United States Department of Agriculture
Economic Research Service
https://www.ers.usda.gov

United States
Department of
Agriculture

Economic
Research
Service

The Drought of 1988

Effects on the U.S. Food and Fiber Sector and on Rural Communities

THE DROUGHT OF 1988: EFFECTS ON THE U.S. FOOD AND FIBER SECTOR AND ON RURAL COMMUNITIES. Economic Research Service, U.S. Department of Agriculture. Staff Report No. AGES89-8.

ABSTRACT

Farmers who entered 1988 without inventories and experienced crop failure will bear most of the financial hardship resulting from the 1988 drought. Federal drought assistance will partially ameliorate these losses. Some farmers can maintain 1988 cash income by selling crop inventories at drought-induced higher prices. Most agricultural input and processing industries will be only mildly affected. Low stream-flow on the Mississippi River system caused grain transportation problems in late spring and early summer. The overall effect of the drought on the U.S. economy will be small, but some farming-dependent rural communities will experience substantial reductions in total business activity.

PREFACE

This report has been submitted to Congress in accordance with the Disaster Assistance Act of 1988, Section 333. Principal authors of this report are Jacqueline Bhola, Thomas A. Carlin, Stan Daberkow, Wyn Francis, Gregory R. Gajewski, Charles Handy, Gregory Hanson, Thomas Hebert, David Henderson, Fred K. Hines, T. Q. Hutchinson, Ralph Monaco, Mindy Petrulis, Judith Sommer, and Harold H. Taylor.

1301 New York Avenue, NW
Washington, D.C. 20005-4788

January 1989

CONTENTS

SUMMARY

1988 will be remembered as the year of the worst drought since 1936 for many parts of the continental United States. The drought affected the production of major farm commodities. Many farmers who had successfully survived the farm financial turbulence of the mid-1980's faced a new challenge as their crops withered in the fields. Some farmers were fortunate enough to have large crop inventories from the previous season and could sell them at drought-induced higher prices. Others made extensive use of irrigation for crop production and could harvest a good crop and receive relatively good prices. But farmers who experienced crop failure without inventories will face substantial financial hardship. We estimate that, without drought relief, 20,000-30,000 of the 550,000 U.S. commercial farmers (those with annual sales of $40,000 or more), located primarily in the Northern Plains and Corn Belt-Lake States, may experience losses that pose a serious threat to longrun survival. The Disaster Assistance Act of 1988 will likely reduce the core problem group to 10,000-15,000 commercial farms.

The U.S. farm sector's 1988 total net cash income will be near the record 1987 level because large inventories of crop commodities were sold to replace drought-reduced production. Cash income in 1989 is expected to fall somewhat because farmers will likely replenish inventories, will receive fewer government payments because of higher commodity prices, and, consistent with increased planting, will incur somewhat larger expenses. Nonetheless, the farm sector will be in a stronger financial position in 1989 and possibly 1990 because the drought lowered burdensome stockpiles, especially corn, while strengthening commodity prices. While the effects of the drought on farmers were more noticeable and received considerable public attention, the potential effect of the drought on other components of the food and fiber system and on rural communities was less evident.

The drought affected the agricultural input industries relatively little. Most expenditures for seed, fertilizer, and pesticides were already made before the drought became severe and widespread. While farm machinery sales in the first part of 1988 continued to strengthen, the drought dampened farmer purchases of harvesting and drying equipment. Energy consumption also likely declined as farmers abandoned withered crops. Some localized farm input businesses in the hardest hit areas of the Northern Plains and Corn Belt were hurt. Assuming normal weather returns in 1989, input suppliers should experience a good year as farmers expand production to replenish inventories and satisfy expanding export markets.

Most processors will have little difficulty obtaining adequate supplies of raw products because of large inventories at the beginning of the crop year. Vegetable processors, primarily in the Lake States, will be most affected by the 1988 drought. Supplies of green peas, sweet corn, green and wax beans, carrots, and beets will be substantially lower than last year. Some vegetable processors temporarily closed plants in the face of short supplies. Fresh vegetables are produced primarily under irrigation. Thus, they were less affected by the drought. We do not expect the drought to have a discernable effect on overall returns to processing industries based on observed experiences from past droughts.

Impaired navigation on the Mississippi River system disrupted export-enhanced grain shipments early in the spring and summer. Alternative transportation, especially railroads, could not handle the large volume of displaced barge cargo. Barge rates escalated as operators were forced to reduce the size of their tows and reduce load sizes. Difficult navigation and increased travel time added to transportation costs. By mid-summer, as export volume shrank and producers held stocks in anticipation of higher prices, demand for barge services declined. Transportation problems could reappear this fall. The U.S Army Corps of Engineers has announced that it will sharply curtail the flow of the Missouri River in mid-November to start filling reservoirs. The resulting diversion of traffic to railroads may tax available car supplies again. Moreover, rail rates tend to exceed barge rates, so total transportation costs probably will rise.

Rural banks in the drought areas entered 1988 in a stronger financial position and more able to meet local loan demands than rural banks elsewhere. This suggests that most lenders will be able to cope with problem loans and provide credit to borrowers in 1989. Any credit problems related to the drought will likely occur in the Northern Plains region. But even there, banks are in a stronger position than they have been in recent years. Moreover, there are Federal credit programs that should help farmers and other borrowers who cannot secure adequate credit on their own. Three Farm Credit System districts (St. Paul, Omaha, and Louisville) were among the hardest hit by the past farm financial stress and are also the three districts most likely to be affected by the drought. While it is difficult to predict at this time how well the three districts can accommodate drought-related loan losses if they should occur, it is unlikely that such losses would force a Farm Credit System bank out of business.

The effects of the drought on the U.S. economy will be relatively small, but some rural communities will experience substantial reductions in business activity. The ultimate effect of the drought on a local area is not only a function of drought severity, but also of the importance of farming to the overall economy of the area, the diversity of the area's farming, and the distribution of Federal drought assistance payments. To illustrate the variation in economic effects of the 1988 drought on various regional economies, we identified and examined five proto-typical multicounty areas that experienced extreme drought during the summer of 1988. They are located in northeast Montana, north central North Dakota, southwest Wisconsin, east central Illinois, and northwest Ohio. Direct income effects of the drought were estimated using information on reduced crop yield, higher feed grain and forage costs for the livestock sector, and estimated payments to the crop sectors based on the provisions of the Federal Disaster Assistance Act of 1988. Regionalized input/output models were used to estimate the indirect drought effects on farm-related and nonfarm sectors of the five regional economies.

Our estimated direct income loss due to drought, as a percentage of total gross regional output, ranges from almost 18 percent in the sparsely populated north central North Dakota site to less than 1 percent in the more industrialized northwest Ohio area. These initial shocks to the regional economies imply potential drops in total business activity of almost 22 percent in the North Dakota area, about 13 percent in northeast Montana, about 3 percent in the Wisconsin and Illinois areas, and less than 1 percent in northwest Ohio.

Federal drought assistance will compensate for some of the losses. The estimated reduction in direct losses to farming due to drought assistance ranged from 20 percent in Ohio and Wisconsin to 45 percent in Montana. It is unclear how drought assistance will offset drought-induced losses on the nonfarm economy because we have little current information about how farmers plan to spend their drought assistance. Currently available information suggests that some portion of the drought assistance will be spent outside the local communities. About two-thirds of the money typically would be spent on local goods and services in the Montana, Ohio, and Wisconsin areas. The proportion would be about 60 percent in Illinois and 50 percent in North Dakota.

The Drought of 1988

Effects on the U.S. Food and Fiber Sector and on Rural Communities

INTRODUCTION

The worst drought year since 1936. That is how 1988 will be remembered in many parts of the continental United States. Particularly hard hit were the Northern Plains, Corn Belt, and Southeast areas where irrigated agriculture is largely absent. Many farmers who had successfully survived the farm financial turbulence of the mid-1980's faced a new challenge as their crops withered in the field. Some were fortunate enough to have large crop inventories from the previous season and could sell them at the drought-induced higher prices. But others were less fortunate and their survival as farmers was severely threatened. While the effects of the drought on farmers were more noticeable and received considerable public attention, the potential effects of the drought on other components of the food and fiber system and on rural communities were less evident.

During the summer, Congress addressed the emergency needs of farmers through the Disaster Assistance Act of 1988, signed by President Reagan on August 11, 1988. As part of that act, Congress asked the Secretary of Agriculture to determine the extent to which rural U.S. businesses and enterprises, the activities of which involve or are directly related to producing, processing, or marketing agricultural commodities or products, or to servicing the business and home needs of U.S. farmers and ranchers, are being hurt directly or indirectly by the drought.

It will be some months yet before the full effect of the 1988 drought can be fully documented. In this report, the Economic Research Service (ERS) assesses the effects of the 1988 drought on the U.S. food and fiber sector and on rural communities as of October 1988. The data and information presented comes from a variety of sources, including reports of the Interagency Drought Policy Committee, surveys of farmers conducted during 1988, financial reports filed by commercial banks and the Farm Credit System, and drought briefing materials prepared for the Secretary of Agriculture throughout spring and summer 1988. Because long-range weather forecasts are tenuous at best, we have assumed that normal weather patterns will return for crop year 1989/90.

BACKGROUND

The drought of 1988 actually started when below-normal precipitation during fall 1987 and winter 1987/88 resulted in dry conditions in the Northwest and across the Northern Plains into Minnesota. By spring 1988, reservoir levels in the Northwest were 25-40 percent below normal, a critical problem because much of that region's agriculture depends on irrigation. Critical spring rains partially ameliorated drought conditions in the Northwest. But, spring rains were sparse throughout much of the Northern Plains, Corn Belt, Delta, and Tennessee Valley. By mid-April, severe and extreme drought conditions encompassed the west coast, the Northern Plains, and western Corn Belt (fig. 1). Severe and extreme drought conditions in southern Appalachia showed signs of spreading.

June 1988 was the hottest June in more than 50 years in the Northern Plains and one of the driest ever in much of the eastern half of the country. Extreme drought gripped the Northern Plains and parts of the western Corn Belt. Practically the entire Corn Belt was experiencing severe drought conditions. The condition of corn, soybeans, sorghum, and spring wheat was deteriorating. Pasture conditions were mostly poor to very poor. By July 9, 43 percent of the continental United States was experiencing severe or extreme drought conditions, the fourth highest percentage on record.

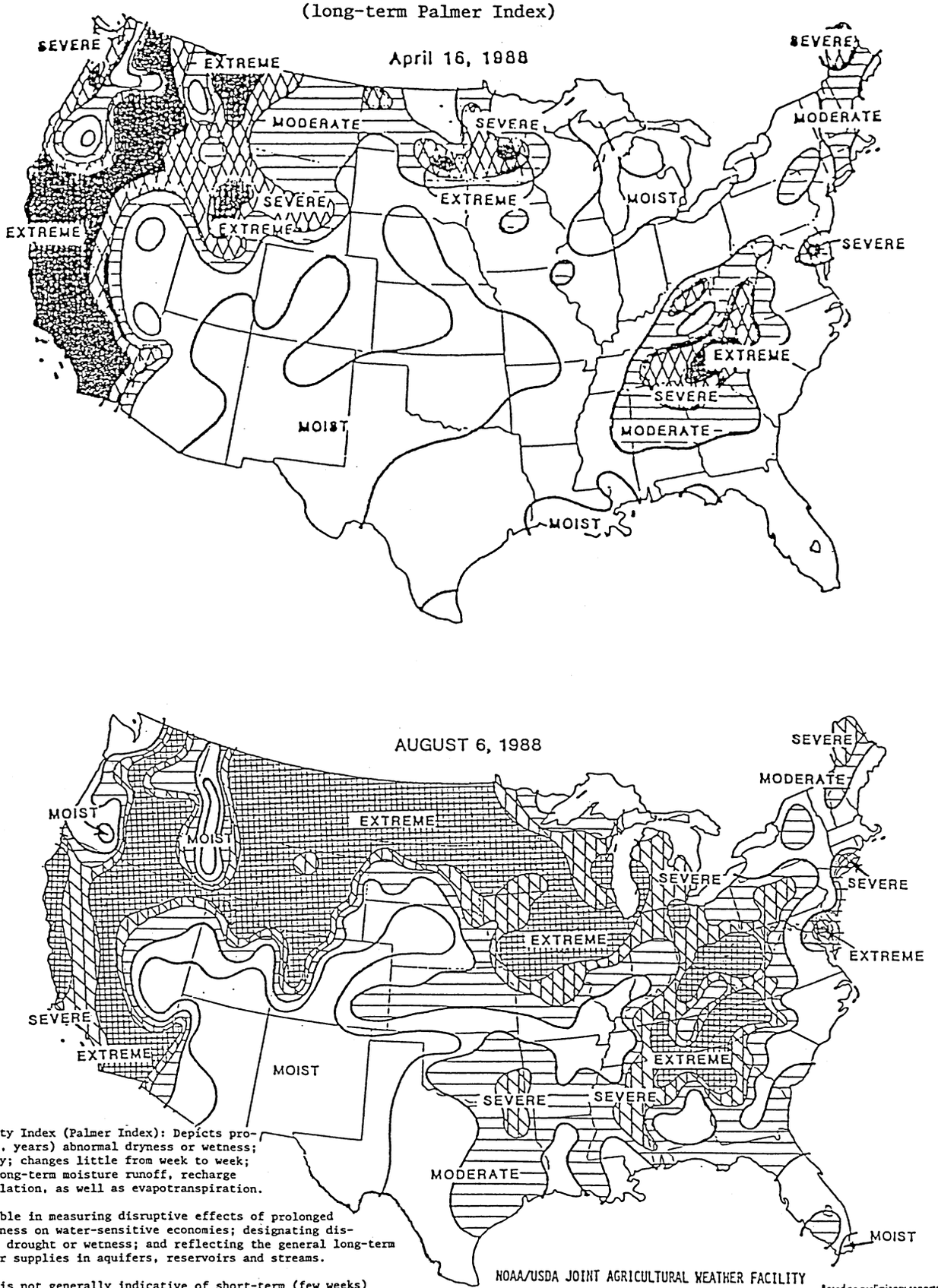
July was a critical month for Corn Belt agriculture because ample July rains could have salvaged some of the corn crop. Soybeans were stressed but could hold out a little longer. In mid-July, the high-pressure ridge entrenched over the center of the country began to weaken. Coupled with conditions that helped pump gulf moisture into the Midwest, a series of slow-moving frontal systems triggered scattered showers and thunderstorms over the eastern half of the country, easing long-term dryness. But, this was short-lived. Hot, dry weather returned in early August. Several Eastern cities set records for having the highest number of days of 90 degrees or over.

Crop conditions continued to deteriorate. The area covered by the drought reached its zenith in early August (fig. 1). Cool weather and rain returned in late August, too late to help corn, soybeans, and many other crops. By then, crop year 1988/89 was drawing to a close.

Throughout this report, we will refer to drought counties. Drought counties are counties experiencing severe or extreme drought on August 6, 1988, as measured by the Drought Severity Index, also called the Palmer Index. The Palmer Index combines precipitation, soil moisture, and temperature data into a single index number. An index number of -4.0 or below signals extreme drought; an index number of -3.0 to -3.9 signals severe drought.

The National Oceanic and Atmospheric Administration/USDA Joint Weather Facility reports index values for weather districts. A weather district includes all or parts of several counties. For example, Minnesota has nine weather districts. We assigned each county in the contiguous United States the index value for the weather district in which the county, or most of the county, fell. Thus, a map of drought counties would closely approximate the area of severe or extreme drought on August 6, 1988 (fig. 1).

Figure 1.
Drought severity
(long-term Palmer Index)



Drought Severity Index (Palmer Index): Depicts prolonged (months, years) abnormal dryness or wetness; responds slowly; changes little from week to week; and reflects long-term moisture runoff, recharge and deep percolation, as well as evapotranspiration.

Uses...applicable in measuring disruptive effects of prolonged dryness or wetness on water-sensitive economies; designating disaster areas of drought or wetness; and reflecting the general long-term status of water supplies in aquifers, reservoirs and streams.

Limitations...is not generally indicative of short-term (few weeks) status of drought or wetness such as frequently affects crops and field operations (this is indicated by the crop moisture index)

We have combined States into four regions that, unless otherwise specified, are used throughout this report. The regions are uniquely defined to reflect areas having severe or extreme drought on August 6, 1988. The Northern Plains includes Montana, North and South Dakota, and Wyoming. The Corn Belt-Lake States includes Iowa, Indiana, Illinois, Michigan, Missouri, Minnesota, Ohio, and Wisconsin. The Southeast includes Alabama, Georgia, Kentucky, Maryland, North and South Carolina, Tennessee, Virginia, and West Virginia. The West includes California, Colorado, Idaho, Nevada, Oregon, Utah, and Washington.

Crop Conditions

The 1988 crop year began on an optimistic note. Stocks of corn, soybeans, and wheat were edging down during the 1987/88 season. Reports on spring planting intentions, as of March 1, indicated that farmers would plant about 200 million acres of crops, about 1 percent below the previous year and the smallest acreage since the Payment-in-Kind Program (PIK) and drought year 1983. This acreage reduction was due partly to increased acreage enrollment in the Conservation Reserve Program (CRP).

Corn acreage was expected to be up about 2 percent and, with trend yields, total production was expected to increase by about 3 percent. Still, expected use exceeded expected production and 1988/89 ending stocks seemed likely to shrink. Total wheat acreage was expected to be up about 1 percent and increased yields were expected to increase production by about 3 percent. With wheat use expected to exceed production and with lower beginning stocks, ending stocks were estimated to be substantially lower. Soybean production was expected to be about the same as in the 1987/88 growing season.

Total grain production for crop year 1988/89 was projected to rise by about 2 percent. Exports of major commodities were expected to be stronger than in the mid-1980's as U.S. farm commodities became more price competitive in world markets. The farm financial problems of the mid-1980's were easing. All this suggested some strengthening in commodity prices and presented a potentially favorable year for U.S. farmers.

