ERS 440



*An Economic Evaluation of the*

# GREAT PLAINS CONSERVATION PROGRAM



Economic Research Service • U. S. Department of Agriculture

ABSTRACT

About 76 percent of total Federal expenditures in cost-sharing under the Great Plains Conservation Program during 1958-66 was in support of eight practices; namely, (1) conversion of cropland to grass (14.6 percent), (2) controlling competitive shrubs on rangeland (12.0 percent), (3) constructing or improving ponds (10.4 percent), (4) constructing terraces (10.4 percent), (5) reseeding rangeland (9.2 percent), (6) constructing wells (7.6 percent), (7) reorganizing irrigation systems (6.4 percent), and (8) leveling land for irrigation (5.3 percent). The remaining 24 percent of Federal expenditures was scattered among 16 other practices. Frequency of participation in the program was highest for operators of the larger farms who were full owners and had the higher income and educational levels. The community effects of the program amounted to less than 1 percent of community personal income.

Keywords: Cost-sharing, expenditures, conservation practices, community effects, Great Plains Conservation Program

PREFACE

This study was carried out through cooperative arrangements with the Soil Conservation Service. In addition to the authors of this report, contributors included Ivan Hanson, Beatrice Holmes, and Norman Landgren, Natural Resource Economics Division, Economic Research Service, USDA; and Paul Barkley, L. M. Hartman, and Melvin Skold, Colorado State University.

Washington, D. C. 20250 July 1970

CONTENTS

TABLES



FIGURES

FIGURES-Continued



APPENDIX TABLES

## HIGHLIGHTS

The Great Plains Conservation Program (GPCP) has encountered many obstacles preventing establishment of permanent vegetative cover on about 10 million acres of land highly susceptible to wind and water erosion.

One major reason more regrassing has not been accomplished since 1956, the year the program was established under congressional authorization, is that income per acre has been higher from crops than from livestock, even for low-grade cropland.

Farm size, tenure, and deferred income costs also have lessened incentives to regrass, according to results of a study of 14 selected counties in northwestern Kansas and eastern Colorado. Because of such obstacles, no substantial advantage or disadvantage was found in the use of long-term contracts, an important feature of the GPCP, for achieving soil conservation objectives.

As of mid-1968, the GPCP had nearly 30,000 cumulative effective contracts. These represented about 12 percent of the operators in the 407 counties designated for inclusion in the GPCP and encompassed about 16 percent of the total farmland in these counties.

Federal assistance in the costs for installing the 24 practices allowed by the GPCP ranged from 50 to 80 percent in the 407 counties. Federal expenditures totaled about $56 million for 1958-66 in the 14 counties studied.

Data for 1958-66 from Soil Conservation Service records for all 407 counties indicate:

(1) About three-fourths of total Federal funds spent were for eight of the 24 practices; namely, (a) converting cropland to grass, (b) controlling competitive shrubs on rangelands, (c) constructing or improving ponds, (d) constructing terraces, (e) reseeding rangeland, (f) constructing wells, (g) reorganizing irrigation systems, and (h) leveling land for irrigation;

(2) Nearly 60 percent of total Federal expenditures were for installing water and related conservation practices;

(3) Less than 15 percent of total Federal expenditures were for converting low-grade cropland to permanent vegetative cover; 15.3 percent was spent on irrigation practices; and

(4) About a third of total Federal funds used were spent in Texas, where, as of the end of 1966, about 18 percent of the farmland in the 99 designated counties was included in the contracts. Only New Mexico had a higher percentage of farmland under contract--25 percent in the State's 18 designated counties.

For the 153 GPCP participants and 217 nonparticipants interviewed in the 14-county study area, the following observations can be made:

(1) Factors associated with participation in the GPCP are size of farm; proportion of operating unit in rangeland; and operator's age, education, income, experience in Federal programs, and attitudes about conservation;

(2) Generally, the highest probability of participation in the GPCP would be for a middle-aged full-owner operator who had a large farm with more than 50 percent of the acreage in rangeland, and who had more than 12 years of

schooling and a background of previous participation in Federal conservation programs. Conversely, an operator least likely to be a GPCP participant would be an aged and low-income tenant who operated a small crop farm and had less than 8 years of schooling and no experience as a participant in Federal conservation programs; and

(3) The major effect of the GPCP on livestock production was to extend the market age of beef calves from 6 months to a year or more, through winter feeding and additional grazing.

Changes in land use due to the GPCP, if significant, were too small to be estimated from information provided by GPCP participants and nonparticipants. The 14-county study area is not considered typical of the entire Great Plains region.

A study of community effects of the program in nine of the 14 study area counties reveals that:

(1) The total community (nine-county area) net income due to the program was about a quarter of a million dollars annually during 1958-66. However, some estimates were about $400,000 for 1965 and for 1966, and it appears that net income would have risen to about half a million dollars annually if the program had continued in the nine counties at about the 1963-66 level of annual investment;

(2) Net or household income was less than 30 percent of gross transactions for all local economic sectors; most of the estimated net income multipliers for the economic sectors were between 3.0 and 4.0;

(3) Until 1966, estimated annual community income derived from Federal expenditures in cost-sharing exceeded the estimates of such income arising from increases in farm production due to the program;

(4) The maximum amount estimated for annual community net income due to the program was less than 1 percent of personal income for the nine counties in 1959; and

(5) The program, whose primary purpose, of course, is to conserve soil, does not seem to contribute significantly to economic development of participating areas nor does it appear to increase employment or bring a more equal income distribution in these areas.

# AN ECONOMIC EVALUATION OF THE GREAT PLAINS CONSERVATION PROGRAM

by

James Kasal and W.B. Back 1/

## INTRODUCTION

### Historical Background

The semiarid region called the Great Plains makes up about one-fifth of the land area of the contiguous 48 States. The Great Plains area extends from the Mexican border on the south to the Canadian border on the north, and from about the 98th meridian on the east to the foothills of the Rocky Mountains on the west. The area includes about 400 counties within the 10 States of Montana, North Dakota, South Dakota, Wyoming, Colorado, Nebraska, Kansas, Oklahoma, New Mexico, and Texas.

Farmers and ranchers in the Great Plains can expect long periods of dry or humid weather. The drought with accompanying depression of the 1930's was a major blow to these farmers and ranchers. Many farms and ranches did not survive as going concerns, as was reflected in the sharp reduction in the Census count of their numbers during the thirties. Drought returned to the Great Plains in 1952 and persisted until 1957 in the central and southern plains. Dust storms also recurred but with less severity than in the 1930's. Nevertheless, the situation in the 1950's seemed to warrant renewed attention and action on conservation problems in the region.

As early as 1940, the Great Plains Agricultural Council had stated that poorer cropland needed restoration to permanent vegetative cover, and that less emphasis should be placed on crop farming and more on livestock farming in the region. 2/ In 1949, the Great Plains Agricultural Council had again suggested that adjustments in land use were needed. The Council recommended that farmers make these adjustments in a period of prosperity rather than waiting for a drought. 3/ The Council's suggestions were more specific in 1950: (1) Land in soil capability classes V, VI, and VII should be regrassed as soon as possible; (2) high price supports should be recognized as deterrents to such regrassing; and (3) a mechanism should be set up for distributing cost-sharing payments for regrassing over 2 or more years. 4/

The 1952 drought was the main discussion topic at a conference of agricultural leaders during late May and early June of 1955. The report on this conference, entitled "Guides to a Successful Long Range Program in the Great Plains," contained two propositions relevant to the emerging Great Plains Conservation Program: (1) Legislation should be sought to authorize forward commitments in cost-sharing for measures requiring more than 1 year for establishment, and (2) major adjustments in land use should be arranged by contract between landowners and governments. The guidelines were considered and approved by the Great Plains Agricultural Council at a meeting in July 1955.

---

1/ Agricultural economists, Natural Resource Economics Division, Economic Research Service.

2/ Proceedings of the Great Plains Agricultural Council, 1940.

3/ Proceedings of the Great Plains Agricultural Council, 1949.

4/ Proceedings of the Great Plains Agricultural Council, 1950.

President Eisenhower sent a message to the Congress in January 1956, expressing concern about problems in the Great Plains and urging consideration and action during the 1956 legislative session. Earlier in his agricultural message, the President had requested additional legislative authority to make long-term contracts with farmers for the use of diverted acres in the interest of soil and water conservation. In May 1956, the Acting Secretary of Agriculture, True D. Morse, transmitted to both Houses of Congress a proposed amendment to Section 16 of the Soil Conservation and Domestic Allotment Act. A bill passed by the Congress became Public Law 84-1021 with the President's signature on August 7, 1956.

Public Law 84-1021 authorized forward cost-sharing arrangements between Great Plains farm or ranch operators and the Federal Government. The major purposes were to bring about permanent changes in cropping systems and land uses and to install soil and water conservation measures needed under such changed systems and uses. The Great Plains Conservation Program (GPCP) was formally launched after this authorization.

The GPCP represents a major experience with long-term, cost-sharing arrangements that is of sufficient duration for a research analysis of the results. The major purpose of the study reported on here was to provide an economic evaluation of such experience since 1956. Because the GPCP's contracting authority is scheduled to expire in 1971, results of the study should be useful in forming any new soil conservation policy for the Great Plains. Extension of the program beyond 1971 appears assured.

## Objectives of the Study

The major objectives of the study were:

(1) To estimate physical and economic consequences of the GPCP with special reference to (a) income of cooperating farmers and ranchers, (b) impacts on communities and the region, and (c) interrelationships with other operating Government programs in the region; and

(2) To assess advantages and disadvantages of long-term contracts with landowners and operators in achieving conservation objectives.

## Study Procedures

A survey of 153 participants and 217 nonparticipants in the GPCP during 1967 provided most of the primary information for the study. Additional procedures included:

(1) Reviewing legal, administrative, and other documents relating to the origin, purposes, and administration of the GPCP;

(2) Assembling and summarizing information from contracts with operators in the central Great Plains and from records of the Soil Conservation Service (SCS), such as expenditures by years, States, and practices; and,

(3) Assembling and analyzing secondary data relating to (a) transactions among farm and nonfarm sectors in a nine-county area of the central Great Plains and (b) distribution of benefits from the program.

The survey took place in 14 contiguous counties in the central Great Plains--nine in northwestern Kansas and five in eastern Colorado. 5/ Sampling procedures for the survey are presented in appendix A.

## SELECTED CHARACTERISTICS OF THE GREAT PLAINS CONSERVATION PROGRAM

Significant features of the GPCP are: (1) contracts with operators for a period of 3 to 10 years encompassing time schedules for land uses and including conservation measures to be installed for entire farm or ranch operating units, and (2) forward commitment in cost-sharing to install conservation measures for the duration of the contracts. The Federal share of estimated average costs generally varies from 50 to 80 percent among the authorized conservation practices (app. table 1). Eligible participants are farm operators living in the designated counties who will control farm or ranch units--either through ownership or lease--for the anticipated periods of the contracts.

Public Law 84-1021 provides that acreage allotments or marketing quotas held by operators will not be reduced or lost because of land-use changes made in accordance with the contracts. Although the major intent of the program is to institute permanent land-use changes, operators are free to return any land to crops after the contract period has ended. Long-term, or forward, commitment in cost-sharing, as well as consideration of the whole farm instead of segments of farms, is a significant feature of the program. (All eligible practices under the GPCP are also eligible under the Agricultural Conservation Program (ACP); however, the ACP includes many more eligible practices.)

### Federal Expenditures in Cost-Sharing

The means of accomplishing the purposes of the GPCP are embodied in the 24 authorized practices (app. B). These practices were classified to simplify summarizing information about Federal expenditures in cost-sharing in the 10 Great Plains States. Practices were grouped by major purposes and by kinds of land to which the practices were applied (cropland or rangeland). Only one practice, GP-1, relates specifically to establishing permanent vegetation on land used, or formerly used, as cropland. The classes and practices are:

| Class and description of practice | Practice number |
|---|---|
| I.--Land-use change | GP-1 |
| II.--Cropland conservation | GP-2, 3, 4 |
| III.--Water management and related conservation practices specific to cropland | GP-7, 8, 9 |
| IV.--Irrigation | GP-15, 16, 17, 18 |
| V.--Rangeland management and conservation | GP-5, 23, 24 |
| VI.--Water management and related conservation practices specific to noncropland (range and pasture) | GP-10, 19, 20, 21, 22 |
| VII.--Water management and related conservation--general | GP-11, 12, 13, 14 |
| VIII.--Other | GP-6, 25 |

5/ The counties are Cheyenne, Greeley, Hamilton, Logan, Rawlings, Sherman, Thomas, Wallace, and Wichita in Kansas; and Cheyenne, Kiowa, Kit Carson, Prowers, and Yuma in Colorado. Availability of data from previous studies of these counties was a major reason for their selection. The area was not considered typical of the entire Great Plains region, as no single 14-county area could be.

Total Federal expenditures in cost-sharing for the study area during 1958-66 were about $56 million. 6/ Expenditure distribution among practices and designated classes of practices is shown in table 1. The eight practices with the highest Federal expenditures accounted for more than 75 percent of total Federal expenditures in cost-sharing. In contrast, the eight practices with the lowest Federal expenditures accounted for less than 4 percent of such expenditures from 1958 to 1966. 7/

Slightly less than 15 percent of Federal expenditures were for conversion of cropland, or former cropland, to permanent vegetative cover (class I) in 1958-66. Yet, during 1956 hearings on the proposed legislation, USDA administrators had anticipated that about three-fourths of the $150 million authorized for Federal expenditures and obligations for the 15-year period ending December 31, 1971, would be used to regrass about 10 million acres of cropland. 8/ Of actual Federal expenditures during 1958-66, about a fourth were for improving vegetative cover on rangeland (class V); more than 20 percent were for water management and related practices specific to rangeland (class VI); and about 15 percent were for installing irrigation practices.

