An Analysis of the Economy of the Gila River Sub-basin of the Colorado River Drainage Basin in 1960 with Emphasis on Heavy Water-using Industries

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AN ANALYSIS OF THE ECONOMY OF THE GILA RIVER SUB-BASIN OF THE COLORADO RIVER DRAINAGE BASIN IN 1960 WITH EMPHASIS ON HEAVY WATER-USING INDUSTRIES

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INPUT-OUTPUT ANALYSIS

A Brief Description of the Model

by

Bernard Udis

August, 1967

Input-Output Analysis

A Brief Description of the Model

The essence of input-output or interindustry analysis is the explicit recognition that each sector of the economy is dependent upon every other sector, and an effort to determine the degree of quantitative interdependence.[1] The literature on input-output is replete with references to "structure," "interdependence" or "interrelationship." These terms emphasize that the primary focus of this analysis is not on the particular level of economic activity as measured by Gross National Product, Employment, or Personal Income, but rather on how the typical or representative firm in each industry depends on all other industries, both as suppliers of inputs and customers for output. A substantial and unique advantage of this means of analysis over alternative techniques is that of its capacity to ferret out both direct and indirect effects of a change in the level of output of a particular industry on all other industries.

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[1]For a simple introduction to input-output analysis, the reader is referred to William H. Miernyk, The Elements of Input-Output Analysis (New York: Random House, 1965). A more sophisticated treatment may be found in Hollis B. Chenery and Paul G. Clark, Interindustry Economics (New York: John Wiley & Sons, Inc., 1959). Detailed and advanced critiques of the method are available in Conference on Research in Income and Wealth, Studies in Income and Wealth, Vol. 18, National Bureau of Economic Research, Input-Output Analysis: An Appraisal (Princeton: Princeton University Press, 1955); and Oskar Morgenstern (ed.), Economic Activity Analysis (New York: John Wiley & Sons, Inc., 1954). The basic references to input-output analysis are those of its modern father, Wassily W. Leontief, The Structure of American Economy, 1919-1939 (New York: Oxford University Press, Second Edition, 1951); and Leontief, et. al., Studies in the Structure of the American Economy (New York: Oxford University Press, 1953). A convenient collection of Leontief's articles has been published as Input-Output Economics (New York: Oxford University Press, 1966). It includes a number of interesting examples of the application of I-O analysis.

Thus a knowledge of the structure of the economy provides the means to trace the implications, industry by industry, and in the aggregate, of a change in the level of economic activity of a particular sector.

The workings of such a table will be illustrated shortly. It should be pointed out here, however, that in a study of this sort where the primary interest is quite particular--what will be the water requirements (both quantitative and qualitative), necessary to support alternative levels of economic activity and population in the future--overall estimates of economic aggregates such as GNP or population are inadequate. The regulatory agency must be concerned with the economic base and how its parts fit together. Officials of the Federal Water Pollution Control Administration, however alert to sharp changes in the level of activity of traditional heavy water users, may be quite unprepared for changes arising elsewhere in the economy, however induced, which may have significant secondary or tertiary effects on the heavy water users. It is our conviction that a knowledge of the structural interrelationships within an economy is a prerequisite to rational and effective measure in the realm of public policy.

The raw material for the analysis is found in the grid or matrix of interindustry transactions. Such a matrix for the Gila Sub-Basin is found in Table G-S of this report. This table shows the detailed disposition of the output of each industry along the horizontal lines or rows. Thus in 1960, the range livestock industry in the Gila Sub-Basin kept none of its own production for further use while selling $31,983,000 to feeder livestock, and $532,000 to the food and kindred products industries. The vertical columns of the table are used to indicate each industry's sources of supply. Again referring to Table G-S, the rentals and finances processing sector ($3,741,000) was the largest supplier to range livestock. This, of course, is simply the other side of the type of transaction noted above. We can quickly spot other purchases by range livestock from forage, feed and food crops ($2,085,000) and other various suppliers to the industry. We can also identify $8,943,000 of imports from outside the Colorado Basin, payments of $9.54 million in profits and related payments, depreciation allowances ($4,747,000), and wages and salaries ($965,000).

While a useful method of interindustry accounting, the transactions table will not yield the desired answer to the basic question: How will a change in the output output of one industry affect all other industries? For this, additional steps are necessary which involve mathematical manipulations of the figures in the transactions table. The details are cumbersome, but in essence, the task is to solve as many simultaneous linear equations as the number of industrial categories in the so-called processing sector[2] of the matrix. Linear or matrix algebra is the technique and a high-speed electronic computer the instrument for this operation. Briefly put, the procedure is to adjust the column totals, labeled Total Gross Outlays, by subtracting the row entry identified as inventory change (depletion), and then expressing each remaining number in the column as a percent of the now-adjusted total. To repeat, this is done only for the industries in the processing sector. The resulting table is known as the "A" matrix, or table of direct coefficients. It yields the direct requirements of the regional economy from industries named in row headings at the left per dollar of output sold outside the processing sector by the industry named at the column head. However, this is only a way-station because it fails to take account of secondary, tertiary and other indirect effects. To complete the story, the "A" matrix must be subtracted from an identity matrix, (a series of 1's along the diagonal and zeros in all other cells), and then inverted. The resulting inverse matrix shows the direct <u>and</u> indirect effects on all industries of a change in the output level of any one of them. It enables one to specify the level of production required of each industry to sustain any particular level of final demand.[3]

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[2]The economy is assumed to consist of two classes of sectors, an autonomous sector which responds largely to forces external to this regional economy, and a non-autonomous sector which is responsive to changes originating within the regional economy. To unearth structural interrelationships within the non-autonomous sectors is the goal of the analysis. These non-autonomous categories are classified as constituting the "processing" sector. The autonomous categories are labeled the "Payments" sector along the rows and the "final demand" sector along the columns. For a detailed discussion of this point together with a diagrammatic and symbolic exposition, see Miernyk, <u>op</u>. <u>cit</u>., Chapter 2.

[3]<u>Ibid.</u>

The inverse matrix for the Gila is shown in Table G-U of this report. Each entry shows the total dollar production directly and indirectly required from the industry at the top of the table per dollar of deliveries to final demand by the industry at the left. Again using range livestock as an example, it may be determined that for each dollar of its sales to final demand, this industry must produce $1.00 of output. Other significant effects are felt in rentals and finance (11.9 cents), forage, feed and food crops (6.4 cents), food and kindred products and service stations with 1.4 cents each. In the aggregate, it requires $1.27 of production from the processing sector to support each dollar of range livestock sales to the final demand sector. The magnitude of these direct and indirect effects gives range livestock 25th rank within the processing sector of the Gila (See Table G-Z).

Returning for a moment to Table G-S showing interindustry transactions, it is assumed that the actual entries will change from year to year but that the relative proportions between industries remain essentially constant over periods of short to intermediate length. This is to say that industrial technology and household consumption patterns change only slowly.[4]

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[4]This assumption of fixed coefficients appears to fly in the face of popular conceptions of an ever-changing technology and fluid tastes. There is also controversy on the professional level concerning the constancy of coefficients assumption. The resolution of this issue, however, will be found in empirical evidence rather than in theorizing, and on this count, there is evidence which supports the assumption of relative constancy over short periods. In his input-output study of four Southwestern Wyoming counties, Richard Lund found very little change in coefficients between 1953 and 1959, despite drastic changes in the economy of the region during the period. It should be noted that the four counties he studies are all in the Green River Sub-Basin of the Colorado River Basin. See Richard E. Lund, A Study of the Resources, People and Economy of Southwestern Wyoming (Cheyenne: Wyoming Natural Resource Board, 1962), p. 77. Chenery and Clark have commented that "the results of input-output analyses are not sensitive to changes in the great many of the coefficients," and "....the research task of examining the important coefficients for possible modifications of the assumption of constancy is a manageable one." See their Interindustry Economics, op. cit., p. 161. In Chapter 6 of the same volume, there is a discussion of various studies which have been conducted to test the validity of the assumptions underlying input-output analysis. Finally, input-output analysis, unlike other methods of analysis, provides an advantage in that it "readily permits introduction of revised coefficients." See Philip M. Ritz, "Comment," in Input-Output Analysis: An Appraisal, op. cit., pp. 181-182.

It cannot be denied, however, that despite some reasonably stable components, the American economy is a dynamic one where change is not a stranger. Nevertheless, the essential point is that the validity of the input-output technique is independent of the degree of constancy of coefficients. As Evans, Hoffenberg have noted, interindustry analysis is basically cross-sectional and "The structural interconnections revealed by it should not be considered as immutable or unchanging, but rather as the starting point approximate to the period to which an analysis of input structures is to refer."[5] Thus, the 1960 tables contained in this report give valuable insights into the structure of the economy of the Gila that will probably remain valid for perhaps a decade. However, projections of the structural relationships which will prevail in this region more than ten years hence must be interpreted with an awareness of their highly tentative nature. Such projections of technical coefficients have been made, however, and appear in the last chapter of this report where the topic of projections is treated in detail.

Implementing the Model in the Gila Sub-Basin of the Colorado River Basin[6]

The model described briefly above is deceptively simple. The direct coefficients can be computed easily on a desk calculator even for a fairly large table. And programs for the inversion of matrices are readily available. The major work involved is in constructing the basic transactions table. Before this can be done the sectors to be included in the table must be defined. An effort must be made to limit each sector to one with relatively homogeneous inputs and outputs. Care must be exercised to avoid the problem of substitutability. After preliminary

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[5] W. Duane Evans and Marvin Hoffenberg, "The Interindustry Relations Study for 1947", Review of Economics and Statistics (May, 1952), pp. 97-142. See especially p. 126.

[6] This section borrows heavily from Miernyk's excellent paper, "Small-Area Interindustry Analysis", Bureau of Economic Research, University of Colorado, (Mimeographed, 1963), pp. 8-17.

investigation has shown what sectors are to be used the transactions table is constructed in two steps:

(1) The first step is to establish "control totals." For the processing sectors these are usually total sales figures, except for the trade sector where gross margins (operating costs plus net revenues) represent output.[7] In the final demand and payments sectors it is possible to estimate other control totals, such as payments to government and personal consumption expenditures.

(2) Once the control totals have been established, the row and column distributions are worked out. In this study the distributions were based on survey data obtained from a sample of all establishments represented in the processing sectors. The procedure is to fill out each row and the corresponding column separately, then to reconcile differences at the intersections. The entire process is iterative. There is no single method for arriving at the final distribution. Frequently, judgment must be used in making inter-section reconciliations.

In constructing the transactions table either producer's or purchaser's prices may be used. The standard practice in the United States, however, has been to use producer's prices, and this was the procedure followed in this study. When this method of valuation is employed, marketing costs are _excluded_ from the output control totals. They are added to the costs of the _comsuming_ sector. Trade margins are registered as purchases by the consumers of specific commodities. Both outputs and inputs are stated in f.o.b. prices. The buyer pays transportation costs, and where a firm uses its own transportation facilities, transportation costs must be imputed to the transportation sector.[8]

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[7]The problem of treating the trade sectors so that they reflect only the distribution of the gross margin is complex, but quite important. An illustrative example appears in the appendix to this chapter.

[8]For a discussion of the problems involved in obtaining data, and the reaons for preferring producer's to purchaser's prices, see Chenery and Clark, _op. cit._, pp. 141-142; and Evans and Hoffenberg, pp. 103-104.

For data collection purposes, the processing sector of the transactions table for the Gila was divided into thirty-six industries. The number of processing sector industries simply reflects the types of economic activity found in the regions. Heavy water using industries were singled out for separate treatment in the processing sector of the transactions table. Also, a number of sub-divisions of the trade and service sectors were closely examined in view of their importance to water-related recreation activities.

It is essential to provide for unallocated inputs and outputs during the data gathering phase. Chenery and Clark have argued that it is better to eliminate unallocated figures even if this must be done solely on the basis of judgment.[9]

In this study unallocated inputs and outputs were not a particularly serious problem. Reasonably comprehensive surveys of most processing sectors permitted fairly reliable distributions of purchases and sales.[10] The survey data were also helpful in distributing purchases and sales within the payment and final demand sectors. This is perhaps an advantage which small area input-output analysis has over the construction of national tables. Those involved in the construction of national tables have available a wealth of statistical information which cannot be obtained on a small-area basis, and thus can estimate more reliable control totals. On the other hand, it would be inordinately costly to conduct nation-wide surveys for all sectors to allocate interindustry flows. In a relatively small and sparsely-populated area, however, such surveys yield a high rate of return.[11]

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[9] Chenery and Clark, op. cit., p. 142.

[10] The extent of coverage varied from sector to sector. It is important to emphasize, however, that sample data were not used to estimate control totals. These were derived from secondary sources.

[11] In some small-area input-output studies interindustry flows have been estimated by applying national coefficients to regional control totals. As Isard has pointed out, however, such estimates are affected by interregional differences in factor proportions and product mix. The use of survey data to distribute purchases and sales should result in far more accurate technical coefficients. See Walter Isard, "Regional Commodity Balances and Interregional Commodity Flows", American Economic Review (May, 1953), pp. 170-171.

The construction of the transactions table would be greatly simplified if there were no interest in imports and exports, i.e., if one were dealing with a closed model. But it is completely unrealistic to treat a small area as a closed economy. In small-area analysis the import and export flows are among the most important to be considered. More will be said about this presently.

In wholesale and retail trade it is possible to obtain good data on purchases both on an interindustry and geographical basis. On the other hand, however cooperative they might be, retailers are rarely in a position to give an interviewer much information about the final destination of their sales. To a lesser extent this difficulty is also encountered in the wholesale trade sector.

Many services are entirely of a local nature, and these present no serious problems. Some services are highly seasonal, however, such as those provided by firms which cater to the tourist trade. In such cases it is difficult to make an accurate breakdown between services provided to residents of the area and those provided to transients. In lodging facilities, for example, such data could no doubt be obtained by a careful search of records. Indeed, some respondents in our survey provided accurate figures, but others were unwilling to do more than make rough estimates. The transportation sector poses similar problems. There are no major difficulties in measuring intra-area shipments. But there are serious difficulties when shipments to and from other areas are involved. In construction, the major problem is simply one of obtaining accurate information from builders. Even at the national level there are serious data deficiencies in the construction sectors, and in some ways these difficulties are compounded in a small-area study.[12] Utilities provide another example of measurement difficulties. Utilities do not keep books on a basis which would permit accurate estimates of sales by county. Power and telephone companies typically distinguish among sales to households, and to commercial and industrial users. But they are quite indifferent to county lines, and usually are equally indifferent to

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[12] See Evans and Hoffenberg, op. cit., pp. 117-118.

state lines. Hence in estimating the sales of utilities on a small-area basis it is necessary to rely on various ratios (to population, employment, etc.) in allocating these sales on a county and eventually a regional basis.

One other classification within the processing sector calls for some comment. This is the exclusion of professional services from the service row and column. These were included in households, a decision dictated entirely by data considerations.

All data were expressed in 1960 prices with no attempt to adjust for price changes during the year. The latter adjustment would have been desirable. But there would have been no way of estimating the percentage of transactions at each of a succession of prices without examining all records on a day-to-day basis, something which could not be attempted because of time and money considerations. Thus, we assumed that the volume of transactions in the base year was not affected by price changes.[13]

The Final Demand and Payments Sectors

The autonomous sector represents the "open" part of the input-output system. For each component of the processing sector, the sum of the row must equal the sum of the column. That is, total gross output must equal total gross outlays (by definition). This is not so for the final demand and payments sectors, however. In this case, the only constraint is that the sum of all rows in the payments sector must equal the sum of all columns in the final demand sector. Thus when the input-output system is used to analyze changes in final demand the sub-sectors comprising final demand can be collapsed into a single column vector. It is important, however, to examine each of the final demand (and payments) sub-sectors since variations in any one will have an effect on levels of production in the processing sectors.

Final Demand sub-sectors---In this model, there are seven final demand sub-sectors. These are: (1) additions to inventory (no matter

[13] Additions to inventory were no doubt affected to some extent by price changes, although there would be some offset from inventory depletions. Price changes in 1960 were not large, however. Consumer prices rose about 1.6 percent and, wholesale prices were virtually stable. See Economic Report of the President (January, 1963), pp. 220-224. Cf. Evans and Hoffenberg, op. cit., p. 119.

where held) during the base year, (2) gross investments, (3) households, (4) state and federal government, (5) local government, and (6) exports. Exports are divided into two classes: (a) exports outside the Sub-Basin but within the Colorado River Basin, and (b) exports to the rest of the world.

The Payments sub-sectors---These consist of: (1) inventory depletion during the year, (2) depreciation allowances, (3) households, (4) state and federal government, (5) local government, and (6) imports. As with exports, imports are subdivided into two groups: (a) imports from the rest of the Colorado River Basin, and (b) imports from the rest of the world.

It is probably fair to say that the most difficult data problems in the construction of a transactions table occur in the final demand and payments sectors.

Inventories---Both the inventory column and row measure gross changes. Thus the column vector minus the row vector yields net inventory changes. As Evans and Hoffenberg point out, it is difficult to handle inventories within the input-output framework since "they introduce a dynamic element into what is essentially a series of static flows."[14] To establish inventory totals in each cell properly it is necessary to obtain data on the amounts sold from stock during the base year (entered in the inventory row), and also to obtain data on the amounts added to stock during the base year (entered in the inventory column). Thus we are concerned only with the flows into and out of inventory, and not the size of the stock itself. Excellent data on inventory changes were obtained from some firms in the survey, but in other cases only rough estimates could be made.[15]

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[14] *Op. cit.*, p. 118.

[15] The inventory problem in some small-area input-output studies has been handled by reporting only net inventory changes. See for example, the transactions table in "The Eighth District Balance of Trade", *Monthly Review*, Federal Reserve Bank of St. Louis (June, 1952). In others it has been avoided by leaving inventories out of the calculations entirely. See, for example Frederick T. Moore and James W. Peterson, "Regional Analysis: An Interindustry Model of Utah," *Review of Economics and Statistics* (November, 1955), pp. 368-383, table following page 372; and Richard E. Lund, *A Study of the Resources, People and Economy of Southwestern Wyoming* Laramie, Wyoming; Division of Business and Economic Research, University of Wyoming (June, 1962), table following page 74.

Household & Government---Control totals for these sectors were built up from published sources of data on income, tax payments, and government purchases. The county data were somewhat uneven from state to state, but there probably are no significant errors in the control totals. Payroll data, obtained from state Divisions of Employment Security, sales tax data, and survey data obtained from business establishments were used to work out the inter-industry flows and some of the allocations within the payments and final demand sectors.

Investment and depreciation---As Chenery and Clark have noted, one of the major gaps in national statistics is the lack of investments by industry cross-classified with investment by type of capital equipment.[16] Even if good data were available, however, there are some conceptual problems involved in handling capital outlays within the input-output system. The basic transactions table is supposed to show the flow of all goods and services from industry of origin to industry of destination. It might be argued that if all flows are to be recorded, they should include sales on current account for intermediate and final use plus sales of capital equipment. But Evans and Hoffenberg have pointed out that input ratios computed from a generalized flow matrix of this kind would not be stable (since purchases of capital equipment by individual establishments tend to be "lumpy" rather than continuous), and these ratios would not be limited to transactions on current account which are the central focus of input-output analysis.[17] Thus industry outputs to gross private domestic investment are listed in a separate column, and depreciation allowances in a separate row. In the tables in this study, the first approximations were based on survey data. These were adjusted following successive iterations of the various rows and columns.

Exports---Many activities covered by a small-area input-output table will be purely local in character, and these pose no particular problem. At the other extreme, some industries in a small area

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[16] Op. cit., p. 273.

[17] Op. cit., pp. 104-105.

might produce entirely for export which greatly simplify the allocation of their production. For those that fall in between some estimation is required. In our tables the distinction between local and export sales for such industries was based largely on survey data. Local sales were subtracted from total sales and the difference allocated to the export column for each sector.

Imports---It is customary in constructing national transactions tables to distinguish between competitive and non-competitive imports. It has also been the practice in constructing national tables to add competitive imports to domestic production in the appropriate sector. Only the non-competitive imports, therefore, are entered in the import row.[18] In our tables this distinction was not made. With the possible exception of some agricultural products, there are few examples of commodities produced in this area which are also imported for local consumption. This simplified the problem, and the assumption was made that all imports were non-competitive.

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[18] See Chenery and Clark, p. 142, and Evans and Hoffenberg, p. 109.

Appendix: Illustrative Example of the Process of Margnning the Trade Sectors

Assumptions

(1) A simple economy with a single processing industry (perhaps mining) with no consumer goods manufacturing in the economy, a single trade sector, a household sector and a link with the outside world through exports and imports-- such as Appendix Table M-1.

(2) All numbers in Appendix Table M-1 represent total dollar sales.

(3) No wholesale sector exists.

(4) The retail trade sector is supplied through imports.

(5) The retail trade margin is twenty percent.

The twenty percent margin is applied to all entries in the trade row which reduces each original entry by eighty percent. The amount by which the trade row is reduced is then added to the import intersection with each of the affected columns as shown in Appendix Table M-2. If we stopped at this point, the import row would be grossly overstated since the processing industry, the household, and exports are all now viewed as importing goods which still appear as trade sector imports. The totals would also be out of balance with the retail trade row total equal to 26 while its column total comes to 130. Further, the sum of the final demand columns (households plus exports) equal 185 while their row totals come to 289. Hence, it becomes necessary to reduce trade imports by the sum of the additions to the imports of the other three columns---104. All row and column totals are now brought back into balance within the processing sector as is the aggregate of the autonomous payments sector and final demand. See Appendix Table M-3.

APPENDIX TABLE M-1

TRANSACTIONS TABLE FOR A HYPOTHETICAL ECONOMY

(Stage 1)

	MINING	RETAIL TRADE	HOUSEHOLDS	EXPORTS	TOTAL GROSS OUTPUT
MINING	0	5	55	0	60
RETAIL TRADE	10	0	90	30	130
HOUSEHOLDS	40	20	0	0	60
IMPORTS	10	105	10	0	125
TOTAL GROSS OUTLAY	60	130	155	30	375

APPENDIX TABLE M-2

TRANSACTIONS TABLE FOR A HYPOTHETICAL ECONOMY

(Stage 2)

	MINING	RETAIL TRADE	HOUSEHOLDS	EXPORTS	TOTAL GROSS OUTPUT
MINING	0	5	55	0	60
RETAIL TRADE	2	0	18	6	26
HOUSEHOLDS	40	20	0	0	60
IMPORTS	18	105	82	24	229
TOTAL GROSS OUTLAY	60	130	155	30	375

APPENDIX TABLE M-3

TRANSACTIONS TABLE FOR A HYPOTHETICAL ECONOMY

(Stage 3)

	MINING	RETAIL TRADE	HOUSEHOLDS	EXPORTS	TOTAL GROSS OUTPUT
MINING	0	5	55	0	60
RETAIL TRADE	2	0	18	6	26
HOUSEHOLDS	40	20	0	0	60
IMPORTS	18	1	82	24	125
TOTAL GROSS OUTLAY	60	26	155	30	271

Just why is all of this manupulation necessary? For one thing the trade sectors differ from other processing sector industries in that their major task is to see that commodities and services are available when and where the consumer requires them. Thus they provide time and place utility but do <u>not</u> alter the physical form of the good. In this analysis an attempt is made to get at "value added" by entering only the gross margins of the trade sectors (the sum of operating expenses plus profit) in the transactions table.

To refer back to the example for a moment, if the trade sector supplies other industries with only twenty percent of the total value of their purchases, who supplies the remaining eighty percent? This example assumes that the missing eighty percent comes in the form of imports from outside the region. It is far from unrealisitc in this part of the country although there are clearly some local producers servicing the domestic market. Thus, instead of assigning the full amount of the difference between total trade sales and the trade margin to imports, some should go to local producers whose product is channeled to local consumers through the trade sector. The simplest case was chosen for the example to make the illustration of the general principle as clear as possible.

Perhaps the rationale for margining the trade sector is best Presented by Evans and Hoffenberg when they write:

> If output of the trade sectors were defined to cover total sales, it would mean that a great variety of commodities would flow into trade as inputs and then be charged out in some averaged aggregate form to consuming sectors. This procedure would eliminate the direct link between producers and users which is a a main purpose of the tabulations and would substitute instead a heterogeneous trading structure.[19]

[19] Evans and Hoffenberg, *op. cit.*, p. 104.

THE ECONOMY OF THE GILA RIVER SUB-BASIN OF THE COLORADO RIVER BASIN: AN OVERVIEW

by

Bernard Udis

Revised

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Introduction

The Gila Sub-Basin is the largest of any of the six sub-basins of the drainage area of the Colorado River Basin. Its 55,317 square miles comprise almost 23 percent of the overall Colorado Basin. Ninety percent of its area lies within Arizona with the remaining tenth in New Mexico.[1] For purposes of this analysis, the Gila Sub-Basin has been defined to include nine counties in Arizona--Cochise, Gila, Graham, Greenlee, Maricopa, Pina, Pinal, Santa Cruz, and Yavapai--and two in New Mexico--Catron and Grant. Figures G-A and G-B show the precise location of the Gila, while Table G-A lists the representative counties[2] of each sub-basin of the Colorado River Basin.

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[1] See U.S. Department of Health, Education and Welfare, Public Health Service, Bureau of State Services, Division of Water Supply and Pollution Control, Region VIII, Colorado River Basin Water Quality Control Project, State and County Area Tabulations for the Colorado River Basin (Denver: Colorado River Basin Water Quality Control Project, January, 1962), p. 7.

[2] The Public Health Service has designated as "representative" certain counties of the Colorado Basin in which most of the economic activity occurs. This was necessary because the boundaries of the Colorado River Basin and its sub-basins follow natural drainage divisions and rarely conform to county borders while most statistical data are available only for entire counties. Ibid., p. 12.

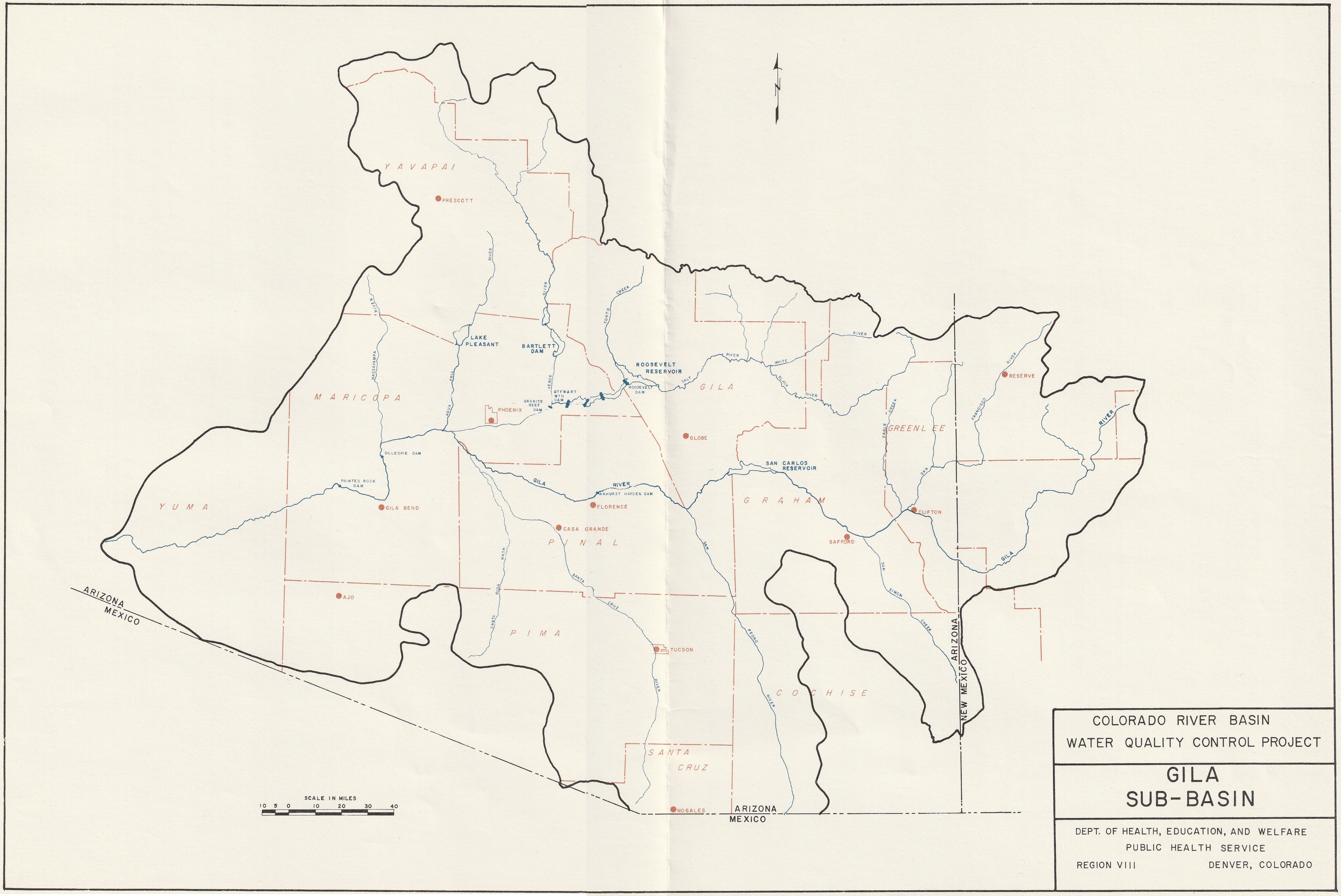
Table G-A

Sub Basin	State and County	Sub-Basin	State and County
I. Upper Main	Colorado	III. San Juan	Utah
Stem	1. Delta	(cont'd)	1. Garfield
	2. Dolores		2. Kane
	3. Eagle		3. San Juan
	4. Garfield		4. Wayne
	5. Grand	IV. Little	
	6. Gunnison	Colorado	Arizona
	7. Hinsdale		1. Apache
	8. Mesa		2. Navajo
	9. Montrose		
	10. Ouray		New Mexico
	11. Pitkin		1. McKinley
	12. San Miguel		
	13. Summit	V. Gila	Arizona
			1. Cochise
	Utah		2. Gila
	1. Grand		3. Graham
			4. Greenlee
II. Green	Colorado		5. Maricopa
	1. Moffat		6. Pima
	2. Rio Blanco		7. Pinal
	3. Routt		8. Santa Cruz
			9. Yavapai
	Utah		
	1. Carbon		New Mexico
	2. Daggett		1. Catron
	3. Duchesne		2. Grant
	4. Emery		
	5. Uintah	IV. Lower	Arizona
		Main Stem	1. Coconino
	Wyoming		2. Mohave
	1. Lincoln		3. Yuma
	2. Sublette		
	3. Sweetwater		Nevada
	4. Uinta		1. Clark
			2. Lincoln
III. San Juan	Colorado		
	1. Archuleta		Utah
	2. La Plata		1. Washington
	3. Montezuma		
	4. San Juan		
	New Mexico		
	1. San Juan		

MAJOR SUB-BASINS OF THE COLORADO RIVER BASIN

COLORADO RIVER BASIN
WATER QUALITY CONTROL PROJECT

U. S. DEPT. OF HEALTH, EDUCATION, & WELFARE
PUBLIC HEALTH SERVICE
REGION VIII DENVER, COLORADO



COLORADO RIVER BASIN
WATER QUALITY CONTROL PROJECT

GILA
SUB-BASIN

DEPT. OF HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE
REGION VIII DENVER, COLORADO

The Gila Sub-Basin encompasses practically all of central and southern Arizona and a portion of southwestern New Mexico. U.S. Highways 60-70 and 80 cut across the Gila, providing the major southern routes to California. It is an area of many contrasts from small mining towns in a state of decline to the major metropolitan areas of Phoenix and Tucson which have grown more rapidly in recent years than any other part of the country. The concentration of manufacturing in these cities imparts more of the flavor of the industrialized United States (modern version), than any other portion of the Colorado River Basin.

The agriculture of the sub-basin is extremely diverse. Crop production provided 60 percent of the gross value of agricultural output in the Gila in 1960 with livestock and its products accounting for the remaining two-fifths. Harvested acreage was largely concentrated in Maricopa and Pinal Counties, which accounted for somewhat over 50 percent and 28 percent of the total, respectively.[1] Virtually all crops produced in the Gila are grown under irrigation.

About 40 percent of all land area in the Gila is administered by the U.S. Forest Service, with substantial acreages of six national forests--the Apache, Cibola, Coronado, Gila, Prescott, and Tonto--within the sub-basin's borders.[2]

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[1] See Lynn Wilkes, "An Analysis of the Agricultural and Forestry Economy of the Gila Sub-Basin for 1960," (revision of June, 1964 Report by J. Dean Jansma), p. 100 of this report.

[2] Ibid., p. 87, and pp. 102, 103.

Population

The Gila is the most populous sub-basin of the Colorado River Basin, and its 1960 population of 1,159,374 was almost five times that of the second ranking sub-basin in population, the Lower Main Stem. Table G-B presents a summary of the age and sex distribution of 1960 sub-basin population. The age profile of the population of the Gila more closely approximates that of the United States than that of any of the other sub-basins of the Colorado, although it is somewhat more heavily concentrated in the group under 40 years of age.

The Gila's population has grown for at least 40 years, and the 76.4 percent increase in the 1950-60 period was the largest gain in this period and probably in history. Eight of the eleven counties which comprise the Gila grew in population in the 1950-60 period ranging from a doubling in Maricopa and +88.1 percent in Pima (reflecting the surge forward of Phoenix and Tucson) to Gila County's +6.6 percent. Three counties of the sub-basin lost population. These were Greenlee (-10.1%), Grant (-15.8%), and Catron (-21.5%).

Census data permit an analysis of population change in terms of the components of such change. For example, it enables one to determine how much of the difference in population between 1950 and 1960 was due to factors other than the excess of births over deaths (the natural increase). The results of such an analysis in the Gila are instructive. During the decade to 1960 the excess of births over deaths in this sub-basin amounted to 186,730. The reported excess of total 1960

Table G-B

Population by Age and Sex: 1960

Gila Sub-Basin

Age Group		Male		Female
0-19		244,874		238,779
20-39		154,621		154,202
40-64		140,703		142,393
65-65+		41,380		42,422
	Total	581,578		577,796
	Total--Both Sexes		1,159,374	

Source: U.S. Census of Population, 1960.

over 1950, however, was 500,244. Thus net in-migration is said to have taken place, and the 313,514 in-migrants constitute 47.7 percent of the 1950 population taken as a base. Thus, a net migration rate of +47.7 is assigned the Gila. This was the largest positive net migration rate found an any sub-basin of the Colorado. Similarly calculated rates for the component counties show positive net rates for five counties (Cochise, Maricopa, Pima, Pinal and Yavapai) and negative rates for six (Greenlee, Gila, Graham, Santa Cruz, Catron and Grant). The positive change in the first five counties so far exceeded the others however, that the net migration rate for the sub-basin was able to attain its level of +47.7 for the decade.[3]

In the aggregate, the Gila retained its historic rank as first in population among the six sub-basins of the Colorado. Indeed, its relative share of the total population of the Colorado River Basin has increased from the 47-48 percent range in 1930 and 1940 to 54.4 percent in 1950 and 60.7 percent in 1960.

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[3]For a detailed discussion of population and migration, see the chapter by J. W. Leasure which appears in the final report. The basic data source here is Bureau of the Census, "Components of Population Change, 1950 to 1960, for Counties, Standard Metropolitan Statistical Areas, State Economic Areas, and Economic Subregions," Current Population Reports, Series P-23, No. 7, November, 1962.

Population Density

The 1,159,374 residents of the Gila Sub-Basin in 1960 were distributed over a land area of 58,539 square miles, with a resulting population density of 19.8 persons per square mile. While, from a statistical point of view they were living in the most crowded of all six sub-basins, this population density was only about a third as large as the national figure of 59.0 persons per square mile. Nevertheless, the increase in population density in the Gila of 76.4 percent over the 1950 level was the largest such gain in the entire Colorado River Basin and something more than four times as fast as the national rate of growth in density of population.

Within the counties of the sub-basin, however, Maricopa with its metropolitan center of Phoenix was already more crowded relatively than the nation. Thus in 1960, the national population density of 59.0 people per square mile compared with 71.9 in Maricopa. At the other extreme, Catron County, New Mexico with 0.4 persons per square mile was the least densely settled of any county of the Gila and was also the third least densely populated county in the entire Colorado River Basin. Catron, Grant, and Greenlee Counties all having lost population in the decade to 1960 also showed declines in population density.

A related matter is the classification of the population into rural and urban categories. By Census definition 21.6 percent of the population of the Gila was classed as rural in 1960. Of this total, only three percent were identified as rural-farm with the remainder of 18.6 percent considered rural-nonfarm.. The urban group comprised 78.4 percent of the population of the Gila, making it the most urban of all six sub-basins of the Colorado. The trend toward urbanization is shown by the data in Table G-B_1. It is noteworthy that in the span of one decade

Table G-B_1

Rural-Urban Distribution of the Population of the Gila Sub-Basin 1950 &1960

Total	1960 U.S.	1960 Gila	1950 U.S.	1950 Gila
Urban	69.9%	78.4%	64.0%	59.7%
Rural Non-farm	22.6	18.6	20.7	31.1
Rural Farm	7.5	3.0	15.3	9.2

Source: U.S. Census of Population: 1950 and 1960.

the Gila has shifted from a position where its population was more rural than was the case in the nation at large, to one where its rural population was smaller than the national figures and its urban class larger.

Within the sub-basin, the most rural county was Catron, New Mexico which was classed as 78.7 percent rural-nonfarm and 21.2 percent rural-farm by the Census Bureau. Pima County, which contains Tucson, was the least rural with only 10.6 percent classed as rural-nonfarm and 1.0 percent as rural-farm and the remaining 88.4 percent considered urban.

Educational Level of the Population

In 1950 the educational attainment of the population 25 years of age and older in the Gila had been on a par with the nation as measured by the median number of years of school completed. This applied to both sexes. However, by 1960, the Gila figures of 10.1 for males and 10.6 for females each lagged behind the corresponding national figures of 10.5 and 11.0. Measured by this criterion, only the Little Colorado Sub-Basin had a lower level of educational attainment among its population.

Within the counties of the sub-basin, Pima's residents reported the largest number of years of schooling--12.0 for males and 12.1 for females. Pima also had led the list in 1950. Neighboring Pinal County was at the low end of the list in the most recent censal year with 8.6 years of schooling among males and 9.1 years for females. During the decade to 1960 the most rapid growth in average educational attainment was found among males in Cochise County (+23 percent) and females in Graham County (+20 percent). Those and additional details are presented in Table G-C.

Table G-C

Median School Completed for Persons 25 Years and Over
In the Gila Sub-Basin

County	Male 1950	Male 1960	Male Percent Change	Female 1950	Female 1960	Female Percent Change
Catron, N. M.	8.1	8.6	6%	8.8	10.4	18%
Cochise, Arizona	9.0	11.1	23	9.5	11.2	18
Gila, Arizona	8.8	9.7	10	9.6	10.2	6
Graham, Arizona	8.8	10.1	15	9.0	10.8	20
Grant, N. M.	8.8	9.0	2	8.9	9.9	11
Greenlee, Arizona	8.9	9.7	9	9.3	10.1	5
Maricopa, Arizona	10.1	11.3	12	11.1	12.0	8
Pima,Arizona	10.8	12.0	11	11.5	12.1	5
Pinal, Arizona	8.2	8.6	5	8.6	9.1	6
Santa Cruz, Arizona	8.9	10.6	19	8.7	9.2	6
Yavapai, Arizona	9.6	10.4	8	10.8	11.5	6
Gila Sub-Basin Average	9.0	10.1	12%	9.6	10.6	10%
United States	9.0	10.5	17%	9.6	11.0	15%

Source: U.S. Census of Population, 1950 and 1960.

Income[4]

The Gila Sub-Basin had the second largest per capita personal income of any sub-basin of the entire Colorado River Basin in 1960. (See Table G-D)[5]. Our estimate of $1,912 for the Gila was second only to the Lower Main Stem and represented 98.5 percent of the national figure. As might have been expected Maricopa and Pima Counties led the sub-basin with $2,014 and $1,979, respectively. (See Table G-E) Pinal County trailed the list with $1,340.

Labor Force Participation

Labor force participation indicates what proportion of the adult population is employed or considers itself available for work. More precisely, the labor force is comprised of those who are employed or

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[4] Our estimates of per capita personal income were derived in the following manner. Personal income for each county was determined by multiplying the mean income from all sources received by income recipients in 1959 by the number of income recipients as reported in Table 86 of various state reports of the 1960 Census of Population, General Social & Economic Characteristics. The personal income from all sources thus derived for 1959 was adjusted to 1960 by the national growth rate in personal income between 1959 and 1960 (4.9%). The resulting total was then divided by 1960 population to arrive at the 1960 per capita personal income figures shown in Tables G-D and G-E.

[5] In Table G-D the term "location quotient" appears for the first time in this report. This refers to a convenient device which aids in the study of regions by permitting a simple comparison per head of population between the region and the entire country for whatever particular economic characteristic is under study. A location quotient with a value of 1.0 would indicate equality between region and nation. A value greater than 1.0 indicates the relative excess of the region over the nation, while a quotient less than 1.0 shows the relative magnitude by which the region trails the nation.

Table G-D

Personal Income Per Capita

U.S., Colorado River Basin, and Six Sub-Basins, 1960

	Per Capita Personal Income (1960 Estimates)	Location Quotient (Sub-Basin Per Capita Personal Income) ÷ (U.S. Per Capita Personal Income)
United States	1,941	--
San Juan Sub-Basin	1,554	0.801
Upper Main Stem Sub-Basin	1,695	0.873
Green Sub-Basin	1,656	0.853
Gila Sub-Basin	1,912	0.985
Lower Main Stem Sub-Basin	2,112	1.088
Little Colorado Sub-Basin	1,022	0.527
Colorado River Basin	1,836	0.946

Source: Our estimates of per capita personal income were derived in the following manner. Personal income for each county was determined by multiplying the mean income from all sources received by income recipients in 1959 by the number of income recipients as reported in Table 86 of various state reports of the _1960 Census of Population, General Social and Economic Characteristics_. The personal income from all sources thus derived for 1959 was adjusted to 1960 by the national growth rate in Personal Income between 1959 and 1960 (4.9%). The resulting total was then divided by 1960 population to arrive at the 1960 per capita personal income figures.

Table G-E

1960 Per Capita Personal Income by
Representative Counties of the Gila Sub-Basin

County	Per Capita Personal Income
Maricopa, Arizona	$2,014
Pima, Arizona	1,979
Yavapai, Arizona	1,867
Cochise, Arizona	1,648
Santa Cruz, Arizona	1,630
Greenlee, Arizona	1,536
Gila, Arizona	1,516
Catron, New Mexico	1,467
Grant, New Mexico	1,453
Graham, Arizona	1,428
Pinal, Arizona	1,340

Source: Our estimates of per capita personal income were derived in the following manner. Personal income for each county was determined by multiplying the mean income from all sources received by income recipients in 1959 by the number of income recipients as reported in Table 86 of various state reports of the 1960 Census of Population, General Social and Economic Characteristics. The personal income from all sources thus derived for 1959 was adjusted to 1960 by the national growth rate in Personal Income between 1959 and 1960 (4.9%). The resulting total was then divided by 1960 population to arrive at the 1960 per capita personal income figures.

actively seeking work. This number, when expressed as a percentage of the noninstitutionalized population aged 14 or older yields the labor force participation rate. This concept is a useful indicator of the level of economic development in a region and is particularly valuable when broken down into age and sex categories. For this report, disaggregation into age classes was not possible, but Table G-F does provide labor force participation rates by sex for the continental United States, for the entire Colorado River Basin, and for each of its six sub-basins. The participation rate for each region has been divided by the corresponding national figure to obtain a "location quotient."

Table G-F indicates that in 1960 the share of the adult population in the Gila employed or seeking work was lower than in the nation at large. The labor force participation rate among sub-basin males of 77.6 percent ranked fourth among the six sub-basins. A third of the females were similarly engaged in employment or the search for it. While this was somewhat below the U.S. rate for women of 34.88 percent, it was exceeded in the Colorado River Basin only by the Lower Main Stem. The proportion of Gila residents of both sexes in the labor force has increased in the decade to 1960, and among males, this represents a movement counter to the national trend. Sub-basin location quotients of 0.986 and 0.935 for males and females, respectively, indicate the relatively small gap which separates labor force participation in the Gila from the national level.

Table G-F

Labor Force Participation Rates

	1950 Male			1960 Male			19
	Rate	Location Quotient	Rank	Rate	Location Quotient	Rank	Rate
United States	81.02	1.000		78.75	1.000		29.28
Colorado River Basin	77.56	0.957		77.88	0.989		25.47
Lower Main Stem Sub-Easin	82.93	1.024	1	82.84	1.052	1	29.03
Gila Sub-Basin	75.78	0.935	5	77.62	0.986	4	25.93
Little Colorado Sub-Basin	75.72	0.934	6	62.92	0.799	6	28.59
Upper Main Stem Sub-Basin	78.20	0.965	3	78.31	0.994	3	23.46
San Juan Sub-Basin	77.77	0.960	4	77.00	0.978	5	21.19
Green Sub-Basin	82.11	1.013	2	79.75	1.013	2	20.67

Source: Computed from data in the U. S. Census of Population, 1950 and 1960.

The variation in labor force participation rates within the sub-basin is shown in Table G-G. Cochise County led in labor force participation rates among men with its 83.2 percent in 1960. Yavapai was found at the low end of the list with 69.7 percent. Among females, Maricopa ranked first with 34 percent while Catron's very low 15.2 percent provided the floor.

The width of the range separating the high county participation rate from the low widened during the 1950-1960 decade. In the case of males, the range increased from 11.83 percentage points in 1950 to 13.49 in 1960. The range in labor force participation rates among females widened even more from 13.02 to 18.78. Despite substantial variation from county to county, both in the magnitude of participation rates and their changes over time there appeared to be some stability in the rank order of specific counties, particularly among women. If female participation rates are ranked in 1960, every county is found to be within one rank of its 1950 position while five counties retained their exact rank over the decade. Among male participation rates, two counties retained their 1950 ranks and five counties did not vary their positions by more than one rank. (See Table G-G)

Table G-G

Labor Force Participation Rates
In the Gila Sub-Basin

County	Male 1950	Male 1960	Female 1950	Female 1960
Catron,,New Mexico	79.24	79.29	15.96	15.18
Cochise, Arizona	74.81	83.22	22.85	29.82
Gila, Arizona	77.06	73.76	18.48	25.60
Graham, Arizona	74.23	73.83	21.69	29.72
Grant, New Mexico	79.09	74.83	22.12	30.12
Greenlee, Arizona	84.07	80.07	18.45	23.81
Maricopa, Arizona	76.22	78.76	28.07	33.96
Pima, Arizona	72.24	75.29	26.18	32.89
Pinal, Arizona	81.20	76.81	18.36	25.33
Santa Cruz, Arizona	77.82	77.57	28.98	32.97
Yavapai, Arizona	74.53	69.73	26.23	32.17
Gila Sub-Basin Mean	75.78	77.62	25.93	32.63

Source: Computed from data in the U.S. Census of Population, 1950 and 1960.

Employment

Table G-H presents the Census version[6] of industrial distribution of sub-basin employment for 1940, 1950 and 1960. In the twenty years from 1940 to 1960, employment in the Gila increased by 221 percent. Further, the increase of 88.2 percent in the most recent decade represents an increased rate of growth over the gain of 70.7 percent in the decade to 1950. These employment increases in the Gila are significantly more rapid than those in the nation at large of 26.7 percent in the first decade, and 15.5 percent in the more recent one. U.S. employment increased by 46.3 percent in the twenty years between 1940 and 1950. (See Table G-K).

Tables G-H and G-J indicate the growing diversity of employment in the sub-basin. The concentration of sub-basin employment among the top few industries has been decreasing since 1940. Service employment has

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[6] The two major sources of data on the industrial distribution of employment by county are the Employment Security Commission's (ESC's) of the various states which gather statistics on covered employment i.e., in industries not exempted from the law, and in establishments large enough to qualify for coverage under the law, and the U.S. Bureau of the Census. The Census enumeration of county employment by industry usually produces larger figures than those reported by the ESC. This is partly due to the much more inclusive definition used by Census which includes agricultural employment, for example, but also reflects various other methodological differences. Thus, the two sets of data are not strictly comparable. A major virtue of the Census data (available in this detail only for the years of the decennial census) is that they do provide a detailed historical record of employment for a group of industries which are defined in a generally consistent manner. For this reason, in this same section of the reports on the other sub-basins of the Colorado River Basin, Census data have been selected for analysis. However, in the detailed study of particular industries for 1960 which follow, ESC data have been utilized.

Table G-H
Gila Employment by Industry

INDUSTRY	1940 Reported Employment	1940 Adjusted Employment*	1950 Reported Employment
Agriculture	23,367	23,704	26,092
Mining	13,311	13,516	11,314
Contract Construction	7,277	7,385	17,685
Manufacturing (Total)	8,869	9,093	16,971
Food and kindred products mfg.	2,132	2,161	3,714
Textile mill products mfg.	58	59	81
Apparel mfg.	47	47	344
Lumber, wood products, furniture mfg.	904	920	1,343
Printing and publishing mfg.	1,292	1,309	2,338
Chemicals and allied products mfg.	386	391	833
Electrical and other machinery mfg.	349	353	1,099
Motor vehicles and equipment mfg.	65	66	113
Other transportation equipment mfg.	29	29	135
**Primary metals	335	339	4,767
**Fabricated metals	2,631	2,770	1,073
Other and miscellaneous mfg.	641	649	1,475
Transportation	5,788	5,879	9,679
Communication, utilities	2,820	2,861	7,647
Wholesale trade	4,388	4,447	8,333
Eating and drinking places	3,991	4,046	8,525
Other retail trade	16,298	16,533	30,731
Finance, insurance, real estate	2,836	2,877	6,999
Services (Total)	28,989	29,426	49,199
Hotels and other personal services	6,580	6,677	10,790
Private households	6,372	6,471	7,031
Business and repair services	2,914	2,956	6,380
Entertainment, recreation services	1,512	1,534	2,282
Medical, other professional services	11,611	11,788	22,716
Government	6,254	6,343	18,156
Total	124,188	126,010	211,675
Industry Not Reported	1,822		3,409

Table G-H (Cont'd)
Gila Employment by Industry

INDUSTRY	Industry as percentage of adjusted Sub-basin employment 1940	1950	1960
Agriculture	18.81%	12.33%	7.65%
Mining	10.72	5.33	4.04
Contract construction	5.86	8.35	8.92
Manufacturing (Total)	7.21	8.18	13.87
Food and kindred products mfg.	1.71	1.75	1.84
Textile mill products mfg.	0.04	0.03	0.03
Apparel mfg.	0.03	0.16	0.64
Lumber, wood products, furniture mfg.	0.73	0.63	0.51
Printing and publishing mfg.	1.03	1.10	1.29
Chemicals and allied products mfg.	0.31	0.39	0.32
Electrical and other machinery mfg.	0.28	0.51	2.74
Motor vehicles and equipment mfg.	0.05	0.05	0.09
Other transportation equipment mfg.	0.02	0.06	1.44
Primary metals	0.26	2.25	1.66
Fabricated metals	2.19	0.50	1.73
Other and miscellaneous mfg,	0.51	0.69	1.53
Transportation	4.66	4.56	2.98
Communication, utilities	2.27	3.61	3.29
Wholesale trade	3.52	3.94	3.61
Eating and drinking places	3.21	4.02	3.34
Other retail trade	13.12	14.52	13.53
Finance, insurance, real estate	2.28	3.30	5.25
Services (Total)	23.35	23.24	24.32
Hotels and other personal services	5.29	5.09	4.12
Private households	5.13	3.32	3.08
Business and repair services	2.34	3.01	3.04
Entertainment, recreation services	1.21	1.07	0.93
Medical, other professional services	9.35	10.72	13.14
Government	5.03	8.57	9.52
Total	100.00	100.00	100.00

Table G-H (Cont'd)

Gila Employment by Industry

* The inclusion of an "industry not reported" sector would grossly complicate the projection procedure and hence, it was decided to allocate employees so classified among the identified manufacturing sectors. This was done by a percentage distribution which would leave the original relationships unchanged.

Source: U.S. Department of Commerce, Office of Business Economics, *Growth Patterns in Employment by County, 1940 - 1950 and 1950 - 1960* (Washington, D.C.: U.S. Government Printing Office, 1965).

** U.S. Department of Commerce, Bureau of the Census, *U.S. Census of Population, 1960* (Washington, D.C.: U.S. Government Printing Office, 1965).

Table G-H_1

Adjusted Employment by Industry in Counties
of the Gila Sub-Basin
1960

Industry	Cochise	Gila	Graham	Greenlee	Maricopa	Pima	Pinal	Santa Cruz	Yavapai	Catron	Grant
Agriculture	1,441	285	847	206	20,085	2,300	3,982	288	810	403	344
Mining	1,841	2,130	116	1,756	587	3,566	3,519	51	749	5	2,065
Contract Construction	1,092	615	265	107	22,754	8,559	1,083	224	1,162	56	206
Manufacturing	1,195	972	240	181	38,705	10,716	805	114	912	202	373
Food & Kindred Prods.	113	36	108	26	5,358	1,528	162	28	41	0	72
Textile Mill Prods.	0	0	0	0	106	20	24	0	0	0	0
Apparel Mfg.	12	0	4	0	1,993	276	80	9	195	0	40
Lumber & Wood Prods.	4	94	19	4	1,378	288	29	0	62	198	8
Printing & Publishing	153	66	27	25	3,649	972	142	13	120	4	54
Chemicals, Etc.	246	0	0	0	879	168	36	5	0	0	0
Electrical, Etc.	87	12	15	7	9,948	968	46	0	31	0	4
Motor Vehicles, Etc.	16	0	0	0	328	37	0	0	0	0	0
Other Transportation	12	8	9	0	5,631	192	15	0	0	0	0
Primary Metals	672	736	11	115	3,073	175	205	13	9	0	162
Fabricated Metals	16	0	4	0	1,979	4,991	4	0	16	0	0
Other Miscellaneous Mfg.	64	20	43	4	4,383	1,101	62	46	438	0	33
Transportation	653	106	46	18	6,254	3,758	350	167	549	18	146
Communication & Utilities	468	159	177	61	8,945	2,546	415	87	331	13	153
Wholesale Trade	288	105	95	28	10,723	2,594	219	325	184	0	70
Eating & Drinking Places	585	355	184	128	7,779	2,941	679	174	499	35	170
Other Retail Trade	2,036	1,042	723	349	32,894	13,029	1,902	735	1,291	104	679
Finance, Insurance, Etc.	431	206	92	43	14,746	4,711	440	89	392	0	114
Services	3,442	1,391	1,133	568	56,950	26,369	2,343	948	2,468	67	1,609
Hotels, Etc.	615	275	188	61	9,639	4,563	467	223	453	17	181
Private Households	649	169	184	96	6,460	3,502	670	205	330	0	215
Business & Repair	309	112	119	27	8,150	2,934	342	49	200	10	74
Entertainment	77	43	47	26	2,390	907	132	25	82	0	46
Medical & Other	1,792	792	595	358	30,311	14,463	1,732	446	1,603	40	1,093
Government	6,459	391	263	83	18,500	10,790	919	374	529	33	233
Total	20,131	7,757	4,181	3,528	238,922	91,879	17,656	3,576	10,076	936	6,162

Source: Same as Table H.

Table G-H_2

Adjusted Employment by Industry in Counties
of the Gila Sub-Basin
1950

Industry	Cochise	Gila	Graham	Greenlee	Maricopa	Pima	Pinal	Santa Cruz	Yavapai	Catron	Grant
Agriculture	1,286	459	1,143	259	14,064	2,269	4,383	363	1,035	567	709
Mining	885	2,380	57	1,493	479	1,629	1,848	219	1,106	11	1,357
Contract Construction	628	366	286	124	9,604	4,720	854	209	562	122	494
Manufacturing	920	1,009	174	971	9,273	2,125	280	179	520	193	1,058
Food & Kindred Prods.	99	46	96	21	2,730	533	83	85	45	0	43
Textile Mill Prods.	3	0	0	0	61	14	1	1	0	0	2
Apparel Mfg.	14	4	5	0	169	113	2	23	18	0	0
Lumber & Wood Prods.	14	108	15	5	729	196	13	7	68	187	22
Printing & Publishing	108	40	26	1	1,475	533	38	32	79	0	44
Chemicals, Etc.	220	4	9	0	522	68	14	2	3	0	4
Electrical, Etc.	10	2	12	1	942	97	29	3	14	0	8
Motor Vehicles, Etc.	0	0	0	0	107	7	0	0	1	0	0
Other Transportation	9	0	0	0	100	20	1	3	3	0	1
Primary Metals	371	787	1	937	1,451	58	73	1	248	0	921
Fabricated Metals	3	3	0	3	973	85	7	3	10	1	1
Other Miscellaneous Mfg.	69	15	10	3	914	401	19	19	31	5	12
Transportation	642	161	81	45	4,013	3,604	365	153	539	13	207
Communication & Utilities	362	201	165	100	4,809	1,260	337	124	276	13	128
Wholesale Trade	129	103	75	16	6,442	1,214	108	138	170	1	84
Eating & Drinking Places	406	258	151	109	4,589	1,915	476	104	437	39	178
Other Retail Trade	1,384	891	559	413	17,023	7,134	1,399	558	1,068	64	739
Finance, Insurance, Etc.	217	104	44	16	4,628	1,624	140	81	171	2	87
Services	2,017	1,206	812	490	26,195	13,012	1,766	656	2,197	128	1,509
Hotels, Etc.	460	291	157	78	5,722	2,901	374	163	581	25	213
Private Households	353	140	151	78	3,738	1,913	242	151	179	13	184
Business & Repair	264	137	120	59	3,816	1,371	244	70	241	16	148
Entertainment	121	87	32	32	1,227	571	86	16	76	1	68
Medical & Other	819	551	352	243	11,692	6,256	820	256	1,120	73	896
Government	507	264	160	81	9,655	6,341	469	273	426	44	218
Total	9,383	7,399	3,707	4,117	111,678	46,847	12,425	3,057	8,507	1,197	6,767

Source: Same as Table H.

Table G-H_3

Adjusted Employment by Industry in Counties
of the Gila Sub-Basin
1940

Industry	Cochise	Gila	Graham	Greenlee	Maricopa	Pima	Pinal	Santa Cruz	Yavapai	Catron	Grant
Agriculture	1,184	582	1,214	317	12,312	2,201	2,783	376	1,146	783	806
Mining	2,066	2,475	58	1,225	520	1,387	1,631	589	1,700	168	1,697
Contract Construction	566	298	265	137	3,244	1,631	326	101	452	119	246
Manufacturing	1,385	738	67	33	3,986	1,190	306	67	610	119	592
Food & Kindred Prods.	48	36	36	11	1,603	313	33	14	44	0	23
Textile Mill Prods.	0	0	0	0	51	7	0	0	0	0	1
Apparel Mfg.	4	3	0	0	23	7	1	2	2	0	5
Lumber & Wood Prods.	42	45	9	9	339	248	35	11	34	115	33
Printing & Publishing	97	37	17	4	724	286	33	23	70	1	17
Chemicals, Etc.	143	0	1	0	205	38	0	1	2	0	1
Electrical, Etc.	10	6	0	1	269	29	17	1	8	2	10
Motor Vehicles, Etc.	0	1	0	0	54	8	1	0	2	0	0
Other Transportation	0	1	0	1	6	17	0	0	2	1	1
Primary Metals	5	11	0	0	274	39	0	0	7	0	3
Fabricated Metals	933	583	1	1	109	34	184	13	419	0	493
Other Miscellaneous Mfg.	103	15	3	6	329	164	2	2	20	0	5
Transportation	571	137	52	44	1,960	2,106	190	95	539	11	174
Communication & Utilities	231	155	61	22	1,395	525	125	50	207	1	89
Wholesale Trade	136	87	46	17	3,256	549	57	91	152	2	54
Eating & Drinking Places	260	200	73	62	2,042	774	222	54	241	22	96
Other Retail Trade	1,215	726	336	284	8,063	3,255	662	427	949	78	538
Finance, Insurance, Etc.	129	63	20	14	1,814	565	47	62	120	3	40
Services	1,891	1,075	531	350	13,236	7,429	1,054	622	1,886	115	1,237
Hotels, Etc.	390	243	104	88	3,198	1,642	216	159	449	14	174
Private Households	549	201	92	70	2,710	1,834	247	195	273	13	287
Business & Repair	166	98	81	36	1,540	541	87	68	185	18	136
Entertainment	77	68	27	16	746	351	61	17	121	1	49
Medical & Other	709	465	227	140	5,042	3,061	443	183	858	69	591
Government	1,455	216	147	53	2,668	891	258	181	269	53	152
Total	11,089	6,652	2,870	2,558	54,496	22,503	7,661	2,715	8,271	1,474	5,721

Source: Same as Table H.

Table G-I

Manufacturing Employment

	Gila 1950	Gila 1960
Food and Kindred Products	3,781	7,472
Textile Mill Products Mfg.	82	150
Apparel Mfg.	348	2,609
Lumber, Wood Products	1,364	2,084
Printing and Publishing	2,376	5,225
Chemicals and Allied Products	846	1,334
Electrical and Other Machinery	1,118	11,118
Primary Metals	4,848	6,733
Fabricated Metals	1,089	7,010
Motor Vehicles and Equipment	115	381
Other Transportation	137	5,867
Other Miscellaneous Mfg.	1,498	6,194
Total	17,602	56,177

Source: Table G-H.

Table G-J

Percentage Distribution of Employment by Industry
in the Gila Sub-Basin

Sector	% of Total Employment	Cumulative Percent
	1940	
Services	23.35%	23.35%
Agriculture	18.81	42.16
Other Retail	13.12	55.28
Mining	10.72	66.00
Manufacturing	7.21	73.21
Construction	5.86	79.07
Government	5.03	84.10
Transportation	4.66	88.76
Wholesale Trade	3.52	92.28
Eating and Drinking	3.21	95.49
Finance, Insurance, Etc.	2.28	97.77
Communications and Utilities	2.27	100.04
	1950	
Services	23.24%	23.24%
Other Retail	14.52	37.76
Agriculture	12.33	50.09
Government	8.57	58.66
Construction	8.35	67.01
Manufacturing	8.18	75.19
Mining	5.33	80.52
Transportation	4.56	85.08
Eating and Drinking	4.02	89.10
Wholesale Trade	3.94	93.04
Communications, Etc.	3.61	96.65
Finance, Insurance, Etc.	3.30	99.95
	1960	
Services	24.32%	24.32%
Manufacturing	13.87	38.19
Other Retail	13.53	51.72
Government	9.52	61.24
Construction	8.92	70.16
Agriculture	7.56	77.72
Finance, Insurance, Etc.	5.25	82.97
Mining	4.04	87.01
Wholesale Trade	3.61	90.62
Eating and Drinking	3.34	93.96
Communications, Etc.	3.29	97.25
Transportation	2.98	100.23

Source: Computed from data in Table G-H 1960.

