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An Analysis of the Economy of the San Juan 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 SAN JUAN RIVER SUB-BASIN OF THE COLORADO RIVER DRAINAGE BASIN IN 1960 WITH EMPHASIS ON HEAVY WATER-USING INDUSTRIES

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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 measures 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 San Juan Sub-Basin is found in Table SJ-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 San Juan Sub-Basin kept $2,797,000 of its own production for further use while selling $134,000 to dairy, and smaller amounts to other industries. The vertical columns of the table are used to indicate each industry's sources of supply. Again referring to Table SJ-S we see that range livestock was its own most important supplier. This, of course, is simply the other side of the transaction noted above. However, as we read down the column, we can quickly spot $5,000 of purchases by range livestock from the dairy industry and other purchases from various suppliers of the industry. We can also identify $1,563,000 of imports from outside the Colorado Basin, payments of $5.99 million in profits and related payments and $2 million in wages and salaries.

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 and 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, op. cit., Chapter 2.

[3]Ibid.

The inverse matrix for the San Juan is shown in Table SJ-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 $1.06 of output. Other significant effects are felt in rentals and finance (2.8 cents), agricultural services (2.4 cents), transportation (1.7 cents), and other retail (1.4 cents). In the aggregate, it requires $1.21 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 a rank order of twenty within the processing sector of the San Juan. (See Table SJ-Z)

Returning for a moment to Table SJ-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 San Juan 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 San Juan 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 intersection 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 San Juan was divided into twenty-eight 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

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[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 not 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]

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

THE ECONOMY OF THE SAN JUAN RIVER SUB-BASIN OF THE COLORADO RIVER BASIN: AN OVERVIEW

By

Bernard Udis

August, 1967

THE ECONOMY OF THE SAN JUAN RIVER SUB-BASIN OF THE COLORADO RIVER BASIN: AN OVERVIEW

Introduction

The area of the San Juan Sub-Basin of the Colorado River Basin is roughly rectangular in shape and covers the points where the four states of Arizona, Colorado, New Mexico and Utah meet at the so-called "four corners" area. The San Juan Sub-Basin is approximately 300 miles long from east to west and 120 miles wide from north to south. The physical characteristics of the sub-basin vary widely, ranging from rugged mountain areas to vast stretches of desert plateau. The Green River converges with the Colorado at the northern boundary of the San Juan Sub-Basin -- then runs a southwesterly course for 220 miles from the mouth of the Green to Lee Ferry, the legal boundary between the upper and lower basins of the Colorado.

The San Juan River is the largest tributary to the Colorado in the area. It drains that portion of the sub-basin southeast of the Colorado and converges with the main stem 80 miles up stream from Lee Ferry. Three small rivers, the Freemont, Escalante, and the Paria, join the Colorado from the west.

The San Juan Sub-Basin contains all or portions of 22 counties comprising 24,296,000 acres. This is sixteen percent of the land area of the entire Colorado River Basin.[1] For purposes of this analysis, however,

[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), pp. 9-10.

The San Juan Sub-Basin has been defined in terms of nine "representative" counties which account for the bulk of the economic activity occurring in the sub-basin.[2] In terms of representative counties, the San Juan Sub-Basin comprises 30,763 square miles, or 12.13 percent of the land area of all the representative counties in the Colorado River Basin. This makes it third largest among the six sub-basins of the Colorado.

Originally populated by miners exploring for gold and other precious metals, the San Juan Sub-Basin still finds its most important economic activity in the area of mining and oil and gas extraction. While there are no major metropolitan areas in the San Juan Sub-Basin, small centers of population do exist in Colorado, New Mexico, and Utah. Here such towns as Durango, Pagosa Springs, Cortez, Silverton, Mancos, Dove Creek, Farmington, Shiprock, Aztec, Bloomfield, Newcomb, Montecello, Blanding, Mexican Hat, and Escalante are found. The portions of the sub-basin in the extreme northeastern corner of Arizona is the most desolate in the region with almost nothing in the way of centers of population other than perhaps Page and Lee Ferry, Arizona.

For purposes of this analysis, the San Juan Sub-Basin has been defined to include the following counties: In Colorado, Archuleta, La Plata, Montezuma, and San Juan; in New Mexico, San Juan County; and in Utah, Garfield, Kane, San Juan, and Wayne Counties. Figures SJ-A and SJ-B show the precise location of the San Juan, while Table SJ-A lists the representative counties of each sub-basin of the Colorado River Basin.

Range livestock is by far the most important agricultural industry in the San Juan Sub-Basin. The share of total farms classified as commercial

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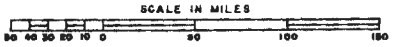
[2]The Public Health Service has designated as "representative" certain counties of the Colorado Basin in which most of the economic activity occurs. This was necessary because the boundaries of the Colorado River Basin and its sub-basins follow natural drainage divisions and rarely conform to county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

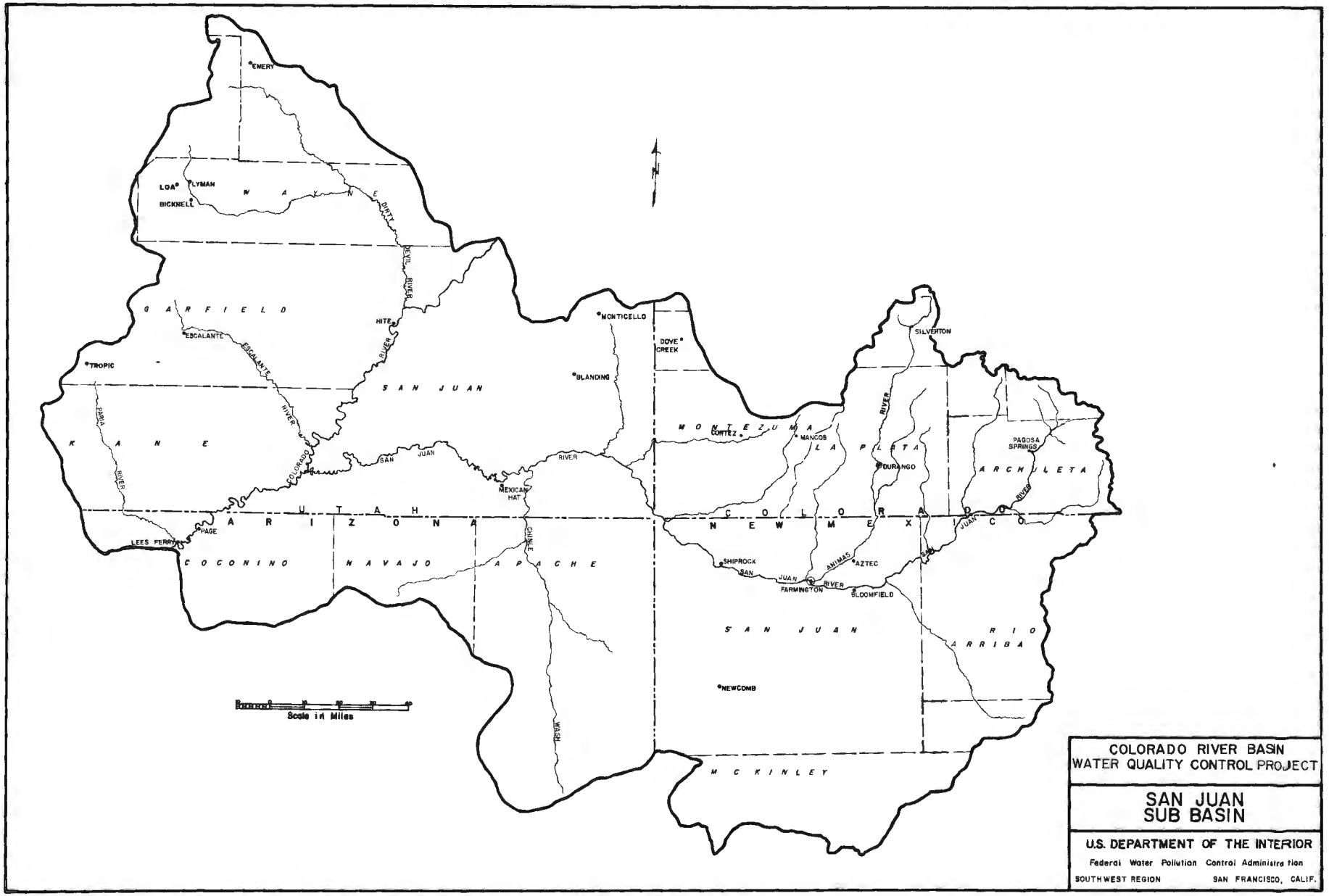
MAJOR SUB-BASINS
OF THE
COLORADO RIVER BASIN

COLORADO RIVER BASIN
WATER QUALITY CONTROL PROJECT

U.S. DEPARTMENT OF THE INTERIOR
Federal Water Pollution Control Administration
SOUTHWEST REGION SAN FRANCISCO, CALIF.



GPO 841-301



COLORADO RIVER BASIN
WATER QUALITY CONTROL PROJECT

SAN JUAN SUB BASIN

U.S. DEPARTMENT OF THE INTERIOR
Federal Water Pollution Control Administration
SOUTHWEST REGION SAN FRANCISCO, CALIF.

Table SJ-A

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

farms in this sub-basin has ranged from sixty percent to approximately sixty-six percent in recent years. The size of farms has increased steadily in the sub-basin since 1939, and in 1960 the average farm in the San Juan area contained approximately 1,800 acres of which only 72 acres were cultivated crop land and only 35, irrigated crop land.

Population

The San Juan Sub-Basin is the fourth most populous sub-basin of the Colorado River area with a 1960 population of 107,045. Table SJ-B presents a summary of the age and sex distribution of the 1960 sub-basin population. In that year the age profile of population in the sub-basin showed a somewhat larger percentage of the population under age 20 and correspondingly smaller proportions between ages 20 and 64 and over 64 years of age than was the case ten years earlier. The gradual increase in the aged portion of the population, 65 years and above, which had been increasing fairly steadily between 1930 and 1950, showed a dramatic reversal with a decline to five percent of the total population in 1960.

The 1960 population of San Juan was almost exactly double the figure for 1930. Most of this growth occurred in the decade between 1950 and 1960. In the same decade five of the nine counties which comprise the San Juan grew in population. The growth rate ranged from Kane County's sixteen percent increase to San Juan County, New Mexico's growth of almost one hundred and ninety-two percent. Four counties of the sub-basin lost population in the decade to 1960. These were San Juan County, Colorado (-42.3%), Wayne County (-21.6%), Garfield County (-13.8%), and Archuleta (-13.2%).

Table SJ-B

Population by Age and Sex - 1960

San Juan Sub-Basin

Age Group	Male	Female
0 - 19	25,895	25,505
20 - 39	14,098	14,695
40 - 64	11,415	10,151
65+	2,674	2,612
TOTAL	54,082	52,963
BOTH SEXES - TOTAL	107,045	

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

Census data permits analysis of population change in terms of the components of such change. For example, it enables one to determine how much of the difference of the population in 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 San Juan are instructive. During the decade to 1960 the excess of births over deaths in this sub-basin amounted to 24,520,. The reported excess of total 1960 population over 1950 population, however, was 45,371. Thus, net in-migration is said to have taken place and the 20,851 in-migrants constitute 33.8 percent of the 1950 population taken as a base. Thus, a net migration rate of +33.8 percent is assigned the San Juan Sub-Basin. Similarly, calculated rates for the component counties show positive net rates for four counties (La Plata and Montezuma Counties, Colorado, San Juan County, New Mexico, and San Juan County, Utah) and negative rates for the remaining five counties (Archuleta and San Juan Counties, Colorado, and Garfield, Kane and Wayne Counties, Utah).

In the aggregate, as noted above, the San Juan ranked fourth in population in 1960 among the six sub-basins of the Colorado. Its approximate 6 percent of total Colorado River Basin population in that year lagged far behind the Lower Main Stem's 12.8 percent and the Gila's 63.1 percent. In relative terms, it was not far ahead of the fifth ranking Little Colorado's 5.74 percent nor far behind the third ranking Upper Main Stem's 6.97 percent. In terms of rank, however, the San Juan has moved up two notches from its sixth ranked position in the decennial census years of 1930, 1940 and 1950.

Population Density

The 107,045 residents of the San Juan in 1960 were distributed over a land area of 30,763 square miles in the representative counties, with a resulting population density of just under 3.5 persons per square mile. This figure compared with national density of population of 59 persons per square mile in that year. While sparsity of population relative to land characterizes all of the sub-basins of the Colorado, the San Juan's "emptiness is exceeded only by the Green River and its population density of 2.2 persons per square mile in 1960. Thus the large gain in the decade to 1960 of population density in the San Juan of 74 percent reflects only the exceedingly low figure which prevailed ten years earlier.

Within the sub-basin, 1960 population density ranged from a low of 0.65 persons per square mile in Kane County, Utah to a "crowded" 11.4 persons per square mile in La Plata County, Colorado.

By census definition, 57.8 percent of the population of the San Juan was classed as rural in 1960. Of this group, 11.8 percent were classed as rural farm and 46.0 percent as rural nonfarm. The changes in the rural farm section of the population since 1950 are truly startling. In the earlier year a third of the population of the San Juan was classed as rural farm compared to the 11.8 percent figure in 1960. The growth in the rural nonfarm portion of the population was minor from 44.2 percent to 46.0 percent with the largest change being absorbed in the urban component which grew from 22.4 percent in 1950 to 42.2 percent in 1960.

Most of this growth in the urban portion of the population of the San Juan was accounted for by three counties -- La Plata and Montezuma in Colorado and San Juan in New Mexico -- each of which approximated 50 percent of its

population as urban. It is interesting to note that with the exception of these three counties, all of the other component counties in San Juan are classed as zero urban. San Juan County, Colorado and Garfield and Kane Counties in Utah are classed as 100 percent rural nonfarm.

Educational Level of the Population

Educational attainment of the population 25 years of age and older in the San Juan Sub-Basin is shown in Table SJ-C. There it may be noted that the median number of school years completed among both men and women over 24 years of age marginally exceeded their counterparts in the nation at large, with 10.7 and 11.5 years of schooling completed, respectively. Among male residents of the sub-basin in 1960, schooling completed ranged from a low of 8.5 years in Archuleta County to a high of 12.1 years in Kane County, Utah. Among women in the sub-basin in the same year, the range of educational attainment extended from a low of 9.5 years in Archuleta County to a high of 12.2 years recorded for both La Plata County, Colorado and Garfield County, Utah.

Income

The San Juan Sub-Basin had the fifth lowest per capita personal income of any sub-basin of the entire Colorado River Basin in 1960 (See Table SJ-D). Our estimates of $1,554 for the San Juan trailed the richest sub-basin (Lower Main Stem) by $558 and trailed the U.S. national average by $387. By our estimates personal income per capita in the San Juan was approximately

Table SJ-C

Median School Years Completed (Persons 25 & Over)

SAN JUAN	Male			Female		
Representative Counties	1950	1960	% Change	1950	1960	% Change
COLORADO						
1. Archuleta	8.2	8.5	3.7%	8.1	9.5	17.3%
2. La Plata	9.1	11.9	30.8	11.0	12.2	10.9
3. Montezuma	8.9	10.2	14.6	9.8	11.3	15.3
4. San Juan	**	10.1	**	**	12.1	**
NEW MEXICO						
1. San Juan	8.3	11.0	32.5	8.7	11.2	28.7
UTAH						
1. Garfield	10.7	11.7	9.3	10.6	12.2	15.1
2. Kane	11.0	12.1	10.0	12.0	12.1	0.8
3. San Juan	8.4	10.0	19.0	9.0	10.9	21.1
4. Wayne	10.0	11.2	12.0	**	12.1	**
SAN JUAN	9.3	10.7	15.1	9.9	11.5	16.2
UNITED STATES	9.0	10.5	17.0	9.6	11.0	15.0

** Not Reported

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

Table SJ-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.

80 percent of the national average.[3] As shown in Table SJ-E, per capita personal income varied in the sub-basin from a low of $1,200 in Archuleta County to a high of $1,724.00 in La Plata County.

Labor Force Participation

Labor force participation may be taken to show 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 are actively seeking work. This number when expressed as a percentage of the noninstitutionalized population, age 14 or older yields 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 this disaggregation into age classes was not possible, but Table SJ-F does provide labor force participation rates by sex for the continental United States, 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.

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[3] In Table SJ-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 SJ-E

Per Capita Personal Income by Representative Counties, San Juan Sub-Basin (1960)

County	Personal Income
La Plata, Colorado	$1,724
San Juan, New Mexico	1,598
Montezuma, Colorado	1,524
Kane, Utah	1,401
San Juan, Colorado	1,358
San Juan, Utah	1,286
Garfield, Utah	1,281
Wayne, Utah	1,244
Archuleta, Colorado	1,200

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 SJ-F

Labor Force Participation Rates

	1950 Male			1960 Male			1950 Female			1960 Female		
	Rate	Location Quotient	Rank	Rate	Location Quotient	Rank	Rate	Location Quotient	Rank	Rate	Location Quotient	Rank
United States	81.02	1.000		78.75	1.000		29.28	1.000		34.88	1.000	
Colorado River Basin	77.56	0.957		77.88	0.989		25.47	0.870		32.33	0.927	
Lower Main Stem Sub-Basin	82.93	1.024	1	82.84	1.052	1	29.03	0.991	1	38.01	1.090	1
Gila Sub-Basin	75.78	0.935	5	77.62	0.986	4	25.93	0.886	3	32.63	0.935	2
Little Colorado Sub-Basin	75.72	0.934	6	62.92	0.799	6	28.59	0.976	2	25.22	0.723	6
Upper Main Stem Sub-Basin	78.20	0.965	3	78.31	0.994	3	23.46	0.801	4	31.44	0.901	3
San Juan Sub-Basin	77.77	0.960	4	77.00	0.978	5	21.19	0.724	5	26.36	0.756	5
Green Sub-Basin	82.11	1.013	2	79.75	1.013	2	20.67	0.706	6	28.52	0.818	4

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

Table SJ-F indicates that in 1960, the share of the adult population employed or seeking work in the San Juan ranked fifth among the sub-basins of the Colorado. Approximately seventy-seven percent of the men and twenty-six percent of the women in a normal work phase of their lives work in the labor force. Sub-basin location quotients of 0.978 and 0.756 for males and females, respectively, indicate a relatively narrower gap between labor force participation rates among men in the San Juan and in the United States than among women. The labor force participation patterns of both men and women in the San Juan moved somewhat closer to the national norms between 1950 and 1960.

The wide variation in labor force participation rates within the sub-basin is shown in Table SJ-G. The range of participation rates among men vary from a low of 65.1 percent in Archuleta County to a high of 83.88 percent in Garfield County, Utah. The range among women in 1960 stretched from San Juan, Colorado's low of 16.55 percent to Garfield County, Utah's high of 36.43 percent. Interestingly, while labor force participation rates declined among sub-basin males for every component county except San Juan, New Mexico and Garfield, Utah, among sub-basin women they increased in every case except San Juan County, Utah.

Table SJ-G

Labor Force Participation Rates
San Juan Sub-Basin

County	Male		Female	
	1950	1960	1950	1960
Archuleta, Colorado	81.33	65.10	20.08	25.50
La Plata, Colorado	79.09	77.60	25.52	32.31
Montezuma, Colorado	75.67	75.01	18.39	26.78
San Juan, Colorado	84.55	80.97	13.98	16.55
San Juan, New Mexico	74.74	77.18	19.41	25.54
Garfield, Utah	75.91	83.88	18.60	36.43
Kane, Utah	75.39	73.74	21.42	32.89
San Juan, Utah	84.24	80.47	28.12	23.80
Wayne, Utah	83.48	72.35	12.75	17.95
Sub-Basin Total	77.77	77.00	21.19	27.23

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

Table SJ-H
San Juan Employment by Industry

INDUSTRY	1940 Reported Employment	1940 Adjusted Employment *	1950 Reported Employment	1950 Adjusted Employment *	1960 Reported Employment	1960 Adjusted Employment *
Agriculture	8,384	8,478	6,786	6,937	3,164	3,229
Mining	610	615	1,098	1,117	4,272	4,363
Contract construction	862	873	1,426	1,461	3,498	3,570
Manufacturing (Total)	1,606	1,619	1,183	1,213	2,096	2,138
Food and kindred products mfg.	134	135	169	173	336	343
Textile mill products mfg.	1,012	1,019	251	256	30	30
Apparel mfg.	1	1	3	3	0	0
Lumber, wood products, furniture mfg.	312	316	442	456	526	537
Printing and publishing mfg.	75	76	121	123	232	236
Chemicals and allied products mfg.	1	1	10	10	99	101
Electrical and other machinery mfg.	10	10	66	67	146	149
Motor vehicles and equipment mfg.	0	0	1	1	4	4
** Other transportation equipment mfg.	1	1	3	3	0	0
** Primary metals	11	11	11	11	6	6
** Fabricated metals	17	17	12	12	71	73
Other and miscellaneous mfg.	32	32	94	96	646	659
Transportation	362	365	934	963	1,103	1,127
Communication, utilities	212	213	535	547	1,510	1,539
Wholesale trade	193	195	334	341	948	968
Eating and drinking places	261	264	490	502	1,208	1,232
Other retail trade	1,287	1,305	1,902	1,949	3,729	3,806
Finance, insurance, real estate	120	121	265	271	812	829
Services (Total)	2,269	2,297	3,061	3,132	7,029	7,169
Hotels and other personal services	419	426	635	649	1,284	1,310
Private households	291	293	312	319	632	645
Business and repair services	319	323	486	497	934	953
Entertainment, recreation services	102	103	115	116	250	254
Medical, other professional services	1,138	1,152	1,513	1,551	3,929	4,007
Government	561	568	781	800	1,673	1,706
Total	16,727	16,913	18,804	19,231	31,042	31,676
Industry Not Reported	185		427		634	

Table SJ-H (Cont'd)
San Juan Employment by Industry

INDUSTRY	Industry as percentage of adjusted Sub-basin employment 1940	1950	1960	Per cent change Based on adjusted employment * 1940 1950	1940 1960	1950 1960
Agriculture	50.13%	36.07%	10.19%	-18.18%	-61.92%	-53.46%
Mining	3.64	5.81	13.77	81.62	609.42	290.59
Contract construction	5.16	7.60	11.27	67.35	308.93	144.35
Manufacturing (Total)	9.57	6.31	6.75	-25.08	32.05	76.25
Food and kindred products mfg.	0.80	0.90	1.08	28.14	154.07	98.26
Textile mill products mfg.	6.02	1.33	0.09	-74.88	-97.06	-88.29
Apparel mfg.	0.01	0.01	0	200.00	-100.00	-100.00
Lumber, wood products, furniture mfg.	1.87	2.37	1.70	44.30	69.93	17.76
Printing and publishing mfg.	0.45	0.69	0.75	61.84	210.52	91.86
Chemicals and allied products mfg.	0.01	0.05	0.32	900.00	1000.00	910.00
Electrical and other machinery mfg.	0.06	0.35	0.47	570.00	1390.00	122.38
Motor vehicles and equipment mfg.	0	0.01	0.01	--	--	300.00
Other transportation equipment mfg.	0.01	0.01	0	200.00	-100.00	-100.00
Primary metals	0.06	0.05	0.01	0	-45.46	-45.46
Fabricated metals	0.10	0.06	0.23	-29.42	329.41	503.33
Other and miscellaneous mfg.	0.18	0.49	2.08	200.00	2059.37	686.45
Transportation	2.16	5.01	3.56	163.83	216.57	17.03
Communication, utilities	1.26	2.84	4.86	156.80	622.53	181.35
Wholesale trade	1.15	1.77	3.06	74.87	396.41	183.87
Eating and drinking places	1.56	2.61	3.89	90.15	366.66	145.41
Other retail trade	7.72	10.13	12.01	49.34	-70.84	95.27
Finance, insurance, real estate	0.72	1.41	2.62	123.96	585.12	205.90
Services (Total)	13.58	16.29	22.63	36.35	212.10	128.89
Hotels and other personal services	2.52	3.37	4.14	52.34	207.51	101.84
Private households	1.73	1.66	2.04	8.87	120 13	102.19
Business and repair services	1.91	2.58	3.01	53.86	195.04	91.75
Entertainment, recreation services	0.61	0.60	0.80	12.62	146.60	118.96
Medical, other professional services	6.81	8.07	12.65	34.63	247.82	158.34
Government	3.36	4.16	5.39	40.84	200.35	113.25
Total	100.00	100.00	100.00	13.70	87.20	64.70

Table SJ-H (Cont'd)

San Juan 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 SJ-H_1

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

Industry	Archuleta	La Plata	Montezuma	San Juan Colo.	San Juan N. M.	Garfield	Kane	San Juan Utah	Wayne
Agriculture	196	771	685	0	743	244	130	271	189
Mining	0	658	438	154	2,301	62	0	719	31
Contract Construction	22	504	355	5	2,090	103	100	359	32
Manufacturing	92	355	239	3	1,054	184	129	68	14
Food & Kindred Prods.	0	113	46	0	153	10	0	18	3
Textile Mill Prods.	0	0	0	0	21	0	0	9	0
Apparel Mfg.	0	0	0	0	0	0	0	0	0
Lumber & Wood Prods.	68	101	33	0	28	163	125	8	11
Printing & Publishing	7	75	42	3	86	11	4	8	0
Chemicals, Etc.	0	4	4	0	93	0	0	0	0
Electrical, Etc.	4	14	28	0	86	0	0	17	0
Motor Vehicles, Etc.	0	0	0	0	4	0	0	0	0
Other Transportation	0	0	0	0	0	0	0	0	0
Primary Metals	0	0	3	0	3	0	0	0	0
Fabricated Metals	0	4	0	0	69	0	0	0	0
Other Miscellaneous Mfg.	13	44	83	0	511	0	0	8	0
Transportation	13	238	136	0	621	10	0	109	0
Communication & Utilities	14	312	106	8	1,046	7	9	13	24
Wholesale Trade	13	209	145	0	500	0	47	54	0
Eating & Drinking Places	27	308	177	3	485	87	64	60	21
Other Retail Trade	90	970	643	12	1,617	127	89	227	31
Finance, Insurance, Etc.	9	217	96	0	457	12	12	23	3
Services	137	1,610	1,031	49	3,359	252	226	441	64
Hotels, Etc.	35	380	180	4	457	89	83	78	4
Private Households	31	158	64	4	322	11	13	42	0
Business & Repair	13	204	156	0	508	11	4	50	7
Entertainment	0	48	37	0	153	8	4	4	0
Medical & Other	58	820	594	41	1,919	133	122	267	53
Government	51	430	232	20	626	97	42	137	71
Total	664	6,582	4,283	254	14,899	1,185	848	2,481	480

Source: Same as Table H.

Table SJ-H_2

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

Industry	Archuleta	La Plata	Montezuma	San Juan Colo.	San Juan N. M.	Garfield	Kane	San Juan Utah	Wayne
Agriculture	403	1,300	1,356	1	1,977	492	238	781	389
Mining	11	198	45	324	309	8	2	204	16
Contract Construction	54	461	230	9	406	109	82	72	38
Manufacturing	125	412	127	3	225	62	58	177	22
Food & Kindred Prods.	0	99	35	0	22	6	1	4	6
Textile Mill Prods.	0	0	0	0	100	3	0	151	2
Apparel Mfg.	0	2	0	0	0	0	0	0	1
Lumber & Wood Prods.	115	170	45	0	10	38	52	14	12
Printing & Publishing	4	47	21	2	33	9	3	3	1
Chemicals, Etc.	0	4	1	0	2	1	0	2	0
Electrical, Etc.	0	42	10	0	11	0	1	3	0
Motor Vehicles, Etc.	0	1	0	0	0	0	0	0	0
Other Transportation	1	0	1	0	0	1	0	0	0
Primary Metals	0	9	1	0	1	0	0	0	0
Fabricated Metals	0	5	3	0	2	1	1	0	0
Other Miscellaneous Mfg.	5	33	10	1	44	3	0	0	0
Transportation	16	216	102	24	422	23	16	127	17
Communication & Utilities	13	158	92	17	203	27	19	11	7
Wholesale Trade	5	158	70	9	86	5	4	3	1
Eating & Drinking Places	25	175	81	14	101	50	22	27	7
Other Retail Trade	108	734	323	43	448	96	72	85	40
Finance, Insurance, Etc.	8	144	46	3	60	4	0	2	4
Services	98	1,033	529	44	797	195	144	220	72
Hotels, Etc.	29	249	108	9	124	47	48	26	9
Private Households	9	102	44	0	81	12	15	51	5
Business & Repair	21	155	128	5	121	21	11	27	8
Entertainment	2	31	27	4	25	5	6	12	4
Medical & Other	37	496	222	26	446	110	64	104	46
Government	38	240	131	18	202	66	40	35	30
Total	904	5,229	3,132	509	5,236	1,137	697	1,744	643

Source: Same as Table H.

Table SJ-H$_3$

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

Industry	Archuleta	La Plata	Montezuma	San Juan Colo.	San Juan N. M.	Garfield	Kane	San Juan Utah	Wayne
Agriculture	545	1,429	1,487	4	2,936	492	268	990	327
Mining	12	137	52	269	102	5	3	28	7
Contract Construction	32	377	109	11	171	69	41	39	24
Manufacturing	20	234	191	5	917	41	21	179	11
Food & Kindred Prods.	0	82	19	0	22	7	0	3	2
Textile Mill Prods.	0	0	4	0	849	0	0	166	0
Apparel Mfg.	0	0	0	0	0	0	0	1	0
Lumber & Wood Prods.	14	86	145	0	7	30	18	7	9
Printing & Publishing	3	40	13	3	10	3	2	2	0
Chemicals, Etc.	0	1	0	0	0	0	0	0	0
Electrical, Etc.	3	1	3	1	1	0	1	0	0
Motor Vehicles, Etc.	0	0	0	0	0	0	0	0	0
Other Transportation	0	1	0	0	0	0	0	0	0
Primary Metals	0	10	1	0	0	0	0	0	0
Fabricated Metals	0	8	2	1	5	1	0	0	0
Other Miscellaneous Mfg.	0	5	4	0	23	0	0	0	0
Transportation	17	183	64	11	43	20	5	8	14
Communication & Utilities	10	91	24	14	37	19	8	7	3
Wholesale Trade	8	108	31	1	36	3	6	1	1
Eating & Drinking Places	18	91	51	16	26	17	26	12	7
Other Retail Trade	77	506	237	39	248	78	58	45	17
Finance, Insurance, Etc.	5	68	18	4	22	1	0	1	2
Services	103	827	364	79	497	136	128	97	66
Hotels, Etc.	20	186	61	22	56	30	38	8	5
Private Households	16	108	50	4	73	11	12	12	7
Business & Repair	20	113	67	18	68	12	8	11	6
Entertainment	7	41	18	6	9	8	8	3	3
Medical & Other	40	379	168	29	291	75	62	63	45
Government	28	180	104	23	140	38	17	25	13
Total	875	4,231	2,732	476	5,175	919	581	1,432	492

Source: Same as Table H.

Employment

Table SJ-H presents the census version[4] of industrial distribution of sub-basin employment for 1940, 1950, and 1960. Total adjusted employment of 31,676 in 1960 represented a 64.7 percent increase during the most recent decade, a gain far in excess of the prior decade growth in employment in the San Juan of 13.7 percent. Growth in sub-basin employment in the decade to 1960 compares very favorably to the national growth rate of the same period of 15.5 percent. (See Table SJ-K)

The most significant changes in the pattern of employment since 1950 in the San Juan have been the following:

1. A sharp decline in agricultural employment.
2. An impressive 290.6 percent gain in mining employment.
3. Significant gains in service and manufacturing employment of 128.9 percent and 76.2 percent respectively.
4. Gains ranging from 181 percent to 206 percent in wholesale trade; communication and utilities; and finance, insurance and real estate.
5. An appreciable decline in the concentration of total employment found among the leading employing industries.

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[4]The two major sources of data on the industrial distribution of employment by county are the Employment Security Commission's (ESC's) use of the various states which gather statistics on covered employment, i.e., employment 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 general historical review of the economy of the San Juan, and in the 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 follows, ESC data have been utilized.

Table SJ-I

Manufacturing Employment

	San Juan	
	1950	1960
Food and Kindred Products	173	343
Textile Mill Products Mfg.	256	30
Apparel Mfg.	3	0
Lumber, Wood Products	456	537
Printing and Publishing	123	236
Chemicals and Allied Products	10	101
Electrical and Other Machinery	67	149
Primary Metals	11	6
Fabricated Metals	12	73
Motor Vehicles and Equipment	1	4
Other Transportation	3	0
Other Miscellaneous Mfg.	96	659
Total	1,211	2,138

Source: Table SJ-H.

Table SJ-J

Percentage Distribution of Employment by Industry
in the San Juan Sub-Basin

Sector	% of Total Employment	Cumulative Percent
	1940	
Agriculture	50.13%	50.13%
Services	13.58	63.71
Manufacturing	9.57	73.28
Other Retail	7.72	81.00
Construction	5.16	86.16
Mining	3.64	89.80
Government	3.36	93.16
Transportation	2.16	95.32
Eating and Drinking	1.56	96.88
Communications and Utilities	1.26	98.14
Wholesale Trade	1.15	99.29
Finance, Insurance, Etc.	.72	100.01
	1950	
Agriculture	36.07%	36.07%
Services	16.29	52.36
Other Retail	10.13	62.49
Construction	7.60	70.09
Manufacturing	6.31	76.40
Mining	5.81	82.21
Transportation	5.01	87.22
Government	4.16	91.38
Communications, Etc.	2.84	94.22
Eating and Drinking	2.61	96.83
Wholesale Trade	1.77	98.60
Finance, Insurance, Etc.	1.41	100.01
	1960	
Services	22.63 %	22.63 %
Mining	13.77	36.40
Other Retail	12.01	48.41
Construction	11.27	59.68
Agriculture	10.19	69.87
Manufacturing	6.75	76.62
Government	5.39	82.01
Communications, Etc.	4.86	86.87
Eating and Drinking	3.89	90.76
Transportation	3.56	94.32
Wholesale Trade	3.06	97.38
Finance, Insurance, Etc.	2.62	100.00

Source: Computed from data in Table SJ-H 1960

Table SJ-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	18,228,393
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	1,258,764	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 SJ-K (Cont'd)
United States Employment by Industry

INDUSTRY	Industry as a percentage of U. S. Employment			Percentage Change		
	1940	1950	1960	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 SJ-K (Cont'd)

San Juan 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)

The details may be found in Tables SJ-H and SJ-J. In 1940 agriculture was the leading employer in the San Juan, accounting for fifty percent of all jobs. Employment in service industries ranked second with 13.6 percent, and together with agriculture, provided 63.7 percent of all sub-basin jobs. By 1960 services employment ranked first and provided 22.6 percent of total sub-basin employment. Agriculture had dropped to fifth place accounting for just over ten percent of all jobs. Mining employment had moved to second place with 13.8 percent of all jobs. Thus the two top ranking industries together accounted for just about 36.5 percent in 1960 of total sub-basin employment compared to their combined 63.7 percent twenty years earlier. Interestingly, the manufacturing industries' relative importance had declined in 1940. In that year they provided 9.6 percent of all jobs compared with 6.7 percent in 1960.

