....	.....	.....
	DRAINAGE WORKS.								
	Open ditches:								
10	Completed ... miles	15.8	14.6	4.0	.....	10.5	60.5	6.7	7.7
11	Additional under construction ... miles	6.7	1.4	.....	.....	.....	.....	.....	.....
12	Maximum completed in any enterprise ... miles	15.8	14.6	4.0	.....	10.5	8.3	3.5	3.4
13	Maximum width at bottom of ditch [2] ... feet	24	100	10	.....	15	18	30	12
14	Maximum of average depths of outlet ditches [2] ... feet	6.5	9.0	8.5	.....	6.0	7.0	10.5	5.0
15	Mean depth of branch ditches [2] ... feet	6.0	.....	4.0	.....	.....	3.0	3.0	4.0
	Tile drains:								
16	Completed ... miles	.....	14.9	8.6	11.3	.....	26.2	.....	5.7
17	Additional under construction ... miles	.....	.....	3.2	9.7	.....	.....	.....	.....
18	Maximum completed in any enterprise ... miles	.....	4.3	8.6	7.0	.....	3.8	.....	2.9
19	Maximum size of tile [2] ... inches	.....	26	30	22	.....	24	.....	24
	Accessory levees and dikes:								
20	Completed ... miles	.....	.....	.....	.....	.....	2.4	.....	.....
21	Additional under construction ... miles	.....	.....	.....	.....	.....	.....	.....	.....
22	Area drained by open ditches only [2] ... acres	47,520	20,000	.....	.....	3,197	[3] 18,950	12,085	.....
23	Length of these ditches ... miles	22.5	16.0	.....	.....	10.5	53.0	6.7	.....
24	Average length per acre ... feet	2.5	4.2	.....	.....	17.3	14.8	2.9	.....
25	Area drained by tile only [2] ... acres	.....	1,444	.....	9,700	.....	6,600	.....	495
26	Length of these tile ... miles	.....	14.9	.....	21.0	.....	20.0	.....	4.0
27	Average length per acre ... feet	.....	54.5	.....	11.4	.....	16.0	.....	42.7
28	Area drained by open ditches and tile [2] ... acres	.....	.....	6,000	.....	.....	[4] 6,720	.....	1,254
29	Length of these drains ... miles	.....	.....	15.8	.....	.....	13.7	.....	9.4
30	Average length per acre ... feet	.....	.....	13.9	.....	.....	10.8	.....	39.6
	DEVELOPMENT OF LAND.								
31	Improved land in operating enterprises, 1920 ... acres	23,760	20,083	5,400	9,700	3,101	25,347	12,085	1,408
32	Improved land prior to drainage ... acres	23,760	18,566	4,500	4,484	.....	17,710	.....	353
33	Increase since drainage ... acres	.....	1,517	900	5,216	3,101	7,637	12,085	1,055
34	Per cent of increase [5]	.....	8.2	20.0	116.3	.....	43.1	.....	298.9
35	Per cent increase is of all improved land in farms, 1920	.....	0.4	0.4	2.2	0.4	2.3	5.1	0.1
36	Unimproved land, 1920 ... acres	23,760	1,361	600	.....	96	6,923	.....	341
37	Unimproved land prior to drainage ... acres	23,760	2,878	1,500	5,216	3,197	14,560	12,085	1,396
38	Decrease since drainage ... acres	.....	1,517	900	5,216	3,101	7,637	12,085	1,055
39	Per cent of decrease	.....	52.7	60.0	100.0	97.0	52.5	100.0	75.6
40	Swampy or subject to overflow, 1920 ... acres	.....	81	600	.....	.....	2,729	.....	498
41	Swampy or subject to overflow prior to drainage ... acres	14,256	18,588	5,100	1,690	3,197	19,839	11,973	1,136
42	Decrease since drainage ... acres	14,256	18,507	4,500	1,690	3,197	17,110	11,973	638
43	Per cent of decrease	100.0	99.6	88.2	100.0	100.0	86.2	100.0	56.2
	CAPITAL INVESTED AND COST PER ACRE.								
44	Total capital invested in and required for completion of operating enterprises ... dollars	96,906	326,436	86,581	85,000	13,028	162,774	57,000	21,782
45	Capital invested in these enterprises to Dec. 31, 1919 ... dollars	53,000	301,436	36,581	50,000	13,028	162,774	57,000	21,782
46	Additional capital required to complete these enterprises ... dollars	43,906	25,000	50,000	35,000	.....	.....	.....	.....
47	Average cost per acre when completed ... dollars	2.04	15.22	14.43	8.76	4.08	5.04	4.72	12.45
48	Enterprises constructing open ditches only ... dollars	96,906	280,000	.....	.....	13,028	[6] 66,908	57,000	.....
49	Average cost per acre when completed ... dollars	2.04	14.00	.....	.....	4.08	3.53	4.72	.....
50	Enterprises constructing tile drains only ... dollars	.....	46,436	.....	85,000	.....	63,831	.....	8,421
51	Average cost per acre when completed ... dollars	.....	32.16	.....	8.76	.....	9.67	.....	17.01
52	Enterprises constructing open ditches and tile drains ... dollars	.....	.....	86,581	.....	.....	[7] 32,035	.....	13,361
53	Average cost per acre when completed ... dollars	.....	.....	14.43	.....	.....	4.77	.....	10.65
	CROPS.								
	Improved land in enterprises reporting—								
54	Corn as principal crop on drained land ... acres	.....	20,083	5,400	9,700	.....	25,347	12,085	343
55	Wheat as principal crop on drained land ... acres	23,760	.....	.....	.....	3,101	.....	.....	1,065
56	Barley as principal crop on drained land ... acres	.....	.....	.....	.....	.....	.....	.....	.....

[1] Includes only Codington, Grant, Hamlin, and Miner Counties.
[2] When works under construction have been completed.
[3] Includes one enterprise constructing also 1.8 miles of levee.
[4] Includes one enterprise constructing also 0.6 mile of levee.
[5] Per cent not shown when more than 1,000.
[6] Includes cost of 1.8 miles of levee.
[7] Includes cost of 0.6 mile of levee.

TENNESSEE.

The following pages present the statistics of drainage for Tennessee 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 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.

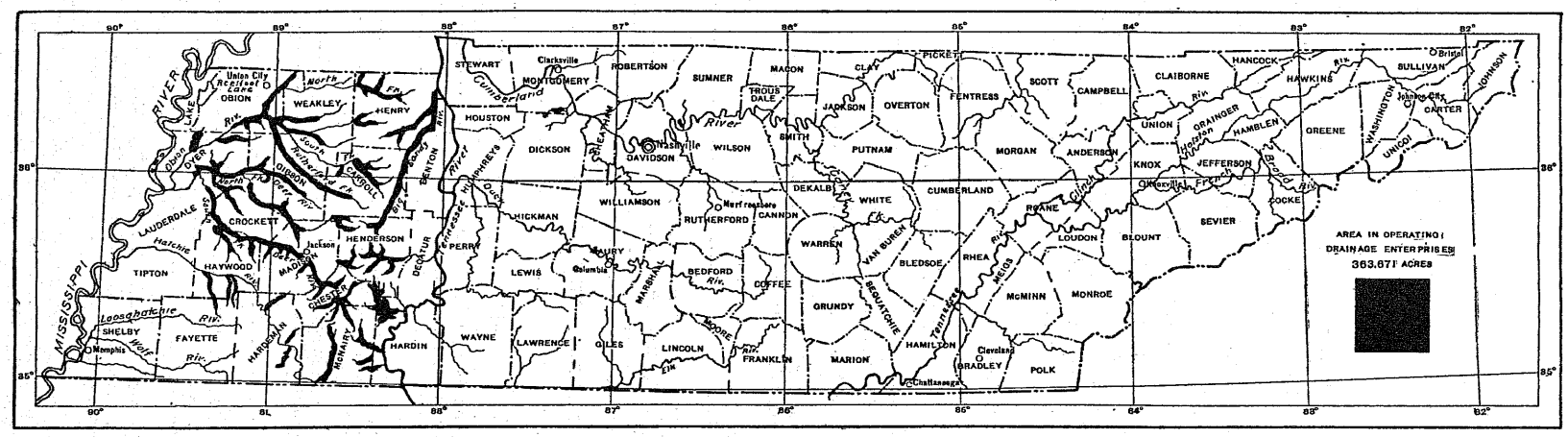
TABLE 1.—SUMMARY FOR THE STATE: 1920.

ITEM.	Amount.	Per cent of total.
DRAINAGE ON FARMS.		
Number of all farms in the state	252,774	100.0
Farms reporting land having drainage	8,887	3.5
Farms reporting land needing drainage	20,997	8.3
All land in farms ... acres	19,510,856	100.0
Improved land in farms ... acres	11,185,302	57.3
Farm land reported as provided with drainage ... acres	254,118	1.3
Farm land reported as needing drainage ... acres	640,479	3.3
Needing drainage only ... acres	76,644	0.4
Needing drainage and clearing ... acres	563,835	2.9
DRAINAGE ENTERPRISES.		
Approximate land area of the state ... acres	26,679,680	100.0
All land in operating drainage enterprises ... acres	363,671	1.4
Improved land ... acres	163,218	0.6
Per cent of all improved land in farms	1.5	.....
Timber and cut-over land ... acres	189,945	0.7
Other unimproved land ... acres	10,508	(1)
Swampy, subject to overflow, seeped, or alkali ... acres	104,063	0.4
Suffering a loss of crops from defective drainage ... acres	29,879	0.1
Improved land prior to drainage ... acres	86,028	0.3
Increase since drainage began ... acres	77,190	0.3
Land in nonoperating enterprises ... acres	82,284	0.3
Open ditches in operating enterprises ... miles	912.7	100.0
Completed ... miles	777.3	85.2
Additional under construction ... miles	135.4	14.8
Tile drains in operating enterprises ... miles	0.4	100.0
Completed ... miles	0.3	75.0
Additional under construction ... miles	0.1	25.0
Total capital invested in and required for completion of operating enterprises	$3,447,991	100.0
Capital invested in these enterprises to Dec. 31, 1919	2,925,944	84.9
Additional capital required to complete these enterprises	522,047	15.1
Average cost per acre when completed	9.48	.....

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

TENNESSEE

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 court decree 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.[1]		
	Acreage.	Per cent of total.	To Dec. 31, 1919. Amount.	To Dec. 31, 1919. Per cent of total.	Additional required to complete.
All organized enterprises	445,955	100.0	$2,995,515	100.0	$1,447,230
Operating enterprises	363,671	81.5	2,925,944	97.7	522,047
With works completed	268,667	60.2	2,283,589	76.2	.....
With works under construction	95,004	21.3	642,355	21.4	522,047
Nonoperating enterprises	82,284	18.5	69,571	2.3	925,183

[1] The inquiry asked for the "total cost of the enterprise to December 31, 1919," and for an "estimate of additional investment to complete."

Location of enterprises.—The drainage enterprises in the state lie almost entirely west of Tennessee River. Most of them are drained through the smaller tributaries of the Mississippi—namely, Obion River, Forked Deer River, and Hatchee River; some are drained through Big Sandy River, Beech River, and a few of the creeks entering the Tennessee; two small enterprises are drained into the Cumberland.

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. Amount.	To Dec. 31, 1919. Per cent of total.	Additional required to complete.
All organized enterprises	445,955	100.0	$2,995,515	100.0	$1,447,230
Operating enterprises	363,671	81.5	2,925,944	97.7	522,047
Mississippi River	275,899	61.8	2,443,362	81.5	219,047
Tennessee and Cumberland Rivers	87,772	19.7	482,582	16.1	303,000
Nonoperating enterprises	82,284	18.5	69,571	2.3	925,183
Mississippi River	81,880	18.4	69,571	2.3	919,183
Tennessee and Cumberland Rivers	404	0.1	.....	.....	6,000

Condition of land in enterprises.—The enterprises generally are narrow strips bordering the streams, which in their natural condition are crooked and considerably obstructed. The resultant overflows cause damage to planted crops or keep the areas so wet that cultivation is not attempted until artificial drainage improvements have been provided. In the lower-lying counties near the Mississippi River, flood elevations in that stream cause backwater to overflow land along its tributaries. The soils are mostly alluvial, and when drained are naturally of greater fertility than those on the higher 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 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 all land.			
All land in enterprises	363,671	100.0	268,667	95,004	82,284
Improved land	163,218	44.9	135,284	27,934	23,116
Timber and cut-over land	189,945	52.2	129,536	60,409	57,150
Other unimproved land	10,508	2.9	3,847	6,661	2,018
Swampy or subject to overflow	104,063	28.6	21,631	82,432	76,004
Suffering a loss of crops	29,879	8.2	7,816	22,063	17,536

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 95 operating drainage enterprises are counted in Tennessee, with an average area of 3,828 acres. There are only 9 operating enterprises of 10,000 acres or more each, and there are 49 that comprise between 1,000 and 5,000 acres each. There is no overlapping of 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	363,671	363,671	100.0
Less than 200 acres	121	121	(1)
200 to 499 acres	2,156	2,156	0.6
500 to 999 acres	12,465	12,465	3.4
1,000 to 4,999 acres	117,651	117,651	32.4
5,000 to 9,999 acres	91,612	91,612	25.2
10,000 to 49,999 acres	139,666	139,666	38.4

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

Character of enterprises.—All the present drainage enterprises, both operating and nonoperating, for agricultural land in Tennessee are public corporations organized under the general drainage district law of the state, approved April 28, 1909 (ch. 185). The statute applies to the whole state except Reelfoot Lake.

