

**1978
Census of
Irrigation
Organizations**

GENERAL EXPLANATION

	Page
GENERAL INFORMATION	134
HISTORY	134
DEFINITIONS AND EXPLANATIONS	134
TYPES OF IRRIGATION ORGANIZATIONS	135
PLANNING PROCESS	138
METHOD OF ENUMERATION	138
OFFICE PROCESSING	138
COSTS AND REVENUES	139
REVENUE FROM FARMS AND RANCHES	139
SUMMARY	139

GENERAL INFORMATION

This chapter presents information on irrigation organizations, which are defined as a group of individuals, a company, a governmental district or agency, or an individual that operates facilities to supply irrigation water to two or more farms or ranches, or stores irrigation water. It may be either a formal, legal organization, or an informal or cooperative arrangement.

Land and water are the most important inputs necessary for agricultural production. In many parts of the country, particularly in the arid portions of the West, irrigation is necessary for the production of most crops. Water for irrigation is obtained from two primary sources: surface water (streams and lakes) and ground water (wells and springs). For the purpose of this census, an additional classification was added: water obtained from other irrigation organizations.

HISTORY

The 1978 Census of Irrigation Organizations provides a periodic statistical picture of the Nation's irrigation organizations. Information relating to the irrigation of farm and ranch lands in the United States has been included as a part of each decennial census of agriculture since 1890, and for each mid-decennial census of agriculture since 1935. In the 1900 Census of Agriculture, two inquiries relating to irrigation of farm and ranch lands were made for all States and territories. These two inquiries pertained to the number of acres irrigated in 1899, and to the source of irrigation water. Special attention was directed to irrigation by Congress in 1902, when it authorized the Director of the Census Bureau to complete and bring the census up-to-date. This census covered not only individual farm irrigators, but also multifarm irrigation systems. The word "systems" included the irrigation works of both individual farms and those serving more than one farm. The data were tabulated by drainage basins to provide better knowledge of how the water was used in each basin.

The first census of irrigation organizations was taken in 1910 in conjunction with the census of agriculture as part of the decennial census program. This census was taken again for 1920, 1930, 1940, 1950, 1959, and 1969. In 1976, Congress author-

ized the census of irrigation organizations to be taken for 1978 and 1987 and every 10 years thereafter, to adjust the data reference year to coincide with the 1982 Economic Censuses.

DEFINITIONS AND EXPLANATIONS

The data shown in the tables of this chapter are derived from the census of irrigation organizations. In general, the subject matter terms used in the tables for column heads and data line captions are indicative of the data source. This section provides more detailed descriptions of selected items and terms than are available on the report forms or in the tables, charts, or graphs. For an exact wording of the questions, see copies of the report forms and instructions in appendix B.

Irrigation Organization

For census purposes, an irrigation organization is defined as a group of individuals, a company, a governmental district or agency, or an individual that operates an irrigation supply system which supplies irrigation water for two or more farms or ranches or could have supplied water to farms or ranches under normal conditions. Also, included are those organizations which provide storage facilities for water ultimately used for irrigation. Often such organizations do not deliver water directly to farms or ranches, but supply water to another irrigation organization serving farms or ranches.

Water Resources Regions (WRR) and Subregions (WRS)

The WRR and WRS are approximations of major and minor drainage basins as delineated by the U.S. Water Resources Council. Boundaries of these areas are shown on the enclosed map. Data collected in the 1978 Census of Irrigation Organizations are tabulated by these geographic areas.

The code, name, and a geographic description of each water resources region are:

01 New England Region—The drainage within the United States that ultimately discharges into the Bay of Fundy and the Atlantic Ocean. These points of discharge are located within and between Maine and Connecticut; Long Island Sound and the St. Francis River, a tributary of the St. Lawrence River.

02 Middle Atlantic Region—The drainage within the United States that ultimately discharges into the Atlantic Ocean, whose point of discharge is located within and between New York and Virginia, and the Richelieu River, a tributary of the St. Lawrence River.

03 South Atlantic-Gulf Region—The drainage that ultimately discharges into the Atlantic Ocean, whose point of discharge is

located within and between North Carolina and Florida; and the Gulf of Mexico, whose point of discharge is located within and between Florida and Mississippi, including the Pearl River.

04 Great Lakes Region—The drainage within the United States that discharges into the Great Lakes system, including the Lakes surfaces; and the St. Lawrence River as far east as, but excluding the Richelieu River.