Table SJ-I shows the details of manufacturing employment in 1950 and 1960. Growth of some consequence was shown in most manufacturing subdivisions with the exception of textile mill products manufacturing which declined sharply in the decade to 1960.

There were some significant divergences in employment development between the San Juan and the nation during the decade to 1960. A comparison of Tables SJ-J and SJ-L indicates that the concentration of employment in the sub-basin in 1960 was appreciably less than in the United States at large, reflecting a shift from prior trends observed in the decennial census years of 1940 and 1950. Table SJ-M shows the relative change in employment in twelve major industry groups for the two areas. Agricultural employment in the sub-basin declined by 53.46 percent, or substantially more than the decline in the national counterpart industry. Mining employment increased almost 300 percent in the sub-basin,

Table SJ-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 SJ-K.

Table SJ-M

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

Industry	United States	San Juan Sub-Basin
Agriculture	- 36.66%	- 53.46%
Mining	- 27.94	290.59
Contract Construction	13.20	144.35
Manufacturing:	23.01	76.25
Food & Kindred Products	32.18	98.26
Textile Mill Products	- 21.12	- 88.29
Apparel Mfg.	11.73	-100.00
Lumber & Wood Products, Etc.	- 8.04	17.76
Printing & Publishing	36.82	91.86
Chemicals & Allied Products	34.47	910.00
Electrical & Other Machinery	50.35	122.38
Motor Vehicles	- 0.68	300.00
Other Transportation Equipment Mfg.	107.52	-100.00
Primary Metals	6.02	- 45.46
Fabricated Metals	110.67	508.33
Other Miscellaneous Mfg.	17.87	686.45
Transportation	- 4.88	17.03
Communications & Utilities	17.87	181.35
Wholesale Trade	14.53	183.87
Eating & Drinking Places	9.15	145.41
Other Retail Trade	15.45	95.27
Finance, Insurance & Real Estate	43.88	205.90
Services:	37.51	128.89
Hotels & Other Personal Services	6.96	101.84
Private Households	19.91	102.19
Business & Repair Services	25.79	91.75
Entertainment	4.21	118.96
Medical & Other Professional Services	62.01	158.34
Government	43.02	113.25
Total	15.48	64.70

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

reversing the national trend of a decline of almost twenty-eight percent in the same period. A similar reversal of trend between the two regions is observed in transportation employment which declined nationally but increased by seventeen percent in the sub-basin. Rates of growth in sub-basin employment in all other major industry groups greatly out-distanced their national counterparts.

A more detailed analysis of industry-by-industry employment changes over time in the sub-basin relative to the nation is made possible by the findings in Table SJ-N. Here 27 industries have been ranked in terms of their location quotients. These were calculated by dividing sub-basin employment per capita by the corresponding national figure. 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 3 to 6 in the decade to 1960. By this index a similar increase in the degree of regional specialization has occurred. For example, the simple mean value for all regional industries with location quotients greater than 1.0 increased from 1.746 in 1940 to 2.108 in 1950 to 2.834 in 1960. In the most recent decade, of course, the figure has been swamped by the renewed influence of mining in the economy of the San Juan Sub-Basin.

Employment Changes by County

Thus far, our discussion of employment trends has been limited to the San Juan Sub-Basin in the aggregate and to the nation. It is interesting,

Table SJ-N
Employment by Industry
Location Quotients for San Juan Sub-Basin**

1960			1950			1940		
Rank	Industry	Location Quotient*	Rank	Industry	Location Quotient*	Rank	Industry	Location Quotient*
1	Mining	10.711	1	Mining	2.919	1	Agriculture	2.043
2	Contract Construction	1.500	2	Agriculture	2.383	2	Textile Mill Products Mfg.	1.830
3	Communications & Utilities	1.430	3	Contract Construction	1.022	3	Mining	1.366
4	Agriculture	1.190	4	Lumber & Wood Products	.913	4	Contract Construction	.868
5	Eating & Drinking	1.095	5	Business, Etc.	.909	5	Business, Etc.	.761
6	Hotels, Etc.	1.080	6	Communications & Utilities	.880	6	Medical, Etc.	.711
7	Business, Etc.	.957	7	Hotels, Etc.	.840	7	Lumber & Wood Products Mfg.	.681
8	Medical, Etc.	.850	8	Transportation	.788	8	Government	.645
9	Lumber & Wood Products Mfg.	.806	9	Medical, Etc.	.780	9	Entertainment, Etc.	.533
10	Entertainment, Etc.	.793	10	Eating & Drinking	.711	10	Hotels, Etc.	.515
11	Other Retail Trade	.787	11	Other Retail Trade	.683	11	Other Retail Trade	.512
12	Wholesale Trade	.703	12	Entertainment, Etc.	.545	12	Eating & Drinking	.477
13	Transportation	.660	13	Government	.544	13	Communications & Utilities	.458
14	Government	.554	14	Textile Mill Products Mfg.	.494	14	Transportation	.339
15	Households	.541	15	Households	.464	15	Wholesale Trade	.323
16	Finance, Insurance, Etc.	.494	16	Wholesale Trade	.414	16	Households	.256
17	Other Miscellaneous Mfg.	.337	17	Printing & Publishing	.333	17	Food & Kindred Products	.247
18	Printing & Publishing	.333	18	Finance, Insurance, Etc.	.333	18	Printing & Publishing	.245
19	Food & Kindred Products	.302	19	Food & Kindred Products	.295	19	Finance, Insurance, Etc.	.168
20	Chemicals, Etc.	.180	20	Other Miscellaneous Mfg.	.083	20	Fabricated Metals	.042
21	Fabricated Metals	.080	21	Electric Energy, Etc.	.072	21	Other Miscellaneous Mfg.	.032
22	Electric Energy	.073	22	Chemicals, Etc.	.023	22	Electric Energy, Etc.	.019
23	Textile Mill Products Mfg.	.036	23	Fabricated Metals	.018	23	Primary Metals	.015
24	Motor Vehicles, Etc.	.008	24	Other Transportation	.015	24	Other Transportation	.007
25	Primary Metals	.008	25	Primary Metals	.013	25	Chemicals, Etc.	.005
26	Other Transportation	---	26	Apparel Mfg.	.007	26	Apparel Mfg.	.003
27	Apparel Mfg.	---	27	Motor Vehicles, Etc.	.003	27	Motor Vehicles, Etc.	---
	ALL INDUSTRIES	.799		ALL INDUSTRIES	.822		ALL INDUSTRIES	.779

* 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 SJ-H and SJ-K.

however, to note developments within the component counties of the sub-basin over the past few decades. These are illustrated in Tables SJ-H_1, H_2, H_3, and SJ-O_1, O_2, O_3. Even a quick inspection of the tables demonstrates the overwhelming importance of three counties--La Plata and Montezuma, Colorado and San Juan County, New Mexico--as providers of jobs in almost all industries. It is only on infrequent occasions, when in a particular industry or year the top three employing counties are not those mentioned above.

Occupational Distribution of the Labor Force

The occupational make-up of the labor force tells how people earn their living and is another useful guide to the economy of the region. Table SJ-P presents occupational data on the labor force, by sex, in the San Juan in the years 1950-1960. A comparison of the relative magnitude of each occupation for those years both in the San Juan and in the nation appears in Tables SJ-Q_1 and SJ-Q_2. A pronounced shift occurred in the occupational structure of the labor force in the San Juan Sub-Basin relative to the United States between the years 1950 and 1960. In former years San Juan Sub-Basin employment showed a heavier concentration among predominantly white collar occupations and a smaller concentration among predominantly blue-collar occupations than was the case in the nation at large. This primarily reflects the distribution of jobs among males employed in the sub-basin, and it basically reflected the much higher concentration of employment in the occupations of farmers and farm managers in the sub-basin than in the nation. By 1960 the situation had completely reversed itself with the sub-basin employment showing a higher concentration among blue-collar occupations and a smaller concentration

Table SJ-O_1

Percent Distribution of Employment By Industry
in Counties of the San Juan Sub-Basin - 1960

	Archuleta	La Plata	Montezuma	San Juan Colo.	San Juan N.M.	Garfield Utah	Kane Utah	San Juan Utah	Wayne Utah
Agriculture	6.06%	23.87%	21.21%	----	23.01%	7.55%	4.02%	8.39%	5.85%
Mining	----	15.08	10.03	3.52%	52.73	1.42	----	16.47	.71
Contract Construction	.61	14.11	9.94	.14	58.54	2.88	2.80	10.05	.89
Manufacturing	4.30	16.60	11.18	0.14	49.30	8.61	6.03	3.18	0.65
Food & Kindred Products	----	32.94	13.41	----	44.60	2.91	----	5.24	.87
Textile Mill Products	----	----	----	----	70.00	----	----	30.00	----
Apparel Mfg.	----	----	----	----	----	----	----	----	----
Lumber & Wood Products	12.66	18.80	6.14	----	5.21	30.35	23.27	1.48	2.04
Printing & Publishing	2.96	31.77	17.79	1.27	36.44	4.66	1.69	3.38	----
Chemicals, Etc.	----	3.96	3.96	----	92.07	----	----	----	----
Electric Energy	2.68	9.39	18.79	----	57.71	----	----	11.40	----
Motor Vehicles, Etc.	----	----	----	----	100.00	----	----	----	----
Other Transportation	----	----	----	----	----	----	----	----	----
Primary Metals	----	----	50.00	----	50.00	----	----	----	----
Fabricated Metals	----	5.47	----	----	94.52	----	----	----	----
Other Miscellaneous Mfg.	1.97	6.67	12.59	----	77.54	----	----	1.21	----
Transportation	1.15	21.11	12.06	----	55.10	.88	----	9.67	----
Communications & Utilities	.90	20.27	6.88	.51	67.96	.45	.58	.84	1.55
Wholesale Trade	1.34	21.59	14.97	----	51.65	----	4.85	5.57	----
Eating & Drinking Places	2.19	25.00	14.36	.24	39.36	7.06	5.19	4.87	1.70
Other Retail Trade	2.36	25.48	16.89	.31	42.48	3.33	2.33	5.96	.81
Finance, Insurance, Etc.	1.08	26.17	11.58	----	55.12	1.44	1.44	2.77	.36
Services	1.91	22.46	14.38	0.68	46.85	3.52	3.15	6.15	0.89
Hotels, Etc.	2.67	29.00	13.74	.30	34.88	6.79	6.33	5.95	.30
Private Households	4.80	24.49	9.92	.62	49.92	1.70	2.01	6.51	----
Business & Repair	1.36	21.40	16.36	----	53.30	1.15	.41	5.24	.73
Entertainment	----	18.89	14.56	----	60.23	3.14	1.57	1.57	----
Medical & Other	1.44	20.46	14.82	1.02	47.89	3.31	3.04	6.66	1.32
Government	2.98	25.20	13.59	1.17	36.69	5.68	2.46	8.03	4.16
Total	2.1	20.8	13.5	0.8	47.0	3.7	2.7	7.8	1.5

Source: Computed from Table SJ-H.

Table SJ-O_2

Percent Distribution of Employment By Industry
In Counties of the San Juan Sub-Basin - 1950

	Archuleta	La Plata	Montezuma	San Juan Colo.	San Juan N.M.	Garfield Utah	Kane Utah	San Juan Utah	Wayne Utah
Agriculture	5.80%	18.74%	19.54%	.01%	28.49%	7.09%	3.43%	11.25%	5.60%
Mining	.98	17.72	4.02	29.00	27.66	.71	.17	18.26	1.43
Contract Construction	3.69	31.55	15.74	.61	27.78	7.46	5.61	4.92	2.60
Manufacturing	10.31	33.97	10.47	0.25	18.55	5.11	4.78	14.59	1.81
Food & Kindred Products	----	57.22	20.23	----	12.71	3.46	.57	2.31	3.46
Textile Mill Products	----	----	----	----	39.06	1.17	----	58.98	.78
Apparel Mfg.	----	66.66	----	----	----	----	----	----	33.33
Lumber & Wood Products	25.21	37.28	9.86	----	2.19	8.33	11.40	3.07	2.63
Printing & Publishing	3.25	38.21	17.07	1.62	26.82	7.31	2.43	2.43	.81
Chemicals, Etc.	----	40.00	10.00	----	20.00	10.00	----	20.00	----
Electric Energy	----	62.68	14.92	----	16.41	----	1.49	4.47	----
Motor Vehicles, Etc.	----	100.00	----	----	----	----	----	----	----
Other Transportation	33.33	----	33.33	----	----	33.33	----	----	----
Primary Metals	----	81.81	9.09	----	9.09	----	----	----	----
Fabricated Metals	----	41.66	25.00	----	16.66	8.33	8.33	----	----
Other Miscellaneous Mfg.	5.20	34.37	10.41	1.04	45.83	3.12	----	----	----
Transportation	1.66	22.42	10.59	2.49	43.82	2.38	1.66	13.18	1.76
Communications & Utilities	2.37	28.88	16.81	3.10	37.11	4.93	3.47	2.01	1.27
Wholesale Trade	1.46	46.33	20.52	2.63	25.21	1.46	1.17	.87	.29
Eating & Drinking Places	4.98	34.86	16.13	2.78	20.11	9.96	4.38	5.37	1.39
Other Retail Trade	5.54	37.66	16.57	2.20	22.98	4.92	3.69	4.36	2.05
Finance, Insurance, Etc.	2.95	53.13	16.97	1.07	22.14	1.47	----	.73	1.47
Services	3.13	32.98	16.89	1.40	25.45	6.23	4.60	7.02	2.30
Hotels, Etc.	4.46	38.36	16.64	1.38	19.10	7.24	7.39	4.00	1.38
Private Households	2.82	31.97	13.79	----	25.39	3.76	4.70	15.98	1.56
Business & Repair	4.22	31.18	25.75	1.00	24.34	4.22	2.21	5.43	1.60
Entertainment	1.72	26.72	23.27	3.44	21.55	4.31	5.17	10.34	3.44
Medical & Other	2.38	31.97	14.31	1.67	28.75	7.09	4.12	6.70	2.96
Government	4.75	30.00	16.37	2.25	25.25	8.25	5.00	4.37	3.75
Total	4.7	27.2	16.3	2.6	27.2	5.9	3.6	9.1	3 3

Source: Computed from Table SJ-H.

Table SJ-O_3

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

	Archuleta	La Plata	Montezuma	San Juan Colo.	San Juan N.M.	Garfield Utah	Kane Utah	San Juan Utah	Wayne Utah
Agriculture	6.42%	16.85%	17.53%	0.04%	34.63%	5.80%	3.16%	11.67%	3.85%
Mining	1.95	22.27	8.45	43.73	16.58	0.81	0.48	4.55	1.13
Contract Construction	3.66	43.18	12.48	1.26	19.58	7.90	4.69	4.46	2.74
Manufacturing	1.24	14.45	11.80	0.31	56.64	2.53	1.30	11.06	0.68
Food & Kindred Products	--	60.74	14.07	--	16.29	5.18	--	2.22	1.48
Textile Mill Products	--	--	--	--	--	--	--	--	--
Apparel Mfg.	--	--	--	--	--	--	--	100.00	--
Lumber & Wood Products	4.43	27.21	45.88	--	2.21	9.49	5.69	2.21	2.84
Printing & Publishing	3.94	52.63	17.10	3.94	13.15	3.94	2.63	2.63	--
Chemicals Etc.	--	100.00	--	--	--	--	--	--	--
Electric Energy	30.00	10.00	30.00	10.00	10.00	--	10.00	--	--
Motor Vehicles, Etc.	--	--	--	--	--	--	--	--	--
Other Transportation	--	100.00	--	--	--	--	--	--	--
Primary Metals	--	90.90	9.09	--	--	--	--	--	--
Fabricated Metals	--	47.05	11.76	5.88	29.41	5.88	--	--	--
Other Miscellaneous Mfg.	--	15.62	12.50	--	71.87	--	--	--	--
Transportation	4.65	50.13	17.53	3.01	11.78	5.47	1.36	2.19	3.83
Communications & Utilities	4.69	42.72	11.26	6.57	17.37	8.92	3.75	3.28	1.40
Wholesale Trade	4.10	55.38	15.89	0.51	18.46	1.53	3.07	0.51	0.51
Eating & Drinking Places	6.81	34.46	19.31	6.06	9.84	6.43	9.84	4.54	2.65
Other Retail Trade	5.90	38.77	18.16	2.98	19.00	5.97	4.44	3.44	1.30
Finance, Insurance, Etc.	4.13	56.19	14.87	3.30	18.18	0.82	--	0.82	1.65
Services	4.48	36.00	15.85	3.44	21.64	5.92	5.57	4.22	2.87
Hotels, Etc.	4.69	43.66	14.31	5.16	13.14	7.04	8.92	1.87	1.17
Private Households	5.46	36.86	17.06	1.36	24.90	3.75	4.09	4.09	2.38
Business & Repair	6.19	34.98	20.74	5.57	21.05	3.71	2.47	3.40	1.85
Entertainment	6.79	39.80	17.47	5.82	8.73	7.76	7.76	2.91	2.91
Medical & Other	3.47	32.89	14.58	2.51	25.26	6.51	5.38	5.46	3.90
Government	4.92	31.69	18.30	4.04	24.64	6.69	2.99	4.40	2.28
Total	5.2	25.0	16.2	2.8	30.6	5.4	3.4	8.5	2.9

Source: Computed from Table SJ-H.

Table SJ-P

Employment by Occupational Groups

	Male		Female		Total	
	1950	1960	1950	1960	1950	1960
Total	15,207	23,349	4,000	8,306	19,207	31,655
1. Professions, Technical & Kindred	909	2,406	668	1,390	1,577	3,796
2. Farmers & Farm Managers	4,036	2,003	109	94	4,145	2,097
3. Managers, Officials & Proprietors	1,369	2,891	255	484	1,624	3,375
4. Clerical	364	943	716	2,373	1,080	3,316
5. Sales Workers	512	1,016	360	600	872	1,616
6. Craftsmen & Foremen	1,736	4,445	24	29	1,760	4,474
7. Operatives	2,104	5,439	397	343	2,501	5,782
8. Private Household Workers	14	12	250	556	264	568
9. Service Workers (Excepting Household)	400	1,013	731	1,984	1,131	2,997
10. Farm Laborers & Foremen	2,146	810	353	40	2,499	850
11. Laborers (Excepting Farm & Mine)	1,382	1,883	24	59	1,406	1,942
12. Not Reported	235	488	113	354	348	842

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

Table SJ-Q_1

Percent Distribution - Occupation Groups for 1960

	Male & Female		Male Only		Female Only	
	U.S.	SJ	U.S.	SJ	U.S.	SJ
All Groups	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Predominantly White Collar	45.02	44.86	40.23	39.65	54.80	59.49
Professional, Technical	11.19	11.99	10.30	10.30	13.00	16.74
Farmers & Farm Managers	8.37	6.62	10.65	8.58	3.68	1.13
Managers, Officials, Proprietors	3.88	10.66	5.49	12.38	0.56	5.83
Clerical	14.40	10.48	6.94	4.04	29.71	28.57
Sales Workers	7.18	5.11	6.85	4.35	7.85	7.22
Predominantly Blue Collar	50.07	52.48	55.20	58.26	39.54	36.25
Craftsmen & Foremen	13.52	14.13	19.53	19.04	1.19	0.35
Operatives	18.41	18.27	19.88	23.29	15.38	4.13
Private Household Workers	8.42	1.79	5.98	0.05	13.44	6.69
Service Workers	4.81	9.47	6.90	4.34	0.52	23.89
Farm Laborers & Foremen	2.24	2.69	2.77	3.47	1.15	0.48
Laborers (Except Farm & Mine)	2.67	6.13	0.14	8.07	7.86	0.71
Occupation Not Reported	4.91	2.66	4.57	2.09	5.66	4.26

Source: Figures have been calculated from Tables SJ-G and SJ-P.

Table $SJ\text{-}Q_2$

Percent Distribution - Occupation Groups for 1950

	Male & Female		Male Only		Female Only	
	U.S.	SJ	U.S.	SJ	U.S.	SJ
All Groups	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Predominantly White Collar	44.53	48.41	41.17	47.28	53.20	52.70
Professional, Technical	8.72	8.21	7.30	5.98	12.37	16.70
Farmers & Farm Managers	8.93	21.58	10.72	26.54	4.31	2.73
Managers, Officials, Proprietors	7.64	8.46	10.31	9.00	0.74	6.37
Clerical	12.32	5.62	6.51	2.39	27.32	17.90
Sales Workers	6.92	4.54	6.33	3.37	8.46	9.00
Predominantly Blue Collar	54.15	49.78	57.70	51.18	45.01	44.48
Craftsmen & Foremen	13.36	9.16	18.65	11.42	1.50	0.60
Operatives	19.81	13.02	20.05	13.84	19.19	9.93
Private Household Workers	7.61	1.38	5.85	0.09	12.17	6.25
Service Workers	6.09	5.89	8.14	2.63	0.81	18.28
Farm Laborers & Foremen	4.28	13.01	4.83	14.11	2.86	8.82
Laborers (Except Farm & Mine)	2.50	7.32	0.18	9.09	8.48	0.60
Occupation Not Reported	1.32	1.81	1.13	1.54	1.79	2.82

Source: Figures have been calculated from Tables SJ-G and SJ-P.

among the white-collar than in the United States. Among predominantly white-collar jobs the major changes had occurred in the farmers and farm manager group which, now, accounting for 8.6 percent of male employment in the sub-basin, actually accounted for a smaller share of total employment than was the case in the nation at large. There was also an appreciable increase in the relative importance of managers, officials and proprietors in the sub-basin. Among blue-collar occupations employment in the sub-basin in the craftsmen and foremen and operative groups, which trailed the nation significantly in 1950, had by 1960 come even to, or in the case of operatives, even lead the nation. The trend toward increasing concentration of female employment in the white-collar occupation and declining concentration of women in the blue-collar jobs was also more pronounced in the sub-basin than in the nation.

Clerical employment among sub-basin women increased by something over ten percentage points in the decade to 1960. Another sharp relative increase occurred in the employment of women in service occupations accompanied by a sharp decline in females employed on farms.

The location quotients in Table SJ-R facilitated a comparison per capita employment in the region with the nation in 1950 and 1960. They confirmed the decline in the importance of agriculture as a provider of jobs in the sub-basin. [illegible], relative to population, the employment of sub-basin residents as farm laborers declined from first to fourth position in the decade to 1960. Farmers as a class of businessmen, however, still lead the occupational lists in 1960, although the magnitude of the location quotient has declined in the ten year period from 1950.

Table SJ-R

Location Quotients (Based On Population)
Employment By Occupation Groups 1950 & 1960
In The San Juan Sub-Basin

1950	
Farm Laborers	2.539
Farmers, Etc.	2.375
Laborers (except farm and mine)	1.023
Managers, Etc.	0.812
Professionals, Etc.	0.797
Service Workers	0.650
Craftsmen, Etc.	0.561
Operatives, Etc.	0.554
Sales	0.552
Household Workers	0.452
Clerical	0.386
1960	
Farmers	1.395
Laborers (except farm and mine)	1.042
Managers, Etc.	1.040
Farm Laborers	0.980
Service Workers	0.918
Professionals, Etc.	0.875
Craftsmen, Etc.	0.853
Operatives, Etc.	0.810
Clerical	0.594
Sales	0.581
Household Workers	0.549

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

INTERINDUSTRY ANALYSIS OF THE ECONOMY OF THE SAN JUAN RIVER SUB-BASIN OF THE COLORADO RIVER BASIN -- 1960

By

Bernard Udis

August, 1967

Interindustry Analysis of the Economy of the San Juan Sub-Basin of the Colorado River Basin -- 1960

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 San Juan 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 San Juan (Table SJ-S), and its derivatives --the table of direct input requirement coefficients (Table SJ-T), and the table of direct and indirect input requirement coefficients (Table SJ-U). It may be recalled that the table of direct input requirements contains the coefficients indicating the direct additions to output by each industry required to sustain a one-dollar increase in sales to the final demand sector by the particular industry under study. Each entry in Table SJ-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.[1]

Each of the processing sector industries will be discussed separately, but certain summary tables have been prepared to highlight particularly

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[1] As explained in the first chapter, this method of reading Table SJ-U results from the fact that the table has been transposed for ease of reading. In the agriculture sector of this report, however, the table of direct and indirect requirements has not been transposed and hence is read in the opposite manner. The reader will be cautioned again of this complication at the appropriate point in the agricultural section.

Industry Producing \ Industry Purchasing		1 Range livestock	2 Dairy	3 Field crops	4 Fruit	5 Forestry	6 All other agricul-ture	7 Coal	8 Oil and gas	9 Uranium	10 All other mining	11 Food and kindred products	12 Lumber and wood products	13 Printing and publishing	14 Stone, clay and glass	15 All other manufac-turing	16 Wholesale trade	17 Service stations	18 All other retail	19 Eating and drinking places	20 Agricul-tural services	21 Oil field services	22 Lodging	23 All other services	24 Transpor-tation	25 Electric energy	26 Other utilities	27 Contract construc-tion	28 Rentals and finance	29 State and Federal government	30 Local government	31 Wages	32 Profits and other income	33 Inventory change (depletion)	34 Gross pri-vate capital formation	35 Exports to other (Colo-rado River) Sub-basins	36 Exports out-side Colo. River Basin	37 Total gross output	
Processing Sector	Agriculture	1. Range livestock	797	134	0	0	0	50	0	0	0	0	229	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	707	0	311		0	41	1,553	11,181	15,142	1
		2. Dairy	5	7	0	0	0	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16	0	25		0	0	0	517	1,676	2
		3. Field crops	0	0	0	0	0	18	0	0	0	0	1,081	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	453	0	38		0	0	382	2,281	3,515	3
		4. Fruit	7	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	44		0	0	155	363	641	4
		5. Forestry	6	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	5		0	0	55	0	1,955	5
		6. All other agriculture	3	0	2	0	0	0	0	0	0	520	0	1,369	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	163		0	0	104	313	843	6
	Mining	7. Coal	0	0	0	0	0	0	0	2,868	0	0	256	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	24	164	7
		8. Oil and gas	0	0	0	0	0	0	0	0	12,207	0	1	0	0	0	0	0	0	0	0	0	0	7	22	60	0	0	0	5	45		0	0	0	0	74	8
		9. Uranium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13	164	2,700	23	0	21	18	0		0	0	7,253	157,609	172,652	8
		10. All other mining	0	0	0	0	0	0	0	0	0	0	0	0	0	1,642	0	0	0	0	0	341	0	0	0	0	0	29,952	0	0		0	0	8,321	4,017	53,307	9
		11. Food and kindred products	55	0	0	0	0	24	0	0	0	649	0	0	0	95	702	0	0	0	0	0	0	0	0	0	513	0	113	45	36		227	0	114	5,117	7,629	10
		12. Lumber and wood products	2	0	0	0	0	0	0	0	0	0	89	0	0	0	0	0	0	0	0	18	0	0	0	0	0	0	95	29	4,959		792	0	205	1,127	8,067	11
		13. Printing and publishing	11	2	5	1	0	1	1	80	3	0	0	0	0	0	0	0	480	0	0	0	143	39	0	0	2	1	14	95	29	4,959		796	0	47	2,227	5,284	12
		14. Stone, clay and glass	0	0	0	0	0	1	1	42	1	62	5	17	4	9	27	68	1,087	56	14	36	45	51	92	20	25	36	163	28	19	294		53	0	13	29	2,415	13
		15. All other manufacturing	54	3	17	3	4	4	1	277	183	45	16	10	9	26	165	42	10	93	46	3	282	8	33	1,532	14	13	524	81	655	129	2,066		2,255	456	293	6,188	13,540	14
	Trade	16. Wholesale trade	92	7	31	2	12	10	1	284	252	14	12	17	5	22	30	30	3	49	178	10	681	12	171	998	15	12	393	58	329	176	3,512		3,437	1,171	3,389	5,508	20,923	15
		17. Service stations	106	9	33	3	23	11	1	22	8	19	5	1	5	2	2	15	1	27	3	6	136	5	12	882	1	4	17	32	44	13	946		152	0	56	670	3,472	16
		18. All other retail	188	16	98	4	15	40	4	234	108	16	20	21	14	18	36	41	10	89	104	6	94	32	51	145	19	31	739	84	151	169	17,430		5,360	1,048	773	2,742	29,950	17
		19. Eating and drinking places	7	0	0	0	0	0	0	81	1	4	1	1	1	0	5	22	1	23	1	0	76	8	13	110	2	13	35	63	80	13	2,758		173	0	364	4,467	8,293	18
		20. Agricultural services	334	56	56	32	310	0	5	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	737	19
		21. Oil field services	0	0	0	0	0	0	0	4,641	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	40,040	20
		22. Lodging	2	0	0	0	0	0	0	45	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		832	14,567	0	0	5,255	21
		23. All other services (except professional)	123	65	34	7	0	2	10	552	114	69	108	121	27	52	142	319	147	893	164	10	866	293	317	1,131	105	73	1,622	654	332	388	4,160		696	248	286	824	14,954	22
		24. Transportation	172	140	5	0	0	15	0	303	6,000	0	40	65	26	15	292	2,043	79	1,702	66	0	1,843	4	308	5,612	46	78	1,593	7	714	667	13,034		0	0	3,168	20,923	58,960	24
	Utilities	25. Electric energy	73	18	13	2	0	6	1	709	191	170	60	75	18	33	102	142	103	394	116	25	185	137	161	97	874	45	77	163	234	298	1,828		0	22	0	98	6,528	25
		26. Other utilities	39	6	9	1	0	4	1	48	136	59	79	10	27	47	81	457	217	485	159	6	138	305	185	754	53	27	107	198	336	614	258	5,195		2,927	0	98	233	13,272	26
		27. Contract construction	0	0	0	0	0	0	0	183	0	0	3	5	0	3	61	22	6	91	14	0	1,861	92	5	52	0	31	13,581	102	7,127	2,835	721		1,310	14,514	4,282	2,300	49,201	27
		28. Rentals and finance	332	32	40	6	41	12	2	2,102	168	242	358	60	98	75	154	633	213	1,482	477	13	470	188	692	1,415	702	168	978	1,452	1,437	1,047	6,884		1,303	822	26	1,623	25,727	28
Final Payments	Government	29. State and Federal	285	6	9	3	285	4	9	3,147	446	79	337	210	42	70	175	738	93	502	118	6	853	34	60	2,885	95	32	648	1,376	7,812	310	31,598		0	0	171	324	52,762	29
		30. Local	1,227	84	118	12	49	17	4	1,877	199	121	28	47	19	30	48	254	47	321	97	19	133	171	102	920	123	265	77	279	8,051	615	6,352		0	0	138	831	22,605	30
		31. Wages	2,007	89	108	0	590	42	66	9,571	7,559	1,955	1,502	1,943	889	318	1,941	6,090	1,270	10,285	2,203	139	8,417	946	4,738	12,270	1,222	2,045	8,334	6,636	15,138	6,952	373		0	1,076	1,638	1,815	122,127	31
	Households	32. Profits and other income	5,999	726	2,268	195	704	234	8	1,341	1,004	108	624	89	90	82	226	1,695	417	4,027	348	88	784	601	2,362	5,672	72	1,032	1,155	8,375	214	841	4,479		0	0	542	124	46,326	32
		33. Inventory change (depletion)	350	32	0	0	0	0	0	0	0	267	480	671	86	623	1,808	2,872	153	5,117	185	0	641	458	834	0	0	2,927	1,337	1,042	0	0	0		0	0	0	0	19,883	33
		34. Depreciation allowances	1,119	125	204	49	54	32	2	53,736	5,210	683	463	13	138	572	674	799	140	997	315	63	2,471	966	864	9,759	436	827	3,823	843	0	0	0		0	0	0	0	84,776	34
	Imports	35. Imports from other Colorado River Sub-Basins	184	14	27	5	28	43	9	857	5,288	405	468	83	45	103	493	80	0	645	287	25	738	253	2,034	1,586	2,229	502	2,294	123	280	543	1,592		23	6,381	54	214	27,936	35
		36. Imports from outside Colorado River Basin	1,563	100	462	38	150	244	43	89,694	14,185	2,195	1,340	468	859	1,466	6,750	4,630	294	1,621	2,875	165	18,927	1,542	1,907	13,516	275	2,336	6,372	3,829	6,803	4,166	55,527		27,226	30,628	11,873	24,509	342,178	36
		37. Total Gross Outlays	15,142	1,676	3,515	641	1,955	843	164	172,652	53,307	7,629	8,067	5,284	2,415	3,663	15,540	20,923	3,272	29,950	8,293	737	40,040	6,255	14,954	58,960	6,528	13,272	49,201	25,727	80,516	21,604	160,418		48,998	98,974	45,551	262,822	1,289,488	37

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.