Drainage districts and levee districts are established by the county courts upon petition from one or more persons to be affected by the proposed improvement, if the work "will be of public utility or conducive to the public health or welfare." The affairs of the district are managed by a board of directors consisting of the judge or chairman of the county court and two persons owning or interested in lands of the district, appointed by the court. The cost of the enterprise is paid by the landowners in proportion to the benefits their lands will receive; the assessments are collected like county taxes. Provision is made for districts embracing land in two or more counties.

The petition must describe approximately the land to be affected and the location of the proposed drains. The court appoints an engineer to make a survey, and to report regarding the land to be affected and the plan of reclamation that will be of public benefit, with an estimate of the cost of the project. The court appoints viewers to make recommendations regarding claims for damages, if any are filed, and after establishing the district he appoints three commissioners to apportion the cost. Public hearings are held, upon the engineer's report and again upon the commissioners' report. Appeal from decisions of the county court may be taken to the circuit court. The board of directors lets the contract and carries out the improvement, and may issue bonds running not more than 20 years.

This law provides that the owners of the land to be affected by a drain or system of drains may agree among themselves regarding the location of the improvement works, the amounts of damages to be paid, and the apportionment of the cost, and file their agreement in writing with the clerk of the county, whereupon the county court will assume jurisdiction and complete the enterprise in accordance with the agreement and in the manner that the law provides for establishing drainage districts. This provision is practicable only where few land owners are interested, and has been used by enterprises embracing a total of 2,500 acres.

Subdistricts within a drainage district may be formed in the same manner as an original district. They will be administered by the board of directors of the drainage district, and assessments for the subdistrict will be secondary to those of the original district.

The first drainage law of Tennessee was enacted in 1842, providing relief for a landowner who could not drain his own land without crossing that of another owner who refused permission for the necessary ditch. The aggrieved owner was permitted to petition the county court, which then would appoint a jury to assess the damages that should be paid for the privilege sought. The petitioner, after paying such damages, or offering payment, might construct and maintain the ditch.

Public drainage work evidently began as supplemental to flood protection by levees. In 1871 the counties were authorized, upon affirmative vote of three-fourths of the voters affected, to issue bonds to raise funds to build levees. In 1901 they were authorized to retain the increment of taxes received, by reason of enhanced value of taxable property resulting from levees and drainage constructed with funds raised by bond issues of the county, to apply upon the payment of such bonds.

Some special acts have been passed, before and since the drainage law of 1909 was enacted, permitting persons interested in overflowed land to ditch and straighten certain streams, but the form of organization was not specified, and no enterprises were reported as organized under those special acts.

Drainage Works.—The total works completed by drainage enterprises to December 31, 1919, comprised 777.3 miles of open ditches, 0.3 mile of tile drains, and 42.3 miles of accessory levees; the additional lengths under construction were 135.4 miles of open ditches, 0.1 mile of tile drains, and 10.2 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 are no pumping districts for land drainage in Tennessee.

TABLE 6.—LAND AND CAPITAL INVESTED IN OPERATING ENTERPRISES, CLASSIFIED BY KIND OF DRAINAGE WORKS: 1920.

KIND OF WORKS.	LAND.		CAPITAL.		
			To Dec. 31, 1919.		Additional required to complete.
	Acreage.	Per cent of total.	Amount.	Per cent of total.	
All kinds	363,671	100.0	$2,925,944	100.0	$522,047
Open ditches only	332,317	91.4	2,439,944	83.4	511,847
Open ditches and levees	30,854	8.5	481,000	16.4	7,700
Tile drains only	500	0.1	5,000	0.2	2,500

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, 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 because the area served is very small, and those of 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 these groups, computed as 3 feet and 10 feet, respectively, would make the mean depth for the state 7.3 instead of 6.8 feet.

TABLE 7.—LAND IN OPERATING ENTERPRISES, CLASSIFIED BY AVERAGE DEPTH OF BRANCH DITCHES: 1920.

DEPTH OF BRANCH DITCHES.	Acreage.	Per cent of total.
All operating enterprises	363,671	100.0
Less than 3 feet	2,000	0.6
3.0 to 3.9 feet	.....	.....
4.0 to 4.9 feet	6,700	1.8
5.0 to 5.9 feet	6,862	1.9
6.0 to 6.9 feet	81,300	22.4
7.0 to 7.9 feet	91,084	25.0
8.0 to 8.9 feet	56,793	15.6
9.0 to 9.9 feet	9,647	2.7
10 feet and more	45,544	12.5
Not reporting branches	63,741	17.5

Maintenance of Works.—The general drainage law provides (act of April 3, 1915, chapter 63), that the board of directors of a drainage district may provide for keeping the drainage works in repair and free from obstructions, by levying a special assessment not to exceed in any year an amount equal to 10 cents per acre upon all the land in the district, and to be based upon the apportionment of the benefits made by the commissioners for apportioning the cost of original construction.

TABLE 8.—LAND AND CAPITAL INVESTED IN OPERATING ENTERPRISES, CLASSIFIED BY METHOD OF MAINTENANCE: 1920.

METHOD OF MAINTENANCE.	LAND.		CAPITAL.		
			To Dec. 31, 1919.		Additional required to complete.
	Acreage.	Per cent of total.	Amount.	Per cent of total.	
All operating enterprises	363,671	100.0	$2,925,944	100.0	$522,047
By district forces	216,559	59.5	1,564,859	53.5	463,200
By contract	98,810	27.2	891,474	30.5	23,000
By landowners	500	0.1	5,000	0.2	2,500
By other methods	600	0.2	7,015	0.2	.....
No maintenance provided	47,202	13.0	457,596	15.6	33,347

Date of Organization.—The progress in drainage development is shown only roughly by the dates of the organization of enterprises, which are the dates when the districts were established by the county 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.

TABLE 9.—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	363,671	100.0	363,671	100.0
1910 to 1914	135,679	37.3	135,679	37.3
1915 to 1919	227,992	62.7	227,992	62.7

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	$2,925,944	100.0	$522,047
1910 to 1914	1,218,662	41.7	12,200
1915 to 1919	1,707,282	58.3	509,847

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	912.7	100.0	0.4	100.0	52.5	100.0
1910 to 1914	287.5	31.5	0.4	100.0	52.5	100.0
1915 to 1919	625.2	68.5	.....	.....	.....	.....

Crops.—The principal crops grown upon the drained land in drainage enterprises are corn and cotton. 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.	Bedford.	Benton.	Carroll.	Chester.	Cocke.	Crockett.	Decatur.
1	Number of all farms in the state or county	252,774	3,340	1,983	4,141	1,667	2,800	3,072	1,813
2	Farms reporting land having drainage	8,887	330	277	249	316	114	220	373
3	Farms reporting land needing drainage	20,997	387	579	415	462	449	131	394
4	Farms in drainage and levee districts	2,669	4	2	261	163	4	227	1
	LAND AND FARM AREA.								
5	Approximate land area of the state or county ... acres	26,679,680	328,960	291,840	396,160	200,320	273,280	170,880	184,320
6	All land in farms ... acres	19,510,856	283,605	203,781	332,123	151,830	218,463	147,308	169,375
7	Improved land in farms ... acres	11,185,302	201,279	80,407	165,804	62,713	119,390	117,670	64,609
8	Woodland in farms ... acres	7,080,169	70,259	104,210	108,409	62,118	96,320	26,851	90,077
9	Other unimproved land in farms ... acres	1,245,385	12,067	19,164	57,910	26,999	2,753	2,787	14,689
10	Farm land reported as provided with drainage ... acres	254,118	5,584	4,781	9,577	8,248	2,895	7,168	7,400
11	Farm land reported as needing drainage ... acres	640,479	6,172	20,800	14,563	14,042	18,676	6,029	12,443
12	Drainage only ... acres	76,644	1,644	1,386	2,300	1,720	325	1,205	1,630
13	Drainage and clearing ... acres	563,835	4,528	19,414	12,263	12,322	18,351	4,824	10,813

		Dyer.	Fayette.	Franklin.	Gibson.	Greene.	Hamblen.	Hardeman.	Hardin.	Hawkins.
1	Number of all farms in the county	3,922	5,875	2,230	6,585	5,313	1,564	3,535	2,907	3,314
2	Farms reporting land having drainage	220	7	119	377	177	58	105	336	119
3	Farms reporting land needing drainage	159	222	418	931	498	38	258	329	96
4	Farms in drainage and levee districts	127	1	2	420	4	.....	18	182	10
	LAND AND FARM AREA.									
5	Approximate land area of the county ... acres	320,000	395,520	368,000	405,120	392,320	101,120	446,080	372,480	308,480
6	All land in farms ... acres	199,198	355,523	214,252	330,804	345,728	109,203	333,857	230,037	286,328
7	Improved land in farms ... acres	158,323	236,785	129,426	251,837	245,593	83,480	144,215	109,496	181,460
8	Woodland in farms ... acres	39,274	78,937	69,023	59,957	86,740	22,219	139,320	106,553	96,102
9	Other unimproved land in farms ... acres	1,601	39,801	15,803	19,010	13,395	3,504	50,322	13,988	8,766
10	Farm land reported as provided with drainage ... acres	7,891	384	2,056	10,709	4,118	1,481	3,788	6,848	3,922
11	Farm land reported as needing drainage ... acres	5,840	5,748	12,859	20,500	8,270	572	13,332	7,011	2,107
12	Drainage only ... acres	1,287	463	659	1,998	1,912	195	1,710	2,146	619
13	Drainage and clearing ... acres	4,553	5,285	12,200	18,502	6,358	377	11,622	4,865	1,488

		Haywood.	Henderson.	Henry.	Hickman.	Jefferson.	Lake.	Lauderdale.	McNairy.	Madison.
1	Number of all farms in the county	4,359	3,290	4,286	1,928	2,209	850	3,406	3,263	4,467
2	Farms reporting land having drainage	43	726	134	59	62	16	83	412	94
3	Farms reporting land needing drainage	230	694	690	113	61	205	65	517	265
4	Farms in drainage and levee districts	72	248	124	.....	1	23	81	145	98
	LAND AND FARM AREA.									
5	Approximate land area of the county ... acres	325,120	343,040	400,640	364,800	199,680	78,080	291,840	376,320	353,280
6	All land in farms ... acres	207,711	300,632	349,597	235,045	182,477	60,250	173,437	283,843	305,617
7	Improved land in farms ... acres	159,717	140,360	192,247	97,899	135,552	52,619	122,735	117,654	179,052
8	Woodland in farms ... acres	37,645	108,631	115,598	120,057	41,585	7,122	47,158	146,587	88,350
9	Other unimproved land in farms ... acres	10,349	51,641	41,752	17,089	5,340	509	3,544	19,602	38,215
10	Farm land reported as provided with drainage ... acres	2,751	16,194	5,192	765	2,642	490	2,707	8,355	6,796
11	Farm land reported as needing drainage ... acres	7,404	21,674	24,477	1,931	2,037	6,523	7,892	15,649	8,303
12	Drainage only ... acres	432	3,896	5,973	68	210	3,506	1,912	2,298	508
13	Drainage and clearing ... acres	6,972	17,778	18,504	1,863	1,827	3,017	5,980	13,351	7,795

		Marion.	Meigs.	Montgomery.	Obion.	Roane.	Rutherford.	Sumner.	Weakley.	All other counties.[1]
1	Number of all farms in the county	1,037	935	4,121	3,378	1,687	5,264	4,585	5,050	144,598
2	Farms reporting land having drainage	104	38	118	716	156	170	26	418	2,115
3	Farms reporting land needing drainage	128	19	202	534	406	222	383	362	10,135
4	Farms in drainage and levee districts	.....	.....	25	138	1	2	2	198	85
	LAND AND FARM AREA.									
5	Approximate land area of the county ... acres	314,240	127,360	330,240	353,280	248,320	392,960	357,120	371,200	16,497,280
6	All land in farms ... acres	114,882	124,528	317,968	290,797	180,463	361,906	318,559	318,104	11,467,625
7	Improved land in farms ... acres	50,812	65,291	222,095	224,632	90,607	222,056	225,666	225,397	6,308,424
8	Woodland in farms ... acres	55,293	54,666	66,000	70,086	79,792	120,169	69,893	75,391	4,519,777
9	Other unimproved land in farms ... acres	8,777	4,571	29,873	2,079	10,064	19,681	23,000	17,316	639,424
10	Farm land reported as provided with drainage ... acres	1,978	1,284	3,874	55,183	2,413	4,459	483	21,061	30,641
11	Farm land reported as needing drainage ... acres	3,018	407	6,373	22,293	9,779	3,706	6,641	13,792	309,616
12	Drainage only ... acres	531	182	983	3,357	1,597	1,917	426	3,866	23,783
13	Drainage and clearing ... acres	2,487	225	5,390	18,936	8,182	1,789	6,215	9,926	285,833

[1] No drainage on farms reported in Dickson, Houston, Lewis, and Van Buren Counties.