USDA's November supply and demand estimates reflected the effect of the 1988 drought on major commodities (tables 1-3). May data reflected USDA's earliest expectations about crop supply and use for the 1988/89 crop year, given farmers' spring planting intentions and normal weather. Corn yield and total production would be down by about one-third as a result of the drought (table 1). Soybean yield and production would be down by one-fifth (table 2). Winter wheat largely escaped the effects of the drought, but spring wheat yields would be almost 40-45 percent lower than expected (table 3).

During the summer, commodity markets responded to the tightening of supplies. As of mid-September, cash corn and soybean prices were up one-third from early May. Wheat prices had increased about 10 percent since mid-August and were near the peak levels of early May. At their peak in late June to mid-July, daily wheat prices were up about 35 percent from early May and corn and soybean prices were up 50 percent.

Table 1--U.S. corn: 1988/89 drought effects

Item	1986/87 [1]	1987/88 [1]	1988/89	
			May [2]	November [1]
		Million bushels		
Supply:				
Beginning stocks	4,040	4,882	4,112	4,260
Production	8,250	7,064	7,300	4,671
Imports	2	4	2	5
Total	12,292	11,950	11,414	8,936
Use:				
Feed and residual	4,714	4,746	5,000	4,500
FS&I [3]	1,192	1,224	1,275	1,215
Domestic total	5,906	5,970	6,275	5,715
Exports	1,504	1,720	1,750	1,775
Total use	7,410	7,690	8,025	7,490
Ending stocks	4,882	4,260	3,389	1,446
		Dollars		
Price	1.50	1.94	1.83	2.40-2.80
		Acres		
Harvested acres	69.2	59.2	60.4	56.7
		Bushels		
Yield	119.3	119.4	121.0	80.2

1/ Source: U.S. Department of Agriculture, Economic Research Service and Foreign Agricultural Service. World Agricultural Supply and Demand Estimates, WASDE-224, Nov. 9, 1988.

2/ Source: U.S. Department of Agriculture, Economic Research Service and Foreign Agricultural Service. World Agricultural Supply and Demand Estimates, WASDE-219, June 9, 1988.

3/ Food, seed, and industrial uses.

Other crops were also affected by drought. Fresh vegetables tend to be grown on irrigated land and, thus, are less affected by lack of rain during the growing season. Nonetheless, drought-related price increases for fresh vegetables, notably tomatoes, helped push the grower price index for fresh vegetables up 21 percent from July to August.

Table 2--U.S. soybeans: 1988/89 drought effects

Item	1986/87 [1]	1987/88 [1]	1988/89	
			May [2]	November [1]
		Million bushels		
Supply:				
Beginning stocks	536	436	275	302
Production	1,940	1,923	1,880	1,512
Total supply	2,476	2,359	2,155	1,814
Use:				
Crush	1,179	1,174	1,155	1,030
Seed and feed	57	56	59	60
Domestic total	1,283	1,257	2,010	1,124
Exports	757	800	760	565
Total use	2,040	2,057	2,010	1,689
Ending stocks	436	280	145	125
		Dollars		
Price	4.78	6.15	6.75	6.75-8.75
		Acres		
Harvested acres	58.3	57.0	57.0	56.8
		Bushels		
Yield	33.3	33.7	33.0	26.6

1/ Source: U.S. Department of Agriculture, Economic Research Service and Foreign Agricultural Service. World Agricultural Supply and Demand Estimates, WASDE-224, Nov. 9, 1988.

2/ Source: U.S. Department of Agriculture, Economic Research Service and Foreign Agricultural Service. World Agricultural Supply and Demand Estimates, WASDE-219, June 9, 1988.

Processed vegetables tend to be grown on nonirrigated land, and a substantial share of the production is located in the Lake States, a region hurt by the drought. The drought's greatest effects were felt on U.S. supplies of dry edible beans and green peas, sweet corn, and snap beans for canning. The prolonged drought will reduce production of some fruit crops in Michigan and perhaps in other States. However, the effects on total production of the major fruits will be small. Sugar beet production will likely be down 8 percent from last year because of lower yields in drought-stressed Minnesota and North Dakota. Flue-cured and burley tobacco production will be above last year's total.

Table 3--U.S. wheat: 1988/89 drought effects

Item	1986/87 [1]	1987/88 [1]	1988/89	
			May [2]	November [1]
		Million bushels		
Supply:				
Beginning stocks	1,905	1,821	1,231	1,256
Production	2,092	2,105	2,170	1,812
Imports	21	16	15	15
Total	4,018	3,941	3,416	3,083
Use:				
Feed and residual	413	291	250	270
FS&I [3]	780	804	870	835
Domestic total	1,193	1,095	1,120	1,105
Exports	1,004	1,592	1,500	1,450
Total use	2,197	2,687	2,620	2,555
Ending stocks	1821	1256	796	528
		Dollars		
Price	2.42	2.57	3.00	3.55-3.85
		Acres		
Harvested acres	60.7	55.9	56.0	53.3
		Bushels		
Yield (all wheat)	34.4	37.6	38.8	34.0
Winter wheat	35.2	39.8	39.4	39.2
Durum	34.0	28.2	33.3	18.5
Other spring wheat	32.0	33.1	34.7	20.6

1/ Source: U.S. Department of Agriculture, Economic Research Service and Foreign Agricultural Service. World Agricultural Supply and Demand Estimates, WASDE-224, Nov. 9, 1988.

2/ Source: U.S. Department of Agriculture, Economic Research Service and Foreign Agricultural Service. World Agricultural Supply and Demand Estimates, WASDE-219, June 9, 1988.

3/ Food, seed, and industrial uses.

The drought both directly and indirectly affected the livestock sector. Pasture and range conditions were the worst since the 1936 drought. Hay production is estimated to be down 12 percent from 1987, despite a 9-percent increase in harvested acreage, including hay cut from set-aside and CRP acreage. Short forage supplies caused some producers to sell older cows during June and July as these animals would have been severely stressed from the heat. Some of these

cows went to slaughter, others went to producers who had forage. Rising feed grain prices will be reflected in higher feed costs for producers of beef, hogs, and poultry.

As the summer growing season came to a close, public attention shifted to other effects of the drought. Forest fires were plaguing the West, with considerable public attention drawn to fires in national parks, such as Yellowstone. Reservoir levels and river flow were low, affecting hydroelectric production, a major source of energy in the West, the Tennessee Valley, and other areas. Fall rains are crucial for reviving pastures, replacing depleted subsoil moisture, and getting the newly planted winter wheat on the Southern Plains off to a good start. As farmers finish harvesting this year's crop, thoughts focus on fall rain and winter snow. These will give the first clues about crop year 1989/90.

Effect on the National Economy

The drought of 1988, though a major event for the food and fiber sector, affected national economic activity only slightly. Crop and livestock losses are likely to come to about $13 billion (1982 dollars), amounting to about 0.3 percent of real gross national product (GNP). Real GNP growth in 1988, though slightly lower when drought effects are considered, should still be over 3.5 percent. This rate is slightly higher than the average rate of real GNP growth from 1983 to 1987, the years of the current expansion. The reduction in real GNP would have been more noticeable had the drought not coincided with an export-led boom in the general economy.

The effects of the drought on the general level of prices, and its rate of change (the inflation rate) are similarly small. ERS estimates food price inflation at 3-5 percent for 1988, and expects that food prices could be only slightly higher in 1989 than they would have been in the absence of the drought. However, any increase in food prices translates into a much smaller effect on the general level of prices because food accounts for only about 16 percent of total consumer expenditures (which is the weight that food receives in the Consumer Price Index, CPI). A 1-percentage-point increase in food prices over and above what would have happened in the absence of the drought adds 0.16 percentage point to the overall national inflation rate. That kind of increase is not noticeable from a national economy perspective. Other price developments, including falling crude oil prices, have helped offset the upward pressure on the general price level that food prices have exerted.

Federal Drought Assistance

During the summer of 1988, Congress passed The Disaster Assistance Act of 1988 to help farmers and others directly affected by the drought. This act provides disaster benefits to farmers and ranchers who suffered losses in 1988 due to drought, hail, excessive moisture, or other related weather conditions. The five titles of the act provide aid for livestock, dairy, crop, and forestry production, along with agricultural credit to producers and rural businesses.

The livestock provisions of the act amended the Agricultural Act of 1949 by providing for new programs to replace the current livestock assistance programs. The 1949 Act authorizes other forms of livestock aid, such as feed donations, transportation assistance, and cost-sharing to re-establish drought-damaged

pastures. The crop provisions provide for disaster payments that vary with the commodity, program participation, and the extent of the loss. Eligibility for drought assistance is limited to livestock producers with gross farm revenues of $2.5 million or less and to crop producers with gross farm revenues of $2 million or less. Combined total payments for crop or livestock losses cannot exceed $100,000 per person, with a maximum of $100,000 for crop disaster payments, a maximum of $50,000 for livestock emergency benefits, or a combination of the two.

Crop disaster payments will be provided to producers who have lost more than 35 percent of their crop production, whether or not the producers participate in Federal farm programs or have crop insurance. However, the price used to determine the payment is higher for program participants (the target price) than the price for nonparticipants (the loan rate). Program participants, in general, can keep the advance deficiency payment for up to 35 percent of the production loss, receive a disaster payment of 65 percent of the target price for a production loss between 35 and 75 percent, and receive a disaster payment of 90 percent of the target price for a production loss between 75 and 100 percent. Producers are required to return any advance deficiency payment which is made on that portion of a crop for which a disaster payment is received. Producers of peanuts, sugar beets, sugarcane, and tobacco crops receive payments in a similar manner based upon the price support loan rate while producers of soybeans and nonprogram crops receive payments based on historical market prices. In no case is a producer to receive a combination of crop insurance benefits and disaster payments that would exceed the income from a normal crop yield. Provisions also require certain producers receiving disaster payments to purchase crop insurance for the 1989 crop.

EFFECTS OF THE 1988 DROUGHT ON THE FOOD AND FIBER SECTOR

Within the U.S. food and fiber sector, farmers will bear most of the adverse effects of the 1988 drought, particularly those in the Nation's midsection. Agricultural input industries--suppliers of seed, fertilizer, pesticides, farm machinery, and energy--appeared to be only slightly affected by the drought as most farmers planted their crops before the drought became severe and widespread. Because there were adequate stocks of major grains going into the new crop year, the food processing sector has been only mildly affected by the drought.

Low streamflow has stressed river transportation, a major way to move grain out of the Midwest. This situation required some adjustments in the transportation sector. Farm and rural financial institutions will be able to accommodate most potential farm financial disruptions caused by the drought. The following discussion focuses on the major industries that make up the food and fiber system and assesses the potential effects of the 1988 drought. Most of these findings are preliminary because it will be well into 1989 before actual performance can be documented.

Table 4--Farm income growth in the mid-1980's

Component of net cash income	1983	1984	1985	1986	1987
		Billion 1982 dollars			
Gross cash farm income	145	144	141	133	137
Cash production expense	109	108	99	88	88
Net cash farm income	36	36	42	45	49

Table 5--Fewer farms were financially vulnerable at the end of 1987

Cash household income and solvency position	1984	1985	1986	1987
	Percent of farms [1]			
Favorable	41	45	47	52
Marginal income	40	33	31	33
Marginal solvency	7	11	11	7
Vulnerable	12	11	10	7

1/ Percentages may not total 100 due to rounding.

Source: U.S. Department of Agriculture, Economic Research Service. Financial Characteristics of U.S. Farms, January 1, 1988, AIB-551, Oct. 1988.

Drought Effects on U.S. Farm Financial Conditions

Many farmers who began the 1980's with minimal financial security (debt was a high proportion of total assets) had been forced to reorganize, reduce the scope of their farming operations, or exit agriculture by 1988. Thus, the vast majority of farmers began 1988 with substantially improved finances which permit greater flexibility in responding to drought conditions than would have been the case if severe dry weather had occurred in 1986 or 1987.

Effects of the drought on farm finances will be moderated by the widespread improvement in farm income that occurred between 1983 and 1987. Net cash farm income rose 37 percent to $49 billion (in 1982 inflation-adjusted dollars), during these 4 years (table 4). Bolstered by record levels of direct Government payments and rising livestock prices in 1986-87, gross income to farmers declined by only $8 billion during 1983-87. But, farm expenses fell more than enough to offset the decline in revenues. Farm expenses fell $21 billion during 1983-87 due largely to lower energy prices, lower interest expense, and Government program-induced cutbacks in planted acreage.

The combination of increased Government subsidies, more effective cost control, rebounding livestock profits, stable or increasing land prices, and a modest gain in crop prices in 1987 strengthened the financial condition of farmers by the beginning of 1988. Data from USDA's Farm Costs and Returns Survey shows that the share of farmers reporting a favorable financial position rose 6 percentage points from 1984 to 1986 and rose an additional 5 percentage points in 1987 (table 5). At the same time, the share of financially vulnerable farms (farms with both cash-flow and solvency problems) declined to only 7 percent at the end of 1987, down from 12 percent in 1984.

Commercial-size farms (those with annual sales of $40,000 or more) account for only about one of every four farm operations. But, they are more than twice as likely to be financially vulnerable than are noncommercial farms. Commercial farms are responsible for more than 3 of every 4 dollars of nonperforming farm loans. The share of commercial farmers that were financially vulnerable fell from 16 to 11 percent between 1986 and 1987 (table 6). Higher returns on assets and higher cash farm income enabled the number of financially vulnerable commercial farms to decline from 90,000 to 60,000 between 1986 and 1987, while the total number of commercial farms remained constant at 550,000.

Financial Effects of Drought Most Severe in Midwest

The financial effects of the drought will be significant in four regions: West, Northern Plains, Corn Belt-Lake States, and the Southeast (table 7). However, the presence of irrigation on 80 percent of the farms in the West and the moderation of the drought in the Southeast during July and August will minimize the net economic damage of the drought in these two regions. For example, the improvement in prices benefiting all corn producers in the Southeast is expected to fully offset the decline in yields of 33 percent of Southeast commercial corn farmers in drought counties. For the entire Southeast, the average soybean yield is expected to increase 3 bushels per acre in 1988 (USDA, National Agricultural Statistics Service, Crop Production, October 12, 1988).

The most devastating effects of the drought will be in the Corn Belt-Lake States and Northern Plains. Adverse production conditions in the Corn Belt-Lake States visibly affect U.S. market conditions because this region contains 40 percent of all commercial farms in the United States. Four of every five commercial farms in the Corn Belt-Lake States and Northern Plains are in drought counties.

- The top 6 soybean-producing States and 8 of the top 10 corn-producing States are in the Corn Belt-Lake States region. Since about 80 percent of these producers are in drought counties, this large area will bear the brunt of the financial damage from the drought.

- Only 46 percent of Corn Belt-Lake States corn/soybean producers are projected to meet cash expenses in 1988 from this year's production. However, sales of 1987 crop inventories in 1988 and Government drought assistance will permit 70-80 percent of corn/soybean producers to satisfy this year's cash-flow requirements.

Table 6--Substantial improvement in the financial condition of commercial farms

Commercial farms with annual sales of $40,000 or more	1985	1986	1987
		Percent	
Returns on assets	NA	5	7
Farms with positive cash income	65	67	72
Farms that are financially vulnerable	17	16	11
		Dollars	
Net cash farm income	38,100	42,700	52,200

Source: USDA Farm Costs and Returns Surveys, 1985-87.

Table 7--Four regions contain 9 out of 10 commercial farms located in drought counties

Item in drought counties	Corn Belt-Lake States	Northern Plains	West	Southeast
		Percent		
Share of region's commercial farms	82	82	64	46
Share of region's financially vulnerable farms	94	90	55	45
Share of corn acreage	81	64	25	41
Share of soybean acreage	74	61	98	27
Share of wheat acreage	64	92	23	25
Share of commercial farms with--				
Irrigation	11	2	80	10
Crop insurance	19	11	8	2

- A cost-price squeeze may develop for Corn Belt-Lake States livestock producers due to drought. In particular, drought-reduced feed production could generate widespread losses for hog producers. Hogs require primarily shell corn and soybean meal for feed which have risen in price at the same time that large supplies of hogs have recently reduced hog prices. While drought counties contain 88 percent of the Corn Belt-Lake States' dairy farms, many will be able to use damaged corn for ensilage. Tight beef supplies have maintained 1988 beef prices at near record highs.

Irrigation is not used on 98 percent of the commercial farms in the Corn Belt-Lake States and, therefore, could not mitigate drought effects. Two marketing factors that will lessen the effect in this region are the availability of large crop inventories in early 1988 and the 50-60 percent rise in soybean prices in 1988. The share of December 1, 1987, stockpiles of corn, soybeans, and wheat still held on Corn Belt-Lake States farms on June 1, 1988, was 54, 38, and 62 percent, respectively. Thus, many farmers in this region were able to substitute sales of 1987 stockpiles at 1988's higher drought-market prices for lower production in 1988. The projected increase in soybean prices from about $6.00 per bushel in 1987 to about $7.50-8 per bushel in 1988 will more than offset the 20-25 percent reduction in 1988 soybean yields.

The Northern Plains has only about one-fifth the number of commercial farms relative to the Corn Belt-Lake States. But, the effect of the drought on an individual producer will likely be more severe in the Northern Plains. The three reasons for this are the substantially greater loss of spring wheat compared with other drought-affected crops, the relative absence of soybean production in this region, and the extensive drought damage to pasture and hay crops.

The production of spring wheat, the Northern Plains dominant crop, fell 58 percent in 1988 (USDA, Economic Research Service and Foreign Agricultural Service, World Agricultural Supply and Demand Estimates, WASDE-224, Nov. 9, 1988). On the other hand, corn and soybean production, the dominant crops in the Corn Belt-Lake States, fell 34 and 21 percent, respectively, from 1987 levels. The more than $3 billion increase in soybean receipts in 1988 will provide increased returns to the Corn Belt-Lake States, which will still produce about 65 percent of the U.S. soybean crop in 1988. But, increased soybean receipts will not benefit the Northern Plains, which produces only 3-4 percent of the U.S. soybean crop.

