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ESTABLISHMENT OF OPERATIONAL GUIDELINES FOR TEXAS COASTAL ZONE MANAGEMENT

Interim Report on

Economics & Land Use

May 1973

THE UNIVERSITY OF TEXAS AT AUSTIN

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ESTABLISHMENT OF OPERATIONAL GUIDELINES FOR TEXAS COASTAL ZONE MANAGEMENT

Interim Report on
ECONOMICS AND LAND USE

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The University of Texas at Austin

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This is one in a series of six interim reports describing progress on this research project during the year ended May 31, 1973. The six reports cover the following areas:

Summary	Resource Capability Units
Economics & Land Use	Estuarine Modeling
Water Needs & Residuals Management	Biological Uses Criteria

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SUMMARY

The overall goal of this project is to develop and test a methodology for assessing the economic and environmental impact of alternative public policies for management of Coastal Zone environmental resources. The objectives of this task force in fulfilling that goal were: (1) the development and evaluation of input/output and demographic models to project under varying assumptions the level of economic activity by industrial sector and the expected level and composition of population in the Coastal Bend Region; and (2) the development and assessment of a land use model to spatially allocate households and industry within the study region.

The major steps necessary to accomplish these objectives were: (1) construction of an input-output model for the COG region; (2) projection of the input-output model to 1980 and to 1990; (3) development of demographic projections for the region for 1980 and 1990; (4) allocation of projected population increases to various types and locations of residences; and (5) projection of the distribution of retail and commercial establishments.

The results to date of each of these steps are presented in this report, along with a discussion of the methods used, including the necessary assumptions. These results can provide an estimate of the economic impact of various alternative plans for the region. In addition, they serve as input to the other task forces on the project team, providing them with a basis for evaluating the environmental impact of the projected changes in the level of households and economic activity, including the effects of increased water demand and waste discharges.

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CHAPTER I

LAND-USE/ECONOMICS

TASK FORCE INTERIM REPORT

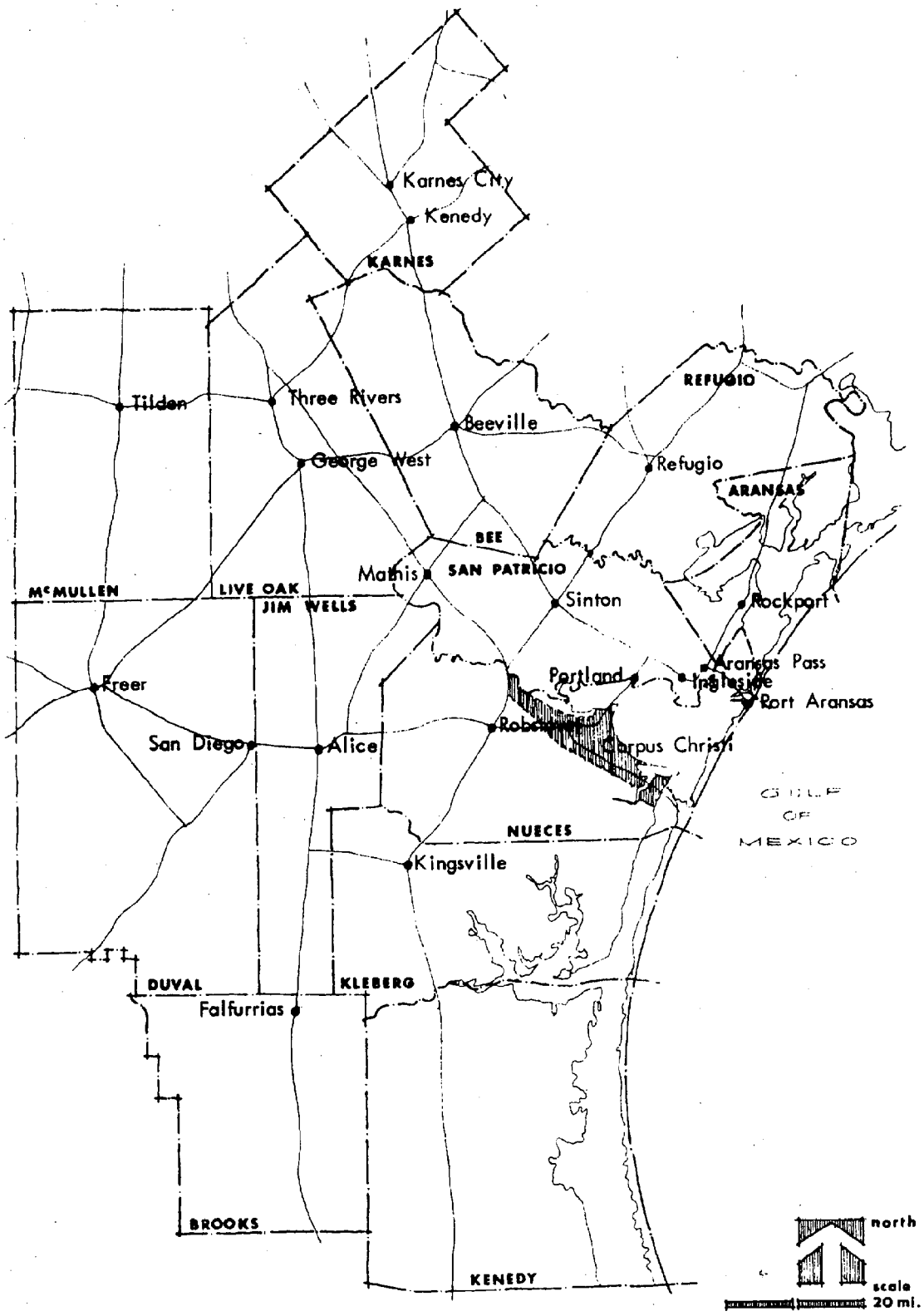
The overall goal of the Texas Coastal Zone Management Project is to develop and test a methodology for assessing the economic and environmental impact of alternative public policies for management of the Coastal Zone environmental resources. The objectives of this Task Force in fulfilling that goal are: (1) the development and evaluation of input/output and demographic models to project under varying assumptions the level of economic activity by industrial sector and the expected level and composition of population in the Coastal Bend Region; and (2) the development and assessment of a land use model to spatially allocate households and industry within the study region.

From the information developed by this Task Force the environmental impact of location of the projected changes in levels of households and economic activity could be evaluated by other Task Forces concerned with resource capability units and biological uses. Also, the environmental impact from increased water demand and waste discharges could be estimated by other Task Forces based on data generated by this Task Force.

Definition of Sub-Area

The first task undertaken was to define the appropriate sub-area for study. The Texas Coastal Zone is comprised of a series of urban-port complexes, Port Arthur-Beaumont, Houston-Texas City-Galveston, Corpus Christi, and Brownsville, between which run long stretches of rural-agricultural environments. These urban-port interfaces are where much of the conflict between economic development and environmental maintenance has become acute.

The Corpus Christi area provides a representative example of both settings at a scale that can be modelled within the time and resource capabilities of this group. The pressure to expand the port and it facilities, and to develop the tourist potential of the coast and the barrier islands (i.e. Mustang and Padre), and the associated patterns of urban growth are in direct conflict with attempts to preserve a scenic and unique coastal environment and the maintenance of unique marine related species of flora and fauna (i.e. whooping cranes). Further, the maintenance and expansion of an irrigated agricultural environment in the immediate port hinterland poses a threat to the supply of fresh water inflows to the bays and estuaries that is critical to the existence of the



COASTAL BEND REGION
Figure I - 1

present marine environment. Given the representativeness of the area, and in addition, its proximity to Austin, the availability of data, and its general economic and physical characteristics, it was decided to focus the study on the Corpus Christi area.

Since it was decided that the study area should be county contiguous and should include two or more counties, a number of alternative configurations were considered, including the Corpus Christi SMSA, alternative groupings of counties, and the Coastal Bend Council of Governments Region (COG). It was decided to define the study area as the Coastal Bend COG, a thirteen county region.

The principal advantage of using the COG as the study area is that it represents a governmental unit with planning responsibility. The principal disadvantage of using the COG is its large size and the fact that some of the counties contained in the COG are located 60 to 80 miles inland from the coast. This disadvantage can be overcome by the use of a spatially hierarchical model employing three levels of resolution: the Coastal Regions, the Council of Governments Area and the Corpus Christi Standard Metropolitan Statistical Area. The remainder of this chapter contains a map of the Coastal Bend COG and some descriptive information about the region.

The Coastal Bend Region

The Coastal Bend Region is located on the broad gulf coastal plain of Texas and includes thirteen South Texas counties which encompass a land area of approximately 7,838,000 acres. The Region, shown in Figure I-1 is distinguished by low-lying tidelands along the gulf coast. The surface rises gently toward the inland counties and culminates in rolling hill country.

Coastal counties include Aransas, Nueces, Kenedy, Kleberg, San Patricio and Refugio, all of which are separated from the Gulf of Mexico by continuous barrier islands. Between the coastal counties and the barrier islands lie numerous shallow bays, tidal flats and estuaries. The inland counties of the Coastal Bend include Bee, Brooks, Duval, Jim Wells, Karnes, Live Oak and McMullen. These gentle to rolling hill counties are used principally for cattle range land.

The Coastal Bend Region includes portions of the drainage area of the Nueces, Frio, Aransas and San Antonio Rivers. The predominant drainage basin for the Region is the Nueces River basin, which provides a major regional resource--water. Principal users of this valuable resource are the City of Corpus Christi, Nueces County, San Patricio County, its several municipalities, and the City of Alice in Jim Wells County. Even though the Nueces River is presently a significant source of area water supply, the Texas Water Development

Board forecasts that anticipated water needs will exceed the entire available supply from the Nueces River basin before the year 2000. A breakdown of land and water area in the Coastal Bend Region by county is given in Table I-1.

The climate of the Coastal Bend is intermediate between the conditions in the humid subtropical region to the northeast along the Texas coast and those of the semi-arid region to the west and southwest. The significant features of the climate are moderate temperatures, cooling sea breezes in the coastal counties and variable rainfall. Peak rainfall months are from May to September with winter months having the least rainfall. Seasonal tropical storms occur during the summer months with a major hurricane occurring an average of once every ten years.

The 1970 population of the Coastal Bend Region as shown in Table I-2 was 433,822 persons. Of this total, 77.5 percent of the population resided in the coastal counties of Aransas, Kenedy, Kleberg, Nueces, Refugio and San Patricio. During the 1960-70 census period coastal counties increased in population as shown in Table I-2 with the exception of Refugio County, which lost 13.5 percent in population, and Kenedy County, which lost 23.3 percent.

The population of the coastal counties numbers 336,394 persons with 284,832 of these residing within the Corpus Christi SMSA (Nueces San Patricio Counties). The growth of the Corpus Christi SMSA has been moderate during the past decade (12.2 percent); however, this condition is not likely to prevail if present plans for economic stimulation are implemented.

Most of the present sources of economic activity in the Region are related to productive use of the land including development of oil and gas resources. Mineral production (oil and gas primarily) accounts for about one-half of the Region's total income. Agricultural enterprise, including crop production and cattle ranching, accounts for 12.0 percent of regional income but only 10.3 percent of employment. Other economic sectors affecting the present structure of the Region's economy are the fishing industry and tourism.

Immediate growth of the Region's economy will be closely related to expansion of the manufacturing sector, particularily chemicals and the basic metals. Growth opportunities in both of these industries will be related to expansion of foreign imports through the Port of Corpus Christi.

Table I-1

LAND AND WATER AREA IN THE COASTAL BEND REGION

Area	Land Area[1]		Total Land Area[2]		Water Area	
	Sq. Miles	Acres	Sq. Miles	Acres	Fresh Acres[3]	Salinate Acres
Coastal Bend Region Counties						
Aransas	271	173,440	276	176,640	57	81,920
Bee	842	538,880	842	538,880	600	-
Brooks	904	578,560	904	578,560	250	-
Duval	1,814	1,160,960	1,814	1,160,960	75	-
Jim Wells	845	540,800	846	541,440	1,830[4]	
Karnes	758	485,120	757.8	484,992	2,150	-
Kenedy	1,394	892,160	1,393.8	892,032	50	20,363
Kleberg	851	544,640	850.9	544,576	75	72,865
Live Oak	1,055	675,200	1,051	672,640	2,738[4]	-
McMullen	1,159	741,760	1,157	740,480	1,175	-
Refugio	774	495,360	774	495,488	132	18,246
SMSA COUNTIES						
Nueces	845	540,800	838	536,320	99	156,160
San Patricio	636	470,596	680	435,200	4,372[4]	-
TOTALS	12,198	7,837,876	12,185	7,798,208	13,603	349,554

Source: 1. City-County Data Book; includes land subject to inundation by water; all streams and estuaries, lakes, reservoirs, ponds less than 40 acres.

2. Soil Conservation Service; includes marshes, streams and water areas less than 40 acres.

3. Soil Conservation Service; includes marshes, streams and water areas less than 40 acres.

4. Coastal Bend Regional Planning Commission Special Survey of all salt water areas, and fresh water areas larger than 40 acres.

Table I-2

1970 CENSUS OF POPULATION FOR THE STATE, COASTAL BEND REGION, COUNTIES AND PLACES OF 1,000 POPULATION OR MORE

	1960	1970	Population and Percentage Change 1960-70	
Texas	9,579,677	11,196,730	+ 1,671,053	+ 16.9
Coastal Bend Region	419,778	433,822	+ 14,044	+ 3.14
Counties:				
Aransas	7,006	8,902	+ 1,896	+ 27.1
Aransas Pass	935	726	- 209	- 22.4
Rockport	2,989	3,879	+ 890	+ 29.8
Bee	23,755	22,737	- 1,018	- 4.3
Beeville	13,811	13,506	- 305	- 2.2
Brooks	8,609	8,005	- 604	- 7.0
Falfurrias	6,515	6,355	- 160	- 2.5
Duval	13,398	11,722	- 1,676	- 12.5
San Diego	3,746	3,759	+ 13	+ 0.3
Jim Wells	34,548	33,032	- 1,516	- 4.4
Alice	20,861	20,121	- 740	- 3.5
Orange Grove	1,109	1,075	- 34	- 3.1
Premont	3,049	3,282	+ 233	+ 7.6
San Diego	605	731	+ 126	+ 20.8
Karnes	14,995	13,462	- 1,533	- 10.2
Falls City	462	442	- 20	- 4.3
Karnes City	2,693	2,926	+ 233	+ 8.7
Kenedy	4,301	4,156	- 145	- 3.4
Runge	1,036	1,147	+ 111	+ 10.7
Kenedy	884	678	- 206	- 23.3
Kleberg	30,052	33,166	+ 3,114	+ 10.4
Kingsville	25,297	28,711	+ 3,414	+ 13.5
Live Oak	7,846	6,697	- 1,149	- 14.6
George West	1,878	2,022	+ 144	+ 7.7
Three Rivers	1,932	1,761	- 171	- 8.9
McMullen	1,116	1,095	- 21	- 1.9
Nueces County	221,573	237,544	+ 15,971	+ 7.2
Agua Dulce	867	742	- 125	- 14.4
Bishop	3,722	3,466	- 256	- 6.9
Corpus Christi	167,690	204,525	+ 36,835	+ 22.0
Driscoll	669	626	- 43	- 6.4
Port Aransas	824	1,218	+ 394	+ 47.8
Robstown	10,266	11,217	+ 951	+ 9.3
Refugio	10,975	9,494	- 1,481	- 13.5
Austwell	287	284	- 3	- 1.0
Refugio	4,944	4,340	- 604	- 12.2
Woodsboro	2,081	1,839	- 242	- 11.6
San Patricio	45,021	47,288	- 2,267	+ 5.0
Aransas Pass	6,021	5,087	- 934	- 15.5
Gregory	1,970	2,246	- 276	+ 14.0
Ingleside	3,022	3,763	+ 741	+ 24.5
Mathis	6,075	5,351	- 724	- 11.9
Odem	2,088	2,130	- 42	+ 2.0
Portland	2,538	7,302	+ 4,764	+187.7
Sinton	6,008	5,563	- 445	- 7.4
Taft	3,463	3,274	- 189	- 5.5

Source: Bureau of the Census Bulletin, PC(V1)-45
U. S. Department of Commerce, January 1971

CHAPTER II

DEVELOPMENT OF AN INPUT-OUTPUT MODEL AND ECONOMIC FORECAST FOR THE COASTAL BEND COG

To provide a basis for making projections of economic activity within the thirteen county Coastal Bend COG, it was necessary to: (1) construct an input-output model for the COG from data contained in the State Input-Output Study; and (2) project the input-output model for the COG to some future date.

Construction of an Input-Output Model for the COG Region

The State Study[1]

In 1971, the Office of the Governor of the State of Texas completed an interindustry study of the structure of the Texas economy. For study purposes, Texas was divided into nine regions, as shown in Figure II-1. A separate input-output model was constructed for the economy of each of the regions and for the State for 1967.

The input-output models were estimated from a combination of survey data obtained from a sample of Texas manufacturing and business establishments and secondary data obtained from state agency files and publications of the United States Bureau of the Census and other federal agencies.

Individual factory and business establishments of the economy were classified according to the major product or service produced. Establishments which produced identical or quite similar products or services were grouped into homogeneous sectors. Establishments in multiproduct lines of production were classified according to the major product and the establishment's entire activities were included in the section into which the major product is placed. The Standard Industrial Classification system (SIC codes) in use at the national level. The single exception to the sectoring concept was for agricultural sectors which were defined along activity or enterprise lines of economic endeavor rather than along establishment lines.

1. Transactions Table

Transactions in a regional economy may be characterized in two manners. First, the transactions may be measured as the dollar

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[1]See Herbert W. Grubb, The Structure of the Texas Economy, Two Volumes (Austin, Texas: Office of the Governor, Office of Information Services, March, 1973).

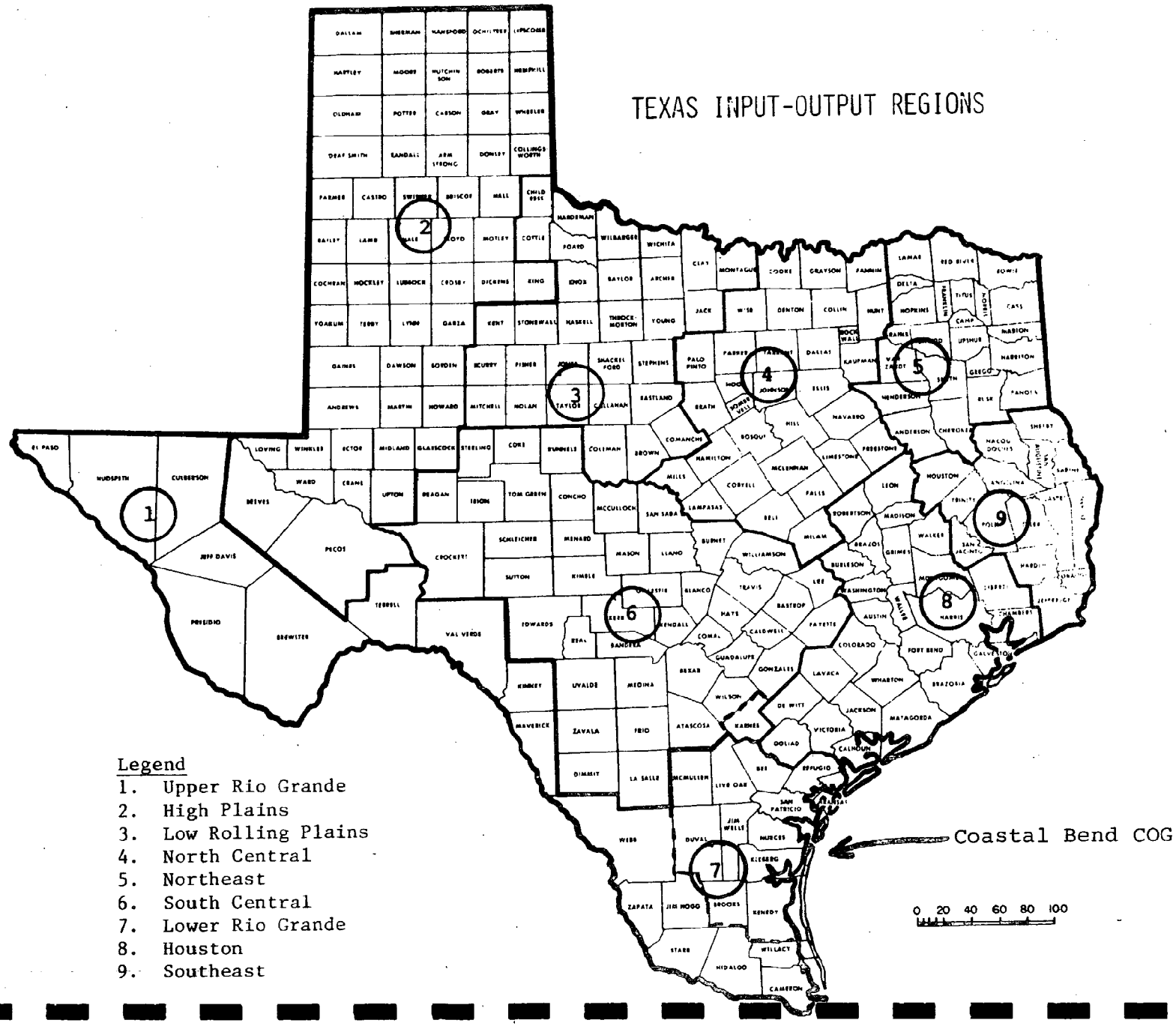
TEXAS INPUT-OUTPUT REGIONS
Legend
1. Upper Rio Grande
2. High Plains
3. Low Rolling Plains
4. North Central
5. Northeast
6. South Central
7. Lower Rio Grande
8. Houston
9. Southeast
Coastal Bend COG
0 20 40 60 80 100

Figure II-1

value of inputs (purchases that are required from each producer to produce the total output of an industry). The purchase of inputs by industry i from industry j to produce its output is also a sale by industry j to industry i. The transactions are classified as transactions by processors, final demand transactions, final payments transactions and final demand-payments transactions (Figure II-2).

Transactions by processors are included in the upper left hand section of Figure II-2. Industries that are classified as processors will produce goods and/or services to sell to other industries and/or final demand industries such as agriculture, manufacturing, services, trade and mining are included in this section.

Final demand transactions are included in the upper right hand section of figure II-2. It is the autonomous sector that determines the level of activity that will take place within a given processing sector, i.e. processors process in order to fulfill Final Demand requirements. Final demand consists of the following sectors. Households; Federal, State, and Local Government; Capital Formation; Net changes in Inventories; and Exports.

Inputs may be purchased from non-processing sectors in the region such as government. In addition, the industry may purchase inputs from industries outside the region. These purchases of inputs are included in the final payments transactions which are included in the lower left hand section of Figure II-2.

Final demand-payments transactions are included in the lower right hand section of Figure II-2. The purchase of goods and/or services outside the region by households would be an example.

Hypothetical Example: Wm. H. Miernyk's The Elements of Input-Output Analysis offers a concise and clear example of how an Input-Output model functions. The hypothetical example shows in Figures II-3, II-4 and II-5 come from Miernyk's above mentioned book. The Hypothetical Transactions Table consists of a Processing Sector (with six separate industries), Fiscal Demand (with five separate sectors), Final Payments (with five separate sectors), Total Gross Output and Total Gross Outlays (Total Gross Output will always be balanced by Total Gross Outlays for each element in the Processing Sector).

Purchases of inputs by sector A from all other sectors, including Final Payments, can be determined by reading down the column for Industry A. Figure II-3 shows that for Industry A to product a total output of 64 units it must purchase 10 units from other members of Industry A (intra-industry purchases, 5 units from B, 7 from C, 11 from D, 4 from E, and 2 from Industry F). In addition it must make purchases totalling 25

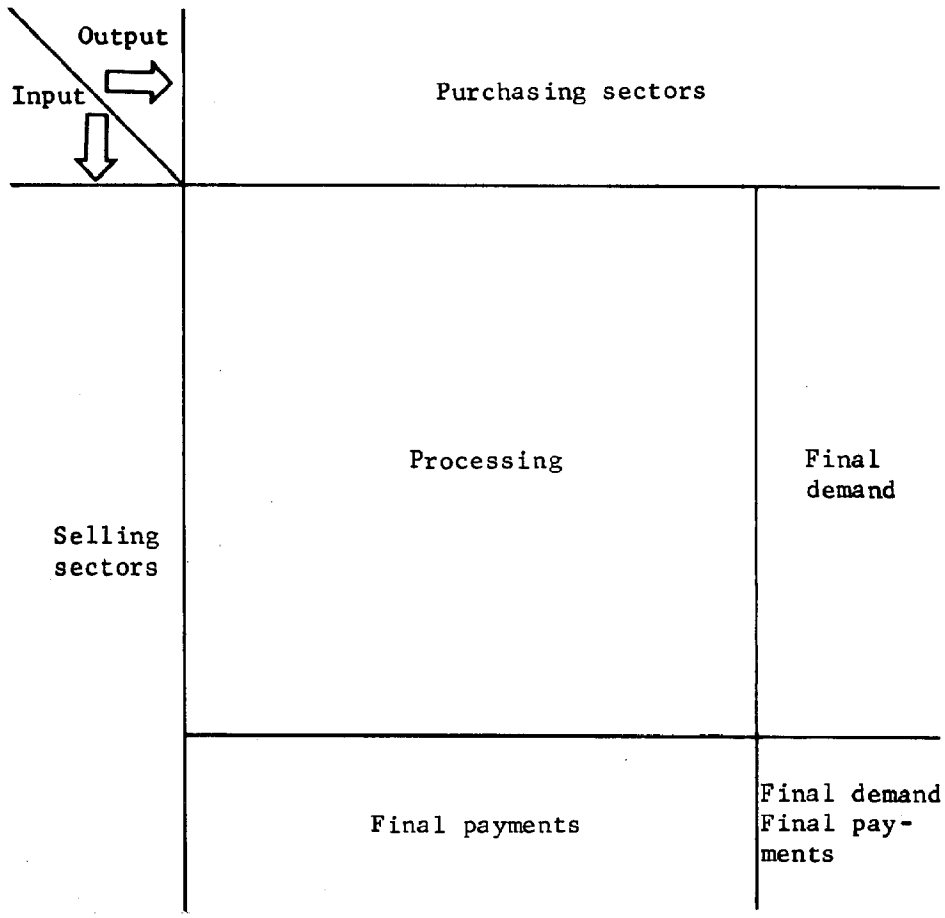

Figure II-2. Major sections in an input-output model

Output ⇨ / Input ⇩			Purchasing sectors: Processing: Agriculture	Purchasing sectors: Processing: Manufacturing	Purchasing sectors: Processing: Trade	Final Demand	Total output
Selling sectors	Processing	Agriculture	21	0	2	62	85
		Manufacturing	1	5	20	15	41
		Trade	30	1	0	5	36
	Final Payments		33	35	14	0	82
Total inputs			85	41	36	82	244

Figure II-3. Hypothetical transactions (thousand dollars)

units from all of the components of Final Payments.

The distribution of Industry A's output is found by reading across the row for Industry A. A quick check on the hypothetical Transactions Table reveals that A produced 10 units for intra-industry use, 15 for B, 1 for C, 2 for D, 5 for E, and 6 for F. The total of Industry A's sales to each sector of Final Demand was 25 units.

The example shows that each sector's total output is equal to the total of all of its inputs. Additionally it shows that the purchases of sector i from sector j are equal to the sales of sector j to sector i; in the example: A 5 units from R and R sells 5 units to A.

2. Direct Requirements Table

The value of the input requirements by sector j to produce one dollar of output is called the direct requirements. The direct requirements are the interindustry requirements to produce one dollar's worth of output by sector j. That is, the direct requirements by sector j are the required purchases of inputs from each selling sector i to produce one dollar of output by sector j. The direct requirements for a processing sector j comprise a list of inputs that are required by sector j from other sectors to produce its product (Figure II-4).

Hypothetical Example: The Direct Requirements Table or Miernyk's input or technical coefficients table measures, "the amounts of inputs required from each industry to produce one dollar's worth of output of a given industry." In Miernyk's model the Direct Requirements coefficients are found by: (1) adjusting gross output by subtracting inventory depletions from it; (2) the next step is to divide the new output figure for each sector into each entry in its column.

In the example, the adjusted gross output for Industry A is equal to 63 (told gross output minus gross inventory depletion). To compute the coefficients for column 1, each entry in this column is divided by 63 (shown by the entries of column 1 of Table II-4). In addition there are indirect effects in each sector resulting from the increased output of a given sector. If, for example, Industry A were to experience an increase in Final Demand it would require increased inputs from the remaining sectors. In order for B to increase its output to A it will require additional inputs from C, D, etc. For C to meet B's requirement it must have additional inputs from the other sector, etc. Obviously the iterative process can be quite lengthy.

Hypothetical Example: Miernyk's Direct and Indirect Requirements show in Figure II-5 is easily obtainable with the aid of high speed electronic computers. The technique is to Direct Requirements

Output ⇨ / Input ⇩			Processing sectors		
			Agriculture	Manufacturing	Trade
Selling sectors	Processing	Agriculture	0.25	0	0.06
		Manufacturing	0.01	0.12	0.56
		Trade	0.35	0.02	0
	Final payments		0.39	0.86	0.38
Total			1.00	1.00	1.00

Figure II-4. Hypothetical direct requirements

Input ⇩ \ Output ⇨		Processing sectors		
		Agriculture	Manufactur-ing	Trade
Processing sectors	Agriculture	1.364	0.002	0.077
	Manufacturing	0.329	1.157	0.662
	Trade	0.489	0.028	1.043
Total		2.182	1.187	1.782

Figure II-5. Hypothetical interindustry coefficients

Table from the Identity Matrix and then computing the transpored inverse matrix.

Interindustry Coefficients= $(I-A)_T^{-1}$

where I=the identity matrix with 1 occupying each element on the diagonal of a square matrix and every other element occupied by 0.
A=the processing sector (or Leontief A matrix)

(Table II-5 contains a slight rounding error)

In describing the new table Miernyk states, "what does Table II-5 show? In Table II-4 we saw that each dollar's worth of production in industry A required 16 C of intraindustry transactions. But it will be recalled that there were direct purchases only. Table II-5 shows that total intraindustry transactions will rise an additional 22 cents to 2 total of 38 cents for each dollar's worth of industry A's products delivered to the final demand sector. This is because when industry A's output rises it must by more from B, C, and the others in the table. When B sells more to A it must buy more from A, C, etc. The same holds true for all the economy. Thus Table II-5 shows the total dollar production directly and indirectly required from the industry at the top for each dollar of delivery to final demand by the industry at the left.

Deriviation of Regional Model

There are two methods available to accomplish this; the first would be to construct our own model from basis data, using the same procedures as followed for Region 7. This alternative was rejected, as the 4-6 man/month manpower requirement was to great.

The alternative method used was a mathematical technique known as the Location Quotients Method. Conceptually, an input-output model can be constructed for any portion of a regional model, or the state model. The procedure to be followed is as follows:

1. Determine the sectors which are to be represented in the new model of the sub-region. i.e., some sectors in the region may not transact business within the sub-region, or it may be desired to disaggregate some regional sectors to focus upon important variables within the subregion.

2. Obtain estimates of the total output model of each of the sectors that are to be represented in the sub-regional input-output model, using secondary data.

3. Obtain a complete input-output model of the next higher level that contains the desired sub-region.

4. If the regional model and subregional model do not match as to sectors then the difference between the two must be reconciled by aggregating or disaggregating the regional model.

5. Using the Location Quotient program construct the new transactions table for the sub-region.

A Location Quotient for each sector is calculated as follows:

$$LQ(i) = \frac{\mathbb{X}i/\mathbb{X}}{Xi/X} \qquad i=\text{index of sectors}$$

where $\mathbb{X}i$=output for sector i in the sub-model

$\mathbb{X}$=total subregional output=$\Sigma\mathbb{X}i$

Xi=output for sector i in the regional model

X=the total output for the region

The Location Quotient measures the degree of "representation" that a sector of the sub-region has in the region. If the Location Quotient is exactly 1, then that sector of the sub-region produces at the same proportion as the sector for the region. If the L.Q. is greater than 1, then the industry in the subregion produces more than it's proportionate share, and the excess must be exported out of the sub-region. If the L.Q. is less than 1, the industry in the subregion does not produce enough to satisfy the needs of the subregion, and some amount must be "imported" to make up the deficit.

Restating, the criteria used for constructing the Direct requirements matrix is: If the L.Q. is greater than or equal to 1, then the coefficient from that sector's row of the region direct requirements table is used directly in the sub-region table, and the excess sales for that sector are put in export. If the L.Q. is less than 1; then the technical coefficients of that sector's row are proportionately reduced by the L.Q. Since there is an excess demand for the sector's output, the deficit must be made up in the import sector. Once the coefficients for each sector have been determined, based on the L.Q.'s, then the final adjustments are made to imports and exports to balance the table.

Using the method of Location Quotients, an input-output model was computed for the Coastal Bend COG by disaggregating the Region 7 Model of the State Input-Output Study. The 71 sectors in the Region 7 Model were reduced to 45 processing sectors as shown in Table II-1. In addition, sectors 46 to 52, were included as final payments sectors.

Projecting the Input-Output Model To 1980

The 1980 projections of Final Demand were derived from a static model which assumed rates of change compatible with those projected for the U.S. (All values in the projected model are stated in terms of 1967 dollars).

The rates of increase to 1980 came from the Dept. of Labor's projected average annual rate of change from 1965 to 1980 in each industrial sector. This method assumed that the portion of sales of each sector in the C.O.G. would grow at the same rate as for the nation.[2]

Of some significance in the figures for Fed. Def. Expenditures is the U. S. Dept. of Labor's projection that defense expenditures in 1980 will be approximately $8 billion above the 1965 level of $50.1 billion. This projection was based on the assumption that Defense Expenditures would return to levels existing prior to the Viet Nam buildup. While the most recent federal budget is not consistent with this forecast this would seem to be, none-the-less, a basically sound projection.

The appropriate U. S. Dept. of Labor tables are contained in Appendix B, while the 1980 input-output model tables (Transactions, Direct Requirements, and Direct, Indirect are given in Appendix C).

Thus, to increase the output of Agriculture by $1,364, the total requirement is $2,182 for all processing sectors. Alternatively, to increase the output of Agriculture by $1.364, all of the processing sectors were required to produce $2.182 of output. To produce one dollar of output by Agriculture would require $1.60 ($2.182 divided by $1.364) of output by all processing sectors. This number, $1.60, is called an output multiplier. The output multiplier estimates the total requirements of all processing sectors per dollar of output by Agriculture. To produce $1,000 of output for final demand by Agriculture would require $1,364 of output by Agriculture with an associated economic activity of $2,182 ($1,364 times $1.60). This is the same amount of economic activity that was estimated by the final demand multiplier.

The Lower Rio Grande Regional Model[3]

The region is the basic functional unit in the Texas Input-Output Model. It was at this level that the basic work of data collection

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[2]A similar procedure was followed by W. E. Mullendore in projecting the statewide final demand for 1980.

[3]See Joe C. Murrell, Jr., Donald B. Eeenens, and Robert N. McMichael, An Input-Output Model of the Lower Rio Grande Region of Texas (Austin, Texas; Office of the Governor, Division of Planning Coordination, April, 1972).

and analysis was accomplished, resulting in a basic transactions table including all sectors operative in the region. These regional models were then aggregated into the State model. As mentioned under the state section the regional models were estimated from a combination of survey and published data. The following information was collected:

1. Dollar value of sales and purchases of the establishment for the calendar year 1967;

2. Breakdown of sales and purchases by destination of source;

3. Standard Industrial Classification, at the 4 digit level, of purchases and sales.

A majority of the data was collected from individual estalbishments within the region, but it was categorized and reported only as aggregated industry totals.

The regional input-output model which contained twelve of the thirteen counties in the study area was the Region Seven, Lower Rio Grande Region Model. This Region includes nineteen counties located in the southernmost tip of Texas (see Figure II-1). The remaining county in the study area, Karnes, was contained in the Region Six Model (see Figure II-1).

Development of the Input-Output Model for the Coastal Bend COG

In order to develop an input-output model for the Coastal Bend COG, a method was needed for disaggregating the Region 7 Model.

There are some inconsistencies in the projections, however, these are being corrected and the new projections will be available in September 1973.

While the above mentioned method is admittedly static the main thrust of this early effort was to experiment with and test the applicability of the methodology for the purposes of this project.

During the summer the next step will be to refine the I-O model by testing different methods of projecting Final Demand. Among them will be such techniques as:

1. Consumption trends consistent with national growth rates in percapita household consumption and projected population changes.

2. The use of time series analysis of personal income data for the state and region.

3. The use of U. S. Dept. of Labor income elasties figures.

4. Projected capital formation per employee ratio.

5. Projected government expenditures (all levels) per employee ratios.

6. The use of other secondary sources of data for projecting and testing.

Once Final Demand had been projected, the complete 1980 Transactions Table was developed using methods consistent with those described by Miernyk in his discussion of static model building, in The Elements of Input-Output Analysis. Since Miernyk's disucssion of the methodology is precise and straightforward the following description was taken from pages 35 and 36 of the above mentioned book.

The computational steps for projecting a transactions table are as follows:

1. (Step 1, the computation of adjusted final demand, was modified somewhat in this case).

2. Multiply each row of the table of direct and indirect coefficients by the adjusted final demand figure for that row. The result will be another table the same size (as the table of direct and indirect requirements).

3. Sum the columns of the matrix obtained in step 2 to obtain new adjusted total gross outputs for each industry. Transfer the row that is thus obtained to the bottom of the table of direct coefficients.

4. Multiply each column entry in the table of direct coefficients by the adjusted total gross output at the bottom of the column. The result is the processing sector of the projected transactions table.

5. To obtain total gross output figures add the appropriate inventory adjustment to the adjusted total gross outputs found in step 3.

6. Insert the original projected final demand figures as a column of the projected processing sector, and insert the total gross output figures obtained in step 5 as a column to the right of final demand. The result is the projected transactions table.