Table G-K
United States Employment by Industry

INDUSTRY	Reported Employment 1940	Adjusted Employment* 1940	Reported Employment 1950	Adjusted Employment* 1950	Reported Employment 1960	Adjusted Employment* 1960
Agriculture	8,538,419	8,670,494	7,042,750	7,147,643	4,349,884	4,527,986
Mining	918,253	932,427	930,657	944,496	654,006	680,643
Contract Construction	2,068,474	2,100,419	3,457,236	3,508,712	3,815,937	3,972,103
Manufacturing	10,591,468	10,754,920	14,600,903	14,818,148	17,513,086	18,228,893
Food and kindred products mfg.	1,105,875	1,122,954	1,414,009	1,435,022	1,822,477	1,896,904
Textile mill products mfg.	1,151,805	1,169,574	1,240,283	1,2[illegible]8,764	954,036	992,947
Apparel mfg.	799,288	811,595	1,063,921	1,079,701	1,159,163	1,206,430
Lumber, wood products, furniture mfg.	939,444	953,964	1,190,176	1,207,898	1,067,252	1,110,864
Printing and publishing mfg.	632,298	642,046	855,254	867,996	1,141,192	1,187,676
Chemicals and allied products mfg.	440,142	446,917	659,327	669,116	864,542	899,797
Electrical and other machinery mfg.	1,072,424	1,088,949	2,084,337	2,115,392	3,055,447	3,180,537
Motor vehicles and equipment mfg.	574,960	583,808	869,388	882,300	841,861	876,333
Other transportation	307,133	311,833	482,799	489,972	976,837	1,016,793
**Primary Metals	878,643	892,230	1,184,975	1,202,612	1,224,922	1,275,062
**Fabricated metals	628,464	638,181	847,209	859,783	1,291,709	1,344,461
Other and miscellaneous mfg.	2,060,992	2,092,869	2,709,255	2,749,592	3,113,648	3,241,089
Transportation	2,185,775	2,219,588	2,954,230	2,998,195	2,739,913	2,851,946
Communication, utilities	938,615	953,135	1,495,077	1,517,271	1,718,234	1,788,482
Wholesale trade	1,209,449	1,228,118	1,981,827	2,011,278	2,212,984	2,303,603
Eating and drinking places	1,120,571	1,137,857	1,692,805	1,717,952	1,801,667	1,875,311
Other retail trade	5,233,332	5,314,305	6,910,018	7,012,632	7,777,984	8,096,324
Finance, insurance and real estate	1,469,881	1,492,560	1,920,691	1,949,298	2,694,630	2,804,834
Services	8,620,952	8,754,248	10,106,309	10,256,685	13,549,947	14,104,103
Hotels and other personal services	1,689,514	1,715,652	1,861,588	1,889,267	1,941,530	2,020,919
Private households	2,336,497	2,372,642	1,639,551	1,663,939	1,916,964	1,995,308
Business and repair services	867,413	880,826	1,313,235	1,332,728	1,610,728	1,676,538
Entertainment, recreation services	396,966	403,050	494,720	502,062	502,879	523,249
Medical, other professional services	3,330,562	3,382,078	4,797,215	4,868,689	7,577,846	7,888,089
Government	1,790,086	1,817,744	3,539,859	3,592,602	4,936,292	5,138,421
Total	44,685,275		56,632,392		63,764,564	
Industry Not Reported	690,540		842,520		2,608,085	
Adjusted total		45,375,815		57,474,912		66,372,649

Table G-K (Cont'd)
United States Employment by Industry

INDUSTRY	Industry as a percentage of U. S. Employment 1940	1950	1960	Percentage Change 1940 1950	1940 1960	1950 1960
Agriculture	19.12%	12.44%	6.82%	-17.57%	-47.78%	-36.66%
Mining	2.06	1.64	1.03	1.29	-27.01	-27.94
Contract construction	4.63	6.11	5.98	67.04	89.11	13.20
Manufacturing	23.65	25.78	27.46	37.78	69.49	23.01
Food and kindred products mfg.	2.47	2.50	2.86	27.78	68.92	32.18
Textile mill products mfg.	2.57	2.19	1.50	7.62	15.11	-21.12
Apparel mfg.	1.78	1.88	1.82	33.03	48.64	11.73
Lumber, wood products, furniture mfg.	2.11	2.10	1.67	7.75	16.44	-8.04
Printing and publishing mfg.	1.41	1.51	1.79	35.19	84.98	36.82
Chemicals and allied products mfg.	.98	1.16	1.36	49.71	101.33	34.47
Electrical and other machinery mfg.	2.39	3.68	4.79	94.25	192.07	50.35
Motor vehicles and equipment mfg.	1.28	1.54	1.32	51.12	50.10	-0.68
Other transportation	.68	.85	1.53	57.12	226.06	107.52
Primary metals	1.96	2.09	1.92	34.78	42.90	6.02
Fabricated metals	1.41	1.50	2.03	34.72	110.67	110.67
Other and miscellaneous mfg.	4.61	4.78	4.88	31.37	54.86	17.87
Transportation	4.90	5.22	4.30	35.08	28.48	-4.88
Communication, utilities	2.11	2.64	2.69	59.18	87.64	17.87
Wholesale trade	2.71	3.50	3.47	63.76	87.57	14.53
Eating and drinking places	2.51	2.99	2.83	50.98	64.81	9.15
Other retail trade	11.72	12.20	12.21	31.95	52.34	15.45
Finance, insurance and real estate	3.29	3.39	4.23	30.60	87.92	43.88
Services	19.30	17.84	21.24	17.16	61.07	37.51
Hotels and other personal services	3.78	3.29	3.04	10.11	17.79	6.96
Private households	5.22	2.90	3.01	-29.87	-15.91	19.91
Business and repair services	1.94	2.32	2.53	51.30	90.33	25.79
Entertainment, recreation services	.88	.87	.79	24.56	29.82	4.21
Medical, other professional services	7.45	8.47	11.88	43.95	133.23	62.01
Government	4.01	6.25	7.74	97.64	182.68	43.02
Total	100.00	100.00	100.00	26.66	46.27	15.48

Table G-K (Cont'd)

Gila Employment by Industry

* The inclusion of an "industry not reported" sector would grossly complicate the projection procedure and hence, it was decided to allocate employees so classified among the identified manufacturing sectors. This was done by a percentage distribution which would leave the original relationships unchanged.

Source: U. S. Department of Commerce, Office of Business Economics, Growth Patterns in Employment by County, 1940 - 1950 and 1950 - 1960. (Washington, D.C.: U.S. Government Printing Office, 1965)

** U.S. Department of Commerce, Bureau of the Census, U.S. Census of Population, 1960 (Washington, D.C.: U.S. Government Printing Office, 1965).

retained its lead as the major employing industry in the Gila, and its share of total employment has increased slightly from 23.35 percent in 1940 to 24.32 in 1960.

The pattern of employment changes shows sharp gains for manufacturing, whose relative share of total employment has almost doubled since 1940; finance has more than doubled. Government employment's share increased 70 percent in the decade to 1950 with a much slower growth rate in the more recent period.

Sharp declines have occurred in agriculture's relative share of sub-basin employment. It tumbled from a second ranking 18.81 percent in 1940 to a sixth rank of 7.56 in 1960. Mining has also experienced a significan drop in relative importance -- from 10.72 percent of sub-basin employment in 1940 to 4.04 percent twenty years later.

The details of manufacturing's move into prominence as a sub-basin employer since 1950 are set forth in Table G-I. The picture is one of uninterrupted growth with increases in employment of five or six or even seven times not uncommon, as for example in transportation equipment, apparel manufacturing, electrical and "other" machinery, miscellaneous manufacturing and fabricated metals.

Some significant divergences in the magnitude and direction of employment change between the Gila and the nation appear during the decade to 1960. Table G-M shows the relative change in employment in twelve major industry groups for the two areas. A difference in direction of change was found in mining, which despite its loss of relative position noted above, added to its employment rolls by 42.92 percent in the sub-basin, while reducing employment by almost 30 percent nationally. During the same period, agricultural employment in the Gila grew by 16.78 percent while declining in the nation by 36.66 percent. Transportation employment also demonstrated contrary directions of change, growing by more than a fifth in the sub-basin as a 4.88 percent decline was recorded in the U.S. While the other industries with the exception of 3 subdivisions of manufacturing shown in Table G-M all added to their employment at both levels, the increases in the Gila far outdistanced those in the parent industries, nationally. Manufacturing, the finance group, and government are outstanding examples of the burgeoning growth rates in this sub-basin.

A more detailed analysis of industry-by-industry employment changes over time in the Gila relative to the nation is made possible by the findings in Table G-N. Here, 27 industries have been ranked in terms of their location quotients. These were calculated by dividing sub-basin employment per capita in the Gila by the corresponding national figures. Industries with a location quotient greater than 1.0 may be viewed roughly as the sub-basin's "specialty" industries which export a portion of their output to other regions while those whose quotients fall below 1.0 may be considered regional industries whose output is probably supplemented by goods imported from other areas.

The number of "specialty" industries has increased from 10 in 1940 and 1950 to 12 in 1960. However, the <u>degree</u> of regional specialization has shrunk as the mean value for all regional industries with location quotients greater than 1.0 has declined from 1.467 in 1940 to 1.316

Table G-L

Percentage Distribution of Employment by Industry - United States, 1940, 1950, 1960

INDUSTRY	% 1940	Cumulative Total	INDUSTRY	% 1950	Cumulative Total	INDUSTRY	% 1960	Cumulative Total
Manufacturing	23.65%	23.65%	Manufacturing	25.78%	25.78 %	Manufacturing	27.46%	27.46%
Services	19.30	42.95	Services	17.84	43.62	Services	21.24	48.70
Agriculture	19.12	62.07	Agriculture	12.44	56.06	Other Retail Trade	12.21	60.91
Other Retail Trade	11.72	73.79	Other Retail Trade	12.20	68.26	Government	7.74	68.65
Transportation	4.90	78.69	Government	6.25	74.51	Agriculture	6.82	75.47
Contract Construction	4.63	83.32	Contract Construction	6.11	80.62	Contract Construction	5.98	81.45
Government	4.01	87.33	Transportation	5.22	85.84	Transportation	4.30	85.75
Finance, Insurance, Etc.	3.29	90.62	Wholesale Trade	3.50	89.34	Finance, Insurance Etc.	4.23	89.98
Wholesale Trade	2.71	93.33	Finance, Insurance, Etc.	3.39	92.73	Wholesale Trade	3.47	93.45
Eating & Drinking Places	2.51	95.84	Eating & Drinking Places	2.99	95.72	Eating & Drinking Places	2.83	96.28
Communications & Utilities	2.10	97.94	Communciations & Utilities	2.64	98.36	Communciations & Utilities	2.69	98.97
Mining	2.06	100.00	Mining	1.64	100.00	Mining	1.03	100.00

Source: Computed from data in Table G-K.

Table G-M

Comparison Of Percentage Change In Employment
By Industry Between 1950 and 1960 - United States and Gila

Industry	United States	Gila Sub-Basin
Agriculture	- 36.66%	16.78%
Mining	- 27.94	42.92
Contract Construction	13.20	101.02
Manufacturing:	23.01	219.15
Food & Kindred Products	32.18	27.61
Textile Mill Products	- 21.12	82.92
Apparel Mfg.	11.73	649.71
Lumber & Wood Products, Etc.	- 8.04	52.78
Printing & Publishing	36.82	119.90
Chemicals & Allied Products	34.47	57.68
Electrical & Other Machinery	50.35	894.45
Motor Vehicles	- 0.68	231.30
Other Transportation Equipment Mfg.	107.52	4182.48
Primary Metals	6.02	38.88
Fabricated Metals	110.67	543.70
Other Miscellaneous Mfg.	17.87	313.48
Transportation	- 4.88	22.82
Communications & Utilities	17.87	71.76
Wholesale Trade	14.53	72.53
Eating & Drinking Places	9.15	56.18
Other Retail Trade	15.45	75.40
Finance, Insurance & Real Estate	43.88	198.90
Services:	37.51	97.02
Hotels & Other Personal Serivces	6.96	52.13
Private Households	19.91	74.74
Business & Repair Services	25.79	90.04
Entertainment	4.21	62.92
Medical & Other Professional Services	62.01	130.62
Government	43.02	109.20
Total	15.48	88.20

Source: Table G-K and Table G-H.

Table G-N
Employment by Industry
Location Quotients for Gila Sub-Basin**

1960 Rank	1960 Industry	1960 Location Quotient*	1950 Rank	1950 Industry	1950 Location Quotient*	1940 Rank	1940 Industry	1940 Location Quotient*
1	Mining	3.718	1	Mining	2.815	1	Mining	4.446
2	Contract Construction	1.404	2	Hotels, Etc.	1.335	2.	Fabricated Metals	1.348
3.	Hotels, Etc.	1.273	3	Government	1.184	3	Hotels, Etc.	1.200
4	Finance, Insurance, Etc.	1.176	4	Communications & Utilities	1.183	4	Entertainment	1.193
5	Government	1.159	5	Contract Construction	1.179	5	Wholesale Trade	1.117
6	Communications & Utilities	1.152	6	Eating & Drinking	1.156	6	Eating & Drinking	1.099
7	Business, Etc.	1.143	7	Business, Etc.	1.122	7	Contract Construction	1.085
8	Entertainment	1.124	8	Medical, Etc.	1.091	8	Medical, Etc.	1.076
9	Eating & Drinking	1.111	9	Entertainment	1.070	9	Government	1.074
10	Agriculture	1.057	10	Other Retail Trade	1.027	10	Business, Etc.	1.031
11	Other Retail Trade	1.048	11	Households	.988	11	Other Retail Trade	.961
12	Medical, Etc.	1.043	12	Wholesale Trade	.971	12	Communications & Utilities	.928
13	Wholesale Trade	.986	13	Primary Metals	.934	13	Agriculture	.844
14	Households	.969	14	Agriculture	.856	14	Households	.840
15	Other Transportation	.888	15	Finance, Insurance, Etc.	.840	15	Transportation	.817
16	Primary Metals	.818	16	Transportation	.755	16	Printing & Publishing	.624
17	Fabricated Metals	.807	17	Printing & Publishing	.635	17	Finance, Insurance, Etc.	.595
18	Printing & Publishing	.683	18	Food & Kindred Products	.605	18	Food & Kindred Products	.594
19	Transportation	.655	19	Fabricated Metals	.291	19	Lumber & Wood Products Mfg.	.299
20	Food & Kindred Products	.608	20	Lumber & Wood Products Mfg.	.260	20	Chemicals, Etc.	.268
21	Electric Energy, Etc.	.542	21	Chemicals, Etc.	.293	21	Primary Metals	.116
22	Apparel Mfg.	.336	22	Other Miscellaneous Mfg.	.125	22	Electric Energy, Etc.	.101
23	Other Miscellaneous Mfg.	.295	23	Electric Energy, Etc.	.121	23	Other Miscellaneous Mfg.	.096
24	Lumber & Wood Products Mfg.	.290	24	Apparel Mfg.	.075	24	Motor Vehicles, Etc.	.036
25	Chemicals, Etc.	.230	25	Other Transportation	.066	25	Other Transportation	.029
26	Motor Vehicles, Etc.	.067	26	Motor Vehicles, Etc.	.031	26	Apparel Mfg.	.018
27	Textile Mill Products Mfg.	.024	27	Textile Mill Products Mfg.	.016	27	Textile Mill Products Mfg.	.016
	ALL INDUSTRIES	.943		ALL INDUSTRIES	.862		ALL INDUSTRIES	.857

* Sub-Basin employment in each industry per capita of sub-basin population divided by national employment in each industry per capita of U. S. population.

** Quotients are based on adjusted sub-basin, and adjusted U. S. employment figures. See Tables G-H and G-K.

in 1950 and to 1.367 in 1960. Such a development, of course, is to be expected as the region increasingly begins to resemble the nation in the variety of economic activity found within its borders.

Within specific industries, notable increases relative to the nation have been registered in the finance group, government and communications. Mining has retained its leading role as a "specialty" industry but its rise from 1950 has thus far been inadequate to the task of regaining its 1940 coefficient of 4.44.

Employment Changes by County

Thus far, our discussion of employment trends has been limited to the Gila sub-basin in the aggregate and to the nation. The intra-sub-basin distribution of employment is provided in Tables G-O, where each county's share of sub-basin employment in a number of major industries is shown in 1940, 1950 and 1960. If one were to write the percentage figure representing the leading county in terms of employment in each of the industries shown in the table, one thing becomes immediately clear -- the historic predominance of Maricopa County. At least since 1940, the pattern is one of Maricopa widening the magnitude of its lead over the other counties of the Gila. Only in mining in 1950 and mining and fabricated metals manufacture in 1960 is the leading employing county not Maricopa. Pima led in mining in 1960 replacing Gila County in that position, as well as in fabricated metals manufacturing where it succeeded in displacing Maricopa County. With the exception of agriculture and mining, Maricopa and Pima Counties together accounted for at least four-fifths of employment in all other major industries. By and large, therefore, what happens in the home counties of Phoenix and Tucson will determine the future economic course of the Gila Sub-Basin.

Occupational Distribution of the Labor Force

The occupational makeup of the labor force tells how people earn their livelihoods and is another useful guide to the economy of a region. Table G-P presents occupational data on the labor force, by sex, in the Gila for the years 1950 and 1960. A comparison of the relative magnitude of each occupation for those years both in the Gila and in the nation appears in Table G-Q_1 and G-Q_2.

As was the case in certain other comparisons, the Gila appears to be a closer approximation to the nation than the other sub-basins of the Colorado. In terms of predominantly white-collar and blue-collar occupations, both regions are very close to each other. This was also true in 1950. In interesting contrast to certain other sub-basins, in the Gila it was the occupational distribution among males which brought the sub-basin so close to the nation. Among women incidence of white-collar employment was greater in the sub-basin than in the U.S., while in the case of blue-collar occupations, sub-basin women have trailed the nation. In the decade to 1960, however, there has been some evidence of a tendency toward convergence of the two groups.

At the specific occupational level, the proportionate share of total employment represented by four groups -- farmers and farm managers, clerical workers, private household workers, and operatives -- was smaller in the sub-basin in 1960 than in the nation at large. The magnitude of the differences however, was not large, except among operatives, and

Table G-0$_1$

Percent Distribution of Employment by Industry
In Counties of the Gila Sub-Basin - 1960

	Cochise	Gila	Graham	Greenlee	Maricopa	Pima	Pinal	Santa Cruz	Yavapai	Catron	Grant
Agriculture	4.64%	.91%	2.73%	.66%	64.80%	7.42%	12.84%	.92%	2.61%	1.30%	1.10%
Mining	11.23	12.99	.70	10.71	3.58	21.76	21.47	.31	4.57	.03	12.60
Contract Construction	3.02	1.70	.73	.29	62.99	23.69	2.99	.62	3.21	.15	.57
Manufacturing	2.20	1.79	0.44	.33	71.13	19.69	1.48	0.21	1.68	0.37	0.69
Food & Kindred Products	1.51	.48	1.44	.34	71.70	20.44	2.16	.37	.54	--	.96
Textile Mill Products	--	--	--	--	70.66	13.33	16.00	--	--	--	--
Apparel Mfg.	.45	--	.15	--	76.38	10.57	3.06	.34	7.47	--	1.53
Lumber & Wood Products	.19	4.51	.91	.19	66.12	13.81	1.39	--	2.97	9.50	.38
Printing & Publishing	2.92	1.26	.51	.47	69.83	18.60	2.71	.24	2.29	.07	1.03
Chemicals, Etc.	18.44	--	--	--	65.89	12.59	2.69	.37	--	--	--
Electric Energy	.78	.10	.13	.06	89.47	8.70	.41	--	.27	--	.03
Motor Vehicles, Etc.	4.19	--	--	--	86.08	9.71	--	--	--	--	--
Other Transportation	.20	.13	.15	--	95.97	3.27	.25	--	--	--	--
Primary Metals	12.99	14.23	.21	2.22	59.42	3.38	3.96	.25	.17	--	3.13
Fabricated Metals	.22	--	.05	--	28.23	71.19	.05	--	.22	--	--
Other Miscellaneous Mfg.	1.03	.32	.69	.06	70.76	17.77	1.00	.74	7.07	--	.53
Transportation	5.41	.87	.38	.14	51.83	31.14	2.90	1.38	4.55	.14	1.21
Communications & Utilities	3.50	1.19	1.32	.45	66.97	19.06	3.10	.65	2.47	.09	1.14
Wholesale Trade	1.96	.71	.64	.19	73.28	17.72	1.49	2.22	1.25	--	.47
Eating & Drinking Places	4.32	2.62	1.36	.94	57.49	21.73	5.01	1.28	3.68	.25	1.25
Other Retail Trade	3.71	1.90	1.31	.63	60.04	23.78	3.47	1.34	2.35	.18	1.23
Finance, Insurance, Etc.	2.02	.96	.43	.20	69.34	22.15	2.06	.41	1.84	--	.53
Services	3.54	1.43	1.16	0.58	58.54	27.10	2.41	0.97	2.54	0.07	1.65
Hotels, Etc.	3.68	1.64	1.12	.36	57.78	27.35	2.79	1.33	2.71	.10	1.08
Private Households	5.20	1.35	1.47	.76	51.76	28.06	5.36	1.64	2.64	--	1.72
Business & Repair	2.50	.90	.96	.21	66.12	23.80	2.77	.39	1.62	.08	.60
Entertainment	2.03	1.13	1.24	.68	63.31	24.02	3.49	.66	2.17	--	1.21
Medical & Other	3.36	1.48	1.11	.67	56.94	27.17	3.25	.83	3.01	.07	2.05
Government	16.74	1.01	.68	.21	47.95	27.97	2.38	.96	1.37	.08	.60
Total	8.8	5.3	2.3	2.0	43.2	17.9	6.1	2.2	6.6	1.2	4.5

Source: Table G-H.

Table G-0_2

Percent Distribution of Employment by Industry
In Counties of the Gila Sub-Basin - 1950

	Cochise	Gila	Graham	Greenlee	Maricopa	Pima	Pinal	Santa Cruz	Yavapai	Catron	Grant
Agriculture	4.84%	1.72%	4.30%	.97%	52.99%	8.55%	16.51%	1.36%	3.90%	2.13%	2.67%
Mining	7.71	20.76	.49	13.02	4.17	14.20	16.12	1.91	9.64	.09	11.83
Contract Construction	3.49	2.03	1.59	.69	53.44	26.26	4.75	1.16	3.12	.67	2.74
Manufacturing	5.51	6.04	1.04	5.81	55.52	12.72	1.68	1.07	3.11	1.16	6.33
Food & Kindred Products	2.61	1.21	2.53	.55	72.20	14.09	2.19	2.24	1.19	--	1.13
Textile Mill Products	3.65	--	--	--	74.39	17.07	1.21	1.21	--	--	2.43
Apparel Mfg.	4.02	1.14	1.43	--	48.56	32.47	.57	6.60	5.17	--	--
Lumber & Wood Products	1.02	7.91	1.09	.36	53.44	14.36	.95	.51	4.98	13.70	1.61
Printing & Publishing	4.54	1.68	1.09	.04	62.07	22.43	1.59	1.34	3.32	--	1.85
Chemicals, Etc.	26.00	.47	1.06	--	61.70	8.03	1.65	.23	.35	--	.47
Electric Energy	.89	.17	1.07	.08	84.25	8.67	2.59	.26	1.25	--	.71
Motor Vehicles, Etc.	--	--	--	--	93.04	6.08	--	--	.86	--	--
Other Transportation	6.56	--	--	--	72.99	14.59	.72	2.18	2.18	--	.72
Primary Metals	7.65	16.23	.02	19.32	29.92	1.19	1.50	.02	5.11	--	18.99
Fabricated Metals	.27	.27	--	.27	89.34	7.80	.64	.27	.91	.09	.09
Other Miscellaneous Mfg.	4.60	1.00	.66	.20	61.01	26.76	1.26	1.26	2.06	.33	.80
Transportation	6.53	1.63	.82	.45	40.85	36.68	3.71	1.55	5.48	.13	2.10
Communications & Utilities	4.65	2.58	2.12	1.28	61.85	16.20	4.33	1.59	3.54	.16	1.64
Wholesale Trade	1.52	1.21	.88	.18	75.96	14.31	1.27	1.62	2.00	.01	.99
Eating & Drinking Places	4.68	2.97	1.74	1.25	52.97	22.10	5.49	1.20	5.04	.45	2.05
Other Retail Trade	4.43	2.85	1.78	1.32	54.50	22.84	4.47	1.78	3.41	.20	2.36
Finance, Insurance, Etc.	3.05	1.46	.61	.22	65.05	22.82	1.96	1.13	2.40	.02	1.22
Services	4.03	2.41	1.62	0.98	52.40	26.03	3.53	1.31	4.40	0.26	3.02
Hotels, Etc.	4.19	2.65	1.43	.71	52.18	26.45	3.41	1.48	5.29	.22	1.94
Private Households	4.94	1.96	2.11	1.09	52.33	26.78	3.38	2.11	2.50	.18	2.57
Business & Repair	4.07	2.11	1.85	.90	58.83	21.13	3.76	1.07	3.71	.24	2.28
Entertainment	5.22	3.75	1.38	1.38	52.95	24.64	3.71	.69	3.28	.04	2.93
Medical & Other	3.54	2.38	1.52	1.05	50.66	27.10	3.55	1.10	4.85	.31	3.88
Government	2.74	1.43	.86	.43	52.36	34.39	2.54	1.48	2.31	.23	1.18
Total	4.4	3.4	1.7	1.9	51.9	21.8	5.8	1.4	4.0	.6	3.1

Source: Table G-H.

Table G-0_3

Percent Distribution of Employment by Industry
In Counties of the Gila Sub-Basin - 1940

	Cochise	Gila	Graham	Greenlee	Maricopa	Pima	Pinal	Santa Cruz	Yavapai	Catron	Grant
Agriculture	4.99%	2.45%	5.12%	1.33%	51.94%	9.28%	11.74%	1.58%	4.83%	3.30%	3.40%
Mining	15.28	18.31	.42	9.06	3.84	10.26	12.06	4.35	12.57	1.24	12.55
Contract Construction	7.66	4.03	3.58	1.85	43.92	22.08	4.41	1.36	6.12	1.61	3.33
Manufacturing	15.23	8.12	0.74	0.36	43.84	13.09	3.37	0.74	6.71	1.31	6.51
Food & Kindred Products	2.22	1.66	1.66	.50	74.17	14.48	1.52	.64	2.03	--	1.06
Textile Mill Products	--	--	--	--	86.44	11.86	--	--	--	--	1.69
Apparel Mfg.	8.51	6.38	--	--	48.93	14.89	2.12	4.25	4.25	--	10.63
Lumber & Wood Products	4.56	4.89	.97	.97	36.84	26.95	3.80	1.19	3.69	12.50	3.58
Printing & Publishing	7.41	2.82	1.29	.30	55.30	21.84	2.52	1.75	5.34	.07	1.29
Chemicals, Etc.	36.57	--	.25	--	52.42	9.71	--	.25	.51	--	.25
Electric Energy	2.83	1.69	--	.28	76.20	8.21	4.81	.28	2.26	.56	2.83
Motor Vehicles, Etc.	--	1.51	--	--	81.81	12.12	1.51	--	3.03	--	--
Other Transportation	--	3.44	--	3.44	20.68	58.62	--	--	6.89	3.44	3.44
Primary Metals	1.47	3.24	--	--	80.82	11.50	--	--	2.06	--	.88
Fabricated Metals	33.68	21.04	.03	.03	3.93	1.22	6.64	.46	15.12	--	17.79
Other Miscellaneous Mfg.	15.87	2.31	.46	.92	50.69	25.26	.30	.30	3.08	--	.77
Transportation	9.71	2.33	.88	.74	33.33	35.82	3.23	1.61	9.16	.18	2.95
Communications & Utilities	8.07	5.41	2.13	.76	48.75	18.35	4.36	1.74	7.23	.03	3.11
Wholesale Trade	3.05	1.95	1.03	.38	73.21	12.34	1.28	2.04	3.41	.04	1.21
Eating & Drinking Places	6.42	4.94	1.80	1.53	50.46	19.13	5.48	1.33	5.95	.54	2.37
Other Retail Trade	7.34	4.39	2.03	1.71	48.76	19.68	4.00	2.58	5.74	.47	3.25
Finance, Insurance, Etc.	4.48	2.18	.69	.48	63.05	19.63	1.63	2.15	4.17	.10	1.39
Services	6.43	3.65	1.80	1.19	44.98	25.25	3.58	2.11	6.40	0.39	4.21
Hotels, Etc.	5.84	3.63	1.55	1.31	47.89	24.59	3.23	2.38	6.72	.20	2.60
Private Households	8.48	3.10	1.42	1.08	41.87	28.34	3.81	3.01	4.21	.20	4.43
Business & Repair	5.61	3.31	2.74	1.21	52.09	18.30	2.94	2.30	6.25	.60	4.60
Entertainment	5.01	4.43	1.76	1.04	48.63	22.88	3.97	1.10	7.88	.06	3.19
Medical & Other	6.01	3.94	1.92	1.18	42.77	25.96	3.75	1.55	7.27	.58	5.01
Government	22.93	3.40	2.31	.83	42.06	14.04	4.06	2.85	4.24	.83	2.39
Total	5.0	1.9	1.0	.9	59.0	22.7	4.4	.9	2.3	.2	1.5

Source: Table G-H.

Table G-P

Employment by Occupation Groups
In The Gila Sub-Basin

	Male		Female		Total	
	1950	1960	1950	1960	1950	1960
Professional, Technical & Kindred	12,171	29,253	9,038	17,956	21,209	47,209
Farmers & Farm Managers	7,600	5,480	346	261	7,946	5,741
Managers, Officials & Proprietors	19,719	33,279	4,211	6,392	23,930	39,671
Clerical	7,948	14,319	14,157	37,734	22,105	52,053
Sales Workers	10,994	20,162	5,352	10,511	16,346	30,673
Craftsmen	28,627	54,249	504	1,154	29,131	55,403
Operatives	26,782	43,826	4,124	10,043	30,906	53,869
Private Household Workers	284	320	5,484	9,832	5,768	10,152
Service Workers (Except Household)	9,707	15,947	9,544	18,697	19,251	34,644
Farm Laborers & Foremen	14,688	18,950	1,133	958	15,821	19,908
Laborers (Except Farm & Mine)	12,256	18,864	202	430	12,458	19,294
Not Reported	1,582	13,702	1,378	7,189	2,960	20,891
Total	152,358	268,351	55,473	121,157	207,831	389,508

Source : U. S. Census of Population, 1960.

Table G-Q_1

Percentage Distribution - Occupation Groups for 1960
In the Gila Sub-Basin

	Male & Female		Male Only		Female Only	
	U.S.	Gila	U.S.	Gila	U.S.	Gila
All Groups	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Predominantly White Collar	45.02	45.00	40.23	38.19	54.80	60.14
Professional Technical	11.19	12.12	10.30	10.90	13.00	14.82
Farmers & Farm Managers	3.88	1.47	5.49	2.04	0.56	0.22
Managers, Officials & Proprietors	8.37	10.18	10.65	12.40	3.68	5.28
Clerical	14.40	13.36	6.94	5.34	29.71	31.14
Service Workers	7.18	7.87	6.85	7.51	7.85	8.68
Predominantly Blue Collar	50.07	49.61	55.20	56.70	39.54	33.93
Craftsmen & Foremen	13.52	14.22	19.53	20.22	1.19	0.95
Operatives	18.41	13.83	19.88	16.33	15.38	8.29
Private Household Workers	2.67	2.61	0.14	0.12	7.86	8.12
Service Workers	8.42	8.89	5.98	5.94	13.44	15.43
Farm Laborers & Foremen	2.24	5.11	2.77	7.06	1.15	0.79
Laborers (Except Farm & Mine)	4.81	4.95	6.90	7.03	0.52	0.35
Occupation Not Reported	4.91	5.39	4.57	5.11	5.66	5.93

Source: Table G-P.

Table G-Q_2

Percentage Distribution - Occupation Groups for 1950
In the Gila Sub-Basin

	Male & Female		Male Only		Female Only	
	U.S.	Gila	U.S.	Gila	U.S.	Gila
All Groups	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Predominantly White Collar	44.53	44.04	41.17	38.36	53.20	59.67
Professional, Technical	8.72	10.20	7.30	7.99	12.37	16.29
Farmers & Farm Managers	7.64	3.82	10.31	4.99	0.74	0.62
Managers, Officials & Proprietors	8.93	11.51	10.72	12.94	4.31	7.59
Clerical	12.32	10.64	6.51	5.22	27.32	25.52
Sales Workers	6.92	7.87	6.33	7.22	8.46	9.65
Predominantly Blue Collar	54.15	54.53	57.70	60.61	45.01	37.82
Craftsmen & Foremen	13.86	14.02	18.65	18.79	1.50	0.91
Operatives	19.81	14.87	20.05	17.58	19.19	7.43
Private Household Workers	2.50	2.78	0.18	0.19	8.48	9.88
Service Workers	7.61	9.26	5.85	6.37	12.17	17.20
Farm Laborers & Foremen	4.28	7.61	4.83	9.64	2.86	2.04
Laborers (Except Farm & Mine)	6.09	5.99	8.14	8.04	0.81	0.36
Occupation Not Reported	1.32	1.43	1.13	1.03	1.79	2.51

Source: Table G-P.

farmers and farm managers. All other occupational groups accounted for larger shares of total employment in the sub-basin than in the nation, although here again, the magnitude of the differences was quite small.

Over the 1950-1960 decade the share of sub-basin employment represented by professional and technical workers, clerical workers, craftsmen, foremen and kindred workers, and the vague occupation not reported group increased while all other occupational groups accounted for smaller shares of the total than they had in 1950. The increasingly familiar pattern of only moderate changes in this sub-basin was duplicated here also. This is to say that over the past decade, the occupational profile of the labor force has remained largely unchanged.

The location quotients in Table G-R facilitate a comparison of per capita employment of specific occupations in the region with the nation in the years 1950 and 1960. The number of regional specialty occupations appears to have grown appreciably not only in number (from 3 to 6) but also in the lead over the nation. For example, the simple mean of the groups with location quotients in excess of 1.0 increased from 1.210 to 1.562 in the decade to 1960. Service workers in the sub-basin were more than three times as numerous relative to population than in the nation, and their lead over the U.S. had grown since 1950. Other regional occupations which are more numerous relative to population in the Gila are laborers (except farm and mine), managers, officials and proprietors, sales workers, occupation not reported, and professional and technical workers. All of these groups except the managerial broke through the 1.0 barrier between 1950 and 1960. Almost as dramatic as

Table G-K

Location Quotients for Occupation Groups
Of the Labor Force in the Gila Sub-Basin

1950

Rank	Occupation Group	Location Quotient
1.	Farm Laborers & Foremen	1.506
2.	Managers, Officials & Proprietors	1.093
3.	Service Workers	1.032
4.	Professional, Technical, Etc.	.994
5.	Sales Workers	.965
6.	Private Household Workers	.957
7.	Not Reported	.918
8.	Craftsmen	.857
9.	Laborers (Except Farm & Mine)	.837
10.	Clerical	.730
11.	Operatives	.636
12.	Farmers & Farm Managers	.424

1960

Rank	Occupation Group	Location Quotient
1.	Service Workers	3.114
2.	Laborers (Except Farm & Mine)	2.075
3.	Managers, Officials & Proprietors	1.136
4.	Sales Workers	1.023
5.	Not Reported	1.017
6.	Professional, Technical, Etc.	1.012
7.	Craftsmen	.984
8.	Operatives	.957
9.	Clerical	.868
10.	Private Household Workers	.737
11.	Farm Laborers & Foremen	.570
12.	Farmers & Farm Managers	.360

Source: Computed from data in the U.S. Census of Population, 1950 and 1960.

the growth in service workers relative to population was the sharp decline in farm laborers and foremen. From the head of the 1950 list of coefficients with 1.506 they fell to eleventh place out of 12 occupations with a quotient of .570.

Table G-Q_1 and G-Q_2 permit an analysis of regional and national occupations by sex. As noted earlier, sub-basin women are more heavily represented among white-collar jobs and less readily found in blue-collar jobs than is generally true of female employment in the U.S. The exceptions are found among farmers and farm managers where sub-basin women are somewhat less prevalent than are their sisters in the national labor force, and private household workers and service workers where the reverse pattern prevails. Once again, the magnitude of these observed differences is quite small.

INTERINDUSTRY ANALYSIS OF THE ECONOMY OF THE GILA RIVER SUB-BASIN OF THE COLORADO RIVER BASIN - 1960:

A Summary Analysis

by

Bernard Udis

Revised

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INTERINDUSTRY ANALYSIS OF THE ECONOMY OF THE GILA RIVER SUB-BASIN OF THE COLORADO RIVER BASIN - 1960:

A Summary Analysis

The interindustry or input-output method of economic analysis was explained in general terms early in this report. In this and the following sections the actual analysis will be applied to major industrial sectors of the Gila Sub-Basin in 1960 with the objective of uncovering the patterns of structural interdependence which characterize the sub-basin's economy.

The basic documents for the analysis which follows are the interindustry transactions table for the Gila (Table G-S) and its derivatives -- the table of direct input requirement coefficients (Table G-T) and the table of direct and indirect input requirement coefficients (Table G-U). It may be recalled that the table of direct input requirements contains the coefficients indicating the direct additions to the sub-basin economy's input by each industry, required to sustain a one dollar increase in sales to the final demand sector by the particular industry listed at the left of the table. Each entry in Table G-U yields the total dollar production which the sub-basin economy requires from the industry at the top of the table per dollar of deliveries to final demand by the industry at the left after all rounds of needs (direct and indirect) in the economy have been met.

Sector	Industry Producing / Industry Purchasing	1 Range livestock	2 Feeder livestock	3 Dairy	4 Forage, Feed & Food Crops	5 Cotton	6 Vegetables	7 Citrus Crops	8 Forestry	9 All Other Agri-culture	10 Uranium	11 Copper	12 All Other Mining	13 Food & Kindred Products	14 Lumber & Wood Products	15 Furniture & Fixtures
Processing Sector — Agriculture	1. Range livestock	0	31,983	0	0	0	0	0	0	0	0	0	0	532	0	0
	2. Feeder livestock	0	0	0	1,041	0	0	115	0	0	0	0	0	28,000	0	0
	3. Dairy	0	0	413	472	0	0	52	0	0	0	0	0	23,222	0	0
	4. Forage, feed & food crops	2,085	17,228	11,784	0	0	0	0	0	1,256	0	0	0	0	0	0
	5. Cotton	0	0	0	0	0	0	0	0	0	0	0	0	13,972	0	0
	6. Vegetables	0	0	0	0	0	0	0	0	0	0	0	0	387	0	0
	7. Citrus crops	0	0	0	0	0	0	0	0	0	0	0	0	450	0	0
	8. Forestry	7	0	0	0	0	0	0	0	0	0	0	0	0	1,638	0
	9. All other agriculture	0	0	0	0	0	0	0	0	0	0	0	0	1,505	0	0
Mining	10. Uranium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	11. Copper	0	0	0	0	0	0	0	0	0	0	5,550	0	0	0	0
	12. All other mining	0	0	0	0	0	0	0	0	0	0	733	6,800	0	0	0
Manufacturing	13. Food & kindred products	436	4,024	877	0	0	0	44	0	1,793	0	2,351	0	4,623	0	0
	14. Lumber & wood products	0	0	0	0	0	0	0	0	0	6	951	367	0	248	611
	15. Furniture & fixtures	0	0	0	0	0	0	0	0	0	0	0	0	0	0	850
	16. Paper & pulp	0	0	0	0	0	0	0	0	0	0	0	0	179	0	293
	17. Chemicals	0	0	0	740	2,072	2,731	321	0	60	0	4,000	872	0	0	0
	18. Primary metals	0	0	0	0	0	0	0	0	0	0	340	846	0	0	0
	19. Printing & publishing	0	0	0	0	0	0	0	0	0	2	791	197	126	76	101
	20. Fabricated metals	0	0	0	0	0	0	0	0	0	3	2,372	745	0	144	0
	21. Textiles & apparel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	22. Leather & leather goods	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	23. Stone, clay & glass	0	0	0	0	0	0	0	0	0	18	1,423	673	111	381	0
	24. All other manufacturing	0	0	0	0	0	0	0	0	0	0	632	591	216	33	83
Trade	25. Wholesale trade	106	597	160	511	2,369	615	62	5	323	1	2,117	939	586	374	237
Retail	26. Service stations	404	172	211	565	1,688	549	57	30	42	1	535	191	86	0	13
	27. Eating & drinking places	0	0	0	0	0	0	0	0	0	0	0	126	36	12	7
	28. All other retail	157	2,251	519	1,665	7,752	2,063	196	12	1,252	6	744	1,302	390	636	45
Services	29. Agricultural services	0	1,419	0	3,500	24,262	0	2,398	0	263	0	0	0	0	0	0
	30. Lodging	0	0	0	0	0	0	0	0	0	0	0	68	67	8	0
	31. All other services (except professional)	0	0	0	0	0	0	0	0	0	5	4,051	1,022	2,314	711	57
Utilities	32. Transportation	0	0	753	947	1,354	5,182	0	0	50	0	8,314	3,381	4,698	958	414
	33. Electric energy	153	120	165	143	397	142	142	0	12	31	4,185	1,859	830	368	209
	34. All other utilities	77	80	33	0	300	0	0	0	21	4	5,621	1,008	647	239	178
	35. Contract construction	0	0	0	0	0	0	0	0	0	17	3,017	0	1,334	98	0
	36. Rentals & finance	3,741	1,623	477	958	6,962	1,212	870	35	202	6	783	2,612	5,421	842	265
Final payments — Government	37. State & Federal	808	263	124	38	2,282	609	13	353	13	48	32,434	2,842	5,368	384	211
	38. Local	1,487	348	206	7,579	10,686	1,482	181	41	434	18	12,297	1,018	876	66	47
Households	39. Wages	965	1,660	1,524	4,311	12,749	8,839	347	496	605	185	93,100	16,480	32,416	7,893	3,377
	40. Profits & other income	9,536	11,853	6,176	5,098	31,647	7,366	516	480	1,814	43	8,400	3,286	4,262	956	659
	41. Inventory change (depletions)	0	0	0	0	0	0	0	0	0	0	7,674	1,003	5,928	4,585	1,412
	42. Depreciation allowances	4,747	1,104	2,948	4,744	9,838	2,563	282	45	686	65	32,057	3,427	2,139	616	334
Imports	43. Imports from other Colorado River Sub-Basins	0	6,353	0	0	831	0	0	0	0	0	0	0	1,013	3,766	0
	44. Imports from outside Colorado River Basin	8,943	5,991	1,001	4,897	26,055	15,035	1,192	148	531	104	74,366	15,912	48,567	3,396	4,295
	45. Total Gross Outlays	33,652	87,069	27,371	37,209	141,244	48,388	6,788	1,645	9,357	563	308,838	67,567	190,301	28,428	13,698

Industry Producing	16 Paper & Pulp	17 Chemicals	18 Primary metals	19 Printing & Publishing	20 Fabricated Metals	21 Textiles & apparel	22 Leather & Leather Goods	23 Stone, clay & glass	24 All Other Manu-facturing	25 Wholesale trade	26 Service stations	27 Eating & Drinking Places	28 All other retail	29 Agri-cultural Services	30 Lodging
1. Range livestock	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2. Feeder livestock	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3. Dairy	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4. Forage, feed & food crops	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5. Cotton	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6. Vegetables	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7. Citrus crops	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8. Forestry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9. All other agriculture	0	0	0	0	0	0	0	0	0	0	0	634	0	0	0
10. Uranium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11. Copper	0	0	300,720	0	0	0	0	0	0	0	0	0	0	0	0
12. All other mining	0	2,431	17,924	0	0	0	0	3,553	113	0	0	0	0	0	0
13. Food & kindred products	0	0	73	3	0	0	77	0	197	0	0	12,078	0	0	731
14. Lumber & wood products	1,998	0	610	0	0	0	0	0	192	0	0	0	0	0	0
15. Furniture & fixtures	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16. Paper & pulp	299	0	0	665	0	0	0	0	141	0	0	0	32	0	0
17. Chemicals	0	105	321	0	0	0	0	0	0	0	0	0	0	0	0
18. Primary metals	0	0	0	0	734	0	0	0	1,351	0	0	0	0	0	0
19. Printing & publishing	15	75	761	726	78	8	1	73	971	0	611	302	10,339	0	1,107
20. Fabricated metals	0	0	591	52	1,102	0	0	0	1,219	0	31	0	858	0	0
21. Textiles & apparel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22. Leather & leather goods	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23. Stone, clay & glass	0	0	502	9	0	0	0	4,888	271	16	0	0	266	0	0
24. All other manufacturing	0	68	1,473	161	479	13	0	57	36,482	2,141	0	0	358	0	0
25. Wholesale trade	0	35	262	472	575	39	0	209	875	2,361	270	7,139	2,840	278	1,151
26. Service stations	0	0	107	107	0	32	0	22	178	131	121	142	448	1,286	719
27. Eating & drinking places	29	0	88	35	0	2	0	0	161	179	60	1,157	789	0	500
28. All other retail	0	40	462	488	41	82	0	82	475	5,665	150	1,130	2,703	289	727
29. Agricultural services	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30. Lodging	0	0	161	10	0	1	0	0	98	1,764	35	0	235	0	0
31. All other services (except professional)	28	205	599	686	523	49	4	878	971	6,246	641	7,231	11,216	444	3,173
32. Transportation	199	210	7,622	874	182	60	1	2,059	2,862	13,375	1,378	1,623	9,629	2,335	214
33. Electric energy	29	135	6,131	369	255	103	2	396	1,971	11,738	1,278	1,113	8,342	226	126
34. All other utilities	57	102	1,003	542	221	62	3	307	899	3,488	983	2,141	7,868	830	1,661
35. Contract construction	0	0	622	147	0	113	3	0	2,118	1,984	537	373	3,669	0	1,341
36. Rentals & finance	68	466	168	1,164	553	342	6	235	1,633	9,741	1,392	3,076	12,020	1,891	1,849
37. State & Federal	151	75	4,471	2,124	805	55	13	929	11,473	6,993	1,485	1,437	5,260	393	783
38. Local	43	41	968	815	88	46	2	370	1,941	1,058	279	657	1,983	243	1,570
39. Wages	892	3,681	26,471	16,661	11,052	6,730	121	10,619	138,821	82,874	12,402	29,318	188,964	4,878	13,467
40. Profits & other income	99	260	1,137	5,055	917	241	34	1,900	9,236	11,938	2,864	8,122	22,699	3,540	1,811
41. Inventory change (depletions)	485	2,087	863	1,009	3,429	1,602	28	2,099	24,100	22,752	3,897	1,625	42,953	0	0
42. Depreciation allowances	133	1,565	3,838	1,847	595	95	9	2,314	13,481	3,223	846	2,747	3,672	4,665	4,571
43. Imports from other Colorado River Sub-Basins	0	0	0	384	282	0	0	0	1,948	1,328	899	0	6,006	483	828
44. Imports from outside Colorado River Basin	465	6,756	11,823	8,465	17,703	4,908	46	3,554	39,752	42,645	3,638	35,683	72,634	10,201	10,607
45. Total Gross Outlays	4,990	18,337	389,571	42,870	39,614	14,583	350	34,764	293,930	231,783	33,797	117,728	415,783	31,982	46,936

Industry Producing	31 Other Services	32 Trans-portation	33 Electric energy	34 All other utilities	35 Contract Construc-tion	36 Rentals & finance	37 State & Federal Gov't	38 Local government	39 Wages	40 Profits & Other Income	41 Inventory Change (additions)	42 Gross Private Capital Formation	43 Exports Inside the CRB	44 Exports Outside the CRB	45 Total Gross Output	
1. Range livestock	0	0	0	0	0	0	223	0	475		0	0	0	439	33,652	1
2. Feeder livestock	0	0	0	0	0	0	0	0	682		0	0	0	57,231	87,069	2
3. Dairy	0	0	0	0	0	0	0	0	759		0	0	0	2,453	27,371	3
4. Forage, feed & food crops	0	0	0	0	0	0	628	0	0		0	0	119	4,109	37,209	4
5. Cotton	0	0	0	0	0	0	557	0	0		0	0	0	126,715	141,244	5
6. Vegetables	0	0	0	0	0	0	0	0	0		0	0	0	48,001	48,388	6
7. Citrus crops	0	0	0	0	0	0	0	0	0		0	0	0	6,338	6,788	7
8. Forestry	0	0	0	0	0	0	0	0	0		0	0	0	0	1,645	8
9. All other agriculture	0	0	0	0	0	0	134	0	4,066		0	0	83	2,935	9,357	9
10. Uranium	0	0	0	0	0	0	0	0	0		0	0	563	0	563	10
11. Copper	0	0	0	0	0	0	0	0	0		2,568	0	0	0	308,838	11
12. All other mining	0	900	0	0	3,200	0	5,310	1,520	608		1,050	0	0	23,425	67,567	12
13. Food & kindred products	170	1,841	38	0	0	0	1,713	2,141	116,673	Profits and other income included in column 39	6,967	0	4,650	28,801	190,301	13
14. Lumber & wood products	0	29	21	0	5,234	0	554	475	5,443		4,918	4,239	0	2,532	28,428	14
15. Furniture & fixtures	0	0	0	0	0	0	389	34	3,145		1,419	1,365	1,451	5,045	13,698	15
16. Paper & pulp	0	121	0	0	0	0	0	0	0		606	0	0	2,654	4,990	16
17. Chemicals	2,272	0	0	0	790	0	0	0	733		2,802	0	0	518	18,337	17
18. Primary metals	0	0	0	0	0	0	28,461	0	0		5,361	0	0	352,478	389,571	18
19. Printing & publishing	1,758	428	131	207	106	1,146	836	489	10,641		992	0	516	9,117	42,870	19
20. Fabricated metals	241	1,518	193	160	12,825	201	32	484	2,530		4,143	1,993	2,554	5,623	39,614	20
21. Textiles & apparel	0	0	0	0	0	0	0	0	2,093		1,518	0	0	10,972	14,583	21
22. Leather & leather goods	0	0	0	0	0	0	0	0	92		37	36	12	173	350	22
23. Stone, clay & glass	0	0	9	0	17,299	0	1,840	290	2,590		2,184	1,500	0	494	34,764	23
24. All other manufacturing	2,667	5,736	958	1,792	3,464	0	84,338	1,274	2,431		29,908	30,767	5,671	82,137	293,930	24
25. Wholesale trade	3,660	1,818	290	1,637	21,833	781	4,740	4,832	80,983		33,766	28,654	4,800	18,461	231,783	25
26. Service stations	2,108	284	7	1,909	1,644	170	268	310	16,761		837	66	442	1,154	33,797	26
27. Eating & drinking places	210	417	347	0	503	1,031	546	317	58,993		2,262	83	5,569	44,269	117,728	27
28. All other retail	2,036	630	812	940	5,336	1,401	1,192	2,326	257,809		51,414	6,592	4,594	49,377	415,783	28
29. Agricultural services	0	0	0	0	0	0	0	0	0		0	0	140	0	31,982	29
30. Lodging	91	311	50	288	0	74	291	286	1,948		0	45	3,123	37,982	46,936	30
31. All other services (except professional)	7,388	2,836	112	5,504	4,416	1,888	3,440	5,321	82,468		9,046	347	3,710	21,794	189,324	31
32. Transportation	2,076	2,901	694	1,250	2,142	74	884	3,162	3,394		0	6,283	1,817	6,063	99,414	32
33. Electric energy	1,698	988	15,850	306	407	2,244	3,352	4,224	35,132		1,341	660	1,992	2,480	111,644	33
34. All other utilities	3,009	3,241	3,225	1,539	1,461	3,241	2,833	3,388	86,454		4,548	2,831	4,185	17,776	166,106	34
35. Contract construction	1,580	213	0	1,387	136,497	11,073	82,108	19,692	22,447		38,999	168,089	2,349	20,624	520,431	35
36. Rentals & finance	6,778	4,519	5,016	5,616	9,912	7,302	23,261	4,214	145,105		191	2,298	1,975	25,085	301,885	36
37. State & Federal	4,281	3,521	9,093	14,532	3,667	6,608	55,975	962	352,406		0	0	2,033	11,496	546,811	37
38. Local	705	1,857	6,878	4,587	516	4,761	60,273	4,951	133,666		0	0	471	2,383	268,118	38
39. Wages	53,629	27,249	25,004	45,358	152,855	70,447	216,207	138,446	7,831		0	5,217	22,340	6,889	1,503,370	39
40. Profits & other income	13,987	2,005	13,560	4,312	6,964	167,738	923	5,417	67,558		0	0	1,758	419,651	865,818	40
41. Inventory change (depletions)	8,931	0	2,677	4,126	9,889	205	0	0	0		0	0	0	0	153,359	41
42. Depreciation allowances	6,416	2,710	11,323	6,067	6,890	8,083	0	0	0		0	0	0	0	150,685	42
43. Imports from other Colorado River Sub-Basins	1,198	1,972	1,261	4,036	3,691	1,900	4,688	3,409	31,388		13,449	13,920	1,898	2,981	109,912	43
44. Imports from outside Colorado River Basin	62,435	31,369	14,095	60,553	108,890	11,517	84,051	23,516	390,677		176,171	195,983	18,819	114,362	1,771,551	44
45. Total Gross Outlays	189,324	99,414	111,644	166,106	520,431	301,885	670,047	231,480	1,927,981		396,497	470,968	97,634	1,575,017	9,477,564	45

Note: Each row shows sales by the industry at the left to all industries listed at the top of the table. Each column shows purchases by the industry listed at the top of the table from each industry listed down the left margin.

INTERINDUSTRY TRANSACTIONS (IN THOUSANDS OF DOLLARS)
GILA RIVER SUB-BASIN 1960
Table G-1960-a

	Industry Producing \ Industry Purchasing	1 Range livestock	2 Feeder livestock	3 Dairy	4 Forage, Feed & Food Crops	5 Cotton	6 Vegetables	7 Citrus	8 Forestry	9 All Other Agri-culture	10 Uranium	11 Copper	12 All other mining
	1. Range livestock	0	.367329	0	0	0	0	0	0	0	0	0	0
	2. Feeder livestock	0	0	0	.027977	0	0	.016942	0	0	0	0	0
	3. Dairy	0	0	.015089	.012685	0	0	.007661	0	0	0	0	0
	4. Forage, feed & food crops	.061958	.197866	.430529	0	0	0	0	0	.134231	0	0	0
Agriculture	5. Cotton	0	0	0	0	0	0	0	0	0	0	0	0
	6. Vegetables	0	0	0	0	0	0	0	0	0	0	0	0
	7. Citrus crops	0	0	0	0	0	0	0	0	0	0	0	0
	8. Forestry	.000208	0	0	0	0	0	0	0'	0	0	0	0
	9. All other agriculture	0	0	0	0	0	0	0	0	0	0	0	0
	10. Uranium	0	0	0	0	0	0	0	0	0	0	0	0
Mining	11. Copper	0	0	0	0	0	0	0	0	0	0	.018428	0
	12. All other mining	0	0	0	0	0	0	0	0	0	0	.002434	.102157
	13. Food & kindred products	.012956	.046216	.032041	0	0	0	.006482	0	.191621	0	.007806	0
	14. Lumber & wood products	0	0	0	0	0	0	0	0	0	.010657	.003158	.005513
	15. Furniture & fixtures	0	0	0	0	0	0	0	0	0	0	0	0
	16. Paper & pulp	0	0	0	0	0	0	0	0	0	0	0	0
	17. Chemicals	0	0	0	.019888	.014670	.056440	.047289	0	.006412	0	.013282	.013100
	18. Primary metals	0	0	0	0	0	0	0	0	0	0	.001129	.012710
Manufacturing	19. Printing & publishing	0	0	0	0	0	0	0	0	0	.003552	.002626	.002960
	20. Fabricated metals	0	0	0	0	0	0	0	0	0	.005329	.007876	.011192
	21. Textiles & apparel	0	0	0	0	0	0	0	0	0	0	0	0
	22. Leather & leather goods	0	0	0	0	0	0	0	0	0	0	0	0
	23. Stone, clay & glass	0	0	0	0	0	0	0	0	0	.031972	.004725	.010111
	24. All other manufacturing	0	0	0	0	0	0	0	0	0	0	.002099	.008879
	25. Wholesale trade	.003150	.006857	.005846	.013733	.016772	.012710	.009134	.003040	.034520	.001776	.007029	.014107
Retail	26. Service stations	.012005	.001975	.007709	.015184	.011951	.011346	.008397	.018237	.004489	.001776	.001776	.002869
Trade	27. Eating & drinking places	0	0	0	0	0	0	0	0	0	0	0	.001893
	28. All other retail	.004665	.025853	.018962	.044747	.054884	.042635	.028874	.007295	.133804	.010657	.002470	.019560
	29. Agricultural services	0	.016297	0	.094063	.171774	0	.353270	0	.028107	0	0	0
	30. Lodging	0	0	0	0	0	0	0	0	0	0	0	.001022
Services	31. All other services (except professional)	0	0	0	0	0	0	0	0	0	.008881	.013451	.015354
	32. Transportation	0	0	.027511	.025451	.009586	.107093	0	0	.005344	0	.027606	.050793
Utilities	33. Electric energy	.004547	.001378	.006028	.003843	.002811	.002935	.020919	0	.001282	.055062	.013896	.027928
	34. All other utilities	.002288	.000919	.001206	0	.002124	0	0	0	.002244	.007105	.018664	.015143
	35. Contract construction	0	0	0	0	0	0	0	0	0	.030195	.010018	0
	36. Rentals & finance	.111167	.018640	.017427	.025746	.049291	.025048	.128167	.021277	.021588	.010657	.002600	.039240

Industry Producing \ Industry Purchasing	13 Food & Kindred Products	14 Lumber & Wood Products	15 Furniture & fixtures	16 Paper & Pulp	17 Chemicals	18 Primary metals	19 Printing & publishing	20 Fabricated metals	21 Textiles & apparel	22 Leather & Leather Goods	23 Stone, clay & glass	24 All Other Manu-facturing
1. Range livestock	.002885	0	0	0	0	0	0	0	0	0	0	0
2. Feeder livestock	.151866	0	0	0	0	0	0	0	0	0	0	0
3. Dairy	.125951	0	0	0	0	0	0	0	0	0	0	0
4. Forage, feed & food crops	0	0	0	0	0	0	0	0	0	0	0	0
5. Cotton	.075781	0	0	0	0	0	0	0	0	0	0	0
6. Vegetables	.002099	0	0	0	0	0	0	0	0	0	0	0
7. Citrus crops	.002441	0	0	0	0	0	0	0	0	0	0	0
8. Forestry	0	.068699	0	0	0	0	0	0	0	0	0	0
9. All other agriculture	.008163	0	0	0	0	0	0	0	0	0	0	0
10. Uranium	0	0	0	0	0	0	0	0	0	0	0	0
11. Copper	0	0	0	0	0	.773640	0	0	0	0	0	0
12. All other mining	0	0	0	0	.149600	.046112	0	0	0	0	.108771	.000419
13. Food & kindred products	.025074	0	0	0	0	.000188	.000072	0	0	.239130	0	.000730
14. Lumber & wood products	0	.010401	.049731	.443507	0	.001569	0	0	0	0	0	.000712
15. Furniture & fixtures	0	0	.069184	0	0	0	0	0	0	0	0	0
16. Paper & pulp	.000971	0	.023848	.066371	0	0	.015886	0	0	0	0	.000523
17. Chemicals	0	0	0	0	.006462	.000826	0	0	0	0	0	0
18. Primary metals	0	0	0	0	0	0	0	.020285	0	0	0	.005007
19. Printing & publishing	.000683	.003188	.008221	.003330	.004615	.001958	.017343	.002156	.000616	.003106	.002235	.003599
20. Fabricated metals	0	.006040	0	0	0	.001520	.001242	.030455	0	0	0	.004518
21. Textiles & apparel	0	0	0	0	0	0	0	0	0	0	0	0
22. Leather & leather goods	0	0	0	0	0	0	0	0	0	0	0	0
23. Stone, clay & glass	.000602	.015980	0	0	0	.001291	.000215	0	0	0	.149640	.001004
24. All other manufacturing	.001172	.001384	.006756	0	.004185	.003789	.003846	.013238	.001001	0	.001745	.135204
25. Wholesale trade	.003178	.015686	.019290	0	.002154	.000674	.011275	.015891	.003004	0	.007011	.003243
26. Service stations	.000466	0	.001058	0	0	.000275	.002556	0	.002465	0	.000674	.000660
27. Eating & drinking places	.000195	.000503	.000570	.006437	0	.000226	.000836	0	.000154	0	0	.000597
28. All other retail	.002115	.026674	.003663	0	.002462	.001189	.011658	.001133	.006317	0	.002510	.001760
29. Agricultural services	0	0	0	0	0	0	0	0	0	0	0	0
30. Lodging	.000363	.000336	0	0	0	.000414	.000239	0	.000077	0	0	.000363
31. All other services (except professional)	.012551	.029820	.004639	.006215	.012615	.001541	.016388	.014454	.003775	.012422	.026879	.003599
32. Transportation	.025481	.040180	.033697	.044173	.012923	.019609	.020879	.005030	.004622	.003106	.063034	.010607
33. Electric energy	.004502	.015434	.017011	.006437	.008308	.015773	.008815	.007047	.007935	.006211	.012123	.007305
34. All other utilities	.003509	.010024	.014488	.012653	.006277	.002580	.012948	.006108	.004776	.009317	.009398	.003332
35. Contract construction	.007235	.004110	0	0	0	.001600	.003512	0	.008705	.009317	0	.007849
36. Rentals & finance	.029402	.035314	.021569	.015094	.028677	.000432	.027806	.015283	.026346	.018634	.007194	.006052

Industry Producing \ Industry Purchasing	25 Wholesale Trade	26 Service stations	27 Eating & drinking	28 All Other Retail	29 Agricultural Services	30 Lodging	31 Other Services	32 Trans-portation	33 Electric energy	34 All other utilities	35 Contract Construc-tion	36 Rentals & Finance	
1. Range livestock	0	0	0	0	0	0	0	0	0	0	0	0	1
2. Feeder livestock	0	0	0	0	0	0	0	0	0	0	0	0	2
3. Dairy	0	0	0	0	0	0	0	0	0	0	0	0	3
4. Forage, feed & food crops	0	0	0	0	0	0	0	0	0	0	0	0	4
5. Cotton	0	0	0	0	0	0	0	0	0	0	0	0	5
6. Vegetables	0	0	0	0	0	0	0	0	0	0	0	0	6
7. Citrus crops	0	0	0	0	0	0	0	0	0	0	0	0	7
8. Forestry	0	0	0	0	0	0	0	0	0	0	0	0	8
9. All other agriculture	0	0	.005461	0	0	0	0	0	0	0	0	0	9
10. Uranium	0	0	0	0	0	0	0	0	0	0	0	0	10
11. Copper	0	0	0	0	0	0	0	0	0	0	0	0	11
12. All other mining	0	0	0	0	0	0	0	.009053	0	0	.006268	0	12
13. Food & kindred products	0	0	.104028	0	0	.015574	.000942	.018519	.000349	0	0	0	13
14. Lumber & wood products	0	0	0	0	0	0	0	.000292	.000193	0	.010252	0	14
15. Furniture & fixtures	0	0	0	0	0	0	0	0	0	0	0	0	15
16. Paper & pulp	0	0	0	.000086	0	0	0	.001217	0	0	0	0	16
17. Chemicals	0	0	0	0	0	0	.012595	0	0	0	.001547	0	17
18. Primary metals	0	0	0	0	0	0	0	0	0	0	0	0	18
19. Printing & publishing	.000684	.020435	.002601	.027731	0	.023585	.009745	.004305	.001202	.001278	.000208	.003799	19
20. Fabricated metals	0	.001037	0	.002301	0	0	.001336	.015269	.001771	.000988	.025120	.000666	20
21. Textiles & apparel	0	0	0	0	0	0	0	0	0	0	0	0	21
22. Leather & leather goods	0	0	0	0	0	0	0	0	0	0	0	0	22
23. Stone, clay & glass	.000077	0	0	.000713	0	0	0	0	.000083	0	.033884	0	23
24. All other manufacturing	.010242	0	0	.000960	0	0	.014784	.057698	.008792	.011063	.006785	0	24
25. Wholesale trade	.011295	.009030	.061489	.007617	.008692	.024523	.020289	.018287	.002661	.010106	.042764	.002589	25
26. Service stations	.000627	.004047	.001223	.001202	.040210	.015319	.011686	.002857	.000064	.011785	.003220	.000564	26
27. Eating & drinking places	.000856	.002007	.009965	.002116	0	.010653	.001164	.004195	.003184	0	.000985	.003418	27
28. All other retail	.027101	.005017	.009733	.007250	.009036	.015489	.011286	.006337	.007452	.005803	.010452	.004644	28
29. Agricultural services	0	0	0	0	0	0	0	0	0	0	0	0	29
30. Lodging	.008439	.001171	0	.000630	0	0	.000504	.003128	.000459	.001778	0	.000245	30
31. All other services (except professional)	.029881	.021438	.062281	.030083	.013883	.067603	.040955	.028527	.001028	.033980	.008650	.006258	31
32. Transportation	.063986	.046087	.013979	.025827	.073010	.004559	.011508	.029181	.006369	.007717	.004196	.000245	32
33. Electric energy	.056154	.042742	.009586	.022375	.007066	.002685	.009413	.009938	.145457	.001889	.000797	.007438	33
34. All other utilities	.016687	.032876	.018441	.021103	.025952	.035389	.016680	.032601	.029596	.009501	.002862	.010743	34
35. Contract construction	.009491	.017960	.003213	.009841	0	.028571	.008759	.002143	0	.008563	.267357	.036704	35
36. Rentals & finance	.046601	.046555	.026494	.032240	.059127	.039394	.037574	.045456	.046032	.034671	.019415	.024204	36

Note: Each entry shows the input directly required from the industry at the left of the table to produce one dollar's worth of output by the industry at the top of the table.