Distribution of Federal expenditures among classes of practices differed markedly among States during 1958-66 (table 2). Montana, Nebraska, and North Dakota allocated a high proportion of these funds (over 25 percent) to class I (regrassing); Kansas, New Mexico, and Wyoming devoted a relatively low proportion of Federal funds to regrassing (less than 10 percent). Apparently, resource situations of program participants differ considerably by State; that is, a relatively high proportion of expenditures in New Mexico, Oklahoma, South Dakota, and Texas were for class V and VI practices--those primarily associated with ranching operations. State distribution of soils with high risk of wind or water erosion is not known.

As of December 31, 1966, nearly a third of total Federal expenditures for cost-sharing with operators were in Texas. These expenditures--totaling over $18 million--exceeded the combined totals for Montana, North Dakota, Oklahoma, South Dakota, and Wyoming. The least amount of expenditures was in Wyoming (2.3 percent of the total). Texas led in proportion of farms participating--nearly 17 percent--and New Mexico led in proportion of land under contract--about one-fourth.

Restrictions exist on cost-sharing for some of the practices. For example, construction of floodways, levees, or dikes (GP-13) is not approved if the primary purpose is to bring new land into agricultural production. Also Federal cost-sharing is not allowed for leveling land for irrigation (GP-16) when the primary purpose is to bring into agricultural production land that had not been devoted to cultivated crops or that had not normally been seeded for hay or pasture, during at least 2 of the preceding 5 years.

Until June 1, 1959, total Federal cost-sharing per contract had no limitations. Between June 1, 1959 and June 5, 1961, there was a limit of $2,500 per year for each contract. Since June 1961, Federal cost-sharing has been limited to a total of $25,000 per contract.

---

6/ At the time these data were summarized, FY 1966 was the last year of record.

7/ Information is not available for estimating effects of the region's other operating conservation programs, such as the ACP, on distribution of GPCP funds among practices or geographical areas.

8/ U.S. House of Representatives, Committee on Agriculture, 84th Cong., 2d sess., Great Plains Conservation Program: Report to Accompany H.R.11833, H. Rept. 2640, July 7, 1956, pp. 3-5.

Table 1.--Distribution of Federal expenditures in cost-sharing among classes of practices, by practices, 14-county study area, 1958-66 1/

| Practice | Class of practices 2/ | | | | | | | | Array | Cumulative total |
|---|---|---|---|---|---|---|---|---|---|---|
| | I | II | III | IV | V | VI | VII | VIII | | |
| | Pct. | | | | | | | | Pct. | Pct. |
| GP-1 | 14.6 | - | - | - | - | - | - | - | 14.6 | 14.6 |
| GP-23 | - | - | - | - | 12.0 | - | - | - | 12.0 | 26.6 |
| GP-21 | - | - | - | - | - | 10.4 | - | - | 10.4 | 37.0 |
| GP-8 | - | - | 10.4 | - | - | - | - | - | 10.4 | 47.4 |
| GP-5 | - | - | - | - | 9.2 | - | - | - | 9.2 | 56.6 |
| GP-19 | - | - | - | - | - | 7.5 | - | - | 7.5 | 64.1 |
| GP-15 | - | - | - | 6.4 | - | - | - | - | 6.4 | 70.5 |
| GP-16 | - | - | - | 5.3 | - | - | - | - | 5.3 | 75.8 |
| GP-11 | - | - | - | - | - | - | 3.9 | - | 3.9 | 79.7 |
| GP-24 | - | - | - | - | 3.1 | - | - | - | 3.1 | 82.8 |
| GP-22 | - | - | - | - | - | 3.0 | - | - | 3.0 | 85.8 |
| GP-7 | - | - | 2.7 | - | - | - | - | - | 2.7 | 88.5 |
| GP-14 | - | - | - | - | - | - | 2.5 | - | 2.5 | 91.0 |
| GP-9 | - | - | 2.1 | - | - | - | - | - | 2.1 | 93.1 |
| GP-6 | - | - | - | - | - | - | - | 1.6 | 1.6 | 94.7 |
| GP-18 | - | - | - | 1.5 | - | - | - | - | 1.5 | 96.2 |
| GP-2 | - | 0.9 | - | - | - | - | - | - | 0.9 | 97.1 |
| GP-3 | - | 0.7 | - | - | - | - | - | - | 0.7 | 97.8 |
| GP-12 | - | - | - | - | - | - | 0.6 | - | 0.6 | 98.4 |
| GP-17 | - | - | - | 0.5 | - | - | - | - | 0.5 | 98.9 |
| GP-20 | - | - | - | - | - | 0.5 | - | - | 0.5 | 99.4 |
| GP-10 | - | - | - | - | - | 0.4 | - | - | 0.4 | 99.8 |
| GP-13 | - | - | - | - | - | - | 0.2 | - | 0.2 | 100.0 |
| GP-4 | - | 3/ | - | - | - | - | - | - | 3/ | 100.0 |
| Total | 14.6 | 1.6 | 15.3 | 13.7 | 24.3 | 21.8 | 7.2 | 1.6 | 100.0 | 100.0 |

1/ Columns may not add to totals due to rounding.
2/ The 24 practices were classified by major purposes and by kinds of land to which the practices were applied (cropland or rangeland). Specific class breakouts are shown in the text tabulation.
3/ Less than 0.05 percent.

## Farms and Acreage Included in the Program

As of December 31, 1966, there were about 30,000 cumulative applications for GPCP contracts, and 25,334 had been signed. Of those signed, 1,080 had been terminated for cause or by mutual consent. The remaining 24,254, the effective contracts (including those expired), encompassed about 46 million acres of farmland and rangeland. 9/ These contracts represented 9.4 percent of the operators and 13.8 percent of the farmland in the 407 designated counties.

As of June 30, 1968, about 30,000 cumulative contracts were in effect (including those expired but excluding those terminated for cause or by mutual consent). These contracts, representing about 12 percent of the operators in the designated counties,

9/ Operators with expired contracts were included with operators having active contracts to give a truer picture of GPCP effects.

Table 2.--Distribution of Federal expenditures in cost sharing among classes of practices under the GPCP, by State, fiscal years 1958-66 1/

| State | Federal expenditures as percentage of State totals in class of practices-- | | | | | | | | State totals | Total expenditures | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | I | II | III | IV | V | VI | VII | VIII | | Amount | As percentage 10-State total |
| | Pct. | | | | | | | | Pct. | 1,000 dol. | Pct. |
| Colorado | 11.3 | 0.8 | 13.0 | 24.9 | 12.8 | 30.4 | 6.4 | 0.4 | 100.0 | 5,599 | 10.0 |
| Kansas | 8.5 | 0.2 | 34.7 | 14.3 | 17.5 | 17.3 | 6.9 | 0.7 | 100.0 | 4,674 | 8.4 |
| Montana | 27.2 | 3.6 | 1.8 | 9.6 | 14.6 | 17.1 | 23.1 | 3.0 | 100.0 | 3,431 | 6.2 |
| Nebraska | 26.8 | 1.2 | 27.2 | 9.1 | 8.0 | 16.3 | 8.1 | 3.3 | 100.0 | 6,858 | 12.3 |
| New Mexico | 4.6 | 0.1 | 2.9 | 12.2 | 37.4 | 27.9 | 14.8 | 0.2 | 100.0 | 4,528 | 8.1 |
| North Dakota | 34.8 | 13.6 | 5.7 | 7.0 | 3.2 | 22.6 | 3.7 | 9.3 | 100.0 | 3,867 | 6.9 |
| Oklahoma | 10.0 | 2/ | 16.4 | 10.5 | 18.0 | 39.7 | 5.3 | 2/ | 100.0 | 4,226 | 7.6 |
| South Dakota | 12.0 | 1.6 | 11.5 | 2.9 | 6.1 | 52.8 | 9.2 | 4.0 | 100.0 | 3,140 | 5.6 |
| Texas | 10.1 | 2/ | 15.4 | 16.9 | 44.8 | 11.5 | 1.1 | 2/ | 100.0 | 18,066 | 32.3 |
| Wyoming | 9.1 | 0.7 | 4.4 | 16.4 | 9.8 | 28.2 | 30.6 | 0.8 | 100.0 | 1,436 | 2.6 |
| Weighted average or total | 14.6 | 1.6 | 15.3 | 13.7 | 24.3 | 21.8 | 7.2 | 1.6 | 100.0 | 55,875 | 100.0 |

1/ Percentages may not add to State totals due to rounding to nearest 0.1 percent.
2/ Less than 0.05 percent.

encompassed nearly 55 million acres of farmland and rangeland--about 16 percent of the total in these counties. 10/

## CHARACTERISTICS OF STUDY AREA

The 14-county study area has problems--many of them severe--that are similar to problems intended for solution by the GPCP.

According to data obtained in the recent Conservation Needs Inventory conducted by SCS, about 11.5 million acres in the study area were in farm and ranch uses. Of this total, about 6.6 million acres, 57 percent, were used as cropland; the remainder was primarily used as rangeland.

About 1.2 million acres of cropland--nearly 20 percent of total cropland in the area--consisted of soils in land capability class IV. Another 540,000 acres--more than 8 percent of that cropland--were composed of soils in classes V through VIII. Land in these classes is subject to wind and water erosion unless regrassed. The Conservation Needs Inventory recommended that nearly all these lands be regrassed. Rangeland, comprising about 40 percent of total farmland in the 14-county area, is subject to wind or water erosion if overgrazed.

The economy of the study area is primarily agricultural. Typically, farms are large and well-managed. Wheat and grain sorghum are the principal dryland cash crops. In recent years, irrigation has increased significantly, a development that has, in turn, increased the significance of such crops as corn and sugar beets. Also, minor crops such as grass seed are important on some farms. The main livestock enterprise is beef cattle, and the typical system is the production of feeders for spring marketing as wintered calves or for fall marketing as yearlings. Drylot feeding of livestock is increasing. Livestock activity provides a major source of income for some farms.

Participation in the Great Plains Conservation Program has been about the same for the 14 study counties and the 407 designated counties in the entire Great Plains region. As of December 31, 1966, the 669 effective contracts in the study area encompassed approximately 1.2 million acres of farmland. Of study area farms, 9.6 percent had contracts, compared with 9.4 percent of farms in the 407 counties. Contracts for study area farms encompassed 11 percent of farmland, compared with 13.8 percent of farmland in the 407 counties. The average obligation of Federal funds per acre under contract was $2.26 in the study area, compared with $1.78 in 407 counties.

## PROFILE OF PARTICIPANTS AND NONPARTICIPANTS

In designing the survey, the researchers considered that a major distinguishing characteristic of participants and nonparticipants in the GPCP would be their resource situation based on size of operating unit, proportion of operating unit in rangeland, and tenure of operator. Other characteristics considered worthy of study were the operator's age, income, education, experience in other Federal programs, and attitudes toward conservation.

### Resource Situations

A distribution of participants and nonparticipants by the resource classification devised for this study is presented in table 3. A chi-square statistical test revealed that the unequal distribution of participants and nonparticipants among items in the table was highly significant. On the basis of the distribution data, it is

10/ The expressed percentages of operators and farmland were based on number of farms and acreage of farmland reported in the 1964 Census of Agriculture.

evident that the participation rate in the Great Plains Conservation Program is higher for (1) large farms than for small farms, (2) units with 50 percent or more of acreage in rangeland than for units with less than 50 percent, and (3) full owners than for other tenure groups.

Because only about 10 percent of the study area's farm operators participated in the program, one would expect the nonparticipant sample to fairly well represent the population of all farms in respect to land resource situations. Comparison of data from the nonparticipant sample with comparable data from the 1964 Census of Agriculture provided the only available test of this expectation. When farms of less than 10 acres were excluded, distribution of farms in the 14-county area by size-group according to the Census was: 50.8 percent, less than 1,000 acres; 28.1 percent, 1,000-1,999 acres; and 21.1 percent, 2,000 acres or more. 11/ This distribution does not appear to differ significantly from the distribution for nonparticipants: 50.2, 29.0, and 20.7 percent for the three size-groups. Evidently, the nonparticipant sample is adequate for identifying characteristics associated with participation in the GPCP.

More than 40 percent of the participants operated farms of 2,000 acres or more, yet only about 20 percent of study area farms were in this size-group. Less than a third of the participants operated farms of less than 1,000 acres, yet about 50 percent of study area farms were of this size. The proportion of participants with operating units in the middle-sized group, 1,000-1,999 acres, was about the same as the proportion these farms were of all study area farms.

For operating units of less than 2,000 acres, little if any relationship exists between participation rates and proportion of operating units in rangeland. For those units of 2,000 acres or more, participation in the program seems to have been at much higher rates for those with more than 50 percent of acreage in rangeland than for those with less than 50 percent. The latter relationship may have arisen because crop farmers and small ranchers were more reluctant to participate in the program.

Participation rates were higher for full owners than for other tenure groups (table 3). This resulted from the relatively high participation of (1) full owners, in all size-groups, with less than 50 percent of acreage in rangeland; and (2) full owners in larger size-groups, with more than 50 percent of acreage in rangeland. Apparently, type of farming is not a major obstacle to participation in the program for full owners, but size of farm does matter for ranching units. Tenants and part owners participate infrequently if operating the smaller crop farms. Many tenants are ineligible for participation because they cannot get leases for the duration of contracts. Only five of the 153 participants interviewed were full tenants.

Distribution of study area farms by tenure of operator was fairly well represented by the nonparticipant sample. The 1964 Census of Agriculture indicates that about 23 percent of farm operators in the study area were full tenants. Of the 36 nonparticipant full tenants interviewed, 27 had less than 50 percent of acreage in rangeland. Also, 26 of the 36 tenants were operating farms of less than 1,000 acres. Of full tenants on farms of less than 1,000 acres, 22 had less than 50 percent of acreage in rangeland. Thus, full tenants in the study area operate primarily the smaller sized units and emphasize crop rather than livestock production.

---

11/ Farms of less than 10 acres were excluded from both samples.