COUNTY TABLE II.—OPERATING DRAINAGE ENTERPRISES: 1920.

		The State.	Carroll.	Chester.	Crockett.	Dyer.	Fayette.	Gibson.	Hardeman
	LAND AREA.								
1	Approximate land area of the state or county ... acres	26,679,680	396,160	200,320	170,880	320,000	395,520	405,120	446,080
2	All land in operating drainage enterprises ... acres	363,671	33,724	13,125	17,282	43,106	1,928	46,484	5,542
3	Improved land ... acres	163,218	8,043	8,422	8,669	18,853	1,169	22,951	2,201
4	Per cent of all improved land in farms	1.5	4.9	13.4	7.4	11.9	0.5	9.1	1.5
5	Timber and cut-over land ... acres	189,945	24,971	4,703	8,613	24,253	759	23,533	3,341
6	Other unimproved land ... acres	10,508	710	...	...	...	...	...	...
7	Swampy or subject to overflow, in enterprises ... acres	104,063	5,832	1,112	...	25,000	121	948	3,194
8	Suffering a loss of crops from defective drainage ... acres	29,879	1,771	...	...	8,000	121	474	97
9	Assessed acreage	363,671	33,724	13,125	17,282	43,106	1,928	46,484	5,542
10	Excess over all land in operating enterprises ... acres	...	...	...	...	...	...	...	...
	DRAINAGE WORKS.								
	Open ditches:								
11	Completed ... miles	777.3	114.9	61.8	39.5	71.2	5.0	79.3	17.6
12	Additional under construction ... miles	135.4	21.3	0.7	...	10.5	0.5	...	5.5
13	Maximum completed in any enterprise ... miles	55.0	55.0	24.5	10.6	20.0	2.8	26.2	7.0
14	Maximum width, at bottom of ditch [1] ... feet	80	30	28	70	80	12	30	15
15	Maximum of average depths of outlet ditches [1] ... feet	16.0	12.0	12.0	15.0	16.0	7.5	11.0	8.0
16	Mean depth of branch ditches [1] ... feet	6.8	6.2	7.0	7.2	7.8	6.0	7.2	6.0
	Tile drains:								
17	Completed ... miles	0.3	...	...	...	...	...	...	...
18	Additional under construction ... miles	0.1	...	...	...	...	...	...	...
19	Maximum completed in any enterprise ... miles	0.3	...	...	...	...	...	...	...
20	Maximum size of tile [1] ... inches	10	...	...	...	...	...	...	...
	Accessory levees and dikes:								
21	Completed ... miles	42.3	...	...	...	...	...	...	...
22	Additional under construction ... miles	10.2	...	...	...	...	...	...	...
23	Area drained by open ditches only [1] ... acres	332,317	33,724	13,125	17,282	43,106	1,928	46,484	5,542
24	Length of these ditches ... miles	862.2	136.2	62.5	39.5	81.7	5.5	79.3	23.1
25	Average length per acre ... feet	13.7	21.3	25.1	12.1	10.0	15.1	9.0	22.0
26	Area having open ditches and levees [1] ... acres	30,854	...	...	...	...	...	...	...
27	Length of these ditches ... miles	50.5	...	...	...	...	...	...	...
28	Average length per acre ... feet	8.6	...	...	...	...	...	...	...
29	Length of the accessory levees ... miles	52.5	...	...	...	...	...	...	...
30	Area drained by tile only [1] ... acres	500	...	...	...	...	...	...	...
31	Length of these tile ... miles	0.4	...	...	...	...	...	...	...
32	Average length per acre ... feet	4.2	...	...	...	...	...	...	...
	DEVELOPMENT OF LAND.								
33	Improved land in operating enterprises, 1920 ... acres	163,218	8,043	8,422	8,669	18,853	1,169	22,951	2,201
34	Improved land prior to drainage ... acres	86,028	2,119	3,725	4,379	13,321	618	12,003	1,221
35	Increase since drainage ... acres	77,190	5,924	4,697	4,290	5,532	551	10,948	980
36	Per cent of increase	89.7	279.6	126.1	98.0	41.5	89.2	91.2	80.3
37	Per cent increase is of all improved land in farms, 1920	0.7	3.6	7.5	3.6	3.5	0.2	4.3	0.7
38	Timber and cut-over land, 1920 ... acres	189,945	24,971	4,703	8,613	24,253	759	23,533	3,341
39	Timber and cut-over land prior to drainage ... acres	262,163	30,895	9,116	12,903	29,785	1,310	34,481	4,321
40	Decrease since drainage ... acres	72,218	5,924	4,413	4,290	5,532	551	10,948	980
41	Per cent of decrease	27.5	19.1	48.4	33.2	18.6	42.1	31.8	22.7
42	Other unimproved land, 1920 ... acres	10,508	710	...	...	...	...	...	...
43	Other unimproved land prior to drainage ... acres	15,480	710	284	...	...	...	...	...
44	Decrease since drainage ... acres	4,972	...	284	...	...	...	...	...
45	Per cent of decrease	32.1	...	100.0	...	...	...	...	...
46	Swampy or subject to overflow, 1920 ... acres	104,063	5,832	1,112	...	25,000	121	948	3,194
47	Swampy or subject to overflow prior to drainage ... acres	353,027	33,724	13,125	16,782	43,106	1,928	36,806	5,542
48	Decrease since drainage ... acres	248,964	27,892	12,013	16,782	18,106	1,807	35,858	2,348
49	Per cent of decrease	70.5	82.7	91.5	100.0	42.0	93.7	97.4	42.4
	CAPITAL INVESTED AND COST PER ACRE.								
50	Total capital invested in and required for completion of operating enterprises ... dollars	3,447,991	360,566	125,941	179,355	466,011	15,660	328,095	45,117
51	Capital invested in these enterprises to Dec. 31, 1919 ... dollars	2,925,944	310,216	124,946	179,355	346,511	14,451	328,095	36,915
52	Additional capital required to complete these enterprises ... dollars	522,047	50,350	995	...	119,500	1,209	...	8,202
53	Average cost per acre when completed ... dollars	9.48	10.69	9.60	10.38	10.81	8.12	7.06	8.14
54	Enterprises constructing open ditches only ... dollars	2,951,791	360,566	125,941	179,355	466,011	15,660	328,095	45,117
55	Average cost per acre when completed ... dollars	8.88	10.69	9.60	10.38	10.81	8.12	7.06	8.14
56	Enterprises constructing open ditches and levees ... dollars	488,700	...	...	...	...	...	...	...
57	Average cost per acre when completed ... dollars	15.84	...	...	...	...	...	...	...
58	Enterprises constructing tile drains only ... dollars	7,500	...	...	...	...	...	...	...
59	Average cost per acre when completed ... dollars	15.00	...	...	...	...	...	...	...
	CROPS.								
	Improved land in enterprises reporting—								
60	Corn as principal crop on drained land ... acres	110,022	7,695	8,119	3,535	10,128	...	22,951	2,201
61	Cotton as principal crop on drained land ... acres	53,196	348	303	5,134	8,725	1,169	...	...

[1] When works under construction have been completed.

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

		Hardin.	Hay-wood.	Hender-son.	Henry.	McNairy.	Madison.	Obion.	Other counties.[1]
	LAND AREA.								
1	Approximate land area of the county ... acres	372,480	325,120	343,040	400,640	376,320	353,280	353,280	1,642,240
2	All land in operating drainage enterprises ... acres	19,345	35,334	20,684	31,589	12,729	23,174	27,160	32,465
3	Improved land ... acres	11,334	20,059	11,433	6,800	7,041	11,727	13,676	10,840
4	Per cent of all improved land in farms	10.4	12.5	8.1	3.5	6.0	6.5	6.1	0.2
5	Timber and cut-over land ... acres	8,011	15,275	8,655	21,660	5,688	11,447	13,484	15,552
6	Other unimproved land ... acres			596	3,129				6,073
7	Swampy or subject to overflow in enterprises ... acres	4,045	1,480	2,658	24,454		1,154	18,252	15,813
8	Suffering a loss of crops from defective drainage ... acres	700	592	1,614	5,256			7,551	3,703
9	Assessed acreage	19,345	35,334	20,684	31,589	12,729	23,174	27,160	32,465
10	Excess over all land in operating enterprises ... acres								
	DRAINAGE WORKS.								
	Open ditches:								
11	Completed ... miles	44.6	58.3	64.2	35.5	52.2	48.8	58.0	26.4
12	Additional under construction ... miles		5.9	5.0	70.7	1.3			14.0
13	Maximum completed in any enterprise ... miles	9.0	17.4	13.0	19.5	12.0	15.0	29.0	16.0
14	Maximum width, at bottom of ditch[2] ... feet	24	50	30	45	20	45	47	70
15	Maximum of average depths of outlet ditches[2] ... feet	12.0	15.0	12.0	10.0	8.0	11.0	10.0	11.0
16	Mean depth of branch ditches[2] ... feet	8.0	6.4	6.8	6.1	6.0	7.2	8.0	7.0
	Tile drains:								
17	Completed ... miles								0.3
18	Additional under construction ... miles								0.1
19	Maximum completed in any enterprise ... miles								0.4
20	Maximum size of tile[2] ... inches								10
	Accessory levees and dikes:								
21	Completed ... miles							13.8	28.5
22	Additional under construction ... miles							10.2	
23	Area drained by open ditches only[2] ... acres	19,345	35,334	20,684	31,589	12,729	23,174	5,900	22,371
24	Length of these ditches ... miles	44.6	64.2	69.2	106.2	53.5	48.8	16.0	31.9
25	Average length per acre ... feet	12.2	9.6	17.6	17.7	22.2	11.1	14.3	7.5
26	Area having open ditches and levees[2] ... acres							21,260	9,594
27	Length of these ditches ... miles							42.0	8.5
28	Average length per acre ... feet							10.4	4.7
29	Length of the accessory levees ... miles							24.0	28.5
30	Area drained by tile only[2] ... acres								500
31	Length of these tile ... miles								0.4
32	Average length per acre ... feet								4.0
	DEVELOPMENT OF LAND.								
33	Improved land in operating enterprises, 1920 ... acres	11,334	20,059	11,433	6,800	7,041	11,727	13,676	10,840
34	Improved land prior to drainage ... acres	2,008	10,830	6,854	6,605	3,611	3,757	7,865	7,112
35	Increase since drainage ... acres	9,326	9,229	4,579	195	3,430	7,970	5,811	3,728
36	Per cent of increase	464.4	85.2	66.8	3.0	95.0	212.1	73.9	52.4
37	Per cent increase is of all improved land in farms, 1920	8.5	5.8	3.3	0.1	2.9	4.4	2.6	0.4
38	Timber and cut-over land, 1920 ... acres	8,011	15,275	8,655	21,660	5,688	11,447	13,484	15,552
39	Timber and cut-over land prior to drainage ... acres	15,357	24,504	11,166	21,855	9,118	19,417	19,295	18,640
40	Decrease since drainage ... acres	7,346	9,229	2,511	195	3,430	7,970	5,811	3,088
41	Per cent of decrease	47.8	37.7	22.5	0.9	37.6	41.0	30.1	16.6
42	Other unimproved land, 1920 ... acres			596	3,129				6,073
43	Other unimproved land prior to drainage ... acres	1,980		2,664	3,129				6,713
44	Decrease since drainage ... acres	1,980		2,068					640
45	Per cent of decrease	100.0		77.6					9.5
46	Swampy or subject to overflow, 1920 ... acres	4,045	1,480	2,658	24,454		1,154	18,252	15,813
47	Swampy or subject to overflow prior to drainage ... acres	19,345	35,334	20,684	31,589	12,729	22,833	27,160	32,340
48	Decrease since drainage ... acres	15,300	33,854	18,026	7,135	12,729	21,679	8,908	16,527
49	Per cent of decrease	79.1	95.8	87.1	22.6	100.0	94.9	32.8	51.1
	CAPITAL INVESTED AND COST PER ACRE.								
50	Total capital invested in and required for completion of operating enterprises ... dollars	95,210	221,742	188,576	327,791	114,387	185,585	400,450	393,505
51	Capital invested in these enterprises to Dec. 31, 1919 ... dollars	95,210	206,951	175,076	116,975	112,737	185,585	392,750	300,171
52	Additional capital required to complete these enterprises ... dollars		14,791	13,500	210,816	1,650		7,700	93,334
53	Average cost per acre when completed ... dollars	4.92	6.28	9.12	10.38	8.99	8.01	14.74	12.12
54	Enterprises constructing open ditches only ... dollars	95,210	221,742	188,576	327,791	114,387	185,585	71,750	226,005
55	Average cost per acre when completed ... dollars	4.92	6.28	9.12	10.38	8.99	8.01	12.16	10.10
56	Enterprises constructing open ditches and levees ... dollars							328,700	160,000
57	Average cost per acre when completed ... dollars							15.46	16.68
58	Enterprises constructing tile drains only ... dollars								7,500
59	Average cost per acre when completed ... dollars								15.00
	CROPS.								
	Improved land in enterprises reporting—								
60	Corn as principal crop on drained land ... acres	11,120		9,833	6,800	1,875	5,085	13,676	7,004
61	Cotton as principal crop on drained land ... acres	214	20,059	1,600		5,166	6,642		3,836

[1] Includes only Benton, Lauderdale, Montgomery, Sumner, and Weakley Counties.
[2] When works under construction have been completed.

