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**DRAINAGE OF  
AGRICULTURAL LANDS**

**THE UNITED STATES**

*Prepared under the supervision of*

Ray Hurley, Chief

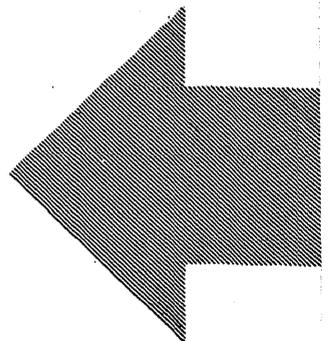
*Agriculture Division*

VOLUME IV

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## PREFACE

Volume IV, Drainage of Agricultural Lands, is one of four principal reports presenting the results of the 1950 Census of Agriculture, Irrigation, and Drainage. This volume presents the information for organized enterprises and private projects draining 500 acres or more of agricultural lands in 1950.

The 1950 Census of Drainage was taken in conformity with the Act of Congress providing for the fifteenth and subsequent decennial censuses, approved June 18, 1929, as amended.

The data were obtained by Census enumerators employed especially for the collection of drainage statistics. These enumerators were trained and assisted by special drainage supervisors working under the direction of technicians of the Agriculture Division of the Bureau of the Census. The field personnel and the actual canvass were under the direction of Lowell T. Galt, Chief, Field Division. The planning of the census and the compilation of the statistics were performed under the general supervision of Ray Hurley, Chief, Agriculture Division, and Warder B. Jenkins, Assistant Chief. Burkett S. Clayton, formerly a drainage engineer with the Soil Conservation Service of the United States Department of Agriculture, was employed as the specialist to plan for the enumeration and for the compilation of the data, as Chief of Drainage Statistics. Linden S. Dodson, Merritt L. Martinson, Arthur W. Jones, Irvin C. Schappaugh, Constance B. Schulz, Walter W. Posey, Charles F. Frazier, and Henry A. Tucker assisted in the compilation of the statistics and in the preparation of this report. The maps were prepared under the supervision of Clarence E. Batschelet, Geographer.

Acknowledgment is made of the cooperation of the Bureau of Agricultural Economics and the Soil Conservation Service of the United States Department of Agriculture, and of the Bureau of Reclamation of the Department of the Interior in the preparation of the drainage questionnaires and in the planning for the 1950 Census of Drainage. Further acknowledgment is made of the assistance of the Soil Conservation Service in providing a list of drainage enterprises to assure complete coverage. Valuable assistance was given by Roger D. Marsden, L. A. Jones, and John G. Sutton of the Soil Conservation Service.

NOVEMBER 1952.

## UNITED STATES CENSUS OF AGRICULTURE: 1950 REPORTS

**Volume I.—Counties and State Economic Areas.**—Statistics for counties include number of farms, acreage, value, and farm operators; farms by size, by color and tenure of operator; facilities and equipment, farm labor, and farm expenditures; livestock and livestock products; specified crops harvested; farms and farm characteristics for commercial farms; farms classified by value of farm products sold, by type of farm, and by economic class; and value of products sold by source.

Data for State economic areas include farms and farm characteristics by size of farm, by tenure of operator, by type of farm, and by economic class.

Volume I will be published in 34 parts as follows:

Part	State or States	Part	State or States
1	New England States: Maine. New Hampshire. Vermont. Massachusetts. Rhode Island. Connecticut.	15	South Atlantic—Continued Virginia and West Virginia.
2	Middle Atlantic States: New York. New Jersey. Pennsylvania.	16	North Carolina and South Carolina.
3	East North Central: Ohio.	17	Georgia.
4	Indiana.	18	Florida.
5	Illinois.	19	East South Central: Kentucky.
6	Michigan.	20	Tennessee.
7	Wisconsin.	21	Alabama.
8	West North Central: Minnesota.	22	Mississippi.
9	Iowa.	23	West South Central: Arkansas.
10	Missouri.	24	Louisiana.
11	North Dakota and South Dakota.	25	Oklahoma.
12	Nebraska.	26	Texas.
13	Kansas.	27	Mountain: Montana.
14	South Atlantic: Delaware, Maryland, District of Columbia.	28	Idaho.
		29	Wyoming and Colorado.
		30	New Mexico and Arizona.
		31	Utah and Nevada.
		32	Pacific: Washington and Oregon.
		33	California.
		34	Territories and possessions.

**Volume II.—General Report.**—Statistics by Subjects, United States Census of Agriculture, 1950. Summary data and analyses of the data for States, for Geographic Divisions, and for the United States by subjects as illustrated by the chapter titles listed below:

Chapter	Title	Chapter	Title
I	Farms and Land in Farms.	VII	Field Crops and Vegetables.
II	Age, Residence, Years on Farm, Work off Farm.	VIII	Fruits and Nuts, Horticultural Specialties, Forest Products.
III	Farm Facilities, Roads, Trading Center, Farm Equipment.	IX	Value of Farm Products.
IV	Farm Labor and Farm Expenditures.	X	Size of Farm.
V	Farm Taxes, Cash Rent.	XI	Color, Race, and Tenure of Farm Operator.
VI	Livestock and Livestock Products.	XII	Economic Class of Farm.
		XIII	Type of Farm.

**Volume III.—Irrigation of Agricultural Lands.**—State reports with data for counties and drainage basins and a summary for the United States, including number of enterprises, irrigation works and equipment, source of water, new capital investment since 1940, cost of irrigation water, number of farms and acreage irrigated, and quantity of water used for irrigation purposes.

The State reports will be issued as separate parts of Volume III as follows:

Part	State	Part	State
1	Arizona.	10	Nebraska.
2	Arkansas and Oklahoma.	11	Nevada.
3	California.	12	New Mexico.
4	Colorado.	13	North Dakota and South Dakota.
5	Florida.	14	Oregon.
6	Idaho.	15	Texas.
7	Kansas.	16	Utah.
8	Louisiana.	17	Washington.
9	Montana.	18	Wyoming.

**Volume IV.—Drainage of Agricultural Lands.**—State reports with statistics for counties and a summary for the United States. One part only. Data on land in drainage enterprises, number and types of enterprises, cost of drainage, indebtedness, assessments, and drainage works.

# DRAINAGE OF AGRICULTURAL LANDS

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# INTRODUCTION

(VII)

# DRAINAGE OF AGRICULTURAL LANDS

## INTRODUCTION

**History of the census of drainage.**—This volume presents statistics relating to drainage of agricultural lands in the United States, as gathered in each of four censuses. The first census of drainage in the United States was taken in 1920, the second in 1930, the third in 1940, and the fourth in 1950. All four censuses were taken as of January 1.

The data obtained in the 1950 enumeration are given in detail for counties, States, and for the United States. Comparative data for counties are usually given, when available, from the Census of 1940. All available comparative data for States and for the United States are presented from all censuses.

**Legal basis for the 1950 Census of Drainage.**—The act providing for the fifteenth decennial census, approved June 18, 1929, states in part: "A census of population, agriculture, irrigation, drainage, distribution, unemployment, and mines shall be taken by the Director of the Census in 1930 and every 10 years thereafter." The Census of drainage in 1950, as in 1940 and 1930, was taken in accordance with that provision.

The act of Congress providing for the fourteenth decennial census (1920), in the paragraph defining the scope of the census of agriculture, stated in part: "Inquiries shall be made as to the quantity of land reclaimed by . . . drainage and the crops produced; also as to the location and character of . . . drainage enterprises, and the capital invested in such enterprises." No provision for inquiries regarding drainage was made in any previous census act, and nothing comparable to a census of drainage had been taken before 1920.

**Scope of the censuses of drainage.**—Prior to 1950, all organized drainage enterprises, regardless of size, were covered in each census of drainage. A report was secured for each enterprise that had constructed drainage works which were still serving agricultural lands or that had contributed to the capital invested in existing works. All unorganized drainage operations on agricultural lands of 500 or more drained acres, conducted by individuals or cooperative groups, were also covered. For 1950, it was decided to restrict the enumeration, as nearly as possible, to drained agricultural areas of 500 acres or more, regardless of whether they were in an organized enterprise or represented a private operation.

The decision to limit the 1950 Census of Drainage to enterprises of 500 or more drained acres was based on the following facts: In 1940, there were 79,220 reports secured in the Census of Drainage. Many of these represented enterprises which had been superseded by later enterprises.<sup>1</sup> Although these superseded enterprises were no longer in existence, the works which they had constructed were still serving to drain agricultural lands or these enterprises had contributed to the capital invested in existing works. Of the 79,220 total, 41,691 were less than 500 acres in size. Of approximately 133 million acres in all enterprises in 1940, only 9 million acres were accounted for by enterprises under 500 acres. Thus, slightly more than half of the enterprises containing about seven percent of the land in enterprises were represented by these small operations. In 1940, about 87 million acres of land were drained. The difference between 133 million and 87 million repre-

<sup>1</sup> 36,857 of the 79,220 reports received in 1940 represented superseded enterprises.

sented lands which were drained by more than one enterprise. Considerably more than one-half of the land in enterprises of less than 500 acres was shown to be in overlapped enterprises.

COMPARISON OF DRAINAGE ENTERPRISES UNDER 500 ACRES WITH ALL ENTERPRISES: 1940

Item	Number	Percent of total	Area (acres)	Percent of total	Net land drained (acres)	Percent of total
All enterprises.....	79,220	100.0	132,828,451	100.0	86,967,039	100.0
Enterprises under 500 acres.....	41,691	52.6	9,065,810	6.8	4,378,743	5.0
Enterprises of 500 acres or more.....	37,529	47.4	123,762,641	93.2	82,588,296	95.0

It is both expensive and difficult to gather information from individuals or officials for small acreages of drained lands. These items are more pronounced for those enterprises which have been superseded. As was shown in the preceding tabulation, many of the small enterprises have been superseded by later enterprises. For that reason, it was decided, in advance of the 1950 Census date, to eliminate enterprises of less than 500 acres from the enumeration. As mentioned, the exclusion of the very small enterprises has a material effect on the number of enterprises covered, but has only a minor effect on the number of drained acres.

Enterprises which have drained agricultural lands have not always been organized primarily for drainage, for example, some irrigation enterprises. In 1950, the enumerators who were charged with the responsibility of securing a drainage questionnaire for irrigation enterprises having their own drainage were often unable to obtain the required information concerning the area and location of the lands benefited by drainage. Nor could they readily secure an allocation of costs, collections, and indebtedness for the drainage works separately from the irrigation works. Because of this difficulty, some of the 1950 information concerning drained lands is lacking in completeness. However, figures for the area of drained land have been supplemented by data secured on the questionnaire for the census of irrigation. The tables carry appropriate footnotes or explanations where the data are incomplete or have been supplemented. Drainage data obtained from the 1950 Census of Irrigation are included for all irrigation enterprises which had any drained land at all. In other words, the restriction of 500 or more drained acres was not applied to irrigation enterprises having their own drainage. (The term "irrigation enterprises having their own drainage" has been loosely applied in presenting the tabular material for drainage. The data shown for such enterprises include any privately drained lands within the irrigation enterprise, provided, of course, such areas were reported.)

Drainage enterprises were enumerated in 40 States in 1950. Enterprises were enumerated in New Jersey and New York for the first time. The eight States with no drainage enterprises, for the purpose of the census, are the New England States and Pennsylvania and West Virginia.

**Procedures.**—Early in the preparation for the 1950 Census of Drainage, technical assistance of drainage specialists in several other government agencies was obtained. These specialists—from the Bureau of Agricultural Economics and the Soil Conservation Service of the United States Department of Agriculture, the Bureau of Reclamation of the Department of Interior, and several members of the Agriculture Division of the Bureau of the Census—comprised a Subcommittee of the Joint Census-Agriculture Committee formed for recommending plans and questionnaires for the 1950 Census of Agriculture and related subjects. The Subcommittee made recommendations as to the size of drainage operations which should be included in the enumeration and as to the type of questions which should be included in the questionnaire. In the main, its recommendations were accepted. Some changes in the content of the questionnaire were made as a result of later field testing.

In counties of Ohio, Indiana, and Michigan, nearly all the drainage enterprises have been organized as county drains and there has been considerable overlapping of enterprises. This overlapping has been due to the fact that much of the maintenance work on existing ditches has been done by including most or all of the land of an earlier enterprise into a new project and then assessing the costs of cleaning the ditches or otherwise improving the drainage works against the benefited lands of the new project, including those lands in the earlier enterprises. There are many counties in which the sum of the areas of all enterprises is several times as large as the area of the land actually drained. When there is a large amount of overlapping and also many small enterprises, as is the case in these three States, it would be a long and costly job to plot all the assessed land in each active enterprise as well as many inactive enterprises in order to determine the total acreage of land in enterprises.

Therefore, a small-scale field test was made in 1949 in Ohio and Indiana to determine in part whether a satisfactory method of enumerating overlapped drainage enterprises had been developed. Additional testing in these two States, and also in Illinois, was performed to ascertain the adequacy and adaptability of the preliminary draft of the drainage questionnaire.

In this preliminary field test, it was learned that in most of the counties having county drains, there are county maps showing the land in drainage enterprises. These maps were usually prepared by the county engineer or other qualified person. The existing maps and the special knowledge of county engineers or surveyors as to the location of the drained lands could be used to best advantage if overlapped lands in enterprises could be eliminated from the enumeration. This elimination would greatly reduce the cost of both field and office work. In part, it was for this reason that it was decided to treat the drained lands of each county, in States having a predominance of county drains, as a single enterprise. In other words, only one questionnaire was filled per county in such States.

Most of the overlapped enterprises, and also those under 500 acres, are in the three States of Ohio, Indiana, and Michigan. The same economies which prompted the Census to use one questionnaire per county in these three States led to the use of one questionnaire per county in Delaware, Iowa, Kentucky, Minnesota, Oklahoma, North Dakota, and South Dakota. This group of ten States has been designated as "county-drain" States, although in Delaware the predominant form of drainage organization is the drainage district.

In order to treat the drained lands of a county as though they comprised a single enterprise, it was necessary to change the drainage questionnaire which had been designed for general use to a shorter form for use in the county-drain States. Because of the fact that data were gathered in less detail and on a county-wide basis in some States, and for individual enterprises in other States, it has been convenient to group the statistics for the States reporting drainage into two totals, those for the

"county-drain" States and for the "drainage-district" States. The short form of the questionnaire for use in the county-drain States was designated as "D-1" and the longer form for use in the drainage-district States was designated "D-2." (A facsimile of each of these two questionnaires is presented in the Appendix to this volume.)

Just prior to the taking of the 1950 Census of Drainage, a separate listing was made from the individual 1940 reports for each county in the United States, showing the names of all enterprises within the county having 500 acres or more of drained lands. Also, the name and address of the individual, board, or company controlling the enterprise was listed. The original listings were later given to the enumerators assigned to the respective counties for their guidance in securing reports for the 1950 enumeration. The lists were recognized as being incomplete for 1950. For those counties which had no known enterprises, it was necessary to be sure that they would not be overlooked in the 1950 canvass if enterprises of 500 acres or more presently existed. To preclude the overlooking of enterprises in such counties, the Director of the Census communicated with appropriate officials in all 48 States prior to the date of enumeration to ascertain whether organized drainage enterprises did exist within such counties. (A facsimile of the Director's letter is included in the Appendix to this volume.)

As a further aid in building-up a listing of the counties in which the enumeration was to be conducted, the Washington Office of the Soil Conservation Service was requested to have its Regional Soil Conservationists supply a list of all cooperative or group drainage enterprises of 500 acres or more to which they had rendered technical assistance. The names of these enterprises were added to the county lists already prepared. (A facsimile of the listing form is also found in the Appendix to this volume.)

Some of the first enumeration in county-drain States was done by the technicians of the Agriculture Division of the Census, but as the enumeration progressed, it was necessary to employ and train enumerators for this work. The training consisted of one or two days of group instruction in which the questionnaires and the enumeration instructions were studied. Additional training was given on the job as the enumerators did their work.

In areas in which irrigation technicians were employed to enumerate irrigation enterprises, these technicians also were trained to enumerate drainage enterprises in their respective areas.

Special drainage supervisors were employed to supervise the drainage enumeration in the other drainage-district States. They were given a week of instruction. Supervisors then held 3-day training schools for enumerators. Training consisted of gaining some understanding of drainage in the States in which the enumerators were to work, and of the drainage questionnaire and instructions, and of practice in plotting drainage enterprises on county maps. After the classroom instruction, the enumerators were sent out in pairs to enumerate a few enterprises. After their work was reviewed by the supervisor, each enumerator was made responsible for the enumeration of drainage in specified counties.

Drainage enterprises were thus enumerated by trained drainage enumerators. Some enumeration was done by the supervisor in counties in which the number of enterprises was small or where the enumeration was complex. The data were obtained from authentic sources, such as officials of enterprises, county engineers, drainage companies, and county records. Each enumerator was provided with a county map on which to plot each enterprise.

In county-drain States the number of drained acres for each county was usually obtained by plotting the drained areas on maps furnished the enumerators for such purpose. Sometimes this mapping was facilitated by copying from existing maps in the

office of the county engineer or surveyor. The instructions provided that plotted areas should then be reviewed by the appropriate official. In many instances it was necessary to plot the drained lands from legal descriptions found in the records relating to individual enterprises. In a few cases, when records were lacking or inadequate, the county engineer, or other official acquainted with drainage, determined the drained areas from his general knowledge. The plotted areas were later measured in the Washington Office by use of a planimeter. If the drained area was readily ascertainable from county records this measurement served as a check on the accuracy of the plotting. If the drained area was not ascertainable from the county records this measurement served to obtain the total area of drained lands for the given county.

In drainage-district States, the number of acres in each enterprise was entered on each individual drainage questionnaire by the enumerator. The acreage and location of the enterprise were then plotted on a map of the county. These plotted areas were also later measured by use of a planimeter. Again, this measuring determined whether the acreage of each enterprise, as entered on the questionnaire, and the area and location of the enterprise, as plotted on the county map, were in reasonable agreement.

As was explained under the topic "Scope of the Censuses of Drainage," the enumerators who had the responsibility for securing drainage questionnaires for enterprises which had been organized to irrigate land, as well as to drain land, were unable to obtain satisfactory figures for the drainage questionnaire. For that reason, the drainage data obtained from the 1950 Census of Irrigation have been substituted for those which were wanted but were unobtainable on the drainage questionnaires. The drained lands for irrigation enterprises having their own drainage have not been mapped. The approximate location and extent of such lands are indicated on the various maps.

Much information of value to the census of drainage was made available by the Federal Land Banks in regions where drainage districts are of importance. The drainage data procured from the several Federal Land Banks contributed to the accuracy of the census of drainage and helped to expedite the enumeration.

After the drainage questionnaires were received in the Washington Office, they were examined for consistency and completeness and prepared for tabulation. By correspondence with drainage officials and others, an attempt was made to supply significant omissions and resolve discrepancies for many of the larger enterprises. The information was then tabulated manually for the individual counties and States.

**Presentation of statistics.**—All of the available statistics for drainage collected in 1950 are presented in this volume.

After the separate State reports showing county statistics had been issued, in preliminary form, totals for the United States were compiled and issued in a preliminary release. The statistics contained in the preliminary releases are now incorporated in this final volume.

The first eleven tables in this volume are summary tables. In these eleven tables, totals are given for the United States when data are available for all States. Likewise, totals are given for the 30 drainage-district States and for the 10 county-drain States. A few of these tables also present totals for the separate States.

Following the eleven summary tables, additional tables are presented for the 30 drainage-district States, in alphabetical order. These are followed, in turn, by tables for the 10 county-drain States, likewise in alphabetical order. There are three State tables and one county table for each of the drainage-district States and two State tables and one county table for each of the county-drain States. This arrangement of tables has been made necessary because some data are available only for the drainage-district States. For Illinois, Missouri, Florida, and Louisiana, two additional State tables present data for pumping plants

showing kind of power, capacity in horsepower, and land served; also, kind of pump, capacity in gallons per minute, and land served.

In the Appendix are facsimiles of both the D-1 and D-2 Drainage Questionnaires used in 1950, Instructions for Enumerators, and the County Listing Sheet for Drainage Enterprises. The letter to the appropriate official in each of the 48 States inquiring as to whether organized drainage enterprises existed in his State is also reproduced in the Appendix.

This volume does not contain a synopsis of the drainage laws of the separate States. In the report for the 1940 Census of Drainage, such a synopsis was presented for 38 States, along with a chart showing the principal features of their laws and also of the laws under which drainage enterprises may be organized in the other 10 States. Laws pertaining to drainage have not been reviewed since the Census of 1940 and, therefore, an up-to-date synopsis is not available for presentation in this report. It was assumed that the one prepared for 1940 was reasonably complete and adequate for purposes of the 1950 Census.