Table 3.--Number and percentage of participants and nonparticipants in the GPCP, by resource situation, 14-county study area, 1967

| Percentage of operation unit | Participants with operating units of-- | | | | | | Total participants | |
|---|---|---|---|---|---|---|---|---|
| | 0-999 acres | | 1,000-1,999 acres | | 2,000 or more acres | | | |
| | No. | Pct. 1/ | No. | Pct. 1/ | No. | Pct. 1/ | No. | Pct. 1/ |
| Less than 50: | | | | | | | | |
| Full owners | 13 | 8.5 | 6 | 3.9 | 2 | 1.3 | 21 | 13.7 |
| Other operators | 8 | 5.2 | 24 | 15.7 | 22 | 14.4 | 54 | 35.3 |
| Total | (21) | (13.7) | (30) | (19.6) | (24) | (15.7) | (75) | (49.0) |
| 50-100: | | | | | | | | |
| Full owners | 10 | 6.5 | 8 | 5.2 | 11 | 7.2 | 29 | 19.0 |
| Other operators | 7 | 4.6 | 11 | 7.2 | 31 | 20.3 | 49 | 32.0 |
| Total | (17) | (11.1) | (19) | (12.4) | (42) | (27.5) | (78) | (51.0) |
| All participants | 38 | 24.8 | 49 | 32.0 | 66 | 43.1 | 153 | 100.0 |
| | Nonparticipants with operating units of-- | | | | | | Total Nonparticipants | |
| | 0-999 acres | | 1,000-1,999 acres | | 2,000 or more acres | | | |
| | No. | Pct. 1/ | No. | Pct. 1/ | No. | Pct. 1/ | No. | Pct. 1/ |
| Less than 50: | | | | | | | | |
| Full owners | 21 | 9.7 | 3 | 1.4 | 1 | 0.5 | 25 | 11.5 |
| Other operators | 49 | 22.6 | 38 | 17.5 | 22 | 10.1 | 109 | 50.2 |
| Total | (70) | (32.3) | (41) | (18.9) | (23) | (10.6) | (134) | (61.8) |
| 50-100: | | | | | | | | |
| Full owners | 19 | 8.8 | 8 | 3.7 | 2 | 0.9 | 29 | 13.4 |
| Other operators | 20 | 9.2 | 14 | 6.5 | 20 | 9.2 | 54 | 24.9 |
| Total | (39) | (18.0) | (22) | (10.1) | (22) | (10.1) | (83) | (38.3) |
| All non-participants | 109 | 50.2 | 63 | 29.0 | 45 | 20.7 | 217 | 100.0 |

1/ Detail may not add to totals due to rounding.

For full owners, whether participants or nonparticipants, little change occurred in acreage of operating unit or range and pasture land during 1962-67. Slight decreases in these acreages occurred for full owners with operating units of less than 1,000 acres. Slight increases in size of unit occurred for full owners with operating units of more than 1,000 acres (table 4).

During the same period, little change in acreage occurred for other operators having operating units of less than 1,000 acres. However, operators with operating units of 1,000 acres or more did increase the size of their units from 1962 to 1967. Thus, operators other than full owners tended to increase farm size, unless they operated farms with less than 1,000 acres; full owners held an approximately constant acreage. There does not appear to be a difference between participants and nonparticipants in these trends.

## Income

More than 53 percent of participants reported annual gross sales of farm products of $20,000 or more. Only 30 percent of nonparticipants had gross sales of this amount. Nearly 72 percent of participants reported annual gross sales exceeding $10,000, compared with about 55 percent of nonparticipants.

Generally, full-owner operators had lower incomes than other tenure groups, although their participation rates were higher (fig. 1). However, among full owners, participation rates increased as farm income increased. Full owners with gross sales in excess of $40,000 had the highest rate of participation in the GPCP.

About 63 percent of participants and 59 percent of nonparticipants received over 90 percent of their net income from farming operations. However, classifying participants and nonparticipants by tenure group reveals that significantly fewer full owners received over 90 percent of their income from farming (table 5). Generally, participants tended to be more dependent on farm income than nonparticipants. More than a fourth of full-owner nonparticipants obtained over half their net income from nonfarm sources. Most of these full owners operated farms of less than 1,000 acres. Other participants or nonparticipants who were more dependent on nonfarm than farm income also were mainly operators of smaller farms.

## Age

Although participants and nonparticipants differed little in average age (49.5 and 51.9 years, respectively), their age distribution differed significantly (fig. 2). 12/ The participation rate was low for both older farmers (65 years or over) and younger farmers (under 35 years). The relatively low rate of participation for younger farmers apparently was due to their concentration in resource situations where factors such as tenure, farm size, or type of farming explained such low rates. Also, shortage of capital may have contributed to low participation rates for young operators.

## Education

The average number of years of school completed was slightly higher for participants than nonparticipants (11.1 and 10.3). However, a significantly higher proportion of participants had completed 1 or more years of college than had nonparticipants and a significantly lower percentage of participants than nonparticipants had completed less than 8 years of school (fig. 3). 12/ For farmers completing 8 to 12 years of school, education was not related significantly to participation in the GPCP.

12/ Determined by chi-square statistical tests.

Table 4.--Average acreages in range and pasture for participants and nonparticipants in the GPCP, by resource situation, 14-county study area, 1962 and 1967

| Resource situations in 1967 | Average acreages for-- | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Participants | | | | Nonparticipants | | | |
| | 1962 | | 1967 | | 1962 | | 1967 | |
| | Range and pasture | Total operating unit | Range and pasture | Total operating unit | Range and pasture | Total operating unit | Range and pasture | Total operating unit |
| | Acres | | | | | | | |
| Full owners with operating units of-- | | | | | | | | |
| Less than 1,000 acres: | | | | | | | | |
| Less than 50 percent in rangeland | 109 | 554 | 106 | 512 | 81 | 474 | 67 | 388 |
| 50-100 percent in rangeland | 362 | 541 | 368 | 519 | 427 | 636 | 343 | 498 |
| 1,000 acres or more: 1/ | | | | | | | | |
| Less than 50 percent in rangeland | 433 | 1,581 | 373 | 1,599 | 465 | 1,860 | 564 | 1,860 |
| 50-100 percent in rangeland | 2,880 | 3,484 | 3,167 | 3,788 | 1,193 | 1,660 | 1,101 | 1,487 |
| Other operators with operating units of-- | | | | | | | | |
| Less than 1,000 acres: | | | | | | | | |
| Less than 50 percent in rangeland | 189 | 716 | 159 | 643 | 90 | 594 | 87 | 598 |
| 50-100 percent in rangeland | 574 | 831 | 566 | 870 | 420 | 757 | 400 | 683 |
| 1,000-1,999 acres: | | | | | | | | |
| Less than 50 percent in rangeland | 300 | 1,476 | 313 | 1,561 | 218 | 1,275 | 246 | 1,415 |
| 50-100 percent in rangeland | 805 | 1,369 | 897 | 1,516 | 699 | 1,274 | 820 | 1,410 |
| 2,000 or more acres: | | | | | | | | |
| Less than 50 percent in rangeland | 756 | 2,752 | 877 | 3,241 | 741 | 3,303 | 869 | 3,935 |
| 50-100 percent in rangeland | 4,459 | 5,588 | 5,058 | 6,186 | 2,409 | 3,809 | 4,000 | 4,100 |

1/ Full owners with 1,000-1,999 acres were combined with full owners having 2,000 acres or more to increase the numbers of farms per resource situation and thus, the reliability of the averages.

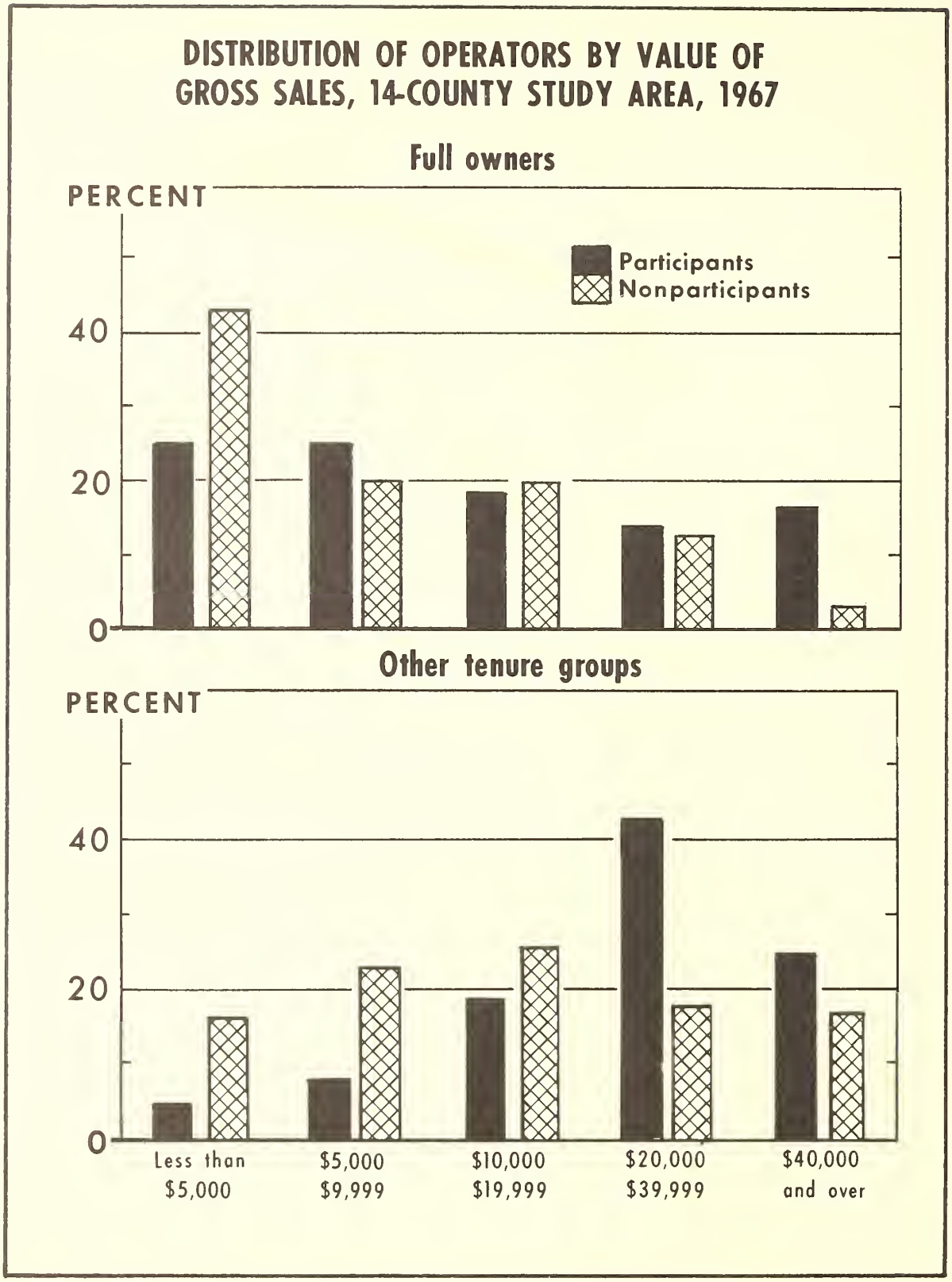
DISTRIBUTION OF OPERATORS BY VALUE OF GROSS SALES, 14-COUNTY STUDY AREA, 1967
Full owners
PERCENT
40
20
0
Participants
Nonparticipants
Other tenure groups
PERCENT
40
20
0
Less than $5,000
$5,000 $9,999
$10,000 $19,999
$20,000 $39,999
$40,000 and over

Figure 1

Table 5.--Tenure and GPCP participation by percentage of net income from farming, 14-county study area, 1967

| Ranges in percentage of net income from farming | Tenure of operator and participation in GPCP | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Full owners | | | | Other tenure groups | | | |
| | Participants | | Non-participants | | Participants | | Non-participants | |
| | No. | Pct. | No. | Pct. | No. | Pct. | No. | Pct. |
| 0 -50 | 7 | 14.3 | 14 | 25.9 | 12 | 11.8 | 19 | 11.7 |
| 51-90 | 17 | 34.7 | 15 | 27.8 | 16 | 15.7 | 42 | 25.8 |
| 91-100 | 25 | 51.0 | 25 | 46.3 | 74 | 72.5 | 102 | 62.6 |
| Total | 49 | 100.0 | 54 | 100.0 | 102 | 100.0 | 163 | 100.0 |

## Experience in Other Government Programs

A higher percentage of participants than nonparticipants have had experience in Federal conservation and credit programs, but a higher proportion of nonparticipants than participants have had experience in Federal feed-grain and wheat programs (table 6). The differences in participation rates in various Federal programs were expected to reflect differences in attitudes toward Federal programs in general and conservation in particular.

Nearly three-fourths of the participants said they had had experience with the ACP before joining the GPCP, and about one-third had undertaken conservation work under the ACP after signing GPCP contracts. Nonparticipants were questioned only about work done with ACP assistance in the past 5 years. About half had participated in the ACP during that period.

Differences in experience in conservation programs, particularly the Soil Conservation Service technical assistance program, appear to be an influential factor affecting participation in the GPCP. The participation rate is related to both attitudes about conservation and experience with other Federal soil conservation programs.

## Attitudes Relating to the GPCP

Participant and nonparticipant opinions of the GPCP were classified into four categories: approval (without qualification or reservation), mild approval (approval with some qualification or reservation), disapproval, and no response. In addition, nonparticipants gave responses that were put into two further categories--no opinion and other miscellaneous.

These opinions are summarized in figure 4. As expected, few participants disapproved of the program. Full-owner participants were expected to and did have fewer qualifications or reservations about the program. Unlike other tenure groups, full owners did not have to share some of the program benefits with nonresident landowners. Participants not responding perhaps had not enough experience with the program to state a categorical approval or disapproval.

Less than 30 percent of the nonparticipants in all tenure groups expressed approval of the program without qualification. About 20 percent gave responses indicating mild approval. Slightly more than 20 percent of full-owner nonparticipants expressed disapproval, and about 15 percent of nonparticipants in other tenure groups expressed disapproval. The nonparticipants giving "no opinion" responses represented about a fourth of all nonparticipants interviewed. The "other" and "no responses" were small percentages of responses of nonparticipants interviewed.