TEXAS.

The following pages present the statistics of drainage for Texas 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.

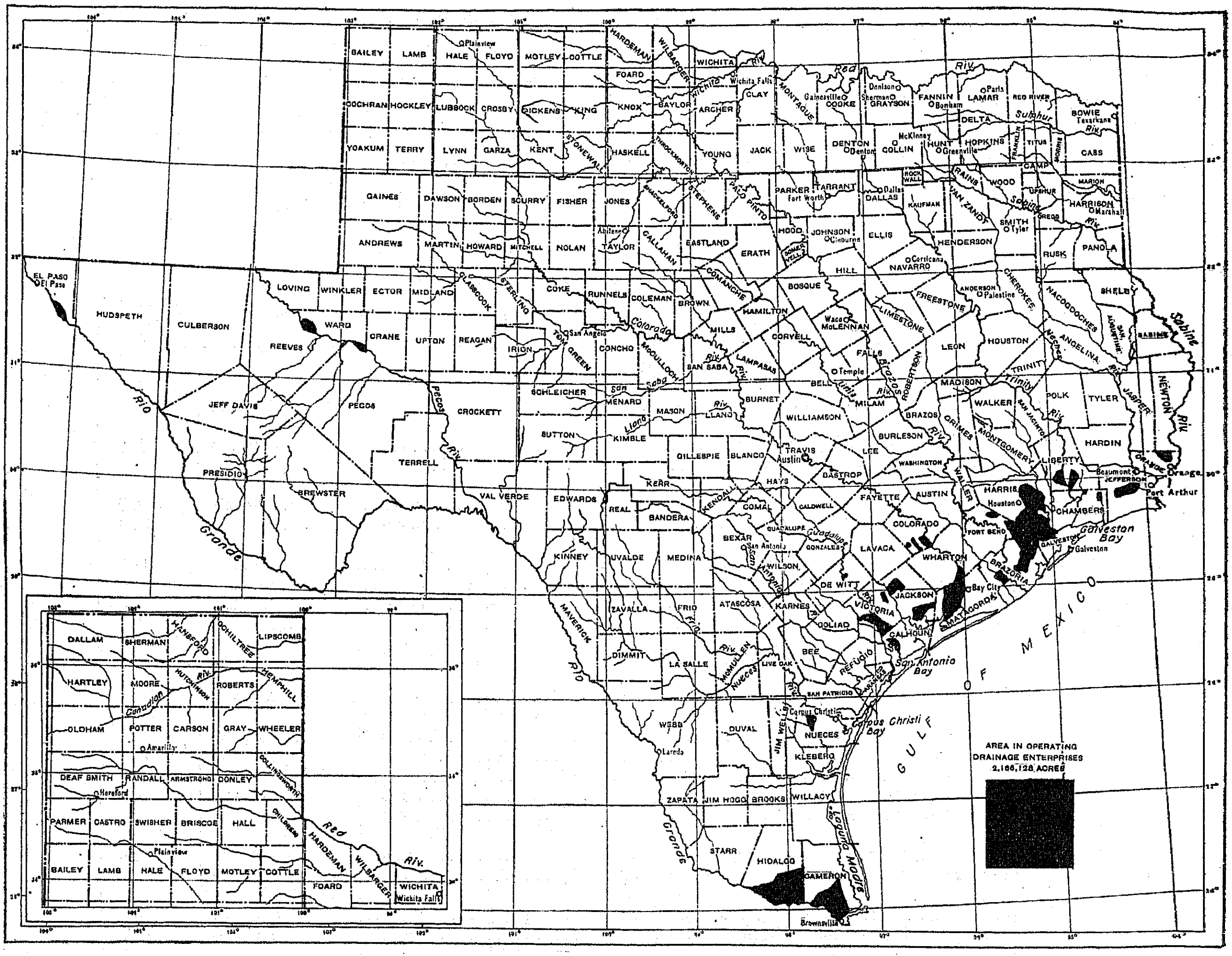
TABLE 1.—SUMMARY FOR THE STATE: 1920.

ITEM.	Amount.	Per cent of total.
DRAINAGE ON FARMS.		
Number of all farms in the state	436,033	100.0
Farms reporting land having drainage	8,106	1.9
Farms reporting land needing drainage	35,108	8.1
All land in farms ... acres	114,020,621	100.0
Improved land in farms ... acres	31,227,503	27.4
Farm land reported as provided with drainage ... acres	756,263	0.7
Farm land reported as needing drainage ... acres	4,130,614	3.6
Needing drainage only ... acres	385,225	0.3
Needing drainage and clearing ... acres	3,745,389	3.3
DRAINAGE ENTERPRISES.		
Approximate land area of the state ... acres	167,934,720	100.0
All land in operating drainage enterprises ... acres	2,166,128	1.3
Improved land ... acres	1,107,153	0.7
Per cent of all improved land in farms	3.5	.....
Timber and cut-over land ... acres	111,922	0.1
Other unimproved land ... acres	947,053	0.6
Swampy, subject to overflow, seeped, or alkali ... acres	201,051	0.1
Suffering a loss of crops from defective drainage ... acres	128,765	(1)
Improved land prior to drainage ... acres	566,275	0.3
Increase since drainage began ... acres	540,878	0.3
Land in nonoperating enterprises ... acres	.....	.....
Open ditches in operating enterprises ... miles	2,824.1	100.0
Completed ... miles	2,728.5	96.6
Additional under construction ... miles	95.6	3.4
Tile drains in operating enterprises ... miles	.....	.....
Completed ... miles	.....	.....
Additional under construction ... miles	.....	.....
Total capital invested in and required for completion of operating enterprises	$6,400,805	100.0
Capital invested in these enterprises to Dec. 31, 1919	5,700,805	89.1
Additional capital required to complete these enterprises	700,000	10.9
Average cost per acre when completed	2.95	.....

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

TEXAS

Approximate Location and Area of Operating Drainage Enterprises.



Operating and nonoperating enterprises.—In the tables that follow, statistics are given for operating enterprises only, as no nonoperating drainage enterprises were found in Texas. The operating enterprises, as already defined, include both those that 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 drainage works some years ago but were constructing extensions or enlargements on January 1, 1920.

TABLE 2.—LAND AND CAPITAL INVESTED IN ALL ENTERPRISES, CLASSIFIED AS BETWEEN WORKS COMPLETED AND WORKS UNDER CONSTRUCTION: 1920.

CLASS.	LAND.		CAPITAL.[1]		
			To Dec. 31, 1919.		Additional required to complete.
	Acreage.	Per cent of total.	Amount.	Per cent of total.	
All operating enterprises [2]	2,166,128	100.0	$5,700,805	100.0	$700,000
With works completed	2,080,128	96.0	5,055,805	88.7	.....
With works under construction	86,000	4.0	645,000	11.3	700,000

[1] The inquiry asked for the "total cost of the enterprise to Dec. 31, 1919," and for an "estimate of additional investment to complete."
[2] No nonoperating enterprises in Texas.

Location of enterprises.—The greater part of the land in drainage enterprises in Texas is situated in the counties near the gulf coast, more particularly in the eastern part of the state. There is a large area in such enterprises in the lower Rio Grande Valley, near Brownsville, and three areas in the upper Rio Grande and Pecos River Valleys. The approximate location of the land in the drainage enterprises is shown by the map on page 2, but it was necessary to prepare that map from information which, in many instances, was very indefinite regarding the location of the enterprise within the county.

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

DRAINAGE BASIN.	LAND.		CAPITAL.		
			To Dec. 31, 1919.		Additional required to complete.
	Acreage.	Per cent of total.	Amount.	Per cent of total.	
All operating enterprises [1]	2,166,128	100.0	$5,700,805	100.0	$700,000
Pecos River	47,440	2.2	83,000	1.5	.....
Rio Grande	513,871	23.7	1,261,000	22.1	600,000
San Antonio River	50,000	2.3	56,680	1.0	.....
Colorado River	288,281	13.3	765,824	13.4	100,000
Brazos River	205,707	9.5	682,000	12.0	.....
Trinity River	92,589	4.3	202,500	3.6	.....
Sabine Lake	68,275	3.2	116,600	2.0	.....
Gulf of Mexico	899,965	41.5	2,533,201	44.4	.....

[1] No nonoperating enterprises in Texas.

Condition of land in enterprises.—The drainage enterprises in the eastern part of Texas are for the drainage and reclamation of land generally swampy or subject to overflow. In the counties bordering the Gulf of Mexico are extensive tracts so little above sea level that the winding streams are too sluggish to drain the land. In the western part of the state, artificial drainage is for the reclamation and protection of land injured or threatened with water-logging and the concentration of salts, commonly called alkali, in the surface soil as a result of irrigation. In the Brownsville section are conditions like those of the humid eastern counties and others like those of the arid western region.

For the state, 8,000 acres of irrigated land in drainage enterprises are reported as not having needed drainage, but as having been assessed merely for contributing to the injury of the other land. This acreage is omitted from the tabulations.

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.[1]			
	Total.		Works completed (acres).	Works under construction (acres).
	Acreage.	Per cent of all land.		
All land in enterprises	2,166,128	100.0	2,080,128	86,000
Improved land	1,107,153	51.1	1,052,653	54,500
Timber and cut-over land	111,922	5.2	111,922	.....
Other unimproved land	947,053	43.7	915,553	31,500
Swampy, overflowed, seeped, or alkali	201,051	9.3	183,451	17,600
Suffering a loss of crops	128,765	5.9	116,965	11,800

[1] No nonoperating enterprises in Texas.

Size of enterprises.—There are 54 operating drainage enterprises in Texas, with an average area of 40,113 acres. Of this number, 30 are of 10,000 to 50,000 acres each, and only 8 are smaller than 10,000 acres each. There is no overlapping of the enterprises in this state, and no enterprise is situated in more than one county.

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	2,166,128	2,166,128	100.0
200 to 499 acres	1,957	1,957	0.1
500 to 999 acres	.....	.....	.....
1,000 to 4,999 acres	9,619	9,619	0.4
5,000 to 9,999 acres	32,032	32,032	1.5
10,000 to 49,999 acres	746,544	746,544	34.5
50,000 to 99,999 acres	918,105	918,105	42.4
100,000 to 499,999 acres	457,871	457,871	21.1

Character of enterprises.—The drainage enterprises in Texas are drainage districts organized under the state drainage district laws of 1907 and 1911, drainage work in the Rio Grande Project of the United States Reclamation Service, a small levee improvement district that has constructed drainage ditches, and one enterprise under private ownership.

The office of State Reclamation Engineer was created by an act of April 7, 1913, to plan and lay out the improvements necessary to reclaim the swamp and overflowed land of the state and make it suitable for agricultural uses. This act abolished the State Levee and Drainage Board and the office of the State Levee and Drainage Commissioner, created by act of March 19, 1909 (ch. 81), which was rewritten by act of March 20, 1911 (ch. 88). It is specifically provided that no money appropriated by the act shall be used for construction of the improvement works. The law requires that each drainage, levee, or improvement district shall file with the State Reclamation Engineer a complete record of its organization, plans, and estimates, immediately prior to the approval of its bond issue by the attorney general of the state.