Profits and other income included in column 31

INTERINDUSTRY TRANSACTIONS (IN THOUSANDS OF DOLLARS
SAN JUAN SUB-BASIN 1960
Table SJ-1960.a

Industry Producing \ Industry Purchasing		1 Range Livestock	2 Dairy	3 Field Crops	4 Fruit	5 Forestry	6 All Other Agriculture	7 Coal	8 Oil & Gas	9 Uranium	10 All Other Mining	11 Food & Kindred Products	12 Lumber & Wood	13 Printing & Publishing	14 Stone, Clay & Glass	15 All Other Manufacturing	16 Wholesale Trade	17 Service Stations	18 All Other Retail Trade	19 Eating & Drinking Places	20 Agricultural Services	21 Oil Field Services	22 Lodging	23 All Other Services	24 Transportation	25 Electric Energy	26 Other Utilities	27 Contract Construction	28 Rentals & Finance
Agriculture	1. Range Livestock	.053880	.081509	0	0	0	.059312	0	0	0	0	.030183	0	0	0	0	0	0	0	0	.188602	0	0	0	0	0	0	0	0
	2. Dairy	.000338	.004258	0	0	0	.029656	0	0	0	0	.142481	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	3. Field Crops	0	0	0	0	0	.021352	0	0	0	0	.045209	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	4. Fruit	.000473	.003041	0	0	0	0	0	0	0	0	.008172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	5. Forestry	.000406	0	0	0	0	0	0	0	0	.070633	0	.296770	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	6. All Other Agriculture	.000203	0	.000569	0	0	0	0	0	0	0	.033742	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mining	7. Coal	0	0	0	0	0	0	0	0	0	0	.000132	0	0	0	0	0	0	0	0	0	0	0	.000496	.000373	.009191	0	0	0	0
	8. Oil and Gas	0	0	0	0	0	0	0	.016611	0	0	0	0	0	0	.119575	0	0	0	0	0	.008655	0	0	.000220	.025123	.260996	.000481	0	0
	9. Uranium	0	0	0	0	0	0	0	0	.228994	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	10. All Other Mining	0	0	0	0	0	0	0	0	0	.088155	0	0	0	.031250	.051121	0	0	0	0	0	.000457	0	0	0	0	0	.010718	0	0
Manufacturing	11. Food and Kindred Products	.003718	0	0	0	0	.028470	0	0	0	0	.011731	0	0	0	0	0	0	0	.059201	0	0	.024668	.002762	.000220	0	.000193	.000021	.000567	0
	12. Lumber and Wood Products	.000135	0	0	0	0	0	.006098	0	.000056	0	0	0	0	0	0	0	0	.000403	0	0	0	0	0	0	0	0	.037063	0	0
	13. Printing and Publishing	.002096	.001217	.001422	.001560	0	.001186	.006098	.000463	.000788	.000136	.008172	.001084	.007299	.001316	.000655	.001496	.021802	.043772	.006907	.018996	.000914	.007763	.003612	.001560	.003064	.002417	.000752	.006603	0
	14. Stone, Clay and Glass Products	0	0	0	0	0	0	0	0	.000038	0	0	0	0	.002303	0	0	0	.000121	0	0	0	0	0	0	0	0	.050915	0	0
	15. All Other Manufacturing	.003651	.001825	.004836	.004680	.002046	.004745	.006098	.001604	.003433	.006112	.002109	.002168	.003864	.008553	.012016	.002327	.003206	.003745	.005673	.004071	.007158	.001380	.002337	.025884	.002145	.001257	.010948	.003281	0
Trade	16. Wholesale Trade	.006220	.004258	.008819	.003120	.006138	.011862	.006098	.001645	.004727	.001902	.001592	.003685	.002147	.007237	.002185	.001662	.000962	.001973	.021954	.013569	.017285	.002070	.012110	.016927	.002298	.001160	.008211	.002350	0
Retail	17. Service Stations	.007166	.005474	.009388	.004680	.011765	.013049	.006098	.000127	.000150	.002581	.000659	.000217	.002147	.000658	.000146	.000831	.000321	.001087	.000370	.008141	.003452	.000863	.000850	.014959	.000153	.000397	.000355	.001296	0
Retail	18. All Other Retail Trade	.012710	.009732	.027881	.006240	.007673	.047450	.024390	.001355	.002026	.002173	.002636	.004552	.006011	.005921	.002622	.002271	.003206	.003584	.012827	.008141	.02386	.005520	.003612	.002459	.002911	.002997	.015440	.003403	0
Retail	19. Eating and Drinking Places	.000473	0	0	0	0	0	0	.000469	.000019	.000543	.000132	.000217	.000429	0	.000364	.001219	.000321	.000926	.000123	0	.001929	.001380	.000921	.001866	.000306	.001257	.000731	.002552	0
Services	20. Agricultural Services	.022580	.034063	.009104	.483619	0	.005931	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	21. Oil Field Services	0	0	0	0	0	0	0	.026881	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	22. Lodging	.000135	0	0	0	0	0	0	.000261	.000019	0	0	0	0	0	.000146	.000665	0	.000685	.000123	0	.001244	.002070	.000567	.001442	.000153	.000397	.000418	.000608	0
	23. All Other Services (Except Professional)	.008515	.039538	.009673	.010920	0	.002372	.060976	.003197	.002139	.009372	.014235	.026230	.011593	.017105	.010341	.017672	.047130	.035960	.020227	.013569	.021980	.050543	.022450	.019182	.016085	.007057	.033685	.026494	0
	24. Transportation	.011628	.085158	.001422	0	0	.017794	0	.001755	.112556	0	.005272	.014091	.011164	.004934	.021264	.113179	.025329	.068539	.008140	0	.046778	.000690	.021813	.095183	.007047	.007540	.033282	.000284	0
Utilities	25. Electric Energy	.004935	.010949	.003698	.003120	0	.007117	.006098	.004107	.003583	.024178	.007908	.016258	.007729	.010855	.007428	.007867	.033023	.015463	.014307	.033921	.004696	.023633	.011402	.001645	.133885	.004350	.001609	.006603	0
Utilities	26. Other Utilities	.002637	.003650	.002560	.001560	0	.004745	.006095	.000278	.002551	.008014	.010413	.002168	.011593	.015461	.005899	.025317	.069574	.019530	.019610	.008141	.003503	.052613	.013102	.012738	.008119	.010343	.004137	.013612	0
	27. Contract Construction	0	0	0	0	0	0	0	.001060	0	0	.000395	.001084	0	.000987	.004442	.001219	.001924	.003664	.001727	0	.047235	.015870	.000354	.000882	0	.002997	.283741	.004132	0
	28. Rentals and Finance	.021092	.019465	.011380	.009360	.020972	.014235	.012195	.012175	.003152	.032872	.047186	.013007	.042073	.024671	.011215	.035067	.068291	.059679	.058831	.017639	.011929	.032431	.049008	.023999	.107537	.016240	.020433	.058821	.058821

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
SAN JUAN SUB-BASIN 1960
Table SJ-1960-b

	Industry Purchasing \ Industry Producing	1 Range Livestock	2 Dairy	3 Field Crops	4 Fruit	5 Forestry	6 All Other Agriculture	7 Coal	8 Oil & Gas	9 Uranium	10 All Other Mining	11 Food & Kindred Products	12 Lumber & Wood	13 Printing & Publishing	14 Stone, Clay & Glass	15 All Other Manufacturing	16 Wholesale Trade	17 Service Stations	18 All Other Retail Trade	19 Printing & Publishing	20 Agricultural Services	21 Oil Field Services	22 Lodging	23 All Other Services	24 Transportation	25 Electric Energy	26 Other Utilities	27 Contract Construction	28 Rentals & Finance
Agriculture	1. Range Livestock	1.062024	.000958	.000193	.000539	.000498	.000354	.000088	.002137	0	.000272	.004105	.000163	.003866	.000020	.004753	.007565	.008165	.014117	.000657	.024277	.000057	.000212	.011958	.016606	.008237	.005064	.000365	.028677
	2. Dairy	.094091	1.004389	.000026	.003104	.000071	.000038	.000212	.003187	0	.000308	.000556	.000038	.003507	.000028	.005374	.007840	.008105	.012044	.000400	.037839	.000086	.000224	.046296	.099387	.016531	.007866	.000513	.032886
	3. Field Crops	.001865	.000029	1.000016	.000002	.000030	.000572	.000064	.002073	0	.000307	.000079	.000025	.003295	.000022	.005385	.009383	.009658	.028357	.000120	.009151	.000056	.000056	.012558	.005786	.006034	.004756	.000360	.017009
	4. Fruit	.096873	.000099	.000021	1.000050	.000080	.000035	.000239	.003721	0	.000431	.000458	.000033	.012207	.000021	.007602	.010904	.009524	.011926	.000202	.485835	.000100	.000074	.021447	.004935	.024623	.008160	.000379	.028028
	5. Forestry	.000001	.000004	.000001	0	1.000013	.000001	.000010	.000719	0	.000132	.000026	.000012	.000797	.000014	.002301	.006302	.011847	.007872	.000090	0	.000019	.000029	.001745	.001863	.000906	.001567	.000250	.024237
	6. All Other Agriculture	.068413	.034009	.022692	.000374	.000070	1.001011	.000130	.003510	0	.000379	.029164	.000053	.004712	.000038	.006597	.013733	.014637	.050075	.000262	.009028	.000094	.000127	.009747	.030555	.011918	.009027	.000628	.027227
Mining	7. Coal	.000010	.000030	.000010	.000002	.001945	.000007	1.000118	.003375	0	.000384	.000209	.000124	.007844	.000024	.006754	.007200	.006340	.025013	.000179	.000002	.000091	.000086	.064984	.005073	.009140	.008733	.000416	.020632
	8. Oil and Gas	.000003	.000010	.000003	.000001	.000051	.000002	.000053	1.017773	0	.000178	.000067	.000129	.000737	.000176	.002096	.002383	.000320	.001630	.000592	.000001	.027358	.000323	.004834	.004184	.005287	.000935	.003443	.014905
	9. Uranium	.000005	.000014	.000004	.000001	.000063	.000003	.000122	.002967	1.297007	.000509	.000094	.000090	.001647	.000070	.008943	.009098	.002682	.003226	.000394	.000001	.000080	.000285	.007076	.163338	.006265	.006339	.000405	.010732
	10. All Other Mining	.000005	.000016	.000005	.000001	.077496	.000004	.000297	.004470	0	1.097093	.000112	.000013	.000879	.000021	.007309	.003002	.003860	.003394	.000764	.000001	.000120	.000053	.012900	.001621	.031544	.010453	.000410	.045404
Manufacturing	11. Food and Kindred Products	.049226	.146012	.046536	.008747	.000053	.034223	.000291	.004575	0	.000247	1.013183	.000053	.010030	.000056	.004141	.004506	.003333	.008883	.000426	.010942	.000123	.000111	.025134	.023448	.013720	.013996	.001118	.061577
	12. Lumber and Wood Products	.000006	.000018	.000006	.000001	.296807	.000004	.000203	.002006	0	.000225	.000125	1.000071	.001899	.000093	.003551	.006347	.004085	.007254	.000375	.000001	.000054	.000074	.028988	.018113	.019829	.003989	.001807	.025971
	13. Printing and Publishing	.000006	.000016	.000005	.000001	.000025	.000004	.000104	.004363	0	.000264	.000113	.000020	1.008166	.000024	.004605	.002786	.002470	.006456	.000630	.000001	.000117	.000073	.014322	.014043	.009967	.013353	.000450	.048421
	14. Stone, Clay and Glass Products	.000004	.000013	.000004	.000001	.002486	.000003	.000146	.006127	0	.034902	.000092	.000070	.002050	1.002400	.009405	.007927	.000989	.006450	.000185	.000001	.000165	.000065	.019919	.008059	.014511	.017366	.001787	.031872
	15. All Other Manufacturing	.000005	.000014	.000005	.000001	.004097	.000003	.000122	.125635	0	.056925	.000099	.000038	.001197	.000353	1.013671	.003384	.000810	.003378	.000602	.000001	.003377	.000254	.013554	.025711	.011483	.007708	.006911	.019301
Trade	16. Wholesale Trade	.000012	.000035	.000011	.000002	.000053	.000008	.000155	.008671	0	.000372	.000245	.000090	.002425	.000121	.006059	1.004366	.002844	.003078	.001650	.000003	.000233	.000912	.022801	.127140	.010501	.028764	.002367	.044464
Retail	17. Service Stations	.000013	.000039	.000012	.000002	.000065	.000009	.000410	.021144	0	.000323	.000270	.000141	.023317	.000188	.004870	.002689	1.001051	.004391	.000781	.000003	.000568	.000175	.053170	.031551	.040439	.073491	.003673	.084031
	18. All Other Retail Trade	.000014	.000041	.000013	.000002	.000217	.000010	.000235	.007590	0	.000454	.000288	.000624	.043287	.000422	.006600	.004306	.002533	1.004774	.001378	.000003	.000204	.000893	.042169	.079098	.020049	.023561	.005886	.073474
	19. Eating and Drinking Places	.002922	.008665	.002762	.000519	.000069	.002031	.000201	.007529	0	.000431	.060130	.000125	.008900	.000164	.006915	.023143	.000962	.014047	1.000461	.000649	.000202	.000247	.026093	.015646	.019006	.023343	.003181	.072715
Services	20. Agricultural Services	.200304	.000192	.000040	.000102	.000118	.000069	.000399	.004819	0	.000316	.000851	.000050	.020862	.000023	.005539	.015555	.009871	.011364	.000283	1.004580	.000130	.000099	.019023	.006997	.042066	.011558	.000419	.032670
	21. Oil Field Services	.000013	.000039	.000013	.000002	.000868	.000009	.000100	.011932	0	.001949	.000273	.002463	.001685	.003388	.009833	.019412	.004449	.003970	.002216	.000003	1.000321	.001410	.027788	.058153	.007003	.006436	.066384	.020020
	22. Lodging	.001231	.003652	.001164	.000219	.000285	.000856	.000305	.015886	0	.000445	.025341	.000852	.009179	.001168	.002422	.003492	.001200	.006867	.001685	.000274	.000427	1.002190	.056052	.005440	.029524	.035842	.022867	.045308
	23. All Other Services	.000146	.000433	.000138	.000026	.000028	.000101	.000653	.004931	0	.000210	.003002	.000044	.004529	.000054	.003500	.013187	.001405	.004227	.001195	.000032	.000133	.000680	1.026189	.027276	.014510	.015549	.001043	.057534
	24. Transportation	.000025	.000074	.000024	.000004	.000142	.000017	.000464	.008541	0	.001686	.000517	.000078	.002716	.000102	.029585	.019419	.016727	.003302	.002256	.000006	.000230	.001668	.024900	1.109993	.004115	.017281	.001993	.033440
Utilities	25. Electric Energy	.000010	.000030	.000009	.000002	.000046	.000007	.010646	.033229	0	.000211	.000205	.000105	.004911	.000053	.003510	.003664	.000634	.004390	.000788	.000002	.000893	.000310	.024221	.010848	1.156495	.012232	.001026	.133293
	26. Other Utilities	.000017	.000050	.000016	.000003	.000073	.000012	.000073	.268983	0	.000203	.000345	.000199	.003031	.000272	.002276	.002215	.000666	.003731	.001515	.000004	.007230	.000514	.009834	.010513	.006948	1.011514	.005314	.023395
	27. Contract Construction	.000016	.000047	.000015	.000003	.016774	.000011	.000114	.005902	0	.019893	.000325	.051798	.002949	.071296	.016358	.014263	.001830	.023160	.001377	.000004	.000159	.000761	.055262	.058166	.007101	.010516	1.397007	.042029
	28. Rentals and Finance	.000043	.000128	.000041	.000008	.000092	.000030	.000099	.004871	0	.000303	.000886	.000237	.007535	.000324	.003680	.003123	.001497	.004058	.002799	.000010	.000131	.000688	.030002	.002481	.008998	.015690	.006331	1.066762

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
SAN JUAN SUB-BASIN 1960
Table SJ-1960-c

important aspects of these industries in the San Juan. Tables SJ-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 dependence of the particular sector upon customers other than domestic industries), the magnitude of their payments to sub-basin households, and the size of the direct and indirect requirements per dollar of sales to final demand by each processing sector industry. Table SJ-AA shows the number of industries responding directly and indirectly 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 degree of interdependence existing among sub-basin industries.

A glance at these tables reveals that the same five industries lead, although the rankings shift, in total gross output and sales to final demand. These prominant sectors are oil and gas, uranium, transportation, oil field services, and contract construction. In magnitude of payments to households, only transportation, oil and gas, and contract construction remain within the top five rankings. Rentals and finance and "other" retail have replaced oil field services and uranium which rank sixth and seventh respectively in magnitude of payments to households. Quite a different picture emerges when sectors are ranked in terms of the relative share of their total gross output which goes to final demand sectors. Here lodging leads with 95.6% of its output directed to final demand, with the largest part of its services provided in the form of export sales to visitors from outside the sub-basin. Final demand sales absorb 95.5%

Table SJ-V

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

Rank	Industry	Total Gross Output
1	Oil and Gas	$172,652,000
2	Transportation	58,960,000
3	Uranium	53,307,000
4	Contract Construction	49,201,000
5	Oil Field Services	40,040,000
6	Other Retail	29,950,000
7	Rentals and Finance	25,727,000
8	Wholesale Trade	20,923,000
9	Other Manufacturing	15,540,000
10	Range Livestock	15,142,000
11	Other Services	14,954,000
12	Other Utilities	13,272,000
13	Eating and Drinking Places	8,293,000
14	Food and Kindred Products	8,067,000
15	Other Mining	7,629,000
16	Electric Energy	6,528,000
17	Lodging	6,255,000
18	Lumber and Wood Products	5,284,000
19	Stone, Clay and Glass Products	3,663,000
20	Field Crops	3,515,000
21	Service Stations	3,272,000
22	Printing and Publishing	2,415,000
23	Forestry	1,955,000
24	Dairy	1,676,000
25	Fruit	641,000
26	Other Agriculture	843,000
27	Agricultural Services	737,000
28	Coal	164,000

Source: Table SJ-S.

Table SJ-W

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

Rank	Industry	Sales to Final Demand
1	Oil and Gas	164,901,000
2	Uranium	41,100,000
3	Transportation	38,506,000
4	Oil Field Services	35,399,000
5	Contract Construction	33,089,000
6	Other Retail	27,673,000
7	Wholesale Trade	17,522,000
8	Range Livestock	13,793,000
9	Rentals and Finance	13,142,000
10	Other Manufacturing	12,042,000
11	Other Utilities	9,325,000
12	Eating and Drinking Places	7,825,000
13	Food and Kindred Products	7,207,000
14	Other Services	6,934,000
15	Lodging	5,981,000
16	Other Mining	5,652,000
17	Lumber and Wood Products	3,494,000
18	Field Crops	3,154,000
19	Electric Energy	2,540,000
20	Service Stations	1,881,000
21	Stone, Clay and Glass Products	1,214,000
22	Other Agriculture	582,000
23	Fruit	567,000
24	Dairy	558,000
25	Printing and Publishing	434,000
26	Coal	74,000
27	Forestry	60,000
28	Agricultural Services	0

Source: Interindustry Transactions Table, SJ-S

Table SJ-X

Sales to Final Demand by Processing Sectors Listed Below as a Percentage of Total Gross Output in the San Juan Sub-Basin

Rank	Industry	Sales to Final Demand ÷ Total Gross Output %
1	Lodging	95.62
2	Oil and Gas	95.51
3	Eating and Drinking Places	94.36
4	Other Retail	92.40
5	Range Livestock	91.09
6	Field Crops	89.73
7	Food and Kindred Products	89.34
8	Fruit	88.46
9	Oil Field Services	88.41
10	Wholesale Trade	83.74
11	Other Manufacturing	77.49
12	Uranium	77.10
13	Other Mining	74.08
14	Other Utilities	70.26
15	Other Agriculture	69.04
16	Contract Construction	67.25
17	Lumber and Wood Products	66.12
18	Transportation	65.31
19	Service Stations	57.49
20	Rental and Finance	51.08
21	Other Services	46.37
22	Coal	45.12
23	Electric Energy	38.91
24	Dairy	33.29
25	Stone, Clay and Glass Products	33.14
26	Printing and Publishing	17.97
27	Forestry	3.06
28	Agricultural Services	0.00

Source: Tables SJ-V and SJ-W.

Table SJ-Y

Magnitude of Processing Sector Industry
Payments to San Juan Sub-Basin Households

Rank	Industry	Wages & Salaries	Profits	Total Payments
1	Transportation	$12,270,000	5,672,000	17,942,000
2	Rentals & Finance	6,636,000	8,375,000	15,011,000
3	Other Retail	10,285,000	4,027,000	14,312,000
4	Oil & Gas	9,571,000	1,341,000	10,912,000
5	Contract Construction	8,334,000	1,155,000	9,489,000
6	Oil Field Services	8,417,000	784,000	9,201,000
7	Uranium	7,559,000	1,004,000	8,563,000
8	Range Livestock	2,007,000	5,900,000	7,907,000
9	Wholesale Trade	6,050,000	1,695,000	7,745,000
10	Other Services	4,738,000	2,362,000	7,100,000
11	Other Utilities	2,045,000	1,032,000	3,077,000
12	Eating & Drinking Places	2,203,000	348,000	2,551,000
13	Field Crops	108,000	2,268,000	2,376,000
14	Other Manufacturing	1,941,000	226,000	2,167,000
15	Food & Kindred Products	1,502,000	624,000	2,126,000
16	Other Mining	1,955,000	108,000	2,063,000
17	Lumber & Wood Products	1,943,000	89,000	2,032,000
18	Service Stations	1,270,000	417,000	1,687,000
19	Lodging	946,000	601,000	1,547,000
20	Electric Energy	1,222,000	72,000	1,294,000
21	Forestry	590,000	704,000	1,294,000
22	Printing & Publishing	889,000	90,000	979,000
23	Dairy	89,000	726,000	815,000
24	Stone, Clay & Glass Products	318,000	82,000	400,000
25	Other Agriculture	42,000	234,000	276,000
26	Agricultural Services	139,000	88,000	227,000
27	Fruit	---	195,000	195,000
28	Coal	66,000	8,000	74,000

Source: Interindustry Transactions Table SJ-S, 1960.

Table SJ-Z

Processing Sector Industries of the San Juan Sub-Basin Ranked by 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

Rank	Industry	Direct and Indirect Requirements Per Dollar of Sales
1	Contract Construction	1.799126
2	Fruit	1.728007
3	Uranium	1.521459
4	Food and Kindred Products	1.484184
5	Lumber and Wood Products	1.421912
6	Electric Energy	1.403760
7	Agricultural Services	1.388299
8	Dairy	1.384646
9	Other Utilities	1.358946
10	Other Agriculture	1.348210
11	Service Stations	1.346821
12	Other Retail Trade	1.320125
13	Other Mining	1.301252
14	Eating and Drinking Places	1.301057
15	Other Manufacturing	1.298859
16	Lodging	1.294173
17	Transportation	1.279205
18	Wholesale Trade	1.267382
19	Oil Field Services	1.250132
20	Range Livestock	1.205927
21	Other Services	1.180755
22	Coal	1.174625
23	Stone, Clay and Glass Products	1.166999
24	Rentals and Finance	1.161037
25	Printing and Publishing	1.130807
26	Field Crops	1.117048
27	Oil and Gas	1.087474
28	Forestry	1.060759

Source: Table of Direct and Indirect Input Requirement Coefficients, Table SJ-U, 1960.

Table SJ-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 $0.01
Food and Kindred Products	11
Contract Construction	11
Other Agriculture	10
Fruit	8
Eating and Drinking Places	8
Agricultural Services	8
Lodging	7
Dairy	7
Service Stations	7
Other Manufacturing	6
Other Retail	6
Oil Field Services	6
Transportation	6
Electric Energy	6
Range Livestock	5
Lumber and Wood Products	5
Stone, Clay and Glass Products	5
Wholesale Trade	5
Other Mining	5
Other Services	5
Printing and Publishing	4
Field Crops	3
Coal	3
Other Utilities	3
Forestry	2
Oil and Gas	2
Uranium	2
Rentals and Finance	2

Source: Table of Direct and Indirect Input Requirement Coefficients, Table SJ-U, 1960.

of the total gross output of the oil and gas industry with most of these sales, again, represented by exports. Eating and drinking places follows in third place with 94% of its total gross output going to final demand -- the bulk of these sales ($4.8 million) also in the form of exports. "Other" retail and range livestock follow in fourth and fifth places in terms of the importance of final demand sales relative to total output with 92.4% and 91% respectively.

As generators of economic activity in the sub-basin three industries, construction, fruit, and food and kindred products manufacturing rank high by both measures (Tables SJ-Z and SJ-AA). They each give rise to reactions, directly and indirectly, of more than $1.50 for each sale of $1.00 to final demand.

It is interesting to note that one of the three industries which constantly leads in measures of interindustry interdependence (Table SJ-Z and SJ-AA), the fruit industry, ranks low in sales to final demand, magnitude of payments to households, and total gross output. This illustrates dramatically the unique capacity of input-output analysis to ferret out structural interrelationships not otherwise evident.

We now turn to an industry-by-industry review based upon the findings of input-output analysis.

SOME ECONOMIC FEATURES OF AGRICULTURE AND FORESTRY IN THE SAN JUAN SUBBASIN OF THE COLORADO RIVER BASIN

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Number and Size of Farm

Since 1939, the number of farms in the study area has declined well over 100 percent (Table 1). In 1959 there were 2,915 units classified as farms. Sixty-two percent were commercial farms with an annual gross income over $2,500.[1] During the past 15 years the percent of total farms classified as commercial has remained constant, ranging from 66 percent in 1949 to 62 percent in 1959.

Size of farms both in respect to total land and cropland harvested has increased steadily since 1939. In 1960 the average farm in the sub-basin contained 1,784 acres of which approximately 72 acres were cultivated cropland and only 35 acres irrigated cropland. Expressed as an aggregate, there were 5,200,000 acres of land in farms in 1960. Total cropland harvested amounted to 208,600 acres.

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[1] According to the census, a commercial farm is one with sales amounting to $2,500 or more or one on which; (1) the operator is under 65 years of age and does not work off the farm more than 100 days per year, and (2) income received by the operator and his family from off-farm sources does not exceed the value of all farm products sold.

Table 1. - Selected Land Resource Data, San Juan Sub-Basin, 1939-1959

Item	Unit	1959	1954	1949	1944	1939
Land in farms	Acres	5,200,958	4,936,672	4,660,495	4,216,244	3,671,762
Total number of farms	Number	2,915	3,919	4,819	4,509	6,382
Average size of farms	Acres	1,784	1,260	967	935	575
Number of Commercial farms	Number	1,799	2,474	3,136	NA	NA
Total Cropland harvested	Acres	208,600	261,093	295,345	262,540	208,251
Average cropland harvested per farm	Acres	72	67	61	58	33
Average irrigated cropland harvested per farm	Acres	35	32	31	NA	22

NA - Not Available
U. S. Census

Table 2. - Total Farm Operators, Farm Operators Working Off Farm, and Farm Operators Working Off Farm More Than 100 Days, San Juan Sub-Basin, 1939-1959

Item	1959	1954	1949	1944	1939
	Numbers				
Total farm operators	2,993	3,882	4,819	4,509	6,382
Total farm operators working off farm	1,575	2,309	2,205	1,473	1,684
Total farm operators working off farm more than 100 days	1,148	1,474	1,232	825	818

U. S. Census

While the number of farms in the San Juan district has declined, the tenure structure has changed but little. The percentage of farmers who were full owners of the land they operated was 73 in 1939. In 1960 it was 65. In the 20-year period the range was not greater at any time.

Investment

Total value of farmland and buildings in 1960 was estimated at $110,000.00. Average value of land and buildings per farm was $37,700 and average value per acre $21.00.

Off-Farm Employment

The incidence of part-time farming is high. Fifty-three percent of the total farm operators were working off the farm in 1959 and 38 percent of all operators did so more than 100 days (Table 2). Off-farm employment historically has been high also.

History of Settlement

Utah. Ancient indian cultures existed in the San Juan area prior to the appearance of the Spanish explorers in about 1540. Evidences of a primative agriculture have been found. For unknown reasons the early basketmakers and cliff dwelling peoples disappeared.

Nomadic tribes of Navajos, Utes, and Piutes were the only in habitants until white settlers appeared upon the scene. In 1878 the Latter-Day Saint Church leaders requested a group to make a pioneer settlement on the San Juan River. During the winter of 1879-80 this company, consisting of eighty-two wagons, spent fifty days getting through "Hole-in-the-rock" down to the river, and then three months getting across the river to the site where Bluff is now located.

Most of these pioneers remained at Bluff, a site on the San Juan River about 30 miles from the Colorado border. Prior to this time a few cattle ranchers had located at the LaSal Mountains north of the river, and in 1879 Fort Montezuma was established.

At Bluff it was cattle that became the first paying industry with sheep a close second. It is estimated that in the 1880's the two largest companies alone grazed over 50,000 head near the Blue Mountains. The range at this time was tax free and the cattle barons of New Mexico, Colorado, and Texas took advantage of this. As a result the range soon became overstocked.[2]

Rich grazing lands in Kane and Wayne Counties attracted sheep and cattle ranchers. The dairy industry thrived for some time and surplus dairy products were shipped to other areas to be traded for other necessities. Because of the scarcity of water, cash crop farming has never been a chief industry of Kane and Wayne Counties. As soon as the Indian hostilities ceased to be a serious problem the cattle and sheep industries increased rapidly.

Colorado. The first settlers into the southwestern Colorado region were miners interested by the gold and silver discovered in the 1870's in the San Juan Mountains area. On the heels of the prospectors were cattlemen and ranchers who settled in Animas Valley in present LaPlata County. Cattle from Texas and other areas of Colorado were brought into the area. Animas City grew to a population of 2,000 but in 1880 when the Denver and Rio Grande Railroad located their depot two miles south of Animas City at the present site of Durango, the population shifted. The growth of Durango was rapid.

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[2] San Juan County Daughters of Utah Pioneers, Saga of San Juan, 1957.

The first settlers into the present Montezuma County were sheep and cattle ranchers. The town of Mancos was established in 1881. The town of Dolores was started when the Rio Grande and Southern Railroad located a depot there in 1892. It was incorporated in 1900. Cortez was founded in 1886 as a result of the construction of a large irrigation project by which water was brought from the Dolores River to the Montezuma Valley.

The Pagosa Springs area had some inhabitants by 1859 but the townsite was not plotted until 1880. Timber and cattle were important industries.[3]

New Mexico. Fruitland was settled in the winter of 1877-78 by Mormons under Luther E. Burnham. Land was cultivated and irrigated immediately.

Farmington was first settled in 1876 and was incorporated in 1901. Cattle ranching was the first industry of the area. Land cultivation began later when the first irrigation ditch was built. It carried water two and one-half miles north of the river and irrigated about four acres. The fruit industry began in 1879 when William Locke brought several small fruit trees from Florence, Colorado. In a few years there were many fine orchards.

Aztec was the site of a profitable trapping industry until 1826 when the beaver were exterminated. A townsite was laid out in 1890, but there was little growth until 1905. Since then it has been a prosperous fruit growing center.

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[3] Hafen, LeRoy R. Colorado and It's People, Vol. I., 1948.

Bloomfield was settled in 1881 by William B. Haines. It has become a prosperous agricultural town growing large crops of grain, beans and other produce. The area was irrigated by a 30-mile canal fed by the San Juan River.[4]

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[4] Work Project Administration, New Mexico--A Guide to a Colorful State, 1940.

THE AGRICULTURAL AND FORESTRY ECONOMY, 1960 AND THEIR INTERINDUSTRY RELATIONSHIPS

The Interindustry Model

The input-output model for the San Juan Sub-basin contains 25 processing sectors and 8 final payment and final demand sectors. The Economic Research Service has responsibility for 6 agricultural sectors and the forestry sector. Data for other segments of the economy are gathered and analyzed by cooperators in the study and all information is pooled and integrated to obtain an input-out analysis of the sub-basin.

The difficulty of isolating agriculture and forestry for discussion is recognized but is considered desirable. The approach enables a sharper focus on data and precedural techniques for agriculture than is possible in the composite presentation.

Range Livestock

General. Sixty-seven percent of the gross product of agriculture was derived from the range livestock sector in 1960. This predominence over the agricultural scene by livestock has existed since the area was settled and at one time was even more pronounced than at present.

Cattle numbers increased by 66 percent between 1939 and 1954. A slight decrease in number occurred in the 1954-1959 period. Sheep production is still a major industry in spite of a significant reduction in sheep and lamb numbers over the last two decades (Table 4). In 1939 there were nearly 500,000 sheep and lambs in the study area. A constant decrease occurred until by 1959 there were 294,000, a 40 percent reduction.

Table 3. - Cattle and Calves on Farms, San Juan Sub-Basin by Representative Counties, Census Years 1939-1959

State and County	1959	1954	1949	1944	1939
			Number		
Colorado					
Archuleta	11,059	13,322	11,062	10,518	11,638
LaPlata	28,852	29,057	22,310	22,421	17,688
Montezuma	22,456	28,243	18,938	18,985	14,165
San Juan	0	0	0	0	0
New Mexico					
San Juan	16,303	16,878	15,554	13,481	10,505
Utah					
Garfield	19,600	19,971	16,553	15,311	14,611
Kane	12,665	14,631	8,847	9,031	5,388
San Juan	16,272	19,634	18,776	16,796	13,473
Wayne	12,841	14,742	12,377	9,712	6,481
San Juan River					
Sub-Basin	140,048	156,478	124,417	116,255	93,949

U. S. Census

Table 4. - Sheep and Lambs on Farms, San Juan Sub-Basin by Representative Counties, Census Years 1939-1959

State and County	1949	1954	1949	1944	1939
			Number		
Colorado					
Archuleta	18,260	24,382	14,268	30,173	16,389
LaPlata	28,086	34,442	41,275	36,546	36,562
Montezuma	35,041	31,912	27,892	43,336	45,820
San Juan	0	0	0	0	0
New Mexico					
San Juan	65,711	78,054	102,255	162,678	131,646
Utah					
Garfield	20,682	27,572	22,564	50,235	57,891
Kane	15,212	20,425	18,169	24,432	51,888
San Juan	83,942	57,288	67,690	73,474	125,155
Wayne	27,096	30,133	16,755	37,843	27,741
San Juan River					
SubBasin	294,030	304,208	310,868	458,717	493,092

U. S. Census

Interindustry Relationships. The range livestock sector is characterized by low interindustry dependence. Ninety-one percent of the sector product enters final demand in the first transaction. Nine percent represents intrasector sales of feed, sales to the dairy and other agricultural sectors and small quantities of livestock moving to small slaughter and locker plants within the sub-basin. Local auctions provide an intermediate service to both buyer and seller but their function is to facilitate exchange. The slaughter plant or the feed yard, not the exchange center, is defined as the buyer of the product in the case of meat animals.