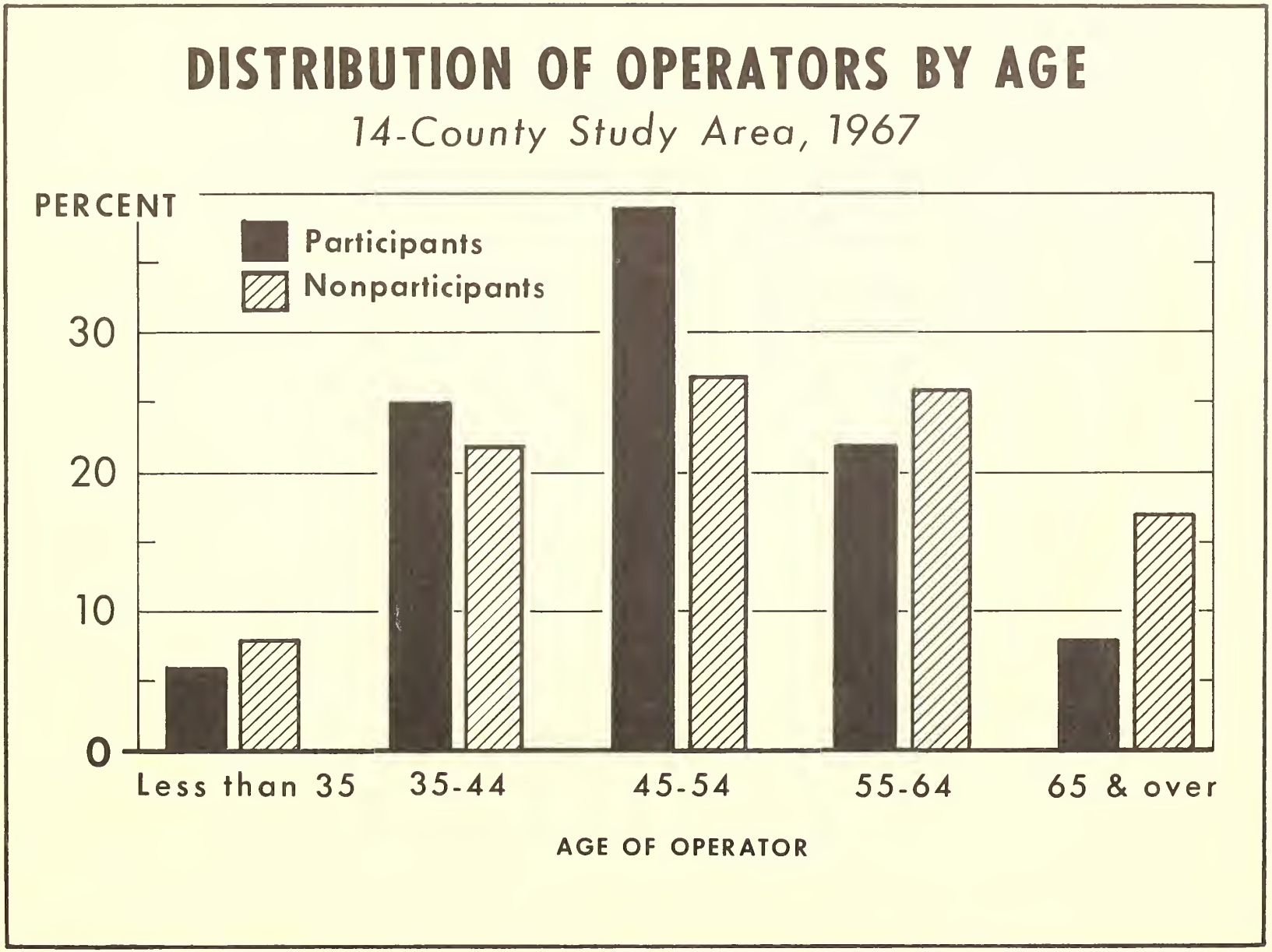
DISTRIBUTION OF OPERATORS BY AGE
14-County Study Area, 1967
PERCENT
Participants
Nonparticipants
30
20
10
0
Less than 35
35-44
45-54
55-64
65 & over
AGE OF OPERATOR

Figure 2

# DISTRIBUTION OF OPERATORS BY EDUCATION

*14-County Study Area, 1967*

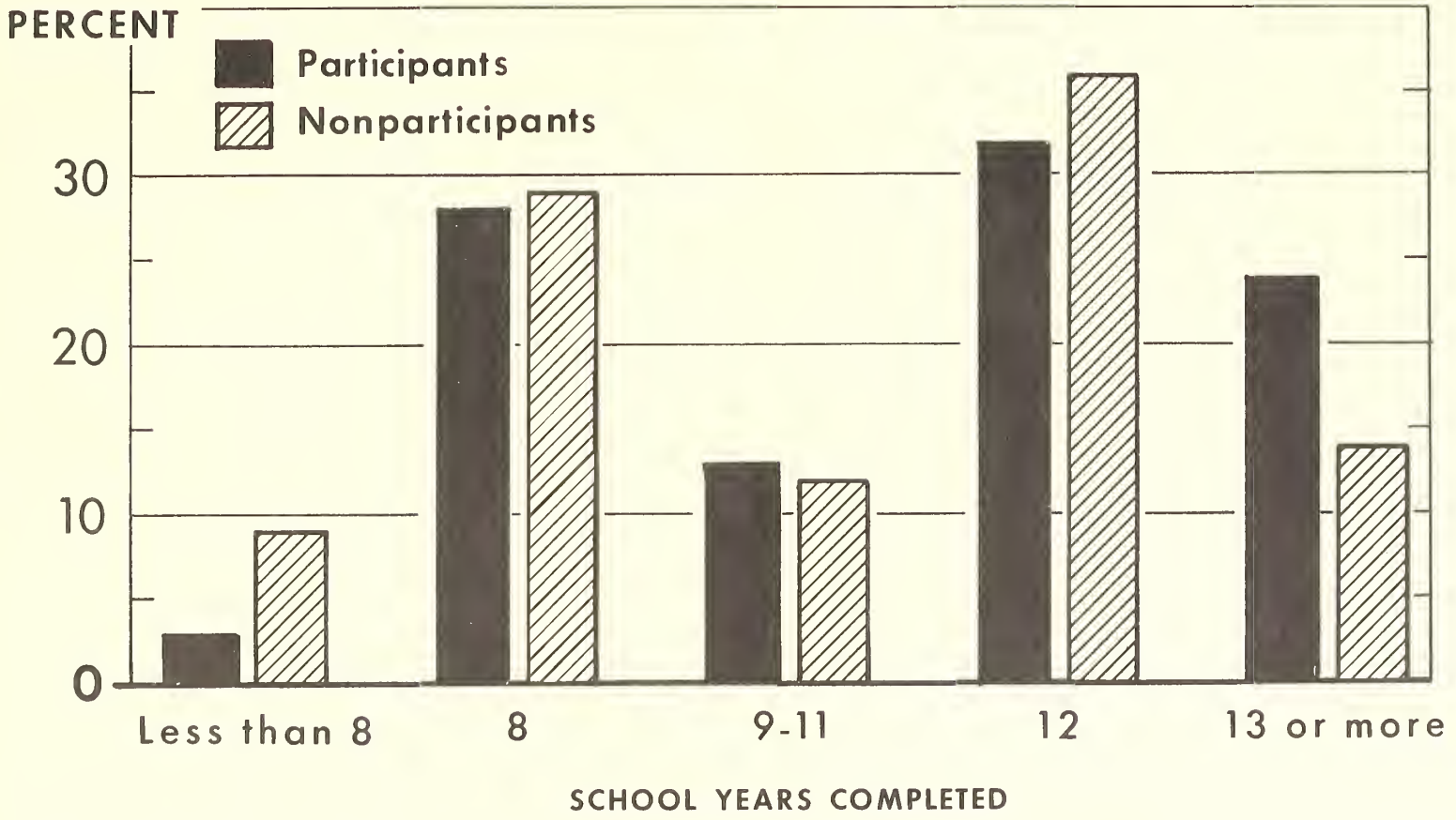


Figure 3

Table 6.--Percentage of participants and nonparticipants in the GPCP having other Government program experiences, by tenure of operator and by type of program, 14-county study area, 1967

| Program | Percentage having other Government program experience | | | | | |
|---|---|---|---|---|---|---|
| | Full owners | | Other operators | | All tenure groups | |
| | Participants | Nonparticipants | Participants | Nonparticipants | Participants | Nonparticipants |
| | Percent 1/ | | | | | |
| Conservation reserve | 30.0 | 20.4 | 32.0 | 13.5 | 31.4 | 15.2 |
| Feed-grain | 52.0 | 79.6 | 77.7 | 92.0 | 69.3 | 88.9 |
| Wheat | 66.0 | 81.5 | 83.5 | 95.1 | 77.8 | 91.7 |
| Federal crop insurance | 26.0 | 25.9 | 41.8 | 40.5 | 36.6 | 36.9 |
| Federal Land Bank | 36.0 | 25.9 | 29.1 | 25.7 | 31.4 | 25.8 |
| Production Credit Association | 14.0 | 9.3 | 28.2 | 12.3 | 23.5 | 11.5 |
| Farmers Home Administration | 20.0 | 13.0 | 16.5 | 11.0 | 17.7 | 11.5 |
| SCS technical assistance 2/ | 68.0 | 35.2 | 75.7 | 44.8 | 73.2 | 42.4 |
| None 3/ | 2.0 | 9.3 | 1.0 | 1.2 | 1.3 | 3.2 |

1/ Totals used to derive the percentages for individual columns.

2/ Responses of nonparticipants were based upon the question of whether their conservation practices ever were carried out because of SCS advice; thus, these responses may overstate actual participation in the SCS technical assistance program by nonparticipants in the GPCP.

3/ Excludes SCS technical assistance.

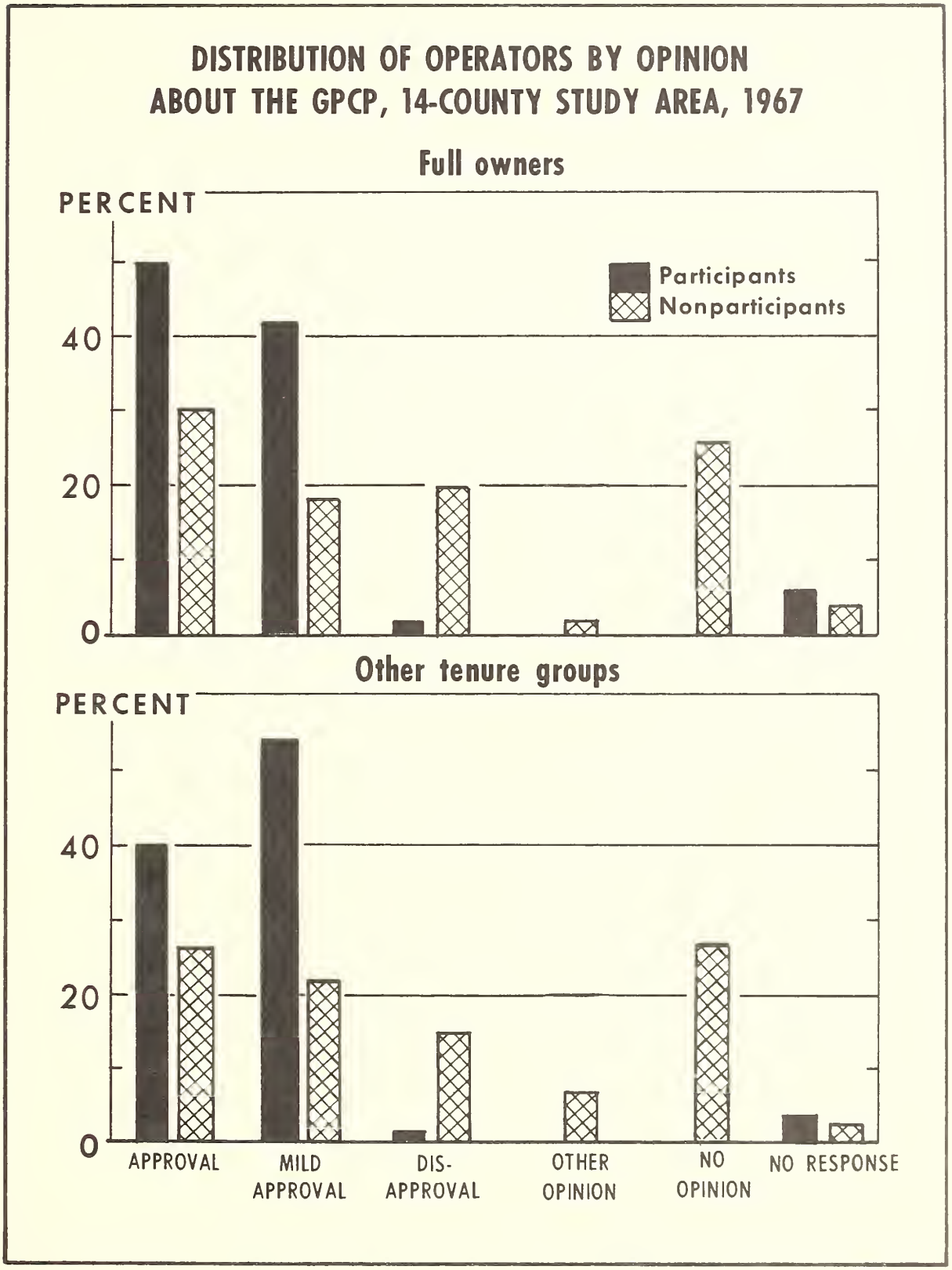
DISTRIBUTION OF OPERATORS BY OPINION
ABOUT THE GPCP, 14-COUNTY STUDY AREA, 1967
Full owners
PERCENT
40
20
0
Participants
Nonparticipants
Other tenure groups
PERCENT
40
20
0
APPROVAL
MILD APPROVAL
DIS-APPROVAL
OTHER OPINION
NO OPINION
NO RESPONSE

Figure 4

Nonparticipant operators expressing approval of the program, with or without qualification, were younger and had more education than nonparticipants giving other responses (disapproval, no response, no opinion, and so forth). 13/

Of the 217 nonparticipants, 72 had not heard of the program before their interview. The remaining 145 had heard about the program from the same major sources as the participants. Only about one-fourth (53) of the nonparticipants said they had considered applying for participation in the GPCP. Of these, 13 had applied. Ten of these said they no longer intended to participate, and three planned to participate. One of the three had signed a contract, but work had not begun.