**Comparability of data.**—Since each of the four drainage censuses was taken as of January 1 of the census year, and since the data obtained are not subject to seasonal fluctuations, the figures in this report would be fully comparable if all other factors had been equal. However, as stated previously, there has been a change in coverage whereby organized enterprises of less than 500 acres were largely excluded from the enumeration in 1950 as contrasted with earlier years. This would affect the number of enterprises far more than the number of acres covered in the enumeration.

Under the topic "Procedures" it was explained that in county-drain States use was made of existing county maps showing the location of drained lands. Also, that in a few cases, the county engineer's knowledge was utilized in preparing such county maps. In either case such mapped drained areas may have included a few enterprises of less than 500 acres although the general plan of operation called for their exclusion. This over-all method of procedure may have given a slightly larger acreage shown as drained than would have been secured if each enterprise had been separately plotted. However, the total area of enterprises of less than 500 acres either included or excluded were usually not large enough to affect materially the total area of drained lands in a given county.

Also, it has been pointed out that in the States with the largest total number of enterprises and with the largest number of enterprises of very small size, viz, the county-drain States, the number of enterprises was not secured for 1950. In the county-drain States the information was secured at the county level and not for each separate enterprise. Again, comparability, particularly for the areas of drained land and financial items, has been affected by the substitution in 1950 of data secured in the census of irrigation in 17 irrigation States for data which were not obtained satisfactorily in the census of drainage.

For the county-drain States a comparison was made of the counties for which drainage data were secured in the censuses of drainage and of irrigation. It was found that the latter census had enumerated some drained lands in several counties in North Dakota, South Dakota, and Oklahoma which had not been enumerated in the census of drainage. The areas of such drained lands have been included in the drainage data in this report for the counties affected. Corresponding financial data, of course, are not available for those projects. Footnotes to the appropriate tables indicate which counties have had such additional information supplied.

Prior to the 1950 Census, information had been secured for the amount of capital invested regardless of whether made many years ago or in a more recent period. The capital invested was supposed to represent the original cost of the drainage works, including all expenses incident to organizing the enterprise, and

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similar costs for extensions and enlargements but not expenditures for repair, maintenance, or operation of the works or enterprise. Costs of superseded enterprises were supposed to be included if the drainage works were still in use. The total of all prior costs is not only difficult to obtain but also it seems to have little worth because it combines a dollar spent in a year when it had high purchasing power with a dollar spent in a year when it had a smaller purchasing power.

For the 1950 Census, it was decided not to attempt to obtain total costs back through the years from the beginning of the enterprise, but rather to confine costs to the 10-year period beginning with 1940. Further, for the 1950 Census, it was decided not to attempt to allocate costs between capital expenditures on the one hand and operation and maintenance expenditures on the other hand. An allocation of costs between capital and operation and maintenance has not been made by many drainage enterprises. A division of the expenditures into these two components was, therefore, not considered feasible.

The tables in this report have been prepared in such manner as to show the total capital costs incurred prior to each census date until 1940. They also show the total annual costs (capital and operation and maintenance) incurred for each year of the succeeding 10-year period.

The 1940 to 1949 data on the cost of construction and operation and maintenance are not entirely comparable for the county-drain States and the drainage-district States. This is due to a change in instructions to enumerators which provided for the exclusion of payments on principal and interest on bonds or other debts in the costs of construction and operation and maintenance figures for the drainage-district States. Such payments were included in the county-drain States.

### DEFINITIONS AND EXPLANATIONS

Basic definitions and general explanations for use in the enumeration were incorporated in the D-1 and D-2 Drainage Questionnaires and in the Instructions to Enumerators, copies of which appear in the Appendix. The definitions and explanations which follow should be helpful in interpreting the statistics which appear in this publication.

The census of drainage relates only to the drainage of agricultural lands.

Drainage of agricultural lands is the act or process of drawing off an excess of water for the purpose of improving the condition of the land. It is accomplished by means of underground conduits, pipes, or tiles; by open or covered trenches in the surface of the ground; or by pumps operated to lower the ground-water table. Land protected from overflow by levees, dikes, or embankments is not considered as drained land unless some form of drainage works has been constructed on the protected land.

A drainage enterprise, for the purpose of the 1950 Census, is an area of 500 acres or more:

- (a) Organized as one drainage district; or
- (b) Assessed for the same public drain; or
- (c) Drained by works operated as one undertaking under private or corporate ownership.

A questionnaire was required for each drainage enterprise in the following States, called herein drainage-district States:

Alabama	Louisiana	North Carolina
Arizona	Maryland	Oregon
Arkansas	Mississippi	South Carolina
California	Missouri	Tennessee
Colorado	Montana	Texas
Florida	Nebraska	Utah
Georgia	Nevada	Virginia
Idaho	New Jersey	Washington
Illinois	New Mexico	Wisconsin
Kansas	New York	Wyoming

If an enterprise was located in more than one county, a separate questionnaire was prepared for each county.

In the following States one questionnaire was filled for each

county as though the drained land in each county represented one enterprise:

Delaware	Michigan	Oklahoma
Indiana	Minnesota	South Dakota
Iowa	North Dakota	
Kentucky	Ohio	

These last-named States are referred to as county-drain States.

**Approximate land area.**—A considerable part of the increase in the approximate land area for all drainage States, in combination, and for the 30 drainage-district States, in combination, is due to the inclusion of more States in 1950 than in 1940. For any given State or county, the approximate land area reported for 1950 is, in general, the same as that reported for 1940. A change in the figures for an individual State or county since 1940 represents an actual change in boundary. The figures for 1940 represent a complete remeasurement and for that reason may be at variance with the figures shown for 1930 and 1920.

**Land drained.**—The term "Land drained (net)" as used in the tables is intended to include only the actual acreage of land drained. If a given acre of land had been included in more than one drainage enterprise it has been counted only once in the "Land drained (net)" figure for the geographic area in which it is located. This term, "Land drained (net)," has not been used for the 10 county-drain States and the counties thereof. It was necessary to use the word "(net)" in connection with the words "Land drained" in all other areas to clarify a subtotal figure for the item "Included in two or more enterprises (overlapped)." The amount of overlapped acreage was not secured in the 10 county-drain States; in such States, therefore, the term "Land in drainage enterprises" was used instead of "Land drained (net)." In the previous census reports a total was given for "Land in drainage enterprises" which represented a combined total for all enterprises even though a particular acre was counted more than once.

Overlapping of drainage enterprises means that some land has been assessed in more than one enterprise. Overlapping may have come about from one of several causes. As has been pointed out, one of the reasons for not enumerating individual drainage enterprises in county-drain States was that clean-out or other maintenance work on existing drainage ditches was often accomplished by the formation of a wholly new enterprise. The succeeding enterprise may have included the same land or more acreage or less acreage than was in the original enterprise. Another type of case representing assessment of lands in more than one enterprise has been the organization of a subdistrict within the confines of an existing enterprise for the purpose of constructing some additional drainage works of localized benefit. The cost of the new works is assessed only against the land benefited by the new works. Such a subdistrict may be administered by the same officials as the main or parent district or by wholly different officers. Again, subdistricts may be organized to construct or install all the drainage works for a particular parcel of land within the boundaries of the main enterprise. In this latter case the main or larger enterprise would probably provide the outlet canals for the drainage water of the subdistrict.

A few drainage enterprises included acreage in more than one county. In the case of cross-county projects, the acreage in each county was secured in the enumeration and was tabulated in like manner.

It should be remembered that the drained acreage which was tabulated and mapped in 1950 was somewhat smaller than would have been the case if the same procedure had been followed in that year as in 1940 and earlier censuses. The exclusion of most projects of less than 500 acres in 1950 is one of the changes of procedure tending to make the 1950 acreage smaller than for earlier years. Another is that for irrigation enterprises in 1940 and earlier years it was assumed that the assessment for costs of drains installed on only part of an irrigation project was made

against all of the land in the irrigation project. The total of the land assessed for irrigation in the irrigation project was tabulated and mapped rather than the acreage on which drains had been installed. In 1950, only that part of the irrigation enterprise actually served by drainage works was tabulated and mapped. The part of the 1950 drained acreage which was secured from the census of irrigation is shown separately in the tables. Along with each such total is presented the total area of irrigated land in the identical irrigation enterprises having their own drainage.

**Number of enterprises.**—The number of enterprises was not obtained for the 10 county-drain States. For the other States the number represents separate drainage undertakings in the State or county, exclusive of those dissolved, abandoned, or entirely superseded by later organizations. Subdistricts that have been reported separately from the main or parent district have been counted as independent enterprises. Old enterprises have been included in the census if they still have authority to maintain the drainage works or if the works are still providing drainage.

Intercounty enterprises or joint-county enterprises were enumerated as if the part of each county were organized separately. In 1950, the total number of enterprises per county is shown, but in the State total each enterprise is counted only once regardless of the number of counties in which parts of it are located.

**Type of enterprise.**—Drainage districts, county drains, and township drains are enterprises organized under general or special State laws for obtaining equitable cooperation among landowners who will be benefited by the same drainage works. A drainage district is governed by officials elected or appointed for that particular enterprise. A county drain is governed by county officials who manage the affairs of all enterprises in the county organized under the same statute. Township drains are managed by township officials, as county drains are managed by county officials. In these three types the costs of each enterprise are assessed, almost universally, against the property benefited and more or less in proportion to the amounts of benefits.

The distinction made between drainage districts and county drains was not applied universally in the States. In Iowa, for example, all of the enterprises are classed herein as county drains although they are drainage districts. In some other States, the term "district" is used locally, even in the statutes, for enterprises classed differently in this report.

State projects are administered by State officials. The cost of each such enterprise is divided between the State and local interests according to a method provided in the statute, which commonly considers the relative amounts of land owned by the respective interests. For 1950 this type of drainage enterprise includes enterprises operated by State institutional farms.

In the Western States much of the drained land is located in irrigation enterprises which were chartered to do both irrigation and drainage work under one organization. However, in some cases, land in an irrigation enterprise is drained by a separate drainage enterprise organized in a manner similar to that used in the nonirrigation States. These drained lands may be in an enterprise incorporated for the purpose of providing drainage or they may be owned by an individual who constructed his own drainage works. In the case of irrigation enterprises having their own drainage, the cost of construction and operation and maintenance of the irrigation works is usually far greater than that for drainage. Separate records are seldom kept for the various expenditures which are included in an over-all cost for both drainage and irrigation. The area of such drainage projects, in censuses prior to 1950, was assumed to be the total acreage assessed for both the irrigation and the drainage work combined although in many cases the land actually drained was only a small part of this total area.

The inquiries on the drainage questionnaire relative to the

land actually drained and those relative to finances were so inadequately answered in 1950 that it was decided not to use the drainage questionnaire submitted for irrigation enterprises that have their own drainage but to use instead area data secured in the 1950 Census of Irrigation.

The data taken from the irrigation questionnaire showed the land actually irrigated in 1949, and the portion of this land which was served by drainage works. The land actually irrigated doubtless varies from year to year, but it is believed that this variation is not great and that the acreage shown approximates the acreage assessed for both irrigation and the drainage works. However, the drained land in some irrigation projects represented improvements made by individuals and not by the organized irrigation enterprise. In such cases, all of the irrigated land would not be subject to assessment for drainage.

The number of acres drained in irrigation enterprises, as shown herein, is 4,109,573, whereas the irrigation census shows 4,372,817 acres of drained land within irrigation enterprises. This difference is made up as follows:

State	Figure shown herein	Figure shown in irrigation census	Difference
Total.....	707,147	970,391	263,244
Florida.....	149,758	159,807	10,049
Louisiana.....	83,750	99,654	15,904
Texas.....	473,639	710,930	237,291

The difference represents separately organized drainage enterprises serving irrigated lands.

The irrigation enterprises having their own drainage were determined in the following manner: In the Washington Office the drainage questionnaires covering the irrigated lands were matched with the census of irrigation questionnaires for the same geographic locality. If the name of the enterprise which had been entered on the drainage questionnaire was the same as that on the irrigation questionnaire it was assumed that the enterprise had its own drainage. In such cases, the drainage questionnaires were usually incomplete and often carried a statement that the costs of drainage and other required items of information could not be properly allocated. If the land represented by a drainage questionnaire and an irrigation questionnaire overlapped in any degree, and the name of the enterprise was not identical, it was assumed that the irrigation enterprise did not have its own drainage. In the latter case, the irrigation questionnaire was not used to supplement the drainage data. In such cases, the drainage questionnaire seemed to be more completely filled.

In the three previous censuses, the land in drainage enterprises included the full assessed area of irrigation enterprises that had their own drainage works, but in the 1950 Census, only the acreage drained is included in the totals for land in drainage enterprises. If this change in procedure had not been made, the acreage shown for land in drainage enterprises for the 1950 Census would have been somewhat greater.

All 17 States in which the census of irrigation was conducted and which were not treated as county-drain States reported some land in irrigation enterprises which had their own drainage. The three irrigation States of North and South Dakota and Oklahoma were treated as county-drain States and, in general, no separate data are presented by type of enterprise for them.

The Federal irrigation enterprises having some drainage are projects constructed by the Bureau of Reclamation or the Office of Indian Affairs of the Department of the Interior. In 1940, the classification of enterprises by type was generally made according to method of control or management, but developments by the Bureau of Reclamation that had been turned over to water users

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for operation were tabulated as Federal. In 1950, the enterprises turned over to water users by the Bureau of Reclamation, were included in the nonfederal classification which in effect reduced the comparability for Federal enterprises by 38 enterprises and 613,997 acres.

Commercial developments, as the term is used in the census of drainage, are those drainage enterprises established for the purpose of developing lands for sale, without organization under drainage laws. Many are organized under general corporation laws.

A cooperative or mutual drain is a joint effort by two or more land owners to drain their farm land. There has been no legal organization for the particular enterprise.

Individual-ownership enterprises comprise drainage undertakings by individual owners, each for his own farm, or by two or more owners operating a single farm as partners without organization under statute law.

**Cost of construction and operation and maintenance.**—The cost of construction and operation and maintenance is shown for the period January 1, 1940, to December 31, 1949. This term includes capital items such as legal services and other costs of organization, engineering, rights-of-way, damages, construction of new works, improvement of old works, purchase of drainage works, etc. Included in operation and maintenance are such items as clean-out of open ditches and tile drains, maintenance and repair of levees, pumping plants, and other works used in draining land, and the cost of operation of drainage pumping plants.

The totals for cost of construction and operation and maintenance do not include expenditures attributable to drainage for those irrigation enterprises having their own drainage. The account books of such enterprises do not usually differentiate between costs for irrigation and costs for drainage. As mentioned heretofore, an attempt was made unsuccessfully in the census of drainage to secure an allocation of costs for irrigation enterprises having drainage which should represent expenditures for drainage.

In the county-drain States, enumerators were instructed to include payments on principal and interest on bonds or other debts in the cost of construction and operation and maintenance figures. In the drainage-district States such payments were not to be included.

**Capital invested.**—In censuses prior to 1950, the capital invested in drainage enterprises prior to the date of the census had been secured. Data for this item were not obtained in 1950.

Capital invested represented the original cost of the drainage works, including all expenses incident to organizing the enterprises and similar costs for extensions and enlargements. It did not include expenditures for repair and maintenance or for operation of the works. Costs of superseded enterprises were included if the drainage works were still in use. For the smaller, especially earlier, projects in which construction of ditches was done largely by the land-owners without compensation from the enterprises, it was impossible to include any cost or value of the labor supplied.

**"Funds collected for drainage" and "Outstanding indebtedness."**—Data for annual collection of taxes and other special assessments to meet the cost of draining agricultural lands were secured in the 1950 Census of Drainage for each of the years 1940 through 1949. No comparable annual data are available for previous 10-year periods. However, in the Census of 1940 the amount of drainage taxes and special assessments was obtained for 1 year, viz, 1939.

The amount of outstanding indebtedness of drainage enterprises was secured in both the 1950 and 1940 enumerations. These figures relate to December 31 of the year preceding the

census date. Such data afford a partial indication of the financial condition of drainage enterprises. Also, they offer an opportunity to test, to a limited degree, the reliability of the drainage statistics gathered in the two censuses, as indicated by the following projected simple bookkeeping equation:

indebtedness	cost of construction	tax collections	indebtedness
at beginning	+ and operation	= and special	+ at end of
of period	maintenance	assessments	period

The four items listed in the assumed equation need to be supplemented with others before it could be said that there is an equation at all. It is for convenience and simplicity only that the alinement of the four terms, as given above, is called an equation. If data are substituted for the various terms there should be a rough indication of whether the financial data gathered in the last two censuses are fairly comparable. If this test is applied to geographic areas the equation should be reasonably in balance without taking into account other factors. For the United States the total outstanding indebtedness for all of the drainage enterprises on December 31, 1939, was \$137,745,272. During the next decade, 1940 to 1949, the cost of construction and operation and maintenance was \$179,033,770. These two amounts total \$316,779,042. The funds collected for drainage during the same decade amounted to \$209,919,061. When the \$63,422,954 indebtedness on December 31, 1949, is added to this latter amount the total is \$273,342,015. The two sides of the equation do not balance by \$43,437,027 as herewith shown:

$$\begin{aligned} \$137,745,272 + \$179,033,770 &= \$209,919,061 + \$63,422,954 \\ & (+\$43,437,027) \end{aligned}$$

An assumption has been made that cash and other reasonably liquid items on hand serving either as a working fund or as a sinking fund did not vary enough to affect either side of the equation materially. That may not have been the case and no data were collected in either of the last two censuses to throw any light on the subject.

For the United States as a whole, there may be several other reasons why there is a lack of balance in the assumed equation. First, the number of enterprises included in the 1950 enumeration was not as large as in 1940. It is believed that the exclusion of many enterprises of less than 500 acres in 1950 did not affect materially the financial items. Many of the small enterprises have been superseded by later enterprises and many of those still functioning, no doubt, have no debt. Again, in the irrigation States, the amount of indebtedness at the close of the 10-year period, 1940 to 1949, did not include the obligations of irrigation enterprises having their own drainage. The indebtedness figure for the beginning of the decade (secured in the 1940 Census) included the whole indebtedness of irrigation enterprises having their own drainage even though all the debt was not applicable to the drainage works of such enterprises. If the indebtedness at the beginning of the period could be decreased or that at the end of the period could be increased, to effect comparability in the recording of the obligations of irrigation enterprises, the two sides of the equation would be nearer in balance.

Again, if any capital or operating costs are paid for out of general public funds, not out of taxes and other special assessments for drainage, there should be an unbalance in the relationship of the four factors outlined.

Refinancing of the obligations of drainage enterprises has also had the effect of causing a lack of balance in the assumed equation. This has come about through a forced or mutually agreed upon decrease in the indebtedness or, as occasionally happens, the State or a city or other public organization has assumed a portion or the whole of the indebtedness of a drainage enterprise and has paid off such obligation from the general revenues.

The inclusion of debt service items (payments on principal and interest) in the cost of construction and operation and mainte-

nance for the 10-county-drain States has caused the second member of the equation to be too large. This would cause an unbalance in the figures for the United States and for the States wherein this procedure was followed.

A factor which operated in the opposing direction was that payments for interest on indebtedness have been included in the general term "collections." To the extent that this was not offset by the inclusion of such amounts in costs, the residual needed to bring the two sides of the equation into agreement was not as high as would otherwise have been the case.

For the foregoing reasons, there is no conclusive proof as to the reliability of these financial items. For most individual enterprises, they seem to have been reasonably well reported in the two censuses. However, for a few geographic areas where several of the factors making for lack of comparability can be eliminated, the two sides of the projected equation are far from being in agreement when the four specified items are considered. For example, in Illinois, which is not a county-drain State nor an irrigation State, it seems that the expressed relationship of the four items does not nearly meet the requirements for an equation. Not many small enterprises were included in Illinois in 1940 which were excluded in 1950. Likewise, it is believed that there was not a great amount of indebtedness in Illinois which was refinanced in the 10-year period. The data for Illinois are:

\$6,974,400	+	\$16,860,472	=	\$17,869,185	+	\$2,858,644	(+	\$3,107,043
(indebted-		(cost of		(tax collec-		(indebted-		residual)
ness at		construc-		tions and		ness at end		
beginning		tion and		special		of period)		
of period)		operation		assess-				
		and main-		ments)				
		tenance)						

**Principal purpose of drainage.**—Three mutually exclusive purposes for the drainage of agricultural lands were recognized in the 1950 Census. The purposes were: (a) Reclamation or improvement of land, (b) Protection of land against overflow, and (c) Removal of alkali or seepage from irrigated land. The first purpose includes the reclamation of land hitherto too wet to be profitably farmed. This included swampland reclaimed as well as other lands already in farms but too wet for farming. The removal of excess water from the soil surface and from the soil root zone is essential to crop production, to good grazing, and for soil fertility.