05 Ohio Region—The drainage of the Ohio River, excluding that of the Tennessee River.

06 Tennessee Region—The drainage of the Tennessee River.

07 Upper Mississippi Region—The drainage of the Mississippi River above the mouth of the Ohio River, but excluding the drainage of the Missouri River above a point immediately below the mouth of the Gasconade River.

08 Lower Mississippi Region—The drainage of the Mississippi River below the mouth of the Ohio River, but excluding the drainages of the Arkansas, White, and Red Rivers and above the points of highest backwater affects of the Mississippi River in those parts; and the coastal streams, other than the Mississippi River, that discharges into the Gulf of Mexico from the boundaries of but excluding the Pearl and Sabine Rivers.

09 Souris-Red-Rainy Region—The drainage within the United States of the Souris, Red, and Rainy Rivers.

10 Missouri Region—The drainage within the United States of the Missouri River above a point immediately below the mouth of the Gasconade River; and the Saskatchewan River.

11 Arkansas-White-Red Region—The drainage of the Arkansas River above the point of highest backwater affect of the Mississippi River; the Red River above the point of highest backwater affect of the Mississippi River; and the White River above the point of highest backwater affect of the Mississippi River, near Peach Orchard Bluff, Ark.

12 Texas-Gulf Region—The drainage that discharges into the Gulf of Mexico from and including Sabine Pass to, but excluding the Rio Grande and the Lower Rio Grande Valley.

13 Rio Grande Region—The drainage within the United States of the Rio Grande; the San Luis Valley, North Plains, San Augustine Plains, Mimbres, Estancia, Jornada del Muerto, Tularosa, Salt, and various smaller closed basins; and the Lower Rio Grande Valley.

14 Upper Colorado Region—The drainage of the Colorado River above the Lee Ferry Compact Point which is about 1 mile below the mouth of the Paria River; and the Great Divide closed basin.

15 Lower Colorado Region—The drainage within the United States of the Colorado River below the Lee Ferry Compact Point which is about 1 mile below the mouth of the Paria River;

the Rios Yaqui, Magdalena, and Sonoita and other lesser streams that ultimately discharge into the Gulf of California; and the Animas Valley, Wilcox Playa, El Dorado Valley, and other smaller closed basins.

16 Great Basin Region—The drainage of the Great Basin that ultimately discharges into Utah and Nevada.

17 Pacific-North West Region—The drainage within the United States that ultimately discharges into the Straits of Georgia and of Juan de Fuca; the Pacific Ocean, whose point of discharge is within Washington and Oregon, including the Columbia River; and the Great Basin in Oregon.

18 California Region—The drainage within the United States that ultimately discharges into the Pacific Ocean, whose point of discharge is within California, which includes the Central Valley; and that portion of the Great Basin, and other closed basins in California.

19 Alaska Region—The drainage within Alaska.

20 Hawaii Region—The drainage within Hawaii.

TYPES OF IRRIGATION ORGANIZATIONS

Because of the diversity of ownership and control, each irrigation organization was classified as:

Unincorporated mutual—This is a partnership or informal group of two or more farmers who operates irrigation supply works for their own needs. Many of the very small organizations of this type are operated on the basis of verbal understandings among the participants with no official formal organization.

Incorporated mutual—This is a legally constituted, cooperative-type corporation owned by the users and supplying water at a cost.

District—A public corporation or special-purpose governmental unit, which can make use of taxing powers and of the power of eminent domain.

USBR constructed and operated—Irrigation facilities constructed by and under the control or management of the U.S. Bureau of Reclamation (USBR) at the time of the census.

USBR constructed-user operated—Projects constructed by the USBR and now under the control of the water users. The users must have some legal form of organization, such as an incorporated mutual, or a district organization to take over operations from USBR. Therefore, data identified as USBR constructed-user operated are also included in the data for other types of organizations.

USBIA operated—The irrigation projects operated by U.S. Bureau of Indian Affairs (USBIA), which primarily serve farms on Indian reservations.

State and local governments—These are State, county, and city governments without the district form of organization.

Commercial—These are controlled by owners rather than the user-customers, and are usually profit-oriented. Irrigation water service may be an incidental function. Examples are: corporations producing electricity from water power, or providing municipal water service and supplying irrigation water to farms.

Other—Organizations which cannot be included in one of the categories given.