Cattle and calves are the leading commodity in three of the four Northern Plains States and provide the second-highest receipts in the fourth. Because of inadequate feed supplies, cow slaughter in the Northern Plains (plus Colorado and Utah) was more than 20 percent higher between June and August of 1988 than in this period last year. It is likely that record high cattle prices in 1988 and 1989 (projected) will enable many beef producers in this region to recover from the drought. However, the Northern Plains remains the most vulnerable region since profits for the two leading commodities, cattle and spring wheat, were substantially reduced in 1988.

The Northern Plains and Corn Belt-Lake States continue to have substantially higher rates of nonperforming loan problems than most other regions (table 8). Eleven percent of the commercial farmers with persistent loan repayment difficulties in these regions will comprise the main group bearing the brunt of the financial stress caused by the drought. This group numbers approximately 5,600 and 28,300 farmers in the Northern Plains and Corn Belt-Lake States.

Without any drought relief, it is likely that 20,000-30,000 U.S. commercial farmers may experience drought-related economic losses that pose a serious threat to longrun survival of their farm operations. But, the Disaster Assistance Act of 1988 will likely reduce the core problem group to 10,000-

Table 8--Larger share of commercial farms have nonperforming loans in severe drought regions

Severe drought regions	1984	1985	1986	1987
		Percent		
Northern Plains	15	21	16	11
Corn Belt-Lake States	19	17	18	11
Other regions	16	14	15	8

Source: USDA Farm Costs and Returns Surveys.

Table 9--Lower 1989 cash farm income reflects inventory replenishment

Farm income	1987	1988 forcast	1989 forcast
	Billion 1982 dollars		
Net cash farm income, based on cash-flow	49	46	39-42
Net farm income, based on production	39	31	36-39
Selected components of farm income:			
Government direct payments	14	12	7-9
Cash expense	88	90	93
Inventory change	-1	-6	7

15,000 commercial farmers. In addition, a second tier of farmers that entered 1988 with weak but improving finances may be pushed by the drought into a more marginally viable status. Key to their survival will be a normal crop production year with strong crop and livestock prices in 1989.

Drought Effects on Farm Income

Farm commodity receipts will increase 6-8 percent in 1988 because: (1) farmers reduced commodity inventories of corn, soybeans, and wheat by nearly 4 billion bushels to maintain sales levels, and (2) crop commodity prices rose by about 20 percent above 1987 prices (table 9). The strength in commodity receipts will offset a slight reduction in Government payments and a 5-percent increase in cash expenses. Thus, 1988 net cash farm income will remain stable at about $45-47 billion (in 1982 dollars). Net cash income reflects the net cash-flow generated by farm production. Net farm income, another widely used indicator of farm performance, primarily measures the income from current year farm production. Net farm income will decline $8-10 billion in 1988, reflecting the effect of drought on crop yields.

Stocks of wheat and corn had accumulated during the early 1980's. These stock accumulations were excessive and raised Government costs. Since 1985, farm policy has attempted to keep U.S. farm commodity prices competitive in world markets and to lower the Government stockpiles. The drought assisted the latter objective. The full effect of the drought may persist for several years, because 1989 yields of wheat, corn, and soybeans are not projected to substantially raise stockpiles reduced during the drought.

Assuming normal weather conditions in 1989, ERS expects net cash income to fall as farmers replenish inventories drawn down by the drought and expects net farm income to rise as farmers expand production. In 1989, the aftermath of the drought will likely contribute to a $3-5 billion decline in direct Government payments as prices will likely be well above Government loan rates. Substantially reduced land retirement due to lower acreage set-asides for those participating in Government programs will lead to a projected $5 billion increase in cash expenses as more land is brought into production. A large increase in crop production due to increased planted acreage and normal yields will more than offset lower Government payments and higher expenses that correspond to increases in acreage. Thus, 1989 net farm income will rebound to approximately the 1987 predrought level. However, lagged effects may follow the drought: net cash income will likely fall 9-15 percent in 1989 if farmers adjust the inventories that were reduced during the summer and fall of 1988.

In summary, the farm sector will maintain 1988 cash income near the 1987 level by selling off large crop inventories to replace drought-reduced production. However, a lagged effect of the drought will occur in 1989 if farmers replenish inventories to more typical levels, receive lower Government deficiency payments, and consistent with an increase in plantings, incur somewhat larger expenses. A farm sector that is less dependent on Government deficiency payments and able to sustain record-level commodity receipts due to increased reliance on open-market sales is more competitive in world markets. Many individual producers will have been financially setback by the 1988 drought. But, the farm sector will be in a slightly stronger economic position in 1989 and possibly 1990 because the drought lowered burdensome stockpiles, especially of corn, and strengthened commodity prices.

Agricultural Inputs and the Drought

The drought had little immediate effect on farm input use nationwide during the 1988 growing season. Businesses that manufacture or distribute agricultural inputs have, so far, been almost unscathed by the drought, since rainfall was near normal when farmers purchased most of the seed, fertilizer, and pesticides needed for 1988 spring planting. Net energy use will likely be lower this year since less fuel will be needed for harvesting and drying even though the irrigation season was extended for most parts of the country. Through August of this year, national sales of larger farm machines were still well ahead of comparable 1987 sales. However, in the drought-affected States of North and South Dakota, Montana, and Minnesota, year-to-date combine sales are over 20 percent below 1987 levels. Furthermore, unit sales since June appear to be slowing with harvesting, storing, and drying equipment sales showing definite declines from 1987.

The shortfall in major crop production for 1988 is expected to boost acreage planted in 1989 and increase demand for agricultural inputs. The agricultural inputs industries can look forward to next spring with optimism. From a farmer's perspective, the main concern is whether this optimism will translate into significantly higher input prices in 1989.

Seeds

Seed use in 1988 was largely unaffected by the drought. However, reduced rainfall severely damaged hybrid corn and soybean seed crops. The U.S. seed corn crop is expected to be reduced by up to 50 percent. Cottonseed production is estimated to be down 25 percent in rainfall-dependent areas but about average in irrigated areas. The 1988 drought has not affected grass seed production. However, U.S. imports of forage seeds have risen primarily due to increased demand resulting from the Conservation Reserve Program (CRP).

The 1989 seed requirements are expected to be met by existing stocks and off-season production. To supplement this year's low seed corn production and previous carryover stocks, many companies are producing seed this winter in Florida, Texas, California, Arizona, and Central and South America. However, transportation problems may create localized shortages. With the drought-reduced supplies of many hybrids, some farmers may be forced to take their second or third choice or to use seeds that are two or three seasons old.

Lower 1988 yield of grain seeds means tighter supplies, which will put upward pressure on 1989 seed prices, particularly if 1989 planted acreage of the principal crops increases significantly as expected. Upward pressure on seed prices will be moderated by imports, current seed stocks, farmers' ability to use seed produced on their own farms, and off-season seed production.

Fertilizer

The drought's effect on fertilizer sales has been negligible. Plant nutrient use is estimated to have increased slightly to about 19.4 million tons in the 1987/88 fertilizer year (July 1-June 30). This increase, the first since 1984 when PIK-idled acreage returned to production, was primarily due to stable crop acreage and higher commodity prices. Corn acreage, which accounts for over 40 percent of plant nutrient use, increased almost 3 percent in 1988 after falling 14 percent in 1987. However, total planted area of the principal crops was close to last year's levels.

Fertilizer sales for the 1988 growing season were mostly concluded before drought conditions became severe, as most fertilizer is applied in March through May. Some side-dressing applications of anhydrous ammonia and nitrogen solutions are applied to corn in June. Sales of these fertilizers in the drought-stricken Corn Belt were, therefore, likely lower than last year. Production of most fertilizers, especially anhydrous ammonia and phosphoric acid, are up from last year due to the strong domestic and export markets (figs. 2 and 3). With the drought causing reduced commodity stocks and upward pressure on commodity prices, fertilizer use is expected to rise next spring.

However, some soils may require fewer nutrients next year because of carryover. Nutrient uptake by drought-stressed crops was most likely reduced by lack of

Fig. 2. Anhydrous ammonia production 1/

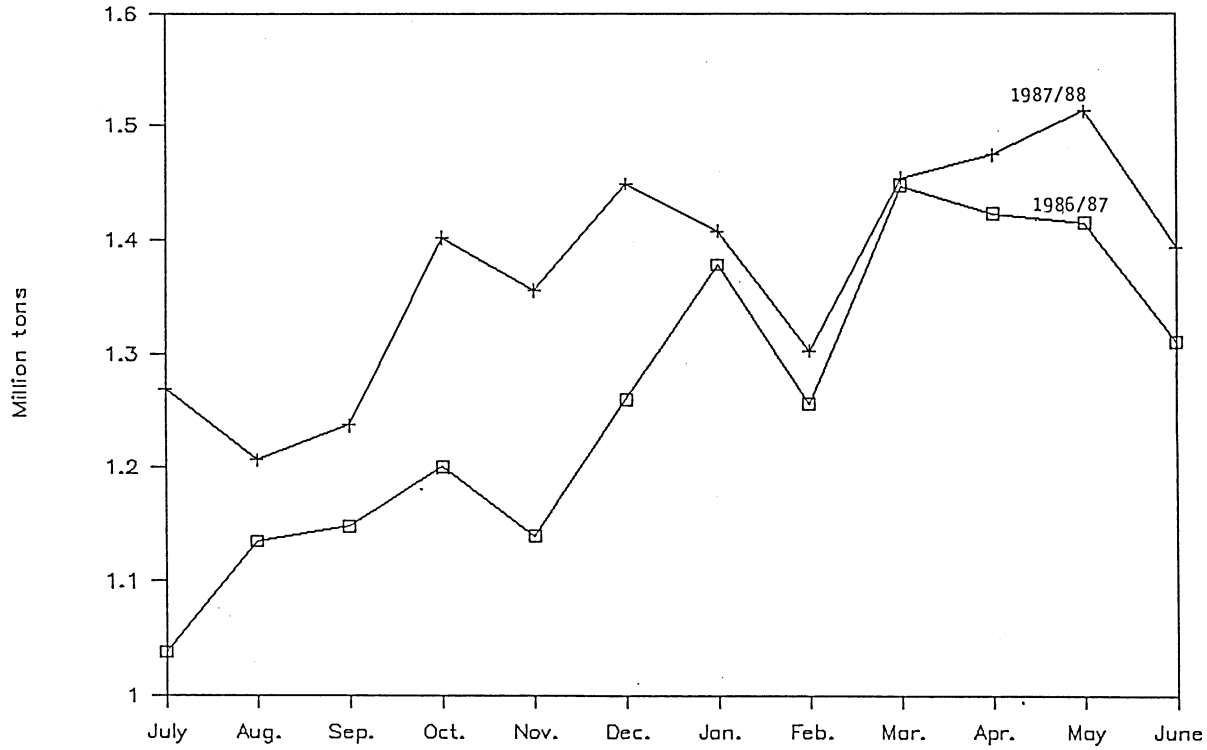
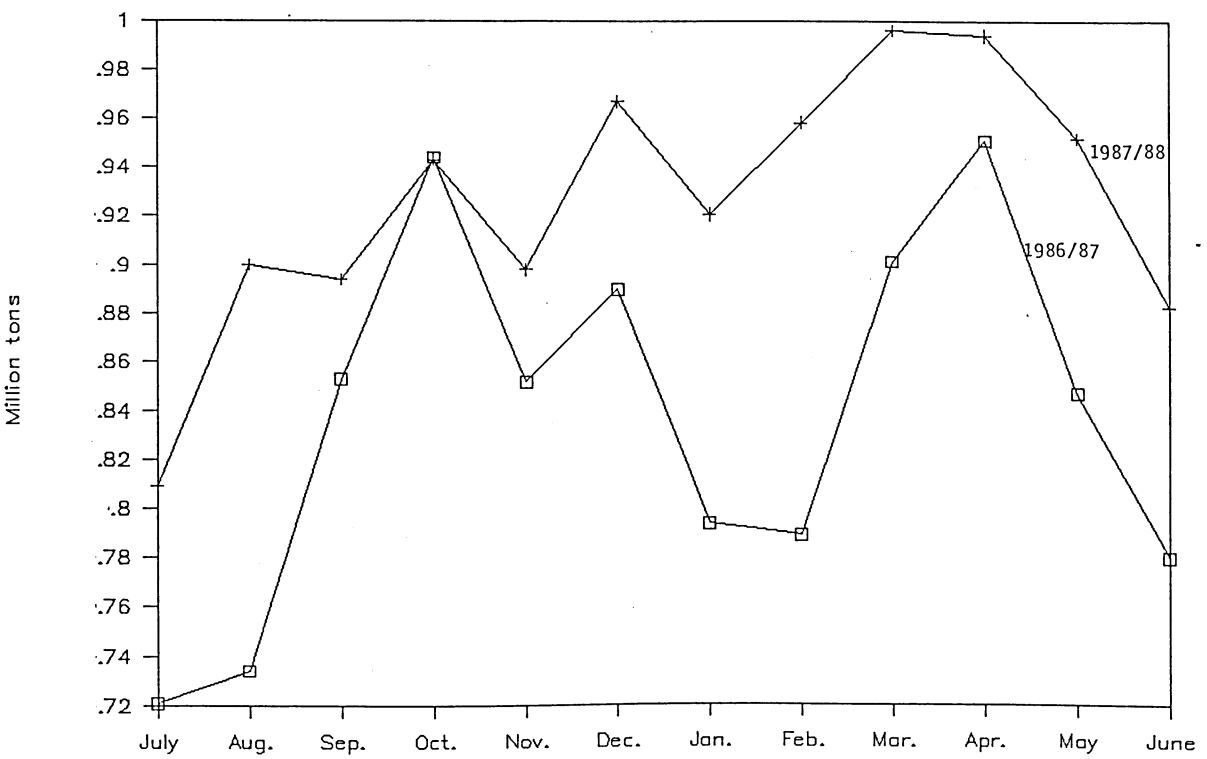


Fig. 3. Phosphoric acid production 1/



1/ FERTILIZER YEAR IS JULY 1 TO JUNE 30.

soil moisture in the tillage zone. There is always nutrient carryover from current year's application to the next crop year, but there is greater carryover in a drought year.

In drought areas, nitrogen for this year's crops is essentially still in the soil. However, less nitrogen is retained in the soil than other nutrients due to denitrification (reduction of nitrates by bacteria resulting in the escape of nitrogen into the air) and leaching. How much nitrogen nutrients will be needed next spring will depend on soil texture, crops planted, and the amount of fall and spring precipitation.

Crop response to phosphate and potash is not the same as for nitrogen. Plant roots must grow toward potash and phosphate because these nutrients move slowly in the soil. Since a drought slows root growth and nutrient movement in the soil, the plant is restricted from obtaining needed potash and phosphate. Hence, higher amounts of phosphate and potash can be retained in dry soils for use with next season's crops than in soils with normal moisture content.

The low depth conditions on the Mississippi River have created fertilizer transportation problems. Spot fertilizer shortages could develop this fall and next spring in the northern Midwest. Higher fertilizer prices could result from more expensive transportation methods.

Pesticides

The drought only slightly affected the quantity of pesticides used in 1988. About 85 percent of herbicides are applied preplant or pre-emergence. Fewer postemergence treatments were likely made because they were uneconomical given the prospects for severely reduced yields.

A majority of the corn insecticides are applied at planting for control of corn rootworm larvae. European corn borers were not a major problem this year because dry weather interfered with mating and egg survival. However, the drought left parts of the Corn Belt extremely susceptible to spider mites, leading to additional insecticide use to control infestations.

Cotton is the other major recipient of insecticide treatments, primarily for boll weevil and budworm-bollworm control. The boll weevil problem had been lower than anticipated because of the hot, dry spring. The dry weather also affected budworms and bollworms by reducing egg and small larvae survival.

Drought can also cause herbicide carryover in the soil. This can be a problem when the herbicide is hazardous to the next crop planted. Farmers may find that their normal crop rotations will need to be changed next spring.

Farm Machinery

Farm machinery sales in the first part of this year continued to show the momentum gained since August of 1987. During January-August 1988, total national unit sales of major pieces of farm machinery were well over the same period in 1987 (table 10). The drought brought reduced sales, especially for combines, around June and July. In the northern Wheat Belt (Minnesota, Montana, North Dakota, South Dakota) and Corn Belt (Illinois, Indiana, Iowa, Missouri,

Table 10--Selected tractor and combine sales in 1987 and 1988

Regional item sales	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Total	Percent change, 1987-88
	Number of units									Percent
Corn Belt: 1/										
2-wheel drive,										
40-99 horse power--										
1987	176	146	258	372	323	437	355	334	2,401	
1988	255	236	467	493	379	480	253	231	2,794	16.4
100 plus horse power--										
1987	248	76	119	281	219	191	205	734	2,073	
1988	412	207	399	455	293	232	186	188	2,372	14.4
4-wheel drive--										
1987	30	12	26	26	13	13	9	13	142	
1988	35	25	91	47	29	40	10	12	289	103.5
Self-propelled combines--										
1987	70	30	30	33	24	111	269	325	892	
1988	255	99	271	82	70	134	115	115	1,141	27.9
Wheat Belt: 2/										
2-wheel drive,										
40-99 horse power--										
1987	46	28	40	103	51	69	59	48	444	
1988	56	61	91	94	76	79	49	48	554	24.8
100 plus horse power--										
1987	147	25	52	155	95	129	98	881	1,582	
1988	329	93	210	230	126	94	105	129	1,316	-16.8
4-wheel drive--										
1987	47	38	28	76	19	36	22	24	290	
1988	75	44	112	88	73	59	19	25	495	70.7
Self-propelled combines--										
1987	22	8	16	49	19	62	230	147	553	
1988	112	25	91	14	25	46	55	64	432	-21.9
United States:										
2-wheel drive,										
40-99 horse power--										
1987	2,068	1,317	2,129	3,213	2,669	3,678	2,766	2,182	20,006	
1988	2,377	2,182	3,190	3,302	3,049	3,637	2,554	2,332	22,623	13.1
100 plus horse power--										
1987	1,001	322	560	1,102	777	872	1,000	2,950	8,580	
1988	1,757	825	1,507	1,580	990	1,022	982	987	9,650	12.5
4-wheel drive--										
1987	121	90	110	162	81	117	88	88	857	
1988	180	145	366	244	207	265	102	149	1,658	93.5
Self-propelled combines--										
1987	166	72	76	171	110	392	749	740	2,474	
1988	602	220	579	182	206	499	371	378	3,037	22.8

1/ The Corn Belt: Illinois, Indiana, Iowa, Missouri, and Ohio.
2/ The northern Wheat Belt: Minnesota, Montana, North Dakota, and South Dakota.