The protection of land against overflow refers to those instances where drainage works were installed to protect lands from inundation at times and with such frequency as to make farming impractical.

The third purpose of drainage, removal of alkali or seepage, is closely related to irrigation. Alkali lands can be reclaimed by irrigation and drainage. The seepage from irrigation ditches must normally be removed by drainage ditches. Waterlogged soil is a common hazard of irrigation. This type of drainage is confined almost entirely to the Western States. Data for the purpose of drainage were obtained only for the 30 drainage-district States. However, this information is not available for the irrigation enterprises having their own drainage.

To reclaim and improve land was the principal purpose of drainage on 89.7 percent of the land in enterprises in 1950. Protection of land against overflow was the purpose of drainage on 7.6 percent of the land area. Removal of alkali and seepage from irrigated land was reported as the reason for drainage of the remaining 2.7 percent of land in enterprises. In 1940 almost twice as much land was protected against overflow as in 1950. In 1930 about the same acreage was protected against overflow as in 1950. Less land was reported drained for the purpose of removing alkali and seepage from irrigated land in 1950 than in 1940 or 1930. This was probably because the whole area of irrigation enterprises was enumerated in 1940 and 1930, whereas

only the drained portions of irrigated enterprises were included in the 1950 Census of Drainage.

**Drainage works.**—Open ditches of a drainage enterprise include all open artificial drainage channels and all natural watercourses improved for land drainage that were being maintained or used by the enterprise.

Tile drains include all covered drainage conduits of earthenware, concrete, or other materials maintained or used by the enterprise.

Levees and dikes do not include spoil banks thrown up in construction of ditches unless the embankments were particularly designed and constructed to act as levees. Conversely, borrow pits resulting from construction of levees are not included as drainage ditches unless particularly designed and constructed as part of the ditch system.

Drainage wells pumped for drainage are those operated to obtain drainage by lowering the ground-water table. They are not sumps into which surface water is discharged by open ditches. The use of such wells is confined almost entirely to the irrigated lands of the arid West where seepage and alkali conditions may cause much damage.

Pumping for drainage is required where river floods or other conditions do not permit gravity flow of water from the land in the enterprise rapidly enough to avoid causing injury. Pumping enterprises, as classed herein, are all those which operate pumps for drainage during any part of the year. Few enterprises perform all their drainage by pumps.

Area served by pumps is the acreage in enterprises that requires pumping any part of the time.

For the 1950 Census of Drainage, pump information is shown only for Florida, Illinois, Louisiana, and Missouri. In nearly all States with irrigation, some of the land served by pumps is located in irrigation enterprises which have their own drainage. Since data for such irrigation enterprises were not usable from the census of drainage it was not possible to show pump information for most of them. Also for the 10 county-drain States, no provision was made for questions relative to pumps on the D-1 questionnaire.

**Drainage condition in year preceding census.**—The condition of land drained is directly related to crop production. Of the 46,545,617 acres in drainage enterprises in the 30 drainage-district States, approximately 25 million acres were reported as having good drainage, 9 million acres had fair drainage, and 12 million acres had poor drainage.

## GENERAL DISCUSSION

**Distribution of land in drainage enterprises.**—The drainage of agricultural lands was reported in 48 States in 1950, 38 States in 1940, 35 in 1930, and 34 in 1920. In the 1950 Census of Drainage approximately 103 million acres of land were reported drained, as compared with 87 million in 1940, 84 million in 1930, and 65 million acres in 1920. Of the 103 million acres of drained land reported in 1950, about 51 million acres are in the 30 drainage-district States and the remainder in the 10 county-drain States.

The 1940 total of 87 million acres included the entire area of irrigation enterprises which did their own drainage but in some instances only a small part of this entire area was actually drained. The 1950 total of 103 million acres drained included only those portions of such enterprises as were actually drained.

The irrigated lands in some cases are drained by separately organized enterprises, whereas in other cases the irrigation enterprises do both irrigation and drainage as a part of their water-control program. If the entire assessed area of enterprises doing both irrigation and drainage had been included in the 1950

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Census, as was done in the three earlier censuses, the total area in enterprises in 1950 would be considerably greater.

The 1950 Drainage Census includes all enterprises which had begun construction of works prior to January 1, 1950. This provision for including unfinished projects made little difference in the total amount of drained land in any State except Louisiana. In that State many of the parishes had adopted a system of parish-wide drainage during the 10-year period prior to January 1, 1950, and had done some construction. In some parishes only a small amount of drainage work had actually been done before the census date.

The inclusion of such parishes largely accounted for the increase of land in enterprises from approximately 4,220,000 acres in 1940 to 12,162,000 acres in 1950. If this parish-wide system of drainage had not been established prior to 1950, it is estimated that the total land in Louisiana enterprises would have been approximately 5 million acres instead of over 12 million acres as shown.

**Location of enterprises.**—As shown by the accompanying map, the greatest portion of land in drainage enterprises is located in the North Central States and Lower Mississippi Valley. The States with the largest drained acreage in 1950 were Louisiana with 12,161,665 acres drained, Minnesota with 11,269,962 acres, Indiana with 11,017,709 acres, and Michigan with 10,194,439 acres. Of the States with drainage, the smallest acreage was reported in New Jersey, which had 11,206 acres. This was followed in order by Virginia with 45,460 acres, New York with 56,465 acres, and Alabama with 76,671 acres. The following eight States reported less drained land in 1950 than in 1940: Arizona, California, Delaware, Idaho, Montana, Nebraska, New Mexico, and Wisconsin. Six of these eight States have irrigation enterprises. Some probable, or at least possible, reasons for the reduction of land in enterprises are: (a) in 1940 the total area of irrigation enterprises having drainage was included in the census, but in 1950 only those parts of irrigation enterprises which were actually drained were included; (b) abandonment or dissolution of enterprises; (c) lands of drainage enterprises transferred to State or Federal control for reforestation or wild-life conservation; and (d) in the earlier censuses all organized enterprises were included, whereas in 1950, many enterprises of less than 500 acres were excluded.

**Number and size of enterprises.**—As was explained under the topic "Procedures," it was expedient to divide the States with drainage into two groups, the county-drain States and the drainage-district States. For the 10 county-drain States, one D-1 questionnaire was filled for each county rather than for each separate enterprise. In the county-drain States, almost all drainage enterprises are managed by the county government. For this reason, in part, all enterprises within the county were enumerated as one. Therefore, the number of enterprises in these States is not available.

In the 30 drainage-district States, there were 14,066 drainage enterprises in 1950, as compared with 9,403 in 1940. In 1950, California had the highest number of drainage enterprises with 2,047, followed by Florida with 1,889, and Illinois with 1,433.

The classification of the land in drainage enterprises, by size of enterprise, has been made on the basis of the sum of the areas in the individual enterprises without a deduction of land in more than one enterprise. Drainage enterprises of less than 500 acres in 1950 totaled 8,273 or 58.8 percent of all enterprises in the 30 drainage-district States. However, these enterprises had only 1.1 percent of the land drained. According to the established procedures, all of these small projects should represent irrigation enterprises having their own drainage. This is consistent with the data collected in the census of irrigation. Of approximately 124,000 irrigation enterprises recorded in the census of irrigation, about 113,000 represented single-farm enterprises. These single-farm enterprises had fewer than 13,000,000 irrigated acres, or slightly more than 100 acres per farm. At

the other extreme of the size classification, 12 enterprises with 500,000 acres and over had 22.3 percent of the total drained land in 1950.

**Period of organization of enterprise.**—The date of organization for drainage enterprises is shown in table 1. During the period 1940 to 1949, there were 1,263 drainage enterprises organized to provide drainage for about 14 million acres. Of the 47 million acres in drainage enterprises in 1950 in the 30 drainage-district States, 5.0 percent of the acreage was in enterprises organized before 1900. There was some acceleration in the next decade, 1900 to 1909, when newly-formed enterprises accounted for 10.4 percent of the presently drained acreage. The highest percentage of the presently drained area is in enterprises which were organized in the period 1910 to 1919, with 33.1 percent of the total. The percentages for the next three decades were 14.2, 6.8, and 30.8, respectively. (See the topic "Distribution of land in drainage enterprises" for a part of the reason for the high proportion organized during the last decade.)

**Financial status of enterprises.**—The number of enterprises reporting arrearage indebtedness declined from 656 in 1939 to 73 in 1949. The amount in arrears decreased from \$36,835,380 in 1939 to \$4,994,840 in 1949. This improvement in financial position was influenced by two factors: (a) the enterprises had ten relatively favorable years in regard to agricultural price levels between 1939 and 1949 to pay off amounts in arrears; and (b) the 1950 drainage figures do not include such statistics for irrigation enterprises having their own drainage.

The area delinquent in drainage taxes increased from 6,092,018 acres in 1930 to 8,650,332 acres in 1940, then declined to 1,490,288 acres in 1950. The same factors mentioned above, which were believed to have been operative in reducing arrearage between 1939 and 1949, probably also worked for reduction in delinquency in drainage taxes during the last decade.

**Drainage works.**—Drainage works consist primarily of three types of construction: open ditches, tile drains, and levees or dikes. The drainage works on 95.0 percent of all the agricultural lands of the country had been constructed prior to 1940.

TABLE A.—DRAINAGE WORKS CONSTRUCTED BEFORE AND AFTER 1940

Item	Total		Constructed before 1940		Constructed after 1940	
	Miles	Per cent	Miles	Per cent	Miles	Per cent
All construction.....	219, 581	100. 0	208, 679	95. 0	10, 902	5. 0
Open ditches.....	155, 453	100. 0	146, 152	94. 0	9, 301	6. 0
Tile drains.....	56, 315	100. 0	55, 734	99. 0	581	1. 0
Levees and dikes.....	7, 813	100. 0	6, 793	86. 9	1, 020	13. 1

Of the 1,020 miles of levees and dikes constructed in the 1940 to 1949 decade, 661 miles were built in Florida. The increase of levees and dikes since 1940 is probably due to the increase of pumped land in the past ten years in several States, especially Florida and Louisiana.

In the 1940 to 1949 period 9 times as many miles of open ditches were constructed as miles of levees and dikes and 16 times as many miles of open ditches as miles of tile drains. The construction of tile drains by organized enterprises has declined materially since 1930.

All of the 40 drainage States have constructed open ditches, and in Alabama, Delaware, Maryland, Oklahoma, and Virginia no other type of drainage works was reported.

The use of tile drains is most common in the Corn Belt States of Iowa, Indiana, and Ohio. They have more miles of tile drains than the total of all the other 37 States. The only other

A sizable amount of tile drains is Minnesota. There are advantages of tile drains, viz, (a) the maintenance cost is less than that of open ditches, and (b) they do not impede the movement of farm machinery in fields. The use of tile to drain open ditches usually requires large sizes of tile with a consequent large capital investment. Unless careful study of the factors is first made, the cost of the work may exceed that derived.

Tile drains are used primarily in those States in which lands need to be protected from the overflow of streams or from coastal water. Pumped lands are usually protected by dikes.

California has the greatest mileage of drainage works of all kinds, followed in order by Ohio and Michigan. These States also have the greatest mileage of open ditches. California, and Ohio lead all States in miles of tile drains. Illinois, Louisiana, and Missouri have the most miles of dikes.

**Pumps.**—The number of enterprises reporting the use of pumps in 1950 was 378. A comparable figure is not available but 272 enterprises were reported in 1930 and 190 in 1910. The area served by pumps was 1,696,586 acres in 1950, somewhat smaller than the area reported in 1940 and 1930. The decline in acres served by pumps is due to the fact that no pumping data were secured from irrigation enterprises doing their own drainage, whereas in 1940 and 1930 the pumps were included in the total. The acreage of pumps in nonirrigation States decreased by 5,701 acres in the past decade. The States with the largest acreages of pumps in both 1940 and 1950 in the order named are: Illinois, Florida, Louisiana, and Missouri. The land area of pumps in California in 1950 amounted to 694,023 acres; in Louisiana, 315,363 acres; in Florida, 293,124 acres; in Missouri, 67,217 acres. Pumped lands for which enterprises do their own drainage are not included for

In the 1950 Drainage Census, information for pumping units is given for the States of Illinois, Missouri, Louisiana, and California located in the humid portion of the United States. In all of the irrigation States having pumped lands, some of the land served by pumps is located in irrigation enterprises doing their own drainage work. It is not possible to show the acreage of pumps for these States. Also, the questionnaire used in the 1950 Drainage Census made no provision for inquiries relating to pumps.

It is expected, however, that the pump tables for the four States listed above will provide useful data showing the kind of power, kind of power, and rate of runoff now used in the States. These tables show that in the Missouri-Illinois area, centrifugal pumps are used far more than any other type.

This is because these pumps are well adapted to the high lifts occasioned by flood stages in the Illinois and Missouri Rivers. The mean annual rainfall in this area is 40 to 50 inches.

The power used in the Missouri-Illinois area is predominantly internal-combustion type. This includes Diesel engines and gas engines using either oil or gasoline for fuel. The

use of electric power appears to be decreasing in this field. Some steam power is still in use.

The pumping enterprises in Louisiana are located in the southern part of the State. The land served by pumps has increased 45.7 percent in the past 10 years. Power to operate the pumps is supplied mainly by internal-combustion engines, although some electric and steam power is still in use. Nearly all the pumping is done with either the centrifugal or axial-flow type of pumps, with the centrifugal type predominating.

The total pump capacity reported for Louisiana in 1950 was 4,283,000 gallons per minute. This is equivalent to 23.9 gallons per minute per acre served, or a depth of 1.27 inches in 24 hours. The capacity reported in 1940 showed a total of 5,055,600 gallons per minute equivalent to 41.0 gallons per minute per acre served, or a depth of 2.17 inches in 24 hours. This is apparently too high. It is probable that 1.27 inches in 24 hours is more nearly correct.

In Florida most of the land served by pumps is in the Lake Okeechobee-Everglades Region of southern Florida, which is largely peat lands. The fall of the large outlet canals is approximately 0.2 foot per mile, and it is necessary to pump practically all the peat lands used for agricultural purposes. However, the pumping lift is low, averaging less than 5 feet. Also, about 60 percent of the annual rainfall of 55 inches occurs during the 4-month period of June to September. During most of this period, farming activities are at a minimum and the amount of pumping can be greatly reduced on lands given to truck crops.

Practically all pumps are so arranged that they can pump either to or from the land served, thus keeping the water tables at a fairly uniform depth. The term "water-control" is commonly used, as this includes either raising or lowering the water tables as conditions may require. By far the greater amount of pumping, however, is for the purpose of drainage or reducing the water table. The need for pumping into the land usually occurs in February or March when the rainfall is very light and the spring crops are being planted.

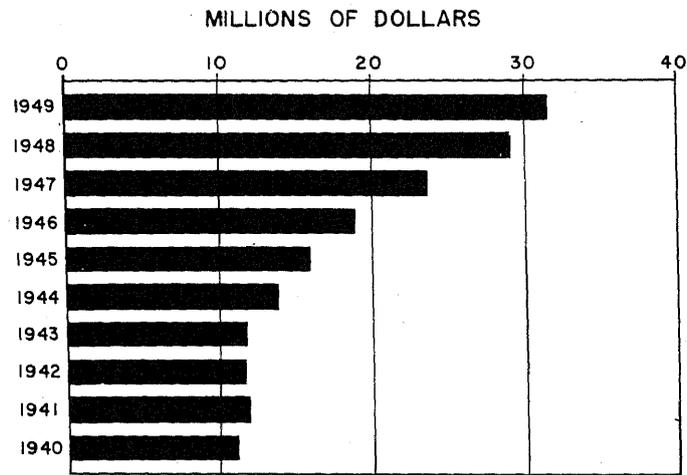
In the Florida pumping area nearly all the pumps are of the axial-flow type. This includes both the large screw pumps and the smaller type of propeller pumps which commonly range from 10,000 to 30,000 gallons per minute. The maximum pumping lifts vary from 5 to 9 feet, but the average lifts will usually be from 4 to 5 feet. During much of the time when the rainfall is light, and Lake Okeechobee is at a low level, very little or no pumping is needed for drainage.

Power to operate the pumps is furnished almost entirely by internal-combustion engines of either the Diesel or ignition type. Only a very small amount of electric power is used.

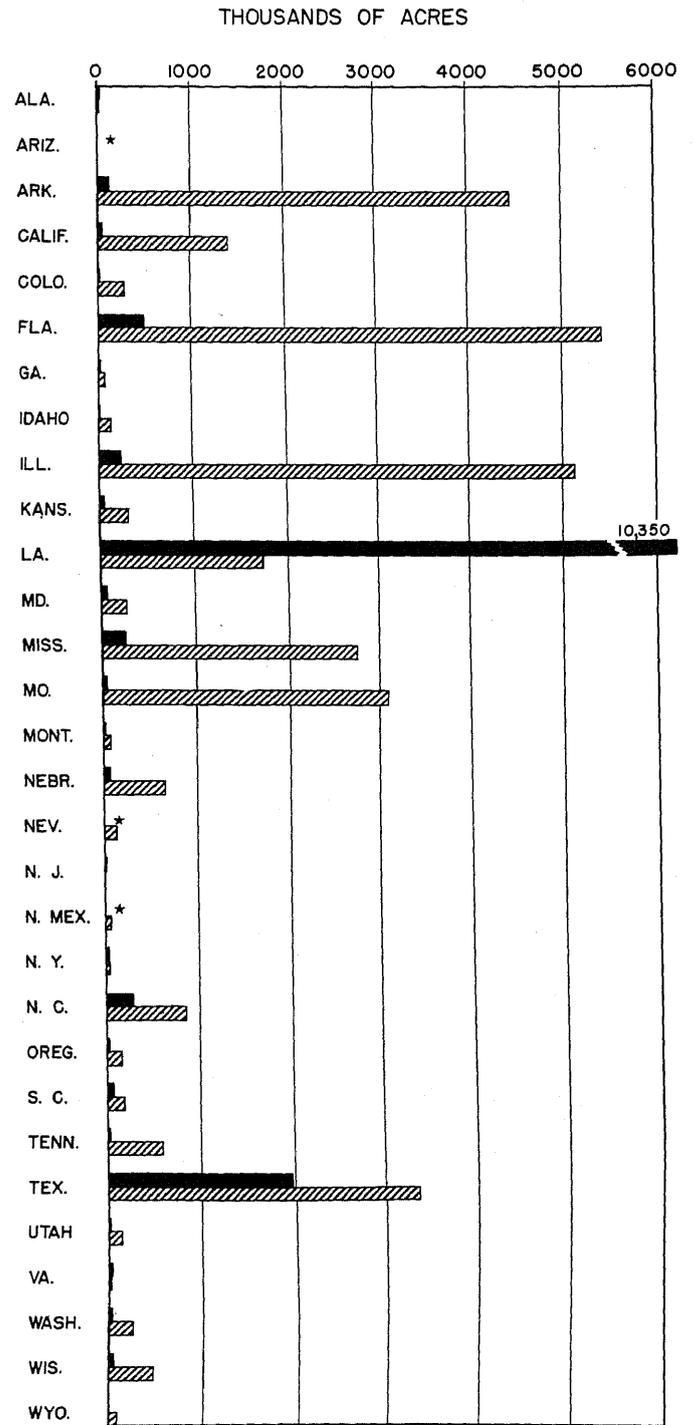
The land served by pumps in Florida has increased from 185,693 acres in 1940 to 293,124 acres in 1950, an increase of 57.9 percent. The reported pump capacities average 23.6 gallons per minute per acre served, or a depth of 1.53 inches in 24 hours. The average pump capacity reported in 1940 was 18.2 gallons per minute per acre, or a depth of 0.96 inch in 24 hours. There has been some increase in the capacity of pumps relative to the area served in the past 10 years, but some of this difference is probably due to the fact that the capacity reported for the pumps is often greater than the amount actual measurements would show.