In the Utah portion of the sub-basin most of the feeder stock enters the Sevier Valley for fattening. Slaughter cattle and some feeders are sold at Spanish Fork, Ogden and Salt Lake City. The country buyer plays an important role in all areas of the sub-basin. Auctions at Durango and Cortez receive animals for sale to slaughter houses and feed yards. Intra-Colorado River Basin sales originating in the San Juan move into the Upper Main Stem and the Gila, mostly the latter.

Sheep and lambs follow much the same market patterns as cattle. Sevier Valley feeders buy most of the Utah lambs, and the Gila Sub-basin feeders buy those grown in Colorado. Wool is largely shipped directly to Boston under consignment but there are agents in Salt Lake City and Denver who make purchases in the study area.[5]

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[5] Data on market patterns is based on interviews with county agents and other agricultural experts residing in the San Juan drainage.

Range livestock farms are found in every county of the San Juan. A diversity of climate, cropping patterns and farm management exists which made some generalizations necessary in the analysis. The farm firm approach was used. In addition to the livestock the firms have cultivated cropland, private pasture, both irrigated and dry, and they use public ranges extensively. Table 5 shows acreage and production of hay crops and feed grains grown in the study area. Approximately 95 percent of these crops are grown on cattle or sheep farms with the balance grown in connection with dairy enterprises or cash crop farms where produce is sold to ranches and dairy farms. A somewhat larger percent of the corn is grown on dairy farms, especially that grown for silage.

In 1960, cattle and calves utilized 265,000 AUM's [6] of BLM [6] forage and 141,000 AUM's on national forests. This federal grazing furnished 24 percent of the total AUM requirements of cattle in this sector or feed for slightly less than three months of the year. This is a rough estimate as feed requirements are not constant throughout the year. Sheep and lambs received 31 percent of total feed requirements from Federal lands or roughly the equivalent of 3.7 months. BLM lands supplied 97,000 AUM's to sheep and national forests 142,000 AUM's.

The 1960 gross product of the range livestock sector totaled $15,142,000. It was composed of the following revenues:

Receipts from the sale of livestock	
Cattle and calves	$9,525,000
Sheep and lambs	2,674,000
Goats	19,000
Subtotal	$12,218,000
Home use of range livestock products	311,000
Receipts from the sale of wool and mohair	1,003,000
Government payments	707,000
Sale of crops	903,000
	$15,142,000

[6] "AUM's" represent animal unit months.
"BLM" represents Bureau of Land Management.

Table 5. - Crop Reduction Primarily on Cattle and Sheep Farms, San Juan Sub-Basin, 1959

Item	Unit	Irrigated	Dryland	Total
Corn for all purposes	Acres	5,589	2,660	8,249
Barley				
Harvested	Acres	6,562	1,400	7,962
Production	Bushels	284,481	21,842	306,323
Yield per acre	Bushel	43	16	38
Oats				
Harvested	Acres	5,420	632	6,052
Production	Bushel	212,406	10,788	223,194
Yield per acre	Bushel	39	17	37
Land from which hay was cut	Acres	69,251	6,585	75,836
Alfalfa				
Harvested	Acres	51,196	3,967	55,163
Production	Tons	117,899	5,037	122,936
Yield per acre	Tons	2.3	1.3	2.2
Clover, timothy, and mixtures of clover and grasses cut for hay				
Production	Acres	12,112	845	12,957
Yield per acre	Tons	17,538	1,004	18,542
Small grain for hay	Tons	1.4	1.2	1.4
Production	Acres	2,408	1,174	3,482
Yield per acre	Tons	3,381	974	4,355
Wild hay harvested	Tons	1.4	.8	1.4
Production	Acres	2,842	318	3,160
Yield per acre	Tons	3,659	365	4,024
All other hay harvested	Tons	1.3	1.1	1.3
Production	Acres	693	381	1,074
Yield per acre	Tons	1,025	398	1,423
	Tons	1.5	1.0	1.3

U. S. Census

The direct coefficients of the range livestock sector show little dependence on other sub-basin industries. Eighty-three percent of the inputs were final payments and appear outside the matrix. Intrasector purchase of feed was the item of greatest dollar value on the input side within the processing sectors. Agricultural services input was $334,000, transportation $172,000; the trade sectors combined was $393,000. It will be recalled that the product of the trade sectors are net margins.

Imports amounted to $1,747,000, 90 percent of which were from outside the Colorado River Basin. Most payments to government were to local units. This item included water costs.

Payments to households represent wages, returns to operator and family labor and management, interest on owner's equity in investment and profit on the enterprise. Wages amounted to $2,000,000 and the residual in households nearly $6,000,000. Available sources indicate owners equity is high in most areas of the sub-basin.[7] Some wage payments are undoubtedly made to transient labor, seasonal haying hands for example, and are spent outside the sub-basin. Wage payments of this nature are the exception rather than the rule.

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[7] U. S. Department of Commerce, U. S. Department of Agriculture, Farm Mortgage Debt and Farm Taxes, U. S. Census of Agriculture, 1959. (U. S. Government Printing Office, Washington, D. C. 1962.)

Dairy Sector

General. Two distinct types of dairy production are found. The highly specialized enterprises with large dairy herds producing grade-A milk are largely centered in LaPlata and Montezuma Counties in Colorado. These two counties produce 80 percent of the total milk production of the study area.

Production in the Utah portion of the sub-basin is from smaller herds and most of the product is milk for manufacturing cheese.

The number of milk cows on farms in the area has declined steadily during the past 20 years. In 1959 there were slightly more than half as many dairy cows as in 1939 (Table 6). Production per cow has followed the national trend upward so that total production of milk and cream has declined little as the inventory of milk cows decreased.

Of the farms in the sub-basin having dairy cows, 90 percent had less than 10 in 1949 (Table 7). Five percent had twenty or more. Seventy-six percent of all herds containing 30 or more cows were located in LaPlata-Montezuma Counties in Colorado. There were a total of 54 herds in this size range in the entire study area.

Of 512 farms in the Utah representative counties which reported having dairy cows in 1959, only 39 had 10 or more cows to the herd.

The dairy sector value of output was $1,676,000 in the base year which was composed of the following revenues:

Crop sales	$13,000
Livestock sales	175,000
Sale of milk and cream	1,448,000
Home use	22,000
Government payments	18,000
	$1,676,000

Table 6. - Milk Cows on Farms, San Juan Sub-Basin by Representative Counties, Census Years 1939-1959

Sub-basin, State and County	1959	1954	1949	1944	1939
			Numbers		
Colorado					
Archuleta	325	580	740	923	1,111
La Plata	2,733	3,395	3,680	4,370	4,492
Montezuma	1,911	2,546	2,564	2,724	2,968
San Juan	0	0	0	0	0
New Mexico					
San Juan	1,275	1,742	2,301	1,546	1,794
Utah					
Garfield	625	1,046	1,339	1,312	1,638
Kane	127	287	343	404	458
San Juan	117	402	640	645	579
Wayne	944	1,025	1,039	1,131	942
San Juan River Sub-Basin	8,057	11,023	12,646	13,055	13,982

U. S. Census

Table 7. - Dairy Herd Size Distribution, San Juan Sub-Basin, 1959

Herd Size	Farms Reporting	Percent of all Farms Reporting
Numbers	Numbers	Percent
1 cow	581	35
2-9 cows	898	55
10-19 cows	76	5
20-29 cows	37	2
30-49 cows	31	2
50 or more	23	1
TOTAL	1,646	100

U. S. Census

Interindustry Relationships. The dairy sector has some interindustry aspects to its market flow. Sixty-five percent of its value of output is sold to other processing industries, primarily the food and kindred products sector.

Some intra-agricultural transactions are made. Range livestock and other agriculture purchase feed grown on dairy farms. There is inter-industry movement of feeds also.

Livestock sold by the dairy sector are mostly cull milk cows which sell as cutters and canners. They are marketed outside the sub-basin.

Much of the eastern portion of the sub-basin lies within the Albuquerque milk shed and is governed by that milk marketing order. Milk produced in the Colorado counties of the sub-basin moves to Durango, Farmington and Albuquerque. San Juan County, New Mexico markets are in Farmington and Albuquerque. Production in the Utah counties is largely manufacturing milk and is shipped to cheese plants in Los and Panguitch.

Considerable interindustry dependence exists in the dairy sector. Thirty cents from each dollar of inputs goes to other processing sectors. The largest expenditure by the industry was to transportation. Charges for this service for milk exported is not included, but is an element of the export transaction.

Purchase from the range livestock sector were next in order of magnitude. This item represents the purchase of feed. Agricultural services and all other services contributed significantly to dairy inputs. Seven percent of total outlay was paid to these sectors. Expenditures represented here include cost of some marketing charges on cull dairy cows, DHIA[8] fees and artificial insemination.

Field Crops

General. This sector includes two dryland crops of considerable economic importance to the sub-basin--wheat and dry beans. A third crop included is Irish potatoes.

Potatoes have never been grown extensively in the area and acreage used in their production has been reduced over the past twenty years.

Wheat production is almost exclusively the winter variety (Table 8). San Juan County, Utah leads in wheat acreage in the sub-basin. Montezuma and LaPlata Counties, Colorado follow in that order. Production is negligible in other areas. During World War II and immediately after, wheat acreages expanded. Peak production during a two-decade period occurred in 1949 when 78,000 acres were harvested. A decline in acreage occurred during the ensuing 10 years. The 1959 acreage was 43,000.

The dry bean production trend is much the same as that of wheat. The two crops reaction to economic forces has been similar. In the years 1939-1959 production reached its highest level about the time of the Korean conflict then declined from a high of 70,000 acres to 60,000 in 1959.

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[8] The initials DHIA represent Dairy Herd Improvement Association.

The Conservation Reserve Program was notably effective in withdrawing land from production in the San Juan region. Contracts effective in 1960 covered 50,000 acres. Most of the land withdrawn had a wheat or bean production base. Production for the base year for these crops was valued at:

Winter wheat	$1,331,000
Spring wheat	55,000
Field beans	1,295,000
Irish potatoes	381,000
Government payments	453,000
	$3,515,000

Table 8. - Acreage, Production and Yield Per Acre of Three Field Crops, San Juan Sub-Basin, 1960

Item	Unit	Irrigated	Dryland	Total
Spring wheat				
Harvested	Acres	1,714	1,057	2,771
Production	Bushels	48,238	12,647	60,885
Yield Per Acre	Bushels	28.1	12.0	22.0
Winter wheat				
Harvested	Acres	3,541	36,803	40,344
Production	Bushels	99,556	488,701	580,257
Yield Per Acre	Bushels	28.1	13.1	14.4
Irish potatoes				
Harvested	Acres	1,107	131	1,238
Production	Cwt.	157,855	2,208	160,063
Yield Per Acre	Cwt.	142.6	16.8	129.3
Dry beans				
Harvested	Acres	923	59,716	60,639
Production	Cwt.	9,670	138,795	148,465
Yield Per Acre	Cwt.	10.5	2.3	2.5

U. S. Census

Interindustry relationships. The bulk of the products grown in this sector is exported outside the Colorado River Basin. The primary market for dry beans is Texas. Wheat moves south and west from the sub-basin. Potatoes not consumed directly by farm families move primarily to the metropolitan Phoenix-Tucson area. Slightly less than 10 percent of the gross product is sold to processing industries within the sub-basin.

Only nine percent of the direct inputs are purchases from industries within the sub-basin.

Fruit Sector

General. The value of production of the fruit sector was $641,000 in the base year.

Two centers of commercial production are found--San Juan County, New Mexico and Montezuma County, Colorado. Even here, however, acreage in orchards is not great. In both areas apples and peaches are the principal crops. Fruit culture in other areas of the sub-basin exists on a very small scale with no county except one having more than 100 acres of bearing and nonbearing trees. LaPlata County had 150 acres in 1960.

Trends in total fruit acreage in the sub-basin is illustrated in the following tabulation:

Year	Acres
1939	4,057
1944	5,509
1949	6,127
1954	4,632
1959	3,141

Gross income to the fruit sector in 1960 was as follows:

Sale of apples	$437,000
Sale of peaches	130,000
Sale of all other fruit	13,000
Home use of fruit	44,000
Sale of other crops	12,000
Government payments	5,000
	$641,000

Interindustry Relationships. Eighty percent of the fruit crops leaves the sub-basin for final sale. In 1960, a total of slightly more than one-half million dollars worth of fruit was exported, $155,000 to other sub-basins of the Colorado and $363,000 outside the Colorado River Basin. Intra-Colorado River Basin sales were mostly in the Phoenix area. Exports outside the Colorado River Basin went mostly to Texas, Oklahoma and Southern New Mexico. Large chain stores purchased most of the graded fruit in recent years.

The amount shown as sold directly to households is somewhat larger as a percent of total production than in most fruit producing areas. This is because a number of fruits are not grown on a commercial basis, but only for home consumption and distribution among local families. This is the use pattern especially of the Utah counties of the sub-basin.

An estimated 10 percent of the fruit crop was sold to the food and kindred products sector for processing and canning. A small volume of hay crops grown on fruit farms were sold to the range livestock and dairy sectors.

The agricultural services inputs were by far the dominant input factor within the matrix. Services included some contract labor, spraying for insects and thinning, and a variety of marketing services. Typical items in the marketing bill are the packing carton which costs approximately 46 percent of the marketing bill, labor 21 percent, depreciation and insurance on the processing equipment 7 percent, association dues 19 percent and other 7 percent of the total marketing costs. In 1960 the cost of marketing services for apples sold through the San Juan Fruit Cooperative averaged $1.40 per carton.

Other on-farm inputs purchased from other processing sectors include gas and oil, fertilizer, repair items, and utilities and some locally financed debt, all of which totaled $50,000. All other inputs were final payments.

Other Agriculture

The most important agricultural enterprises of the sub-basin have been discussed up to this point. A diversity of agricultural products of less economic significance have been lumped together for consideration in this sector. It includes vegetables sold or grown for home consumption valued at $126,000; alfalfa and grass seed which produced a revenue of $16,000; horses and mules sold, $62,000; hogs and pigs sold and raised for home consumption, $276,000; nursery and greenhouse products, $24,000; and poultry and poultry products, $339,000.

This sector is characterized by a larger percent of total gross output moving into the food and kindred products sector and into households as consumption on farms or direct sales to households from farms.

Intra-agricultural transactions are of importance. Hogs were fed skimmed milk from those dairy farms which sold the butterfat as separated cream. Poultry feeds were purchased from the livestock sectors and field crops. Other input patterns are not unique. Investment was low as little land was involved within the sector as defined.

Agricultural Services

The nature of a group of services performed for the agricultural sectors differed from other inputs to an extent to warrant their inclusion in a separate sector for analysis. The agricultural services sector had even greater significance in some of the other sub-basins of the Colorado River.

The Lower Main Stem and Gila Sub-basins had services valued at several million dollars. They included cotton ginning, special services to vegetable and melon producers, contract labor, etc. Desire for continuity in procedure also influenced the decision to include an agricultural services sector in the interindustry matrix of the San Juan model.

Interindustry relationships. The value of the services to all agricultural sectors was $737,000. The primary service provided to range livestock was in connection with marketing. The sales auction fee is an example of payment made for this service. Marketing fees for cull dairy cows and Dairy Herd Improvement Association dues were primary services to the dairy sector. Cleaning and bagging of dry beans was significant in the field crop sector. Contract labor, spraying and processing and marketing were the major services rendered to the fruit sector.

Most significant inputs to the agricultural services were wages and salaries paid to households, purchases of feed from the livestock sector, and purchases from retail outlet in the sub-basin. Imports accounted for approximately 25 percent of total inputs.

Interindustry dependence for the agricultural services, dairy and other agriculture sectors are in the same order of magnitude. Services furnished by this sector were sold exclusively to other agricultural sectors and 19 percent of all inputs were purchased from agricultural sectors and 31 percent from all the processing sectors.

Forestry Sector

Forest products are harvested from a large area of the sub-basin. The national forests contribute most of the volume cut, but some timbers, posts and logs are taken from Indian reservations, BLM lands and State and private land.

Obtaining data on forest products became somewhat of a problem because forest boundaries seldom coincide with hydrologic units, such as a sub-basin. However, forest management data is usually handled on the basis of districts within a national forest so that data for areas smaller than entire forests may be obtained and used with considerable confidence.

There are 3,007,000 acres of national forests in the sub-basin. This acreage is 23 percent of all Federally-owned land and 15 percent of the total land area of the sub-basin.

Portions of four national forests lie within the sub-basin. Dixie and Fishlake National Forests are found in the Utah representative counties in the western portion of the study area and the Manti-LaSal and San Juan Forests in the eastern reaches of the sub-basin. The San Juan National Forest lies wholly within Colorado and only the LaSal unit of the Manti-LaSal Forest lies within the sub-basin, mostly within Utah but extending slightly into Colorado. The timber resources of the sub-basin are immense and to date have not been utilized fully.

The history of the timber stands is quite different from that of the grasslands of the sub-basin. Many of the early settlers used adobe to build their homes and other buildings, and even today a large proportion of the buildings are being made of brick. The local demand for lumber has never been very high. The small timber stands in the canyons of lower elevations were cut quite heavily, but many areas in the higher mountains were largely untouched until quite recently. In many forest areas it was in the 1940's with the advent of good highways and trucks that outside lumber markets were developed and large scale timber operations began.

Standing volume of timber in the sub-basin is estimated at 9.35 billion board-feet. About 6.5 billion are in the eastern forests of the sub-basin and 2.85 billion in Kane, Garfield and Wayne Counties, Utah. Sixty-four percent of the forest resources of the sub-basin are found within the San Juan National Forest.

Volume cut, 1960. An estimated 69,400 MBF[9] of sawtimber, poles, posts and fuelwood were cut in the sub-basin in 1960. The volume cut had a stumpage value of $459,000. By far the most productive forest was the San Juan National Forest where 62 percent of the total volume was cut. Timber harvested there also was of higher quality and a larger percent was sawtimber. This fact is reflected by a high stumpage value per MBF of $8.51.[10] The average stumpage value for the sub-basin was $6.61[10] per MBF and the lowest value was an average stumpage value of $3.97[10] per MBF on the sub-basin portion of the Fishlake National Forest.

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[9] MBF indicates millions of board feet.

[10] Includes KV. The initials K.V. are the abbreviation of the Knutsen-Vandburg Act under the terms of which payments are made to the government for purposes of improving the timber stand.

Table 9 shows the volume cut in 1960 by land ownership, estimated annual allowable cut and the percent of allowable actually harvested in 1960. The allowable cut estimate shows the volume of timber that may be cut during a given period under specified management plans for sustained production. This item will be discussed further in descriptions of projections.

Table 9.--Timber Volume Cut 1960, Estimated Annual Allowable Cut and Percent of Allowable Cut Harvested, San Juan Sub-basin

Land ownership	Volume cut 1960	Annual allowable cut	Percent of allowable cut harvested, 1960
	MBF	MBF	Percent
National Forests:			
Manti-LaSal	209	2,700	8
Dixie	11,963	21,300	56
Fishlake	958	5,400	18
San Juan	43,267	50,000	86
Indian lands	5,665	6,000[1]	94
State and private lands	2,638	2,700[1]	98
BLM lands	4,700	5,000[1]	94
Total	69,400	93,100	75

NOTE: [1] Undetermined, but here estimated to be approximately equal to volume cut.

Unpublished data from State and Federal agencies concerned.

Forest products harvested from lands other than national forests are largely posts of pinion, juniper and cedar, and fuelwood. Some sawtimber is harvested from BLM lands in the Utah portion of the sub-basin however; management plans are being formulated to manage and utilize BLM forest lands more efficiently. Small quantities of sawtimber were taken from Indian land in Colorado.

The gross value of the 69,400 MBF of timber cut in the sub-basin includes stumpage and harvesting costs with the sawlogs loaded on trucks ready for delivery to mills. Harvesting costs of $1,496,000 together with stumpage charges of $459,000 is the gross value of the forestry sector in 1960.

Disposition of Output. Livestock ranchers have always depended upon the forest lands for posts, poles and smaller timber for fence maintenance and construction and repair of corrals and chutes. In 1960, an estimated $5,000 worth of forest products were sold to the range livestock sector. A similar volume of products were sold to households within the sub-basin as fuelwood, Christmas trees sold direct, and miscellaneous forest products.

Round timber for use as mine props and a lesser volume of miscellaneous timber used in mine structures and milling establishments was sold to the mining sector of the sub-basin. Such sales were estimated at $520,000 in 1960.

In most forest areas of the Intermountain West, the volume of Aspen timber is largely an unutilized resource. This specie is being harvested and effectively utilized in the San Juan Sub-basin, at least in the western portions of the sub-basin. The amount shown as exports to other sub-basins is primarily Aspen timber shipped to Cedar City for processing into excelsior and furniture core stock. Sub-basin forests contributed an estimated $55,000 worth of timber for this use in the base year.

Over 70 percent of the volume of timber cut in the sub-basin in 1960 was sawtimber. Essentially all of the sawtimber cut within the subbasin was milled within the confines of the sub-basin.

Saw logs from the LaSal division of the Manti-LaSal National Forest are sawed in San Juan County, Utah by mills of small capacity. Usually there is sufficient local demand for the small volume cut.

Sawtimber from Fishlake and Dixie National Forests is milled primarily by the Crofts-Pearson sawmill in Panguitch, Utah. This mill has a large capacity and annually saws a volume well over one-third of the annual cut of sawtimber of the State of Utah. This large mill has been expanding rapidly and has bought out several smaller firms in recent years. A small mill is operating at Alton, Utah and a half dozen smaller mills with a combined capacity of about five MBF saws the balance of the timber cut in the area. There is sufficient mill capacity within the representative counties in the Utah portion of the sub-basin to handle all timber cut in these counties.

Inputs of Forestry Sector. The total outlay of the forestry sector involves cost items in five general categories. In addition to the stumpage fee and profit margin there was the cost of the following procedures:[11]

Felling and bucking	$ 389,000
Skidding and loading	638,000
General logging administration	214,000
	$1,241,000

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[11] Felling and bucking: All costs of making logs ready for skidding, including limbing logs, wood scalers, saw rental, and crew transportation are included. Smog felling and cull tree felling are included.

Skidding and loading: All costs of skidding logs from stump to landing and loading logs on trucks are included. Includes all machine water barring of skid trails, landing construction and slash disposal on landings, maintenance and final cleanup of all necessary machine erosion control measures on landings.

General logging administration: Includes all costs of overhead, including woods supervision and camp costs.

Profit on the logging operation and interest on the investment in equipment and material involved in the harvesting process is represented by the figure for "profit and other."

Stumpage fees paid for timber harvested on national forests, BLM lands and State lands are shown as payments to "State and Federal Government."

Wages and salaries paid to households amounted to approximately 30 percent of gross outlay. Amounts for gas, oil and other supplies and operating expenses were paid to "gas and auto," "all other retail," and "imports."

Direct and Indirect Relationships

Some attention to the direct and indirect activity resulting from the transactions of the agricultural and forestry sectors is desirable.

Although imports supply many of the inputs used by the range livestock industry, there are considerable direct and indirect effects of expansion or contraction of this sector. Each dollar increase in the sale of range livestock product to the autonomous sectors results in $1.21 of induced activity within the processing sectors of the San Juan economy.

Intraindustry transactions are the most important contributor to the induced activity of the range livestock sector but rentals and finance, agricultural services, and transportation are industries which show considerable sensitivity to range livestock activity (Table 10). Rental and finance activity increased by 2.9 cents, agricultural services 2.4 cents and transportation 1.7 cents each time range livestock increases its sales outside the processing sector by one dollar.

Table 10.--Direct and Indirect Activity Resulting from the Delivery of One Dollar of Output to Final Demand from Agricultural and Forestry Sectors, by Processing Sector, San Juan Sub-basin, 1960

Processing sectors	Sectors producing: Range livestock	Dairy	Field crops	Fruit	Other agri.	Agri. services	Forestry
	Dollars						
Range livestock	1.062	.094	.003	.093	.068	.200	.000
Dairy	.001	1.004	.000	.000	.034	.000	.000
Field Crops	.000	.000	1.000	.000	.022	.000	.000
Fruit	.001	.003	.000	1.000	.000	.000	.000
Other agriculture	.000	.000	.000	.000	1.001	.000	.000
Agricultural services	.024	.033	.009	.436	.009	1.005	.000
Forestry	.000	.000	.000	.000	.000	.000	1.000
Coal	.000	.000	.000	.000	.000	.000	.000
Oil and gas	.002	.003	.002	.004	.004	.005	.001
Uranium	.000	.000	.000	.000	.000	.000	.000
All other mining	.000	.000	.000	.000	.000	.000	.000
Food and kindred	.004	.001	.000	.001	.029	.001	.000
Lumber and wood	.000	.000	.000	.000	.000	.000	.000
Printing & publishing	.004	.004	.003	.012	.005	.021	.001
Stone, clay and glass	.000	.000	.000	.000	.000	.000	.000
All other manufacturing	.005	.005	.005	.008	.007	.006	.002
Wholesale trade	.003	.003	.009	.011	.014	.016	.006
Gas and auto	.003	.003	.010	.009	.015	.010	.012
All other retail	.014	.012	.023	.012	.050	.011	.003
Eating & drinking	.001	.000	.000	.000	.000	.000	.000
Oil field services	.000	.000	.000	.000	.000	.000	.000
Lodging	.000	.000	.000	.000	.000	.000	.000
All other services	.013	.046	.013	.021	.010	.019	.002
Transportation	.017	.099	.006	.005	.031	.007	.002
Electric energy	.003	.017	.006	.025	.012	.042	.001
Other utilities	.005	.003	.006	.003	.009	.012	.002
Contract construction	.000	.002	.000	.000	.001	.001	.000
Rentals and finance	.029	.033	.017	.023	.027	.032	.024
Total direct and indirect activity	1.206	1.385	1.117	1.728	1.343	1.383	1.061

Editor's Note: In this chapter, Dr. Wilkes has used the untransposed form of the table of Direct and Indirect Coefficients. It is read as he indicates in the text--each column shows the direct and indirect requirements from the sectors at the left end of the table to support a delivery of a dollar of output to final demand by the sector listed at the top. Throughout the remainder of this sub-basin report, however, the transposed form of the table has been used. As explained in the chapter describing the input-output model, a transposed table is read in the opposite manner: i.e., the columns in Dr. Wilkes' Table 10 become rows.

The total increased activity, direct and indirect, resulting from the sale of an additional dollars worth of product from the dairy sector to the autonomous sectors is 38.5 cents. With the inclusion of indirect effects, sales by the transportation sector increase 10 cents, range livestock 9.4 cents, agricultural services 3.3 cents and all other services 4.6 cents with each dollar increase of sales out of the processing sector by dairy. Rentals and finance, electric energy, and all other retail have coefficients of at least .01.

The coefficients of direct and indirect activity of the field crops sector is the lowest of any agricultural sector. One dollar of additional sales to the autonomous sectors results in an additional 11.7 cents of direct and indirect economic activity within the processing sectors of the sub-basin.

Interdependence is high in the fruit sector. The coefficient of direct and indirect activity per dollar of income which enters the economy from outside is the highest of any agricultural sector or the forestry sector. In 1960, 72.3 cents of induced activity resulted from the delivery of an additional dollars worth of products from the fruit sector outside the sub-basin or to the final demand sectors within the sub-basin.

The intraindustry activity notable in the range livestock and dairy sectors is absent in the fruit sector.

In view of the high coefficient of direct and indirect activity in the fruit sector it appears the possibility of expanding the acreage in orchards might be explored by those working to improve the general economic atmosphere of the sub-basin.

The coefficient of direct and indirect activity for the other agriculture sector was 1.348.

The coefficient of direct and indirect activity for the forestry sector at 1.060 is the lowest of the seven sectors discussed in this report.

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THE MINING, MANUFACTURING AND ENERGY SECTORS OF THE SAN JUAN RIVER BASIN

by

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MINING

Mining has been a source of income and employment in the San Juan Sub-Basin since the earliest recorded times. The first efforts of records were made by sixteenth century Spaniards who mined unknown amounts of gold and silver ores. While no quantitative records are available for the period, it is known that the Indians who stayed on after the Spaniards left continued with sporadic mining efforts. The first full-scale mining did not occur, however, until major silver strikes were made in the middle nineteenth century. These strikes attracted a large influx of miners and settlers and were the major impetus for the settlement of the region by American pioneers. While gold and silver ores are still produced they now represent only a small percentage of the total value of sub-basin mineral output.

Two events occurred in the mid-fifties which caused the tremendous jump in production value shown in Table SJ-I. First was the fabulous four-corners oil field strike which increased oil production in the Utah counties, from $4.35 million to $22.62 million in the single year between 1955 and 1956. The other major development was the first release by the U. S. Bureau of Mines of production statistics on uranium ores which had been mined in the area for several years. Prior to 1951 the historical time series is not particularly reliable because statistical information for San Juan County, New Mexico, and the four Utah counties was available only intermittently. This resulted in some understatement of the value of county and sub-basin mineral production.

Table SJ-I

Value of San Juan Sub-Basin Mineral Production, 1930-1960

Year	Total	Colorado Counties	New Mexico County	Utah Counties	Year	Total	Colorado Counties	New Mexico County	Utah Counties
1960	$165,513,000	$2,002,653	$40,620,000	$122,890,347	1944	c	c	c	c
1959	180,273,348	2,399,186	38,254,270	139,619,892	1943	$1,865,656	$1,562,704	$18,018a	$284,934d
1958	125,099,666	1,501,984	23,868,236	99,729,486	1942	1,349,098	1,331,396	16,698a	1,004b
1957	41,957,500	1,654,651	6,862,204	33,440,645	1941	1,644,200	1,634,829	8,601a	770b
1956	27,680,305	1,420,275	3,560,918	22,619,112	1940	1,446,649	1,444,583	c	2,066b
1955	3,205,230	1,611,504	1,158,471	435,255	1939	1,469,390	1,085,546	383,076a	1,064b
1954	1,556,251	1,234,206	243,577	78,468	1938	2,404,791	2,401,898	c	2,893b
1953	2,285,960	1,990,480	152,724	142,756	1937	2,237,436	2,216,795	c	20,641b
1952	3,064,729	3,001,251	19,597	43,881	1936	1,457,400	1,455,045	c	2,355b
1951	3,513,423	3,427,639	21,801	63,983	1935	983,344	956,634	19,988a	6,722b
1950	2,491,039	2,465,885	13,575a	11,579d	1934	1,046,027	1,045,306	c	721b
1949	2,587,641	2,569,552	c	18,089d	1933	918,060	916,420	c	1,640b
1948	2,763,548	2,734,260	c	29,288d	1932	774,821	774,821	c	c
1947	2,808,554	2,532,399	52,920a	223,235d	1931	964,581	941,323	23,000a	258b
1946	2,513,739	2,278,946	69,283a	165,510b	1930	3,289,729	3,264,083	20,000a	5,646b
1945	c	c	c	c					

[a] figure represents only value of coal production

[b] figure represents only value of gold, silver, lead, zinc and copper production

[c] figures not available for this year

[d] figure represents only value of coal, gold, silver, copper, lead and zinc production

Sources: Minerals Yearbook Annuals, 1930-1961, U. S. Department of the Interior, Bureau of Mines (Washington D. C.: U. S. Government Printing Office), and
Colorado Bureau of Mines, Annual Statistics, 1930-1950; Denver, Colorado.

As shown in Table SJ-I the total value of all minerals produced in the sub-basin in 1960 was $165.5 million. Almost 84 percent of this total was accounted for by oil and gas production. Uranium mining was second in importance, accounting for an additional twelve percent. Wage and salary payments for all mining sectors (including oil field services) were $30.8 million in 1960 or approximately eighteen percent of all sub-basin wage and salary payments. The detailed data are shown in Table SJ-II.[1] Oil and gas

Table SJ-II

Rank Order Distribution of Mining Sector Total Payments to Households in the San Juan Sub-Basin (In Thousands of Dollars)

Rank	Sector	Wages & Salaries	Profits	Total Payments
1.	Oil & Gas	$9,571	$1,341	$10,912
2.	Oil Field Services	8,417	784	9,201
3.	Uranium	7,559	1,004	8,563
4.	"All Other" Mining	1,955	108	2,063
5.	Coal	66	8	74
	Totals	$27,568	$3,245	$30,813

Source: San Juan Sub-Basin Transaction Table, SJ-S.

production had the largest wage and salary payments followed by the related oil field services sector. Total mining employment for 1960 was 5,234

[1]The figure cited in the text compares with $31.7 million reported by the Colorado, New Mexico, and Utah State Departments of Employment. Because these agencies are restricted in the reporting of data by disclosure regulations, and because their sector classifications do not exactly correspond to those used in the 1957 Standard Industrial Classification Manual, it was decided to utilize the wage and salary totals derived from the data collected for this study.

and the average wage was $5,267.[2] Partial mining wage and employment data, by county and transaction table sector, are presented in Table SJ-III.

Interindustry Transactions

Coal--Total gross output of the coal mining sector was $164,000 in 1960 which represents production of 37,192 short tons with an average value per ton of $4.41. This was the smallest total gross output of all the processing sector industries. Table SJ-IV traces coal production from 1945 through 1960. It shows a strong downward trend from a high of almost 89,000 tons in 1945 to the 37.2 thousand tons in 1960. Most of this decline has been experienced by mines located in the Colorado counties of the sub-basin.