TABLE II-1

Sectors of the Coastal Bend COG Regional

Input-Output Model

Sector Number	Sector Name	Region 7 Sector Number	Standard Industrial Classification
1	Irrigated Crops	1,2,3	0112,0313,0122,0123,0119
2	Dry-Farmed Crops	4,5,6	0212,0413,0219,0141
3	Range and Feedlot Livestock Production	7	0235,0315,0316
4	Dairy,Poultry,&Eggs	8	0132,0133,0134
5	Agricultural Supply	9	5962,5969
6	Ginning	10	0712
7	Agricultural Services	11	0713,0714,0715,0719,0722 0723,0729,0731,0741
8	Fisheries	12	0912,0913,0914,0919,0989
9	Mining:Crude Petroleum, Natural Gas, and Services	13	0311,1321,1381,1382,1389
10	Construction	14,15,16	1311,1511,1611,1621,1700
11	Meat Products	17	2011,2013
12	Dairy Manufacturing	18	2021,2022,2023,2024,2026
13	Canned,Preserved,Pickled, Dried,and Frozen Food	19	2035,2036,2037,2038
14	Other Food and Kindred Products	20	2041,2043,2044,2045,2046 2042,2051,2052,2061,2062 2063,2069,2071,2072,2091 2092,2093,2094,2095,2096 2097,2098,2099,2121
15	Beverages	21	2082,2084,2086,2089

TABLE II-1
(cont'd.)

Sector Number	Sector Name	Region 7 Sector Number	Standard Industrial Classification
16	Textile Mill Products, Furnishings,&Apparel	22	2211,2221,2231,2241,2251 2253,2256,2259,2261,2262 2269,2271,2272,2279,2281 2284,2291,2293,2294,2295 2297,2298,2299,2311,2321 2322,2323,2327,2328,2329 2331,2335,2336,2337,2339 2341,2342,2351,2352,2361 2363,2369,2371,2381,2384 2385,2386,2387,2389,2391 2392,2393,2394,2395,2396 2397,2399
17	Wood Furniture&Other Wood & Paper Products	23	2431,2432,2433,2441,2442 2443,2445,2491,2499,2511 2512,2515,2519,2521,2541 2591,2599 2641,2642,2643,2645,2646 2647,2649 2651,2652,2653,2654,2655
18	Newspapers,Publishing& Printing	24	2711 2721,2731,2741 2732,2751,2752,2753 2761 2711,2782,2789,2791,279 2794,2799
19	Chemicals,Drugs& Related Products	25	28121,28122,28123,28124 28132,28133,28134 28182,28183,28185,28191 28192,28193,28194,28195 28196,28197,28198,28199 2879,2871,2872,2879,285 2871,2891,2892,2893,289 2899
20	Petroleum,Refining& Products	26	2911 2951,2952,2992,2999
21	Clay,Cut Stone,& Shell Products	27	3221,3229,3231 3251,3253,3253,3255,325 3261,3262,3269 3281,3291,3292,3295,329 3297,3299,3274,3275,323 3293

TABLE II-1
(cont'd.)

Sector Number	Sector Name	Region 7 Sector Number	Standard Industrial Classification
22	Cement&Concrete Products	28	3271,3272,3273,3241
23	Primary Metals,Foundairs &Forging	29	3321,3322,3323 3331,3332,3333,3339,3341 3334 3362,3369,3391,3392,3399
24	Fabricated Steel & Other Metal Products	30	3441 3443 3444,3446,3449 3471,3479 3494,3498 3481,3491,3492,3493,3499
25	Machinery&Processing Equipment	31	3522,3531,3537 3532,3533 3511,3519 3551,3552,3553,3559,3554 3555 3561,3562,3564,3566 3567,3569 3581,3582,3586,3589,3599
26	Electrical&Electronic Equipment	32	3611,3612,3613,3621,3622 3623,3624,3641,3642,3643 3644,3629 3651,3661,3662,3671,3672 3673,3674,3679 3691,3693,3694,3652,3699
27	Transportation Equipment	33	3713,3715,3714,3711 3731,3732 3741,3742,3791,3751,3799
28	Other Manufacturing	34	3011 3079 3111,3121,3131,3141,3142 3151,3161,3171,3172,3199 3841,3842,3843 3851,3861,3871,3831,3941 3942,3949 3941,3942,3949 3911,3913,3914,3931,3951 3952,3953,3955,3961,3962 3963,3964,3991,3982,3983 3984,3987,3993,3994,3995 3999

TABLE II-1
(cont'd.)

Sector Number	Sector Name	Region 7 Sector Number	Standard Industrial Classification
29	Highway Motor Freight Passenger Service, & Warehousing	35	4131,4132 4213,4231 4212,4214,4224 4221 4222,4223 4224,4226
30	Water Transportation	36	4411,4421,4441,4452 4453,4454,4459,4463 4464,4469
31	Air Transportation	37	4511,4521,4582,4583
32	Other Transportation	38	4011,4013,4021,4041 4612,4613,4619 4111,4119,4121,4140,4150 4141,4142,4151,4171,4172 4742,4782,4783,4784,4789 4721
33	Communications	39	4811,4821 4832,4833 4899
34	Gas Services (public & private)	40	4922,4923,4932 9149,4249,9349
35	Electric Services (public&private)	41	4911,4931 9151,9241,9351
36	Water&Sanitary Service Systems(public & private)	42	9102,9202,9302 4941,4952,4953,4959,496
37	Wholesale Groceries & Related Products	44	5041,5042,5043,5044,504 5046,5047,5048,5049
* 38	Wholesale Livestock	46	5054,4731

TABLE II-1
(cont'd.)

Sector Number	Sector Name	Region 7 Sector Number	Standard Industrial Classification
39	Wholesale Trade-Other	43,45,47,48,49	5012,5013,5014 5052,5053,5059 5081,5082,5084,5085 5083,5088,5087 5092 5022,5028,5029,5033,5034 5036,5037,5039,5063,5064 5065,5072,5074,5077,5091 5093,5094,5095,5096,5097 5098,5099
40	Retail Food Stores	54	5411,5421,5431,5441,5451 5462,5499
* 41	Automobile Dealers, Repair Shops,&Gasoline Service Stations	55,56	5511,7549,5521,5531,7531 7534,7535,7538,7539,7542 554 (?)
42	All Other Retail Trade	50,51,52,53 57,58,59 60	5211 5252 5221,5231,5241,5251 5311,5331,5399 5411,5421,5431,5441 5451,5462,5499 5611,5621,5631,5641,5681 5699 5712,5713,5714,5715,5719 5722,5723,5733 5812,5813 5321 5912,5921,5932,5933,5942 5943,5952,5953,5591,5992 5599,5971,5582,5983,5984 5992,5993,5994,5996,5997 5999,5995,5341,5351
43	Banking,Insurance,Real Estate,&Finance	61,62	60,61 63,6411 62,64,65,66,67
* 44	Education (public & private	70	8211 8221,8222 8231,8241,8242,8299

TABLE II-1
(cont'd.)

Sector Number	Sector Name	Region 7 Sector Number	Standard Industrial Classification
45	Services-Other	63,64,65,66, 67,68,69,71	7011,7021,7041,7031,7032 7211,7212,7213,7214,7215 7216,7217,7218,7231,7241 7251,7261,7271,7299 7311,7312,7313,7319 7331,7332,7339 7361 7813,7814,7815,7821,7395 7221 7391,8921 7341,7342,7349,7351,7392 7393,7394,7396,7397 73, 7398,7309 7816,7817,7818,7832,7833 7911,7929,7932,7933,7941 7942,7943,7945,7946 7947,7948,7949 7512,7513,7519,7523,7525 7622,7623,7629 7631,7641,7692,7694,7695 8011,8021,8031,8041 8061,8071,8072 8092,8099 8111 8911 8931 8411,8421,8611,8621,8631 8641,8651,8661,8671,8691 8811
46	Households		
47	Federal Government		
48	State Government		
49	Local Government		
50	Depreciation		
51	Imports		
52	Residual		

Table II-2
PROCESSING SECTOR, 1967

	1	2	3	4	5
1	11.041250	61.161250	0.000000	0.000000	0.000000
2	0.000000	59.111250	775.523250	1965.257250	0.000000
3	0.000000	0.000000	5179.675250	0.000000	0.000000
4	0.000000	0.000000	0.000000	0.000000	0.000000
5	124.464250	420.453250	45.983250	13.522250	0.000000
6	157.681250	439.404000	0.000000	0.000000	0.000000
7	638.178000	1581.347250	863.273000	414.616250	0.000000
8	0.000000	0.000000	0.000000	0.000000	0.000000
9	0.000000	0.000000	0.000000	0.000000	0.000000
10	97.178250	333.853250	330.521250	138.536000	0.000000
11	0.000000	0.000000	0.000000	0.000000	0.000000
12	0.000000	0.000000	0.000000	0.000000	0.000000
13	0.000000	0.000000	0.000000	0.000000	0.000000
14	0.000000	0.000000	2318.331250	2401.591250	0.000000
15	0.000000	0.000000	0.000000	0.000000	0.000000
16	.942250	2.963250	0.000000	0.000000	.094250
17	4.052250	40.149000	234.795250	14.962250	1.943250
18	0.000000	0.000000	.305000	0.000000	3.226250
19	920.189000	3201.386250	420.747250	119.834250	0.000000
20	243.395250	1636.336250	2.907250	228.263000	.137000
21	0.000000	0.000000	0.000000	0.000000	.004250
22	0.000000	0.000000	0.000000	0.000000	0.000000
23	1.677250	70.059250	0.000000	0.000000	0.000000
24	16.822250	53.950000	39.420250	17.537250	0.000000
25	145.378000	1038.211250	3.315000	23.161250	0.000000
26	3.072250	20.220250	1.169250	1.077250	.001250
27	0.000000	0.000000	0.000000	0.000000	0.000000
28	60.127250	82.455250	9.470250	14.110000	.254250
29	0.000000	0.000000	675.200250	533.364250	.017000
30	0.000000	0.000000	0.000000	0.000000	0.000000
31	0.000000	0.000000	0.000000	0.000000	0.000000
32	0.000000	0.000000	0.000000	0.000000	.020250
33	25.878250	90.888000	42.227000	37.477250	14.824250
34	0.000000	0.000000	5.990250	13.854250	1.268250
35	28.699000	100.793250	50.640250	24.452000	21.267000
36	0.000000	0.000000	0.000000	0.000000	4.039250
37	0.000000	0.000000	0.000000	0.000000	0.000000
38	0.000000	0.000000	616.621250	62.640250	0.000000
39	396.042250	1433.969250	740.126000	1133.932250	249.704250
40	0.000000	0.000000	0.000000	0.000000	0.000000
41	240.435250	1198.485250	191.864250	418.441250	2.081250
42	130.821250	664.259000	236.923250	106.081000	0.000000
43	890.634000	3072.986250	2144.365250	1015.288250	37.485000
44	217.570250	755.241250	306.414000	313.764250	5.345250
45	11.839250	46.712250	19.041250	84.034250	71.272250

Table II-2
(cont'd.)

6	7	8	9	10
0.000000	.133250	1.800250	.002250	0.000000
0.000000	1.209250	0.000000	0.000000	0.000000
0.000000	.017250	545.483250	0.000000	0.000000
0.000000	281.783000	0.000000	0.000000	0.000000
0.000000	0.000000	0.000000	0.000000	0.000000
0.000000	0.000000	0.000000	0.000000	0.000000
0.000000	0.000000	0.000000	0.000000	0.000000
0.000000	0.000000	307.446250	0.000000	0.000000
0.000000	3.443250	0.000000	51579.572250	0.000000
199.360250	0.000000	0.000000	1102.025250	2122.793250
0.000000	.143250	0.000000	0.000000	0.000000
0.000000	.049250	0.000000	0.000000	0.000000
0.000000	.012000	.954000	.001000	0.000000
0.000000	27.663250	874.616250	0.000000	0.000000
0.000000	5.399250	0.000000	0.000000	0.000000
.270250	.030250	4.978250	0.000000	2.946250
.065250	495.421000	0.000000	132.530250	2352.193250
1.333000	.058250	0.000000	19.768250	162.143000
0.000000	1148.149250	30.211250	1139.276250	1147.377250
14.519250	222.167250	642.122000	4950.671000	1894.445250
0.000000	.044000	.039250	.122250	310.121250
0.000000	.064250	0.000000	0.000000	7983.602000
0.000000	.225250	0.000000	0.000000	38.227250
.041250	.219250	84.468250	36.982250	2577.732250
.060250	44.553000	.223250	249.710250	235.401250
.001000	.301250	21.185000	88.658000	71.180000
6.703250	.027250	1673.534250	0.000000	2377.847250
.002250	.722250	.138250	.296250	27.730250
21.439250	5.016000	6.758250	1885.742250	392.693250
0.000000	0.000000	0.000000	14245.616250	0.000000
0.000000	30.535250	0.000000	904.253000	0.000000
0.000000	0.000000	0.000000	38.340250	3.178000
11.499000	42.711250	65.341000	1655.157250	879.771250
20.817250	5.113250	8.416250	379.072250	58.542250
108.845250	25.148000	35.695250	1597.706000	359.346250
.164250	8.871250	19.430250	23.922250	42.120000
0.000000	.016250	0.000000	0.000000	0.000000
0.000000	0.000000	0.000000	0.000000	0.000000
16.751000	52.309250	853.067000	1860.202250	7346.434250
0.000000	.903000	628.231250	.689250	0.000000
17.372250	3.154250	18.662250	753.612000	2298.570250
0.000000	168.881250	0.000000	58.748250	130.876250
84.745250	44.265250	12.654250	1570.925250	4018.217000
16.192250	8.521000	33.752000	3423.902250	366.026250
36.130000	309.168250	346.092250	4802.884000	2413.497250

Table II-2
(cont'd.)

	11	12	13	14	15
1	.052447	.211709	35.590882	596.027531	1.246580
2	0.000000	0.000000	1.666031	2538.125571	0.000000
3	3184.727262	1.520586	7.855302	143.475274	15.749074
4	220.548746	5143.220129	2.146398	58.682058	2.151603
5	0.000000	0.000000	0.000000	0.000000	0.000000
6	0.000000	0.000000	0.000000	219.835428	0.000000
7	0.000000	0.000000	0.000000	0.000000	0.000000
8	0.000000	0.000000	743.991931	.780582	0.000000
9	0.000000	0.000000	0.000000	0.000000	0.000000
10	0.000000	0.000000	1.294087	391.532571	0.000000
11	46.144477	0.000000	.761898	6.738629	0.000000
12	0.000000	92.695641	0.000000	.893784	0.000000
13	0.000000	.323940	.132312	2.344833	.003159
14	0.000000	45.150810	3.530163	4765.781769	2.018930
15	0.000000	0.000000	0.000000	12.627211	2.274800
16	0.000000	0.000000	0.000000	8.651235	0.000000
17	.003445	5.454507	11.470366	600.421842	.300490
18	.055510	1.684925	4.716563	12.683298	15.857661
19	0.000000	0.000000	.774762	.131726	11.786238
20	10.168277	33.158110	.026830	49.982454	.079367
21	.003063	.001822	0.000000	.142532	2.865514
22	0.000000	0.000000	0.000000	.311307	0.000000
23	0.000000	0.000000	0.000000	.866513	0.000000
24	0.000000	0.000000	0.000000	9.153442	0.000000
25	0.000000	.004737	0.000000	.056087	0.000000
26	.001914	.011660	0.000000	1.163412	.003159
27	0.000000	0.000000	0.000000	.078213	0.000000
28	.037134	6.285309	.248820	35.484316	0.000000
29	.165764	0.000000	1.668972	136.454668	25.630102
30	0.000000	0.000000	0.000000	0.000000	0.000000
31	0.000000	0.000000	0.000000	0.000000	0.000000
32	.388953	0.000000	0.000000	966.656253	0.000000
33	32.092033	16.269508	6.295121	632.056248	91.769500
34	6.871368	0.000000	5.750068	290.154690	16.548275
35	37.532775	0.000000	23.172646	1538.869604	74.033480
36	3.390319	0.000000	4.359320	83.494476	19.760873
37	0.000000	1.437506	25.680330	316.139268	15.150463
38	0.000000	0.000000	0.000000	0.000000	0.000000
39	56.476604	22.723164	2.690716	244.443568	13.542585
40	0.000000	0.000000	0.000000	0.000000	0.000000
41	9.459281	48.949178	.448759	26.885052	34.329309
42	.364834	0.000000	.135620	6.372780	.246789
43	0.000000	0.000000	.033813	3.050290	0.000000
44	9.578340	10.477215	5.604525	333.408292	25.010959
45	68.581604	9.153762	4.094695	958.460400	120.077952

Table II-2
(cont'd.)

16	17	18	19	20
.030250	.001250	0.000000	.019250	0.000000
0.000000	.005250	.004250	.588250	0.000000
0.000000	.001250	0.000000	.076250	0.000000
0.000000	.022000	.018250	.579000	0.000000
0.000000	0.000000	0.000000	0.000000	0.000000
.010250	0.000000	0.000000	.003250	0.000000
0.000000	0.000000	0.000000	0.000000	0.000000
0.000000	0.000000	0.000000	.003250	0.000000
0.000000	0.000000	.028250	9082.250250	105605.335250
.042250	2.407250	1.433000	3852.437000	229.693250
0.000000	.019250	.006250	.508250	0.000000
0.000000	.006250	.001250	.093250	0.000000
0.000000	.002000	0.000000	.027250	0.000000
0.000000	42.467250	.055250	25.162000	0.000000
0.000000	.155250	.186000	2.290250	0.000000
.078000	.370250	.042250	1.555250	0.000000
.223250	64.179000	40.587250	504.720250	8.238250
.007250	9.730250	81.994250	14.524000	16.002000
0.000000	31.845250	1.012000	3279.360250	5355.810250
.001250	.168250	1.493250	935.714250	415.483250
0.000000	.017000	.004250	.273250	.312250
0.000000	0.000000	.012250	0.000000	4.174000
0.000000	.102250	.031000	528.859000	0.000000
0.000000	1.428250	58.223250	166.959250	.119250
0.000000	.020250	.116250	331.300250	1.741250
.001000	.020000	.530250	.590250	.068250
0.000000	.052250	.040000	4.893000	0.000000
.009250	.689250	1.066250	422.366250	.878000
.084250	59.249250	78.062250	1327.095250	184.476250
0.000000	0.000000	4.591250	923.143250	578.339250
.023250	1.502000	.024000	163.338000	0.000000
2.586000	45.964250	29.358250	4323.748250	391.812250
.897250	62.372250	55.281250	488.287250	45.875000
.177250	3.693250	9.070250	5450.093250	1474.940250
.598250	33.580000	61.320000	7778.847000	834.987250
.063000	2.482250	4.260250	32.488250	118.557250
0.000000	.008250	.006250	2.557250	0.000000
0.000000	0.000000	0.000000	0.000000	0.000000
.173250	15.544250	56.080250	1385.911250	396.581000
0.000000	.002000	.001000	.020000	0.000000
.023250	3.525250	16.756250	514.547250	0.000000
.001250	14.106250	2.303250	14.886250	6.384250
.006000	.772250	.477250	815.009250	0.000000
.205250	13.392000	35.253000	386.871000	158.644250
.201250	32.147250	186.197250	1455.946250	763.000250

Table II-2
(cont'd.)

	21	22	23	24	25
1	0.000000	0.000000	0.000000	0.000000	.572250
2	.002250	0.000000	0.000000	.001250	.121250
3	0.000000	0.000000	0.000000	0.000000	.004250
4	.012250	0.000000	0.000000	.002250	.022000
5	0.000000	0.000000	0.000000	0.000000	0.000000
6	0.000000	0.000000	0.000000	0.000000	0.000000
7	0.000000	0.000000	0.000000	0.000000	0.000000
8	0.000000	0.000000	0.000000	0.000000	0.000000
9	.005250	0.000000	0.000000	0.000000	.051250
10	.137000	11.359250	0.000000	2.131250	16.910250
11	.014250	0.000000	0.000000	.002000	.099250
12	.004250	0.000000	0.000000	.001250	.039000
13	0.000000	0.000000	0.000000	0.000000	.004250
14	.031250	0.000000	257.728250	.015250	.122250
15	.006000	0.000000	0.000000	.048250	.459250
16	0.000000	0.000000	.461250	.001000	.002000
17	6.726250	18.388250	34.713250	2.989250	.448250
18	.179250	13.178250	42.365000	.895250	.959250
19	2.179250	0.000000	20.623250	1.016250	2.170250
20	3.409000	.963000	0.000000	.293000	6.716000
21	.127250	8.153250	.378250	.039250	.070250
22	1.335250	317.036250	0.000000	0.000000	.549250
23	.059250	59.754250	3.026250	.026250	41.832250
24	.455000	0.000000	.459000	1.848250	25.013000
25	.055250	0.000000	0.000000	7.851000	10.604250
26	.121250	.002000	6.189250	.071250	4.699250
27	.023250	0.000000	0.000000	.005250	2.405250
28	.057000	0.000000	27.830250	.036250	1.810000
29	14.586250	612.144250	110.204250	.284000	8.810250
30	0.000000	0.000000	0.000000	0.000000	64.183250
31	.037250	0.000000	0.000000	.059250	6.011250
32	26.536250	280.304250	1653.968000	2.594250	5.270000
33	3.118000	78.073250	273.793250	31.958250	34.698250
34	14.334250	18.180000	351.250250	5.039000	5.651250
35	16.454250	0.000000	1710.388250	22.209250	15.381250
36	.266250	8.448250	89.860000	2.411250	2.837000
37	.114000	0.000000	0.000000	.003250	.060250
38	0.000000	0.000000	0.000000	0.000000	0.000000
39	4.172250	73.239250	2864.018250	69.732000	66.859250
40	.002250	0.000000	0.000000	0.000000	0.000000
41	.387250	78.957250	44.520250	4.949250	2.745250
42	.096000	3.777000	1.440250	10.619250	4.334000
43	.565250	0.000000	1266.425000	.552250	1.929250
44	.865250	19.156250	226.116250	19.047000	11.021250
45	4.403250	66.340250	1689.415250	9.307250	35.203250

Table II-2
(cont'd.)

26	27	28	29	30
.001250	0.000000	.002250	0.000000	0.000000
.010250	0.000000	14.736250	0.000000	0.000000
0.000000	0.000000	0.000000	0.000000	0.000000
0.000000	0.000000	.003250	0.000000	0.000000
0.000000	0.000000	0.000000	0.000000	0.000000
0.000000	0.000000	0.000000	0.000000	0.000000
0.000000	0.000000	0.000000	0.000000	0.000000
0.000000	0.000000	0.000000	0.000000	0.000000
.967250	0.000000	.002000	0.000000	0.000000
1.357000	.330250	14.487250	167.803250	71.988250
.001250	0.000000	.005250	0.000000	0.000000
0.000000	0.000000	.001250	0.000000	0.000000
0.000000	0.000000	0.000000	0.000000	0.000000
.025250	0.000000	.014000	.303250	0.000000
.481250	0.000000	.165250	0.000000	0.000000
.002000	.197250	.015250	0.000000	0.000000
.843250	1.327250	11.714250	8.435250	8.042250
.307250	.157000	.270000	1.513000	3.463250
12.846250	0.000000	16.341250	0.000000	.364000
.662000	.007250	.635250	249.498250	546.401250
.008250	.029250	.006250	.002250	.111250
.001250	0.000000	1.250000	0.000000	.353250
2.047250	0.000000	.990250	0.000000	71.807000
5.933000	13.333250	2.307250	0.000000	0.000000
.952250	1.869000	1.438250	.001250	.389250
9.365250	4.834250	.099000	.005000	.922250
.003250	0.000000	.050250	0.000000	0.000000
3.506000	19.459250	5.496250	.064250	0.000000
1.607250	0.000000	4.937250	0.000000	11.471250
.119250	0.000000	0.000000	0.000000	4297.344000
1.588250	0.000000	.370000	0.000000	0.000000
4.146000	0.000000	77.291250	0.000000	22.694250
6.470250	6.118250	18.071250	804.013250	60.881250
.709250	3.962000	5.081250	185.565250	1.098250
4.008250	17.426250	41.423000	308.757000	33.054000
.253000	2.714250	1.868250	14.350250	3.790250
.001250	0.000000	.003250	0.000000	0.000000
0.000000	0.000000	0.000000	0.000000	0.000000
6.630250	133.131250	18.264250	653.454250	1500.140250
0.000000	0.000000	0.000000	0.000000	0.000000
.311250	1.438000	1.662000	0.000000	1.908250
.279000	3.440250	2.343250	0.000000	23.911000
.444250	0.000000	.744250	760.996250	885.468250
1.680250	2.835250	4.693250	51.940000	22.530250
11.184250	140.871250	12.679000	676.907250	299.763250

Table II-2
(cont'd.)

	31	32	33	34	35
1	0.000000	0.000000	0.000000	0.000000	0.000000
2	0.000000	0.000000	0.000000	0.000000	0.000000
3	0.000000	0.000000	0.000000	0.000000	0.000000
4	0.000000	0.000000	0.000000	0.000000	0.000000
5	0.000000	0.000000	0.000000	0.000000	0.000000
6	0.000000	0.000000	0.000000	0.000000	0.000000
7	0.000000	0.000000	0.000000	0.000000	0.000000
8	0.000000	0.000000	0.000000	0.000000	0.000000
9	0.000000	10591.619250	0.000000	185551.076250	0.000000
10	2.725250	301.969250	11.411250	368.367250	80.184250
11	0.000000	0.000000	0.000000	0.000000	0.000000
12	0.000000	0.000000	0.000000	0.000000	0.000000
13	0.000000	0.000000	0.000000	0.000000	0.000000
14	0.000000	19.687250	0.000000	0.000000	0.000000
15	0.000000	0.000000	0.000000	0.000000	0.000000
16	0.000000	0.000000	0.000000	.243250	.109250
17	.413250	5.362000	.867250	.039000	3.142250
18	1.038250	19.317250	304.511250	11.995250	56.496000
19	0.000000	.266250	0.000000	1.201250	.283250
20	587.099000	103.596250	23.097000	288.677250	50.442250
21	.001250	2.073000	.002250	0.000000	.013250
22	0.000000	0.000000	0.000000	0.000000	1.774000
23	0.000000	29.813250	0.000000	0.000000	.365250
24	0.000000	5.537250	0.000000	0.000000	.090250
25	.006250	56.564250	.029250	54.019000	.103250
26	.022250	22.290000	32.832250	.354250	.839000
27	0.000000	4.244250	2.230000	.172250	.209250
28	.004000	17.360250	6.658250	.001250	.132250
29	0.000000	10.842250	29.554250	168.821000	58.217250
30	0.000000	0.000000	0.000000	0.000000	0.000000
31	672.995250	6.607000	25.996250	0.000000	.411000
32	0.000000	91.915250	23.617000	58.976250	126.865250
33	31.600250	25.556250	125.656250	686.706250	236.310250
34	.944250	53.273250	26.597250	3397.598250	5340.995250
35	1.863000	97.633000	234.273250	201.706000	0.000000
36	.247250	4.840250	24.639000	41.959250	92.385000
37	0.000000	0.000000	0.000000	0.000000	0.000000
38	0.000000	0.000000	0.000000	0.000000	0.000000
39	42.542250	63.359250	3.991250	78.914250	31.917250
40	0.000000	0.000000	0.000000	0.000000	0.000000
41	0.000000	0.000000	0.000000	197.665250	182.657250
42	0.000000	0.000000	7.837250	.902000	5.426250
43	45.437250	66.044250	205.556250	1583.118250	327.019000
44	51.751000	79.597000	497.732000	3612.233250	820.477250
45	84.930250	64.156250	176.427250	1681.829250	191.914250

Table II-2
(cont'd.)

36	37	38	39	40
0.000000	0.000000	0.000000	0.000000	0.000000
0.000000	0.000000	0.000000	0.000000	0.000000
0.000000	0.000000	0.000000	0.000000	0.000000
0.000000	0.000000	0.000000	0.000000	0.000000
0.000000	0.000000	0.000000	0.000000	0.000000
0.000000	0.000000	0.000000	0.000000	0.000000
0.000000	0.000000	0.000000	0.000000	0.000000
0.000000	0.000000	0.000000	0.000000	0.000000
0.000000	0.000000	0.000000	0.000000	0.000000
344.744250	0.000000	20.507250	0.000000	0.000000
0.000000	0.000000	0.000000	0.000000	0.000000
0.000000	0.000000	0.000000	0.000000	0.000000
0.000000	3.566250	0.000000	.001250	0.000000
0.000000	12.658250	0.000000	0.000000	1.059250
0.000000	0.000000	0.000000	0.000000	0.000000
.070250	0.000000	0.000000	.236250	0.000000
5.374250	.021250	.009250	8.674250	5.305250
1.695000	16.401000	.001250	28.178000	513.350250
69.727250	0.000000	0.000000	0.000000	0.000000
19.352250	.205250	0.000000	.747250	0.000000
5.333250	0.000000	0.000000	.002250	0.000000
90.862000	0.000000	0.000000	0.000000	0.000000
.351250	0.000000	0.000000	0.000000	0.000000
.875250	0.000000	0.000000	0.000000	0.000000
.802250	0.000000	0.000000	1.599250	0.000000
3.052000	0.000000	0.000000	2.063000	0.000000
0.000000	57.342250	0.000000	8.273250	0.000000
2.579250	1.905250	.001000	11.082250	.002000
0.000000	11.756000	0.000000	119.532250	.821250
0.000000	0.000000	0.000000	0.000000	0.000000
0.000000	0.000000	0.000000	127.450000	0.000000
0.000000	.417250	0.000000	23.539250	0.000000
17.419250	355.352250	9.265250	2382.181250	179.100250
0.000000	31.474250	.646250	814.141250	107.184250
435.334250	308.299000	7.446250	1499.566000	1038.525000
464.273000	35.721250	.968000	283.305250	151.124250
0.000000	0.000000	0.000000	0.000000	0.000000
0.000000	0.000000	0.000000	0.000000	0.000000
111.302250	44.585250	4.199250	355.246250	0.000000
0.000000	0.000000	0.000000	0.000000	0.000000
0.000000	11.334250	2.514250	135.979250	15.097250
0.000000	1.661000	0.000000	145.383000	0.000000
18.442250	97.292250	83.803250	2957.335250	236.143250
0.000000	52.191250	13.450000	433.584250	233.309000
3.131250	567.001250	38.096250	2675.531250	548.262250

Table II-2
(cont'd.)

	41	42	43	44	45
1	0.000000	0.000000	0.000000	2.367250	11.568250
2	0.000000	0.000000	0.000000	0.000000	.865250
3	0.000000	0.000000	0.000000	15.365250	98.916250
4	0.000000	0.000000	0.000000	3.975250	16.894000
5	0.000000	0.000000	0.000000	0.000000	0.000000
6	0.000000	0.000000	0.000000	0.000000	.004250
7	0.000000	0.000000	0.000000	0.000000	0.000000
8	0.000000	0.000000	0.000000	0.000000	74.944250
9	0.000000	0.000000	0.000000	0.000000	.372250
10	0.000000	0.000000	968.063250	416.675000	776.748000
11	0.000000	7.147250	0.000000	406.391250	9.751250
12	0.000000	89.055250	0.000000	1307.815250	28.619250
13	0.000000	1.059250	0.000000	62.746250	9.803250
14	0.000000	1075.276000	.015250	832.615000	32.842000
15	0.000000	84.269250	150.917250	53.137250	16.644250
16	0.000000	.004250	0.000000	.088250	.211250
17	.074250	17.025250	3.086000	208.217250	74.297250
18	648.277250	2077.845000	801.242250	151.958000	560.821000
19	0.000000	0.000000	0.000000	12.360250	169.828250
20	0.000000	38.862250	0.000000	6.041250	20.332250
21	0.000000	.003250	.073250	.098250	.125250
22	0.000000	0.000000	0.000000	0.000000	0.000000
23	0.000000	0.000000	0.000000	0.000000	.793000
24	3.060250	0.000000	.008250	.553000	4.545250
25	0.000000	.123250	.047000	6.427250	4.753250
26	.005000	.663000	.058250	21.378250	9.416250
27	0.000000	0.000000	0.000000	.846250	.035000
28	.001250	.058250	.027250	19.157000	24.018250
29	451.535250	182.846250	0.000000	362.478250	785.984250
30	0.000000	0.000000	0.000000	0.000000	0.000000
31	0.000000	132.557250	117.921250	36.599250	167.963250
32	0.000000	11.901000	4.951000	7.979250	410.963000
33	1777.999250	1078.739250	1529.876250	327.100000	1974.844250
34	97.172000	123.660250	156.784250	230.606250	322.273250
35	943.522250	1535.203250	711.790250	1036.043250	2244.002250
36	154.717250	263.872000	95.750000	135.618250	629.476000
37	0.000000	0.000000	0.000000	28.844000	479.959250
38	0.000000	0.000000	0.000000	0.000000	0.000000
39	0.000000	249.655250	210.843250	533.866250	1213.474250
40	0.000000	0.000000	0.000000	0.000000	619.594250
41	76.880250	28.857250	37.369250	1.285250	651.701000
42	0.000000	11.080250	400.647250	4.987250	121.469250
43	1628.191000	4097.753000	6321.166000	542.822000	20.637250
44	193.819250	381.520250	720.683250	15.131250	726.777250
45	1528.097250	1893.311250	4842.086250	279.935250	3949.982000

Table II-2

1980 PROJECTED FINAL DEMAND

Household	Fed. Gov. Non-Def.	Def. Fed. Gov.	Sta--	Local	Export	Capital In
717.936	3564.596	2388.401	0.000	0.000	18367.301	40.510
1415.907	11034.976	7393.828	0.000	0.000	57297.262	260.284
3463.356	266.012	178.238	0.000	0.000	36255.806	163.353
6045.376	0.000	0.000	1.597	0.000	9411.957	0.000
0.000	0.000	0.000	0.000	0.000	889.864	0.000
12.520	0.000	0.000	0.000	0.000	1209.570	0.000
0.000	0.000	0.000	0.000	0.000	3893.321	0.000
1988.141	0.000	0.000	0.000	0.000	25984.399	0.000
0.000	0.000	0.000	0.000	0.000	57620.276	0.000
0.000	2006.282	1251.481	15732.744	3608.671	94732.124	110462.662
4476.961	0.000	0.000	0.000	0.000	2957.299	0.000
11138.316	18.508	11.546	47.891	0.000	3187.869	0.000
34.915	8.969	5.596	7.988	0.000	3152.969	0.000
7790.044	17.996	11.224	219.127	0.000	61813.497	0.000
9750.604	0.000	0.000	0.000	0.000	554.783	0.000
7.891	0.000	0.000	1.170	20.206	177.936	0.000
1714.816	491.442	306.559	77.446	0.000	3102.842	122.288
3800.414	.001	.001	0.000	0.000	2513.224	0.000
2425.930	2328.108	1452.175	205.446	102.774	200569.592	0.000
22807.048	46699.862	29119.853	240.013	0.000	285309.152	0.000
1.030	0.000	0.000	3.341	0.000	32.640	4.513
54.187	0.000	0.000	8.389	0.000	7266.071	252.434
1693.800	289.004	180.379	0.000	0.000	158074.193	4.166
170.581	50.103	31.253	24.532	0.000	912.167	1668.684
19.293	62.326	38.880	106.532	0.000	3009.469	2105.808
22.097	29.082	18.139	94.521	583.900	596.672	37.476
208.886	0.000	0.000	.385	0.000	0.000	0.000
503.404	178.314	111.233	115.469	0.000	1532.391	97.632
6792.444	795.728	496.357	177.382	0.000	2857.339	357.589
0.000	0.000	0.000	0.000	0.000	1380.360	212.906
4864.813	1231.897	768.439	1.663	14.087	1237.205	56.711
6517.235	365.161	227.782	.503	0.000	6238.026	315.186
16096.907	1774.322	1106.856	377.607	24.482	4364.510	409.788
4888.940	1228.014	758.434	30.899	8.225	403183.519	0.000
20098.744	836.429	521.739	179.569	28.425	2474.665	0.000
4516.234	604.215	562.526	22.847	3.303	486.468	0.000
8575.867	0.000	0.000	0.000	0.000	24350.386	1174.663
66.875	0.000	0.000	0.000	0.000	64.400	0.000
73632.708	147.812	92.207	29.837	79.669	63932.054	8842.305
69216.339	0.000	0.000	0.000	0.000	22194.974	2270.226
68978.700	0.000	0.000	0.000	30.203	24548.815	14990.554
121503.859	0.000	0.000	.360	7.379	39972.535	9216.889
60835.687	124.640	77.753	107.152	18201.526	34456.191	371.511
50549.051	9438.458	5324.127	13773.269	0.000	7430.625	0.000
[illegible]	[illegible]	889.033	143.852	25.205	48726.659	667.756

Table II-4

DIRECT REQUIREMENTS TABLE : COASTAL BEND , 1967

	1	2	3	4	5	6	7	8
1 IRRIGATED CROPS	0.00056834	0.00156123	0	0	0	0	0.00001800	0.00006410
2 DRY-FARMED CROPS	0	0.00150890	0.02297165	0.14940377	0	0	0.00016358	0
3 RANGE,FEEDLOT LVS	0	0	0.15342638	0	0	0	0.00000230	0.01942603
4 DAIRY,POULTRY,EGG	0	0	0	0	0	0	0.03812652	0
5 AG. SUPPLY	0.01091598	0.01073269	0.00136206	0.00102798	0	0	0	0
6 GINNING	0.01382924	0.01121644	0	0	0	0	0	0
7 AGL SERVICES	0.05597071	0.04036623	0.02557088	0.03152015	0	0	0	0
8 FISHERIES	0	0	0	0	0	0	0	0.01094893
9 MINING:PET,GAS,SR	0	0	0	0	0	0	0.00046595	0
10 CONSTRUCTION	0.00852289	0.00852209	0.00979031	0.01053185	0	0.10350987	0	0
11 MEAT PRODUCTS	0	0	0	0	0	0	0.00001935	0
12 DAIRY MANUFACT	0	0	0	0	0	0	0.00000663	0
13 CAN,PKE,P.D,FROZ	0	0	0	0	0	0	0.00000162	0.00003397
14 OTHER FOOD,KIN PR	0	0	0.06867094	0.18257497	0	0	0.00374293	0.03114728
15 BEVERAGES	0	0	0	0	0	0	0.00073051	0
16 TEXTILE MILL PROD	0.00038262	0.00007563	0	0	0.00006291	0.00014019	0.00000406	0.00017728
17 WOOD,PAPER PRODCT	0.00035538	0.00102486	0.00695483	0.00113745	0.00130029	0.00003375	0.06703271	0
18 NEWS,PUBLSH,PRINT	0	0	0.00000903	0	0.00215889	0.00069211	0.00000785	0
19 CHEM,DRUG,PET PRO	0.00070417	0.00172013	0.01246268	0.00911008	0	0	0.15534977	0.00107569
20 RUBBR,PLSTC,PRODCT	0.02134669	0.04176990	0.00008611	0.01735313	0.00009168	0.00753842	0.03006020	0.02286759
21 CLAY,GLT STN,SHTL	0	0	0	0	0.00000268	0	0.00000595	0.00000129
22 CEM,CONC PRODUCTS	0	0	0	0	0	0	0.00000866	0
23 PRI MET,FOUND,FAB	0.00014708	0.00178836	0	0	0	0	0.00003044	0
24 FAB STL,OTH METAL	0.00147536	0.00137715	0.00116765	0.00133321	0	0.00002129	0.00002763	0.00300812
25 MACH,PROC EQUIPMT	0.01275022	0.02650188	0.00009819	0.00176076	0	0.00003115	0.00602622	0.00000794
26 ELEC,ELECTR EQUIP	0.00026943	0.00051515	0.00003463	0.00008188	0.00000067	0.00000052	0.00004073	0.00075445
27 TRANSPORTN EQUIP	0	0	0	0	0	0.00348027	0.00000365	0.05959877

Table II-4
(cont'd.)