Source: Farm and Industrial Equipment Institute.

Ohio) July/August unit sales of nearly all types of equipment fell below 1987 levels for those months (figs. 4 and 5). Significant sales incentives for the 100-plus horsepower (hp) 2-wheel drive tractors led to an increase in sales in August 1987 which distorts the comparison of 1988 and 1987 unit sales. While unit sales in August 1988 were down from August 1987, the decline cannot be attributed solely to the drought.

For the remainder of 1988, unit sales will likely be near 1987 levels. U.S. cash farm income in 1988 is near the 1987 level, but is unevenly distributed because of the drought. Also, depreciation is still an important tax management tool for farmers. While machinery prices have been increasing as special incentives disappeared early in 1988, machinery inventories are up. Many grain system suppliers had anticipated that 1988 would be a good sales year for their products. However, the spring and midsummer drought over much of the country changed that outlook. Suppliers now expect to sell significantly fewer grain augers, elevators, bins, crop dryers, and flow dryers. Sales of grain bins through August 1988 are 50 percent below last year's level. Sales look brighter for livestock equipment. Sales of dairy and beef mechanization equipment and milking machines will probably be close to last year's levels.

Energy

ERS expects the 1988 drought to lower overall energy expenditures for U.S. agricultural production by 1-3 percent from year earlier levels. About 65 percent of aggregate U.S. agricultural energy expenditures is for energy consumed directly for tilling and planting the soil and for miscellaneous crop and livestock operations. Most of these expenditures already had been incurred in 1988 before the drought. The remaining 35 percent of energy expenditures will be expended for irrigation and harvest operations. This fall some crop area likely will not be harvested, and with reduced yields, fuel consumption for combining, transportation, and drying will be reduced. To some extent, reductions in harvesting expenditures will be offset by increased irrigation expenditures.

The major States currently affected by the drought--Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota and Wisconsin--produce on the average, about 85 percent of the U.S. corn crop, 80 percent of the soybeans, and 60 percent of the wheat. These States consume about 50 percent of all gasoline, diesel, and LP (liquid petroleum) gas and 33 percent of all natural gas used on farms. These States also consume nearly 40 percent of all farm electricity.

The agricultural input manufacturing and distribution industries have withstood the drought quite well. However, some localized businesses and communities in the hardest hit areas of the northern Wheat Belt and Corn Belt were hurt by the drought. Reduced planted acreage, input use per acre, and harvested acreage, and, in severe cases, increased accounts receivable have contributed to a decline in economic activity.

Food Processing and Marketing

The drought only mildly affected the U.S. food processing sector, which had been in very strong financial position. Total stocks for major farm commodities and

Fig. 4. Corn Belt: 2—wheel drive tractor

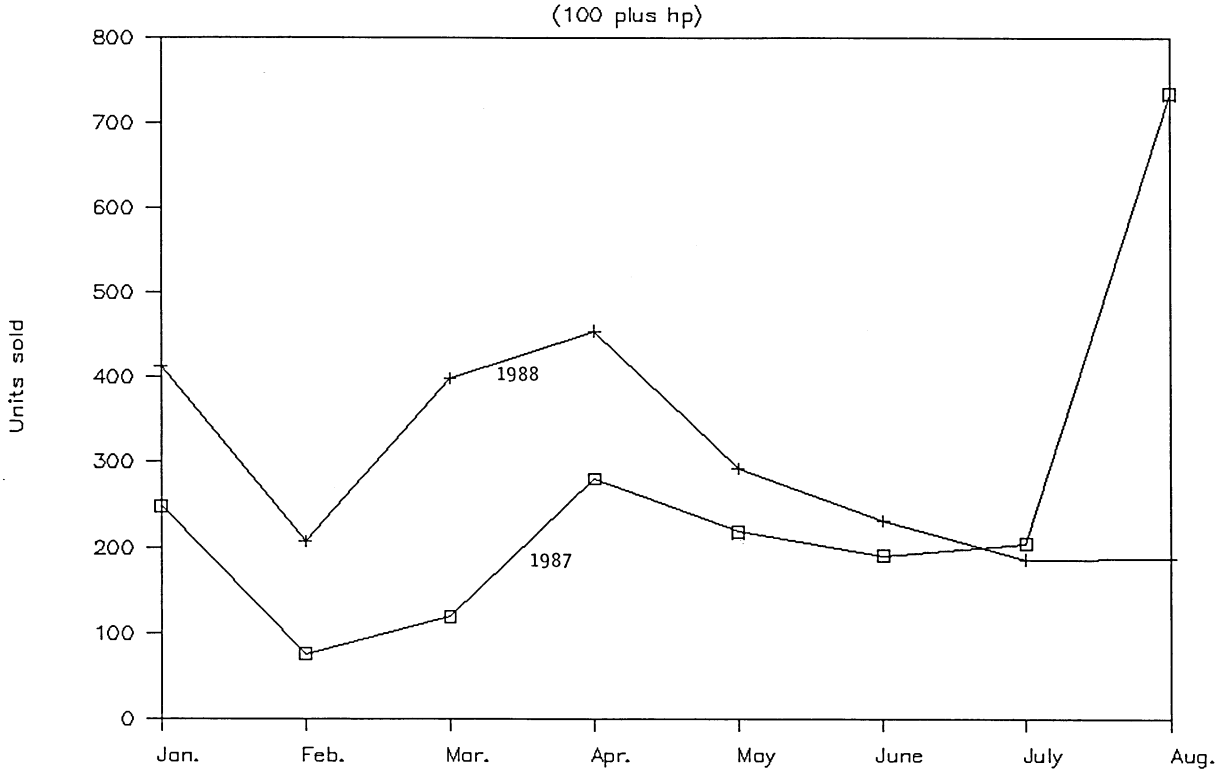
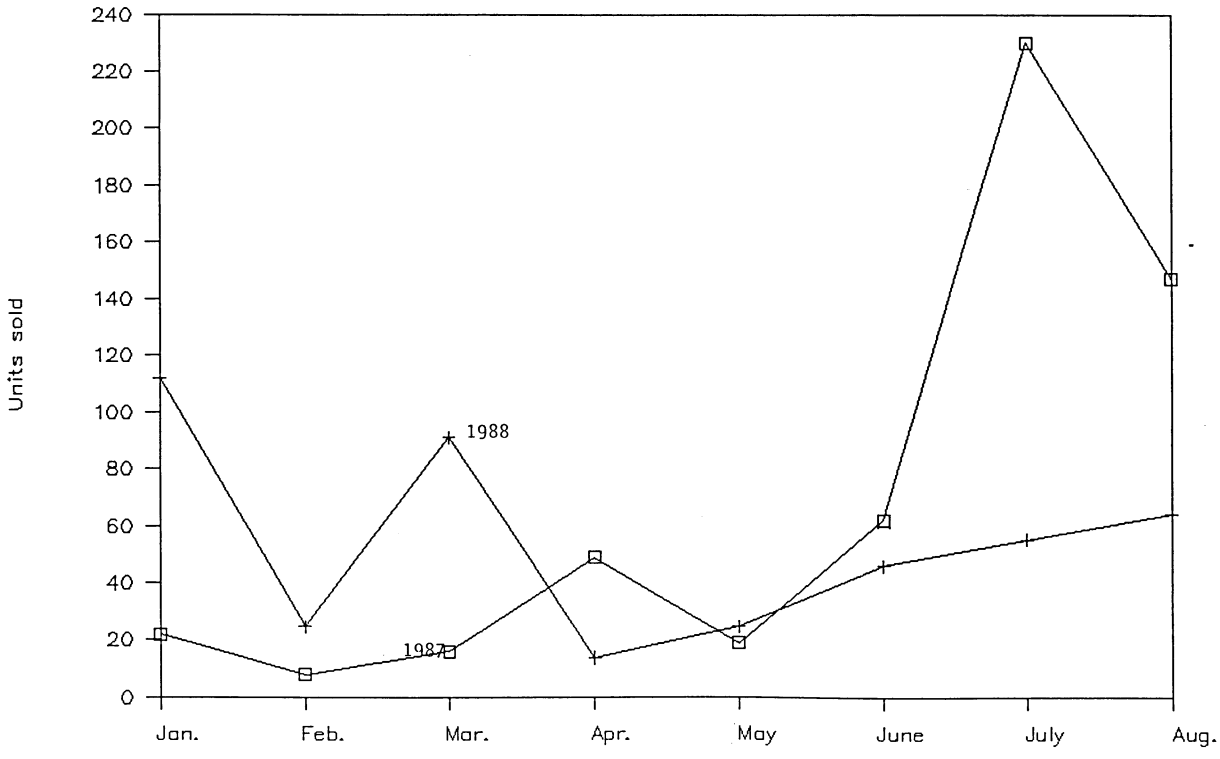


Fig. 5. Wheat Belt: self—propelled combine



most processed foods were in good supply. By drawing on available stocks, most food processing firms experienced very little disruption to their production and marketing operations. Isolated exceptions to this generalization centered in the processed vegetable industry and, to a lesser extent, in specialized uses of barley and oats.

General Trends Affecting Food Processing

In 1987, shipments from U.S. food processing industries reached $330 billion, a 5-percent increase from 1986. [1] The overall growth rate in food manufacturing conceals wide variations across individual food industries. Cheese, poultry processing, snacks, soft drinks, and many frozen specialty products have grown rapidly in recent years. In contrast, butter, fluid milk, canned fruits and vegetables, and sugar have held steady or declined.

Before the drought, the food processing industries had 3 consecutive years of relatively strong economic growth on the demand side and wage and price stability on the supply side. Average hourly labor costs in food processing in 1987 were up only 2 percent over 1986 cost. Real, inflation-adjusted, hourly earnings declined in 1987. Food processing employment increased about 2 percent in 1987 to 1.2 million employees.

Interest rates on long-term debt, such as funds for the $11.3 billion in new plant and equipment investments, and on short-term operating debt also affected this moderately leveraged industry. The prime interest rate, which fell to 7 percent by mid-1987, had risen to about 9.5 percent by the end of 1987. Energy costs for 1987 averaged about 10.5 percent above those in 1986. Packaging materials such as glass, paperboard, and plastics were 6 percent higher. Advertising prices in this advertising-intensive industry rose sharply. Advertising time on evening network programming cost 9 percent more in 1987 than in 1986.

The food manufacturing industries have been characterized by major structural changes in recent years. Nearly all of the 53 food processing industries have experienced a sharp decline in both the number of firms and establishments, limited entry of new firms, and an increasing share of total sales by the four or eight largest firms. The drought will have very little effect on the expected continued trend in plant consolidation as firms take advantage of plant-level economies of scale.

Stable growth and input costs have resulted in strong average profit rates for food processors in recent years. After-tax returns on stockholders' equity for food and tobacco manufacturers was 19.3 percent in the first quarter of 1988 and

---

[1] The U.S. food processing sector is comprised of 53 food processing industries. These industries are grouped under the following nine three-digit Standard Industrial Classifications (SIC): meat products, dairy products, preserved fruits and vegetables, grain mill products, bakery products, sugar and confections, fats and oils, beverages, and miscellaneous food which includes seafood, roasted coffee, and pasta products.

Table 11--Profits as a percentage of common stock equity, 1970-88

Year	Food manufacturing	Food retailing	All manufacturing
		Percent	
1970	10.8	--	9.3
1971	11.0	--	9.7
1972	11.2	--	10.6
1973	12.8	--	12.8
1974*	13.9	--	14.9
1975	14.4	--	11.6
1976	14.9	10.0	13.9
1977	13.2	10.7	14.2
1978	13.8	12.7	15.0
1979	14.7	12.7	16.4
1980*	14.7	13.7	13.9
1981	13.6	13.9	13.6
1982	13.0	12.7	9.2
1983*	12.3	13.6	10.5
1984	13.3	17.3	12.5
1985	13.2	14.5	10.1
1986 1/	16.0	11.9	9.5
1987 1/	17.4	12.5	12.7
1988Q1 * 1/	19.3	9.3	15.8
Q2 * 1/	25.1	--	17.5

-- = Not available.
* = Drought years.
1/ Data not comparable with pre-1986 estimates because tobacco manufacturers were included beginning in 1986.

jumped to 25.1 percent in the second quarter (table 11). After-tax profit rates for all manufacturing companies for the same two quarters was 15.8 percent and 17.5 percent.

While this year's drought was far more extensive than the drought of 1974, 1980, and 1983, it is useful to examine the profits experience of food processors and food retailers in previous drought years. Table 11 shows that droughts in 1974, 1980, and 1983 had no discernable effect on overall returns in these industries in the drought or subsequent years.

The U.S. food processing industry exports an average of 3-5 percent of total shipments. The absolute amount is large, growing from $11.5 billion in 1986 to $12.6 billion in 1987. Processed food exports continued to increase rapidly

during the first half of 1988. However, higher prices and reduced quantities of drought-affected products, such as processed vegetables and soybean oil meals, will probably dampen export growth during the second half of 1988 and first half of 1989.

Specific Regional Drought Effects

Most severely affected among food processing firms are vegetable processors in New York, the Lake States, and Wisconsin. Wisconsin is the major vegetable-producing State in the Midwest. Supplies of green peas, sweet corn, green beans, wax beans, carrots, and beets will be substantially lower than last year. Green peas are in tightest supply, with processors in Wisconsin reporting production this year at 35-40 percent below expectations. Canned pea production totaled 12.7 million cases in 1988, down 45 percent from the 23.2 million cases packed in 1987, according to the National Food Processors Association. As a result, many processors are only partially filling orders for canned peas to regular customers and are refusing orders from new customers. Some wholesalers and institutions that buy canned peas on bid are finding it difficult to obtain supplies. Some distributors and wholesale buying groups are turning more to import sources to meet their inventory needs.

Multiplant processors reported that they tried to maintain efficient production by temporarily closing one or more processing plants and consolidating production in their remaining plants. Thus, one of the major effects of the drought was reflected in reduced employment in vegetable processing plants. Several vegetable processors estimated that total seasonal employment and hours worked were down about 30-35 percent. Wisconsin processors noted that seasonal labor supply was very tight this summer, and that they had difficulty hiring enough workers to fill even the reduced number of jobs.

While overall production of processed vegetables is down, prices are up sufficiently to keep total revenue from falling much, if any, according to several processors. Thus, even for the vegetable processing industry, the drought reduced employment and payrolls in local communities more than it reduced gross sales and profits of processors.

Since expected carryover stocks will be very low, contract acreage will be up next year for vegetable crops. Several processors will strongly encourage contract growers to increase the number of irrigated acres.

Some actions such as recent plant closings may be attributed to the drought when more fundamental reasons may be the actual cause. The soybean processing industry has had significant excess capacity since long before the drought. In recent years, there has been a decline in soybean acreage, particularly in the Southeast. The decline in acreage was due largely to low relative prices of soybeans and provisions of the commodity price support program. Thus, the decision to close soybean processing plants this year was probably due more to longer run economic conditions rather than to the drought.

The aggregate effect of the drought on the food processing sector is very small. Most processors will have little trouble obtaining adequate raw product supplies either from current year production or from reserve stocks. The major exception is vegetable processors located in New York and in the Lake States where some

vegetable processors have temporarily closed plants in face of short supplies. Next year may be a good year for vegetable processors as they attempt to replenish their inventories.

Effects of the 1988 Drought on Grain Transportation

Impaired navigation on the Mississippi River system has a great potential to disrupt grain exports. About half of all U.S. grain exports leave the United States through Louisiana and eastern gulf ports. These ports are located in a deficit grain area and receive 70 percent of their export grain, chiefly corn, by barge. Barges also carry about a third of the grain supplied to the poultry-producing areas of the Southeast. The availability of low-cost barge transportation is the underlying reason for the gulf ports' dominance in exporting grain. Any impairment to barge transportation on the Mississippi River system has the potential for both reducing exports and greatly increasing distribution costs for both domestic and export grain.

Effects on the Barge Industry

In mid-June, low water levels on the lower Mississippi and Ohio Rivers began to halt barge traffic at choke points for more than a day. By the end of June, stoppages were a daily occurrence. Water depth at the mouth of the Ohio River at Cairo in mid-June was 17 feet below normal. At Memphis, the water was 12 feet below normal. Channel widths narrowed from 500 feet to 200 feet. Low water also increased the number of bends at which tows had to be disassembled to proceed. Tows of 30-50 barges loaded to 9 feet or more are common on the lower Mississippi. But, to continue service in June, barge operators reduced individual barge loads by 10 percent. Some operators reduced the number of barges in a tow by 25-30 percent. Others retained tow sizes, but encountered lengthy delays as tows were broken up to navigate bends in the river. To maintain safe navigation, the U.S. Coast Guard issued a number of restrictions on barge drafts, tow size, and tow boat horsepower which remained in effect throughout the summer and fall. Violating these restrictions was not illegal, but violators would substantially increase their liability in the event of an accident. Most operators generally complied with U.S. Coast Guard recommendations.