Coal sales to final demand of $74,000 amounted to 45 percent of its 1960 total gross output. As shown in Table SJ-X (p. 69), this percentage was the seventh lowest among the twenty-eight processing sector industries. It also was the lowest percentage of final demand sales of all the mining sectors. Households accounted for the largest share of final demand deliveries. Sales to electric energy of $60,000 accounted for two-thirds of all coal mining sales to processing sector industries.

The largest share of total inputs to coal mining--86 percent of its total gross outlays--came from the final payments sector, with wage and salary payments to sub-basin households accounting for nearly 50 percent of this amount and imports accounting for 36 percent, four-fifths of which were from outside the Colorado River Basin. The largest processing sector purchase was from "all other" services, (43%).

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[2]Data were provided by the Colorado, Utah, and New Mexico State Departments of employment.

Table SJ-III

Mining Wages and Employment, by County and Sector, 1960
San Juan Sub-Basin

County		Wages	Employment
Archuleta		a	a
La Plata			
Coal		$ 37,283	11
Oil & Gas		2,080,468	290
All Other Mining		1,690,477	309
	Total	$3,808,228	610
Montezuma			
Coal		21,731	6
Oil & Gas		237,501	47
Uranium		c	c
All Other Mining		a	a
	Total	259,232	53[b]
San Juan, Colorado			
Lead & Zinc		c	c
All Other Mining		a	a
San Juan, New Mexico			
Coal		7,459	4
Oil & Gas		13,470,835	2,232
Uranium		833,416	133
All Other Mining		a	a
	Total	14,311,710	2,369[b]
Garfield			
Coal		a	a
Uranium		c	c
All Other Mining		a	a
Kane		a	a
San Juan, Utah			
Lead & Zinc		c	c
Uranium		c	c
Oil & Gas		a	a
All Other Mining		a	a
Wayne		a	a
	Grand Total	$18,379,170	3,032

[a] Witheld to avoid disclosing figures for individual firms.

[b] Total exclusive of data witheld for disclosure reasons or because of classification problems.

[c] Because all wage and employment information for metal mining in the subject county was grouped into one general classification, it is not possible to report the wage and employment data by particular type of metal mining.

Source: Colorado State Department of Employment

Table SJ-IV

Selected Statistics for San Juan Sub-Basin Coal Production, 1945-1960

Year	Sub-Basin Totals		Colorado Counties		New Mexico County		Utah Counties	
	Tons	Dollar Value	Tons	Dollar Value	Tons	Dollar Value	Tons	Dollar Value
1960	37,192	164,080	30,648	127,802	4,209	24,202	2,335	12,076
1959	36,115	172,252	28,015	129,149	6,800	36,720	1,300	6,383
1958	39,203	207,971	33,058	166,282	6,820	29,599	2,325	12,090
1957	42,213	174,563	39,772	163,066	a	a	2,441	11,497
1956	65,014	282,790	51,447	216,592	9,946	48,636	3,621	17,562
1955	75,280	313,685	55,836	222,227	16,038	75,058	3,406	16,400
1954	40,466	204,353	40,466	204,353	a	a	a	a
1953	50,285	209,386	43,800	182,646	3,162	12,300	3,323	14,440
1952	46,117	198,861	37,853	153,683	3,943	19,597	4,321	25,581
1951	44,615	189,722	38,776	156,267	3,798	21,801	2,041	11,654
1950	51,116	195,556	46,386	170,839	2,528	13,575	2,202	11,142
1949	53,204	187,752	48,923	169,762	a	a	4,281	17,990
1948	51,831	163,777	48,977	153,788	a	a	2,854	9,989
1947	75,080	222,498	57,398	156,376	13,963	52,920	3,719	13,202
1946	88,194	262,007	68,342	192,724	19,852	69,283	a	a
1945	88,791	242,469	69,680	179,078	14,727	48,746	4,384	14,645

[a] figure witheld to avoid disclosure

Source: Minerals Yearbook, Annuals, 1945-1960, U. S. Department of the Interior, Bureau of Mines (Washington, D. C.: U. S. Government Printing Office).

Table SJ-Z (p. 71) shows the rank order of the sum of direct and indirect requirements from all processing sector industries resulting from sales to final demand of one dollar by each. Coal mining had a moderately low degree of structural interdependence with other processing sector industries, and created only $1.17 of total output for every dollar delivery to final demand. In this respect, coal ranks seventh from the bottom of all processing sector industries but is higher than the oil and gas sector. The largest individual production increase was in "all other" services.

Oil and Gas---Annual sub-basin petroleum production for the years 1953 through 1960 is shown in Table SJ-V. The total 1960 production was almost 44.6 million barrels, most of which came from the Utah counties. The average value per barrel was $2.81. In addition, there were almost 353.8 million mcf's of natural gas production at an average price per mcf of eleven cents.[3]

As shown in Table SJ-X (p. 69), the oil and gas sector delivered ninety-six percent of its 1960 total gross output of $172.6 million to final demand. This sector ranks first (along with lodging) among all sub-basin processing sector industries in this respect. Of the remaining sales to processing sector industries, intraindustry transactions, other utilities, and "all other" manufacturing were the largest with 37 percent, 35 percent, and 31 percent respectively.

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[3]The letters "mcf" represent thousand of cubic feet.

Table SJ-V

Annual Petroleum Production of San Juan Sub-Basin Counties, by State, 1953-1960
(Number of 42 Gallon Barrels)

Year	Totals	Colorado Counties	New Mexico County	Utah Counties
1960	44,564,000	204,000	12,431,000	31,929,000
1959	48,481,000	239,000	13,177,000	35,065,000
1958	28,754,000	139,000	7,538,000	21,077,000
1957	3,455,000	154,000	1,676,000	1,625,000
1956	1,321,000	168,000	678,000	475,000
1955	349,000	195,000	-	154,000
1954	231,000	231,000	-	-
1953	242,000	242,000	-	-

Source: Minerals Yearbook, Annuals, 1953-1960, Vol. III, Area Statistics, U. S. Department of the Interior, Bureau of Mines (Washington D. C.: U. S. Government Printing Office).

Approximately ninety-three percent of the oil and gas industry's total gross outlays were made in the payments sector with imports being the largest component. Of inputs from processing sector industries, the largest purchase came from oil field services, intraindustry transactions, and rentals and finance.

Table SJ-Z shows that the sum of direct and indirect effects of the oil and gas sector on all processing sector industries is $1.09, the lowest ranked mining sector and the second lowest of all processing sector industries in the sub-basin. The largest sectoral output increase was the three cents reported by oil field services.

Uranium--Table SJ-VI shows the current dollar value and tonnage of sub-basin uranium production in 1960 and prior years through 1956--when uranium production data were first published by the U. S. Bureau of Mines. The $24.3 millions worth of raw uranium ore mined in 1960 is a very much

Table SJ-VI

Value and Tonnage of San Juan Sub-Basin
Uranium Production, 1956-1960

Year	San Juan Totals		Colorado Sub-Basin Counties	
	Short Tons	Value (dollars)	Short Tons	Value (dollars)
1960	907,498	$24,340,806	12	$ 173
1959	1,610,576	34,582,793	-	-
1958	1,111,586	35,901,717	4	362
1957	918,577	29,499,616	-	-
1956	743,885	21,397,472	203	1,007

Year	New Mexico Sub-Basin County		Utah Sub-Basin Counties	
	Short Tons	Value (dollars)	Short Tons	Value (dollars)
1960	-	$ -	907,486	$24,340,633
1959	-	-	1,610,576	34,582,793
1958	-	-	1,111,582	35,901,355
1957	-	-	918,577	29,499,616
1956	2,896	48,793	740,786	21,347,672

Source: Minerals Yearbook, Annuals, 1956-1960, Vol. III, Area Statistics, U. S. Department of the Interior, Bureau of Mines (Washington, D. C.: U. S. Government Printing Office)..

lower figure than $53.3 million total gross output reported for the uranium sector in the transactions table. Because of the heavy concentration of uranium mining in the San Juan and contiguous sub-basins, a large uranium ore-processing industry has grown up in the area to separate U_3O_8 (yellow-cake) from the raw ore. It consists primarily of milling and flotation operations that are properly classified as "mining" activities

in the Standard Industrial Classification Manual.[4] In order to preserve this classification system, all local mining and processing operations were included in the single uranium row and column of the transactions table. Thus, the uranium sector is a vertically structured industry with locally mined raw ore showing as a uranium row to uranium column sale (intra-industry) which is then further processed in the same column. This procedure double counts local ore production so that the value of total gross output will be twice the value of local ores used as inputs plus the value added in processing these ores into "yellow-cake". The vertical combination of separate input structures into one column and row of the transactions table is an accepted procedure where the output of one activity is consumed as an input to another in the same geographical area (i.e. sub-basin).[5]

Seventy-seven percent of the uranium sector's total gross output was sold to final demand, the largest portion of which ($28.9 million) was "yellow-cake" sales to the federal government. Uranium's total final demand sales ranked second among the five mining sectors, and tied with "other" manufacturing for twelfth place among the twenty-eight processing sector industries shown in Table SJ-X. Intraindustry sales of $12.2 million represented the only processing sector transaction, and this entire amount consisted of sales of unprocessed uranium ores to

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[4] U. S. Bureau of the Budget, Standard Industrial Classification Manual-1957 (Washington, D. C.: U. S. Government Printing Office, 1957).

[5] See Evans and Hoffenberg, op. cit., p. 75.

concentrating mills. Approximately sixty-four percent of uranium's inputs came from the payments sector with imports accounting for the largest portion.

Table SJ-Z shows uranium to have the third largest sum of direct and indirect effects ($1.52) of all processing sector industries, and the largest value of the five mining sectors. Most of these effects are accounted for by intraindustry transactions and transportation output increases.

"All Other" Mining--The total gross output of the "all other" mining sector ($7.6 million) includes the production of gold, silver, lead, zinc, copper, stone, sand and gravel, and other minerals which individually account for a very small proportion of total sub-basin extractive value. Annual production figures for gold, silver, lead, zinc and copper in Table VII are for the years 1952 through 1960. Table SJ-X shows that approximately seventy-four percent of this sector's output was delivered to final demand in 1960--the third lowest percentage of the five mining sectors, and thirteenth highest of all sub-basin processing sector industries. The largest sales to final demand were exports outside the Colorado River Basin. The only significant processing sector sale was to the "all other" manufacturing sector.

As in all previous mining sectors, inputs from final payments accounted for the largest portion (seventy-six percent) of total gross outlays, with imports from outside the Colorado River Basin alone representing fourty-five percent of purchases from final demand. Wage and salary payments followed with one-third of inputs from final demand. In addition

Table SJ-VII

Annual Dollar Value of San Juan Sub-Basin
Gold, Silver, Copper, Lead, and Zinc Production, 1952-1960

Year	Sub-Basin Total	Colorado Counties	Utah Counties
1952	2,824,143	2,823,866	277
1953	823,334	823,334	-
1954	145,731	143,315	2,416
1955	294,440	294,440	-
1956	570,611	541,936	28,675
1957	561,342	404,910	156,432
1958	488,355	249,762	238,573
1959	443,263	90,335	352,928
1960	588,134	292,847	295,287

Source: Minerals Yearbook, Annuals, 1952-1960, Vol. III, Area Statistics, U. S. Department of the Interior, Bureau of Mines (Washington, D. C.: U. S. Government Printing Office).

to intraindustry transactions, the only other significant purchase from processing sector industries came from forestry.

For every increase in final demand sales of one dollar by the "all other" mining sector, all processing sector industries produce $1.30 of additional outputs. As shown in Table SJ-Z, this sector stands second highest among the mining sectors, and ties with eating and drinking places and "other" manufacturing for thirteenth highest among all the processing sector industries in the sum of its direct and indirect effects.

Oil Field Services--This sector is handled as a separate activity in the San Juan Sub-Basin because of the high level of oil exploration and drilling activity in 1960. In mature oil fields the role of oil and gas field services is classified under the four-digit industry code 1389

in the Standard Industrial Classification Manual.[6] The customary activities of this industry code include such things as excavating slush pits and cellars, pulling casings, shooting wells, perforating well casings, and performing the preventive maintenance necessary to keep wells at optimum production. There are, however, two additional categories at the four digit level under oil and gas field services. One of these is code 1381--drilling oil and gas wells, and the other is 1382--oil and gas field exploration services.[7]

Table SJ-VIII shows the summary of sub-basin drilling activities for 1960. Two types of wells are included in this summary. The first are called "wildcat" wells. These are wells drilled in areas where no previous production has been recorded with the hope of making a strike. The second classification is that of "development" wells. These are wells drilled around the perimeter of proven production sites to both increase production from a given site and to define its outer limits. The data in Table SJ-VIII are arranged to show new producers of crude oil, new producers of gas, holes drilled which produce nothing (dry), the total number of wells drilled, and the total footage for all classifications of drilling in 1960.

These data indicate that a total of 666 wells were drilled in the San Juan Sub-Basin in 1960 with a total footage of almost 3.5 million feet.

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[6] Op. cit., p. 28.

[7] Ibid., p. 27.

Table SJ-VIII

San Juan Sub-Basin Drilling Activities in 1960

Colorado Counties

Wildcat Well Completion in 1960					Development Well Completion in 1960				
Crude	Gas	Dry	Total	Footage	Crude	Gas	Dry	Total	Footage
				Archuleta					
-	-	2	2	1,400	2	-	-	2	2,200
				La Plata					
-	2	8	10	53,000	-	49	7	56	326,900
				Montezuma					
1	-	32	33	64,900	-	1	7	8	30,700

Utah Counties

Wildcat Well Completion in 1960					Development Well Completion in 1960				
Crude	Gas	Dry	Total	Footage	Crude	Gas	Dry	Total	Footage
				Garfield					
-	-	2	2	8,500	-	-	-	-	-
				Kane					
-	-	2	2	17,700	-	-	-	-	-
				San Juan					
5	-	27	32	196,000	86	-	16[a]	102	582,800
				Wayne					
-	-	5	5	21,900	-	-	-	-	-

New Mexico Counties

Wildcat Well Completion in 1960					Development Well Completion in 1960				
Crude	Gas	Dry	Total	Footage	Crude	Gas	Dry	Total	Footage
				San Juan					
3	-	33	36	144,600	158	196	22	376	2,034,600
				Sub-Basin Totals					
9	2	111	122	508,000	246	246	52	544	2,977,200
				Grand Total	255	248	163	666	3,485,200

[a]Includes one development service well completion.

Source: Minerals Yearbook Annuals.

The average drilling cost per well was over $30,000 and the average well depth was 5,233 feet. In addition, completion costs (pumps, casing, cementing and so on) averaged $30,000 for the 403 producing wells.

Oil field services had a 1960 total gross output slightly in excess of $40 million. This sector delivered eighty-eight percent of its total gross output to final demand and ranked eighth, tying with fruit, among all processing sector industries. Almost all final demand deliveries (98%) were to gross private capital formation ($34.6 million) representing exploration and drilling activity. The only processing sectors sales were to oil and gas mining of $4.6 million.

Eighty-two percent of oil field service inputs came from the payments sector, and imports from outside the Colorado River Basin and local wage and salary payments accounted for the greatest share. The largest processing sector purchases came from contract construction and transportation.

The sum of the direct and indirect effects of the oil field services sector came to $1.25 for every dollar increase in this sector's additional deliveries to final demand. Oil field services ranked nineteenth in total direct and indirect effects. The largest single output increases were called forth from the contract construction and transportation sectors.

MANUFACTURING

Manufacturing has not yet become a major source of income and employment in the counties of the San Juan Sub-Basin. Traditionally, the economy has been classified as agricultural and extractive. The only manufacturing which has taken place has been oriented toward the basic resources of the area--such as lumber and wood products or petroleum refineries--and those activities oriented towards local markets such as bakeries, printing and publishing establishments, dairies and bottlers.

Table SJ-IX shows some selected characteristics of sub-basin manufacturing, by county for the United States census years 1939, 1947, 1954 and 1958. Over this time the number of establishments has slightly more than doubled, as have the number of production employees. The value added increased from slightly more than $.7 million in 1939 to $9.4 million in 1958 an increase of almost 1,250 percent. The 1963 Census of Manufacturers showed a slight decline to 103 firms with 1,394 employees, 1,076 of which were classed as production type. Value added of $9.3 million is not directly comparable with earlier figures due to the increased witholding of data to prevent disclosure.

By 1960 the number of firms as reported by the United States Public Health Service[8] had increased from the 1958 figure of 112 to 163. This growth is quite misleading because many of the firms included as manufacturing establishments by the state agencies were not considered in the 1958 United States Census of Manufacturing, even though these establishments were operating in 1958. Much of the difficulty occurs in the

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[8] Directory of Manufacturers 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, 1962.

Table SJ-IX

Selected Statistics on the San Juan Sub-Basin Manufacturing, By County

	Number of Establishments	Average Annual Employment: Total Employees	Average Annual Employment: Production Employees	Value Added
1939				
Archuleta, Colo.	6	a	147	$ 66,000
La Plata, Colo.	21	a	140	379,000
Montezuma, Colo.	6	a	254	292,000
San Juan, Colo.	1	a	b	b
San Juan, N. M.	6	a	17	b
Garfield, Utah	3	a	8	b
Kane, Utah	2	a	b	b
San Juan, Utah	3	a	7	b
Wayne, Utah	1	a	b	b
Sub-Basin Totals	49	a	473	$ 737,000[c]
1947				
Archuleta, Colo.	4	106	105	$ 291,000
La Plata, Colo.	33	251	212	1,110,000
Montezuma, Colo.	15	208	173	712,000
San Juan, Colo.	2	b	b	b
San Juan, N. M.	9	52	46	257,000
Garfield, Utah	14	72	66	214,000
Kane, Utah	4	32	29	74,000
San Juan, Utah	6	31	29	128,000
Wayne, Utah	3	5	5	b
Sub-Basin Totals	95	757	665	$ 2,786,000[c]

[a] Not available

[b] Withheld to avoid disclosing figures for individual companies.

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

Table SJ-IX (Cond't.)

	Number of Establishments	Average Annual Employment: Total Employees	Average Annual Employment: Production Employees	Value Added
1954				
Archuleta, Colo.	12	189	124	$ 463,000
La Plata, Colo.	24	394	232	1,683,000
Montezuma, Colo.	17	175	159	681,000
San Juan, Colo.	3	8	7	21,000
San Juan, N. M.	12	83	66	575,000
Garfield, Utah	11	54	51	195,000
Kane, Utah	5	25	21	138,000
San Juan, Utah	3	40	35	252,000
Wayne, Utah	2	b	b	b
Sub-Basin Totals	89	808	695	$4,018,000[c]
1958				
Archuleta, Colo.	9	173	154	$ 929,000
La Plata, Colo.	27	345	253	2,440,000
Montezuma, Colo.	23	173	154	852,000
San Juan, Colo.	2	b	b	b
San Juan, N. M.	30	436	321	4,624,000
Garfield, Utah	6	147	85	b
Kane, Utah	.2	b	b	b
San Juan, Utah	10	37	31	555,000
Wayne, Utah	3	3	3	b
Sub-Basin Totals	112	1,314	1,001	$9,403,000[c]

[a] Not available

[b] Withheld to avoid disclosing figures for individual companies.

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

Table SJ-IX (Cond't.)

	Number of Establishments	Average Annual Employment: Total Employees	Average Annual Employment: Production Employees	Value Added
1963				
Archuleta, Colo.	7	217	188	b
La Plata, Colo.	19	292	193	$2,180
Montezuma, Colo.	22	202	166	1,025
San Juan, Colo.	1	b	b	b
San Juan, N. M.	32	341	217	4,495
Garfield, Utah	5	198	187	b
Kane, Utah	3	29	23	b
San Juan, Utah	11	110	97	1,571
Wayne, Utah	3	5	5	b
Sub-Basin Totals	103	1,394	1,076	$9,271[c]

[a] Not available

[b] Withheld to avoid disclosing figures for individual companies.

[c] 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 Manufacturers: 1958, 1954, 1947, Vol. III, Area Statistics (Washington, D. C.: U. S. Government Printing Office, appropriate states' data.)

lumber and wood products sector where many of the firms are small contract loggers who cut and deliver logs to the sawmills under contract. Most logging operations are conducted on a seasonal basis. Because of the seasonal nature of these establishments many are not included in the Federal census statistics, while the state reports them on the basis of state reporting laws. Also, since many of the employees are on the payroll for only a portion of the year, their average wage payments, calculated on a full year basis, are quite low. The best way to correct this is to utilize the notion of "man-years" when discussing employment in heavily seasonal industries. Table SJ-X shows the number of manufacturing firms by sector and county for 1960, compiled by the state agencies and the United States Public Health Service.

The total gross output of all sub-basin manufacturing sectors was almost $35 million, or only three percent of the sub-basin's total gross output in 1960. Sectors with the largest total gross outputs were "all other" manufacturing, and food and kindred products. Wage and salary payments for all manufacturing came to $6.6 million in 1960, roughly five percent of all sub-basin wage and salary payments. Sectoral wages and salaries, and other household payments (profits and other income) are shown in Table SJ-XI. This table shows that the largest payments to households were made by lumber and wood products and "all other" manufacturing. Wages and employment as reported by the state departments of employment security are presented in Table SJ-XII. These data are not complete for the entire sub-basin because many figures were not released due to disclosure rules. This lack of information prevented an accurate determination

Table SJ-X

Number of Manufacturing Firms, by Sector and County, 1960
San Juan Sub-Basin

Archuleta		
Lumber & Wood Products		11
Printing & Publishing		1
"All Other" Manufacturing		1
	Total	13
La Plata		
Food & Kindred Products		10
Lumber & Wood Products		13
Printing & Publishing		8
Fabricated Metals		2
"All Other" Manufacturing		5
Petroleum & Coal		2
Textile Mill Manufacturers		1
Primary Metals		1
	Total	42
Montezuma		
Food & Kindred Products		8
Lumber & Wood Products		6
Printing & Publishing		6
Fabricated Metals		3
"All Other" Manufacturing		3
Chemicals		1
	Total	30
San Juan, Colo.		
Printing & Publishing		1
Primary Metals		2
	Total	3
San Juan, N.M.		
Food & Kindred Products		7
Printing & Publishing		9
Fabricated Metals		5
"All Other" Manufacturing		15
Lumber & Wood Products		2
Chemicals		1
Petroleum & Coal		2
Leather and Leather Products		1
	Total	42
Garfield		
Food & Kindred Products		1
Lumber & Wood Products		12
Fabricated Metals		1
	Total	14

Table SJ-X (Cond't.)

Kane		
Lumber & Wood Products		3
Printing & Publishing		1
	Total	4
San Juan, Utah		
Food & Kindred Products		3
Lumber & Wood Products		6
Printing & Publishing		2
"All Other" Manufacturing		2
	Total	13
Wayne		
Food & Kindred Products		1
Lumber & Wood Products		4
	Total	5
	Grand Total	163

1960 Directory of Manufacturers for the Colorado River Basin, U. S. Department of Health, Education and Welfare, Public Health Services, Division of Water Supply and Pollution Control, Region VIII, Denver, Colorado.

Table SJ-XI

Rank Order Distribution of Manufacturing Sector
Total Payments to Households in the San Juan Sub-Basin
(In Thousands of Dollars)

Rank	Sector	Wages & Salaries	Profits	Total Payments
1	"All Other" Manufacturing	$1,941	$226	$2,167
2	Food & Kindred Products	1,502	624	2,126
3	Lumber & Wood Products	1,943	89	2,032
4	Printing & Publishing	889	90	979
5	Stone, Clay & Glass Products	318	82	400
	Totals	$6,593	$1,111	$7,704

Source: Table SJ-S

Table SJ-XII

Manufacturing Wages and Employment, by Sector and County, 1960
San Juan Sub-Basin

	Wages	Employment
Archuleta		
Lumber & Wood Products	$ 672,650	167
Printing & Publishing	a	a
Stone, Clay & Glass Products	a	a
Total	$ 672,650	167[b]
La Plata		
Food & Kindred Products	$ 414,348	124
Lumber & Wood Products	353,079	79
Printing & Publishing	202,823	48
Stone, Clay & Glass Products	a	a
"All Other" Manufacturing	201,655	44
Total	$1,171,905	295[b]
Montezuma		
Food & Kindred Products	$ 67,853	16
Lumber & Wood Products	294,946	78
Printing & Publishing	36,990	9
Stone, Clay & Glass Products	a	a
"All Other" Manufacturing	83,373	6
Total	$ 483,162	109
San Juan, Colo.		
Printing & Publishing	a	a
San Juan, N.M.		
Food & Kindred Products	$ 497,150	111
Printing & Publishing	352,325	72
Stone, Clay & Glass Products	98,710	20
"All Other" Manufacturing	1,431,314	230
Total	$2,379,499	443
Garfield	a	a
Kane	a	a
San Juan, Utah	a	a
Wayne	a	a

[a]Witheld to avoid disclosing figures for individual companies.

[b]Total less wages and employment data not released because of disclosure for subject year.

Source: The Colorado and New Mexico State Departments of Employment

of employment and calculation of average annual wages in the manufacturing sectors.

Food and Kindred Products--The major kinds of food and kindred products establishments in 1960 were packing plants, animal feed manufacturers, dairy and related products, and flour mills. Table SJ-X shows final demand deliveries by establishments in food and kindred products manufacturing equal to eighty-nine percent of total gross outputs to be seventh highest of all processing sector final demand deliveries, and the largest of the manufacturing sectors. The greatest share (69%) of final demand deliveries went to sub-basin residents, and the largest sales to processing sector industries went to eating and drinking places (56%), and lodging (17%). Sixty-five percent of food and kindred products inputs came from the payments sector, the largest of which were wages and salaries (29%), and imports (34%), three-fourths of which came from outside the Colorado River Basin. Slightly more than $2.8 million of purchases were made from other processing sector industries. The largest of these was the $1,081 purchase from dairy which accounted for thirty-eight percent of inputs to the processing sectors.

The sum of direct and indirect effects of the food and kindred products sector was $1.48, the highest expansionary effect for all manufacturers as shown in Table SJ-Z. In addition, this sector stood fourth highest with respect to direct and indirect effects of all processing sector industries. The largest individual production increases occurred in the dairy sector.

Lumber and Wood Products---Sawmills, planing mills, and logging camps were the major types of producers in this sector in 1960. The total gross output came to $5.3 million, of which sixty-six percent consisted of deliveries to final demand as shown in Table SJ-X. This sector was the third highest of the manufacturing sectors and ranked seventeenth among all processing sector industries. Most of these final demand deliveries (64 percent) consisted of exports outside the Colorado River Basin. The only significant sale to other processing sector industries was $1,774,000 to the contract construction sector.

Inputs from the payments sector accounted for sixty-seven percent of the sector's total gross outlays. The major portion of this ($1.9 million or 55%) was for wages and salaries. Most of the processing sector purchases (78%) came from the forestry sector which supplied raw logs.

Table SJ-Z shows that lumber and wood products created $1.42 of output for every additional dollar of product delivered to final demand. This ranked fifth among all processing sector industries and was the second largest of all the manufacturing sectors. The largest individual production increases occurred in the forestry sector.

Printing and Publishing---Most of the production in this sector in 1960 took place in local newspaper publishing establishments. As shown in Table SJ-X final demand deliveries for this sector were a smaller percentage of total gross output than any of the other sub-basin

manufacturing industries and third lowest of all the processing sector industries. Only eighteen percent of the total gross output of $2.4 million was accounted for by final demand sales, and deliveries to sub-basin residents accounted for two-thirds of these. Twenty-seven of the twenty-eight processing sector industries purchased goods and services from printing and publishing, and the largest was the 55 percent purchased by the "all other" retail sector. The bulk of total input purchases (almost ninety percent) came from the final payments sector; the largest of these were wages and salaries and imports.

As shown in Table SJ-Z the sale of an additional dollar of printing and publishing output to final demand had an expansionary effect of $1.13. This is the smallest value of all manufacturing sectors and stands fourth from the bottom among all sub-basin processing sector industries. The largest individual output increase was experienced by the rentals and finance sector.

Stone, Clay and Glass Products---The major activity of this sector was the manufacture of ready mixed concrete, add total gross output came to almost $3.7 million in 1960. Table SJ-X shows that the thirty-three percent of total gross output delivered to final demand sectors ranks second lowest of all manufacturing sectors and fourth from the bottom of all processing sector industries. Sales to the contract construction sector accounted for ninety-nine percent of sales made to processing sector industries.

Input purchases from the payments sector came to eighty-nine percent of total gross outlays; the largest component was imports from outside the Colorado River Basin. Of the remaining processing sector purchases the "all other" mining sector delivered the largest amount with twenty-four percent, followed by rentals and finance with nineteen percent.

Only $1.17 in additional outputs were generated in the processing sector for every dollar of this sector's sales to final demand. This was the second lowest expansionary effect for all manufacturing sectors and placed the sector sixth from the bottom with respect to the expansionary effects of all processing sector industries. The largest individual output increases occurred in the "all other" mining and in the rentals and finance sectors.

"All Other" Manufacturing--The establishments comprising this sector are a very heterogeneous group and are included together under one heading to eliminate the possibility of disclosure of data where there are fewer than three firms of a given kind operating in the sub-basin. Included in this sector are two small oil refineries, leather products manufacturers, furniture manufacturers, fabricated metal products and several other small and varied establishments. This sector's 1960 total gross output of $15.5 million was the largest of all the manufacturing sectors, and Table SJ-X shows that seventy-seven percent of its output went to final demand. This was the second largest percent of deliveries to final demand of any manufacturing sector and the highest among all sub-basin processing sector industries. The largest component of final demand sales were exports outside the Colorado River Basin. Because petroleum refineries are

included in this sector, "all other" manufacturing sold its output to each of the twenty-eight processing sector industries. In most cases these are gasoline sales which passed through the margined service station sector. The largest of these sales--approximately $1.5 million or forty-four percent--was to the transportation sector. Seventy-eight percent of this sector's total gross outlays are recorded in the payments sector, and imports from outside the Colorado River Basin was the largest single entry accounting for fifty-six percent of inputs. The largest processing sector purchase came from the oil and gas sector and accounted for forty-eight percent of processing sector purchases.

Table SJ-Z shows that the "all other" manufacturing sector's sum of direct and indirect effects ($1.30) ranked fifteenth highest among all twenty-eight processing sector industries and third lowest of all sub-basin manufacturing sectors. The largest individual production increase was experienced by the oil and gas sector.

ELECTRIC ENERGY

There were seven firms producing and selling electric energy in the San Juan in 1960 and some of these firms operated several establishments in the sub-basin. For example, the Utah Power and Light Company serves the four Utah counties from several different establishments and the Arizona Public Service Company has more than one establishment in the sub-basin.

Most of the Colorado counties are served by two Rural Electrification Administration (R. E. A.) associations and two privately owned companies, while San Juan County, New Mexico, is served both by Arizona Public Service Company and the Farmington Power and Light Company.

The town of Farmington system sold more energy than any other establishment in the sub-basin in 1960. These data are presented in Table SJ-XIII. The next largest in terms of sales was the Western Colorado Power Company, but some of its sales were exported to establishments and consumers in the Upper Main Stem Sub-Basin. It was impossible to derive sales time series data for the Utah Power and Light Company to sub-basin residents since operating data were available only for the entire system which is state-wide.

Interindustry Relations --The total gross output for the electric energy sector was $6,528,000 in 1960, of which thirty-nine percent was final demand sales as shown in Table SJ-X. Only five processing sector industries ranked lower. Household sales of $1,828,000 accounted for seventy-two percent of all final demand deliveries. Twenty-seven of the twenty-eight processing sector industries purchased power from the sub-

basin's electric energy producers. The largest delivery by electric energy to processing sector was the $1,079,000 sold to all the mining sectors combined. Intraindustry transactions of $874,000 accounted for the largest delivery to any single industry within the processing sector.

The payments sector contains $4,452,000 (sixty-eight percent) of electric energy's total gross outlays. Imports from other sub-basins and wage and salary payments were the largest of these expenditures accounting for fifty percent and twenty-seven percent, respectively.

Each dollar of electric energy sales to final demand generates $1.40 of additional output within the processing sector. Table SJ-Z shows this was the sixth largest expansionary effect among all processing sector industries. Intraindustry transactions total $1.16 and this ranks third among all processing sector industries. Rentals and finance experienced the largest increase in output with $0.14.

Table SJ-XIII

Selected Statistics for the San Juan Sub-Basin Electric Energy Firms, 1941-1960

Year	La Plata Electric Assn.			Western Colorado Power Co.			Empire Electric Assn.		
	Miles Energized	Consumers Served	Operating Revenues	Miles Energized	Consumers Served	Operating Revenues	Miles Energized	Consumers Served	Operating Revenues
1960	818	2,561	480,486	197	12,198	2,506,395	1,070	5,147	920,127
1959	786	2,486	475,101	196	12,095	3,359,032	1,063	5,275	905,434
1958	768	2,383	425,286	196	11,847	3,125,529	892	5,398	816,678
1957	758	2,256	358,681	195	11,627	2,807,720	816	5,111	681,729
1956	722	2,194	332,703	195	11,383	2,665,604	816	4,286	587,473
1955	710	2,075	310,826	195	11,106	2,423,052	809	4,113	526,267
1954	666	1,907	274,107	195	10,802	2,200,041	782	3,878	454,362
1953	638	1,812	249,724	192	10,562	2,111,922	768	3,593	400,001
1952	621	1,749	224,917	192	10,496	1,863,510	680	3,376	349,604
1951	587	a	210,368	191	10,533	1,670,628	639	a	325,007
1950	525	a	174,113	191	10,438	1,514,188	612	a	289,309
1949	a	a	a	191	10,093	1,385,178	a	a	a
1948	350	a	117,305	191	9,741	1,264,487	254	a	201,262
1947	327	a	90,305	191	9,242	1,122,078	147	a	153,577
1946	265	a	49,935	191	8,630	938,819	147	a	116,036
1945	230	a	38,888	168	8,051	818,931	130	a	91,015
1944	225	a	34,870	160	7,707	779,379	90	a	66,572
1943	215	a	32,052	141	7,502	742,676	90	a	14,502
1942	a	a	a	141	7,714	719,458	a	a	a
1941	190	a	11,716	141	7,386	743,987	113	a	18,386

[a]Data not available for these years.