DIRECT PURCHASES PER DOLLAR OF OUTPUT
GILA RIVER SUB-BASIN 1960
Table G-1960-b

DIRECT AND INDIRECT REQUIREMENTS PER DOLLAR OF FINAL DEMAND
GILA RIVER SUB-BASIN 1960
Table G-1960-c

Sector	Industry Producing → / Industry Purchasing ↓	1 Range livestock	2 Feeder Livestock	3 Dairy	4 Forage Feed & Food Crops	5 Cotton	6 Vegetables	7 Citrus crops	8 Forestry	9 All other agriculture	10 Uranium	11 Copper	12 All other mining
	1. Range livestock	1.001463	.003876	.002581	.063942	.001041	.000029	.000034	.000215	.000115	0	.000012	.000349
	2. Feeder livestock	.372830	1.014553	.009817	.228131	.004076	.000113	.000131	.000086	.000442	0	.000025	.001003
	3. Dairy	.006674	.017889	1.025625	.445554	.002706	.000075	.000087	.000011	.000295	0	.000054	.002065
	4. Forage, feed & food crops	.010563	.028734	.013387	1.012107	.000209	.000006	.000007	.000011	.000025	0	.000067	.003849
Agriculture	5. Cotton	.000037	.000095	.000079	.000056	1.000046	.000001	.000001	.000008	.000008	0	.000053	.002839
	6. Vegetables	.000139	.000361	.000301	.000213	.000177	1.000005	.000006	.000016	.000024	0	.000178	.010749
	7. Citrus crops	.006814	.018483	.008990	.007960	.000658	.000018	1.000021	.000016	.000076	0	.000118	.008476
	8. Forestry	.000003	.000007	.000006	.000004	.000004	0	0	1.000002	.000001	0	.000003	.000040
	9. All other agriculture	.013334	.034726	.027594	.154028	.015174	.000420	.000489	.000021	1.001639	0	.000052	.002074
	10. Uranium	.000011	.000029	.000024	.000017	.000014	0	0	.000776	.000004	1.000000	.000173	.005211
Mining	11. Copper	.000535	.001385	.001158	.000816	.000680	.000019	.000022	.000242	.000075	0	1.019920	.006387
	12. All other mining	.000103	.000266	.000222	.000159	.000131	.000004	.000004	.000444	.000030	0	.011526	1.119456
	13. Food & kindred products	.062072	.160803	.134379	.094659	.078898	.002185	.002541	.000061	.008503	0	.000051	.001268
	14. Lumber & wood products	.000064	.000167	.000139	.000099	.000082	.000002	.000003	.069436	.000015	0	.000176	.002993
	15. Furniture & fixtures	.000062	.000159	.000133	.000095	.000078	.000002	.000003	.004566	.000016	0	.000079	.000677
	16. Paper & pulp	.000136	.000353	.000295	.000214	.000173	.000005	.000006	.032992	.000061	0	.000119	.001972
	17. Chemicals	.000035	.000091	.000076	.000054	.000044	.000001	.000001	.000073	.000009	0	.001769	.168768
Manufacturing	18. Primary metals	.000458	.001187	.000992	.000699	.000582	.000016	.000019	.000322	.000067	0	.789646	.057148
	19. Printing & publishing	.000044	.000115	.000096	.000069	.000056	.000002	.000002	.000542	.000013	0	.000067	.000452
	20. Fabricated metals	.000021	.000055	.000046	.000033	.000027	.000001	.000001	.000011	.000004	0	.016594	.001342
	21. Textiles & apparel	.000010	.000025	.000021	.000015	.000012	0	0	.000011	.000003	0	.000019	.000239
	22. Leather & leather goods	.014850	.038470	.032148	.022646	.018875	.000523	.000608	.000027	.002035	0	.000026	.000545
	23. Stone, clay & glass	.000110	.000285	.000238	.000168	.000140	.000004	.000005	.000066	.000020	0	.001542	.144099
	24. All other manufacturing	.000078	.000202	.000168	.000119	.000099	.000003	.000003	.000092	.000015	0	.004685	.001365
	25. Wholesale trade	.000105	.000272	.000228	.000162	.000134	.000004	.000004	.000021	.000024	0	.000116	.001039
Trade / Retail	26. Service stations	.000081	.000210	.000175	.000125	.000103	.000003	.000003	.000037	.000026	0	.000078	.000936
	27. Eating & drinking places	.006628	.017172	.014342	.010845	.008415	.000233	.000271	.000017	.006425	0	.000039	.000616
	28. All other retail	.000055	.000143	.000119	.000086	.000070	.000002	.000002	.000033	.000022	0	.000082	.000692
	29. Agricultural services	.000098	.000255	.000213	.000151	.000125	.000003	.000004	.000011	.000018	0	.000061	.000926
Services	30. Lodging	.001058	.002740	.002290	.001621	.001344	.000037	.000043	.000048	.000206	0	.000049	.000836
	31. All other services (except professional)	.000093	.000240	.000201	.000143	.000118	.000003	.000004	.000021	.000022	0	.000143	.002606
	32. Transportation	.001230	.003187	.002664	.001880	.001564	.000043	.000050	.000082	.000195	0	.000664	.010763
Utilities	33. Electric energy	.000064	.000165	.000138	.000100	.000081	.000002	.000003	.000021	.000031	0	.000095	.000178
	34. All other utilities	.000019	.000050	.000042	.000030	.000025	.000001	.000001	.000014	.000005	0	.000090	.000388
	35. Contract construction	.000034	.000087	.000073	.000053	.000043	.000001	.000001	.000984	.000014	0	.000804	.016886
	36. Rentals & finance	.000027	.000070	.000059	.000044	.000034	.000001	.000001	.000040	.000024	0	.000046	.000672

Industry Purchasing	13 Food & Kindred Products	14 Lumber & Wood Products	15 Furniture fixtures	16 Paper & pulp	17 Chemicals	18 Primary metals	19 Printing & publishing	20 Fabricated metals	21 Textiles & Apparel	22 Leather & Leather Goods	23 Stone, Clay & Glass Products	24 All other manufacturing
1. Range livestock	.013742	.000093	0	.000039	.001343	.000015	.001082	.000389	0	0	.000294	.000627
2. Feeder livestock	.053785	.000120	0	.000111	.004723	.000032	.001904	.000572	0	0	.000314	.001529
3. Dairy	.035703	.000137	0	.000142	.009074	.000068	.002115	.001100	0	0	.000255	.003957
4. Forage, feed & food crops	.002752	.000122	0	.000099	.020398	.000085	.002358	.000969	0	0	.000251	.003316
5. Cotton	.000612	.000123	0	.000088	.014909	.000067	.002655	.000865	0	0	.000304	.002678
6. Vegetables	.002335	.000233	0	.000206	.057057	.000226	.002634	.002257	0	0	.000332	.008692
7. Citrus crops	.008678	.000217	0	.000103	.048038	.000150	.002752	.001205	0	0	.000552	.003552
8. Forestry	.000047	.000027	0	.000015	.000017	.000004	.000717	.000131	0	0	.000081	.000213
9. All other agriculture	.200234	.000259	0	.000346	.010004	.000066	.005077	.001118	0	0	.000610	.003373
10. Uranium	.000187	.011297	0	.000086	.000300	.000219	.004524	.007031	0	0	.039601	.002076
11. Copper	.008968	.003521	0	.000114	.013997	.001454	.003482	.009421	0	0	.006446	.005965
12. All other mining	.001724	.006470	0	.000188	.015247	.014624	.005310	.014533	0	0	.013757	.017645
13. Food & kindred products	1.041127	.000699	0	.001174	.003621	.000064	.002125	.001180	0	0	.001361	.004867
14. Lumber & wood products	.001078	1.010719	0	.000154	.000521	.000223	.005085	.007559	0	0	.019449	.006309
15. Furniture & fixtures	.001032	.066460	1.074327	.027681	.000160	.000100	.010127	.001400	0	0	.001415	.012561
16. Paper & pulp	.002286	.480230	0	1.071301	.000389	.000151	.006559	.004510	0	0	.009323	.006858
17. Chemicals	.000587	.001058	0	.000140	1.008991	.002245	.006014	.002586	0	0	.002173	.009032
18. Primary metals	.007686	.004685	0	.000167	.012414	1.001879	.005209	.010025	0	0	.007297	.011606
19. Printing & publishing	.000745	.007884	0	.017373	.000282	.000085	1.018727	.002117	0	0	.000741	.007192
20. Fabricated metals	.000357	.000163	0	.000069	.000481	.021055	.002822	1.031934	0	0	.000251	.017250
21. Textiles & apparel	.000163	.000162	0	.000028	.000091	.000024	.001113	.000532	1.000000	0	.000564	.001993
22. Leather & leather goods	.249074	.000347	0	.000345	.001068	.000033	.003968	.000782	0	1.000000	.000899	.002025
23. Stone, clay & glass	.001845	.000965	0	.000196	.002438	.001956	.004398	.003330	0	0	1.177848	.011086
24. All other manufacturing	.001305	.001344	0	.000746	.000186	.005944	.004599	.006090	0	0	.001982	1.157910
25. Wholesale trade	.001763	.000311	0	.000155	.000520	.000147	.002920	.001987	0	0	.000888	.018559
26. Service stations	.001357	.000535	0	.000447	.000412	.000099	.022054	.002926	0	0	.001203	.005446
27. Eating & drinking places	.111043	.000225	0	.000227	.001346	.000049	.004423	.000924	0	0	.000524	.004493
28. All other retail	.000923	.000480	0	.000634	.000485	.000104	.029312	.003526	0	0	.001553	.004769
29. Agricultural services	.001649	.000161	0	.000145	.000286	.000077	.002111	.001647	0	0	.000267	.006430
30. Lodging	.017741	.000689	0	.000481	.001109	.000062	.026092	.001656	0	0	.001839	.003579
31. All other services (except professional)	.001554	.000309	0	.000231	.013334	.000182	.011525	.002387	0	0	.000728	.020001
32. Transportation	.020636	.001188	0	.001514	.000680	.000842	.006001	.017184	0	0	.000601	.071113
33. Electric energy	.001069	.000308	0	.000058	.000066	.000120	.002164	.002558	0	0	.000301	.013201
34. All other utilities	.000324	.000204	0	.000065	.000510	.000115	.002492	.001788	0	0	.000639	.014672
35. Contract construction	.000563	.014320	0	.000061	.002609	.001020	.001750	.036203	0	0	.055046	.014012
36. Rentals & finance	.000454	.000581	0	.000078	.000200	.000058	.004335	.002161	0	0	.002100	.001067

Industry Purchasing	25 Wholesale trade	26 Service stations	27 Eating & drinking	28 All other retail	29 Agricultural Services	30 Lodging	31 All other services	32 Transportation	33 Electric energy	34 All other utilities	35 Contract Construction	36 Rentals & finance
1. Range livestock	.005303	.013560	.000522	.008921	.006272	.000128	.002271	.004108	.008213	.005046	.006739	.119052
2. Feeder livestock	.013453	.012005	.000503	.040563	.038752	.000254	.004601	.013598	.008909	.006262	.005592	.076661
3. Dairy	.014981	.017030	.000563	.042194	.042706	.000374	.005566	.048454	.014043	.006990	.003990	.041870
4. Forage, feed & food crops	.017193	.019984	.000527	.048980	.095709	.000357	.006117	.038396	.010264	.006984	.003819	.041710
5. Cotton	.020492	.019400	.000593	.058437	.171789	.000368	.007502	.027403	.009897	.011177	.005300	.068020
6. Vegetables	.016407	.012056	.000829	.045066	.000059	.000586	.007328	.115023	.009130	.006898	.003649	.037358
7. Citrus crops	.015510	.023695	.000999	.035863	.354443	.000385	.011060	.032278	.033579	.015766	.010044	.163882
8. Forestry	.003530	.018376	.000153	.007720	.000001	.000070	.001053	.001389	.001605	.001223	.001813	.023402
9. All other agriculture	.041652	.010077	.000777	.147272	.045987	.000661	.011429	.027208	.012300	.010732	.007648	.049346
10. Uranium	.005207	.002323	.000416	.012756	.000005	.000143	.012776	.005158	.066725	.011007	.042830	.018042
11. Copper	.009769	.002546	.000314	.004213	.000226	.000262	.017718	.032088	.018942	.022093	.015421	.009214
12. All other mining	.019494	.004167	.002888	.024545	.000044	.001632	.024246	.063974	.041562	.023363	.004739	.055311
13. Food & kindred products	.011046	.006684	.000732	.020893	.026214	.000662	.017444	.039086	.011001	.008620	.014298	.058071
14. Lumber & wood products	.019330	.002174	.001102	.029721	.000027	.000743	.036302	.046466	.022375	.015023	.009570	.046142
15. Furniture & fixtures	.023956	.001832	.001297	.007559	.000026	.000440	.011203	.044207	.025928	.020408	.003212	.033201
16. Paper & pulp	.011195	.001542	.007829	.015071	.000059	.000573	.027136	.071665	.019990	.023439	.006221	.042872
17. Chemicals	.006119	.000988	.000682	.006929	.000015	.000358	.018208	.023898	.017112	.011535	.002831	.040490
18. Primary metals	.009992	.002623	.000791	.006138	.000194	.000795	.017668	.048732	.035701	.022346	.014803	.012791
19. Printing & publishing	.013562	.003221	.001335	.013458	.000019	.000509	.020540	.025149	.013179	.016304	.007705	.034363
20. Fabricated metals	.017637	.000422	.000204	.002331	.000009	.000227	.017335	.008215	.011123	.008339	.002054	.019364
21. Textiles & apparel	.004156	.002707	.000362	.007017	.000004	.000164	.005156	.005714	.010340	.006121	.013742	.029103
22. Leather & leather goods	.003873	.001967	.000328	.005640	.006271	.000217	.018061	.013183	.010505	.012449	.017555	.034967
23. Stone, clay & glass	.013600	.002233	.000904	.007804	.000047	.000617	.039854	.086503	.024619	.018590	.002673	.023437
24. All other manufacturing	.005223	.001043	.000880	.002852	.000033	.000538	.005914	.014104	.011117	.005428	.013354	.009933
25. Wholesale trade	1.015599	.001866	.001846	.030028	.000045	.008927	.037156	.069559	.069755	.024019	.018109	.059565
26. Service stations	.013258	1.005237	.002756	.007668	.000035	.001582	.027524	.050745	.053273	.038668	.028994	.057736
27. Eating & drinking places	.067050	.003293	1.010616	.016277	.003022	.000801	.072010	.025021	.018868	.024189	.010183	.043271
28. All other retail	.010866	.002205	.002631	1.009378	.000024	.000919	.035171	.029536	.028886	.025227	.016833	.040455
29. Agricultural services	.012104	.041333	.000783	.011167	1.000042	.000501	.020376	.079172	.013414	.032266	.005809	.070187
30. Lodging	.030622	.017207	.011288	.019295	.000449	1.000468	.076544	.011167	.008733	.040560	.044494	.051626
31. All other services (except professional)	.023525	.012758	.001638	.013660	.000040	.000869	1.046579	.016226	.015302	.020717	.016246	.046186
32. Transportation	.022250	.004194	.004853	.009293	.000521	.003590	.035395	1.035420	.016389	.037473	.008392	.056166
33. Electric energy	.004578	.000680	.004061	.009694	.000028	.000699	.004170	.009004	1.171779	.036534	.003836	.058204
34. All other utilities	.012457	.012591	.000345	.007317	.000008	.001995	.037811	.010550	.004994	1.012182	.015151	.040226
35. Contract construction	.061930	.005012	.001766	.017730	.000015	.000657	.019077	.016624	.008906	.008376	1.368541	.035750
36. Rentals & finance	.005719	.001040	.003680	.005915	.000012	.000344	.008532	.001723	.009905	.012250	.052003	1.028042

Note: Each entry shows the total dollar production directly and indirectly required from the industry at the top of the table per dollar of deliveries to final demand by the industry at the left.

Each of the processing sector industries will be discussed separately but certain summary tables have been prepared to highlight particularly important aspects of these industries in the Gila. Tables G-V, W, X, Y and Z rank processing sector industries according to the magnitude of their total gross output, sales to final demand, and percent of their total gross output which goes to final demand sectors (providing an index of the dependence of the particular sector upon customers outside the processing sector), the magnitude of their payments to sub-basin households, and the size of the economy's direct and indirect requirements per dollar of sales to final demand by each processing sector industry. Table G-AA shows the number of industries responding in amounts of $0.01 or more to an increase in sales of $1.00 by each processing sector industry. This provides an indicator of the degree of interdependence existing between sub-basin industries.

An examination of these summary tables reveals that almost without exception, the same twelve industries dominate the upper third of all sub-basin industries in total gross output, sales to final demand, and payments to households. These industries are construction, primary metals, "other" retail trade, copper, rentals and finance, "other" manufacturing, wholesale trade, food and kindred products manufacturing, "other" services, "other" utilities, cotton, and eating and drinking places. When sub-basin industries are ranked in terms of percent of gross output going to final demand (Table G-X) and magnitude of the direct and indirect reaction of all industries per dollar of sales to final demand (Table G-Z), the rank order of industries shifts dramatically. For example,

Table G-V

Total Gross Output of Processing Sector Industries in the Gila Sub-Basin

Rank	Industry	Total Gross Output
1	Contract Construction	$520,431,000
2	"All Other" Retail	415,783,000
3	Primary Metals	389,571,000
4	Copper	308,838,000
5	Rentals & Finance	301,885,000
6	"Other" Manufacturing	293,930,000
7	Wholesale Trade	231,783,000
8	Food & Kindred Products	190,301,000
9	"All Other" Services	189,324,000
10	"Other" Utilities	166,106,000
11	Cotton	141,244,000
12	Eating & Drinking Places	117,728,000
13	Electric Energy	111,644,000
14	Transportation	99,414,000
15	Feeder Livestock	87,069,000
16	"Other" Mining	67,567,000
17	Vegetables	48,388,000
18	Lodging	46,936,000
19	Printing & Publishing	42,870,000
20	Fabricated Metals	39,614,000
21	Forage, Feed & Food Crops	37,209,000
22	Stone, Clay & Glass	34,764,000
23	Service Stations	33,797,000
24	Range Livestock	33,652,000
25	Agricultural Services	31,982,000
26	Lumber & Wood Products	28,428,000
27	Dairy	27,371,000
28	Chemicals	18,337,000
29	Textiles & Apparel	14,583,000
30	Furniture & Fixtures	13,698,000
31	"Other" Agriculture	9,357,000
32	Citrus Crops	6,788,000
33	Paper & Pulp	4,990,000
34	Forestry	1,645,000
35	Uranium	563,000
36	Leather & Leather Goods	350,000

Source: Table G-S, 1960.

Table G-W

Processing Sector Industry Sales to Final Demand
in the Gila Sub-Basin

Rank	Industry	Sales to Final Demand
1	Primary Metals	$386,300,000
2	"All Other" Retail	373,304,000
3	Contract Construction	354,308,000
4	"Other" Manufacturing	236,526,000
5	Rentals & Finance	202,129,000
6	Wholesale Trade	176,236,000
7	Food & Kindred Products	160,945,000
8	Cotton	127,272,000
9	"All Other" Services	126,126,000
10	"Other" Utilities	122,015,000
11	Eating & Drinking Places	112,042,000
12	Feeder Livestock	57,913,000
13	Electric Energy	49,181,000
14	Vegetables	48,001,000
15	Lodging	43,675,000
16	"Other" Mining	31,913,000
17	Printing & Publishing	22,591,000
18	Transportation	21,603,000
19	Service Stations	19,838,000
20	Lumber & Wood Products	18,161,000
21	Fabricated Metals	17,359,000
22	Textiles & Apparel	14,583,000
23	Furniture & Fixtures	12,848,000
24	Stone, Clay & Glass	8,898,000
25	"Other" Agriculture	7,218,000
26	Citrus Crops	6,338,000
27	Forage, Feed & Food Crops	4,856,000
28	Chemicals	4,053,000
29	Paper & Pulp	3,260,000
30	Dairy	3,212,000
31	Copper	2,568,000
32	Range Livestock	1,137,000
33	Uranium	563,000
34	Leather & Leather Goods	350,000
35	Agricultural Services	140,000
36	Forestry	000,000

Source: Table G-S, 1960.

Table G-X

Sales to Final Demand of Processing Sector Industries as a Percent of Total Gross Output in the Gila Sub-Basin

Rank	Industry	Sales to Final Demand ÷ Total Gross Output
1	Uranium	100.00%
2	Textiles & Apparel	100.00
3	Leather & Leather Goods	100.00
4	Vegetables	99.20
5	Primary Metals	99.16
6	Eating & Drinking Places	95.17
7	Furniture & Fixtures	93.79
8	Citrus Crops	93.37
9	Lodging	93.05
10	Cotton	90.11
11	"All Other" Retail	89.78
12	Food & Kindred Products	84.57
13	"Other" Manufacturing	80.47
14	"Other" Agriculture	77.14
15	Wholesale Trade	76.03
16	"Other" Utilities	73.46
17	Contract Construction	68.0
18	Rentals & Finance	66.96
19	"All Other" Services	66.62
20	Feeder Livestock	66.51
21	Paper & Pulp	65.33
22	Lumber & Wood Products	63.88
23	Service Stations	58.70
24	Printing & Publishing	52.70
25	"Other" Mining	47.23
26	Electric Energy	44.05
27	Fabricated Metals	43.82
28	Stone, Clay & Glass	25.60
29	Chemicals	22.10
30	Transportation	21.73
31	Forage, Food & Feed Crops	13.05
32	Dairy	11.74
33	Range Livestock	3.38
34	Copper	0.83
35	Agricultural Services	0.44
36	Forestry	0.00

Source: Table G-S, 1960.

Table G-Y

Magnitude of Processing Sector Industry Payments
to Households - Gila Sub-Basin

Rank	Industry	Wages & Salaries	Profits	Total Payments
1	Rentals & Finance	$ 70,447,000	$167,738,000	$238,185,000
2	"Other" Retail	188,964,000	22,699,000	211,663,000
3	Contract Construction	152,855,000	6,964,000	159,819,000
4	"Other" Manufacturing	138,821,000	9,236,000	148,057,000
5	Copper	93,100,000	8,400,000	101,500,000
6	Wholesale Trade	82,874,000	11,938,000	94,812,000
7	"Other" Services	53,629,000	13,987,000	67,616,000
8	"Other" Utilities	45,358,000	4,312,000	49,670,000
9	Cotton	12,749,000	31,647,000	44,396,000
10	Electric Energy	25,004,000	13,560,000	38,564,000
11	Eating & Drinking	29,318,000	8,122,000	37,440,000
12	Food & Kindred	32,416,000	4,262,000	36,678,000
13	Transportation	27,249,000	2,005,000	29,254,000
14	Primary Metals	26,471,000	1,137,000	27,608,000
15	Printing & Publishing	16,661,000	5,055,000	21,716,000
16	"Other" Mining	16,480,000	3,286,000	19,766,000
17	Vegetables	8,839,000	7,366,000	16,205,000
18	Lodging	13,467,000	1,811,000	15,278,000
19	Service Stations	12,402,000	2,864,000	15,266,000
20	Feeder Livestock	1,660,000	11,853,000	13,513,000
21	Stone, Clay & Glass	10,619,000	1,900,000	12,519,000
22	Fabricated Metals	11,052,000	917,000	11,969,000
23	Range Livestock	965,000	9,536,000	10,501,000
24	Forage, Feed & Food	4,311,000	5,098,000	9,409,000
25	Lumber & Wood Products	7,893,000	956,000	8,849,000
26	Agricultural Services	4,878,000	3,540,000	8,418,000
27	Dairy	1,524,000	6,176,000	7,700,000
28	Textiles & Apparel	6,730,000	241,000	6,971,000
29	Furniture & Fixtures	3,377,000	659,000	4,036,000
30	Chemicals	3,681,000	260,000	3,941,000
31	"Other" Agriculture	605,000	1,814,000	2,419,000
32	Paper & Pulp	892,000	99,000	991,000
33	Forestry	496,000	480,000	976,000
34	Citrus Crops	347,000	516,000	863,000
35	Uranium	185,000	43,000	228,000
36	Leather & Leather Goods	121,000	34,000	155,000

Source: Table G-S, 1960.

Table G-Z

Processing Sector Industries of the Gila Sub-Basin
Ranked by the Magnitude of the Total Dollar Production
Directly and Indirectly Required by the Sub-Basin Economy to
Sustain a $1.00 Increase in Deliveries to Final Demand
by the Industries Named Below

Rank	Industry	Direct & Indirect Requirements per Dollar of Sales
1	Primary Metals	2.084678
2	Feeder Livestock	1.915450
3	Paper & Pulp	1.845525
4	Food & Kindred Products	1.816380
5	Citrus Crops	1.814381
6	Dairy	1.792347
7	Contract Construction	1.688948
8	"Other" Agriculture	1.635727
9	Stone, Clay & Glass	1.571620
10	Leather & Leather Goods	1.514311
11	"Other" Mining	1.487808
12	Eating & Drinking Places	1.482858
13	Cotton	1.425902
14	Forage, Feed & Food Crops	1.389355
15	Transportation	1.376017
16	Lodging	1.375973
17	Furniture & Fixtures	1.374402
18	Wholesale Trade	1.365833
19	Lumber & Wood Products	1.353248
20	Vegetables	1.340530
21	Chemicals	1.332912
22	Electric Energy	1.323990
23	Service Stations	1.323732
24	Agricultural Services	1.299681
25	Range Livestock	1.271416
26	"All Other" Services	1.267591
27	"Other" Manufacturing	1.257354
28	Uranium	1.248968
29	"Other" Retail Trade	1.245223
30	Copper	1.217413
31	Printing & Publishing	1.205948
32	Fabricated Metals	1.179777
33	"Other" Utilities	1.177101
34	Rentals & Finance	1.141217
35	Textiles & Apparel	1.089611
36	Forestry	1.061657

Source: Table G-U, 1960.

Table G-AA

Number of Processing Sector Industries Responding in Amounts of at Least $0.01 per Dollar of Sales to Final Demand by the Industries Listed Below

Industry	Intersections $\geq$ $0.01
"Other" Agriculture	16
Food & Kindred Products	13
"Other" Mining	13
Citrus Crops	12
Leather & Leather Goods	12
Eating & Drinking Places	12
"All Other" Services	11
Forage, Feed & Food Crops	11
Primary Metals	11
Lodging	11
Dairy	10
Furniture & Fixtures	10
Contract Construction	10
Feeder Livestock	9
Lumber & Wood Products	9
Paper & Pulp	9
Service Stations	9
Transportation	9
Wholesale Trade	8
"All Other" Retail	8
Cotton	8
Uranium	8
Printing & Publishing	8
Stone, Clay & Glass	8
Agricultural Services	8
Vegetables	7
Fabricated Metals	7
"Other" Utilities	7
Copper	6
Chemicals	6
Range Livestock	4
Textile & Apparel	3
"Other" Manufacturing	3
Electric Energy	3
Forestry	2
Rentals & Finance	2

Source: Table G-U, 1960.

one-half of the 12 leading industries in Table G-X are newcomers to the head of the list. Indeed, many of them are found close to the bottom of the order of gross output, sales to final demand, and payments to households. Uranium and leather goods which lead the list showing relative share of gross output going to final demand (Table G-X) rank 35 and 36 in terms of gross output (Table G-V) and payments to households (Table G-Y). Also, when industries are ranked as generators of economic activity in the sub-basin (Table G-Z), only four industries out of the top twelve seem at home in that company -- primary metals, food and kindred products manufacturing, construction, and eating and drinking places. Table G-AA also lends support to the proposition that the magnitude of an industry's operations is not an adequate guide to its importance as a generator of economic activity in other regional industries; that the structural interdependence of a regional economy is not self-evident.

The desire to uncover such structural interrelationships prompted the use of input-output analysis in this study. We now turn to an industry-by-industry review of such structural interrelations in the Gila Sub-Basin based on the results of the input-output analysis.

AN ANALYSIS OF THE AGRICULTURAL AND FORESTRY ECONOMY

OF THE GILA SUB-BASIN 1960

By

Lynn Wilkes

A Revision of June, 1964 Report by J. Dean Jansma

Natural Resources Economics Division
Economic Research Service
United States Department of Agriculture
Salt Lake City, Utah

August, 1967

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History of Settlement

The area comprising the Gila subbasin has sustained human habitation for at least 12,000 years and probably some type of agriculture has been practiced for nearly as long a time.

A primitive form of maize was introduced to the area from further south. By the time of the Christian Era two other vegetal plants, squash and beans, were introduced to the area and most of the inhabitants of the Gila basin drainage were well on their way to a sedentary agricultural life. The archeologist has given these early people the name Hohokam.

A complex system of canals was constructed by the Hohokam people which evidenced a sophisticated system of planning and intercommunity organization. Some of the earliest water conveyance systems existed as early as 500 A.D., but the system reached its height between 1000 and 1400 A.D.

Several hundred miles of these engineering projects have been traced in the Salt and Gila River Valleys. The size and capacity of the system in many instances equal modern works. In fact, in pioneering days, a few of these ancient canals were restored to use by cleaning them out.

The relatively advanced civilization of these early people went into a decline about 1400 A.D. By the time white men entered the subbasin only the primitive groups of the Pima and Papago Indians remained. Spanish adventurer and explorers traversed the area in their travels. Trappers and prospectors followed although the area was never rich in high quality furs because of the climate.

California-bound emigrants were probably the earliest Americans to bring cattle into the State. With the establishment of population centers, the demand for cattle grew. William H. Kirkland and William S. Oury, and a few other settlers introduced cattle raising during the late 1850's. The first herds, however, were largely wiped out during the Indian wars.

It was not until about 1870 when most of the hostile Indians had been settled on reservations that ranching operations began to flourish. Colonel Henry C. Hooker established a fine cattle ranch in Sulphur Spring Valley. King S. Woolsey began cattle operations in central Arizona and H.R. Hislop operated the largest cattle company in the Southwest in Pima County.

Sheep were brought into the subbasin at an early date and although overshadowed by the cattle industry they have been economically important. The Navajo's are thought to be the first herders of sheep in Arizona, but white men established herds also. Pastures at higher elevations were utilized during the summer months with the herds moved to the pastures in the valleys to spend the season when snow covered the mountains.

The rapid expansion of the range livestock industry was due to low prices in adjacent areas, a severe drought in California and abundance of good feed in the valleys of the Gila and Salt Rivers. The area was open range country until 1890 and one could drive and graze sheep and cattle onto any land except Indian reservations.

Other, more intense, forms of agriculture developed in the Gila subbasin when migrants to the area noticed thousands of acres of fertile land which needed only water. Individual diversions from the Salt River furnished immediate needs, but a cooperative effort was needed. The first canal company was organized in 1867 and by 1880, nine additional company canals were built and 55,000 acres of the Salt River Valley were under cultivation.

Occasional floods and silt were problems, but the irrigated agriculture prospered until about 1897 when a severe, three-year drought hit the area. The drought ended with a flash flood which washed out all diversion dams. It was apparent more adequate control of the river was necessary. This need was met with the organization of the Salt River Valley Water User's Association and the successful agitation for participation by the Bureau of Reclamation in constructing storage facilities on the Salt and Verde Rivers.

Construction of Roosevelt Dam was begun in 1905 and completed in 1912. An auxiliary diversion facility was constructed at Granite Reef. The Bureau of Reclamation operated these facilities for a number of years but disputes arose between the Bureau and the Salt River Valley Water User's Association. The dispute primarily concerned the allocation of power generated at the dams. In 1917, the entire project was turned over to the Association with them assuming the indebtedness of 10 million dollars.

By 1920, Roosevelt Dam had overflowed four times. In addition to the flood hazard, precious water was lost. To provide additional control to the stream, Horse Mesa, Mormon Flat, and Stewart Mountain Dams were constructed on the Salt River and Bartlett and Horseshoe Dams on the Verde River. These facilities provide almost 100 percent utilization of the flood waters of these two rivers.

Ground water has been developed by both private individuals and associations with a large base acreage of land dependent on that resource. The history of the subbasin has been and will be closely associated with water development.

Physical Characteristics and the Resource Base

The Gila drainage basin embraces 53,000 square miles, 47,380 of which are in south and central Arizona, and 5,620 in western New Mexico. The Gila River rises in the mountainous region of southwestern New Mexico and drains most of southern Arizona. Elevations range from 530 feet at Sentinel to 12,600 feet at Humphrey's Peak in the San Francisco Mountains.

Tributary to the Gila are three major rivers and three with lesser flows. The San Francisco River drains mountainous regions of southwestern New Mexico and southwestern Arizona. The San Pedro rises in Sonora, Mexico, flows north to the Gila. The Salt River rises in the White Mountains of eastcentral Arizona, joins with the Verde River and then flows for 40 miles through the Salt River Valley before converging with the Gila. The Santa Cruz, the Agua Fria and the Hassayampa Rivers are tributaries to the Gila, but only occasional large floods contribute to its flow.

Extremes in temperature and precipitation occur within some of the mountainous regions of the subbasin, but the major agricultural areas are characterized by temperatures which seldom fall below freezing and precipitation between 7 and 9 inche annually. The Phoenix area has a minimum daily mean temperature in January of 39 degrees F; in Safford it is 28 degrees F. Phoenix has an annual precipitation of 7.67 inches; Safford just slightly more, 8.95 inches.

The soils of the subbasin are generally very productive. Numerous sharp changes in terrain characterize a wide variety of soil types. To the extent that it is possible to generalize on the soil of so vast an area it may be said that the soils are low in organic matter and therefore in nitrogen. Certain soluble salts and lime accumulations are prevalent at the valley floors where irrigated agriculture exists. Soils of the area have not developed sharp or distinct profile characteristics as have soils in the more humid areas. With careful management practices which include addition of important quantities of commercial fertilizer, the soils found in the subbasin have been some of the richest in the world.

Much of the land area of the subbasin is under federal ownership (Table 1) Land ownership is distributed as follows: (1) private -- 22 percent, 2) state and local government -- 17 percent, and (3) federal land - 61 pe cent. A further classification indicates that the Forest Service administrates about 41 percent of the federal lands while the Bureau of Land Management and various Indian groups each administer about 25 percent (Table 2).

There were about 801,000 acres of cropland harvested in the subbasin in 1960 (Table 3). This represents slightly more than two percen of the subbasin's total land area. early all the harvested acr age was under irrigation in 1960. The average size of farm in the subbasin was over 3,000 acres. This includes grazing land however, only 135 acres were irrigated cropland. Table 3 sho average size of farm and irrig ted cropland per farm by county.

Table 1.- Land ownership in Gila Subbasin of Colorado River, by county, 1960

Counties 1/	Private land		State and local government		Federal land 2/		Total 3/
	000 Acres	Percent of total	000 Acres	Percent of total	000 Acres	Percent of total	000 Acres
Cochise	1,566	40.3	1,363	35.0	959	24.7	4,004
Gila	67	2.2	30	1.0	2,930	96.8	3,040
Graham	240	8.4	504	17.6	2,122	74.0	2,950
Greenlee	68	5.8	143	12.1	971	82.1	1,199
Maricopa	1,438	24.6	465	7.9	3,952	67.5	5,905
Pima	707	12.1	921	15.8	4,204	72.1	5,914
Pinal	789	23.8	1,226	37.0	1,299	39.2	3,442
Santa Cruz	299	38.0	62	7.9	426	54.1	798
Yavapai	1,215	23.6	1,272	24.6	2,676	51.8	5,178
Catron	4/ 1,592	36.1	5/	5/	2,823	63.9	4,415
Total	7,981	22.0	5,986	17.0	22,352	61.0	36,845

1/ All Arizona counties except Catron County, New Mexico.
2/ Includes lands owned or controlled and held in trust (Indian).
3/ Total is not sum of components due to reporting of both surface and subsurface mineral acreages; and some Federal lands include scattered tracts of private land holdings.
4/ Includes state and local government-owned land.
5/ See footnote 4.

U.S. MEW-PMS land ownerships in Colorado River Basin, Denver, Colorado, Jan. 1963.

Table 2.- Federal land status, Gila Subbasin of Colorado River, 1959

County	Forest Service	Park Service	BLM	BR	Military	Indian 1/	Other	Total
	- - - - - - - - - - - - - -	- - - - - -	- - - - - -	000 Acres	- - - - - -	- - - - - -	- - - - - -	- - - - - -
Cochise	498	11	358	------	92	------	------	959
Gila	1,667	1	55	48	------	1,159	2/	2,930
Graham	396	------	737	------	2/	989	------	2,122
Greenlee	749	------	222	------	------	------	------	971
Maricopa	692	------	2,192	8	802	252	6	3,952
Pima	437	394	397	------	461	2,479	35	4,203
Pinal	223	2/	452	24	1	599	------	1,299
Santa Cruz	425	2/	1	------	------	------	------	426
Yavapai	1,996	1	620	54	2	3	------	2,676
Catron	2,173	2/	636	15	------	------	------	2,824
Total	9,256	407	5,670	149	1,358	5,481	41	22,362
				Percentage distribution of Federally-owned land				
Cochise	51.9	1.2	37.3	------	9.6	------	------	100.0
Gila	56.9	2/	1.9	1.6	------	39.6	2/	100.0
Graham	18.7	------	34.7	------	2/	46.6	------	100.0
Greenlee	77.1	------	22.9	------	------	------	------	100.0
Maricopa	17.5	------	55.5	0.2	20.3	6.4	0.1	100.0
Pima	10.4	9.4	9.4	------	11.0	59.0	0.8	100.0
Pinal	17.2	2/	34.8	1.8	0.1	46.1	------	100.0
Santa Cruz	99.8	2/	0.2	------	------	------	------	100.0
Yavapai	74.6	2/	23.2	2.0	0.1	0.1	------	100.0
Catron	77.0	2/	22.5	0.5	------	------	------	100.0
Total	41.4	1.8	25.3	0.7	6.1	24.5	0.2	100.0

1/ Includes land owned or controlled and held in trust (Indian).
2/ Insignificant.

U.S. HEW-PHS Land Ownership in Colorado River Basin, Denver, Colo. Jan. 1962.

Table 3.- Number and size of farms, Gila Subbasin, 1959

	Number of farms	Total land in farms	Cropland harvested	Irrigated cropland harvested	Size of farm 1/	Irrigated cropland per farm 2/
	Number	000 acres	000 acres	000 acres	Acres	Acres
Cochise	824	2,826	71.1	70.2	3,429	85
Gila	155	926	3.5	3.5	5,973	23
Graham	395	2,392	32.0	31.9	6,055	81
Greenlee	106	246	5.6	5.5	2,321	52
Maricopa	2,490	2,583	395.0	394.4	1,038	158
Pima	424	4,218	49.8	49.3	9,947	116
Pinal	679	2,425	228.3	228.2	3,571	336
Santa Cruz	122	359	5.1	5.0	2,941	41
Yavapai	461	3,224	9.2	8.9	6,996	19
Catron	252	1,433	1.6	0.8	5,686	3
Total	5,908	20,632	801.2	797.7	3,492	135

1/ Total land in farms divided by number of farms.
2/ Irrigated cropland harvested divided by number of farms.

U. S. Census.

The population of the subbasin nearly doubled between 1950 and 1960, but the rural population showed a slight decrease during the same time span (Table 4). The difference in the two trends can be attributed, to a large extent, to the phenomenal growth of Phoenix and Tucson. In 1950, these two cities accounted for slightly less than 25 percent of the subbasin's population, whereas by 1960 they accounted for over 50 percent of the total population. 1/

The civilian labor force in the subbasin totaled nearly 404 thousand in 1960 (Table 5). Employment according to occupational groups indicated that about seven percent of the total labor force was employed in agriculture. The percentage range was from a low of 1.7 percent in Pima County to a high of 22.2 percent in Catron County.

In addition to the local labor force, a substantial number of Mexican Nationals are employed in agricultural activities. A historical pattern of their employment is shown in table 6.

This introduction was designed to provide a general description of the resource base of the subbasin. The next section will contain a more detailed examination of the agricultural economy in 1960.

1/ Arizona Statistical Review, Research Department of Valley National Bank, Phoenix, 1963.

Table 4.- Total and rural population, Gila Subbasin, by counties, 1920-60

Counties	1960	1950	1940	1930	1920
Total population	1,140,674	635,481	408,051	362,436	274,744
Cochise	55,039	31,488	34,627	40,998	46,465
Gila	25,745	24,158	23,867	31,016	25,678
Graham	14,045	12,985	12,113	10,373	10,148
Greenlee	11,509	12,805	8,698	9,886	15,362
Maricopa	663,510	331,770	186,193	150,970	89,576
Pima	265,660	141,216	72,838	55,676	34,680
Pinal	62,673	43,191	28,841	22,081	16,130
Santa Cruz	10,808	9,344	9,482	9,684	12,689
Yavapai	28,912	24,991	26,511	28,470	24,016
Catron	2,773	3,533	4,881	3,282	
Rural population	233,371	250,890	251,674	225,280	168,370
Cochise	30,079	15,635	20,151	23,147	27,344
Gila	13,673	13,510	13,004	16,166	11,945
Graham	9,397	9,220	12,113	10,373	10,148
Greenlee	7,318	2,706	6,030	9,886	11,199
Maricopa	89,306	93,787	105,796	95,476	54,750
Pima	31,178	62,909	36,020	23,170	14,388
Pinal	35,074	31,125	28,841	22,031	16,130
Santa Cruz	3,522	3,191	4,367	3,678	7,490
Yavapai	16,051	15,274	20,493	18,021	14,976
Catron	2,773	3,533	4,881	3,282	

U. S. Census

Table 5.- Civilian labor force in Gila Subbasin, by counties, 1960

County	Civilian labor force	Farmers and farm managers	Farm laborers and foremen	Agriculture employment	Percent agriculture employment
Cochise	16,850	1,806	836	2,642	15.7
Gila	8,289	786	447	1,233	14.9
Graham	4,482	499	434	933	20.8
Greenlee	3,759	278	96	374	9.9
Maricopa	244,745	2,655	14,032	16,687	6.8
Pima	91,670	576	965	1,543	1.7
Pinal	19,013	761	2,643	3,404	17.9
Santa Cruz	3,771	112	121	233	6.2
Yavapai	10,465	326	355	681	6.5
Catron	940	57	152	209	22.2
Total	403,984	7,858	20,081	27,939	6.9

Leasure, J. William, Population Projections for the Three Upper Subbasins of the Colorado River Basin. San Diego State College, 1965.

Table 6.- Number of Mexican Nationals employed in the Gila Subbasin, by months, 1954-1962

Year	January	February	March	April	May	June	July	August	September	October	November	December	Total man months
1954	3,750	1,000	650	850	1,050	1,400	900	700	1,900	6,900	6,900	4,400	30,400
1955	1,400	1,000	1,000	900	1,000	1,300	1,400	400	3,500	8,000	7,100	4,700	31,700
1956	2,300	1,000	1,400	3,000	2,000	1,600	1,200	700	6,800	11,100	11,400	6,800	49,300
1957	2,200	1,900	2,100	4,100	2,700	1,700	1,300	900	5,000	10,000	11,800	7,800	51,500
1958	4,300	2,900	3,700	5,700	5,000	3,900	2,300	2,700	8,700	14,000	14,000	8,300	75,500
1959	3,200	2,200	3,600	7,300	6,400	3,000	1,700	1,600	6,600	9,200	10,600	6,900	62,300
1960	3,400	2,600	2,500	7,300	5,500	2,800	1,400	1,500	5,700	8,000	9,800	5,600	56,100
1961	3,100	2,600	3,100	6,600	4,700	3,100	1,300	1,300	4,200	6,600	7,100	5,400	49,100
1962	2,900	2,400	2,500	5,400	4,200	2,500	1,150	770	2,540	3,100	5,600	3,600	36,660

Agricultural Employment in Arizona 1950-1962, Arizona State Employment Service.

AGRICULTURAL AND FORESTRY ECONOMY OF THE GILA SUBBASIN IN 1960

A summary of the data compiled for the agricultural and forestry components of the transactions table are shown in table 7. The rows show the output for each sector whereas the sector's purchase of inputs are specified in the columns. The rows and columns are complete only for the agricultural and forestry sectors. For example, the row total for sector 20 (gas and auto) accounts for the sector's output sold to agriculture and forestry; not for the sector's total output.

It is recognized, of course, that there are "overlaps" between sectors. For example, a single entrepreneual unit may include both range livestock and feed lot operations. Thus, it was necessary to develop the "cost and returns" on the basis of an enterprise rather than a managerial unit.

The remainder of this section examines in greater detail the commodity groups, (or sectors) within the agricultural and forestry economy.

Table 7.- Intra- and interindustry transactions made by the agricultural and forestry sectors, Gila Subbasin, 1960 1/ 2/

Sector	Industry producing \ Industry purchasing	Processing sectors: 1 Range livestock	2 Feeder livestock	3 Dairy	4 Forage, feed and food crops	5 Cotton	6 Vegetables	7 Citrus crops	8 Forestry	9 All other agriculture	29 Agricultural services 3/	13 Food and kindred products	14 Lumber and wood products	27 Eating and drinking places	Final demand: 37 State & Federal Gov't.	39 Households	41 Exports to other Colorado River subbasins	42 Exports outside Colorado River Basin	Total gross output
		1,000 dollars																	
Processing sectors	1 Range livestock	-----	31,983	-----	-----	-----	-----	-----	-----	-----	-----	532	-----	-----	223	475	-----	439	33,652
	2 Feeder livestock	-----	-----	-----	1,041	-----	-----	115	-----	-----	-----	28,000	-----	-----	-----	682	-----	57,231	87,069
	3 Dairy	-----	-----	413	472	-----	-----	52	-----	-----	-----	23,222	-----	-----	-----	759	-----	2,453	27,371
	4 Forage, feed and food crops	2,085	17,228	11,784	-----	-----	-----	-----	-----	1,256	-----	-----	-----	-----	628	-----	119	4,109	37,209
	5 Cotton	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	13,972	-----	-----	557	-----	-----	126,715	141,244
	6 Vegetables	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	387	-----	-----	-----	-----	-----	48,001	48,388
	7 Citrus crops	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	450	-----	-----	-----	-----	-----	6,338	6,788
	8 Forestry	7	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	1,638	-----	-----	-----	-----	-----	1,645
	9 All other agriculture	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	1,505	-----	634	134	4,066	83	2,935	9,357
	29 Agricultural services 3/	-----	1,419	-----	3,500	24,262	-----	2,398	-----	263	-----	-----	-----	-----	-----	-----	140	-----	31,982
	10 Uranium	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----								
	11 Copper	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----								
	12 All other mining	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----								
	13 Food and kindred products	436	4,024	877	-----	2,072	-----	44	-----	1,853	-----								
	14 Lumber and wood products	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----								
	15 Furniture and fixtures	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----								
	16 Paper and pulp	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----								
	17 Chemicals	-----	-----	-----	-----	-----	2,731	321	-----	-----	-----								
	18 Primary metals	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----								
	19 Printing and publishing	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----								
	20 Fabricated metals	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----								
	21 Textiles and apparel	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----								
	22 Leather and leather goods	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----								
	23 Stone, clay and glass	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----								
	24 All other manufacturing	-----	-----	-----	-----	831	-----	-----	-----	-----	-----								
	25 Wholesale trade	-----	-----	-----	-----	112	-----	-----	-----	-----	-----								
	26 Service stations	404	172	211	565	1,688	549	57	30	42	1,286								
	27 Eating and drinking places	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----								
	28 All other retail trade	157	2,251	519	1,665	7,752	2,063	196	12	1,252	289								
	30 Lodging	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----								
	31 All other services, except prof.	-----	-----	-----	-----	-----	-----	-----	-----	-----	444								
	32 Transportation	-----	-----	753	947	1,354	5,182	-----	-----	50	2,335								
	33 Electric energy	153	120	165	143	397	142	142	-----	12	226								
	34 All other utilities	77	80	33	-----	300	-----	-----	-----	21	830								
	35 Contract construction	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----								
	36 Rentals and finance	3,741	1,623	477	958	6,962	1,212	870	35	202	1,891								
Final payment	37 State and Federal Government	808	263	124	38	2,282	609	13	353	13	393								
	38 Local government	1,487	348	206	7,579	10,686	1,482	181	41	434	243								
	39 Households	10,501	13,513	7,700	9,409	44,396	16,205	863	976	2,419	8,418								
	40 Depreciation allowances	4,747	1,104	2,948	4,744	9,838	2,563	282	45	686	4,665								
	41 Imports from other subbasins	-----	6,353	-----	-----	-----	-----	-----	-----	-----	483								
	42 Imports from outside CRB	9,049	6,588	1,161	6,148	28,312	15,650	1,254	153	854	10,479								
	Total gross outlay	33,652	87,069	27,371	37,209	141,244	48,388	6,788	1,645	9,357	31,982								

1/ Some transactions among nonagricultural sectors are not shown in this table.
2/ Columns have been deleted where there were no purchases from agricultural and forestry sectors.
3/ Agricultural services sector (29) is listed out of numerical order so that it is adjacent to other agricultural sectors.

Range Livestock

The major enterprises in the range livestock sector are the production of cattle and sheep and the sale of wool. The total gross output of $33.6 million was derived from the following revenues: (1) Sale of cattle (feeders and cull breeding stock) $31.9 million; (2) sheep, lamb and wool revenues, $1.2 million; (3) value of home consumption, $0.5 million; and (4) certain government payment such as wool incentive payments, $0.2 million.

On the input side, the range livestock sector purchased feed from the feed, food, and forage sector in the amount of $2.1 million. Some feed was also imported into the subbasin. Another import item of significance was breeding stock. An estimated $7.8 million was expended for this input for the sector.

Approximately $4.3 million were expended by the range livestock sector for machinery purchases and machinery expenses and repair. Ranch buildings and fences cost the sector $1.2 million and hired labor $1.4 million. Utilities and insurance were items of lesser importance.

A dependance on federal and state grazing land characterizes the range livestock sector. One hundred and forty-nine thousand cattle and 33,000 sheep grazed 1,252,000 AUM[2/] on forest and established BLM districts in 1960 and an undetermined number of livestock utilized Section 15 BLM lands. A total of $510,000 was payed to the Federal Treasury for these grazing privileges. In addition, an equivalent of 34,293 cattle obtained 411,000 AUM of grazing from Indian lands in the subbasin. Actually, much of the forage available on reservations was utilized by sheep. Bureau of Indian Affairs data reports all useage in cow month equivalents however.

[2/] AMU's represents animal units months.

State-owned lands totaling 4.7 million acres were grazed and about $380,000 were paid to state government for these grazing privileges.

Livestock Feeding

The total gross product from livestock feeding in the subbasin in 1960 was $87.1 million. This accounts for 22 percent of the subbasin's total gross output (excluding forestry and agricultural services). An estimated 470,000 head of animals were marketed from the subbasins feedlots. About 396,200 head (69.5 percent) were shipped out of Arizona for slaughter. The largest slaughter market for Arizona livestock is Los Angeles. A high degree of interdependance between the range livestock and feeder livestock sectors is indicated by the fact that $32 million of the livestock feeding inputs were purchased from range livestock. Texas and Mexico were also suppliers of feeder stock to the subbasin.

The cost of feed of approximately $25.1 million was largely purchased from feed, food and forage sector with the exception of cotton hulls and concentrates some of which were imported. There has been a trend toward the use of rations containing a higher percentage of concentrates. The percentage of concentrates in the average feedlot ration in Arizona increased from 48.2 percent in 1957 to 66.9 percent in 1961.

Farm Dairy

This sector includes only the on-farm production of milk and cream and excludes the processing and distribution of these products

Dairy production has been highly specialized in the subbasin. Annual milk production per herd has more than doubled between 1950 and 1960 This has resulted from more producing animals per herd and greater production per animal. Annual butterfat production per herd was 16,800 pounds in 1950.

By 1960 it was 46,777 pounds per herd. The number of cows per herd in the same period increased from 58 to 122. Milk production per cow increased from 9,100 pounds in 1960 to 10,310 pounds in 1960.

Nearly all the milk produced in the subbasin is under the Central Arizona milk marketing order. Of approximately 412.9 million pounds produced under the marketing order in 1960, 336.2 million pounds were for Class I consumption and 80.7 million were delivered to manufacturers.

The gross receipts from dairy products and animals within the subbasin in 1960 were estimated at $27.4 million. The total gross product from the sector was obtained as follows: (1) Dairy product sales, 80.9 percent; (2) sale of calves and cull cows, 12.9 percent; and (3) home consumption and miscellaneous, 6.2 percent.

The largest single item on the input side is the purchase of feed and forage. About 18 percent of total dollar cost of feed was paid for hay, silage and greenchop accounted for 11 percent and concentrates about 15 percent of the total feed bill. It was estimated that labor, hired and family, claimed 19 percent of total input allocations in the dairy sector. Interest and depreciation were also items of importance.

Forage, Feed and Food Crops

Grains and forage crops are included in this sector. Their value in 1960 was estimated at 37.2 million dollars. Over 490,000 acres were devoted to grain and forage production in 1960. Alfalfa, barley and grain sorghums were the major crops in this group; 165,900 acres produced alfalfa, 161,900 barley, and from 124,700 acres various sorghum crops were harvested. Corn and wheat were of lesser importance. Table 8 shows the total acreage and value of production for these crops.

Table 8.- Acreage and value of production of crops, feed, food and forage sector, 1960

Crop	Acreage	Value of production (1,000 dollars)
Alfalfa	165,900	17,300
Barley	161,900	11,000
Corn	19,700	900
Grain sorghum	124,700	7,000
Wheat	17,900	1,000
Total	490,100	37,200

An estimated 70,000 acres of the sorghums were harvested as grain and the balance for silage and other forage uses. A small acreage of the small grains was cut as hay.

The grain and forage products represented in this sector were sold to the range livestock, feeder livestock and dairy sectors (Table 7). Feed companies within the basin and without and livestock producers in other areas also purchased grain and forage from this sector.

Important inputs for grain and forage crops were $7.6 million paid for irrigation water delivered by irrigation companies, about $4.8 million for seed, commercial fertilizer and insecticides, $3.5 million paid for custom machine work, and $6.5 million for labor, $3.4 million of which was irrigation labor. Depreciation and interest charges on investment in ground water pumping facilities was estimated at about $3.5 million.

Cotton

Cotton accounted for 36.1 percent of the total value of agricultural production in the subbasin and was the most important single commodity produced in 1960. About 91 percent of Arizona's upland cotton and 99 percent of the state's Egyptian cotton acreage is grown in the Gila subbasin. The gross value of production in this sector in 1960 was $141.2 million. Eighty-three percent of the revenues were obtained from the sale of upland cotton, 6 percent Egyptian and 11 percent from cottonsedd.

Acreage devoted to cotton in 1960 totaled 391.4 thousand acres, 82 percent of which were in Pinal and Maricopa Counties. Approximately $21 million was paid by the cotton sector to agricultural services for such services as fertilizer, insecticide, defoliant applications and for picking and ginning. Ginning services cost the cotton sector $11.8 million and machine picking $7 million. There has occurred a notable change from hand to machine picking. In addition to application costs, materials such as insecticides, weedicides, defoliants and fertilizer were inputs the cost of which approached $16.6 million in 1960.

Vegetable Crops

Vegetable crops in the Gila subbasin were valued at $48.4 million in 1960. Vegetables rank third (following cotton and feeder livestock) in terms of value of production in the subbasin. Budget d ta were dev loped for nine separate vegetable crops. The following is a ranking of their economic importance and the percentage each crop is of total vegetable production: (1) Early spring lettuce--42.5 percent; (2) late fall lettuce--30.3 percent; (3) Irish potatoes--10.3 percent; (4) cantaloups and honey dew melons--3.8 percent; (5) spring carrot --2.3 percent; (6) late spring onions--2.0 percent; (7) watermelons--1.9 percent; (8) winter celery--1.2 percent; (9) winter cabbage--1.0 percent; (10) all other--4.7 percent. The diversity of the vegetable industry is indicated by the fact that nearly 40 different produce items are shipped from the State of Arizona each year.

The data problems in this sector were the most difficult of any encountered. Extremely high incomes per acre (the average gross income per acre in 1960 for all vegetable crops was $713) causes even small acreages to have economic importance. For example, the value of the 1960 celery crop was $574 thousand, even though there were only 350 acres of this crop in the subbasin. Also, there are large year-to-year fluctuations in both acreages and prices received for vegetable crops. About 68 percent of Arizona's vegetable acreage is in the Gila subbasin.

Cartons and packing materials were an important input item, amounting to approximately $6.7 million in 1960. Wages approached $15.6 million, of which $6.9 million was paid for cutting, packing and loading lettuce.

Citrus Crops

Citrus production in the Gila was valued at $6.8 million in 1960. This amount accounts for about 83 percent of the value of citrus production in Arizona. A ranking of the citrus products produced is as follows: (1) grapefruit--37 percent; (2 navel oranges--31 percent; (3) valencia oranges--24 percent; and (4) lemons--8 percent. The data problems associated with citrus production are nearly as complex as for vegetables, including extreme fluctuations in production and prices. For example, the lemon acreage in the Gila decreased from 1,510 acres in 1960 to 1,100 acres in 1961. During this same period, production more than doubled, that is, from 540 thousand boxes in 1960 to 1,400 thousand boxes in 1961. Another problem is the "lag" experienced between planting and harvesting. It takes 5 years and an expenditure of about $2,000 per acre before the owner of an orchard begins to realize any income from his investment. The development of a current "operating account" from this type of investment is highly complex.

Other Agriculture

Although this sector includes several products and enterprises, the major component is the poultry industry. A distribution of the $9.4 million of production in this sector indicates the following: (1) other crops--20 percent; (2) other fruits-- 2 percent; and (3) poultry and poultry products--78 percent. About 95 percent of Arizona's poultry industry is located in the Gila subbasin. Income from eggs sold was the largest single source of income ($5.5 million). Broilers, other chickens, and turkeys each supplied about $0.5 million of income to the subbasin in 1960.

There is an upward trend in the size of laying flocks. Arizona Agriculture, 1961, reports that about 40 percent of the flocks have 5,000 or more laying hens. Arizona flocks provide less than 30 percent of the local demand for eggs and more than 20 million dozen eggs are shipped in each year to meet this deficit. It seems that there would be ample room for expansion of Arizona's poultry industry.

Summary of Basic Agricultural Sectors

The agricultural industry of the Gila subbasin is extremely diversified. About 40 percent of the value of gross output is from livestock and livestock products, and 60 percent from crop production. Table 3 shows the acreage of cropland harvested in each county by commodity group. Maricopa County accounts for slightly over half of the harvested acreage in the subbasin. Pinal County accounts for an additional 28 percent of the harvested acreage.

Table 9.- Gila subbasin, cropland harvested, by counties, 1960

Crop	Cochise	Gila	Graham	Greenlee	Maricopa	Pima	Pinal	Santa Cruz	Yavapai	Catron N.M.	Total	Percent of total Acreage
					000 acres							
Alfalfa hay	13.0	0.3	8.0	1.6	109.0	2.4	19.0	1.9	10.1	0.6	165.9	16.2
Cotton	17.0	----	18.7	2.1	157.7	29.2	164.8	1.9	----	----	391.4	38.2
Barley	5.0	0.4	8.0	0.3	79.8	8.5	55.3	1.3	3.1	0.2	161.9	15.8
Corn	2.0	----	0.5	0.3	10.0	0.2	0.1	1.5	5.1	----	19.7	1.9
Grain sorghum 1/	36.0	0.1	5.5	1.9	50.0	8.0	21.6	1.0	0.5	0.1	124.7	12.2
Wheat	0.5	0.1	----	0.1	9.0	0.2	7.0	----	1.0	----	17.9	1.7
Vegetables	4.5	----	0.3	0.2	59.0	0.5	3.2	0.1	0.2	----	68.0	6.6
Grapefruit	----	----	----	----	4.5	----	----	----	----	----	4.5	0.4
Oranges	----	----	----	----	8.5	----	----	----	----	----	8.5	0.
Lemons	----	----	----	----	1.5	----	----	----	----	----	1.5	0.2
Other crops	2.0	0.1	2.0	0.5	35.0	3.0	15.0	0.3	3.0	0.1	61.0	6.0
Total	80.0	1.0	43.0	7.0	524.0	52.0	286.0	8.0	23.0	1.0	1025.0	100.0

1/ Includes acreage harvested for grain (70,200 acres) and harvested as forage (54,400 acres).

Arizona Agriculture, 1961.

Other Sectors

Agricultural services - The agricultural services sector provides specialized inputs to the basic agricultural sectors. A distribution of the $32.0 million "output" of this sector is as follows: (1) contracting, ginning and sterilization of cotton -- 42 percent; (2) machine harvesting of cotton -- 23 percent; (3) custom baling -- 11 percent; (4) aerial spraying -- 9 percent; (5) harvesting of citrus -- 8 percent; and (6) miscellaneous -- 7 percent. A small amount of ginning service is exported to the Lower Main Stem subbasin.

The important expenditure items in this sector were for machinery purchases and repair, wages and transportation. The agricultural services sector led all agricultural sectors in the percentage of its inputs imported from outside the Colorado River Basin.

Forestry - About one-fourth of the total land area in the Gila subbasin is administered by the U. S. Forest Service. Significant acreages of six national forests are located within the boundaries of the subbasin. They are the Apache, Cibola, Coronado, Gila, Prescott and Tonto National Forests (figure 2).