When asked why they chose not to participate, about 31 percent of the nonparticipants gave no response. About 70 percent of those not responding operated farms of less than 1,000 acres. Also, about two-thirds of the nonrespondents were mainly crop farmers having less than 50 percent of the operating unit in rangeland. The 150 nonparticipants responding to the question gave the following reasons for lack of participation: Too many restrictions or an aversion to long-term commitment (57 respondents), program did not meet needs or work not needed (40), inadequate understanding of program (30), Federal share of cost inadequate (9), and other reasons (14).

## ANTICIPATED AND ESTIMATED BENEFITS OF THE GPCP

Participants were asked to indicate the most important reason for their participation in the GPCP from a preselected list of possible reasons. The list of reasons and the percentage of responses are:

| Main reason for participation in the GPCP | Responses by participants |
|---|---|
| | Pct. |
| Reduce soil erosion | 20.85 |
| Increase water supply or use water more efficiently | 14.66 |
| Increase production | 13.68 |
| Increase livestock operation | 11.40 |
| Increase land values | 9.45 |
| Reduce risk due to extreme weather hazards | 9.45 |
| Take advantage of Government assistance | 6.51 |
| Increase income | 5.44 |
| Improve wildlife habitat | 3.92 |
| Reduce farm workload | 2.93 |
| Other | 1.63 |

Only two reasons in this list relate directly to the major purposes of the GPCP--to reduce soil erosion and to reduce risk due to extreme weather hazards. These reasons together accounted for about 30 percent of the responses. Increasing water supply and efficiency in water use, increasing livestock operations, increasing production, and increasing land values are interrelated; all reflect motives to increase income and wealth. These four reasons together accounted for about 55 percent of the responses.

About three-fourths of the participants said benefits they received from the program were about the same as they had expected. Only 7 percent said benefits were less than expected, and 16 percent, more than expected. Three participants either expressed no opinion or did not respond.

13/ Chi-square statistical tests of the differences in age and in educational distribution between these 2 classes of nonparticipants resulted in statistical significance between the 90- and 95-percent levels of probability.

More than two-thirds of the participants believed that the program had decreased soil erosion, reduced risk due to extreme weather hazards, and increased the water supply, the efficiency of water use, and the value of the land they operated (table 7). Also, the majority thought participation in the program had resulted in increased livestock and crop production and in improved wildlife habitat.

Table 7.--Participants in the GPCP expressing changes in resources and farm operations due to the GPCP, by type of resource or farm operation, 14-county study area, 1967

| Type of resource or farm operation | Change due to the GPCP | | | | |
|---|---|---|---|---|---|
| | Increase | Decrease | No change | Don't know | No response |
| | Number | | | | |
| Soil erosion | 3 | 130 | 18 | 0 | 2 |
| Risk due to extreme weather hazards | 8 | 121 | 23 | 0 | 1 |
| Water supply | 110 | 1 | 40 | 1 | 1 |
| Water use | 105 | 4 | 41 | 1 | 2 |
| Livestock production | 88 | 6 | 51 | 7 | 1 |
| Crop production | 84 | 7 | 51 | 8 | 3 |
| Land values | 131 | 0 | 13 | 6 | 3 |
| Work load | 51 | 52 | 46 | 1 | 3 |
| Wildlife habitat | 90 | 3 | 53 | 6 | 1 |

A higher proportion of farms with 50 percent of acreage in rangeland, compared with those having less than 50 percent in rangeland, indicated an increase in livestock production due to the program. Full owners appeared more confident than other tenure groups of a decrease in soil erosion and in risk due to extreme weather hazards as a result of the program. An increase in water supply was a more frequent response of operators with more than 50 percent of their operating units in rangeland than of those with less than 50 percent in rangeland. Generally, operators emphasizing crop production believed their workload had increased because of the program, while those emphasizing livestock production thought their workload had decreased. Compared with other operators, operators of small farms, particularly crop farms, more frequently indicated that wildlife habitat had not improved as a result of the program.

## PROGRAM EFFECTS ON LAND USE

Major differences in land uses between participants and nonparticipants, both in 1962 and 1967, were related to differences in resource situations, especially the proportion of total acreage in rangeland (tables 8 and 9 and appendix tables 2 and 3). Participants had larger total acreage and a higher proportion of land in range in both years. Cropland as a percentage of total acreage was higher for nonparticipants than participants. The shift of land from retirement to rotational use as cropland during 1962-67 was more pronounced for nonparticipants than participants.

Data in tables 8 and 9 do not reflect a significantly higher rate for participants than for nonparticipants of conversion of cropland to grass. Data in the contracts of the 153 participants interviewed reveal a planned conversion of about 59 acres per farm (a total of 8,982 acres), and nearly all this conversion had been completed by 1967. However, about 12 percent of the acreage (1,047 acres) had been reconverted to cropland by 11 participants with expired contracts, by the time of the interviews (1967). The net increase in grassland of about 52 acres per farm accounted at least partially for the increase in dryland acreage of hay, pasture, and rangeland by participants during 1962-67. However, the occurrence of nearly comparable trends in hay, pasture, and rangeland acreage for participants and nonparticipants, during this period, creates doubt that the GPCP has appreciably affected the conversion of cropland to grass. When interviewed, nonparticipants indicated having

Table 8.--Percentage distribution of farmland by tenure of operator, by land use and type, GPCP participants, 1962 and 1967 1/

| Type and use of land | Percentage of total acreage of-- | | | | | |
|---|---|---|---|---|---|---|
| | Full owners | | Other tenure groups | | Total participants | |
| | 1962 | 1967 | 1962 | 1967 | 1962 | 1967 |
| | Percent 2/ | | | | | |
| Total farmland | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| Dryland | (94.2) | (92.0) | (97.0) | (94.7) | (96.3) | (94.3) |
| Hay, pasture, and range | 72.1 | 73.0 | 60.7 | 61.7 | 63.4 | 64.3 |
| Cropland | (22.0) | (20.0) | (36.3) | (32.9) | (32.9) | (30.0) |
| Retirement 3/ | 5.7 | 5.8 | 5.3 | 3.9 | 5.4 | 4.3 |
| Rotational 4/ | 16.3 | 14.2 | 31.0 | 29.0 | 27.5 | 25.7 |
| Irrigated land | (5.3) | (6.3) | (2.4) | (4.7) | (3.1) | (5.1) |
| Hay and pasture | 1.7 | 1.8 | .4 | .6 | .7 | .9 |
| Cropland | (3.6) | (4.5) | 2.0 | (4.0) | (2.4) | (4.2) |
| Retirement 3/ | - | 6/ | - | - | - | - |
| Rotational 4/ | 3.6 | 4.5 | 2.0 | 4.0 | 2.4 | 4.2 |
| Other land 5/ | .5 | .6 | .6 | .6 | .6 | .6 |

Note: Figures in parentheses are subtotals.

1/ Based on acreages in app. table 2.
2/ Details may not total due to rounding.
3/ Soil bank, conservation reserve, and cropland diversion under wheat and feed-grain programs.
4/ Wheat, feed grain, other crops, and fallow.
5/ Farmsteads, roads, wasteland, and so forth.
6/ Less than 0.05 percent.

Table 9.--Percentage distribution of farmland by tenure of operator, by land use and type, GPCP nonparticipants, 1962 and 1967 1/

| Type and use of land | Percentage of total acreage of-- | | | | | |
|---|---|---|---|---|---|---|
| | Full owners | | Other tenure groups | | Total nonparticipants | |
| | 1962 | 1967 | 1962 | 1967 | 1962 | 1967 |
| | Percent 5/ | | | | | |
| Total farmland | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| Dryland | (95.1) | (93.9) | (94.0) | (93.1) | (94.2) | (93.2) |
| Hay, pasture, and range | 53.4 | 55.4 | 38.8 | 39.8 | 41.0 | 41.7 |
| Cropland | (41.6) | (38.5) | (55.2) | (53.2) | (53.2) | (51.4) |
| Retirement 2/ | 10.0 | 6.1 | 9.4 | 3.9 | 9.5 | 4.2 |
| Rotational 3/ | 31.6 | 32.4 | 45.8 | 49.3 | 43.7 | 47.3 |
| Irrigated land | (3.7) | (4.7) | (5.0) | (6.1) | (4.8) | (5.9) |
| Hay and pasture | .8 | 1.2 | .2 | .3 | .3 | .4 |
| Cropland | (2.9) | (3.5) | (4.8) | (5.8) | (4.5) | (5.5) |
| Retirement 2/ | - | - | .3 | .2 | .2 | .2 |
| Rotational 3/ | 2.9 | 3.5 | 4.5 | 5.6 | 4.3 | 5.3 |
| Other land 4/ | 1.2 | 1.4 | 1.0 | .9 | 1.0 | .9 |

Note: Figures in parentheses are subtotals.

1/ Based on acreages in app. table 3.
2/ Soil bank, conservation reserve, and cropland diversion under wheat and feed-grain programs.
3/ Wheat, feed grain, other crops, and fallow.
4/ Farmsteads, roads, wasteland, and so forth.
5/ Details may not total due to rounding.

made considerable conversion of cropland to grass, both at their own expense and with ACP assistance.

Information in participant's contracts indicates that 42 participants with more than 50 percent of the operating unit in rangeland had agreed to convert cropland to pasture, and 25 participants with less than 50 percent of the operating unit in rangeland had agreed to do so. Of the nearly 9,000 acres designated for conversion by all participants, nearly three-fourths (74 percent) was converted by participants with more than 50 percent of the operating unit in rangeland. Also, information from schedules of the 11 participants who had reconverted a total of 1,047 acres to cropland indicates that those with less than 50 percent of the operating unit in rangeland had done most of this reconversion (about 70 percent). Thus, ranchers instead of crop farmers are apparently the major contributors to the objective of making permanent changes in land use through GPCP assistance.

Irrigated acreage per farm nearly doubled for participants during 1962-67; in contrast, for nonparticipants, it showed an increase of about 30 percent. The difference between these increases was due largely to the 120-percent increase in irrigated acreage for participants who were not full owners. One can assume that, without the GPCP, the trends toward increase in irrigated acreage for participants would have been the same as the trends toward increases in irrigated cropland (as percent of total cropland) for nonparticipants. Per farm, participants increased irrigated acreage by 63.4 acres during 1962-67. If the above assumption is true, approximately 37 of these 63.4 acres were irrigated as a result of the Great Plains Conservation Program. There was not a significant difference between the percentages of total cropland irrigated by participants and nonparticipants in 1962.

Participants used a higher proportion of irrigated acreage for hay and pasture than nonparticipants did. This higher proportion reflects the greater emphasis on livestock production by participants.

## PROGRAM EFFECTS ON LIVESTOCK PRODUCTION

Nearly 80 percent of participant farms and over 70 percent of nonparticipant farms had beef cattle operations--predominantly the cow-calf system--in both 1962 and 1967 (table 10). However, participants shifted considerably from cow-calf to cattle feeding operations during 1962-67. Participants placed a greater emphasis than nonparticipants on cattle feeding in both 1962 and 1967.

The number of cattle per farm for participants indicates that the increase in cattle feeding occurred mainly on farms with more than 50 percent of acreage in rangeland (table 11). However, full owners with less than 50 percent of acreage in rangeland did increase significantly both cattle and hog feeding. The other tenure groups with less than 50 percent of acreage in rangeland made major reductions in the number of beef cows during 1962-67, but otherwise these groups made small adjustments in livestock numbers. Most sheep enterprises were part-owner or tenant farms with less than 50 percent of acreage in rangeland.

In contrast with participant farms, very little change occurred in the numbers of livestock on nonparticipant farms during 1962-67 (table 12). The nonparticipant sample fails to represent adequately the trends in livestock numbers in the study area. According to the Censuses of Agriculture, cattle numbers in the 14-county area increased about 12 percent during 1959-64; and, according to the State Crop Reporting Services count, this increase was nearly 40 percent. The Crop Reporting Services estimate numbers as of January 1 of each year. Their count for 1967 exceeded that for 1962 for the study area by about 25 percent. This 25 percent was approximately the

Table 10.--Number and percentage of GPCP participant farms by type of livestock enterprise, 14-county study area, 1962 and 1967

| Livestock enterprise | Participant farms | | | | Nonparticipant farms | | | |
|---|---|---|---|---|---|---|---|---|
| | 1962 | | 1967 | | 1962 | | 1967 | |
| | No. | Pct. | No. | Pct. | No. | Pct. | No. | Pct. |
| Beef cattle 1/ | (122) | (79.7) | (122) | (79.7) | (156) | (71.9) | (154) | (71.0) |
| Cow-calf | 67 | 43.8 | 61 | 39.8 | 119 | 54.8 | 114 | 52.5 |
| Feeder | 28 | 18.3 | 30 | 19.6 | 29 | 13.4 | 27 | 12.5 |
| Combination 2/ | 27 | 17.6 | 31 | 20.3 | 8 | 3.7 | 13 | 6.0 |
| No beef cattle | (31) | (20.3) | (31) | (20.3) | (61) | (28.1) | (63) | (29.0) |
| Other livestock 3/ | 14 | 9.2 | 6 | 3.9 | 9 | 4.1 | 10 | 4.6 |
| No livestock | 17 | 11.1 | 25 | 16.4 | 52 | 24.0 | 53 | 24.4 |
| Total farms | 153 | 100.0 | 153 | 100.0 | 217 | 100.0 | 217 | 100.0 |

Note: Figures in parentheses are subtotals.

1/ Farms with beef cattle may also have other kinds of livestock.
2/ Both cow-calf and feeder operations.
3/ Dairy cattle, sheep, hogs, poultry, or horses.