DRAINAGE OF AGRICULTURAL LANDS

ANNUAL COST OF CONSTRUCTION AND OPERATION AND MAINTENANCE FOR DRAINAGE ENTERPRISES, 1940 TO 1949, FOR THE UNITED STATES: 1950 CENSUS OF DRAINAGE



LAND IN DRAINAGE ENTERPRISES BY PERIOD IN WHICH ORGANIZED FOR 30 DRAINAGE-DISTRICT STATES: 1950 CENSUS OF DRAINAGE

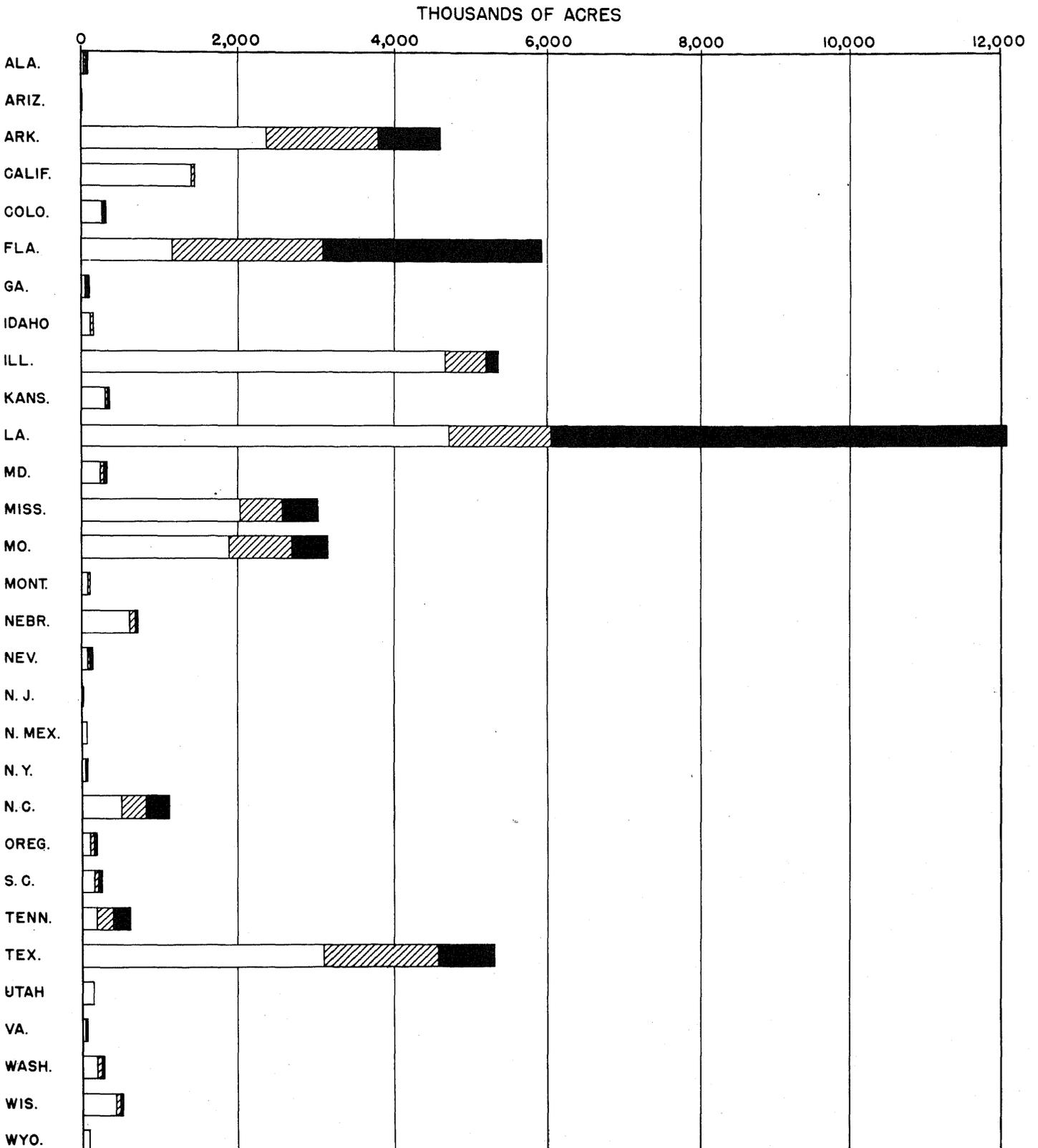


\* NO ENTERPRISES ORGANIZED

1940-1949

BEFORE 1940

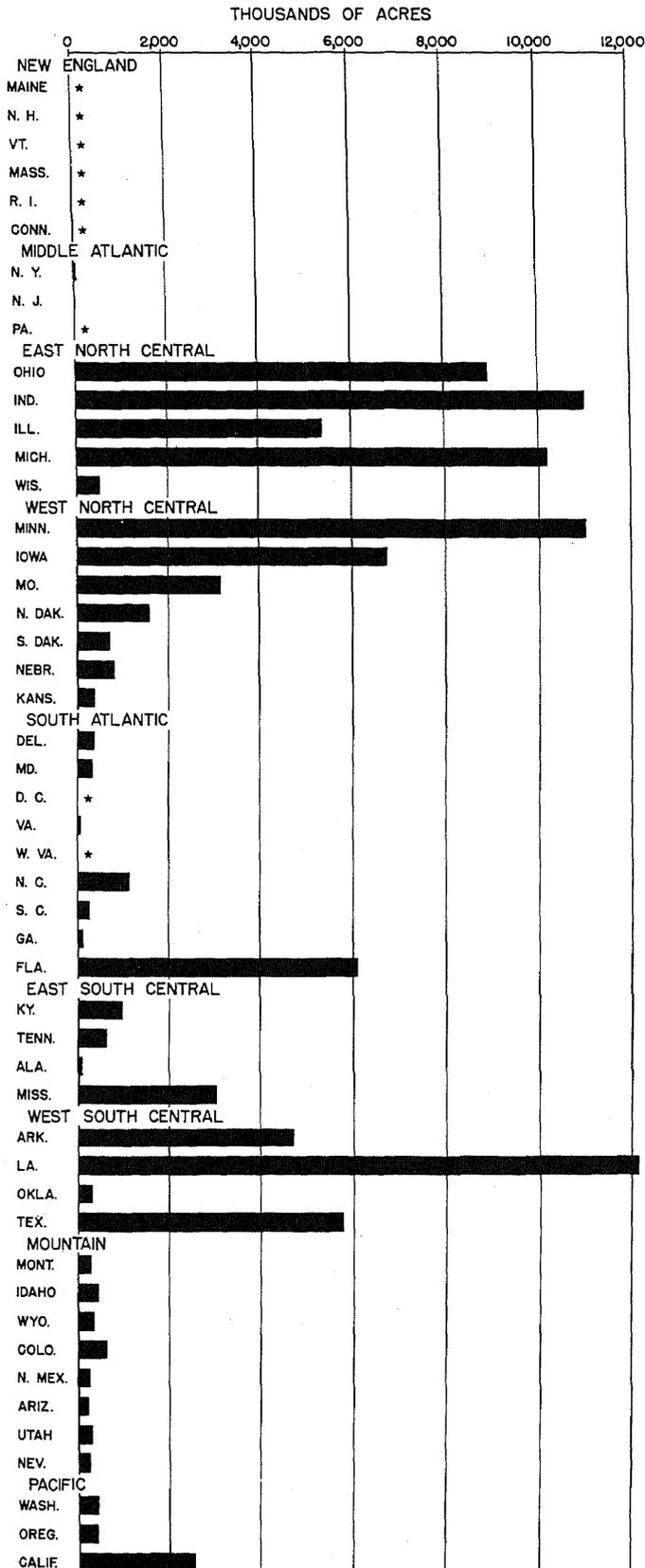
LAND IN DRAINAGE ENTERPRISES BY DRAINAGE CONDITION  
 IN 1949 FOR THE 30 DRAINAGE DISTRICT STATES:  
 1950 CENSUS OF DRAINAGE



 GOOD DRAINAGE  
 FAIR DRAINAGE  
 POOR DRAINAGE

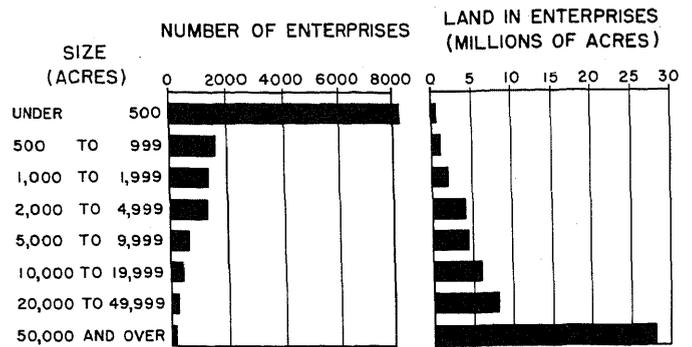
# DRAINAGE OF AGRICULTURAL LANDS

**LAND IN DRAINAGE ENTERPRISES, BY STATES:  
1950 CENSUS OF DRAINAGE**



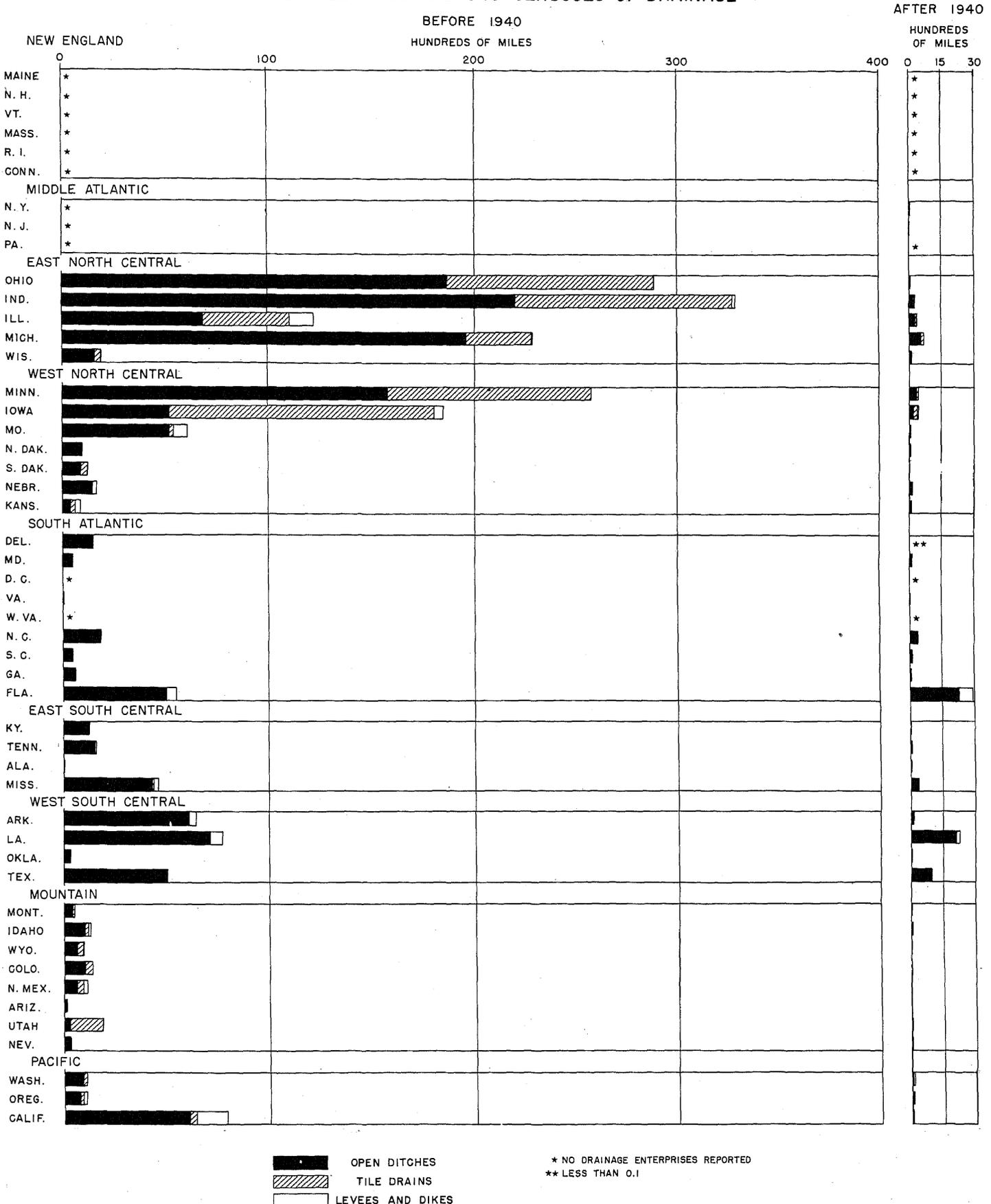
\* NO LAND IN DRAINAGE ENTERPRISES

**NUMBER OF DRAINAGE ENTERPRISES AND LAND IN DRAINAGE ENTERPRISES CLASSIFIED BY SIZE OF ENTERPRISE FOR 30 DRAINAGE-DISTRICT STATES: 1950 CENSUS OF DRAINAGE**



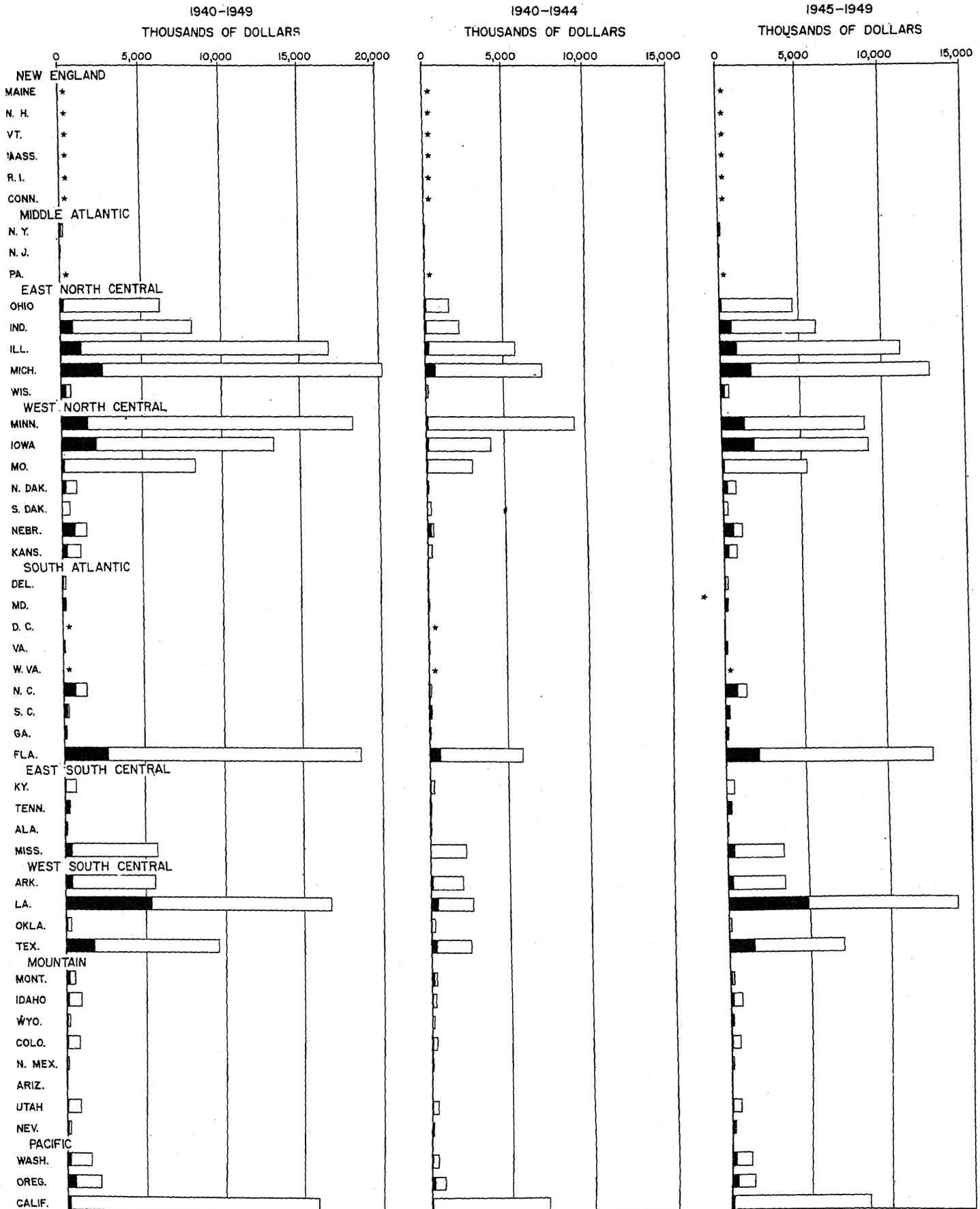
# INTRODUCTION

## MILES OF OPEN DITCHES, TILE DRAINS, AND LEVEES AND DIKES, COMPLETED BETWEEN JANUARY 1, 1940 AND JANUARY 1, 1950, AND COMPLETED PRIOR TO JANUARY 1, 1940 BY STATES: 1950 AND 1940 CENSUSES OF DRAINAGE



DRAINAGE OF AGRICULTURAL LANDS

COST OF CONSTRUCTION AND OPERATION AND MAINTENANCE, 1940 TO 1949, WITH COMPARISON 1940 TO 1944 AND 1945 TO 1949, BY STATES: 1950 CENSUS OF DRAINAGE



\* NO DRAINAGE ENTERPRISES REPORTED    ■ COST OF DRAINAGE WORKS    □ COST OF CONSTRUCTION AND OPERATION AND MAINTENANCE

# SUMMARY

(1)

DRAINAGE OF AGRICULTURAL LANDS

Table 1.—NUMBER OF DRAINAGE ENTERPRISES, LAND AREA, FINANCIAL DATA, AND DRAINAGE WORKS, FOR ALL DRAINAGE STATES: 1950, 1940, 1930, AND 1920

[All censuses taken as of Jan. 1]