Irrigation systems have been classified by type since the 1910 census, but the classification systems, while similar, have differed. The mutual or cooperative category was subdivided into unincorporated and incorporated organizations beginning in 1940. USBR projects have been reported in the censuses of 1950 through subsequent censuses for those constructed and operated by USBR and those released to the operation of the users. Three adjustments in the classification between 1969 and 1978 were made: (1) For the 1969 census, districts were subdivided into "irrigation" and "other," but were deleted for the 1978 census; (2) A subtype of irrigation organization, "Serving residences and businesses," was deleted; and (3) A type of organization, "Farmer or rancher supplying water to others for irrigation," was deleted.

Acres Irrigated

The acres of agricultural land to which water was artificially applied during the census year are shown as acres irrigated. The water was supplied by a qualifying organization. Land irrigated prior to the census year, but not in the census year, was excluded. Land flooded during high-water periods was to be included as irrigation only if the water was diverted to agricultural land by dams, canals, or other works.

Acres Developed for Irrigation

Land that could be irrigated with the facilities of an irrigation organization and land that could have been irrigated but was not during the census year, are included in acres developed for irrigation.

Farms and Ranches Served

The concept of a "farm" as reported by irrigation organizations will often differ from the census definition of a farm. If a farm operator received water from a number of delivery points, usually on separate tracts of land, the irrigation organization will usually list each delivery point as a farm. The census would count only one farm in this instance and then only if it meets the census definition of a farm. This method of reporting accounts for most of the difference in the farm and ranch count between the census of agriculture and the census of irrigation organizations.

Residential Users Served

Residential users were to be reported only by those organizations making direct deliveries.

Other Users Served

Municipal, recreational, industrial, and other organizations of this kind receiving water directly from irrigation organizations are included as other users served.

Sources of Water

Sources of water for irrigation organizations are divided into four categories. Two categories comprise the amount of water diverted from natural sources. The other two source categories provide data on imports to one geographical area from another, and exchanges of water between irrigation organizations.

Ground sources—Water obtained from wells or natural springs.

Surface sources—Water obtained from lakes, streams, reservoirs or drainage ways.

Imports and exports—Transfer of water across State boundaries, water resources region boundaries, or subregion boundaries.

Organizations engaged in these water transfers are classified as exporting organizations in one geographical area, and as importing organizations in the receiving area. Imports add to the total water supply of the receiving area, but not when all geographic areas are aggregated.

No exports or imports of water are shown in the totals for the United States, the 17 Western States and Louisiana, or for all other States, because there were no transfers of water between these larger areas. Significant exports and imports occur between States, between water resources regions, and between subregions. Such transfers are not additive to a total for the larger areas. (See tables 8 and 9.)

The chart illustrates the importance of water imports and exports between States, and their relationship to the net water supply within each State. (See page 137.)

Exchanges between irrigation organizations—These exchanges add to the total water supply for distribution by the receiving organization, but are subtracted from the supply of the delivering organization. The amount of water delivered equals the amount received.

Other Releases From the Conveyance System

Other releases include water released from the irrigation conveyance facilities, which were not delivered to a water user because of spillage or wastage or release of excess water. Free flow of water over an on-stream dam is not counted as a release. Also, release of water from a reservoir specifically for down stream diversion by another organization is not counted as other releases, but as an exchange between organizations.