DIRECT REQUIREMENTS TABLE : COASTAL BEND , 1967

	1	2	3	4	5	6	7	8
28 OTHER MANUFACT	0.00527337	0.00210479	0.00028051	0.00107268	0.00016998	0.00000104	0.00009769	0.00000491
29 HWY MOT FR, WRHSG	0	0	0.02000000	0.04054767	0.00001138	0.01113136	0.00067869	0.00024067
30 WATER TRANSPORTN	0	0	0	0	0	0	0	0
31 AIR TRANSPORTN	0	0	0	0	0	0	0.00413152	0
32 OTH TRANSPORTN SR	0	0	0	0	0.00001338	0	0	0
33 COMMUNICATIONS	0.00226960	0.00232005	0.00125080	0.00284910	0.00992046	0.00597040	0.00577899	0.00232696
34 GAS SERVICES	0	0	0.00017743	0.00105322	0.00084857	0.01080841	0.00069181	0.00029972
35 ELECTRIC SERVICES	0.00251701	0.00257289	0.00150000	0.00185890	0.01423222	0.05651350	0.00340264	0.00127119
36 WATER, SANI SERVF	0	0	0	0	0.00270296	0.00008515	0.00120029	0.00069195
37 WHLSE GROCERIES	0	0	0	0	0	0	0.00000216	0
38 WHLSE LIVESTOCK	0	0	0.01826484	0.00476205	0	0	0	0
39 WHLSE TRADE-OTHER	0.03473443	0.03660419	0.02192316	0.08620436	0.16713266	0.00869730	0.00707765	0.03037967
40 FOOD STORES	0	0	0	0	0	0	0.00012218	0.02237289
41 AUTO DEAL,GAS STA	0.02108709	0.03059311	0.00568318	0.03181093	0.00139264	0.00901973	0.00042675	0.00066460
42 ALL OTHER RETAIL	0.01147351	0.01695620	0.00701786	0.00806454	0	0	0.02285037	0
43 BANK,F.,I.,R.,E.	0.07811209	0.07844253	0.06351792	0.07718474	0.02508556	0.04400052	0.00598926	0.00045064
44 EDUCATION	0.01908174	0.01927865	0.00907624	0.02385313	0.00357696	0.00840706	0.00115293	0.00120199
45 SERVICES - OTHER	0.00103833	0.00119239	0.00056401	0.00638848	0.04769636	0.01875909	0.04183183	0.01232521
46 HOUSEHOLDS	0.33585029	0.25731798	0.40393057	-0.10018527	0.36641580	0.36409709	0.17200481	0.36724060
47 FEDERAL GOVT	0.01489405	0.00837019	0.00500930	0.01053185	0.00619828	0.03395898	0.02467332	0.02464978
48 STATE GOVT	0.00067374	0.00070565	0.00029816	0.00052661	0.00424551	0.00873313	0.00242479	0.00389790
49 LOCAL GOVT	0.01853534	0.01872659	0.00881635	0.02317006	0.00347457	0.00816615	0.00111992	0.00116756
50 DEPRECIATION	0.08095378	0.09946581	0.03050299	0.10205383	0.02784340	0.18046625	0.01770243	0.10465709
51 IMPORTS	0.16616751	0.19666736	0.09958113	0.27241792	0.13267808	0.11573728	0.31585614	0.27704472
52 RESIDUAL	0	0	0	0	0.18274413	0	0.06890465	0
COLUMN TOTAL	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000

Table II-4
(cont'd.)

DIRECT REQUIREMENTS TABLE : COASTAL BEND , 1967

	9	10	11	12	13	14	15	16
28 OTHER MANUFACT	0.00000042	0.00015057	0.00000488	0.00042366	0.00007740	0.00033126	0	0.00006707
29 HWY MOT FR, WRHSG	0.00269281	0.00213222	0.00002194	0	0.00051985	0.00127387	0.00246987	0.00062595
30 WATER TRANSPORTN	0.02034254	0	0	0	0	0	0	0
31 AIR TRANSPORTN	0.00129126	0	0	0	0	0	0	0.00017139
32 OTH TRANSPORTN SR	0.00005475	0.00001726	0.00005160	0	0	0.00902426	0	0.01927018
33 COMMUNICATIONS	0.00236354	0.00477692	0.00425725	0.00109669	0.00196122	0.00590059	0.00884355	0.00668420
34 GAS SERVICES	0.00004131	0.00031787	0.00091150	0	0.00179130	0.00270875	0.00159468	0.00131896
35 ELECTRIC SERVICES	0.00223150	0.00195115	0.00497901	0	0.00721924	0.01436618	0.00713441	0.00445614
36 WATER, SANI SERVI	0.00003416	0.00022870	0.00044976	0	0.00135802	0.00077946	0.00190427	0.00046946
37 WHLSE GROCERIES	0	0	0	0.00009688	0.00800061	0.00295133	0.00145997	0
38 WHLSE LIVESTOCK	0	0	0	0	0	0	0	0
39 WHLSE TRADE-OTHER	0.00265634	0.03988920	0.00749208	0.00153175	0.00083817	0.00228201	0.00130503	0.00128915
40 FOOD STORES	0.00000098	0	0	0	0	0	0	0
41 AUTO DEAL,GAS STA	0.00107515	0.01248063	0.00125481	0.00329960	0.00013969	0.00025098	0.00330823	0.00017139
42 ALL OTHER RETAIL	0.00008839	0.00071062	0.00004835	0	0.00004214	0.00005949	0.00002374	0.00000745
43 BANK,F.,I.,R.,E.	0.00224326	0.02181786	0	0	0.00001053	0.00002848	0	0.00004471
44 EDUCATION	0.00488928	0.00198742	0.00127065	0.00070624	0.00174595	0.00311254	0.00241020	0.00152760
45 SERVICES - OTHER	0.00085845	0.01310465	0.00909792	0.00061702	0.00127557	0.00894774	0.01157156	0.00149780
46 HOUSEHOLDS	0.32340174	0.37728357	0.08306170	0.15512641	0.11369315	0.14543644	0.27736535	0.37616340
47 FEDERAL GOVT	0.04837406	0.05577158	0.00755627	0.00596950	0.00952122	0.01855261	0.00905938	0.01906898
48 STATE GOVT	0.04839412	0.00672454	0.00178988	0.00210112	0.00098107	0.00255682	0.00330457	0.00664694
49 LOCAL GOVT	0.00474928	0.00193050	0.00123429	0.00068600	0.00169603	0.00302341	0.00135632	0.00148289
50 DEPRECIATION	0.12011585	0.07635897	0.01729165	0.01113628	0.00988168	0.01930365	0.09244903	0.01452342
51 IMPORTS	0.15748696	0.26684263	0.40137011	0.28061951	0.41859945	0.46763345	0.39418230	0.63786076
52 RESIDUAL	0.16538872	0	-0.00136958	0.17774108	0.16706338	0.20353141	0.17502163	-0.09626892
COLUMN TOTAL	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000

Table II-4
(cont'd.)

DIRECT REQUIREMENTS TABLE : COASTAL BEND , 1967

	9	10	11	12	13	14	15	16
1 IRRIGATED CROPS	0.00000000	0	0.00000691	0.00001425	0.01108809	0.00556424	0.00012009	0.00022355
2 DRY-FARMED CROPS	0	0	0	0	0.00051893	0.02369477	0	0
3 RANGE,FEEDLOT LVS	0	0	0.42248265	0.00010248	0.00244718	0.00133941	0.00151766	0
4 DAIRY,POULTRY,EGG	0	0	0.02925772	0.34670010	0.00066870	0.00054783	0.00020731	0
5 AG. SUPPLY	0	0	0	0	0	0	0	0
6 GINNING	0	0	0	0	0	0.00205228	0	0.00007452
7 AG. SERVICES	0	0	0	0	0	0	0	0
8 FISHERIES	0	0	0	0	0.23178782	0.00000728	0	0
9 MINING:PET,GAS,SR	0.07365492	0	0	0	0	0	0	0
10 CONSTRUCTION	0.00157368	0.01152621	0	0	0.00040305	0.00365516	0	0.00031297
11 MEAT PRODUCTS	0	0	0.00612148	0	0.00023725	0.00006291	0	0
12 DAIRY MANUFACT	0	0	0	0.00624853	0	0.00000834	0	0
13 CAN,PRE,P,O,FROZ	0.00000000	0	0	0.00002181	0.00004122	0.00002189	0.00000030	0
14 OTHER FOOD,KIN PR	0	0	0	0.00304355	0.00109969	0.04449115	0.00019452	0
15 BEVERAGES	0	0	0	0	0	0.00011788	0.00021918	0
16 TEXTILE MILL PROD	0	0.00001600	0	0	0	0.00008076	0	0.00058124
17 WOOD,PAPER PRODUCT	0.00018925	0.01277179	0.00000041	0.00036766	0.00357344	0.00550526	0.00002892	0.00166174
18 NEWS,PUBLSH,PRINT	0.00002823	0.00088039	0.00000731	0.00011358	0.00146931	0.00011840	0.00152816	0.00005216
19 CHEM,DRUG,SEL PRO	0.00162687	0.00622995	0	0	0.00024137	0.00000123	0.00113577	0
20 PETRO,REFN,PRODCT	0.00706949	0.01028634	0.00134886	0.00223514	0.00000824	0.00046661	0.00000761	0.00000745
21 CLAY,CUT STN,SHEL	0.00000017	0.00168388	0.00000041	0.00000010	0	0.00000133	0.00027610	0
22 CEM,CONC PRODUCTS	0	0.04334886	0	0	0	0.00000290	0	0
23 PRI MET,FOUND,FRG	0	0.00020756	0	0	0	0.00000809	0	0
24 FAB STL,OTH METAL	0.00005281	0.01399641	0	0	0	0.00008545	0	0
25 MACH,PROC EQUIPMT	0.00035658	0.00127817	0	0.00000029	0	0.00000052	0	0
26 ELEC,ELECTR EQUIP	0.00012660	0.00038649	0.00000020	0.00000079	0	0.00001086	0.00000030	0.00000745
27 TRANSPORTN EQUIP	0	0.01291108	0	0	0	0.00000073	0	0

Table II-4
(cont'd.)

DIRECT REQUIREMENTS TABLE : COASTAL BEND , 1967

	17	18	19	20	21	22	23	24
1 IRRIGATED CROPS	0.00000012	0	0.00000012	0	0	0	0	0
2 DRY-FARMED CROPS	0.00000062	0.00000042	0.00000368	0	0.00000560	0	0	0.00000021
3 RANGE,FEEDLOT LVS	0.00000012	0	0.00000048	0	0	0	0	0
4 DAIRY,POULTRY,EGG	0.00000271	0.00000191	0.00000363	0	0.00003361	0	0	0.00000041
5 AG. SUPPLY	0	0	0	0	0	0	0	0
6 GINNING	0	0	0.00000002	0	0	0	0	0
7 AG. SERVICES	0	0	0	0	0	0	0	0
8 FISHERIES	0	0	0.00000002	0	0	0	0	0
9 MINING:PET,GAS,SR	0	0.00000297	0.05688536	0.45532842	0.00001401	0	0	0
10 CONSTRUCTION	0.00029656	0.00015180	0.02412918	0.00099035	0.00038376	0.00084890	0	0.00043919
11 MEAT PRODUCTS	0.00000234	0.00000064	0.00000518	0	0.00003922	0	0	0.00000041
12 DAIRY MANUFACT	0.00000074	0.00000011	0.00000058	0	0.00001120	0	0	0.00000021
13 CAN,PRE,P,D,FROZ	0.00000025	0	0.00000017	0	0	0	0	0
14 OTHER FOOD,KIN PR	0.00523226	0.00000583	0.00015760	0	0.00008684	0	0.00267786	0.00000309
15 BEVERAGES	0.00001910	0.00001970	0.00001434	0	0.00001681	0	0	0.00000959
16 TEXTILE MILL PROD	0.00004559	0.00000445	0.00000974	0	0	0	0.00000479	0.00000021
17 WOOD,PAPER PRODCT	0.00790734	0.00429939	0.00316124	0.00003552	0.01884044	0.00137420	0.00036068	0.00061602
18 NEWS,PUBLSH,PRINT	0.00119881	0.00868564	0.00009097	0.00006899	0.00050140	0.00098484	0.00044018	0.00018446
19 CHEM,DRUG,REL PRD	0.00392555	0.00010720	0.02053980	0.02309213	0.00610368	0	0.00021428	0.00020939
20 PETRO,REFN,PRODCT	0.00002070	0.00015815	0.00586071	0.00179140	0.00954907	0.00007197	0	0.00006039
21 CLAY,CUT STN,SHEL	0.00000209	0.00000042	0.00000171	0.00000135	0.00035574	0.00060930	0.00000393	0.00000804
22 CEM,CONC PRODUCTS	0	0.00000127	0	0.00001800	0.00373952	0.02369328	0	0
23 PRI MET,FOUND,FRG	0.00001257	0.00000328	0.00331243	0	0.00016527	0.00446564	0.00003144	0.00000536
24 FAB STL,OTH METAL	0.00017594	0.00616758	0.00104572	0.00000051	0.00127452	0	0.00000477	0.00038087
25 MACH,PROC EQUIPMT	0.00000246	0.00001229	0.00207505	0.00000751	0.00015406	0	0	0.00161807
26 ELEC,ELECTR EQUIP	0.00000246	0.00005614	0.00000370	0.00000029	0.00033894	0.00000015	0.00006431	0.00001463
27 TRANSPORTN EQUIP	0.00000041	0.00000424	0.00003065	0	0.00006443	0	0	0.00000103

Table II-4
(cont'd.)

DIRECT REQUIREMENTS TABLE : COASTAL BEND , 1967

	17	18	19	20	21	22	23	24
28 OTHER MANUFACT	0.00008489	0.00011292	0.00264543	0.00000379	0.00015966	0	0.00028916	0.00000742
29 HWY MOT FR, WRHSG	0.00729993	0.00826912	0.00831207	0.00079539	0.04085737	0.04574780	0.00114505	0.00005853
30 WATER TRANSPORTN	0	0.00048633	0.00578197	0.00249357	0	0	0	0
31 AIR TRANSPORTN	0.00018506	0.00000254	0.00102304	0	0.00010364	0	0	0.00001216
32 OTH TRANSPORTN SR	0.00546311	0.00310990	0.02708117	0.00163934	0.07433095	0.02094816	0.01718515	0.00053462
33 COMMUNICATIONS	0.00768470	0.00585593	0.00305332	0.00019779	0.00873394	0.00583469	0.00264478	0.00658645
34 GAS SERVICES	0.00045501	0.00096079	0.03413587	0.00635936	0.04015149	0.00135866	0.00364958	0.00103852
35 ELECTRIC SERVICES	0.00413731	0.00649564	0.04872169	0.00360013	0.04608989	0	0.01777137	0.00457721
36 WATER, SANT SERVE	0.00030580	0.00045126	0.00020348	0.00051117	0.00074510	0.00063135	0.00093367	0.00049690
37 WHLSE GROCERIES	0.00000099	0.00000064	0.00001602	0	0.00031933	0	0	0.00000062
38 WHLSE LIVESTOCK	0	0	0	0	0	0	0	0
39 WHLSE TRADE-OTHER	0.00191514	0.00594057	0.00868045	0.00170990	0.01168634	0.00547342	0.02975789	0.01437157
40 FOOD STORES	0.00000025	0.00000011	0.00000013	0	0.00000560	0	0	0
41 AUTO DEAL,GAS STA	0.00043431	0.00177497	0.00322279	0	0.00108404	0.00590075	0.00046257	0.00101997
42 ALL OTHER RETAIL	0.00175797	0.00024396	0.00009324	0.00002753	0.00026891	0.00028227	0.00001496	0.00218855
43 BANK,F.,I.,R.,E.	0.00009512	0.00005053	0.00510469	0	0.00158264	0	0.01315948	0.00011377
44 EDUCATION	0.00165000	0.00373436	0.00242311	0.00068401	0.00242298	0.00143160	0.00234940	0.00392553
45 SERVICES - OTHER	0.00396075	0.01972389	0.00911911	0.00328975	0.01233340	0.00495784	0.01755346	0.00191815
46 HOUSEHOLDS	0.14565193	0.35010308	0.23211988	0.02280709	0.27183065	0.16032201	0.33513295	0.27745827
47 FEDERAL GOVT	0.01161934	0.06594474	0.01859736	0.01567179	0.02437829	0.01392319	0.01427813	0.03241970
48 STATE GOVT	0.00140235	0.00279465	0.00375240	0.00038048	0.01122415	0.00355583	0.00102335	0.00126750
49 LOCAL GOVT	0.00160268	0.00352917	0.00230835	0.00066442	0.00235295	0.00139057	0.00225213	0.00381321
50 DEPRECIATION	0.01036632	0.02767893	0.05715162	0.01229745	0.05066135	0.05258048	0.02339478	0.05147915
51 IMPORTS	0.62119868	0.39453010	0.25166077	0.30635317	0.39289296	0.48750904	0.43716512	0.51336241
52 RESIDUAL	0.15369966	0.07852247	0.15745697	0.13912941	-0.03589376	0.15610404	0.07580580	0.07979793
COLUMN TOTAL	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000

Table II-4
(cont'd.)

DIRECT REQUIREMENTS TABLE : COASTAL BEND , 1967

	25	26	27	28	29	30	31	32
1 IRRIGATED CROPS	0.00009562	0.00000084	0	0.00000082	0	0	0	0
2 DRY-FARMED CROPS	0.00002023	0.00000843	0	0.00602997	0	0	0	0
3 RANGE,FEEDLOT LVS	0.00000067	0	0	0	0	0	0	0
4 DAIRY,POULTRY,EGG	0.00000368	0	0	0.00000123	0	0	0	0
5 AG. SUPPLY	0	0	0	0	0	0	0	0
6 GINNING	0	0	0	0	0	0	0	0
7 AG. SERVICES	0	0	0	0	0	0	0	0
8 FISHERIES	0	0	0	0	0	0	0	0
9 MINING:PET,GAS,SR	0.00000853	0.00081535	0	0.00000082	0	0	0	0.62624259
10 CONSTRUCTION	0.00282688	0.00114418	0.00007727	0.00592808	0.01105726	0.00340852	0.00038266	0.01785429
11 MEAT PRODUCTS	0.00001055	0.00000084	0	0.00000205	0	0	0	0
12 DAIRY MANUFACT	0.00000652	0	0	0.00000041	0	0	0	0
13 CAN,PRE,P,D,FROZ	0.00000067	0	0	0	0	0	0	0
14 OTHER FOOD,KIN PA	0.00002039	0.00002108	0	0.00000573	0.00001997	0	0	0.00116402
15 BEVERAGES	0.00007673	0.00040556	0	0.00006752	0	0	0	0
16 TEXTILE MILL PROD	0.00000053	0.00000169	0.00004612	0.00000614	0	0	0	0
17 WOOD,PAPER PRODCT	0.00007489	0.00071079	0.00031070	0.00479337	0.00055582	0.00038078	0.00005800	0.00031703
18 NEWS,PUBLSH,PRINT	0.00016032	0.00025885	0.00003676	0.00011048	0.00009970	0.00016397	0.00014576	0.00114214
19 CHEM,DRUG,REL PRD	0.00036276	0.01083136	0	0.00668673	0	0.00001723	0	0.00001573
20 PETRO,REFN,PRODCT	0.00112273	0.00055818	0.00000164	0.00025984	0.01644049	0.02587126	0.08244368	0.00612524
21 CLAY,CUT STN,SHEL	0.00001170	0.00000675	0.00000679	0.00000246	0.00000013	0.00000526	0.00000014	0.00012257
22 CEM,CONC PRODUCTS	0.00009178	0.00000084	0	0.00051150	0	0.00001671	0	0
23 PRI MET,FOUND,FRG	0.00699314	0.00172597	0	0.00040511	0	0.00339995	0	0.00176273
24 FAB STL,OTH METAL	0.00418147	0.00500253	0.00312174	0.00094402	0	0	0	0.00032738
25 MACH,PROC EQUIPMT	0.00177269	0.00080270	0.00043760	0.00058843	0.00000007	0.00001842	0.00000084	0.00334442
26 ELEC,ELECTR EQUIP	0.00078554	0.00789628	0.00113132	0.00004051	0.00000033	0.00004366	0.00000309	0.00131792
27 TRANSPORTN EQUIP	0.00040205	0.00000253	0	0.00002046	0	0	0	0.00025093

Table II-4
(cont'd.)

DIRECT REQUIREMENTS TABLE : COASTAL BEND , 1967

	25	26	27	28	29	30	31	32
28 OTHER MANUFACT	0.00030258	0.00295615	0.00455606	0.00224896	0.00000422	0	0.00000056	0.001026
29 HWY MOT FR, WRHSG	0.00147278	0.00135497	0	0.00202022	0	0.00054313	0	0.000641
30 WATER TRANSPORTN	0.01072560	0.00010034	0	0	0	0.20347273	0	
31 AIR TRANSPORTN	0.00100437	0.00133895	0	0.00015140	0	0	0.09450567	0.000390
32 OTH TRANSPORTN SR	0.00088100	0.00349578	0	0.03162746	0	0.00107453	0	0.005434
33 COMMUNICATIONS	0.00580053	0.00545531	0.00143245	0.00739465	0.05297985	0.00288262	0.00443745	0.001511
34 GAS SERVICES	0.00094469	0.00059781	0.00092765	0.00207914	0.01222767	0.00005199	0.00013256	0.003149
35 ELECTRIC SERVICES	0.00257127	0.00337942	0.00408006	0.01695028	0.02034532	0.00156506	0.00026161	0.005772
36 WATER, SANI SERVC	0.00047427	0.00021332	0.00065545	0.00076439	0.00094558	0.00017945	0.00003469	0.000286
37 WHLSE GROCERIES	0.00001003	0.00000084	0	0.00000123	0	0	0	
38 WHLSE LIVESTOCK	0	0	0	0	0	0	0	
39 WHLSE TRADE-OTHER	0.01117695	0.00559021	0.03117083	0.00747363	0.04305888	0.07102936	0.00597398	0.003746
40 FOOD STORES	0	0	0	0	0	0	0	
41 AUTO DEAL,GAS STA	0.00045889	0.00026223	0.00033669	0.00068009	0	0.00009034	0	
42 ALL OTHER RETAIL	0.00072452	0.00023524	0.00080543	0.00095876	0	0.00113215	0	
43 BANK,F.,I.,R.,E.	0.00032247	0.00037437	0	0.00030444	0.05014528	0.04192557	0.00638051	0.003904
44 EDUCATION	0.00184240	0.00141652	0.00066378	0.00192037	0.00342255	0.00106076	0.00726716	0.004706
45 SERVICES - OTHER	0.00556495	0.00943001	0.03298305	0.00518824	0.04460430	0.01419332	0.01192634	0.003793
46 HOUSEHOLDS	0.20301244	0.27699302	0.27639492	0.23029805	0.31723303	0.41085928	0.25501189	0.371851
47 FEDERAL GOVT	0.01346353	0.03201178	0.00989203	0.02314393	0.03412763	0.02503329	0.04011971	0.039128
48 STATE GOVT	0.00214465	0.00226391	0.00075228	0.00084213	0.04062850	0.00286241	0.00090996	0.004330
49 LOCAL GOVT	0.00178958	0.00135919	0.00064458	0.00184713	0.00332450	0.00089304	0.00705905	0.004571
50 DEPRECIATION	0.01099891	0.01978582	0.03611954	0.07931438	0.06324480	0.00863935	0.00140060	0.064440
51 IMPORTS	0.38355128	0.48007970	0.52626872	0.46332506	0.19223429	0.05808906	0.08073723	0.035645
52 RESIDUAL	0.32140194	0.12111035	0.06716605	0.09506039	0.09329984	0.12109081	0.40080686	0.085682
COLUMN TOTAL	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000	1.000000

Table II-4
(cont'd.)

DIRECT REQUIREMENTS TABLE : COASTAL BEND , 1967

	33	34	35	36	37	38	39	40
1 IRRIGATED CROPS	0	0	0	0	0	0	0	0
2 DRY-FARMED CROPS	0	0	0	0	0	0	0	0
3 RANGE,FEEDLOT LVS	0	0	0	0	0	0	0	0
4 DAIRY,POULTRY,EGG	0	0	0	0	0	0	0	0
5 AG. SUPPLY	0	0	0	0	0	0	0	0
6 GINNING	0	0	0	0	0	0	0	0
7 AG. SERVICES	0	0	0	0	0	0	0	0
8 FISHERIES	0	0	0	0	0	0	0	0
9 MINING:PET,GAS,SR	0	0.61891311	0	0	0	0	0	0
10 CONSTRUCTION	0.00036789	0.00122870	0.00198030	0.05039791	0	0.02689608	0	0
11 MEAT PRODUCTS	0	0	0	0	0	0	0	0
12 DAIRY MANUFACT	0	0	0	0	0	0	0	0
13 CAN,PRS,F,O,PROD	0	0	0	0	0.00015598	0	0.00000001	0
14 OTHER FOOD,KIN PR	0	0	0	0	0.00055367	0	0	0.00001536
15 BEVERAGES	0	0	0	0	0	0	0	0
16 TEXTILE MILL PROD	0	0.00000081	0.00000269	0.00001023	0	0	0.00000201	0
17 WOOD,PAPER PRODUCT	0.00002795	0.00000013	0.00007760	0.00078562	0.00000092	0.00001180	0.00007382	0.00007693
18 NEWS,PUBLSH,PRINT	0.00981753	0.00004001	0.00139523	0.00024779	0.00071740	0.00000131	0.00023982	0.00744425
19 CHEM,DRUG,ALL PRO	0	0.00000401	0.00000699	0.01019335	0	0	0	0
20 PETRO,REFN,PRODUCT	0.00074465	0.00096289	0.00124576	0.00282906	0.00000897	0	0.00000636	0
21 CLAY,CUT STN,SHEL	0.00000006	0	0.00000032	0.00077963	0	0	0.00000002	0
22 CEM,CONC PRODUCTS	0	0	0.00004381	0.01328306	0	0	0	0
23 PRI MET,FOUND,FAB	0	0	0.00000901	0.00005131	0	0	0	0
24 FAB STL,OTH METAL	0	0	0.00000222	0.00012792	0	0	0	0
25 MACH,PROD EQUIPMT	0.00000093	0.00018018	0.00000254	0.00011724	0	0	0.00001361	0
26 ELEC,ELECTR EQUIP	0.00105851	0.00000118	0.00002072	0.00044617	0	0	0.00001756	0
27 TRANSPORTN EQUIP	0.00007190	0.00000057	0.00000516	0	0.00250820	0	0.00007041	0

Table II-4
(cont'd.)

DIRECT REQUIREMENTS TABLE : COASTAL BEND , 1967

	33	34	35	36	37	38	39	40
28 OTHER MANUFACT	0.00021466	0.00000000	0.00000326	0.00037702	0.00008333	0.00000131	0.00009432	0.00000003
29 HWY MOT FR, WRHSG	0.00095283	0.00056311	0.00143773	0	0.00051422	0	0.00101731	0.00001191
30 WATER TRANSPORTN	0	0	0	0	0	0	0	0
31 AIR TRANSPORTN	0.00083812	0	0.00001015	0	0	0	0.00108469	0
32 OTH TRANSPORTN SR	0.00076142	0.00019672	0.00315317	0	0.00001824	0	0.00020033	0
33 COMMUNICATIONS	0.00405119	0.00229054	0.00583613	0.00254647	0.01554345	0.01215157	0.02027414	0.00259719
34 GAS SERVICES	0.00085750	0.01133283	0.13190604	0	0.00137670	0.00084727	0.00692895	0.00155431
35 ELECTRIC SERVICES	0.00755303	0.00067280	0	0.06364120	0.01348530	0.00976585	0.01276243	0.01506003
36 WATER, SANI SERVE	0.00079437	0.00013996	0.00228162	0.06787177	0.00156247	0.00126959	0.00241114	0.00219150
37 WHLSE GROCERIES	0	0	0	0	0	0	0	0
38 WHLSE LIVESTOCK	0	0	0	0	0	0	0	0
39 WHLSE TRADE-OTHER	0.00012867	0.00026322	0.00078325	0.01627117	0.00195019	0.00550722	0.00302341	0
40 FOOD STORES	0	0	0	0	0	0	0	0
41 AUTO DEAL,GAS STA	0	0.00065932	0.00451106	0	0.00049576	0.00329725	0.00115728	0.00021893
42 ALL OTHER RETAIL	0.00025267	0.00000301	0.00013401	0	0.00007265	0	0.00123732	0
43 BANK,F.,I.,R.,E.	0.00062719	0.00528055	0.00807638	0.00269602	0.00425565	0.10991235	0.02516913	0.00342440
44 EDUCATION	0.01604703	0.01204875	0.02026324	0	0.00228289	0.01764043	0.00369012	0.00338330
45 SERVICES - OTHER	0.00568806	0.00560981	0.00473968	0.00045772	0.02480118	0.04996505	0.02277077	0.00795055
46 HOUSEHOLDS	0.21514983	0.08530773	0.13898076	0.28153688	0.26840022	0.41019184	0.31455554	0.17771702
47 FEDERAL GOVT	0.14975486	0.03835524	0.15246635	0.09761617	0.02800096	0	0.04323413	0.01132531
48 STATE GOVT	0.01953988	0.01068862	0.01558328	0	0.00332641	0.00538394	0.00463212	0.00189843
49 LOCAL GOVT	0.01558754	0.01170373	0.01968304	0	0.00221749	0.01713548	0.00358445	0.00328642
50 DEPRECIATION	0.13706814	0.06064977	0.12603225	0.28263491	0.03143940	0.04703110	0.05580806	0.02454372
51 IMPORTS	0.39077089	0.03699372	0.06326235	0.15130555	0.25571416	0.13806490	0.28543124	0.06219757
52 RESIDUAL	0.01527271	0.09590899	0.29609881	0.04377582	0.34051419	0.14492565	0.19050951	0.67510282
COLUMN TOTAL	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000

Table II-4
(cont'd.)

DIRECT REQUIREMENTS TABLE : COASTAL BEND , 1967

	41	42	43	44	45	HOUSEHOLDS
1 IRRIGATED CROPS	0	0	0	0.00003133	0.00008718	0.00044492
2 DRY-FARMED CROPS	0	0	0	0	0.00000652	0.00087748
3 RANGE,FEEDLOT LVS	0	0	0	0.00020338	0.00074542	0.00195655
4 DAIRY,POULTRY,EGG	0	0	0	0.00005261	0.00012731	0.00359385
5 AG. SUPPLY	0	0	0	0	0	0
6 GINNING	0	0	0	0	0.00000003	0.00001298
7 AG. SERVICES	0	0	0	0	0	0
8 FISHERIES	0	0	0	0	0.00056477	0.00125075
9 MINING:PET,GAS,SR	0	0	0	0	0.00000280	0
10 CONSTRUCTION	0	0	0.00922659	0.00551525	0.00585349	0
11 MEAT PRODUCTS	0	0.00006498	0	0.00537913	0.00007348	0.00276043
12 DAIRY MANUFACT	0	0.00080972	0	0.01731069	0.00021567	0.00686762
13 CAN,PRE,P,D,FROZ	0	0.00000963	0	0.00083053	0.00007387	0.00002153
14 OTHER FOOD,KIN PR	0	0.00977674	0.00000014	0.01102078	0.00024749	0.00480323
15 BEVERAGES	0	0.00076620	0.00143839	0.00070334	0.00012543	0.00601201
16 TEXTILE MILL PROD	0	0.00000004	0	0.00000116	0.00000159	0.00000493
17 WOOD,PAPER PRODCT	0.00000096	0.00015480	0.00002941	0.00275603	0.00055989	0.00113747
18 NEWS,PUBLSH,PRINT	0.00838958	0.01889241	0.00763663	0.00201137	0.00422629	0.00248272
19 CHEM,DRUG,REL PRO	0	0	0	0.00016360	0.00127981	0.00167004
20 PETRO,REFN,PRODCT	0	0.00035335	0	0.00007996	0.00015322	0.01399049
21 CLAY,CUT STN,SHEL	0	0.00000003	0.00000070	0.00000130	0.00000094	0.00000065
22 CEM,CONC PRODUCTS	0	0	0	0	0	0.00003426
23 PRI MET,FOUND,FRG	0	0	0	0	0.00000598	0.00108648
24 FAB STL,OTH METAL	0.00003960	0	0.00000008	0.00000732	0.00003425	0.00011415
25 MACH,PROC EQUIPMT	0	0.00000112	0.00000045	0.00008507	0.00003582	0.00001090
26 ELEC,ELECTR EQUIP	0.00000006	0.00000603	0.00000055	0.00028297	0.00007096	0.00001614
27 TRANSPORTN EQUIP	0	0	0	0.00001120	0.00000026	0.00013086

Table II-4
(cont'd.)