Item	1950	1940	1930	1920
ALL DRAINAGE STATES				
LAND AREA				
Approximate land area for States having drainage (see text).....	1,819,883,520	1,785,118,720	1,743,699,840	1,717,932,160
Land drained (net).....	102,688,331	86,967,039	84,408,093	65,495,038
FINANCIAL ITEMS <sup>1</sup>				
Cost of construction and operation and maintenance Jan. 1, 1940 to Dec. 31, 1949.....	179,033,770	xxxxxxxxxxxx	xxxxxxxxxxxx	xxxxxxxxxxxx
Cost of new drainage works Jan. 1, 1940 to Dec. 31, 1949.....	23,872,422	xxxxxxxxxxxx	xxxxxxxxxxxx	xxxxxxxxxxxx
Capital invested prior to date of census.....	xxxxxxxxxxxx	691,724,519	680,250,255	372,273,567
Funds collected for drainage Jan. 1, 1940 to Dec. 31, 1949.....	209,919,061	xxxxxxxxxxxx	xxxxxxxxxxxx	xxxxxxxxxxxx
Outstanding indebtedness Dec. 31, of year preceding census.....	63,422,954	137,745,272	(*)	(*)
DRAINAGE WORKS <sup>1</sup>				
Completed since Jan. 1, 1940.....	9,301	xxxxxxxxxxxx	xxxxxxxxxxxx	xxxxxxxxxxxx
open ditches, miles..	581	xxxxxxxxxxxx	xxxxxxxxxxxx	xxxxxxxxxxxx
tile drains, miles..	1,020	xxxxxxxxxxxx	xxxxxxxxxxxx	xxxxxxxxxxxx
levees and dikes, miles..	1,020	xxxxxxxxxxxx	xxxxxxxxxxxx	xxxxxxxxxxxx
Completed prior to date of census.....	xxxxxxxxxxxx	146,152.3	138,673.0	107,468.2
open ditches, miles..	xxxxxxxxxxxx	55,734.0	55,031.9	42,311.7
tile drains, miles..	xxxxxxxxxxxx	6,792.9	6,539.5	3,509.8
levees and dikes, miles..	xxxxxxxxxxxx	6,792.9	6,539.5	3,509.8
30 STATES <sup>2</sup>				
NUMBER OF ENTERPRISES AND LAND AREA				
Approximate land area (see text).....	1,481,769,600	1,447,021,440	1,406,192,640	1,380,424,960
Drainage enterprises (including irrigation enterprises having their own drainage).....	14,066	9,403	(*)	(*)
Land drained (net).....	50,655,190	39,872,238	36,687,719	22,281,273
Included in 2 or more enterprises (overlapped).....	3,962,516	5,335,049	4,956,436	1,375,943
By drainage enterprises (organized separately from irrigation enterprises).....	46,545,617	35,724,094	34,123,634	21,743,345
By irrigation enterprises <sup>3</sup> .....	4,109,573	4,148,144	2,564,085	338,128
Total irrigated land in such irrigation enterprises <sup>4</sup> .....	8,359,152	6,156,084	(*)	(*)
CLASSIFICATION OF LAND IN ENTERPRISES				
Drainage condition in year preceding census: <sup>1</sup>				
Good drainage (no loss of cultivated crops).....	4,676	(*)	(*)	(*)
acres..	24,969,512	30,270,286	26,443,718	(*)
Fair drainage (frequent loss of cultivated crops).....	3,031	(*)	(*)	(*)
acres..	9,176,046	3,429,844	5,902,865	(*)
Poor drainage (unfit for cultivation).....	2,115	(*)	(*)	(*)
acres..	12,400,059	6,172,108	4,341,136	(*)
Type of enterprise: <sup>3</sup>				
Drainage district.....	3,210	(*)	(*)	(*)
acres..	33,530,379	34,164,779	32,511,512	20,235,010
State drainage project.....	7	(*)	(*)	(*)
acres..	31,336	1,223	2,136	604,900
County drain.....	152	(*)	(*)	(*)
acres..	9,850,748	476,833	645,112	243,669
Township drain.....	190	(*)	(*)	(*)
acres..	323,783	161,439	166,025	(*)
Commercial development drainage project.....	19	(*)	(*)	(*)
acres..	153,652	71,696	68,077	192,328
Cooperative or mutual drain.....	893	(*)	(*)	(*)
acres..	1,409,494	(*)	(*)	10,000
Individual ownership drain.....	516	(*)	(*)	(*)
acres..	1,100,979	812,124	716,580	375,056
Irrigation enterprises having their own drainage:				
From Census of Irrigation.....	59,054	4,398	(*)	(*)
Federal.....	4,109,573	3,876,683	3,699,866	1,516,131
Nonfederal.....	59,024	(*)	(*)	(*)
From Census of Drainage.....	3,510,754	(*)	(*)	(*)
Federal.....	xxxxxxxxxxxx	4,148,144	2,564,085	338,128
Nonfederal.....	xxxxxxxxxxxx	1,863,047	(*)	162,928
Other types of drainage enterprises.....	25	2,285,097	(*)	175,200
acres..	145,246	36,000	14,192	82,383
Principal purpose of drainage: <sup>1</sup>				
Reclamation or improvement of land.....	4,510	(*)	(*)	(*)
acres..	41,758,508	29,362,406	29,586,871	(*)
Protection of land against overflow.....	248	(*)	(*)	(*)
acres..	3,516,380	6,149,612	3,786,293	(*)
Removal of alkali or seepage from irrigated land.....	267	(*)	(*)	(*)
acres..	1,270,729	4,360,220	3,314,555	(*)
Period in which organized: <sup>1</sup>				
1940-1949.....	1,263	xxxxxxxxxxxx	xxxxxxxxxxxx	xxxxxxxxxxxx
acres drained..	14,351,738	xxxxxxxxxxxx	xxxxxxxxxxxx	xxxxxxxxxxxx
1930-1939.....	315	(*)	(*)	(*)
acres drained..	3,057,135	2,757,083	xxxxxxxxxxxx	xxxxxxxxxxxx
1920-1929.....	924	(*)	(*)	(*)
acres drained..	6,601,915	9,045,010	6,888,556	xxxxxxxxxxxx
1910-1919.....	1,369	(*)	(*)	(*)
acres drained..	15,404,483	19,562,047	15,328,461	612,463,488
1900-1909.....	675	(*)	(*)	(*)
acres drained..	4,826,336	6,129,598	11,536,542	67,056,675
Before 1900.....	466	(*)	(*)	(*)
acres drained..	2,304,010	2,378,500	2,934,160	62,403,246

See footnotes at end of table.

SUMMARY

Table 1.—NUMBER OF DRAINAGE ENTERPRISES, LAND AREA, FINANCIAL DATA, AND DRAINAGE WORKS, FOR ALL DRAINAGE STATES: 1950, 1940, 1930, AND 1920—Continued

[All censuses taken as of Jan. 1]

Item	1950	1940	1930	1920
30 STATES <sup>2</sup> —Continued				
FINANCIAL ITEMS <sup>1</sup>				
Cost of construction and operation and maintenance Jan. 1, 1940 to Dec. 31, 1949.....number of enterprises reporting..	3,426	xxxxxxx	xxxxxxx	xxxxxxx
.....dollars..	110,231,690	xxxxxxx	xxxxxxx	xxxxxxx
Cost of new works for lands not previously drained Jan. 1, 1940 to Dec. 31, 1949.....number of enterprises reporting..	983	xxxxxxx	xxxxxxx	xxxxxxx
.....dollars..	16,288,346	xxxxxxx	xxxxxxx	xxxxxxx
Capital invested prior to date of census.....dollars..	xxxxxxx	411,479,389	394,682,416	188,850,022
Funds collected for drainage Jan. 1, 1940 to Dec. 31, 1949.....number of enterprises reporting..	3,471	xxxxxxx	xxxxxxx	xxxxxxx
.....dollars..	144,415,544	xxxxxxx	xxxxxxx	xxxxxxx
Outstanding indebtedness Dec. 31, of year preceding census.....number of enterprises reporting..	696	1,664	(*)	(*)
.....dollars..	52,893,483	126,542,465	(*)	(*)
Indebtedness in arrears Dec. 31, of year preceding census.....number of enterprises reporting..	73	656	(*)	(*)
.....dollars..	4,994,840	36,835,380	(*)	(*)
Area delinquent in drainage taxes Dec. 31, of year preceding census.....number of enterprises reporting..	358	1,167	1,150	(*)
.....acres..	1,490,288	8,650,332	6,092,018	(*)
DRAINAGE WORKS <sup>1</sup>				
Completed since Jan. 1, 1940.....open ditches..number of enterprises reporting..	1,065	xxxxxxx	xxxxxxx	xxxxxxx
.....miles..	7,817	xxxxxxx	xxxxxxx	xxxxxxx
.....tile drains..number of enterprises reporting..	65	xxxxxxx	xxxxxxx	xxxxxxx
.....miles..	135	xxxxxxx	xxxxxxx	xxxxxxx
.....levees and dikes..number of enterprises reporting..	146	xxxxxxx	xxxxxxx	xxxxxxx
.....miles..	965	xxxxxxx	xxxxxxx	xxxxxxx
Completed prior to date of census.....open ditches..miles..	xxxxxxx	59,927.5	53,192.1	28,705.5
.....tile drains..miles..	xxxxxxx	8,471.1	8,501.8	6,120.6
.....levees and dikes..miles..	xxxxxxx	6,170.5	6,109.6	3,246.3
Drainage wells.....number of enterprises reporting..	10	(*)	13	(*)
.....number of wells pumped..	66	488	444	(*)
Pumping units.....number of enterprises reporting..	369	(*)	272	335
.....number of units operated..	1,146	(*)	991	378
Area served by pumps.....number of enterprises reporting..	378	(*)	272	190
.....acres..	1,696,586	2,224,511	2,077,806	1,260,528
10 STATES <sup>7</sup>				
LAND AREA				
Approximate land area (see text).....acres..	338,113,920	338,097,280	337,507,200	337,507,200
Land in drainage enterprises.....acres..	52,033,141	47,094,801	47,720,374	43,213,765
FINANCIAL ITEMS				
Cost of construction and operation and maintenance Jan. 1, 1940 to Dec. 31, 1949.....dollars..	68,802,080	xxxxxxx	xxxxxxx	xxxxxxx
Cost of new drainage works Jan. 1, 1940 to Dec. 31, 1949.....dollars..	7,584,076	xxxxxxx	xxxxxxx	xxxxxxx
Capital invested prior to date of census.....dollars..	xxxxxxx	280,245,130	285,567,839	183,423,545
Funds collected for drainage Jan. 1, 1940 to Dec. 31, 1949.....dollars..	65,503,517	xxxxxxx	xxxxxxx	xxxxxxx
Outstanding indebtedness Dec. 31, of year preceding census.....dollars..	10,529,471	11,202,807	(*)	(*)
DRAINAGE WORKS				
Completed since Jan. 1, 1940.....open ditches..miles..	1,484	xxxxxxx	xxxxxxx	xxxxxxx
.....tile drains..miles..	446	xxxxxxx	xxxxxxx	xxxxxxx
.....levees and dikes..miles..	55	xxxxxxx	xxxxxxx	xxxxxxx
Completed prior to date of census.....open ditches..miles..	xxxxxxx	86,224.8	85,480.9	78,762.7
.....tile drains..miles..	xxxxxxx	47,262.9	46,530.1	36,191.1
.....levees and dikes..miles..	xxxxxxx	622.4	429.9	263.5

\*Not available. <sup>1</sup>Data for irrigation enterprises having their own drainage not included for 1950. <sup>2</sup>Largely States with organized drainage districts and other corporate and private enterprises. See text. <sup>3</sup>Data not available for drainage and for irrigation enterprises for 1920, for Arizona, Nevada, New Mexico, and Oregon. (The total drained area for these 4 States was 199,799 acres). <sup>4</sup>From Census of Irrigation for 1950. <sup>5</sup>An interstate enterprise is counted in each State in which a part is located. It is counted only once in the 30 State total. <sup>6</sup>Date of organization not available for 1920, for all enterprises in Arizona, Nevada, New Mexico, and Oregon (199,799 acres); nor for 158,065 acres in other States. <sup>7</sup>County-drain States. See text.

Table 2.—ANNUAL COST OF CONSTRUCTION AND OPERATION AND MAINTENANCE COST OF NEW WORKS; AND FUNDS COLLECTED; FOR ALL DRAINAGE STATES: 1940-1949

[Data are for calendar years]

Financial items	All drainage States (amount, dollars)	30 States <sup>1</sup>		10 States <sup>2</sup> (amount, dollars)	Financial items	All drainage States (amount, dollars)	30 States <sup>1</sup>		10 States <sup>2</sup> (amount, dollars)
		Number of enterprises reporting	Amount (dollars)				Number of enterprises reporting	Amount (dollars)	
Cost of construction and operation and maintenance Jan. 1, 1940 to Dec. 31, 1949.....	179,033,770	3,426	110,231,690	68,802,080	Cost of new drainage works Jan. 1, 1940 to Dec. 31, 1949—Continued	3,166,521	128	2,292,218	874,303
1945 to 1949.....	118,998,835	3,054	75,474,470	43,524,365	1940 to 1944.....	847,874	58	585,754	262,120
1949.....	31,517,208	2,214	20,305,448	11,211,760	1944.....	761,825	55	552,807	208,938
1948.....	29,103,462	2,133	19,222,181	9,881,281	1942.....	668,364	38	485,030	183,334
1947.....	23,635,739	2,022	15,224,054	8,411,685	1941.....	595,553	36	456,885	138,668
1946.....	18,868,027	1,853	11,645,339	7,222,688	1940.....	292,905	28	211,662	81,243
1945.....	15,874,399	1,671	9,077,448	6,796,951	Funds collected for drainage Jan. 1, 1940 to Dec. 31, 1949.....	209,919,061	3,471	144,415,544	65,503,517
1940 to 1944.....	60,034,935	1,879	34,757,220	25,277,715	1945 to 1949.....	128,136,671	3,103	88,218,831	39,917,840
1944.....	13,754,850	1,582	8,135,637	5,619,213	1949.....	30,405,968	2,107	20,116,051	10,289,917
1943.....	11,680,225	1,577	7,043,661	4,636,564	1948.....	28,090,532	2,072	19,551,283	8,539,249
1942.....	11,622,551	1,518	6,723,109	4,899,442	1947.....	25,669,339	1,968	18,062,647	7,606,692
1941.....	11,858,842	1,519	6,658,374	5,200,468	1946.....	24,077,324	1,792	16,740,225	7,337,099
1940.....	11,118,467	1,513	6,196,439	4,922,028	1945.....	19,893,508	1,650	13,748,625	6,144,883
Cost of new drainage works Jan. 1, 1940 to Dec. 31, 1949.....	23,872,422	983	16,288,346	7,584,076	1940 to 1944.....	81,782,390	1,925	56,196,713	25,585,677
1945 to 1949.....	20,705,901	899	13,996,128	6,709,773	1944.....	17,857,447	1,574	12,352,386	5,505,061
1949.....	6,745,381	399	4,453,480	2,291,901	1943.....	16,604,413	1,549	11,745,320	4,859,093
1948.....	5,480,198	334	3,811,674	1,668,524	1942.....	16,434,645	1,534	11,257,936	5,176,709
1947.....	3,982,765	285	2,675,951	1,306,814	1941.....	16,059,107	1,516	10,964,089	5,095,018
1946.....	2,656,197	175	1,845,545	810,652	1940.....	14,826,778	1,544	9,876,982	4,949,796
1945.....	1,841,360	106	1,209,478	631,882					

<sup>1</sup>Largely States with organized drainage districts and other corporate and private enterprises. See text. <sup>2</sup>County-drain States. See text.

## DRAINAGE OF AGRICULTURAL LANDS

Table 3.—NUMBER OF DRAINAGE ENTERPRISES, LAND IN ENTERPRISES, AND FINANCIAL DATA, BY STATES:  
1950, 1940, 1930, AND 1920

State	Approximate land area (acres) 1950	Number of drainage enterprises <sup>1</sup>		Land in drainage enterprises <sup>1</sup>							
		1950	1940	Total acres (net)				Included in 2 or more enterprises (acres overlapped)			
				1950	1940	1930	1920	1950	1940	1930	1920
Total 40 States.....	1,819,883,520	(*)	(*)	102,688,331	86,967,039	84,408,093	65,495,038	(*)	45,861,412	44,086,985	30,134,253
Total 30 States <sup>2</sup> .....	1,481,769,600	314,066	9,403	50,655,190	39,872,238	36,687,719	22,281,273	3,962,516	5,335,049	4,956,436	1,375,943
Alabama.....	32,689,920	10	1	76,671	28,045	.....	.....	.....	.....	.....	.....
Arizona.....	72,688,000	25	23	197,268	298,633	318,931	39,640	.....	2,274	.....	.....
Arkansas.....	33,712,000	844	346	4,701,095	4,592,738	4,631,155	3,479,591	629,514	1,040,561	1,133,653	363,221
California.....	100,313,600	2,047	1,067	2,554,576	2,667,194	2,233,714	1,108,319	.....	88,563	60,354	.....
Colorado.....	66,510,080	630	297	623,976	468,322	366,719	171,656	1,080	972	640	.....
Florida.....	34,727,680	1,889	948	6,083,676	5,699,022	5,954,934	1,637,073	1,103,349	764,424	1,418,693	122,868
Georgia.....	37,429,120	55	52	96,259	84,374	84,255	65,452	.....	.....	.....	.....
Idaho.....	52,972,160	379	250	436,171	659,136	375,464	64,642	.....	15,396	.....	.....
Illinois.....	35,798,400	1,433	1,695	5,370,825	5,091,364	5,032,682	3,909,049	299,963	805,760	709,234	181,550
Kansas.....	52,549,120	121	132	356,988	258,113	257,169	93,856	6,353	833	557	.....
Louisiana.....	28,903,680	922	1,129	12,161,665	4,219,624	3,655,483	2,266,328	509,987	483,850	437,630	75,706
Maryland.....	6,327,680	93	126	323,815	183,337	.....	.....	41,853	7,585	.....	.....
Massachusetts.....	30,348,800	441	273	3,023,744	2,890,618	2,988,496	1,601,444	288,315	236,252	171,448	3,040
Missouri.....	44,304,640	318	286	3,147,484	3,087,063	3,150,022	2,596,204	671,651	1,347,916	961,548	508,685
Montana.....	93,361,920	404	239	289,189	372,661	167,629	168,682	3,336	1,528	.....	.....
Nebraska.....	49,064,320	473	195	821,088	916,181	879,459	607,730	157,413	89,360	14,440	100,720
Nevada.....	70,264,960	82	44	251,154	153,373	162,980	15,940	.....	.....	.....	.....
New Jersey.....	4,814,080	5	.....	11,206	.....	.....	.....	.....	.....	.....	.....
New Mexico.....	77,767,040	223	169	244,961	305,885	176,292	140,219	.....	.....	.....	.....
New York.....	30,684,160	14	.....	56,465	.....	.....	.....	.....	.....	.....	.....
North Carolina.....	31,422,080	413	246	1,128,509	825,576	679,236	542,828	63,304	74,272	9,200	9,600
Oregon.....	61,641,600	1,087	338	418,858	348,825	211,182	4,000	.....	5,090	.....	.....
South Carolina.....	19,580,160	45	24	249,011	204,366	208,249	140,031	8,000	.....	.....	.....
Tennessee.....	26,855,040	151	155	615,838	601,592	593,560	363,671	5,148	16,580	5,832	.....
Texas.....	168,648,320	543	180	5,794,786	4,218,850	2,883,356	2,166,128	134,831	312,320	.....	.....
Utah.....	52,701,440	471	240	302,158	202,058	156,052	113,823	5,292	2,092	.....	.....
Virginia.....	25,531,520	30	2	45,460	15,714	15,042	.....	.....	.....	.....	.....
Washington.....	42,743,040	533	375	431,613	405,709	367,242	94,924	30,907	27,631	27,609	10,553
Wisconsin.....	35,011,200	206	396	514,700	716,203	892,713	794,569	1,720	11,790	2,985	.....
Wyoming.....	62,403,840	189	175	325,981	312,662	245,703	95,474	500	.....	2,613	.....
Total 10 States <sup>4</sup> .....	338,113,920	(*)	(*)	52,033,141	47,094,801	47,720,374	43,213,765	(*)	40,526,363	39,130,549	28,758,310
Delaware.....	1,265,920	(*)	(*)	352,547	395,014	.....	.....	(*)	458,548	.....	.....
Indiana.....	23,171,200	(*)	(*)	11,017,709	10,121,952	10,214,014	9,087,183	(*)	9,850,573	12,835,773	5,928,038
Iowa.....	35,830,400	(*)	(*)	6,734,863	6,164,344	6,137,649	5,224,478	(*)	1,380,587	1,259,995	681,265
Kentucky.....	25,669,760	(*)	(*)	959,892	465,270	585,625	358,480	(*)	50,347	40,783	.....
Michigan.....	36,494,080	(*)	(*)	10,194,439	8,978,386	9,180,851	9,729,171	(*)	7,091,887	5,851,841	6,037,307
Minnesota.....	51,205,760	(*)	(*)	11,269,962	10,990,409	11,474,683	9,232,709	(*)	3,711,787	3,206,822	741,953
North Dakota.....	44,834,560	(*)	(*)	1,572,220	1,376,041	1,094,142	1,240,328	(*)	464,740	89,240	.....
Ohio.....	26,318,080	(*)	(*)	8,923,362	7,729,267	8,165,494	8,107,204	(*)	17,482,794	15,845,135	15,357,608
Oklahoma.....	44,341,120	(*)	(*)	300,884	197,646	170,158	12,150	(*)	.....	960	.....
South Dakota.....	48,983,040	(*)	(*)	707,263	676,472	697,758	222,062	(*)	35,100	.....	12,139

See footnotes at end of table.