The drainage district law approved March 28, 1911 (ch. 118), supersedes the act of March 23, 1907 (ch. 40), which was similar to the later law in its principal provisions. The present statute authorizes the establishment of drainage districts by the county commissioners' court, upon petition from 25 freehold resident taxpayers or from one-third of all such taxpayers in the proposed district. After the sufficiency of the petition is determined at public hearing, the commissioners appoint an engineer to make a survey and preliminary plans for the improvement works. Public hearing is held again upon the engineer's report. Before the district is organized, the issue of bonds and levy of the drainage tax must be approved by two-thirds of the voting property taxpayers at a special election. Three drainage commissioners to administer the affairs of the district are appointed by the county commissioners, or they are elected by the real property taxpayers of the district if a majority of those taxpayers petition for such an election. The bonds of the district may not be issued for longer than 40 years, and must be approved by the attorney general of the state. They are paid by the proceeds of taxes levied annually upon all real, personal, and other property in the district. This law does not provide for organizing a drainage district located in more than one county. The several amendments to this law have not affected the character of the enterprises as described.

Levee improvement districts are organized under a law of April 1, 1915 (ch. 146), which repealed a somewhat similar law of March 19, 1909 (ch. 85). These districts are established by the county commissioners' court upon petition from the owners of a majority of the acreage in the proposed district, and each is under the control of three district supervisors appointed by the court. Bond issues and taxes for drainage must be approved as in drainage districts. The Conservation and Reclamation District Act of March 24, 1919 (ch. 44), makes it unlawful for any levee improvement district to construct or maintain any levee or other improvement without first obtaining the State Reclamation Engineer's approval of the proposed work.

The first public drainage law of Texas was passed in April, 1895 (ch. 97). It provided for the establishment of drainage districts by the county commissioners' court, to be under the control of that court, upon petition from five owners of land to be affected. The work was to be apportioned to each tract of land, corporation, county highway, and railroad in proportion to the benefits to be derived by each. A similar law was enacted in 1897 (ch. 77). An act of April 11, 1899 (ch. 64), authorizes the creation of drainage districts by the county commissioners' court, to be controlled by that court, the cost of drainage to be paid by an ad valorem tax upon all property in the county or subdivision thereof. A statute of 1905 (ch. 110) provides that drainage districts may be established by the county commissioners' court upon petition from 50 or a majority of the resident owners of land that will be affected, to be under the control of that court or of elected trustees as desired by the property holders. This act authorizes the formation of drainage districts situated in two or more counties. No enterprises were reported as organized under these laws, though all are still in effect except in so far as that of 1895 has been superseded by that of 1897.

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. Amount.	To Dec. 31, 1919. Per cent of total.	Additional required to complete.
All operating enterprises[1]	2,166,128	100.0	$5,700,805	100.0	$700,000
Drainage districts	2,096,282	96.8	4,954,981	86.9	100,000
Laws of 1907, ch. 40	1,560,205	72.0	3,266,380	57.3	.....
Laws of 1911, ch. 118	536,077	24.7	1,688,601	29.6	100,000
U. S. Reclamation Service	56,000	2.6	635,000	11.1	600,000
Other[2]	13,846	0.6	110,824	1.9	.....

[1] No nonoperating enterprises in Texas.
[2] Includes 1,477 acres in a levee improvement district under laws of 1915 (ch. 146); 7,500 acres under individual ownership; and 4,869 acres in a drainage district under a law not specified.

Drainage works.—The total works completed by drainage enterprises to December 31, 1919, comprised 2,728.5 miles of open ditches and 59.8 miles of accessory levees; the additional works under construction were 95.6 miles of open ditches only. These figures do not include drains 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 open ditches or tile drains. 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.		
			To Dec. 31, 1919.		Additional required to complete.
	Acreage.	Per cent of total.	Amount.	Per cent of total.	
All kinds	2,166,128	100.0	$5,700,805	100.0	$700,000
Open ditches only	1,617,933	74.7	4,889,205	85.8	700,000
Open ditches and levees	548,195	25.3	811,600	14.2	.....

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 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, 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 of 10 feet and more were omitted; to include these groups, computed as 3 feet and 10 feet, respectively, would show the mean depth for the state 4.0 instead of 3.8 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	2,166,128	100.0
Less than 3 feet	64,250	3.0
3.0 to 3.9 feet	585,086	27.0
4.0 to 4.9 feet	808,948	37.3
5.0 to 5.9 feet	249,207	11.5
6.0 to 6.9 feet	1,477	0.1
7.0 to 7.9 feet	20,289	0.9
8.0 to 8.9 feet	.....	.....
9.0 to 9.9 feet	.....	.....
10 feet and more	56,000	2.6
Not reporting branches	380,871	17.6

Maintenance of works.—The drainage district law of 1911, as amended March 5, 1915 (ch. 33), provides for the maintenance of each drainage district by the commissioners of the district, who must submit annually to the county commissioners' court a report of the condition of the district and estimates for the maintenance work required. Taxes are levied by the court on all property in the district sufficient to pay for the maintenance, but not to exceed in any year one-half of 1 per cent of the assessed valuation, and when collected are placed in the construction and maintenance fund of the district. Bonds not required for construction cost may be sold, with the consent of the court, for maintenance purposes. The drainage law of 1907 also provided that it should be the duty of the drainage commissioners to maintain the drainage works of the districts established under that statute.

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

METHOD OF MAINTENANCE.	LAND.		CAPITAL.		
			To Dec. 31, 1919.		Additional required to complete.
	Acreage.	Per cent of total.	Amount.	Per cent of total.	
All operating enterprises	2,166,128	100.0	$5,700,805	100.0	$700,000
By district forces	1,852,087	85.5	4,919,205	86.3	700,000
By contract	284,541	13.1	707,000	12.4	.....
No maintenance provided [1]	29,500	1.4	74,600	1.3	.....

[1] Includes 7,500 acres maintained by landowners.

Date of organization.—The progress of development 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' 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 reclamation 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	2,166,128	100.0	2,166,128	100.0
1900 to 1904	7,500	0.3	7,500	0.3
1905 to 1909	886,481	40.9	886,481	40.9
1910 to 1914	1,009,724	46.6	1,009,724	46.6
1915 to 1919	262,423	12.1	262,423	12.1

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	$5,700,805	100.0	$700,000
1900 to 1904	50,000	0.9	.....
1905 to 1909	1,580,000	27.7	.....
1910 to 1914	3,362,876	59.0	600,000
1915 to 1919	707,929	12.4	100,000

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

DATE OF ORGANIZATION.	DITCHES.		LEVEES.	
	Miles.	Per cent of total.	Miles.	Per cent of total.
All drains and levees	2,824.1	100.0	59.8	100.0
1900 to 1904	6.2	0.2	4.0	6.7
1905 to 1909	612.3	21.7	52.0	87.0
1910 to 1914	1,746.7	61.8	1.0	1.7
1915 to 1919	458.9	16.2	2.8	4.7

Crops.—The principal crops grown upon the drained land in drainage enterprises are cotton, corn, and vegetables. 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.	Bandera.	Bastrop.	Bell.	Bexar.	Blanco.	Bosque.	Bowie.	Brazoria.
1	Number of all farms in the state or county	436,033	670	3,325	4,555	3,205	713	2,467	4,970	2,074
2	Farms reporting land having drainage	8,106	59	92	22	34	145	29	8	730
3	Farms reporting land needing drainage	35,108	326	145	.....	294	250	154	130	78
4	Farms in drainage and levee districts	2,778	2	3	.....	15	1	.....	1	723
	LAND AND FARM AREA.									
5	Approximate land area of the state or county ... acres	167,934,720	519,040	554,880	693,120	808,320	480,000	624,000	558,720	857,600
6	All land in farms ... acres	114,020,621	464,199	390,582	534,247	576,218	429,221	539,735	316,692	303,037
7	Improved land in farms ... acres	31,227,503	37,912	182,718	372,040	234,287	46,532	201,131	200,907	165,150
8	Woodland in farms ... acres	14,532,913	5,296	162,116	102,113	86,339	53,223	131,799	106,203	60,048
9	Other unimproved land in farms ... acres	68,260,205	420,991	45,748	60,094	255,592	329,466	206,805	9,582	77,839
10	Farm land reported as provided with drainage ... acres	756,263	2,150	7,117	1,545	1,020	7,930	1,494	3,148	86,337
11	Farm land reported as needing drainage ... acres	4,130,614	24,154	9,683	.....	19,700	12,576	6,861	7,321	24,010
12	Drainage only ... acres	385,225	12	819	.....	115	100	626	81	5,666
13	Drainage and clearing ... acres	3,745,389	24,142	8,864	.....	19,585	12,476	6,235	7,240	18,344

		Brazos.	Brown.	Burleson.	Calhoun.	Cameron.	Cass.	Chambers.	Clay.	Collin.
1	Number of all farms in the county	3,023	2,303	2,685	533	1,507	5,355	506	2,118	6,001
2	Farms reporting land having drainage	93	56	17	333	26	115	21	7	12
3	Farms reporting land needing drainage	54	385	174	278	19	985	135	188	6
4	Farms in drainage and levee districts	2	.....	38	104	39	3	1	.....	.....
	LAND AND FARM AREA.									
5	Approximate land area of the county ... acres	382,080	611,840	437,760	360,320	896,640	608,640	395,520	741,120	561,920
6	All land in farms ... acres	277,405	545,472	293,063	163,494	299,279	429,423	179,430	721,789	462,225
7	Improved land in farms ... acres	143,515	182,004	140,697	53,602	83,121	238,140	51,321	276,527	419,478
8	Woodland in farms ... acres	115,797	147,671	134,010	9,240	29,046	180,464	8,846	89,425	21,276
9	Other unimproved land in farms ... acres	18,093	215,797	18,356	100,652	187,112	10,819	119,263	355,837	21,471
10	Farm land reported as provided with drainage ... acres	4,916	4,262	927	36,668	1,566	3,092	462	1,130	411
11	Farm land reported as needing drainage ... acres	6,315	26,737	14,514	57,008	1,192	53,090	8,683	27,937	267
12	Drainage only ... acres	886	140	482	28,390	165	1,285	4,087	1,566	18
13	Drainage and clearing ... acres	5,429	26,597	14,032	28,618	1,027	51,805	4,596	26,371	249

		Colorado.	Comanche.	Cooke.	Coryell.	Dallas.	Delta.	Denton.	El Paso.	Ellis.
1	Number of all farms in the county	2,469	3,015	2,919	3,069	5,379	2,191	4,200	542	5,774
2	Farms reporting land having drainage	126	346	17	311	49	24	35	158	40
3	Farms reporting land needing drainage	417	201	163	479	139	140	248	68	18
4	Farms in drainage and levee districts	42	.....	1	9	16	3	.....	136	3
	LAND AND FARM AREA.									
5	Approximate land area of the county ... acres	622,080	606,720	577,280	694,400	549,760	167,040	609,280	590,720	624,000
6	All land in farms ... acres	457,296	454,339	440,101	559,051	453,167	145,476	528,215	217,367	530,195
7	Improved land in farms ... acres	169,846	216,129	237,874	246,011	358,570	123,512	395,308	30,119	469,771
8	Woodland in farms ... acres	150,468	146,597	79,654	158,975	36,024	15,261	69,507	638	15,931
9	Other unimproved land in farms ... acres	136,982	91,613	122,573	154,065	58,573	6,703	63,400	186,610	44,493
10	Farm land reported as provided with drainage ... acres	19,985	20,609	918	18,509	3,276	1,384	812	14,052	2,361
11	Farm land reported as needing drainage ... acres	33,914	13,152	5,022	22,587	10,023	3,746	7,300	4,275	1,801
12	Drainage only ... acres	14,725	1,769	266	829	3,804	10	2,120	877	484
13	Drainage and clearing ... acres	19,189	11,383	4,756	21,758	6,219	3,736	5,180	3,398	1,317

		Erath.	Fannin.	Fayette.	Fort Bend.	Galveston.	Gonzales.	Grayson.	Hamilton.	Hardeman.
1	Number of all farms in the county	3,387	6,338	4,728	3,325	723	4,361	5,569	2,049	1,077
2	Farms reporting land having drainage	16	106	218	8	136	44	86	14	18
3	Farms reporting land needing drainage	257	589	511	123	55	685	159	136	73
4	Farms in drainage and levee districts	3	3	24	1	8	10	5	.....	13
	LAND AND FARM AREA.									
5	Approximate land area of the county ... acres	693,120	536,320	619,520	506,880	252,800	652,800	602,880	533,120	487,040
6	All land in farms ... acres	556,065	460,727	514,358	384,741	102,332	608,301	508,520	444,790	366,152
7	Improved land in farms ... acres	233,568	390,079	223,394	207,057	27,900	264,874	399,487	179,155	166,237
8	Woodland in farms ... acres	122,209	50,948	204,520	49,716	3,935	204,477	61,001	74,192	3,320
9	Other unimproved land in farms ... acres	200,288	19,700	86,444	127,968	70,497	138,950	48,032	191,443	196,595
10	Farm land reported as provided with drainage ... acres	1,129	8,037	4,991	2,052	8,956	2,039	1,537	456	1,355
11	Farm land reported as needing drainage ... acres	15,165	16,883	15,529	11,626	12,453	92,668	2,593	7,619	11,372
12	Drainage only ... acres	1,260	4,533	1,301	9,456	12,023	908	648	61	854
13	Drainage and clearing ... acres	13,905	12,350	14,228	2,170	430	91,760	1,945	7,558	10,518