Sawtimber cut in 1960 was estimated at 35 MM board-feet which is about 75 percent of the annual allowable cut (Table 10)

GILA SUBBASIN

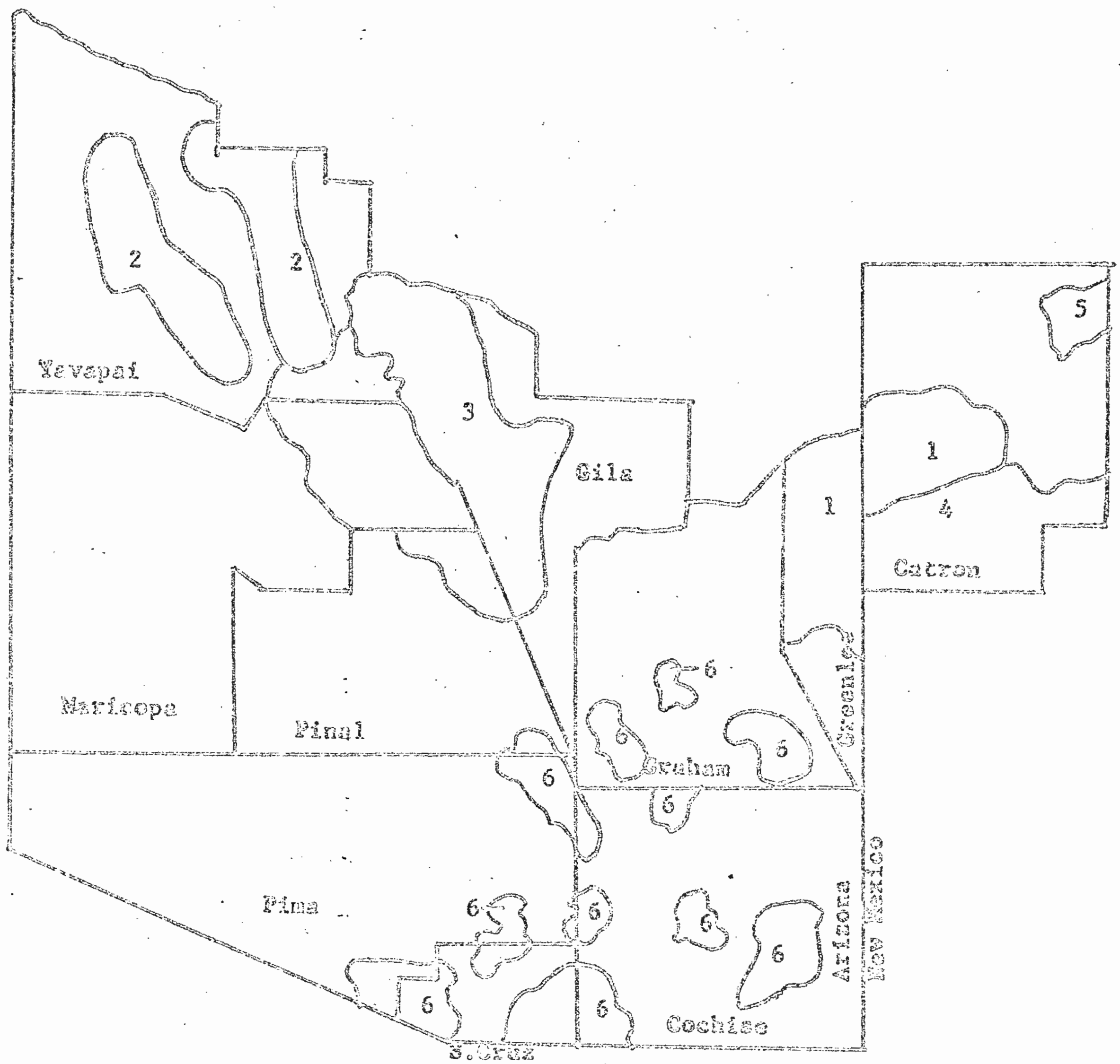

Figure 2

Approximate location of National Forests in Gila Subbasin

(1) Apache National Forest
(2) Prescott National Forest
(3) Tonto National Forest
(4) Gila National Forest
(5) Cibola National Forest
(6) Coronado National Forest

Table 10.- Sawtimber cut in 1960 and annual allowable cut, Gila subbasin

National Forest	Cut 1960 (Board-feet)	Annual allowable cut (Board-feet)
Coronado	2,309,540	4,000,000
Gila	20,462,840	27,300,000
Prescott	1,773,000	3,200,000
Cibola	1,110,000	1/ 0
Tonto	5,424,000	7,800,000
Apache	3,888,360	4,182,000
Total	34,967,740	46,482,000

1/ A severe draught and bark beetle infestation in the 1950's required all timber harvested on salvage basis. No allowable cut is set up and it will be at least 20 years before a small harvest cut will be made.

Information supplied by forest supervisors in each forest.

In addition to sawtimber, it was estimated that ranchers in the subbasin purchased about $7 thousand in poles and posts from the national forest.

The available data from national forests indicate the value of stumpage is approximately 36 percent of the value of timber. The following is an approximate breakdown of allocation of gross value.

	Percent
Stumpage cost	36.2
Felling and bucking	14.9
Skidding	13.9
Loading on trucks	6.0
Unloading and log yard expense	2.0
Load on railroad cars	4.0
Logging general expense	5.0
Logging depreciation	3.0
Profit and other	15.0
	100.0

COEFFICIENTS OF DIRECT AND INDIRECT ACTIVITY

Direct Coefficients

After transactions tables are constructed for a base year it is possible to calculate technical coefficients for industries appearing in the transactions table. These coefficients are calculated for processing sectors only and may be expressed in monetary or physical terms. Of course, values in our input-output tables are expressed in dollars. The calculation of the technical coefficient is simple, and has been explained in the chapter of this report dealing with the I-O model. By way of brief review, after adjusting the sector gross output for inventory depletions, each entry in each industry column is divided by the adjusted gross output for that industry. Thus, we obtain a measure of the increased direct activity in all sectors when output of a given industry increased by one dollar.

Because direct coefficients are calculated for processing sectors on they do not represent total input requirements. Imports and other inputs from the final payments sector may be more or less important, depending on the size of area for which the table is made and other factors. The subbasins of the Colorado River Basin have shown considerable dependance on final payment sectors, particularly imports.

The direct coefficient may also be viewed as a measure of induced economic activity resulting from an increase of one dollar in the gross output of a sector.

Direct interindustry dependance in the subbasin is greatest in the feeder livestock sector and least in the forestry sector. Feeder livestock purchased 68 percent of its input requirements from other producing sectors of the subbasin, 37 percent of which were obtained from the range livestock sector. Only about 5 percent of the inputs to the forestry sector were represented by subbasin interindustry transactions.

Table 11 shows the direct coefficients for all the agricultural and forestry sectors of the Gila subbasin. Of the nonagricultural producing sectors, only food and kindred and lumber and wood have transactions with the agricultural sectors. The food and kindred products sector purchased 35 percent of its inputs from agriculture of which 27 percent was obtained from the feeder livestock and farm dairy sectors. The lumber and wood sector purchased sawlogs from the forestry sector for manufacture.

Direct and Indirect Activity

This coefficient shows the total expansion of output in all industries as a result of the delivery of one dollar's worth of output outside the processing sector (to final demand) by each industry. When output is expanding in industry A, demand for the product of industry B is increased. The indirect effects do not stop here. When B expands its production because of an increase in final demand for the products of industry A, the increased demand will be felt by all other industries in the processing sectors which sell to B. In this way the chain reaction of successive rounds of purchases are reflected.

This calculation is usually obtained through the use of electronic computers which rapidly take the difference between an identity matr x and the input coefficient matrix and from this computing an inverse matrix, ~~an~~

Table 11.- Direct purchases per dollar of output for sectors relating to agriculture and forestry, Gila subbasin, 1960 1/

Sector producing \ Sector purchasing	Range live-stock	Feeder live-stock	Farm dairy	Feed, food & forage	Cotton	Vege-tables	Citrus	All other agricul-ture	Agricul-tural services	Forestry
	Dollars									
Range livestock	-----	.3673	-----	-----	-----	-----	-----	-----	-----	-----
Feeder livestock	-----	-----	-----	.0279	-----	-----	.0169	-----	-----	-----
Farm dairy	-----	-----	.0150	.0126	-----	-----	.0076	-----	-----	-----
Forage, feed and food	.0619	.1978	.4305	-----	-----	-----	-----	.1342	-----	-----
Agricultural services	-----	.0162	-----	.0940	.1717	-----	.3532	.0281	-----	-----
Forestry	.0002	-----	-----	-----	-----	-----	-----	-----	-----	-----
Food and kindred products	.0129	.0462	.0320	-----	-----	-----	.0064	.1916	-----	-----
Chemicals	-----	-----	-----	.0198	.0146	.0564	.0472	.0064	-----	-----
Wholesale trade	.0031	.0068	.0058	.0137	.0167	.0127	.0091	.0345	.0086	.0030
Service stations	.0120	.0019	.0077	.0151	.0119	.0113	.0083	.0044	.0402	.0182
All other retail	.0046	.0258	.0189	.0447	.0548	.0426	.0288	.1338	.0090	.0072
All other services	-----	-----	-----	-----	-----	-----	-----	-----	.0138	-----
Transportation	-----	-----	.0275	.0254	.0095	.1070	-----	.0053	.0730	-----
Electric energy	.0045	.0013	.0060	.0038	.0028	.0029	.0209	.0012	.0070	-----
All other utilities	.0022	.0009	.0012	-----	.0021	-----	-----	.0022	.0259	-----
Rentals and finance	.1111	.0186	.0174	.0257	.0492	.0250	.1281	.0215	.0591	.0212
Total 2/	.2125	.6828	.5620	.2827	.3333	.2579	.6265	.5632	.2366	.0496

1/ Only sector having transactions with agriculture and forestry are shown.
2/ Totals are based on unrounded data.

This expression is the Leontief matrix -- a table of direct and indirect coefficients.

Table 12 s [illegible] the c[illegible] f[illegible] ients for the sectors of the Gila subbasin Data for the nonagricul[illegible] ural sectors are shown to facilitate a comparison with agricultural sectors.

Table 12.- Total of direct and indirect requirements by sector per dollar of delivery to final demand, Gila subbasin, 1960

Sector	Total direct and indirect requirements per dollar to final demand
	Dollars
Range livestock	1.271
Feeder livestock	1.915
Farm dairy	1.792
Forage, feed and food	1.389
Cotton	1.425
Vegetables	1.340
Citrus crops	1.814
Forestry	1.061
All other agriculture	1.635
Agricultural services	1.299
Uranium	1.248
Copper	1.217
All other mining	1.487
Food and kindred products	1.816
Lumber and w od products	1.353
Furniture and fixtures	1.374
Paper and pulp	1.845
Chemi als	1.332
Primary metals	2.084
Printing and publishing	1.205
Fabricated metals	1.179
Textiles and apparel	1.089
Leather and leather goods	1.514
Stone clay and glass	1.571
All other manufacturing	1.257
Wholesale trade	1.365
Service stations	1.323
Eating and drinking	1.682
All other retail trade	1.245
Lodging	1.375
All other services	1.267
Transportation	1.376
Electric energy	1.323
All other utilities	1.177
Contract cor truction	1.688
Rentals and finance	1.412

WATER RESOURCES OF THE GILA SUBBASIN IN 1960

Arid conditions of the Gila subbasin require that virtually all crops produced be grown under irrigation. Water for domestic use and livestock retains the highest priority of use with agriculture ranking next and industry and mining holding third position. Those using water for domestic and industrial purposes are able and generally willing to pay more for water than those who put water to use for agriculture.

In 1960, 95 percent of total water use was applied to agriculture, but municipal and industrial use is increasing rapidly. For example, in 1949 municipal use was estimated at approximately 40,000 acre-feet, by 1957 this use had increased to 120,000 acre-feet and has increased significantly since then.

An analysis of the use of irrigation water among the representative counties in the subbasin indicates that Maricop County accounts for slightly over 50 percent of the total water used for irrigation in the subbasin. The two largest water-using counties, Maricopa and Pinal, account for approximately 80 percent of the demand for irrigation water.

Evapotranspiration use by crops in 1960 was estimated at 3.3 million acre-feet. A farm irrigation efficiency of 65 percent is commonly estimated for the study area. At this efficiency, total water requirements at the farm headgate would be 5.2 million acre-feet.

The 1959 Census of Agriculture reported that in the census year about 1.1 million acre-feet entered conveyance systems from surface sources, of which about 723,000 acre-feet were delivered to farms and an additional 1.2 million acre-feet of ground water entered conveyance systems for delivery by organizations, of which 943,000 acre-feet were delivered to farms. A similar pattern of water distribution was assumed for 1960.

In addition to the flows supplied by irrigation organizations an estimated 3.5 million acre-feet of ground water was pumped at or near farms and represented a source of supply in addition to water delivered by irrigation companies. Table 13 summarizes estimated water requirements by sector at farms for the Gila subbasin for 1960. Table 14 shows sources from which farm requirements were met.

Preliminary to making projections of water availability the amount of underground water pumped in 1960 from about 20 ground water areas was analyzed. Table 15 gives major pumping areas and an estimate of their contribution to total water drawn from the ground during the base year.

Table 13.- Estimated evapotranspiration use and on-farm water requirements by sector, Gila subbasin, 1960

	Evapotranspiration requirements	Total requirement at farm 1/
	- - - - - - - - - Acre-feet	- - - - - - - - -
Feed and food grains and forage	1,706,000	2,624,000
Cotton	1,344,000	2,067,000
Citrus crops	51,000	78,000
Vegetables and melons	71,000	174,000
All other crops	153,000	235,000
Total	3,325,000	5,178 000

1/ Farm irrigation efficiency was estimated at 65% for all sectors except vegetables. Evapotranspiration use by lettuce, the major vegetable crop is only 8.5 inches but other requirements such as crisping during harvest increase total requirements.

Table 14.- Estimated sources of irrigation water used on farms, Gila subbasin, 1960

Items	Acre-feet	Acre-feet	Acre-feet
Requirement at farms			5,178,000
Water ering conveyance sys from surface sources 1/	1,096,000		
Estimat conveyance losses 2/	373,000		
Available from surface sources		723,000	
Ground water entering conveyance systems for delivery by irrigation organizations 1/	1,240,000		
Estimated conveyance loss 3/	298,000		
Ground water delivered by irrigation organizations		942,000	
Supplied by ground water pumped at or near farm 4/		3,513,000	
Total available			5,178,000

1/ Census of Irrigation, 1959. Assumed same quantity for 1960.

2/ Assumed conveyance efficiency of 66 percent.

3/ Assum d shorter conveyance distance for ground water delivered by organizations. Conveyance efficiency 76 percent.

4/ Little or no off-farm conveyance loss.

Table 15.- Estimated volume of water pumped from underground aquifers by major ground water areas, Gila subbasin, 19[illegible]

Area	Acre-feet
Salt River Valley	
East of Agua Fria River	
Queen Creek-Higley-Magma	405,000
Phoenix-Glendale-Tolleson	365,000
Tempe-Mesa-Chandler	513,000
Paradise Valley	67,000
Total East of Agua Fria River	1,350,000
West of Agua Fria River	
Litchfield Park-Beardsley-Marinette	481,000
Liberty-Buckeye-Hassayampa	422,000
Lower Centennial Wash	78,000
Total West of Agua Fria River	981,000
Total Salt River Valley	2,331,000
Lower Santa Cruz	
Eloy Area	273,000
Casa Grande-Florence	316,000
Stanfield-Maricopa	480,000
Other	20,000
Total Lower Santa Cruz	1,089,000
Upper Santa Cruz	197,000
Avra-Marana Area	126,000
Wilcox Valley	
Kansas Settlement	104,000
Stewart Area	68,000
Pearce-Cochise	24,000
Total Wilcox Valley	196,000
San Simon Valley	
Bowie Area	27,000
San Simon	25,000
Rodeo-Cienega	18,000
Total San Simon Valley	70,000
Harquahala Plains	219,000
Douglas Valley	105,000
Duncan Valley	33,000
Safford Area	133,000
Gila Bend	36,000
Other	217,000
TOTAL	4,752,000

* [illegible] continu[illegible]

Arizona State Land Department Annual Report on Ground Water in Arizona Spring 1963 to Spring 1964 Contained estimates of volume of ground water pumped in 1963 for areas appearing in the table. The estimate of ground water pumped in 1960 was distributed to areas by the ratio shown in the 1963 report.

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THE MINING, MANUFACTURING AND ENERGY SECTORS OF THE GILA SUB-BASIN

by

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MINING

Introduction

Mining has been one of the most important economic activities of the Gila Sub-Basin since Territorial days. Even before the Gadsden Purchase in 1853, Spanish camps had been established to mine gold, silver, copper and lead ores. United States citizens, who resided in the Arizona Territory, continued to mine gold and silver only until about 1875, when the establishment of reliable transportation facilities led to interest in the exploitation of non-precious minerals.[1] The most abundant of these ores, and the one receiving the most attention, was copper.

Copper mining has been, and continues to be, one of the major sources of income and employment in the Gila Sub-Basin. "For more than eighty years the copper mines of Arizona have poured a ceaseless stream of metal into the nation's industries."[2] For over fifty years the state of Arizona has ranked as the leading copper producer in the United States, and the greatest share of this output has come from the Gila Sub-Basin. In fact, the record of steady growth in Arizona (and the Gila Sub-Basin) is closely linked with the development of copper mining there.

"All of the Gila Sub-Basin copper mining regions occur within a belt where intense faulting, folding and igneous intrusions have occurred."[3] "Bonanza" or high grade ore mines were predominant

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[1] This and much that follows comes from T. G. Chapman, The Mineral Industries of Arizona - A Brief History of the Development of Arizona's Mineral Resources, Arizona Bureau of Mines, Bulletin No. 169, Tucson, Arizona: University of Arizona Press (1962).

[2] Frank P. Knight and Frank J. Tuck, Mining in Arizona, Its Past - Its Present - Its Future, Arizona Department of Mineral Resources (April 1961), p. 11.

[3] T. G. Chapman, op. cit., p. 6.

from about 1880 to 1910, and such properties as the Old Dominion at Globe, the Copper Queen at Bisbee, and the Clifton-Morenci mines were the major producers. Since 1910, the low grade "porphyries" have been the major copper ores mined.

We have estimated that the total value of Gila Sub-Basin copper production in the first sixty years of the twentieth century exceeds $7.3 billion.[4/] The 1960 reported value of copper production was $387.1 million, which accounted for slightly more than 85 per cent of the value of all sub-basin mining output that year. The role of the copper mining sector as the single most important branch of mining activity in the Gila Sub-Basin is evident. Copper mining alone accounted for over 7 per cent of the $4.2 billion of total gross output of all processing sector industries.

While copper is central in the mining story of the Gila Sub-Basin, other metals -- notably gold, silver, lead and zinc -- have also been important in the historical development of the sub-basin economy. The roles of gold and silver have been mentioned above.

The production of lead was first reported in 1894, and that of zinc in 1905. However, historical records indicate that there was some production of both metals prior to those years. The value of sub-basin lead production in 1960 was $2.1 million, $1.6 million of which came from Yavapai County, Arizona. Zinc production in 1960 was was worth $12.2 million, 83 per cent of it coming from two counties -- Yavapai County, Arizona and Grant County, New Mexico. These two metals, as well as molybdenum, are most frequently produced in conjunction with the mining of copper ores.

Some additional metals, such as manganese, tungsten, mercury, and "rare metals," (exclusive of gold and silver) have been, or are currently being mined in the Gila Sub-Basin.

Non-metallic mineral output includes asbestos, lime, clays, sand, gravel, stone, mica, perlite, pumice, gemstones, barite, feldspar, gypsum, and several others. The Gila Sub-Basin reported

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[4/] See Table G-1 of this report.

no production of mineral fuels (coal, crude petroleum, or natural gas) in 1960.

There have been commercial uranium operations in the sub-basin since as early as 1956, and these operations are classified as metal mining. The value of uranium output is a small percentage of the state's total output, and production data for the counties of the Gila Sub-Basin are not available. The total gross output in the transactions table was derived by a fairly simple ratio method and a process of elimination from more aggregated data.

The total value of mineral production in the Gila Sub-Basin in 1960 was $447 million, almost 24 percent of which came from one county -- Pinal County, Arizona. The total gross output of all mining activities in 1960, as shown in the Gila Sub-Basin table of transactions, was $376.9 million, more than 9 percent of the aggregate total gross output of all processing sector industries in the Gila. The $70 million discrepancy between the value of mineral production reported by the Minerals Yearbook (Table G-1) and the combined gross output of three mining sectors of the Gila transactions table reflects the inclusion of the value of anode copper in the first case. In the Gila I-O table, anode copper is considered to be part of the output of the primary metals industry.

Wage and salary payments to persons employed in the mining industry amounted to $109.8 million, and the 16,940 persons employed received an average annual wage of $6,482.[5/] The sub-basin's mining industries employed slightly over 7 percent of all persons employed.

The total values of mineral production in the sub-basin's Arizona counties in 1960, by county, were as follows: Cochise County -- $44,255,697; Gila -- $47,186,532; Graham -- $150,596; Greenlee -- $70,413,650; Maricopa -- $6,384,838; Pima -- $98,271,821; Pinal -- $106,722,094; Santa Cruz -- $816,087; and Yavapai -- $26,710,885.[6/] Catron County, New Mexico produced $38,422 in 1960, and New Mexico's Grant County produced $46,093,287.

[5/] Employment and wage data are from unpublished records of the State of Arizona and State of New Mexico Employment Security Commissions.

[6/] 1960 Minerals Yearbook, Volume III, Area Reports, U.S. Department of the Interior, Bureau of Mines, Washington, D.C.: U.S. Government Printing Office (1961), p. 16.

Uranium

Historical review -- Uranium mining is not a major part of total mining activity in the Gila Sub-Basin. While all Arizona counties in the Gila have deposits of uranium ore, only a few have been opened to commercial exploitation. In 1957, uranium ore production was reported in several of the Arizona counties in the sub-basin -- Gila, Maricopa, Pima, Santa Cruz and Yavapai. By 1960, however, only three sub-basin Arizona counties were producing -- Cochise, Gila and Yavapai. Neither of the New Mexico counties in the sub-basin have a record of uranium production.

Interindustry relations -- The 1960 total gross output of uranium in the Gila was $563,000 (slightly more than one-tenth of one per cent of all mining total gross outputs), and the entire amount was exported to other sub-basins of the Colorado River Basin since there were no uranium processing mills located in the Gila.

Uranium inputs -- The extent of the uranium industry's dependence upon other processing sector industries for its inputs is modest. Only 17 per cent of total gross outlays -- $97,000 -- were purchased from within the processing sector in 1960, and the largest of these was $31,000 of electric energy, followed by $18,000 of stone, clay and glass products and $17,000 of contract construction purchases. Inputs from the remaining processing sectors were less than $7,000 each. The largest single outlay to an autonomous sector was $185,000 in wages and salaries to resident sub-basin employees. Imports from outside the Colorado River Basin amounted to $104,000. Federal, state and local tax liabilities were $66,000, and depletion allowances and depreciation together accounted for $65,000.

Direct and indirect effects of the uranium industry on the sub-basin economy -- Uranium mining in the Gila Sub-Basin is neither the strongest nor the weakest case of interdependence within the mining sector. On the one hand, there is greater interdependence between uranium mining and other sectors of the sub-basin economy than is true in the much larger copper mining industry, but there is less interdependence than is found in "all other mining." Each time the uranium industry adds $1.00 to deliveries outside the processing sector, total sales within the processing sector go up $1.25. Uranium mining in the Gila Sub-Basin is rather unusual in that there are no intraindustry transactions. And only eight other industries in the processing sector are affected to any significant extent by changes in the final demand for the output of uranium mines.

The largest interindustry effect involves the electric energy industry. For each additional dollar of uranium sales to final demand, the output of the electric utilities increases $.07. Two other sectors -- contract construction and stone, clay and glass -- add $.04 to sales when uranium deliveries to final demand go up $1.00. Payments to rentals and finance increase $.02. The remaining gains of $.01 each are in the lumber and wood products industry, the retail, and services and utilities sectors.

Water inputs --

Since the number of mines is small and total output is barely one-half million dollars, it is doubtful that water inputs are significant enough to merit further investigation. Gilkey and Beckman make the following statement about the one uranium mine they investigated: "This mine, like other uranium mines in the state, uses relatively small amounts of water . . (and) requires four gallons per minute of new water."[7/] No gallon/ton water use figures could be calculated from the data presented by the authors but it is of a very low order of magnitude. There are no uranium mills in the Gila, and it is not anticipated that mills will be located there in the near future since the output of uranium ores is small and is not expected to increase.

Copper

Historical review -- Copper mining was the mainstay of the Gila Sub-Basin economy well before the turn of the present century, and

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[7/] M. M. Gilkey and Robert T. Beckman, Water Requirements and Uses in Arizona Mineral Industries, U. S. Department of the Interior, Bureau of Mines, Washington, D. C.: U. S. Government Printing Office, (1963), p. 56.

it has had a substantial and far reaching effect on the growth and development of the region. While copper production in the Gila was known to have occurred in the Spanish period (primarily the sixteenth century), it was not until the early 1870's that the major discoveries of copper ores were made. Many Arizona mining camps were established during this decade that are still yielding great mineral wealth. Among the mines are the Globe-Miami, Silver King, Superior, Bisbee, Tombstone and Clifton-Morenci.

Exploitation of these deposits proceeded at a rapid rate, stimulated by improvement in transportation facilities with the coming of railroads. Production increased quickly, and by 1904 the Gila accounted for over 24 per cent of total U. S. copper tonnage.[8/] Output reached a level of almost 430,000 tons by 1918, but there was a postwar slump and by 1921 there had been a 77 per cent decline to 100,000 tons.

Production recovered after 1921, and by 1926 the previous peaks had almost been reached. By 1929, the output level was almost 460,000 tons. But during the next four years there was another tremendous drop to slightly less than 70,000 tons -- an 85 per cent decline from the 1929 peak.

It should be noted that copper production has varied almost directly with major price changes. Copper anodes (the pure copper refined from copper ores) are a homogeneous product which has been sold on a relatively free world market. While minor price fluctuations have had little effect on production, major price changes have always caused a rapid expansion or contraction of mining activity. Both the rapid declines in production described above were preceded by significant declines (between \$.02 and \$.03 per lb.) in the price of finished copper. With copper presently selling at prices between \$.31 and \$.32 per lb., it is evident that price decreases of this amount would cause copper producers to sell out of

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[8/] See Table G-1. Complete sub-basin production figures prior to 1904 could not be obtained.

TABLE G-1

VALUE AND TONNAGE OF GILA SUB-BASIN AND TOTAL U. S. COPPER PRODUCTION, 1874-1960
(value in current dollars)

	Gila Total		Arizona Sub-Basin Counties		New Mexico Sub-Basin Counties					
	Short tons	Value (dollars)	Short tons	Value (dollars)	Short tons	Value (dollars)	Total U.S. production (short tons)	Gila as per cent of U.S. tonnage	Total U.S. value (thousands of dollars)	Gila as per cent U.S. valu
1960	603,160	$387,136,689	538,356	$345,624,712	64,660	$41,511,977	1,080,169	55.8%	$693,468	55.8%
1959	468,522	287,672,447	430,101	264,081,984	38,421[a]	23,590,463	824,846	56.8	506,455	56.8
1958	540,871	284,481,887	485,766	255,512,253	55,075	28,969,634	979,329	55.2	515,127	55.2
1957	581,160	349,860,059	515,782	310,502,744	65,378	39,357,315	1,086,859	53.5	654,289	53.5
1956	571,729	490,224,197	500,501	429,680,567	71,228	60,543,630	1,104,156	51.8	938,532	52.2
1955	517,971	386,447,396	453,879	338,634,764	64,092	47,812,632	998,570	51.9	744,933	51.9
1954	436,051	257,270,090	377,867	222,941,530	58,184	34,328,560	835,468	52.2	492,927	52.2
1953	463,119	265,824,566	393,248	225,718,612	69,871	40,105,954	926,448	50.0	531,781	50.0
1952	469,306	227,144,104	395,262	191,306,808	74,044	35,837,296	925,359	50.7	447,874	50.7
1951	486,957	235,687,188	415,369	201,038,596	71,588	34,648,592	928,329	52.5	449,311	52.5
1950	466,151	194,127,835	402,448	167,627,387	63,703	26,500,448	909,337	51.3	378,284	51.3
1949	412,050	162,346,109	358,761	141,350,243	53,289	20,995,866	752,746	54.7	296,582	54.7
1948	447,285	194,179,564	374,465	162,575,684	72,820	31,603,880	834,797	53.6	362,302	53.6
1947	424,107	178,124,499	365,872	153,665,904	58,235	24,458,595	862,872	49.2	360,860	49.4
1946	337,595	109,381,428	288,741	93,552,894	48,854	15,828,534	599,656	56.3	172,701	63.3
1945	341,535	92,323,586	286,213	77,386,646	55,322	14,936,940	782,726	43.6	184,723	50.0
1944	327,224	114,332,445	260,317	96,267,420	66,907[a]	18,065,025	1,003,379	32.6	236,797	48.3
1943	475,566	123,619,536	402,696	104,673,310	72,870[a]	18,946,226	1,092,939	43.5	257,934	47.9
1942	469,468	113,612,164	393,054	95,118,681	76,414[a]	18,493,483	1,087,991	43.1	256,766	44.3
1941	395,009	93,221,900	326,102	76,959,777	68,907[a]	16,262,123	966,072	40.9	227,993	40.9
1940	345,931	78,180,146	280,906	63,484,304	65,025[a]	14,695,842	909,084	38.1	205,453	38.1
1939	304,294	$ 63,257,402	261,930	$ 54,445,596	42,364[a]	$ 8,811,806	712,675	42.7%	$148,236	42.7%

TABLE G-1 (cont.)

	Gila Total		Arizona Sub-Basin Counties		New Mexico Sub-Basin Counties					
	Short tons	Value (dollars)	Short tons	Value (dollars)	Short tons	Value (dollars)	Total U.S. production (short tons)	Gila as per cent of U.S. tonnage	Total U.S. value (thousands of dollars)	Gila as per cent U.S. value
1938	304,172	$ 72,846,172	287,591	$ 69,596,306	16,581[a]	$ 3,249,866	562,328	54.1%	$110,216	66.1%
1937	240,674	45,995,705	211,163	38,854,067	29,511	7,141,638	834,161	28.9	201,993	22.8
1936	271,996	39,263,957	269,767	38,853,977	2,229	409,980	611,410	44.5	112,499	34.9
1935	140,548	23,331,086	138,974	23,069,719	1,574[a]	261,367	381,294	36.9	63,295	36.9
1934	99,929	15,988,682	89,014	14,242,210	10,915	1,746,472	244,227	40.9	39,076	40.9
1933	69,595	8,908,031	57,013	7,297,599	12,582	1,610,432	225,000	30.9	28,800	30.9
1932	104,505	13,167,550	91,241	11,496,286	13,264[a]	1,671,264	272,005	38.4	34,273	38.4
1931	228,819	41,645,260	200,655	36,519,312	28,164[a]	5,125,948	521,356	43.9	94,887	43.9
1930	316,439	82,274,431	287,636	74,785,521	28,803	7,488,910	697,200	45.4	181,271	45.4
1929	459,310	161,676,569	415,033	146,091,166	44,277	15,585,403	1,001,432	45.9	352,504	45.9
1928	406,640	117,112,298	366,065	105,426,973	40,575	11,685,325	912,950	44.5	262,930	44.5
1927	374,579	98,139,421	340,960	89,331,259	33,619	8,808,162	842,020	44.5	220,609	44.5
1926	399,539	111,871,345	361,572	101,240,585	37,967	10,630,760	869,811	45.9	243,547	45.9
1925	391,979	111,322,065	356,625	101,281,557	35,354	10,040,508	837,435	46.8	237,832	46.8
1924	373,524	97,863,474	338,775	88,759,225	34,749	9,104,249	817,125	45.7	214,087	45.7
1923	334,553	108,358,955	306,140	100,005,546	28,413	8,353,409	717,500	46.6	210,945	51.4
1922	212,357	56,336,490	198,138	52,497,239	14,219	3,839,251	475,143	44.7	128,289	43.9
1921	99,232	25,602,330	92,415	23,843,471	6,817	1,758,859	252,793	39.3	65,211	39.3
1920	307,416	111,432,644	281,908	102,045,725	25,508	9,386,919	604,531	50.9	222,467	50.1
1919	313,465	109,168,437	288,427	99,854,318	25,038	9,314,119	643,210	48.7	239,274	45.6
1918	429,441	212,143,769	380,971	188,199,742	48,470	23,944,027	954,267	45.0	471,408	45.0
1917	404,360	218,780,124	353,673	193,105,120	50,687	25,675,004	943,060	42.9	514,911	42.5
1916	401,989	197,735,485	358,007	176,140,487	43,982	21,594,998	963,925	41.7	474,288	41.7
1915	264,217	92,650,697	227,973	79,965,437	36,244	12,685,260	694,005	38.1	242,902	38.1
1914	225,188	59,900,115	196,058	52,151,653	29,130	7,748,462	575,069	39.2	152,968	39.2
1913	229,909	71,272,011	203,191	62,989,404	26,718	8,282,607	612,242	37.6	189,795	37.6
1912	198,421	$ 65,479,104	181,945	$ 60,042,002	16,476	$ 5,437,102	621,634	31.9%	$205,139	31.9%

TABLE G-1 (cont.)

	Gila Total		Arizona Sub-Basin Counties		New Mexico Sub-Basin Counties					
	Short tons	Value (dollars)	Short tons	Value (dollars)	Short tons	Value (dollars)	Total U.S. production (short tons)	Gila as per cent of U.S. tonnage	Total U.S. value (thousands of dollars)	Gila a per cent U.S. val
1911	154,691	$38,673,203	152,732	$38,183,337	1,959	$ 489,866	548,616	28.2%	$137,154	28.2%
1910	150,469	38,219,231	148,267	37,659,873	2,202	559,358	540,080	27.9	137,180	27.9
1909	154,306	40,119,971	151,718	39,447,015	2,588	672,956	546,476	28.2	142,084	28.2
1908	145,334	38,368,254	142,713	37,676,209	2,621	692,045	471,285	30.8	124,419	30.8
1907	130,891	52,356,777	126,868	50,747,514	4,023	1,609,263	434,498	30.1	173,799	30.1
1906	136,321	52,620,573	133,127	51,387,529	3,194	1,233,044	458,903	29.7	177,596	29.6
1905	116,835	36,453,948	114,194	35,628,517	2,641	825,431	450,954	25.9	139,796	26.1
1904	101,787	$25,468,153	99,573	24,893,077	2,214	$ 575,076	406,269	25.1%	105,630	24.1%
1903		d/	73,974 b/	20,416,821 b/		e/	349,022		91,506	
1902			59,972	14,633,283			329,754		76,569	
1901			65,389	21,840,028			301,036		87,301	
1900			59,159	19,640,749			303,059		98,494	
1899			66,527	22,752,381			284,333		101,222	
1898			55,579	13,783,622			263,256		61,826	
1897			40,765	9,783,688			247,039		54,080	
1896			36,467	7,876,972			230,031		49,457	
1895			23,977	4,795,355			192,957		38,012	
1894			22,257	4,228,915			182,433		33,141	
1893			21,951	4,741,505			169,893		32,055	
1892			19,218	4,458,587			176,486		37,977	
1891			19,937	5,103,780			147,906		38,455	
1890			17,398	5,428,283			132,558		30,849	
1889			15,793	4,264,135			115,623		26,908	
1888			15,990	5,341,946			115,635		33,834	
1887			8,860	2,445,424			92,614		21,116	
1886			7,829	1,737,928			80,618		16,528	
1885			11,353	$ 2,452,287			85,481		$ 18,293	

TABLE G-1 (cont.)

	Gila Total		Arizona Sub-Basin Counties		New Mexico Sub-Basin Counties		Total U.S. production (short tons)	Gila as per cent of U.S. tonnage	Total U.S. value (thousands of dollars)	Gila a per cent U.S. val
	Short tons	Value (dollars)	Short tons	Value (dollars)	Short tons	Value (dollars)				
1884		d/	13,367	$3,475,465		e/	72,611		$17,790	
1883			11,937	3,939,369			58,576		18,065	
1882			8,992	3,435,023			45,823		16,038	
1881			5,000c/	1,820,000c/			35,840		12,176	
1880			1,000	428,000			30,240		$11,491	
1879			875	325,500						
1878			750	249,000						
1877			625	237,500						
1876			500	210,000						
1875			450	204,300						
1874			400	$ 90,000						

a/Less than one ton produced in other counties, value included.

b/Arizona data prior to 1903 are for entire state.

c/Arizona data prior to 1882 are estimated data taken from Arizona Metal Production.

d/Sub-Basin totals from 1874 to 1904 not available due to data problems as in footnotes b/ and c/ above.

e/New Mexico counties data not available prior to 1904.

SOURCES: Minerals Yearbook, Annuals, 1883-1961, U. S. Department of the Interior, Bureau of Mines, Washington, D.C.: U. S. Government Printing Office.

Arizona Metal Production, M. J. Elsing and R. E. S. Heineman, Arizona Bureau of Mines, Economic Series No. 19, Bulletin No. 140, Tucson, Arizona: University of Arizona (1936), pp. 14-17.

inventory rather than current production. Thus, production always takes a more severe dip than a price cut might appear to warrant when there are available inventories, and this is the usual inventory condition in the copper industry.

Chart G-2 shows a trend line of production since the early 1900's.[9/] Dips in production are always followed by a rather rapid recovery to levels near previous peaks. This is due to the virtual depletion of inventories before production is resumed after the initial price drop.

Production recovered quickly from the 1933 lows, and by 1936 had reached a level of slightly more than 270,000 tons. The war years of 1941 through 1945 saw copper production reach a new peak -- almost 476,000 tons in 1943. In the early postwar years production dipped slightly but it had exceeded the 1943 peak by 1951. Since that time, with intermittent dips due primarily to labor problems, production has climbed steadily, and in 1960, 603,000 tons of copper worth $387 million were mined in the Gila. The value of sub-basin copper production since 1904 is pictured in Chart G-4. Additional charts (G-3 and G-5) show the production figures in tons and dollars, respectively, for the counties, by state, of the Gila Sub-Basin.

Of particular interest is the role of Gila copper production in the U. S. output of copper ores. Chart G-6 is a belt diagram showing Gila Sub-Basin production of copper ores as a per cent of total U. S. production for 1904 through 1960 inclusive. By 1905, Gila production was almost 26 per cent of the U. S. total, and it reached a level of slightly over 50 per cent by 1920. In the three decades from 1920 to 1950, Gila production varied between 30 and 50 per cent of the U. S. total, but from 1950 to the present it has not fallen below 50 per cent. In 1960, almost 56 per cent of all U. S. copper ores mined came from the Gila Sub-Basin. Not only does

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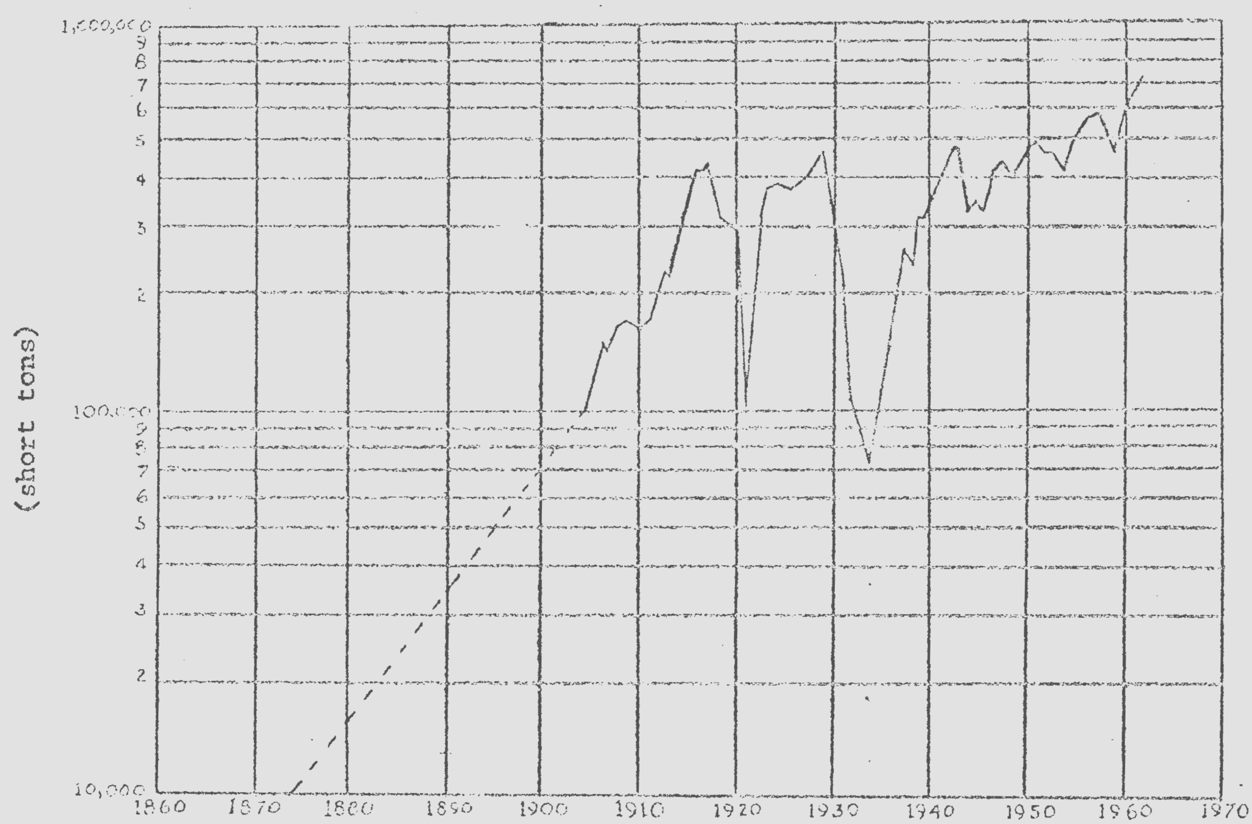
[9/] The period from 1874-1903 has been estimated by backward extrapolation for the sub-basin total, even though data for some Arizona counties go back as far as 1874 on Table G-1.

CHART G-2

GILA SUB-BASIN COPPER PRODUCTION, 1874-1962
(short tons)

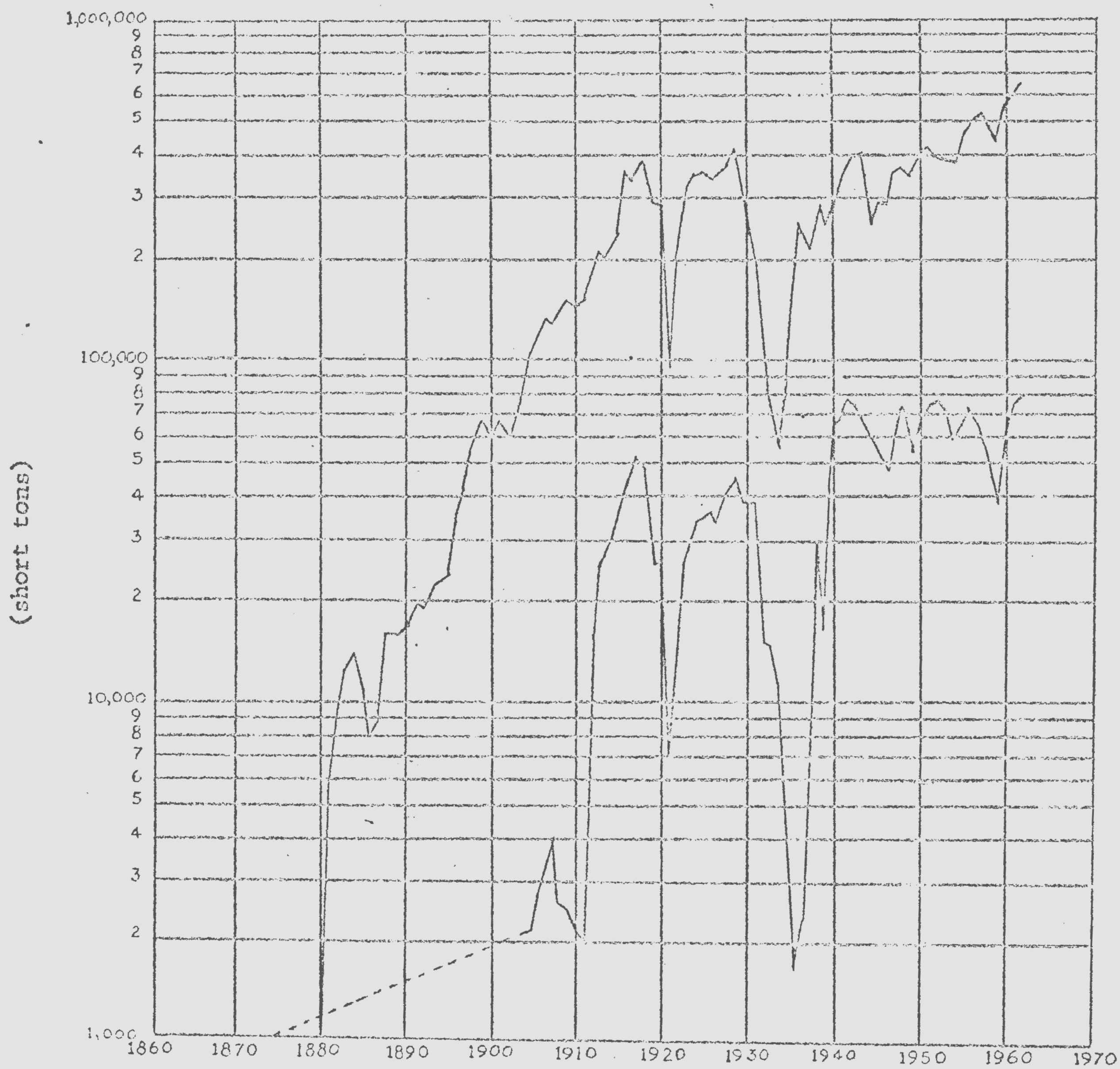


SOURCES: Minerals Yearbook, Annuals, 1883-1961, U. S. Department of the Interior, Bureau of Mines, Washington, D.C.: U. S. Government Printing Office.

Arizona Metal Production, M. J. Elsing and R. E. S. Heineman, Arizona Bureau of Mines, Economic Series No. 19, Bulletin No. 140, Tucson, Arizona: University of Arizona (1936), pp. 14-17.

CHART G-3

COPPER PRODUCTION IN THE ARIZONA AND NEW MEXICO COUNTIES
OF THE GILA SUB-BASIN, 1874-1962
(short tons)

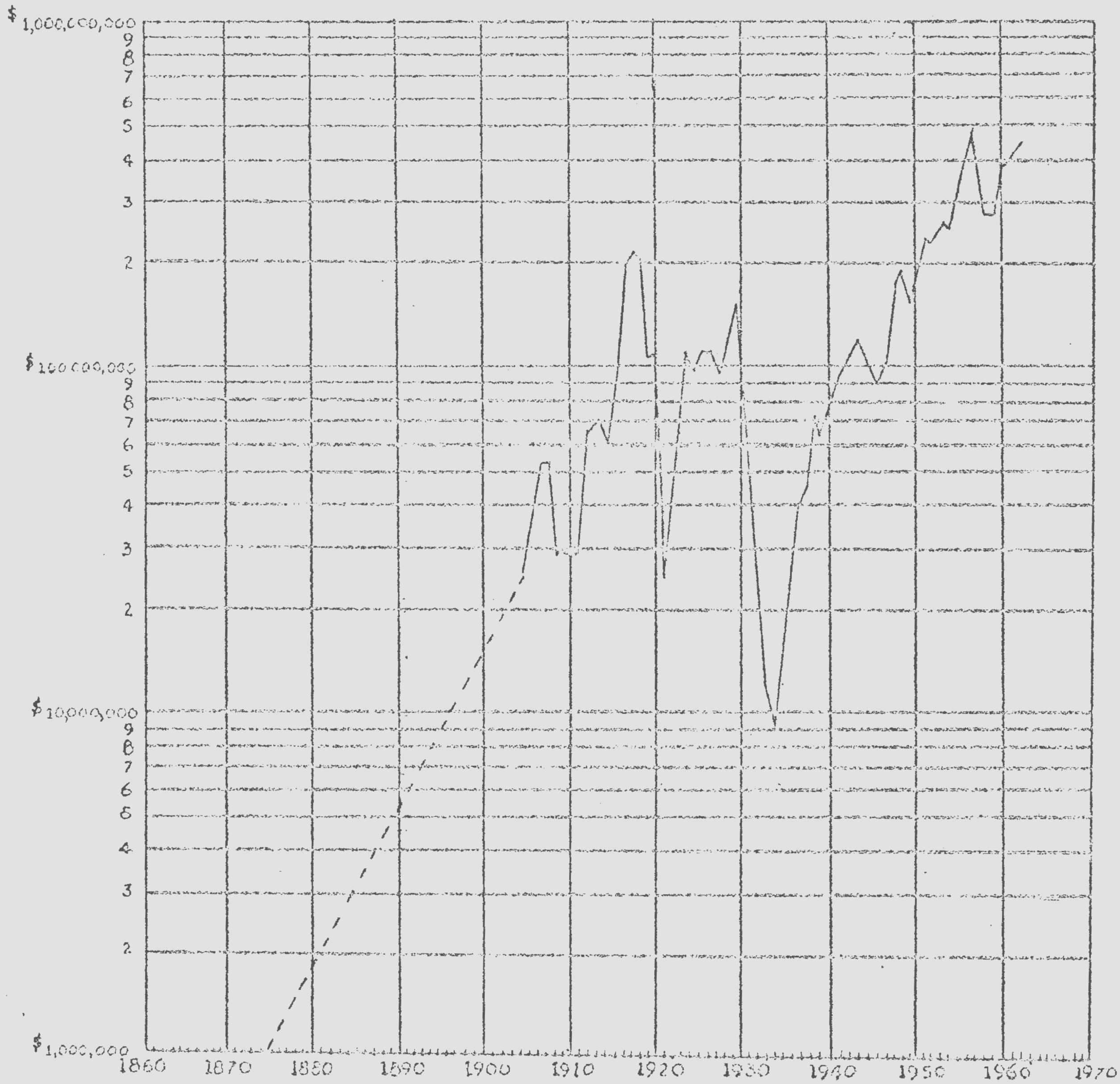


SOURCES: Minerals Yearbook, Annuals, 1883-1961, U. S. Department of the Interior, Bureau of Mines, Washington, D.C.: U. S. Government Printing Office.

Arizona Metal Production, M. J. Elsing and R. E. S. Heineman, Arizona Bureau of Mines, Economic Series No. 19, Bulletin No. 140, Tucson, Arizona: University of Arizona (1936), pp. 14-17.

CHART G-4

VALUE OF GILA SUB-BASIN COPPER PRODUCTION, 1874-1962
(current dollars)

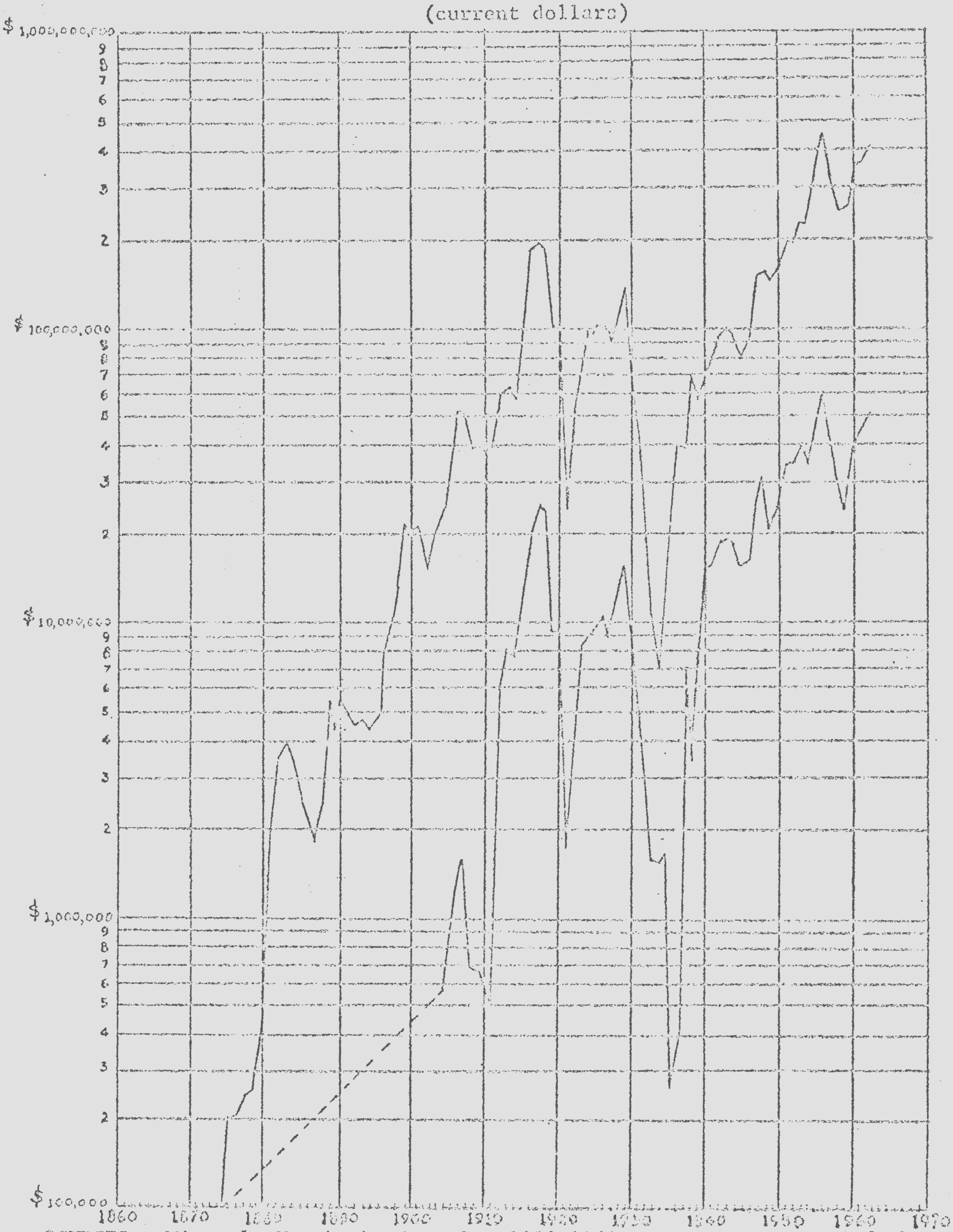


SOURCES: Minerals Yearbook, Annuals, 1883-1961, U. S. Department of the Interior, Bureau of Mines, Washington, D.C.: U. S. Government Printing Office.

Arizona Metal Production, M. J. Elsing and R. E. S. Heineman, Arizona Bureau of Mines, Economic Series No. 19, Bulletin No. 140, Tucson, Arizona: University of Arizona (1936), pp. 14-17.

CHART G-5

VALUE OF COPPER PRODUCTION IN THE ARIZONA AND NEW MEXICO COUNTIES OF THE GILA SUB-BASIN, 1874-1962
(current dollars)

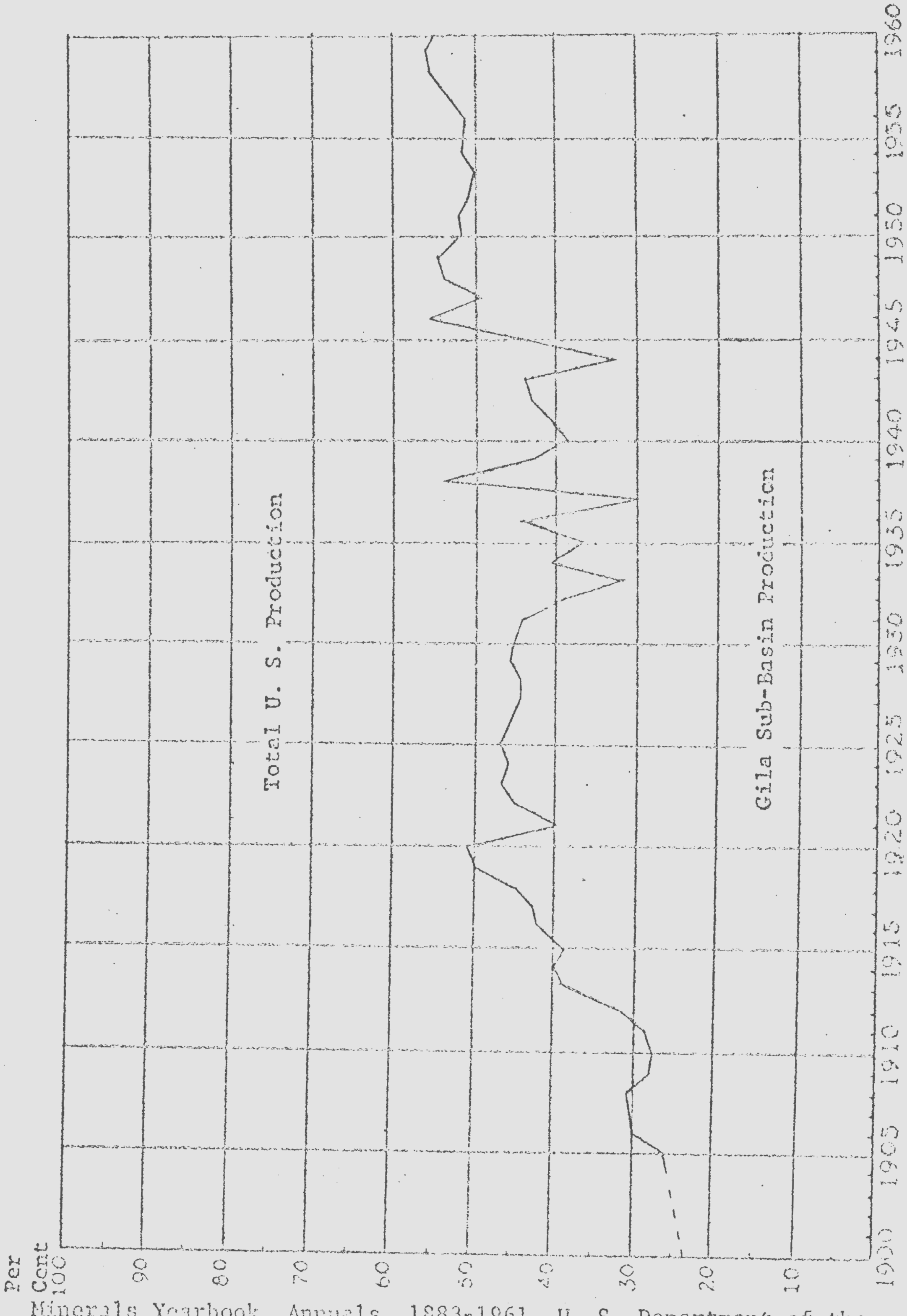


SOURCES: Minerals Yearbook, Annuals, 1883-1961, U. S. Department of the Interior, Bureau of Mines, Washington, D.C.: U. S. Government Printing Office.

Arizona Metal Production, M. J. Elsing and R. E. S. Heineman, Arizona Bureau of Mines, Economic Series No. 19, Bulletin No. 140, Tucson, Arizona: University of Arizona (1936), pp. 14-17.

CHART G-6

GILA SUB-BASIN COPPER PRODUCTION AS A PERCENTAGE OF TOTAL U. S. PRODUCTION, 1900-1960
(short tons)



SOURCES: Minerals Yearbook, Annuals, 1883-1961, U. S. Department of the Interior, Bureau of Mines, Washington, D.C.: U. S. Government Printing Office.

Arizona Metal Production, M. J. Elsing and R. E. S. Heineman, Arizona Bureau of Mines, Economic Series No. 19, Bulletin No. 140, Tucson, Arizona: University of Arizona (1936), pp. 14-17.

copper mining provide a major source of income and employment for sub-basin residents, it also represents a major proportion of national production. The two other western copper mining complexes -- one in Utah and the other in Montana -- account for almost all of the remaining production of U. S. copper ore. The major Arizona copper mines in 1960, classified as both open pit and underground mines, are shown in Table G-7. All of them lie entirely within the Gila Sub-Basin.

Interindustry relations -- Aside from inventory accumulation of \$2,568,000, and intraindustry transactions of \$5.5 million, the entire output of the copper mining industry (\$308,838,000) went to the sub-basin primary metals industry. After the copper ores are extracted they are concentrated, generally by a flotation process: "The concentrate, so obtained, is further treated by smelting and refining methods, resulting in the production of essentially pure copper and the recovery of gold and silver and other economic compounds present in such ores."[10]

Copper inputs -- The largest single input to the copper industry from another processing sector in 1960 was \$8,314,000 of transportation services. Four million dollars of chemicals purchases were primarily explosives used in the mining operations. Several other large interindustry purchases were made: other utilities -- \$5,621,000; electric energy -- \$4,185,000; "all other services" -- \$4,051,000; and contract construction -- \$3,017,000. Inputs from no other processing sector exceeded \$2,400,000.

The autonomous sectors contributed \$260,328 million of inputs, 84 per cent of total gross outlays, in 1960. The largest was wage and salary payments (\$93,100,000) followed by imports (\$74,366,000). Additional household payments of \$8,400,000 were made through the "profits and other" income sector. These three purchases accounted for over 68 per cent of purchases from all autonomous sectors. Total

[10] T. G. Chapman, *op. cit.*, p. 8.

TABLE G-7

MAJOR ARIZONA COPPER MINES, 1960

Open Pit

Mine	County	Operator	Cumulative tons ore mined through 1960
Morenci	Greenlee	Phelps Dodge Corp.	14,499,800
New Cornelia	Pima	Phelps Dodge Corp.	9,065,600
Ray	Pinal	Kennecott Copper Corp.	6,526,814
Inspiration	Gila	Inspiration Cons. Copper Co.	5,314,770
Esperanza	Pima	Duval Sulphur & Potash Co.	4,245,762
Lavender Pit	Cochise	Phelps Dodge Corp.	4,248,400
Copper Cities	Gila	Miami Copper Co.	3,058,372
Silver Bell	Pima	Amer. Smelting & Refining Co.	2,718,700
Bagdad	Yavapai	Bagdad Copper Corp.	1,828,055
Pima	Pima	Pima Mining Co.	1,327,473
		Total Tonnage	52,833,746

Underground

Mine	County	Operator	Cumulative tons ore mined through 1960
San Manuel	Pinal	San Manuel Mining Co.	12,261,220
Magma	Pinal	Magma Copper Co.	386,636
Copper Queen	Cochise	Phelps Dodge Corp.	509,700
Mineral Hill & Daisy	Pima	Banner Mining Co.	48,872
Miami	Gila	Miami Copper Co.	a/
		Total Tonnage	13,206,428

a/ Underground mining discontinued June 26, 1959.

SOURCE: Frank P. Knight and Frank J. Tuck, Mining in Arizona, Its Past - Its Present - Its Future, Arizona Department of Mineral Resources (April 1961), p. 16.

tax liability amounted to nearly $45 million, and depletion allowances on current production (as well as depreciation expense) was $32,057,000.