SUMMARY

Table 3.—NUMBER OF DRAINAGE ENTERPRISES, LAND IN ENTERPRISES, AND FINANCIAL DATA, BY STATES: 1950, 1940, 1930, AND 1920—Continued

State	Cost of construction and operation and maintenance Jan. 1, 1940 to Dec. 31, 1949 <sup>5</sup>				Capital invested prior to date of census (dollars)			Funds collected Jan. 1, 1940 to Dec. 31, 1949 <sup>5</sup>		Outstanding indebtedness Dec. 31, of year preceding census <sup>5</sup>			
	Total		Cost of new works (for lands not previously drained)		1940	1930	1920	Number of enterprises reporting	Dollars	1950		1940	
	Number of enterprises reporting	Dollars	Number of enterprises reporting	Dollars						Number of enterprises reporting	Dollars	Number of enterprises reporting	Dollars
Total 40 States.....	(*)	179,033,770	(*)	23,872,422	691,724,519	680,250,255	372,273,567	(*)	209,919,061	(*)	63,422,954	4,038	137,745,272
Total 30 States <sup>2</sup> .....	3,426	110,231,690	983	16,288,346	411,479,389	394,682,416	188,850,022	3,471	144,415,544	696	52,893,483	1,664	126,542,465
Alabama.....	8	70,223	7	58,768	410,000	.....	.....	7	71,744	1	7,500	1	41,000
Arizona.....	.....	.....	.....	.....	1,119,242	1,875,100	414,425	2	21,658	.....	.....	3	94,000
Arkansas.....	127	5,540,041	28	391,898	39,450,754	37,532,575	14,147,174	129	10,212,742	49	3,806,107	139	13,234,878
California.....	159	15,926,510	16	135,346	70,144,044	66,451,698	47,687,153	152	25,128,521	39	3,807,651	90	17,123,185
Colorado.....	47	773,236	5	23,445	4,890,317	4,358,866	1,081,875	47	1,196,111	13	217,100	38	1,853,395
Florida.....	207	18,602,511	63	2,707,207	43,356,692	45,487,795	13,846,807	217	25,509,403	51	12,759,985	94	32,295,849
Georgia.....	22	132,354	22	107,104	2,064,840	1,918,525	794,585	22	132,354	14	332,463	652	410,163
Idaho.....	44	906,297	12	132,962	7,567,032	5,112,444	1,668,569	44	1,697,580	19	563,299	33	1,905,858
Illinois.....	892	16,860,472	103	1,217,157	72,567,174	74,565,923	43,595,069	872	17,869,185	80	2,858,644	158	6,974,400
Kansas.....	60	1,116,786	10	279,036	3,733,919	2,701,082	936,508	60	1,048,723	14	324,835	20	1,806,105
Louisiana.....	392	16,652,384	142	5,316,026	23,361,758	20,752,645	9,021,991	408	15,071,987	80	8,685,002	140	10,797,537
Maryland.....	28	183,309	22	129,578	43,914	.....	.....	30	139,158	12	30,698	.....	.....
Mississippi.....	345	5,702,914	156	441,404	23,259,677	23,601,443	7,076,164	367	9,218,457	92	3,052,455	233	6,688,362
Missouri.....	225	8,281,620	9	114,063	49,050,414	47,340,174	20,723,128	223	14,046,370	70	2,657,882	169	8,174,365
Montana.....	25	462,260	9	167,830	2,827,839	1,879,296	664,990	25	481,803	8	139,255	17	1,503,091
Nebraska.....	75	1,533,019	27	757,990	7,578,999	6,847,070	4,588,578	77	1,923,660	6	203,883	36	1,278,621
Nevada.....	5	193,919	2	62,292	1,337,647	1,349,774	117,851	5	193,919	1	4,000	5	648,856
New Jersey.....	5	39,357	5	34,407	.....	.....	.....	5	39,357	.....	.....	.....	.....
New Mexico.....	5	74,636	.....	.....	5,722,121	3,279,371	1,710,796	5	393,026	3	77,000	13	3,900,967
New York.....	12	177,224	7	75,119	.....	.....	.....	13	479,623	3	78,400	.....	.....
North Carolina.....	250	1,438,698	158	737,994	5,467,906	4,719,079	3,623,518	251	1,416,418	8	150,588	33	686,601
Oregon.....	50	2,175,816	17	476,561	5,482,012	4,165,549	200,000	50	1,982,961	19	841,119	30	1,781,706
South Carolina.....	33	319,486	27	206,956	1,241,300	1,265,276	582,183	37	383,460	7	40,072	24	636,250
Tennessee.....	26	270,623	23	255,697	6,501,750	6,366,747	2,925,944	48	437,337	3	3,427	133	1,898,137
Texas.....	89	9,534,229	32	1,822,245	14,047,181	12,002,949	5,700,805	96	11,687,605	24	10,872,172	64	4,574,165
Utah.....	30	836,973	13	29,181	4,869,273	4,772,000	1,005,473	29	918,616	4	31,400	18	2,769,190
Virginia.....	28	111,394	27	95,794	201,300	241,608	.....	28	111,394	.....	.....	2	128,500
Washington.....	131	1,541,318	24	203,873	5,332,842	4,637,576	1,397,419	120	1,415,828	44	195,276	54	490,034
Wisconsin.....	92	610,918	15	296,176	4,254,586	6,207,278	4,163,055	83	604,729	16	84,654	39	392,143
Wyoming.....	14	163,163	2	12,237	5,594,856	5,250,573	1,175,962	19	581,815	16	1,068,616	26	4,455,107
Total 10 States <sup>4</sup> .....	(*)	68,802,080	(*)	7,584,076	280,245,130	285,567,839	183,423,545	(*)	65,503,517	(*)	10,529,471	2,374	11,202,807
Delaware.....	(*)	173,300	(*)	3,326	454,883	.....	.....	.....	120,096	.....	.....	6	1,271
Indiana.....	(*)	8,206,459	(*)	785,767	47,540,385	54,110,854	31,147,682	(*)	6,733,336	(*)	221,102	266	429,245
Iowa.....	(*)	13,302,757	(*)	2,143,433	75,374,497	77,478,893	49,627,304	(*)	13,703,726	(*)	2,498,927	277	1,286,932
Kentucky.....	(*)	711,162	(*)	44,832	4,947,994	5,357,633	1,521,725	(*)	801,518	(*)	58,270	33	758,606
Michigan.....	(*)	20,235,636	(*)	2,556,472	40,412,251	37,677,084	24,683,715	(*)	21,324,715	(*)	2,476,509	673	809,579
Minnesota.....	(*)	18,301,583	(*)	1,594,914	65,576,077	64,139,641	42,017,447	(*)	15,991,688	(*)	3,773,824	768	6,034,528
North Dakota.....	(*)	890,373	(*)	245,364	3,673,336	3,148,919	2,208,049	(*)	964,092	(*)	182,591	5	184,096
Ohio.....	(*)	6,189,421	(*)	147,941	35,215,586	36,836,449	30,680,145	(*)	5,117,426	(*)	398,874	313	303,447
Oklahoma.....	(*)	299,114	(*)	62,027	1,971,350	2,283,598	76,415	(*)	276,412	(*)	197,489	13	262,199
South Dakota.....	(*)	483,275	(*)	.....	5,078,771	4,534,768	1,461,063	(*)	470,508	(*)	721,885	20	1,132,904

\*Not available.

<sup>1</sup>Including irrigation enterprises having their own drainage.

<sup>2</sup>Largely States with organized drainage districts and other corporate and private enterprises. See text.

<sup>3</sup>An interstate enterprise is counted in each State in which a part is located. It is counted only once in the 30-State total.

<sup>4</sup>County-drain States. See text.

<sup>5</sup>Data for irrigation enterprises not included in 1950.

<sup>6</sup>Revised.

## DRAINAGE OF AGRICULTURAL LANDS

Table 4.—NUMBER OF DRAINAGE ENTERPRISES, LAND AREA, CLASSIFICATION OF LAND, FINANCIAL

Item	Total (30 States) <sup>1</sup>	Alabama	Arizona	Arkansas	California	Colorado	Florida	Georgia
NUMBER OF ENTERPRISES AND LAND AREA								
1 Approximate land area (see text).....acres..	1,481,769,600	32,689,920	72,688,000	33,712,000	100,313,600	66,510,080	34,727,680	37,429,120
2 Drainage enterprises (including irrigation enterprises having their own drainage).....number..	14,066	10	25	844	2,045	630	1,889	55
3 Land drained (net).....acres..	50,655,190	76,671	197,268	4,701,095	2,554,576	623,976	6,083,676	96,259
4 Included in 2 or more enterprises (overlapped).....acres..	3,962,516			629,514		1,080	1,103,349	
5 By drainage enterprises (organized separately from irrigation enterprises).....acres..	46,545,617	76,671	3,385	4,606,628	1,453,537	304,364	5,933,918	96,259
6 By irrigation enterprises <sup>2</sup> .....acres..	4,109,573		193,883	94,467	1,101,039	319,612	149,758	
7 Total irrigated land in such irrigation enterprises <sup>2</sup> .....acres..	8,359,152		293,530	104,770	1,873,883	943,473	175,717	
CLASSIFICATION OF LAND IN ENTERPRISES								
Drainage condition in 1949: <sup>3</sup>								
8 Good drainage (no loss of cultivated crops).....number of enterprises reporting..	4,676	10	2	241	163	51	207	53
9 acres..	24,969,512	33,317	3,385	2,372,670	1,402,766	257,425	1,175,611	46,285
10 Fair drainage (frequent loss of cultivated crops).....number of enterprises reporting..	3,031	7		220	40	29	150	48
11 acres..	9,176,046	15,516		1,431,880	45,452	24,164	1,935,664	14,671
12 Poor drainage (unfit for cultivation).....number of enterprises reporting..	2,115	3		190	22	21	108	53
13 acres..	12,400,059	27,838		802,078	5,319	22,775	2,822,643	35,303
Type of enterprise:								
14 Drainage district.....number of enterprises..	3,210	3	2	229	102	39	98	35
15 acres..	33,530,379	35,936	3,385	4,506,440	1,202,950	255,753	5,416,739	69,485
16 State drainage project.....number of enterprises..	7							
17 acres..	31,336							
18 County drain.....number of enterprises..	152							
19 acres..	9,850,748							
20 Township drain.....number of enterprises..	190							
21 acres..	323,783							
22 Commercial development drainage project.....number of enterprises..	19				5		4	
23 acres..	153,652				66,480		32,530	
24 Cooperative or mutual drain.....number of enterprises..	893	7		23	1	4	13	10
25 acres..	1,409,494	40,735		32,398	73,266	27,190	118,476	17,205
26 Individual ownership drain.....number of enterprises..	516			15	43	8	102	10
27 acres..	1,100,979			67,790	110,841	21,421	224,562	9,569
28 Irrigation enterprises having their own drainage <sup>2</sup> .....number of enterprises..	9,054		23	577	1,882	579	1,651	
29 acres drained.....	4,109,573		193,883	94,467	1,101,039	319,612	149,758	
30 Federal.....number of enterprises..	30		3		1			
31 acres drained.....	598,819		64,245		67,309	400		
32 Nonfederal.....number of enterprises..	9,024		20	577	1,881	578	1,651	
33 acres drained.....	3,510,754		129,638	94,467	1,033,730	319,212	149,758	
34 Other types of drainage enterprises.....number of enterprises..	25						21	
35 acres..	145,246						141,611	
Principal purpose of drainage in 1949: <sup>3</sup>								
36 Reclamation or improvement of land.....number of enterprises reporting..	4,510	10		264	83	2	237	55
37 acres..	41,758,508	76,671		4,584,008	886,182	53,520	5,931,458	96,259
38 Protection of land against overflow.....number of enterprises reporting..	248			3	37		1	
39 acres..	3,516,380			22,620	306,471		2,460	
40 Removal of alkali or seepage from irrigated land.....number of enterprises reporting..	267		2		43	49		
41 acres..	1,270,729		3,385		260,884	250,844		
Period in which organized: <sup>3</sup>								
42 1940-1949.....number of enterprises reporting..	1,263	7		32	21	3	131	16
43 acres drained.....	14,351,738	40,735		130,269	53,454	12,190	501,508	23,488
44 1930-1939.....number of enterprises reporting..	315			9	12	3	11	1
45 acres drained.....	3,057,135			68,310	39,284	7,202	247,323	3,050
46 1920-1929.....number of enterprises reporting..	924	1	2	79	25	28	46	4
47 acres drained.....	6,601,915	3,911	3,385	1,228,611	355,113	191,074	611,944	5,516
48 1910-1919.....number of enterprises reporting..	1,369	2		120	59	16	46	33
49 acres drained.....	15,404,483	32,025		2,731,579	701,066	90,858	4,563,505	61,705
50 1900-1909.....number of enterprises reporting..	675			27	26	1	3	
51 acres drained.....	4,826,336			447,859	209,212	3,040	8,238	
52 Before 1900.....number of enterprises reporting..	466				20		1	1
53 acres drained.....	2,304,010				95,408		1,400	2,500
FINANCIAL ITEMS <sup>3</sup>								
54 Cost of construction and operation and maintenance Jan. 1, 1940 to Dec. 31, 1949.....number of enterprises reporting..	3,426	8		127	159	47	207	22
55 dollars..	110,231,690	70,223		5,540,041	15,926,510	773,236	18,602,511	132,354
56 Cost of new works for lands not previously drained Jan. 1, 1940 to Dec. 31, 1949.....number of enterprises reporting..	983	7		28	16	5	63	22
57 dollars..	16,288,346	58,768		391,898	135,346	23,445	2,707,207	107,104
58 Capital invested prior to Jan. 1, 1940.....dollars..	411,479,389	410,000	1,119,242	39,450,754	70,144,044	4,890,317	43,356,692	2,064,840
59 Funds collected for drainage Jan. 1, 1940 to Dec. 31, 1949.....number of enterprises reporting..	3,471	7	2	129	152	47	217	22
60 dollars..	144,415,544	71,744	21,658	10,212,742	25,128,521	1,196,111	25,509,403	132,354
61 Outstanding indebtedness Dec. 31, 1949.....number of enterprises reporting..	696	1		49	39	13	51	14
62 dollars..	52,893,483	7,500		3,806,107	3,807,651	217,100	12,759,985	332,463
63 Indebtedness in arrears Dec. 31, 1949.....number of enterprises reporting..	73			3	6	1	13	14
64 dollars..	4,994,840			381,479	69,187	1,500	3,213,041	332,463
65 Area delinquent in drainage taxes Dec. 31, 1949.....number of enterprises reporting..	358			55	6	3	38	14
66 acres..	1,490,288			86,519	8,432	710	589,126	20,277
DRAINAGE WORKS								
67 Completed since Jan. 1, 1940.....open ditches.....number of enterprises reporting..	1,065	7		29	15	4	145	22
68 miles..	7,817	66		123	34	11	2,263	115
69 tile drains.....number of enterprises reporting..	65				2	1	4	1
70 miles..	135				11	1	16	2
71 levees and dikes.....number of enterprises reporting..	146			4		1	67	
72 miles..	965			15		1	661	
73 Completed prior to Jan. 1, 1940.....open ditches.....miles..	59,927.5	42.3	100.8	6,030.3	6,091.1	972.9	5,022.1	550.3
74 tile drains.....miles..	8,471.1		8.8	10.8	32.2	365.3		2.0
75 levees and dikes.....miles..	6,170.5		24.5	332.4	1,537.6		470.6	5.0
76 Drainage wells <sup>3</sup> .....number of enterprises reporting..	10				5			
77 number of wells pumped.....	66				48			
78 Pumping units <sup>3</sup> .....number of enterprises reporting..	369			2	120		99	
79 number of units operated.....	1,146			5	382		354	
80 Area served by pumps <sup>3</sup> .....number of enterprises reporting..	378			2	120		99	
81 acres..	1,696,586			8,430	694,023		293,124	

See footnotes at end of table.

SUMMARY

DATA, AND DRAINAGE WORKS, BY STATES, FOR 30 DRAINAGE-DISTRICT STATES: 1950

Idaho	Illinois	Kansas	Louisiana	Maryland	Mississippi	Missouri	Montana	Nebraska	Nevada	New Jersey	New Mexico	New York	North Carolina
52,972,160	35,798,400	52,549,120	28,903,680	6,327,680	30,348,800	44,304,640	93,361,920	49,064,320	70,264,960	4,814,080	77,767,040	30,684,160	31,422,080
376	1,433	121	922	93	441	318	403	473	82	5	222	14	413
436,171	5,370,825	356,988	12,161,665	323,815	3,023,744	3,147,484	289,189	821,088	251,154	11,206	244,961	56,465	1,128,509
299,963	299,963	6,353	509,987	41,853	288,315	671,651	3,336	157,413					63,304
143,577	5,370,825	355,089	12,077,915	323,815	3,023,744	3,147,484	99,692	717,791	128,095	11,206	52,113	56,465	1,128,509
292,594		1,899	83,750				189,497	103,297	123,059		192,848		
827,602		2,701	238,622				582,395	313,192	209,306		254,313		
36	1,427	77	404	92	362	285	24	153	5	5	5	13	369
113,716	4,674,916	307,980	4,717,434	228,946	2,030,112	1,893,795	64,516	613,566	65,588	7,956	47,777	31,232	500,789
30	611	48	206	50	235	258	14	115	4	4	3	7	370
20,940	528,473	26,488	1,321,603	52,595	543,959	808,177	25,676	80,391	19,856	1,430	355	18,244	319,366
25	250	30	173	55	196	188	8	43	3	5	3	5	203
8,921	167,436	21,221	6,038,878	42,274	449,673	445,512	9,500	23,834	42,651	1,820	3,981	6,989	308,354
37	1,089	82	96	90	249	315	22	112	4	1	5		115
135,172	4,787,745	352,589	2,143,670	319,482	2,772,485	3,137,944	94,172	581,848	125,595	4,300	52,113		684,586
	3,091											28,245	
		2	21										3
		2,500	9,461,809					131,973					91,590
	136												20
	250,419												21
			10										22
			54,642										23
3	189		95	3	127	2	3	5	1	4			24
5,195	302,121		128,197	4,333	140,006	5,290	2,260	3,970	2,500	6,906		25,502	340,356
4	16		189		65	1	2					5	4
3,210	27,449		289,597		111,253	4,250	3,260					2,638	16,342
332		37	511					376	319		217		
292,594		1,899	83,750					189,497	103,297		192,848		
								8			6		
800								85,569			700		
332		37	511					368	319		75		
291,794		1,899	83,750					103,928	103,297		122,359		
													4
													3,635
10	1,398	78	387	93	440	232	1	123		5		14	412
18,254	5,019,142	340,442	11,526,925	323,815	2,983,139	2,613,084	700	634,482		11,206		56,465	1,127,839
15	35	6	37		1	86	1						1
33,445	351,683	14,647	550,990		40,605	534,400	7,959						670
19								25	31	5			
91,878							91,033	83,309	120,095		52,113		
12	98	14	317	20	178	14	6	25		4		8	190
14,246	238,919	48,401	10,349,967	57,525	263,245	46,380	15,338	60,062		6,906		26,963	201,679
4	55	3	16	70	13	9	7	17	1	1		6	26
15,205	161,910	16,083	321,259	259,420	42,426	75,712	10,330	114,112	20,720	4,300		29,502	175,095
21	168	12	40	1	118	90	9	40	3				40
68,639	587,982	71,658	495,449	1,178	1,182,717	548,009	53,857	265,660	104,875				138,752
7	390	17	26	1	109	124	2	40			5		93
45,487	1,126,211	105,649	436,007	5,152	1,363,044	1,315,959	10,007	141,925			52,113		357,036
	397	16	7	1	22	75	3	21	1				24
	1,484,106	76,255	263,441	540	170,922	1,138,328	10,160	112,317	2,500				92,002
	325	22	5		1	6		11					40
	1,771,697	37,043	211,792		1,390	23,096		23,715					83,945
44	892	60	392	28	345	225	25	75	5	5		12	250
906,297	16,860,472	1,116,786	16,652,384	183,309	5,702,914	8,281,620	462,260	1,533,019	193,919	39,357	74,636	177,224	1,438,698
12	103	10	142	22	156	9	9	27	2	5		7	158
132,962	1,217,157	279,036	5,316,026	129,578	441,404	114,063	167,830	757,990	62,292	34,407		75,119	737,094
7,567,032	72,567,174	3,733,919	23,361,758	43,914	23,259,677	49,050,414	2,827,839	7,578,999	1,337,647		5,722,121		5,467,906
44	872	60	408	30	367	223	25	77	5	5		13	251
1,697,580	17,869,185	1,048,723	15,071,987	139,158	9,218,457	14,046,370	481,803	1,923,660	193,919	39,357	393,026	479,623	1,416,418
19	80	14	80	12	92	70	8	6	1		3		8
563,299	2,858,644	324,835	8,685,002	30,698	3,052,455	2,657,882	139,255	203,883	4,000		77,000	78,400	150,588
1	9	4	1	1	1	3							63
1,500	341,336		428,000	1,351	9,200	106,590							64
12	26	1	21	5	5	58	1	3	3		3		
5,683	25,850	60	416,575	3,311	4,483	142,246	70	1,550	1,552		2,550		
19	96	9	141	26	156	8	8	28	2	5		7	158
59	273	48	2,116	138	372	30	40	167	21	12		31	403
2	34						2	1		2			
4	67						2	1		2			
8	5	7	12			4		1					1
968.1	19	58	166			17		1					2
174.6	6,862.2	381.4	7,105.5	461.3	4,344.1	5,191.5	420.9	1,406.7	426.4		625.2		1,846.6
95.4	4,246.6	210.5	6.0		34.1	170.3	73.8	26.3			308.9		
2	1,157.8	278.3	624.4		190.5	687.1	0.8	230.3	23.0		181.3		
13													4.0
21	47												
54	115		30			8							
21	54		102			16							
39,248	315,363		32			8							
			179,266			67,217							

DRAINAGE OF AGRICULTURAL LANDS

Table 4.—NUMBER OF DRAINAGE ENTERPRISES, LAND AREA, CLASSIFICATION OF LAND, FINANCIAL DATA, AND DRAINAGE WORKS, BY STATES, FOR 30 DRAINAGE-DISTRICT STATES: 1950—Continued