Table 11.--Livestock of participants in the GPCP, by type of operation, tenure, and resource situation, 14-county study area, 1962 and 1967

| Type of operation | Full owner | | | | Other tenure groups | | | | All participants | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Rangeland less than 50 percent | | Rangeland 50-100 percent | | Rangeland less than 50 percent | | Rangeland 50-100 percent | | | |
| | 1962 | 1967 | 1962 | 1967 | 1962 | 1967 | 1962 | 1967 | 1962 | 1967 |
| | Number per farm | | | | | | | | | |
| Cattle: | | | | | | | | | | |
| Beef cows | 31.9 | 30.9 | 74.1 | 85.5 | 68.4 | 33.4 | 107.2 | 131.0 | 76.9 | 74.2 |
| Cattle fed 1/ | 85.2 | 110.7 | 126.6 | 230.8 | 76.2 | 117.8 | 101.0 | 168.7 | 73.3 | 154.5 |
| Calves sold 2/ | 17.9 | 14.2 | 63.3 | 62.0 | 29.3 | 38.5 | 83.0 | 127.0 | 51.2 | 67.9 |
| Dairy cows | 0.2 | 0.1 | 0.0 | 0.3 | 1.6 | 1.8 | 2.1 | 6.2 | 1.2 | 2.7 |
| Sheep: | | | | | | | | | | |
| Ewes | 0.0 | 0.0 | 10.4 | 7.4 | 26.4 | 29.1 | 0.0 | 0.0 | 11.3 | 11.7 |
| Lambs fed | 0.0 | 0.0 | 0.0 | 0.8 | 20.4 | 31.6 | 0.0 | 0.0 | 7.2 | 11.3 |
| Lambs sold | 0.0 | 0.0 | 6.9 | 4.1 | 9.3 | 4.6 | 0.0 | 0.0 | 4.6 | 2.4 |
| Hogs: | | | | | | | | | | |
| Sows | 0.6 | 1.2 | 1.0 | 0.6 | 0.9 | 2.4 | 0.6 | 1.0 | .8 | 1.5 |
| Pigs fed | 3.4 | 98.3 | 14.1 | 13.1 | 14.8 | 25.8 | 1.6 | 11.6 | 8.9 | 28.8 |
| Pigs sold | 11.4 | 23.8 | 11.7 | 0.0 | 2.7 | 8.7 | 8.5 | 30.3 | 7.5 | 7.3 |

1/ Includes both cattle finished for slaughtering and cattle to be sold as stockers and feeders.
2/ Includes stockers and feeders sold as calves, yearlings, and 2-year-olds.

Table 12.--Livestock of nonparticipants in the GPCP, by type of operation, tenure, and resource situation, 14-county study area, 1962 and 1967

| Type of operation | Full owners | | | | Other tenure groups | | | | All nonparticipants | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Rangeland less than 50 percent | | Rangeland 50-100 percent | | Rangeland less than 50 percent | | Rangeland 50-100 percent | | | |
| | 1962 | 1967 | 1962 | 1967 | 1962 | 1967 | 1962 | 1967 | 1962 | 1967 |
| | Number per farm | | | | | | | | | |
| Cattle: | | | | | | | | | | |
| Beef cows | 6.8 | 5.0 | 28.9 | 23.3 | 23.3 | 24.6 | 60.1 | 76.3 | 31.3 | 35.9 |
| Cattle fed 1/ | 1.0 | 2.8 | 5.7 | 10.0 | 55.1 | 54.2 | 25.9 | 34.1 | 35.0 | 37.4 |
| Calves sold 2/ | 6.1 | 3.7 | 48.9 | 23.7 | 19.6 | 24.6 | 48.7 | 66.8 | 29.2 | 32.6 |
| Dairy cows | 1.6 | 1.3 | 0.0 | 0.0 | .4 | .9 | .3 | .5 | 4.6 | .7 |
| Sheep: | | | | | | | | | | |
| Ewes | 0.0 | 0.0 | 8.6 | 0.0 | 0.0 | 0.0 | 2.2 | 4.5 | 1.7 | 1.1 |
| Lambs fed | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 2.1 | 3.0 | .5 | .8 |
| Lambs sold | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Hogs: | | | | | | | | | | |
| Sows | 3.3 | 1.2 | .2 | 1.3 | .2 | .4 | .9 | 1.2 | .7 | .8 |
| Pigs fed | 15.0 | 14.6 | 2.5 | 3.2 | 1.4 | 4.8 | 9.7 | 12.0 | 5.2 | 7.5 |
| Pigs sold | 30.0 | 6.0 | 0.0 | 6.5 | 1.1 | 3.7 | 1.8 | 5.4 | 4.5 | 4.8 |

1/ Includes both cattle finished for slaughtering and cattle to be sold as stockers and feeders.
2/ Includes stockers and feeders sold as calves, yearlings, and 2-year-olds.

change in number of cattle by participants during 1962-67. In addition to the head count, the effects of the GPCP livestock production include size and condition of animals sold and other variables affecting income per head of livestock.

Data from the survey done for this report indicate participants fed 8,322 head to finished (slaughter) grades in 1967, compared with 7,657 head in 1962. The 1967 figure represents an increase of about 9 percent in the 5-year period. In 1967, 16,888 head of cattle put on feed by participants were sold as stockers and feeders (not finished), compared with 8,533 head in 1962. Here, the 1967 figure represents an increase of nearly 100 percent during the period. Little change occurred during 1962-67 in the number of cattle put on feed by nonparticipants and finished or sold as stockers or feeders. Thus, the major effect of the GPCP livestock production apparently was to extend the age when calves were sold as stockers and feeders. This age extension could have occurred because of the increased production of forage and feed crops resulting from the program.

## COMMUNITY EFFECTS OF THE PROGRAM

Trade relations among economic units or sectors within geographical areas provide the basis for extending local economic consequences of programs such as the GPCP beyond those consequences experienced directly by participants. Community economic effects of the GPCP, including both direct and indirect effects, arise from two major sources: (1) Changes in farm production (and thus income) as a result of the added capital investment in land, and (2) Federal expenditures in cost-sharing in the region that represent an inflow of new capital investment. To estimate the community effects of the program, it was assumed that the landowner's share of the capital investment in land would not affect the level of total spending in the local economy. These private capital investments in land were assumed to be substitutions for other types of local expenditures. However, such private investment does relate to the first source of community effects--the change in farm income occurring from changes in farm production.

Another study, encompassing nine of the 14 counties included in this study, was conducted to develop the transactions and other matrices needed to estimate community effects of the GPCP. 14/ Secondary data from a variety of sources were used to estimate financial accounts for 11 sectors of the local economy. 15/ Net income to families in the nine-county area was assumed to be income to the household sector. Estimated net income multipliers for the endogenous production sectors were the ratios of total to direct changes in consumption expenditures (table 13). These multipliers were used to estimate community effects of the program.

### Effects on Farm Production and Income

Any enduring community effects of the GPCP depend on changes in farm production and income. More than half the participants in the survey (14-county area) indicated

14/ The counties were Cheyenne, Logan, Rawlings, Sherman, Thomas, and Wallace in Kansas and Cheyenne, Kit Carson, and Yuma in Colorado. The study was carried out by economists of Colorado State University under a cooperative agreement with the Nat. Resour. Econ. Div., Econ. Res. Serv., and was closely coordinated with the study of the 14 counties.

15/ The endogenous sectors were primary agriculture (crops), secondary agriculture (livestock), agricultural processing (marketing), other manufacturing, retail and service, households, and capital inputs (construction). The exogenous sectors were State and local governments, Federal Government, and imports or exports.

Table 13.--Estimated net income multipliers by economic sector, nine-county study area 1/

| Economic sector | Estimated net income to area residents per dollar of gross volume of transactions | | Net Income multiplier 2/ |
|---|---|---|---|
| | Direct | Total | |
| Primary agriculture (crops) | .238886 | .870485 | 3.644 |
| Secondary agriculture (livestock) | .217932 | .858410 | 3.939 |
| Agricultural inputs | .271729 | .796218 | 2.930 |
| Agricultural processing (marketing) | .037943 | .773060 | 3/ 20.374 |
| Manufacturing | .197468 | .469004 | 2.375 |
| Trade and services | .258043 | .864796 | 3.351 |
| Capital inputs (construction) | .291515 | .878885 | 3.015 |

1/ Items in this table differ from comparable items in table 7 of the publication by Melvin D. Skold and Arthur J. Greer, The Impact of Agricultural Change on a Local Economy in the Great Plains, Colo. State Univ. Expt. Sta. Tech. Bul. 106, 1969. The tables differ due to differences in rounding of the coefficients. The household sector is included implicitly throughout the consumption coefficients for the specified sectors.

2/ Total income divided by direct income; the ratio of total to direct changes in consumption expenditures.

3/ This large multiplier is due to the very small net household income per dollar gross volume of business for this sector. Also, it is misleading as a multiplier because changes in agricultural processing (marketing) do not cause changes in farm production: the causal relation is the reverse.

that both crop and livestock production had increased because of the program. Less than 5 percent of these participants said such production had decreased. Available data did not provide the basis for quantifying program effects on production and income. However, related information on expenditures associated with the program in the nine-county area during 1958-66 tends to support the opinions of participants in the survey (14-county area). Less than 10 percent of these expenditures were for conversion of cropland to grass--the practice with the potential of significantly decreasing crop production. Furthermore, about two-thirds of this conversion occurred on operating units with more than 50 percent of acreage in rangeland. Livestock, rather than crops, was the main enterprise on most of these farms. Improvements in water and range for livestock required about one-third of the total GPCP expenditures in the nine-county area during 1958-66.

Terracing accounted for about one-fourth of GPCP expenditures. Most terracing took place on crop farms (with less than 50 percent of acreage in rangeland). Whether terracing increased or decreased crop production during the study period could not be ascertained from available information.

About one-fourth of the expenditures in the nine-county area were for installing irrigation practices. Nearly 60 percent of this amount was used to install irrigation practices on operating units with more than 50 percent of acreage in rangeland. Thus, apparently one major contribution of the increased production by these units due to irrigation was to support their cattle operations. Improvement practices for water and range for livestock probably contributed significantly to the increase in livestock production on participant farms.

As a first step in approximating the effects of the GPCP on farm production and income, estimates were made of effects of the program on livestock production. It was assumed that the livestock production increase observed for participant farms resulted from the fact that participants extended the age and increased the weight of calves before selling them as stockers and feeders or as low-slaughter grades of cattle. (Generally, this assumption is consistent with the data on cattle numbers in table 11.) Information from the nine-county survey was inadequate for precisely estimating program effects on the age that cattle were sold. However, survey data did indicate an increase in the sale of yearlings and older cattle on participant farms during the period studied. Thus, it was assumed that the effect of the program was to extend the age of cattle sold from 6 to 12 months for half the calves and from 6 to 18 months for the other half. Average weights and prices of cattle for these ages (6 months, 1 year, and 18 months) reported at the Kansas City market during 1958-67 were used to estimate the gross income change associated with this assumed increase in livestock output. The gross income change amounted to $425,158 for the 10-year period (app. table 4).16/ Net income to the livestock sector associated with the increase in livestock output was an estimated $92,656.

Information from the nine-county survey and other sources was also inadequate for estimating production and income increases for the crop sector that would be comparable to those developed for the livestock sector. Production of crops for sale (rather than for livestock feed) probably did increase because of the program--especially as a result of increased irrigation. Because the survey and other sources were inadequate for such estimates, it was assumed that the rate of return on private capital invested in the program was the same in both the livestock and the crop sectors.

The contracts of participants sampled in the nine counties indicate that more than half the private expenditures were on operating units with more than 50 percent of acreage in rangeland. Also, in these counties, 56 percent of the participants and 67 percent of the acreage under contract as of 1966 were associated with operating units that had more than 50 percent of acreage in rangeland. Although division of the operating units by percent of acreage in rangeland is only a crude proxy for division of production on participant farms between the livestock and the crop sector, information available did not suggest a better proxy. To divide the total private investment between the two sectors, 60 percent was assumed invested to increase livestock output, and 40 percent, to increase cash crops (method I in table 14). 17/

Total private investment in the period ending in 1966 for the nine counties was $635,527 (app. table 5). An allocation ratio of 60-40 percent assigns $381,316 to the livestock sector and $254,211 to the crop sector. The $92,656 net income to the livestock sector estimated previously represents a return on the total invested of 24.3 percent. A comparable rate of return on the estimated $254,211 invested in the crop sector would result in cumulated net earnings by that sector of $61,774. Total net

16/ The inclusion of 1967, though the investment period considered ended with 1966, was on the basis of an assumed lag of a year in realizing some production effects of the investments.

17/ The statistics on Federal and private investment by practices and years were available by counties, not by resource situations of participants.

income for both sectors would be $154,430. Average net return per year of investment (1958-67) was an estimated $6,864 for the crop sector, $10,295 for the livestock sector, and $17,159 for both sectors. This set of estimated increases in net farm income during 1958-67, indicated in table 14 as obtained by method I, should be considered conservative and probably too low. The estimates by this method amount to an average annual return of nearly 6.5 percent on cumulated private investment during the period, a percentage return on investment insufficient to replace capital invested and also earn reasonable annual returns for the private investor. An alternative approach, method II, was thus developed and is given below.

If an average productive life of 15 years is assumed for GPCP practices installed, $163,576 of the $635,527 invested by the landowners would be returned in the form of net farm income during 1958-67. 18/ If an average annual return of 7 percent on cumulated (undepreciated) private investment is assumed, an estimated $134,320 would be added to the return of principal (the $163,576). The total net farm income increase in the period would be $297,396, or $33,100 per year of investment. Methods I and II were both used to derive expected total community effects of the program during 1958-67.

### Effects of Federal Expenditures in Cost-Sharing

The Federal part of the capital investment in land could affect the economy of a community in two ways: (1) As the source of an increment to total spending in the local area, regardless of the productivity effects of the investment, and (2) as a contributor along with the private part of the investment to any change in farm production and income. The view taken in this study is that the individual operators relate expected production and income effects only to their own contribution to the investment. Therefore, the Federal part of the investment was excluded from the estimated and assumed rates of return on investment that were presented for the livestock and crop sectors. A view supporting this exclusion is that Federal investment for private gain could not be justified anyway. Instead the real justification for Federal investment associated with conservation arises from the externalities, or the favorable social effects of the program not taken into account by private investors. 19/ Therefore, estimated effects of Federal expenditures on local communities were limited to effects on direct and indirect net incomes. These effects were due to the added spending brought about by the inflow of new capital into the nine-county area.