Direct and indirect effects of the copper industry on the sub-basin economy -- The copper mining industry, despite its importance in the Arizona economy, represents the weakest case of interdependence of the three mining sectors in the Gila Sub-Basin. Copper mining derives relatively few inputs from other industries in the processing sector. Intraindustry transactions are relatively small. Each time copper deliveries to final demand are increased by $1.00, intraindustry transactions go up about $.02. The largest interindustry transaction involves transportation. When copper sales to final demand are increased $1.00, the transportation industry sells an additional $.03 worth of its services to other firms. Electric energy, "all other services" and "all other utilities" add about $.02 to sales when copper output is expanded. The "chemicals" sector, and contract construction, also benefit to the extent of additional sales of $.01 for each additional $1.00 delivery of copper to final demand. The sum of all interindustry transactions is relatively small at $1.22

Water inputs -- The sub-basin copper industry is a major consumer of water, both for processing and domestic purposes. It has been estimated that new water intake in 1960 was nearly 23.1 billion gallons, most of which was used in the flotation concentrating process.[11/] Water needs in the mining operations are small, and the flotation concentrating process accounts for over 96 per cent of total intake water.

Tables G-8 and G-9 give some idea of the magnitude and patterns of water use in the sub-basin copper industry. The data in Table G-8

[11/] For a comprehensive study of water input requirements of the copper industry in Arizona, see M. M. Gilkey and Robert T. Beckman, op. cit., pp. 12-50. The following discussion depends heavily on this source.

TABLE G-8

AVERAGE AMOUNTS OF WATER REQUIRED AND CONSUMED IN PRODUCING COPPER IN ARIZONA, 1960[a]

Process		Total intake		Consumption	
		Gallons per pound of copper	Per cent	Gallons per pound of copper	Per cent
"A"	Mining	1.1[b]	1.9%	1.0[b]	11.1%
	Flotation concentrating	56.0[c]	96.2	7.5[c]	83.3
	Smelting	1.1[d]	1.9	.5[d]	5.6
	Total	58.2	100.0%	9.0	100.0%
"B"	Leaching	29.7	96.4%	15.1	96.8%
	Smelting	1.1[d]	3.6	.5[d]	3.2
	Total	30.8	100.0%	15.6	100.0%

[a] Excludes water required for powerplants, and for domestic and miscellaneous purposes.

[b] Based on average grade of ore mined.

[c] Based on average grade of feed at concentrators.

[d] Based on smelter output.

SOURCE: M. M. Gilkey and Robert T. Beckman, Water Requirements and Uses in Arizona Mineral Industries, U. S. Department of the Interior, Bureau of Mines, Washington, D.C.: U. S. Government Printing Office (1963), p. 14.

TABLE G-9

WATER BALANCE, COPPER INDUSTRY OF ARIZONA, 1960[a]

	Subtotal, gpm[b]	Total, gpm[b]	Million gpy[c]
Total new water in	-	47,513	23,098
Evaporation	29,073	-	13,562
Seepage	17,405	-	9,032
Discharge to stream	1,035	-	504
Total water out	-	47,513	23,098
Recirculated	325,903	-	158,624[d]
Transferred	4,979	-	2,423

[a] Covers all users of appreciable quantities of water and includes all operational and domestic uses.

[b] Operating rates.

[c] Adjusted to number of working days per year at individual operations.

[d] Includes approximately 120 billion gallons of water recirculated at powerplants.

SOURCE: M. M. Gilkey and Robert T. Beckman, Water Requirements and Uses in Arizona Mineral Industries, U. S. Department of the Interior, Bureau of Mines, Washington, D.C.: U. S. Government Printing Office (1963), p. 14.

show the heavy dependence of the flotation concentrating process upon water, and the relatively small water needs in the mining and smelting of the concentrated ores into copper anodes. Table G-8 shows that the mining-flotation-smelting process uses about twice as much intake water than the leeching-smelting method, but consumes only slightly more than half as much per pound of copper produced. Thus, while one method requires greater intake, the other method consumes a higher proportion of its total intake. Total water figures in gallons per minute and million gallons per year for the Arizona copper industry are listed in Table G-9. The data in the two water tables are aggregated from the operating data collected from 22 copper mining and smelting operations in Arizona in 1960. Most of these were located in the Gila Sub-Basin.

The Gilkey-Beckman data are quite comprehensive. In 1960, the total water intake of this industry (including smelting) was approximately 42,703 gallons per ton of copper ore mined.

"All Other Mining"

Historical review.-- There were several other extractive industries operating in the Gila Sub-Basin in 1960, producing sand and gravel, stone, pumice, coal, gemstones, molybdenum, asbestos, lime, mercury, mica, clays, manganese ore and concentrate, manganiferous ore and concentrate, cement, gypsum, pyrites, perlite, beryllium concentrate, silver, gold, lead and zinc. The 1960 Minerals Yearbook reports the aggregate value of output of those minerals to be $59.9 million, and as a group comprised almost 15.5 per cent of the $387 million total mining output in the sub-basin. The Arizona counties in the sub-basin provided the greatest share.

Metallic minerals have been the most important historically, and they represent the greatest share of the 1960 output of this sector. Most important in value was zinc production, followed by gold, silver and lead. These four metals are generally by-products of the copper ores mined in the sub-basin, and therefore have a production history in recent times which parallels that of copper ores. The value of sand and gravel production was also a significant portion of the total value of the "all other mining" sector.

Prior to 1951, the U. S. Bureau of Mines Minerals Yearbook did not include its Area Reports, and the value of mineral output by county was not generally revealed. Thus, the historical data for the above mining activities are not available. Table G-10 is a brief but complete resume of "all other mining" outputs (from which the value of uranium production has not been removed) for the years 1951 through 1960. These data have been estimated as residuals from the more aggregated county data in Area Reports.

Interindustry relations -- The major share of total gross outputs go to other processing sector industries within the sub-basin (53 per cent). Total processing sector sales were $35,654,000, and half ($17,924,000) went to primary metals manufacturers. Most of this is the value of the gold, lead, silver, and zinc by-products of the copper ore concentrates. In addition, stone, clay and glass manufacturers bought $3,553,000 (primarily gypsum, lime, and sand and gravel). Other sales were made to contract construction -- $3,200,000; chemicals -- $2,431,000; and smaller amounts to the copper sector, "all other manufacturing," and transportation. Intraindustry transactions were $6,800,000.

Final demand deliveries amounted to $31,913,000, of which 73 per cent was exported outside the Colorado River Basin. All governmental agencies purchased $6.8 million, and the remainder went to households and inventory additions.

"All other mining" inputs -- This sector is more dependent than the other mining sectors on sub-basin processing industries for inputs, primarily because of large intraindustry transactions of $6,800,000. Other large interindustry purchases were from transportation -- $3,381,000; rentals and finance -- $2,612,000; electric energy -- $1,859,000; "all other retail" -- $1,302,000; "all other

TABLE G-10

VALUE OF GILA SUB-BASIN MINERAL PRODUCTION, LESS COPPER, 1952-1960

Year	Total	Arizona Counties	New Mexico Counties
1960	$59,907,220	$55,287,488	$ 4,619,732
1959	51,535,839	48,393,714	3,142,125
1958	49,803,868[a]	46,349,828	3,454,040[a]
1957	59,318,675	48,649,926	10,668,749
1956	56,508,183	43,464,454	13,043,729
1955	40,882,612	34,838,534	6,044,078
1954	30,303,394[a]	29,144,071	1,159,323[a]
1953	33,359,780	29,021,173	4,338,607
1952	$58,015,872[a]	$38,709,408	$19,306,464[a]

[a] Partial data only - exclusive of Catron County.

SOURCE: Minerals Yearbook, Annuals, 1952-1960, Volume III, Area Reports, U. S. Department of the Interior, Bureau of Mines, Washington, D.C.: U. S. Government Printing Office.

services" -- $1,022,000; and other utilities -- $1,008,000. Inputs from other sub-basin processing industries were less than $1 million each.

Autonomous sector purchases of $43,968,000 amounted to almost 65 per cent of total gross outlays. Wages and salaries represent the largest payments ($16,480,000). Imports from outside the Colorado River Basin total $15,912,000. These two accounted for almost 74 per cent of all inputs from the autonomous sectors. Total tax liability was $3.9 million, depletion and depreciation combined amounted to $4.4 million, and payments to resident sub-basin households through the "profits and other" sector were $3.3 million.

Direct and indirect effects of the "all other mining" industry on the sub-basin economy -- As noted in an earlier section mining in the Gila economy is quite diversified. There is also a higher degree of interdependence in the case of the "all other mining" sector than in uranium and copper. For each additional delivery of $1.00 to final demand from this sector there is a total increase in output of $1.49 among the industries included in the processing sector of the transactions table. The strongest link is between the "all other mining" and transportation sectors. Each time sales from this sector to final demand are increased $1.00 there are sales by the transportation industry to all sectors of more than $.06. Following closely behind transportation is the rentals and finance sector to which payments of slightly less than $.06 are made for each $1.00 increase in sales to final demand, and electric energy -- $.04. Seven other sectors have increased sales of approximately $.02; these are: wholesale trade and the "all other" sectors in manufacturing, utilities, retail trade and the services. There were five other industries whose sales increased more than $.01 but less than $.02. These are: copper mining, chemicals, primary metals, fabricated metals, and the stone, clay and glass industry.

Water inputs -- The heterogeneous products in the "all other mining" sector require that water inputs be evaluated by individual types of mining activity where water use is significant. Gilkey and Beckman discuss lead-zinc operations, one zinc-copper operation, and several sand and gravel washing operations.[12/]

The lead-zinc and zinc-copper operations require significant quantitites of intake water, and the magnitude and nature of their pollution loadings might be a useful object of study by the F.W.P.C.A. While the authors' data on quantity are quite good, there are no data on pollution levels and this information must be developed independently. "If it is assumed that the average of 350 gallons per ton washed . . (sand and gravel operations) . . is applied to all other sand and gravel washing operations in the state, the total water required for this purpose in 1960 amounted to 4.4 billion gallons."[13/] If this average rate is applied to the 10,148,000 short tons of sand and gravel produced in the Gila Sub-Basin in 1960, water use would amount to nearly 3.6 billion gallons in that year. It is characteristic of sand and gravel washing operations that more than four-fifths of all water intake on the average is returned to ground water via settling ponds, with little or no resulting pollution.

MANUFACTURING

Introduction

Manufacturing in the Gila Sub-Basin is more diversified than in the other Colorado sub-basins. In 1960, total gross output of all manufacturing sectors in this sub-basin was $1,071,436,000 This represented over 26 per cent of the total gross output of all processing sector industries in that year. The sector with the largest total gross output was primary metals -- $389,571,000 followed by "all other manufacturing" -- $293,930,000. The only other manufacturing sector with total gross outputs in excess of $100 million was food and kindred products at $190,301,000.

12/ Ibid., pp. 50-68.

13/ Ibid., p. 61.

Total wage and salary payments to sub-basin households amounted to $258,734,000. With 44,587 persons employed in manufacturing, the average annual wage was $5,803. Manufacturing employment represented 19 per cent of total sub-basin employment.

The sub-basin manufacturing industries are combined into twelve sectors. In addition to those mentioned above these include: lumber and wood products, furniture and fixtures, paper and pulp products, chemicals, printing and publishing, fabricated metals, textiles and apparel, leather and leather goods, and stone, clay and glass products.

The number of manufacturing establishments has increased almost four-fold since 1939, the first year for which data are presented on Table G-11. While data on the total number of employees in manufacturing are not presented in the table, we have estimated that 1939 manufacturing employment was 6,400. If this estimate is at all close, manufacturing employment in the Gila increased by about 700 per cent from 1939 to 1960.

Data on value added by manufacturing are available only for selected years. The Census of Manufactures shows that value added in 1939 was slightly more than $10 million. By 1958 it amounted to more than $325 million -- an unadjusted annual growth rate of 150 per cent.

Two Arizona counties, Maricopa and Pima, dominate manufacturing in this sub-basin. In 1939, for example, 70 per cent of the manufacturing establishments were located in these two counties. This had increased to 85 per cent by 1958. These data suggest that agglomeration forces -- a well-trained labor supply, market potential, industrial specialization, and external economies of scale -- have contributed much to the growth of manufacturing in this region since 1939.

The United States Public Health Service reported 796 manufacturing firms in the Gila in 1960.[14/] This would be a decrease of nearly

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[14/] 1960 Directory of Manufactures for the Colorado River Basin, U. S. Department of Health, Education and Welfare, Public Health Service, Bureau of State Services, Division of Water Supply and Pollution Control, Region VIII, Denver, Colorado. Colorado River Basin Water Control Project (January 1962), p. 83.

TABLE G-11

SELECTED STATISTICS ON GILA SUB-BASIN MANUFACTURING, BY COUNTY

	Number of establishments	Average annual employment: Total employees	Average annual employment: Production employees	Value added
1939				
Catron, New Mexico	7	n.a.*	74	$ 78,000
Grant, New Mexico	7	n.a.	114	d**
Cochise, Arizona	19	n.a.	1,060	d
Gila, Arizona	15	n.a.	448	d
Graham, Arizona	9	n.a.	40	180,000
Greenlee, Arizona	3	n.a.	2	d
Maricopa, Arizona	145	n.a.	1,934	8,350,000
Pima, Arizona	51	n.a.	423	1,591,000
Pinal, Arizona	5	n.a.	145	d
Santa Cruz, Arizona	3	n.a.	8	d
Yavapai, Arizona	17	n.a.	580	d
Sub-Basin Totals	281	n.a.	4,828	$ 10,199,000[a/]
1947				
Catron, New Mexico	7	61	60	$ 227,000
Grant, New Mexico	10	371	344	d
Cochise, Arizona	21	1,100	901	d
Gila, Arizona	16	826	719	15,475,000
Graham, Arizona	6	61	49	502,000
Greenlee, Arizona	4	430	407	d
Maricopa, Arizona	284	7,449	5,635	41,425,000
Pima, Arizona	97	1,174	911	6,015,000
Pinal, Arizona	8	231	191	d
Santa Cruz, Arizona	4	26	20	91,000
Yavapai, Arizona	19	457	373	d
Sub-Basin Totals	476	12,186	9,610	$ 63,735,000[a/]
1954				
Catron, New Mexico	13	139	133	$ 687,000
Grant, New Mexico	12	468	394	5,051,000
Cochise, Arizona	26	1,104	896	6,818,000
Gila, Arizona	21	939	792	6,873,000
Graham, Arizona	9	89	63	572,000
Greenlee, Arizona	5	396	357	d
Maricopa, Arizona	461	15,717	11,935	115,281,000
Pima, Arizona	150	4,548	3,340	37,438,000
Pinal, Arizona	21	407	357	3,053,000
Santa Cruz, Arizona	5	64	58	208,000
Yavapai, Arizona	22	299	274	1,550,000
Sub-Basin Totals	745	24,170	18,599	$177,531,000[a/]

TABLE G-11 (cont.)

		Average annual employment		
	Number of establishments	Total employees	Production employees	Value added
1958				
Catron, New Mexico	11	139	127	$ 637,000
Grant, New Mexico	13	322	271	d
Cochise, Arizona	35	1,274	997	d
Gila, Arizona	22	1,009	843	5,288,000
Graham, Arizona	15	101	77	958,000
Greenlee, Arizona	3	335	312	d
Maricopa, Arizona	698	25,850	18,387	227,710,000
Pima, Arizona	202	8,102	5,992	83,898,000
Pinal, Arizona	27	440	368	3,782,000
Santa Cruz, Arizona	6	32	26	164,000
Yavapai, Arizona	26	565	519	3,007,000
Sub-Basin Totals	1,058	38,169	27,919	$325,444,000[a/]

1963

* Not available.

** Witheld to avoid disclosing figures for individual companies.

[a/] Total less value added for counties where data not released because of disclosure, for subject year.

SOURCE: U. S. Bureau of the Census, U. S. Census of Manufactures: 1958, 1954, 1947, Volume III, Area Statistics, Washington, D.C.: U. S. Government Printing Office, Appropriate states' data.

25 per cent from the number of firms in the sub-basin given in Table G-11. Other data indicate that there were only 881 firms in the Arizona counties of the sub-basin in 1962, a drop of 15 per cent from the number reported in 1958.[15/] It is possible that the Public Health Service data understate the actual number of establishments located in the Gila in 1960. For purposes of this report, however, the 1960 Public Health Service data have been utilized.

On this basis, the largest number of establishments in any single industry were in food and kindred products -- 154, followed by 137 printing and publishing firms. Next were stone, clay and glass products firms -- 78, then fabricated metals -- 77 firms, and 54 lumber and wood products establishments. Firms from every other major manufacturing classification were found in the sub-basin in 1960.

Food and Kindred Products

Food and kindred products had the third largest total gross output ($190,301,000) of any single manufacturing sector in the Gila transactions table. This represented over 17 per cent of all manufacturing outputs. Total employment in this industry was 6,349 -- over 14 per cent of all manufacturing employment. Wage and salary payments totaled $32,416,000, yielding an average annual wage of $5,106.

The largest number of firms within this industrial classification consisted of soft drink bottlers (30), followed by 28 bakeries, 25 dairies, 17 meat packers, 14 cottonseed oil mills, and 13 specialty food canning firms. Other firms include breweries, candy, manufactured ice, vegetable and fruit canning, pickled vegetable canning, frozen foods, and one firm not elsewhere classified. Except for the

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[15/] Manufacturing Establishments in Arizona, 1962, Industry Report No. 3, Tempe, Arizona: Bureau of Business Services, College of Business Administration, Arizona State University (1962), Table 1, pp. 4-5.

few specialty operations, and the cottonseed oil mills, these firms are entirely oriented to local markets.

Interindustry relations -- The largest share ($160,945,000 or 85 per cent) of food and kindred outputs was delivered to the final demand sector. The largest part -- $116,673,000 -- went to sub-basin households. All government units combined purchased $3,854,000, and exports totaled $33,451,000. Inventory additions were almost $7 million.

The largest sales within the processing sector were made to eating and drinking places -- $12,078,000 -- and these sales accounted for over 6 per cent of total gross output. Other large processing sector sales were to feeder livestock ($4,024,000); copper ($2,351,000); other agriculture ($1,793,000) and transportation ($1,841,000). Intraindustry transactions were $4,623,000. Additional sales to other processing sector industries did not exceed $900,000 each.

Food and kindred products inputs -- Only 47 per cent of total gross outlays, or $89,732,000, was spent on inputs from other processing sector industries. Almost 76 per cent of this amount -- $68,068,000 -- came from the agricultural sectors. The three largest agricultural suppliers were feeder livestock -- $28,000,000; dairy farms -- $23,222,000; and cotton -- $13,972,000. Inputs from rentals and finance were $5,421,000; from transportation -- $4,698,000; "all other services" -- $2,314,000; and contract construction -- $1,334,000.

The largest inputs from all autonomous sectors were nearly $50,000,000 of imports, followed by wage and salary payments of $32,416,000. Total tax liability was approximately $6.2 million, and depreciation was $2,139,000. Additional payments to sub-basin households amounted to $4,262,000 going to the "profits and other" income sector.

Direct and indirect effects of the food and kindred products industry on the sub-basin economy -- This industry ranks third among the sub-basin's twelve manufacturing sectors in terms of interdependence. Each time the industry increases its sales to final demand by $1.00, total sales within the processing sector go up $1.82. The largest increases are from agriculture. For each increase in sales to final demand of $1.00 by food and kindred products, feeder livestock sales increased $.16, dairy sales go up $.13, the sale of forage, feed and food crops goes up $.09, cotton sales rise $.08, and the sales from the range livestock sector go up $.06. There is, clearly, strong interdependence between the food and kindred products industry and the agricultural sectors of the Gila Sub-Basin. The transactions just summarized again indicate the principle of interdependence at work. Increased demand for food and kindred products stimulates the demand for livestock, both range and feeder. This, in turn, increases purchases from the forage, feed and food crops, and the cotton sectors. There are similar interconnections between the food and kindred products industry and the dairy industry. The latter steps up its purchases of feeds when food products sales go up.

Water inputs -- Data are not available on water inputs to the food and kindred products industry. While the thirty soft drink bottling firms in the area no doubt consume a substantial amount of process water, they account for only a small part of total water consumption.

The waste-disposal techniques of the seventeen meat packers in the sub-basin constitute a potential problem for water quality control objectives. The 25 sub-basin dairies probably use large quantities of water for cooling milk and milk products after pasteurization. Whether the water intake is large or held to a minimum by up-to-date recycling methods is unknown at the present time. Also unknown is whether the exhausted warm water is returned to the source before cooling, or whether it goes through a cooling pond first. This information is essential in evaluating the effects of these operations on the total water use pattern of the sub-basin.

The only other types of establishments which probably use water in substantial quantities would be the brewery and the manufactured ice firm, for which data are not available. It is doubtful that the flour mills, cottonseed oil firms, the tallow works, or the other sub-basin food and kindred products firms use much water either in process or for cooling.

Lumber and Wood Products

The lumber and wood products sector is one of the smaller manufacturing activities in the Gila Sub-Basin, both in terms of employment and value of output. Slightly more than 3 per cent of total wage and salary payments were made by this industry group which employed 1,464 people in 1960 -- less than 4 per cent of the manufacturing labor force. Total wage and salary payments were $7,893,000, giving an annual average wage of $5,391.

In the Gila input-output table, logging operations are part of the forestry sector, which is one of the agricultural sectors. Over 99 per cent of the forestry sector's outputs go to the lumber and wood products industry which consists of all operations processing timber.

Interindustry relations -- The 1960 total gross output of the lumber and wood products sector was $28,428,000. Of this, $18,161,000, or 64 per cent, went to final demand. The largest item in final demand was sales to households -- $5,443,000, followed by inventory additions -- $4,918,000, and gross private capital formation -- $4,239,000. Exports and government purchases represented a relatively small portion of final sales.

Processing sector sales ($10,267,000) accounted for 36 per cent of total gross output. Over half went to contract construction -- $5,234,000. Sales to paper and pulp were $1,998,000, and to copper -- almost $1 million. Sales were also made to uranium, other mining, furniture and fixtures, primary metals, "all other manufacturing," transportation, and electric energy. Intraindustry transactions were $248,000.

Lumber and wood products inputs -- Only $6,766,000 (slightly less than one-fourth of total gross outlays) was used to purchase inputs from other processing sector industries. The largest came from forestry -- $1,638,000. Other significant purchases were from transportation -- $958,000; rentals and finance -- $842,000; "all other services" -- $711,000; and "all other retail" -- $636,000. Remaining purchases from other processing sector industries were less than $400,000 each.

Autonomous sector outlays amounted to $21,662,000. The major portion ($7,893,000) went to wages and salaries. Imports totaled $7,162,000 and over half came from other sub-basins of the Colorado River Basin -- mostly timber cut in the Little Colorado. This represented one of the few instances of inter-sub-basin dependence uncovered. Depreciation was $616,000, and total tax liabilities came to $450,000. Sub-basin households received $956,000 through "profits and other" income.

Direct and indirect effects of the lumber and wood products industry on the sub-basin economy -- This industry represents another case of relatively weak interdependence. For each increase in sales to final demand, the industry generates total sales within the processing sector of $1.35. In terms of interdependence, lumber and wood products ranks seventh in the Gila Sub-Basin manufacturing economy. Only nine other processing sectors have sales of $.01 or more due to an expansion of $1.00 in the final sales of lumber and wood products. The strongest links are with forestry ($.07), transportation ($.05), and rentals and finance ($.05). Other significant gains are in "all other services" ($.04) and "all other retail" ($.03).

Water inputs -- The lumber and wood products sector requires little or no water. Firms in this sector are primarily engaged in the sawing and grading of raw lumber, and would have little occasion to be heavy water users.

Furniture and Fixtures

The furniture and fixtures industry is the third smallest of the manufacturing sectors individually reported in the Gila transactions table. Its total gross output was $13,698,000, slightly in excess of 1 per cent of all manufacturing total gross outputs. Average annual employment in 1960 was 754 persons, and total wage and salary payments amounted to $3,377,000, for an average annual wage of $4,479. Employment was less than 2 per cent of all sub-basin manufacturing employment, and wage and salary payments were slightly in excess of 1 per cent of total manufacturing wage and salary payments.

Interindustry relations -- Deliveries to final demand accounted for $12,848,000, almost 94 per cent of the $13,698,000 total gross output in 1960. The largest sales were exports -- $6,496,000, followed by household purchases of $3,145,000. Inventory additions and gross private capital formation each accounted for about $1.4 million of final sales, and the remainder ($423,000) was sold to government units combined. The only processing sector entry was intraindustry transactions of $850,000.

Furniture and fixture inputs -- Slightly less than one-fourth of total gross outlays were purchases from other processing sector industries. The largest of these came from lumber and wood products -- $611,000, followed by transportation -- $414,000; paper and pulp -- $293,000; rentals and finance -- $265,000. In addition, purchases were made from printing and publishing, "other manufacturing," all of the trade sectors, electric energy and other utilities.

Purchases from autonomous sectors totaled $10,335,000, almost 42 per cent of which were imports. Inputs from sub-basin households totaled $4,036,000, most of which were direct wage and salary payments. Total tax liabilities were slightly in excess of one-quarter of a million dollars, and depreciation of capital assets amounted to $334,000.

Direct and indirect effects of the furniture and fixtures industry on the sub-basin economy -- This sector stands in sixth place, in terms of interdependence, in the Gila manufacturing economy.

A total of $1.37 in sales is generated within the processing sector each time the furniture and fixtures industry increases its output to final demand by $1.00. The strongest link ($.07) is with the lumber and wood products industry. Transportation sales go up $.04 with each addition to final sales of furniture and fixtures. Except for the rentals and finance sector, which experiences output gains slightly more than $.03 for each $1.00 of final sales by furniture and fixtures, only seven other sectors show increases in sales ranging from slightly more than $.01 to less than $.03.

Water inputs -- This sector requires little or no water. These firms are primarily engaged in cutting and shaping lumber (or metal) into unfinished or finished furniture, and the only water used, aside from sanitary purposes, would be for blending self-made glues.

Paper and Pulp Products

There are only four paper and pulp firms in this sub-basin, and all but one fabricate manufactured paper into corrugated and solid fiber boxes. The remaining firm is a paper pulp operation that converts wood inputs (chips, bark and lumber) into finished paper.

This was the second smallest of the individually reported manufacturing sectors in the Gila in 1960, and it employed only 164 persons. The annual payroll was $892,000, and the average annual wage was $5,439. Employment represented only four-tenths of one per cent of all manufacturing employment in the sub-basin, and wage and salary payments were only three-tenths of one per cent of the manufacturing total.

Total gross output in this sector was $4,990,000 in 1960. Almost two-thirds -- $3,260,000 -- were final sales. The largest component consisted of exports outside the Colorado River Basin valued at $2,654,000, while inventory additions accounted for the remaining $606,000.

Sales were made to seven processing sector industries: $665,000 to printing and publishing, followed by $293,000 to furniture and fixtures, and $179,000 to food and kindred products. Sales made to other processing sector industries include "all other manufacturing," "all other retail," and transportation. Intraindustry sales were $299,000.

Paper and pulp inputs -- Nearly 55 per cent of paper and pulp outlays were purchases from processing sector industries. The largest of these was $1,998,000 from lumber and wood products, followed by transportation -- $199,000. Other processing sector supplying industries include printing and publishing, eating and drinking places, "all other services," electric energy, other utilities, and rentals and finance.

Autonomous sector purchases were $2,268,000 distributed as follows: wages and salaries -- $892,000; inventory depletions -- $485,000; imports from outside the Colorado River Basin -- $465,000; tax payments to all governmental units -- $194,000; depreciation -- $133,000, and $99,000 to "profits and other" income.

Direct and indirect effects of the paper and pulp industry on the sub-basin economy -- This industry represents a case of strong interdependence. Each time its output to final demand goes up by $1.00, total sales within the processing sectors increase $1.85. Only nine other processing sectors show increases in sales of more than $.01, but some of these are quite large. The largest sales, by far, are those from lumber and wood products to the paper and pulp industry. These go up $.48 each time paper and pulp sales to final demand increase $1.00. This accounts for a substantial fraction of the indirect effects. The next largest increase is reported by transportation ($.07), followed by rentals and finance ($.04) and forestry ($.03). All remaining increases in sales are less than $.03.

Water inputs -- The three firms fabricating paper boxes have no significant water inputs. The only water used by these firms would be for sanitary purposes and, possibly, for blending glue. The pulp firm is another matter. Firms converting raw wood inputs to finished paper customarily use large amounts of water as part of the production process. Not only is the water intake high, per dollar of output, but effluents contain many impurities.

Chemicals

There were 21 chemical firms in the Gila Sub-Basin in 1960. Average annual employment in the industry was 641 persons, total wage and salary payments were $3,681,000, and average annual wages were $5,743. This sector accounted for 1.4 per cent of both total sub-basin manufacturing wage and salary payments and employment.

The firms in this industrial classification include those engaged in manufacturing and mixing fertilizers, insecticide firms, one explosive firm, one industrial inorganic chemical firm, four paint firms, and one firm producing detergents and sanitary chemicals. The largest of the chemical firms in the sub-basin was the explosives producer.

Interindustry relations -- Total gross output in 1960 was $18,337,000, of which $14,284,000 (78 per cent) was sold within the processing sector to other sub-basin firms. Copper was the prime customer, absorbing $4 million of chemicals -- mostly explosives. Fertilizer purchases by the vegetable sector came to $2,731,000, and "all other services" purchased $2,272,000. Cotton purchased almost $2.1 million. Additional processing sector sales were made to citrus agriculture, other mining, primary metals, and contract construction. Intraindustry transactions were $105,000.

Sales to final demand totaled $4,053,000 the greatest share of which ($2,802,000) represented inventory additions. Exports were $518,000 and households purchased $733,000. There were no other sales to final demand.

Chemical inputs -- Less than one-fourth of total gross outlays by this sector were purchases from sub-basin firms within the processing sector. "All other mining" supplied $2,431,000, and purchases from other sectors include rentals and finance -- $466,000;

transportation -- $210,000; and "all other services" -- $205,000. The input from "all other mining" consisted primarily of lime which was used as a raw material by the fertilizer and insecticide firms.

The autonomous sectors were the major suppliers to this industry -- $14,465,000 -- and accounted for 79 per cent of total gross outlays. The largest was imports -- $6,756,000 followed by wage and salary payments -- $3,681,000, and inventory depletions -- $2,087,000. Total tax payments were $116,000, and depreciation amounted to $1,565,000.

Direct and indirect effects of the chemical industry on the sub-basin economy -- This is another case of weak interdependence. The chemical industry ranks eighth among the manufacturing sectors. Only six other processing sectors show sales of $.01 or more for each increase in deliveries to final demand of $1.00 by the chemical industry. The largest sales induced by the chemical industry were those of "all other mining" -- $.17, much of which represents direct raw material inputs to chemicals itself. This is followed by $.04 in the rentals and finance sector, and others range below this figure. The total addition to sales within the processing sector of the transactions table amounts to only $1.33 for each additional delivery of $1.00 worth of chemical products to final demand.

Water inputs -- No data have been found on the water needs of the sub-basin chemicals industry, either for processing or cooling. However, various components of this industry on a national basis are known to be heavy water users, and their discharge contains high levels of organic and inorganic waste materials. Whether the firms located in the sub-basin are among those which follow this use pattern is not known, and plant data must be obtained for further analysis.

Primary Metals

The primary metals industry has the largest total gross output of any manufacturing sector in the sub-basin -- $389,571,000 in 1960. This output represents about 36 per cent of total gross output from all sub-basin manufacturing firms, and over 9 per cent of the total of all processing sector industries within the sub-basin.

There were fifteen primary metals firms in the sub-basin in 1960 -- most of them processing copper concentrate. In addition, there were several foundries and one rolling mill. Average annual employment was 4,320 persons who received wages and salaries of $26,471,000 -- an annual average wage of $6,128. Nearly 10 per cent of all sub-basin manufacturing employment was in this industry, and wage and salary payments slightly exceeded 10 per cent of all sub-basin manufacturing payrolls.

Interindustry relations -- Over 99 per cent of the outputs of this sector go to final demand. Final sales amounted to $386,300,000 and of these deliveries $325,478,000 were exported outside the Colorado River Basin. State and federal governments purchased $28,461,000 (primarily gold, silver, and lead by-products of copper ores) and inventory additions were $5,361,000. Primary metals outputs were sold to only four processing sector industries: other manufacturing -- $1,351,000; "all other mining" -- $846,000; fabricated metals -- $734,000; and copper -- $340,000. There were no intraindustry transactions.

Primary metals inputs -- Of all manufacturing sectors in the Gila Sub-Basin, the primary metals industry had the largest degree of interdependence with other processing sectors. This is due primarily to the availability in the sub-basin of raw material inputs -- copper ores from the copper mining sector, and lead, gold and silver ores from the "all other mining" sector. Purchases from these two sectors combined total $318,644,000, almost 82 per cent of total gross outlays. Purchases from other processing sector industries included electric energy -- $6,131,000; transportation -- $7,622,000; "all other manufacturing" -- $1,473,000; and other utilities -- $1,003,000. Most of the remaining nonagricultural processing sectors had sales to primary metals, but none individually exceeded $1 million.

Inputs from all autonomous sectors totaled $49,371,000. Wage and salary payments were the largest -- $26,471,000, followed by imports -- $11,623,000. Tax payments to all government units were in excess of $5.4 million, depreciation exceeded $3.8 million, and payments to sub-basin households through the "profits and other" income sector were $1,137,000.

Direct and indirect effects of the primary metals industry on the sub-basin economy -- This is the strongest case of interdependence in the Gila Sub-Basin. For each additional delivery of $1.00 to final demand, this industry generates $2.08 of sales within the processing sector of the transactions table. The largest sales increases are by copper mining, and these amount to $.79. In second place, but with a wide gap between, is the "all other mining" sector which sells an additional $.06 worth of output when primary metals increases its deliveries to final demand by $1.00. Eight other industries have interindustry transactions ranging between $.04 and $.01. Intraindustry transactions are quite small in this sector, amounting to less than $.01.

Water inputs -- Process water use by the primary metals manufacturers in this sub-basin is not high. Table G-8 shows water consumption of smelting operations to vary between 3.2 and 5.6 per cent of total consumption for both mining and smelting, depending upon which ore concentration method is used. Table G-9 shows almost 23.1 billion gallons of water intake by the entire Arizona copper industry in 1960. Assuming that primary metals firms use approximately 5 per cent of this water, less than 1.2 billion gallons of water would have been used by this industry in 1960.

While the quantity consumed is a minor part of the total for the copper industry, no data are available on the pollution level of the discharge water, and they must be obtained before an analysis can be made. The water inputs to foundries and rolling mill are small enough to warrant no further investigation, although Gilkey and Beckman provide some data on them.[16]

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[16] Gilkey and Beckman, *op. cit.*, pp. 71-72.

Printing and Publishing

The printing and publishing industry was second in number of firms, with 137 establishments, among the manufacturing sectors of the sub-basin. Unlike the printing and publishing establishments studied in other Colorado River sub-basins, these firms are almost evenly divided between those specializing in printing on a job basis, or publishing newspapers and periodicals. Almost 82 per cent of the total number of firms in this sector are located in two Arizona counties -- Maricopa and Pima.

Wage and salary payments to the 3,292 persons employed were $16,661,000. They represented over 7 per cent of all sub-basin manufacturing employees and wage payments were over 6 per cent of total manufacturing wages in that year. The average annual wage was $5,061.

Interindustry relations -- The 1960 total gross output of this industry was $42,870,000, less than 4 per cent of manufacturing total gross outputs. Almost 53 per cent went to final demand. The $22,591,000 of final sales were made primarily to households ($10,641,000) and exports ($9,117,000). Sales to all government units totaled $1,325,000, and inventory additions amounted to almost $1 million.

Total sales to processing sector industries were $20,279,000, and almost every sub-basin industry within the processing sector had purchases from printing and publishing. The largest sales were to the trade sectors -- $11,252,000. "All other services" purchased $1,758,000, rentals and finance -- $1,146,000, and lodging purchases were $1,107,000. Sales to remaining processing sector industries were less than $1 million each.

Printing and publishing inputs -- The printing and publishing sector of the Gila does not rely heavily on purchases from other processing sector industries. A little more than 15 percent of total gross outlays, or $6,510,000, were processing sector purchases. The largest was from rentals and finance -- $1,164,000, followed by transportation -- $874,000, "all other services" -- $686,000, and paper and pulp -- $665,000. Additional purchases from nonagricultural processing sector industries were less than $600,000 each. Intraindustry transactions were $726,000.

Autonomous sector inputs amounted to $36,360,000. These came primarily from households -- $21,716,000 (wages and salaries and "profits and other" income combined), imports -- $8,849,000, and tax payments to all government units -- $2,939,000.

Direct and indirect effects of the printing and publishing industry on the sub-basin economy -- This is one of the weakest cases of interdependence among the Gila Sub-Basin manufacturing sectors. A total of $1.21 in sales are generated for each additional delivery to final demand of $1.00 by printing and publishing. The strongest link, and this means only an additional $.03 in sales, is with rentals and finance. There are seven other sectors whose sales increased by amounts ranging from $.01 to $.03; all remaining interindustry connections are quite weak.

Water inputs -- The printing and publishing industry is not dependent on water as a processing input. The only water use is for sanitary purposes, and it is doubtful that further investigation of water use by this industry would be justified.

Fabricated Metals

There were 77 fabricated metals establishments in the Gila Sub-Basin in 1960. Average annual employment was 2,074 persons; total wages and salaries were $11,052,000, and average annual wages were $5,329. These firms employed nearly 5 percent of the sub-basin manufacturing labor force and paid slightly more than 4 percent of all sub-basin manufacturing wages. The sector ranked fifth in total gross output ($39,614,000), and accounted for more than 3 percent of all manufacturing outputs.

There were several different types of firms within the sector, including cutlery, sheet metal shops, fabricated structural steel, electroplating, and metal coating. Most, however, were sheet metal shops and electroplating establishments.

Interindustry relations -- Over half of the $39,614,000 total gross output (56 per cent) went to other sub-basin firms within the processing sector. The largest of the $22,255,000 processing sector sales was to contract construction ($12,825,000), which included the output of both sheet metal shops and fabricated steel establishments. Other large sales were made to copper mining -- $2,372,000; transportation -- $1,518,000; and other manufacturing -- $1,219,000. Sales to processing sector industries not mentioned above were less than $900,000 each, except for intraindustry transactions which amounted to $1,102,000.

The largest of the $17,359,000 of final sales was exports ($8,177,000), 31 percentof which went to other sub-basins. Inventory additions were $4,143,000, and sales to households $2,530,000. Government purchases totaled $516,000, and $1,993,000 went to gross private capital formation.

Fabricated metals inputs -- Only $4,743,000 of total gross outlays represented purchases from other sub-basin processing sector industries. In addition to intraindustry transactions of $1,102,000, the major supplying sectors were primary metals ($734,000), wholesale trade ($575,000), rentals and finance ($553,000), and "all other services" ($523,000). Remaining purchases from other processing sector industries were less than $500,000 each.

Outlays to autonomous sectors were $34,871,000, over 88 per cent of total gross outlays. The largest was imports ($17,985,000), followed by almost $11.1 million of wage and salary payments. Federal, state and local tax payments totaled $893,000, and depreciation was more than one-half million dollars. Sub-basin households received an additional $917,000 through the "profits and other" income sector. Inventory depletions were $3.4 million.

Direct and indirect effects of the fabricated metals industry on the sub-basin economy -- This is an even weaker case of interdependence than printing and publishing. Total sales generated within the processing sectors amount to only $1.18 for each additional sale of $1.00 to final demand by fabricated metals. The strongest link, and this amounts to only $.02, is with primary metals. This is followed by an increase of less than $.02 in wholesale trade"all other" services, rentals and finance and copper. Intraindustry transactions amount to $0.03.

Water inputs -- Gilkey and Beckman report that in the electroplating firms, "except for rinsing, all operations involving the use of water are conducted on a batch basis, with water being added only to replace evaporative losses. Cleaning and plating baths are used as long as possible to conserve contained chemicals. All recoverable materials are salvaged, and the solution is neutralized before it is discarded."[17] From their data, collected from eleven electroplating plants in the Phoenix area, it appears that about 10 per cent of daily intake water is used to maintain the plating solutions, and the remainder (except for that used for sanitary purposes) is used in cleaning metal surfaces before plating, and in rinsing solution from the plated products.

Total water intake for these plants averaged 1,112 gallons per day. There is no recirculation of cleaning and rinsing water, and approximately 90 per cent of this amount is returned to city sewer systems, septic tanks or cesspools, or to evaporation from seepage pits. In almost every plant surveyed, water returned to city sewer systems was neutralized by adding the proper chemicals to remove cyanide, chromic acid, and other soluble chemicals collected in the washing and rinsing process.

One structural steel fabricating plant was interviewed, and its water intake was 250,000 gallons per day -- used primarily for compressor cooling and for makeup in the pickling and rinse solutions. In this case, most of the cooling water is discharged directly into

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[17] *Ibid.*, p. 73.

an irrigation system except for a smaller amount returned to the city sewer system. "No quality problems have been encountered, and none of the water is treated by the company."[18] It appears that the water needs of the fabricated metals industry do not represent a major problem -- either with respect to daily quantities consumed or to contamination of exhaust fluids.

Textiles and Apparel

This industry had 39 firms operating in the sub-basin in 1960. None produced textile mill products; they were all producers of men's and women's ready-to-wear apparel.

There were 2,320 persons employed in this industry (slightly more than 5 per cent of total sub-basin manufacturing employment) who received $6,730,000, less than 3 per cent of all sub-basin manufacturing wage and salary payments. Average annual wage in this industry was $2,901.

Interindustry relations -- Total apparel output in 1960 was $14,583,000, slightly more than 1 per cent of all manufacturing total gross outputs. All of this was sold to final demand. Exports were $10,972,000 (over 75 per cent of total gross output), households purchased $2,093,000, and the remaining $1,518,000 went to inventory additions.

Textiles and apparel inputs -- Almost 94 per cent of total outlays were made in the autonomous sectors. The largest item was wage and salary payments which represented over 46 per cent of total gross outlays. Additional household payments to the "profits and other" income sector were $241,000, and total tax payments were $101,000. Next to wages and salaries, imports ($4,908,000) represented the most important autonomous sector purchase, and accounted for almost 34 per cent of total gross outlays.

This industry is probably located in the sub-basin because of specialized styles which have become associated with the region. The

[18] Ibid., p. 75.

major input is labor -- which is characteristic of this industry nationally -- and the raw materials inputs (cloth, thread, etc.) must be imported from outside the region.

Direct and indirect effects of the textiles and apparel industry on the sub-basin economy -- This is the weakest case of interdependence among the manufacturing sectors of the sub-basin economy. Additional sales within the processing sector generated by an increase in sales to final demand of $1.00 amount to only $.09. The largest of these ($.03) is by rentals and finance, followed by additional sales of less than $.02 by contract construction and electric energy. All other interindustry effects amount to less than $.01.

Water inputs -- This industry requires no processing water inputs, and the only water use is for sanitary purposes. No further investigation of this industry is warranted.

Leather and Leather Goods

The leather and leather goods industry is the smallest of the individually reported sub-basin manufacturing sectors. There were only 37 persons employed who earned $121,000 in 1960, for an average annual wage of $3,270. Neither wage and salary payments nor employment represented as much as 1 per cent of the total of all manufacturing sectors.

Interindustry relations -- The entire total gross output of this industry -- $350,000 -- was delivered to final demand. The largest sales were exports ($185,000) and households purchased $92,000. Additional outputs were delivered to gross private capital formation -- $36,000, and to inventory additions -- $37,000.

Leather and leather goods inputs -- The only significant purchase by the leather and leather goods industry from other processing sector industries was from food and kindred products -- $77,000, which represented 22 per cent of total gross outlays. These were hides used as a raw material input. Much smaller purchases were made from other processing sector industries including printing and publishing, rentals and finance, contract construction, electric energy, other utilities, transportation, and "all other services."

The largest autonomous sector purchase (almost 35 per cent of total gross outlays) was from households which received wage and salary payments of $121,000. An additional $34,000 was paid to sub-basin households through the "profits and other" income sector. Imports were $46,000, and taxes amounted to $15,000.

Direct and indirect effects of the leather and leather goods industry on the sub-basin economy -- There is rather strong interdependence between this industry and other sectors of the Gila economy. Although there are no intraindustry transactions, total sales of $1.51 are generated for each delivery to final demand of $1.00. The closest link is with the food and kindred products industry, representing the sale of hides. Food and kindred products sales increased $.25 for each increase in final sales of leather and leather goods of $1.00. Second in rank is the feeder livestock sector with $.04 of induced sales. The rentals and finance sector also increases its sales by slightly less than $.04. There are nine other sectors whose sales increased by amounts ranging from $.01 to slightly more than $.03.

Water inputs -- This sector requires no process water inputs, and since the 1960 total gross output was so low further investigation would be unwarranted.

Stone, Clay and Glass Products

In 1960, there were 78 firms in this industrial classification in the Gila Sub-Basin -- the third highest number in the individually reported manufacturing sectors. Included were brick and structural clay tile firms, concrete brick and block, other concrete products, ready-mix concrete, cement, gypsum products, and the cut stone and stone products firms. They employed 1,889 people, and had total wage and salary payments of $10,619,000. The average annual wage was $5,621, and these firms accounted for slightly more than 4 per cent of both total manufacturing employment and wage and salary payments.

Interindustry relations -- This industry had a total gross output of $34,764,000 in 1960, more than 3 percent of all manufacturing outputs. About three-fourths of total gross outputs ($25,866,000) were consumed by other sub-basin processing sector industries. The largest sales were to contract construction -- $17,299,000 (nearly 50 per cent of total gross output), followed by copper mining -- $1,423,000, "all other mining" -- $673,000, primary metals -- $502,000, and lumber and wood products -- $381,000. Additional processing sector sales were made to uranium, food and kindred products, printing and publishing, "all other manufacturing," and others. Intraindustry transactions were $4,888,000.

Stone, clay and glass products inputs -- Inputs from all processing sector industries amounted to $12,779,000, the largest of which was intraindustry transactions. Other significant inputs came from "all other mining" ($3,553,000), and transportation ($2,059,000). These three inputs together account for slightly more than 30 per cent of total gross outlays.

Purchases from autonomous sectors amounted to $21,985,000, the largest of these being $10,619,000 in wage and salary payments. An additional $1.9 million was paid to sub-basin households through the "profits and other" income sector. Additional inputs from autonomous sectors include imports -- $3,554,000, total tax payments -- $1,499,000, depreciation -- $2,314,000, and inventory depletions of nearly $2.1 million.

Direct and indirect effects of the stone, clay and glass industry on the sub-basin economy -- This industry ranks fourth in terms of interdependence among manufacturing sectors. Total sales of $1.57 are generated by each sale of $1.00 to final demand. The intraindustry transactions are high, amounting to $.18. This is followed by " all other" mining sales of $0.14. The transportation industry is next, with an increase in sales of $0.09 for each additional $1.00 delivery of stone, clay and glass products to final demand. There are six other sectors whose sales increase by amounts ranging from $0.01 to almost $0.04, as the final demand for stone, clay and glass products goes up by $1.00

Water inputs -- Cement manufacturing firms in this sector require water for cooling kilns and lubricants -- in addition to normal sanitary uses. Gilkey and Beckman discuss two Arizona cement plants.[19/] One plant, the Arizona Portland Cement Company in Pima County, Arizona, requires a water intake of only 179 gallons per minute. The other cement plant, the American Cement Corporation in Yavapai County, Arizona, requires almost the same amount -- 180 gallons per minute. Except for the evaporation losses in both plants, exhaust water is returned to ground water by seepage from cesspools and dump pits.

Ready-mix concrete plants require relatively large amounts of process water to combine with powdered cement and aggregate (sand, gravel, or the new lightweight aggregates) to produce a pourable product. All water used evaporates after the cement has been poured and hardens. Gilkey and Beckman give no data on water gallons per cubic yard of concrete, but one firm reported inputs of 15,000 gallons per day for this purpose.[20/]

"All Other Manufacturing"

This sector is made up of firms which are not included in the previously discussed manufacturing sectors. Establishments in this sector operating in the Gila Sub-Basin in 1960 were: petroleum and coal products, machinery (except electrical), electrical machinery, transportation, professional and scientific instruments, rubber and plastic products, and all others not elsewhere classified. Most of these firms are located in the two Arizona counties which contain standard metropolitan areas -- Phoenix, in Maricopa County, and Tucson, in Pima County. The largest firms in this sector are Air Research Manufacturing Company, Hughes Aircraft Company, Sperry-Rand, Motorola, and the General Electric Company.

Rows and columns could not be constructed for the industries to which these companies belong for two reasons. First, most of the

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[19/] *Ibid.*, pp. 62-64.

[20/] *Ibid.*, pp. 65-68.

larger firms did not cooperate with our field interviewers, either because federal security regulations prevented them from doing so, or because they did not wish to participate. The second reason is the Census rule prohibiting the publications of data about establishments unless there are three or more establishments in the sector. As a result, the "all other manufacturing" sector is made up of firms with widely varying characteristics. This is a deficiency, but it could be overcome only by a higher degree of business cooperation than was found in the three lower sub-basins.

Total employment in this sector was 21,543 in 1960. Total wage and salary payments were $138,821,000, and the average annual wage was $6,444. These establishments accounted for over 48 per cent of all manufacturing employment in the sub-basin, and almost 54 per cent of total manufacturing wage and salary payments.

Interindustry relations -- Total gross output was $293,930,000 in 1960, twenty-seven percent of all manufacturing total gross outputs. Four-fifths of this ($236,526,000) were deliveries to final demand, and the largest sales ($84,338,000) were to state and federal government. A substantial proportion of these sales consisted of military and defense hardware manufactured in the sub-basin. All exports combined totaled $87,808,000, most of which went outside the Colorado River Basin. Almost $31 million went to gross private capital formation; $29.9 million represented inventory additions, and the remainder went to households and local government.

Processing sector sales totaled $57,404,000, and represented one-fifth of total gross outputs. The major share of these ($36,482,000) were intraindustry transactions. Other large sales were made to transportation -- $5,736,000; contract construction -- $3,464,000; "all other" services -- $2,667,000; and wholesale trade -- $2,141,000. Sales to all other processing sector industries were less than $2 million each.

"All other" manufacturing inputs -- Almost 82 percent of the $293,930,000 of total gross outlays went to the autonomous sectors.

Wage and salary payments accounted for $138,821,000 -- over half of autonomous sector outlays. They represented more than 47 percent of total gross outlays, reflecting the labor intensive nature of these heterogeneous firms.

Total Federal, state and local tax payments were $13,414,000; imports totaled $40,700,000; depreciation was almost $13.5 million; and resident sub-basin households received $9,236,000 through the "profits and other" income sector.

Inputs from all processing sector industries were dominated by more than $36 million worth of intraindustry transactions. Purchases of over $1 million were made from only six other processing sector industries: primary metals, fabricated metals, transportation, electric energy, contract construction, and rentals and finance.

Direct and indirect effects of the "all other manufacturing" industry on the sub-basin economy -- This sector, as is true of a number of other heterogeneous sectors, exhibits a rather low degree of interdependence. Each time the final sales of the composite firms in this sector go up $1.00, total sales within the processing sectors increase $1.26. A large proportion of these are intraindustry transactions which amount to almost $.16. The largest interindustry transaction, and this amounts to less than $.02, is with the transportation sector. Only two other sectors, electric energy and contract construction, report sales of more than $.01 (but less than $.02) each time "all other manufacturing" increases its deliveries to final demand by $1.00.

Water inputs -- Gilkey and Beckman discuss water use at the Hughes Aircraft Company, Motorola (both plants), and the Sperry-Rand operation at Phoenix. The daily water intake of the three plants is slightly in excess of 1.1 million gallons per day, and is used primarily for cooling (both in the manufacturing process and for air conditioning), makeup solutions for chemical batches, rinsing, and sanitary purposes. At all the plants listed above, most of the water exhaust is accounted for by evaporation or seepage to ground water from cooling ponds. Very little is discharged to streams or sewers, and all water disposed of is treated so that industrial waste has been removed almost entirely.[21/] No data have been collected on the other types of manufacturing activities aggregated into this sector.

ELECTRIC ENERGY

Historical review -- The major portion of the electric energy needs of the Gila Sub-Basin, from 1940 through 1960, have been provided by three large establishments: The Arizona Public Service Company, The Tucson Gas, Electric Light & Power Co. -- which are privately-owned, and the publicly-owned Salt River Project. It has been estimated that these three firms alone account for more than 60 per cent of the electric power produced in the state of Arizona.[22/] If sales, rather than energy generation, are the criterion, their per cent of total sales is much higher since these firms purchase additional power for resale.

There were five Rural Electrification Association cooperatives operating in the sub-basin in 1960. They include the Sulphur Springs Valley Electric Co-op, Duncan Valley Electric Co-op, Graham County Electric Co-op, Trico Electric Co-op, and the Welton-Mohawk Irrigation and Drainage District. Other R.E.A. establishments have reported activities in earlier years -- such as the Ma-Yu Electric Co-op, the Verde Electric Co-op, and the Stonewall Electric Co. These firms reported no sales in 1960, however.

In addition to the publicly-owned Salt River Project, the smaller San Carlos Irrigation District has been operated for a number of years by the Bureau of Indian Affairs. Also, there are a few small publicly-owned Class "C" municipal establishments in the sub-basin, and they

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21/ Ibid., pp. 75-80.

22/ The Economy of Arizona, A Review of Arizona Population, Labor Force, Industries and Economic Outlook, Employment Security Commission of Arizona, Unemployment Compensation Division, Table 4-13 (1964), p. 53.

rely primarily on purchased power for redistribution, rather than self-generated power.

Table G-12 shows selected data -- including operating revenues -- for many sub-basin electric energy firms for the years 1940 through 1960.[23/] These data are partial for several reasons. One is that there were several years in which data for the largest private firm -- the Arizona Public Service Company -- were not available because prior to 1952 the company was three separate firms (Arizona Edison Company, Northern Arizona Light and Power Company, and Central Arizona Light and Power Company), not all reporting complete enough information. Further, Arizona Public Service Company data include energy sales to portions of Arizona counties located in other sub-basins of the lower basin, and therefore are overstatements of actual revenues occurring from within the Gila Sub-Basin itself.

Another major difficulty is with the Rural Electrification Association data. Its Annual Statistical Report includes data on only those cooperatives still having outstanding loans with the Administration. Since many of the R.E.A. firms did not report in 1960 -- even though they had reported in earlier years -- we can only assume that their loans have been entirely repaid and that they were no longer obligated to report operating data to the Administration.

Total 1940 operating revenues for all reporting companies (except Arizona Public Service Company), in Table G-12, were slightly in excess of $1.4 million. However, it seems reasonable to assume, from Table G-12, that its revenues approached $5 million in that year. The sum -- $6.4 million -- will be taken as the 1940 operating revenue base. By 1950, total operating revenues were in excess of $18.2 million, an almost three-fold increase over 1940. Much of this increase can be attributed to the rapidly expanding copper industry -- a large user of electric energy -- and to some population growth.

[23/] Data for Class "C" municipal establishments, as defined by the Federal Power Commission, are not available for this report.

TABLE G-12

SELECTED DATA FOR GILA SUB-BASIN ELECTRIC UTILITIES, 1940-1960[c/]

	1960	1959	1958	1957	1956	1955	1954	1953	1952	1951
Arizona Public Service										
Miles energized	1,640[a/]	1,603[a/]	1,573[a/]	1,364[a/]	1,317[a/]	1,154[a/]	1,086[a/]	1,047[a/]	916[a/]	908[a,d]
Consumers connected	173,543	165,313	156,490	149,800	141,369	133,789	127,476	122,022	116,132	108,818
Operating revenues (thousands of dollars)	$53,752	47,274	42,152	37,539	34,692	28,579	25,034	22,427	19,441	15,961
Tucson Gas, Electric, Light & Power Company										
Miles energized	645[a/]	619[a/]	598[a/]	553[a/]	448[a/]	409[a/]	400[a/]	388[a/]	326[a/]	312[a/]
Consumers connected	75,413	70,751	66,452	63,870	60,815	57,027	53,405	51,030	47,205	42,316
Operating revenues (thousands of dollars)	$16,215	14,063	11,934	10,599	9,494	8,181	7,188	6,427	5,575	4,529
Sulphur Springs Valley Electric Cooperative										
Miles energized	2,081	1,974	1,881	1,793	1,501	1,466	1,414	1,331	755	718
Consumers connected	7,772	7,200	6,813	6,313	6,250	4,789	4,001	3,648	3,337	2,979
Operating revenues (thousands of dollars)	$ 2,164	1,954	1,634	1,334	1,277	1,104	902	753	562	434
Duncan Valley Electric Cooperative										
Miles energized	256	254	251	255	255	255	255	n.a.*	n.a.	n.a.
Consumers connected	876	870	845	813	816	820	818			
Operating revenues (thousands of dollars)	$ 159	153	131	127	135	126	123			
Graham County Electric Cooperative										
Miles energized	652	643	636	629	623	619	606	587	557	382
Consumers connected	2,592	2,563	2,497	2,435	2,353	2,337	2,360	2,323	2,189	2,020
Operating revenues (thousands of dollars)	$ 582	568	453	490	526	477	452	444	341	347
Morenci Water & Electric Company										
Miles energized	n.r.**	n.r.	n.r.	n.r.	n.d.p.***					
Consumers connected	2,512	2,539	2,643	2,705						
Operating revenues (thousands of dollars)	$ 320	309	309	305						
Trico Electric Cooperative										
Miles energized	853	728	708	691	732	694	620	174	144	100
Consumers connected	1,506	1,316	1,233	1,135	1,046	978	883	372	349	306
Operating revenues (thousands of dollars)	$ 700	539	501	518	549	453	487	40	33	28

TABLE G-12 (cont.)

	1960	1959	1958	1957	1956	1955	1954	1953	1952	1951
Wellton-Mohawk Irrigation & Drainage										
Miles energized	346	346	346	346	311	n.d.p.				
Consumers connected	893	829	752	714	564					
Operating revenues (thousands of dollars)	$ 221	197	203	178	139					
Ma-Yu Electric Cooperative										
Miles energized							n.d.s.****	466	491	446
Consumers connected								771	714	572
Operating revenues (thousands of dollars)								$ 554	427	203
Verde Electric Cooperative										
Miles energized		n.d.s.	219	219	216	214	188	262	212	176
Consumers connected			520	480	464	433	402	443	380	333
Operating revenues (thousands of dollars)			$ 79	72	66	60	53	76	62	48
Stonewall Electric Company										
Miles energized						n.d.s.	1,414	116	116	116
Consumers connected							4,001	200	200	200
Operating revenues (thousands of dollars)							n.r.	n.r.	n.r.	n.r.
Salt River Project										
Miles energized	646[a/]	659[a/]	621[a/]	578[a/]	542[a/]	574[a/]	578[a/]	519[a/]	48[illegible][a/]	n.d.p.
Consumers connected	86,168	74,528	63,971	55,626	49,982	43,815	37,156	32,253	27,38[illegible]	
Operating revenues (thousands of dollars)	$ 29,926	26,822	22,192	18,308	15,297	13,363	11,573	10,164	8,595	
San Carlos Irrigation & Drainage District										
Miles energized	194[a/]	198[a/]	n.a.	189[a/]	189[a/]	189[a/]	183[a/]	183[a/]	17[illegible][a,b/]	117
Consumers connected	2,938	2,880		2,576	2,247	2,222	2,087	1,899	1,627	331
Operating revenues (thousands of dollars)	$ 868	777		841	941	744	723	794	764	n.r.
TOTAL[f/]										
Miles energized	7,313	7,024	6,833	6,617	6,134	5,574	5,330	4,230	4,173	3,275
Consumers connected	354,213	328,789	302,216	285,467	265,906	246,210	232,589	214,961	199,514	157,875
Operating revenues (thousands of dollars)	$104,906	92,665	79,590	70,312	63,115	53,086	46,634	41,678	35,800	21,549

TABLE G-12 (cont.)

	1950	1949	1948	1947	1946	1945	1944	1943	1942	1941	1940
Arizona Public Service											
Miles energized	822[a,d/]	958[a,d/]	e/	863[a,d/]	729[a,d/]	e/	584[d/]	e/	e/	e/	e/
Consumers connected	102,379	100,800		81,315	73,099		63,941				
Operating revenues (thousands of dollars)	$13,710	12,199		9,456	7,775		6,914				
Tucson Gas, Electric, Light & Power Company											
Miles energized	288[a/]	281[a/]	277[a/]	268[a/]	266[a/]	264	259	258	207	14[illegible]	145
Consumers connected	38,595	35,548	31,703	26,703	23,407	21,752	20,638	19,846	18,978	17,7[illegible]0	16,849
Operating revenues (thousands of dollars)	$ 3,756	3,468	3,088	2,554	2,160	2,010	2,036	2,005	1,705	1,49[illegible]	1,412
Sulphur Springs Valley Electric Cooperative											
Miles energized	652	n.a.	347	334	334	402	402	388	388	258	258
Consumers connected	2,755		2,263	1,964	1,684	1,702	1,580	811	767	608	n.r.
Operating revenues (thousands of dollars)	$ 353		284	248	249	196	150	92	73	40	n.r.
Duncan Valley Electric Cooperative											
Miles energized	175	n.a.	22	n.d.p.							
Consumers connected	772		616								
Operating revenues (thousands of dollars)	$ 65		29								
Graham County Electric Cooperative											
Miles energized	365	n.a.	221	207	159	n.d.p.					
Consumers connected	1,895		1,512	1,297	1,208						
Operating revenues (thousands of dollars)	$ 245		146	112	46						
Morenci Water & Electric Company											
Miles energized	n.d.p.										
Consumers connected											
Operating revenues (thousands of dollars)											
Trico Electric Cooperative											
Miles energized	199	n.a.	139	n.d.p.							
Consumers connected	276		92								
Operating revenues (thousands of dollars)	$ 72		9								

TABLE G-12 (cont.)

	1950	1949	1948	1947	1946	1945	1944	1943	1942	1941	1940
Wellton-Mohawk Irrigation & Drainage											
Miles energized	n.d.p.										
Consumers connected											
Operating revenues (thousands of dollars)											
Ma-Yu Electric Cooperative											
Miles energized	n.d.p.										
Consumers connected											
Operating revenues (thousands of dollars)											
Verde Electric Cooperative											
Miles energized	100	n.a.	100	n.d.p.							
Consumers connected	290		230								
Operating revenues (thousands of dollars)	$ 21		12								
Stonewall Electric Company											
Miles energized	116	n.a.	116	116	116	116	116	115	115	113	77
Consumers connected	200		200	200	200	200	190	200	191	226	n.r.
Operating revenues (thousands of dollars)	n.r.		n.r.	n.r.	n.r.	16	15	15	15	n.r.	n.r.
Salt River Project											
Miles energized	n.d.p.										
Consumers connected											
Operating revenues (thousands of dollars)											
San Carlos Irrigation & Drainage District											
Miles energized	117	n.a.	117	117	117	117	117	117	117	117	117
Consumers connected	331		331	331	336	341	322	302	290	295	n.r.
Operating revenues (thousands of dollars)	n.r.		n.r.	n.r.	17	n.r.	n.r.	n.r.	n.r.	24	n.r.
TOTAL[f]											
Miles energized	2,834	1,239	1,339	1,905	1,721	899	1,488	878	827	925	597
Consumers connected	147,493	136,348	36,947	111,810	99,934	23,995	86,671	21,159	20,216	18,909	16,849
Operating revenues (thousands of dollars)	$ 18,223	15,667	3,568	12,369	10,246	2,222	9,116	2,112	1,792	1,562	1,412

TABLE G-12 (cont.)