		Harris.	Harrison.	Hidalgo.	Hopkins.	Hunt.	Jackson.	Jefferson.	Johnson.	Kaufman.
1	Number of all farms in the county	2,880	5,789	1,727	5,445	5,135	1,485	419	3,367	4,398
2	Farms reporting land having drainage	529	31	46	20	36	343	128	20	102
3	Farms reporting land needing drainage	769	767	96	59	93	140	56	26	325
4	Farms in drainage and levee districts	372	1	61	29	3	331	13	1	70
	LAND AND FARM AREA.									
5	Approximate land area of the county ... acres	1,058,560	558,080	1,042,560	520,320	571,520	571,520	588,800	473,600	533,760
6	All land in farms ... acres	379,262	390,842	394,874	397,734	432,751	398,771	130,230	370,817	397,980
7	Improved land in farms ... acres	216,879	230,656	99,822	270,014	341,460	126,961	93,435	245,023	313,752
8	Woodland in farms ... acres	69,149	147,839	14,455	89,252	59,762	74,751	7,491	31,823	53,198
9	Other unimproved land in farms ... acres	93,234	12,347	280,597	38,468	31,529	197,059	29,304	93,971	31,030
10	Farm land reported as provided with drainage ... acres	135,200	610	3,486	946	2,530	38,182	36,446	720	11,000
11	Farm land reported as needing drainage ... acres	109,378	39,418	56,455	2,357	3,734	50,253	16,986	706	18,112
12	Drainage only ... acres	84,984	744	1,869	112	1,609	13,699	13,759	398	2,830
13	Drainage and clearing ... acres	24,394	38,674	54,586	2,245	2,125	36,554	3,227	308	15,282

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

	Kendall.	Kent.	Kerr.	Lamar.	Lampasas.	Lee.	Leon.	Liberty.	Limestone.
1 Number of all farms in the county	617	412	561	6,831	1,139	2,295	3,301	1,314	5,095
2 Farms reporting land having drainage	19	14	47	436	77	49	21	217	115
3 Farms reporting land needing drainage	113	11	161	221	212	455	322	210	399
4 Farms in drainage and levee districts	.....	.....	9	21	2	1	3	154	3
LAND AND FARM AREA.									
5 Approximate land area of the county ... acres	382,720	560,000	730,880	604,800	473,600	359,680	704,640	742,400	623,360
6 All land in farms ... acres	376,306	349,654	679,768	450,761	394,626	309,873	448,637	199,957	462,388
7 Improved land in farms ... acres	37,688	48,868	36,429	354,637	104,066	113,741	176,220	73,449	346,027
8 Woodland in farms ... acres	66,038	25,291	168	80,243	47,807	183,416	253,551	44,117	75,293
9 Other unimproved land in farms ... acres	272,580	275,495	643,171	15,881	242,753	12,716	18,866	82,391	41,068
10 Farm land reported as provided with drainage ... acres	780	2,310	2,091	25,069	2,446	503	740	39,438	6,806
11 Farm land reported as needing drainage ... acres	4,833	10,050	26,586	8,705	14,875	29,062	34,824	49,196	17,993
12 Drainage only ... acres	18	1,100	370	1,485	259	379	614	30,715	421
13 Drainage and clearing ... acres	4,815	8,950	26,216	7,220	14,616	28,683	34,210	18,475	17,572

	McCulloch.	McLennan.	Madison.	Matagorda.	Milam.	Montague.	Morris.	Nacogdoches.	Navarro.
1 Number of all farms in the county	1,207	5,709	2,226	1,616	5,606	3,005	1,745	4,219	6,293
2 Farms reporting land having drainage	2	23	106	108	79	9	29	105	45
3 Farms reporting land needing drainage	176	154	296	66	409	101	365	798	481
4 Farms in drainage and levee districts	.....	26	.....	47	1	4	.....	1	5
LAND AND FARM AREA.									
5 Approximate land area of the county ... acres	686,720	671,360	316,800	727,040	613,760	594,560	165,760	677,760	678,400
6 All land in farms ... acres	466,579	568,599	241,726	406,587	480,353	449,506	112,367	406,628	566,919
7 Improved land in farms ... acres	131,795	440,977	103,952	221,676	328,555	201,317	71,688	197,497	438,853
8 Woodland in farms ... acres	20,036	56,333	119,005	48,828	105,927	145,832	32,724	196,288	82,999
9 Other unimproved land in farms ... acres	314,748	71,289	18,769	136,083	45,871	102,357	7,955	12,843	45,067
10 Farm land reported as provided with drainage ... acres	1,928	2,556	1,835	58,606	2,257	750	603	3,740	2,661
11 Farm land reported as needing drainage ... acres	9,556	8,072	21,166	25,034	21,668	4,391	9,391	43,165	22,063
12 Drainage only ... acres	.....	2,356	282	14,837	512	1,574	709	550	74
13 Drainage and clearing ... acres	9,556	5,716	20,884	10,197	21,156	2,817	8,682	42,615	21,989

	Nueces.	Orange.	Palo Pinto.	Parker.	Polk.	Presidio.	Red River.	Reeves.	Refugio.
1 Number of all farms in the county	1,247	311	1,242	2,945	2,022	102	5,832	206	310
2 Farms reporting land having drainage	7	149	21	27	58	2	53	2	21
3 Farms reporting land needing drainage	41	226	70	154	546	10	102	2	65
4 Farms in drainage and levee districts	12	17	.....	.....	.....	1	13	2	2
LAND AND FARM AREA.									
5 Approximate land area of the county ... acres	496,000	232,320	613,120	560,000	778,880	2,439,680	664,960	1,779,840	473,600
6 All land in farms ... acres	323,935	64,872	432,443	456,447	161,408	1,212,914	385,236	1,050,716	155,983
7 Improved land in farms ... acres	162,621	26,071	94,944	195,542	61,960	6,723	261,996	16,385	35,988
8 Woodland in farms ... acres	13,098	20,339	113,186	142,412	95,988	.....	115,466	.....	4,269
9 Other unimproved land in farms ... acres	148,216	18,462	224,313	118,493	3,460	1,206,191	7,774	1,034,331	115,726
10 Farm land reported as provided with drainage ... acres	3,167	12,365	547	651	2,145	408	1,220	560	6,221
11 Farm land reported as needing drainage ... acres	18,358	23,960	7,533	4,597	32,498	13,475	5,878	1,822	21,131
12 Drainage only ... acres	130	9,339	130	70	804	12,508	855	22	3,426
13 Drainage and clearing ... acres	18,228	14,621	7,403	4,527	31,694	967	5,023	1,800	17,705

	Robertson.	Rusk.	San Patricio.	Smith.	Tarrant.	Titus.	Tom Green.	Tyler.	Upshur.
1 Number of all farms in the county	4,903	6,059	757	6,317	3,336	2,938	680	1,134	3,690
2 Farms reporting land having drainage	75	159	10	191	16	20	5	75	53
3 Farms reporting land needing drainage	211	898	236	387	22	264	81	675	515
4 Farms in drainage and levee districts	3	2	12	1	7	3	.....	1	42
LAND AND FARM AREA.									
5 Approximate land area of the county ... acres	558,080	629,120	432,640	588,800	577,920	254,720	930,560	581,120	384,000
6 All land in farms ... acres	392,122	486,963	204,295	456,057	395,322	195,771	750,663	128,988	265,381
7 Improved land in farms ... acres	236,513	283,148	96,067	294,948	253,224	116,478	95,530	35,123	158,806
8 Woodland in farms ... acres	132,496	183,704	31,084	131,727	71,487	68,476	44,054	88,111	96,301
9 Other unimproved land in farms ... acres	23,113	20,111	77,204	29,382	70,611	10,817	611,079	5,754	10,274
10 Farm land reported as provided with drainage ... acres	5,043	3,758	2,892	5,560	521	434	515	1,676	1,294
11 Farm land reported as needing drainage ... acres	15,991	33,490	31,556	11,187	288	6,140	159,161	49,103	22,319
12 Drainage only ... acres	1,234	495	440	594	121	6	1,420	261	685
13 Drainage and clearing ... acres	14,757	32,995	31,116	10,593	167	6,134	157,741	48,842	21,634

	Val Verde.	Victoria.	Ward.	Washington.	Webb.	Wharton.	Williamson.	Young.	All other counties.[1]
1 Number of all farms in the county	285	2,101	238	4,158	257	2,967	4,598	1,480	184,957
2 Farms reporting land having drainage	92	239	57	135	6	3	30	7	286
3 Farms reporting land needing drainage	6	281	19	371	11	44	58	439	14,031
4 Farms in drainage and levee districts	.....	179	54	.....	.....	1	1	2	56
LAND AND FARM AREA.									
5 Approximate land area of the county ... acres	1,973,120	569,600	529,280	401,920	2,060,160	711,680	722,560	560,000	111,180,800
6 All land in farms ... acres	1,699,287	551,984	349,476	348,026	971,850	438,068	610,036	484,282	75,726,897
7 Improved land in farms ... acres	7,059	151,090	19,051	188,202	21,698	245,952	393,663	147,107	14,888,264
8 Woodland in farms ... acres	315	114,312	5,000	85,950	114,639	41,875	129,004	71,271	7,596,448
9 Other unimproved land in farms ... acres	1,691,913	286,582	325,425	73,874	835,513	150,241	87,369	265,904	53,242,185
10 Farm land reported as provided with drainage ... acres	1,155	20,114	6,612	6,239	918	1,465	943	485	8,483
11 Farm land reported as needing drainage ... acres	503	45,172	2,594	20,455	1,680	4,406	4,291	54,117	2,293,110
12 Drainage only ... acres	188	22,424	582	3,424	470	1,966	117	365	46,524
13 Drainage and clearing ... acres	315	22,748	2,012	17,031	1,210	2,440	4,174	53,752	2,246,586

[1] Drainage on farms reported in Anderson, Angelina, Archer, Atascosa, Austin, Briscoe, Brooks, Burnet, Caldwell, Camp, Coleman, Collingsworth, Comal, Culberson, De Witt, Falls, Franklin, Freestone, Gillespie, Goliad, Gregg, Grimes, Guadalupe, Hardin, Haskell, Hays, Hemphill, Henderson, Hill, Hood, Houston, Jack, Jasper, Jim Wells, Kimble, Kleberg, Lavaca, Live Oak, Llano, Marion, Mason, Maverick, Medina, Mills, Mitchell, Montgomery, Nolan, Panola, Pecos, Rains, Rockwall, Runnels, Sabine, San Augustine, San Saba, Stephens, Stonewall, Swisher, Taylor, Terrell, Travis, Trinity, Uvalde, Van Zandt, Walker, Wilson, and Wood Counties.

COUNTY TABLE II.—OPERATING DRAINAGE ENTERPRISES: 1920.