Item	Oregon	South Carolina	Tennessee	Texas	Utah	Virginia	Washington	Wisconsin	Wyoming
<b>NUMBER OF ENTERPRISES AND LAND AREA</b>									
Approximate land area (see text)..... acres..	61,641,600	19,580,160	26,855,040	168,648,320	52,701,440	25,531,520	42,743,040	35,011,200	62,403,840
Drainage enterprises (including irrigation enterprises having their own drainage)..... number..	1,085	45	151	543	470	30	533	206	189
Land drained (net)..... acres..	418,858	249,011	615,838	5,794,786	302,158	45,460	431,613	514,700	325,981
Included in 2 or more enterprises (overlapped)..... acres..		8,000	5,148	134,831	5,292		30,907	1,720	500
By drainage enterprises (organized separately from irrigation enterprises)..... acres..	178,493	249,011	615,838	5,321,147	150,193	45,460	272,908	514,700	86,785
By irrigation enterprises <sup>1</sup> ..... acres..	240,365			473,639	151,965		158,705		239,196
Total irrigated land in such irrigation enterprises <sup>1</sup> ..... acres..	447,570			922,967	384,172		355,946		438,993
<b>CLASSIFICATION OF LAND IN ENTERPRISES</b>									
Drainage condition in 1949: <sup>3</sup>									
Good drainage (no loss of cultivated crops)..... number of enterprises reporting..	48	45	98	90	31	24	135	202	19
acres..	94,956	145,246	175,648	3,118,515	133,595	21,773	187,572	427,937	74,808
Fair drainage (frequent loss of cultivated crops)..... number of enterprises reporting..	39	32	122	85	20	13	125	131	15
acres..	63,802	61,292	213,535	1,449,906	8,877	19,025	62,011	55,150	7,548
Poor drainage (unfit for cultivation)..... number of enterprises reporting..	37	22	107	73	17	7	101	72	15
acres..	19,735	42,473	226,655	752,726	7,721	4,662	23,045	31,613	4,429
Type of enterprise:									
Drainage district..... number of enterprises..	44	14	129	62	25		126	68	17
acres..	161,286	167,994	592,040	5,155,647	130,003		257,853	299,051	84,116
State drainage project..... number of enterprises..									
acres..									
County drain..... number of enterprises..									
acres..									
Township drain..... number of enterprises..						15,721	5,570	141,585	83
acres..								54	
Commercial development drainage project..... number of enterprises..								73,364	
acres..									
Cooperative or mutual drain..... number of enterprises..	9	11	20	13	7	28	9		2
acres..	16,507	28,540	21,623	18,155	16,070	29,739	8,205		2,669
Individual ownership drain..... number of enterprises..	2	20	2	4			1		
acres..	700	52,477	2,175	147,345	4,120		1,280	700	
Irrigation enterprises having their own drainage <sup>2</sup> ..... number of enterprises..	1,030			446	434		393		170
acres drained..	240,365			473,639	151,965		158,705		239,196
Federal..... number of enterprises..	66,352			1	1		3		2
acres drained..	1,028			67,079	8,186		98,520		47,375
Nonfederal..... number of enterprises..	174,010			445	433		390		168
acres drained..				406,560	143,779		60,185		191,821
Other types of drainage enterprises..... number of enterprises..									
acres..									
Principal purpose of drainage in 1949: <sup>3</sup>									
Reclamation or improvement of land..... number of enterprises reporting..	44	45	148	84	10	30	88	206	11
acres..	142,037	249,011	568,813	3,710,518	19,361	45,460	177,837	514,700	47,180
Protection of land against overflow..... number of enterprises reporting..	3		3	11			8		
acres..	15,979		47,025	1,563,151			24,275		
Removal of alkali or seepage from irrigated land..... number of enterprises reporting..	8			2	26		44		8
acres..	20,477			47,478	130,832		70,796		39,605
Period in which organized: <sup>3</sup>									
1940-1949..... number of enterprises reporting..	11	26	19	38	8	27	16	20	2
acres drained..	20,266	68,076	22,590	1,965,642	7,884	25,939	24,411	42,986	2,669
1930-1939..... number of enterprises reporting..	9	4	5	12	1	1	5	9	5
acres drained..	33,367	4,727	5,999	1,344,379	1,069	13,568	7,637	8,700	26,446
1920-1929..... number of enterprises reporting..	18	11	34	11			42	65	4
acres drained..	60,822	119,472	102,122	149,903	30,518	2,153	64,914	137,501	16,180
1910-1919..... number of enterprises reporting..	15	4	93	30			55	57	8
acres drained..	60,060	56,736	485,127	1,255,338	110,722	3,800	103,872	148,010	41,490
1900-1909..... number of enterprises reporting..	2			6			13	30	
acres drained..							47,134	150,419	
Before 1900..... number of enterprises reporting..	3,978			605,885			9	25	
acres drained..							24,940	27,084	
<b>FINANCIAL ITEMS<sup>3</sup></b>									
Cost of construction and operation and maintenance Jan. 1, 1940 to Dec. 31, 1949..... number of enterprises reporting..	50	33	26	89	30	28	131	92	14
dollars..	2,175,816	319,486	270,623	9,534,229	836,973	111,394	1,541,318	610,918	163,163
Cost of new works for lands not previously drained Jan. 1, 1940 to Dec. 31, 1949..... number of enterprises reporting..	17	27	23	32	13	27	24	15	2
dollars..	476,561	206,956	255,697	1,822,245	29,181	95,794	203,873	296,176	12,237
Capital invested prior to Jan. 1, 1940..... number of enterprises reporting..	50	37	48	96	29	28	120	83	19
dollars..	1,982,961	383,460	437,337	11,687,605	918,616	111,394	1,415,828	604,729	581,815
Outstanding indebtedness Dec. 31, 1949..... number of enterprises reporting..	19	7	3	24	4		44	16	16
dollars..	841,119	40,072	3,427	10,872,172	31,400		195,276	84,654	1,068,616
Indebtedness in arrears Dec. 31, 1949..... number of enterprises reporting..	3			2			8	2	2
dollars..	4,550			52,000			17,243	1,900	33,500
Area delinquent in drainage taxes Dec. 31, 1949..... number of enterprises reporting..	9	1	2	33	6		37	15	1
acres..	2,594	47	1,750	151,913	965		12,340	7,990	3,695
<b>DRAINAGE WORKS</b>									
Completed since Jan. 1, 1940 <sup>3</sup> .....									
open ditches..... number of enterprises reporting..	17	28	23	33	12	27	23	15	2
miles..	90	128	105	948	29	59	55	76	5
tile drains..... number of enterprises reporting..	2	3		1	3		4	3	
miles..	2	1		4	5		4	10	
levees and dikes..... number of enterprises reporting..	2	1		2			4		
miles..	4	1		7			4		
Completed prior to Jan. 1, 1940.....									
open ditches..... miles..	780.1	459.9	1,508.0	4,906.3	267.8	46.7	885.0	1,580.7	643.3
tile drains..... miles..	150.6			14.1	1,618.6		179.0	282.5	262.1
levees and dikes..... miles..	143.2		30.0	61.7	5.0		72.4	8.0	7.2
Drainage wells <sup>3</sup> ..... number of enterprises reporting..	2						1		
number of wells pumped..	4						1		
Pumping units <sup>3</sup> ..... number of enterprises reporting..	23						1		
number of units operated..	70						15		
Area served by pumps <sup>3</sup> ..... number of enterprises reporting..	23						43		
acres..	61,752			5,105			33,058		

<sup>1</sup>Largely States with organized drainage districts and other corporate and private enterprises. See text. <sup>2</sup>From Census of Irrigation. <sup>3</sup>Data for irrigation enterprises, having their own drainage not included. <sup>4</sup>An interstate enterprise is counted only in the State in which the headquarters is located.



DRAINAGE OF AGRICULTURAL LANDS

Table 6.—TYPES OF DRAINAGE WORKS COMPLETED IN THE PERIOD JANUARY 1, 1940 TO DECEMBER 31, 1949 AND COMPLETED PRIOR TO 1940, BY STATES: CENSUSES OF 1950, 1940, 1930, AND 1920

State	Open ditches					Tile drains					Levees and dikes				
	Completed Jan. 1, 1940 to Dec. 31, 1949		Completed prior to date of census (miles)			Completed Jan. 1, 1940 to Dec. 31, 1949		Completed prior to date of census (miles)			Completed Jan. 1, 1940 to Dec. 31, 1949		Completed prior to date of census (miles)		
	Number of enterprises re-reporting	Miles	1940	1930	1920	Number of enterprises re-reporting	Miles	1940	1930	1920	Number of enterprises re-reporting	Miles	1940	1930	1920
Total 40 States.....	(*)	9,301	146,152.3	138,673.0	107,468.2	(*)	581	55,734.0	55,031.9	42,311.7	(*)	1,020	6,792.9	6,539.5	3,509.8
Total 30 States <sup>1</sup> .....	1,065	7,817	59,927.5	53,192.1	28,705.5	65	135	8,471.1	8,501.8	6,120.6	146	965	6,170.5	6,109.6	3,246.3
Alabama.....	7	66	42.3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Arizona.....	.....	.....	100.8	349.4	32.6	.....	.....	8.8	14.3	1.0	.....	.....	24.5	2.5	26.0
Arkansas.....	29	123	6,030.3	4,974.3	3,154.1	.....	.....	10.8	0.1	20.4	4	15	332.4	201.9	121.8
California.....	15	34	6,091.1	4,605.9	3,009.8	2	11	326.2	486.2	85.6	.....	.....	1,537.6	1,389.5	1,131.1
Colorado.....	4	11	972.9	814.9	132.5	1	1	365.3	369.5	195.2	1	1	.....	.....	.....
Florida.....	145	2,263	5,022.1	5,112.6	1,990.8	4	16	.....	.....	.....	97	661	470.6	718.4	66.2
Georgia.....	22	115	550.3	496.9	276.8	1	2	2.0	40.0	.....	.....	.....	5.0	.....	.....
Idaho.....	19	59	968.1	651.2	274.5	2	2	174.6	19.9	1.8	4	8	95.4	74.8	9.5
Illinois.....	96	273	6,862.2	5,996.4	4,754.5	34	67	4,246.6	3,825.6	3,507.1	5	19	1,157.8	1,108.4	650.2
Kansas.....	9	48	381.4	324.7	138.4	.....	.....	210.5	212.1	213.0	7	58	278.3	227.0	165.1
Louisiana.....	141	2,116	7,105.5	7,701.2	1,771.6	.....	.....	6.0	2.0	0.2	12	166	624.4	576.3	440.7
Maryland.....	26	138	461.3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mississippi.....	156	372	4,344.1	4,022.1	1,815.1	.....	.....	34.1	43.5	238.8	.....	.....	190.5	227.7	6.7
Missouri.....	8	30	5,191.5	4,960.5	3,438.7	.....	.....	170.3	123.4	38.8	4	17	687.1	931.4	456.9
Montana.....	8	40	420.9	284.2	102.1	2	2	73.8	76.7	50.7	.....	.....	0.8	.....	.....
Nebraska.....	28	167	1,406.7	1,202.3	734.5	1	1	26.3	93.4	359.4	1	1	230.3	116.8	26.8
Nevada.....	2	21	426.4	334.8	16.6	.....	.....	.....	4.0	4.0	.....	.....	23.0	33.0	.....
New Jersey.....	5	12	.....	.....	.....	2	2	.....	.....	.....	.....	.....	.....	.....	.....
New Mexico.....	.....	.....	625.2	282.9	124.0	.....	.....	308.9	305.4	282.2	.....	.....	181.3	12.0	.....
New York.....	7	31	.....	.....	.....	.....	.....	.....	.....	.....	1	2	.....	.....	.....
North Carolina.....	158	403	1,846.6	1,483.5	1,171.3	.....	.....	.....	.....	.....	1	1	4.0	22.0	33.5
Oregon.....	17	90	780.1	495.1	.....	2	2	150.6	42.5	13.0	2	4	143.2	121.4	.....
South Carolina.....	28	128	459.9	423.0	262.7	3	6	.....	150.0	101.5	1	1	.....	11.0	.....
Tennessee.....	23	105	1,508.0	1,413.0	777.3	.....	.....	.....	.....	0.3	.....	.....	30.0	29.8	42.3
Texas.....	33	948	4,906.3	3,661.8	2,728.5	1	4	14.1	8.5	.....	2	7	61.7	215.9	59.8
Utah.....	12	29	267.8	304.3	120.3	3	5	1,618.6	1,944.5	599.1	.....	.....	5.0	2.0	2.0
Virginia.....	27	59	46.7	40.0	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Washington.....	23	55	885.0	746.7	162.4	4	4	179.0	199.2	83.0	4	4	72.4	78.8	.....
Wisconsin.....	15	76	1,580.7	1,989.4	1,691.3	3	10	282.5	303.4	211.3	.....	.....	8.0	9.0	7.7
Wyoming.....	2	5	643.3	521.0	25.1	.....	.....	262.1	237.6	114.2	.....	.....	7.2	.....	.....
Total 10 States <sup>2</sup> .....	(*)	1,484	86,224.8	85,480.9	78,762.7	(*)	446	47,262.9	46,530.1	36,191.1	(*)	55	622.4	429.9	263.5
Delaware.....	(*)	2	1,482.3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Indiana.....	(*)	198	22,000.1	20,786.8	17,470.7	(*)	48	10,754.7	10,438.7	8,227.6	(*)	20	139.0	131.9	165.8
Iowa.....	(*)	203	5,189.7	4,800.0	3,998.0	(*)	165	12,873.2	13,382.4	10,384.9	(*)	35	456.8	113.4	45.2
Kentucky.....	(*)	22	1,231.8	1,204.8	664.5	(*)	1	2.0	71.0	86.2	.....	.....	.....	.....	0.2
Michigan.....	(*)	554	19,608.6	17,188.5	16,023.8	(*)	145	3,229.5	3,490.2	2,173.9	.....	.....	13.6	34.6	33.1
Minnesota.....	(*)	357	15,856.7	14,477.6	14,657.0	(*)	80	9,893.4	9,451.3	5,924.6	.....	.....	0.4	149.7	0.1
North Dakota.....	(*)	94	940.4	817.6	708.3	.....	.....	10.4	9.6	9.3	.....	.....	.....	.....	2.1
Ohio.....	(*)	38	18,732.2	25,048.2	24,984.0	(*)	7	10,163.9	9,371.6	9,205.3	.....	.....	5.2	0.3	9.6
Oklahoma.....	(*)	16	334.3	303.0	18.6	.....	.....	.....	.....	.....	.....	.....	.....	.....	5.0
South Dakota.....	.....	.....	840.7	854.4	237.8	.....	.....	335.8	315.3	179.3	.....	.....	7.4	.....	2.4

\*Not available.  
<sup>1</sup>Largely States with organized drainage districts and other corporate and private enterprises. See text.  
<sup>2</sup>County-drain States.

SUMMARY

Table 7.—NUMBER OF ENTERPRISES REPORTING LAND DRAINED, WITH NUMBER OF ACRES DRAINED, BY TYPE OF ENTERPRISE: 1950

State	United States and State totals <sup>1</sup>	Drainage districts	State drainage projects	County drains	Township drains	Commercial development drainage projects	Cooperative or mutual drains	Individual ownership drains	Irrigation drainage <sup>1</sup>		Other types of drainage
									Federal	Non-federal	
United States.....	number of enterprises.. 14,066 acres drained.. 102,688,331	3,210 33,530,379	7 31,336	152 61,883,889	190 323,783	19 153,652	893 1,409,494	516 1,100,979	30 598,819	9,024 3,510,754	25 145,246
Alabama.....	number of enterprises.. 10 acres drained.. 76,671	3 35,936					7 40,735				
Arizona.....	number of enterprises.. 25 acres drained.. 197,268	2 3,385							3 64,245	20 129,638	
Arkansas.....	number of enterprises.. 844 acres drained.. 4,701,095	229 4,506,440					23 32,398	15 67,790		577 94,467	
California.....	number of enterprises.. 2,045 acres drained.. 2,554,576	102 1,202,950				5 66,480	13 73,266	43 110,841	1 67,309	1,881 1,033,730	
Colorado.....	number of enterprises.. 630 acres drained.. 623,976	39 255,753					4 27,190	8 21,421	1 400	578 319,212	
Delaware.....	number of enterprises.. 22 acres drained.. 352,547			2 352,547							
Florida.....	number of enterprises.. 1,889 acres drained.. 6,083,676	98 5,416,739				4 32,530	13 118,476	102 224,562		1,651 149,758	21 141,611
Georgia.....	number of enterprises.. 55 acres drained.. 96,259	35 69,485					10 17,205	10 9,569			
Idaho.....	number of enterprises.. 376 acres drained.. 436,171	37 135,172					3 5,195	4 3,210		332 291,794	
Illinois.....	number of enterprises.. 1,433 acres drained.. 5,370,825	1,089 4,787,745	3 3,091				136 250,419	16 302,121			
Indiana.....	number of enterprises.. 279 acres drained.. 11,017,709			279 11,017,709							
Iowa.....	number of enterprises.. 786 acres drained.. 6,734,863			786 6,734,863							
Kansas.....	number of enterprises.. 121 acres drained.. 356,988	82 352,589								37 1,899	35
Kentucky.....	number of enterprises.. 218 acres drained.. 959,892			218 959,892							
Louisiana.....	number of enterprises.. 992 acres drained.. 12,161,665	96 2,143,670				10 54,642	95 128,197	189 289,597		511 83,750	
Maryland.....	number of enterprises.. 93 acres drained.. 323,815	90 319,482					3 4,333				
Michigan.....	number of enterprises.. 254 acres drained.. 10,194,439			254 10,194,439							
Minnesota.....	number of enterprises.. 282 acres drained.. 11,269,962			282 11,269,962							
Mississippi.....	number of enterprises.. 441 acres drained.. 3,023,744	249 2,772,485					127 140,006	65 111,253			
Missouri.....	number of enterprises.. 318 acres drained.. 3,147,484	315 3,137,944					2 5,290	1 4,250			
Montana.....	number of enterprises.. 403 acres drained.. 289,189	22 94,172					3 2,260	2 3,260	8 85,569	368 103,928	
Nebraska.....	number of enterprises.. 473 acres drained.. 821,088	112 581,848					5 3,970			319 103,297	
Nevada.....	number of enterprises.. 82 acres drained.. 251,154	4 125,595					1 2,500		2 700	75 122,359	
New Jersey.....	number of enterprises.. 5 acres drained.. 11,206	1 4,300					4 6,906				
New Mexico.....	number of enterprises.. 222 acres drained.. 244,961	5 52,113							6 92,281	211 100,567	
New York.....	number of enterprises.. 14 acres drained.. 56,465		4 28,245				5 25,582	5 2,638			
North Carolina.....	number of enterprises.. 413 acres drained.. 1,128,509	115 684,586					3 91,590	4 287			4 3,635
North Dakota.....	number of enterprises.. 221 acres drained.. 1,572,220			221 1,572,220							
Ohio.....	number of enterprises.. 263 acres drained.. 8,923,362			263 8,923,362							
Oklahoma.....	number of enterprises.. 219 acres drained.. 300,884			219 300,884							
Oregon.....	number of enterprises.. 1,085 acres drained.. 418,858	44 161,286					9 16,507	2 700	2 66,355	1,028 174,010	
South Carolina.....	number of enterprises.. 45 acres drained.. 249,011	14 167,994					11 28,540	20 52,477			
South Dakota.....	number of enterprises.. 232 acres drained.. 707,263			232 707,263							
Tennessee.....	number of enterprises.. 151 acres drained.. 615,838	129 592,040					20 21,623	2 2,175			
Texas.....	number of enterprises.. 543 acres drained.. 5,794,786	62 5,155,647					13 18,155	22 147,345	1 67,079	445 406,560	
Utah.....	number of enterprises.. 470 acres drained.. 302,158	25 130,003					7 16,070	4 4,120	1 8,186	433 143,779	
Virginia.....	number of enterprises.. 30 acres drained.. 45,460						28 29,739				
Washington.....	number of enterprises.. 533 acres drained.. 431,613	126 257,853					9 8,205	1 1,280	3 98,520	390 60,185	
Wisconsin.....	number of enterprises.. 206 acres drained.. 514,700	68 299,051					1 73,364	1 700			
Wyoming.....	number of enterprises.. 189 acres drained.. 325,981	17 84,116					2 2,669		2 47,375	168 191,821	

<sup>1</sup>An interstate enterprise is counted only in the State in which the headquarters is located.  
<sup>2</sup>Number of enterprises are the number of counties reporting, not the number of separate projects within a county.