Rains intermittently lifted the river levels since June, but the water fell again with the continuing drought. Usual river depth measurements have become meaningless, and navigation channels are kept open by constant dredging. At Memphis in early August, the Mississippi River flow was 46 percent below normal for that time of year.

Reduced load size, smaller tows, and lengthened transit times dropped the capacity of the Mississippi River system by at least 50 percent. Difficult navigation and increased travel time add to costs, especially for fuel and labor which normally account for about 35 percent of total operating costs. A recent study sponsored by the American Waterways Operators indicates that the barge industry could lose as much as $200 million this year.

Barge rates during January-May 1988 averaged 23-24 percent above rates the same time in 1987 because of an 8-percent increase in demand for barge service fueled by increased grain export volume (tables 12 and 13). Rates rose 4 percent

Table 12--Grain shipments, Illinois Waterway and Mississippi River (Locks 11-22)

Month	1981	1982	1983	1984	1985	1986	1987 P	1988 P
				Million tons				
Jan.	2.7	1.2	2.7	1.0	2.0	1.8	1.2	1.9
Feb.	1.7	.8	2.3	3.6	.9	1.7	1.7	2.0
Mar.	3.4	2.1	3.8	4.5	3.1	2.9	3.6	3.0
Apr.	4.5	4.1	3.3	5.3	4.1	3.4	3.8	4.2
May	4.4	3.8	3.9	4.4	3.1	3.6	4.0	4.3
June	4.1	4.4	4.2	3.7	3.2	3.2	3.8	3.6
July	3.4	3.9	4.2	3.4	3.4	2.5	2.8	2.7
Aug.	4.3	5.0	4.8	3.3	3.0	3.3	3.5	3.3
Sep.	3.4	4.1	5.3	3.1	2.4	3.2	3.3	NA
Oct.	3.4	3.2	4.9	4.6	2.6	3.1	3.8	NA
Nov.	4.6	4.2	5.7	5.5	4.3	5.2	3.9	NA
Dec.	3.9	3.2	4.4	3.1	3.3	2.4	2.9	NA
Total	43.9	39.8	49.4	45.6	35.6	36.4	38.3	25.0
Monthly average	3.7	3.3	4.1	3.8	3.0	3.0	3.2	3.2

NA = Not available. P = Preliminary.
Source: Mississippi River Barge Traffic, U.S. Army Corps of Engineers, Rock Island District.

Table 13--Monthly average barge rates from Peoria and St. Louis to New Orleans, 1988

Month	Origin	
	Peoria	St. Louis
	Dollars per ton	
Jan.	7.32	4.39
Feb.	6.89	4.59
Mar.	8.16	6.13
Apr.	7.25	5.47
May	6.19	4.65
June	9.86	7.56
July	9.79	6.81
Aug.	7.61	6.46
Sep.	10.22	8.28

Source: Transportation Situation Report, Illinois Department of Agriculture, 1988.

between the end of May and the first 2 weeks of June. Rates soared in the last week of June as river navigation problems spread widely. For example, rates from Peoria to New Orleans averaged $17.44 per ton in contrast to $6.37 per ton the prior week. Rates for June from Peoria averaged $9.86 per ton, up 59 percent from May.

The decline in rates after the first week of July resulted from sharply reduced demand for barge service. Demand declined primarily because export volume shrank and producers held stocks in anticipation of higher prices. Shipments of grain and soybeans in June 1988 fell 16 percent from May and fell again in August. By August, barge rates had fallen to $7.61 per ton, only 45 cents above the January-May average. Prospects of large corn sales to the Soviet Union lifted rates above $10 per ton in early September, but rates fell to $8.78 per ton in the last week of the month.

There generally is substantial rate fluctuation in the barge industry. Barge rates generally peak at some time in the second half of the year, when relatively low corn and soybean prices at harvest enhance export and domestic demand. Differences between the first and second half of this year will be larger than in 1987 but smaller than in 1986.

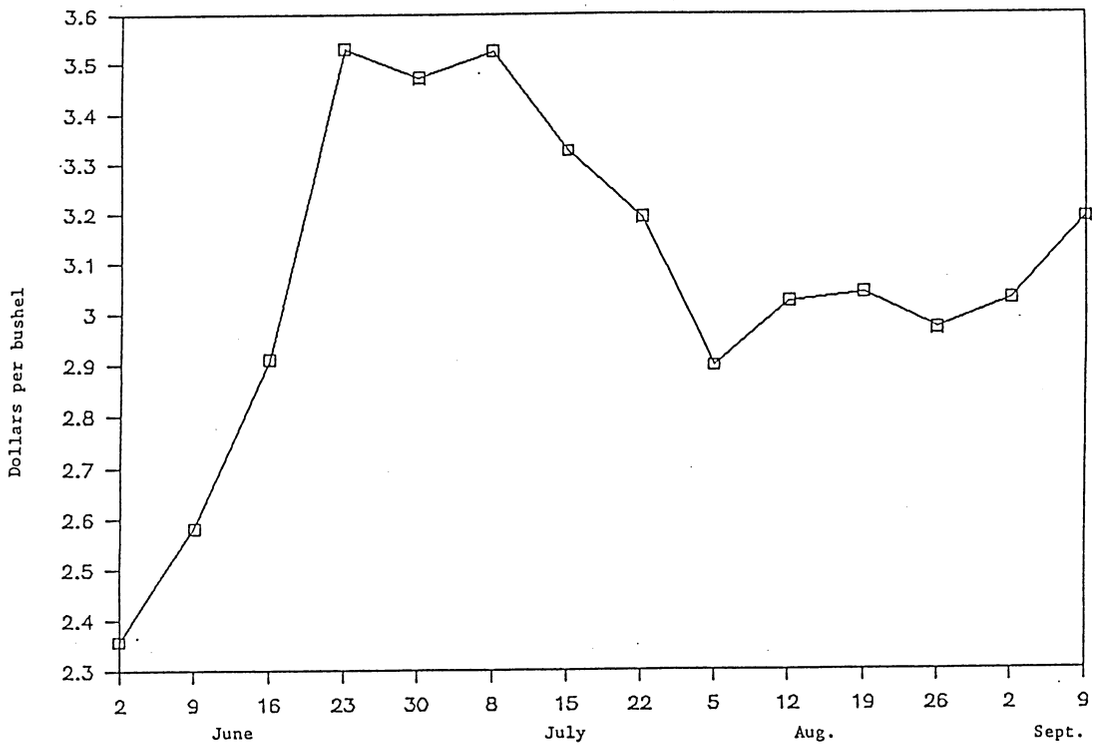
On June 16, the national media announced that low water in the Mississippi River was impeding barge transportation. The price of barge-delivered corn at New Orleans that day rose 17 cents per bushel. Between June 15 and June 27, export corn prices climbed 67 cents per bushel (22 percent). Part of this increase was due to buyers' anticipation of high barge rates and reduced grain supplies at the gulf. It should be remembered, however, that corn prices had been rising before river navigation became impaired. Prices rose 14 cents per bushel between June 14 and June 15. Gulf corn prices for June 10-June 16 averaged $2.91 per bushel, 33 cents above the June 3-June 9 average. Figure 6 shows gulf corn prices trending down through August from the June 27 high of $3.69 per bushel. It is doubtful that much of the rise in corn prices can be attributed to rising barge rates or reduced deliveries at New Orleans because there appears to be no more than a weak relationship between barge rates and corn prices, and because corn prices began increasing as crop forecasts began to predict a short crop. It is more reasonable to conclude that the drought caused both barge rates and corn prices to rise, but the rate increase did not cause the price increases.

Opportunities to divert traffic from barges to rail or trucks are limited. Trucks are not a viable substitute for the reduced barge capacity. A fully loaded barge holds 1,500 tons of grain, about 58 truck loads. Bumper-to-bumper, a mile-long truck convoy would replace about 1.4 barges. One day, 1,760 barges were stacked above Greenville, Mississippi, 287 miles from New Orleans. Grain in these barges would have filled a line of trucks 1,257 miles long.

Effects on Railroads

Railroads are a viable, though more costly, alternative to barges. For example, in late September a unit train load (54 cars) of corn could be shipped from Sioux City, Iowa, to Mobile, Alabama, for about $17 per ton. Barge shipments from Peoria to New Orleans would cost less than $9 per ton, a substantial savings over rail transportation.

Figure 6. Prices of barge - delivered corn at New Orleans
(5-day average from June 16, 1988)



There are physical limits to the degree to which railroads can substitute for barge transportation. When the drought's effects on the barge industry first surfaced, railroads were experiencing the first shortage of grain cars this decade. Demand for railcar loadings of grain had been high throughout 1987 and had grown in the early months of 1988 mostly from larger grain exports over the period (table 14). Many shippers experienced delays of 2 weeks or more before car orders were filled. The Association of American Railroads said there was an average daily shortage of 8,000 cars in April.

Fewer jumbo covered hopper cars are available for transport. These each carry about 96 tons of grain and are the predominant vehicle for rail shipments of grains and oilseeds. This fleet rose from 186,000 to 239,000 cars in 1980-86, but increases were small thereafter. Scrapping of aged and damaged cars reduced the fleet to 236,000 by 1988. Nearly half the jumbo cars are owned by nonrailroad firms, many of which are under the control of grain marketing firms. Only 2,000 jumbo grain cars are on order, and delivery did not begin until September 1988. Long-term supply prospects are not bright. During most of the 1980's, railroads held a large surplus of cars. Numerous rail spokespersons have indicated unwillingness to increase their fleets when continuance of record demand is in doubt.

The number of covered hopper cars is but one factor in rail car supply. For a given shipment, the demand for cars is best measured in car days, the number of cars needed times the number of days required to complete the shipment and return the cars for loading. The quantity of tractive power (number of locomotives needed to pull a train and the time required to make a round trip) are also factors.

Table 14--Weekly average railcar loading of grain and soybeans, 1979-88

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
						Carloads						
1979	21.5	20.5	23.3	24.1	26.2	30.1	31.1	29.4	28.6	32.1	32.6	30.5
1980	30.5	31.0	30.2	26.5	23.6	28.3	32.6	32.9	32.1	24.1	31.5	28.1
1981	34.4	31.1	27.7	23.5	21.3	28.0	22.2	26.2	25.6	25.6	27.4	22.4
1982	23.0	27.2	26.8	25.8	23.8	22.5	27.0	25.1	20.3	29.5	25.4	21.9
1983	24.7	26.3	26.8	21.2	20.8	21.4	27.9	27.5	29.7	31.4	29.5	.9
1984	31.1	29.1	27.7	26.8	23.6	24.3	26.6	29.8	29.2	24.5	28.6	25.4
1985	25.3	23.7	23.3	20.2	17.7	24.7	22.7	20.2	18.9	26.2	28.2	23.5
1986	25.4	22.6	20.6	17.7	17.7	24.9	24.4	24.3	27.3	33.6	29.9	24.8
1987	23.1	26.7	27.1	25.0	26.2	32.2	32.3	30.8	32.2	33.9	30.8	29.0
1988	30.8	33.2	34.2	33.0	31.9	31.9	29.7	27.1	NA	NA	NA	NA

NA = Not available.
Source: Association of American Railroads.

Car supply could be increased if the time spent unloading at ports were reduced. However, such gains appeared to have already been realized. In the first 6 months of 1987, 74 percent of all cars delivered to a port were unloaded within 7 days. During the same period this year, 80 percent of all grain cars were unloaded within 7 days, despite the increase in arrivals at ports. In 1986, each hopper car was loaded slightly more than five times per year. In 1987, loadings increased to more than six per year. Further major improvement in car utilization appears unlikely.

In recent years, favorable rates became available for shipments of wheat and corn from Kansas and Nebraska to Pacific Northwest ports. These rates, combined with relatively low ocean rates from the Pacific Northwest to major Asian markets, resulted in substantial flows of corn and wheat from Kansas and Nebraska to Puget Sound and Columbia River ports. The trip to the Pacific Northwest consumes more car days and more locomotive days. Moreover, the route to the Pacific Northwest passes through mountainous terrain which requires increased tractive power. Rail unloadings of grain at Pacific coast ports increased 35 percent to 141,000 cars between 1986 and 1987. This year, 191,000 cars are estimated to be unloaded at these ports, 35 percent above 1987.

While the rail trip to Great Lakes ports is relatively short from the Corn Belt, these ports were also affected by the drought. Water levels at these ports are 4-16 inches below 1987 levels. The Vidal Shoals between Superior and Huron are critical. There, low water has cost a foot of draft for the already relatively small ocean vessels serving the Great Lakes. A foot of draft represents about 3,500 tons of cargo. Ocean vessels serving the Great Lakes average about half the capacity of those docking at the gulf, and rates are about twice as high. Although some export traffic was diverted to Great Lakes and Atlantic ports, higher rail and ocean rates sharply limit the diversion.

In late June, reduced barge capacity and high rates were expected to divert a substantial volume of grain to railroads. At that time, the Burlington Northern Railroad (BN) announced a series of increases for "...barge competitive rates on wheat." For shipment to new Orleans, these rail rates would have amounted to an additional $197 per car in August with a further increase of $276 per car in September, a 26-percent increase from June. The announced increases for some destinations would have resulted in December rates more than 80 percent above June rates. In June, the combination of record demand for rail service and a sharp drought-caused reduction in barge capacity made it likely that these rate increases would prevail. Moreover, other railroads were expected to raise their rates by like amounts.

It appears, however, that rail rates for grain remained nearly level between May and July after having risen about 6 percent from December 1987 to May 1988. Preliminary data published by the U.S. Department of Labor's Bureau of Labor Statistics (BLS) show that grain rates fell slightly in August and then rose 5 percent in September. By November, rates had returned to the July level.

The BLS index indicates that rail rates have not risen as much as was permitted by the Interstate Commerce Commission (ICC). For the first two quarters of 1988, increases of 4.2 and 3.5 percent were approved by ICC to offset rising rail costs. A decrease of less than 1 percent was suggested for the third

Table 15--Weekly average rail grain unloadings at ports, 1988

Month	North Atlantic ports	South Atlantic and gulf ports	Pacific ports	Total
		Cars		
Jan.	668	8,117	3,165	11,950
Feb.	883	9,224	3,648	13,755
Mar.	699	9,720	4,501	14,920
Apr.	919	7,837	4,676	13,432
May	487	6,295	4,588	11,370
June	616	5,422	3,016	9,054
July	682	5,741	2,701	9,124
Aug.	266	2,726	2,944	5,936

Source: Association of American Railroads.

quarter. Such changes in rates are voluntary for railroads. The ICC has approved a 0.5-percent increase in tariff rates for the fourth quarter of 1988. This suggests that no more than modest rate increases can be expected in the fourth quarter.

The immediate cause of this recent rate stability was a sharp decline in demand for rail service. During the first 6 months of 1988, an average of 32,500 cars were loaded with grain each week. July loadings fell to 29,678 per week. Average loadings declined further in August to 27,081, about 15 percent below June loadings. Much of the decline in grain loadings for rail shipments resulted from reduced marketings of grain and slackened grain exports. During January-April 1988, 13,500 cars per week, on average, were unloaded at export points (table 15). Unloadings fell 21 percent in May to 11,400 cars per week and dropped further in June to 9,000 cars per week. By August, unloadings averaged only 5,900 cars per week. The decline was most pronounced at South Atlantic/gulf and North Atlantic ports. August unloadings declined 69 and 66 percent, respectively, from January-April averages. Unloadings at Pacific ports fell only 28 percent in the same period.

Rail service for grain exports fell much more rapidly than did service for domestic shipments. Exports accounted for 39-44 percent of total grain shipments during January-April but for only 22 percent by August. The reduced loadings have created a surplus of railcars. September data reflect a seasonal upturn in grain shippers' demand for rail service. Despite the increases, car loadings during the first half of September were 10 percent lower than a year earlier. Thus, the supply of railcars probably was adequate for the September-October harvest.

A car shortage could reappear in coming months. The U.S. Army Corps of Engineers planned to sharply curtail the flow of the Missouri River in mid-November, reducing water levels at St. Louis by as much as 3.5 feet. The upper Mississippi River normally freezes in mid-December, which will further reduce

the flow. The resulting diversion of traffic to railroads may tax car supplies. Moreover, rail rates tend to exceed barge rates, so total transportation costs probably will rise.

Credit Issues and the Drought of 1988

Farmers and some rural businesses unable to meet expenses this year because of the drought will have difficulty repaying local lenders. Rural hydroelectric, transportation, recreation, and farm-supply businesses have experienced unplanned, drought-induced drops in income that make timely loan repayment difficult. The key credit issues are how well lenders will be able to adjust to these drought-related problem loans and still provide adequate credit for the coming year. This analysis suggests that most lenders will be able to cope with the additional losses and provide the credit needed for a strong 1989. Any major credit problems related to the drought, to the extent they arise, will likely be most severe in the Northern Plains. Agricultural bank failures could be pushed to the upper end of this year's predrought forecast range of 40-60 banks, but will not reach last year's post-Depression high of 75 banks. Moreover, a host of Federal credit programs should bridge the gap for most farmers and other rural borrowers who cannot secure adequate credit on their own.

Most agricultural and rural lending institutions were rebounding as farmers entered this spring's planting season. Lenders were better poised to deal with drought-related farm and rural loan losses than they were a few years ago. Delinquent loans at agricultural commercial banks, those with above-average concentrations of farm loans, have been falling since mid-1986. Agricultural bank returns rose to 7.6 percent of equity in 1987, up from 5.1 percent in 1986. Loan losses at Farm Credit System (FCS) institutions fell by $821 million between 1986 and 1987. Delinquent farm loans held by life insurance companies fell $453 million between 1986 and 1987.

The effects of the drought would not be expected to appear in the first half of 1988 performance data. Thus, except for the Farmers Home Administration (FmHA), rural and agricultural lenders showed continuing improvement through June 30. During the first half of 1988, 20 agricultural banks and 30 rural commercial banks failed, down sharply from 42 agricultural and 54 rural bank failures during the first half of 1987. Delinquent farm nonreal estate loans held by commercial banks fell $138 million in the first half of 1988, while delinquent loans held by the FCS fell $591 million.