DIRECT REQUIREMENTS TABLE : COASTAL BEND , 1967

	41	42	43	44	45	HOUSEHOLDS
28 OTHER MANUFACT	0.00000001	0.00000053	0.00000026	0.00025357	0.00018100	0.00033810
29 HWY MOT FR, WRHSG	0.00584346	0.00166249	0	0.00479788	0.00592309	0.00445994
30 WATER TRANSPORTN	0	0	0	0	0	0
31 AIR TRANSPORTN	0	0.00120525	0.00112390	0.00048444	0.00126575	0.00319426
32 OTH TRANSPORTN SR	0	0.00010821	0.00004719	0.00010561	0.00309697	0.00427909
33 COMMUNICATIONS	0.02300972	0.00980823	0.01458123	0.00432961	0.01488221	0.01127502
34 GAS SERVICES	0.00125754	0.00112436	0.00149431	0.00305236	0.00242861	0.00326822
35 ELECTRIC SERVICES	0.01221046	0.01395854	0.00678406	0.01371342	0.01691056	0.01343594
36 WATER, SANI SERVE	0.00200225	0.00239921	0.00091259	0.00179509	0.00474366	0.00301905
37 WHLSE GROCERIES	0	0	0	0.00038179	0.00361692	0.00555337
38 WHLSE LIVESTOCK	0	0	0	0	0	0.00004336
39 WHLSE TRADE-OTHER	0	0.00226994	0.00200954	0.00706644	0.00914461	0.04768051
40 FOOD STORES	0	0	0	0	0.00466919	0.04482047
41 AUTO DEAL,GAS STA	0.00099493	0.00026238	0.00035616	0.00001701	0.00491115	0.04617648
42 ALL OTHER RETAIL	0	0.00010074	0.00381856	0.00006601	0.00091538	0.07867881
43 BANK,F.,I.,R.,E.	0.02107100	0.03725804	0.06024694	0.00718498	0.00015552	0.03887460
44 EDUCATION	0.00250828	0.00346890	0.00686882	0.00020028	0.00547691	0.03481757
45 SERVICES - OTHER	0.01977565	0.01721457	0.04614965	0.00370532	0.02976664	0.07310772
46 HOUSEHOLDS	0.46167554	0.32022457	0.31210263	0.63989411	0.29697845	0.00842365
47 FEDERAL GOVT	0.02938592	0.04200721	0.04679489	0.00382398	0.02355959	0.13593348
48 STATE GOVT	0.00134390	0.00427811	0.01567168	0.00009312	0.01001032	0.00331904
49 LOCAL GOVT	0.00243646	0.00336958	0.00667213	0.00008249	0.00504334	0.02702898
50 DEPRECIATION	0.02490964	0.02096126	0.02391696	0.10167377	0.04669088	0
51 IMPORTS	0.11814387	0.10581701	0.07994045	0.15649426	0.21504932	0.35451999
52 RESIDUAL	0.26500135	0.38166585	0.34717492	0.00433742	0.28008745	0.00847188
COLUMN TOTAL	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000

Table II-5

DIRECT AND INDIRECT REQUIREMENTS TABLE : COASTAL BEND , 1967

	1	2	3	4	5	6	7	8
1 IRRIGATED CROPS	1.00098028	0.00157634	0.00052509	0.00131589	0.00000570	0.00000368	0.00009940	0.00026222
2 DRY-FARMED CROPS	0.00041229	1.00181130	0.02942026	0.15447551	0.00001245	0.00001677	0.00617551	0.00137011
3 RANGE,FEEDLOT LVS	0.00007717	0.00007809	1.16142147	0.00042017	0.00006757	0.00005620	0.00009099	0.02327915
4 DAIRY,POULTRY,EGG	0.00227953	0.00169061	0.00133625	1.00174626	0.00004557	0.00007391	0.03823477	0.00506197
5 AG. SUPPLY	0.01093355	0.01077118	0.00193203	0.00270265	1.00000033	0.00000037	0.00010679	0.00004934
6 GINNING	0.01284967	0.01126057	0.00051295	0.00214512	0.00000044	1.00000059	0.00009517	0.00009019
7 AG. SERVICES	0.05611603	0.04058286	0.03146908	0.03789518	0.00000399	0.00000465	1.00146234	0.00366720
8 FISHERIES	0.00001123	0.00001133	0.00001033	0.00002119	0.00003345	0.00001699	0.00002955	1.01108894
9 MINING:PET,GAS,SA	0.02335000	0.03324692	0.00604540	0.02073961	0.00347282	0.01777522	0.03601164	0.01303184
10 CONSTRUCTION	0.01356067	0.01343979	0.01483011	0.01576110	0.00091639	0.10579575	0.00530441	0.00073690
11 MEAT PRODUCTS	0.00011503	0.00012007	0.00008014	0.00017745	0.00003351	0.00006109	0.00004817	0.00001543
12 DAIRY MANUFAC	0.00038207	0.00039262	0.00024487	0.00053773	0.00010688	0.00019619	0.00010751	0.00004264
13 CAN,PRL,P,O,FROZ	0.00001875	0.00001906	0.00001404	0.00003098	0.00000862	0.00001097	0.00000912	0.00003622
14 OTHER FOOD,KIN PR	0.00109219	0.00097849	0.08561458	0.19210686	0.00010422	0.00016483	0.01194703	0.03468416
15 BEVERAGES	0.00019758	0.00019248	0.00017991	0.00023369	0.00005676	0.00006525	0.00078334	0.00001401
16 TEXTILE MILL PROD	0.00008728	0.00007998	0.00001063	0.00002908	0.00006358	0.00014255	0.00001050	0.00018526
17 WOOD,PAPER PRODUCT	0.00476405	0.00437827	0.01126765	0.00541547	0.00140409	0.00148431	0.06843450	0.00047336
18 NEWS,PUBLSH,PRINT	0.00157492	0.00156675	0.00116240	0.00173080	0.00291290	0.00160723	0.00132985	0.00035496
19 CHEM,DRUG,PTL PRO	0.09222462	0.09143384	0.02278655	0.02917136	0.00014006	0.00097118	0.16095630	0.00227407
20 PETRO,REFN,PRODCT	0.02429485	0.04441989	0.00316796	0.02646756	0.00023209	0.00911225	0.03298700	0.02343416
21 CLAY,GLT STN,SHEL	0.00002510	0.00002486	0.00002653	0.00002900	0.00000734	0.00018176	0.00001798	0.00000415
22 CEM,CONC PRODUCTS	0.00061957	0.00061060	0.00066674	0.00071656	0.00009232	0.00470860	0.00027126	0.00004546
23 PRI MET,FOUND,FRG	0.00056771	0.00230522	0.00014874	0.00043528	0.00000289	0.00005095	0.00064237	0.00001557
24 FAB STL,OTH METAL	0.00184739	0.00180461	0.00168024	0.00186576	0.00003476	0.00153330	0.00038641	0.00323500
25 MACH,PROC EQUIPMT	0.01357777	0.02710367	0.00117617	0.00622220	0.00001065	0.00018784	0.00665780	0.00010076
26 ELEC,ELECTR EQUIP	0.00031367	0.00057513	0.00008181	0.00021103	0.00002868	0.00006726	0.00008344	0.00004972
27 TRANSPORTN EQUIP	0.00023813	0.00023194	0.00019927	0.00022648	0.00002756	0.00484984	0.00003591	0.06027290
28 OTHER MANUFACT	0.00557121	0.00240365	0.00050746	0.00158931	0.00020409	0.00005436	0.00061236	0.00032025
29 RWY MOT FR, WRHSG	0.00186539	0.00172124	0.02443131	0.04202126	0.00064582	0.01205739	0.00466453	0.00100445
30 WATER TRANSPORTN	0.00152793	0.00201800	0.00034528	0.00090918	0.00009236	0.00049306	0.00228167	0.00042438
31 AIR TRANSPORTN	0.00062117	0.00058936	0.00037138	0.00056471	0.00034122	0.00015921	0.00495833	0.00009973
32 OTH TRANSPORTN SR	0.00290709	0.00286273	0.00158384	0.00284812	0.00032315	0.00046007	0.00519664	0.00051594
33 COMMUNICATIONS	0.00063127	0.00696301	0.00660318	0.01230461	0.01496210	0.00937910	0.00911166	0.00395471
34 GAS SERVICES	0.00561353	0.00575013	0.00299667	0.00597760	0.00466697	0.01934590	0.00882527	0.00153190
35 ELECTRIC SERVICES	0.01071115	0.01086855	0.00690007	0.01144019	0.01805618	0.05851579	0.01388737	0.00359321
36 WATER, SANI SERVE	0.00056859	0.00060655	0.00050598	0.00097764	0.00372474	0.00056058	0.00180332	0.00109027
37 WHLSE GROCERIES	0.00005677	0.00005680	0.00029928	0.00065893	0.00020165	0.00009627	0.00021597	0.00016437
38 WHLSE LIVESTOCK	0.00001226	0.00000948	0.02158484	0.00477804	0.00000145	0.00000138	0.00016374	0.00042545
39 WHLSE TRADE-OTHER	0.03984619	0.04186534	0.03046313	0.09726630	0.16844352	0.01429091	0.01371561	0.03382640
40 FOOD STORES	0.00006295	0.00006127	0.00005552	0.00010746	0.00025778	0.00011826	0.00034647	0.02269956
41 AUTO DEAL,GAS STA	0.02208721	0.03162473	0.00822781	0.03741146	0.00198123	0.01084831	0.00283738	0.00106746
42 ALL OTHER RETAIL	0.01324677	0.01841453	0.00996101	0.01217491	0.00039225	0.00033898	0.02356842	0.00033995
43 BANK,F.,I.,R.,E.	0.08821328	0.08900535	0.08870486	0.10355322	0.03169840	0.05141443	0.01323509	0.00351423
44 EDUCATION	0.02116875	0.02149862	0.01339615	0.02991590	0.00543134	0.01093201	0.00407296	0.00220522
45 SERVICES - OTHER	0.01195245	0.01199625	0.01123005	0.02191599	0.05504755	0.02524129	0.04784112	0.01680740
COLUMN TOTAL	1.49563412	1.53901945	1.62418120	1.88925083	1.31631738	1.36346682	1.52943895	1.27031670

Table II-5
(cont'd.)

DIRECT AND INDIRECT REQUIREMENTS TABLE : COASTAL BEND , 1967

	9	10	11	12	13	14	15	16
1 IRRIGATED CROPS	0.00000150	0.00000255	0.00026997	0.00049190	0.01117026	0.00567160	0.00012392	0.00022450
2 DRY-FARMED CROPS	0.00000817	0.00000878	0.01705638	0.05397672	0.00105278	0.02498612	0.00008636	0.00000415
3 RANGE,FEEDLOT LVS	0.00002486	0.00002538	0.50223050	0.00027687	0.00841726	0.00171394	0.00181396	0.00000771
4 DAIRY,POULTRY,EGG	0.00003704	0.00002262	0.03006936	0.34949650	0.00073470	0.00066363	0.00023079	0.00001323
5 AG. SUPPLY	0.00000018	0.00000018	0.00090098	0.00094434	0.00014545	0.00033528	0.00000499	0.00000252
6 GINNING	0.00000028	0.00000041	0.00028139	0.00075640	0.00018600	0.00251006	0.00000354	0.00007783
7 AG. SERVICES	0.00000222	0.00000186	0.01449388	0.01322963	0.00090610	0.00140198	0.00006408	0.00001335
8 FISHERIES	0.00000624	0.00001086	0.00001107	0.00001322	0.23436967	0.00002043	0.00000802	0.00000153
9 MINING:PET,GAS,SR	1.08486461	0.00788985	0.00511705	0.00844489	0.00535777	0.01131476	0.00211956	0.01468969
10 CONSTRUCTION	0.00206262	1.01238965	0.00689257	0.00553733	0.00093248	0.00493886	0.00032170	0.00378431
11 MEAT PRODUCTS	0.00003103	0.00001750	1.00620779	0.00006640	0.00025525	0.00009244	0.00001671	0.00001078
12 DAIRY MANUFACT	0.00009973	0.00005607	0.00014973	1.00648923	0.00005126	0.00009299	0.00005341	0.00003464
13 CAN,PRE,P,D,FRGZ	0.00000532	0.00000377	0.00000893	0.00003355	1.00005346	0.00002809	0.00000389	0.00000178
14 OTHER FOOD,KIN PR	0.00008048	0.00013208	0.04207409	0.07025022	0.00960402	1.04693080	0.00041804	0.00005985
15 BEVERAGES	0.00001156	0.00004247	0.00008629	0.00009286	0.00000848	0.00013516	1.00022397	0.00000235
16 TEXTILE MILL PROD	0.00000012	0.00001764	0.00000544	0.00001045	0.00004433	0.00008784	0.00000016	1.00058173
17 WOOD,PAPER PRODCT	0.00027650	0.01320045	0.00496441	0.00223895	0.00383105	0.00615725	0.00009002	0.00170640
18 NEWS,PUBLSH,PRINT	0.00017358	0.00146555	0.00067004	0.00076956	0.00164641	0.00035721	0.00174491	0.00017305
19 CHEM,DRUG,REL PRO	0.00203779	0.00680948	0.01060267	0.01025199	0.00196795	0.00297286	0.00126306	0.00007468
20 PETRO,REFN,PRODCT	0.00863014	0.01067710	0.00352363	0.01150736	0.00581544	0.00202147	0.00012700	0.00030223
21 CLAY,CUT STN,SHEL	0.00000405	0.00173373	0.00001324	0.00001032	0.00000351	0.00001196	0.00027856	0.00000418
22 CEM,CONC PRODUCTS	0.00009435	0.04496631	0.00031822	0.00025232	0.00006621	0.00023749	0.00004511	0.00004260
23 PRI MET,FOUND,FRG	0.00010548	0.00044816	0.00007688	0.00015276	0.00001374	0.00009050	0.00000551	0.00003693
24 FAB STL,OTH METAL	0.00009256	0.01424702	0.00077251	0.00065395	0.00080749	0.00021993	0.00002095	0.00002060
25 MACH,PROC EQUIPMT	0.00039742	0.00135018	0.00068572	0.00217505	0.00019734	0.00080068	0.00001074	0.00007547
26 ELEC,ELECTR EQUIP	0.00014704	0.00042562	0.00004834	0.00007648	0.00020587	0.00005388	0.00001427	0.00004420
27 TRANSPORTN EQUIP	0.00002805	0.01307677	0.00009440	0.00008041	0.01400226	0.00008620	0.00000941	0.00001609
28 OTHER MANUFACT	0.00001161	0.00024550	0.00027200	0.00098437	0.00022201	0.00045859	0.00001182	0.00009195
29 HWY MOT FR, WRHSG	0.00307583	0.00474148	0.01174887	0.01470995	0.00095727	0.00169382	0.00269474	0.00073782
30 WATER TRANSPORTN	0.02775362	0.00030349	0.00022833	0.00035590	0.00017301	0.00032789	0.00006491	0.00037778
31 AIR TRANSPORTN	0.00153036	0.00014107	0.00020608	0.00020393	0.00004305	0.00006723	0.00003564	0.00023208
32 OTH TRANSPORTN SR	0.00020976	0.00148915	0.00006798	0.00105003	0.00024012	0.00973813	0.00013887	0.01943385
33 COMMUNICATIONS	0.00323194	0.00751637	0.00786912	0.00556549	0.00332079	0.00705521	0.00946212	0.00695891
34 GAS SERVICES	0.00126353	0.00182057	0.00320271	0.00215897	0.00331593	0.00532007	0.00282224	0.00209320
35 ELECTRIC SERVICES	0.00310021	0.00406795	0.00867725	0.00416685	0.00858037	0.01611447	0.00784672	0.00481860
36 WATER, SANI SERVE	0.00014188	0.00059227	0.00082432	0.00036471	0.00177317	0.00102531	0.00216032	0.00054939
37 WHLSE GROCERIES	0.00003413	0.00006547	0.00018264	0.00034038	0.00805162	0.00313098	0.00150779	0.00000798
38 WHLSE LIVESTOCK	0.00000063	0.00000057	0.00931635	0.00166938	0.00015724	0.00003447	0.00003423	0.00000020
39 WHLSE TRADE-OTHER	0.00527850	0.04203854	0.02351670	0.03553007	0.00945425	0.00430910	0.00172870	0.00156468
40 FOOD STORES	0.00004206	0.00008180	0.00007292	0.00004148	0.00527087	0.00005080	0.00005829	0.00000912
41 AUTO DEAL,GAS STA	0.00127258	0.01313935	0.00595034	0.01639062	0.00076209	0.00143418	0.00345134	0.00023992
42 ALL OTHER RETAIL	0.00015389	0.00096932	0.00466403	0.00425591	0.00032560	0.00065408	0.00006382	0.00002395
43 BANK,F.,I.,R.,E.	0.00434768	0.02543633	0.04112074	0.03629212	0.00239497	0.00366777	0.00964512	0.00043252
44 EDUCATION	0.00560858	0.00295349	0.00816174	0.01121714	0.00284943	0.00466850	0.00290767	0.00196314
45 SERVICES - OTHER	0.00875011	0.01746224	0.01518408	0.00847303	0.00583893	0.01074331	0.01244284	0.00194284
COLUMN TOTAL	1.16508490	1.25208679	1.78969169	1.68208898	1.35556925	1.18462732	1.05717980	1.06048449

Table II-5
(cont'd.)

DIRECT AND INDIRECT REQUIREMENTS TABLE : COASTAL BEND , 1967

	17	18	19	20	21	22	23	24
1 IRRIGATED CROPS	0.00003194	0.00000266	0.00000348	0.00000123	0.00000396	0.00000131	0.00001808	0.00000106
2 DRY-FARMED CROPS	0.00013733	0.00000957	0.00003440	0.00000612	0.00002915	0.00000488	0.00007527	0.00000703
3 RANGE,FEEDLOT LVS	0.00002117	0.00003319	0.00003004	0.00001825	0.00005245	0.00001433	0.00003342	0.00001546
4 DAIRY,POULTRY,EGG	0.00002105	0.00003360	0.00003926	0.00002443	0.00007674	0.00001547	0.00002724	0.00002848
5 AG. SUPPLY	0.00000187	0.00000021	0.00000049	0.00000013	0.00000051	0.00000010	0.00000108	0.00000014
6 GINNING	0.00001343	0.00000036	0.00000109	0.00000021	0.00000116	0.00000024	0.00000701	0.00000027
7 AG. SERVICES	0.00000854	0.00000244	0.00000359	0.00000155	0.00000516	0.00000112	0.00000576	0.00000164
8 FISHERIES	0.00000342	0.00001342	0.00000870	0.00000540	0.00001119	0.00000533	0.00001250	0.00000235
9 MINING:PET,GAS,SR	0.00533931	0.00393663	0.11421163	0.50344143	0.08953816	0.01694051	0.01642243	0.00171902
10 CONSTRUCTION	0.00071282	0.00054497	0.00617762	0.00269062	0.00297463	0.00197946	0.00077614	0.00056503
11 MEAT PRODUCTS	0.00001452	0.00002563	0.00003213	0.00002022	0.00007024	0.00001241	0.00002010	0.00002390
12 DAIRY MANUFACT	0.00003969	0.00008021	0.00009314	0.00006472	0.00010987	0.00003985	0.00006378	0.00007699
13 CAN,PRE,P,G,FRCZ	0.00000249	0.00000519	0.00000542	0.00000360	0.00000586	0.00000243	0.00000439	0.00000377
14 OTHER FOOD,KIN PR	0.00557749	0.00010265	0.00030836	0.00006035	0.00038122	0.00008366	0.00288066	0.00008718
15 BEVERAGES	0.00002474	0.00002747	0.00003319	0.00000776	0.00003246	0.00000762	0.00002753	0.00001625
16 TEXTILE MILL PROD	0.00004654	0.00000480	0.00001086	0.00000036	0.00000129	0.00000019	0.00000524	0.00000032
17 WOOD,PAPER PRODCT	1.00804915	0.00441882	0.00368271	0.00027199	0.01917043	0.00151417	0.00043265	0.00064846
18 NEWS,PUBLSH,PRINT	0.00139071	1.00898712	0.00046643	0.00019634	0.00098487	0.00127334	0.00076459	0.00034716
19 CHEM,DRUG,REL PRO	0.00408699	0.00018864	1.02157887	0.02459575	0.00680316	0.00010161	0.00031368	0.00023868
20 PETRO,REFN,PRODCT	0.00030185	0.00040436	0.00790585	1.00609439	0.01164646	0.00116391	0.00032496	0.00011213
21 CLAY,CUT STN,SHEL	0.00000442	0.00000240	0.00005065	0.00000704	1.00037365	0.00063110	0.00000846	0.00000961
22 CEM,CONC PRODUCTS	0.00003754	0.00003506	0.00117400	0.00014776	0.00398240	1.02437034	0.00005281	0.00003398
23 PRI MET,FOUND,FRG	0.00003834	0.00001325	0.00349792	0.00014421	0.00035246	0.00461614	1.00006444	0.00001923
24 FAB STL,OTH METAL	0.00020398	0.00623706	0.00146898	0.00009473	0.00136936	0.00004623	0.00002995	1.00039905
25 MACH,PROC EQUIPMT	0.00003908	0.00003834	0.00230715	0.00025342	0.00047135	0.00008333	0.00007153	0.00162679
26 ELEC,ELECTR EQUIP	0.00002202	0.00007330	0.00007892	0.00007427	0.00047360	0.00004428	0.00009923	0.00002695
27 TRANSPORTN EQUIP	0.00001849	0.00001428	0.00037966	0.00003719	0.00012625	0.00003278	0.00001803	0.00001092
28 OTHER MANUFACT	0.00010921	0.00012650	0.00275241	0.00007640	0.00027002	0.00003041	0.00031943	0.00001432
29 HWY MOT FR, WRHSG	0.00749880	0.00858158	0.00922805	0.00247938	0.04183605	0.04709975	0.00142978	0.00015620
30 WATER TRANSPORTN.	0.00016953	0.00071974	0.01038860	0.01618912	0.00237957	0.00043893	0.00042415	0.00006811
31 AIR TRANSPORTN	0.00024333	0.00005990	0.00138503	0.00077139	0.00035255	0.00006980	0.00012142	0.00005230
32 OTH TRANSPORTN SR	0.00595205	0.00329465	0.02827099	0.00248549	0.07542558	0.02176472	0.01746832	0.00058733
33 COMMUNICATIONS	0.00847121	0.00707981	0.00528689	0.00202562	0.01268786	0.00914411	0.00434169	0.00709912
34 GAS SERVICES	0.00144603	0.00223855	0.04262653	0.00856562	0.04847870	0.00246716	0.00663660	0.00187412
35 ELECTRIC SERVICES	0.00493882	0.00746420	0.05128904	0.00641224	0.04892363	0.00176769	0.01902344	0.00504716
36 WATER, SANI SERVE	0.00040893	0.00066974	0.00053018	0.00066670	0.00117461	0.00085427	0.00126882	0.00062193
37 WHLSE GROCERIES	0.00003608	0.00007998	0.00006630	0.00003087	0.00038508	0.00003146	0.00008241	0.00001189
38 WHLSE LIVESTOCK	0.00000049	0.00000077	0.00000074	0.00000045	0.00000132	0.00000034	0.00000074	0.00000042
39 WHLSE TRADE-OTHER	0.00248946	0.00683559	0.01195620	0.00480256	0.01482692	0.00817630	0.03038860	0.01456732
40 FOOD STORES	0.00002318	0.00010018	0.00006101	0.00003789	0.00008623	0.00003906	0.00009391	0.00001205
41 AUTO DEAL,GAS STA	0.00052756	0.00196381	0.00410601	0.00074028	0.00163858	0.00616212	0.00072823	0.00108906
42 ALL OTHER RETAIL	0.00177205	0.00030492	0.00022023	0.00011074	0.00038963	0.00032922	0.00013953	0.00221943
43 BANK,F.,I.,R.,E.	0.00088394	0.00099413	0.00875435	0.00257268	0.00596082	0.00326392	0.01534451	0.00080038
44 EDUCATION	0.00208844	0.00431750	0.00513915	0.00360965	0.00542569	0.00216773	0.00340341	0.00427143
45 SERVICES - OTHER	0.00489426	0.02136754	0.01297191	0.00798175	0.01719436	0.00833561	0.02004871	0.00256950
COLUMN TOTAL	1.06819251	1.09143469	1.37861099	1.59793020	1.41648492	1.16512673	1.14382665	1.04708391

Table II-5
(cont'd.)

DIRECT AND INDIRECT REQUIREMENTS TABLE : COASTAL BEND , 1967

	25	26	27	28	29	30	31	32
1 IRRIGATED CROPS	0.00009714	0.00000242	0.00000347	0.00001184	0.00000545	0.00000268	0.00000236	0.00000924
2 DRY-FARMED CROPS	0.00002819	0.00003105	0.00003198	0.00006153	0.00001225	0.00000613	0.00001253	0.00004813
3 RANGE,FEEDLOT LVS	0.00002264	0.00001655	0.00003623	0.00001653	0.00006519	0.00003028	0.00003962	0.00003752
4 DAIRY,POULTRY,EGG	0.00002247	0.00001415	0.00001507	0.00003164	0.00004800	0.00002177	0.00005725	0.00005734
5 AG. SUPPLY	0.00000142	0.00000040	0.00000045	0.00006524	0.00000033	0.00000016	0.00000027	0.00000073
6 GINNING	0.00000164	0.00000053	0.00000050	0.00006842	0.00000047	0.00000027	0.00000042	0.00000345
7 AG. SERVICES	0.00000786	0.00000226	0.00000289	0.00024676	0.00000398	0.00000186	0.00000346	0.00000523
8 FISHERIES	0.00000477	0.00000651	0.00002081	0.00000446	0.00003100	0.00001458	0.00001048	0.00000782
9 MINING:PET,GAS,SR	0.00268521	0.00591911	0.00156772	0.02619693	0.01939374	0.01846175	0.04615444	0.46925467
10 CONSTRUCTION	0.00308818	0.00168050	0.00041220	0.00708519	0.01228871	0.00521548	0.00089450	0.01966669
11 MEAT PRODUCTS	0.00002936	0.00001179	0.00000917	0.00001913	0.00003606	0.00001594	0.00004784	0.00004785
12 DAIRY MANUFACT	0.00004768	0.00003494	0.00002924	0.00005569	0.00011516	0.00005186	0.00015366	0.00015339
13 CAN,PRE,P,D,FRCZ	0.00000307	0.00000233	0.00000361	0.00000303	0.00000874	0.00000396	0.00000829	0.00000801
14 OTHER FOOD,KIN PR	0.00008544	0.00006999	0.00004096	0.00013228	0.00012668	0.00007897	0.00012028	0.00135393
15 BEVERAGES	0.00008287	0.00041364	0.00000827	0.00007490	0.00009111	0.00009112	0.00001968	0.00001981
16 TEXTILE MILL PROD	0.00000053	0.00000196	0.00004637	0.00000716	0.00000054	0.00000040	0.00000011	0.00000061
17 WOOD,PAPER PRODCT	0.00014707	0.00081694	0.00037345	0.00501861	0.00078943	0.00059582	0.00013314	0.00077848
18 NEWS,PUBLSH,PRINT	0.00031428	0.00040868	0.00026585	0.00035597	0.00138650	0.00091795	0.00037831	0.00139334
19 CHEM,DRUG,REL PRO	0.00047760	0.01123577	0.00011310	0.00754678	0.00060063	0.00090497	0.00226980	0.00162372
20 PETRO,REFN,PRODCT	0.00167988	0.00089631	0.00005796	0.00114427	0.01688976	0.03281316	0.09163052	0.01192499
21 CLAY,CUT STN,SHEL	0.00001788	0.00001066	0.00000639	0.00001972	0.00002262	0.00001647	0.00000208	0.00015771
22 CEM,CONC PRODUCTS	0.00024037	0.00008202	0.00003424	0.00085387	0.00056858	0.00026362	0.00004456	0.00088224
23 PRI MET,FOUND,FRG	0.00705903	0.00179361	0.00000869	0.00051333	0.00001061	0.00427945	0.00001382	0.00187532
24 FAB STL,OTH METAL	0.00424320	0.00509106	0.00314426	0.00108232	0.00018597	0.00008323	0.00002091	0.00067781
25 MACH,PROC EQUIPMT	1.00179671	0.00086367	0.00045265	0.00089921	0.00003249	0.00004734	0.00002713	0.00365180
26 ELEC,ELECTR EQUIP	0.00080661	1.00797522	0.00114917	0.00010519	0.00007564	0.00007424	0.00002005	0.00144448
27 TRANSPORTN EQUIP	0.00044475	0.00002745	1.00000973	0.00012261	0.00016849	0.00007582	0.00001350	0.00050947
28 OTHER MANUFACT	0.00031661	0.00302628	0.00458146	1.00232805	0.00003726	0.00002244	0.00001475	0.00105752
29 HWY MOT FR, WRHSG	0.00161214	0.00160093	0.00028789	0.00238747	1.00061959	0.00107511	0.00037514	0.00279277
30 WATER TRANSPORTN	0.01357227	0.00037439	0.00004744	0.00075975	0.00055383	1.25603179	0.00148267	0.01770225
31 AIR TRANSPORTN	0.00115368	0.00154546	0.00009828	0.00026369	0.00027805	0.00025349	1.10448735	0.00146788
32 OTH TRANSPORTN SR	0.00110503	0.00404432	0.00029574	0.03223254	0.00036104	0.00164281	0.00028492	1.00577783
33 COMMUNICATIONS	0.00050001	0.00610750	0.00278268	0.00829468	0.05606776	0.00693513	0.00563535	0.00410913
34 GAS SERVICES	0.00160624	0.00174702	0.00199249	0.00505828	0.01618068	0.00174625	0.00117196	0.00501422
35 ELECTRIC SERVICES	0.00527363	0.00451804	0.00532821	0.01817057	0.02297750	0.00442638	0.00143581	0.00826853
36 WATER, SANI SERVE	0.00061944	0.00033837	0.00097197	0.00096558	0.00157925	0.00071038	0.00022377	0.00048637
37 WHLSE GROCERIES	0.00003698	0.00004039	0.00012712	0.00002681	0.00018628	0.00008791	0.00005784	0.00004512
38 WHLSE LIVESTOCK	0.00000052	0.00000037	0.00000073	0.00000045	0.00000142	0.00000066	0.00000100	0.00000096
39 WHLSE TRADE-OTHER	0.01282089	0.00624528	0.03175798	0.00863633	0.04454316	0.09038365	0.00730947	0.00818402
40 FOOD STORES	0.00003323	0.00004895	0.00016374	0.00003081	0.00023747	0.00011200	0.00007004	0.00004937
41 AUTO DEAL,GAS STA	0.00058538	0.00042203	0.00058864	0.00115023	0.00062160	0.00047381	0.00015483	0.00111663
42 ALL OTHER RETAIL	0.00078776	0.00028074	0.00089642	0.00112008	0.00034730	0.00179213	0.00006615	0.00015393
43 BANK,F.,I.,R.,E.	0.00173336	0.00097432	0.00103761	0.00198623	0.05573126	0.05896243	0.00806904	0.00773839
44 EDUCATION	0.00223459	0.00186138	0.00120084	0.00303790	0.00596294	0.00259546	0.00863151	0.00866682
45 SERVICES - OTHER	0.00709325	0.01045024	0.03496887	0.00656520	0.05070575	0.02391339	0.01494123	0.01039145
COLUMN TOTAL	1.07852306	1.08103557	1.09497455	1.15073726	1.30995029	1.51523450	1.29650182	1.81860699

Table II-5
(cont'd.)

DIRECT AND INDIRECT REQUIREMENTS TABLE : COASTAL BEND , 1967

	33	34	35	36	37	38	39	40
1 IRRIGATED CROPS	0.00000254	0.00000296	0.00000333	0.00000060	0.00000774	0.00000758	0.00000294	0.00000134
2 DRY-FARMED CROPS	0.00002567	0.00002187	0.00003061	0.00000596	0.00002054	0.00002998	0.00000917	0.00000620
3 RANGE,FEEDLOT LVS	0.00005528	0.00005817	0.00007420	0.00000863	0.00003593	0.00011236	0.00003812	0.00001980
4 DAIRY,POULTRY,EGG	0.00010484	0.00010196	0.00014362	0.00001309	0.00002533	0.00013416	0.00003595	0.00002638
5 AG. SUPPLY	0.00000046	0.00000045	0.00000061	0.00000010	0.00000038	0.00000070	0.00000022	0.00000014
6 GINNING	0.00000076	0.00000073	0.00000102	0.00000016	0.00000164	0.00000103	0.00000033	0.00000024
7 AG. SERVICES	0.00000582	0.00000575	0.00000785	0.00000091	0.00000298	0.00000874	0.00000264	0.00000166
8 FISHERIES	0.00000716	0.00001002	0.00000872	0.00000208	0.00005262	0.00003802	0.00001586	0.00000589
9 MINING:PET,GAS,SR	0.00243002	0.67995419	0.09271346	0.00999920	0.00247078	0.00242270	0.00642542	0.00258350
10 CONSTRUCTION	0.00068627	0.00274351	0.00282358	0.05530711	0.00037636	0.02893000	0.00066136	0.00028374
11 MEAT PRODUCTS	0.00008974	0.00006677	0.00012317	0.00001098	0.00001878	0.00010961	0.00002512	0.00002184
12 DAIRY MANUFACT	0.00026878	0.00027900	0.00039630	0.00003507	0.00005971	0.00035181	0.00009079	0.00007009
13 CAN,PRE,P,O,FROZ	0.00001420	0.00001407	0.00001938	0.00000186	0.00016053	0.00002050	0.00000593	0.00000390
14 OTHER FOOD,KIN PR	0.00022203	0.00021457	0.00030493	0.00004091	0.00063335	0.00028446	0.00008809	0.00007162
15 BEVERAGES	0.00002436	0.00002532	0.00003192	0.00001070	0.00001284	0.00019188	0.00004720	0.00000966
16 TEXTILE MILL PROD	0.00000016	0.00000097	0.00000297	0.00001235	0.00000030	0.00000073	0.00000217	0.00000014
17 WOOD,PAPER PRODCT	0.00013829	0.00023392	0.00021738	0.00166429	0.00004459	0.00049326	0.00012386	0.00013522
18 NEWS,PUBLSH,PRINT	0.01009967	0.00028417	0.00169720	0.00055954	0.00107392	0.00144973	0.00084660	0.00764177
19 CHEM,DRUG,REL PRO	0.00007134	0.00133120	0.00028066	0.01165567	0.00006829	0.00030740	0.00008848	0.00004829
20 PETRO,REFN,PRODCT	0.00090438	0.00642461	0.00221777	0.00390457	0.00009797	0.00040644	0.00025173	0.00006552
21 CLAY,CUT STN,SHEL	0.00000216	0.00000526	0.00000771	0.00094070	0.00000221	0.00005128	0.00000349	0.00000246
22 CEM,CONC PRODUCTS	0.00004406	0.00012669	0.00020572	0.01736277	0.00004305	0.00131112	0.00006850	0.00004671
23 PRI MET,FOUND,FRG	0.00000462	0.00006875	0.00002617	0.00018792	0.00000159	0.00001467	0.00000266	0.00000126
24 FAB STL,OTH METAL	0.00007907	0.00008103	0.00006061	0.00093631	0.00002183	0.00041940	0.00001726	0.00005223
25 MACH,PROC EQUIPMT	0.00001010	0.00043648	0.00007896	0.00023353	0.00000618	0.00004637	0.00002211	0.00000383
26 ELEC,ELECTR EQUIP	0.00108007	0.00010138	0.00005440	0.00051542	0.00002507	0.00004013	0.00004723	0.00000742
27 TRANSPORTN EQUIP	0.00003214	0.00003784	0.00004407	0.00071714	0.00251796	0.00037841	0.00008217	0.00000452
28 OTHER MANUFACT	0.00022829	0.00001338	0.00001673	0.00045526	0.00010606	0.00002977	0.00010794	0.00000557
29 RAY MUT PK, WRHSG	0.00119474	0.00261722	0.00200043	0.00124853	0.00075204	0.00066248	0.00126420	0.00018818
30 WATER TRANSPORTN	0.00007184	0.01740122	0.00237890	0.00035575	0.00006465	0.00006689	0.00016635	0.00007125
31 AIR TRANSPORTN	0.00096403	0.00101684	0.00018948	0.00007086	0.00006663	0.00026733	0.00130571	0.00002628
32 OTH TRANSPORTN SR	0.00086871	0.00036601	0.00324684	0.00102555	0.00017572	0.00029449	0.00035813	0.00010819
33 COMMUNICATIONS	1.00457113	0.00467228	0.00706194	0.00428690	0.01631603	0.01544605	0.02149097	0.00299816
34 GAS SERVICES	0.00204468	1.01248760	0.13382411	0.00998383	0.00344178	0.00300054	0.00906123	0.00370460
35 ELECTRIC SERVICES	0.00817535	0.00302117	1.00121968	0.00954252	0.01435232	0.01234118	0.01393699	0.01554370
36 WATER, SANI SERVE	0.00096021	0.00031272	0.00259338	1.07310379	0.00188313	0.00189782	0.00282475	0.00245398
37 WHLSE GROCERIES	0.00003139	0.00004950	0.00003627	0.00001181	1.00009931	0.00021915	0.00009389	0.00003329
38 WHLSE LIVESTOCK	0.00000151	0.00000155	0.00000204	0.00000022	0.00000078	1.00000269	0.00000087	0.00000049
39 WHLSE TRADE-OTHER	0.00053390	0.00384395	0.00178873	0.02021897	0.00242937	0.00773832	1.00355696	0.00025274
40 FOOD STORES	0.00003148	0.00005589	0.00003446	0.00001351	0.00012375	0.00027244	0.00011868	1.00004084
41 AUTO DEAL,GAS STA	0.00011080	0.00152747	0.00480000	0.00120590	0.00071017	0.00408030	0.00138618	0.00035838
42 ALL OTHER RETAIL	0.00029731	0.00013612	0.00020219	0.00011393	0.00012906	0.00054839	0.00138027	0.00002958
43 BANK,F.,I.,R.,E.	0.00744013	0.00864963	0.01028865	0.00581697	0.00497308	0.11842002	0.02746044	0.00390570
44 EDUCATION	0.01648004	0.01586316	0.02264960	0.00197109	0.00309449	0.01944573	0.00483172	0.00391367
45 SERVICES - OTHER	0.00670651	0.01177894	0.00731940	0.00287920	0.02625119	0.05816627	0.02534087	0.00871742
COLUMN TOTAL	1.06721374	1.77646631	1.30123153	1.29613215	1.08275203	1.28046232	1.12371456	1.05346742

Table II-5
(cont'd.)

DIRECT AND INDIRECT REQUIREMENTS TABLE : COASTAL BEND , 1967

	41	42	43	44	45
1 IRRIGATED CROPS	0.00000244	0.00006043	0.00000604	0.00011624	0.00009419
2 DRY-FARMED CROPS	0.00000036	0.00029673	0.00001579	0.00131999	0.00003073
3 RANGE,FEEDLOT LVS	0.00003143	0.00008370	0.00007527	0.00298094	0.00098162
4 DAIRY,POULTRY,EGG	0.00002704	0.00032426	0.00006357	0.00627915	0.00025475
5 AG. SUPPLY	0.00000017	0.00000429	0.00000040	0.00002595	0.00000349
6 GINNING	0.00000022	0.00002544	0.00000061	0.00004319	0.00000328
7 AG. SERVICES	0.00000205	0.00002772	0.00000490	0.00033393	0.00004166
8 FISHERIES	0.00001380	0.00001540	0.00003187	0.00019827	0.00060867
9 MINING:PET,GAS,SR	0.00239521	0.00286659	0.00236298	0.00409238	0.00623327
10 CONSTRUCTION	0.00060851	0.00079649	0.01041390	0.00610286	0.00669042
11 MEAT PRODUCTS	0.00002098	0.00009231	0.00004846	0.00541978	0.00011212
12 DAIRY MANUFACT	0.00006710	0.00089915	0.00015732	0.01744050	0.00033964
13 CAN,PRE,P,O,FROZ	0.00000463	0.00001521	0.00001069	0.00083263	0.00008236
14 OTHER FOOD,KIN PR	0.00005718	0.01036731	0.00017183	0.01304659	0.00050485
15 BEVERAGES	0.00003894	0.00083194	0.00154778	0.00072071	0.00013757
16 TEXTILE MILL PROD	0.00000017	0.00000114	0.00000039	0.00000272	0.00000213
17 WOOD,PAPER PRODUCT	0.00008000	0.00034570	0.00026329	0.00301962	0.00074133
18 NEWS,PUBLSH,PRINT	0.00901943	0.01961565	0.00872046	0.00222981	0.00473574
19 CHEM,DRUG,REL PRO	0.00007017	0.00012451	0.00016900	0.00054319	0.00151667
20 PETRO,REFN,PRODCT	0.00018608	0.00061342	0.00030030	0.00058518	0.00061821
21 CLAY,CUT STN,SHEL	0.00000299	0.00000397	0.00002020	0.00001367	0.00001717
22 CEM,CONC PRODUCTS	0.00005978	0.00007435	0.00048179	0.00029990	0.00037158
23 PRI MET,FOUND,FRG	0.00000166	0.00000318	0.00000637	0.00000990	0.00002217
24 FAB STL,OTH METAL	0.00010558	0.00013603	0.00020323	0.00012677	0.00016747
25 MACH,PROC EQUIPMT	0.00000497	0.00001685	0.00002054	0.00014909	0.00006940
26 ELEC,ELECTR EQUIP	0.00003131	0.00002522	0.00003087	0.00029850	0.00010529
27 TRANSPORTN EQUIP	0.00001089	0.00001292	0.00013855	0.00010438	0.00013535
28 OTHER MANUFACT	0.00001297	0.00001767	0.00002053	0.00028575	0.00020748
29 HWY MOT FR, WRHSG	0.00613335	0.00205776	0.00052489	0.00529570	0.00637623
30 WATER TRANSPORTN	0.00006784	0.00008824	0.00006812	0.00011370	0.00017598
31 AIR TRANSPORTN	0.00008913	0.00143150	0.00142700	0.00057981	0.00149022
32 OTH TRANSPORTN SR	0.00016604	0.00039823	0.00030186	0.00035334	0.00337269
33 COMMUNICATIONS	0.02431948	0.01126755	0.01675214	0.00539472	0.01647773
34 GAS SERVICES	0.00327344	0.00342459	0.00299452	0.00528654	0.00531780
35 ELECTRIC SERVICES	0.01335528	0.01531003	0.00866266	0.01462864	0.01866788
36 WATER, SANI SERVE	0.00236124	0.00280772	0.00138968	0.00205755	0.00540053
37 WHLSE GROCERIES	0.00008219	0.00010825	0.00019204	0.00044944	0.00373802
38 WHLSE LIVESTOCK	0.00000070	0.00000307	0.00000168	0.00008435	0.00001914
39 WHLSE TRADE-OTHER	0.00009312	0.00297955	0.00325629	0.00852017	0.01035542
40 FOOD STORES	0.00010430	0.00009649	0.00024086	0.00002938	0.00483279
41 AUTO DEAL,GAS STA	1.00120575	0.00053222	0.00083957	0.00054726	0.00530473
42 ALL OTHER RETAIL	0.00012190	1.00029909	0.00413670	0.00023639	0.00099278
43 BANK,F.,I.,R.,E.	0.02317303	0.04024426	1.06496911	0.00940698	0.00166978
44 EDUCATION	0.00356861	0.00456633	0.00819702	1.00111943	0.00659169
45 SERVICES - OTHER	0.02226999	0.02058900	0.05143213	0.00533326	1.03211766
COLUMN TOTAL	1.11384744	1.14390143	1.19067323	1.12605826	1.14777957

Table II-6

Projected Processing Sector, 1980

Transactions Table for Coastal Bend C.O.G.