DRAINAGE OF AGRICULTURAL LANDS

Table 8.—NUMBER AND AREA OF DRAINAGE ENTERPRISES, CLASSIFIED BY SIZE, FOR 30 DRAINAGE-DISTRICT STATES: 1950

State	Total		Under 500		500-999		1,000-1,999		2,000-4,999		5,000-9,999	
	Number of enterprises	Acres	Number of enterprises	Acres	Number of enterprises	Acres	Number of enterprises	Acres	Number of enterprises	Acres	Number of enterprises	Acres
Total.....	114,066	54,617,706	8,276	604,271	1,588	1,099,449	1,398	1,962,705	1,317	4,119,015	651	4,538,729
Alabama.....	10	76,671	.....	.....	4	2,199	.....	.....	3	12,051	1	7,540
Arizona.....	25	197,268	.....	.....	1	610	.....	.....	.....	.....	1	5,000
Arkansas.....	844	5,330,609	560	83,548	37	24,199	25	33,065	43	136,228	47	341,529
California.....	2,047	2,554,576	1,659	152,728	129	87,405	81	109,470	83	258,686	48	326,785
Colorado.....	630	625,056	491	43,649	48	32,883	32	46,213	32	98,360	12	818,865
Florida.....	1,889	7,187,025	1,588	61,246	85	59,903	69	93,103	55	178,019	35	242,882
Georgia.....	55	96,259	.....	.....	24	18,158	21	31,946	7	20,844	2	15,046
Idaho.....	379	436,171	284	24,271	31	22,646	22	30,870	27	88,505	8	60,393
Illinois.....	1,433	5,670,788	.....	.....	278	201,239	415	586,223	434	1,358,522	179	1,231,412
Kansas.....	121	363,341	.....	.....	16	11,837	24	36,970	17	53,268	17	125,555
Louisiana.....	922	12,671,652	486	30,156	167	115,041	106	143,618	54	167,051	18	135,583
Maryland.....	93	365,668	.....	.....	19	13,826	22	36,213	36	110,643	13	90,165
Mississippi.....	441	3,312,059	.....	.....	135	91,316	84	118,377	89	275,321	56	394,409
Missouri.....	318	3,819,135	.....	.....	26	20,759	53	81,053	104	329,655	52	367,628
Montana.....	404	292,525	355	24,266	11	7,380	13	16,828	12	39,332	7	47,728
Nebraska.....	473	978,501	303	15,765	29	21,045	38	56,581	50	165,909	30	214,581
Nevada.....	82	251,154	44	8,224	10	6,917	10	15,028	9	23,141	4	21,650
New Jersey.....	5	11,206	.....	.....	1	750	.....	.....	3	9,256	.....	.....
New Mexico.....	223	244,961	194	20,681	12	8,347	5	7,300	3	8,518	5	37,196
New York.....	14	56,465	.....	.....	8	4,827	2	2,300	.....	.....	1	8,500
North Carolina.....	413	1,191,813	.....	.....	209	132,493	106	137,059	55	156,636	19	130,256
Oregon.....	1,087	418,858	995	34,389	25	16,717	31	42,451	15	49,580	10	60,821
South Carolina.....	45	257,011	.....	.....	16	10,933	10	12,310	6	20,261	6	48,627
Tennessee.....	151	620,986	.....	.....	34	24,627	50	73,448	35	112,312	17	116,827
Texas.....	543	5,929,617	360	48,881	52	35,013	27	36,415	23	80,137	14	98,649
Utah.....	471	307,450	386	24,481	29	18,550	22	29,253	20	64,828	8	56,698
Virginia.....	30	45,460	.....	.....	19	13,685	7	8,254	3	9,953	.....	.....
Washington.....	533	462,520	374	14,043	66	49,167	46	71,905	27	82,657	16	102,818
Wisconsin.....	206	516,420	.....	.....	62	43,147	68	92,463	56	160,830	14	90,670
Wyoming.....	189	326,481	143	13,685	5	3,830	6	9,404	16	48,512	11	77,916

State	10,000-19,999		20,000-49,999		50,000-99,999		100,000-199,999		200,000-499,999		500,000 and over	
	Number of enterprises	Acres										
Total.....	433	6,033,424	270	8,084,363	88	6,123,174	24	3,304,555	19	6,575,535	12	12,172,486
Alabama.....	.....	.....	2	54,881	.....	.....	.....	.....	.....	.....	.....	.....
Arizona.....	2	28,424	1	47,490	.....	.....	1	110,000	.....	.....	.....	.....
Arkansas.....	65	890,690	47	1,430,600	13	933,322	8	1,159,188	1	298,240	.....	.....
California.....	20	259,547	14	415,078	12	740,077	.....	.....	1	204,800	.....	.....
Colorado.....	10	138,831	4	130,255	1	53,000	.....	.....	.....	.....	.....	.....
Florida.....	22	303,173	22	668,120	7	505,069	5	598,878	.....	.....	1	4,476,632
Georgia.....	1	10,265	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Idaho.....	2	25,635	4	130,171	1	53,680	.....	.....	.....	.....	.....	.....
Illinois.....	100	1,356,455	25	757,035	1	69,902	1	110,000	.....	.....	.....	.....
Kansas.....	10	133,812	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Louisiana.....	32	456,721	27	747,154	8	604,461	4	654,960	13	4,754,615	7	4,862,292
Maryland.....	2	33,541	.....	.....	1	81,280	.....	.....	.....	.....	.....	.....
Mississippi.....	38	554,362	25	716,197	12	913,712	2	248,365	.....	.....	.....	.....
Missouri.....	42	607,549	30	866,242	8	540,420	1	129,024	1	333,880	1	542,925
Montana.....	3	32,000	2	47,991	1	77,000	.....	.....	.....	.....	.....	.....
Nebraska.....	17	230,040	3	102,415	3	172,165	.....	.....	.....	.....	.....	.....
Nevada.....	1	13,850	3	111,745	1	50,599	.....	.....	.....	.....	.....	.....
New Jersey.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
New Mexico.....	2	30,655	.....	.....	2	132,264	.....	.....	.....	.....	.....	.....
New York.....	3	40,838	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
North Carolina.....	9	116,263	12	329,661	3	189,445	.....	.....	.....	.....	.....	.....
Oregon.....	8	115,483	2	48,062	1	51,355	.....	.....	.....	.....	.....	.....
South Carolina.....	4	52,096	3	112,784	.....	.....	.....	.....	.....	.....	.....	.....
Tennessee.....	9	134,670	6	159,102	.....	.....	.....	.....	.....	.....	.....	.....
Texas.....	16	252,721	32	1,007,781	11	801,243	2	294,140	3	984,000	3	2,290,637
Utah.....	4	47,640	2	66,000	.....	.....	.....	.....	.....	.....	.....	.....
Virginia.....	1	13,568	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Washington.....	2	21,750	1	22,000	1	98,180	.....	.....	.....	.....	.....	.....
Wisconsin.....	5	73,310	.....	.....	1	56,000	.....	.....	.....	.....	.....	.....
Wyoming.....	5	59,535	3	113,599	.....	.....	.....	.....	.....	.....	.....	.....

<sup>1</sup>This total is for 10 fewer enterprises than are listed for the States below. The difference represents interstate enterprises serving 2 States. No enterprise served more than 2 States. In presenting the State totals, all interstate enterprises have been treated as 2 separate enterprises. The headquarters of these interstate enterprises and the other States in which lands are located are: California (2) Land also in Arizona and Oregon. Idaho (3) Land also in Oregon and Utah. Montana (1) Land also in Wyoming. New Mexico (1) Land also in Texas. Oregon (2) Land also in Idaho. Utah (1) Land also in Idaho.

# SUMMARY

**Table 9.—NUMBER AND AREA OF DRAINAGE ENTERPRISES, CLASSIFIED BY SIZE: 1950, 1940, 1930, AND 1920**

Size group	Number of enterprises 1950 <sup>1</sup>	30 States <sup>2</sup>				All drainage States				
		Area of enterprises (acres) <sup>3</sup>				Area of enterprises (acres) <sup>3</sup>				
		1950	1940	1930	1920	1940	1930	1920		
Total.....	14,066	54,617,706	45,207,287	41,644,155	23,657,216	132,828,451	128,495,078	95,629,291		
Under 100 acres.....	8,273	603,554	4,383	2,727	12,395	525,455	324,157	1,152,025		
100 to 199 acres.....			19,496	12,057		1,446,870	1,040,664			
200 to 499 acres.....			220,974	147,705		7,093,485	5,984,023			
500 to 999 acres.....			953,935	910,371		11,234,727	11,130,096			
1,000 to 1,999 acres.....	1,398	1,962,013	1,726,342	4,998,968	3,183,867	14,558,019	34,074,009	29,522,536		
2,000 to 4,999 acres.....	1,314	4,102,149	3,960,638			20,511,078				
5,000 to 9,999 acres.....	651	4,528,281	4,542,720			2,820,328			16,387,515	15,865,002
10,000 to 19,999 acres.....	433	6,003,783	6,041,949			9,423,712			16,964,180	35,075,951
20,000 to 49,999 acres.....	268	7,920,801	10,047,929	14,768,991	9,423,712	20,141,844	10,218,995	8,605,536		
50,000 to 99,999 acres.....	87	6,084,562	6,816,045			6,304,255			4,880,449	10,760,472
100,000 to 199,999 acres.....	25	3,566,263	3,794,141			10,014,219			2,868,617	5,925,431
200,000 to 499,999 acres.....	19	6,575,535	2,954,853							3,155,493
500,000 acres and over.....	12	12,172,486	4,123,882	.....	.....	4,123,882	3,378,199	.....		

<sup>1</sup>An interstate enterprise is counted in each State in which a part is located. It is counted only once in the 30-State summary.

<sup>2</sup>Largely States with organized drainage districts and other corporate and private enterprises. See text.

<sup>3</sup>The sum of the areas in the individual enterprises without deduction for area in more than 1 enterprise (overlapped).

**Table 10.—ACRES OF LAND SERVED BY DRAINAGE PUMPS, CAPACITY OF ENGINES OR MOTORS, AND CAPACITY OF PUMPS, FOR SPECIFIED STATES: 1950, 1940, AND 1930**

State	Land served (acres)	Engine or motor capacity (h.p.)	Pump capacity		
			Total (g.p.m.)	Per acre (g.p.m.)	Depth in 24 hours (inches)
Florida.....	293,124	28,129	8,399,300	28.7	1.53
.....1950..					
.....1940..	185,693	7,204	3,394,600	18.3	0.98
.....1930..	129,872	5,065	1,980,799	15.3	0.81
Illinois <sup>1</sup> .....	315,363	21,020	3,331,997	10.6	0.57
.....1950..					
.....1940..	375,437	23,206	3,648,100	9.7	0.52
.....1930..	331,448	18,658	3,156,700	9.5	0.51
Louisiana.....	179,266	15,041	4,283,000	23.9	1.27
.....1950..					
.....1940..	123,066	11,041	5,055,600	41.1	2.19
.....1930..	123,163	6,495	2,956,500	24.0	1.28
Missouri.....	67,217	2,800	713,890	10.6	0.57
.....1950..					
.....1940..	64,527	2,115	502,000	7.8	0.42
.....1930..	71,604	2,533	607,430	8.5	0.45

<sup>1</sup>Pump data for Illinois do not include 1 enterprise serving 61,650 acres which was considered primarily a sanitary project in the 1950 Census.

## DRAINAGE OF AGRICULTURAL LANDS

Table 11.—PRECIPITATION FOR 1949 BY MONTHS, WITH PERCENTAGE OF NORMAL PRECIPITATION, FOR THE 40 DRAINAGE STATES

State	Annual		January		February		March		April		May	
	Inches	Percent	Inches	Percent	Inches	Percent	Inches	Percent	Inches	Percent	Inches	Percent
Alabama.....	57.37	106	6.58	130	6.20	117	6.15	101	5.79	125	4.07	103
Arizona.....	13.41	97	3.06	239	0.76	58	0.51	47	0.38	58	0.29	91
Arkansas.....	57.04	117	10.16	234	3.98	112	5.42	114	2.75	55	5.29	105
California.....	14.68	70	2.30	58	2.68	69	4.30	147	0.16	10	1.08	135
Colorado.....	16.84	102	1.50	190	0.57	59	1.52	114	1.13	63	2.50	132
Florida.....	55.29	102	0.88	32	2.69	88	2.39	66	5.16	171	2.34	60
Georgia.....	48.30	96	3.03	78	5.58	116	2.98	59	5.71	149	3.50	102
Idaho.....	14.89	85	1.90	50	2.91	169	1.03	61	0.54	39	2.02	127
Illinois.....	41.28	112	6.09	260	2.63	136	3.21	100	1.77	50	2.77	67
Indiana.....	45.19	115	7.74	255	2.89	119	3.81	101	2.01	56	3.36	82
Iowa.....	28.06	89	2.72	269	0.87	80	2.44	144	1.33	51	2.68	103
Kansas.....	31.85	120	3.09	451	1.14	118	1.95	135	2.18	83	5.34	143
Kentucky.....	51.72	114	6.86	157	5.35	154	5.17	109	3.52	88	2.78	70
Louisiana.....	61.91	109	6.11	122	4.82	106	8.25	165	6.53	139	2.35	58
Maryland-Delaware.....	40.86	74	5.30	162	3.40	118	2.83	79	2.77	79	4.77	130
Michigan.....	32.37	105	2.70	138	2.10	123	2.05	98	1.62	68	2.75	84
Minnesota.....	26.88	106	1.55	207	0.41	54	1.71	140	0.74	35	3.24	101
Mississippi.....	60.95	114	8.69	187	5.22	105	8.45	142	5.11	104	4.68	109
Missouri.....	40.09	119	6.37	276	2.58	123	3.42	105	1.65	41	4.59	96
Montana.....	12.36	83	0.84	112	0.95	151	0.80	89	0.57	51	1.94	91
Nebraska.....	25.38	112	1.93	352	0.29	41	2.46	220	1.52	63	4.84	142
Nevada.....	7.72	89	1.39	124	0.94	85	0.79	89	0.24	30	1.77	227
New Jersey.....	39.72	87	5.99	165	3.68	106	2.61	68	3.73	103	4.77	132
New Mexico.....	15.35	107	1.61	278	0.63	91	0.45	59	0.92	107	1.23	98
New York.....	34.23	87	3.49	121	2.41	91	1.96	64	3.33	110	3.15	88
North Carolina.....	54.17	109	2.83	75	3.75	94	2.94	70	4.46	125	4.68	116
North Dakota.....	16.24	95	1.14	238	0.46	98	0.60	77	0.45	32	2.34	104
Ohio.....	37.51	99	5.38	186	2.70	104	2.93	84	2.67	83	3.05	81
Oklahoma.....	30.88	118	5.41	363	2.23	149	2.30	105	2.07	59	7.94	165
Oregon.....	23.81	86	1.09	28	5.93	179	2.39	82	0.83	40	2.37	135
South Carolina.....	48.75	102	2.19	62	5.08	122	2.09	54	5.06	154	3.42	97
South Dakota.....	17.19	90	1.51	275	0.14	25	1.22	110	1.18	57	2.38	91
Tennessee.....	57.47	115	8.43	172	3.42	76	5.56	104	4.15	95	3.68	90
Texas.....	34.34	114	3.62	200	2.37	133	1.78	89	3.96	136	3.25	88
Utah.....	14.67	111	2.11	185	0.90	75	1.46	130	0.52	46	1.92	178
Virginia.....	45.37	108	3.78	115	2.69	88	2.66	73	3.50	107	4.75	126
Washington.....	29.84	87	0.99	23	6.25	164	2.51	77	1.30	54	1.14	57
Wisconsin.....	28.00	92	1.92	155	0.80	68	2.35	134	1.64	66	2.28	63
Wyoming.....	14.04	96	1.55	153	0.69	81	0.98	88	0.94	57	2.57	130

State	June		July		August		September		October		November		December	
	Inches	Percent	Inches	Percent	Inches	Percent	Inches	Percent	Inches	Percent	Inches	Percent	Inches	Percent
Alabama.....	5.76	135	6.71	121	4.61	98	3.31	101	3.37	116	0.80	25	4.01	76
Arizona.....	0.64	247	1.97	95	1.25	56	1.63	123	1.15	129	0.33	34	1.24	95
Arkansas.....	5.17	125	4.32	117	3.11	88	3.20	97	8.50	262	0.37	10	4.77	112
California.....	0.96	19	9.02	18	0.10	59	0.09	22	0.27	25	1.68	82	1.94	53
Colorado.....	3.26	226	2.18	102	1.30	67	0.85	63	1.24	103	0.24	30	0.55	62
Florida.....	7.55	112	7.86	105	11.05	136	7.60	112	3.72	90	1.86	84	2.39	86
Georgia.....	5.10	114	5.66	96	6.81	128	3.26	86	3.07	113	1.08	40	2.52	61
Idaho.....	0.65	49	0.30	49	0.35	60	0.88	90	1.53	108	1.87	56	1.72	86
Illinois.....	4.19	104	4.40	116	2.90	86	2.76	86	5.17	194	0.67	26	4.72	220
Indiana.....	5.36	135	3.50	105	3.66	110	2.64	80	4.89	176	1.12	37	4.21	154
Iowa.....	5.51	121	3.47	96	2.34	62	3.21	80	1.93	84	0.49	28	1.07	90
Kansas.....	5.93	148	3.83	123	2.72	87	2.22	80	2.42	126	0.15	12	0.87	101
Kentucky.....	5.52	132	4.09	99	4.54	123	1.84	64	4.53	170	1.82	53	5.70	150
Louisiana.....	5.20	110	8.03	132	4.04	79	3.94	97	7.30	223	0.34	8	5.00	94
Maryland-Delaware.....	2.02	51	4.63	106	4.32	96	3.29	98	3.57	117	1.68	63	2.28	72
Michigan.....	4.17	132	4.21	147	2.45	85	2.78	82	2.49	94	2.25	90	2.80	144
Minnesota.....	4.08	99	6.20	188	2.01	61	1.74	61	3.24	175	0.94	79	1.02	134
Mississippi.....	5.51	132	6.28	125	3.89	94	3.77	122	4.75	184	0.39	10	4.21	80
Missouri.....	6.55	136	4.30	139	3.04	80	4.78	120	6.09	207	0.45	16	3.57	160
Montana.....	1.71	62	1.26	86	0.57	50	1.02	76	1.34	133	0.48	56	0.88	114
Nebraska.....	4.92	130	2.36	77	2.74	102	2.19	104	1.70	116	0.17	22	0.29	43
Nevada.....	0.38	64	0.26	67	0.28	56	0.27	64	0.40	62	0.52	81	0.48	50
New Jersey.....	0.23	6	3.87	82	3.60	76	4.20	113	2.49	69	1.61	49	2.94	83
New Mexico.....	2.11	179	3.01	133	1.62	68	2.44	132	0.71	63	0.07	11	0.55	73
New York.....	1.47	40	3.28	85	4.28	116	3.64	104	1.79	54	2.69	88	2.74	93
North Carolina.....	6.26	127	6.65	111	9.31	171	4.02	97	4.10	128	2.87	102	2.30	61
North Dakota.....	2.64	75	3.56	145	0.99	48	0.56	37	2.55	248	0.30	49	0.65	135
Ohio.....	4.23	107	4.22	111	3.31	98	2.71	93	1.68	67	1.47	55	2.96	110
Oklahoma.....	5.00	125	2.72	98	2.00	69	3.87	123	3.57	121	0.13	6	1.64	96
Oregon.....	0.51	36	0.22	30	0.34	32	1.03	87	1.89	85	3.84	99	3.57	84
South Carolina.....	4.26	91	5.07	85	9.94	172	3.93	95	5.51	121	2.28	97	1.92	55
South Dakota.....	2.00	56	2.02	83	1.93	91	1.57	101	2.15	178	0.24	36	0.65	127
Tennessee.....	7.01	155	5.99	131	4.20	108	2.00	63	6.61	232	1.25	34	5.18	114
Texas.....	3.23	108	2.94	114	2.32	98	2.80	94	5.56	207	0.13	6	2.38	103
Utah.....	1.47	216	0.70	72	0.54	49	0.77	75	1.89	160	0.59	63	1.80	164
Virginia.....	4.72	113	5.84	124	7.01	156	2.83	88	3.40	114	2.02	80	2.17	71
Washington.....	0.75	44	0.66	97	0.61	80	1.38	78	2.96	98	5.95	116	5.34	98
Wisconsin.....	4.99	119	5.53	161	2.20	66	2.01	55	1.80	76	1.20	63	1.28	99
Wyoming.....	2.14	123	0.97	73	0.58	51	0.90	75	1.85	164	0.36	46	0.71	91