Delinquencies held by the FmHA continued at about 25 percent of the caseload as the agency faced delays in implementing restructuring provisions authorized in the Agricultural Credit Act of 1987. While the drought may increase the current financial stress of delinquent borrowers, projected increases in commodity prices may improve repayment prospects and increase the number of borrowers who qualify for restructuring.

Farm and Rural Banks in Drought Areas

Over 1,300 counties were identified as experiencing severe or extreme drought conditions according to the Palmer Index of drought severity on August 6, the approximate peak of the drought. About 45 percent of the Nation's 13,505

commercial banks have headquarters in these drought counties, as do 47 percent of the 7,367 rural banks and 52 percent of the 4,480 agricultural banks (table 16). Most of the drought-related loan losses will occur in these 3,500 or so rural and 2,300 agricultural banks in drought counties. Roughly 2,000 of the agricultural banks in drought counties have headquarters in rural counties. On a national level, most agricultural banks are also in rural counties.

Rural banks in the drought counties entered 1988 in a stronger financial position and were more able to meet local loan demands than were rural banks elsewhere. Rural banks in counties experiencing severe drought conditions posted a return on equity of 10.6 percent, while those in counties with extreme drought conditions posted a 9.3-percent return. These returns compare favorably with the 9-percent return posted by rural banks in counties not affected by the drought. Loan delinquency rates are also generally lower at rural banks in drought counties. Rural banks in drought counties are also better capitalized than their counterparts elsewhere, and so are better able to sustain unexpected losses.

Less than 8 percent of the rural banks in drought counties are forecast as vulnerable to failure in 1988, compared with 11.8 percent of rural banks elsewhere. Fewer failures mean fewer disruptions to local credit markets and indicate the relative strength of rural banks in drought counties. A bank is considered vulnerable to failure if it has an above-average forecast probability of failure during 1988. The forecasts are based on bank-level financial data reported for mid-1987 and on the dependence of the bank's home-county on the energy sector in 1982. Over 89 percent of the banks that failed in 1987 were forecast as vulnerable to failure that year. Vulnerable banks that do not fail in a given year are at risk of failure in subsequent years.

In terms of their ability to meet new loan demands, rural banks in drought-stressed counties reported loan-to-deposit ratios of 59 percent while those in counties with extreme drought conditions had loan-to-deposit ratios of 55 percent. Nationally, commercial banks reported a loan-to-deposit ratio of 79 percent and rural banks in counties not affected by the drought reported a ratio of 61 percent. Lower loan-to-deposit ratios signal higher liquidity. Hence, banks with lower ratios may be in a better position to extend new loans.

Moreover, rural banks in drought-stricken counties were net suppliers of funds to national and regional credit markets at the end of 1987. Rural banks in the drought counties supplied 3.6-4.5 percent of their assets to the Federal funds market, a national market where banks with excess cash lend to banks in need of cash. The Federal funds market deals only in very short-term loans, so funds lent can be recalled to make new local loans within a matter of days. Agricultural banks in drought counties are also stronger and more able to write new local loans than are agricultural banks elsewhere. Agricultural banks in counties experiencing severe drought conditions ended 1987 with an 8.7-percent return on equity. Agricultural banks in counties with extreme drought conditions posted a 8.2-percent return. That compares with a return of 6.8 percent for agricultural banks in counties not experiencing severe or extreme drought. Loan delinquency rates are also lower for agricultural banks in drought counties. While 14.6 percent of agricultural banks in counties not experiencing severe or extreme drought conditions are forecast as vulnerable to

Table 16--Commercial banks and the drought of 1988 [1]

Area and condition [2]	Total banks	Vulnerable banks [3]	Average assets [3]	Loans as percent of deposits [3]	Federal funds as percent of assets [3]	Return on equity [3]	Delinquent loans as percent of loans [3]
	---Number---		Million	---------- Percent ----------			
All banks:							
United States	13,505	1,534	218.9	79.0	-3.60	1.85	3.46
No drought	7,444	1,076	256.9	80.4	-4.03	.17	3.81
Severe drought	2,801	245	181.0	76.6	-3.25	8.45	2.37
Extreme drought	3,260	213	164.7	76.9	-2.43	.98	3.27
Rural banks: [4]							
United States	7,367	730	48.3	59.4	3.54	9.40	2.24
No drought	3,914	461	51.3	61.0	3.18	8.97	2.35
Severe drought	1,613	116	49.0	59.1	3.57	10.62	1.80
Extreme drought	1,840	153	41.0	55.2	4.45	9.26	2.41
Agricultural banks: [5]							
United States	4,480	543	33.3	52.2	4.66	7.64	2.98
No drought	2,149	314	33.4	53.0	5.01	6.84	3.28
Severe drought	909	103	33.5	52.7	4.09	8.71	2.48
Extreme drought	1,422	126	33.0	50.5	4.50	8.19	2.84
Northern Plains:	399	63	34.2	49.0	5.09	7.36	3.95
No drought	69	8	38.0	46.5	3.87	8.97	3.44
Severe drought	38	10	33.4	52.4	2.27	7.84	3.29
Extreme drought	292	45	33.4	49.2	5.79	6.84	4.17
Corn Belt-Lake States:	2,134	172	33.3	51.1	4.17	8.65	2.38
No drought	425	29	36.0	52.4	4.52	8.75	2.35
Severe drought	686	73	33.5	52.2	4.01	8.61	2.35
Extreme drought	1,023	70	32.0	49.7	4.12	8.64	2.42

See notes at end of table.

Continued--

Table 16--Commercial banks and the drought of 1988 1--continued

Area and condition [2]	Total banks	Vulnerable banks [3]	Average assets [3]	Loans as percent of deposits [3]	Federal funds as percent of assets [3]	Return on equity [3]	Delinquent loans as percent of loans [3]
	---Number---		Million	----------Percent----------			
Southeast:	290	7	37.5	59.9	4.74	10.35	1.79
No drought	134	7	37.3	64.7	5.10	9.60	1.65
Severe drought	87	0	36.8	55.2	4.14	10.74	2.06
Extreme drought	69	0	39.0	56.6	4.76	11.16	1.78
West:	152	48	38.6	62.2	5.22	3.23	4.42
No drought	104	32	33.7	59.8	5.24	4.55	4.31
Severe drought	10	5	65.2	68.7	8.43	.47	4.30
Extreme drought	38	11	45.1	64.3	3.95	.88	4.67

1/ Commercial banks are domestically chartered FDIC-insured institutions reporting positive loans, deposits, and assets on December 31, 1987.

2/ Conditions are defined on the county level according to the Palmer Index of drought severity on August 6, 1988, the approximate height of the drought. Severe and extreme drought conditions are the second and most serious categories of the Palmer Index. 3/ Vulnerable banks are those with forecast failure probabilities during 1988 greater than 0.98 percent, the approximate average failure probability in 1986. Forecast failure probabilities are computed for each bank and are based on bank-level financial data reported for mid-1987 and on the dependence of the bank's home county on the oil and gas sector in 1982. Over 89 percent of the banks that failed in 1987 had above-average forecast probabilities of failure that year. Vulnerable banks not failing in 1988 are at risk of failure in subsequent years. All financial percentages are as of December 31, 1987, weighted by bank size. Loans as a percentage of deposits and Federal funds sold as a percentage of assets are both measures of a bank's capacity to write new loans. Return on equity is net income as a percentage of equity capital. Delinquent loans are loans 90 days or more past due and still accruing interest, plus loans in nonaccrual status. 4/ Rural banks are those headquartered in nonmetropolitan counties. 5/ Agricultural banks are those reporting farm loans exceeding 15.6 percent of total loans on December 31, 1987, the unweighted-average farm loan concentration at all commercial banks on that date.

experiencing severe or extreme drought conditions are forecast as vulnerable to failure, 9.8 percent of the agricultural banks in drought counties are vulnerable.

Agricultural banks in the drought counties entered 1988 with lower loan-to-deposit ratios than their counterparts in areas not experiencing drought-related problems. Agricultural banks in the extreme-drought counties (the counties hardest hit) are holding 50.5 percent of their deposits as loans, a historic low for agricultural banks. Several Federal Reserve Bank district surveys of agricultural banks show that the bankers believe their loan-to-deposit ratios are below desired rates, indicating a willingness to write more loans. As a result, agricultural banks in the drought areas are in a strong position to write new local loans for the coming planting season.

The performance of agricultural and rural banks in counties not hit by the drought is relatively weaker for reasons unrelated to the drought. Many of these banks are located in the "energy belt"-- Texas, Oklahoma, Louisiana, Colorado, and Kansas. While these States have been largely spared from the worst of this year's drought, the farm and rural bank rebound has been slow because of depressed, oil-related local economies. Agricultural and rural banks in the energy belt pull down the performance averages of the no-drought bank group.

National comparisons mask some important regional differences. Agricultural banks in the drought counties in the Northern Plains are somewhat weaker than their no-drought counterparts. In the Northern Plains, 55 agricultural banks (over 16 percent) in drought counties are vulnerable to failure. In contrast, only 11.6 percent of the agricultural banks in the Northern Plains no-drought counties are vulnerable. Agricultural banks in the Northern Plains' drought counties had lower returns on equity and generally higher delinquency rates than their no-drought counterparts. Agricultural banks in the West are markedly worse off than agricultural banks nationally. The performance differences between the drought and no-drought county banks in the West are generally smaller for the loan delinquency rates, but the drought banks have substantially lower returns.

Loan-to-deposit ratios and net Federal funds sold at agricultural banks in drought counties in the Northern Plains and West generally do not compare favorably with their no-drought counterparts. This may suggest that agricultural banks in drought counties in these two regions will have relatively more difficulty writing new loans. Nonetheless, these banks are more liquid than the average U.S. bank.

While the performance and liquidity differences could be important in the drought-stressed areas of the Northern Plains, the differences are less important in the West. Large drought-related loan losses are not expected in the West because much of the agriculture there uses irrigation. Moreover, the West contains only 152 agricultural banks, and nonagricultural banks are writing an increasing share of farm loans.

Agricultural banks in the drought counties in the Southeast were among the top performers in 1987, outpacing other groups of agricultural banks. In addition to having the highest returns on equity, banks in the Southeast are more liquid

than their no-drought counterparts. Agricultural banks in this region have been strong performers throughout the 1980's and should have little trouble coping with drought-related losses or increases in local loan demands. Moreover, rain late in the summer substantially improved growing conditions in the Southeast.

The Farm Credit System and the Drought

While the FCS posted a profit in the first half of 1988 for the first time since the early 1980's, this performance aggregate masks important regional variations. Some areas hit hardest by the drought roughly correspond to the St. Paul, Omaha, and Louisville FCS districts, which were among those hit hardest by the farm financial stress of 1983-86. These three district FCS institutions have received federally guaranteed financial assistance to help rebuild their capital base.

The effects of drought-related loan losses on the ability of the FCS banks in the three districts to write new loans is difficult to predict at this time. If drought-related loan losses are substantial, each of the three may apply for more federally guaranteed support and can reasonably expect such support to be forthcoming. Drought-related loan losses would not likely force a FCS bank out of business.

Because all FCS institutions pool their cash needs and jointly secure FCS bond issues, the hardest hit districts will not have to pay a district-specific premium to get funds for new loans to farmers. Pooling will enable the FCS institutions in drought areas to write new loans without paying a special interest penalty for the funds, except to the extent that drought losses hurt investors' evaluation of the creditworthiness of the FCS as a whole.

Yet the weak institutions may have to moderate new loan growth relative to the growth of their capital to meet the new capital-asset ratio standards. But by how much is unclear. The Farm Credit Administration, the FCS's regulator, has promised to forbear on enforcing the new capital standards for some institutions if the institutions show a reasonable effort to meet the standards in the future.

Both the Sacramento and St. Louis FCS districts also include extreme drought areas. But these district institutions are better capitalized and so could sustain larger drought-related loan losses. As with all institutions in the FCS, both district institutions are eligible to apply for federally guaranteed assistance should the need arise.

The Demand for Agricultural and Rural Credit Will Be Up

There are two forces pushing up the demand for farm and rural credit for the coming year. First, farmers and other rural business that suffer drought-related losses that are not covered by Federal drought assistance will need credit to tide them over until conditions improve. Second, most farmers are expected to expand acreage and output this coming year and will use new credit to finance the expansion. The expansion is expected because crop prices are higher, USDA is loosening set-aside requirements, and fewer farmers will participate in price-support programs. Credit demanded from private sources

will also be up because advance deficiency payments will be smaller and the costs of important inputs, such as seed and fertilizer, will be up.

The increase in farm output will increase the demand for farm-related inputs, so rural businesses providing the inputs will experience increases in demand. To meet the new demands, the businesses will likely increase their use of credit to increase production. For example, some farm equipment sales slowed this summer as the drought stalled the recent sales recovery. But the demand for farm equipment should rebound as farmers prepare to expand production. Increased financing by the equipment dealers will go along with the resurgence in demand.

Federal Programs to Bridge the Gap

Lenders are willing and able to finance most of the coming acreage expansion. The competition is now very keen among lenders for high-quality farm and farm-related customers. Stabilizing agricultural land markets and rising commodity prices are positive signals for lenders as well as producers. Perhaps more important, the lenders are re-assured by the continued strong Federal support for U.S. agriculture.

Questions arise about the willingness of private-sector lenders to meet the increased credit needs of those with drought-related losses. The private-sector lenders have enough liquidity to expand, but lenders will be concerned about the quality of the borrowers in light of the mid-1980's farm financial crisis. The FmHA (Farmers Home Administration), with its mission as the "lender of last resort" for farmers, is well suited to bridge this gap.

In fiscal year 1989 (October-September), FmHA has authority to issue $2.3 billion in loan guarantees for farm operating loans written by other lenders. The guarantees cover up to 90 percent of a loan made by a qualifying lender in case the farm borrower defaults. FmHA guaranteed only $886 million of such loans in fiscal year 1988, suggesting the program is large enough to meet increased drought-related borrowing needs.

While the guarantees are useful for marginal farm borrowers, farmers with large losses or poor credit histories or prospects will have to rely on FmHA's emergency disaster lending program or the regular direct lending program. The $900 million in funding for direct farm operating loans in fiscal 1988 was exhausted by the end of the year. This will likely be repeated in fiscal year 1989.

FmHA's emergency disaster loans are for farmers unable to find credit elsewhere who have losses due to floods, drought, and other natural disasters. To be eligible, farmers must be in or next to a county that has been declared a natural or emergency disaster area by the Secretary of Agriculture. As of October 13, 1988, there were 1,503 counties plus 121 contiguous counties declared as disaster areas. Moreover, the Disaster Assistance Act of 1988 waives the requirement that the disaster loans be only for crops under Federal crop insurance. The budget for fiscal year 1989 contains $600 million for these emergency disaster loans. Only $29 million in emergency disaster loans were made in fiscal year 1988, the lowest volume since the 1950's.

The Disaster Assistance Act directs FmHA to make its guaranteed operating credit available for refinancing unpaid 1988 operating loans made by private-sector lenders. The drought bill also provides $200 million of loan guarantees for rural businesses that suffered drought-related losses.

There are other programs for rural businesses hurt by the drought. When the Secretary of Agriculture designates disaster areas eligible for FmHA emergency loans to farmers, the Small Business Administration (SBA) makes economic injury disaster loans available to farm-related small businesses and small agricultural cooperatives unable to secure credit elsewhere that suffered drought-related losses. These typically include businesses linked to farming such as fertilizer, seed and equipment dealers, contract harvesters, and crop dusters.

Less direct Federal credit programs will also aid those with drought-related losses. The capital forbearance program for commercial banks allows banks whose capital has been impaired by losses not related to fraud or mismanagement until 1995 to rebuild capital. Small agricultural commercial banks in farming-dependent communities are also allowed to amortize agricultural loan losses over 5 years instead of taking the losses when they are incurred. These policies will keep small local banks in business, thereby allowing them to continue supporting their small local borrowers. Rules on restructuring farm loans have been liberalized for all private farm lenders, and farm borrowers have been given new powers in negotiating with their lenders during hard times. The federally guaranteed recapitalization of the FCS also ensures the FCS will remain a viable lender, at least for the foreseeable future.