	1	2	3	4	5
1	24.854360	157.008484	0.000000	0.000000	0.000000
2	0.000000	151.745881	1598.029775	3313.858531	0.000000
3	0.000000	0.000000	10673.149095	0.000000	0.000000
4	0.000000	0.000000	0.000000	0.000000	0.000000
5	280.174737	1079.355431	94.752288	22.801505	0.000000
6	354.947728	1128.004347	0.000000	0.000000	0.000000
7	1436.567956	4059.513733	1778.845390	699.134730	0.000000
8	0.000000	0.000000	0.000000	0.000000	0.000000
9	0.000000	0.000000	0.000000	0.000000	0.000000
10	218.752699	857.042533	681.066362	233.602347	0.000000
11	0.000000	0.000000	0.000000	0.000000	0.000000
12	0.000000	0.000000	0.000000	0.000000	0.000000
13	0.000000	0.000000	0.000000	0.000000	0.000000
14	0.000000	0.000000	4777.113214	4049.614192	0.000000
15	0.000000	0.000000	0.000000	0.000000	0.000000
16	2.121048	7.607029	0.000000	0.000000	.057751
17	9.121801	103.067443	483.815025	25.229664	1.190715
18	0.000000	0.000000	.628478	0.000000	1.976866
19	2071.387655	8218.353969	866.984495	202.067058	0.000000
20	547.893874	4200.677289	5.990629	384.901920	.083946
21	0.000000	0.000000	0.000000	0.000000	.002604
22	0.000000	0.000000	0.000000	0.000000	0.000000
23	3.775567	179.850749	0.000000	0.000000	0.000000
24	37.867657	138.496314	81.228684	29.571684	0.000000
25	327.252548	2665.216528	6.830832	39.054992	0.000000
26	6.915776	51.907880	2.409336	1.816482	.000766
27	0.000000	0.000000	0.000000	0.000000	0.000000
28	135.349198	211.672812	19.514233	23.792582	.155790
29	0.000000	0.000000	1391.305939	899.370131	.010417
30	0.000000	0.000000	0.000000	0.000000	0.000000
31	0.000000	0.000000	0.000000	0.000000	0.000000
32	0.000000	0.000000	0.000000	0.000000	.012408
33	58.253128	233.320723	87.012225	63.194935	9.083472
34	0.000000	0.000000	12.343405	23.361331	.777113
35	64.602766	258.748724	104.348422	41.231482	13.031229
36	0.000000	0.000000	0.000000	0.000000	2.475027
37	0.000000	0.000000	0.000000	0.000000	0.000000
38	0.000000	0.000000	1270.599066	105.625320	0.000000
39	891.509274	3681.176202	1525.090815	1912.060653	153.029315
40	0.000000	0.000000	0.000000	0.000000	0.000000
41	541.230778	3076.659685	395.352150	705.584526	1.275274
42	294.484636	1705.234908	488.199945	178.876036	0.000000
43	2004.857994	7888.735308	4418.641888	1712.000619	22.968712
44	489.760614	1938.797583	631.391381	529.075945	3.275270
45	26.650695	119.916116	39.236070	141.700338	43.671650

Table II-6
(cont'd.)

6	7	8	9	10
0.000000	.084167	2.236023	.006814	0.000000
0.000000	.763820	0.000000	0.000000	0.000000
0.000000	.010896	677.524324	0.000000	0.000000
0.000000	177.987597	0.000000	0.000000	0.000000
0.000000	0.000000	0.000000	0.000000	0.000000
0.000000	0.000000	0.000000	0.000000	0.000000
0.000000	0.000000	0.000000	0.000000	0.000000
0.000000	0.000000	381.867478	0.000000	0.000000
0.000000	2.174921	0.000000	156209.138004	0.000000
130.539944	0.000000	0.000000	3337.492089	3675.163491
0.000000	.090484	0.000000	0.000000	0.000000
0.000000	.031109	0.000000	0.000000	0.000000
0.000000	.007580	1.184928	.003029	0.000000
0.000000	17.473430	1086.328102	0.000000	0.000000
0.000000	3.410424	0.000000	0.000000	0.000000
.176958	.019107	6.183298	0.000000	5.100803
.042725	312.931559	0.000000	401.368899	4072.320635
.872841	.036793	0.000000	59.868300	280.716002
0.000000	725.225888	37.524263	3450.307034	1986.438848
9.507121	140.331443	797.555698	14993.145847	3279.827660
0.000000	.027793	.048751	.370235	536.909762
0.000000	.040583	0.000000	0.000000	13821.903095
0.000000	.142279	0.000000	0.000000	66.182325
.027010	.138489	104.914851	112.001033	4462.793281
.039451	28.141802	.277290	756.249445	407.547028
.000655	.190284	26.313095	268.501446	123.232980
4.389250	.017212	2078.634241	0.000000	4116.735061
.001473	.456208	.171715	.897195	48.009010
14.038298	3.168345	8.394169	5710.985154	679.864558
0.000000	0.000000	0.000000	43142.960239	0.000000
0.000000	19.287522	0.000000	2738.537283	0.000000
0.000000	0.000000	0.000000	116.113747	5.502029
7.529479	26.978465	81.157610	5012.656678	1523.136169
13.631015	3.229773	10.453509	1148.023274	101.353412
71.271243	15.884678	44.335734	4838.665118	622.131344
.107550	5.603505	24.133586	72.448721	72.921791
0.000000	.010264	0.000000	0.000000	0.000000
0.000000	0.000000	0.000000	0.000000	0.000000
10.968458	33.041020	1059.562585	5633.637064	12718.783113
0.000000	.570378	780.302517	2.087399	0.000000
11.375249	1.992375	23.179682	2282.319837	3979.483854
0.000000	106.673461	0.000000	177.919535	226.584297
55.490702	27.960045	15.717370	4757.559407	6956.685214
10.602592	5.382270	41.922096	10369.314745	633.696339
23.657716	195.285429	429.868227	14545.571761	4178.455428

Table II-6
(cont'd.)

16	17	18	19	20
.046775	.001005	0.000000	.038055	0.000000
0.000000	.004221	.003145	1.162890	0.000000
0.000000	.001005	0.000000	.150736	0.000000
0.000000	.017687	.013506	1.144604	0.000000
0.000000	0.000000	0.000000	0.000000	0.000000
.015850	0.000000	0.000000	.006425	0.000000
0.000000	0.000000	0.000000	0.000000	0.000000
0.000000	0.000000	0.000000	.006425	0.000000
0.000000	0.000000	.020907	17954.362538	227674.182573
.065331	1.935289	1.060502	7615.739343	495.194895
0.000000	.015476	.004625	1.004741	0.000000
0.000000	.005025	.000925	.184342	0.000000
0.000000	.001608	0.000000	.053870	0.000000
0.000000	34.141197	.040888	49.741821	0.000000
0.000000	.124812	.137651	4.527510	0.000000
.120611	.297659	.031267	3.074516	0.000000
.345210	51.596180	30.036892	997.762680	17.760815
.011211	7.822555	60.680445	28.711955	34.498657
0.000000	25.601727	.748938	6482.845242	11546.573076
.001933	.135263	1.105091	1849.778680	895.738924
0.000000	.013667	.003145	.540178	.673179
0.000000	0.000000	.009066	0.000000	8.998712
0.000000	.082203	.022942	1045.481676	0.000000
0.000000	1.148230	43.088543	330.055528	.257091
0.000000	.016280	.086032	654.935135	3.753955
.001546	.016079	.392415	1.166843	.147140
0.000000	.042006	.029602	9.672790	0.000000
.014303	.554117	.789086	834.960122	1.892877
.130275	47.632948	57.770540	2623.485214	397.711719
0.000000	0.000000	3.397788	1824.927538	1246.839619
.035951	1.207521	.017761	322.896814	0.000000
3.998719	36.952581	21.726788	8547.457014	844.706695
1.387413	50.143658	40.911294	965.276894	98.901756
.274081	2.969158	6.712505	10774.086529	3179.818661
.925071	26.996365	45.380315	15377.713157	1800.146168
.097417	1.995584	3.152829	64.224812	255.597171
0.000000	.006633	.004625	5.055332	0.000000
0.000000	0.000000	0.000000	0.000000	0.000000
.267896	12.496672	41.502600	2739.756376	854.987627
0.000000	.001608	.000740	.039537	0.000000
.035951	2.834096	12.400586	1017.189310	0.000000
.001933	11.340604	1.704537	29.428074	13.763783
.009278	.620844	.353192	1611.161457	0.000000
.317377	10.766388	26.089241	764.790883	342.020598
.311192	25.844518	137.796639	2878.205961	1644.949640

Table II-6
(cont'd.)

	21	22	23	24	25
1	0.000000	0.000000	0.000000	0.000000	.545039
2	.000263	0.000000	0.000000	.000769	.115484
3	0.000000	0.000000	0.000000	0.000000	.004048
4	.001432	0.000000	0.000000	.001384	.020954
5	0.000000	0.000000	0.000000	0.000000	0.000000
6	0.000000	0.000000	0.000000	0.000000	0.000000
7	0.000000	0.000000	0.000000	0.000000	0.000000
8	0.000000	0.000000	0.000000	0.000000	0.000000
9	.000614	0.000000	0.000000	0.000000	.048813
10	.016011	7.122783	0.000000	1.310919	16.106141
11	.001665	0.000000	0.000000	.001230	.094531
12	.000497	0.000000	0.000000	.000769	.037145
13	0.000000	0.000000	0.000000	0.000000	.004048
14	.003652	0.000000	441.374533	.009380	.116437
15	.000701	0.000000	0.000000	.029678	.437412
16	0.000000	0.000000	.789917	.000615	.001905
17	.786105	11.530295	59.448448	1.838670	.426935
18	.020949	8.263381	72.552513	.550663	.913636
19	.254692	0.000000	35.318508	.625089	2.067051
20	.398414	.603846	0.000000	.180223	6.396643
21	.014872	5.112470	.647775	.024142	.066910
22	.156052	198.796601	0.000000	0.000000	.523132
23	.006925	37.468718	5.182628	.016146	39.843060
24	.053176	0.000000	.786064	1.136847	23.823592
25	.006457	0.000000	0.000000	4.829103	10.100001
26	.014171	.001254	10.599449	.043825	4.475793
27	.002717	0.000000	0.000000	.003229	2.290877
28	.006662	0.000000	47.660913	.022297	1.723932
29	1.704712	383.843161	188.731152	.174687	8.391309
30	0.000000	0.000000	0.000000	0.000000	61.131234
31	.004353	0.000000	0.000000	.036444	5.725405
32	3.101323	175.763914	2832.515855	1.595708	5.019403
33	.364404	48.955590	468.886775	19.657328	33.048293
34	1.675261	11.399713	601.536367	3.099459	5.382524
35	1.923028	0.000000	2929.138796	13.660777	14.649847
36	.031117	5.297449	153.890447	1.483145	2.702096
37	.013323	0.000000	0.000000	.001999	.057385
38	0.000000	0.000000	0.000000	0.000000	0.000000
39	.487616	45.924445	4904.796889	42.891735	63.679986
40	.000263	0.000000	0.000000	0.000000	0.000000
41	.045258	49.509900	76.243503	3.044254	2.614709
42	.011220	2.368356	2.466511	6.531837	4.127911
43	.066061	0.000000	2168.826054	.339686	1.837511
44	.101123	12.011867	387.237155	11.715696	10.497172
45	.514613	41.598449	2893.221320	5.724834	33.529279

Table II-6
(cont'd.)

	31	32	33	34	35
1	0.000000	0.000000	0.000000	0.000000	0.000000
2	0.000000	0.000000	0.000000	0.000000	0.000000
3	0.000000	0.000000	0.000000	0.000000	0.000000
4	0.000000	0.000000	0.000000	0.000000	0.000000
5	0.000000	0.000000	0.000000	0.000000	0.000000
6	0.000000	0.000000	0.000000	0.000000	0.000000
7	0.000000	0.000000	0.000000	0.000000	0.000000
8	0.000000	0.000000	0.000000	0.000000	0.000000
9	0.000000	10617.909500	0.000000	360628.635464	0.000000
10	3.207825	302.718790	12.078599	715.941839	75.458330
11	0.000000	0.000000	0.000000	0.000000	0.000000
12	0.000000	0.000000	0.000000	0.000000	0.000000
13	0.000000	0.000000	0.000000	0.000000	0.000000
14	0.000000	19.736117	0.000000	0.000000	0.000000
15	0.000000	0.000000	0.000000	0.000000	0.000000
16	0.000000	0.000000	0.000000	.472770	.102811
17	.486426	5.375309	.917968	.075799	2.957051
18	1.222099	19.365199	322.319581	23.313423	53.166224
19	0.000000	.266911	0.000000	2.334695	.266556
20	691.059881	103.853394	24.447751	561.059978	47.469272
21	.001471	2.078146	.002382	0.000000	.012469
22	0.000000	0.000000	0.000000	0.000000	1.669444
23	0.000000	29.887252	0.000000	0.000000	.343723
24	0.000000	5.550994	0.000000	0.000000	.084931
25	.007357	56.704652	.030961	104.988872	.097165
26	.026190	22.345328	34.752335	.688504	.789551
27	0.000000	4.254785	2.360414	.334777	.196917
28	.004708	17.403341	7.047636	.002429	.124455
29	0.000000	10.869162	31.282632	328.112820	54.786027
30	0.000000	0.000000	0.000000	0.000000	0.000000
31	792.166257	6.623400	27.516555	0.000000	.366776
32	0.000000	92.143400	24.998162	114.623558	119.388033
33	37.195882	25.619685	133.004839	1334.651045	222.382536
34	1.111454	53.405484	28.152702	6603.417482	5026.206299
35	2.192892	97.875342	247.973945	392.026611	0.000000
36	.291032	4.852264	26.079930	81.550091	86.939989
37	0.000000	0.000000	0.000000	0.000000	0.000000
38	0.000000	0.000000	0.000000	0.000000	0.000000
39	50.075442	63.516519	4.224665	153.374148	30.036103
40	0.000000	0.000000	0.000000	0.000000	0.000000
41	0.000000	0.000000	0.000000	384.173193	171.891750
42	0.000000	0.000000	8.295586	1.753086	5.106436
43	53.483076	66.208183	217.577526	3076.876652	307.745070
44	60.914837	79.794574	526.840206	7020.572310	772.119751
45	99.969321	64.315497	186.745013	3268.726864	180.603159

Table II-6
(cont'd.)

36	37	38	39	40
0.000000	0.000000	0.000000	0.000000	0.000000
0.000000	0.000000	0.000000	0.000000	0.000000
0.000000	0.000000	0.000000	0.000000	0.000000
0.000000	0.000000	0.000000	0.000000	0.000000
0.000000	0.000000	0.000000	0.000000	0.000000
0.000000	0.000000	0.000000	0.000000	0.000000
0.000000	0.000000	0.000000	0.000000	0.000000
0.000000	0.000000	0.000000	0.000000	0.000000
0.000000	0.000000	0.000000	0.000000	0.000000
320.633093	0.000000	3.666165	0.000000	0.000000
0.000000	0.000000	0.000000	0.000000	0.000000
0.000000	0.000000	0.000000	0.000000	0.000000
0.000000	5.434071	0.000000	.003016	0.000000
0.000000	19.288001	0.000000	0.000000	1.491572
0.000000	0.000000	0.000000	0.000000	0.000000
.065337	0.000000	0.000000	.570096	0.000000
4.998379	.032380	.001654	20.931889	7.470534
1.576453	24.991015	.000223	67.996514	722.868967
64.850578	0.000000	0.000000	0.000000	0.000000
17.998768	.312750	0.000000	1.803194	0.000000
4.960246	0.000000	0.000000	.005429	0.000000
84.507179	0.000000	0.000000	0.000000	0.000000
.326684	0.000000	0.000000	0.000000	0.000000
.814036	0.000000	0.000000	0.000000	0.000000
.746141	0.000000	0.000000	3.859161	0.000000
2.838545	0.000000	0.000000	4.978239	0.000000
0.000000	87.375222	0.000000	19.964233	0.000000
2.398859	2.903124	.000179	26.742649	.002816
0.000000	17.913198	0.000000	288.444044	1.156435
0.000000	0.000000	0.000000	0.000000	0.000000
0.000000	0.000000	0.000000	307.550418	0.000000
0.000000	.635784	0.000000	56.802716	0.000000
16.200961	541.467794	1.656387	5748.456955	252.198207
0.000000	47.958871	.115533	1964.609507	150.930419
404.887296	469.770430	1.331197	3618.612397	1462.388485
431.802091	54.430235	.173053	683.645728	212.804086
0.000000	0.000000	0.000000	0.000000	0.000000
0.000000	0.000000	0.000000	0.000000	0.000000
103.517853	67.936750	.750717	857.247020	0.000000
0.000000	0.000000	0.000000	0.000000	0.000000
0.000000	17.270557	.449483	328.132406	21.259040
0.000000	2.530948	0.000000	350.824656	0.000000
17.152413	148.249012	14.981851	7136.364786	332.522731
0.000000	79.526388	2.404512	1046.284953	328.531711
2.912253	863.967840	6.810623	6456.341734	772.029947

Table II-6
(cont'd.)

	41	42	43	44	45
1	0.000000	0.000000	0.000000	3.635764	26.581845
2	0.000000	0.000000	0.000000	0.000000	1.988195
3	0.000000	0.000000	0.000000	23.598868	227.292499
4	0.000000	0.000000	0.000000	6.105426	38.819501
5	0.000000	0.000000	0.000000	0.000000	0.000000
6	0.000000	0.000000	0.000000	0.000000	.009766
7	0.000000	0.000000	0.000000	0.000000	0.000000
8	0.000000	0.000000	0.000000	0.000000	172.208974
9	0.000000	0.000000	0.000000	0.000000	.855366
10	0.000000	0.000000	2194.817736	639.954328	1784.833072
11	0.000000	12.303587	0.000000	624.159931	22.406692
12	0.000000	153.303576	0.000000	2008.620699	65.762105
13	0.000000	1.823439	0.000000	96.369435	22.526179
14	0.000000	1851.026819	.034575	1278.779800	75.465257
15	0.000000	145.064748	342.163445	81.611359	38.245619
16	0.000000	.007316	0.000000	.135540	.485416
17	.125521	29.308005	6.996658	319.792477	170.722279
18	1095.922830	3576.892651	1816.596902	233.386164	1288.670030
19	0.000000	0.000000	0.000000	18.983609	390.236057
20	0.000000	66.899165	0.000000	9.278512	46.720007
21	0.000000	.005595	.166074	.150898	.287803
22	0.000000	0.000000	0.000000	0.000000	0.000000
23	0.000000	0.000000	0.000000	0.000000	1.822177
24	5.173400	0.000000	.018705	.849330	10.444201
25	0.000000	.212168	.106560	9.8[illegible]1354	10.922150
26	.008453	1.141317	.132066	32.833992	21.636920
27	0.000000	0.000000	0.000000	1.299721	.080424
28	.002113	.100274	.061782	29.422464	55.189800
29	763.327402	314.759478	0.000000	556.715726	1806.056383
30	0.000000	0.000000	0.000000	0.000000	0.000000
31	0.000000	228.189809	267.354071	56.211312	385.950609
32	0.000000	20.486898	11.225034	12.255008	944.322166
33	3005.735541	1856.988608	3468.574525	502.379698	4537.851824
34	164.270786	212.874127	355.465258	354.178839	740.528401
35	1595.039121	2642.765568	1613.789042	1591.217045	5156.330533
36	261.551931	454.240724	217.086847	208.290601	1446.427390
37	0.000000	0.000000	0.000000	44.300336	1102.863660
38	0.000000	0.000000	0.000000	0.000000	0.000000
39	0.000000	429.767393	478.029204	819.943643	2788.354747
40	0.000000	0.000000	0.000000	0.000000	1423.720832
41	129.967265	49.676124	84.724518	1.973964	1497.496611
42	0.000000	19.074024	908.357682	7.659716	279.115408
43	2752.482351	7054.050032	14331.509070	833.698418	47.420845
44	327.654474	656.765533	1633.951479	23.239477	1670.008898
45	2583.272301	3259.228237	10978.101668	429.941261	9076.378061

Table II-7
TOTAL OUTPUT OF ECONOMIC SECTORS 1967 & 1980

Sector	Total Output 1967 (Thousands of Dollars)	Projected Total Output 1980 (Thousands of Dollars)
1	11402.000	25666.437
2	39175.000	100567.078
3	33760.002	69565.287
4	13153.999	22180.561
5	1494.286	915.618
6	1926.000	1261.137
7	7390.735	4668.346
8	28080.008	34877.134
9	700286.858	2120824.247
10	184170.995	318852.785
11	4922.666	7538.133
12	10177.906	14834.787
13	2183.333	3209.805
14	52043.627	107117.520
15	6569.988	10376.965
16	134.197	207.516
17	8116.384	6525.107
18	9440.177	6986.278
19	159658.824	315623.606
20	231932.227	50021.910
21	356.998	41.724
22	13380.839	8390.417
23	96243.999	164823.423
24	4852.081	2984.491
25	5981.865	5697.426
26	1186.001	1388.477
27	4471.012	230.156
28	2443.794	2500.430
29	15175.825	14142.559
30	21120.000	2198.780
31	7121.213	8382.211
32	16912.965	16954.952
33	31017.083	32831.020
34	299801.497	582680.569
35	40490.906	38104.448
36	6840.443	6362.032
37	22861.855	34835.746
38	762.453	136.307
39	117498.504	283536.412
40	68959.016	97103.947
41	77271.641	130628.924
42	109983.055	189329.619
43	104920.949	237879.468
44	75549.551	116033.520
45	132698.294	304917.836

CHAPTER III

DEVELOPMENT OF A DEMOGRAPHIC FORECAST FOR THE COASTAL BEND COG REGION, 1970-1990

Prior to 1960, the thirteen counties in the Coastal Bend COG experienced steady increases in population, although the rate of increase per decade continuously fell between 1920 and 1960. During the most recent decade, the region continued to experience a declining rate of increase in population. Between 1960 and 1970, the United States and Texas grew at respective rates four and five times that of the region. Of the thirteen counties in the region, only four increased in population. Table III-1 summarizes the growth in population in the region between 1920 and 1970.

The Recent Past

A breakdown of the major components of regional population change between 1960 and 1970, as shown in Appendix A, revealed:[1]

(1) The birth rate (births per 1,000 population) decreased by 23.3 percent while the death rate (deaths per 1,000 population) increased by 13.6 percent;

(2) Net migration accounted for a loss of over 62,000 persons, almost 15 percent of the 1970 population; and

(3) The shift of population from rural to urban places continued with 5 percent fewer persons living in rural areas of the region in 1970.

Examination of the age, sex, ethnic composition, family size, and education characteristics of the region's population over this period indicated that:

(1) The number of persons 65 years or older increased by almost 2 percent while the number of persons 20 years or younger decreased by nearly 4 percent;

(2) While the median age for the State of Texas dropped 0.6 years, the median age was increasing for every county in the Coastal Bend COG;

(3) In 1960, the ratio of males per 100 females was 99.9, or almost a one-to-one ratio, but by 1970, the ratio had dropped to 97.3, a decrease of 2.6 males for every 100 females;

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[1]The observations in this section and the compilation of data in Appendix A were taken from Population of the Coastal Bend Region, a report prepared by the Coastal Bend Council of Governments, (September, 1972).

TABLE III-1

TOTAL POPULATION IN THE COASTAL BEND REGION*
1920 - 1970

Year	Population	Population Change	Percent Change
1920	104,884	-	-
1930	179,569	+ 74,685	+ 71.2
1940	243,496	+ 63,927	+ 35.6
1950	336,684	+ 93,188	+ 27.7
1960	419,778	+ 83,094	+ 19.8
1970	433,822	+ 14,044	+ 3.3

*All figures reflect totals for the thirteen counties presently in the Coastal Bend State Planning Region.

(4) In 1970, the white population was divided almost equally between Anglos and persons of Spanish heritage, Negroes accounted for 3.9 percent of the region's population, and other races accounted for less than 1 percent;

(5) Average family size decreased from 4.15 to 3.88 during the decade, both figures representing an average family size larger than those for the State; and

(6) The educational attainment level in the region is increasing, although the region still lags behind the state in the increase in the percent of persons completing four years or more of college.

The density and distribution patterns reflected a continued intra-regional rural to urban population shift. The regional population density increased by 1.3 persons per square mile while the region's share of total state population decreased by nearly six-tenths of one percent.

Development of Demographic Projections

To provide a basis for analyzing expected changes in population in the study region, it was necessary to develop a set of demographic projections for the area. Three demographic projections were evaluated. The first was developed by the Population Research Center at the University of Texas at Austin, utilizing the ratio/correlation-multiple regression method. A second set of population projections was developed by the Coastal Bend COG using the standard cohort-survival method. A third set also was developed by the Population Research Center at the University of Texas at Austin, utilizing the cohort-migration-survival method. In this section, some general comments on demographic projections are presented, followed by a description of the three population projection methods, the results of these three projections, and a general evaluation of the projections.

Population Projections in General

Before describing the methodology employed in the three sets of population projections made for the Coastal Bend COG it is appropriate to make a few comments concerning the general nature of population projections. Populations projections should be thought of as statements about the future size of populations based on certain assumptions. Population forecasts, on the other hand, may be thought of as the most likely population projection for an area at some time in the future, and require a substantial amount of judgment.

Ratio-Correlation/Multiple Regression Method

Small area population projections have proven difficult to

make directly or by extrapolation (arithmetically or geometrically) but projections for larger areas, such as a state, have proven more accurate in the past. The ratio-correlation/multiple regression method makes use of this fact in projecting regional population. This method involves mathematically relating changes in several indicator series to population changes by a multiple regression equation.[2] More specifically, a multiple regression equation is derived to express the relationship between the dependent variable, the change in an area's share of the population of the state, and a set of independent variables, the change in an area's share of the total for the state for several symptomatic series. In making its population projection for Texas counties, the Population Research Center at the University of Texas at Austin used five symptomatic indicators: births, deaths, auto registrations, voter registrations, and school enrollments.

The dependent variable (Xo) in the regression equation represents the ratio of a county's share of the total state population in 1970 to its share in 1960, that is,

$$\frac{\text{Percent of total state population in county i, 1970}}{\text{Percent of total state population in county i, 1960}} = \frac{\left(\frac{Pi}{Pt}\right)_{1970}}{\left(\frac{Pi}{Pt}\right)_{1960}}$$

The independent variables ($X_1, X_2, \ldots X_5$) are expressed in a corresponding manner; for example if X, equals Births,

$$\frac{\text{Percent of total state births in county i, 1970}}{\text{Percent of total state births in county i, 1960}} = \frac{\left(\frac{B_i}{B_T}\right)_{1970}}{\left(\frac{B_i}{B_T}\right)_{1960}}$$

or in general,

$$\frac{\left(\frac{X_i^j}{X_i^j}\right)}{\left(\frac{X_i^j}{X_i^j}\right)}$$

where i=county
j=symptomatic indicator

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[2]This method has been described by Robert C. Schmidt and Albert H. Crosetti, "Accuracy of Ratio-Correlation Method for Estimating Postcensal Population," Land Economics, (August, 1954) pp. 279-80; and David Goldberg, Allan Feldt, and J. William Smit, "Estimates of Population Change in Michigan, 1950-60," Michigan Population Studies, No. 1, 1960, pp. 36-39.

The regression equation thus appears:

$$X_o = \frac{\left(\frac{P_i}{P_T}\right)_{1970}}{\left(\frac{P_i}{P_J}\right)_{1960}} = a+b_1X_1+b_2X_2+b_3X_3+b_4X_4+b_5X_5$$

The resulting coefficients, $a, b_1, b_2, b_3, b_4, b_5$, are then applied to the estimated values of the five symptomatic indicators for each future period to obtain an estimate of the county's share of the state population for each future period. The estimated values of the symptomatic indicators are themselves obtained by extrapolation from the trends established over the base period, 1948, to 1960. Using the Bureau of the Census projections of state population for each future period, the percentage share of the county is then applied to the estimated state total to obtain an estimate of the county's population for each future period.

Thus, the basic assumptions made in this procedure are that the past relationship of the symptomatic indicators to the county's share of total state population will remain unchanged, the U. S. Census projections for the state will prove accurate, and the estimates of the future values of the symptomatic indicators from past trends will prove accurate.

The Cohort-Survival Method

The cohort-survival method of projecting population, often termed the Hamilton-Perry method, is based on the assumption that the vital rates of a region, natality, mortality, and migration, experienced in the most recent period are likely to remain relatively constant over the next few periods.[3] Essentially, this method involves dividing the population into cohorts, i.e. population groups that enter on some stage of the life cycle simultaneously. Commonly, five year cohorts are employed in making projections. Thus, the population is divided into those individuals age 0 to 4 years, 5 to 9 years, etc. The population is then adjusted to its ages on the first estimate date, i.e. the individual cohorts are "aged", i.e. moved forward for the number of years of the first estimate. This would give what the population would be if there had been no change due to births, deaths, and migration. Each

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[3]See Henry S. Shryock, Jacob S. Siegel, and Associates, The Methods and Materials of Demography, Volume 2 (Washington, D.C.: The U.S. Department of Commerce, Bureau of the Census, 1971), pp. 735-40.

cohort is then multiplied times a survival coefficient which reflects both mortality and migration, i.e. a person leaves the cohort either through death or out-migration, and enters only through in-migration. One final step is required. Since at the time of the first estimate, there will be no individuals in the first two cohorts, because these cohorts did not exist in the base period, (i.e. if the base period is 1970 and the first estimate is 1980, in 1980, the 0 to 4 years and 5 to 9 years cohorts will have advanced to 10 to 14 years and 15-19 years respectively; at this point, there will be no individuals in the 0 to 4 years and 5 to 9 years cohorts) it will be necessary to add in to the population for the first estimate date the number of individuals entering the population via birth over the projection period. This final step will result in a new set of age cohorts for the first estimate dates.

The basic disadvantage of this method is its failure to separate net migration and mortality. In areas where migration is a significant determinant of population change, the method is of limited usefulness.

Cohort Migration-Survival Component Method

The third method for projecting regional population, the cohort migration-survival component method, overcomes the principal objection to the cohort-survival method by employing a separate estimate of net migration after removing the effects of mortality through the employment of life table survival rates.[4] In using this method, the Population Research Center at the University of Texas at Austin projected to 1980 and 1990 the male and female populations separately by age group. The complete methodology employed in this projection is given in the Appendix to this chapter.

Coastal Bend COG Population Projections

The population projections for the Coastal Bend COG using each of the three methods discussed above are given in Table III-2. It can be seen that the three projections vary widely by county, but that the projections for the Corpus Christi SMSA and the entire Coastal Bend COG Region are reasonably close. In general, the ratio-correlation/multiple regression method gives the largest projection, while the cohort migration-survival component method gives the lowest projection. Because the latter method is based on assumptions which appear to be most reasonable, and because it includes migration as a separate component in the analysis, this projection has been adopted as the "most likely" for use in estimating the future labor force and in the spatial allocation models.

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[4] Shryock, Siegel, and Associates, op. cit., pp. 797-799.

TABLE III-2

COASTAL BEND COG POPULATIONS PROJECTIONS

Area	Population Estimate 1970	1971	Projected 1980	1990
County:				
Aransas	8,902	9,900	13,600 10,937 10,210	17,900 12,990 11,267
Bee	22,737	23,300	24,500 22,516 23,360	29,300 21,411 25,073
Brooks	8,005	8,500	9,300 7,338 7,587	9,400 6,679 7,344
Duval	11,722	12,200	12,200 10,148 11,074	10,500 8,698 11,227
Jim Wells	33,032	32,700	35,900 31,668 27,296	40,800 30,004 11,227
Karnes	13,462	13,500	12,700 11,870 12,867	9,300 10,340 12,998
Kenedy	678	1,000	700 516 612	600 390 612
Kleberg	33,166	33,000	38,400 38,049 37,394	46,000 41,237 42,618
Live Oak	6,697	6,700	6,300 6,003 6,054	5,500 5,050 5,720
McMullen	1,095	1,500	800 1,069 1,136	500 1,043 1,209
Nueces	237,544	253,000	274,300 260,741 263,551	307,300 280,721 298,141

TABLE III-2
(cont'd.)

Area	Population Estimate 1970	1971	Projected 1980	1990
			9,600	9,100
Refugio	9,494	8,700	8,286	7,163
			6,625	4,272
			46,000	44,900
San Patricio	47,288	47,800	49,199	51,029
			46,754	43,862
			484,300	531,100
Coastal Bend Region	433,822	451,800	458,340	476,755
			454,520	483,518
			320,300	352,200
Corpus Christi SMSA	284,832	300,800	309,940	331,750
			310,305	342,003

Notes: a - 1970 Census

b - Population Research Center Estimate, rounded to nearest 100.

c - Three projections are given:

(1) PRC Estimate - Ratio/Correlation - Multiple Regression Method

(2) COG Estimate - Cohort Survival Method

(3) Population Research Center Projection - Cohort Migration - Survival Method

Coupling the Input-Output Projection With the Population Projection

To test whether the economic projections obtained from the Input-Output model were consistent with the population projections, it was necessary to develop a mechanism to couple the two sets of projections. It was decided to provide this coupling through employment. The labor force required for fulfillment of the input-output model projections was computed by applying sector employment multipliers derived from secondary data. In each sector, each million dollars of output was assumed to require a certain labor input. Then, using the age-sex breakdown of the population projected to 1980, average participation rates were applied to yield labor force estimates for the COG for 1980. The projected labor force was then compared with the projected employment requirements derived from the input-output model. These projections were sufficiently close to be judged consistent. The increase in population projected to 1980 is about 90 percent and the employment increase estimated from the input-output model is 92 percent.

APPENDIX A

DESCRIPTION OF THE METHODOLOGY USED IN THE COHORT MIGRATION-SURVIVAL PROJECTION

In this Appendix, the methodology used in the cohort migration-survival projection is described.

Assumptions

Two sets of assumptions may be specified: those inherent in all population projections, i.e. the Basic Assumptions; and those underlying this specific projection model, i.e. the Model-Specific Assumptions.

Basic Assumptions

1. It is assumed that the counties under investigation will not be affected by any natural disaster.

2. It is assumed that the counties under investigation will not be subject to unpredictable economic fluctuations, depressions, booms, etc.

Model-Specific Assumptions

1. It is assumed that rates of fertility current in Texas counties between 1960 and 1970 will continue through 1980, and the mortality rates of males and females of Texas counties will approximate that of the United States in 1960.

2. The areal unit of analysis is the Texas county in 1970. Accordingly, it is assumed that no boundary changes will occur in the composition of each county during the projection period.

3. Net-migration is considered separately in this model. Since migration is the major component in subnational projections, the assumptions about migration are the most important. Therefore assumptions are incorporated concerning the previous migration change of each age-sex group in each county, modified according to the recent trends in each county's net migration. These assumptions are explained in more detail in the methodology section below.

Methodology

The basic method employed in this projection model is a variation of the "Cohort Migration - Survival Component" method.[1] This basic method is preferred over the simple "cohort survival" approach since, as will be noted below, the survival coefficients account separately for net migration and mortality,[2] and thus will tend to yield a more accurate population projection. Furthermore the use of a refined Cohort Migration-Survival Component method is favored since a) the assumptions dealing with net migration are thought to be the most realistic, and b) the population categories employed are the best possible given the available census data.

Since the Cohort Migration - Survival Component method, by definition, projects actual cohorts, a certain degree of realism is introduced not found in some of the other projection procedures;[3] by employing cohorts, i.e., age-sex-specific population categories, the order of demographic events in real life is closely paralleled.

Another feature of the Cohort Migration - Survival Component method is the introduction of net migration as a separate component, i.e., independent of fertility and mortality. This component is a composite measure of in- and out-migration. It is considered as the major demographic component in projections at the county level,

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[1]Henry S. Shryock, Jacob S. Siegel and Associates, The Methods and Materials of Demography, (U. S. Department of Commerce, 1971), pp. 797-799.

[2]Ibid., p. 797.

[3]See for example the statement on the ratio-correlation projection technique in Dudley L. Poston, Jr., and Benjamin S. Bradshaw, Population Projections For Texas Counties, 1975-1990 (Austin: Population Research Center, The University of Texas at Austin), May, 1972.

and the two migration streams, when aggregated, measure their combined effect on populations in the future, i.e., the projection period.