Table SJ-XIII (Cond't.)

Year	Town of Farmington			Arizona Public Service Co.			Telluride Power and Light Co.		
	Miles Energized	Consumers Served	Operating Revenues	Miles Energized	Consumers Served	Operating Revenues	Miles Energized	Consumers Served	Operating Revenues
1960	a	11,866	2,245,868	1,640	173,543	53,751,795	733	9,007	2,227,492
1959	a	11,933	2,121,546	1,603	165,313	47,273,920	679	9,238	1,998,422
1958	a	a	a	1,573	156,940	42,152,380	678	9,358	1,810,924
1957	a	a	a	1,364	149,800	37,538,833	670	9,315	1,735,047
1956	a	a	a	1,317	141,369	34,691,549	670	9,349	1,687,017
1955	a	a	a	1,154	133,789	28,578,518	657	9,510	1,610,159
1954	a	a	a	1,086	127,476	25,033,825	556	9,554	1,509,774
1953	a	a	a	1,047	122,022	22,426,584	552	9,344	1,401,171
1952	a	a	a	833	116,132	19,441,148	500	8,679	1,322,774
1951	a	a	a	a	a	a	506	8,425	1,251,084
1950	a	a	a	a	a	a	500	8,137	1,066,177
1949	a	a	a	a	a	a	527	7,926	943,631
1948	a	a	a	a	a	a	498	7,864	798,091
1947	a	a	a	a	a	a	420	8,196	654,536
1946	a	a	a	a	a	a	422	7,739	564,986
1945	a	a	a	a	a	a	421	7,084	537,335
1944	a	a	a	a	a	a	390	6,436	524,447
1943	a	a	a	a	a	a	388	6,137	488,098
1942	a	a	a	a	a	a	388	6,021	404,599
1941	a	a	a	a	a	a	379	6,198	390,585

[a]Data not available for these years.

Table SJ-XIII (Cond't.)

Utah Power and Light Co.

Year	Miles Energized	Consumers Served	Operating Revenues
1960	3,363	212,011	48,899,340
1959	3,112	205,857	45,190,189
1958	3,092	199,943	41,371,365
1957	2,988	194,835	40,261,913
1956	a	189,128	38,386,602
1955	3,616	182,277	34,831,016
1954	3,382	176,213	29,689,512
1953	3,353	171,932	27,716,213
1952	3,275	167,483	24,050,758
1951	3,191	162,948	21,789,466
1950	2,648	156,639	19,367,939
1949	2,802	151,137	18,373,103
1948	2,848	145,210	17,035,763
1947	2,635	138,318	15,543,060
1946	2,541	131,690	13,745,575
1945	2,470	126,738	13,074,842
1944	2,508	131,841	13,120,741
1943	2,445	130,837	15,586,262
1942	2,411	126,604	14,319,283
1941	2,460	112,944	13,095,909

[a]Data not available for these years.

Sources:

Annual Statistical Report, Rural Electrification Administration (Washington, D. C.: U. S. Government Printing Office).

Statistics of Electric Utilities in the United States, Publicly Owned, 1945-1960, Federal Power Commission (Washington, D. C.: U. S. Government Printing Office).

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

INTERINDUSTRY ANALYSIS:

TERTIARY INDUSTRIES AND CONSTRUCTION

SAN JUAN RIVER SUB-BASIN

By

Bernard Udis

August, 1967

TERTIARY INDUSTRIES

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

Generally, trade sectors primarily depend upon local income and population. They also reflect the particular trade channels which have evolved in the region for the distribution of goods and services. Typically they cater to the needs of the local population,[1] and mirror changes in the economy which have originated elsewhere in the "basic" industries whose level 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 located abroad.

As noted earlier, the trade categories are treated differently from other industries in input-output analysis. Since they are conceived of as providing essentially place utility without changing the basic physical form of the goods, an attempt is made to get at "value added" by entering only their gross margins into the transactions table. Gross margins are defined to be the sum of operating expenses plus profit. On the basis

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[1] In those sections of the country which draw visitors from outside their own regions, the trade and service sectors clearly do not depend primarily on local population. This complicates any attempt at projecting future levels of output for these industries. For a further discussion of this see the final chapter of this report dealing with projections and also the section entitled "Outdoor Recreation" by Professor Paul T. Therkildsen which will appear as a part of the final report of this study.

of intensive study the following margins were used in the San Juan Sub-Basin: 28.4 percent for wholesale trade, 23.9 percent for gas service stations, and 29.3 percent for "all other" retail trade.

Wholesale Trade[2]

Interindustry Relations --Total gross output of the wholesale sector amounted to $20,923,000 in 1960, the eighth largest of the twenty-eight processing sector industries in the San Juan. Although sales of the wholesale industry were made to every other processing sector industry the overwhelming share of its output -- 83.7 percent -- was destined for the final demand sectors. Among final demand sector transactions, exports to destinations outside the Colorado River Basin of $5.5 million accounted for the largest single sale. This constituted slightly more than one-fourth of the gross output of the entire wholesaling industry. Other important final demand destinations for the wholesaling sector were to sub-basin households which purchased $3.5 million, inventory accumulations accounting for $3.4 million, and exports to other sub-basins of the Colorado accounting for $3.4 million. Within the processing sector group of industries, transportation and oil field services were the single most important customers for the output of the wholesaling sector with $998,000 and $681,000 of deliveries, respectively. Together these two sectors accounted for almost 50 percent of the processing sector sales of the wholesaling industry.

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[2]According to the Census of Business for 1958 there were 211 wholesaling establishments in the counties comprising the San Juan Sub-Basin of which the largest number (107) were found in San Juan County, New Mexico. A slight decline in number of wholesaling establishments was reported in the 1963 Census of Business which showed 191 wholesalers in the San Juan Sub-Basin. San Juan County, New Mexico retained its dominance, however, with 104 of these firms.

Inputs of the Wholesale Sector --Almost 82 percent of the total outlays of this industry went to the autonomous or payments sector with the largest outlay -- $6 million -- representing payments to sub-basin households for labor services provided to the wholesaling sector. Ninety-eight percent of all imports by this sector were accounted for by shipments from outside the Colorado River Basin. Total imports of $4.7 million represented almost 23 percent of the total outlays of this industry and 27.5 percent of its purchases from the payments sectors.

Within the processing sector, the bulk of inputs to the wholesaling industry were provided by the transportation industry sales of $2 million. This represented almost 54 percent of all inputs from the processing sector. Next in importance among processing sector suppliers were the rentals and finance sector ($633,000), "other" utilities ($157,000), and "all other" services ($319,000). The $142,000 of inputs from the electric energy industry represented the only other input in excess of $100,000 to wholesaling.

Direct and Indirect Effects of the Wholesale Trade Sector on the Sub-Basin Economy --Total Sales of $1.27 are generated in the regional economy for each sale of $1.00 to final demand by sub-basin wholesalers. This earned for wholesaling a rank of eighteenth among the 28 processing sector industries in the San Juan Sub-Basin in terms of its influence on the output of other industries. Intraindustry transactions of $1.004 ranked sixteenth among processing sector industries in the sub-basin. Only five other processing sector industries responded in amounts of at least $0.01 for each wholesaling dollar of sales to final demand. Transportation led the five with its response of $0.13 per dollar of wholesaling sales to final demand. Rentals and finance,

"other" utilities, "all other" services, and electric energy followed but in the much lower range of $0.04 to $0.01 per dollar of wholesale sales to final demand.

Service Stations[3]

Interindustry Relations --The gasoline service stations in the San Juan Sub-Basin ranked twenty-first among the 28 processing sector industries in terms of the magnitude of its gross output -- $3.3 million. Almost 57.5 percent of its gross output represented sales to final demand sectors -- $1.9 million. Sales to sub-basin households of $946,000 led the list of final demand customers accounting for slightly over 50 percent of all final demand sales and almost 30 percent of total gross output. Export sales followed with $726,000 accounting for almost 40 percent of final demand sales. Once again, the importance of service station sales to customers from outside the Colorado River Basin was paramount, accounting for 92.3 percent of total exports.

Of service station sales to the processing sectors, the transportation industry led all other sectors by a large margin with $882,000. Oil field services and range livestock followed with $136,000 and $106,000 of sales respectively.

Inputs to the Gas Service Station Sector.--The autonomous or payments sector accounted for almost three-fourths of the gross outlays of service stations. Payments to sub-basin households, both in the form of profits

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[3]The 1958 Census of Business shows 146 gas service stations in the San Juan with the largest number (45) located in San Juan County, New Mexico. The 1963 Census shows the growth in number of auto service stations to 200 with San Juan, New Mexico still in the lead and increasing to 75.

and wages and salaries, together accounted for approximately 51 percent of the gross outlay of this industry. Import purchases from outside the Colorado River Basin of $294,000 ranked next in importance.

The most significant processing sector customers of the service station industry in the San Juan Sub-Basin were "other" utilities and rentals and finance, each of which provided close to $215,000 of inputs. This represented in each case almost 25 percent of inputs from the processing sector, and close to 6.5 percent of gross outlays.

Direct and Indirect Effects of the Gas Service Station Sector on the Sub-Basin Economy --Service stations ranked eleventh in importance as a generator of economic activity in the San Juan Sub-Basin with each dollar of their sales to final demand giving rise to total sales of $1.35 in the sub-basin economy. Seven processing sector industries responded with at least $0.01 of sales. These were rentals and finance ($0.08), "other" utilities ($0.07), "all other' services ($0.05), electric energy ($0.04), transportation ($0.03), printing and publishing ($0.02), and oil and gas ($0.02).

"All Other" Retail Trade[4]

Interindustry Relations.--The "all other" retail group is a residual category within which new and used car dealers occupy an important position. Its 1960 total gross output of $29.9 million placed this industry in sixth rank in the sub-basin. Over 92 percent of its gross output was destined for the final demand sector. Of its 27.7 million of sales to final demand,

[4]In 1958 the Census of Business classified 152 establishments in the San Juan as "other" retail. The largest number of these (54) were found in San Juan County, New Mexico. By 1963 the number of establishments so classified had grown to 176, and San Juan, New Mexico's 69 still lead the list.

households absorbed $17.4 million or 63 percent. Inventory accumulation also was important at $5.4 million dollars or almost 20 percent of final demand sales.

The major processing sector outlet for the sales of "all other" retail trade in the San Juan was the contract construction industry, whose $739,000 accounted for 32.5 percent of all processing sector sales and almost one-fourth of gross output. Also absorbing more than $100,000 of purchases from the "all other" retail trade industry were the oil and gas sector ($234,000), range livestock ($188,000), transportation($145,000), uranium ($108,000), and eating and drinking ($104,000).

Inputs of the "All Other" Retail Group --The payments sector accounted for 78.5 percent of this industry's gross outlays or $23.5 million. Households alone provided over $14 million combined, both in the form of labor services remunerated by wages and salaries, and profits. This combined figure represented 47.7 percent of gross outlays. Inventory depletion of $5.1 million was also significant, accounting for 21.8 percent of final payments and 17.1 percent of gross outlays. Within the processing sectors, the most significant supplying industries were transportation ($1.7 million), rentals and finance ($1.5 million), and printing and publishing ($1.1 million)

Direct and Indirect Effects of "All Other" Retail Trade on the Sub-Basin Economy--Processing sector industries of the San Juan Sub-Basin responded with $1.32 of output for each one dollar of final demand sales by the "other" retail group. This reaction ranked twelfth in the sub-basin. Six industries responded in amounts of at least $0.01 for each dollar of final demand sales by the "other" retail group. Transportation and rentals and finance tied for first place with a seven-cent reaction. Second rank

of $0.04 in reaction was held jointly by "all other" services and printing and publishing. "Other" utilities and electric energy responded in amounts of $0.02 per dollar of final demand sales by the "other retail" sector.

Eating and Drinking Places[5]

Introduction --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 inter-industry analysis, eating and drinking places are not treated in the same fashion as 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 worse, the food is cooked, baked, broiled, fried, or what have you. Thus, no margining is applied to the transactions of this industry.

Interindustry Relations --The $8.3 million of gross output of the eating and drinking group ranked thirteenth among the 28 processing sector industries in the San Juan Sub-Basin. Sales to final demand of $7.8 million accounted for 94 percent of gross output. Total exports of $4.8 million and sales to households of $2.7 million, together, accounted for over 90 percent of gross output.

Among processing sector industries only transportation absorbed over $100,000 of the output of the eating and drinking sector. Most of its other row intersections are quite insignificant.

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[5]By Census enumeration in 1958, there were 203 eating and drinking establishments in the San Juan Sub-Basin. San Juan County, New Mexico's 62 establishments led the list. In 1963, the number of eating and drinking places had shrunk to 180, but San Juan County, New Mexico still lead with 64 establishments.

Inputs of Eating and Drinking Places --Over three-fourths of the outlays of eating and drinking places represented purchases from the autonomous or payments sector of $6.4 million. Imports of $32 million primarily from outside the Colorado River Basin, and payments to sub-basin households of wages and salaries of $2.2 million accounted for the major suppliers in the payments sector. Within the processing group of industries, two sectors, food and kindred products and rentals and finance, each accounted for one-fourth of eating and drinking purchases from the payments sector, with $480,000 and $477,000, respectively.

Direct and Indirect Effects of the Eating and Drinking Industry on the Sub-Basin Economy --The regional economy responded in the amount of $1.30 for each dollar of final demand sales by the eating and drinking group. This ranked fourteenth among the 28 processing sector industries in the San Juan Sub-Basin. Eleven other industries responded in amounts of at least $0.01 each time eating and drinking places experienced a one-dollar increase in their sales to final demand. With the exception of rentals and finance's $0.07 and food and kindred product's $0.06 no other industry responded directly and indirectly in amounts greater than $0.02.

Lodging

Interindustry Relations --Lodging held seventeenth place among the San Juan Sub-Basin's 28 processing sector industries when ranked by magnitude of gross output. Of the lodging industry's $6.3 million of gross output almost 96 percent was destined for final demand customers, with exports in the aggregate accounting for three-fourths of the total gross output. No other final demand sector approached the output of $4.7 million which

represented export sales. Inventory accumulation accounted for $806,000 and sales to sub-basin households reached $427,000.

Within the processing sector, only three industries absorbed more than $20,000 of output from the lodging industry. These were transportation, ($85,000), oil field services ($49,000), and oil and gas ($45,000).

Inputs to the Lodging Industry --Almost 80 percent of lodging outlays -- $5 million -- went to the autonomous or payments sector. Aggregate imports to the lodging industry accounted for $1.8 million or almost 29 percent of the industry's gross outlays, with the bulk coming from outside the Colorado River Basin. Depreciation absorbed almost $970,000 while payments to sub-basin households in the form of wages and salaries, and profits accounted for $1.5 million.

Lodging inputs from processing sector industries in the aggregate only accounted for one-fifth of the gross outlays of lodging, with other services, and rentals and finance leading the list of supplying industries with 23 percent and 15 percent, respectively, of inputs from sub-basin processors. The only other processing sector industries with inputs to lodging of over $100,000 were the food and kindred products manufacturing group and electric energy.

Direct and Indirect Effects of the Lodging Industry on the Sub-Basin Economy --The direct and indirect effect in the sub-basin economy of $1.29 per dollar of lodging sales to final demand ranked sixteenth in the San Juan Sub-Basin. Intraindustry response was very low, with the $1.002 ranking nineteenth in the sub-basin.

Each dollar of lodging sales to final demand did evoke a response of at least $0.01 in seven other sub-basin processing sector industries. The

largest of these reactions was in the "other" services group ($0.05), and "other"utilities ($0.05). The other five responding industries of this magnitude were rentals and finance, contract construction, electric energy, food and kindred products manufacturing, and oil and gas.

"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 income" row.

Interindustry Relations --The "other" services produced a total gross output of $14.9 million in 1960 to rank eleventh among the twenty-eight proces sector industries in the San Juan. Of this gross output, $6.9 million or 46.4 percent was accounted for by sales to final demand. The major final demand customers of "other" services were sub-basin households ($4.2 million or 60 percent of final demand sales), export sales ($1.1 million), and inventory accumulation ($696,000).

Of the somewhat more than $8 million of sales to processing sector industries, contract construction's $1.6 million and transportation's $1.1 million led the list. Other processing sector industries which absorbed at least $500,000 worth of output from the "other" services sector were "other" retail trade ($893,000), oil field services ($866,000), rentals and finance ($654,000), and oil and gas ($552,000).

Inputs of the "All Other" Services Industry --Purchases from the autonomous or payments sector of $12.9 million accounted for 86 percent of the gross outlays of this industry. Of this total figure, sub-basin households provided the largest component of inputs with wages and salaries accounting

for $4.7 million and profits $2.4 million. These figures, respectively, account for 31.7 percent and 15.8 percent of gross outlays of the "other" services industry. Imports accounted for almost $4 million of inputs to the "all other" services group with an almost even division between imports from other sub-basins and from outside the entire Colorado River Basin.

Within the processing sector group, rentals and finance was the most important provider of inputs accounting for a third of total processing sector inputs to the "all other" services group with its $692,000. Both other services (that is intraindustry transactions) and transportation each provided inputs in excess of $300,000. The only other significant providers of inputs were in the "other" utilities group, wholesale trade, and electric energy.

Direct and Indirect Effects of the "All Other" Services Group on the Sub-Basin Economy --The sub-basin economy experienced an addition of $1.18 to its output for each dollar of sales to final demand by the "other" services group. This was a modest degree of interdependence and ranked twenty-first among the 28 sub-basin processing sector industries. Five other industries in the processing sector responded by at least $0.01 for each final demand sale of one dollar by "all other" services group. The most important response was the $0.05 shown in the rentals and finance sector. After this, response indicators fall to $0.02 for transportation and $0.01 apiece for "other" utilities, electric energy, and wholesale trade.

Transportation

Interindustry Relations.--Transportation's $59 million of total gross output ranked second in the economy of the San Juan Sub-Basin. Its sales to final demand of $38.5 million accounted for 65 percent of the gross

output of the industry. Aggregate exports of over $24 million were the most significant final demand sale with export sales to outside the Colorado River Basin being much more significant than sales to other sub-basins. Sub-basin households accounted for $13 million of the final demand sales by the transportation industry. No other single final demand sector accounted for as much as $800,000 of sales. Within the processing sector group of industries, uranium's $6 million accounted for 10 percent of gross output and led the list. It was followed fairly closely by intraindustry transactions of $5.6 million. The wholesale trade industry, oil field services, and "other" retail trade, and contract construction also accounted for over $1 million of processing sector sales by the transportation sector.

Inputs of the Transportation Industry --Seventy-eight percent of gross outlays of the transportation group ($6 million) went for purchases from the payments sector. Sub-basin households were by far the most important single supplier to transportation, accounting for $12.3 million in wages alone. This represented 20.8 percent of the gross outlays of transportation and almost 27 percent of inputs from the final payments group. Depreciation of $9.2 million was also a significant input. Aggregate imports of $15 million accounted for almost one-third of inputs to transportation from final payments and most of these came from outside the Colorado River Basin.

Within the processing sector groups, intraindustry transactions from transportation were most important at $5.6 million. This represented almost 44 percent of outlays from the processing sector. Other significant purchases came from the "other" manufacturing group ($1.5 million), rentals and finance ($1.4 million), "other" services ($1.1 million).

Direct and Indirect Effects of Transportation Industry on the Sub-Basin Economy --Transportation's sales to final demand of $1.00 gave rise to a cumulative effect of $1.27 from the processing sector of the sub-basin economy. This ranked seventeenth out of the 28 industries in the San Juan. Intraindustry transactions of $1.11 were quite high and ranked fourth among the processing sector industries.

Six of the other processing sector industries responded with sales of at least $0.01 for each dollar of final demand sales by transportation. The largest response was found in the rentals and finance group with total sales of $0.03. "Other" manufacturing and "other" services responded in amounts of $0.02 while wholesale trade, "other" utilities and service stations, each responded in the amount of $0.01.

"All Other" Utilities

Interindustry Relations --The utilities group, excluding electric power, ranked twelfth in the sub-basin with total gross output of $13.3 million. Seventy percent of this amount, $6.9 million, represented sales to final demand. Sub-basin households were the major customer in the final demand sector, and their purchases of $5.2 million accounted for 39 percent of the gross output of this industry and almost 56 percent of its sales to final demand. Inventory accumulation was also significant, absorbing $2.9 million of the gross output of "all other" utilities.

Within the processing sector group, transportation's $754,000 led, followed by "other" retail trade ($485,000), wholesale trade ($457,000), rentals and finance ($336,000), and lodging ($305,000).

Inputs of "All Other" Utilities --Payments by the "all other" utilities group from the payments or autonomous sector of $1 million accounted for 75 percent of the gross outlays of the industry. Inventory depreciation of $2.9 million and aggregate imports of $2.8 million were the most significant sources of inputs. Sub-basin households in the aggregate provided $3 million in labor services.

Almost one-fourth of gross outlays by this industry or $3.3 million came from the processing sector group. Within it the most significant supplier was oil and gas with its $2.7 million or 82 percent of inputs from the processing sector.

Direct and Indirect Effects of the "All Other" Utilities Group on the Sub-Basin Economy --Directly and indirectly this industry's sales to final demand generated $1.35 of response in the sub-basin economy. This ranked ninth among the 28 processing sector industries in the San Juan and was noticeably more important as a generator of economic activity than the same industry in the Upper Main Stem. Only three industries have reacted in amounts of at least $0.01 to each sale of final demand of one dollar by the "other" utilities group. These were oil and gas with a very large $0.27 response, rentals and finance with $0.02 and transportation with $0.01.

Contract Construction

Interindustry Relations --Contract construction's gross output of $49.2 million ranked fourth among the 28 processing sector industries in the San Juan in 1960. Sixty-seven percent of this total ($33.1 million) represented sales to final demand. As is natural for the sector the single most significant group represented gross private capital formation

with $14.5 million of building. This accounted for 44 percent of final demand sales of construction and almost 30 percent of its gross output. State and Federal government together accounted for $7.1 million of construction sales, and aggregate exports $6.6 million. Contrary to the case with most of the other tertiary industries, however, the majority of export sales by construction represented exports to other sub-basins of the Colorado rather than to destinations outside of the Colorado River Basin.

Intraindustry transactions were the most important within the processing sector industry and their $13.6 million of sales accounted for 84 percent of all processing sector sales by contract construction. Oil field services followed with $1.9 million. No other processing sector industry accounted for as much as $200,000 of construction sales.

Inputs of Contract Construction --Construction's $25 million of purchases from the payments sector accounted for 50 percent of its gross outlays. Imports in the aggregate of $9.3 million, most of which came from outside the Colorado River Basin, payments to sub-basin households in the form of wages of $8.3 million, and depreciation allowance of $3.8 million were the most important suppliers from the autonomous or payments sector. When profits received by residents of the sub-basin are included, payments to households become even more significant growing to $9.5 million. The largest single source of supply from the processing sector was found in the construction industry itself -- supplying $13.6 million of output. The next four ranking industries were stone, clay and glass manufacturing ($2.4 million); lumber and wood products ($1.8 million); and "other" services ($1.6 million); and transportation ($1.6 million). In the aggregate, intraindustry transactions and purchases from the four other industries

listed above accounted for 85.5 percent of inputs from the processing sector and almost 43 percent of the total outlays of the construction industry.

Direct and Indirect Effects of the Contract Construction Industry on the Sub-Basin Economy --Construction ranks first among the San Juan's 28 processing sector industries, generating one $1.79 of cumulative effects in the sub-basin economy for every dollar of its sales to final demand. It retains a top rank in terms of intraindustry generation with $1.40. Eleven other processing sector industries responded in amounts of at least $0.01 for each dollar of sales to final demand by sub-basin contract construction. The most significant responses were recorded in the stone, clay and glass products manufacturing industry ($0.07); transportation, "other" services, and lumber and wood products manufacturing . . each registering five-cent reactions; rentals and finance ($0.04); and "other" retail trade ($0.02). One-cent reactions were recorded for "other" mining, "other" manufacturing, forestry, wholesale trade, and "other" utilities.

Rentals and Finance

Interindustry Relations --Rentals and finance gross output of $25.7 million is ranked seventh in the San Juan Sub-Basin. Of this amount 51 percent of $13.1 million represented sales to final demand. The overwhelming share of these sales of $6.9 million went to sub-basin households in the form of wages and profits. This figure accounted for 52.4 percent of sales to final demand and almost 27 percent of gross outlays. Aggregate exports of $1.6 million, almost all of which went outside the Colorado River Basin and sales to State and Federal governments of $1.4 million followed

in importance behind sales to households. Inventory accumulation was also important at $1.3 million.

Sales to the processing sector of $12.6 million were largely accounted for by oil and gas ($2.1 million), "other" retail trade ($1.5 million), rentals and finance ($1.5 million), transportation ($1.4 million), contract construction ($978,000), electric energy ($702,000), "other" services ($692,000), and wholesale trade ($633,000).

Inputs of Rentals and Finance --Eighty-seven and one-half percent of the gross outlays of this industry ($22.5 million) were accounted for by inputs from the autonomous or payments sector. As might be expected, the household sector was far in the lead with a combined profits and wages figure of $15.1 million. This was almost 67 percent of inputs from final payments. Aggregate imports followed at $3.9 million, most of these coming from outside the Colorado River Basin. Only 12.5 percent of gross outlays came from the processing sector industries, and of this total ($3.2 million) rentals and finance in the form of interindustry transactions accounted for $1.5 million. "Other" services at $654,000 and "other" utilities at $336,000 ranked second and third.

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. Its $1.16 of direct and indirect effects accompanying each dollar of final demand sales ranked twenty-fourth among the 28 processing sector industries in the San Juan. Only two industries responded with at least $0.01 to each dollar increase in finance sale to final demand. These were "other" services with $0.03 and "other" utilities with $0.01.

PROJECTED INTERINDUSTRY RELATIONS

SAN JUAN RIVER 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, Input-Output Analysis: An Appraisal (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 continue. 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 subbasin 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:

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

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

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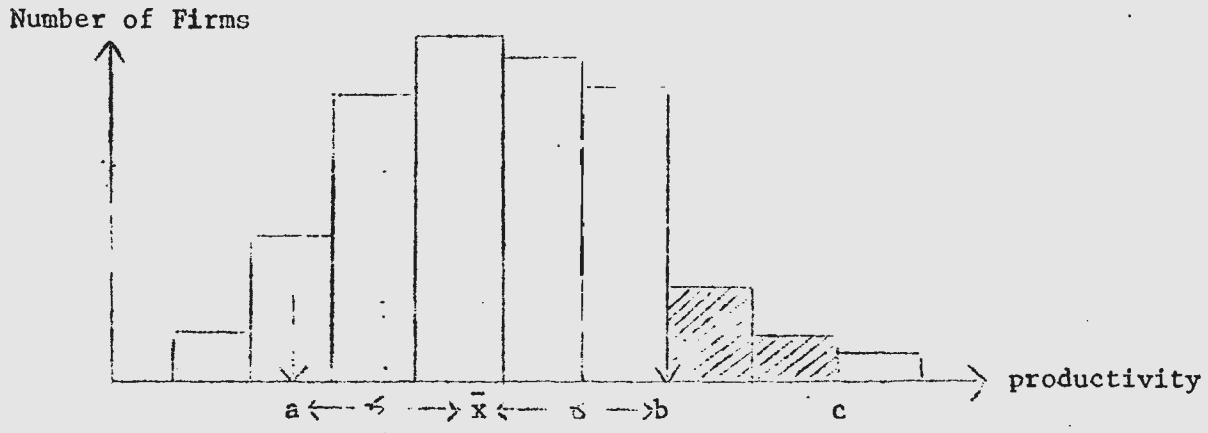
[6]For a detailed discussion of the two types of productivity measure see Solomon Fabricant, Basic Facts on Productivity Change (New York: National Bureau of Economic Research, Inc., Occasional Paper 63, 1959), pp. 3-13.

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



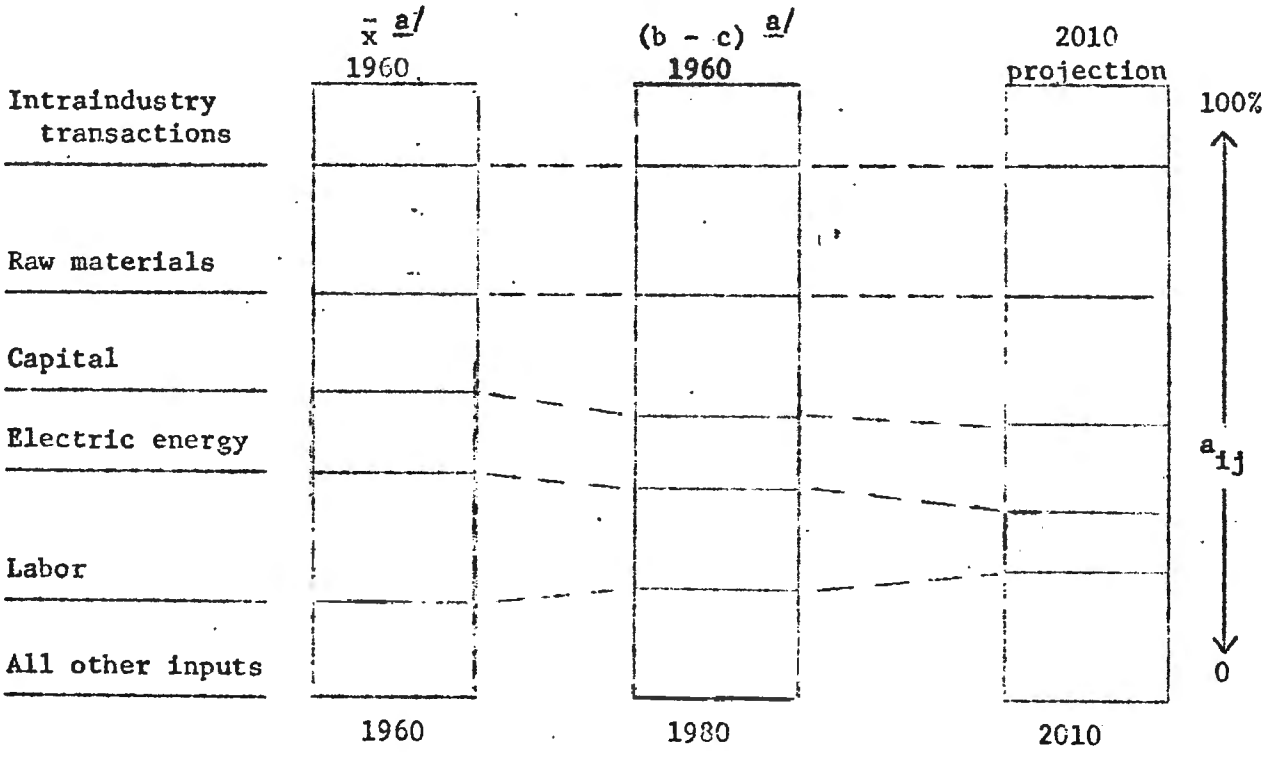
The $\bar{x}$ represents the mean, and the interval a to b represents the mean plus or minus one standard deviation. In a normal distribution this would include about 68 per cent of the firms. In this study, the a_{ij}'s are approximately representative of the firms with average productivity, or $\bar{x}$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



[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 SAN JUAN 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 San Juan 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 SJ-$1980_{a,b,c}$ and SJ $2010_{a,b,c}$. 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 Insitute, West Virginia University. They were checked by the individuals primarily responsible for individual sectors.[11]

Projections of Final Demand for the Agricultural and Forestry Sectors

Projecting economic activity is an undertaking wrought with uncertainty. Short-term extensions of historical trend on a State or National basis

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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 San Juan 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 Dr. Lynn Wilkes of the Economic Research Service, Department of Agriculture, Logan, 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, services, construction, government, etc.) were made under the direction of Dr. Bernard Udis, Director of the Bureau of Economic Research, University of Colorado, Boulder.