Effects on Nonfarm Industries

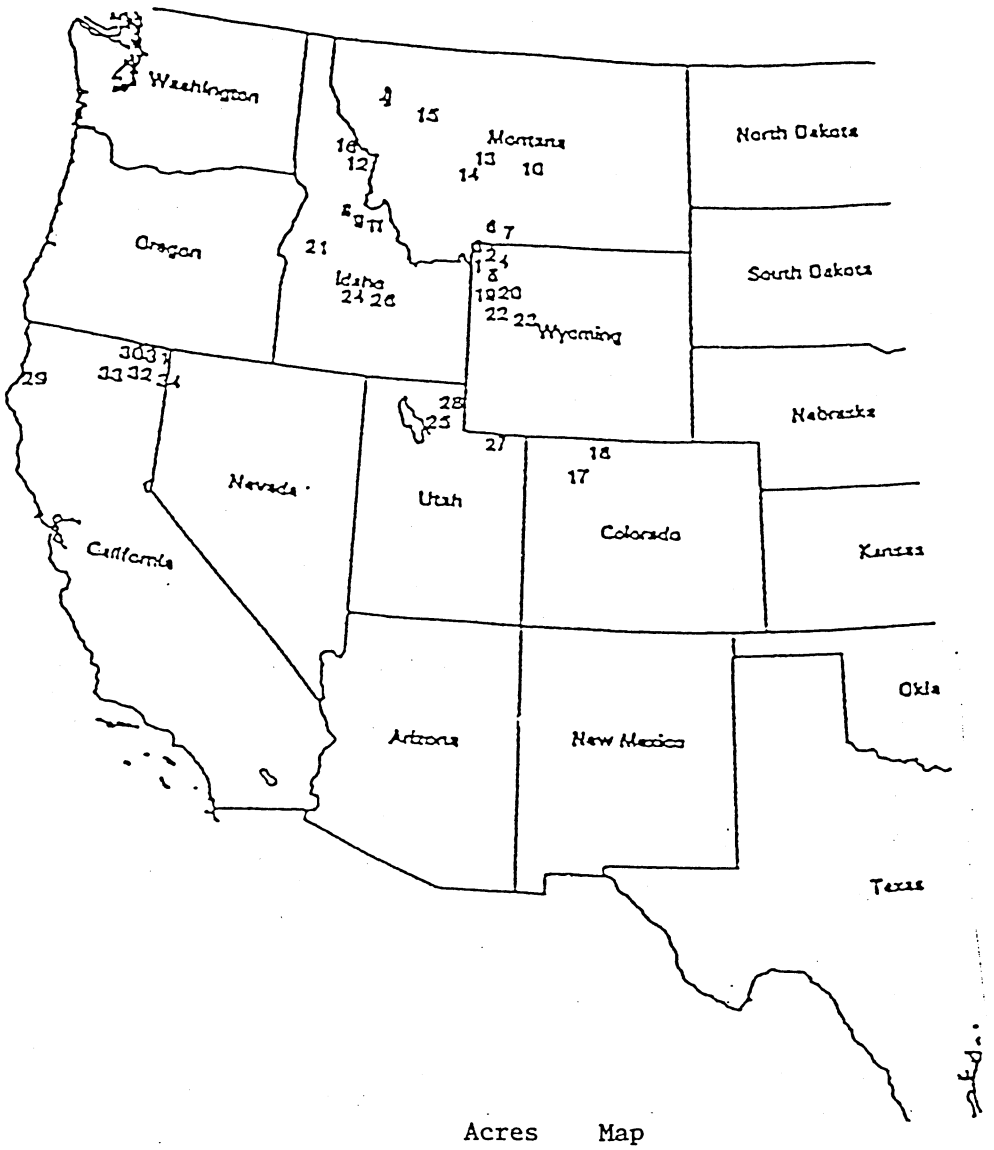
The 1988 drought will affect some nonfarm rural industries. Two dominant sectors include forestry and electric power generation.

Forestry

Prolonged drought conditions, periodic strong winds, and lightning storms in Wyoming, Montana, Oregon, California, Washington, and Idaho made the summer and fall of 1988 a severe fire season (fig. 7). Extremely low moisture content in many timber stands and record low humidity created ideal conditions for igniting wild fires. Over 4 million acres were consumed by fire as of mid-September 1988 (table 17). Extreme burning conditions were expected in the West through the fall. Final data for 1988, which will not be available until next year, will likely show total 1988 burned acreage near or exceeding that of other drought years.

Over 30,000 personnel were directly engaged in fire-suppression efforts across the Nation. Firefighters came from 40 States, six Federal agencies, the National Guard, private industry, volunteer urban and rural fire departments, four Army battalions, and Canadian firefighting agencies. Several thousand additional personnel were indirectly involved in suppressing the fires. On several occasions during the fire season, the number of fires over a widespread area of the Nation resulted in a shortage of firefighting resources. As a result, fires threatening life and property were given priority over other fires. Firefighting costs easily exceeded $300 million.

Figure 7. Major fires on State and Federal lands, as of 9/8/88



Map number	Name (State)	Acres burned	Map number	Name (State)	Acres burned
1.	North Fork (WY)	168,800	18.	Beaver Lake (CO)	500
2.	Wolf Lake (WY)	64,300	19.	Mink Creek (WY)	126,500
3.	Fan (WY)	23,325	20.	Huck (WY)	86,345
4.	Clover/Mist (WY)	263,100	21.	Eagle Bar (ID)	15,275
5.	Snake River Complex (WY)	180,000	22.	Hunter (WY)	5,440
6.	Hellroaring Creek (MT)	57,470	23.	Fayette (WY)	25,425
7.	Storm Creek (WY)	65,000	24.	Battleaxe (ID)	24,041
8.	Moose Complex (ID)	41,672	25.	Affleck Park (UT)	5,608
9.	Ladder Creek (ID)	36,780	26.	Little Lost (ID)	700
10.	Dry Fork (MT)	12,800	27.	White Rock (UT)	6,000
11.	South Lost Horse (MT)	6,280	28.	Mount Ogden (UT)	345
12.	Jay West (ID)	1,480	29.	Saddle (CA)	1,250
13.	Canyon Creek (MT)	240,000	30.	White Mountain (WA)	18,870
14.	Lick Creek (MT)	1,090	31.	South 17 Mile (WA)	11,121
15.	Red Bench (MT)	5,400	32.	Dinkleman (WA)	35,000
16.	Little Rock Creek (MT)	1,050	33.	Grant Canyon (WA)	1,200
17.	Sentinel Mountain (CO)	1,800	34.	Grass Mountain (WA)	2,000

Table 17--Wildfires on national, State, and private lands

Year	Fires	Area burned
	Number	Acres
1988 year to Sept.	71,521	4,301,130
1987	142,325	4,448,163
1986	210,000	5,000,000
1985	195,000	4,950,000
1984	181,466	3,039,009
1983	161,649	5,080,553
1982	174,755	2,382,036
1981	249,370	4,814,206
1980	234,892	5,260,825

Source: Boise Interagency Fire Center.

Mortality rates for pine seedlings planted in 1988 exceeded normal rates in many areas of the Northeast, Appalachia, and Midwest. Mortality is also expected to be higher among younger trees that had not yet developed deep roots. In addition, drought-stressed trees are more susceptible to insect damage. Southern pine beetle activity increased rapidly in Alabama, Mississippi, Georgia, and the West. Replanting will place additional demands on State and private reforestation programs already affected by an upward trend in tree plantings on private lands and CRP acreage.

Hydroelectric Power

The drought has affected hydroelectric power generation which will increase rural residents' electric bills in some areas. Below-normal streamflow occurred in the Pacific Northwest, the western Great Lakes, the Southeast, and the northern Great Plains. This situation strained the capacity of many reservoirs to provide water for electrical power generation, municipal water, and recreation. Many reservoirs are either empty or have significantly below-average storage conditions. With significant deficits in soil moisture in watershed areas and loss of bank storage in streams and reservoirs, it is apparent that one or more years of above-average precipitation will be required to bring surface water-storage systems back to average conditions. Even some steam plants had to reduce generation because temperatures of cooling water discharge exceeded environmental limits due to low streamflow.

Drought conditions forced changes in the use of electric power supply sources but did not result in major curtailments of service to residential, commercial, and most industrial users. In some areas, utilities have occasionally exercised contractual options to curtail service to interruptible customers. Hydroelectric power facilities operated by the Army Corps of Engineers in the Lower Mississippi Valley, Missouri River, north Pacific, Ohio River, South Atlantic, and Southwest divisions operated below normal, causing an increase in the use of coal, oil, and nuclear power sources. For the first half of 1988, hydroelectric generation nationwide was about 12.4 percent less than it was for

the first half of 1987. Coal-fired generation increased some 5.9 percent, oil-fired generation was up by 5 percent, and nuclear generation was up 17.1 percent. The summer of 1988 was not only unusually dry, but also unusually hot. Thus, not all the increase in energy generation can be attributed solely to the drought. Shifts to higher cost oil and coal generating units, coupled with increased costs of coal transportation due to barging difficulties on major rivers, likely put upward pressure on electric utility rates in those areas largely reliant on hydroelectric generation. It is not possible to estimate effects of the drought in relation to electric power costs at this time.

1988 DROUGHT EFFECTS ON RURAL ECONOMIES

The ultimate effect of the drought on a local area is not only a function of drought severity, but also a function of the importance of farming to the overall economy of the area, the diversity of the area's farm sector, the types of farming enterprises that dominate an area, and the distribution of Federal drought assistance payments. For instance, two areas most affected by the drought are the spring wheat growing areas of the Northern Plains and the northern Rocky Mountain States. Farming is the most important economic activity in these areas and is dominated by wheat production. The drought in these regions caused yield reductions of 70-75 percent in wheat and feed grain production. For some other areas that experienced extreme drought, effects have been cushioned by a more diverse farming sector that is smaller and not so critical to the area's overall economy. Such areas are typical in the more industrialized eastern Corn Belt.

Five Drought-Affected Areas

To illustrate the variation in the economic effects of the 1988 drought on various farm sectors as well as on regional economies, we have chosen five multicounty areas that experienced extreme drought during the summer of 1988 (fig. 8). These areas are located in northeast Montana, north central North Dakota, southwest Wisconsin, east central Illinois, and northwest Ohio and conform to crop reporting districts delineated by the National Agricultural Statistics Service in conjunction with the Crop Reporting Board of each State.

Northeast Montana

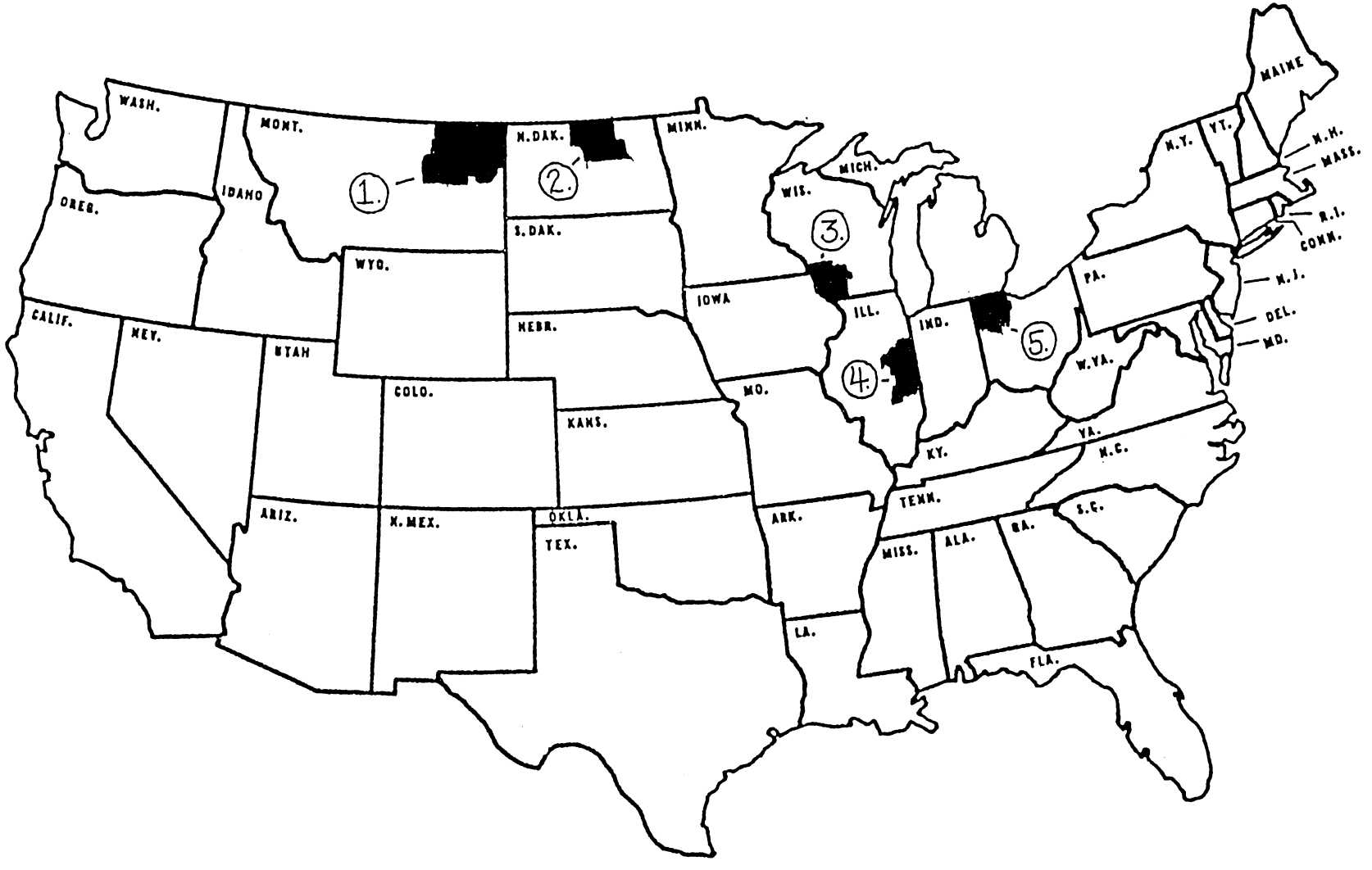
The eight-county area of northeast Montana [2] is highly dependent upon farm production activities for its economic base. More than one in five jobs (22.7 percent) are in the farm production sector with another 5 percent of all jobs in agribusiness industries such as farm inputs and farm processing and marketing (table 18).

Large-scale wheat farms and cattle ranches are the major farm enterprises in this area. More than 80 percent of all farm sales in northeast Montana are from wheat and cattle, with the average operation covering over 3,500 acres (table 19). This compares with the U.S. average farm of 440 acres. However, average farm sales ($60,452) are only slightly above the U.S. average, suggesting the

---

[2] Includes Daniels, Dawson, Garfield, McCone, Roosevelt, Richland, Sheridan, and Valley counties.

Figure 8. Five multi county areas (crop reporting districts) selected for drought impact analysis



1. Northeast Montana
2. North central North Dakota
3. Southwest Wisconsin
4. East central Illinois
5. Northwest Ohio

Table 18--Population and employment for five selected drought-affected areas of the United States

Item	United States 1/	Northeast Montana	North central North Dakota	Southwest Wisconsin	East central Illinois	Northwest Ohio
			1,000			
Population, 1986	241,033	58	43	195	463	977
			Number			
Average county population	77,828	7,288	8,661	27,838	66,192	88,772
			Percent			
Percent of counties losing population:						
1980-83	28	25	20	14	86	73
1983-86	47	88	80	57	86	18
			Dollars			
Per capita income, 1986	14,629	11,506	10,957	11,482	13,049	14,154
			1,000			
Total employment, 1985	104,191	22	15	75	191	421
			Percent of total employment			
Farm-related employment,						
Total	18.9	38.0	41.2	40.9	24.1	19.0
Farm production	3.7	22.7	32.1	26.0	6.9	4.2
Direct agribusiness,						
Total	3.4	4.9	3.0	4.9	5.1	2.9
Farm inputs	.4	1.4	1.9	2.3	1.2	.5
Farm processing and marketing	3.0	3.6	1.1	2.6	4.0	2.4
Indirect agribusiness	2.2	.6	.4	.9	2.4	2.2
Food and fiber wholesaling and retailing	9.6	9.7	5.7	9.2	9.6	9.6

1/ Excludes Alaska and Hawaii.

Table 19--Farm structure indicators for five selected drought-affected areas of the United States

Item and unit	United States 1/	Northeast Montana	North central North Dakota	Southwest Wisconsin	East central Illinois	Northwest Ohio
Number of counties	3,077	8	5	7	7	11
Number of farms	2,240,976	3,944	3,840	11,829	9,612	12,374
Acres per farm	440	3,566	1,153	289	377	252
Value per farm (dollars)	345,801	593,217	406,272	252,467	757,963	362,658
Value of farm sales per farm (dollars)	58,857	60,452	53,412	61,138	94,835	50,178
Percent of sales from:						
Crops	46.2	68.4	79.5	13.8	85.8	67.6
Corn	10.2	.3	.6	9.8	49.8	24.8
Wheat	5.9	56.2	48.8	2/	.5	5.6
Soybeans	7.9	2/	2/	.3	33.0	26.5
Oats and other grains	4.3	5.3	28.4	.1	.3	1.1
Livestock	51.9	31.6	20.5	86.2	14.2	32.4
Cattle	24.0	27.9	14.7	17.8	4.2	9.3
Hogs	7.3	1.6	.7	.2	6.3	12.8
Dairy	12.0	.2	4.0	55.5	1.2	4.4
Percent of operators reporting:						
No off-farm work	38.5	51.2	51.4	56.4	46.1	36.0
200 days or more Off-farm work	34.6	14.7	14.3	19.1	20.2	38.3
Percent of sales from farms with sales of:						
Less than $10,000	2.7	1.2	1.6	1.7	.6	3.0
$10,000-$39,999	8.2	12.9	15.6	9.7	6.0	14.8
$40,000-$99,999	16.4	31.8	36.0	32.8	20.9	24.9
$100,000-$249,999	24.8	36.0	33.6	37.5	42.4	31.6
$250,000 or more	47.2	18.0	12.9	18.2	29.9	25.7

1/ Excludes Alaska and Hawaii.
2/ Less than 0.05 percent.
Source: 1982 Census of Agriculture.

low productivity of the soil and the low labor intensity of farming and ranching operations in this area.

During the early 1980's, northeast Montana experienced modest growth stemming from rapid expansion in the energy sector. But since 1983, problems in the U.S. energy sector have translated to some loss of jobs and population in the local economy. The 1988 drought has reduced wheat and barley yields in this area by 70-75 percent. The August crop estimates issued by USDA's National Agricultural Statistics Service in conjunction with the Montana Crop Reporting Board estimated that 1988 wheat yields in the area would average 7 bushels per acre and barley would average 6 bushels per acre, compared with a normal yield of 28 bushels of wheat and 35 bushels of barley.

North Central North Dakota

This five-county area [3] is the smallest in terms of population, employment, and general economic activity of the five areas selected for drought effect analysis. It is also the most dependent on farm production activities for its economic base. In 1985, 32.1 percent of all jobs in this area were in the farm production sector with another 3 percent in agribusiness employment. Farms in this area produce mainly wheat and feed grains (mostly barley). These crops accounted for over three-fourths of all farm sales in 1982. Sales in the livestock sector are primarily beef cattle, but include some dairy and swine. Average farm sales were lower than the national average, with most sales coming from medium-sized farms.