* Not available.
** Not reported.
*** No data prior to this year.
**** No data since this year.

a/ Circuit miles.

b/ Source changes from R.E.A. to F.P.C. data.

c/ Citizens Utilities Company has offices in Kingman (Lower Main Stem) and Nogales (Gila) data included in the Lower Main Stem summary.

d/ Data calculated from individual company data - Arizona Edison, Northern Arizona Light & Power and Central Arizona Light & Power merged in 1952 to form Arizona Public Service.

e/ Incomplete data - combined total not figured.

f/ Total is partial data only.

SOURCES: Statistics of Electric Utilities in the United States, Privately Owned, Annuals, 1940-1960, Federal Power Commission, Washington D.C.: U. S. Government Printing Office.

Statistics of Electric Utilities in the United States, Publicly Owned, Annuals, 1940-1960, Federal Power Commission, Washington D.C.: U. S. Government Printing Office.

Annual Statistical Report, 1940-1960, Rural Electrification Borrowers, U. S. Department of Agriculture, Rural Electrification Administration, Washington, D.C.: U. S. Government Printing Office.

The 1950-1960 decade witnessed tremendous growth in electric energy operating revenues. The 1960 value ($104.9 million) was over five and one-half times the 1950 revenues. Most of this growth can be attributed to two major causes -- the rapid net in-migration of population to the Gila Sub-Basin (and more particularly to the Phoenix and Tucson metropolitan areas), and the tremendous expansion of manufacturing activity in the sub-basin. The concomitant growth in both number of circuit miles energized and the number of consumers connected for the twenty-one year period is shown in Table G-12. It is interesting to note that the three largest firms referred to above had over 335,000 consumers in 1960, almost 95 per cent of the total -- 354,213.

The exact number of persons employed in this sector is unknown, but an estimate has been derived. Wage and salary data for the electric, gas, and sanitary services industry (Standard Industrial Classification sector number 49) totaled $34,005,000 in 1960.[24/] This sector employed 5,834 persons, earning an average annual wage of $5,829. Wage and salary payments of only the electric energy firms amounted to $25,004,000 in 1960; simple division by the average annual wage indicates electric energy employment of approximately 4,290. This represents but a small fraction of total sub-basin non-agricultural employment.

Interindustry relations -- The 1960 electric energy total gross output of $111,644,000 was slightly less than 3 per cent of the total of all sub-basin processing sector industries. Sales to final demand accounted for 44 per cent of the total -- $49,181,000, and households purchased the largest share ($35,132,000). Sales to all governmental units totaled $7,576,000, exports were $4,472,000 (Much of which represented sales of power to contiguous Arizona counties located in the Little Colorado and Lower Main Stem Sub-Basins), and sales to gross private capital formation and inventory additions taken together were slightly in excess of $2 million.

[24/] Employment and wage data are from unpublished records of the Arizona and New Mexico Employment Security Commissions.

Energy sales were made to almost every processing sector industry within the sub-basin. The largest purchase -- $11,730,000 -- was by wholesale trade, and the remaining trade sectors (including eating and drinking places) together had purchases of $10,733,000. Other significant energy sales were to primary metals --$6,131,000 ; copper mining -- $4,185,000; rentals and finance -- $2,244,000; and "all other manufacturing" -- almost $2 million. Sales to other processing sectors were less than $2 million each, and intraindustry transactions amounted to $15,850,000.

Electric energy inputs -- Purchases from all processing sector industries totaled $27,753,000 in 1960, 57 per cent of which were intraindustry transactions. The only inputs in excess of $1 million from other processing sector industries were supplied by rentals and finance -- $5,016,000, and other utilities -- $3,225,000.

Three-fourths of total gross outlays were autonomous sector purchases -- $83,891,000. The largest was wages and salaries -- $25,004,000, followed by tax payments to all governmental units -- $15,971,000; imports -- $15,356,000; and payments to resident sub-basin households through the "profits and other" income sector -- $13,560,000. Remaining autonomous sector outlays were for capital depreciation and inventory depletion.

Direct and indirect effects of the electric energy industry on the sub-basin economy -- The electric energy industry does not show a significant degree of interdependence within processing sectors. For each new dollar of electric energy sales to final demand, only $1.32 of transactions are generated within the sub-basin economy. The basic reason for this lack of interdependence is that the value of imports of electric energy for redistribution is significant, and energy generated within the sub-basin relies on natural gas for fuel -- all of which must be imported into the Gila.

Intraindustry transactions were $1.17 -- primarily a result of the intra-company purchase and sale of electric power. Only three other processing sector industries experience output increases of

$.01 or more when final demand sales of electric energy are increased by $1.00. They are: rentals and finance -- $.06; "all other utilities" -- $.04; and "all other manufacturing" -- $.01.

Water inputs -- While some power sold in this sub-basin is imported, the greatest share is locally generated. Steam-electric generation, with its attendant heat pollution potential, is the major process used for sub-basin energy generation. It is possible that water used for this purpose will become an important factor in the total water use requirements of the sub-basin.

Gilkey and Beckman estimate that, for the state as a whole, almost 3.5 billion gallons of intake water was supplied to the nine electric energy producing plants in 1960. All but 10.5 million gallons of purchased water came from company-owned wells. "No data are available regarding the quantities of water consumed or the amounts returned to supply."[25] Also, no data are reported on the condition of exhaust water -- either as to waste loadings or temperature.

[25] Gilkey and Beckman, op. cit., pp. 81-82.

TERTIARY INDUSTRIES AND CONSTRUCTION

OF THE GILA SUB-BASIN

By

Bernard Udis

Revised

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The tertiary industries are usually viewed as consisting of the trade and service sectors, transportation, utilities, government and finance. Since government is not considered a processing sector in this report, it is excluded from this analysis.

The trade sectors depend primarily upon local income and population. They also reflect the particular trade channels which have evoled in the region for the distribution of goods and services. Typically they cater to the needs of the local population[2] and mirror changes in the economy which have originated elsewhere in the "basic" industries whose levels of operations are determined outside the region. These basic industries are usually the "specialty" industries of the region which export a significant portion of their output to the rest of the country or to customers abroad.

As noted earlier, the trade categories are treated differently from other industries in input-output analysis. Since they are conceived of as providing time and place utility without changing the basic physical form of the goods, an attempt is made to get at "value added" by these sectors by entering only their gross margins into the transactions table. Gross margins are defined as the sum of operating expenses plus profit. On the basis of the findings of our field investigations, the following margins were used in the Gila Sub-Basin: 16.7 percent for wholesale trade, 22.7 percent for gas service stations, and 34.5 percent for "all other" retail trade.

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[1]In those sections of the country which draw large numbers of visitors from outside their own population, the trade and service sectors clearly no longer depend primarily upon the local population. This complicates any attempt at projecting future levels of output for these industries. For a discussion of this problem, see p. 108 in the chapter on projections and the portions of the final report which deal with outdoor recreation.

Wholesale Trade [2]

Interindustry relations---Total gross output of the wholesale sector amounted to $231.8 million in 1960, the seventh largest of the thirty six processing sector industries in the Gila. Roughly three-quarters of this amount ($176.2) went to the final demand sector. The remaining quarter of the gross output of wholesalers went to the domestic processing sector industries. Of these sales to the processing sector two industries -- contract construction ($21.8 million) and eating and drinking places ($7.1 million) accounted for 52.2 percent. The remainder of wholesaling outputs was widely distributed among other processing sector industries.

The three-quarters of gross output going to the final demand sector was largely concentrated in domestic investment, inventory accumulation and households. Together, these three absorbed more than four-fifths of wholesale sales to final demand.

Inputs of the wholesale sector----Approximately three-quarters ($172.8 million) of the gross outlays of wholesalers represented

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[2] According to the Census of Business for 1958, there were 1563 wholesaling establishments in the counties comprising the Gila sub-basin of which the largest number (1028) were found in Maricopa county. Pima county followed with 275 and then Pinal and Cochise counties with 57 and 56, respectively. In 1963 there were 2,005 wholesaling establishments in the Gila with the largest number (1,371) in Maricopa County.

purchases from the autonomous or payments sector. Labor services accounted for forty-five percent of these and the $82,874,000 wage bill gave the 17,724 employees of sub-basin wholesalers an average annual wage of $4,676. An additional $11.9 million came to domestic households from this industry in the form of profits and related payments. Imports from outside the Colorado River Basin of $42.6 million represented an additional 24.7 percent of wholesale purchases from the final payments sector.

Within the processing sector, transportation transactions of $ 13.4 million led the way with 22.7 percent of wholesaling's gross outlays to the processing sector industries. Electric energy, and rentals and finance accounted for 19.9 percent and 16.5 percent respectively. The tertiary industries and construction accounted for almost all remaining wholesale inputs from the processing sector.

Direct and indirect effects of the wholesale trade sector on the sub-basin economy.---Total sales of $ 1.37 are generated in the regional economy by each wholesale sale of $1.00 to final demand. This figure put wholesaling in eighteenth place and barely in the top half of processing sector industries. Intraindustry transactions of $1.02 were recorded. The largest interactions with wholesale trade were experienced by electric energy and transportation --- $0.07 each. Six other industries responded in amounts greater than $0.01 to a dollar of wholesaling sales to final demand. These were rentals and finance ($0.06), "all other" services ($0.04), "all other" retail ($0.03), "other" utilities ($0.02), "other" manufacturing ($0.02), and contract construction ($0.02).

Gas and Auto Service Stations[3]

Interindustry relations.---Auto service stations ranked twenty-third in total gross output with a figure of $33.8 million.

Sales to final demand of $19.8 million accounted for 58.7 percent of this industry's gross output, and sales to households of $16.8 million alone accounted for nearly eighty-five percent of this total. The only other sector taking over a million dollars of this industry's output was exports to the outside world.

All but five processing sector industries bought some of the output of service stations. Because of this wide distribution of gross output to the processing sector, the leading customers of service stations accounted for modest shares of the total. The leading outlets for service station sales were "other services" ($2.1 million or 15.1 percent), "other utilities" ($1.9 million or 13.7 percent), cotton ($1.7 million or twelve percent) and contract construction ($1.6 million or 11.8 percent).

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[3]The Census of Business shows 1434 service stations in the Gila in 1958 with Maricopa and Pima leading with 754 and 323, respectively. Pinal and Yavapai followed with 90 each. In 1963 there were 1,828 service stations in the Gila. Maricopa County led with 974.

Inputs to the gas and auto service station sector---Almost $26.3 million or over two-thirds of the gross outlays of service stations represented purchases from the payments sector. Fifty-five percent of the total was remuneration for labor services. The industry's wage bill of $12.4 million provided its 9753 employees with an average annual wage of $4787. Sub-basin households also received profits and related payments of $2.9 million from this industry. accounting for another 12.8 percent of payments sector inputs to

The only other sizeable figures were for inventory depletion ($3.9 million) and imports from outside the Colorado River Basin ($3.6 million).

With respect to processing sector suppliers, auto service stations received their largest deliveries from rentals and finance and transportation, each providing something over twelve percent of service station purchases from the processing sector, electric energy eleven percent, and "other utilities" a bit more than 8.5 percent. Again, the great bulk of service station suppliers among processing industries were in the tertiary group and construction.

Direct and indirect effects of the gas and auto service station sector on the sub-basin economy---Service stations ranked 23rd in interdependence, giving rise to $1.32 of total sales in the sub-basin economy for every service station sale of one dollar to final demand. Rentals and finance showed the greatest response -- $0.06. Eight other processing sector industries showed a response of at least $0.01 per dollar of final demand sales by regional service stations. These were electric energy ($0.05), transportation ($0.05) "other" utilities ($0.04), "other" services ($0.03), contract construction ($0.03), printing and publishing ($0.02), lodging ($0.02) and "all other" retail ($0.01). The intraindustry coefficient of $1.005 was quite small and ranked twenty-fourth among the thirty-six processing sector industries.

Eating and drinking places[4]

A few words are in order concerning this industry before we examine the findings of the input-output analysis. While classified as a retail trade sector in the *Census of Business*, for purposes of interindustry analysis, eating and drinking places are not treated in the same fashion as the other trade sectors. The margining of sales found in the trade sectors reflects the fact that there is no physical transformation of the commodity in this phase of its movement to the consumer. This, of course, is not true of restaurants where, for better or for worse, the food is cooked, baked, broiled, fried, or what have you. Thus no margining is applied to the transactions of this industry.

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[4]By *Census* enumeration in 1958, there were 2241 eating and drinking establishments in the Gila. Maricopa's 1271 and Pima's 438 again led the list. Pinal followed with 144. In 1963 there were 2,500 establishments in the Gila, with Maricopa's 1,446 leading the list of counties.

Interindustry relations.--The $117.7 million of gross output of the eating and drinking group earned twelfth rank for the industry among the processing sector industries of the Gila. This barely put it in the top third of these industries. Its $112.0 million of sales to final demand represented 95.2 percent of its gross output for a sixth ranking position in the sub-basin in terms of the share of its output going to other than domestic processing industries. Sales to households and exports to the outside world constituted nine-tenths of all sales to final demand by eating and drinking places. These two sectors absorbed $59 million and $44 million, respectively. Exports to other sub-basins of $5.6 million accounted for another 4.97percent of sales to final demand.

The remaining 4.8 percent of gross output of eating and drinking places was directed to the processing sector. Intraindustry transactions of $1.2 million ranked first here, accounting for a fifth of all processing sector purchases from eating and drinking. Rentals and finance and "other retail trade" each accounted for between fourteen and eighteen percent of the total. All remaining processing sector customers took less than ten percent of the total sales to their group.

Inputs of eating and drinking places.--These establishments spent $79.6 million or more than two thirds of their gross outlay on the output of the payments sector. Almost half (44.8 percent) of such purchases came in the form of imports from outside the Colorado River Basin. An additional 47.0 percent came from households. Labor services were in the neighborhood of $30 million and a wage bill of $29.3 million provided the industry's 8597 employees an average annual wage of $3410. While higher than its counterparts in the Lower Main Stem and the Little Colorado, this annual wage was relatively low among the processing sector industries of the Gila, ranking twentieth among the twenty four industries for which available data permitted the calculation of such a figure. Again, a large number of part-time workers and a reliance upon gratuities and payment in kind (free meals) contribute to a relatively low wage. Sub-basin households also received profits and related payments of $8.1 million from the eating and drinking group, accounting for an additional ten percent of outlays to the payments sector.

The most important processing sector suppliers of eating and drinking places were food and kindred products manufacturing ($12.1 million or 31.7 percent), "other services" ($7.2 million or 18.95 percent), wholesale trade ($7.1 million or 18.7 percent) and rentals and finance ($3.1 million or 8.1 percent). Once again, almost all processing sector suppliers to eating and drinking places were found in the tertiary group of industries.

Direct and indirect effects of the eating and drinking industry on the sub-basin economy---The regional economy responded in the amount of $1.48 for each dollar of final demand sales by the eating and drinking group. This earned the industry a twelfth rank among the processing sector's thirty six industries. A total of twelve other industries responded in amounts of at least $0.01 each time eating and drinking places experienced a $1.00 increase in its sales to final demand. Only three other industries -- other agriculture and food and kindred products manufacturing and other mining -- evoked a response of that magnitude in a larger number of industries, sixteen, thirteen and thirteen respectively. Thus, retail distribution of food and drink had a high degree of interdependence with the other processing sector industries of the sub-basin.

The largest interindustry response----$0.11-----was found in food and kindred products manufacturing. Wholesale trade and "all other services" came next with cumulative effects of $0.07 plus. Rentals and finance ($0.04), transportation ($0.03), and "other utilities" ($0.02) responded in amounts in excess of $0.02, while electric energy ($0.02), feeder livestock ($0.02), "all other retail" ($0.02), dairy operations ($0.01), forage, feed and food crops ($0.01) and construction ($0.01) all reacted by at least $0.01. The intraindustry coefficient of $1.01 ranked in twenty-first place among processing sector industries.

"All Other" Retail [5]

Interindustry relations----The "all other" retail group is a residual category within which new and used car dealers occupy an important position. Total gross output of $415.8 million placed

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[5] In 1958, the Census classified 1416 establishments in the Gila as "other retail trade." The two major metropolitan counties, Maricopa and Pima, led again with 782 and 304 establishments, respectively. In 1963 there were 1,834 "other" retail establishments in the Gila. Maricopa County led with 1,090.

this industry in a secondranking position in the sub-basin. Almost ninety percent of its output or $373.3 million was destined for the final demand sector. Households took almost seventy percent of this amount with inventory accumulation and exports out of the Colorado River Basin each accounting for an additional thirteen plus percent. The output of this industry was widely distributed among processing sector industries. However, the only processing industries taking more than ten percent of "other" retail's sales to their sector were cotton ($7.8 million or 18.2 percent), wholesale trade ($5.7 million or 13.3 percent), and contract construction ($5.3 million or 12.6 percent).

Inputs of the "other retail" group.--The payments sector accounted for eighty-three percent of this industry's gross outlays or $344.2 million. Households provided $189 million of labor services or almost three fifths of all purchases from the payments sector by the "other retail" group. This amount yielded an average annual wage of $5925 when distributed to the industry's 31,894 employees. Households received $22.7 million as profits and related income from "other retail" firms. Total payments to households of $211.7 million from "other retail" establishments ranked second in the sub-basin. Inventory depletion of $43 million and imports from outside the Colorado River Basin of $72.6 million accounted for 12.4 and 21.1 percent, respectively of inputs to the "other retail" group from the payments sector.

Purchases by "other" retail from the processing sector were as follows: rentals and finance $12 million or 16.7 percent; other services $11.2 million or 15.6 percent; printing and publishing, $10.3 million or 14.4 percent; transportation, "other" utilities, and electric energy followed with between 13 percent and 11 percent each.

Direct and indirect effects of the "other retail" industry on the sub-basin economy----Processing sector industries of the Gila responded with $1.25 of output for each $1.00 of final demand sales by the "other retail" group. This reaction ranked twenty-ninth in the sub-basin. The intraindustry coefficient of $1.01 was in twenty-second place.

Eight industries responded in amounts of at least $0.01 for each dollar of sales to final demand by the "other" retail group. The most pronounced reaction was rentals and finance's $0.04. Reactions of $0.04 also were found in "all other" services. Printing and publishing, transportation and "all other" utilities and electric energy followed with 3¢ reactions. The remainder of the prominently reacting group were contract construction ($0.02), "other" manufacturing ($0.01), and wholesale trade ($0.01).

Lodging

Interindustry relations----Lodging held eighteenth place among the Gila's thirty six processing sector industries when ranked by magnitude of gross output. Ninety-three percent of its total gross output of $46.9 million represented sales to the final demand sector, and of this, over eighty-six percent or $38 million went to tourists from outside the Colorado River Basin. Another $3 million or seven percent were exports to the residents of other sub-basins. These two classes of export sales together accounted for 88 percent of the total gross output of the lodging industry. Wholesaling purchases of $1.8 million accounted for the largest share of lodging's modest sales to processing sector industries----fifty four percent. Transportation took another 9.5 percent and "other utilities" and "other retail trade" 8.8 percent and 7.2 percent, respectively.

Inputs of the lodging industry----Almost three fourths of lodging outlays----$33.6 million----went to the payments sector. Households accounted for over forty percent and imports from outside the Colorado River Basin, $10.6 million or thirty two percent of payments sector sales to lodging. Depreciation allowances of $4.6 million represented another 13.6 percent. The industry's wage bill of $13.5 million provided its 5367 employees with the less than affluent average annual wage of $2696. This was the lowest annual wage among the twenty four processing industries for which we had data. A low level of hourly and weekly wages and part-time employment of the industry's predominantly female work force help explain this low annual wage. Households in the sub-basin also received $1.8 million as profits and related payments.

Within the processing sector, "other services" $3.2 million accounted for a fourth of lodging purchases followed by rentals and finance $1.8 million (14.2 percent), "other utilities" $1.7 million (12.8 percent), and contract construction's $1.3 million (10.3 percent).

Direct and indirect effects of the lodging industry on the sub-basin economy.---Lodging in the Gila sub-basin held the sixteenth position as a generator of economic activity. The direct and indirect effect in the sub-basin economy of $1.38 per dollar of lodging sales to final demand occupied sixteenth place in the list of thirty six processing sector industries. In terms of self-stimulation, however, lodging's intraindustry coefficient of $1.0005 was very low and ranked twenty-fifth in the sub-basin.

Each dollar of lodging sales to the final demand sector did evoke a response of at least $0.01 in in eleven other sub-basin processing industries. Only six other industries triggered a response of that magnitude in a larger number of industries. Reactions of at least a nickel were observed in "all other services" ($0.08), and the finance group ($0.05). Responding more than $0.02 were construction ($0.04), "other utilities ($0.04), wholesale trade ($0.03), and printing and publishing ($0.03). The remaining responses of at least $0.01 were found in "all other retail" ($0.02), food and kindred products manufacturing ($0.02), auto service stations ($0.02), and eating and drinking places ($0.01), and transportation ($0.01).

"All Other Services"

This sector includes all services not shown separately on the tables with the exception of professional services which have been included in the "profits and other" row.

Interindustry relations---The "other services" group produced a total gross output of $189.3 million in 1960 to earn ninth place among the thirty six processing sector industries in the Gila. Sixty seven percent of this amount or $126.1 million represented sales to the final demand sector. The major final demand customers of "other services" were households ($82.5 million or 65.4 percent) and all exports ($25.5 million or 20 percent).

The sales of "other services" were rather widely distributed in the processing sector. Only three industries accounted for more than ten percent of total processing sector purchases---"other retail trade" (17.8 percent or $11.2 million), intraindustry transactions (11.7 percent or $7.4 million), and eating and drinking places (11.4 percent or $7.2 million).

Inputs of the "all other services" industry---Four fifths of the total gross outlay of this industry or $151.6 million represented purchases from the payments sector. Imports from the outside world of $62.4 million and household sales to "other services" of $53.6 million accounted for 41.1 and 35.4 percent, respectively of payments sector inputs to "other services".
Profits and related payments added another $14 million to household incomes and constituted almost ten percent more of payments sector outlays by "other services".

Within the processing sector, intraindustry transactions of $7.4 million were the largest item and represented one fifth of total deliveries to "other services" from processing sector industries. Rentals and finance was close behind with $6.8 million of sales. Other industries providing more than five percent of such deliveries were "other" utilities, wholesale trade, "other" manufacturing, chemicals, service stations, transportation, and "other" retail.

Direct and indirect effects of the "other services" group on the sub-basin economy---The sub-basin economy experienced an addition of $1.27 to its output for each dollar of sales to final demand by the "other services" group. This was a rather moderate reaction and ranked twenty sixth among the Gila's thirty six processing sector industries. Despite the rather small size of the aggregate activity generated in the sub-basin by "other services," eleven other industries felt a nudge of at least $0.01 when its final demand sales increased by a dollar. Only six other industries evoked a response of that magnitude in a larger number of processing sector industries. The responding industries were rentals and finance ($0.05), wholesale trade ($0.03), "other utilities" ($0.02), construction ($0.02), electric energy ($0.02), "other" retail ($0.01), transportation ($0.02), and "other" manufacturing ($0.02).

chemicals ($0.01), service stations ($0.01), and printing and publishing ($0.01). The intraindustry coefficient of $1.05 was moderately large and ranked 7th in the processing sector.

Transportation

Interindustry relations----Transportation just missed a berth in the top third of industries with its total gross output of $99.4 million. It is an industry which primarily services other sub-basin processing sector industries and only 21.7 percent of its gross output----$21.6 million----went to final demand sector. Of this relatively small amount, domestic investment and exports to the outside world each took about a third. Exports to other sub-basins of the Colorado absorbed close to 8.4 percent and households another 15.7 percent.

Since transport sales to the processing sector were so widely distributed, only three processing industries took as much as ten percent of the sales of the transportation group. These were wholesale trade (13.5 percent), "other" retail trade (9.7 percent), and copper (8.4 percent).

Inputs of the transportation industry----Seventy one percent of gross outlays of the transportation group or $70.7 million went for purchases from the payments sector. Imports from outside the Colorado River Basin of $31.4 million was the largest payments sector supplier and accounted for 31.6 percent of the total. Imports from other sub-basins of $2.0 million added another 1.98 percent. Purchases of labor services from households of $27.2 million provided an average annual wage of $5,063 to the industry's 5,382 employees. Profits and related payments of $2 million were also paid to sub-basin households by the transportation industry.

Twenty nine percent of transport's gross outlays went to the processing sector. "Other manufacturing's" $5.7 million of deliveries to transportation constituted one fifth of all such processing sector deliveries. It was followed by the finance group's $4.5 million which represented another 15.7 percent. The only other processing sector industries whose sales to transport exceeded ten percent of the total were "other utilities" ($3.2 million or 11.3 percent) and intraindustry transactions of $2.9 million (10.1 percent).

Direct and indirect effects of the transportation industry on the sub-basin economy----Transportation sales to final demand of $1.00 gave rise to a cumulative effect of $1.38 from the processing sector of the sub-basin. This ranked fifteenth out of the thirty six industries of the processing sector of the Gila.

Nine of these industries responded by at least $0.01 for every such dollar of final demand sales by the transport group. Two industries reacted by more than five cents----"other manufacturing" ($0.07), and rentals and finance ($0.06). Four others experienced repercussions in their own operations of at least two cents---"other utilities" ($0.04), "all other services" ($0.04), wholesale trade ($0.02), and food and kindred products manufacturing ($0.02). The remaining three whose operations were increased by close to a penney were fabricated metals ($0.017), electric energy ($0.016), and "other mining" ($0.01).

The intraindustry coefficient of $1.04 ranked tenth in the sub-basin.

"All Other Utilities"

Interindustry relations---The utilities group, excluding electric power, ranked tenth in the sub-basin with total gross output of $166.1 million. Its sales to the final demand sector of $122 million constituted 73.5 percent of gross output. Households were the major customer in the final demand sector, and their purchases of $86.5 million accounted for seventy one percent of the total. Exports of $22 million took another eighteen percent. There was little concentration among a few major customers in the processing sector. The only processing industries which absorbed more than ten percent of the total were "other retail" with $7.9 million or 17.8 percent, and copper with $5.6 million or 12.17 percent. Wholesaling, transportation, rentals and finance, and electric energy each accounted for between seven & eight percent of "other utility" sales to the processing sector.

Inputs of "all other utilities"---This industry's purchases from the payments sector of $143.6 million represented eighty six percent of its gross outlays---a ratio exceeded by only four other industries. Imports of $64.6 million provided 45 percent of the total, while households, supplying $45.4million in labor services accounted for another 31.6 percent. Profits and related payments to households of $4.3 million added another three percent. The other payments sector industries supplied the remaining fifth.

Half of the fourteen percent of gross outlays which came from the processing sector was supplied by rentals and finance and "other services", each of which provided about $5.5 million or one fourth of processing sector sales to the "other utilities" group. Service stations and "other manufacturing provided 8.5 percent and 7.9 percent, respectively, of the total. Intraindustry transactions of $1.5 million accounted for another seven percent.

Direct and indirect effects of the "other utilities" group on the sub-basin economy---This industry was rather weak as a generator of economic activity in the sub-basin, giving rise to a total reaction of $1.18 among the region's processing industries for each dollar of its sales to the final demand sector. This figure ranked thirty third out of the Gila's thirty six processing sector industries. Seven other industries reacted in amounts of at least $0.01 for each dollar of such sales by "other utilities".

However, the degree of interdependence was rather small. The largest reaction, for example, was rentals and finance's $0.04. All other services also experienced a nudge of that magnitude. The remaining industries in the group all recorded reactions which hovered around $0.01---- construction ($0.02), other manufacturing ($0.01), wholesale trade ($0.01), service stations ($0.01), and transportation ($0.01). The intraindustry coefficient of $1.01 ranked nineteenth in the processing sector.

Contract Construction

Interindustry relations----Contract construction's gross output of $520.4 million led all thirty six industries in the processing sector of the Gila sub-basin. Sixty-eight percent of this total ($354.3 million) went to the final demand sector. As might be expected, the two major customers of the construction industry in this sector were domestic investment which took $168.1 million or forty seven percent of final demand purchases from construction, and state and federal government which took $82.1 million or twenty three percent of the total. Inventory accumulation absorbed another eleven percent, while households, exports outside the Colorado River Basin, and local government each accounted for roughly six percent of the total.

As was true in the other 5 sub-basins of the Colorado, here also intraindustry transactions led all other processing sector industries. Construction's sales to itself of $136.5 million represented eighty two percent of the industry's total sales to the entire processing sector. The only other outlets for construction sales in this sector which absorbed more than two percent of the total were rentals and finance (6.7 percent or $11.1 million) and "other retail trade" (2.2 percent or $3.7 million).

Inputs of contract construction----Construction's $293 million of purchases from the payments sector amounted to 56.3 percent of its total outlays. Households provided just over half of these purchases with $152.9 million. This wage bill yielded an average annual wage of $5948 to the industry's 25,696 employees. Households also received $7.0 million in the form of profits and related payments. Over thirty-eight percent of construction inputs from the payments sector came from imports.

Three fifths of construction's purchases from processing sector industries were intraindustry, with construction supplying itself $136.5 million of inputs. The only other processing sector industries providing more than five percent of construction's inputs from that sector were wholesale trade (9.6 percent or $21.8 million), stone, clay and glass products (7.6 percent or $17.3 million), and fabricated metals (5.6 percent or $12.8 million).

Direct and indirect effects of the contract construction industry on the sub-basin economy----Construction ranked seventh among the Gila's thirty six processing sector industries generating $1.69 of cumulative effects in the sub-basin economy for every dollar of its sales to final demand. Ten industries responded in amounts of at least $0.01. Wholesale trade's reaction of $0.06 was the largest, followed by stone, clay and glass ($0.06), rentals and finance ($0.04), fabricated metals ($0.04), "all other services" ($0.02), "all other retail" ($0.02), transportation ($0.02), "other mining" ($0.02), lumber and wood products manufacturing ($0.01), and "other manufacturing" ($0.01). In terms of interdependence, only ten other industries evoked reactions of at least $0.01 in a larger number of industries than did construction. The intraindustry coefficient of $1.37 was the largest among the processing sector industries of the Gila.

Rentals and Finance

Interindustry relations.---Rentals and finance ranked fifth in the processing sector of the sub-basin with total gross output of $301.9 million. Its sales to final demand of $202.1 million accounted for sixty-seven percent of gross output. The $145.1 million going to households constituted seventy-two percent of final demand sales of the finance group. Exports took another 13.4 percent ($27.1 million) and state and federal government 11.5 percent ($23.3 million).

The rentals and finance industry was the most pervasive in terms of the number of its trading partners. Every processing sector industry had some dealings with it.
As a result there was little concentration of finance outputs to a few major customers in the processing sector. Only one industry accounted for more than ten percent of the total---"other retail"

trade with twelve percent ($12 million). The purchases of eight other industries exceeded five percent of the total. In descending order, these were construction ($9.9 million), wholesale trade ($9.7 million), intraindustry transactions ($7.3 million), cotton ($7.0 million), "other" services ($6.8 million), "other" utilities ($5.6 million), food and kindred products ($5.4 million), and electric energy ($5.0 million).

Inputs of rentals and finance----Ninety percent of finance industry outlays represented purchases from the payments sector. Of this substantial figure of $271 million, the largest share (sixty two percent or $167.7 million) represented payments to households as profits and related income. This large entry reflects the convention of channeling property and related income through the rentals and finance sector. Payments to households for labor services amounted to $70.4 million. This yielded an average annual income of $5049 to the industry's 13,953 employees. As indicated in Table G-Y, total payments to households by the rentals and finance industry of $238,185,000 was the largest in the sub-basin. This figure represented almost eighty eight percent of payments sector purchases by rentals and finance. Imports of $13.4 million accounted for another five percent with depreciation and state and federal government each providing between two and three percent ($8.1 million and $6.6 million, respectively).

The major processing sector supplier of the finance group was contract construction. Its $11.1 million of sales to the finance group accounted for 36.2 percent of all such finance inputs. Next in importance were intraindustry transactions of $7.3

million which equalled one fourth of processing sector sales to the finance group. "Other utilities" accounted for 10.6 percent ($3.2 million). Electric energy and "other services" were the only other processing sector industries providing more than five percent of finance inputs with 7.4 percent ($2.2 million) and 6.2 percent ($1.9 million), respectively.

Direct and indirect effects of the rentals and finance industry on the sub-basin economy.---The rentals and finance sector was not a powerful generator of additional economic activity in the region. The $1.14 of direct and indirect effects accompanying each dollar of final demand sales by the finance group ranked thirty fourth among the Gila's thirty six processing sector industries. Only two other industries responded by at least $0.01 to each dollar increase in finance sales to final demand. They were contract construction ($0.05) and "other utilities" ($0.01). The intra-industry coefficient of $1.03 ranked thirteenth among sub-basin processing industries.

PROJECTED INTERINDUSTRY RELATIONS

GILA SUB-BASIN: 1980 and 2010

August, 1967

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PROJECTIONS

We are striving for long-range consistent projections for the Colorado River Basin in addition to a model of the region's structural interdependence in the base year -- 1960. It is true, of course, that the quality of any attempt to forecast the future structure of a region's economy through the input-output technique will be no better than the independently determined estimates of final demand used and the validity of the input coefficients. Nevertheless, we believe that the automatic internal consistency feature of input-output analysis will impose useful limits on the range of our forecasts of final demand, assuming that we have knowledge of factor productivity and of resource constraints within the region. As Evans & Hoffenberg have noted,

> . . . a reasonable structural relationship that accounts directly and positively for demand should give sensible results regardless of the values of the independent variables in the estimating equation. A regression relationship based on historical data, on the contrary, may in some instances yield estimates that contradict physical possibilities. The degree to which past variation is "explained" by the equation as judged by the coefficient of correlation, is not evidence in determining whether a representation of the underlying structural situation has been obtained.[1]

This advantage of input-output technique is especially valuable in our study since one of our major tasks will be to determine the feasibility of alternative growth patterns in the Colorado Basin in terms of anticipated resource availability -- particularly water. Thus, once the water requirements, both quantitative and qualitative, which match alternative demand structures have been ascertained, we should be able to render a judgment on the ability of the region to sustain a particular development path.

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[1]W. Duane Evans and Marvin Hoffenberg, "The Nature and Uses of Interindustry-Relations Data and Methods," in Conference on Research Income and Wealth, <u>Input-Output Analysis: An Appraisal</u> (Princeton: Princeton University Press, 1955), pp. 53-123, especially p. 112.

The Stability of Technical Coefficients

There is evidence that for relatively short periods input coefficients are quite stable. Also, given the relatively weak interdependence among many sectors of the sub-basin economies, some of the direct input coefficients are quite small. Even fairly large changes in these coefficients would not have a serious impact upon the interindustry projections. One can be equally sure, however, that for long-term projections regional input-output coefficients will not be stable. These coefficients can be affected by: (a) changes in relative prices with possible substitution among factors of production, (b) technological change, and (c) changes in interregional trade patterns. Each of these might have an important effect upon the regional coefficients and hence upon the accuracy (or even the "reasonableness") of the projected transactions tables.

It should also be mentioned that the projections of gross output, and hence the new transactions tables, can also be affected by errors in projection of final demand. There is no fixed formula for projecting final demand. Different methods have been employed in making the projections for agriculture; for the mining, manufacturing and energy sectors; and for the trade, service and construction sectors. The assumptions on which the final demand projections are based, and the projection methods used, are discussed in a later section of this chapter

Long-Run Change in Input-Output Coefficients

The static, open input-output model used in the Colorado River Basin Economic Study is based upon three fundamental assumptions. These are that:

(1) Each group of commodities is supplied by a single producing sector.

(2) The inputs to each sector are a unique function of the level of output of that sector.

(3) There are no external economies or diseconomies.[2]

It is assumed that the demand for part of the output of one nonautonomous sector (x_i) by another nonautonomous sector (x_j) is a direct

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[2] Chenery and Clark, *op. cit.*, pp. 33-34.

function of the level of production in x_j. This is expressed symbolically in equation (1):

$$(1) \qquad x_{ij} = a_{ij} X_j$$

The transactions table may then be described by equation (2):

$$(2) \qquad X_i = \sum_{j=1}^{n} a_{ij} (x_j) + x_{ia} \qquad (i = 1. . .n)$$

where x_j is the amount demanded by the j-th sector from the i-th sector, and x_{ia} is the end product demand of the autonomous sector.

The direct input coefficients in equation (1) may be rewritten as

$$(3) \qquad a_{ij} = \frac{x_{ij}}{X_j},$$

and it is the stability (or lack of stability) of these input coefficients that we wish to examine.

The Effects of Changes in Prices and Technology on the Direct Input Coefficients

The trend of some prices can be projected with reasonable accuracy. The "price" of labor (wages plus fringe benefits) has been steadily rising, and it is relatively safe to assume that this rise will continee. It is less easy to forecast future changes in the prices of some of the other factors of production. In making consistent projections, however, it is not absolute price changes but relative price changes that matter since it is the latter which are likely to induce substitution among the factors of production. This raises some questions: What will be the direction and rate of changes in prices for the various factors of production? And how are these relative changes likely to affect the demand for different factors of production?

These are not simple questions to answer, but it might not be necessary to answer them directly since the effects of relative price changes are not completely independent of technological change. This can be illustrated by a simple example. If labor costs rise more rapidly than the cost of capital, management will have an inducement to substitute machinery for labor. This substitution is not a continuous process since it is partly dependent upon discovery and innovation. It also depends upon the extent to which existing machinery has been depreciated, the state of the market, and a number of other variables. But in many industries there has been a long-run substitution of capital for labor, and it is reasonable to suppose that this is at least partly a function of relative changes in labor and capital costs.[3] Thus, if it is possible to adjust the a_{ij}'s for long-run technological change, some of the effects of relative price changes will be included. If these changes can be projected, the resulting coefficients will have been "adjusted" to some extent at least for anticipated changes in relative prices and technology.

In an effort to adjust for such changes a simple "dynamic" model has been constructed.[4] The input coefficients in the 1960 tables represent averages based on the sample establishments included in the various sub-basin surveys. Within each industry and sector, however, there are variations around these averages, and to a large extent the different input patterns are the result of variations in productivity among the establishments in each industry and sector. These variations in productivity in turn are primarily a function of the combinations of capital and labor in the sample establishments.[5]

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[3]See, for example, U.S. Department of Labor, Bureau of Labor Statistics, Technological Trends in Thirty-Six Major American Industries (Washington, D.C.: Office of Productivity and Technological Developments, 1964).

[4]The general outline of this technique for adjusting input coefficients was suggested by Professor Wassily Leontief of Harvard University. The procedure is a simplified version of methods used by others for projecting technical coefficients for specific industries. See, for example, Anne P. Carter, "Incremental Flow Coefficients for a Dynamic Input-Output Model with Changing Technology," in Tibor Barna (ed.), Structural Interdependence and Economic Development (New York: St. Martin's Press, 1963), pp. 277-302; and Per Sevaldson, "Changes in Input-Output Coefficients," idem., pp. 303-328.

[5]It is important to stress that not all variations in productivity are the result of different capital/output ratios. An example of another influence, which complicates the statistical analysis, is given in a later section.

The measurement of productivity is not a simple process. The following formulas were used to estimate productivity in the sample establishments in the lower sub-basins:

$$(4) \qquad P = \frac{O}{(L)} ,$$

and

$$(5) \qquad P' = \frac{O}{(C)+(L)}$$

where P and P' equal "productivity," O is the gross output of the establishment measured in dollars, C represents capital inputs, and L represents labor inputs. Ideally, the labor inputs would be measured in terms of man-hours or man-years. Data were not available on this basis, however, and in our computations L measures the annual average number of production workers in each establishment. Also, ideally C should measure the stock of capital in the establishment in 1960. Since this figure could not be obtained for each establishment, that year's depreciation allowance was used as a substitute. In effect, the depreciation allowance was used to weight the labor input to give an approximation of output per unit of capital plus labor inputs. This is admittedly a rough measure, but it would have been useless to employ a more refined formula given the data limitations.

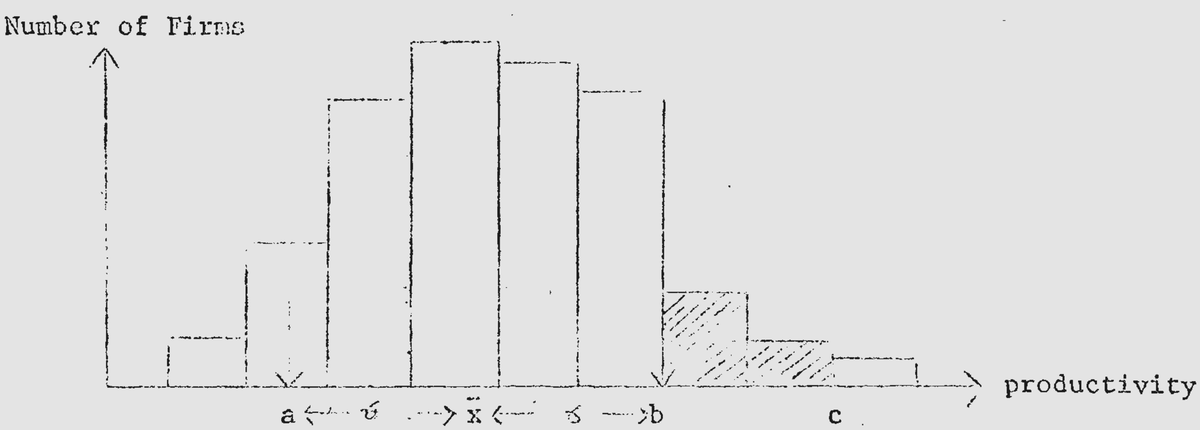
The use of two formulas to estimate "productivity" requires an explanation. It has long been customary to measure productivity in terms of labor inputs, and this practice has been followed in the present study by using formula (4) above. It is possible, however, for two establishments in the same industry to produce the same number of units of output in a given time period, and yet have widely different labor inputs. If this occurs, examination will generally reveal that the establishment with smaller labor inputs has correspondingly higher capital inputs. For this reason, a second measure of productivity -- the one represented by formula (5) -- was also computed for each industry and sector.[6] The two productivity

[6]For a detailed discussion of the two types of productivity measure see Solomon Fabricant, Basic Facts on Productivity Change (New York: National Bureau of Economic Research, Inc., Occasional Paper 63, 1959), pp. 3-13.

indexes computed for sample establishments in the lower sub-basins were used to identify the more "advanced" establishments in each industry and sector. In general, it was assumed that the establishments with the highest capital/output ratios fell in this category. Thus primary reliance was on the measures computed by formula (5). The measures computed by (4) were used largely as a check to help spot unusual sample establishments in each industry or sector.

If we assume for the moment that there are a large number of establishments in each industry and sector surveyed, a frequency distribution of P's might look something like Figure P-1.

Figure P-1

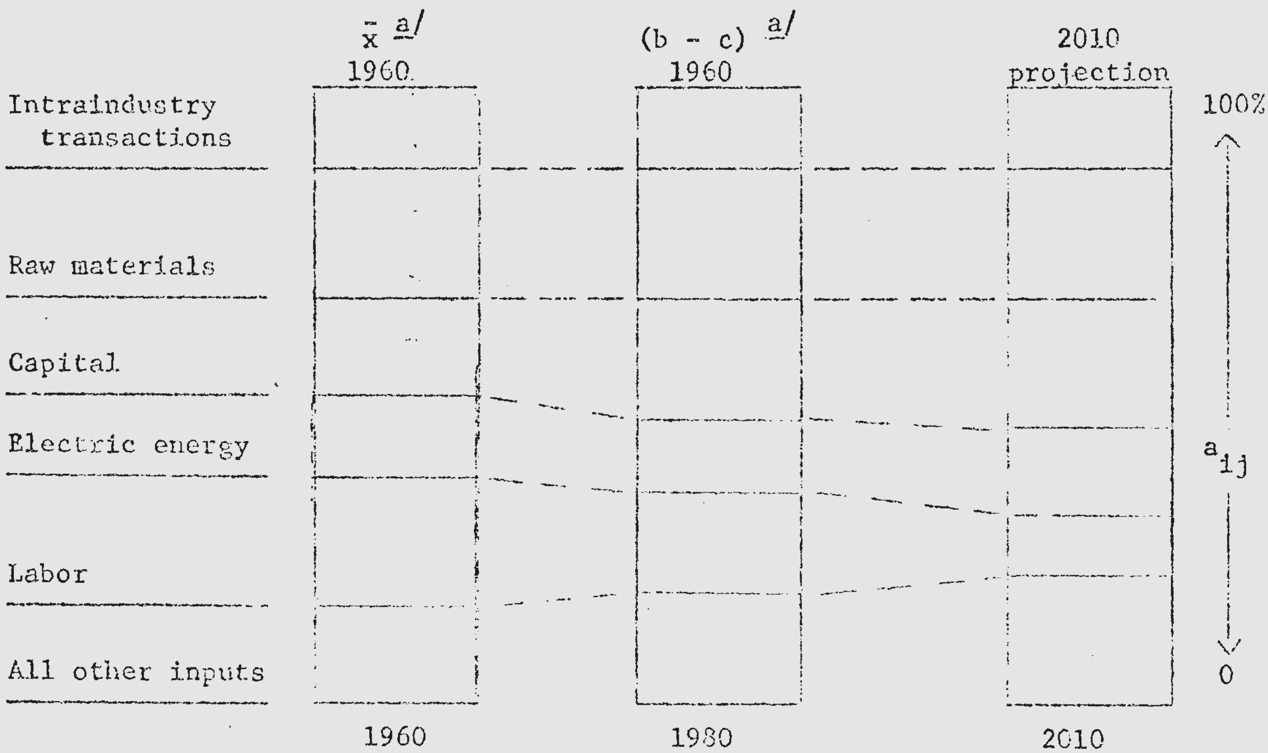


The $\bar{x}$ represents the mean, and the interval a to b represents the mean plus or minus one standard deviation. In a normal distribution this would include about 68 per cent of the firms. In this study, the a_{ij}'s are approximately representative of the firms with average productivity, or $\bar{x}$ in this distribution.

Consider for a moment the firms in the shaded interval (b - c) of Figure P-1. These are establishments with relatively high levels of productivity. In general, although this is not necessarily true, these will be newer firms with more advanced equipment than those in the interval (a - b). They will also be "better managed" than those which fall in the range of the mean plus or minus one standard deviation. Let us assume that the firms in the interval (b - c) are about twenty years "newer" on the average than those which fall in the interval (a - b). We can make the further assumption that competitive pressures will force the firms in the interval (a - b) to try to emulate those in the interval (b - c), and that new firms coming into the industry will more closely resemble the newer firms than those in the interval (a - b). That is, we are assuming that there will be steady improvement in industry-wide productivity. If these assumptions are at all realistic the "average" firm in 1980 will roughly approximate the "superior" firms in 1960, and we can estimate the average input coefficients for 1980 from those of the establishments in the interval (b - c) in 1960. From these, a new table of a_{ij}'s can be constructed and used to make the 1980 projections. The input coefficients can then be extrapolated to 2010. This procedure is illustrated by the hypothetical example of Figure P-2.

Figure P-2

INPUT COEFFICIENTS FOR A HYPOTHETICAL INDUSTRY
AS A PER CENT OF TOTAL INPUTS



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[a]Based on 1960 interview data. Figures at bottom of each column show years for which these input patterns will be used.

For purposes of this illustration assume that intraindustry transactions and the raw material coefficient in this industry remain unchanged. Assume, however, that there will be a substitution of capital for labor. The input coefficients for 1980 are the average coefficients for establishments in the 1960 interval (b - c) in Figure P-1. If we assume that this substitution will continue, the changes can be projected to 2010 to give the input coefficients shown by the third bar of Figure P-2.[7]

The question might be raised: Why select the firms in the interval (b - c) of Figure P-1? Why not take the "best" firm to the right of c in this Figure?

The answer is that an effort is being made to project a "representative" firm in 1980, and this is not necessarily the "best" firm in 1960. The Office of Productivity and Technological Developments of the U.S. Department of Labor at one time considered using the "best" (i.e. highest-productivity) firm in its surveys in making national projections of technological change. Upon investigation, however, it was found that the "best" firm in many cases was often so atypical that it would be unsafe to use it for projection purposes. Such firms may be relatively small, family-owned operations, and the persons who run the firm are highly motivated. They do not necessarily have the latest equipment, and are not necessarily the "best" firm in the industry in a technological sense. Hence, a safer assumption is that average productivity in some future year will be more nearly approximated by that found in a small sample of "representative" superior firms in the base period.[8]

Some Practical Considerations Involved in Applying the Simple Dynamic Model to the Sub-Basins

The simple model sketched above was based upon a number of assumptions, and few of these assumptions apply to this study. The major problem is that in only a few sectors -- and these are largely nonmanufacturing -- are there enough establishments in the sample to provide a

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[7] Such projections must be made cautiously rather than mechanically and would not necessarily be the linear extrapolations suggested by Figure P-2.

[8] This paragraph is based on comments made by Mr. Leon Greenberg, Bureau of Labor Statistics, at the Conference on Manpower Projections held at the Brookings Institution, Washington, D. C., June 25-26, 1964.

frequency distribution which even begins to approximate that sketched in Figure P-1. In the cases where there are enough establishments in the sample -- say twenty or more -- variations similar to those assumed in the model were found. Unfortunately, even in these cases not all of the questionnaires were complete enough to permit the mechanical calculation of new "average" coefficients for 1980. Some approximation was required, and here it became necessary to rely upon the extrapolation of national productivity trends to round out the picture. Also, there is no way of knowing even in these cases whether the superior establishments in the sample are "twenty years ahead of the times" when compared with the average establishments in 1960. In spite of these problem, it appears that the best estimates of a_{ij}'s for 1980 will be those computed from a small sample of superior establishments operating in 1960.

The problem is even more acute in the case of other sectors where our survey was limited to a small number of firms. Equally wide variations in "productivity" were found in these sectors, but it required discussion with the individual interviewers in most cases before a decision could be made about using one or two of the superior firms in 1960 as prototypes of the "average" firm in 1980. Again it was necessary to supplement the survey data with projections of national trends to estimate the input coefficients for these industries and sectors in 1980. The problem of extrapolation to 2010 was also a serious one, but if one assumes that "reasonable" input coefficients were projected to 1980 the latter problem may be viewed as manageable.

The Effects of Changing Patterns of Trade on Regional Input Coefficients

In regional input-output analysis particular attention must be directed to the influences of changing trade patterns on the region's input coefficients In his recent book, Miernyk gives a lucid example of this problem which might well have been drawn from the Colorado River Basin:

> Assume that in a base period, a region relies heavily upon some extractive activity -- say the mining of coal and various minerals. At one stage of the region's development, both the coal and ore might be shipped to other regions. Since

ore is in general a "weight-losing" material, however, at some point it will become economical to locate a concentrating mill close to the mines. The minerals will then become an input to the concentrating mill, and only the metal concentrate will be exported. If the production of this ore expands, however, it might soon become economical to locate a smelter in the region. The concentrate will then no longer be an export but will become an input to the smelter. The smelter, in turn, could stimulate the growth of various types of fabricating operations in the area, and these might attract satellite activities. The location of a smelter and of fabricating activities in the region would change the distribution pattern of coal mined in the area. The smelter would use coal as inputs, and this might also be true of some of the fabricating plants, so that relatively less coal would show up in the export column as some part of regional production became inputs to establishments in the area.[16]

The high degree of specialization found in regions of the country make such changes in trade patterns a potential threat to the stability of technical coefficients. Even if similar technology were assumed for all parts of the country, questions of interregional trade patterns and sector composition would somehow have to be handled in any effort to project through the use of input-output analysis.

Locational theory and empirical location studies have been helpful in making projections of structural changes in the sub-basin economies to 1980 and 2010. The first step was to determine the kinds of economic activities not now represented in the sub-basins which might locate there between now and 1980. Following this, it was necessary to estimate their total purchases and sales on the basis of population projections, and projected changes in the outputs of existing industries. National demand for the output of these industries (as well as of existing industries) was estimated. Then the share of national demand which will be supplied by industries in the sub-basins was determined. Probable changes in import and export patterns for each of the industries and sectors currently operating in the sub-basins was also estimated. None of this was easy, but it was necessary in order to anticipate changes in the structure of the sub-basin economies and to make the projected input-output tables operationally significant.

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[9] William H. Miernyk, The Elements of Input-Output Analysis, op. cit. pp. 71-72.

After projecting the activities that are most likely to appear in the sub-basins between now and 1980, the final step was to estimate their input coefficients (as well as their impacts on imports and exports). Here we were forced to rely upon preliminary input coefficients from other regional studies and on national coefficients which could be used as a first approximation to the regional coefficients. These were then adjusted to take into account differences in the characteristics of the regional economies and the national economy.

The many adjustments necessary to allow for structural change, and changes in trade patterns, required a number of assumptions and a certain amount of judgment. It must be emphasized that the end result is a series of projections, based upon probability or likelihood, rather than predictions. It is probably safer, however, to use the tools of location theory, and the experience of earlier location studies, in projecting the sub-basin economies to 1980 and 2010 than to make the assumptions that their present structures will remain unchanged, and that the input coefficients for 1960 will still apply in 1980 and 2010.

PROJECTIONS OF INTERINDUSTRY RELATIONS IN THE GILA SUB-BASIN, 1980 and 2010[10]

A summary of the projections of final demand for each industry included in the processing sectors of the 1960 transactions table for the Gila Sub-Basin appears in Table P-1. Following it, projected interindustry transactions tables and their derivitive tables of direct, and direct and indirect coefficients appear as Tables G-1980$_{a,b,c}$ and G-2010$_{a,b,c}$. The projections of final demand for each sector were made by the individuals responsible for that particular industry group.[11] Direct input coefficients for 1980 and 2010 for all processing industry sectors were initially made by Professor William H. Miernyk, Director, Regional Research Institute, West Virginia University. They were checked by the individuals primarily responsible for individual sectors.[11]

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[10] The projections which follow have been described in various staff memoranda as "unconstrained." What is meant by this is that the quantity and quality of water is expected to be available for economic activity in the Gila Sub-Basin in 1980 and 2010 is assumed to be at least equal to the 1960 water supply. In a final report on the economic study of the Colorado River Basin to be forthcoming shortly, this artificial constraint will be relaxed and the economic consequences of reduced water availability and deteriorating water quality will be considered.

[11] Projections of agricultural activity were made by Mr. Lynn Wilkes of the Economic Research Service, Department of Agriculture, Salt Lake City, Utah. The manufacturing, mining and electrical energy section projections were done by Dr. John H. Chapman, Jr., Assistant Professor of Economics at West Virginia University. Projections for the tertiary industries (trade, service, construction, government, etc.) were made under the direction of Bernard Udis, Bureau of Economic Research, University of Colorado, Boulder and Gilbert W. Bonem, Department of Economics, University of New Mexico, Albuquerque.

Table G-P-1

1960 Final Demand, and Final Demand Projected to 1980 and 2010, by Sectors
In the Gila Sub-Basin
(thousands of dollars)

Industry Sectors	1960 Final Demand	1980 Final Demand	1960 - 1980 % Change	2010 Final Demand	1960 - 2010 % Change
Range Livestock	$ 1,137	$ 3,381	197.4%	$ 6,674	487.0%
Feeder Livestock	57,913	29,930	- 48.3	11,060	- 80.9
Dairy	3,212	3,381	5.3	38,733	1,105.9
Forage, Feed & Food Crops	4,856	1,171	- 75.9	- 0 -	- 0 -
Cotton	127,272	176,959	39.0	202,330	59.0
Vegetables	48,001	75,849	58.0	84,895	76.9
Citrus Crops	6,338	7,559	19.3	9,524	50.3
Forestry	- 0 -	- 0 -	- 0 -	- 0 -	- 0 -
Other Agriculture	7,218	14,031	94.4	20,975	190.6
Uranium	563	614	9.1	906	60.9
Copper	2,568	3,852	50.0	7,44	190.0
Other Mining	31,913	47,231	48.0	74,996	135.0
Food & Kindred Products	160,945	436,161	171.0	587,210	264.9
Lumber & Wood Products	18,161	35,959	98.0	74,460	310.0
Furniture & Fixtures	12,848	20,942	63.0	30,321	136.0
Paper & Pulp	3,260	5,216	60.0	10,758	230.0
Chemicals	4,053	12,159	200.0	31,694	682.0
Primary Metals	386,300	579,450	50.0	1,124,133	191.0
Printing & Publishing	22,591	49,474	119.0	106,855	373.0
Fabricated Metals	17,359	46,552	168.2	101,377	484.0
Textiles & Apparel	14,583	20,562	41.0	30,334	108.0
Leather & Leather Goods	350	847	142.0	1,614	361.1
Stone, Clay & Glass Products	8,898	18,063	103.0	44,134	396.0
Other Manufacturing	236,526	451,765	91.0	808,917	242.0
Wholesale Trade	176,236	736,362	317.8	1,699,314	864.2
Service Stations	19,838	76,176	284.0	175,791	786.1
Eating & Drinking Places	112,042	451,409	302.9	1,041,724	829.8
Other Retail Trade	373,304	1,523,507	308.1	3,515,822	841.8
Agricultural Services	140	200	42.9	350	150.0
Lodging	43,675	139,330	219.0	396,127	807.0
Other Services	126,126	533,142	322.7	1,526,874	1,110.6

(Continued)

Table G-P-1 (Cont'd.)

1960 Final Demand, and Final Demand Projected to 1980 and 2010, by Sectors
In the Gila Sub-Basin
(thousands of dollars)

Industry Sectors	1960 Final Demand	1980 Final Demand	1960 - 1980 % Change	2010 Final Demand	1960 - 2010 % Change
Transportation	$21,603	$71,516	231.0%	$166,664	671.5%
Electric Energy	49,181	154,428	214.0	327,545	566.0
Other Utilities	122,015	464,209	280.5	124,365	1.9
Contract Construction	354,308	1,731,315	388.6	4,185,393	1,081.3
Rentals & Finance	202,129	933,083	361.6	3,776,377	1,768.3

Source: Tables G-S, 1980-a and 2010-a.

Note: Each row shows sales by the industry at the left to all industries listed at the top of the table. Each column shows purchases by the industry listed at the top of the table from each industry listed down the left margin.