Industry Producing		Industry Purchasing	1 Range Livestock	2 Dairy	3 Field Crops	4 Fruit	5 Forestry	6 All Other Agriculture	7 Coal	8 Oil & Gas	9 Uranium	10 All Other Mining	11 Food & Kindred Products	12 Lumber & Wood Products	13 Printing & Publishing	14 Stone, Clay & Glass Products	15 All Other Manufacturing	16 Wholesal Trade	17 Service Stations	18 All Other Retail	19 Eating & Drinking Places	20 Agricultural Services	21 Oil Field Services	22 Lodging	23 All Other Services (Except Professional)	24 Transportation	25 Electric Energy	26 Other Utilities	27 Contract Construction	28 Rentals & Finance	29 Final Demand	30 Total Gross Output	
Agriculture		1. Range Livestock	858	304	0	0	0	66	0	0	0	0	443	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16,196	17,866	1.
		2. Dairy	0	19	0	0	0	33	0	0	0	0	2,749	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	910	3,710	2.
		3. Field Crops	0	0	0	0	0	23	0	0	0	0	519	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,935	4,477	3.
		4. Fruit	0	15	0	0	0	0	0	0	0	0	92	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	706	812	4.
		5. Forestry	0	0	0	0	0	0	0	0	0	696	0	1,905	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	95	2,697	5.
		6. All Other Agriculture	0	0	4	0	0	0	0	0	0	0	351	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	740	1,096	6.
Mining		7. Coal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	36	0	449	0	0	93	578	7.
		8. Oil & Gas	0	0	0	0	0	0	0	2,259	0	0	0	0	0	0	2,701	0	0	0	0	0	101	0	0	66	660	7,203	102	0	148,261	161,353	8.
		9. Uranium	0	3	0	0	0	0	0	0	11,825	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	37,241	49,066	9.
		10. All Other Mining	0	0	0	0	0	0	0	0	0	953	0	0	0	238	1,170	0	0	0	0	0	0	0	0	0	0	0	1,224	0	7,128	10,714	10.
Manufacturing		11. Food & Kindred Products	71	0	0	0	0	31	0	0	0	0	214	0	0	0	0	0	0	0	1,355	0	0	396	109	66	0	0	0	64	12,963	15,271	11.
		12. Lumber & Wood Products	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4,079	0	2,333	6,416	12.
		13. Printing & Publishing	36	4	4	2	0	1	3	0	49	0	122	6	40	8	23	66	151	3,195	123	17	17	127	146	133	79	76	102	384	802	5,716	13.
		14. Stone, Clay & Glass Products	0	0	0	0	0	0	0	0	0	0	0	0	0	23	0	0	0	0	0	0	0	0	0	0	0	0	5,507	0	2,147	7,677	14.
		15. All Other Manufacturing	71	7	22	4	8	5	4	323	196	64	46	19	29	69	315	98	25	290	141	4	118	16	109	1,727	106	51	1,122	256	17,261	22,508	15.
Trade	Retail	16. Wholesale Trade	107	15	40	2	19	13	3	323	245	21	31	26	17	54	45	66	6	145	475	13	287	32	474	1,129	79	25	816	128	28,196	32,834	16.
		17. Service Stations	125	22	40	4	32	15	4	161	0	32	15	6	11	8	23	33	0	73	18	8	68	16	36	996	0	25	102	64	4,338	6,277	17.
		18. All Other Retail	232	37	125	5	22	55	14	323	98	21	46	32	34	54	68	66	19	290	299	7	34	95	146	199	79	76	1,632	192	68,322	72,623	18.
		19. Eating & Drinking Places	18	0	0	0	0	0	0	161	0	11	0	0	0	0	0	33	0	73	0	0	34	16	36	133	0	25	0	192	16,870	17,602	19.
		20. Agricultural Services	375	122	45	370	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	919	20.
Services		21. Oil Field Services	0	0	0	0	0	0	0	4,034	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12,872	16,906	21.
		22. Lodging	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	33	0	73	0	0	34	32	36	66	0	0	0	64	15,521	15,859	22.
		23. All Other Services (Except Professional)	143	148	45	9	3	2	35	484	98	96	229	173	74	138	248	591	301	2,614	370	13	338	809	839	1,328	423	204	3,569	1,729	21,433	36,486	23.
		24. Transportation	214	334	4	0	0	20	0	323	5,544	0	92	96	63	38	563	3,743	176	5,301	194	0	761	16	803	6,375	211	204	3,467	0	37,865	66,405	24.
Utilities		25. Electric Energy	89	48	18	3	0	10	5	645	196	279	137	109	46	84	203	263	207	1,234	264	31	85	381	401	133	3,538	102	204	448	17,242	26,406	25.
		26. Other Utilities	54	15	13	2	0	5	3	0	147	86	168	19	69	123	135	821	446	1,452	352	7	68	840	474	863	211	255	510	896	17,422	25,457	26.
		27. Contract Construction	0	0	0	0	0	0	0	161	0	0	15	13	0	8	90	33	13	363	18	0	693	254	0	66	0	76	31,411	256	68,517	101,987	27.
		28. Rentals & Finance	393	78	54	9	81	18	8	2,420	147	354	764	90	246	192	293	1,182	433	4,357	1,144	17	220	539	1,788	1,660	2,852	433	2,448	3,778	38,043	64,036	28.
		29. Final Payments	15,080	2,542	4,063	402	2,532	792	496	149,736	30,521	8,101	9,238	3,922	5,087	6,640	16,631	25,806	4,500	53,163	12,849	802	14,048	12,290	31,053	51,465	17,719	16,702	45,692	55,585			29.
		30. Total Gross Outlays	17,866	3,710	4,477	812	2,697	1,096	578	161,353	49,066	10,714	15,271	6,416	5,716	7,677	22,508	32,834	6,277	72,623	17,602	919	16,906	15,859	36,486	66,405	26,406	25,457	101,987	64,036			30.

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)
SAN JUAN SUB-BASIN 1980
Table SJ-1980-a

Industry Producing	Industry Purchasing	1 Range Livestock	2 Dairy	3 Field Crops	4 Fruit	5 Forestry	6 All Other Agriculture	7 Coal	8 Oil and Gas	9 Uranium	10 All Other Mining	11 Food and Kindred Products	12 Lumber and Wood Products	13 Printing and Publishing	14 Stone, Clay and Glass Products	15 All Other Manufacturing	16 Wholesale Trade	17 Service Stations	18 All Other Retail Trade	19 Eating and Drinking Places	20 Agricultural Services	21 Oil Field Services	22 Lodging	23 All Other Services	24 Transportation	25 Electric Energy	26 Other Utilities	27 Contract Construction	28 Rentals and Finance	
Agriculture	1. Range Livestock	.048	.082	.000	.000	.000	.060	.000	.000	.000	.000	.029	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	1.
	2. Dairy	.000	.005	.000	.000	.000	.030	.000	.000	.000	.000	.180	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	2.
	3. Field Crops	.000	.000	.000	.000	.000	.021	.000	.003	.000	.000	.034	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	3.
	4. Fruit	.000	.004	.000	.000	.000	.000	.000	.000	.000	.000	.006	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	4.
	5. Forestry	.000	.000	.000	.000	.000	.000	.000	.000	.000	.065	.000	.297	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	5.
	6. All Other Agriculture	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.023	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	6.
Mining	7. Coal	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	7.
	8. Oil and Gas	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.001	.000	.017	.000	.000	8.
	9. Uranium	.000	.000	.000	.000	.000	.000	.000	.014	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.001	.025	.283	.001	9.
	10. All Other Mining	.000	.000	.000	.000	.000	.000	.241	.000	.000	.000	.000	.000	.000	.000	.000	.120	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	10.
Manufacturing	11. Food and Kindred Products	.000	.000	.000	.000	.000	.000	.000	.000	.000	.089	.000	.000	.000	.000	.000	.052	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.012	.000	11.
	12. Lumber and Wood Products	.004	.000	.000	.000	.000	.028	.000	.000	.000	.000	.014	.000	.000	.000	.000	.031	.000	.000	.000	.000	.000	.000	.025	.003	.001	.000	.000	.000	12.
	13. Printing and Publishing	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.040	.000	.000	13.
	14. Stone, Clay and Glass Products	.002	.000	.001	.000	.000	.006	.000	.000	.000	.000	.008	.001	.007	.001	.001	.002	.024	.044	.007	.019	.001	.008	.004	.002	.003	.003	.001	.006	14.
	15. All Other Manufacturing	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.054	.000	15.
	16. Wholesale Trade	.004	.002	.005	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	16.
Trade	17. Service Stations	.006	.004	.009	.005	.003	.005	.007	.002	.004	.006	.003	.003	.005	.009	.014	.003	.004	.004	.004	.008	.004	.007	.001	.003	.026	.004	.002	.011	17.
Retail	18. All Other Retail Trade	.007	.006	.009	.003	.007	.012	.006	.002	.003	.002	.002	.004	.003	.007	.002	.002	.001	.002	.027	.014	.017	.002	.013	.017	.003	.001	.008	.002	18.
	19. Eating and Drinking Places	.013	.010	.028	.005	.012	.014	.007	.001	.000	.003	.001	.001	.002	.001	.001	.001	.009	.006	.001	.015	.000	.001	.001	.001	.001	.001	.001	.001	19.
	20. Agricultural Services	.001	.000	.000	.006	.008	.050	.025	.002	.002	.002	.003	.005	.006	.007	.003	.002	.003	.004	.017	.008	.002	.006	.004	.003	.003	.003	.016	.003	20.
	21. Oil Field Services	.023	.033	.010	.000	.000	.000	.000	.001	.000	.001	.000	.000	.000	.000	.000	.001	.000	.001	.000	.000	.000	.000	.001	.001	.002	.000	.001	.000	21.
	22. Lodging	.000	.000	.000	.456	.000	.006	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	22.
	23. All Other Services	.020	.000	.020	.000	.000	.000	.000	.023	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	23.
	24. Transportation	.008	.040	.010	.000	.009	.000	.000	.000	.000	.000	.020	.000	.000	.000	.000	.000	.001	.000	.001	.000	.000	.002	.002	.001	.022	.096	.008	.008	24.
	25. Electric Energy	.042	.090	.091	.000	.000	.018	.000	.002	.113	.000	.006	.015	.011	.005	.023	.114	.028	.073	.011	.000	.045	.001	.022	.096	.008	.008	.034	.000	25.
	26. Other Utilities	.005	.013	.004	.004	.000	.009	.009	.004	.004	.026	.009	.017	.008	.011	.009	.008	.033	.017	.015	.034	.005	.024	.011	.002	.134	.004	.002	.007	26.
	27. Contract Construction	.003	.004	.003	.002	.000	.003	.006	.000	.003	.008	.011	.012	.016	.006	.025	.071	.020	.020	.008	.004	.053	.013	.013	.008	.010	.005	.014	.026	27.
	28. Rentals and Finance	.000	.000	.000	.000	.000	.000	.000	.001	.000	.000	.001	.002	.000	.001	.004	.001	.002	.005	.001	.000	.041	.016	.000	.001	.000	.003	.308	.004	27.
		.022	.021	.012	.011	.030	.016	.013	.015	.003	.033	.050	.014	.043	.025	.013	.036	.069	.060	.065	.018	.013	.034	.049	.025	.108	.017	.024	.059	28.

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 OUTPUT
SAN JUAN SUB-BASIN
Table SJ-1980-b

Industry Purchasing \ Industry Producing		1 Range Livestock	2 Dairy	3 Field Crops	4 Fruit	5 Forestry	6 All Other Agriculture	7 Coal	8 Oil and Gas	9 Uranium	10 All Other Mining	11 Food and Kindred Products	12 Lumber and Wood Products	13 Printing and Publishing	14 Stone, Clay and Glass Products	15 All Other Manufac-turing	16 Wholesale Trade	17 Service Stations	18 All Other Retail Trade	19 Eating and Drinking Places	20 Agricul-tural	21 Oil Field Services	22 Lodging	23 All Other Services	24 Transpor-tation	25 Electric Energy	26 Other Utilities	27 Contract Constructi-on	28 Rentals and Finance	
Agriculture	1. Range Livestock	1.050631	.000807	.000153	.000030	.000025	.000102	.000151	.002413	.000000	.000301	.004444	.000017	.003730	.000022	.005170	.007273	.007908	.014263	.001215	.022106	.000060	.000080	.011588	.017002	.008228	.005426	.000402	.029502	1.
	2. Dairy	.086600	1.005149	.000023	.004025	.000030	.000016	.000370	.003731	.000000	.000343	.000680	.000025	.003388	.000031	.005863	.007706	.008699	.012356	.000482	.036824	.000093	.000208	.047160	.105099	.019009	.008458	.000567	.034918	2.
	3. Field Crops	.000071	.000049	1.000024	.000001	.000027	.001002	.000123	.002357	.000000	.000327	.000103	.000018	.002922	.000023	.005624	.009597	.009280	.028503	.000124	.010010	.000059	.000075	.012967	.005568	.006486	.005231	.000422	.017783	3.
	4. Fruit	.000005	.000019	.000004	1.000001	.000033	.000002	.000427	.003795	.000000	.000433	.000106	.000017	.011793	.000020	.007487	.009963	.009273	.010127	.000141	.456001	.000095	.000071	.020387	.003522	.023917	.007919	.000366	.026917	4.
	5. Forestry	.000003	.000010	.000002	.000000	1.000017	.000001	.000021	.000963	.000000	.000198	.000058	.000014	.000910	.000018	.003374	.007213	.012095	.008241	.000128	.000001	.000024	.000055	.003150	.002176	.001078	.001818	.000337	.034083	5.
	6. All Other Agriculture	.066994	.035383	.021994	.000314	.000037	1.000685	.000256	.004022	.000000	.000417	.028809	.000034	.004716	.000044	.007093	.013920	.015619	.052702	.000312	.008942	.000101	.000139	.009829	.031802	.014479	.009608	.000805	.030034	6.
Mining	7. Coal	.000012	.000044	.000008	.000002	.001818	.000006	1.000280	.003810	.000000	.000455	.000245	.006020	.007864	.000025	.007841	.007204	.007271	.025692	.000189	.000003	.000095	.000126	.065305	.005439	.012621	.008811	.000469	.022157	7.
	8. Oil and Gas	.000006	.000023	.000004	.000001	.000050	.000003	.000094	1.015031	.000000	.000192	.000128	.000126	.000334	.000169	.002540	.002728	.001222	.002289	.001140	.000001	.025376	.000083	.004706	.004456	.005243	.000793	.003128	.018086	8.
	9. Uranium	.000011	.000043	.000008	.000002	.000043	.000006	.000128	.003600	1.317523	.000574	.000239	.000019	.002050	.000025	.009942	.009651	.002565	.003353	.000399	.000003	.000090	.000199	.007230	.166901	.007114	.007104	.000455	.011101	9.
	10. All Other Mining	.000009	.000034	.000007	.000001	.071384	.000004	.000590	.004791	.000000	1.098124	.000189	.000020	.000745	.000023	.007407	.003185	.004274	.003211	.001276	.000002	.000120	.000068	.012740	.001764	.033956	.010541	.000418	.046560	10.
Manufacturing	11. Food and Kindred Products	.048282	.184373	.035010	.006829	.000047	.023386	.000301	.005422	.000000	.000340	1.015273	.000085	.009897	.000113	.005407	.004991	.003828	.008477	.000368	.010703	.000136	.000137	.027903	.029000	.016045	.015069	.002089	.066389	11.
	12. Lumber and Wood Products	.000008	.000029	.000006	.000001	.297060	.000004	.000385	.002604	.000000	.000329	.000160	1.000132	.001929	.000175	.004907	.007029	.004958	.007887	.000184	.000002	.000065	.000096	.030480	.019541	.020856	.005067	.003237	.030405	12.
	13. Printing and Publishing	.000006	.000024	.000005	.000001	.000028	.000003	.000192	.004966	.000000	.000342	.000133	.000020	1.007876	.000026	.005873	.003674	.002332	.006462	.000223	.000001	.000124	.000090	.015905	.014127	.010367	.013841	.000477	.049640	13.
	14. Stone, Clay and Glass Products	.000006	.000023	.000004	.000001	.002280	.000003	.000274	.006774	.000000	.034730	.000124	.000077	.001809	1.003111	.009998	.007748	.001373	.007562	.000211	.000001	.000169	.000078	.011014	.008380	.014859	.018011	.001878	.032576	14.
	15. All Other Manufacturing	.000006	.000023	.000004	.000001	.003853	.000003	.000246	.126352	.000000	.058089	.000127	.000261	.001584	.000352	1.015967	.003365	.001893	.003893	.000348	.000001	.003159	.000081	.016549	.030153	.013608	.008024	.006492	.022324	15.
Trade	16. Wholesale Trade	.000019	.000071	.000014	.000003	.000054	.000009	.000207	.009449	.000000	.000426	.000393	.000087	.003009	.000117	.006905	1.004767	.003063	.002900	.001466	.000004	.000236	.001208	.023428	.128328	.010784	.028576	.002155	.045866	16.
Retail	17. Service Stations	.000016	.000060	.000011	.000002	.000074	.000008	.000743	.023349	.000000	.000405	.000331	.000161	.025562	.000212	.006073	.002881	1.000840	.004266	.000487	.000003	.000584	.000183	.054449	.034780	.040521	.075047	.003906	.085362	17.
Retail	18. All Other Retail Trade	.000021	.000080	.000015	.000003	.000131	.000010	.000416	.008501	.000000	.000535	.000438	.000324	.045592	.000435	.007266	.004542	.002544	1.005319	.001480	.000005	.000213	.001215	.042762	.084409	.021981	.024263	.008036	.074636	18.
Retail	19. Eating and Drinking Places	.003728	.014235	.002703	.000527	.000068	.001806	.000378	.008792	.000000	.000596	.078386	.000100	.009449	.000132	.009803	.028470	.001792	.018458	1.000401	.000826	.000220	.000179	.028288	.020934	.020587	.024571	.002435	.081806	19.
Services	20. Agricultural Services	.000005	.000018	.000003	.000001	.000024	.000002	.000709	.004653	.000000	.000277	.000099	.000019	.020180	.000020	.004760	.014634	.009198	.008584	.000148	1.000001	.000116	.000073	.017385	.004112	.040701	.010580	.000366	.027900	20.
	21. Oil Field Services	.000018	.000070	.000013	.000003	.000804	.000009	.000152	.009577	.000000	.001447	.000386	.002389	.001826	.003233	.009646	.019043	.005027	.003562	.002245	.000004	1.000239	.002130	.025738	.056042	.007409	.007008	.059699	.021296	21.
	22. Lodging	.001225	.004678	.000888	.000173	.000316	.000593	.000568	.017255	.000000	.000491	.025760	.000958	.009498	.001293	.002317	.003532	.001426	.007435	.001301	.000272	.000431	1.002127	.056918	.006190	.030082	.056362	.023869	.047581	22.
	23. All Other Services	.000159	.000607	.000115	.000022	.000026	.000077	.001268	.005386	.000000	.000256	.003344	.000031	.004965	.000031	.004329	.014136	.001580	.004656	.001298	.000035	.000135	.001134	1.026982	.027788	.014172	.015575	.000574	.057824	23.
	24. Transportation	.000070	.000265	.000050	.000010	.000139	.000034	.000106	.009942	.000000	.001736	.001461	.000090	.003317	.000121	.029830	.019588	.016839	.003949	.002409	.000015	.000249	.001199	.025949	1.111388	.004707	.017632	.002226	.035123	24.
Utilities	25. Electric Energy	.000013	.000049	.000009	.000002	.000071	.000006	.019692	.033599	.000000	.000356	.000272	.000160	.004848	.000056	.005966	.004560	.000563	.004722	.000516	.000003	.000840	.000185	.024908	.012322	1.156901	.012268	.001040	.136369	25.
Utilities	26. Other Utilities	.000009	.000034	.000006	.000001	.000083	.000004	.000125	.290870	.000000	.000269	.000185	.000219	.003545	.000296	.003282	.002242	.001565	.003982	.001434	.000002	.007272	.000069	.010976	.011300	.006713	1.011222	.005460	.025586	26.
	27. Contract Construction	.000016	.000061	.000012	.000002	.018664	.000008	.000205	.007733	.000000	.022828	.000334	.057847	.003567	.078327	.019501	.014659	.003005	.025060	.000418	.000004	.000193	.000212	.059654	.062011	.008555	.012585	1.446154	.050181	27.
	28. Rentals and Finance	.000070	.000266	.000050	.000010	.000100	.000034	.000193	.005458	.000000	.000366	.001462	.000255	.006909	.000344	.004740	.002826	.001198	.003684	.003267	.000015	.000136	.001109	.030657	.002222	.009524	.016131	.006353	1.067186	28.

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
SAN JUAN SUB-BASIN 1980
Table SJ-1980-c

Industry Producing		Industry Purchasing	1 Range Livestock	2 Dairy	3 Field Crops	4 Fruit	5 Forestry	6 All Other Agriculture	7 Coal	8 Oil & Gas	9 Uranium	10 All Other Mining	11 Food & Kindred Products	12 Lumber & Wood Products	13 Printing & Publishing	14 Stone, Clay & Glass Products	15 All Other Manufacturing	16 Wholesale Trade	17 Service Stations	18 All Other Retail	19 Eating & Drinking Places	20 Agricultural Services	21 Oil Field Services	22 Lodging	23 All Other Services (Except Professional)	24 Transportation	25 Electric Energy	26 Other Utilities	27 Contract Construction	28 Rentals & Finance	29 Final Demand	30 Total Gross Output	
Agriculture		1. Range Livestock	1,185	731	0	0	0	112	0	0	0	0	513	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	23,799	26,341	1.
		2. Dairy	0	53	0	0	0	57	0	0	0	0	5,674	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,129	8,913	2.
		3. Field Crops	0	0	0	0	0	40	0	0	0	0	540	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4,441	5,022	3.
		4. Fruit	0	45	0	0	0	0	0	0	0	0	351	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	804	1,200	4.
		5. Forestry	0	0	0	0	0	0	0	0	0	878	0	1,984	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	110	2,971	5.
		6. All Other Agriculture	0	0	10	0	0	0	0	0	0	0	811	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,015	1,836	6.
Mining		7. Coal	0	0	0	0	0	0	0	0	0	0	54	0	0	0	0	0	0	0	0	0	0	0	1,146	0	0	0	0	161	1,361	7.
		8. Oil & Gas	0	0	0	0	0	0	0	1,811	0	0	0	0	0	0	4,374	0	0	0	0	0	54	0	0	294	969	18,169	215	0	125,000	150,886	8.
		9. Uranium	0	0	0	0	0	0	0	0	13,266	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40,980	54,206	9.
		10. All Other Mining	0	0	0	0	0	0	0	0	0	1,420	0	0	0	533	1,870	0	0	0	0	0	0	0	0	0	0	0	0	2,792	0	9,342	15,957	10.
Manufacturing		11. Food & Kindred Products	105	0	0	0	0	53	0	0	0	0	486	0	0	0	0	0	0	0	4,838	0	0	1,309	433	98	0	0	0	0	228	19,468	27,019	11.
		12. Lumber & Wood Products	0	0	0	0	0	0	10	0	54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5,799	0	817	6,679	12.
		13. Printing & Publishing	53	18	5	4	0	4	10	151	54	0	216	7	117	34	35	256	439	8,607	329	32	14	403	578	196	132	172	215	1,370	1,161	14,609	13.
		14. Stone, Clay & Glass Products	0	0	0	0	0	0	0	0	0	0	0	0	0	69	0	0	0	191	0	0	0	0	0	0	0	0	12,671	0	4,268	17,199	14.
		15. All Other Manufacturing	132	27	30	7	12	11	11	453	271	112	108	27	88	189	564	426	63	956	470	8	82	50	578	2,642	264	115	2,792	913	23,881	35,282	15.
Trade	Retail	16. Wholesale Trade	184	45	50	5	24	24	10	453	325	48	54	27	73	120	106	170	16	574	1,409	24	245	151	2,022	1,762	176	115	1,718	457	74,810	85,196	16.
		17. Service Stations	211	53	50	7	39	26	11	302	54	48	27	7	29	34	35	170	0	383	47	14	68	50	289	1,664	44	57	215	228	11,509	15,672	17.
		18. All Other Retail	369	98	146	8	27	94	35	302	163	32	81	40	102	138	106	170	47	765	1,080	14	27	352	578	391	132	172	3,866	685	181,270	191,291	18.
		19. Eating & Drinking Places	26	0	0	0	0	0	0	302	0	16	27	0	15	17	35	85	16	191	0	0	27	50	144	196	44	115	215	685	44,766	46,973	19.
Services		20. Agricultural Services	632	330	50	583	0	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,608	20.
		21. Oil Field Services	0	0	0	0	0	0	0	3,621	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10,000	13,621	21.
		22. Lodging	26	0	0	0	0	0	0	151	0	0	27	7	0	17	35	85	0	191	0	0	27	50	144	196	44	57	215	228	48,843	50,345	22.
		23. All Other Services (Except Professional)	316	365	55	14	6	6	86	604	163	160	459	194	219	327	459	1,704	768	7,268	1,080	24	259	2,668	3,466	2,153	749	460	7,946	6,622	105,828	144,426	23.
		24. Transportation	342	811	10	0	0	35	0	453	6,180	0	216	107	175	103	953	9,966	486	15,492	752	0	599	50	3,177	9,493	441	575	7,732	0	39,720	97,868	24.
Utilities		25. Electric Energy	158	134	25	6	0	20	20	604	325	447	297	127	131	224	423	767	533	3,634	752	55	68	1,208	1,589	196	5,905	230	430	1,598	24,163	44,068	25.
		26. Other Utilities	79	36	15	4	0	9	8	151	163	128	324	33	175	292	212	2,130	1,144	4,016	939	13	41	2,769	1,877	1,272	308	575	1,074	3,425	36,295	57,508	26.
		27. Contract Construction	0	0	0	0	0	0	1	151	0	0	27	27	0	34	176	170	31	1,339	47	0	477	906	144	98	0	230	74,095	913	135,906	214,774	27.
		28. Rentals & Finance	632	205	70	17	98	33	20	2,716	217	558	1,378	107	628	464	564	3,237	1,113	11,858	3,476	32	218	1,812	7,221	2,642	4,980	1,035	5,584	13,928	163,499	228,344	28.
		29. Final Payments	21,891	5,962	4,506	545	2,765	1,299	1,139	138,661	32,971	12,110	15,349	3,985	12,857	14,604	25,335	65,860	11,016	135,826	31,754	1,392	11,415	38,517	122,186	74,575	28,734	35,431	87,200	197,064			29.
		30. Total Gross Outlays	26,341	8,913	5,022	1,200	2,971	1,836	1,361	150,886	54,206	15,957	27,019	6,679	14,609	17,199	35,282	85,196	15,672	191,291	46,973	1,608	13,621	50,345	144,426	97,868	44,068	57,508	214,774	228,344			30.

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)
SAN JUAN SUB-BASIN 2010
Table SJ-2010-a

	Industry Producing \ Industry Purchasing	1 Range Livestock	2 Dairy	3 Field Crops	4 Fruit	5 Forestry	6 All Other Agriculture	7 Coal	8 Oil and Gas	9 Uranium	10 All Other Mining	11 Food and Kindred Products	12 Lumber and Wood Products	13 Printing and Publishing	14 Stone, Clay and Glass Products	15 All Other Manufac-turing	16 Wholesale Trade	17 Service Stations	18 All Other Retail Trade	19 Eating and Drinking Places	20 Agricul-tural Services	21 Oil Field Services	22 Lodging	23 All Other Services	24 Transpor-tation	25 Electric Energy	26 Other Utilities	27 Contract Construction	28 Rentals and Finance	
Agriculture	1. Range Livestock	.045	.082	.000	.000	.000	.061	.000	.000	.000	.000	.019	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	1.
	2. Dairy	.000	.006	.000	.000	.000	.031	.000	.000	.000	.000	.210	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	2.
	3. Field Crops	.000	.000	.000	.000	.000	.022	.000	.000	.000	.000	.020	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	3.
	4. Fruit	.000	.005	.000	.000	.000	.000	.000	.000	.000	.000	.013	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	4.
	5. Forestry	.000	.000	.000	.000	.000	.000	.000	.000	.000	.055	.000	.297	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	5.
	6. All Other Agriculture	.000	.000	.002	.000	.000	.000	.000	.000	.000	.000	.030	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	6.
Mining	7. Coal	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.002	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.026	.000	.000	.000	.000	7.
	8. Oil and Gas	.000	.000	.000	.000	.000	.000	.000	.012	.000	.000	.000	.000	.000	.000	.124	.000	.000	.000	.000	.000	.004	.000	.000	.003	.022	.316	.001	.000	8.
	9. Uranium	.000	.000	.000	.000	.000	.000	.000	.000	.224	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	9.
	10. All Other Mining	.000	.000	.000	.000	.000	.000	.000	.000	.000	.089	.000	.000	.000	.000	.031	.053	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.013	.000	10.
Manufacturing	11. Food and Kindred Products	.004	.000	.000	.000	.000	.029	.000	.000	.000	.000	.018	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.026	.003	.001	.000	.000	.000	.001	11.
	12. Lumber and Wood Products	.000	.000	.000	.000	.000	.000	.007	.000	.001	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.027	.000	12.
	13. Printing and Publishing	.002	.002	.001	.003	.000	.002	.007	.001	.001	.000	.008	.001	.008	.002	.001	.003	.028	.045	.007	.020	.001	.008	.004	.002	.003	.003	.001	.006	13.
	14. Stone, Clay and Glass Products	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.004	.000	.000	.000	.001	.000	.000	.000	.000	.000	.000	.000	.000	.059	.000	14.
	15. All Other Manufacturing	.005	.003	.006	.006	.004	.006	.008	.003	.005	.007	.004	.004	.006	.011	.016	.005	.004	.005	.010	.005	.006	.001	.004	.027	.006	.002	.013	.004	15.
Trade	16. Wholesale Trade	.007	.005	.010	.004	.008	.013	.007	.003	.006	.003	.002	.004	.005	.007	.003	.002	.001	.003	.030	.015	.018	.003	.014	.018	.004	.002	.008	.002	16.
Retail	17. Service Stations	.008	.006	.010	.006	.013	.014	.008	.002	.001	.003	.001	.001	.002	.002	.001	.002	.000	.002	.001	.009	.005	.001	.002	.017	.001	.001	.001	.001	17.
	18. All Other Retail Trade	.014	.011	.029	.007	.009	.051	.026	.002	.003	.002	.003	.006	.007	.008	.003	.002	.003	.004	.023	.009	.002	.007	.004	.004	.003	.003	.018	.003	18.
	19. Eating and Drinking Places	.001	.000	.000	.000	.000	.000	.000	.002	.000	.001	.001	.000	.001	.001	.001	.001	.001	.001	.000	.000	.002	.001	.001	.002	.001	.002	.001	.003	19.
Services	20. Agricultural Services	.024	.037	.010	.486	.000	.007	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	20.
	21. Oil Field Services	.000	.000	.000	.000	.000	.000	.000	.024	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	21.
	22. Lodging	.001	.000	.000	.000	.000	.000	.000	.001	.000	.000	.001	.001	.000	.000	.001	.001	.000	.001	.000	.000	.002	.001	.001	.002	.001	.001	.001	.001	22.
	23. All Other Services	.012	.041	.011	.012	.002	.003	.061	.004	.003	.010	.017	.029	.015	.019	.013	.020	.049	.038	.023	.015	.019	.053	.024	.022	.017	.008	.037	.029	23.
	24. Transportation	.013	.091	.002	.003	.000	.019	.000	.003	.114	.000	.008	.016	.012	.006	.027	.117	.031	.081	.016	.000	.044	.001	.022	.097	.010	.010	.036	.000	24.
Utilities	25. Electric Energy	.006	.015	.005	.005	.000	.011	.015	.004	.006	.028	.011	.019	.009	.013	.012	.009	.034	.019	.016	.034	.005	.024	.011	.002	.134	.004	.002	.007	25.
	26. Other Utilities	.003	.004	.003	.003	.000	.005	.006	.001	.003	.008	.012	.005	.012	.017	.006	.025	.073	.021	.020	.008	.003	.055	.013	.013	.007	.010	.005	.015	26.
	27. Contract Construction	.000	.000	.000	.000	.000	.000	.001	.001	.000	.000	.001	.004	.000	.002	.005	.002	.002	.007	.001	.000	.035	.018	.001	.001	.000	.004	.345	.004	27.
	28. Rentals and Finance	.024	.023	.014	.014	.033	.018	.015	.018	.004	.035	.051	.016	.043	.027	.016	.038	.071	.062	.074	.020	.016	.036	.050	.027	.113	.018	.026	.061	28.