		THE STATE.	Brazoria.	Calhoun.	Cameron.	Chambers.	Colorado.	De Witt.	El Paso.	Fort Bend.	Galveston.	Harris.
	LAND AREA.											
1	Approximate land area of the state or county.....acres..	167,934,720	857,600	360,320	896,640	395,520	622,080	562,560	590,720	506,880	252,800	1,058,560
2	All land in operating drainage enterprises.....acres..	2,166,128	327,362	36,426	202,556	16,000	48,250	9,600	56,000	36,915	93,911	238,266
3	Improved land.....acres..	1,107,153	[1]145,000	27,320	[1]78,000	12,500	25,650	1,920	[1]28,500	27,686	[1]25,899	142,148
4	Per cent of all improved land in farms.....	3.5	87.8	51.0	93.8	24.4	15.1	0.9	94.6	13.4	92.8	65.5
5	Timber and cut-over land.....acres..	111,922	2,072	.....	.....	900	475	.....	.....	.....	.....	79,770
6	Other unimproved land.....acres..	947,053	180,290	9,106	124,556	2,600	22,125	7,680	27,500	9,229	68,012	16,348
7	Swampy, seeped, or alkali, in enterprises.....acres..	201,051	32,736	3,643	10,256	2,600	12,000	.....	5,600	4,459	18,782	47,835
8	Suffering a loss of crops from defective drainage..acres...	128,765	17,916	2,732	10,256	2,050	7,200	.....	5,600	3,345	11,269	23,211
9	Assessed acreage.....	2,166,128	327,362	36,426	202,556	16,000	48,250	9,600	56,000	36,915	93,911	238,266
10	Excess over all land in operating enterprises...acres..	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	DRAINAGE WORKS.											
	Open ditches:											
11	Completed.....miles..	2,728.5	456.2	45.0	165.0	30.0	28.4	4.0	70.0	177.0	80.0	407.0
12	Additional under construction.....miles..	95.6	.....	.....	.....	.....	48.6	.....	47.0	.....	.....	.....
13	Maximum completed in any enterprise.....miles..	140.0	120.0	45.0	100.0	20.0	14.0	4.0	70.0	140.0	41.0	122.0
14	Maximum width at bottom of ditch[2].....feet..	200	18	14	25	8	11	12	12	60	12	20
15	Maximum of average depths of outlet ditches[2]..feet..	10.0	5.0	4.0	6.0	8.0	4.0	4.0	10.0	5.0	4.0	6.0
16	Mean depth of branch ditches[2].....feet..	3.8	3.4	4.0	5.2	3.0	3.6	4.0	.....	3.5	3.5	4.0
	Accessory levees and dikes:											
17	Completed.....miles..	59.8	15.0	.....	.....	.....	.....	.....	.....	.....	.....	.....
18	Additional under construction.....miles..	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
19	Area drained by open ditches only[2].....acres..	1,617,933	285,927	36,426	202,556	16,000	48,250	9,600	56,000	36,915	93,911	238,266
20	Length of these ditches.....miles..	2,567.0	375.2	45.0	165.0	30.0	77.0	4.0	117.0	177.0	80.0	407.0
21	Average length per acre.....feet..	8.4	6.9	6.5	4.3	9.9	8.4	2.2	11.0	25.3	4.5	9.0
22	Area having open ditches and levees[2].....acres..	548,195	41,435	.....	.....	.....	.....	.....	.....	.....	.....	.....
23	Length of these ditches.....miles..	257.1	81.0	.....	.....	.....	.....	.....	.....	.....	.....	.....
24	Average length per acre.....feet..	2.5	10.3	.....	.....	.....	.....	.....	.....	.....	.....	.....
25	Length of the accessory levees.....miles..	59.8	15.0	.....	.....	.....	.....	.....	.....	.....	.....	.....
	DEVELOPMENT OF LAND.											
26	Improved land in operating enterprises, 1920.....acres..	1,107,153	[1]145,000	27,320	[1]78,000	12,500	25,650	1,920	[1]28,500	27,686	[1]25,899	142,148
27	Improved land prior to drainage.....acres..	566,275	[3]105,954	9,106	54,625	8,600	21,380	1,920	28,000	27,686	18,782	23,827
28	Increase since drainage.....acres..	540,878	39,046	18,214	23,375	3,900	4,270	.....	500	.....	7,117	118,321
29	Per cent of increase.....	95.5	36.9	200.0	42.8	45.3	20.0	.....	1.8	.....	37.9	496.6
30	Per cent increase is of all improved land in farms, 1920.....	1.7	23.6	34.0	28.1	7.6	2.5	.....	1.7	.....	25.5	54.6
31	Timber and cut-over land, 1920.....acres..	111,922	2,072	.....	.....	900	475	.....	.....	.....	.....	79,770
32	Timber and cut-over land prior to drainage.....acres..	116,642	2,072	.....	.....	2,000	475	.....	.....	.....	.....	79,770
33	Decrease since drainage.....acres..	4,720	.....	.....	.....	1,100	.....	.....	.....	.....	.....	.....
34	Per cent of decrease.....	4.0	.....	.....	.....	55.0	.....	.....	.....	.....	.....	.....
35	Other unimproved land, 1920.....acres..	947,053	180,290	9,106	124,556	2,600	22,125	7,680	27,500	9,229	68,012	16,348
36	Other unimproved land prior to drainage.....acres..	1,483,211	219,336	27,320	147,931	5,400	26,395	7,680	28,000	9,229	75,129	134,669
37	Decrease since drainage.....acres..	536,158	39,046	18,214	23,375	2,800	4,270	.....	500	.....	7,117	118,321
38	Per cent of decrease.....	36.1	17.8	66.7	15.8	51.9	16.2	.....	1.8	.....	9.5	87.9
39	Swampy or subject to overflow, 1920.....acres..	201,051	32,736	3,643	10,256	2,600	12,000	.....	5,600	4,459	18,782	47,835
40	Swampy or subject to overflow prior to drainage...acres..	1,000,442	130,946	18,213	48,738	13,300	24,020	5,760	14,000	27,686	56,347	152,321
41	Decrease since drainage.....acres..	799,391	98,210	14,570	38,482	10,700	12,020	5,760	8,400	23,227	37,565	104,486
42	Per cent of decrease.....	79.9	75.0	80.0	79.0	80.5	50.0	100.0	60.0	83.9	66.7	68.6
	CAPITAL INVESTED AND COST PER ACRE.											
43	Total capital invested in and required for completion of operating enterprises.....dollars..	6,400,805	1,064,000	60,000	757,120	23,000	140,000	30,000	1,235,000	180,000	165,000	615,000
44	Capital invested in these enterprises to Dec. 31, 1919.....dollars..	5,700,805	1,064,000	60,000	757,120	23,000	40,000	30,000	635,000	180,000	165,000	615,000
45	Additional capital required to complete these enterprises.....dollars..	700,000	.....	.....	.....	.....	100,000	.....	600,000	.....	.....	.....
46	Average cost per acre when completed...dollars..	2.95	3.25	1.65	3.74	1.44	2.90	3.13	22.05	4.88	1.76	2.58
47	Enterprises constructing open ditches only.....dollars..	5,589,205	864,000	60,000	757,120	23,000	140,000	30,000	1,235,000	180,000	165,000	615,000
48	Average cost per acre when completed.....dollars..	3.45	3.02	1.65	3.74	1.44	2.90	3.13	22.05	4.88	1.76	2.58
49	Enterprises constructing open ditches and levees..dollars..	811,600	200,000	.....	.....	.....	.....	.....	.....	.....	.....	.....
50	Average cost per acre when completed .....dollars..	1.48	4.83	.....	.....	.....	.....	.....	.....	.....	.....	.....
	CROPS.											
	Improved land in enterprises reporting—											
51	Corn as principal crop on drained land.....acres..	490,263	145,000	27,320	.....	.....	4,275	.....	.....	.....	.....	32,374
52	Cotton as principal crop on drained land.....acres..	350,516	.....	.....	31,020	.....	.....	1,920	.....	27,686	25,899	109,774
53	Vegetables as principal crop on drained land...acres..	145,703	.....	.....	46,980	.....	.....	.....	.....	.....	.....	.....
54	Alfalfa as principal crop on drained land.....acres..	28,500	.....	.....	.....	.....	.....	.....	28,500	.....	.....	.....
55	Other crops as principal ones on drained land..acres..	92,171	.....	.....	.....	12,500	21,375	.....	.....	.....	.....	.....

[1] Office estimate; the reported figures exceeded the improved acreage in all farms in the county as determined by the census of agriculture.
[2] When works under construction have been completed.
[3] The reported figures have been reduced by the same acreage as the improved land, 1920.

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

		Henderson.	Hidalgo.	Jackson.	Jefferson.	Liberty.	Matagorda.	Nueces.	Orange.	Victoria.	Ward.	Wharton.
	LAND AREA.											
1	Approximate land area of the county.....acres..	605,440	1,042,560	571,520	588,800	742,400	727,040	496,000	232,320	569,600	529,280	711,680
2	All land in operating drainage enterprises.....acres..	1,477	357,871	137,873	46,275	91,112	223,394	23,763	22,000	133,000	47,440	16,637
3	Improved land.....acres..	977	[1] 98,723	96,265	20,824	57,863	167,218	9,505	6,600	102,750	[1] 17,664	14,141
4	Per cent of all improved land in farms.....	0.5	98.9	75.8	22.3	78.8	75.4	5.8	25.3	68.0	92.7	5.7
5	Timber and cut-over land.....acres..	500	.....	14,021	2,314	120	750	.....	11,000	.....	.....	.....
6	Other unimproved land.....acres..	.....	259,148	27,587	23,137	33,129	55,426	14,258	4,400	30,250	29,776	2,496
7	Swampy, seeped, or alkali, in enterprises.....acres..	.....	.....	6,451	4,628	4,532	27,065	.....	5,500	13,300	.....	1,664
8	Suffering a loss of crops from defective drainage.....acres..	.....	.....	4,392	2,082	2,875	22,498	.....	1,650	10,275	.....	1,414
9	Assessed acreage.....	1,477	357,871	137,873	46,275	91,112	223,394	23,763	22,000	133,000	47,440	16,637
10	Excess over all land in operating enterprises.....acres..	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	DRAINAGE WORKS.											
	Open ditches:											
11	Completed.....miles..	2.9	25.0	537.5	15.0	125.1	210.4	55.0	30.0	195.0	49.0	21.0
12	Additional under construction.....miles..	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
13	Maximum completed in any enterprise.....miles..	2.9	25.0	122.0	15.0	60.1	75.0	55.0	30.0	110.0	30.0	21.0
14	Maximum width at bottom of ditch [2].....feet..	20	200	20	60	30	12	12	10	12	6	8
15	Maximum of average depths of outlet ditches [2].....feet..	6.0	5.0	4.0	4.0	5.0	6.0	4.0	5.0	4.0	5.0	4.0
16	Mean depth of branch ditches [2].....feet..	6.0	.....	3.0	3.0	3.9	4.0	4.0	.....	3.3	5.0	3.0
	Accessory levees and dikes:											
17	Completed.....miles..	1.8	15.0	1.0	.....	.....	26.0	.....	1.0	.....	.....	.....
18	Additional under construction.....miles..	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
19	Area drained by open ditches only [2].....acres..	.....	.....	114,873	46,275	91,112	120,982	23,763	.....	133,000	47,440	16,637
20	Length of these ditches.....miles..	.....	.....	460.5	15.0	125.1	169.2	55.0	.....	195.0	49.0	21.0
21	Average length per acre.....feet..	.....	.....	21.2	1.7	7.2	7.4	12.2	.....	7.7	5.5	6.7
22	Area having open ditches and levees [2].....acres..	1,477	357,871	23,000	.....	.....	102,412	.....	22,000	.....	.....	.....
23	Length of these ditches.....miles..	2.9	25.0	77.0	.....	.....	41.2	.....	30.0	.....	.....	.....
24	Average length per acre.....feet..	10.4	0.4	17.7	.....	.....	2.1	.....	7.2	.....	.....	.....
25	Length of the accessory levees.....miles..	1.8	15.0	1.0	.....	.....	26.0	.....	1.0	.....	.....	.....
	DEVELOPMENT OF LAND.											
26	Improved land in operating enterprises, 1920.....acres..	977	[1] 98,723	96,265	20,824	57,863	167,218	9,505	6,600	102,750	[1] 17,664	14,141
27	Improved land prior to drainage.....acres..	.....	[3] 62,935	21,345	11,569	11,518	81,736	5,941	2,200	53,500	7,332	8,319
28	Increase since drainage.....acres..	977	35,788	74,920	9,255	46,345	85,482	3,564	4,400	49,250	10,332	5,822
29	Per cent of increase.....	.....	56.9	351.0	80.0	402.4	104.6	60.0	200.0	92.1	140.9	70.0
30	Per cent increase is of all improved land in farms, 1920.....	0.5	35.9	59.0	9.9	63.1	38.6	2.2	16.9	32.6	54.2	2.4
31	Timber and cut-over land, 1920.....acres..	500	.....	14,021	2,314	120	750	.....	11,000	.....	.....	.....
32	Timber and cut-over land prior to drainage.....acres..	1,477	.....	16,544	2,314	240	750	.....	11,000	.....	.....	.....
33	Decrease since drainage.....acres..	977	.....	2,523	.....	120	.....	.....	.....	.....	.....	.....
34	Per cent of decrease.....	66.1	.....	15.3	.....	50.0	.....	.....	.....	.....	.....	.....
35	Other unimproved land, 1920.....acres..	.....	259,148	27,587	23,137	33,129	55,426	14,258	4,400	30,250	29,776	2,496
36	Other unimproved land prior to drainage.....acres..	.....	294,936	99,984	32,392	79,354	140,908	17,822	8,800	79,500	40,108	8,318
37	Decrease since drainage.....acres..	.....	35,788	72,397	9,255	46,225	85,482	3,564	4,400	49,250	10,332	5,822
38	Per cent of decrease.....	.....	12.1	72.4	28.6	58.3	60.7	20.0	50.0	61.9	25.8	70.0
39	Swampy or subject to overflow, 1920.....acres..	.....	.....	6,451	4,628	4,532	27,065	.....	5,500	13,300	.....	1,664
40	Swampy or subject to overflow prior to drainage.....acres..	1,477	35,787	110,989	23,137	82,001	131,858	3,564	15,400	57,200	35,220	12,478
41	Decrease since drainage.....acres..	1,477	35,787	104,538	18,509	77,469	104,793	3,564	9,900	43,900	35,220	10,814
42	Per cent of decrease.....	100.0	100.0	94.2	80.0	94.5	79.5	100.0	64.3	76.7	100.0	86.7
	CAPITAL INVESTED AND COST PER ACRE.											
43	Total capital invested in and required for completion of operating enterprises.....dollars..	45,000	176,000	453,452	92,000	157,500	675,824	158,429	24,600	215,880	83,000	50,000
44	Capital invested in these enterprises to Dec. 31, 1919.....dollars..	45,000	176,000	453,452	92,000	157,500	675,824	158,429	24,600	215,880	83,000	50,000
45	Additional capital required to complete these enterprises.....dollars..	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
46	Average cost per acre when completed.....dollars..	30.47	0.49	3.29	1.99	1.73	3.03	6.67	1.12	1.62	1.75	3.01
47	Enterprises constructing open ditches only.....dollars..	.....	.....	380,452	92,000	157,500	382,824	158,429	.....	215,880	83,000	50,000
48	Average cost per acre when completed.....dollars..	.....	.....	3.31	1.99	1.73	3.16	6.67	.....	1.62	1.75	3.01
49	Enterprises constructing open ditches and levees.....dollars..	45,000	176,000	73,000	.....	.....	293,000	.....	24,600	.....	.....	.....
50	Average cost per acre when completed.....dollars..	30.47	0.49	3.17	.....	.....	2.86	.....	1.12	.....	.....	.....
	CROPS.											
	Improved land in enterprises reporting—											
51	Corn as principal crop on drained land.....acres..	.....	.....	16,084	.....	38,610	109,709	.....	.....	102,750	.....	14,141
52	Cotton as principal crop on drained land.....acres..	977	.....	80,181	.....	.....	45,890	9,505	.....	.....	17,664	.....
53	Vegetables as principal crop on drained land.....acres..	.....	98,723	.....	.....	.....	.....	.....	.....	.....	.....	.....
54	Alfalfa as principal crop on drained land.....acres..	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
55	Other crops as principal ones on drained land.....acres..	.....	.....	.....	20,824	19,253	11,619	.....	6,600	.....	.....	.....