During 1958, the Federal share of the total cost of installing GPCP practices in the nine-county area was $1,292,231 (app. table 5). According to Skold and Greer's

---

18/ If the assumption can be accepted that the landowners' investment represented a reduction in their consumption expenditures rather than in other productive investments in the year of investment, and that no change occurred in their total expenditures, then the following hypothesis can be made. The return of principal in the form of net farm income would result in an increase in total expenditures by the farm sectors. This increase would consist of the amount of principal returned (in addition to any return on this investment). The second method of estimating changes in farm production and income was based on this assumption. However, some results of this study invalidate the assumption. Nearly 80 percent of the participants surveyed indicated they would have undertaken the work under ACP assistance, had GPCP assistance not been available. About a third said they would have been willing to undertake the work on their own. Thus, most of the private investment probably did not substitute for consumption or other kinds of expenditures. If such substitution did not occur, the community effects of the program estimated by method II are probably excessive.

19/ No effort was made in this study to evaluate benefits or costs of the program other than those reflected in private market transactions in local areas.

research, these expenditures were initial receipts containing net income components to three sectors: agricultural inputs (sector 3), capital inputs or construction (sector 8), and imports (sector 11). The part going to the import sector was a small direct leakage. In addition, the indirect leakage from purchases outside the nine-county area by sectors 3 and 8 and by other local sectors with expenditures influenced by sectors 3 and 8 was substantial. During 1958-66, sector 3's initial receipts amounted to an estimated $311,769; sector 8 received an estimated $976,349. The net income of these two sectors from initial receipts amounted to $369,337, or an average of $41,037 per year during the period. When the multiplier effects were added, total community impacts from Federal cost-sharing during the period amounted to an estimated $1,106,347, or $122,927 per year. The large leakage from the nine-county area prevented total net income from reaching the original level of Federal expenditures ($1,292,231) in cost-sharing. The relationship was about 86 cents in community net income to each dollar of Federal expenditures. Yearly estimates of community income from Federal expenditures are included in the summary of community effects (table 14).

## Summary of Community Effects

As mentioned, estimated community effects of the Great Plains Conservation Program for the nine-county area are summarized by source in table 14. The direct effects were the net incomes to the initial recipients of income generated by the program. The columns of total effects were obtained by applying the appropriate sector multipliers in table 13 to the direct income of the sectors. Results of the two methods described earlier for estimating net farm income increases are shown in table 14 as net income associated with production increases. Total community effects are estimates of the total amounts arising from increases in farm production, plus the estimated total amounts due to Federal expenditures in cost-sharing.

In estimating annual community effects, it was assumed that net income arising from effects on production would lag behind both Federal and private investment by a year. For a practice such as regrassing, the lag would be longer. Some investments would cause production effects the same year. However, the intent was to assess the general magnitude of annual impacts of the program from all sources during the investment period. Thus, some error in assessing the magnitude of the lag did not matter.

A result not anticipated was the greater annual impact of Federal expenditures rather than farm production increases on the community (except in 1966 for method II of estimating farm production). This result should not be surprising, however, because a balance of about three-fourths of the capital investment made during 1958-66 remains to affect future farm production. If the program is continued in the nine-county area at annual investments approximately equal to those for 1964-66, total annual community effects can be expected eventually to increase to a maximum of about half a million dollars annually; this assumes that method II properly estimates increases in farm income due to the program. This increase would be about twice the estimated annual impact for the entire 1958-66 period.

The magnitude of estimated community effects of the GPCP is not large when total personal income in the nine-county area is considered. Personal income in this area was about $82 million in 1959. 20/ The average annual impact of one-quarter of a million dollars during the period studied would have been about one-third of 1 percent of the aggregate personal income in the area in 1959. The anticipated maximum community effect would still have been below 1 percent of aggregate personal income. Thus, the Great Plains Conservation Program does not appear to merit a significant role in programs designed to bring about economic development of rural areas in the Great Plains.

20/ Based on reported aggregate income in 1959 of the population in 1960, in County and City Data Book, 1967, U.S. Dept. of Commerce, Bur. of the Census.

Table 14.--Estimated community effects of the Great Plains Conservation Program, nine-county area, 1958-67

| Year | Net income to community associated with Federal expenditures | | Net income to community associated with production | | | | Total community effects | |
|---|---|---|---|---|---|---|---|---|
| | | | Method I | | Method II | | | |
| | Direct income 1/ | Total income 2/ | Direct income 3/ | Total income 4/ | Direct income 3/ | Total income 4/ | Method I | Method II |
| | -Dollars- | | | | | | | |
| 1958 | 18,774 | 56,254 | 5/ 2,602 | 5/ 10,249 | - | - | 66,503 | 56,254 |
| 1959 | 19,817 | 59,377 | 6,728 | 26,252 | 3,764 | 14,382 | 85,629 | 73,759 |
| 1960 | 29,207 | 87,474 | 6,088 | 23,487 | 7,591 | 29,005 | 110,961 | 116,479 |
| 1961 | 36,135 | 107,873 | 8,306 | 31,868 | 13,257 | 50,655 | 139,741 | 158,528 |
| 1962 | 31,261 | 93,454 | 11,303 | 43,256 | 20,035 | 76,554 | 136,710 | 170,008 |
| 1963 | 54,442 | 163,305 | 15,184 | 58,159 | 26,613 | 101,688 | 221,464 | 264,993 |
| 1964 | 53,159 | 159,182 | 17,562 | 66,848 | 37,866 | 144,686 | 226,030 | 303,868 |
| 1965 | 78,807 | 236,553 | 21,565 | 82,003 | 46,648 | 178,242 | 318,556 | 414,795 |
| 1966 | 47,735 | 142,875 | 29,851 | 113,578 | 66,547 | 254,276 | 256,453 | 397,151 |
| 1967 | - | - | 35,241 | 134,377 | 75,575 | 288,772 | 6/ 134,377 | 6/ 288,772 |
| Total | 369,337 | 1,106,347 | 154,430 | 590,077 | 297,896 | 1,138,260 | 1,696,424 | 2,244,607 |
| Per investment year | 41,037 | 122,927 | 17,159 | 65,564 | 33,100 | 126,473 | 188,492 | 249,401 |

1/ Derived by applying the direct coefficients of sectors 3 and 8 to the receipts of Federal expenditures by these sectors (app. table 6) and summing the results.

2/ Derived by applying the multipliers for sectors 3 and 8 (table 13) to respective direct income of these sectors and summing the results.

3/ See text for an explanation of Methods I and II, used to estimate net incomes of crop and livestock sectors (sectors 1 and 2, respectively).

4/ Derived by applying sectors 1 and 2 multipliers (table 13) to corresponding net income of these sectors and summing the results.

5/ The intent was to lag the effects of investment on production by 1 year; however, the procedure used to estimate increases in income from livestock resulted in the small income from this source in the first year of investment for Method I.

6/ Excluding Federal expenditures in 1967.

## CONCLUSIONS

Survey results plus data on expenditures by practice for the entire Great Plains region indicate that the initial expectation--that a major emphasis of the program would be on establishing a permanent vegetative cover on land with high risk of wind or water erosion (GP-1)--was not being realized. The high expected (and realized) income from crops produced on a large part of land in classes IV to VIII was a major obstacle to changing the use of these lands. Other obstacles were loss of income during a conversion period of about 3 years, farmer uncertainty of the amount of returns from converted lands, and the tenure situation. Approximately half the farmland and more than half the cropland in the Great Plains is operated by nonowners. Perhaps the initial expectation was overly optimistic that three-fourths of program funds would be used to convert low-grade cropland to grass. Nevertheless, the need seems apparent for reordering priorities among practices to give greater emphasis to GP-1 and for overcoming obstacles to changing the use of cropland.

Survey results indicate that direct beneficiaries of the program mainly are landowners or the higher income farm operators in the Great Plains region. Both the small amount of community effects and the high leakage from local areas suggest that residential laborers gain but little from the program. Thus, major beneficiaries other than landowners are (1) owners of capital resources that include items used in installing the practices and the fixed plant and equipment associated with the local business, and (2) owners of capital items imported for both production and consumption. Therefore, the program does not contribute importantly either to increasing local employment or to redistributing income in a way favorable to lower income people.

Such limited economic consequences, however, bear little or no relation to the major purpose of a program such as the GPCP--serving society's interest in conserving soil. Nonetheless, it is important to recognize the limitations of soil conservation programs in general, and the Great Plains Conservation Program in particular, as instruments for bringing about economic development of rural areas.

The study did not reveal substantial advantages or disadvantages of long-term contracts with landowners for achieving soil conservation objectives. Opinions of those interviewed in the survey were mixed, but participants favored long-term contracts more than nonparticipants did. Apparently, the major problems associated with the achievement of soil conservation objectives in the Great Plains are unrelated to the type or length of contracts with landowners. Thus, some possibly significant advantages of the types used in the Great Plains Conservation Program were not detected by this study.

## APPENDIX A:

## PROCEDURES IN SAMPLING PARTICIPANTS AND NONPARTICIPANTS

A sample consisting of 208 contracts of participants in the 14-county area was used to obtain information on the extent and time schedule of practices installed, costs incurred, and the participant's farmland resource situations. The sample was one-third of all contracts. It was reduced to a sample of 165 contracts by random methods to obtain subclass totals adequate for representing the various land resource situations. An attempt was made to interview each of the 165 participants. Schedules were obtained from 153 of them.

Information was lacking about the resource situations of individual nonparticipants in the 14-county area. Thus, it was necessary to obtain, at a cost as low as possible, a random sample of nonparticipants large enough to represent adequately the major resource situations. These aims were accomplished with the assistance of the Statistical Reporting Service (SRS) of the Department of Agriculture. The resulting sample consisted of 120 segments of rural land in the 14-county area. An attempt was made to interview all farmers living, and operating land, within these segments. An additional attempt was made to interview nonresident operators, if the northwest corner of all land types they operated fell within a sample segment and if they were nonparticipants. Farms in the nonparticipant sample also had to comply with the Census definition of a farm. A few screening questions were asked of all candidates for the nonparticipant sample before interviews were conducted. These procedures resulted in 217 usable nonparticipant schedules.

APPENDIX B:

DESCRIPTION AND CLASSIFICATION OF CONSERVATION PRACTICES ELIGIBLE UNDER THE GPCP

Class, Number, 1/ and Description of Practices

Class I. Land-use change practices

GP-1 (A-2)--Initial establishment of a permanent vegetative cover as part of an improved cropping system or as a needed land-use adjustment.

Class II. Cropland conservation practices

GP-2 (A-6)--Initial establishment of field strip-cropping to protect soil from wind or water erosion.

GP-3 (A-5)--Initial establishment of contour strip-cropping to protect soil from wind or water erosion.

GP-4 (E-2)--Initial establishment of contour farming operations on nonterraced land to protect soil from wind or water erosion.

Class III. Water management and related conservation practices specific to cropland



GP-7 (C-1)-- Initial establishment of permanent sod waterways to dispose of excess water without causing erosion.

GP-8 (C-4)--Constructing terraces to detain or control the flow of water and check soil erosion.

GP-9 (C-5)--Constructing diversion terraces, ditches, or dikes to intercept runoff and divert excess water to protected outlets.

Class IV. Irrigation practices

GP-15 (C-12)--Reorganizing irrigation systems to conserve water and prevent erosion.

GP-16 (C-13)--Leveling land for more efficient use of irrigation water and to prevent erosion.

GP-17 (C-14)--Constructing, enlarging, deepening, or lining dams, pits, or ponds for irrigation water.

GP-18 (C-15)--Lining irrigation ditches to prevent erosion and loss of water by seepage.

See footnotes at end of appendix.

--Continued

DESCRIPTION AND CLASSIFICATION OF CONSERVATION PRACTICES
ELIGIBLE UNDER THE GPCP --Continued

Class, Number, 1/ and Description of Practices

Class V. Rangeland management and conservation practices

GP-5 (B-2)--Improvement of vegetative cover on rangeland by artificial reseeding for soil protection.

GP-23 (B-3)--Controlling competitive shrubs to permit growth of adequate desirable vegetative cover for soil protection on range or pasture land.

GP-24 (B-9)--Constructing permanent fences as a means of protecting vegetative cover.

Class VI. Water management and related conservation practices specific to noncropland (range and pasture)

GP-10 (B-4)--Furrowing, chiseling, ripping, scarifying, pitting, or listing noncrop grazing land to prevent soil loss, retard runoff, and improve water penetration.

GP-19 (B-5)--Constructing wells for livestock water as a means of protecting vegetative cover.

GP-20 (B-6)--Developing springs and seeps for livestock water as a means of protecting vegetative cover.

GP-21 (B-7)--Constructing, enlarging, deepening, or sealing dams, pits, or ponds, as a means of protecting vegetative cover.

GP-22 (B-8)--Installing pipelines for livestock water as a means of protecting vegetative cover.

Class VII. Water management and related conservation practices: general (excluding irrigation)

GP-11 (C-6)--Constructing erosion control, detention, or sediment retention dams to prevent or heal gullying or to retard or reduce runoff of water.

GP-12 (C-7)--Constructing channel lining, chutes, drop spillways, pipe drops, drop inlets, or similar structures for the protection of outlets and water channels that dispose of excess water.

GP-13 (C-8)--Streambanks or shore protection, channel clearance, enlargement, or realignment, or construction of floodways, levees, or dikes, to prevent erosion or flood damage to farmland.

GP-14 (C-16)--Constructing spreader ditches or dikes to divert and spread water to prevent erosion, to permit beneficial use of runoff, or replenish ground water supply.

See footnotes at end of appendix. --Continued

DESCRIPTION AND CLASSIFICATION OF CONSERVATION PRACTICES
ELIGIBLE UNDER THE GPCP --Continued

Class, Number, 1/ and Description of Practices

Class VIII. Other practices

GP-6 (A-8)--Initial establishment of a stand of trees or shrubs on farm or ranch lands for windbreaks, shelterbelts, erosion control, or other purposes to protect farm or ranch land from wind or water erosion.