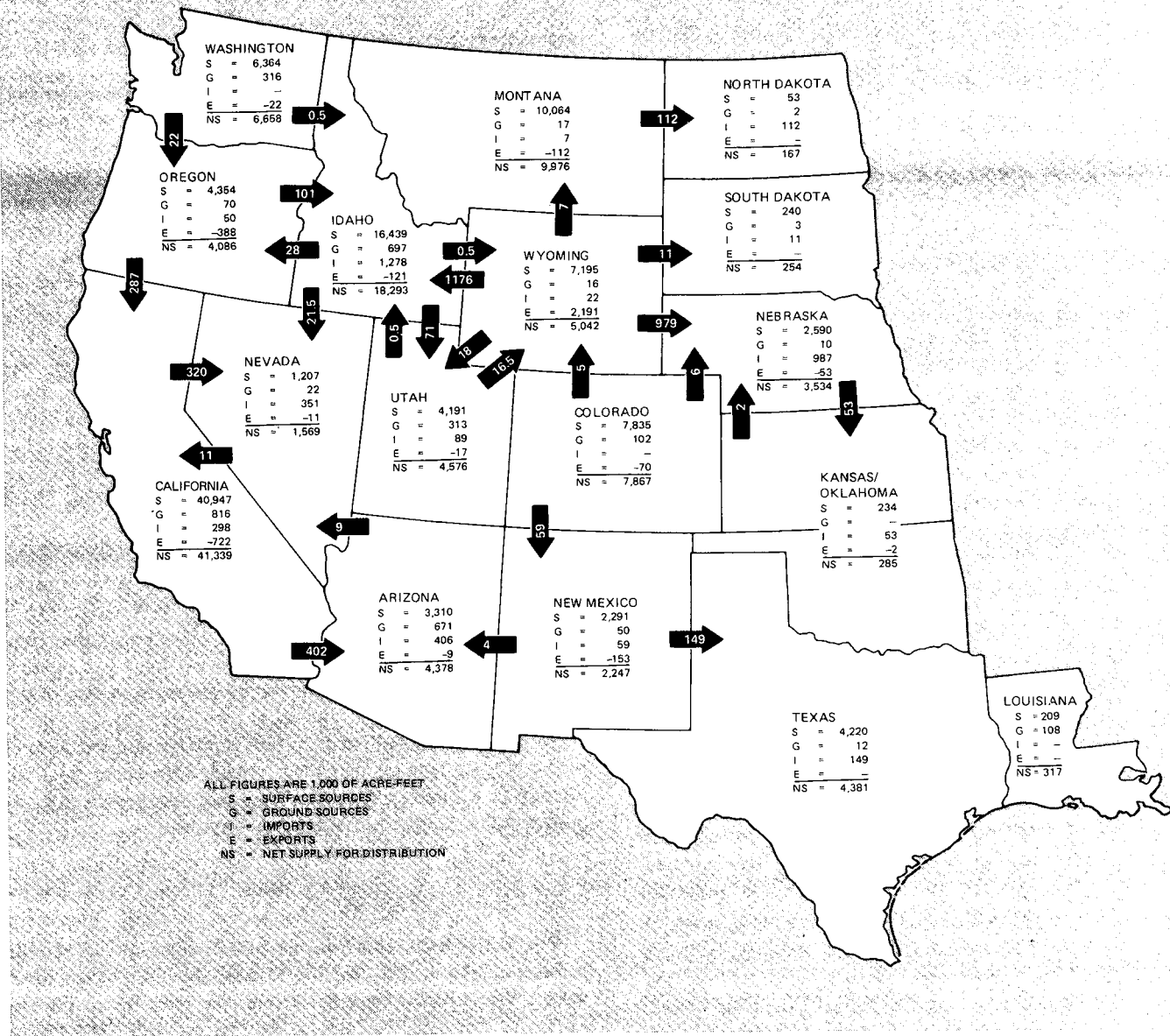
Conveyance Losses

Conveyance losses are water losses due to seepage or evaporation after water enters the organization's conveyance facilities.

Total Water Conveyed

For any area, the sum of water obtained by all organizations from natural sources, water imported from another area, and the

Natural Sources, Imports, and Exports of Water, by States: 1978
(Thousands of acre-feet)



amount of water exchanged among all organizations in the area, equals total water conveyed. It also equals the sum of water delivered to all users and deliveries to other organizations, exports, releases, and conveyance losses in an area.

Organizations Conveying Water

This includes any organization reporting water conveyed. Organizations not conveying water are organizations which are temporarily inactive, or which operate storage reservoirs and do not deliver water to users.

Organizations supplying irrigation water are shown in table 32 by the number of miles of conveyance facilities operated.

For the 17 Western States and Louisiana, 369 organizations are classified as having no conveyance facilities, yet over 31 million acre-feet of water have been conveyed. This inconsistency occurs because some organizations maintain only an on-stream reservoir or diversion dam from which deliveries are made (usually to other irrigation organizations) either directly into the canal of another organization, or by means of natural channels.

Net Water Supply

For any State or other geographical area shown in the tables or charts, net water supply is the amount of water obtained from natural sources (surface and/or ground), plus imports

minus exports. It is the amount of water available for distribution within the area.

On-Stream and Off-Stream Reservoirs

Source of water is the major distinction between on-stream and off-stream reservoirs. On-streams reservoirs receive most of the water from the river on which they are located, but water is diverted into off-stream reservoirs.

New Capital Investments

New capital investments are those expenditures for improvements to existing facilities, buildings, and new construction. Normal repair and replacement costs were to be reported as operation and maintenance costs.

PLANNING PROCESS

Initial planning for the 1978 Census of Irrigation Organizations began in December 1976 when census officials contacted the Water Resources Council (WRC). The council agreed to act as a coordinator for defining the content of the irrigation and drainage items for inclusion in the 1978 census program.