As was the case with northeast Montana, the early 1980's brought modest energy-related growth to this area. But by the mid-1980's, problems in the energy sector as well as in the farm sector caused a reversal in the modest growth of the local economy. The 1988 drought reduced wheat and feed grain yields in the area by 70 percent, resulting in large effects to the area's largely wheat- and feed grain-based economy.

Southwest Wisconsin

The economy of the seven-county southwest Wisconsin area [4] is based largely on medium-sized dairy operations. Twenty-six percent of all employment in the area is in farm production activities with another 5 percent employed in the closely linked agribusiness industries. Over half of all farm sales are dairy products. Sales of cattle and calves comprise 17.8 percent of all farm sales, with the majority of such sales probably stemming from the sale of cull and excess cattle from dairy operations. The 1986 population figure for the area was only slightly higher than in 1980. Since 1983, four of the seven counties have lost population.

The 1988 drought affected southwest Wisconsin mainly by causing feed shortages that raised feed costs for dairy operations.

---

[3] Includes Benson, Bottineau, McHenry, Pierce, and Rolette counties.

[4] Includes Crawford, Grant, Iowa, Lafayette, Richland, Sauk, and Vernon counties.

East Central Illinois

The seven-county area of east central Illinois [5] represents one of the most productive farming areas in the United States. Located in the heart of the Corn Belt, this area produces corn yields that are normally 40 percent above the U.S. average. While the farm sector is important to the area, the area's economic base is not very dependent on farming. Most of the local jobs are in industry or government. Farm production activities account for about 7 percent of all employment, while agribusiness accounts for 5 percent of total employment. Despite a much larger population base than in the other selected study areas, this area has also lost population since 1980, with six of the seven counties having some population loss during the 1980's. Such losses reflect recent adjustments in the industrial base of the area and are somewhat typical of many areas throughout the industrialized Midwest.

The farm sector is dominated by medium-to-large corn-soybean farms, with over 80 percent of total farm sales coming from corn and soybeans. The livestock sector, producing mainly hogs, accounts for only 6.3 percent of all sales. The corn yield for 1988 was estimated at 70 bushels per acre, compared with a normal yield exceeding 140 bushels. The soybean yield was estimated to be down 25 percent.

Northwest Ohio

The 11-county area of northwest Ohio [6] is dominated by nonfarm economic activities. The farm production sector accounts for only 4 percent of total employment. Employment in agribusiness accounts for another 3 percent of total employment. Manufacturing is the most important nonfarm sector. Corn and soybeans account for over 50 percent of all farm sales, while the sale of hogs and cattle and calves account for about 12 percent and 9 percent. Farms are smaller than the U.S. average, both in sales and in acreage. Farms with a value of sales less than $40,000 were more numerous than in the other selected areas. This reflects the importance of part-time farming in the area and the strong nonfarm influence on the activities of the farm sector. Corn and soybean yield losses in northwest Ohio were estimated to be 40 percent and 25 percent.

Calculating Drought Effects

In estimating drought effects we must take into account the direct income effects on the local farm sector, the overall economic effects on the regional economy, and the compensating effects of drought legislation. Direct income effects are based on: crop yield-loss estimates for wheat, feed grains, and soybeans, estimated income losses of the livestock sectors (beef, dairy, and hogs) resulting from higher drought-induced feed grain and forage prices, and

---

[5] Includes Champaign, Ford, Iroquois, Livingston, Kankakee, and Vermillion counties.

[6] Includes Allen, Defiance, Fulton, Henry, Lucas, Hancock, Paulding, Putnam, Van Wert, Williams, and Wood counties.

estimated payments to the crop sectors based on the provisions of the Federal Disaster Assistance Act of 1988.

Regionalized input/output models, estimated by using the Forest Service IMPLAN System, were used to estimate the total drought effects on farm-related and nonfarm sectors of the selected regional economies.[7] This system allows the user to construct a set of regional income and product accounts for 1982, the latest year for which such information is available, and a corresponding predictive (input/output) model for any U.S. county or group of counties. The model takes into account the economic links within the entire regional economy, including the regional links between farm and nonfarm sectors, and links to economic activities outside the region.

Direct Drought Effects

Crop production losses are the estimated dollar value of the 1988 deviations from normal yield. The estimated losses are measured in terms of 1982 crop prices (which also happen to approximate quite closely current commodity prices). Using 1982 prices is consistent with using 1982 input/output models. It is also assumed that crop production figures for 1982 are representative of the typical yields found in the study areas. Yield losses are based on information from the August Crop Report for each State. For example, the wheat yield in northeast Montana was estimated to be one-fourth of normal. The associated crop production loss in the food grain sector of northeast Montana was estimated to be $129.5 million across all acres planted to wheat in 1988 (table 20).

Losses in the livestock sector are estimates of income losses resulting from drought-related increases in feed grain and forage prices. Feed cost increases were calculated for the beef, dairy, and hog sectors by applying estimated 1988 prices of feed grain and forage to a cow-calf production budget, a milk production budget, and a farrow-to-finish production budget. The budgets were taken from Economic Indicators of the Farm Sector: Costs of Production, 1986, published by USDA's Economic Research Service.

More specifically, the magnitude of direct farm losses in a particular area depends on the severity of the drought in that area, the types of farm enterprises common to the area, and the portion of drought losses offset by payments from the Federal disaster assistance legislation. The importance of these losses to the local and regional economy depends on the significance of the farm sector to the local and regional economy. For northeast Montana, the direct farm loss is estimated at $152.5 million, mostly in the large food grains (mainly wheat) sector. An estimated Federal drought assistance payment of $68 million reduces this loss to $84.5 million. The farm economy in north central North Dakota is similar to Montana and has an estimated net direct loss of $79.4 million. In southwest Wisconsin, the net direct loss is $104.7 million, mainly because the feed shortage brought higher feed costs to the dominant dairy sector. Estimated drought assistance payments for southwest Wisconsin may be

---

[7] For a detailed explanation of the model see, U.S. Department of Agriculture, Forest Service, "Systems Application Unit for Land Management Planning," IMPLAN User's Guide, Sept. 1983.

Table 20--Direct effect of the drought and Federal drought disaster payments on the local farm sector in selected regional economies

Assumptions	Yield loss									
	Northeast Montana		North Central North Dakota		Southwest Wisconsin		East Central Illinois		Northwest Ohio	
	Percent	Million dollars	Percent	Million dollars	Percent	Million dollars	Percent	Million dollars	Percent	Million dollars
Direct losses in the farm sector		-152.5		-114.6		-134.2		-326.0		-164.8
Crop sector 1/		-145.3		-110.3		-45.4		-311.9		-144.3
Food grains	75	-129.5	70	-85.7	20	-.1	--	--	--	--
Feed grains	80	-15.8	70	-24.6	25	-45.3	50	-225.6	40	-90.1
Soybeans	--	--	--	--	--	--	25	-86.3	25	-54.2
Livestock Sector 2/		-7.2		-4.3		-88.8		-14.1		-20.5
Beef		-6.4		-2.0		-2.4		-1.1		-1.1
Dairy		-.2		-2.0		-70.9		-2.3		-4.7
Hogs		-.7		-.2		-15.5		-10.7		-14.7
Federal drought payment		68.0		35.2		29.4		108.0		31.2
Crops 3/										
Food grains		57.1		27.9		.1		--		--
Feed grains		10.9		7.4		29.4		108.0		31.2
Soybeans /4		--		--		--		--		--
Livestock /5		--		--		--		--		--
Net direct effect		-84.5		-79.4		-104.7		-218.0		-133.6

-- = No estimate.

1/ Drought-induced losses are based on yield loss estimates made by the National Agricultural Statistics Service cooperating with the Crops Reporting Branch in the respective States and reported in the August Crop Report. For Montana, North Dakota and Illinois, yield estimates were made for individual crop reporting districts and were used in calculating drought losses. For Wisconsin and Ohio, the State average yield loss was used to estimate losses in the sub-state areas (crop reporting districts) under study here.

2/ These are income losses due to increased feed costs resulting from drought-induced grain and forage price increases. For beef cow-calf and dairy operations, feed cost increases were calculated to represent roughly 15 percent of output for each sector (approximately $39 per beef cow unit and $255 per milk cow). For swine operations, drought-induced feed cost increases were calculated to represent about 20 percent of final output (about $10 per hundred weight marketed).

3/ In estimating drought payments for crop losses, we assumed that all producers are Federal farm program participants, that they realize the average county yield, and that they have no crop insurance. We further assume that they return the advance deficiency payment for losses covered by a crop disaster payment. For example, a corn yield of 70 bushels per acre in Illinois is 50 percent less than the normal 140 bushels per acre. The advance deficiency payment is $61.60 per acre (140 bushels per acre at $.44 per bushel). The disaster payment is $39.99 ($1.90 per bushel or 65 percent of the $2.93 per bushel target price) on the portion (21 bushel per acre) of the production loss between 35 percent and 75 percent of normal yield. The advance deficiency payment to be returned is $9.24 (21 bushels at $.44 per bushel). Thus, the estimated Federal drought payment for corn production losses in Illinois is $92.35 per acre.

4/ Drought payments for soybean losses are not estimated because soybean production losses in the selected regions do not exceed 35 percent of normal yield.

5/ Payments to the livestock sector for feed grain production losses are included in the crop drought payment because farmers cannot collect for the same feed grain loss under both the crop and livestock provisions. However, other aid is available to the livestock sector, including: the sale of feed grain owned by the Commodity Credit Corporation (CCC) at a price not to exceed 75 percent of the current basic county loan rate; feed grain donations by the CCC to producers financially unable to purchase feed; reimbursement of up to 50 percent of the cost of feed or the costs of transporting or handling feed grain, hay, or forage; and, reimbursement of up to 50 percent of the cost of transporting livestock to and from available grazing locations.

underestimated since dairy operators who normally do not produce all their feed requirement are eligible to purchase CCC-owned grain at 75 percent of the loan rate. Such potential assistance to livestock enterprises was not estimated. However, drought assistance payments to dairy operations that produce their own feed are included in table 20 if the claims are made through the crop provisions. For east central Illinois and northwest Ohio, net direct farm losses of $218 million and $133.6 million are accounted for by the large feed grain and soybean sectors.

Indirect Drought Effects on Local Business Activity

Based on our estimates of yield reduction in the crop sector and income reduction in the livestock sector, declines in total business activity would range from about $116 million in southwest Wisconsin to $389 million in east central Illinois if no Federal disaster assistance is considered (table 21). Of course, most of the decline in total gross output is due to decreased farm production. Only a very small proportion (less than 3 percent) of the drop in total gross output can be attributed to the agricultural processing industries and to the agricultural inputs industries. The processing industries can purchase commodities from areas that are hardly affected by the drought, and inputs industries had already sold most of this year's seed, fertilizer, and chemicals before the drought hit. However, if the drought losses were to lower incomes for farmers, the resulting decreased demand for nonfarm goods and services could cause depressed business activity in the local nonfarm economy.

Without Federal aid, losses in total gross output for nonfarm industries would range from $19 million in north central North Dakota to almost $58 million in southwest Wisconsin. The nonfarm economy of southwest Wisconsin is large and more diversified, so income dollars are recycled more often among local businesses within the region. A large part of the potentially large losses in the nonfarm economy of southwest Wisconsin are attributable to income losses in the very important livestock sector. The livestock sector would bear almost two-thirds of the drought-induced direct income losses in the local farm sector because shortages of feed and forage brought higher feed costs. With lower incomes, discretionary spending by farm households would decrease, some nondiscretionary spending would be postponed, and nonfarm businesses, especially those in the retail and service sectors, would suffer substantial declines.

Federal disaster assistance will, of course, ameliorate some of the drought effects. But the distribution of Federal money to drought-stricken farmers will benefit some industries and some areas more than others. For example, our estimate of Federal disaster assistance to drought-stricken farmers ranges from $29 to $30 million in northwest Ohio, north central North Dakota, and southwest Wisconsin, to $68 million in northeast Montana and $108 million in east central Illinois. Although payments will be made directly to farmers who, for the most part, reside in the area, some proportion of those payments will be spent on goods and services from outside the region. The rest will be spent (if not saved) on local goods and services. In the Montana, Ohio, and Wisconsin study areas, the average propensity to respend money on local goods and services appears to be close to two-thirds. In the North Dakota and Illinois study areas, the respective percentages are close to 50 and 40 percent, suggesting that more than half of the disaster assistance funds in these areas will likely bypass the local business centers. In North Dakota, for example, a substantial

Table 21--Total (direct and indirect) effect from drought on total gross output in selected regional economies 1/

Sector	Loss due to drought in: Northeast Montana	North central North Dakota	Southwest Wisconsin	East central Illinois	Northwest Ohio
	Change in total gross output (million dollars)				
Agriculture-related industries	160.7	121.0	58.2	348.5	164.6
Farm production	160.2	118.4	53.4	336.9	159.7
Food grains	135.6	86.2	.2	.1	.1
Feed grains	16.6	24.7	47.1	235.0	92.9
Soybeans	*	.1	*	96.4	63.4
Livestock	.8	1.6	2.4	.4	.5
Other	7.2	5.8	3.7	5.0	2.8
Processing industries	.4	.2	2.8	1.3	1.2
Meat products	.2	*	.9	.2	.3
Dairy products	*	.1	1.5	.3	.3
Other	.2	.1	.4	.8	.6
Input industries	.1	2.4	2.0	10.3	3.7
Nonagriculture industries	33.8	18.9	57.6	40.9	49.3
Manufacturing	5.7	3.7	1.7	6.1	15.8
Transportation	8.2	2.4	8.8	6.8	6.1
Wholesale and retail	2.2	.9	10.0	.9	2.4
Services 2/	13.1	10.1	34.9	20.0	21.9
Other	4.6	1.8	2.2	7.1	3.1
All industries	194.5	139.9	115.8	389.4	213.9

* = Less than $50,000.
1/ The direct and indirect impacts were derived from the Forest Service IMPLAN model.
2/ Includes finance, insurance, and real estate industries.

portion of the local disaster payments may be spent in a large, metropolitan area such as Fargo because the sparsely developed, farm-based communities cannot provide as full an array of consumer goods and services. In the Illinois area, the leakage of funds to other communities is especially high because most local residents have extremely easy access to several dominant economic centers, including Chicago.

Total Drought Effect on the Regional Economy

The direct effect of the drought on regional economies would be a loss of income to the farm sector, which would then cause actual and potential drops in business activity for the local nonfarm industries. Our estimated direct income loss due to drought, as a percentage of total gross regional output, ranges from almost 18 percent in the sparsely populated north central North Dakota to less than 1 percent in the more industrialized northwest Ohio (table 22). These initial shocks to the regional economies imply potential drops in total business activity of almost 22 percent in the North Dakota area and about 13 percent in northeast Montana. In the more industrialized regions, the potential drops in total business activity are much less: about 3 percent in the Wisconsin and Illinois area and less than 1 percent in northwest Ohio.

Federal drought assistance will compensate for some of the losses, but not completely. Even after Federal drought assistance, we expect direct income losses to range from about 12 percent in north central North Dakota to less than 0.5 percent in northwest Ohio. We did not estimate the effect of drought assistance payments on local total business activity because we did not have information on how farmers might actually spend this money. Because drought assistance compensates for 20-45 percent of the direct income loss, there will still likely be severe adjustment problems for many participants in the local economy.

Table 22--Structure of production in the farm sector and final estimates of direct and longer-term impacts of the drought on the overall regional economy of five selected farming regions for 1988

Item	Northeast Montana	North central North Dakota	Southwest Wisconsin	East central Illinois	Northwest Ohio
			Million dollars		
Total gross output	1,489.7	651.1	3,808.3	10,292.9	28,845.5
Crops	192.4	129.2	158.2	783.6	474.8
Food grains	172.6	121.4	.6	28.1	47.0
Feed grains	19.8	3.5	148.3	448.0	213.7
Soybeans	*	4.3	9.3	307.5	214.1
Livestock	40.0	57.0	697.1	99.0	163.6
Beef	37.0	43.3	145.6	29.1	55.2
Dairy	.4	11.6	462.1	10.5	28.2
Hogs	2.6	2.1	89.4	59.4	80.2
Other farm sectors	77.4	44.5	241.2	62.8	147.5
			Percent of total gross output		
Farm sector	20.8	35.4	28.8	9.2	2.8
Crops	12.9	19.8	4.2	7.6	1.6
Livestock	2.7	8.8	18.3	1.0	.1
Other farm sectors	5.2	6.8	6.3	.6	.1
Direct income loss:					
Due to drought	10.2	17.6	3.5	3.2	.5
After federal drought payment	5.7	12.2	2.8	2.1	.5
Potential drop in business activity due to drought 1/	13.1	21.5	3.0	3.8	.7

* = Less than $50,000.
1/ Takes into account both direct and indirect effects of the drought on the local economy.

*U.S. Government Printing Office : 1989 - 241-793/80469

SALES INFORMATION

Purchase copies of this report from ERS-NASS Reports, P.O. Box 1608, Rockville, MD 20850. Order by title and series number. Write to the above address for price information, or call the ERS-NASS order desk, toll free, at 1-800-999-6779 (8:30-5:00 ET). You may also charge your purchase by telephone to VISA or MasterCard. Foreign customers, please add 25 percent for postage (includes Canada).

Microfiche

Purchase microfiche copies ($6.95 each) from the National Technical Information Service (NTIS), 5285 Port Royal Road, Springfield, VA 22161. Order by title and series number. Enclose a check or money order payable to NTIS; add $3 handling charge for each order. Call NTIS at (703) 487-4650 and charge your purchase to your VISA, MasterCard, American Express, or NTIS Deposit Account. NTIS will RUSH your order within 24 hours for an extra $10; call (800) 336-4700.

UNITED STATES DEPARTMENT OF AGRICULTURE
ECONOMIC RESEARCH SERVICE
1301 NEW YORK AVENUE, NW.
WASHINGTON, DC 20005-4788