[1] Office estimate; the reported figures exceeded the improved acreage in all farms in the county as determined by the census of agriculture.
[2] When works under construction have been completed.
[3] The reported figures have been reduced by the same acreage as the improved land, 1920.

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.
DRAINAGE ON FARMS.		
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
DRAINAGE ENTERPRISES.		
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 [1] ... acres	16,509	(2)
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	(2)
Land in nonoperating enterprises ... acres	20,731	(2)
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	.....

[1] No timber or cut-over land reported.

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

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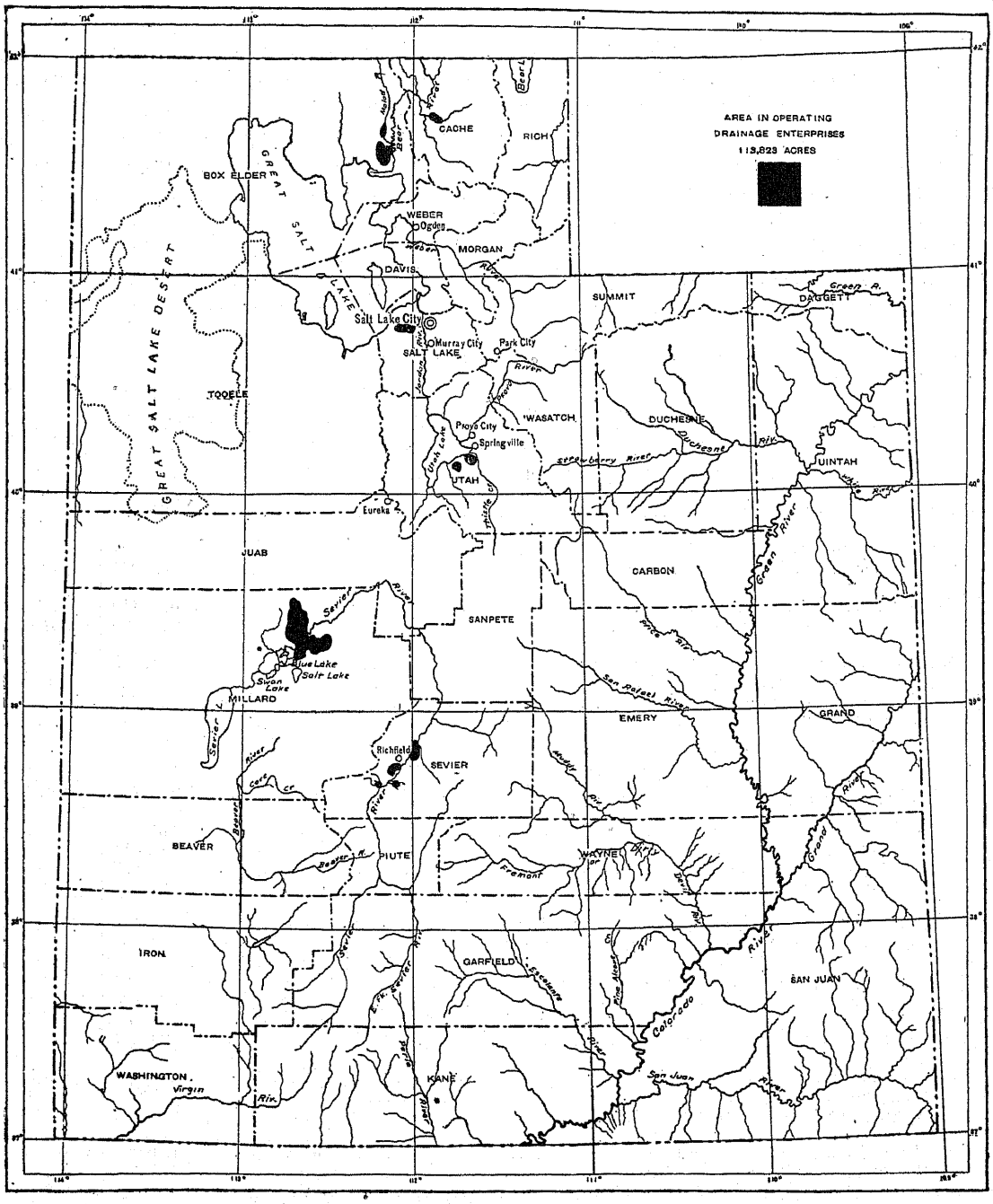
UTAH

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.[1]		
			To Dec. 31, 1919.		Additional required to complete.
	Acreage.	Per cent of total.	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

[1] 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.		
			To Dec. 31, 1919.		Additional required to complete.
	Acreage.	Per cent of total.	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	363,500	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 protect 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.				Nonoperating 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	17,676
Unimproved land[1]	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	17,398

[1] 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. Amount	To Dec. 31, 1919. Per cent of total.	Additional required to complete.
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	105,519	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	708,016	69.8	1,813,300
Laws of 1919, ch. 41	2,428	1.8	65,000	6.4	52,000
Commercial developments[1]	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

[1] 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. Amount.	To Dec. 31, 1919. Per cent of total.	Additional required to complete.
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[1]	108,452	95.3	881,923	87.7	1,837,800

[1] 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	4,554	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 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.

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.

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	.....
	LAND AND FARM AREA.							
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	49,751
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	165,926	20,153	3,854	617	5,502	9,738	541
12	Drainage only ... acres	74,786	17,880	3,671	128	5,328	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.[1]
1	Number of all farms in the county	1,038	2,438	1,813	1,108	521	3,237	1,687	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
	LAND AND FARM AREA.								
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	113,065	271,778	318,133	259,566	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

[1] No drainage on farms reported in Grand, Piute, Rich, and Wayne Counties.

County Table II.—OPERATING DRAINAGE ENTERPRISES: 1920.

		The State.	Box Elder.	Millard.	Salt Lake.	Sevier.	Other counties.[1]
	LAND AREA.						
1	Approximate land area of the state or county ... acres	52,597,760	3,484,160	4,199,040	483,840	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	83.5	0.2	9.7	2.1
5	Unimproved land [2] ... 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	.....	.....	.....	.....	.....	.....
	DRAINAGE WORKS.						
	Open ditches:						
10	Completed ... miles	120.3	15.0	89.6	0.5	1.2	14.0
11	Additional under construction ... miles	4.5	.....	.....	4.5	.....	.....
12	Maximum completed in any enterprise ... miles	58.8	8.0	58.8	0.5	1.0	7.0
13	Maximum width at bottom of ditch [3] ... feet	24	20	24	12	6	8
14	Maximum of average depths of outlet ditches [3] ... feet	15.0	15.0	7.0	3.5	6.0	7.0
15	Mean depth of branch ditches [3] ... feet	5.7	3.9	5.9	6.0	.....	5.7
	Tile drains:						
16	Completed ... miles	599.1	206.6	37.0	.....	81.5	74.0
17	Additional under construction ... miles	777.6	.....	653.0	55.0	38.1	31.5
18	Maximum completed in any enterprise ... miles	206.0	206.0	92.0	.....	42.0	.....
19	Maximum size of tile [3] ... inches	24	18	20	.....	24	.....
	Accessory levees and dikes:						
20	Completed ... miles	2.0	.....	.....	.....	.....	2.0
21	Additional under construction ... miles	.....	.....	.....	.....	.....	.....
22	Area drained by open ditches only [3] ... acres	1,050	1,050	.....	.....	.....	.....
23	Length of these ditches ... miles	7.0	7.0	.....	.....	.....	.....
24	Average length per acre ... feet	35.2	35.2	.....	.....	.....	.....
25	Area drained by tile only [3] ... acres	4,321	750	.....	.....	3,571	.....
26	Length of these tile ... miles	38.2	0.6	.....	.....	37.6	.....
27	Average length per acre ... feet	46.7	4.2	.....	.....	55.6	.....
28	Area drained by open ditches and tile [3] ... acres	[4] 108,452	10,890	76,634	4,080	8,076	[4] 8,772
29	Length of these drains ... miles	1,456.3	214.0	979.6	5.0	83.2	174.5
30	Average length per acre ... feet	70.9	103.8	67.5	6.5	54.4	151.7
31	Length of the accessory levees ... miles	2.0	.....	.....	.....	.....	2.0
	DEVELOPMENT OF LAND.						
32	Improved land in operating enterprises, 1920 ... acres	97,314	7,245	76,634	200	6,485	6,750
33	Improved land prior to drainage ... acres	89,394	2,889	76,634	200	6,351	3,320
34	Increase since drainage ... acres	7,920	4,356	.....	.....	134	3,430
35	Per cent of increase	8.9	150.7	.....	.....	2.1	103.3
36	Per cent increase is of all improved land in farms, 1920	0.5	2.0	.....	.....	0.2	1.1
37	Unimproved land, 1920 [2] ... acres	16,509	5 445	.....	3,880	5,162	2,022
38	Unimproved land prior to drainage [2] ... acres	24,429	9,801	.....	3,880	5,296	5,452
39	Decrease since drainage ... acres	7,920	4,356	.....	.....	134	3,430
40	Per cent of decrease	32.4	44.4	.....	.....	2.5	62.9
41	Swampy, seeped, or alkali, 1920 ... acres	88,181	4,000	74,357	3,880	3,922	2,022
42	Swampy, seeped, or alkali prior to drainage ... acres	104,592	9,800	76,634	3,880	5,776	8,502
43	Decrease since drainage ... acres	16,411	5,800	2,277	.....	1,854	6,480
44	Per cent of decrease	15.7	59.2	3.0	.....	32.1	76.2
	CAPITAL INVESTED AND COST PER ACRE.						
45	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
46	Capital invested in these enterprises to Dec. 31, 1919 ... dollars	1,005,473	188,500	428,157	5,000	213,816	170,000
47	Additional capital required to complete these enterprises ... dollars	1,865,300	.....	1,600,800	75,000	119,500	70,000
48	Average cost per acre when completed ... dollars	25.22	14.85	26.48	19.61	28.62	27.36
49	Enterprises constructing open ditches only ... dollars	10,000	10,000	.....	.....	.....	.....
50	Average cost per acre when completed ... dollars	9.52	9.52	.....	.....	.....	.....
51	Enterprises constructing tile drains only ... dollars	141,050	3,500	.....	.....	137,550	.....
52	Average cost per acre when completed ... dollars	32.64	4.67	.....	.....	38.52	.....
53	Enterprises constructing open ditches and tile drains ... dollars	[5] 2,719,723	175,000	2,028,957	80,000	195,766	[5] 240,000
54	Average cost per acre when completed ... dollars	25.08	16.07	26.48	19.61	24.24	27.36
	CROPS.						
	Improved land in enterprises reporting—						
55	Alfalfa as principal crop on drained land ... acres	80,884	.....	76,634	200	.....	4,050
56	Sugar beets as principal crop on drained land ... acres	14,630	5,445	.....	.....	6,485	2,700
57	Other crops as principal ones on drained land ... acres	1,800	1,800	.....	.....	.....	.....

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