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
SAN JUAN SUB-BASIN 2010
Table SJ-2010-b

Industry Purchasing		1 Range Livestock	2 Dairy	3 Field Crops	4 Fruit	5 Forestry	6 All Other Agri-culture	7 Coal	8 Oil and Gas	9 Uranium	10 All Other Mining	11 Food and Kindred Products	12 Lumber and Wood Products	13 Printing and Publishing	14 Stone, Clay and Glass Products	15 All Other Manufac-turing	16 Wholesale Trade	17 Service Stations	18 All Other Retail Trade	19 Eating and Drinking Places	20 Agricul-tural Services	21 Oil Field Services	22 Lodging	23 All Other Services	24 Transpor-tation	25 Electric Energy	26 Other Utilities	27 Contract Construc-tion	28 Rentals and Finance	
Agriculture	1. Range Livestock	1.047302	.000963	.000094	.000064	.000027	.000136	.000266	.002972	.000000	.000388	.004539	.000018	.004024	.000052	.006486	.008588	.009098	.015428	.001278	.025204	.000071	.001190	.016546	.018914	.009877	.005878	.000610	.032898	1.
	2. Dairy	.086411	1.006190	.000015	.005040	.000032	.000022	.000571	.004580	.000000	.000446	.000724	.000026	.004747	.000062	.007432	.009254	.009209	.013743	.000563	.041753	.000110	.000458	.049569	.107296	.021922	.008854	.000820	.038917	2.
	3. Field Crops	.000139	.000095	1.000047	.000002	.000028	.002005	.000207	.002838	.000000	.000411	.000155	.000019	.003141	.000068	.006863	.010782	.010415	.029631	.000179	.010023	.000068	.000115	.014514	.007475	.007931	.005555	.000640	.020780	3.
	4. Fruit	.000006	.000029	.000003	1.000002	.000037	.000004	.000692	.004862	.000000	.000556	.000139	.000021	.014140	.000047	.009390	.012093	.010671	.011972	.000247	.486002	.000117	.000141	.023097	.004495	.026621	.009616	.000591	.033082	4.
	5. Forestry	.000003	.000016	.000002	.000001	1.000018	.000002	.000034	.001275	.000000	.000269	.000075	.000013	.001089	.000037	.004488	.008289	.013143	.009285	.000169	.000001	.000031	.000075	.004580	.002686	.001283	.002108	.000460	.037799	5.
	6. All Other Agriculture	.067756	.037554	.022621	.000578	.000039	1.000945	.000516	.004803	.000000	.000523	.029996	.000035	.006091	.000122	.008642	.015383	.015987	.054049	.000431	.010529	.000115	.000325	.012178	.034546	.017546	.010072	.001150	.034016	6.
Mining	7. Coal	.000011	.000058	.000006	.000004	.002130	.000008	1.000518	.004573	.000000	.000574	.000276	.007067	.009106	.000165	.009197	.008496	.008453	.026844	.000273	.000004	.000110	.000196	.068190	.006433	.019915	.009234	.002329	.026123	7.
	8. Oil and Gas	.000012	.000065	.000006	.000004	.000040	.000009	.000142	1.013526	.000000	.000265	.000307	.000085	.001460	.000187	.003674	.003875	.002320	.002382	.002188	.000005	.024325	.001124	.006143	.005887	.005451	.002120	.003121	.021996	8.
	9. Uranium	.000011	.000059	.000006	.000004	.000437	.000008	.000274	.004628	1.322751	.000692	.000277	.001342	.002265	.000042	.011719	.011353	.004336	.004947	.000464	.000004	.000111	.000417	.009547	.169956	.010516	.007523	.000631	.014104	9.
	10. All Other Mining	.000010	.000052	.000005	.000003	.060408	.000007	.000953	.005347	.000000	1.098212	.000243	.000021	.000822	.000036	.008734	.004411	.004291	.003244	.001358	.000004	.000128	.000139	.014343	.002234	.036639	.010717	.000545	.049667	10.
Manufacturing	11. Food and Kindred Products	.040828	.216406	.021070	.014339	.000051	.030636	.002565	.006871	.000000	.000466	1.019801	.000084	.010568	.000154	.007312	.005909	.004399	.009360	.001488	.016381	.000165	.001307	.032889	.035608	.020189	.016860	.002448	.070959	11.
	12. Lumber and Wood Products	.000009	.000047	.000005	.000003	.297082	.000007	.000610	.003797	.000000	.000489	.000219	1.000185	.002127	.000405	.006537	.007578	.005428	.009360	.000267	.000004	.000091	.001178	.033624	.021414	.023453	.007449	.006685	.034777	12.
	13. Printing and Publishing	.000011	.000056	.000005	.000004	.000029	.000008	.000306	.005718	.000000	.000423	.000264	.000019	1.009015	.000045	.007098	.005894	.002456	.007566	.001288	.000004	.000037	.000155	.018447	.015966	.011736	.014120	.000632	.050652	13.
	14. Stone, Clay and Glass Products	.000011	.000060	.000006	.000004	.001953	.000009	.000458	.008197	.000000	.034945	.000285	.000104	.003008	1.004246	.012358	.008037	.002511	.008727	.001304	.000005	.000197	.001164	.022835	.010180	.017596	.019443	.003735	.036124	14.
	15. All Other Manufacturing	.000013	.000067	.000007	.000004	.003336	.000009	.000458	.131087	.000000	.059396	.000316	.000234	.001847	.000511	1.018544	.004860	.002211	.004103	.001572	.000005	.003146	.001314	.017613	.033248	.017579	.008565	.008550	.027602	15.
Trade (Retail)	16. Wholesale Trade	.000019	.000099	.000010	.000007	.000066	.000014	.000318	.011118	.000000	.000609	.000468	.000110	.004160	.000239	.009359	1.005161	.004466	.003157	.001565	.000008	.000267	.001417	.026398	.132364	.012208	.028966	.003984	.049383	16.
	17. Service Stations	.000020	.000104	.000010	.000007	.000063	.000015	.001092	.026645	.000000	.000453	.000492	.000127	.029743	.000266	.006541	.003372	1.001140	.004475	.001704	.000008	.000639	.000391	.056387	.038840	.041951	.077429	.004420	.089126	17.
	18. All Other Retail Trade	.000021	.000112	.000011	.000007	.000137	.000016	.000643	.010243	.000000	.000749	.000529	.000323	.046825	.001707	.008982	.006152	.004002	1.005672	.001656	.000008	.000246	.001411	.046144	.094299	.024679	.025847	.011779	.078727	18.
	19. Eating and Drinking Places	.004216	.022347	.002176	.001481	.000069	.003164	.000812	.010469	.000000	.000790	.105308	.000088	.010258	.000205	.012714	.032097	.002260	.024955	1.000671	.001692	.000251	.000430	.032924	.029555	.023113	.025839	.003037	.095427	19.
Services	20. Agricultural Services	.000005	.000027	.000003	.000002	.000026	.000004	.001064	.005127	.000000	.000359	.000125	.000022	.021363	.000042	.006023	.015832	.009324	.009666	.000257	1.000002	.000123	.000149	.018906	.004789	.040927	.010770	.000537	.030822	20.
	21. Oil Field Services	.000019	.000099	.000010	.000007	.000511	.000014	.000197	.007524	.000000	.001395	.000465	.001460	.001933	.003205	.008854	.020106	.006184	.003659	.002348	.000007	1.000181	.002276	.025054	.055219	.007528	.006169	.054041	.024883	21.
	22. Lodging	.001079	.005717	.000557	.000379	.000265	.000809	.000844	.019837	.000000	.000625	.026940	.000776	.009679	.001699	.002745	.004890	.001617	.008679	.001504	.000433	.000476	1.001312	.059840	.007358	.030401	.058662	.028533	.051028	22
	23. All Other Services	.000137	.000724	.000070	.000048	.000039	.000102	.000380	.006171	.000000	.000361	.003411	.000064	.005062	.000140	.005557	.015312	.002720	.004741	.001364	.000055	.000148	.001214	1.028509	.028382	.014361	.015834	.002282	.059654	23.
	24. Transportation	.000064	.000338	.000033	.000022	.000124	.000048	.000138	.013232	.000000	.001861	.001592	.000072	.003606	.000160	.031259	.020936	.019189	.005167	.002529	.000026	.000318	.002396	.028979	1.113465	.005168	.018163	.002618	.038670	24.
Utilities	25. Electric Energy	.000019	.000100	.000010	.000007	.000102	.000014	.030997	.030695	.000000	.000528	.000471	.000247	.005141	.000085	.008691	.006081	.001989	.005142	.001766	.000008	.000737	.001428	.027786	.015516	1.157544	.011809	.001340	.143943	25.
	26. Other Utilities	.000017	.000089	.000009	.000006	.000079	.000013	.000185	.324375	.000000	.000349	.000419	.000202	.003980	.000446	.003917	.003865	.002052	.004209	.002852	.000007	.007785	.001451	.012019	.014522	.007090	1.011895	.007449	.029045	26.
	27. Contract Construction	.000025	.000131	.000013	.000009	.013705	.000019	.000253	.009562	.000000	.026318	.000617	.041273	.004175	.090576	.024465	.015925	.003566	.029816	.002165	.000010	.000229	.002032	.067116	.069921	.009694	.014118	1.528549	.058085	27.
	28. Rentals and Finance	.000063	.000334	.000033	.000022	.000077	.000047	.000254	.006383	.000000	.000396	.001576	.000187	.006976	.000409	.004894	.002984	.001274	.003768	.003336	.000025	.000153	.001164	.033110	.002530	.009654	.017318	.006845	1.069917	28.

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
SAN JUAN SUB-BASIN 2010
Table SJ-2010-c

Table SJ-P-1

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

Industry Sectors	1960 Final Demand	1980 Final Demand	1960 - 1980 % Change	2010 Final Demand	1960 - 2010 % Change
Range Livestock	$13,793	$16,196	17.4%	$23,799	72.5%
Dairy	558	910	63.1	3,129	460.8
Field Crops	3,154	3,935	24.8	4,441	40.8
Fruit	567	706	24.5	804	41.8
Forestry	60	95	58.3	110	83.3
Other Agriculture	582	740	27.1	1,015	74.4
Coal	74	93	25.7	161	117.6
Oil & Gas	164,901	148,261	--10.1	125,000	- 24.2
Uranium	41,100	37,241	- 9.4	40,980	- .3
Other Mining	5,652	7,128	26.1	9,342	65.3
Food & Kindred Products	7,207	12,963	79.9	19,468	170.1
Lumber & Wood Products	3,494	2,333	- 33.2	817	- 76.6
Printing & Publishing	434	802	84.8	1,161	167.5
Stone, Clay & Glass Products	1,214	2,147	76.7	4,268	251.6
Other Manufacturing	12,042	17,261	43.3	23,881	98.3
Wholesale Trade	17,522	28,196	60.9	74,810	326.9
Service Stations	1,881	4,338	130.6	11,509	511.9
Other Retail Trade	27,673	68,322	146.9	181,270	555.0
Eating & Drinking Places	7,825	16,870	115.6	44,766	472.1
Agricultural Services	- 0 -	- 0 -	- 0 -	- 0 -	- 0 -
Oil Field Services	35,399	12,872	- 63.6	10,000	- 71.8
Lodging	5,981	15,521	159.5	48,843	716.6
Other Services	6,934	21,433	209.1	105,828	1,426.2
Transportation	38,506	37,865	- 1.7	39,720	3.2
Electric Energy	2,540	17,242	578.8	24,163	851.3
Other Utilities	9,325	17,422	86.8	36,295	289.2
Contract Construction	33,089	68,517	107.1	135,906	310.7
Rentals & Finance	13,142	38,043	189.5	163,499	1,144.1

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

involves a considerable degree of error. Projecting for smaller geographical areas for periods as long as 50 years produces results which at best may be regarded as general orders of magnitude. The task is undertaken here in the belief that the level of aggregation and the approach from the "supply" side will produce results useful to those concerned with water management.

The projections are made under the institutional water quantity restraints of the Colorado River Basin Compacts. The water quality constraints are those existing in the base year.

Cropland Projections

A consistent downward trend in cropland harvested that has occurred since the early 1940's will be reversed upon the development of the first land scheduled to be brought into production under the Navajo Reclamation Project in 1969. Other Federal reclamation projects not delivering water in 1960, but which will be fully developed in 1980 are the Florida Project in Colorado and Hammond Project in New Mexico. The Hammond Project is located on the southside of the San Juan River in northeastern San Juan County, New Mexico. The project will provide water for irrigating 3,900 acres of land previously not irrigated. The Florida Project will provide irrigation water for 5,730 acres of nonirrigated land and supplemental water for 13,720 acres of land which was inadequately irrigated in 1960.

Two other projects, the Animas-La Plata and the Dolores, were assumed approved and completed by 2010, but their effects were not included in the 1980 projections. The Animas-La Plata proposed project is in San Juan, La Plata and Montezuma Counties in Colorado and San Juan County in New Mexico. Approximately 60,000 acres of land not irrigated in 1960 would

receive irrigation water and 45,000 acres would receive supplemental water. The proposed Dolores Project would irrigate 32,000 acres of new land and furnish supplemental water to 28,000 acres.

The distribution system of the Navajo Project will be nearing completion by 1980. However, only about 35 percent of the project land will be fully developed by 1980, considering a ten-year development period. An estimated 75,000 acres of new land will be receiving water, but only about 30,000 acres would be fully developed. The project land will be fully developed by 2010. Both the Animas-LaPlata and the Dolores projects were assumed fully developed by 2010. The project development described will bring under irrigation some lands which were dry farmed in 1960.

Although reclamation projects will be bringing new land into production in sufficient volume to reverse the overall downward trend in cropland harvested, some land farmed in 1960 will have shifted to other uses by the projection target dates. The net effect, however, will be a considerable increase in cropland harvested (Table P-2).

Table P-2.--Cropland Acreage, Irrigated and Dry, 1960 with Projections for 1980 and 2010, San Juan Sub-Basin

Item	1960	Projected 1980	Projected 2010
		Acres	
Irrigated land in farms	192,300	280,000	399,000
Irrigated cropland harvested	101,700	164,000	251,000
Other irrigated	90,600	116,000	148,000
Dry cropland harvested	106,900	100,000	80,000
Total cropland harvested	208,600	264,000	479,000
Acreage in conservation reserve or similar land retirement program	50,000	38,000	0

Projected Crop Yields

Projected yields for irrigated crops are based on estimates made by the USDA Field Party during the Reappraisal of Direct Agricultural Benefits for Participating Projects in the Upper Colorado River Storage Project. Projected yields for dryland crops follow closely the work by Poli[12] with yields obtained in 1960 as a base.

The work previously done in the Upper Colorado River Basin was valuable in regard to two specific problems. Projections were provided for situations where an inadequate water supply existed, and also provided estimates on what yields may be expected with an adequate water supply (Table P-3)

Table P-3.--Projected Crop Yields without and with Project Development, Selected Projects, Upper Colorado River Basin

Crop	Unit	Florida Project	Hammond Project	Emery County Project
Without Project Development				
Alfalfa hay	Tons	2.2	---	2.7
Rotation pasture	AUM	4.4	---	5.4
Corn silage	Tons	9.0	---	10.9
Small grains	Bushels	45.0	---	44.6
Permanent pasture	AUM	2.0	---	2.0
With Project Development				
Alfalfa hay	Tons	3.2	4.1	3.6
Rotation pasture	AUM	6.4	7.8	7.2
Corn silage	Tons	11.7	14.9	14.8
Corn grain	Bushels	---	67.0	---
Small grain	Bushels	51.0	47.0	55.0
Dry beans	Cwt.	---	14.9	---
Apples	Bushels	---	350.0	---
Permanent pasture	AUM	2.0	---	2.0

These estimates are available for two project areas[13] within the sub-basin and a third project[14] on the periphery of the sub-basin which was considered fairly representative of irrigated land in the Utah portion of the sub-basin.

Estimates of gross product for target dates were made using weighted averages of the projected yields and using value judgments to adjust to local conditions. The re-evaluation projections were adjusted upward for the 2010 projections.

Projected Prices

Prices were held constant throughout the projection period at the level existing in the base year.

Projected Value of Production for Agricultural and Forestry Sectors, 1980 and 2010

Range Livestock New agricultural land brought into production is expected to have a similar pattern of use as land presently cultivated in the sub-basin. Expanded irrigated acreages in the sub-basin will be producing primarily feed for livestock. Grazing on public lands will probably remain near the 1960 level or contract slightly. Increased livestock numbers will depend on forage grown by the farm enterprise. Although crop yields will increase, more private land per dollar of output will be required in the projected period than in the base year.

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[13] Florida Project, Colorado and Hammond Project, New Mexico.

[14] Emery County Project, Utah.

Appraisal was made for a 50-year period with projected yields to be obtained in approximately 25 years.

It is anticipated that the decreasing trend in sheep and lamb numbers in the sub-basin will be leveled somewhat by the development of the Navajo Project. Cattle will, however, continue to be the primary enterprise of the sector. Projected gross values of production are presented in Table P-4.

Table P-4.--Estimates of Gross Value of Production for Agricultural and Forestry Sectors, 1960 and Projections for 1980 and 2010, San Juan Sub-Basin

Sector	1960	1980	2010
		1000 dollars	
1. Range livestock	15,142	17,866	26,341
2. Dairy	1,676	3,710	8,913
3. Field crops	3,515	4,447	5,022
4. Fruit	641	812	1,200
5. Other agriculture	843	1,096	1,836
6. Agricultural services	737	919	1,608
7. Forestry	1,955	2,697	2,971

Home consumption of range livestock products will increase in absolute numbers, but the proportion going to households will be reduced. Project development on Indian reservations will result in fewer families living on a subsistance level. Percentage of product going to export will be increased by corresponding reduction in home use. Otherwise, little change in marketing patterns are projected.

Dairy. With the projected increase in irrigated acreage, dairy production will expand considerably. It is likely that all milk production by 1980 will be produced under grade-A conditions although the percent going as manufactured milk may increase slightly. Net effect will be some reduction in the proportion of production being exported from the sub-basin throughout the projection period.

Field Crops. Approximately the same marketing patterns that existed in the base year will extend through the projection period. Land in government programs such as conservation reserve will be reduced by 1980 and nearly eliminated by 2010.

The projected increase in gross value for field crops is derived mostly from yield increases. A slight increase in acreage however is projected for dry beans and potatoes.

Fruit. Although little increase in acreage is projected, improved water supply and technology is expected to increase the gross product of the fruit sector to a million dollar enterprise by 2010. Little change in market pattern is projected.

Other Agriculture. Enterprise in this sector will continue as relatively unimportant factors in the economy of the sub-basin. Some increase in poultry products is projected.

Agricultural services. Growth of this sector is dependent on the expansion of the other agricultural sectors.

Forestry. National forest lands are managed according to the concept of sustained yields. Cutting of timber is based on what is termed "annual allowable cut." This is the volume of timber which may be harvested annualy without depleting the available resource.

The annual allowable cut is based upon specified management plans. These management plans are usually for ten-year periods. As technology changes, roads into primative areas are developed, the estimate of annual allowable cut is subject to change. At present a given volume of timber stands on slopes too steep to be harvested under general logging procedures, or are loggable only under modified cutting procedures. New methods may

make such areas loggable in the future. In such an instance, the estimate of annual allowable cut would be increased.

Annual allowable cut for forest areas in the sub-basin in 1960 was approximately 93,100 MBF.* Only 69,400 MBF were cut. Historically, the area has not harvested the maximum permissable. Data available for the San Juan National Forest for the five-year period 1957-1961 portrays this fact.

Year	Annual Allowable Cut MBF	Actual Cut MBF
1957	50,000	53,692
1958	50,000	26,460
1959	50,000	49,747
1960	50,000	43,595
1961	50,000	33,859
Total	250,000	207,353

Unpublished data in forest office, San Juan National Forest, Durango, Colorado.

During this five-year period, the total actual cut was 83 percent of the allowable cut as indicated in the tabulation. Actual cut fell short due to a lack of demand for lumber under poor market conditions.

The Forest Service has projected an increase in the annual allowable cut for the Rocky Mountain region of 108 percent of the 1962 level for 1980 and 117 percent of the 1962 level for the year 2000.[15] It is assumed that development in the San Juan Sub-Basin will follow this general trend.

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*The initials "MBF" abbreviate the term "millions of board feet."

[15] U.S. Department of Agriculture, Timber Trends in the United States, Forest Resources Report No. 17, Feb. 1965, (GPO Washington, D.C.).

It has been estimated that at present levels of appropriations, no more than 70 percent of the planned national forest road system will be completed by the year 2000.[16]

Table P-5 presents projections for forest products for the San Juan Sub-Basin for the years 1980 and 2010.

Table P-5.--Allowable Annual Cut, Percent of Annual Allowable Cut Harvested and Gross Value of Forest Products for Base Year 1960 and Projected for 1980 and 2010, San Juan Sub-Basin

Item	Unit	Base Year 1960	1980	2010
Annual allowable cut	MBF	93,100	100,500	108,900
Percent of allowable cut harvested	Percent	75	90	100
Gross value of forest products	1,000 dollars	1,955	2,548	3,068

In 1960 only a small portion of the gross value of forest products harvested within the sub-basin entered final demand. Over 95 percent of the value was represented by sawtimber which was manufactured into lumber within the sub-basin or became inputs of other industries within the sub-basin. Any significant change in this pattern of marketing cannot be foreseen at this time.

Water Requirements for Projected Crop Acreage

In estimating water requirements for the target dates 1980 and 2010 an increased conveyance efficiency of 15 percent over the projection period was assumed. The water diversion requirement for 1980 was estimated by taking

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[16] Ibid.

the requirement for the base year, 1960 and adjusting for increased conveyance efficiency expected to be obtained and changes in base acreage and then adding requirements for the Hammond, Florida and Navajo Projects[17] (Table P-6).

The projected estimate of diversion requirements for 2010 considers expected increased conveyance efficiencies and increased requirements for the Dolores and Animas-La Plata Projects and for the increased water needs of the Navajo Project upon its completion and full development (Table P-6). Water for the Dolores Project will be imported from the Upper Main Stem Sub-Basin.

Table P-6.--Estimated Water Requirements for Agricultural Use, San Juan Sub-Basin, 1980 and 2010

Item	Amount	
	1980	2010
	Acre-feet	
Diversion requirement	981,000[a/]	1,397,000[b/]
Estimated consumptive use	420,000	598,000
Conveyance and farm loss	562,000	799,000
Estimated return flow[c/]	336,000	559,000
Net disappearance	645,000	838,000

[a/] Includes 110,000 acre-feet of water imports.

[b/] Includes 230,000 acre-feet of water imports.

[c/] Identifying return flow in quantitative terms is difficult. The limitations of this estimate is recognized.

[17] As estimated by the Bureau of Reclamation.

Notes on the Projection of Final Demand for the Mining, Manufacturing and Electric Utility Industries

By and large, projections of final demand for the mining, manufacturing and electric utility industries followed the general procedures outlined earlier in this chapter. In several cases, however, the projected values show extremely slow or rapid growth, and these require the specific explanations which follow.

Coal.--Slow growth because most of the increased production will be sold in the processing sector to accommodate the large increases in electric energy final demand projections.

Oil and Gas.--Decline due to lack of known reserves in sub-basin to sustain present production levels, even with secondary recovery (water-flood) operations.

Uranium.--Decline due to the end of Government support program in 1969 and uncertainty as to future of peaceful uses for atomic energy.

Oil Field Services.--Decline due to a tapering off of further exploration activity and few new wells being drilled in sub-basin.

Electric Energy.--Large increase because of the plans of 15 energy producers to combine into a cooperative in San Juan County to produce and export power over extra high voltage (EHV) transmission lines.[18]

Projection of Final Demand for "All Other" Sectors (Tertiary)

With the exception of the export segments of the tourist-oriented sectors, the following procedure was followed.[19]

The projections are based on a comparison of per capita final demand

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[18] "Power Partnerships Get Popular," Businss Week (September 26, 1964), pp. 42-44.

[19] The special considerations that were taken into account in the tourist-oriented sectors are discussed in the concluding paragraphs of this section.

in each sector in the United States $\left(\frac{FD_i^{us}}{P^{us}}\right)$ with per capita final demand in the sub-basin $\left(\frac{FD_i^{sb}}{P^{sb}}\right)$.

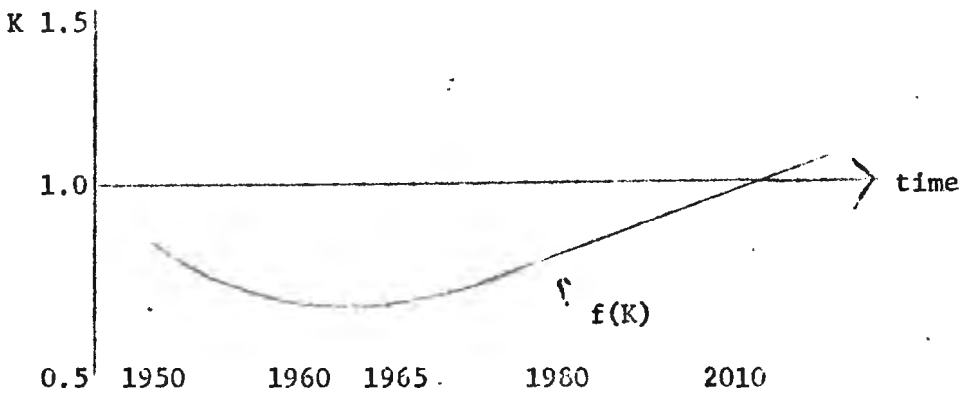
FD_i^{us} was derived from data in the ORRRC Report #23, pages 280-283. P^{us} was obtained from Resources for the Future, Inc. Using these data we were able to obtain a national per capita final demand expenditure estimate for both historical years (1950 and 1960) and for the projected years.

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 $\left(\frac{FD_i^{sb}}{P^{sb}}\right)$ 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 values of K_t, final demand expenditures for industry "i" in a sub-basin may be found by:

$$FD_i^{sb} = K\left(\frac{FD_i^{sb}}{P^{us}}\right)\left(P^{sb}\right).$$

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

$\sum W_i$ = 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 ORRRC 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 SJ $1980_{a,b,c}$ and SJ $2010_{a,b,c}$) a series of summary tables have been prepared which follow:

Table SJ-1980-d

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

	Industry	Total Gross Output
1.	Oil & Gas	$161,353,000
2.	Contract Construction	101,987,000
3.	Other Retail Trade	72,623,000
4.	Transportation	66,405,000
5.	Rentals & Finance	64,036,000
6.	Uranium	49,066,000
7.	Other Services (Except Professional)	36,486,000
8.	Wholesale Trade	32,834,000
9.	Electric Energy	26,406,000
10.	Other Utilities	25,457,000
11.	Other Manufacturing	22,508,000
12.	Range Livestock	17,866,000
13.	Eating & Drinking Places	17,602,000
14.	Oil Field Services	16,906,000
15.	Lodging	15,859,000
16.	Food & Kindred Products	15,271,000
17.	Other Mining	10,714,000
18.	Stone, Clay & Glass Products	7,677,000
19.	Lumber & Wood Products	6,416,000
20.	Service Stations	6,277,000
21.	Printing & Publishing	5,716,000
22.	Field Crops	4,477,000
23.	Dairy	3,710,000
24.	Forestry	2,697,000
25.	Other Agriculture	1,096,000
26.	Agricultural Services	919,000
27.	Fruit	812,000
28.	Coal	578,000

Source: Table SJ-1980-a.

Table SJ-1980-e

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

	Industry	Sales to Final Demand
1.	Oil & Gas	$148,261,000
2.	Contract Construction	68,517,000
3.	Other Retail Trade	68,322,000
4.	Rentals & Finance	38,043,000
5.	Transportation	37,865,000
6.	Uranium	37,241,000
7.	Wholesale Trade	28,196,000
8.	Other Services (Except Professional)	21,433,000
9.	Other Utilities	17,422,000
10.	Other Manufacturing	17,261,000
11.	Electric Energy	17,242,000
12.	Eating & Drinking Places	16,870,000
13.	Range Livestock	16,196,000
14.	Lodging	15,521,000
15.	Food & Kindred Products	12,963,000
16.	Oil Field Services	12,872,000
17.	Other Mining	7,128,000
18.	Service Stations	4,338,000
19.	Field Crops	3,935,000
20.	Lumber & Wood Products	2,333,000
21.	Stone, Clay & Glass Products	2,147,000
22.	Dairy	910,000
23.	Printing & Publishing	802,000
24.	Other Agriculture	740,000
25.	Fruit	706,000
26.	Forestry	95,000
27.	Coal	93,000
28.	Agricultural Services	0

Source: Interindustry Transactions Table, SJ-1980-a.

Table SJ-1980-f

Sales to Final Demand by Processing Sectors Listed Below
As a Percentage of Total Gross Output in the
San Juan Sub-Basin

	Industry	Sales to Final Demand Divided by Total Gross Output %
1.	Lodging	97.87
2.	Eating & Drinking Places	95.84
3.	Other Retail Trade	94.08
4.	Oil & Gas	91.89
5.	Range Livestock	90.65
6.	Field Crops	87.89
7.	Fruit	86.95
8.	Wholesale Trade	85.87
9.	Food & Kindred Products	84.89
10.	Other Manufacturing	76.69
11.	Oil Field Services	76.14
12.	Uranium	75.90
13.	Service Stations	69.11
14.	Other Utilities	68.44
15.	Other Agriculture	67.52
16.	Contract Construction	67.18
17.	Other Mining	66.53
18.	Electric Energy	65.30
19.	Rentals & Finance	59.41
20.	Other Services (Except Professional)	58.74
21.	Transportation	57.02
22.	Lumber & Wood Products	36.36
23.	Stone, Clay & Glass Products	27.97
24.	Dairy	24.53
25.	Coal	16.09
26.	Printing & Publishing	14.03
27.	Forestry	3.52
28.	Agricultural Services	0.00

Source: Tables SJ-1980-d and SJ-1980-e.

Table SJ-1980-h

Processing Sector Industries of the San Juan 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	1.446154
2.	Uranium	1.317523
3.	Electric Energy	1.156901
4.	Transportation	1.111388
5.	Other Mining	1.098124
6.	Rentals & Finance	1.067186
7.	Range Livestock	1.050631
8.	Other Services (Except Professional)	1.026982
9.	Other Manufacturing	1.015967
10.	Food & Kindred Products	1.015273
11.	Oil & Gas	1.015031
12.	Other Utilities	1.011222
13.	Printing & Publishing	1.007876
14.	Other Retail Trade	1.005319
15.	Dairy	1.005149
16.	Wholesale Trade	1.004767
17.	Stone, Clay & Glass Products	1.003111
18.	Lodging	1.002127
19.	Service Stations	1.000840
20.	Other Agriculture	1.000685
21.	Eating & Drinking Places	1.000401
22.	Coal	1.000280
23.	Oil Field Services	1.000239
24.	Lumber & Wood Products	1.000132
25.	Field Crops	1.000024
26.	Forestry	1.000017
27.	Fruit	1.000001
28.	Agricultural Services	1.000001

Source: Table of Direct and Indirect Requirement Coefficients, SJ-1980-c.

Table SJ-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
Contract Construction	11
Food & Kindred Products	10
Other Agriculture	10
Eating & Drinking Places	9
Lodging	7
Service Stations	7
Dairy	7
Fruit	6
Other Manufacturing	6
Other Retail Trade	6
Agricultural Services	6
Transportation	6
Electric Energy	6
Other Services (Except Professional)	5
Oil Field Services	5
Wholesale Trade	5
Stone, Clay & Glass Products	5
Printing & Publishing	5
Lumber & Wood Products	5
Other Mining	5
Range Livestock	5
Field Crops	4
Coal	4
Other Utilities	4
Rentals & Finance	2
Uranium	2
Oil & Gas	2
Forestry	2

Source: Table of Direct & Indirect Requirements per Dollar of Final Demand, SJ-1980-c.

Table SJ-2010-d

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

	Industry	Total Gross Output
1.	Rentals & Finance	$228,344,000
2.	Contract Construction	214,774,000
3.	Other Retail Trade	191,291,000
4.	Oil & Gas	150,886,000
5.	Other Services (Except Professional)	144,426,000
6.	Transportation	97,868,000
7.	Wholesale Trade	85,196,000
8.	Other Utilities	57,508,000
9.	Uranium	54,206,000
10.	Lodging	50,345,000
11.	Eating & Drinking Places	46,973,000
12.	Electric Energy	44,068,000
13.	Other Manufacturing	35,282,000
14.	Food & Kindred Products	27,019,000
15.	Range Livestock	26,341,000
16.	Stone, Clay & Glass Products	17,199,000
17.	Other Mining	15,957,000
18.	Service Stations	15,672,000
19.	Printing & Publishing	14,609,000
20.	Oil Field Services	13,621,000
21.	Dairy	8,913,000
22.	Lumber & Wood Products	6,679,000
23.	Field Crops	5,022,000
24.	Forestry	2,971,000
25.	Other Agriculture	1,836,000
26.	Agricultural Services	1,608,000
27.	Coal	1,361,000
28.	Fruit	1,200,000

Source: Table SJ-2010-a.

Table SJ-2010-e

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

	Industry	Sales to Final Demand
1.	Other Retail Trade	$181,270,000
2.	Rentals & Finance	163,499,000
3.	Contract Construction	135,906,000
4.	Oil & Gas	125,000,000
5.	Other Services (Except Professional)	105,828,000
6.	Wholesale Trade	74,810,000
7.	Lodging	48,843,000
8.	Eating & Drinking Places	44,766,000
9.	Uranium	40,980,000
10.	Transportation	39,720,000
11.	Other Utilities	36,295,000
12.	Electric Energy	24,163,000
13.	Other Manufacturing	23,881,000
14.	Range Livestock	23,799,000
15.	Food & Kindred Products	19,468,000
16.	Service Stations	11,509,000
17.	Oil Field Services	10,000,000
18.	Other Mining	9,342,000
19.	Field Crops	4,441,000
20.	Stone, Clay & Glass Products	4,268,000
21.	Dairy	3,129,000
22.	Printing & Publishing	1,161,000
23.	Other Agriculture	1,015,000
24.	Lumber & Wood Products	817,000
25.	Fruit	804,000
26.	Coal	161,000
27.	Forestry	110,000
28.	Agricultural Services	0

Source: Interindustry Transactions Table, SJ-2010-a.

Table SJ-2010-f

Sales to Final Demand by Processing Sectors Listed Below As a Percentage of Total Gross Output in the San Juan Sub-Basin

	Industry	Sales to Final Demand Divided by Total Gross Output %
1.	Lodging	97.02
2.	Eating & Drinking Places	95.30
3.	Other Retail Trade	94.76
4.	Range Livestock	90.35
5.	Field Crops	88.43
6.	Wholesale Trade	87.81
7.	Oil & Gas	82.84
8.	Uranium	75.60
9.	Service Stations	73.44
10.	Oil Field Services	73.42
11.	Other Services (Except Professional)	73.27
12.	Food & Kindred Products	72.05
13.	Rentals & Finance	71.60
14.	Other Manufacturing	67.69
15.	Fruit	67.00
16.	Contract Construction	63.28
17.	Other Utilities	63.11
18.	Other Mining	58.54
19.	Other Agriculture	55.28
20.	Electric Energy	54.83
21.	Transportation	40.59
22.	Dairy	35.11
23.	Stone, Clay & Glass Porducts	24.82
24.	Lumber & Wood Products	12.23
25.	Coal	11.83
26.	Printing & Publishing	7.95
27.	Forestry	3.70
28.	Agricultural Services	0.00

Source: Tables SJ-2010-d and SJ-2010-e.

Table SJ-2010-h

Processing Sector Industries of the San Juan 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	1.528549
2.	Uranium	1.322751
3.	Electric Energy	1.157544
4.	Transportation	1.113465
5.	Other Mining	1.098212
6.	Rentals & Finance	1.069917
7.	Range Livestock	1.047302
8.	Other Services (Except Professional)	1.028509
9.	Food & Kindred Products	1.019801
10.	Other Manufacturing	1.018544
11.	Oil & Gas	1.013526
12.	Other Utilities	1.011895
13.	Printing & Publishing	1.009015
14.	Dairy	1.006190
15.	Other Retail Trade	1.005672
16.	Wholesale Trade	1.005161
17.	Stone, Clay & Glass Products	1.004246
18.	Lodging	1.001312
19.	Service Stations	1.001140
20.	Other Agriculture	1.000945
21.	Eating & Drinking Places	1.000671
22.	Coal	1.000518
23.	Lumber & Wood Products	1.000185
24.	Oil Field Services	1.000181
25.	Field Crops	1.000047
26.	Forestry	1.000018
27.	Fruit	1.000002
28.	Agricultural Services	1.000002

Source: Table of Direct & Indirect Requirement Coefficients, SJ-2010-c.

Table SJ-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
Other Agriculture	13
Food & Kindred Products	12
Eating & Drinking Places	12
Contract Construction	11
Other Retail Trade	8
Fruit	8
Dairy	7
Stone, Clay & Glass Products	7
Service Stations	7
Lodging	7
Transportation	7
Electric Energy	6
Agricultural Services	6
Wholesale Trade	6
Other Manufacturing	6
Field Crops	6
Range Livestock	5
Uranium	5
Other Mining	5
Lumber & Wood Products	5
Printing & Publishing	5
Oil Field Services	5
Other Services (Except Professional)	5
Other Utilities	4
Coal	4
Forestry	2
Oil & Gas	2
Rentals & Finance	2

Source: Table of Direct & Indirect Requirements per Dollar of Final Demand, SJ-2010-c.