An interagency committee was formed in February 1977 as a task force on the data requirements for the census of irrigation organizations. The committee consisted of representatives from the:

- U.S. Water Resources Council
- U.S. Department of Agriculture (USDA)
- U.S. Department of Commerce
- U.S. Department of Interior
- U.S. Army Corps of Engineers
- U.S. Environmental Protection Agency

This committee, in conjunction with representatives from various private agencies, made recommendations to the Bureau of the Census on the content of the report forms. Recommendations from this committee were developed into proposed versions of the report forms for single and multibasin irrigation organizations. These forms were subsequently approved by the Office of Management and Budget (OMB), and a content test of each form was conducted in 10 States in the spring of 1978. The completed content pretest forms were not processed for their data content, but were used only to analyze the quality of the response to the Census Bureau's inquiries. It was found that respondents had relatively little difficulty answering most items, although considerable use had been made of their business records. Nevertheless, certain changes in format and content were indicated which were considered in development of the final report forms for the 1978 Census of Irrigation Organizations.

The basic plan was to assemble a mail list of all irrigation organizations for a mail-out/mail-back enumeration. As in all censuses of this kind, the mail list was crucial to the conduct of a complete and accurate census. The list was assembled primarily from the 1969 Census of Irrigation Organizations and from records of other government agencies. These included not only lists of irrigation organizations from the USBR, USBIA,

USDA, and Agriculture Stabilization and Conservation Service, but also lists from State Departments of Agriculture and Water Conservation Boards with an interest in irrigation within each State.

METHOD OF ENUMERATION

The 1978 Census of Irrigation Organizations was essentially a mail-out/mail-back enumeration supplemented by data provided by the USBIA and USBR. Report forms were mailed late in December 1978 to 12,252 irrigation organizations identified as possibly supplying water to farms and ranches for irrigating agricultural lands. These organizations were asked to fill out and mail the report form back to the Bureau of the Census. The initial mailing was followed by a thank you-reminder letter, and three followup mailings to nonrespondents. There were no field followups on delinquent cases, but telephone followups were made toward the end of the enumeration period to large, complex nonrespondents and several smaller nonrespondents, which supplied water to farms and ranches in the 1969 census.

Arrangements were made with USBIA and USBR to collect irrigation data from agencies under their control. Data collected by these Bureaus were turned over to the Bureau of the Census for processing and publication with the other data.

Two report forms were used to collect data from irrigation organizations, form 78-A60 for single drainage basin organizations, and form 78-A61 for organizations with operations in more than one drainage basin or State. Copies of the report forms are shown in appendix B. A census report was required from any business entity, cooperative group, or a district that delivered, conveyed, or stored water, or would normally do so. Reports were not required from lateral ditches and small groups of water users who divided water obtained from, and paid fees directly to, a parent company. These operations were to be included in the reports from the parent company.

OFFICE PROCESSING

The completed report forms were mailed to the Census Bureau, Suitland, Md., by the respondents. All report forms were subjected to a clerical edit and technical review prior to keying of the data. The clerical edit consisted of basic checks, sorts, coding, and arranging data for data keying. Each report form was checked for obvious errors, illegible entries, and other factors that could affect the ability to key the data.

The technical review of the report forms involved reviewing the corrections and changes made by the clerical staff. It also included a detailed check of the report forms to ensure they met the criteria of an irrigation organization, classified them by single or multibasin units, checked for possible evidence of other irrigation organizations, checked for consistency of certain critical items, and coded the report forms for each State or drainage basin.

Forms were then shipped to the Jeffersonville, Ind., Census Bureau office where the data were keyed directly to magnetic tapes. The data were transmitted via telephone data link to the Census Bureau in Suitland, Md., for computer processing.

The computer processing phase was divided into three principal operations—a computer consistency edit, analytical tabulations, and data tabulation. The computer edit was used to make a series of tests and comparisons on critical data items and ratios with data, especially related to water transfers between irrigation organizations. These data and ratios of different data items were compared to tolerance limits developed from data of previous censuses, or were checked against other data for consistency. Based on the computer edit program, data lists were printed from those report forms in which errors and inconsistencies had been detected, together with item codes of the discrepancies. These printouts were reviewed and necessary corrections were made, after which the data were re-edited and re-entered in the data file in preparation for tabulation.

After completion of the consistency edit and correction of the data file, preliminary tabulations were made of the data. These preliminary analytical tabulations showed aggregate data by State and by water resources region. The results were reviewed using previous census data and other available check data. A second tabulation was made, incorporating the corrections found necessary in the first set of tabulations, the data were reviewed again and necessary corrections were made, and the final corrected tables were released to publication.