GP-25--Special conservation practices 2/

1/ Numbers in parentheses are corresponding Agricultural Conservation Program numbers for the same practices.
2/ These are to be designated and approved by the Secretary when the 24 approved practices fail to solve special conservation problems in a designated county. To date, no expenditures under GP-25 have been approved.

APPENDIX C:

Appendix table 1.--Percentage of sharing rates for approved practices under the GPCP, for Great Plains States by practice number, selected fiscal years 1/

| GP practice number | Colo. | | Kans. | | Mont. | | Nebr. | | N. Mex. | | N. Dak. | | Okla. | | S. Dak. | | Tex. | | Wyo. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1957 | 1966 | 1964 | 1967 | 1957 | 1967 | 1957 | 1967 | 1957 | 1967 | 1957 | 1966 | 1958 | 1966 | 1957 | 1966 | 1957 | 1967 | 1957 | 1966 |
| | Percent | | | | | | | | | | | | | | | | | | | |
| GP-1 | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 2/80 | 80 | 70 | 80 | 80 | 80 | 80 | 80 | 80 |
| GP-2 | 60 | 60 | 80 | 80 | 50 | 80 | 80 | 50 | 80 | 80 | 50 | 50 | 80 | 70 | 80 | 65 | 80 | 50 | 50 | 50 |
| GP-3 | 80 | 80 | 80 | 80 | 70 | 70 | 80 | 50 | 80 | 80 | 80 | 80 | 80 | 70 | 80 | 80 | 80 | 50 | 80 | 80 |
| GP-4 | 60 | 3/NA | 50 | 50 | 50 | 50 | NA | NA | 80 | 80 | NA | NA | NA | NA | 50 | 50 | NA | NA | 50 | 50 |
| GP-5 | 80 | 80 | 80 | 2/80 | 70 | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 70 | 60 | 80 | 80 | 2/80 | 80 | 80 |
| GP-6 | 80 | 80 | 80 | 80 | 80 | 80 | 75 | 75 | 70 | 70 | 80 | 80 | 80 | 70 | 80 | 80 | 80 | 50 | 65 | 65 |
| GP-7 | 80 | 80 | 75-80 | 75-80 | 80 | 80 | 75 | 75 | 80 | 80 | 80 | 80 | 70 | 70 | 80 | 80 | 80 | 80 | 80 | 80 |
| GP-8 | 80 | 80 | 70 | 70 | 80 | 80 | 80 | 80 | 80 | 80 | NA | 80 | 70 | 70 | 80 | 80 | 70 | 70 | 80 | 80 |
| GP-9 | 60 | 60 | 70 | 70 | 80 | 80 | 75 | 75 | 60 | 60 | 80 | 80 | 70 | 70 | 80 | 80 | 70 | 70 | 80 | 80 |
| GP-10 | 50 | 50 | 80 | 80 | 50 | 50 | 80 | 80 | 50 | 50 | NA | 50 | 80 | 70 | 65 | 65 | 50 | 50 | 50 | 50 |
| GP-11 | 70 | 70 | 70-80 | 70-80 | 80 | 80 | 75 | 75 | 60 | 60 | 80 | 80 | 70 | 50 | 65 | 70 | 70 | 70 | 80 | 80 |
| GP-12 | 60 | 80 | 60 | 60 | 70 | 70 | 75 | 75 | 60 | 60 | 80 | 80 | 50 | 70 | 80 | 80 | 80 | 80 | 80 | 80 |
| GP-13 | 60 | 60 | NA | NA | 50 | 2/50 | NA | NA | 60 | 60 | 50 | 50 | NA | NA | 50 | NA | NA | 50-80 | 50-80 | 50-80 |
| GP-14 | 50 | 50 | 80 | 80 | 80 | 80 | 75 | 75 | NA | NA | 80 | 50-80 | 80 | 70 | 80 | 80 | 70 | 70 | 80 | 80 |
| GP-15 | 50 | 50 | 30 | 30 | 50 | 50 | 60 | 60 | 50 | 50 | 60 | 50 | 50 | 50 | 65 | 65 | 50 | 50 | 50 | 50 |
| GP-16 | 50 | 50 | 50 | 50 | 50 | 50 | 60 | 60 | 50 | 50 | 70 | 50 | 50 | 50 | 65 | 65 | 50 | 50 | 50 | 50 |
| GP-17 | 50 | 50 | 80 | 80 | 50 | 50 | 75 | 75 | 50 | 50 | 80 | 50 | 50 | 50 | 65 | 70 | 50 | 50 | 50 | 50 |
| GP-18 | 50 | 50 | NA | NA | 50 | 70 | 60 | 60 | 50 | 50 | NA | NA | NA | 50 | 65 | 75 | 50 | 50 | 50 | 50 |
| GP-19 | 60 | 70 | 80 | 80 | 50 | 50 | 75 | 75 | 50 | 50 | 60 | 60 | 60 | 70 | 75 | 50-75 | 50 | 50 | 50-75 | 50-75 |
| GP-20 | 60 | 70 | NA | NA | 50 | 50 | 50 | 50 | 50 | 50 | 60 | 2/60 | 70 | 70 | 65 | 65 | NA | NA | 50 | 65 |
| GP-21 | 60 | 70 | 70-80 | 70-80 | 50 | 50 | 75 | 75 | 50 | 50 | 60-80 | 60-80 | 70 | 50 | 65 | 70 | 50 | 50 | 60 | 70 |
| GP-22 | 60 | 70 | 80 | 80 | 50 | 50 | NA | 75 | 50 | 50 | NA | 50 | 50 | 70 | 65 | 65 | 50 | 50 | 50 | 65 |
| GP-23 | 60 | 60 | 50 | 50 | 50 | 50 | 75 | 75 | 80 | 60 | 50 | 50 | 50 | 50 | 65 | 65 | 50-80 | 50-80 | 50 | 50 |
| GP-24 | 60 | 70 | 80 | 80 | 70 | 70 | 50 | 50 | 50 | 50 | 50 | 50 | NA | NA | 50 | 50 | 50 | 50 | 50 | 50 |
| GP-25 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |

1/ The cost-sharing rates shown are those designated as maximums by individual States. These rates are not necessarily the ones actually used in cost sharing--those actually used are designated by county committee.

2/ Cost-sharing rate on one component of practice did change from 1957.

3/ NA=not applicable (or eligible) for cost sharing within the designated State.

Appendix table 2.--Use of land on operating units of GPCP participants, 14-county study area, 1962 and 1967

| Land use | GPCP participants | | | | | |
|---|---|---|---|---|---|---|
| | Full owners | | Other tenure groups | | Total | |
| | 1962 | 1967 | 1962 | 1967 | 1962 | 1967 |
| | Acres 1/ | | | | | |
| Acres per farm | 1818.2 | 1932.1 | 2871.4 | 3188.4 | 2527.4 | 2778.1 |
| Dryland acreage | (1712.1) | (1797.6) | (2785.1) | (3018.4) | (2434.7) | (2619.7) |
| Hay, pasture, and range | 1311.1 | 1411.5 | 1744.0 | 1968.5 | 1602.7 | 1786.6 |
| Cropland | (400.9) | (386.1) | (1041.1) | (1049.9) | (832.0) | (833.1) |
| Retirement 2/ | 104.0 | 112.2 | 151.5 | 124.1 | 136.0 | 120.2 |
| Rotational use 3/ | 297.0 | 273.9 | 889.5 | 925.8 | 696.0 | 712.9 |
| Irrigated acreage | (96.2) | (122.5) | (68.1) | (149.5) | (77.3) | (140.7) |
| Hay and pasture | 31.3 | 35.2 | 10.2 | 20.5 | 17.2 | 25.2 |
| Cropland | (64.9) | (87.3) | (57.8) | (129.0) | (60.1) | (115.5) |
| Retirement 2/ | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Rotational use 3/ | 64.9 | 87.3 | 57.8 | 129.0 | 60.1 | 115.5 |
| Other 4/ | 9.9 | 11.9 | 18.2 | 20.5 | 15.4 | 17.7 |

Note: Figures in parentheses are subtotals.

1/ Details may not total due to rounding.
2/ Soil bank, conservation reserve, and cropland diversion under wheat and feed-grain programs.
3/ Wheat, feed grain, other crops, and fallow.
4/ Farmsteads, roads, wasteland, and so forth.

Appendix table 3.--Use of land on operating units of GPCP nonparticipants, 14-county study area, 1962 and 1967

| Land use | GPCP nonparticipants | | | | | |
|---|---|---|---|---|---|---|
| | Full owners | | Other tenure groups | | Total | |
| | 1962 | 1967 | 1962 | 1967 | 1962 | 1967 |
| | Acres 1/ | | | | | |
| Acres per farm | 853.1 | 739.2 | 1591.0 | 1748.5 | 1407.4 | 1497.4 |
| Dryland acreage | (811.0) | (693.8) | (1495.8) | (1627.2) | (1325.4) | (1394.9) |
| Hay, pasture, and range | 455.9 | 409.2 | 617.0 | 696.4 | 576.9 | 624.9 |
| Cropland | (355.0) | (284.5) | (878.8) | (930.8) | (748.5) | (770.0) |
| Retirement 2/ | 85.4 | 44.9 | 149.3 | 68.0 | 133.4 | 62.2 |
| Rotational use 3/ | 269.6 | 239.6 | 729.5 | 862.8 | 615.1 | 707.8 |
| Irrigated acreage | (31.4) | (34.8) | (79.3) | (106.1) | (67.4) | (88.3) |
| Hay and pasture | 6.9 | 8.8 | 3.5 | 5.4 | 4.3 | 6.2 |
| Cropland | 24.4 | 26.0 | 75.9 | 100.7 | (63.1) | (82.1) |
| Retirement 2/ | 0.0 | 0.0 | 4.4 | 3.6 | 3.3 | 2.7 |
| Rotational use 3/ | 24.4 | 26.0 | 71.4 | 97.1 | 59.8 | 79.4 |
| Other 4/ | 10.6 | 10.6 | 15.8 | 15.3 | 14.6 | 14.2 |

Note: Figures in parentheses are subtotals.

1/ Details may not total due to rounding.
2/ Soil bank, conservation reserve, and cropland diversion under wheat and feed-grain programs.
3/ Wheat, feed grain, other crops, and fallow.
4/ Farmsteads, roads, wasteland, and so forth.

Appendix table 4.--Estimated change in number and value of livestock due to the GPCP, nine-county area, 1958-67 1/

| Year | Estimated change in value of cattle | | | | | |
|---|---|---|---|---|---|---|
| | Number of cattle with change in value | Cattle, 6-12 months | | Cattle, 6-18 months | | Total change in value |
| | | Per head 2/ | Total 3/ | Per head 4/ | Total 3/ | |
| | Number | Dollars | | | | |
| 1958 | 378 | 16.09 | 3,041 | 47.09 | 8,900 | 11,941 |
| 1959 | 442 | 53.87 | 11,906 | 68.25 | 15,083 | 26,989 |
| 1960 | 518 | 31.74 | 8,220 | 46.47 | 12,036 | 20,256 |
| 1961 | 605 | 27.96 | 8,444 | 54.31 | 16,456 | 24,900 |
| 1962 | 708 | 26.13 | 9,250 | 64.73 | 22,914 | 32,164 |
| 1963 | 830 | 39.75 | 16,496 | 66.25 | 27,494 | 43,990 |
| 1964 | 971 | 34.38 | 16,674 | 56.96 | 27,683 | 44,357 |
| 1965 | 1,136 | 27.92 | 14,155 | 68.75 | 39,050 | 53,205 |
| 1966 | 1,329 | 43.28 | 28,738 | 69.07 | 45,931 | 74,669 |
| 1967 | 1,779 | 33.05 | 29,381 | 71.13 | 63,306 | 92,687 |
| Total | - | - | $146,305 | - | $278,853 | $425,158 |

1/ Based on information from the survey and the Kansas City, Mo. cattle market.
2/ Based on market value of increase in cattle weight from 400 to 550 pounds.
3/ Based on half the number of cattle with change in value.
4/ Based on market value of increase in cattle weight from 400 to 725 pounds.

Appendix table 5.--Estimated Federal and private investment associated with the GPCP, nine-county study area, 1958-66

| Year | Federal expenditures in cost-sharing: receipts by sector | | | | Private investment allocated to sector | | | Adjusted cumulative total 1/ |
|---|---|---|---|---|---|---|---|---|
| | 3--Agricultural inputs | 8--Construction | 11--Imports | Total receipts | 1--Crops | 2--Livestock | Total investment | |
| 1958 | 15,121 | 50,305 | 204 | 2/ 65,630 | 11,404 | 17,106 | 2/ 28,510 | 26,609 |
| 1959 | 15,961 | 53,100 | 215 | 2/ 69,276 | 12,000 | 18,000 | 2/ 30,000 | 52,708 |
| 1960 | 25,309 | 76,589 | 183 | 2/ 102,091 | 18,000 | 27,000 | 2/ 45,000 | 90,807 |
| 1961 | 46,515 | 80,601 | 498 | 2/ 127,614 | 22,000 | 33,000 | 2/ 55,000 | 135,209 |
| 1962 | 34,544 | 75,037 | 1,421 | 111,002 | 22,174 | 33,261 | 55,435 | 176,411 |
| 1963 | 36,268 | 152,949 | 569 | 189,786 | 37,125 | 55,688 | 92,813 | 248,772 |
| 1964 | 47,288 | 138,275 | 391 | 185,954 | 36,835 | 55,253 | 92,088 | 314,269 |
| 1965 | 45,466 | 227,959 | 465 | 273,890 | 60,057 | 90,085 | 150,142 | 427,811 |
| 1966 | 45,287 | 121,534 | 167 | 166,988 | 34,616 | 51,923 | 86,539 | 473,952 |
| Total | 311,769 | 976,349 | 4,113 | 1,292,231 | 254,211 | 381,316 | 635,527 | - |

1/ Estimated undepreciated investment carried over to following year, based on an assumed average productive period of 15 years for the installed practices.

2/ A cumulated total through fiscal year 1961 was allocated arbitrarily among individual years during 1958-61, but generally in relation to the trend in total investment in installing practices during these years.