Having discussed some of the basic features of the Cohort Migration-Survival Component projection model, it is appropriate at this point to turn to a consideration of the methodological specifics involved.

1. As already noted, this method requires separating mortality from net migration in the survival coefficients. Accordingly, a standard set of survival rates was employed for the age-set population categories. (Survival rates are nothing more than the complement of mortality rates.) The standard set of survival rates was taken from a United States life table for the year 1966.[4] The obvious assumption here is that mortality by age and sex for the United States closely approximate those for the Texas counties.

2. The use of the projection model projects to 1980 the male and female populations separately by age group. Interpolation and extrapolation then occur back to 1973 and forward to 1985. (These details are delineated in a separate section below). In any event the projection procedure provides an ongoing method surviving cohorts as they pass through life.

3. A specific consideration in calculating net migration is the use of numerical net migration totals, rather than net migration rates. This decision in favor of absolute migration totals prevents the domination of migration in populous counties and provides for a slower population growth effect due to net migration.

4. In those counties with small populations with a history of repeated out migration, the net migration component will frequently override the fertility and mortality components, with the result that the county could "disappear" sometime during the projection period unless the continual negative net migrations were modified with a constraining assumption. Accordingly it is assumed in the Projection model that any age-sex cohort in a single decade will not experience a decline of more than half its population through negative net migration. This constraining assumption is not that unrealistic; indeed since 1950 no age-sex cohort in a Texas county has lost more than half its population in a decade through net out-migration.

Steps in the Development of the Projections

The actual steps followed in the preparation and computation of the projections are described below.

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[4]Nathan Keyfitz, Population: Facts and Methods of Demography, (San Francisco: W. H. Freeman, 1971), p. 557.

Step 1: With respect to the organization of the data inputs for each county, the male and female populations were organized separately into age groups 0-4, 5-9, 10-14,....60-64, and 65+. These data were made available for each of the three decennial census periods of 1950, 1960, and 1970.

Step 2: The 1950 age-sex cohorts were survived to 1960 applying the "Standard" life table survival rates already discussed. This computation thus produced "expected 1960 totals" for each of the age-sex cohorts. These would be the numbers in each cohort that would have survived from 1950 to 1960 if only mortality were involved.

Step 3: Net migration in the county was assumed to be the differences between the "expected 1950 totals" (as calculated in step 2) and the actual 1960 totals as recorded by the census enumerations. Thus at the termination of this step, "estimated 1950-1960 net migration totals" were produced for each of the age-sex cohorts in each of the Texas counties.

Step 4: The next concern was the projection of the 1970 population cohorts from the 1960 actual base populations as enumerated by the census. From these actual 1960 cohort data, the "standard" set of life table survival rates were employed and the 1960 cohorts were survived to 1970. Next the "estimated 1950-1960 net migration totals (as calculated in step 3) were employed and five different projections for the 1970 age-sex cohorts were computed, assigning variable weights to the "estimated 1950-1960 net migration totals." The weights used were 60%, 80%, 100%, 120%, and 140%. A weight of 100% merely employs the "estimated 1950-1960 net migration totals" as given. The obvious assumption here is that the 1960-1970 net migration for each of the age-sex cohorts is the same as the 1950-1960 net migration (as calculated in step 3). On the other hand, a weight of 60% takes only 60% of the "estimated 1950-1960 net migration totals" in the development of 1960-1970 net migration totals, the assumption here being that 1960-1970 net migration was only 60% of that in the 1950-1960 period. As already noted, five separate projections were made for each of the age-sex cohorts, each projection dependent upon the assignment of a different weight to the "estimated 1950-1960 net migration totals."

Step 5: After computing the five separate 1970 projections for each age-sex cohort, each projection was summed over the age-sex cohort categories producing five 1970 population projections for the county being investigated. Of the five 1970 population projections, that projection the closest numerically to the "actual 1970 census population" of the county was judged to be the "best" projection. Accordingly, the net migration "weight" employed in the "best" 1970 projection was favored over the other four, and this "best weight" was used in all further steps of the projection procedures with respect to the estimation of the net migration component.

Step 6: In this final step of the actual projection procedures, the 1980 projections were developed. Employing the life table survival rates discussed above, the 1970 age-sex cohorts were survived to 1980. The amount of 1970-1980 net migration for each age-sex cohort was then calculated. An "estimated 1960-1970 net migration" for each cohort was first calculated in the same manner as the 1950-1960 estimate of net migration was computed (see step 3). These numerical totals for each cohort were next multiplied by the net migration "best weight" (see step 5). The resulting product, i.e., the "estimated 1970-1980 net migration" component was then added to its respective 1980 "survived" age-sex cohort.

Step 7: The completion of the preceding step, made available 1980 projections for each of the age-sex cohorts delineated earlier (see Step 1), with the obvious exceptions of the male and female 0-4 and 5-9 year old cohorts. Since these four cohorts were not alive in 1970, they could not have been survived to 1980 as was possible with those cohorts alive in 1970. In any event, the problem was now one of "creating" these four new cohorts and placing them into the 1980 population. This objective was accomplished in the following manner:

a) The number of males in the age groups 0-4 and 5-9, and the number of females in the age groups 0-4 and 5-9, per 1000 women in the age group 15-49 in 1970, e.g., 1970 ratio for males 0-4=# males 0-4 in 1970/#women 15-49 in 1970, were determined.

b) From the above equations, four ratios were produced: one each for males and females in age groups 0-4 and 5-9. Each ratio was then taken one at a time and multiplied by the # of women 15-49 in 1980; thus using the "male 0-4" ratio, the result would be the # of males in the age category 0-4 in 1980.

c) The assumptions in this operation focus on the fertility component. It is assumed that the ratio of males and females in the age categories 0-4 and 5-9, per 1000 women between the ages of 15-49, in 1970 will be the same in 1980, and in each of the other projection years.

This final step provided projected age-sex cohort totals for each of the 254 Texas counties for the year 1980. The projections for individual years 1970 to 1973, and 1981 to 1985 were computed through linear interpolation and extrapolation. Similarly the age categories employed in the college-age projections were developed subsequent to the completion of Step 7 above through interpolation and addition.

APPENDIX B

DEMOGRAPHIC FEATURES OF THE COASTAL BEND COG, 1960-1970

B.1 Population and Percent Change, 1960-1970

B.2 Birth Rates, 1960-1970

B.3 Death Rates, 1960-1970

B.4 Vital Statistics-Coastal Bend Region

B.5 Migration, 1960-1970

B.6 Urban and Rural Residence, 1960-1970

B.7 Median Age, 1960-1970

B.8 Ethnic Composition, 1970

B.9 Average Family Size and Net Change

B.10 Years of School Completed 1960-1970 and Percent Change

B.11 Population Distribution, 1960-1970

B.12 Population Density Coastal Bend Region, 1960-1970

TABLE B.1

POPULATION AND PERCENT CHANGE
1960-1970

Area	1960 Population	1970 Population	Population Change	Percent Change
United States	180,684,000	203,184,722	+22,500,722	+12.5
Texas	9,579,677	11,196,730	+ 1,671,053	+16.9
Coastal Bend Region	419,778	433,822	+ 14,044	+ 3.3
SMSA	266.594	284,832	+ 18,238	+ 6.8
Metropolitan Counties	71,606	75,000	+ 3,494	+ 4.9
Non-Metropolitan Counties	81,578	73,890	- 7,688	- 9.4
County				
Aransas	7,006	8,902	+ 1,896	+27.1
Bee	23,755	22,737	- 1,018	- 4.3
Brooks	8,609	8,005	- 604	- 7.0
Duval	13,398	11,722	- 1,676	-12.5
Jim Wells	34,548	33,032	- 1,516	- 4.4
Karnes	14,995	13,462	- 1,533	-10.2
Kenedy	884	678	- 206	-23.3
Kleberg	30,052	33,166	+ 3,114	+10.4
Live Oak	7,846	6,697	- 1,149	-14.6
McMullen	1,116	1,095	- 21	- 1.9
Nueces	221,573	237,544	+ 15,971	+ 7.2
Refugio	10,975	9,494	- 1,481	-13.5
San Patricio	45,021	47,228	+ 2,267	+ 5.0

SOURCE: 1960 and 1970 Census.

TABLE B.2

BIRTH RATES
1960 and 1970

Area	1960 Population[1]	1960 Births[2]	1960 Birth Rate Per 1000 Population	1970 Population[1]	1970 Births[2]	1970 Birth Rate Per 1000 Population	Percent Change 1960-1970
United States[3]	180,684,000	4,258,000	23.7	203,184,772	3,718,000	18.3	-22.8
Texas	9,579,677	246,737	25.6	11,196,730	230,624	20.6	-19.5
Coastal Bend Region	419,778	12,418	29.6	433,822	9,852	22.7	-23.3
County							
Aransas	7,006	165	23.6	8,902	153	17.2	-27.0
Bee	23,755	723	30.4	22,737	578	25.4	-16.5
Brooks	8,609	248	28.8	8,005	164	20.5	-28.8
Duval	13,398	376	28.1	11,722	246	21.0	-28.8
Jim Wells	34,548	979	28.3	33,032	757	22.9	-18.4
Kames	14,995	413	27.5	13,462	233	17.3	-37.1
Kenedy	884	27	30.5	678	11	16.2	-46.9
Kleberg	30,052	1,002	33.3	33,166	887	26.7	-19.8
Live Oak	7,846	181	23.1	6,697	113	16.9	-26.8
McMullen	1,116	22	19.7	1,095	11	10.0	-49.2
Nueces	221,573	6,597	29.8	237,544	5,526	23.3	-21.8
Refugio	10,975	296	27.0	9,494	110	11.6	-57.0
San Patricio	45,021	1,389	30.9	47,288	1,063	22.5	-27.2

SOURCES: [1]1960 and 1970 Census.
[2]Texas State Department of Health, Vital Statistics, 1960 and 1970.
[3]Bureau of the Census, Statistical Abstract of the U. S., 1971

TABLE B.3
DEATH RATES
1960 and 1970

Area	1960 Population[1]	1960 Deaths[2]	1960 Death Rate Per 1000 Population	1970 Population[1]	1970 Deaths[2]	1970 Death Rate Per 1000 Population	Percent Change 1960-1970
United States[3]	180,684,000	1,712,000	9.5	203,184,772	1,921,000	9.5	-
Texas	9,579,677	77,231	8.0	11,196,730	94,287	8.4	+ 5.0
Coastal Bend Region	419,778	2,791	6.6	433,822	3,264	7.5	+13.6
County							
Aransas	7,006	51	7.3	8,902	96	10.8	+48.0
Bee	23,755	172	7.2	22,737	180	7.9	+ 9.7
Brooks	8,609	76	8.8	8,005	77	9.6	+ 9.1
Duval	13,398	110	8.2	11,722	117	10.0	+21.9
Jim Wells	34,548	224	6.5	33,032	259	7.8	+20.0
Karnes	14,995	159	10.6	13,462	181	13.4	+28.0
Kenedy	884	3	3.4	678	4	5.9	+73.5
Kleberg	30,052	173	5.8	33,166	187	5.6	- 3.5
Live Oak	7,846	49	6.2	6,697	72	10.8	+74.2
McMullen	1,116	10	9.0	1,095	7	6.4	-28.9
Nueces	221,573	1,365	6.2	237,544	1,692	7.1	+14.5
Refugio	10,975	80	7.3	9,494	61	6.4	-12.3
San Patricio	45,021	319	7.1	47,288	331	7.0	- 1.4

SOURCES: [1]1960 and 1970 Census
[2]Texas State Department of Health, Vital Statistics, 1960 and 1970.
[3]Bureau of the Census, Statistical Abstract of the U. S., 1971.

TABLE B.4

VITAL STATISTICS - COASTAL BEND REGION

County	Total Births 1960-1970	% of Region	Total Deaths 1960-1970	% of Region	Total Births 1970-1971	% of Region	Total Deaths 1970-1971	% of Region
Aransas	1,452	1.4	763	2.6	153	1.6	96	2.9
Bee	6,103	5.7	1,757	5.9	578	5.9	180	5.5
Brooks	2,262	2.1	615	2.1	164	1.7	77	2.4
Duval	3,093	2.9	1,051	3.6	246	2.5	117	3.6
Jim Wells	8,380	7.9	2,366	8.0	757	7.7	259	7.9
Karnes	3,186	2.9	1,530	5.2	233	2.4	181	5.6
Kenedy	166	.2	38	.1	11	.1	4	.1
Kleberg	8,445	7.9	1,848	6.3	887	9.0	187	5.7
Live Oak	1,418	1.3	613	2.1	113	1.2	72	2.2
McMullen	180	.2	98	.3	11	.1	7	.2
Nueces	57,683	54.2	14,702	49.7	5,526	56.1	1,692	51.8
Refugio	2,293	2.2	876	2.9	110	1.1	61	1.9
San Patricio	11,830	11.1	3,305	11.2	1,063	10.8	331	10.1
TOTALS	106,491	100.0	29,562	100.0	9,852	100.0	3,264	100.0

SOURCE: Texas State Department of Health, Vital Statistics, 1960-1971.

TABLE B.5

MIGRATION
1960 - 1970

Area	1960 Population	1970 Population	Population Change 1960-1970	Births 1960-1970*	Deaths 1960-1970*	Net Total Migration	Net Migration as a % of 1960 Population
Texas	9,579,677	11,196,730	+1,617,053	2,244,631	844,196	+216,618	+ 2.3
Coastal Bend Region	419,778	433,822	+ 14,044	105,764	29,669	- 62,051	-14.8
SMSA	266,594	284,832	+ 18,238	69,118	18,073	- 32,807	-12.3
Metropolitan Counties	71,606	75,000	+ 3,494	18,159	5,004	- 9,661	-13.5
Non-Metropolitan Counties	81,578	73,890	- 7,688	18,487	6,592	- 19,583	-24.0

*Figures have been adjusted for compatability with April 1 Census dates.

SOURCES: 1960 and 1970 Census
Texas State Department of Health, Vital Statistics, 1960-1970

TABLE B.6

URBAN AND RURAL RESIDENCE*
1960 and 1970

Area	1960 Urban Number	1960 Urban % of Total	1960 Rural Number	1960 Rural % of Total	1970 Urban Number	1970 Urban % of Total	1970 Rural Number	1970 Rural % of Total	Rural to Urban Shift 1960-1970 Number	Rural to Urban Shift 1960-1970 Percent
Texas	7,187,470	75	2,392,207	25	8,920,946	80	2,275,784	20	1,733,476	+5
Coastal Bend Region	316,061	75	103,717	25	348,902	80	84,920	20	32,841	+5
SMSA	223,591	84	43,003	16	253,606	89	31,226	11	30,015	+5
Metropolitan Counties	53,736	75	17,870	25	57,350	76	17,650	24	3,614	+1
Non-Metropolitan Counties	38,734	47	42,844	53	37,846	51	36,044	49	- 888	+4
County										
Aransas	3,924	56	3,082	44	4,605	52	4,297	48	681	-4
Bee	13,811	58	9,944	42	13,506	59	9,231	41	- 305	+1
Brooks	6,515	76	2,094	24	6,355	79	1,650	21	- 160	+3
Duval	6,470	48	6,928	52	6,563	56	5,159	44	93	+8
Jim Wells	24,515	71	10,033	29	24,134	73	8,898	27	- 381	+2
Karnes	6,994	47	8,001	53	7,082	53	6,380	47	88	+6
Kenedy	-	-	884	100	-	-	678	100	-	-
Kleberg	25,297	84	4,755	16	28,711	87	4,455	13	3,414	+3
Live Oak	-	-	7,846	100	-	-	6,697	100	-	-
McMullen	-	-	1,116	100	-	-	1,095	100	-	-
Nueces	196,462	89	25,111	11	223,266	94	14,278	6	26,804	+5
Refugio	4,944	45	6,031	55	4,340	46	5,154	54	- 604	+1
San Patricio	27,129	60	17,892	40	30,340	64	16,948	36	3,211	+4

SOURCE: 1960 and 1970 Census.

*The urban population comprises all persons living in urbanized areas and in places of 2,500 inhabitants or more outside urbanized areas (Bureau of the Census definition).

**Even though many counties had fewer urban residents in 1970 than in 1960, due to extensive outmigration, urban residence as a percent of total population increased during the decade. In Aransas County, even though urban residence increased, it resulted in a decreasing percent of total county population.

TABLE B.7

MEDIAN AGE
1960 and 1970

Area	1960	1970	Median Age Change 1960-1970
Texas	27.0	26.4	- .6
Coastal Bend Region	22.6	24.1	+1.5
County			
Aransas	27.3	34.1	+6.8
Bee	22.3	23.7	+1.4
Brooks	22.3	24.6	+2.3
Duval	24.1	26.3	+2.2
Jim Wells	21.6	24.1	+2.5
Karnes	25.5	28.9	+3.4
Kenedy	20.6	22.9	+2.3
Kleberg	21.9	22.6	+ .7
Live Oak	24.2	30.7	+6.5
McMullen	29.4	31.9	+2.5
Nueces	22.8	24.1	+1.3
Refugio	24.4	27.9	+3.5
San Patricio	20.3	23.2	+2.9

SOURCE: 1970 Census.

TABLE B.8

ETHNIC COMPOSITION - 1970

Area	Total Population	White		White Less Spanish Heritage		Spanish Heritage		Negro		Other Races	
		Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Texas	11,196,730	9,696,569	86.6	7,636,898	68.2	2,059,671	18.4	1,419,677	12.7	80,484	0.7
Coastal Bend Region	433,822	413,123	95.2	209,993	48.4	203,130	46.8	16,752	3.9	3,947	0.9
SMSA	284,832	269,623	94.7	142,849	50.2	126,774	44.5	12,241	4.3	2,968	1.0
Metropolitan Counties	75,100	72,239	96.2	34,182	45.5	38,057	50.7	2,294	3.1	567	0.8
Non-Metropolitan Counties	73,890	71,261	96.4	32,962	44.6	38,299	51.8	2,217	3.0	412	0.6
County											
Aransas	8,902	8,437	94.8	6,065	68.1	2,372	26.6	411	4.6	54	0.6
Bee	22,737	21,891	96.3	12,999	57.2	8,892	39.1	616	2.7	230	1.0
Brooks	8,005	7,872	98.3	1,473	18.4	6,399	79.9	108	1.3	25	0.3
Duval	11,722	11,662	99.5	1,757	15.0	9,905	84.5	27	0.2	33	0.3
Jim Wells	33,032	32,472	98.3	11,347	34.4	21,125	64.0	409	1.2	151	0.5
Karnes	13,462	12,976	96.4	7,461	55.4	5,515	41.0	438	3.3	48	0.4
Kenedy	678	678	100.0	146	21.5	532	78.5	0.0	.0	0	0.0
Kleberg	33,166	31,330	94.5	16,770	50.6	14,560	43.9	1,474	4.4	362	1.1
Live Oak	6,697	6,587	98.4	3,884	58.0	2,703	40.4	94	1.4	16	0.5
McMullen	1,095	1,079	98.5	336	30.7	743	67.9	7	0.6	9	0.8
Nueces	237,544	223,773	94.2	120,230	50.6	103,543	43.6	11,096	4.7	2,675	1.1
Refugio	9,494	8,516	89.7	4,906	51.7	3,610	38.0	927	9.8	51	0.5
San Patricio	47,288	45,850	97.0	22,619	47.8	23,231	49.1	1,145	2.4	293	0.6

SOURCE: 1970 Census

TABLE B.9

AVERAGE FAMILY SIZE AND NET CHANGE
1960-1970

Area	1960 Total Families	1960 Total Persons In Families*	1960 Average Family Size	1970 Total Families	1970 Total Persons In Families	1970 Average Family Size	Net Change In Average Family Size 1960-1970
Texas	2,368,412	8,801,300	3.72	2,809,850	10,120,127	3.60	-.12
Coastal Bend Region	95,379	395,874	4.15	103,391	401,602	3.88	-.27
SMSA	60,643	252,350	4.16	68,082	266,006	3.90	-.26
Metropolitan Counties	16,098	66,453	4.13	17,535	67,237	3.83	-.30
Non-Metropolitan Counties	18,638	77,071	4.14	17,774	68,359	3.85	-.29
Counties							
Aransas	1,793	6,545	3.65	2,450	8,254	3.37	-.28
Bee	5,338	21,633	4.05	5,392	20,270	3.76	-.29
Brooks	1,980	8,377	4.23	1,920	7,631	3.97	-.26
Duval	3,026	12,932	4.27	2,799	11,196	4.00	-.27
Jim Wells	7,747	33,390	4.31	7,770	31,479	4.05	-.26
Karnes	3,429	14,333	4.18	3,214	12,530	3.90	-.28
Kenedy	173	813	4.70	137	632	4.61	-.09
Kleberg	6,558	26,518	4.04	7,315	27,504	3.76	-.28
Live Oak	1,814	7,510	4.14	1,688	6,212	3.68	-.46
McMullen	290	1,043	3.60	284	1,041	3.67	+.07
Nueces	50,805	208,980	4.11	57,072	220,977	3.87	-.24
Refugio	2,588	10,430	4.03	2,340	8,847	3.78	-.25
San Patricio	9,838	43,370	4.41	11,010	45,029	4.11	-.30

SOURCE: 1960 and 1970 Census.

*Includes head of family (male or female), wife of head, child of head and other relatives of head.

TABLE B.10

YEARS OF SCHOOL COMPLETED*
Texas and the Coastal Bend Region
1960 and 1970 and Percent Change

Years of School Completed	1960 Texas Number	1960 Texas Percent	1960 Coastal Bend Region Number	1960 Coastal Bend Region Percent	1970 Texas Number	1970 Texas Percent	1970 Coastal Bend Region Number	1970 Coastal Bend Region Percent	Percent Change 1960-1970 Texas	Percent Change 1960-1970 Coastal Bend Region
No School Years Completed	204,045	4.1	20,834	10.6	176,676	3.0	14,925	7.1	- 1.1	- 3.5
Elementary:										
1-4 Years	468,181	9.3	27,495	14.0	364,067	6.3	21,888	10.4	- 3.0	- 3.6
5-8 Years	1,381,937	27.5	48,229	24.6	1,217,670	20.9	43,047	20.5	- 6.6	- 4.1
High School:										
1-3 Years	986,842	19.6	30,801	15.7	1,302,223	22.4	38,795	18.5	+ 2.8	+ 2.8
4 Years	1,095,017	21.8	37,867	19.3	1,458,297	25.1	50,232	23.9	+ 3.3	+ 4.6
College:										
1-3 Years	491,090	9.8	16,892	8.6	665,746	11.4	21,966	10.5	+ 1.6	+ 1.9
4 Years or More	403,447	8.0	14,316	7.3	632,476	10.9	19,034	9.1	+ 2.9	+ 1.8
Total Persons 25 Years and Over	5,030,559	100.0	196,434	100.0	5,817,155	100.0	209,887	100.0		

SOURCE: 1960 and 1970 Census

*Persons 25 Years or Older.

TABLE B.11

POPULATION DISTRIBUTION 1960 and 1970

Texas as a Percent of United States
Coastal Bend Region as a Percent of Texas
Counties and Groups of Counties as a Percent of Coastal Bend Region

Area	1960	1970	Change 1960-1970
Texas	5.34	5.50	+ 0.16
Coastal Bend Region	4.38	3.87	- 0.51
SMSA	63.51	65.66	+ 2.15
Metropolitan Counties	17.06	17.30	+ 0.24
Non-Metropolitan Counties	19.43	17.03	- 2.40
County			
Aransas	1.67	2.05	+ 0.38
Bee	5.66	5.24	- 0.42
Brooks	2.05	1.85	- 0.20
Duval	3.19	2.70	- 0.49
Jim Wells	8.23	7.61	- 0.62
Karnes	3.57	3.10	- 0.47
Kenedy	0.21	0.16	- 0.05
Kleberg	7.16	7.62	+ 0.46
Live Oak	1.87	1.54	- 0.33
McMullen	0.27	0.25	- 0.02
Nueces	52.78	54.76	+ 1.98
Refugio	2.61	2.19	- 0.42
San Patricio	10.72	10.90	+ 0.18

SOURCE: 1960 and 1970 Census

TABLE B.12

POPULATION DENSITY
COASTAL BEND REGION
1960 and 1970

County	Area in Square Miles[1]	1960 Population[2]	1960 Population Density[3]	1970 Population[4]	1970 Population Density[3]	Change 1960-1970
Aransas	270	7,006	25.9	8,902	32.9	+7.0
Bee	842	23,755	28.2	22,737	27.0	- 1.2
Brooks	904	8,609	9.5	8,005	8.9	- 0.6
Duval	1,814	13,398	7.4	11,722	6.5	- 0.9
Jim Wells	846	34,548	40.8	33,032	39.0	- 1.8
Karnes	757	14,995	19.8	13,462	17.8	- 2.0
Kenedy	1,407	884	0.6	678	0.5	- 0.1
Kleberg	850	30,052	35.3	33,166	39.0	+3.7
Live Oak	1,051	7,846	7.5	6,697	6.4	- 1.1
McMullen	1,157	1,116	1.0	1,095	0.9	- 0.1
Nueces	838	221,573	264.3	237,544	283.4	+19.1
Refugio	771	10,975	14.2	9,494	12.3	- 1.9
San Patricio	680	45,021	66.2	47,288	69.6	+3.4
TOTALS	12,187	419,778	34.3	433,822	35.6	1.3

SOURCES: [1]1972-73 Texas Almanac
[2]1960 Census
[3]Persons Per Square Mile
[4]1970 Census

CHAPTER IV

MANUFACTURING AND PORT FACILITIES

In 1970, there were 1,791 persons employed in manufacturing activities within the Corpus Christi metropolitan area, representing 11.2 percent of total employment. Although there was little or no growth in terms of employment in the area in the sixties, it now appears that manufacturing will offer increasing job opportunities in the seventies.

Industrial Development

The major employers are high wage, low labor intensive industries (i.e., labor costs represents a small part of total cost), refineries, chemical plants, and metal plants. These industries display an affinity toward waterfront locations.

New companies locating in the area include DuPont's new freon plant, the first major industry to locate in Corpus Christi since ARADMAC in 1961; Levi Strauss and Robstown Manufacturing Companies, which located there because of an available female labor supply; and IHC Holland-LeTourneau Marine Corporation, builder of offshore drilling rigs and barges. Holland-LeTourneau employs approximately 700 persons; total employment should reach 1,500 by 1977.

Table IV-1 shows the linkages that exist within the manufacturing sector of the local economy, and between this sector and other areas. For example, the San Patricio Reduction Plant supplies the Sherwin Alumina Plant with alumina, and receives raw bauxite from Jamaica and Haiti.

Manufacturing industries support many local businesses other than manufacturing firms. For example, IHC Holland-Le Tourneau is served locally by Alamo Express, Union Barge Company, City Machine Shop, Western Auto, Xerox, IBM, and Texas Office Supplies.

The linkages that local manufacturers have with areas outside the local economy are particularly relevant when considering new industries that might locate near Corpus Christi within the next ten years. Inputs which are now produced elsewhere may be produced here, and products which are manufactured locally and shipped to other regions for further processing may be further processed locally in the future. These linkages have been slow to develop in Corpus Christi for several reasons: (1) lack of local raw materials (e.g., bauxite, zinc, newsprint, timber); (2) lack of local markets; (3) distance from major distribution and transportation centers.

Within the next decade, industrial development resulting from

backward linkages will be more likely to occur than development stemming from forward linkages. For example, when DuPont begins operation it will utilize nitrogen and oxygen shipped from Houston. Big Three Industries is planning a new $9 million plant near Ingleside which, by 1975, will supply these inputs locally. Other possible developments in the seventies include a new lime plant, new refinery capacity, a soft drink canning plant, and varied wholesalers and suppliers (e.g., welding equipment and barge equipment).

The Port of Corpus Christi

The Port of Corpus Christi is located immediately adjacent to the downtown business district. In 1970, it was the thirteenth largest port in the United States and the second largest in Texas. The port is operated by the Nueces County Navigation District. It functions as well-protected, fully equiped maritime harbor, and also as an inland harbor with access through the sheltered waters of the Intercoastal Canal to ports on the Mississippi River System and its linking tributaries and canals. The port provides essential low-cost transportation for cotton, grain, and petroleum products. Besides direct employment of longshoremen, etc., port-related work includes truckers, rail carriers, weighers, testers, samplers, ship chandlers, and others who repair and clean ships.

The port has seen continuous improvement and each new improvement has in some way benefited the area economy. The 90th Congress has authorized $20 million for port improvements, the most significant contribution for improvements to be made by the government since the port was opened. Completion of the enlargement and deepening program will make Corpus Christi the deepest port on the Gulf of Mexico. It will then accomodate many vessels that cannot presently enter or that can enter only with partial cargoes.

On April 24, 1972, the Nueces County Navigation District presented its plan for a deep water port at Harbor Island (72 ft. depth) to the U. S. Army Corps of Engineers. Corpus Christi is in contention with other coast cities for such a port. A port of this size is needed to accomodate the very large tankers carrying foreign crude oil to the United States. If the port is approved, it will make Corpus Christi one of the foremost port areas in the country. It is estimated that with the completion of such a project, petroleum tonnage alone would double in the first five years. Major industrial growth could also be expected.

TABLE IV-1

CHARACTERISTICS OF SELECTED MANUFACTURING FIRMS IN THE CORPUS CHRISTI SMSA, 1972

SIC Code	Industry	Year of Initial Operation	Home Office	Current Employment	Average** Wage Rate	Labor** Intensity	Original Location Factors
20	FOOD AND KINDRED PRODUCTS						
2024 + 2026	Ice Cream & Fluid Milk				M	L	
	Borden Dairy Products	1929	Houston	***			Market
2036	Fresh or Frozen Packaged Fish & Sea Food				VL	M	
	Coastal Freezing Plant	1950	Aransas Pass	***			Raw material
2042 + 2046	Prepared Animal Feeds & Wet Corn Milling				M-H	L	
	CPC International	1947	Englewood Cliffs, New Jersey	370			(1) Source of grain sorghum (2) Water transportation
2051	Bread and Other Bakery Products				M	M	
	Rainbo Baking Company	1930	Dallas	***			Market
2086	Bottled and Canned Soft Drinks				L	VL	
	American Bottling Company	1904	Corpus Christi	***			Market
	Royal Crown-Dr. Pepper Bottling Company	1965	Corpus Christi	***			Market
23	APPAREL						
2327	Trousers				VL	H	
	Robstown Manufacturing Company	1968	Dallas	475			Labor Supply
	Levi Strauss and Company	1970	San Francisco	***			Labor Supply
24	LUMBER AND WOOD PRODUCTS						
2431	Millwork				M	H	
	Vauter Door Company	1946	Corpus Christi	***			Historically evolved from

TABLE IV-1

(Continued)

SIC Code	Industry	Inputs*	Outputs	Percent of Total Output Sold Outside Coastal Bend Region	Production Outside Region Using Product as Input	Production Inside Region Using Product as Input
20	FOOD AND KINDRED PRODUCTS					
2024 + 2026	Ice Cream & Fluid Milk					
	Borden Dairy Products	Raw milk	Processed milk and ice cream	-		
2036	Fresh or Frozen Packaged Fish & Sea Food					
	Coastal Freezing Plant	Shrimp	Shrimp			
2042 + 2046	Prepared Animal Feeds & Wet Corn Milling					
	CPC International	Yellow dent* and waxy corn*	Dextrose, starch, edible oil, livestock feeds	85	Foods, textiles, primary metals, beverages, paper	Aluminum, liestock feeds, dairy products
2051	Bread and Other Bakery Products					
	Rainbo Baking Company	Flour*, sugar, shortening*, yeast*, wappers*	Bakery products, except speciality items	-		
2086	Bottled and Canned Soft Drinks					
	American Bottling Company	Liquid sugar* and concentrates*	Coca-Cola	-		
	Royal Crown-Dr. Pepper Bottling Company	Liquid sugar* and concentrates*	Soft drinks			
23	APPAREL					
	Trousers					
	Robstown Manufacturing Company	Fabric*	Men's slacks	99		
	Levi Strauss and Company	Fabric*	Men's slacks	99		
24	LUMBER AND WOOD PRODUCTS					
2431	Millwork					
	Vauter Door Company	Lumber*, veneer*, plastic*, glue*	Wood and plastic laminated doors	[illegible]	Buildings	Buildings

TABLE IV-1

(Continued)

SIC Code	Industry	Year of Initial Operation	Home Office	Current Employment	Average** Wage Rate	Labor** Intensity	Original Location Factors
27	PRINTING AND PUBLISHING						
2711	Newspapers				H	M	
	Caller-Times Publishing Company	1886	San Antonio	390			Market
28	CHEMICALS AND ALLIED PRODUCTS						
2812	Alkalies and Chlorine				H	L	
	PPG Industries	1932	Pittsburgh	667			(1) Port, (2) proximity to salt, oyster shell, limestone supplies, and natural gas
2813	Industrial Gases				H	VL	
	Big Three Industries	1975	Houston				Market (DuPont)
2818	Industrial Organic Chemicals, N.E.C.				VH	VL	
	DuPont	1973	Wilmington, Delaware	***			(1) Reasonably close to raw materials, (2) favorable construction costs, (3) availability of water and rail transportation, (4) favorable attitude of local government toward business, (5) attractive neighboring communities
	Celanese Chemical & Plastics Company	1945	New York	815 plus 115 contractor			Proximity to fuel gas and raw materials

TABLE IV-1

(Continued)

SIC Code	Industry	Inputs	Outputs	Percent of Total Output Sold Outside Coastal Bend Region	Production Outside Region Using Product as Input	Production Inside Region Using Product as Input
27	PRINTING AND PUBLISHING					
2711	Newspapers					
	Caller-Times Publishing Company	Newsprint*	Newspapers	5		
28	CHEMICALS AND ALLIED PRODUCTS					
2812	Alkalies and Chlorine					
	PPG Industries	Limestone*, potash*, chrome ore*, electricity and natural gas	Chlorine, alkalies, chrome chemiclas	95	Glass, papers, phosphates, plastics, leather, petro-chemicals	Petroleum, freon
2813	Industrial Gases					
	Big Three Industries	Air	Oxygen, nitrogen, argon			Freon products
2818	Industrial Organic Chemicals, N.E.C.					
	DuPont	Chemical raw materials*	Carbon tetrachloride and freon products	99	Refrigeration and air conditioning systems, aerosols, cleaning agents, foam blowing.	
	Celanese Chemical & Plastics Company	Liquified petroleum gases, fuel gas (methane), auxiliary chemicals* and [redacted] supplies*	More than 50 industrial organic chemicals & specialized engineering plastics	100	Plastics, paints fibers, building materials, packaging materials, toys, engineering parts, touch brushes, drapes, [redacted]	

TABLE IV-1

(Continued)

SIC Code	Industry	Year of Initial Operation	Home Office	Current Employment	Average** Wage Rate	Labor** Internsity	Original Location Factors
2819	Industrial Inorganic Chemicals, N.E.C.				H	L	
	Sherwin Alumina Plant	1953	Richmond, Virginia	850			(1) Port, (2) available and inexpensive fuel and water supply, (3) labor supply, (4) plant site elevation relatively high at sea frontage, (5) climate
2895	Carbon Black				H	L	
	Ashland Chemical Company	1939	Columbus, Ohio	***			(1) Availability and cost of natural gas
29	PETROLEUM REFINING AND RELATED PRODUCTS						
2911	Petroleum Refining				VH	VL	
	Champlin Petroleum Company	1937	Fort Worth	295			(1) Readily available supply of crude oil for conversion into energy producing products, (2) water and pipeline transportation
	Southwestern Oil and Refining Company	1936	Corpus Christi	240			
	Coastal States Petrochemicals Company	1936	Corpus Christi	324			
	Suntide Refining Company	1953		500			
32	STONE, CLAY, GLASS, AND CONCRETE PRODUCTS						
	Ready-Mix Concrete				M	M	
	South Texas Materials Company	1932	Corpus Christi	***			Market
	Gulf Concrete Company	1963	Corpus Christi	***			
	Counts Concrete Company	1961	Corpus Christi	***			
	Centex Cement Corporation			***			

TABLE IV-1
(Continued)

SIC Code	Industry	Inputs*	Outputs	Percent of Total Output Sold Outside Coastal Bend Region	Production Outside Region Using Product as Input	Production Inside Region Using Product as Input
2819	Industrial Inorganic Chemicals, N.E.C.					
	Sherwin Alumina Plant	Bauxite*, caustic soda*, starch, lime*, fuel labor	Metallurgical grade aluminum oxile(alumina)	85	Aluminum ingot, aluminum sheeting, beverages cans, Reynolds wrap	Aluminum ingot
2895	Carbon Black					
	Ashland Chemicals Company	Oil*, natural, gas, electric power	Carbon black	100	Rubber tires and other rubber products	
29	PETROLEUM REFINING AND RELATED PRODUCTS					
2811	Petroleum Refining					
	Champlin Petroleum Company	Crude Petroleum*, chemicals*	Motor fuels, jet turbine fuels, home heating fuels, furnace oils, petrochemicals	95-99	Synthetic fibers, waxes, solvents, plastics, pharmaceuticals pesticides, fertilizers, pigments and dyer, synthetic rubber, and hundreds of other products	Petrochemicals
	Southwestern Oil and Refining Company					
	Coastal States Petrochemical Company					
	Suntide Refining Company					
32	STONE, CLAY, GLASS, AND CONCRETE PRODUCTS					
3273	Ready-Mix Concrete					
	South Texas Materials Company	Oyster shell, sand, gravel	Cement	-		Construction and varied other uses
	Gulf Concrete Company					
	Counts Concrete Company					
	Centex Cement Corporation					

TABLE IV-1
(Continued)

SIC Code	Industry	Year of Initial Operation	Home office	Current Employment	Average** Wage Rate	Labor** Intensity	Original Location Factors
33	PRIMARY METALS						
3333	Primary Smelting & Refining of Zinc				M	M	
	American Smelting and Refining Company	1941	New York	780			(1) Port and rail facilities, (2) ample gas, water, and electrical power, (3) availability of labor (4) proximity to Mexico for import of raw materials (5) climate
3334	Primary Production of Aluminum				VH	L	
	San Patricio Reduction Plant (Reynolds Metals Company)	1952	Richmond, Virginia	920			(1) Nearness to alumina supply, (2) proximity to gas fuel
34	FABRICATED METALS						
3441	Fabricated Structural Steel				M	M	
	Western Steel Company	1946	Corpus Christi	***			Market, including marine and industrial repairs
	Coastal Iron Works	1945	Corpus Christi	***			
	Gulf Iron Works	1944	Corpus Christi				
3443	Fabricated Plate Work				M	M	
	Hunt Tool Company	1964	Houston	***			Market
35	MACHINERY, EXCEPT ELECTRICAL						
3522	Farm Machinery & Equipment				H	M	
	E. L. Caldwell & Sons	1916	Corpus Christi	***			Home grown company
3533	Oil Field Machinery				M	M	
	IHC Holland-LeTourneau Marine Corporation	1971	Kilgore, Texas	400			(1) Trainable work force (2) access to Gulf with no

TABLE IV-1
(Continued)

SIC Code	Industry	Inputs*	Outputs	Percent of Total Output Sold Outside Coastal Bend Region	Production Outside Region Using Product as Input	Production Inside Region Using Product as Input
33	PRIMARY METALS					
3333	Primary Smelting & Refining of Zinc American Smelting and Refining Company	Zinc sulphide* and Zinc ores*	Special high grade zinc, die cast alloy metals, sulfuric acid, cadmium	99-100	Automobiles, hardware and household appliances, other metals,	Typewriter parts, auto parts
3334	Primary Production of Aluminum San Patricio Reduction Plant (Reynolds Metals Company)	Carbon*, alumina, gas	Primary Aluminum ingot	99-100	Sheeting, beverage cans, Reynolds wrap	Typewriter parts, die castings for traffic signal lights, parts for automobile manufacturers, water tanks, guard rails
34	FABRICATED METALS					
3441	Fabricated Structural Steel Western Steel Company Coastal Iron Works Gulf Iron Works	Structural steel*, reinforcing steel*	Fabricated structural and reinforcing steel, pressure vessels, tubing bundles	15-20		Petroleum and petrochemicals, transportation, construction
3443	Fabricated Plate Work Hunt Tool Company		Shell and tube heat exchangers			
35	MACHINERY, EXCEPT ELECTRICAL					
3522	Farm Machinery & Equipment E. L. Caldewell & Sons	Steel*	Farm equipment	43	Food & fiber	Food & fiber
3533	Oil Field Machinery [redacted] Hol[redacted] LeTo[redacted]au Marine Corporation	[redacted] Steel*, [redacted] and barge	[redacted] Offshore drilling rigs and barges	[redacted]	[redacted] Oil, [redacted] operations	[redacted]

TABLE IV-1
(Continued)

*Inputs with an asterisk originated at least partially from outside the Coastal Bend Region.