Industry Producing \ Industry Purchasing		1 Range Livestock	2 Feeder Livestock	3 Dairy	4 Forage, Feed & Food Crops	5 Cotton	6 Vegetables	7 Citrus Crops	8 Forestry	9 All Other Agricul-ture	10 Uranium	11 Copper	12 All Other Mining
Agriculture	1. Range Livestock	0	41,153	0	0	0	0	0	0	0	0	0	0
	2. Feeder Livestock	0	0	0	1,611	0	0	192	0	0	0	0	0
	3. Dairy	0	0	941	575	0	0	90	0	0	0	0	0
	4. Forage, Feed & Food Crops	2,736	20,808	29,973	58	0	0	0	0	2,799	0	0	0
	5. Cotton	0	0	0	0	215	0	0	0	0	0	0	0
	6. Vegetables	0	0	0	0	0	78	0	0	0	0	0	0
	7. Citrus Crops	0	0	0	0	0	0	11	0	0	0	0	0
	8. Forestry	0	0	0	0	0	0	0	0	0	0	0	0
	9. All Other Agriculture	0	0	0	0	0	0	0	0	67	0	0	0
Mining	10. Uranium	12	0	0	0	0	0	0	0	0	12	0	164
	11. Copper	0	0	0	0	0	0	0	0	0	0	13,178	328
	12. All Other Mining	4	0	0	0	0	0	0	0	0	4	3,514	24,637
Manufacturing	13. Food & Kindred Products	730	5,896	2,606	0	3,653	0	102	0	4,465	0	4,393	0
	14. Lumber & Wood Products	6	0	0	0	0	0	0	0	0	6	1,318	821
	15. Furniture & Fixtures	0	0	0	0	0	0	0	0	0	0	0	0
	16. Paper & Pulp	0	0	0	0	0	0	0	0	44	0	0	0
	17. Chemicals	0	0	0	2,877	6,446	5,307	688	0	200	4	8,785	3,121
	18. Primary Metals	0	0	0	0	0	0	0	0	0	0	439	2,464
	19. Printing & Publishing	0	0	0	0	0	0	23	0	0	3	3,514	1,642
	20. Fabricated Metals	0	0	0	0	0	0	0	0	0	12	3,953	2,792
	21. Textiles & Apparel	0	0	0	0	0	0	0	0	0	0	0	0
	22. Leather & Leather Goods	0	0	0	0	0	0	0	0	0	0	0	0
	23. Stone, Clay & Glass	0	0	0	0	0	0	0	0	0	32	2,196	3,285
	24. All Other Manufacturing	0	0	0	58	1,934	156	34	0	44	8	3,953	1,642
Trade	25. Wholesale Trade	137	809	434	806	3,653	1,015	102	6	311	2	3,953	2,464
Trade (Retail)	26. Service Stations	547	231	579	806	2,363	781	90	42	111	2	1,757	657
	27. Eating & Drinking Places	0	0	0	0	0	0	0	0	0	1	0	821
	28. All Other Retail	182	2,890	1,376	2,474	11,388	3,278	316	21	2,732	9	2,196	3,285
Services	29. Agricultural Services	0	925	0	4,834	35,452	156	3,882	0	444	0	0	0
	30. Lodging	0	0	0	0	0	0	0	0	0	1	2,196	1,478
	31. All Other Services (Except Professional)	0	0	0	58	215	78	23	0	22	8	8,785	3,285
	32. Transportation	547	2,081	2,172	1,611	2,578	2,420	11	36	200	16	18,449	11,497
Utilities	33. Electric Energy	274	231	652	518	2,578	1,249	271	0	178	47	8,346	9,034
	34. All Other Utilities	137	116	145	58	859	78	11	0	67	12	8,785	4,599
	35. Contract Construction	0	0	0	0	0	0	0	0	0	40	4,393	1,971
	36. Rentals & Finance	5,517	2,428	1,520	1,726	10,743	2,185	1,456	57	555	20	2,196	27,922
	37. Final Payments	34,467	38,031	32,001	39,474	132,784	61,269	3,984	1,938	9,975	551	332,963	57,825
	38. Total Gross Outlays	45,596	115,599	72,399	57,544	214,861	78,050	11,286	2,100	22,214	790	439,262	165,734

Industry Producing \ Industry Purchasing	13 Food & Kindred Products	14 Lumber & Wood Products	15 Furniture & Fixtures	16 Paper & Pulp	17 Chemicals	18 Primary Metals	19 Printing & Publishing	20 Fabricated Metals	21 Textiles & Apparel	22 Leather & Leather Goods	23 Stone, Clay & Glass	24 All Other Manufactur-ing	25 Wholesale Trade
1. Range Livestock	1,062	0	0	0	0	0	0	0	0	0	0	0	0
2. Feeder Livestock	83,866	0	0	0	0	0	0	0	0	0	0	0	0
3. Dairy	67,411	0	0	0	0	0	0	0	0	0	0	0	0
4. Forage, Feed & Food Crops	0	0	0	0	0	0	0	0	0	0	0	0	0
5. Cotton	37,687	0	0	0	0	0	0	0	0	0	0	0	0
6. Vegetables	2,123	0	0	0	0	0	0	0	0	0	0	0	0
7. Citrus Crops	3,716	0	0	0	0	0	0	0	0	0	0	0	0
8. Forestry	0	2,100	0	0	0	0	0	0	0	0	0	0	0
9. All Other Agriculture	4,777	0	0	0	0	0	0	0	0	0	0	0	0
10. Uranium	0	0	0	0	0	0	0	0	0	0	0	0	0
11. Copper	0	0	0	0	0	421,904	0	0	0	0	0	0	0
12. All Other Mining	0	0	0	0	8,987	33,752	0	4,605	0	0	19,324	1,427	0
13. Food & Kindred Products	20,170	0	0	0	0	603	104	0	0	204	0	4,994	0
14. Lumber & Wood Products	0	933	908	7,829	0	1,205	0	0	0	0	0	713	0
15. Furniture & Fixtures	0	0	1,372	0	0	0	0	0	0	0	0	0	0
16. Paper & Pulp	5,308	58	807	1,678	0	0	6,219	0	0	1	0	1,427	0
17. Chemicals	531	58	0	22	786	603	0	0	0	0	0	4,281	0
18. Primary Metals	0	0	0	0	0	6,027	0	7,073	0	0	0	8,561	0
19. Printing & Publishing	4,777	175	202	134	337	3,616	1,970	658	37	5	703	5,707	923
20. Fabricated Metals	0	350	0	0	0	1,808	311	8,388	0	0	0	4,994	0
21. Textiles & Apparel	0	0	0	0	0	0	0	0	129	18	0	0	0
22. Leather & Leather Goods	0	0	0	0	0	0	0	0	37	0	0	0	0
23. Stone, Clay & Glass	531	992	0	0	0	1,808	104	0	0	0	29,513	5,707	0
24. All Other Manufacturing	4,777	233	242	45	449	7,233	622	3,948	166	2	527	103,448	101,563
25. Wholesale Trade	15,393	1,050	484	0	225	603	1,659	3,783	92	0	1,581	2,854	12,003
26. Service Stations	531	117	40	22	0	603	829	329	92	0	176	2,140	923
27. Eating & Drinking Places	531	58	20	201	112	603	207	329	37	0	176	713	1,847
28. All Other Retail	2,123	1,808	81	0	225	603	1,244	1,316	221	0	1,405	2,854	28,622
29. Agricultural Services	0	0	0	0	0	0	0	0	0	0	0	0	0
30. Lodging	531	58	20	45	56	603	311	329	18	0	0	713	11,080
31. All Other Services (Except Professional)	9,024	1,867	161	201	1,348	3,014	2,280	3,948	166	19	5,270	5,707	27,699
32. Transportation	15,924	3,208	787	1,342	1,180	17,479	2,902	2,632	148	4	12,121	12,128	64,631
33. Electric Energy	4,777	1,458	464	336	899	16,273	1,866	2,961	240	9	2,986	11,415	56,321
34. All Other Utilities	3,185	875	363	403	506	9,644	1,762	2,303	148	11	2,108	6,421	17,543
35. Contract Construction	4,777	467	0	0	56	4,822	622	329	203	10	351	5,707	11,080
36. Rentals & Finance	16,986	2,625	605	559	2,247	12,657	3,628	4,605	572	20	2,284	7,134	48,011
37. Final Payments	236,345	48,917	15,923	10,326	45,019	58,551	79,228	126,139	18,403	581	101,408	560,418	636,116
38. Total Gross Outlays	546,863	67,407	22,479	23,143	62,432	604,014	105,868	173,675	20,709	884	179,933	759,463	1,018,362

Industry Producing \ Industry Purchasing	26 Service Stations	27 Eating & Drinking Places	28 All Other Retail	29 Agricultur-al Services	30 Lodging	31 All Other Services (Except Professional)	32 Transpor-tation	33 Electric Energy	34 All Other Utilities	35 Contract Construction	36 Rentals & Finance	37 Final Demand	38 Total Gross Output	
1. Range Livestock	0	0	0	0	0	0	0	0	0	0	0	3,381	45,596	1.
2. Feeder Livestock	0	0	0	0	0	0	0	0	0	0	0	29,930	115,599	2.
3. Dairy	0	0	0	0	0	0	0	0	0	0	0	3,381	72,399	3.
4. Forage, Feed & Food Crops	0	0	0	0	0	0	0	0	0	0	0	1,171	57,544	4.
5. Cotton	0	0	0	0	0	0	0	0	0	0	0	176,959	214,861	5.
6. Vegetables	0	0	0	0	0	0	0	0	0	0	0	75,849	78,050	6.
7. Citrus Crops	0	0	0	0	0	0	0	0	0	0	0	7,559	11,286	7.
8. Forestry	0	0	0	0	0	0	0	0	0	0	0	0	2,100	8.
9. All Other Agriculture	0	3,339	0	0	0	0	0	0	0	0	0	14,031	22,214	9.
10. Uranium	0	0	0	0	0	0	0	0	0	0	0	614	790	10.
11. Copper	0	0	0	0	0	0	0	0	0	0	0	3,852	439,262	11.
12. All Other Mining	0	0	0	0	0	0	0	0	0	22,252	0	47,231	165,734	12.
13. Food & Kindred Products	0	52,469	0	0	2,645	775	6,488	408	0	0	0	436,161	546,863	13.
14. Lumber & Wood Products	0	0	0	0	0	0	0	408	0	17,307	0	35,959	67,407	14.
15. Furniture & Fixtures	0	0	0	0	165	0	0	0	0	0	0	20,942	22,479	15.
16. Paper & Pulp	0	0	1,499	0	165	0	721	0	0	0	0	5,216	23,143	16.
17. Chemicals	0	0	0	0	0	11,618	0	0	0	4,945	0	12,159	62,432	17.
18. Primary Metals	0	0	0	0	0	0	0	0	0	0	0	579,450	604,014	18.
19. Printing & Publishing	2,432	1,908	0	46	4,132	9,294	2,163	815	1,902	2,472	6,802	49,474	105,868	19.
20. Fabricated Metals	111	0	8,991	0	0	2,324	6,128	1,631	1,268	84,062	0	46,552	173,675	20.
21. Textiles & Apparel	0	0	0	0	0	0	0	0	0	0	0	20,562	20,709	21.
22. Leather & Leather Goods	0	0	0	0	0	0	0	0	0	0	0	847	884	22.
23. Stone, Clay & Glass	0	0	1,499	0	0	0	0	0	0	116,204	0	18,063	179,933	23.
24. All Other Manufacturing	0	0	2,997	0	0	13,167	22,347	5,707	10,144	22,252	0	451,765	759,463	24.
25. Wholesale Trade	1,106	30,050	46,454	413	4,628	18,588	6,848	1,223	8,876	106,314	4,081	736,362	1,018,362	25.
26. Service Stations	553	477	1,499	1,836	2,645	10,843	1,442	0	8,876	7,417	0	76,176	125,532	26.
27. Eating & Drinking Places	442	4,770	4,496	92	2,149	1,549	2,163	1,631	1,268	2,472	5,442	451,409	483,538	27.
28. All Other Retail	774	4,770	14,985	413	2,810	11,618	2,884	5,299	5,706	22,252	8,162	1,523,507	1,673,830	28.
29. Agricultural Services	0	0	0	0	0	0	0	0	0	0	0	200	45,893	29.
30. Lodging	221	0	1,499	0	0	775	1,081	408	3,170	0	1,360	139,330	165,283	30.
31. All Other Services (Except Professional)	2,543	34,343	47,953	734	11,735	33,304	10,453	1,223	29,165	22,252	12,244	533,142	812,268	31.
32. Transportation	5,639	6,678	49,452	3,396	826	10,069	11,174	4,892	6,974	12,362	1,360	71,516	360,442	32.
33. Electric Energy	4,754	5,247	35,965	367	661	9,294	3,604	63,185	3,170	2,472	9,523	154,428	416,054	33.
34. All Other Utilities	3,759	9,540	34,466	1,147	6,281	13,167	11,895	13,860	8,876	7,417	14,965	464,209	649,717	34.
35. Contract Construction	2,432	3,816	17,982	0	5,289	6,971	1,442	815	7,608	655,192	53,056	1,731,315	2,520,746	35.
36. Rentals & Finance	6,081	14,310	56,944	2,799	6,777	30,981	18,022	21,198	25,361	49,448	38,091	933,083	1,361,356	36.
37. Final Payments	94,685	311,821	1,347,149	43,650	114,375	627,931	251,587	293,351	527,353	1,363,654	1,206,270			37.
38. Total Gross Outlays	125,532	483,538	1,673,830	45,893	165,283	812,268	360,442	416,054	649,717	2,520,746	1,361,356			38.

INTERINDUSTRY TRANSACTIONS (IN THOUSANDS OF DOLLARS)
GILA SUB-BASIN 1980
Table G-1980-a

Industry Producing \ Industry Purchasing	1 Range Livestock	2 Feeder Livestock	3 Dairy	4 Forage, Feed & Food Crops	5 Cotton	6 Vegetables	7 Citrus Crops	8 Forestry	9 All Other Agriculture	10 Uranium	11 Copper	12 All Other Mining	13 Food & Kindred Products	14 Lumber & Wood Products	15 Furniture & Fixtures	16 Paper & Pulp	17 Chemicals	18 Primary Metals
Agriculture — 1. Range Livestock	.000	.356	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.002	.000	.000	.000	.000	.000
2. Feeder Livestock	.000	.000	.000	.028	.000	.000	.017	.000	.000	.000	.000	.000	.158	.000	.000	.000	.000	.000
3. Dairy	.000	.000	.013	.010	.000	.000	.008	.000	.000	.000	.000	.000	.127	.000	.000	.000	.000	.000
4. Forage, Feed & Food Crops	.060	.180	.414	.001	.000	.000	.000	.000	.126	.000	.000	.000	.000	.000	.000	.000	.000	.000
5. Cotton	.000	.000	.000	.000	.001	.000	.000	.000	.000	.000	.000	.000	.071	.000	.000	.000	.000	.000
6. Vegetables	.000	.000	.000	.000	.000	.001	.000	.000	.000	.000	.000	.000	.004	.000	.000	.000	.000	.000
7. Citrus Crops	.000	.000	.000	.000	.000	.000	.001	.000	.000	.000	.000	.000	.007	.000	.000	.000	.000	.000
8. Forestry	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.036	.000	.000	.000	.000
9. All Other Agriculture	.000	.000	.000	.000	.000	.000	.000	.000	.003	.000	.000	.000	.009	.000	.000	.000	.000	.000
Mining — 10. Uranium	.000	.000	.000	.000	.000	.000	.000	.000	.000	.015	.000	.001	.000	.000	.000	.000	.000	.000
11. Copper	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.030	.002	.000	.000	.000	.000	.000	.700
12. All Other Mining	.000	.000	.000	.000	.000	.000	.000	.000	.000	.005	.008	.150	.000	.000	.000	.000	.160	.056
Manufacturing — 13. Food & Kindred Products	.016	.051	.036	.000	.017	.000	.009	.000	.201	.000	.010	.000	.038	.000	.000	.000	.000	.001
14. Lumber & Wood Products	.000	.000	.000	.000	.000	.000	.000	.000	.000	.007	.003	.005	.000	.016	.045	.350	.000	.002
15. Furniture & Fixtures	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.068	.000	.000	.000
16. Paper & Pulp	.000	.000	.000	.000	.000	.000	.000	.000	.002	.000	.000	.000	.010	.001	.040	.075	.000	.000
17. Chemicals	.000	.000	.000	.050	.030	.068	.061	.000	.009	.005	.020	.019	.001	.001	.000	.001	.014	.001
18. Primary Metals	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.001	.015	.000	.000	.000	.000	.000	.010
19. Printing & Publishing	.000	.000	.000	.000	.000	.000	.002	.000	.000	.004	.008	.010	.009	.003	.010	.006	.006	.006
20. Fabricated Metals	.000	.000	.000	.000	.000	.000	.000	.000	.000	.015	.009	.017	.000	.006	.000	.000	.000	.003
21. Textiles & Apparel	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
22. Leather & Leather Goods	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
23. Stone, Clay & Glass	.000	.000	.000	.000	.000	.000	.000	.000	.000	.040	.005	.020	.001	.017	.000	.000	.000	.003
24. All Other Manufacturing	.000	.000	.000	.001	.009	.002	.003	.000	.002	.010	.009	.010	.009	.004	.012	.002	.008	.012
Trade (Retail) — 25. Wholesale Trade	.003	.007	.006	.014	.017	.013	.009	.003	.014	.002	.009	.015	.029	.018	.024	.000	.004	.001
26. Service Stations	.012	.002	.008	.014	.011	.010	.008	.020	.005	.002	.004	.004	.001	.002	.002	.001	.000	.001
27. Eating & Drinking Places	.000	.000	.000	.000	.000	.000	.000	.000	.000	.010	.000	.005	.001	.001	.001	.009	.002	.001
28. All Other Retail	.004	.025	.019	.043	.053	.042	.028	.010	.123	.011	.005	.020	.004	.031	.004	.000	.004	.001
Services — 29. Agricultural Services	.000	.008	.000	.084	.165	.002	.344	.000	.020	.000	.000	.000	.000	.000	.000	.000	.000	.000
30. Lodging	.000	.000	.000	.000	.000	.000	.000	.000	.000	.001	.005	.009	.001	.001	.001	.002	.001	.001
31. All Other Services (Except Professional)	.000	.000	.000	.001	.001	.001	.002	.000	.001	.010	.020	.020	.017	.032	.008	.009	.024	.005
Utilities — 32. Transportation	.012	.018	.030	.028	.012	.031	.001	.017	.009	.020	.042	.070	.030	.055	.039	.060	.021	.029
33. Electric Energy	.006	.002	.009	.009	.012	.016	.024	.000	.008	.060	.019	.055	.009	.025	.023	.015	.016	.027
34. All Other Utilities	.003	.001	.002	.001	.004	.001	.001	.000	.003	.015	.020	.028	.006	.015	.018	.018	.009	.016
35. Contract Construction	.000	.000	.000	.000	.000	.000	.000	.000	.000	.050	.010	.012	.009	.008	.000	.000	.001	.008
36. Rentals & Finance	.121	.021	.021	.030	.050	.028	.129	.027	.025	.025	.005	.170	.032	.045	.030	.025	.040	.021

Industry Producing \ Industry Purchasing	19 Printing & Publishing	20 Fabricated Metals	21 Textiles & Apparel	22 Leather & Leather Goods	23 Stone, Clay & Glass	24 All Other Manufacturing	25 Wholesale Trade	26 Service Stations	27 Eating & Drinking Places	28 All Other Retail	29 Agricultural Services	30 Lodging	31 All Other Services (Except Professional)	32 Transportation	33 Electric Energy	34 All Other Utilities	35 Contract Construction	36 Rentals & Finance	
1. Range Livestock	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	1.
2. Feeder Livestock	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	2.
3. Dairy	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	3.
4. Forage, Feed & Food Crops	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	4.
5. Cotton	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	5.
6. Vegetables	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	6.
7. Citrus Crops	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	7.
8. Forestry	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	8.
9. All Other Agriculture	.000	.000	.000	.000	.000	.000	.000	.000	.007	.000	.000	.000	.000	.000	.000	.000	.000	.000	9.
10. Uranium	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	10.
11. Copper	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	11.
12. All Other Mining	.000	.028	.000	.000	.110	.002	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.009	.000	12.
13. Food & Kindred Products	.001	.000	.000	.250	.000	.007	.000	.000	.110	.000	.000	.016	.001	.018	.001	.000	.000	.000	13.
14. Lumber & Wood Products	.000	.000	.000	.000	.000	.001	.000	.000	.000	.000	.000	.000	.000	.000	.001	.000	.007	.000	14.
15. Furniture & Fixtures	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.001	.000	.000	.000	.000	.000	.000	15.
16. Paper & Pulp	.060	.000	.000	.001	.000	.002	.000	.000	.000	.001	.000	.001	.000	.002	.000	.000	.000	.000	16.
17. Chemicals	.000	.000	.000	.000	.000	.006	.000	.000	.000	.000	.000	.000	.015	.000	.000	.000	.000	.000	17.
18. Primary Metals	.000	.043	.000	.000	.000	.012	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.002	.000	18.
19. Printing & Publishing	.019	.004	.002	.006	.004	.008	.001	.022	.004	.000	.001	.025	.012	.006	.002	.003	.001	.005	19.
20. Fabricated Metals	.003	.051	.000	.000	.000	.007	.000	.001	.000	.006	.000	.000	.003	.017	.004	.002	.034	.000	20.
21. Textiles & Apparel	.000	.000	.007	.022	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	21.
22. Leather & Leather Goods	.000	.000	.002	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	22.
23. Stone, Clay & Glass	.001	.000	.000	.000	.168	.008	.000	.000	.000	.001	.000	.000	.000	.000	.000	.000	.047	.000	23.
24. All Other Manufacturing	.006	.024	.009	.002	.003	.145	.110	.000	.000	.002	.000	.000	.017	.062	.014	.016	.009	.000	24.
25. Wholesale Trade	.016	.023	.005	.000	.009	.004	.013	.010	.063	.031	.009	.028	.024	.019	.003	.014	.043	.003	25.
26. Service Stations	.008	.002	.005	.000	.001	.003	.001	.005	.001	.001	.040	.016	.014	.004	.000	.014	.003	.000	26.
27. Eating & Drinking Places	.002	.002	.002	.000	.001	.001	.002	.004	.010	.003	.002	.013	.002	.006	.004	.002	.001	.004	27.
28. All Other Retail	.012	.008	.012	.000	.008	.004	.031	.007	.010	.010	.009	.017	.015	.008	.013	.009	.009	.006	28.
29. Agricultural Services	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	29.
30. Lodging	.003	.002	.001	.000	.000	.001	.012	.002	.000	.001	.000	.000	.001	.003	.001	.005	.000	.001	30.
31. All Other Services (Except Professional)	.022	.024	.009	.023	.030	.008	.030	.023	.072	.032	.016	.071	.043	.029	.003	.046	.009	.009	31.
32. Transportation	.028	.016	.008	.005	.069	.017	.070	.051	.014	.033	.074	.005	.013	.031	.012	.011	.005	.001	32.
33. Electric Energy	.018	.018	.013	.011	.017	.016	.061	.043	.011	.024	.008	.004	.012	.010	.155	.005	.001	.007	33.
34. All Other Utilities	.017	.014	.008	.013	.012	.009	.019	.034	.020	.023	.025	.038	.017	.033	.034	.014	.003	.011	34.
35. Contract Construction	.006	.002	.011	.012	.002	.008	.012	.022	.008	.012	.000	.032	.009	.004	.002	.012	.265	.039	35.
36. Rentals & Finance	.035	.028	.031	.025	.013	.010	.052	.055	.030	.038	.061	.041	.040	.050	.052	.040	.020	.028	36.

Note: Each entry shows the input directly required from the industry at the left of the table to produce one dollar's worth of output by the industry at the top of the table.

DIRECT PURCHASES PER DOLLAR OF OUTPUT
GILA SUB-BASIN 1980
Table G-1980-b

Industry Purchasing ↓ / Industry Producing →		1 Range Livestock	2 Feeder Livestock	3 Dairy	4 Forage, Feed & Food Crops	5 Cotton	6 Vegetables	7 Citrus Crops	8 Forestry	9 All Other Agriculture	10 Uranium	11 Copper	12 All Other Mining	13 Food & Kindred Products	14 Lumber & Wood Products	15 Furniture & Fixtures	16 Paper & Pulp	17 Chemicals	18 Primary Metals
Agriculture	1. Range Livestock	1.001642	.004514	.002888	.062190	.001246	.000070	.000123	.000007	.000164	.000001	.000062	.000826	.017538	.000198	.000000	.000337	.003334	.000083
	2. Feeder Livestock	.361658	1.015549	.010013	.208923	.004360	.000246	.000430	.000015	.000561	.000002	.000133	.002316	.061342	.000413	.000001	.000925	.001048	.000177
	3. Dairy	.006637	.018414	1.022747	.427605	.002895	.000163	.000285	.000013	.000375	.000004	.000184	.004394	.040733	.000357	.000001	.000742	.022116	.000243
	4. Forage, Feed & Food Crops	.010265	.028816	.010654	1.011229	.000225	.000013	.000022	.000008	.000037	.000010	.000256	.009976	.003170	.000230	.000001	.000316	.051695	.000326
	5. Cotton	.001123	.003049	.002461	.001660	1.002350	.000076	.000133	.000011	.000182	.000006	.000287	.006147	.018988	.000307	.000001	.000512	.031034	.000380
	6. Vegetables	.000058	.000157	.000127	.000086	.000070	1.001005	.000007	.000008	.000016	.000014	.000303	.013325	.000978	.000231	.000001	.000265	.069489	.000382
	7. Citrus Crops	.006837	.019138	.009740	.007911	.000854	.000048	1.001085	.000015	.000125	.000012	.000316	.012251	.012014	.000419	.000001	.000607	.062966	.000403
	8. Forestry	.000026	.000072	.000058	.000039	.000032	.000002	.000003	1.000002	.000007	.000000	.000039	.000093	.000445	.000066	.000000	.000117	.000058	.000053
	9. All Other Agriculture	.013969	.038032	.029108	.146506	.015251	.000859	.001504	.000068	1.004957	.000004	.000233	.003750	.214584	.001894	.000001	.004969	.017848	.000312
Mining	10. Uranium	.000067	.000183	.000148	.000101	.000081	.000005	.000008	.000292	.000026	1.015244	.001009	.015656	.001139	.008121	.000002	.000532	.006038	.001353
	11. Copper	.000730	.001982	.001600	.001079	.000877	.000049	.000086	.000135	.000119	.000016	1.032433	.015639	.012342	.003755	.000006	.000976	.021940	.002041
	12. All Other Mining	.000217	.000590	.000476	.000328	.000261	.000015	.000026	.000253	.000094	.001206	.016517	1.187828	.003671	.007023	.000013	.001424	.024158	.019494
Manufacturing	13. Food & Kindred Products	.062691	.170145	.137348	.092549	.075311	.004243	.007425	.000166	.009582	.000003	.000309	.002531	1.059664	.004622	.000002	.012429	.009556	.000421
	14. Lumber & Wood Products	.000104	.000282	.000228	.000156	.000125	.000007	.000012	.036614	.000032	.000004	.000465	.003771	.001758	1.017048	.000002	.001660	.001893	.000633
	15. Furniture & Fixtures	.000097	.000264	.000213	.000146	.000117	.000007	.000012	.002379	.000033	.000001	.000296	.000582	.001643	.066073	1.072964	.047505	.000579	.000409
	16. Paper & Pulp	.000201	.000546	.000441	.000307	.000242	.000014	.000024	.013865	.000112	.000002	.000316	.001867	.003401	.385142	.000004	1.082421	.002149	.000432
	17. Chemicals	.000092	.000250	.000202	.000139	.000111	.000006	.000011	.000051	.000043	.000196	.002833	.193047	.001556	.001417	.000004	.000801	1.018662	.003374
	18. Primary Metals	.000653	.001773	.001432	.000967	.000785	.000044	.000077	.000197	.000120	.000081	.731264	.079490	.011045	.005481	.000007	.001374	.01823	1.013096
	19. Printing & Publishing	.000148	.000401	.000324	.000221	.000177	.000010	.000017	.000856	.000048	.000001	.000301	.000857	.002497	.023781	.000004	.066445	.000716	.000414
	20. Fabricated Metals	.000104	.000281	.000227	.000156	.000125	.000007	.000012	.000027	.000038	.000040	.033986	.039129	.001752	.000761	.000004	.000625	.002272	.046983
	21. Textiles & Apparel	.000071	.000192	.000155	.000107	.000085	.000005	.000008	.000009	.000028	.000001	.000162	.000499	.001195	.000262	.000001	.000271	.000331	.000223
	22. Leather & Leather Goods	.015690	.042582	.034374	.023163	.018848	.001062	.001858	.000067	.002401	.000001	.000159	.001132	.265204	.001869	.000001	.004666	.002872	.000217
	23. Stone, Clay & Glass	.000157	.000427	.000345	.000235	.000189	.000011	.000019	.000046	.000048	.000160	.002392	.157478	.002658	.001270	.000003	.000874	.003991	.002865
	24. All Other Manufacturing	.000570	.001547	.001249	.000843	.000685	.000039	.000068	.000095	.000100	.000008	.010703	.007453	.009634	.002648	.000002	.003415	.007864	.014810
Trade	25. Wholesale Trade	.000201	.000546	.000441	.000300	.000242	.000014	.000024	.000026	.000057	.000002	.001382	.001553	.003398	.000723	.000014	.000853	.001624	.001910
Retail	26. Service Stations	.000116	.000316	.000255	.000177	.000140	.000008	.000014	.000034	.000055	.000001	.000222	.000975	.001967	.000955	.000003	.001753	.000654	.000305
	27. Eating & Drinking Places	.007110	.019298	.015567	.011388	.008531	.000481	.000841	.000031	.008184	.000001	.000213	.000993	.120033	.000859	.000002	.001906	.002573	.000292
	28. All Other Retail	.000085	.000230	.000185	.000128	.000102	.000006	.000010	.000024	.000041	.000001	.000383	.001048	.001430	.000678	.000002	.001324	.000761	.000527
Services	29. Agricultural Services	.000122	.000332	.000268	.000183	.000147	.000008	.000014	.000009	.000042	.000000	.000152	.000339	.002067	.000240	.000001	.000455	.000464	.000210
	30. Lodging	.001130	.003067	.002476	.001681	.001357	.000076	.000134	.000057	.000272	.000001	.000192	.001380	.019098	.001589	.001074	.003228	.001618	.000262
	31. All Other Services (Except Professional)	.000126	.000341	.000275	.000188	.000151	.000009	.000015	.000021	.000040	.000004	.000444	.003716	.002123	.000581	.000002	.001073	.016293	.000605
	32. Transportation	.001266	.003437	.002774	.001876	.001521	.000086	.000150	.000049	.000244	.000002	.001366	.001591	.021403	.001359	.000004	.003235	.001351	.001888
Utilities	33. Electric Energy	.000145	.000393	.000317	.000219	.000174	.000010	.000017	.000051	.000060	.000001	.000398	.000552	.002449	.001425	.000002	.000363	.000337	.000550
	34. All Other Utilities	.000058	.000158	.000128	.000089	.000070	.000004	.000007	.000013	.000028	.000001	.000340	.000831	.000986	.000351	.000006	.000437	.001025	.000469
	35. Contract Construction	.000061	.000164	.000133	.000091	.000073	.000004	.000007	.000362	.000026	.000028	.002177	.027280	.001023	.010048	.000002	.000377	.003877	.002939
	36. Rentals & Finance	.000039	.000106	.000085	.000061	.000047	.000003	.000005	.000020	.000037	.000001	.000109	.001165	.000657	.000558	.000001	.000400	.000347	.000148

Industry Purchasing ↓ / Industry Producing →	19 Printing & Publishing	20 Fabricated Metals	21 Textiles & Apparel	22 Leather & Leather Goods	23 Stone, Clay & Glass	24 All Other Manufacturing	25 Wholesale Trade	26 Service Stations	27 Eating & Drinking Places	28 All Other Retail	29 Agricultural Services	30 Lodging	31 All Other Services (Except Professional)	32 Trans-portation	33 Electric Energy	34 All Other Utilities	35 Contract Construction	36 Rentals & Finance	
1. Range Livestock	.001431	.000797	.000000	.000000	.000552	.002953	.006459	.013538	.000865	.008805	.005511	.000386	.003810	.017612	.011150	.006873	.008244	.131804	1.
2. Feeder Livestock	.001852	.001394	.000000	.000000	.000659	.006714	.016704	.011116	.001044	.039224	.026553	.000634	.006951	.038045	.013114	.008230	.007177	.085254	2.
3. Dairy	.001850	.001731	.000000	.000000	.000608	.008318	.017685	.016521	.001103	.041650	.036650	.000699	.007793	.053848	.021909	.009436	.005516	.050629	3.
4. Forage, Feed & Food Crops	.001792	.001676	.000000	.000000	.000695	.008385	.019438	.018549	.001208	.048142	.085219	.000739	.009401	.043577	.018641	.009243	.005362	.051074	4.
5. Cotton	.002041	.001648	.000000	.000000	.000824	.017700	.023625	.018537	.001441	.058137	.165601	.000795	.011181	.032894	.023107	.014561	.007108	.074415	5.
6. Vegetables	.001565	.001617	.000000	.000000	.000729	.009073	.016873	.010697	.000997	.044885	.002025	.000705	.007750	.038918	.025473	.006832	.004530	.041821	6.
7. Citrus Crops	.005146	.001928	.000000	.000000	.001164	.010961	.017701	.023140	.002342	.036402	.345334	.000942	.016645	.036495	.040275	.018017	.012157	.171345	7.
8. Forestry	.000813	.000581	.000000	.000000	.000194	.002186	.004355	.020286	.000399	.010881	.000010	.000217	.002133	.019559	.002293	.002235	.002736	.031093	8.
9. All Other Agriculture	.003402	.002217	.000000	.000000	.001236	.013079	.030531	.010287	.001558	.137656	.035745	.001099	.014968	.034702	.023464	.013379	.009767	.057928	9.
10. Uranium	.005919	.020286	.000000	.000000	.053741	.019316	.009314	.003322	.002191	.015710	.000027	.001736	.018458	.030843	.078080	.022854	.073720	.041732	10.
11. Copper	.010315	.012169	.000000	.000000	.007899	.019223	.014393	.005635	.001018	.008710	.000283	.005978	.028465	.051471	.029003	.026823	.017891	.019464	11.
12. All Other Mining	.016223	.025715	.000000	.000000	.031349	.029927	.027922	.007222	.008678	.031247	.000086	.012235	.040178	.098219	.088640	.047960	.036743	.229992	12.
13. Food & Kindred Products	.011561	.002343	.000000	.000000	.002805	.023138	.041105	.007699	.002357	.025130	.024316	.002078	.026546	.054388	.023612	.014810	.019573	.071032	13.
14. Lumber & Wood Products	.005009	.008994	.000000	.000000	.022051	.015241	.024366	.004253	.002275	.035941	.000041	.001897	.041674	.065707	.036557	.022771	.017273	.061331	14.
15. Furniture & Fixtures	.012814	.002177	.000000	.000000	.001955	.025152	.030683	.003527	.002550	.009601	.000038	.002099	.017608	.054915	.037104	.027051	.005615	.047647	15.
16. Paper & Pulp	.009717	.005079	.000000	.000000	.008666	.015081	.012764	.003720	.011525	.015667	.000081	.003377	.031291	.093915	.035594	.032918	.010066	.059030	16.
17. Chemicals	.009869	.005169	.000000	.000000	.005540	.018273	.011061	.002010	.004063	.010981	.000037	.003362	.034952	.040180	.035985	.020338	.011146	.084616	17.
18. Primary Metals	.015325	.014777	.000000	.000000	.012058	.033873	.015456	.006176	.002868	.010845	.000254	.006321	.031410	.074930	.060097	.041712	.028559	.055322	18.
19. Printing & Publishing	1.021397	.005080	.000000	.000000	.002670	.014894	.020907	.009493	.003583	.015946	.000058	.003892	.033339	.039518	.028186	.024218	.013582	.048896	19.
20. Fabricated Metals	.006815	1.056449	.000000	.000000	.002268	.038770	.029017	.003683	.003222	.012643	.000041	.003427	.033438	.028387	.032397	.022502	.009525	.047576	20.
21. Textiles & Apparel	.002880	.001202	1.007094	.002014	.001204	.013430	.007612	.005610	.002515	.013688	.000028	.001310	.012368	.010889	.017925	.010868	.018307	.036901	21.
22. Leather & Leather Goods	.009770	.001660	.022156	1.000044	.001868	.010537	.012649	.002797	.001021	.007950	.006086	.000780	.032878	.020649	.020738	.019055	.024066	.048257	22.
23. Stone, Clay & Glass	.008663	.005776	.000000	.000000	1.206650	.018615	.019103	.003608	.003401	.016783	.000062	.002340	.048742	.102277	.040162	.027120	.011869	.057686	23.
24. All Other Manufacturing	.010814	.010272	.000000	.000000	.012571	1.174766	.008267	.004434	.001860	.007119	.000221	.001721	.014493	.026296	.026438	.015033	.015760	.021099	24.
25. Wholesale Trade	.004364	.004212	.000000	.000000	.002888	.140462	1.020433	.003185	.003814	.036323	.000079	.013065	.041253	.080710	.080520	.029884	.025087	.071159	25.
26. Service Stations	.024212	.004065	.000000	.000000	.002234	.009336	.016053	1.006729	.005308	.011013	.000046	.002863	.031534	.057900	.055789	.041486	.036365	.069776	26.
27. Eating & Drinking Places	.007249	.001915	.000000	.000000	.001441	.015998	.073820	.003812	1.011263	.018732	.002973	.001478	.084927	.029029	.024027	.027835	.018908	.051759	27.
28. All Other Retail	.001501	.008342	.000000	.000000	.002596	.012269	.035864	.002359	.003973	1.013671	.000034	.001885	.039415	.039630	.033866	.028752	.021464	.049811	28.
29. Agricultural Services	.003423	.002134	.000000	.000000	.000529	.009216	.013574	.041459	.003271	.012052	1.000048	.000809	.023981	.081498	.015458	.032179	.007158	.074422	29.
30. Lodging	.027971	.002845	.000000	.000000	.003112	.009644	.036874	.018575	.014179	.022286	.000441	1.001065	.082741	.014443	.012770	.044841	.050778	.057081	30.
31. All Other Services (Except Professional)	.014238	.004929	.000000	.000000	.001436	.027573	.028945	.015565	.002941	.018671	.000049	.001833	1.050925	.020292	.020823	.022720	.018110	.052508	31.
32. Transportation	.008638	.020129	.000000	.000000	.001629	.081555	.025086	.005935	.007178	.012200	.000493	.003965	.038373	1.039599	.019036	.039695	.012621	.063985	32.
33. Electric Energy	.003485	.006065	.000000	.000000	.000789	.022956	.066747	.001029	.005442	.017361	.000057	.001694	.009009	.017600	1.186529	.043650	.008727	.068952	33.
34. All Other Utilities	.004924	.003729	.000000	.000000	.001506	.024258	.018368	.015459	.002791	.011889	.000023	.005576	.052659	.016117	.010717	1.018515	.021601	.049409	34.
35. Contract Construction	.003460	.050437	.000000	.000000	.078367	.027470	.064400	.005245	.002427	.017723	.000024	.001421	.022698	.023151	.013665	.011280	1.366429	.044463	35.
36. Rentals & Finance	.005696	.002277	.000000	.000000	.003230	.002543	.006954	.000651	.004434	.007707	.000016	.001261	.012303	.003327	.010141	.013100	.055724	1.033249	36.

Note: Each entry shows the total dollar production directly and indirectly required from the industry at the top of the table per dollar of deliveries to final demand by the industry at the left.

DIRECT AND INDIRECT REQUIREMENTS PER DOLLAR OF FINAL DEMAND
GILA SUB-BASIN 1980
Table G-1980-c

	Industry Producing \ Industry Purchasing	1 Range Livestock	2 Feeder Livestock	3 Dairy	4 Forage, Feed & Food Crops	5 Cotton	6 Vegetable	7 Citrus Crops	8 Forestry	9 All Other Agriculture	10 Uranium	11 Copper	12 All Other Mining	13 Food & Kindred Products	14 Lumber & Wood Products	15 Furniture & Fixtures	16 Paper & Pulp	17 Chemicals	18 Primary Metals	19 Printing & Publishing	20 Fabricated Metals	21 Textiles & Apparel	22 Leather & Leather Goods	23 Stone, Clay & Glass	24 All Other Manufacturing	25 Wholesale Trade	26 Service Stations	27 Eating & Drinking Places	28 All Other Retail	29 Agricultural Services	30 Lodging	31 All Other Services (Except Professional)	32 Transportation	33 Electric Energy	34 All Other Utilities	35 Contract Construction	36 Rentals & Finance	37 Final Demand	38 Total Gross Output	
Agriculture	1. Range Livestock	0	52,198	0	0	0	0	0	0	0	0	0	0	828	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6,674	59,700	1.
Agriculture	2. Feeder Livestock	0	0	0	1,678	0	0	318	0	0	0	0	0	138,243	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11,060	151,299	2.
Agriculture	3. Dairy	0	0	1,681	480	0	0	149	0	0	0	0	0	111,753	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	38,733	152,796	3.
Agriculture	4. Forage, Feed & Food Crops	2,985	13,617	38,657	60	0	0	0	0	4,622	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	59,941	4.
Agriculture	5. Cotton	0	0	0	0	776	0	0	0	0	0	0	0	55,463	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	202,330	258,568	5.
Agriculture	6. Vegetables	0	0	0	0	0	193	0	0	0	0	0	0	11,589	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	84,895	96,678	6.
Agriculture	7. Citrus Crops	0	0	0	0	0	0	56	0	0	0	0	0	9,106	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9,524	18,686	7.
Agriculture	8. Forestry	0	0	0	0	0	0	0	0	0	0	0	0	0	2,139	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,139	8.
Agriculture	9. All Other Agriculture	0	0	0	0	0	0	0	0	170	0	0	0	9,934	0	0	0	0	0	0	0	0	0	0	0	0	0	11,324	0	0	0	0	0	0	0	0	0	20,975	42,403	9.
Mining	10. Uranium	0	0	0	0	0	0	0	0	0	67	0	1,714	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	906	2,687	10.
Mining	11. Copper	0	0	0	0	0	0	0	0	0	0	34,673	2,856	0	0	0	0	0	821,838	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7,447	866,814	11.
Mining	12. All Other Mining	0	0	0	0	0	0	0	0	0	27	13,002	114,243	0	0	0	0	29,132	73,597	0	36,134	0	0	104,390	12,209	0	0	0	0	0	0	0	0	0	0	115,841	0	74,996	573,571	12.
Manufacturing	13. Food & Kindred Products	1,075	7,868	5,653	0	4,913	0	224	0	8,693	0	15,603	0	37,251	0	0	0	0	2,453	1,627	0	0	406	0	18,314	0	0	127,967	0	0	8,675	2,167	17,234	2,100	0	0	0	587,210	849,431	13.
Manufacturing	14. Lumber & Wood Products	0	0	0	0	0	0	0	0	0	11	2,600	2,285	0	2,026	648	19,607	0	1,227	0	0	0	0	0	3,052	0	0	0	0	0	0	0	0	1,050	0	24,387	0	74,460	131,354	14.
Manufacturing	15. Furniture & Fixtures	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,004	0	0	0	0	0	0	0	0	0	0	0	0	0	0	482	0	0	0	0	0	0	30,321	32,807	15.
Manufacturing	16. Paper & Pulp	0	0	0	0	0	0	0	0	85	0	0	0	10,761	225	1,444	6,274	0	0	30,505	0	0	3	0	9,157	0	0	0	6,981	0	964	0	2,872	0	0	0	0	10,758	80,030	16.
Manufacturing	17. Chemicals	0	0	0	5,395	15,773	7,251	1,271	0	594	27	17,336	14,280	2,483	225	0	157	3,075	1,227	0	0	0	0	0	18,314	0	0	0	0	0	0	34,676	0	0	0	24,387	0	31,694	178,164	17.
Manufacturing	18. Primary Metals	0	0	0	0	0	0	0	0	0	0	1,734	10,282	0	0	0	0	0	22,079	0	40,385	0	0	0	30,523	0	0	0	0	0	0	0	0	0	0	0	0	1,124,133	1,229,136	18.
Manufacturing	19. Printing & Publishing	0	0	0	0	0	0	56	0	0	16	10,402	10,282	11,589	450	442	706	1,457	11,040	8,948	4,960	137	13	5,176	15,261	4,275	6,691	6,795	115,188	114	12,530	28,174	7,659	4,200	2,573	6,097	29,413	106,855	411,500	19.
Manufacturing	20. Fabricated Metals	0	0	0	0	0	0	0	0	0	54	13,002	11,424	0	788	0	0	0	6,133	2,440	51,013	0	0	0	18,314	0	268	0	27,924	0	0	8,669	17,234	5,250	1,286	463,362	0	101,377	728,538	20.
Manufacturing	21. Textiles & Apparel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	384	41	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30,334	30,759	21.
Manufacturing	22. Leather & Leather Goods	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	137	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,614	1,751	22.
Manufacturing	23. Stone, Clay & Glass	0	0	0	0	0	0	0	0	0	121	5,201	17,136	828	2,139	0	0	0	6,133	1,220	0	0	0	147,527	19,840	0	0	0	6,981	0	0	0	0	0	0	621,881	0	44,134	873,140	23.
Manufacturing	24. All Other Manufacturing	0	0	0	120	2,844	387	93	0	170	27	13,002	8,568	12,417	900	531	314	2,104	20,853	3,254	23,381	384	5	4,314	236,551	254,391	0	0	17,453	0	0	41,178	60,318	16,800	12,220	67,066	0	808,917	1,608,560	24.
Trade	25. Wholesale Trade	179	908	1,070	839	4,396	1,257	168	6	594	11	9,535	9,711	37,251	2,364	973	0	971	3,680	7,321	20,547	247	0	7,765	9,157	36,342	3,212	74,742	38,396	515	14,458	60,683	19,149	4,200	10,290	262,165	14,706	1,699,314	2,357,119	25.
Trade — Retail	26. Service Stations	716	303	1,070	779	2,586	870	131	45	297	5	6,935	3,427	1,656	450	147	157	162	3,680	4,067	2,834	219	0	863	6,105	4,275	1,873	1,132	3,491	2,345	8,193	32,509	4,787	1,050	10,933	18,291	0	175,791	302,174	26.
Trade — Retail	27. Eating & Drinking Places	0	0	0	0	0	0	0	0	0	3	0	5,141	828	450	59	1,098	809	2,453	2,034	3,543	137	0	863	3,052	6,413	1,338	11,324	10,472	172	7,229	4,334	6,702	4,200	2,573	6,097	24,511	1,041,724	1,147,558	27.
Trade — Retail	28. All Other Retail	239	3,631	2,750	2,458	13,187	3,964	505	26	4,749	35	7,801	14,852	4,967	4,277	118	0	1,295	4,906	6,101	9,211	494	0	7,765	7,631	72,683	1,873	11,324	38,396	572	9,157	34,676	8,617	15,750	7,075	48,775	29,413	3,515,822	3,895,093	28.
Services	29. Agricultural Services	119	756	458	4,855	42,405	1,063	6,335	6	848	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	350	57,197	29.
Services	30. Lodging	0	0	0	0	0	0	0	0	0	3	6,068	7,997	1,656	338	59	392	324	1,227	2,440	2,834	82	0	0	3,052	32,066	535	0	6,981	0	0	2,167	2,872	1,050	3,859	0	9,804	396,127	481,933	30.
Services	31. All Other Services (Except Professional)	0	0	0	120	1,034	290	56	2	127	40	30,338	14,280	16,556	4,390	354	1,020	4,693	8,586	10,168	20,547	384	42	28,470	18,314	70,545	6,423	82,669	115,188	1,087	36,145	97,526	29,680	4,200	31,514	54,872	58,826	1,526,874	2,275,362	31
Utilities	32. Transportation	776	3,026	4,889	1,798	3,620	3,190	37	41	424	81	52,009	51,409	33,112	6,753	1,238	6,274	4,855	39,252	12,609	15,587	329	11	61,254	30,523	160,330	14,185	16,987	118,679	4,233	2,410	32,509	31,595	14,700	8,361	48,775	4,902	166,664	957,428	32.
Utilities	33. Electric Energy	418	303	1,834	719	4,137	1,837	486	0	848	228	21,670	45,697	12,417	3,939	884	2,353	3,399	38,025	8,948	19,130	521	31	19,843	33,575	134,677	11,776	13,589	87,264	515	2,410	28,174	11,489	173,253	4,502	12,194	39,217	327,545	1,067,848	33.
Utilities	34. All Other Utilities	179	151	306	120	1,551	193	19	0	212	54	26,004	17,136	6,622	2,251	737	1,882	2,104	23,306	7,728	13,462	329	26	12,941	21,366	47,030	9,635	23,781	80,283	1,430	18,795	36,843	33,510	38,851	10,933	24,387	58,826	124,365	647,350	34.
	35. Contract Construction	0	0	0	0	0	0	0	0	0	161	13,002	9,711	9,934	1,801	0	0	486	14,719	3,661	2,834	384	19	2,588	12,209	29,928	6,156	10,192	48,868	0	15,422	19,505	4,787	4,200	8,361	1,603,477	205,889	4,185,393	6,213,687	35.
	36. Rentals & Finance	7,642	3,934	3,667	1,858	13,446	2,900	2,410	66	1,230	94	8,668	111,387	33,112	6,303	1,120	2,745	8,092	33,119	16,269	21,964	1,042	42	13,804	18,314	117,576	14,988	35,106	136,132	3,603	20,241	88,857	48,829	55,651	26,369	121,937	147,064	3,776,377	4,905,958	36.
	37. Final Payments	45,372	64,604	90,761	38,662	147,900	73,283	6,372	1,947	18,740	1,622	558,229	89,753	279,075	89,146	22,049	37,051	115,206	89,603	282,160	440,172	25,549	1,112	455,577	1,063,727	1,386,588	223,221	720,626	3,036,416	42,611	324,822	1,722,715	650,094	721,343	506,501	2,689,696	4,283,387			37.
	38. Total Gross Outlays	59,700	151,299	152,796	59,941	258,568	96,678	18,686	2,139	42,403	2,687	866,814	573,571	849,431	131,354	32,807	80,030	178,164	1,229,136	411,500	728,538	30,759	1,751	873,140	1,608,560	2,357,119	302,174	1,147,558	3,895,093	57,197	481,933	2,275,362	957,428	1,067,848	647,350	6,213,687	4,905,958			38.

Note: Each row shows sales by the industry at the left to all industries listed at the top of the table. Each column shows purchases by the industry listed at the top of the table from each industry listed down the left margin.

INTERINDUSTRY TRANSACTIONS (IN THOUSANDS OF DOLLARS)
GILA SUB-BASIN 2010
Table G-2010-a

Sector	Industry Producing \ Industry Purchasing	1 Range Livestock	2 Feeder Livestock	3 Dairy	4 Forage, Feed & Food Crops	5 Cotton	6 Vegetables	7 Citrus Crops	8 Forestry	9 All Other Agriculture	10 Uranium	11 Copper	12 All Other Mining
Agriculture	1. Range Livestock	.000	.345	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	2. Feeder Livestock	.000	.000	.000	.028	.000	.000	.017	.000	.000	.000	.000	.000
	3. Dairy	.000	.000	.011	.008	.000	.000	.008	.000	.000	.000	.000	.000
	4. Forage, Feed & Food Crops	.050	.090	.253	.001	.000	.000	.000	.000	.109	.000	.000	.000
	5. Cotton	.000	.000	.000	.000	.003	.000	.000	.000	.000	.000	.000	.000
	6. Vegetables	.000	.000	.000	.000	.000	.002	.000	.000	.000	.000	.000	.000
	7. Citrus Crops	.000	.000	.000	.000	.000	.000	.003	.000	.000	.000	.000	.000
	8. Forestry	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	9. All Other Agriculture	.000	.000	.000	.000	.000	.000	.000	.000	.004	.000	.000	.000
Mining	10. Uranium	.000	.000	.000	.000	.000	.000	.000	.000	.000	.025	.000	.003
	11. Copper	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.040	.005
	12. All Other Mining	.000	.000	.000	.000	.000	.000	.000	.000	.000	.010	.015	.200
Manufacturing	13. Food & Kindred Products	.018	.052	.037	.000	.019	.000	.012	.000	.205	.000	.018	.000
	14. Lumber & Wood Products	.000	.000	.000	.000	.000	.000	.000	.000	.000	.004	.003	.004
	15. Furniture & Fixtures	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	16. Paper & Pulp	.000	.000	.000	.000	.000	.000	.000	.000	.002	.000	.000	.000
	17. Chemicals	.000	.000	.000	.090	.061	.075	.068	.000	.014	.010	.020	.025
	18. Primary Metals	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.002	.018
	19. Printing & Publishing	.000	.000	.000	.000	.000	.000	.003	.000	.000	.006	.012	.018
	20. Fabricated Metals	.000	.000	.000	.000	.000	.000	.000	.000	.000	.020	.015	.020
	21. Textiles & Apparel	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	22. Leather & Leather Goods	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	23. Stone, Clay & Glass	.000	.000	.000	.000	.000	.000	.000	.000	.000	.045	.006	.030
	24. All Other Manufacturing	.000	.000	.000	.002	.011	.004	.005	.000	.004	.010	.015	.015
Trade	25. Wholesale Trade	.003	.006	.007	.014	.017	.013	.009	.003	.014	.004	.011	.017
Trade – Retail	26. Service Stations	.012	.002	.007	.013	.010	.009	.007	.021	.007	.002	.008	.006
	27. Eating & Drinking Places	.000	.000	.000	.000	.000	.000	.000	.000	.000	.001	.000	.009
	28. All Other Retail	.004	.024	.018	.041	.051	.041	.027	.012	.112	.013	.009	.026
Services	29. Agricultural Services	.002	.005	.003	.081	.164	.011	.339	.003	.020	.000	.000	.000
	30. Lodging	.000	.000	.000	.000	.000	.000	.000	.000	.000	.001	.007	.014
	31. All Other Services (Except Professional)	.000	.000	.000	.002	.004	.003	.003	.001	.003	.015	.035	.025
Utilities	32. Transportation	.013	.020	.032	.030	.014	.033	.002	.019	.010	.030	.060	.090
	33. Electric Energy	.007	.002	.012	.012	.016	.019	.026	.000	.020	.085	.025	.080
	34. All Other Utilities	.003	.001	.002	.002	.006	.002	.001	.000	.005	.020	.030	.030
	35. Contract Construction	.000	.000	.000	.000	.000	.000	.000	.000	.000	.060	.015	.017
	36. Rentals & Finance	.128	.026	.024	.031	.052	.030	.129	.031	.029	.035	.010	.195

Industry Producing \ Industry Purchasing	13 Food & Kindred Products	14 Lumber & Wood Products	15 Furniture & Fixtures	16 Paper & Pulp	17 Chemicals	18 Primary Metals	19 Printing & Publishing	20 Fabricated Metals	21 Textiles & Apparel	22 Leather & Leather Goods	23 Stone, Clay & Glass	24 All Other Manufacturing
1. Range Livestock	.001	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
2. Feeder Livestock	.167	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
3. Dairy	.135	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
4. Forage, Feed & Food Crops	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
5. Cotton	.067	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
6. Vegetables	.014	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
7. Citrus Crops	.011	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
8. Forestry	.000	.019	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
9. All Other Agriculture	.012	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
10. Uranium	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
11. Copper	.000	.000	.000	.000	.000	.670	.000	.000	.000	.000	.000	.000
12. All Other Mining	.000	.000	.000	.000	.180	.060	.000	.051	.000	.000	.121	.008
13. Food & Kindred Products	.045	.000	.000	.000	.000	.002	.004	.000	.000	.250	.000	.012
14. Lumber & Wood Products	.000	.018	.022	.250	.000	.001	.000	.000	.000	.000	.000	.002
15. Furniture & Fixtures	.000	.000	.068	.000	.000	.000	.000	.000	.000	.000	.000	.000
16. Paper & Pulp	.013	.002	.049	.080	.000	.000	.075	.000	.000	.002	.000	.006
17. Chemicals	.003	.002	.000	.002	.019	.001	.000	.000	.000	.000	.000	.012
18. Primary Metals	.000	.000	.000	.000	.000	.018	.000	.057	.000	.000	.000	.020
19. Printing & Publishing	.014	.004	.015	.009	.009	.009	.022	.007	.005	.008	.006	.010
20. Fabricated Metals	.000	.007	.000	.000	.000	.005	.006	.072	.000	.000	.000	.012
21. Textiles & Apparel	.000	.000	.000	.000	.000	.000	.000	.000	.014	.025	.000	.000
22. Leather & Leather Goods	.000	.000	.000	.000	.000	.000	.000	.000	.005	.000	.000	.000
23. Stone, Clay & Glass	.001	.019	.000	.000	.000	.005	.003	.000	.000	.000	.171	.013
24. All Other Manufacturing	.015	.008	.018	.004	.013	.017	.008	.033	.014	.003	.005	.155
25. Wholesale Trade	.045	.021	.033	.000	.006	.003	.018	.029	.009	.000	.009	.006
26. Service Stations	.002	.004	.005	.002	.001	.003	.010	.004	.008	.000	.001	.004
27. Eating & Drinking Places	.001	.004	.002	.014	.005	.002	.005	.005	.005	.000	.001	.002
28. All Other Retail	.006	.038	.004	.000	.008	.004	.015	.013	.018	.000	.009	.005
29. Agricultural Services	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
30. Lodging	.002	.003	.002	.005	.002	.001	.006	.004	.003	.000	.000	.002
31. All Other Services (Except Professional)	.020	.039	.012	.013	.029	.007	.025	.029	.014	.026	.033	.012
32. Transportation	.040	.060	.042	.080	.030	.032	.031	.022	.012	.007	.071	.020
33. Electric Energy	.015	.035	.030	.030	.021	.031	.022	.027	.019	.019	.023	.022
34. All Other Utilities	.008	.020	.025	.024	.013	.019	.019	.019	.012	.016	.015	.014
35. Contract Construction	.012	.016	.000	.000	.003	.012	.009	.004	.014	.012	.003	.008
36. Rentals & Finance	.040	.056	.038	.035	.050	.027	.040	.031	.038	.026	.016	.012

Industry Producing \ Industry Purchasing	25 Wholesale Trade	26 Service Stations	27 Eating & Drinking Places	28 All Other Retail	29 Agricultural Services	30 Lodging	31 All Other Services (Except Professional)	32 Transportation	33 Electric Energy	34 All Other Utilities	35 Contract Construction	36 Rentals & Finance	
1. Range Livestock	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	1.
2. Feeder Livestock	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	2.
3. Dairy	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	3.
4. Forage, Feed & Food Crops	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	4.
5. Cotton	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	5.
6. Vegetables	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	6.
7. Citrus Crops	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	7.
8. Forestry	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	8.
9. All Other Agriculture	.000	.000	.010	.000	.000	.000	.000	.000	.000	.000	.000	.000	9.
10. Uranium	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	10.
11. Copper	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	11.
12. All Other Mining	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.019	.000	12.
13. Food & Kindred Products	.000	.000	.113	.000	.000	.018	.001	.018	.002	.000	.000	.000	13.
14. Lumber & Wood Products	.000	.000	.000	.000	.000	.000	.000	.000	.001	.000	.004	.000	14.
15. Furniture & Fixtures	.000	.000	.000	.000	.000	.001	.000	.000	.000	.000	.000	.000	15.
16. Paper & Pulp	.000	.000	.000	.002	.000	.002	.000	.003	.000	.000	.000	.000	16.
17. Chemicals	.000	.000	.000	.000	.000	.000	.016	.000	.000	.000	.004	.000	17.
18. Primary Metals	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	18.
19. Printing & Publishing	.002	.025	.006	.033	.002	.026	.013	.008	.004	.004	.001	.006	19.
20. Fabricated Metals	.000	.001	.000	.008	.000	.000	.004	.018	.005	.002	.076	.000	20.
21. Textiles & Apparel	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	21.
22. Leather & Leather Goods	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	22.
23. Stone, Clay & Glass	.000	.000	.000	.002	.000	.000	.000	.000	.000	.000	.102	.000	23.
24. All Other Manufacturing	.119	.000	.000	.005	.000	.000	.019	.063	.016	.019	.011	.000	24.
25. Wholesale Trade	.017	.012	.066	.011	.009	.030	.028	.020	.004	.016	.043	.003	25.
26. Service Stations	.002	.007	.001	.001	.041	.017	.015	.005	.001	.017	.003	.000	26.
27. Eating & Drinking Places	.003	.005	.010	.003	.003	.015	.002	.007	.004	.004	.001	.005	27.
28. All Other Retail	.034	.007	.010	.011	.010	.019	.016	.009	.015	.011	.008	.006	28.
29. Agricultural Services	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	29.
30. Lodging	.015	.002	.000	.002	.000	.000	.001	.003	.001	.006	.000	.002	30.
31. All Other Services (Except Professional)	.033	.024	.073	.033	.019	.075	.045	.031	.004	.049	.009	.012	31.
32. Transportation	.075	.053	.015	.034	.074	.005	.015	.033	.014	.013	.008	.001	32.
33. Electric Energy	.063	.044	.012	.025	.009	.005	.013	.012	.165	.007	.002	.008	33.
34. All Other Utilities	.022	.036	.021	.023	.025	.039	.017	.035	.037	.017	.004	.012	34.
35. Contract Construction	.014	.023	.009	.014	.000	.032	.009	.005	.004	.013	.263	.042	35.
36. Rentals & Finance	.055	.056	.031	.039	.063	.042	.041	.051	.053	.041	.020	.030	36.

Note: Each entry shows the input directly required from the industry at the left of the table to produce one dollar's worth of output by the industry at the top of the table.