COSTS AND REVENUES

The methods of handling expenditures and receipts among irrigation organizations are many and varied. Instances may be found where an organization(s) reports water conveyed or facilities operated, and no cost of operation is shown. Revenue may be shown and no costs; or the reverse. Cost may greatly exceed revenue or revenue greatly exceed cost.

When these unexpected relationships were first noted during processing of the reports of individual organizations, the managers were contacted. It soon became evident that there were explanations for the inconsistencies and the remainder of the unusual reports were accepted without further contact, except those where the seeming discrepancies were of a large magnitude. Some of the explanations were: (1) Two or more organizations with a need for additional water storage from a third organization to construct a dam and reservoir. Costs of operations and maintenance are paid wholly or in part by the cooperating organizations and costs are omitted from the report by the reservoir organization; (2) On-stream dams are constructed by government agencies chiefly for power production, flood control, and navigation, but they also provide irrigation benefits through release of water when it is needed. In some of these cases, no operation and maintenance cost is charged to the irrigation function, and no revenue is collected from the water users; (3) During the first few years of operation of a government project, charges to water users may be considerably less than cost, or nonexistent; and (4) On some projects of USBIA, no charges are assessed against part or all of the users.

REVENUE FROM FARMS AND RANCHES

Charges to farms and ranches for irrigation water were generally less per unit of water than those made to other

customers of irrigation water-supplying organizations. Generally, lower rates were charged because the quantity of water delivered per farm customer was large in comparison to that delivered to other customers, and the facilities required are much less complex. In some areas of the country, a comparatively small number of organizations are so closely related to larger water suppliers that unusual methods of handling revenue collections are practiced. A small water-distributing unit may obtain water from a larger water supplier, distribute it to farms, but not collect directly from its farm customers. Instead, the farmers pay directly to the larger organization. In other cases, there are water distributors that deliver to farms, but collect no revenue directly from farms. There may also be water suppliers that deliver only to other irrigation organizations, not to farms, but report revenues received directly from farmers. Thus, the smaller organizations may report deliveries to farms with no revenue from farms, and the larger organizations report revenue with no corresponding deliveries. Generally, larger organizations in these cases provide the financing for the operation of the smaller organizations' facilities. Also, there are some cooperating groups of farmers who maintain their common irrigation facilities with contributed labor and make no regular charges. Such groups are reported as delivering water to farms but with no revenue.

SUMMARY

Irrigation Organizations

The number of irrigation organizations in the 17 Western States and Louisiana declined from 7,927 in 1969 to 7,359 in 1978 or a 7.2-percent decrease. This decline is a continuation of the trend as reported in the 1969 Census of Agriculture and largely due to the merger of smaller organizations with the larger organizations, and the conversion of irrigation organizations into city and industrial water suppliers.

Acres Irrigated by Irrigation Organizations

The number of acres reported irrigated by irrigation organizations increased by 5.0 percent since the last census. This is the smallest increase in acres irrigated in recent years. Also, less water was used per acre in some areas than in previous years because of the drought in 1978. Some irrigation organizations did not have sufficient water to meet the needs of their users because of shortage of water in lakes, reservoirs, streams, and other sources. This change is reflected in table 2 by a decrease in the acres irrigated in Arizona, Colorado, Kansas and Oklahoma, that had severe droughts in 1978.

Source and Disposition of Water

The amount of water conveyed by irrigation organizations between the 1978 and the 1969 censuses increased by approximately 10 percent. About two-thirds of the water came directly from surface supplies, and about one-third of it came from other irrigation organizations. Less than 2 percent of the water came directly from ground water sources, and only about 2 percent of it was imported from other States. More water was

imported from Wyoming to Idaho than between any of the other States. These data are shown in table 8 for the different water resource areas.

New Capital Investment

Data were collected on improvements to existing irrigation facilities and construction of additional irrigation facilities during the past 9 years. Capital investments were considerably less during this period than in the previous 9 years, but there has

been a continued increase in the amount spent between each census. About 2.3 percent more was spent on new capital investment from January 1, 1970, to December 31, 1978, than from January 1, 1960, to December 31, 1969. A large part of this difference was due to inflation, and the absolute difference is not as great as it may appear. The amount spent on new capital investment has fallen primarily because there are fewer and fewer prime locations available for the construction of new irrigation facilities. Facilities have already been constructed on the more desirable rivers and streams.