**VL (very low), L (low), M (moderate), H (high), VH (very high). See text for further explanation of these symbols. "-" means zero or negligible.

***Signifies less than 200 employees.

SOURCE: Average Wage Rate and Labor Internsity information is from Growth and Labor Characteristics of Manufacturing Industries, Economic Development Administration, U.S. Department of Commerce. Other information is mostly from the CRP Industrial Questionnaire (Summer, 1972).

TABLE IV-2

TOTAL COMMERCE AT LEADING
U.S. PORTS: 1970

PORT	TONS
New York	174,008,108
New Orleans	123,674,208
Houston	64,654,263
Norfolk	53,544,337
Philadelphia	52,224,396
Baltimore	51,084,394
Chicago	48,254,387
Baton Rouge	45,535,281
Duluth	42,758,965
Toledo	31,932,493
Detroit	31,241,263
Tampa	31,356,522
Corpus Christi	30,544,712

SOURCE: Waterborne Commerce of the United States, Calender Year 1970: Part 5, National Summaries, U.S. Army Corps of Engineers, Vicksburg, Mississippi.

TABLE IV-3

COMMERCE AT LEADING TEXAS PORTS:
1961 and 1970

PORT	TONS		PERCENT CHANGE
	1961	1970	1961 - 1970
Houston	56,474,299	64,654,263	14.5
Corpus Christi	26,760,121	30,544,712	14.1
Beaumont	28,735,935	30,480,706	6.1
Port Arthur	25,579,302	22,671,406	-11.4
Texas City	16,418,556	17,097,411	4.1

SOURCE: Waterborne Commerce of the United States, Calender Year 1970: Part 5, National Summaries, U.S. Army Corps of Engineers, Vicksburg, Mississippi.

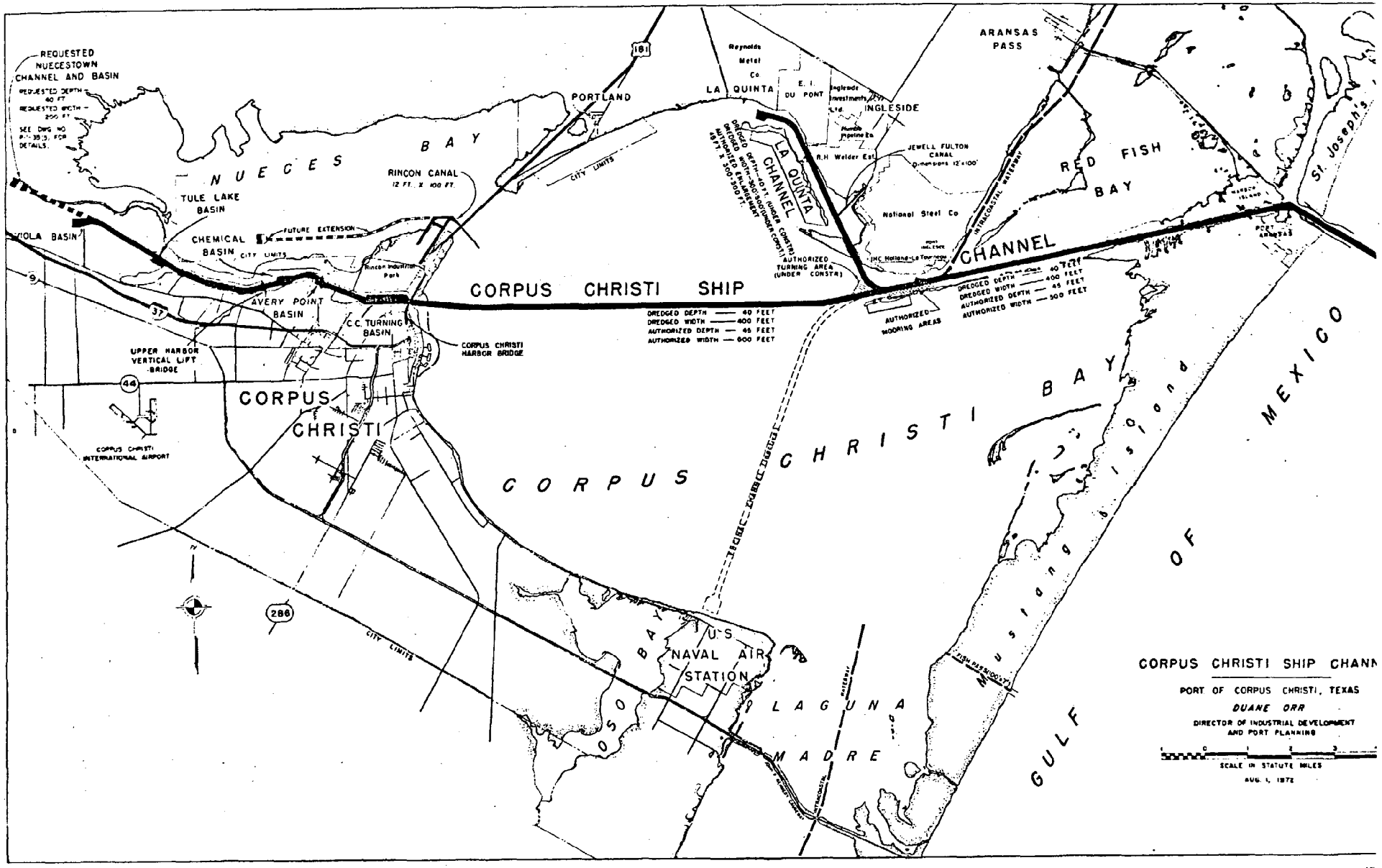


FIGURE IV-1
CORPUS CHRISTI SHIP CHANNEL

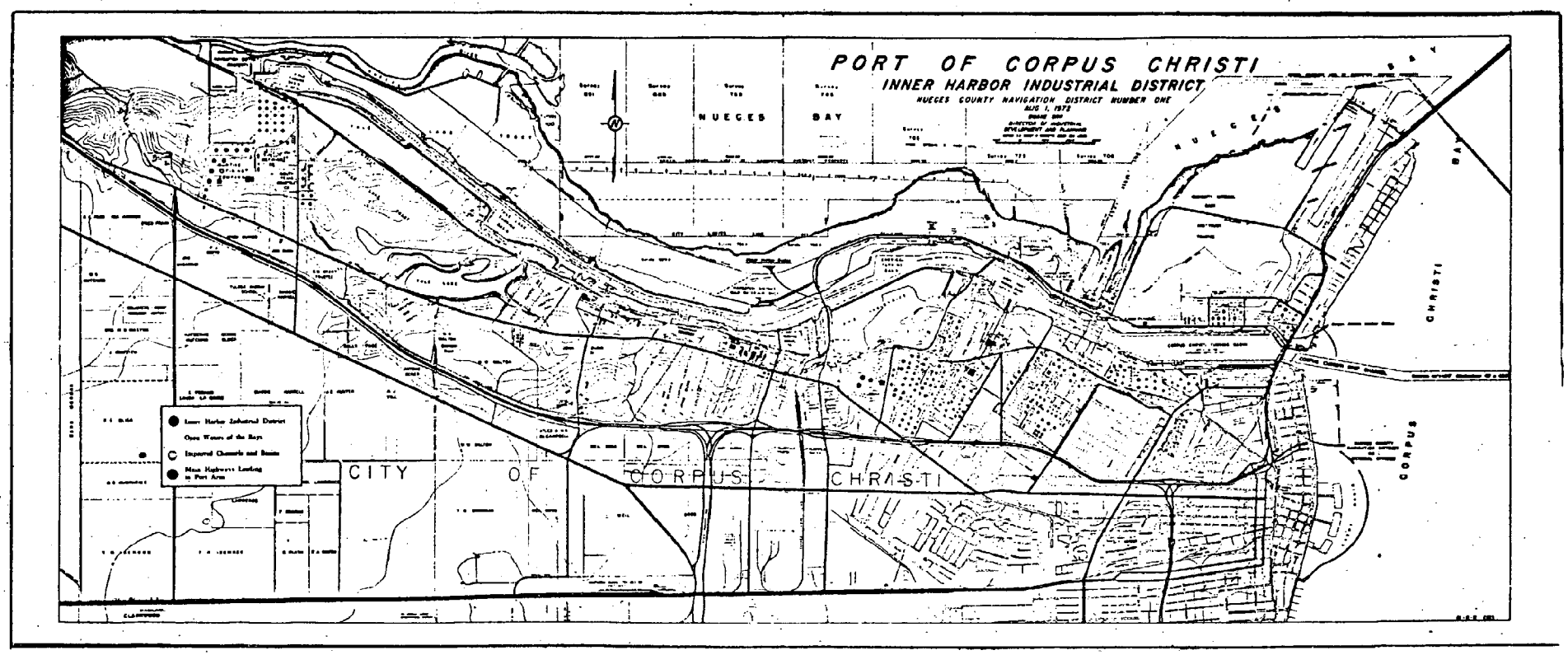


FIGURE IV-2
PORT OF CORPUS CHRISTI--INNER HARBOR INDUSTRIAL DISTRICT

APPENDIX C

LOCATION OF INDUSTRIAL GROWTH

LOCATION OF INDUSTRIAL GROWTH

Because of the high spatial concentration of industry in the COG, it was decided that little could be gained from a regional model of industrial location. The greater part of the heavy industry in the COG is concentrated in the Corpus Christi area.

In order to ascertain the likely future spatial growth patterns of industrial firms located in the study area, a series of personal interviews were held with plant executives in the Coastal Bend COG region. The information obtained from these interviews provides an estimate not only of the future increase in plant capacity for firms in the region, but also the most likely locations of this additional capacity.

The interviews are summarized below.

Industrial Development

El Paso Natural Gas Co.-plans to have a new facility for the reprocessing of crude oil and liquified natural gas in operation by 1977. The plant will be located on the North shore of Corpus Christi Bay at a cost of $500 million, and initial employment is estimated at 200-300 with an annual payroll of about $3.5 million.

Coastal States Gas Producing Co.-plans the construction of a $30 million plant near the existing Coastal States Petrochemical Co. for the production of substitute natural gas (SNG). Completion date is set for 1974.

DuPont-presently constructing a freon plant on the North shore of Nueces Bay. Started in March, 1972, the plant will be built in stages and is scheduled for startup in fall 1973. DuPont has purchased about 1500 acres, but will only use about half the land for present development. The first stage will employ about 300 persons, but no detailed plans for subsequent stages are available.

Big Three Industries, Inc.-plans to build a $9 million plant near Ingleside to furnish oxygen and nitrogen to the DuPont plant. Production will begin about Fall, 1975.

IHC Holland-LeTourneau Co.-presently building a construction yard near Ingleside for the production of "jack-up drilling platforms." When full-scale production begins this year, the firm hopes to be building about three platforms a year, at a cost of 10 to 15 million dollars each. Employment will be about 200, mostly welders.

American Petrofina-recently purchased 250 acres of land along the Aransas Ship Channel, adjacent to the proposed Harbor Island Superport. The company will undoubtedly develop the land if the port improvements are made, and will most likely exert considerable lobby pressure to get the project approved.

Public Utilities

Central Power and Light-presently constructing a new generating station which will provide an additional 325,000 kilowatts by 1974. The Barney M. Davis Power Station will run on natural gas and utilize a 1,150 acre cooling lake. The plant is located just South of Corpus Christi on the King Ranch.

Water Supply-all projections for the Corpus Christi area show that a larger supply of water will be needed by about 1980. The Texas Water Rights Commission has designated the City of Corpus Christi and the Nueces River Authority as co-sponsors for the Choke Canyon reservoir project. At present the co-sponsors are working on the complete proposal, including environmental impact statements, to be submitted for congressional approval next January. Officials from South Texas say they will urge for immediate construction of the project. Cost estimates for construction by 1976 are as high as $80 million. However, no estimates on the length of time needed for construction have been made available.

Master Plan for Water Lines-Bob Schneider, Director of Utilities, has said that the city will soon require more planning with regard to water lines, and hopes to develop a master plan for water line extension. The city already has a master plan for sewers.

Padre Island Sewage Treatment Plant-The city is trying to get funds from EPA to build a new treatment plant to replace two temporary package treatment plants already on the island. The plant will be built as soon as possible and will serve as the city's tool for limiting development by Padre Island Investment Corporation. (i.e. capacity will be limited).

Environmental Protection

Reynolds Metals Co.-plans to install $6 million worth of air pollution equipment over the next year in order to upgrade their older facilities.

Sun Oil Co.-plans to build a $2.7 million waste treatment facility at their Suntide refinery. The project is to be funded by the sale of revenue bonds to be issued by the Nueces County Navigation District and paid off by Sun Oil.

City Sewage Control-The highest organic loading of the inner Harbor now comes from the city's sewage treatment plant. Part

of the bond issues approved in December will be used to upgrade the effluent substantially.

Beeville Sewage Control-Beeville voters approved a bond election to rehabilitate a sewage treatment plant and provide for another.

Kingsville Sewage Control-Previously served by septic tanks which empty into Baffin Bay, the city now has under construction a collection system and sewage treatment plant.

Other South Texas Cities-George West, Alice, Rockport, Port Aransas, Mathis, Aransas Pass, Refugio, Trivoli, Orange Grove, Edroy, and Skidmore have all either improved their sewage treatment systems in the last year or are planning to do so in 1973. Increased effluent control should upgrade the quality of the bay waters in the next few years.

Residential and Commercial Development

Cochera Corporation-planning a 91 acre mobile home development along Cayo del Oso north of Padre Island Drive and west of Flour Bluff Drive.

Padre Island Investment Corporation-recently applied for a permit to dredge the entirety of Packery Channel East of Mustang Island Highway in connection with a plan to convert the surrounding area to a hotel and multifamily residential development. Dredging is not planned to start for two or three years, which seems to give a time-frame for the rest of the development.

General Construction-In an article appearing in the Corpus Christi Caller, Bill B. Cobb said, "To replace the boom in housing experienced in the Corpus Christi area...will be the expansion planned by commercial and industrial construction...DuPont... Coastal States...Big Three Industries. In the commercial field... Mission Shopping Center...Handy Dan, Best Products, Commerce I Commercial Center, several HEB outlets...and a new Sears and HEB Center." The author put little confidence in the housing market for 1973. Another author predicted a sharp rise in the townhouse and condominium styles of living, at the expense of single-family unit construction, especially FHA 235 homes.

Transportation

Expansion of Corpus Christi International Airport-Voters recently approved a $500,000 bond issue for the acquisition of land adjacent to the airport for future expansion. Enough land will be bought in the coming months to make the present location adequate for another 50 or 60 years, according to the director of the operation.

Port Expansion-Many proposals have been made in this area, but all seem a long way off. The Maritime Administration of the U.S. Department of Commerce has recommended the construction of an offshore facility capable of handling 500,000-ton tankers by the year 1982. No definite decisions have been made yet regarding such a port. The Nueces County Navigation District has offered a different plan for port development. The so-called Harbor Island Plan would be built in three stages: first, deepening of the channel to Harbor Island to a depth of 72 feet, thus permitting ships up to 275,000 tons to unload approximately 8 miles away from the present port. Phases 2 and 3 consist of deepening inland channels to facilitate movement from Harbor Island to the present docking areas. Local officials do not see the two possibilities as mutually exclusive. The Harbor Island proposal, however, has no provisions or policies for either division of costs or environmental protection. These deficiencies and their resolutions would seem to place the Harbor Island Plan at least 3-5 years in the future, with the possibility of a deep-channel project taking up to 10 years.

Regardless of the outcome of a superport decision, Port officials are presently planning to deepen the existing channels from 40 to 45 feet. President Nixon's 1972 budget included $4,7 million to begin this project, which should be completed in the near future.

Rincon Industrial Park-The City of Corpus Christi is promoting the development of this area extensively. Current plans are to widen two existing channels from 150 to 250 feet each, as well as to widen access to each. So far only one firm has located here, but future development seems inevitable. The City has not given a timetable for development, but the extent of the promotion efforts might indicate the city was looking at approximately 3 years.

Texas Highway Department-plans to build a new bridge across the Packery Channel to Padre Island (in conjunction with proposed resort and residential development).

Overall Highway Construction-Delays in Federal appropriations for new highway construction have seriously hampered completion of district projects now in progress and could eliminate some of the planned ones. The outcome will be based on the priority given to the Urban Mass Transit Program by Congress.

Local Land-Use Policies and Ordinances

Mobile Home Restrictions-The Corpus Christi City Council recently voted to require building permits for mobile homes. Also, mobile home lots must now be at least 6000 sq. ft. Other restrictions

are being considered, such as a slab foundation requirement, and it seems inevitable that the trend will be to further control and possibly discourage mobile home development.

General Development Control through Utility Restriction- The city of Corpus Christi seems to be following a trend toward stronger land-use control by limiting access to available utilities. Padre Island Investment Corp. is being controlled by the limitations of sewer facilities, and fringe area development is being supervised through annexation and water distribution policy. Also, the city hopes to use limited water distribution to limit peripheral development to the proposed DuPont plant. (The city contracted with DuPont for a maximum of 28 million gallons per day, and any peripheral industries or expansion by DuPont will have to share this supply.) National Steel recently purchased a large tract of land adjacent to DuPont, and the city may also limit development here by rationing the water supply.

Education and Recreation

Texas A&I University-opening a new branch this September with an anticipated enrollment of 700 to 800. The school hopes to expand to around 2000 in a few years. The city was recently granted authority to issue $1.5 million in bonds to purchase 35 acres of land and the buildings at the University of Corpus Christi's Ward Campus.

Tourism-Due to expanding hotel accommodations, beach restoration projects, and liquor by the drink, the Corpus Christi Area Tourist Bureau is expecting the tourist industry to grow rapidly in the coming years. They are planning an intensified advertising campaign for 1973.

Miscellaneous

Corpus Christi's Relationship to the COG-In December, Mayor Price Johnson of Refugio said that the City of Corpus Christi will probably need to be given more representation to keep it in the Coastal Bend Council of Governments.

Naval Air Training Base-In an analysis of cuts in Defense spending the Corpus Christi Caller said that the Naval Air Base will "probably not" be affected.

Public Works Projects-Over the next 3-5 years the following projects will be completed (lumped together because they were all approved in the same bond election):

$3.6 million for sanitary sewer improvements

$3.5 million for beach restoration

Additions to the police building, museum, and two new fire stations

$4.2 million for street improvements

$3.2 million for drainage improvements

Voters approved $4.9 million for an auditorium that would be a part of an $11 million convention center, but the latter was not approved. The center is still in question, but if it does not pass another vote it is unlikely that either the auditorium or the convention center will be built in the next few years.

CHAPTER V

QUALITATIVE ALLOCATION OF RESIDENTIAL POPULATION

The regional base for the present modelling effort is outlined in the S.M.S.A. map of the Corpus Christi Region (Figure V-1). Where appropriate, data will be graphically displayed in this format. The matching of tracts for 1960 with tracts and or portions of counties for 1970 is presented in Table V-1.

Qualitative Assessment

First, an attempt was made to identify those geographical areas in and around the Corpus Christi region which are most likely to accommodate the industrial and residential growth anticipated over the next ten years. For a number of reasons, industrial growth is much easier to anticipate geographically than is residential growth. First, industrial locations are usually centralized due to zoning laws, proximity to natural resources, and transportation availability. Second, the number of industrial locations is usually fewer than the number of single-family residences which accompany them. And third, decisions concerning industrial location are usually well-planned and made years in advance of actual location. As an example, development of the north shore of Corpus Christi Bay by El Paso Natural Gas Co., DuPont, Coastal States Gas Co., and others will not be completed until 1977, yet there is no uncertainty as to where they intend to locate. No such definitive statements can be made about the residential growth which will occur as a result of these plants. For these reasons, a set of models are utilized to deal with residential growth.

A qualitative and subjective methodology was the basis for a preliminary examination. Personal observation of current events was combined with the opinions of knowledgeable city residents and the forecasts of Bell Telephone Co., the Corpus Christi Dept. of Utilities, the Coastal Bend Council of Governments, the Corpus Christi Planning Dept., realtors and land developers. What follows is more or less a "greatest common denominator" of fact and opinion. The results have been mapped with an appropriate discussion associated with each node of activity.

1980 Growth Areas - Qualitative Assessment

The future development of the Coastal Bend region can be divided into five distinct geographical categories: South Corpus Christi, West Corpus Christi, North Corpus Christi Bay, Padre and Mustang Islands, and Outlying or Peripheral areas.

TABLE V-1

BASIS OF 1960-1970 SMALL AREA S.M.S.A. DATA MATCH

* = Corpus Christi City Tracts

1960 - 1970	1960 - 1970	1960 - 1970	1960 - 1970	1960 - 1970
* 1 - 1	*11 - 11	*21 - 21	*52 - 29	Ingleside - 103
* 2 - 2	*12 - 12	*22 - 22	*53 - 30,31,32	Gregory - 105
* 3 - 3	*13 - 13	*23 - 23	54 - 54	Portland - 106
* 4 - 4	*14 - 14	*24 - 24, 34, 33	56 - 56	Taft - 108
* 5 - 5	*15 - 15	*25 - 25	57 - 57	Sinton - 110
* 6 - 6	*16 - 16	*26 - 26	58 - 58	Odem - 111
* 7 - 7	*17 - 17	*27 - 27	59 - 59	Mathis - 113
* 8 - 8	*18 - 18	28(Bay) 28	60 - 60	Remainder of San Patricio Co. -104 -107 -109 -112
* 9 - 9	*19 - 19	*50, -50,35,36,37		Aransas Pass -102
*10 -10	*20 - 20	*51 - 51		

The letters accompanying the discussion of geographical categories refer to the appropriate areas on the map in Figure V-2.

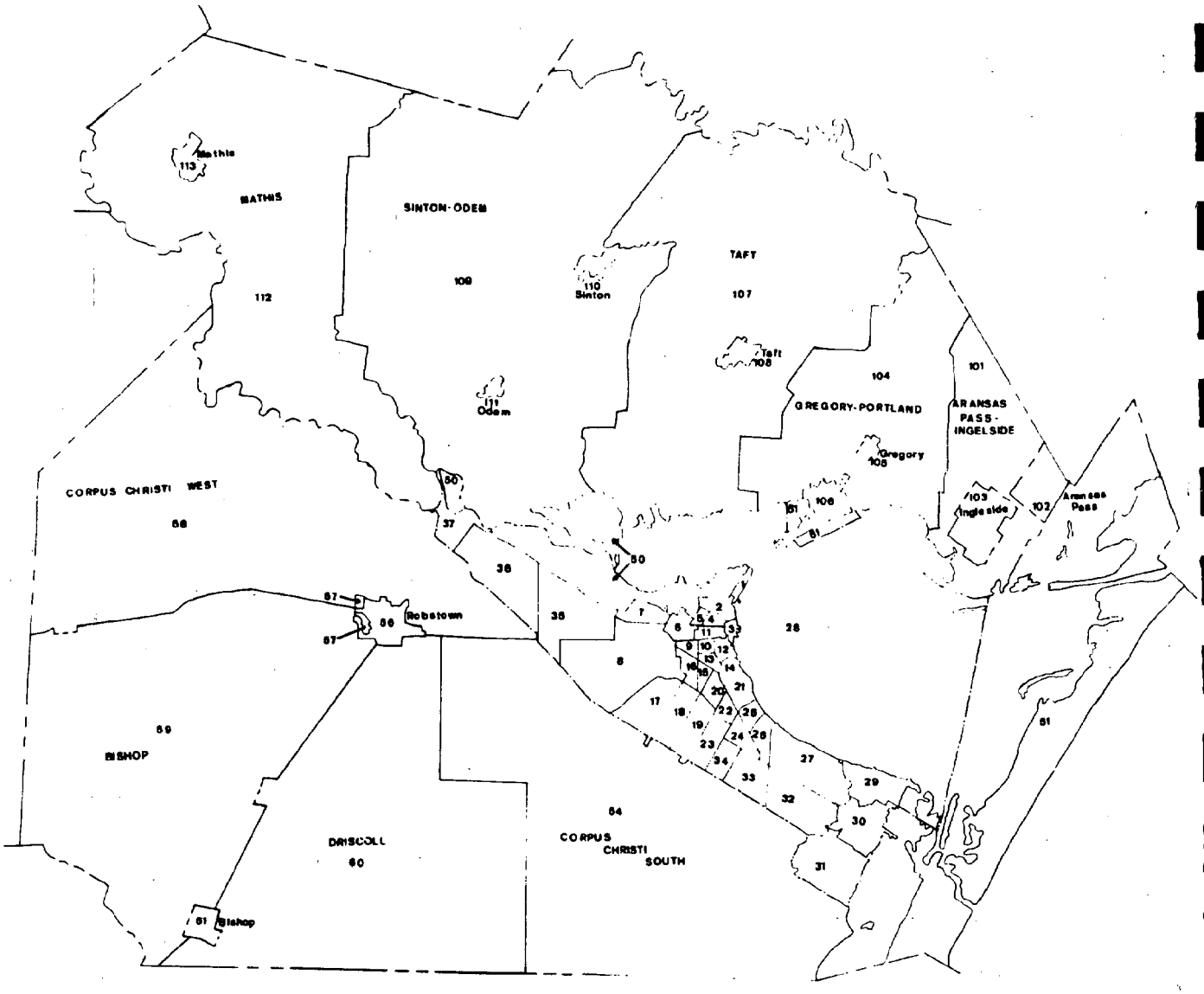
A. South Corpus Christi: It is estimated that between 50 and 75 percent of all present housing construction is occuring in this area and that it will continue to accommodate about half of all residential growth until about 1980. Most of the present development is occuring east of Oso Creek in Census Tract 30, but both sides of the creek should be developed in 5 to 7 years to include Census Tracts 31, 32, and 33. The number of people this area could accommodate is questionable because there may be a pattern toward increased high density living but it is estimated that an additional 10,000 people will locate here by 1980.

B. and C. West Corpus Christi: This area includes the vicinity of the Corpus Christi Airport and the Bay area northwest of the city known as North Beach. In 1972, the voters approved a bond issue for the restoration of the beaches in the North Beach area and it is estimated that approximately 2,500 people will move to this area by 1980, many of the new residents being of retirement age. Much of the residential growth in the rest of West Corpus Christi will accompany new industry in the area and will locate in Census Tracts 36, 8, and 17. In addition, the most westerly portion of the city, Tract 37, will also develop in the next 5-7 years. The major limitations to growth in this area are in Tracts 8 and 35. Tract 8 includes a large section of land to be reserved for the airport expansion recently passed by the voters. Tract 35 will not develop for a few more years because of oil fields and drainage problems, although the planned improvement of Highway 44 might spur development in this area. Estimates as to how fast this area will grow in comparison to the Southern areas vary widely. It seems most probable that growth in this region will lag behind the southern expansion for the rest of the decade. Population increase of about 5000 (excluding the North Beach area) seems reasonable by the year 1980.

D. North Corpus Christi Bay: The area north of Corpus Christi Bay is within the extraterritorial jurisdiction of Corpus Christi but not within the city itself. The two basic growth areas in North Bay are Ingleside and Portland, with Ingleside attracting more of the industrial growth and Portland serving as a residential growth center. It is estimated that this area might accommodate as much as 25 percent of the Coastal Bend's total growth in the next 5-7 years. A reasonable estimate of population growth would be about 1000 persons per year until about 1980 for both Portland and Ingleside combined.

E. Padre-Mustang Islands: These two Islands have the potential to develop in one or two ways; as a second home and resort community, or as a retirement community. The lack of hospitals, shopping centers, and other services demanded by older persons will prohibit growth

CORPUS CHRISTI REGION
S. M. S. A.



CENSUS TRACTS
AS OF 1970 CENSUS

Figure V-1

as a retirement community for at least five years. At present the majority of development on the Islands is being done on the north end of Padre Island. The city hopes to limit the long-run growth of the areas south of presently planned development by limiting the capacity of the new sewage treatment plant to a level sufficient only for the immediate area. It is generally agreed that Padre Island will develop prior to Mustang Island to the north. Additionally, most of the development on Padre Island will probably be low-density, whereas predictions for Mustang Island are for more condominium and hotel construction. From all indications there should be about 3000 families or about 10,000 people living on both islands by 1980.

F. Outlying Areas: Little population growth is anticipated in these areas during the current decade.

1990 Growth Areas - Qualitative Assessment

In the decade 1980-1990 development in the Coastal Bend Region will continue in South Corpus Christi, West Corpus Christi, North Corpus Christi Bay, Padre and Mustang Islands, and commence in several outlying areas. (See Figure V-3)

A. South Corpus Christi: Development in this area should continue past 1980 but at a slower pace. Expansion should continue to the south to the King Ranch and to the southwest to the Chapman Ranch which present absolute barriers to further growth. An additional estimated 7500 people should move into this area between 1980 and 1990.

B. and C. West Corpus Christi: North Beach will continue to develop with an expected completion by 1985 and an additional 2,500 people. The rest of West Corpus Christi should continue as in the last decade with an additional 5,000 people moving into the areas indicated by 1990.

D. North Corpus Christi: Portland and Ingleside will continue growing with an annual increase of 1000 or more. It has been estimated that portland will expand to engulf Gregory to the north by the year 2000.

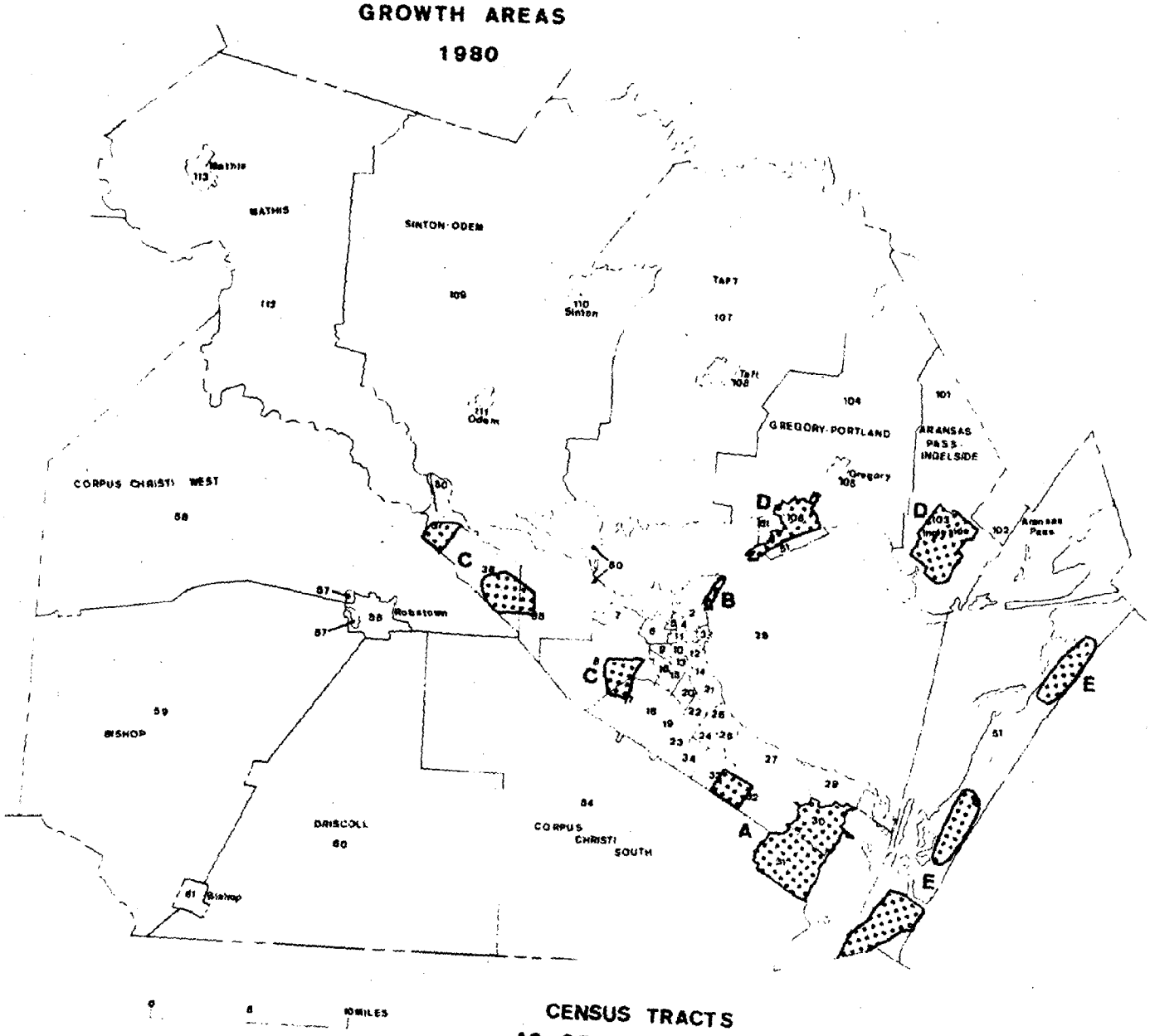
E. Padre-Mustang Islands: Continued population growth on these Islands depends on the provision of sufficient services to handle increased population.

F. Outlying Areas: There are three pockets of potential growth in this decade in these outlying areas. In Aransas County, Aransas Pass has the potential to become a resort or retirement area but this will probably have to wait until Padre and Mustang Islands are extensively developed. The city of Edroy may grow provided it can get water from the proposed Choke Canyon Reservoir to be built

CORPUS CHRISTI REGION

GROWTH AREAS

1980



CENSUS TRACTS
AS OF 1970 CENSUS

Figure V-2

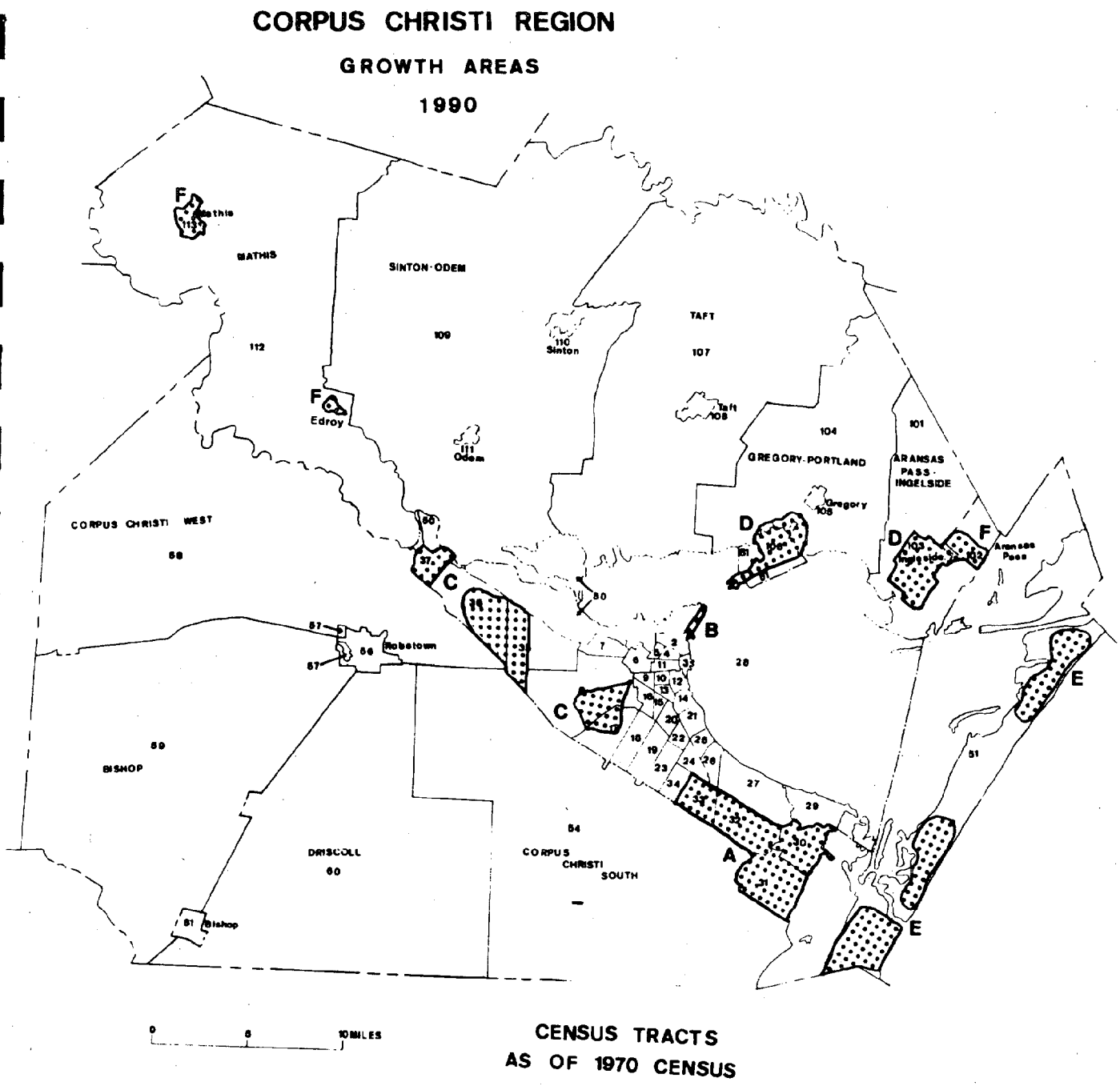

CORPUS CHRISTI REGION
GROWTH AREAS
1990
MATHIS
SINTON-ODEM
TAFT
GREGORY-PORTLAND
ARANSAS PASS-INGLESIDE
CORPUS CHRISTI WEST
BISHOP
DRISCOLL
CORPUS CHRISTI SOUTH
Edroy
Odem
Sinton
Taft
Gregory
Aransas Pass
Robstown
Bishop
A
B
C
D
E
F
0
5
10 MILES
CENSUS TRACTS
AS OF 1970 CENSUS

Figure V-3

around 1985. Finally, Mathis has some potential for inexpensive summer home development, possibly of the mobile home variety.