DIRECT PURCHASES PER DOLLAR OF OUTPUT
GILA SUB-BASIN 2010
Table G-2010-b

Industry Purchasing		1 Range Livestock	2 Feeder Livestock	3 Dairy	4 Forage, Feed & Food Crops	5 Cotton	6 Vegetables	7 Citrus Crops	8 Forestry	9 All Other Agriculture	10 Uranium	11 Copper	12 All Other Mining
Agriculture	1. Range Livestock	1.001668	.004776	.003142	.051387	.001342	.000280	.000220	.000004	.000253	.000005	.000146	.001738
	2. Feeder Livestock	.349800	1.013729	.009570	.111343	.004265	.000890	.000700	.000009	.000778	.000010	.000249	.003159
	3. Dairy	.004966	.014272	1.018943	.259641	.002814	.000587	.000462	.000008	.000518	.000019	.000337	.006162
	4. Forage, Feed & Food Crops	.009931	.028775	.008629	1.006283	.000241	.000050	.000040	.000007	.000065	.000067	.000690	.021873
	5. Cotton	.001294	.003687	.002995	.001187	1.004478	.000307	.000241	.000009	.000288	.000047	.000731	.015411
	6. Vegetables	.000081	.000231	.000188	.000076	.000092	1.002023	.000015	.000006	.000033	.000056	.000630	.018226
	7. Citrus Crops	.006859	.019836	.010318	.004768	.001066	.000222	1.003184	.000010	.000226	.000053	.000671	.017226
	8. Forestry	.000033	.000095	.000077	.000031	.000038	.000008	.000006	1.000002	.000013	.000001	.000082	.000286
	9. All Other Agriculture	.014183	.040469	.031257	.122113	.014892	.003109	.002445	.000036	1.006709	.000024	.000584	.007654
Mining	10. Uranium	.000124	.000353	.000286	.000117	.000140	.000029	.000023	.000099	.000059	1.025736	.002245	.030816
	11. Copper	.001345	.003831	.003112	.001233	.001526	.000319	.000251	.000079	.000297	.000091	1.045081	.029728
	12. All Other Mining	.000403	.001147	.000931	.000386	.000457	.000095	.000075	.000128	.000248	.003916	.025171	1.272848
Manufacturing	13. Food & Kindred Products	.063390	.180635	.146720	.058015	.071954	.015020	.011813	.000089	.012935	.000019	.000850	.006046
	14. Lumber & Wood Products	.000167	.000477	.000387	.000160	.000190	.000040	.000031	.019370	.000096	.000022	.001005	.007001
	15. Furniture & Fixtures	.000152	.000434	.000352	.000145	.000173	.000036	.000028	.000747	.000079	.000005	.000692	.001539
	16. Paper & Pulp	.000306	.000873	.000709	.000301	.000347	.000073	.000057	.005273	.000250	.000010	.000646	.003275
	17. Chemicals	.000190	.000541	.000440	.000184	.000216	.000045	.000035	.000032	.000132	.000722	.005051	.234693
	18. Primary Metals	.001171	.003337	.002710	.001078	.001329	.000277	.000218	.000091	.000296	.000312	.715384	.101330
	19. Printing & Publishing	.000406	.001156	.000938	.000380	.000460	.000096	.000076	.000411	.000162	.000009	.000767	.002833
	20. Fabricated Metals	.000239	.000681	.000553	.000227	.000271	.000057	.000045	.000024	.000130	.000240	.046233	.078022
	21. Textiles & Apparel	.000173	.000494	.000401	.000165	.000197	.000041	.000032	.000008	.000096	.000006	.000479	.001789
	22. Leather & Leather Goods	.015881	.045256	.036759	.014536	.018027	.003763	.002960	.000039	.003249	.000009	.000438	.002815
	23. Stone, Clay & Glass	.000212	.000605	.000492	.000200	.000241	.000050	.000040	.000028	.000095	.000575	.004120	.187015
	24. All Other Manufacturing	.001017	.002897	.002353	.000935	.001154	.000241	.000189	.000098	.000248	.000071	.018182	.022963
Trade	25. Wholesale Trade	.000301	.000858	.000697	.000282	.000342	.000071	.000056	.000021	.000118	.000015	.002618	.004779
Trade — Retail	26. Service Stations	.000151	.000430	.000349	.000146	.000171	.000036	.000028	.000018	.000100	.000008	.000477	.002541
	27. Eating & Drinking Places	.007442	.021208	.017210	.007915	.008436	.001761	.001385	.000018	.011671	.000007	.000484	.002426
	28. All Other Retail	.000114	.000326	.000264	.000110	.000130	.000027	.000021	.000030	.000069	.000009	.000781	.002831
Services	29. Agricultural Services	.000143	.000409	.000332	.000136	.000163	.000034	.000027	.000006	.000076	.000003	.000283	.000873
	30. Lodging	.001308	.003727	.003027	.001215	.001484	.000310	.000244	.000031	.000435	.000010	.000477	.003365
	31. All Other Services (Except Professional)	.000156	.000445	.000362	.000147	.000177	.000037	.000029	.000012	.000067	.000018	.000884	.005910
	32. Transportation	.001336	.003808	.003093	.001233	.001517	.000317	.000249	.000031	.000361	.000013	.002252	.004076
Utilities	33. Electric Energy	.000248	.000706	.000573	.000233	.000281	.000059	.000046	.000030	.000110	.000005	.000787	.001762
	34. All Other Utilities	.000100	.000286	.000232	.000097	.000114	.000024	.000019	.000008	.000073	.000007	.000692	.002203
	35. Contract Construction	.000131	.000373	.000303	.000124	.000148	.000031	.000024	.000119	.000069	.000212	.006506	.068943
	36. Rentals & Finance	.000057	.000164	.000133	.000059	.000065	.000014	.000011	.000009	.000069	.000010	.000331	.003174

Industry Purchasing	13 Food & Kindred Products	14 Lumber & Wood Products	15 Furniture & Fixtures	16 Paper & Pulp	17 Chemicals	18 Paper & Pulp	19 Printing & Publishing	20 Fabricated Metals	21 Textiles & Apparel	22 Leather & Leather Goods	23 Stone, Clay & Glass	24 All Other Manufacturing
1. Range Livestock	.019962	.000217	.000001	.000581	.005117	.000197	.002312	.001478	.000000	.000000	.001372	.003866
2. Feeder Livestock	.063468	.000448	.000001	.001455	.011145	.000334	.003739	.002046	.000000	.000000	.001438	.007696
3. Dairy	.041879	.000400	.000001	.001193	.024652	.000437	.003627	.002282	.000000	.000000	.001276	.009370
4. Forage, Feed & Food Crops	.003584	.000379	.000001	.000804	.093338	.000825	.004942	.002908	.000000	.000000	.002054	.012453
5. Cotton	.021855	.000484	.000002	.001179	.063710	.000932	.005646	.003024	.000000	.000000	.002284	.023215
6. Vegetables	.001372	.000339	.000001	.000694	.077496	.000766	.004157	.002628	.000000	.000000	.001779	.013653
7. Citrus Crops	.015860	.000539	.000002	.001288	.071168	.000832	.009125	.003346	.000000	.000000	.002809	.015763
8. Forestry	.000561	.000089	.000000	.000255	.000128	.000115	.001563	.000944	.000000	.000000	.000517	.002712
9. All Other Agriculture	.221606	.001875	.000002	.006690	.028441	.000779	.010038	.003840	.000000	.000000	.002847	.020364
10. Uranium	.002089	.005188	.000003	.001297	.012490	.002987	.010817	.032722	.000000	.000000	.068737	.025425
11. Copper	.022710	.004134	.000010	.002295	.023758	.004671	.017632	.022724	.000000	.000000	.012991	.033320
12. All Other Mining	.006796	.006718	.000022	.003704	.034926	.026567	.032786	.037793	.000000	.000000	.054611	.048633
13. Food & Kindred Products	1.070719	.004665	.000004	.017321	.016578	.001173	.019652	.005081	.000000	.000000	.005715	.037592
14. Lumber & Wood Products	.002825	1.019485	.000005	.003502	.003616	.001388	.009034	.013229	.000000	.000000	.028012	.024041
15. Furniture & Fixtures	.002570	.039324	1.072966	.059378	.001186	.000980	.020040	.003393	.000000	.000000	.002665	.037008
16. Paper & Pulp	.005169	.277530	.000008	1.089429	.003915	.000902	.015034	.006690	.000000	.000000	.008727	.022192
17. Chemicals	.003208	.001680	.000007	.001951	1.026754	.005485	.017675	.009311	.000000	.000000	.011730	.031060
18. Primary Metals	.019778	.004804	.000010	.003104	.020182	1.024272	.025442	.026720	.000000	.000000	.021600	.052848
19. Printing & Publishing	.006848	.021615	.000008	.084202	.001349	.001078	1.026750	.010362	.000000	.000000	.007190	.020768
20. Fabricated Metals	.004035	.001240	.000008	.001818	.004622	.065662	.014224	1.084403	.000000	.000000	.006865	.058610
21. Textiles & Apparel	.002927	.000421	.000004	.000934	.000808	.000673	.007646	.003219	1.014327	.005072	.003541	.022204
22. Leather & Leather Goods	.268254	.002073	.000002	.007382	.004872	.000607	.014462	.003655	.025358	1.000127	.004131	.016786
23. Stone, Clay & Glass	.003587	.001450	.000004	.001885	.006259	.004507	.015083	.009122	.000000	.000000	1.215915	.026572
24. All Other Manufacturing	.017173	.005137	.000004	.009470	.016330	.025881	.015689	.019277	.000000	.000000	.022411	1.193315
25. Wholesale Trade	.005087	.001124	.000018	.002205	.003083	.003716	.008481	.007595	.000000	.000000	.006533	.156227
26. Service Stations	.002549	.000939	.000004	.002681	.000987	.000665	.028597	.006580	.000000	.000000	.005255	.011563
27. Eating & Drinking Places	.125528	.000947	.000002	.003033	.003900	.000675	.011506	.003692	.000000	.000000	.003430	.020378
28. All Other Retail	.001929	.001576	.000003	.005457	.001115	.001098	.036479	.012628	.000000	.000000	.006096	.015309
29. Agricultural Services	.002421	.000299	.000001	.000865	.000691	.000399	.005652	.002940	.000000	.000000	.001283	.010375
30. Lodging	.022088	.001636	.001075	.005265	.002250	.000658	.030912	.005898	.000000	.000000	.006997	.012411
31. All Other Services (Except Professional)	.002638	.000646	.000003	.001757	.017900	.001223	.016846	.007691	.000000	.000000	.003266	.032709
32. Transportation	.022571	.001651	.000005	.005342	.002313	.003197	.012361	.023440	.000000	.000000	.003604	.086277
33. Electric Energy	.004182	.001591	.000002	.000962	.000723	.001115	.007303	.008814	.000000	.000000	.002271	.027943
34. All Other Utilities	.001692	.000423	.000007	.000926	.001509	.000976	.007255	.005564	.000000	.000000	.003617	.029996
35. Contract Construction	.002209	.006283	.000003	.001138	.008554	.008807	.007795	.115648	.000000	.000000	.171745	.040143
36. Rentals & Finance	.000970	.000455	.000003	.000684	.000668	.000451	.007435	.005465	.000000	.000000	.007679	.003670

Industry Purchasing	25 Wholesale Trade	26 Service Stations	27 Eating & Drinking Places	28 All Other Retail	29 Agricultural Services	30 Lodging	31 All Other Services (Except Professional)	32 Transportation	33 Electric Energy	34 All Other Utilities	35 Contract Construction	36 Rentals & Finance	
1. Range Livestock	.006974	.013589	.001199	.008683	.006502	.000660	.005058	.019522	.013567	.007762	.009650	.140361	1.
2. Feeder Livestock	.014821	.009326	.001310	.034035	.015778	.000925	.007705	.038099	.013899	.008511	.008257	.089227	2.
3. Dairy	.016356	.012656	.001375	.033081	.024804	.000961	.008380	.051672	.025671	.009709	.006070	.049165	3.
4. Forage, Feed & Food Crops	.019916	.017990	.002162	.047530	.081753	.001390	.013958	.049503	.026380	.012631	.007381	.059239	4.
5. Cotton	.024483	.018364	.002412	.058015	.164951	.001462	.018099	.038983	.032063	.019102	.009351	.083525	5.
6. Vegetables	.017222	.010582	.001688	.045239	.011051	.001189	.012098	.044388	.031975	.009852	.006172	.048631	6.
7. Citrus Crops	.018572	.022872	.003498	.036958	.340791	.001589	.021373	.040382	.046537	.019984	.014398	.176833	7.
8. Forestry	.004537	.021572	.000579	.013153	.003012	.000327	.003857	.022354	.002897	.002852	.003434	.036162	8.
9. All Other Agriculture	.032619	.012645	.002273	.127517	.033655	.001970	.020412	.040811	.042866	.018337	.012894	.068749	9.
10. Uranium	.014604	.004488	.003352	.020808	.000045	.002659	.028869	.048109	.116352	.033401	.091830	.062943	10.
11. Copper	.020955	.011462	.002280	.016116	.000476	.009142	.050642	.078100	.043594	.042559	.029023	.036003	11.
12. All Other Mining	.037467	.012310	.016497	.045535	.000147	.020851	.059156	.140263	.142008	.062535	.055599	.291385	12.
13. Food & Kindred Products	.060436	.009128	.003435	.028698	.022399	.004156	.034732	.071760	.038139	.021085	.027258	.089296	13.
14. Lumber & Wood Products	.029614	.006926	.006180	.045027	.000119	.004574	.053135	.074836	.052900	.031319	.031324	.078319	14.
15. Furniture & Fixtures	.041753	.007680	.004807	.010745	.000057	.004076	.024943	.061937	.050484	.037732	.008249	.060890	15.
16. Paper & Pulp	.013935	.005950	.018665	.015933	.000129	.007608	.038122	.114476	.058301	.042847	.014547	.073620	16.
17. Chemicals	.017160	.004736	.009297	.019573	.000070	.006614	.047314	.061640	.056195	.030364	.020218	.114953	17.
18. Primary Metals	.023930	.012980	.005742	.020919	.000416	.009298	.051625	.100743	.080878	.058139	.044335	.080722	18.
19. Printing & Publishing	.025085	.012441	.007941	.020625	.000147	.007754	.037344	.048467	.038076	.029759	.020156	.059918	19.
20. Fabricated Metals	.040193	.007728	.008066	.022382	.000087	.007304	.046916	.046463	.055486	.035042	.018206	.068238	20.
21. Textiles & Apparel	.013332	.009313	.006094	.021172	.000063	.003752	.020507	.017785	.028022	.017346	.024609	.048378	21.
22. Leather & Leather Goods	.018347	.003610	.001672	.009676	.005612	.001568	.039361	.028459	.035361	.024988	.026919	.056161	22.
23. Stone, Clay & Glass	.021968	.005046	.005113	.021518	.000077	.004073	.057703	.114285	.059800	.035298	.018093	.076119	23.
24. All Other Manufacturing	.013670	.006797	.004063	.010933	.000361	.003799	.024347	.037360	.041478	.025336	.019132	.033165	24.
25. Wholesale Trade	1.026256	.005249	.005693	.041190	.000108	.016783	.048380	.089873	.088074	.036455	.030285	.079172	25.
26. Service Stations	.019231	1.009368	.006867	.012041	.000055	.003314	.034639	.062202	.059651	.045224	.039151	.073450	26.
27. Eating & Drinking Places	.080363	.004554	1.011787	.020471	.002919	.002216	.088727	.034277	.029066	.030978	.022354	.057399	27.
28. All Other Retail	.017182	.003150	.004549	1.015393	.000042	.003175	.042427	.042418	.036660	.030451	.025365	.053382	28.
29. Agricultural Services	.014311	.042956	.004695	.013663	1.000052	.001071	.028462	.082764	.018064	.033331	.008301	.078019	29.
30. Lodging	.040595	.020290	.016774	.025473	.000467	1.001635	.089286	.017492	.016665	.047667	.052301	.061438	30.
31. All Other Services (Except Professional)	.033960	.017120	.003467	.020756	.000056	.002338	1.054990	.024801	.024612	.024403	.019472	.056464	31.
32. Transportation	.027960	.007688	.008871	.014479	.000475	.004565	.043141	1.044671	.024751	.044041	.015622	.068595	32.
33. Electric Energy	.008901	.002750	.005943	.020770	.000089	.002088	.012195	.021982	1.202525	.049152	.013313	.073309	33.
34. All Other Utilities	.021626	.019022	.005235	.014820	.000037	.006946	.057861	.020256	.015192	1.023155	.024235	.053110	34.
35. Contract Construction	.069963	.006879	.004240	.021275	.000048	.003201	.033003	.043533	.028998	.020419	1.367708	.062347	35.
36. Rentals & Finance	.007753	.000954	.005694	.008241	.000022	.002472	.016626	.004754	.012610	.015038	.060485	1.037027	36.

Note: Each entry shows the total dollar production directly and indirectly required from the industry at the top of the table per dollar of deliveries to final demand by the industry at the left.

DIRECT AND INDIRECT REQUIREMENTS PER DOLLAR OF FINAL DEMAND
GILA SUB-BASIN 2010
Table G-2010-c

Projected Acreage of Irrigated Cropland and Value of Production, 1980 and 2010

Projected Acreage and C

Irrigated acreage is expected to decrease throughout the projection period. The reduction will be a result of a depletion of ground water reserves in many of the important agricultural areas of the subbasin and of urban expansion into formerly agricultural land. The reduced quantities of water for agricultural use will be only partially offset by the Central Arizona Project.

As pumping costs increase, one might expect at firs glance, only the "high return" crops such as cotton, vegetables and citrus to be grown. Cotton allotments, however, are an institutional constraint projected to remain at approximately the 1960 level. The vegetable growing areas of California, Texas and Mexico were considere' near enough to the Gi' subbasi to absorb additional demand as increased pumping costs inflate cost of production in Central Arizona. A small acreage reduction of vegetables i projected for 1980 and a larger reduction by 2010 (T.ble P-2).

Alfalfa, sorghums and small grains are projected, but at a reduced acreage for 1980 and 2010 Budgets developed by the University of Arizona[13] show small grains, sorghum and alfalfa were being grown at a negative return to management when irrigated from ground water pumped at prevalent depths in 1960. It appears these crops have a value to the general croppirg pat to warrant their inclusion in the rotation even under the unfavorable cost-return situation.

[13] Arizona Experiment Station, Arizona Agriculture, 1960, University of Arizona, Tucson, Arizona, 1961.

Table P-2--Crop Acreage 1960 and Projected 1980 and 2010

Crop	1960	1980	2010
	- - - - - - - - - 1,000 acres	- - - - - - - - -	
Alfalfa hay	165.9	157	136
Cotton	391.4	390	374
Barley	161.9	136	77
Corn	19.7	17	14
Sorghums	124.6	95	60
Wheat	17.9	18	12
Vegetables	68.0	60	50
Grapefruit	4.0	5	6
Oranges	8.5	10	12
Lemons	2.0	3	4
Other crops	61.1	47	18
Total	1,025.0	938	763

Theoretically, pumping could continue as long as variable costs are being met. But before returns to fixed factors reach zero, however, operators relying on a declining water table would realize that fixed costs were not being covered and would decline to reinvest as their pumping equipment wore out.

Table P-2 shows crops acreages grown in 1960 and those projected to 1980 and 2010.

Projected Per Acre Crop Yields

Adon Poli, in estimating the long term production prospects for western agriculture,[14] devised some indices of production possibilities. He developed two separate indices of expected yields for projection purposes. One was the economic attainable yield and the other was the economic maximum yield. The economic attainable yield estimates were based on what "could reasonably be expected by 1975 from actual application of present technology, together with past experience in rate of adaption of technology." It also took into account limitations of management, materials, equipment and available capital. The economic maximum yield estimates were based "on full, efficient economic application of all presently known technology under assumed favorable economic conditions."

The 1975 index of economic maximum yields developed by Poli for the western states was 156 (1957-59=100). The comparable index for Arizona was 237. It was assumed that the economic attainable index would be appropriate for 1980 and the economic maximum would be relevant for the year 2010. The projected yields are presented below.

[14] Adon Poli, Long Term Production Prospects for Western Agriculture, USDA, Agricultural Economic Report No. 33, May 1963

Table P-3-Crop Fields, 1960 and Projected 1980 and 2010, Gila Subbasin

Crop	Unit	1960	1980		2010		
		Amount	Amount	Percent of 1960	Amount	Percent of 1960	Percent of 1980
Alfalfa hay	Tons	4.09	7.11	173	10.31	252	145
Barley	Tons	1.46	2.53	173	3.43	235	136
Corn	Tons	0.90	1.56	173	2.12	236	136
Grain sorghum	Tons	1.44	2.49	173	3.39	235	136
Wheat	Tons	0.99	1.49	151	1.82	184	122
Cotton	Bales	1.99	3.06	154	3.84	193	125
Vegetables	Cwt.	181	331	183	492	272	149
Citrus	Boxes	213	330	155	447	210	135

The Livestock Sectors

Range Livestock. The long range trend in numbers of cattle and calves has been erratic over the past two decades (Table P-3). The number of cattle in 1960 was 37 percent higher than in 1950, but only 20 percent higher than in 1940. In years of exceptionally high rainfall ranchers buy in additional cattle to utilize rangeland forage.

Table P-4--Historical Pattern of Cattle and Calves on Arizona Ranch[a]

Year	Head (000)	Year	Head (000)
1941	846	1951	776
1942	906	1952	853
1943	852	1953	891
1944	878	1954	861
1945	850	1955	907
1946	871	1956	944
1947	848	19 7	894
1948	784	1958	850
1949	748	1959	884
1950	745	1960	1,017

[a] Does not include cows and heifers for milk.

Hill, J. Basic Indicators of the Industrial Potential of Arizona Agriculture, Dept. of Agric. Econ., U. of Arizona, Tucson, May 1962.

Poli projects significant increased potential yields from pasture and rangeland in the Western United States, including Arizona. The range livestock sector is highly oriented to the rangelands. Using Poli's indices as a basis for projection, the value of total gross output is estimated at $45.6 million in 1980 and $59.7 million in 2010.

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Livestock Feeding. The projections for the livestock feeding sector were closely tied to those developed for the range livestock sector. The high degree of dependency between the two sectors is indicated by the following relationships shown in the 1960 data; (1) about 95 percent of the gross output from the range sector are purchased as inputs for the livestock feeding sector (2) nearly 50 percent of the total value of inputs for livestock feeding sector are livestock purchases.

The projections for 1980 and 2010 were developed under the assumption that the relationship between the two sectors in the projection years would be the same as they were in 1960. The value of gross output in 1980 is estimated to be $115.6 million, and by 2010 it will increase to $151.3 million.

Farm Dairy. About 412.9 million pounds of milk were produced in the Gila subbasin in 1960. This is approximately 365 pounds per capita. Medium level population projections usedin the study were multiplied by 365 pounds to estimate production in 1980 and 2010. The resulting projections are 1,093.6 million pounds in 1980 and 2,307.7 million pounds in 2010. Local demand and supply of milk were about equal in 1960. It is assumed this balance will be retained as well as the 1960 per capita consumption level. The projected gross value of production for 1980 and 2010 are $72.4 million and $152.8 million, respectively.

Other Agriculture. Poultry and poultry products, the major enterprise in this sector, is expected to increase at the same rate as population in the subbasin. Thus, the poultry industry is expected to expand considerably and have a gross output of $19.3 million in 1980 and $40.8 million in 2010. The total gross output of the sector is estimated at $22.2 million in 1980 and $42.4 million in 2010.

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Forestry. Sawtimber cut in 1960 was about 75 percent of the annual allowable cut. It was assumed that the actual cut in 1980 would be at the same level as the annual allowable cut in 1960, that is, a 25 percent increase over 1960. Thus, the value of timber is estimated to be $1.5 million in 1980. It is assumed that grazing fees will increase at the same rate as the increase in pasture and range yields estimated for the range livestock sector. An increase of 36 percent by 1980 indicates the probable value of grazing fees to be $0.6 million. The value of gross output for the forestry sector is thus estimated to be $2.1 million in 1980.

It was assumed that the value of timber in 2010 would be the same as that estimated for 1980. The projected value of grazing in the national forest in 2010 was computed in the same manner as the 1980 projection. An estimated increase in pasture and range yield of 78 percent suggests the expected value of grazing in 2010 to be $0.7 million dollars. The total value of forest output was thus estimated at $2.1 million for 2010.

Agricultural Services. Projection for the agricultural services sector were based on the projected output of the sectors which purchased inputs from this sector. For example, the inputs of agricultural services purchased by the cotton sector in 1960 amounted to 17.2 percent of the value of gross output of the cotton sector. Similar percentage relationships were developed for each sector. Using this technique, it was estimated that the value of gross output in agricultural services sector would be $45.9 million in 1980 and $57.2 million in 2010.

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Summary of Gross Output and Final Demand. All prices are projected at 1960 levels. The projected gross value of production for 1980 and 2010 with the data for 1960 for comparison is presented in Table P-5. Final demand by sector is shown in Table P-6.

Table P-5--Present and Projected Total Gross Output for Agricultural and Forestry Sectors, Gila Subbasin, 1960, 1980 and 2010

Sector	Year		
	1960	1980	2010
	1000 dollars		
Range livestock	33,652	45,596	59,700
Livestock feeding	87,069	115,599	151,299
Farm dairy	27,371	72,399	152,796
Forage, feed and food crops	37,209	57,564	59,941
Cotton	141,244	214,860	258,568
Vegetables	48,388	78,050	96,678
Citrus	6,788	11,286	18,686
Other agriculture	9,357	22,214	42,403
Agricultural services	31,982	45,893	57,197
Forestry	1,645	2,100	2,139
Total	424,705	665,541	899,407

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Table P-6--Final Demand Estimates, by Sector, 1960 and Projected 1980 and 2010

Sector	Gross output	Final demand	Percent final demand of gross output
	1000 dollars	1000 dollars	Percent
1960			
Range livestock	33,652	1,137	3.4
Livestock feeding	87,069	57,913	66.5
Farm dairy	27,371	3,212	11.7
Forage, feed and food	37,209	4,836	13.1
Cotton	141,244	127,272	90.1
Vegetables	48,388	48,001	99.2
Citrus	6,788	6,338	93.4
Other agriculture	9,357	7,218	77.1
Agricultural services	31,982	140	.4
Forestry	1,645	0	0
1980			
Range livestock	45,596	3,381	7.4
Livestock feeding	115,599	29,930	25.9
Farm dairy	72,399	3,381	4.7
Forage, feed and food	57,544	1,171	2.0
Cotton	214,850	176,959	82.4
Vegetables	78,050	75,849	97.2
Citrus	11,286	7,559	67.0
Other agriculture	22,214	14,031	63.2
Agricultural services	45,893	200	.4
Forestry	2,100	0	0
2010			
Range livestock	59,700	6,674	11.2
Livestock feeding	151,299	11,060	7.3
Farm dairy	152,796	38,733	25.3
Forage, feed and food	59,941	0	0
Cotton	258,568	202,3 0	78 3
Vegetables	96,678	84,895	87.8
Citrus	18,686	9,524	51.0
Other agriculture	42,403	20,975	49.5
Agricultural services	57,197	350	.6
Forestry	2,139	0	0

Projected Water Availability, 1980 and 2010

Surf

Surface diversions for agricultural use in 1960 were approximately 1,096,000 ac feet and farm deliveries from surface sources an estimated 723,400 acre-feet. This was assumed to be a typical water year for surface sources as all major streams are adequately controlled with storage capacity.

In estimating water availability for the subbasin, the assumption was made that the Central Arizona Project would b delivering water by 1980. This project will make an additional 814,000[15] acre-feet of water available to meet farm requirements for irrigation in Central Arizona. Assuming this additional supply will be distributed in approximately the same pattern as present surface waters in Central Arizona, Maricopa County would receive 572,000 acre-feet from the Central Arizona Project and Pinal County 242,000. In addition to water for irrigation the Central Arizona Project plans include the delivery of 256,000 acre-feet of water for municipal and industrial us . The Metropolitan Phoenix and Tucson areas will receive most of the additional municipal and industrial supplies.

After the twenty sixth year of project operation, planners estimate that 312,000 acre-feet will be delivered for municipal and industrial use and 758,000 for irrigation.[15] Surface diversions at the volume they occurred in 1960 plus imported Colorado River water to the subbasin would enable farm deliveries from surface sources approaching 1,537,000 ac e-feet by 1980 and 1,481,000 acre-feet by 2010. The projections made here assume no importat n of water other t n Colorad Ri r sourc .

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[15] U. S. De artment of the Interior. Appraisal Report Central Arizona Project, Region 3, Boulder City, Nevada, Jan. 1962, p. 37.

Ground Water Sources

Ground water is the primary source for irrigation in the Gila subbasin. the resource is vast, but by no means inexhaustable. Depth to water is continually dropping in many areas. Although extensive geologic research has been completed in the Gila drainage, the exact nature of underground reservoirs is impossible to determine. How long present rates of depletion may continue before the ground water resource is exhausted cannot be predicted with great accuracy, but by analyzing available data on water level trends some useful estimates may be made.

Salt River Valley. The Salt River Valley comprises the lands in the vicinity of Phoenix and tributary valleys such as Paradise Valley and Deer Valley, as well as lands west of the Hassayampa River and the lower reaches of Centennial Wash. The valley has six subdivisions generally referred to when ground water is discussed.

Table P-7 shows the average depth to water for major ground water areas of the Salt River Valley in 1959 and some projections based on the data contained in Figure P-3. The most rapid decline of the ground water table is occurring in the Litchfield Park-Beardsley-Marinette area of the valley. A constant but less rapid decline has occurred in most other areas.

Lower Santa Cruz. This area is 90 percent within Pinal County and the remainder is in Pima County. It is the second largest area of agricultural development in the state and is largely dependent on ground water for irrigation supplies. Recharge of aquifer is greatest in the Casa Grande-Florence area and is negligible in the Stanfield-Maricopa and Eloy areas (Table P-8). Figure P-4 shows historical trend in water table levels.

Table P-7-Average Depth to Ground Water 1959 and Projected 1980 and 2010, Major Ground Water Areas of Salt River Valley, Gila Subbasin

Area	1959 [a]	Projected [b] 1980	Projected [b] 2010
	- - - Feet below surface - - -		
Queen Creek-Higley-Gilbert-Magma Area			
Magma	300	500	850
Higley	175	375	725
Gilbert	200	400	750
Queen Creek	275	475	825
Tempe-Mesa-Chandler Area			
Northeast of Mesa	300	420	620
Chandler	150	270	470
Mesa	200	320	520
Tempe	100	220	420
Phoenix-Glendale-Tolleson			
Phoenix	100	240	550
Glendale	200	340	650
Tolleson	150	290	600
Deer Valley	360	500	810
Paradise Valley	250	390	700
Litchfield Park-Beardsley-Marinette Area			
Litchfield Park	250	520	1,320
Marinette	300	570	1,370
Beardsley	275	545	1,345
Liberty-Buckeye-Hassayampa			
Hassayampa	80	165	325
Buckeye	115	200	360
Liberty	50	135	295

[a] Arizona State Land Dept. Annual Report on Ground Water in Arizona, Spring 1958 to Spring 1959. Phoenix, Arizona, Sept. 1959.

[b] Based on 35-year trend.

Figure P-3--Cumulative Net Change in Water Levels in Feet, Historical and Projected, Selected Areas, Salt River Valley, Gila Subbasin

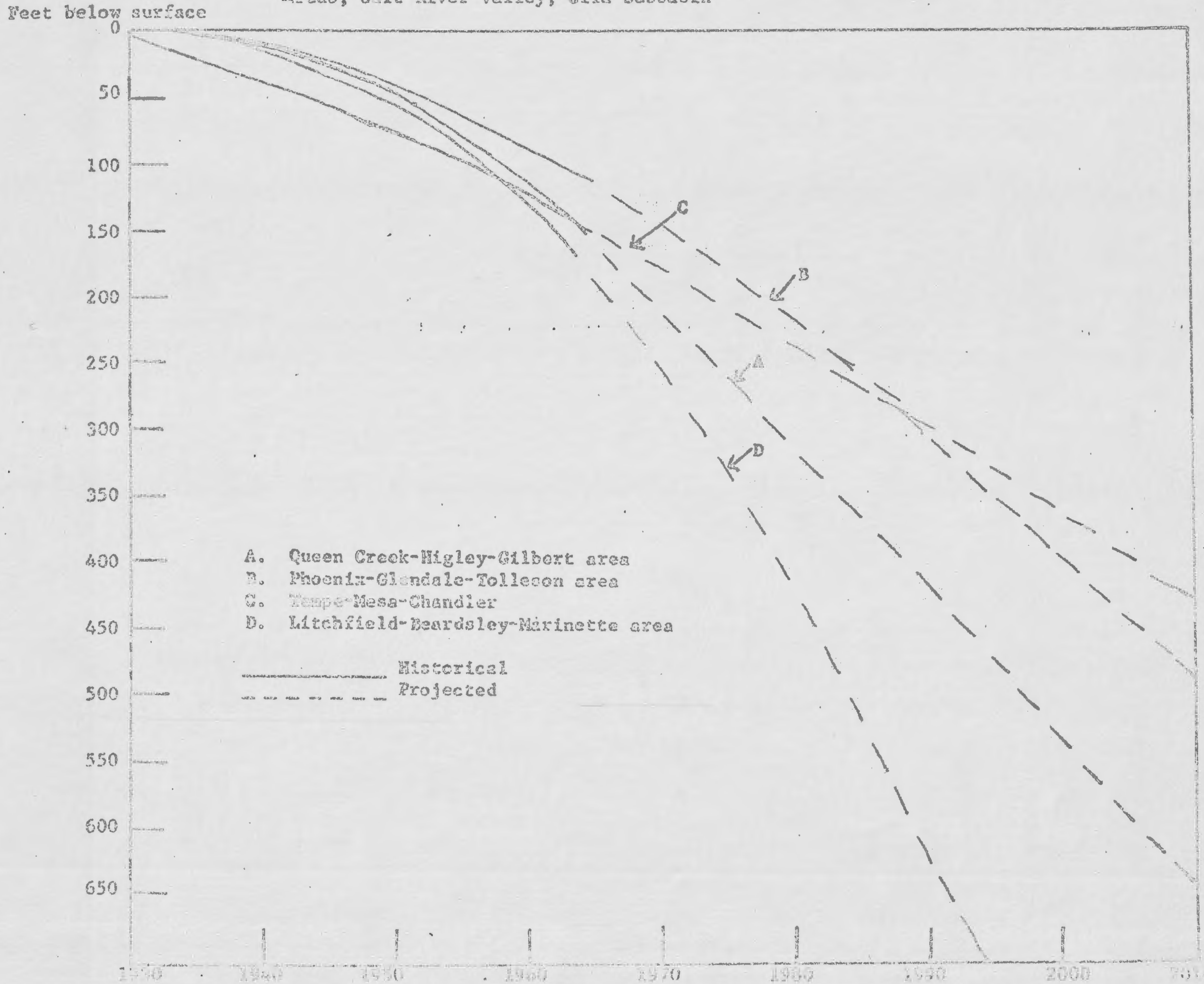

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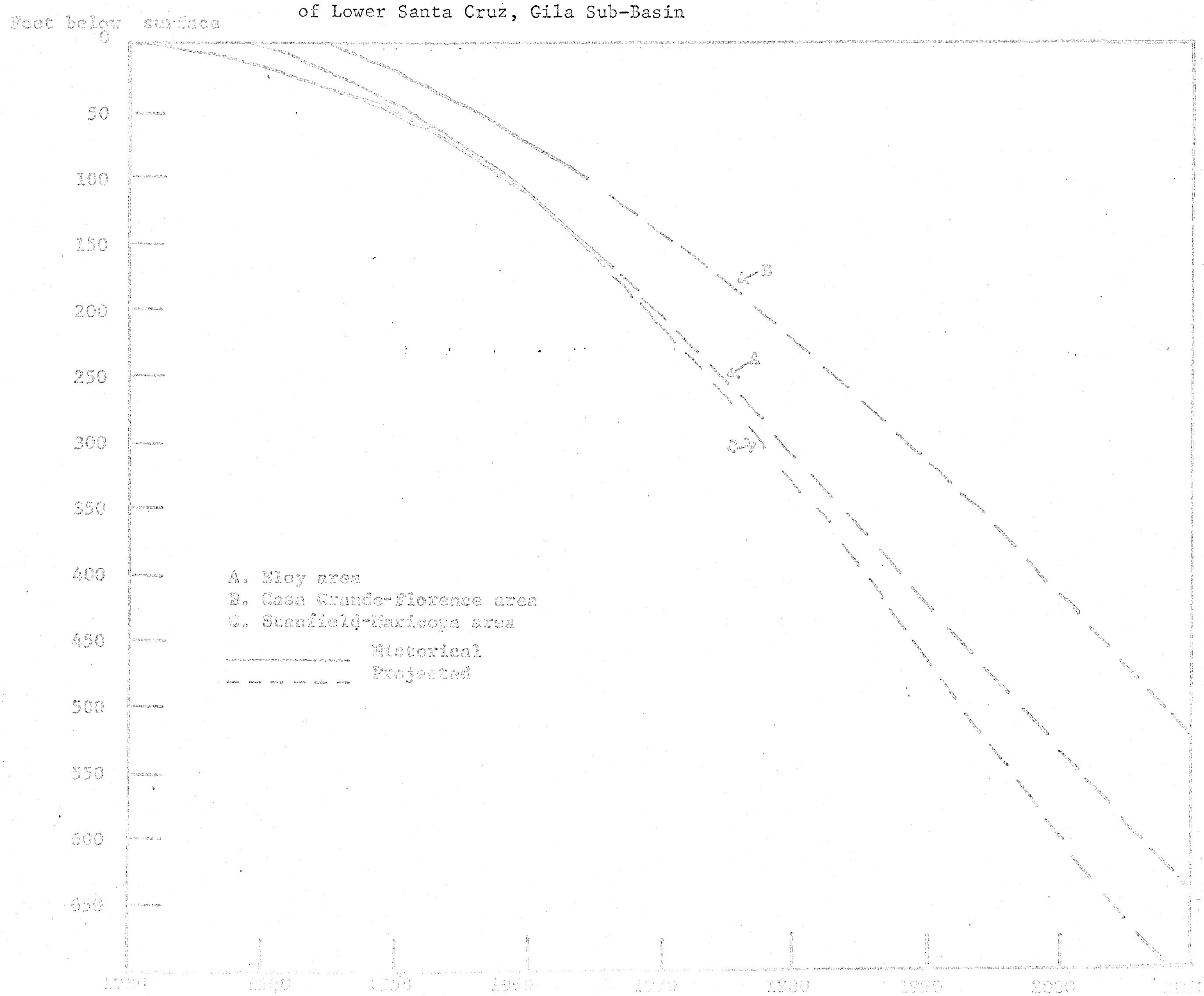
Table P-8--Depth to Ground Water 1959, and Projected Depth 1980 and 2010, Major Ground Water Areas, Gila Sub-Basin

Area	1959	Projected 1980	Projected 2010
	- - - Feet below surface - - -		
Lower Santa Cruz			
Eloy	275	575	+1,000
Casa Grande-Florence	175	280	480
Stanfield-Maricopa	400	580	850
Upper Santa Cruz	100	Little decline	
Avra-Marana Area	250	Little decline	
Wilcox Valley			
Kansas Settlement	175	500	+1,000
Stewart Area	90	140	210
Pearce-Cochise	100	150	200
San Simon Valley			
Bowie Area	250	430	580
San Simon	60	100	220
Rodeo-Cienega	100	150	200
Harquahala Plains	240	600	+1,000
Other			
Douglas Valley	100	150	200
Duncan Valley	50	100	150
Safford Area	100	100	100

Figure P-4-- Cumulative Net Change in Water Levels, Historical and Projected Major Areas of Lower Santa Cruz, Gila Sub-Basin



16

Upper Santa Cruz. Pumping from ground water for agriculture exceeds other uses but municipal and industrial demands are increasing as Tucson grows. There has been little decline in the water table in this area.

Avra-Marana Area. This area includes the Avra Valley and small acreage of irrigated land near Marana in Pima County. Ground water is stable here.

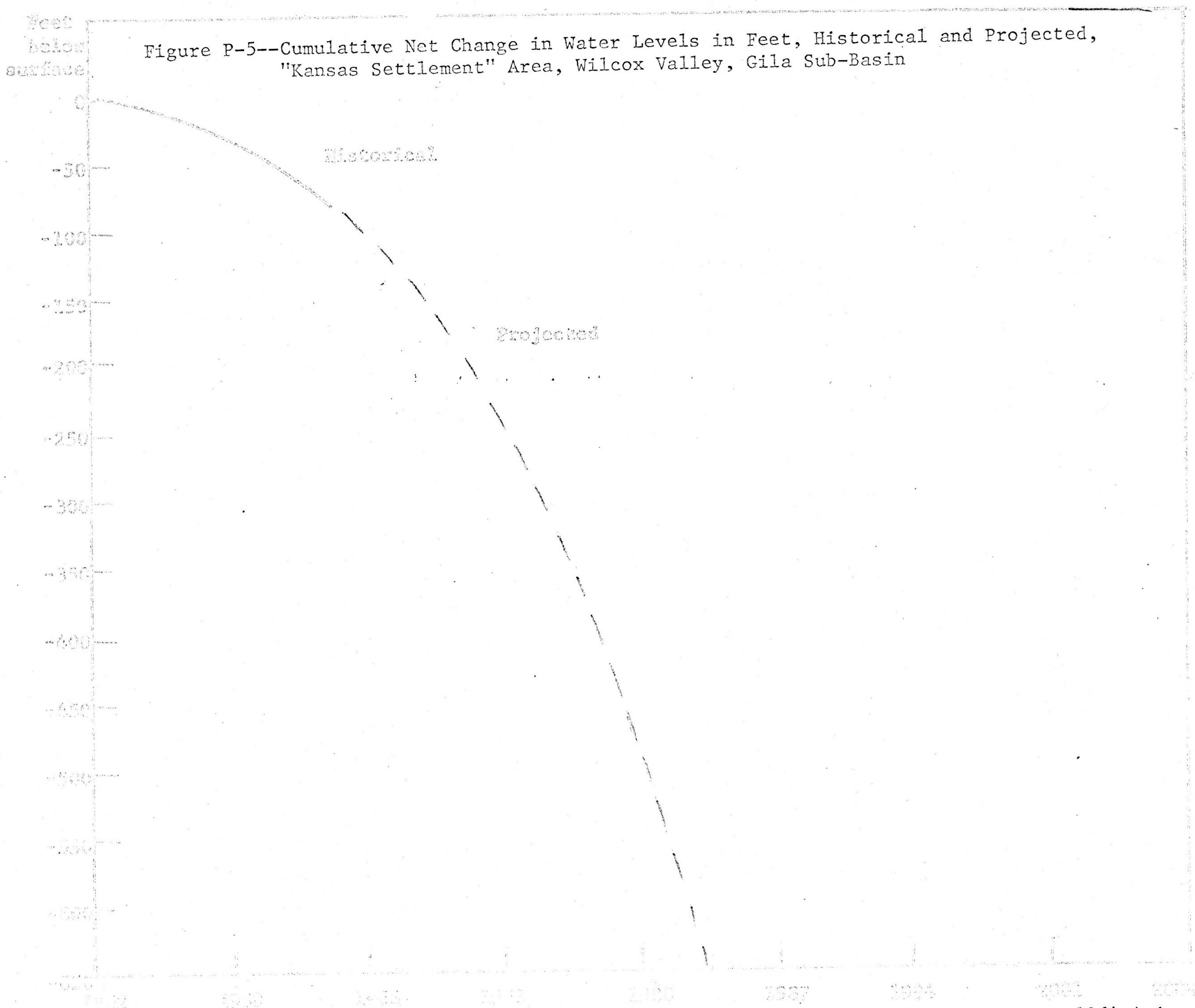
Wilcox Valley. Most of this watershed is within Cochise County but approximately 250 square miles of the northern part is in Graham County. The entire ground water area covers about 1,500 square miles. There are three locations within the valley where irrigation takes place, the Kansas Settlement area, the Stewart area and the Pearce-Cochise area. Adequate recharge of aquifers occurs except in the Kansas Settlement area (Figure P-5).

San Simon Valley. Irrigated land in this valley is found in the area adjacent to Bowie and San Simon in Cochise County. A smaller area of irrigated land is found between Rodeo and Cienogo. Approximately 8000 acres are irrigated from ground water sources. A significant lowering of the water table has occurred in the Bowie area but recharge elsewhere in the valley is near adequate to balance pumping (Table P-8).

Harquhala Plains. This small valley in Maricopa County is an increasingly important agricultural area. The withdrawal of ground water for irrigation has increased from about 33,000 acre-feet in 1954 to about 200,000 acre-feet in recent years. Recharge of ground water fails to balance the increase rate of pumping and water levels have declined as much as 200 feet since 195 and are continuing to decline at an increasing rate as Figure P-6 indicates.

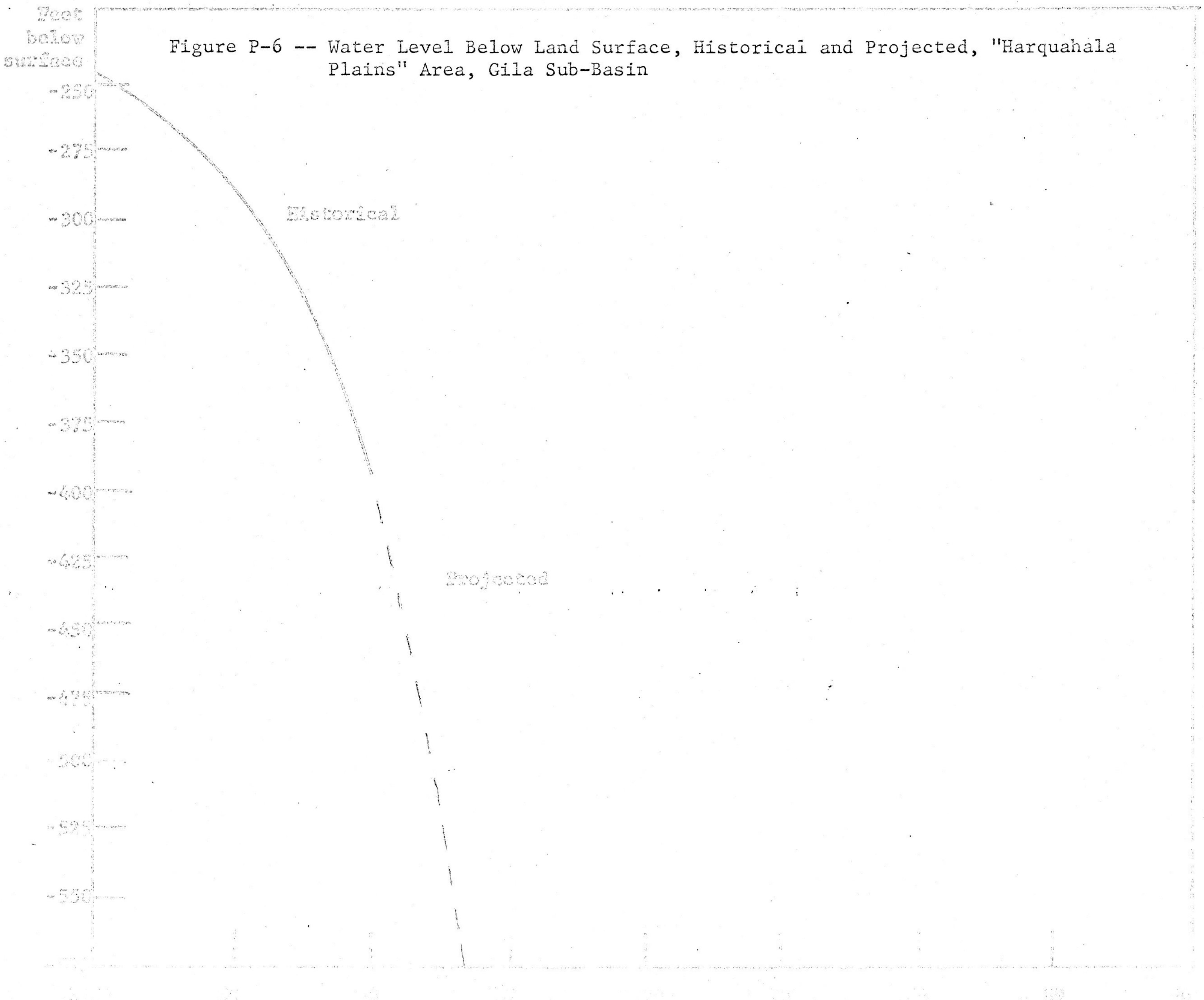
Other areas. Douglas Valley, Duncan Valley, Safford area and Gil Bend all draw from ground water sources for irrigation. Recharge of aquifers has been sufficient to prevent any great decline in water levels (Table P-8).

Figure P-5--Cumulative Net Change in Water Levels in Feet, Historical and Projected, "Kansas Settlement" Area, Wilcox Valley, Gila Sub-Basin



Historical data from Annual report on Ground Water in Arizona, Spring 1963 to Spring, 1964 Ariz.

Figure P-6 -- Water Level Below Land Surface, Historical and Projected, "Harquahala Plains" Area, Gila Sub-Basin



Historical data from annual report on Ground Water in Arizona, Spring 1963 to Spring, 1964 Ariz.

Projection of Final Demand for "All Other" Sectors

With the exception of the export segments of the tourist-oriented sectors, the following procedure was followed.[15]

The projections are based on a comparison of per capita final demand in each sector in the United States $\left(\frac{FD_i^{us}}{P^{us}}\right)$ with per capita final demand in the sub-basin $\left(\frac{FD_i^{sb}}{P^{sb}}\right)$.

FD_i^{us} was derived from data in the ORRRC Report #23, pages 280-283. P^{us} was obtained from Resources for the Future, Inc. Using these data we were able to obtain a national per capita final demand expenditure estimate for both historical years (1950 and 1960) and for the projected years.

To obtain a sub-basin value for final demand in 1950, it was assumed that final demand constituted the same portion of TGO in 1950 that it did in 1960. Thus, having 1950 and 1960 final demand, it was possible to obtain $\frac{FD_i^{sb}}{P^{sb}}$ comparable to the U.S. figures derived earlier.

It was assumed that that the area's per capita final demand for a given industry would converge towards that of the national counterpart industry at a steady rate of compound growth (logrithmic). By employing this annual growth rate, the 1960 ratio (K) can be projected to 1980 and 2010. Given the various value of K_t, final demand expenditures for industry "i" in a sub-basin may be found by:

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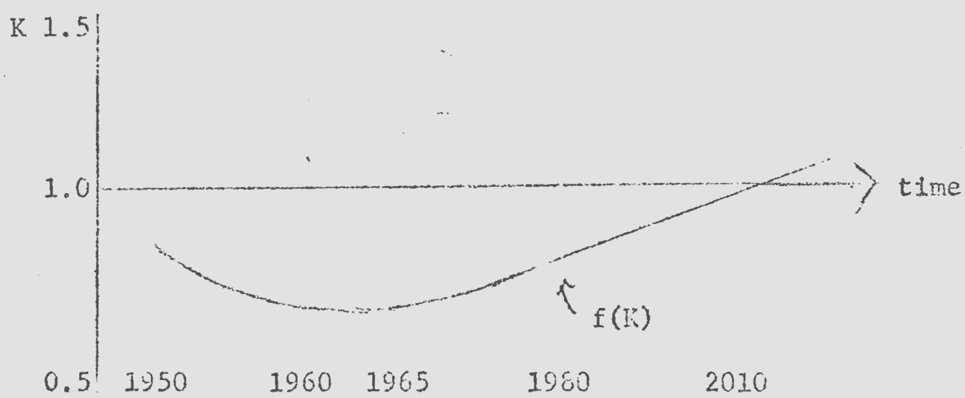
[15] The special considerations that were taken into account in the tourist-oriented sectors are discussed in the concluding paragraphs of this section.

$$FD_i^{sb} = \left(\frac{FD_i^{us}}{P^{us}} \right) P^{sb} .$$

From the medium projection of population we are able to obtain the medium projection of final demand for each sector.

One of the basic problems encountered in this method was that of projecting K. In most cases K converged towards the national mean in the 1950 to 1960 period. In such cases, K was projected at its 1950-1960 growth rate until a value of 1.00 was reached. From that time on, it was assumed that K would remain at 1.00 to 2010. There was a problem when K was diverging from the national average in the 1950-1960 period. In such cases, it was assumed that 1960 represented the point of greatest divergence, and that the growth trend of K would reverse itself towards eventual convergence with K equal to 1.00. Most of the time, it was assumed that K would reach 1.00 in 2010 and appropriate growth rates were employed in the 1960 to 2010 period to supply intermediate values for 1965 and 1980. This divergence pattern can be demonstrated graphically.



The divergence is greatest (K is the smallest) at 1960, slowly K recovers to an arbitrary 2010 value of 1.00.

In addition, a tourism variable, or weight, was introduced in the projections of several sectors, where applicable, as follows:

$$T_i^{sb} = X \cdot K_t \left(\frac{\sum W_i \cdot Y_i^d}{Y_{us}^d} \right)$$

where

T_i^{sb} = the tourism "weight" to be applied to the final demand data.

X = 1960 exports from the input-output table.

K_t = U.S. projected increase in tourist and recreation expenditures (ORPRC).

W_i = per cent of total tourists entering sub-basins that originated in state i, therefore

$$\sum W_i = \text{all tourists for a given year.}$$

Y_i^d = disposable personal income in state i.

Y_{us}^d = disposable personal income in U.S.

The service sectors presented another problem. Since the ORPRC projections of final demand for the U.S. were made only for total services, it was decided that we should do the same. Lodging and Other Services were aggregated, projected as a whole, and disaggregated in a ratio similar to that of 1960 but with small allowances for projected changes in the distribution of total services.

The same procedure was used in the projections of total trade; however, another problem presented itself in the trade sectors. In this report, final demand for Eating and Drinking is shown as gross sales in the input-output table. The ORRRC projections of total trade included Eating and Drinking as part of their projections of margin sales, thus, it was necessary to convert our gross sales figure to margin sales for purposes of projecting. Once the projections were complete, the margin sales of Eating and Drinking were reconverted to gross sales.

Appendix

Summary Analysis of Projected I-O Tables

In order to facilitate analysis of the projected tables of input-output relations and coefficients which appeared above (Tables G $1980_{a,b,c}$ and G $2010_{a,b,c}$) a series of summary tables have been prepared which follow:

Table G-2010-d

Total Gross Output of Processing Sector Industries in the Gila Sub-Basin

	Industry	Total Gross Output
1.	Contract Construction	$6,213,687,000
2.	Rentals & Finance	4,905,958,000
3.	Other Retail Trade	3,895,093,000
4.	Wholesale Trade	2,357,119,000
5.	Other Services (Except Professional)	2,275,362,000
6.	Other Manufacturing	1,608,560,000
7.	Primary Metals	1,229,136,000
8.	Eating & Drinking Places	1,147,558,000
9.	Electric Energy	1,067,848,000
10.	Transportation	957,428,000
11.	Stone, Clay & Glass Products	873,140,000
12.	Copper	866,814,000
13.	Food & Kindred Products	849,431,000
14.	Fabricated Metals	728,538,000
15.	Other Utilities	647,350,000
16.	Other Mining	573,571,000
17.	Lodging	481,933,000
18.	Printing & Publishing	411,500,000
19.	Service Stations	302,174,000
20.	Cotton	258,568,000
21.	Chemicals	178,164,000
22.	Dairy	152,796,000
23.	Feeder Livestock	151,299,000
24.	Lumber & Wood Products	131,354,000
25.	Vegetables	96,678,000
26.	Paper & Pulp	80,030,000
27.	Forage, Feed & Food Crops	59,941,000
28.	Range Livestock	59,700,000
29.	Agricultural Services	57,197,000
30.	Other Agriculture	42,403,000
31.	Furniture & Fixtures	32,807,000
32.	Textiles & Apparel	30,759,000
33.	Citrus Crops	18,686,000
34.	Uranium	2,687,000
35.	Forestry	2,139,000
36.	Leather & Leather Goods	1,751,000

Source: Table G-2010-a.

Table G-2010-e

Processing Sector Industry Sales to Final Demand in the Gila Sub-Basin

	Industry	Sales to Final Demand
1.	Contract Construction	$4,185,393,000
2.	Rentals & Finance	3,776,377,000
3.	Other Retail Trade	3,515,822,000
4.	Wholesale Trade	1,699,314,000
5.	Other Services (Except Professional)	1,526,874,000
6.	Primary Metals	1,124,133,000
7.	Eating & Drinking Places	1,041,724,000
8.	Other Manufacturing	808,917,000
9.	Food & Kindred Products	587,210,000
10.	Lodging	396,127,000
11.	Electric Energy	327,545,000
12.	Cotton	202,330,000
13.	Service Stations	175,791,000
14.	Transportation	166,664,000
15.	Other Utilities	124,365,000
16.	Printing & Publishing	106,855,000
17.	Fabricated Metals	101,377,000
18.	Vegetables	84,895,000
19.	Other Mining	74,996,000
20.	Lumber & Wood Products	74,460,000
21.	Stone, Clay & Glass Products	44,134,000
22.	Dairy	38,733,000
23.	Chemicals,	31,694,000
24.	Textiles & Apparel	30,334,000
25.	Furniture & Fixtures	30,321,000
26.	Other Agriculture	20,975,000
27.	Feeder Livestock	11,060,000
28.	Paper & Pulp	10,758,000
29.	Citrus Crops	9,524,000
30.	Copper	7,447,000
31.	Range Livestock	6,674,000
32.	Leather & Leather Goods	1,614,000
33.	Uranium	906,000
34.	Agricultural Services	350,000
35.	Forestry	- 0 -
36.	Forage, Feed & Food Crops	- 0 -

Source: Interindustry Transactions Table, G-2010-a.

Table G-2010-f

Sales to Final Demand by Processing Sectors Listed Below
As a Percentage of Total Gross Output in the
Gila Sub-Basin

	Industry	Sales to Final Demand Divided by Total Gross Output %
1.	Textiles & Apparel	98.62
2.	Furniture & Fixtures	92.42
3.	Leather & Leather Goods	92.18
4.	Primary Metals	91.46
5.	Other Retail	90.26
6.	Vegetables	87.81
7.	Lodging	82.20
8.	Cotton	78.25
9.	Rentals & Finance	76.98
10.	Wholesale Trade	72.09
11.	Food & Kindred Products	69.13
12.	Contract Construction	67.36.
13.	Other Services (Except Professional)	67.10
14.	Service Stations	58.18
15.	Lumber & Wood Products	56.69
16.	Citrus Crops	50.97
17.	Other Manufacturing	50.29
18.	Other Agriculture	49.47
19.	Uranium	33.72
20.	Electric Energy	30.67
21.	Printing & Publishing	25.97
22.	Dairy	25.35
23.	Other Utilities	19.21
24.	Chemicals	17.79
25.	Transportation	17.41
26.	Eating & Drinking Places	15.31
27.	Fabricated Metals	13.92
28.	Paper & Pulp	13.44
29.	Other Mining	13.08
30.	Range Livestock	11.18
31.	Feeder Livestock	7.31
32.	Stone, Clay & Glass Products	5.05
33.	Copper	0.86
34.	Agricultural Services	0.61
35.	Forestry	0.00
36.	Forage, Feed & Food Crops	0.00

Source: Tables G-2010-d and G-2010-c.

Table G-2010-h

Processing Sector Industries of the Gila Sub-Basin Ranked By The Magnitude of the Total Dollar Production Directly and Indirectly Required by the Sub-Basin Economy to Sustain a $1.00 Increase in Deliveries to Final Demand by the Industries Named.

	Industry	Direct and Indirect Requirements Per Dollar of Sales
1.	Contract Construction	1.367708
2.	Other Mining	1.272848
3.	Stone, Clay & Glass Products	1.215915
4.	Electric Energy	1.202525
5.	Other Manufacturing	1.193315
6.	Paper & Pulp	1.089429
7.	Fabricated Metals	1.084403
8.	Furniture & Fixtures	1.072966
9.	Food & Kindred Products	1.070719
10.	Other Services (Except Professional)	1.054990
11.	Copper	1.045081
12.	Transportation	1.044671
13.	Rentals & Finance	1.037027
14.	Chemicals	1.026754
15.	Printing & Publishing	1.026750
16.	Wholesale Trade	1.026256
17.	Uranium	1.025736
18.	Primary Metals	1.024272
19.	Other Utilities	1.023155
20.	Lumber & Wood Products	1.019485
21.	Dairy	1.018943
22.	Other Retail Trade	1.015393
23.	Textiles & Apparel	1.014327
24.	Feeder Livestock	1.013729
25.	Eating & Drinking Places	1.011787
26.	Service Stations	1.009368
27.	Other Agriculture	1.006709
28.	Forage, Feed & Food Crops	1.006283
29.	Cotton	1.004478
30.	Citrus Crops	1.003184
31.	Vegetables	1.002023
32.	Range Livestock	1.001668
33.	Lodging	1.001635
34.	Leather & Leather Goods	1.000127
35.	Agricultural Services	1.000052
36.	Forestry	1.000002

Source: Table of Direct and Indirect Requirement Coefficients, G-2010-c.

Table G-2010-i

Number of Processing Sector Industries Responding in Amounts of At Least $0.01 per Dollar of Sales to Final Demand by the Industries Listed Below.

Industry	Intersections greater than $0.01
Food & Kindred Products	21
Other Agriculture	19
Other Mining	18
Primary Metals	17
Leather & Leather Goods	16
Other Manufacturing	16
Copper	16
Citrus Crops	16
Uranium	14
Eating & Drinking Places	14
Lodging	13
Fabricated Metals	13
Printing & Publishing	13
Cotton	13
Forage, Feed & Food Crops	13
Lumber & Wood Products	12
Paper & Pulp	12
Chemicals	12
Contract Construction	11
Transportation	11
Other Services (Except Professional)	11
Stone, Clay & Glass Products	11
Furniture & Fixtures	11
Vegetables	11
Dairy	11
Feeder Livestock	10
Service Stations	10
Other Retail	10
Agricultural Services	9
Other Utilities	9
Wholesale Trade	9
Textiles & Apparel	9
Electric Energy	7
Rentals & Finance	5
Range Livestock	6
Forestry	4

Source: Table of Direct and Indirect Requirements per Dollar of Final Demand, G-2010-c.

Table G-1980-d

Total Gross Output of Processing Sector Industries in the Gila Sub-Basin

	Industry	Total Gross Output
1.	Contract Construction	$ 2,520,746,000
2.	Other Retail Trade	1,673,830,000
3.	Rentals & Finance	1,361,356,000
4.	Wholesale Trade	1,018,362,000
5.	Other Services (Except Professional)	812,268,000
6.	Other Manufacturing	759,463,000
7.	Other Utilities	649,717,000
8.	Primary Metals	604,014,000
9.	Food & Kindred Products	546,863,000
10.	Eating & Drinking Places	483,538,000
11.	Copper	439,262,000
12.	Electric Energy	416,054,000
13.	Transportation	360,442,000
14.	Cotton	214,861,000
15.	Stone, Clay & Glass Products	179,933,000
16.	Fabricated Metals	173,675,000
17.	Other Mining	165,734,000
18.	Lodging	165,283,000
19.	Service Stations	125,532,000
20.	Feeder Livestock	115,599,000
21.	Printing & Publishing	105,868,000
22.	Vegetables	78,050,000
23.	Dairy	72,399,000
24.	Lumber & Wood Products	67,407,000
25.	Chemicals	62,432,000
26.	Forage, Feed & Food Crops	57,544,000
27.	Agricultural Services	45,893,000
28.	Range Livestock	45,596,000
29.	Paper & Pulp	23,143,000
30.	Furniture & Fixtures	22,479,000
31.	Other Agriculture	22,214,000
32.	Textiles & Apparel	20,709,000
33.	Citrus Crops	11,286,000
34.	Forestry	2,100,000
35.	Leather & Leather Goods	884,000
36.	Uranium	790,000

Source: Table G-1980-a.

Table G-1980-e

Processing Sector Industry Sales to Final Demand in the Gila Sub-Basin

	Industry	Sales to Final Demand
1.	Contract Construction	$1,731,315,000
2.	Other Retail Trade	1,523,507,000
3.	Rentals & Finance	933,083,000
4.	Wholesale Trade	736,362,000
5.	Primary Metals	579,450,000
6.	Other Services (Except Professional)	533,142,000
7.	Other Utilities	464,209,000
8.	Other Manufacturing	451,765,000
9.	Eating & Drinking Places	451,409,000
10.	Food & Kindred Products	436,161,000
11.	Cotton	176,959,000
12.	Electric Energy	154,428,000
13.	Lodging	139,330,000
14.	Service Stations	76,176,000
15.	Vegetables	75,849,000
16.	Transportation	71,516,000
17.	Printing & Publishing	49,474,000
18.	Other Mining	47,231,000
19.	Fabricated Metals	46,552,000
20.	Lumber & Wood Products	35,959,000
21.	Feeder Livestock	29,930,000
22.	Furniture & Fixtures	20,942,000
23.	Textiles & Apparel	20,562,000
24.	Stone, Clay & Glass Products	18,063,000
25.	Other Agriculture	14,031,000
26.	Chemicals	12,159,000
27.	Citrus Crops	7,559,000
28.	Paper & Pulp	5,216,000
29.	Copper	3,852,000
30.	Dairy	3,381,000
31.	Range Livestock	3,381,000
32.	Forage, Feed & Food Crops	1,171,000
33.	Leather & Leather Goods	847,000
34.	Uranium	614,000
35.	Agricultural Services	200,000
36.	Forestry	- 0 -

Source: Interindustry Transactions Table, G-1980-a.

Table G-1980-f

Sales to Final Demand by Processing Sectors Listed Below
As a Percentage of Total Gross Output in the
Gila Sub-Basin

	Industry	Sales to Final Demand Divided by Total Gross Output %
1.	Textiles & Apparel	99.29
2.	Vegetables	97.18
3.	Primary Metals	95.93
4.	Leather & Leather Goods	95.81
5.	Eating & Drinking Places	93.36
6.	Furniture & Fixtures	93.16
7.	Other Retail	91.02
8.	Lodging	84.30
9.	Cotton	82.36
10.	Food & Kindred Products	79.76
11.	Uranium	77.72
12.	Wholesale Trade	72.31
13.	Other Utilities	71.45
14.	Contract Construction	68.68
15.	Rentals & Finance	68.54
16.	Citrus Crops	66.98
17.	Other Services (Except Professional)	65.63
18.	Other Agriculture	63.16
19.	Service Stations	60.68
20.	Other Manufacturing	59.48
21.	Lumber & Wood Products	53.35
22.	Printing & Publishing	46.73
23.	Electric Energy	37.12
24.	Other Mining	28.50
25.	Fabricated Metals	26.80
26.	Feeder Livestock	25.89
27.	Paper & Pulp	22.54
28.	Transportation	19.84
29.	Chemicals	19.48
30.	Stone, Clay & Glass Products	10.04
31.	Range Livestock	7.42
32.	Dairy	4.67
33.	Forage, Feed & Food Crops	2.03
34.	Copper	0.88
35.	Agricultural Services	0.44
36.	Forestry	0.00

Source: Tables G-1980-d and G-1980-e.

Table G-1980-h

Processing Sector Industries of the Gila Sub-Basin Ranked By The Magnitude of the Total Dollar Production Directly and Indirectly Required by the Sub-Basin Economy to Sustain a $1.00 Increase in Deliveries to Final Demand by the Industries Named.

	Industry	Direct and Indirect Requirements Per Dollar of Sales
1.	Contract Construction	1.366429
2.	Stone, Clay & Glass Products	1.206650
3.	Other Mining	1.187828
4.	Electric Energy	1.186529
5.	Other Manufacturing	1.174766
6.	Paper & Pulp	1.082421
7.	Furniture & Fixtures	1.072964
8.	Food & Kindred Products	1.059664
9.	Fabricated Metals	1.056449
10.	Other Services (Except Professional)	1.050925
11.	Transportation	1.039599
12.	Rentals & Finance	1.033249
13.	Copper	1.032433
14.	Dairy	1.022747
15.	Printing & Publishing	1.021397
16.	Wholesale Trade	1.020433
17.	Chemicals	1,018662
18.	Other Utilities	1.018515
19.	Lumber & Wood Products	1.017048
20.	Feeder Livestock	1.015549
21.	Uranium	1.015244
22.	Other Retail	1.013671
23.	Primary Metals	1.013096
24.	Eating & Drinking Places	1.011263
25.	Forage, Feed & Food Crops	1.011229
26.	Textiles & Apparel	1.007094
27.	Service Stations	1.006729
28.	Other Agriculture	1.004957
29.	Cotton	1.002350
30.	Range Livestock	1.001642
31.	Citrus Crops	1.001085
32.	Lodging	1.001065
33.	Vegetables	1.001005
34.	Agricultural Services	1.000048
35.	Leather & Leather Goods	1.000044
36.	Forestry	1.000002

Source: Table of Direct and Indirect Requirement Coefficients, G-1980-c.

Table G-1980-i

Number of Processing Sector Industries Responding in Amounts of At Least $0.01 per Dollar of Sales to Final Demand by the Industries Listed Below.

Industry	Intersections greater than $0.01
Other Agriculture	17
Food & Kindred Products	17
Other Mining	16
Primary Metals	16
Citrus Crops	15
Leather & Leather Goods	15
Eating & Drinking Places	13
Copper	13
Cotton	12
Paper & Pulp	12
Lodging	12
Contract Construction	12
Other Services (Except Professional)	11
Other Manufacturing	11
Fabricated Metals	11
Printing & Publishing	11
Lumber & Wood Products	11
Uranium	11
Forage, Feed & Food Crops	11
Dairy	11
Feeder Livestock	11
Furniture & Fixtures	10
Chemicals	10
Stone, Clay & Glass Products	10
Transportation	10
Other Utilities	9
Service Stations	9
Wholesale Trade	9
Vegetables	8
Textiles & Apparel	8
Other Retail Trade	8
Agricultural Services	8
Range Livestock	7
Electric Energy	5
Rentals & Finance	4
Forestry	4

Source: Table of Direct and Indirect Requirements per Dollar of Final Demand, G-1980-c.