Graphs of the shift in population density between 1960 and 1970 demonstrate only a mild expansion of the city but a sharp adjustment of the density curve to the right. (See Figure V-4) This implies a continuing low density central city but rising density in the adjacent land. This increasingly homogenous density distribution is likely to be exaggerated in the future with continued expansion of residential populations in the periphery. (See Figure V-5)

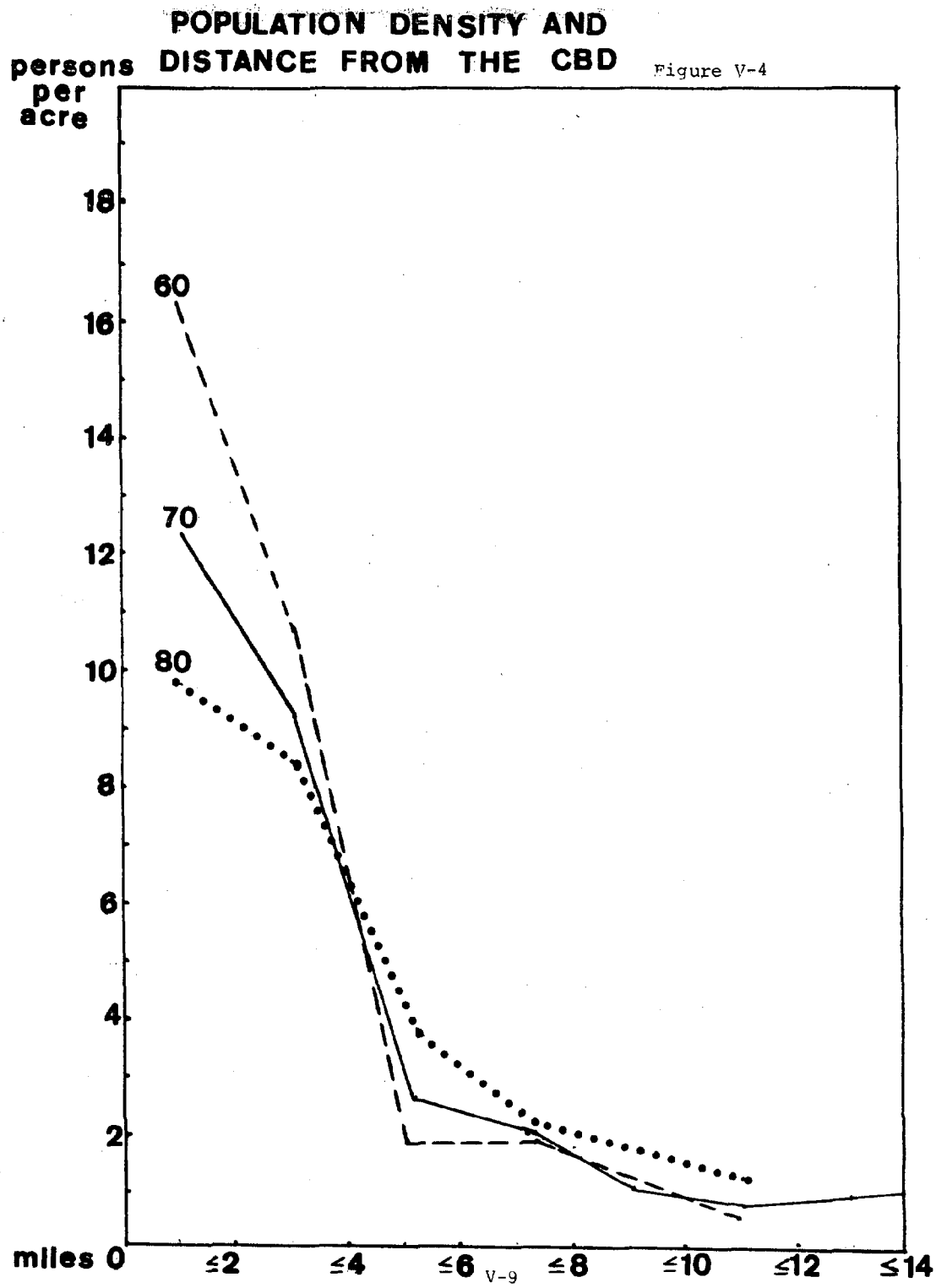

POPULATION DENSITY AND
DISTANCE FROM THE CBD
persons per acre
18
16
14
12
10
8
6
4
2
0
60
70
80
miles
≤2
≤4
≤6
≤8
≤10
≤12
≤14

Figure V-4

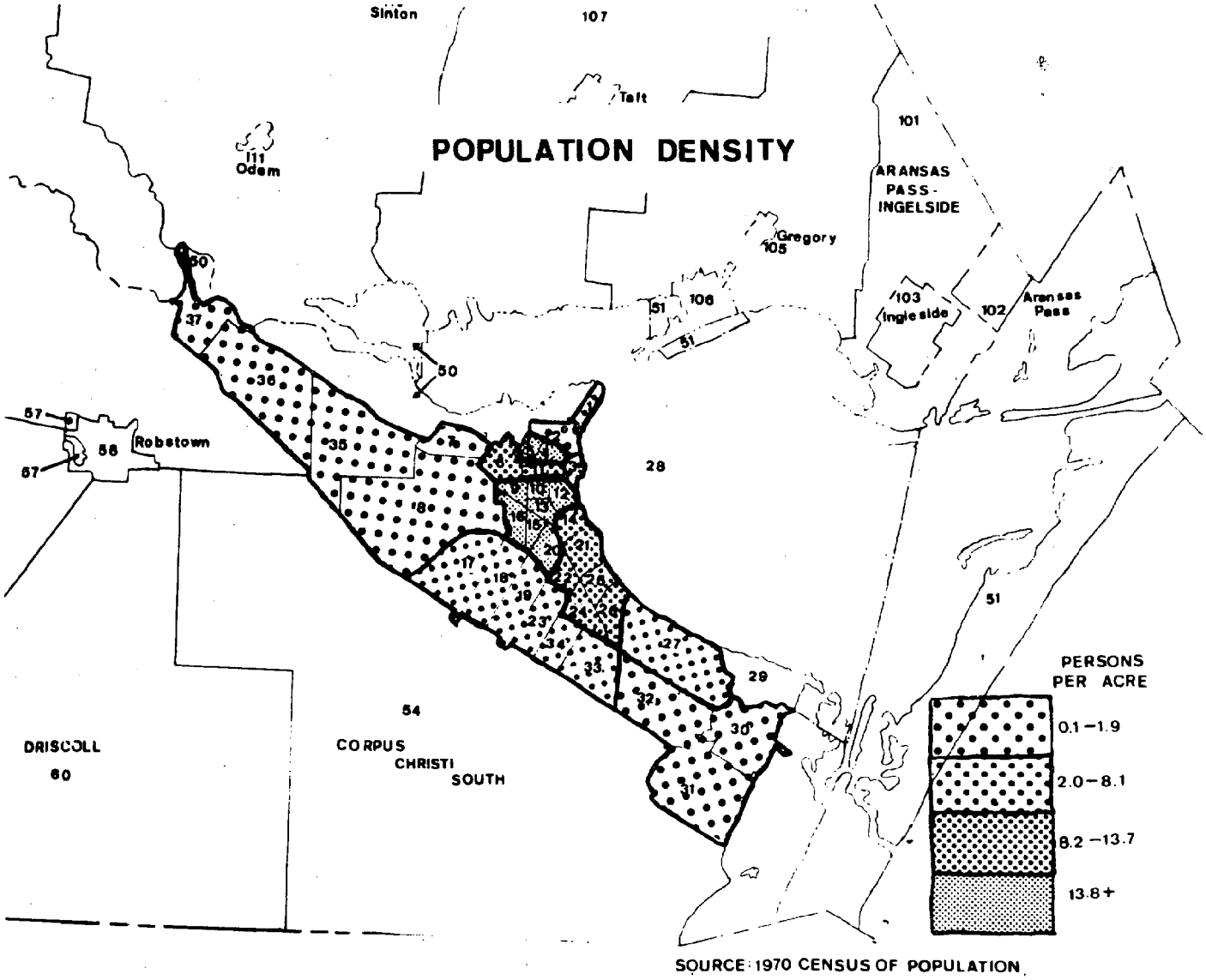

POPULATION DENSITY
Sinton
107
Taft
111
Odem
101
ARANSAS
PASS-
INGELSIDE
Gregory
105
103
Ingleside
102
Aransas
Pass
106
51
50
37
36
35
57
56
Robstown
28
18
17
16
15
14
13
12
19
20
21
22
23
24
25
26
27
29
30
31
32
33
34
51
PERSONS
PER ACRE
0.1 – 1.9
2.0 – 8.1
8.2 – 13.7
13.8 +
54
DRISCOLL
60
CORPUS
CHRISTI
SOUTH
SOURCE: 1970 CENSUS OF POPULATION

Figure V-5

CHAPTER VI

ANALYSIS OF INTRA-METROPOLITAN POPULATION PATTERNS

Differing national, state, regional, and county growth rates together with internal migration have led to changes in the present distribution of population. In every decade since at least 1920 the percent of Americans living in Texas has increased, and now stands at 5.5 percent. The percent of the Texas population residing in the Coastal Bend Region increased until it reached 4.4 percent in 1950 where the figure remained through 1960. However, in 1970 only 3.19 percent of all Texans lived in the Coastal Bend Region.

Within the region, population has been increasingly concentrating in Nueces County, which now accounts for 54.8 percent of total region population.

Nueces County Migrants

Nueces County experienced a net outmigration of 28,130 people in the 1960's, representing 12.7 percent of the 1960 population. People moved into Nueces County, but a far greater number moved out. Much of the out-of-state net migration is accounted for by California and Florida due to the concentration of military personnel at NAS and ARADMA in Nueces County. Fifty-six percent of the people moving into Nueces County came from another residence in Texas, while 62 percent of the outmigrants relocated in another part of Texas.

Houston accounts for most of the net outmigration from Nueces County. From 1965 to 1970, 6,034 more people moved from Nueces County to Houston than vice verse. The Dallas-Ft. Worth area and Austin also attracted many area residents. Nueces County experienced a net immigration from the Rio Grande Valley and South Texas.

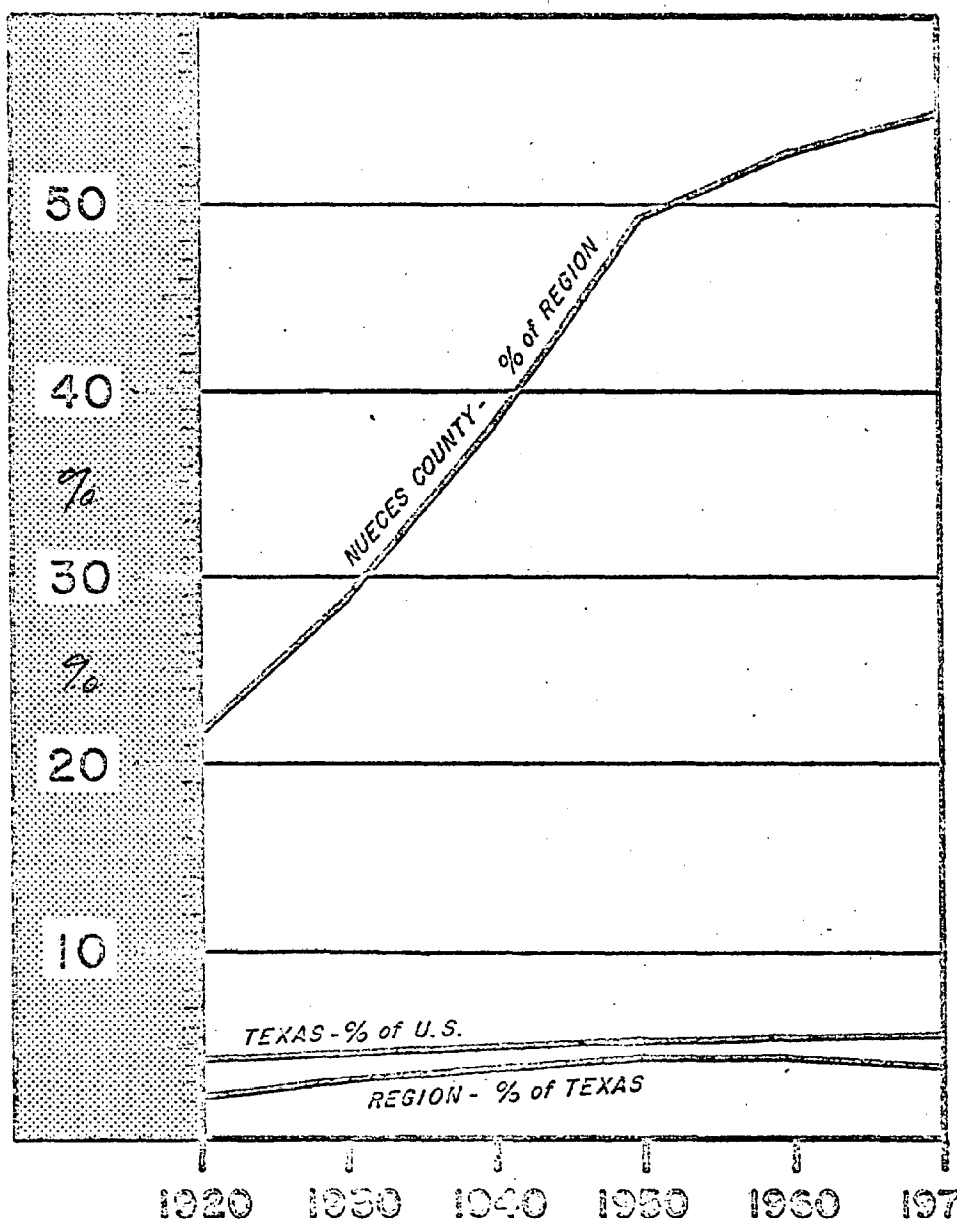
These migration trends can be explained in large part by the economic differential between Houston and Corpus Christi, and between Corpus Christi and the South Texas Rio Grande Valley. Houston has a low unemployment rate, and offers a higher standard of living, while also offering a wider variety of jobs from which to choose.

According to the 1970 Census of Population, the male unemployment rate in 1970 was 2.6 percent in Houston, 3.4 percent in Corpus Christi, 6.4 percent in Brownsville, 41.8 percent in

POPULATION GROWTH

Nueces County & Coastal Bend Region

1920 - 1970



	1920	1930	1940	1950	1960	1970
NUECES COUNTY AS % OF REGION	21.7	28.8	38.1	49.2	52.8	54.8
REGION AS % OF TEXAS	2.3	3.1	3.8	4.4	4.4	3.9
TEXAS AS % OF U.S	4.4	4.7	4.9	5.1	5.3	5.5

Figure VI-1

Harlingen, and 4.6 percent in McAllen. Per capita income in 1969 was $3,395 in Houston, $2,646 in Corpus Christi, $1,487 in Brownsville, $1,909 in Harlingen, and $2,030 in McAllen.

Table VI-1 shows migration into and out of Nueces County by age group. From 1965 to 1970 there has been a net outmigration for every age group, including those of retirement age. People under fifty-five account for a larger part of the total population and are more mobile than those over fifty-five. Therefore, these people account for the major share of net outmigration. Nevertheless, almost 1,000 more people aged fifty-five and over moved out of Nueces County than moved in.

There was also a net outmigration from the northern coastal Bend Region of 10,158 persons between 1965 to 1970. There has been a net outmigration in every age group up to age fifty-five. However, there was a net inmigration of 666 persons into the north Coastal Bend Region who were over fifty-five.

Urbanization

Population has increasingly been concentrating in towns and cities of the counties comprising the Coastal Bend Region, even in those counties losing population. This is due to increases in the number of people residing in these towns and cities, decreases in the rural population, and annexation.

Forty-seven percent of the population in the region resides in the city of Corpus Christi, compared with 44 percent in 1960. Eighty-four percent of the population in Nueces County resided in Corpus Christi in 1960, compared with 86 percent in 1970. These figures take into account Corpus Christi's growth from annexation.

The fastest growing city in the region is Portland, northside of Corpus Christi Bay, which grew by 188 percent in the sixties and had a population of 7,302 in 1970.

Residential Mobility

Table VI-2 describes the mobility of residents in the towns and cities in the Coastal Bend and the population movement between towns and cities.

The Robstown County Subdivision (Robstown, North San Pedro, and South San Pedro) and Taft display the most stability in their existing populations. Over seventy percent of the population in these places lived at the same residence in 1965. Portland, being the fastest growing town in the area, displayed the least population stability.

Table VI-1

INMIGRATION AND OUTMIGRATION FOR NUECES COUNTY
FROM 1965 TO 1970, BY AGE GROUP

	Total Population 5 Years Old and Over, 1970		Percent of Population 5 Years Old and over, 1960	Inmigration* 1965-1970		Outmigration* 1965-1970		Net Migration
	Number	Percent		Number	Percent of Total Immigration	Number	Percent of Total Outmigration	
TOTAL	214,739	100.0	100.0	37,175	100.0	49,419	100.0	-12,244
Age Group:								
5-9	27,260	12.7	15.3	4,713	12.7	6,867	13.9	-2,154
10-14	27,338	12.7	13.1	3,808	10.2	5,431	11.0	-1,623
15-19	24,984	11.6	9.3	3,772	10.1	5,148	10.4	-1,376
20-24	20,031	9.3	7.4	6,723	18.1	7,795	15.8	-1,072
25-29	15,486	7.2	7.6	4,842	13.0	6,528	13.2	-1,686
30-34	13,217	6.2	8.4	3,330	9.0	4,339	8.8	-1,009
35-39	13,355	6.2	8.4	2,544	6.8	3,437	7.0	-893
40-44	14,371	6.7	6.7	2,249	6.0	2,764	5.6	-515
45-54	25,186	11.7	11.5	2,626	7.1	3,579	7.2	-953
55-65	18,579	8.7	6.9	1,421	3.8	2,007	4.1	-586
65 and Over	14,932	7.0	5.4	1,147	3.1	1,524	3.1	-377

*Immigrants moved into the county from elsewhere in the United States between 1965 and 1970 and were still living there in 1970. Outmigrants lived in the county in 1965 and moved out to some other area in the United States where they lived in 1970. Migrants within the county are excluded.

SOURCE: U.S. Bureau of the Census. 1970 Census of Population PC(2)-2E. Migration Between State Economic Areas.

TABLE VI-2

RESIDENCE IN 1965 OF POPULATION IN TOWNS AND CITIES
IN CORPUS CHRISTI SMSA

Place	Number Of Persons 5 Years Old And Over, 1970	Percent Of Population 5 Years Old And Over Whose Residence In 1970 Was The Same As In 1965	Reported Residence In 1965 Of Persons 5 Years Old And Over In 1970							
			Corpus Christi		Outside Of Corpus Christi But Within SMSA		Outside Of SMSA		Abroad	
			Number	Percent	Number	Percent	Number	Percent	Number	Percent
Corpus Christi	185,172	48.6	44,807	52.5	4,306	5.0	33,894	39.7	2,313	2.7
Robstown, North San Pedro, And South San Pedro	14,632	71.8	136	4.2	2,541	79.0	504	15.7	36	1.1
Bishop	3,159	62.5	55	5.3	407	39.3	573	55.4	-	-
Port Aransas	1,234	46.3	120	20.2	275	46.4	188	31.7	10	1.7
Portland	6,548	36.1	991	27.4	678	18.8	1,807	50.0	138	3.8
Aransas Pass	4,607	50.8	97	4.8	1,557	77.7	344	17.2	7	.3
Sinton	5,048	54.3	24	1.1	1,575	75.0	459	21.9	42	2.0
Mathis	4,940	66.6	62	3.8	1,017	62.7	537	33.1	7	.4
Taft (including Taft Southwest)	4,877	72.4	16	1.3	958	76.8	273	21.9	-	-
Ingleside	3,313	59.7	142	12.6	507	45.0	478	42.4	-	-
Gregory	2,151	57.1	52	6.3	603	72.5	177	21.3	-	-
Odem	1,687	49.9	30	3.6	540	65.0	244	29.4	17	2.0

SOURCE: U.S. Bureau Of The Census.

Of the people in Corpus Christi in 1970 who moved between 1965 to 1970, 52.5 percent moved from another residence in Corpus Christi, and 42.4 percent moved from outside the metropolitan area (i.e., Nueces and San Patricio Counties) or abroad. Only five percent moved from another residence within the metropolitan area.

Of the persons in Portland in 1970 who moved between 1960 to 1970, 27.4 percent moved from Corpus Christi, 18.8 percent moved from another city besides Corpus Christi within the metropolitan area, and 53.8 percent moved there from another place outside the metropolitan area or abroad.

Population Distribution; The City of Corpus Christi

The 1970 U. S. Census of Population shows the population of Corpus Christi increasing from 167,690 in 1960 to 204,525 in 1970, a 22 percent increase. However, as Table VI-3 indicates, much of this growth was due to annexation. City boundaries increased significantly from 1960 to 1970. In 1960, the city was bounded roughly by Corpus Christi Bay, the Corpus Christi Industrial Zone, Cayo Del Oso, and what is now Padre Island Drive. In the intervening years the boundary was extended to Saratoga Blvd., Calallen, and Flour Bluff.

Population growth from 1960 to 1970 within the 1960 city limits was small, amounting to only a .8 percent increase.

The most realistic measure of population growth in Corpus Christi is the increase in population from 1960 to 1970 within the land area which now defines the city. Using this measure there were 18,112 more people in Corpus Christi in 1970 than in 1960, representing a 9.7 percent gain.

Although population grew only slightly from 1960 to 1970 within the land area defined by the 1960 city limits, there was a very substantial shift in population within this area toward South Padre Island Drive. Further, most of the growth in the 1960's in the areas eventually annexed by the city was also along South Padre Island Drive.

The section of town which lost population in the sixties includes downtown and a very large surrounding area: the area between Ocean Drive and Staples to Everhart; out the Crosstown Expressway to Horne Rd.; out Agnes (Hwy 44) to Baldwin; the area between Leopard, Corn Products Rd. and the Port of Corpus Christi and North Beach. The population in this area declined by 16.5 percent from 1960 to 1970. In 1960, 59 percent of Corpus Christi's population lived in this section of town, compared with only 44.9 percent in 1970. Every one of the eighteen census tracts comprising this section lost population from 1960 to 1970.

TABLE VI-3

POPULATION CHANGE IN CORPUS CHRISTI: 1960-1970

Area	Population 1960	Population 1970	Percent Change
City Limits as Existed in 1960 and 1970	167,690	204,525	22.0
Within 1960 City Limits	167,690	168,951	.8
Within 1970 City Limits	186,413	204,525	9.7

Source: U. S. Bureau of the Census, Census of Population and Housing, Census Tracts, Final Report PHC (1) - 51, 1972, and Final Report PHC (1) - 33, 1962; 1970 Census of Housing, Block Statistics, Report HC (3) - 228, 1971. The 1970 population within the 1960 city limits, and the 1960 population within the 1970 city limits, were arrived at through the manipulation of census track and block data.

The area of greatest population loss was the corridor around Leopard, Agnes, and Port. The area of greatest population gain within the 1960 city limits was around Weber, South Padre Island Drive, Airline, and the Padre-Staples Mall. The rapid increase in the population between Padre Island Drive and Saratoga also concentrated between Weber and Airline in new developments.

Table VI-4 presents the total population for each census tract in 1960 and 1970, showing the changes in population resulting from boundary changes due to annexation.

Intra-Urban Mobility

The fact that population in one area of town decreased dramatically does not necessarily mean that there was a population movement within the city from the declining area to the growing area. All available evidence indicates that this was not the case. Instead, it appears that in the 1960's a significant portion of the out-migrants from Nueces County were from the Central Area of Corpus Christi. A significant portion of the new residents in the growing Southeast Area are inmigrants from outside of Corpus Christi.

Population mobility figures from the 1970 U. S. Census of Population show that most of the people moving to Corpus Christi from 1965 to 1970 moved here from outside the immediate metropolitan area. Of these, 58 percent located in the Southeast Area of the city, 18 percent located in Flour Bluff, and 10.5 percent located in the Northwest Area. Only 13.5 percent of the inmigrants to Corpus Christi located in the Central Area of town, even though this Area accounted for 44.8 percent of the total city (as defined in 1970) population in 1960.

These mobility figures do not show movement within Corpus Christi when a household moves from one residence in town to another. This information was obtained from the CRP Community Information Survey and from special population movement surveys conducted by the CRP. The results are set forth in Tables VI-5, and VI-6. Very little population movement was found to occur between the Central and the Southeast parts of town.

In Table VI-5 current residence (summer, 1972) is shown along the top of the table, and residence two years previously is shown along the left side of the table. For example, of the forty households interviewed in census tract 1, eighteen resided in the same dwelling two years ago, four of them for over twenty years while eight households moved into their current dwelling place from census tract 9 within the last two years. Ten households interviewed resided outside of Corpus Christi two years ago.

A visual glance at Table VI-5 shows a grouping of large numbers (5,7,8,etc.) that forms a diagonal extending from the upper

TABLE VI-4
POPULATION OF CORPUS CHRISTI, BY
CENSUS TRACT: 1960 AND 1970

Census Tract	Population 1960	Population 1970	1970 in 1960 Area*
1	1,681	831	
2	1,113	495	
2.99	217	471	
3	731	434	
4	4,981	3,178	
5	2,834	2,725	
6	9,028	8,656	
7	3,834	3,758	
8	700	830	792
9	10,173	6,598	
10	8,350	5,538	
11	5,857	3,555	
12	6,599	5,724	
13	5,291	5,131	
14	5,764	5,287	
15	6,652	6,298	
16	15,512	12,397	
17	6,117	8,126	7,174
18	7,370	8,797	8,206
19	9,439	11,625	11,593
20	8,806	8,616	
21	7,442	7,271	
22	5,922	6,123	
23	5,181	8,173	6,742
24	9,426	8,482	12,924
25	5,151	4,873	
26	5,472	9,094	
27	8,047	13,828	14,467
29	n.a.	5,214	
30	n.a.	3,981	
31	n.a.	3,018	
32	n.a.	2,784	
33	n.a.	4,224	
34	n.a.	7,843	
35	n.a.	2,184	
36	n.a.	6,939	
37	n.a.	1,424	

*Estimated using block statistics from the U.S. Bureau of the Census.

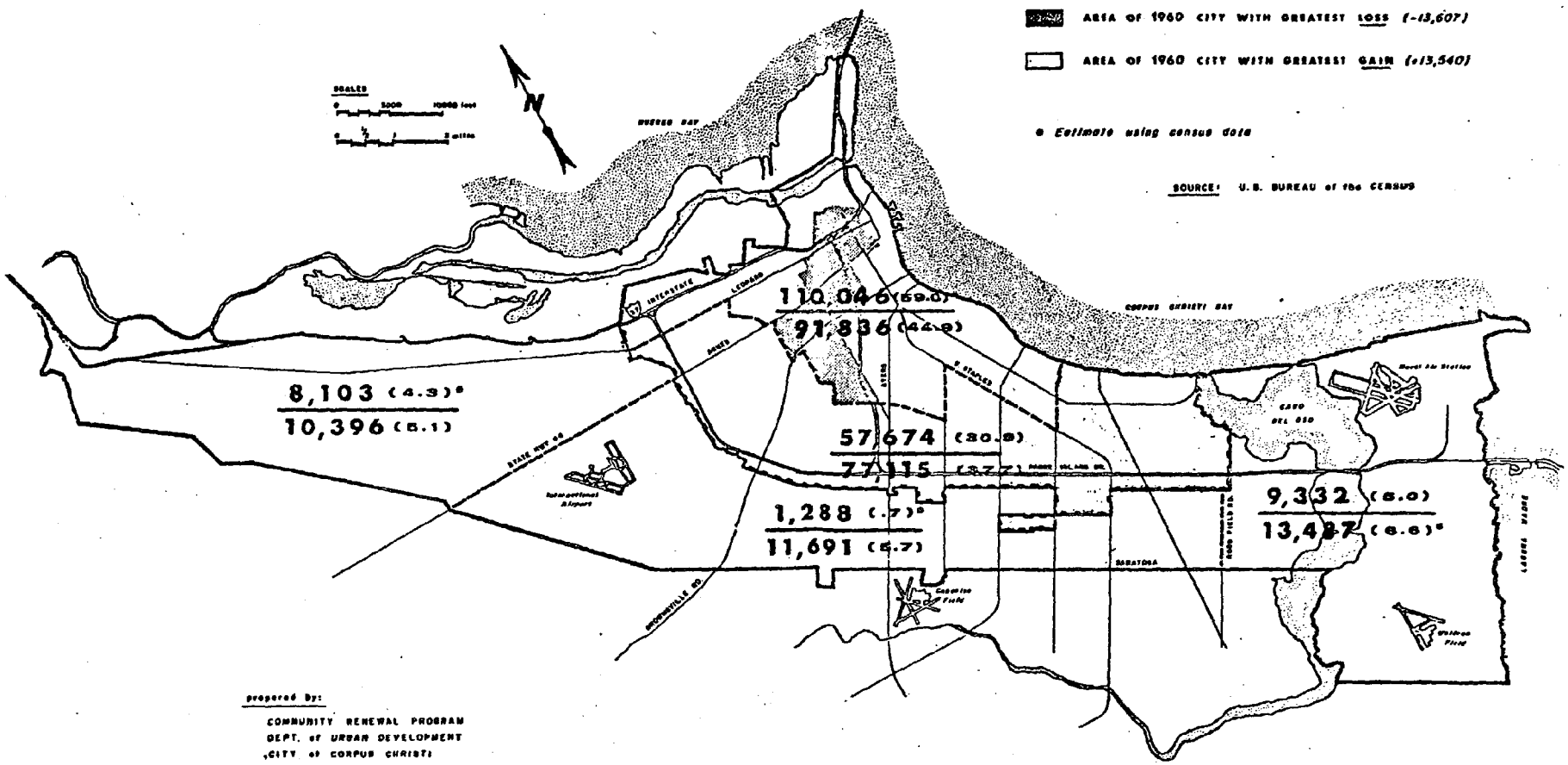
SOURCE: U.S. Bureau of the Census.

CORPUS CHRISTI

POPULATION

GROWTH and DISTRIBUTION

1960 - 1970



left corner of the table to the lower right corner of the table. Move away from the diagonal and the numbers become more scattered as well as smaller. This means that for those who move from one dwelling unit to another in town, the tendency is to relocate in the immediate vicinity and not to move from one area of the city to another.

For example, of the ten households who moved into a new dwelling in census tract 12 within the last two years, five moved from another dwelling in the same tract. Two moved there from adjacent tract 18. Two moved there from adjacent tract 8.

Table VI-6 summarizes and emphasizes the conclusions of Table VI-5. Of the 520 households interviewed in the Southeast Area of town, only 14 (2.7%) reported a residence two years ago in the Central Area of town.

Ethnic Composition of Population

Of the 204,525 persons in Corpus Christi, 53.1 percent are Anglo, 40.6 percent are Mexican American, and 5.1 percent are Black. Eighty-nine percent of all Blacks and 63.8 percent of all Mexican Americans live in the Central Area of town. Only 6.3 percent of all Anglos live in the Central Area.

Forty-two percent of all the Blacks in Corpus Christi live in Census Tracts 4 and 5. This is the area between Carrizo, Leopard, Broadway, and Nueces Bay Blvd. Enough information exists for this area to say something about the mobility of the Black population in Corpus Christi.

The percent of the population in Tract Five which is black increased from 24.7 percent in 1960 to 74.2 percent in 1970. Eighty-three percent of the Black movers moved into a dwelling in the same tract or from another dwelling in Corpus Christi most probably from Tract Four since it was the largest Black neighborhood in 1960. Further, 71.5 percent of those moving into Tract Four between 1965 and 1970 came from another town within the metropolitan area, representing 11 percent of all immigrants into Corpus Christi from another town within the SMSA.

Thus, it appears that most Blacks migrating into Corpus Christi locate in Tracts Four and Five, the predominantly Black neighborhoods. Moreover, there appears to be little movement of Blacks out of these census tracts to other areas of town.

Population Projection by Age Groups for Small Areas

The areal base used for the projection of population is the census tracts within the City of Corpus Christi. Later projections

Table VI-5

POPULATION MOVEMENT WITHIN CORPUS CHRISTI, BY CENSUS TRACT

Residence Two Years Ago \ Current Residence		Tract 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	Total
Same Dwelling	2-4.99yrs.	10	4	3	12	5	7	5	5	4	9	5	7	5	5	7	3	5	6	8	7	6	12	9	15	16	6	10			8	9	10	10	18	10	10	6	275
	5-9.99yrs.	1	6	6	6	9	9	6	5	3	7	3	8	4	7	9	6	7	12	7	6	9	8	14	7	7	13	12			2	7	11	15	11	6	13	7	203
	10-19.99yrs	3	8	5	4	12	11	5	5	8	6	6	1	15	10	12	7	11	19	9	8	11	11	5	11	11	5	10			2	8	1	6	2	13	9	2	273
	20yrs. & over	4	3	7	10	3	7	9	3	13	11	16	6	8	7	4	18	3	2	7	7	9	2	2		4	5	2			7	2	1	4		5	3	3	152
Tract	1	8	2																												1								11
	2		2		1						1																												4
	3		2	5					1		1		1																							1			11
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	8																																						
	9	1					1		1	7			1					2						1															14
	10			1					1	2	2	1	1	2		1				1			1																13
	11								2			5								1													1					1	10
	12	1		1		1			3				7			2																							15
	13							1			2		2	2			1			1	1		1																11
	14		1												2								1	1															5
	15													1		1																							2
	16		1	1				1		1		1	1	1	1		4								1											1			12
	17								2									5																				1	8
	18										1						1	2	1	1	1			1			1											1	10
	19	1								1				1						1					1														5
	20			1									1			1					3	1	1					1				1	1				1	1	13
	21																				1											1							2
	22	1																			1			2		1	1						1						7
	23	1					1									1								1	1						1							1	7
	24								1				1													1	1												4
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	26							1													1						1								3				6
	27		1																									1			2	1	1						6
	28																																						
	29																																						
	30																							1				1			3	1	1						7
	31																															4							4
	32																																5	2					7
	33																																						
	34																																		1				1
	35							2													1															2			6
	36		2					1	1																														4
	37																																						4
Other Town in Coastal Bend		1	1									1						3		1												1	1				1	[illegible]	14
Other Town in Texas Outside Coastal Bend		4	3	5		1		3	3			1	1		2	2				2	2	1	1	1	1		4	1			3	1	1	1	1		2		45
Outside Texas and Abroad		5	3	5	1	3	1		7	1		1	2	1	6			1		1	1	2	2	2	2		3	2			11	3	5	1	3	1			77
Total [redacted] Interviewed		[redacted] 40	[redacted] 40	40	40	[redacted] 40	40	40	[redacted] 40	40	40	[redacted] 40	40	40	[redacted] 40	40	40	[redacted] 40	40	40	[redacted] 40	40	40	40	[redacted] 40	40	40	[redacted] 40	40	40	40	[redacted] 40	40	40	[redacted] 40	40	[redacted] 4	[redacted] 1,46

TABLE VI-6

POPULATION MOVEMENT WITHIN
CORPUS CHRISTI, BY AREA

		Current Residence				Total
		Area				
		Central	Flour Bluff*	Northwest	Southeast	
Residence Two Years Ago — Area	Central	498 (88.9%)	2 (2.5%)	21 (8.8%)	14 (2.7%)	535
	Flour Bluff*	---	53 (66.3%)	---	3 (.6%)	56
	Northwest	4 (.7%)	---	188 (78.3%)	2 (.4%)	194
	Southeast	12 (2.1%)	6 (7.5%)	6 (2.5%)	451 (86.7%)	475
	Out of Town	46 (8.2%)	19 (23.8%)	25 (10.4%)	50 (9.6%)	140
Total Households Interviewed		560 (100.0%)	80 (100.0%)	240 (100.0%)	520 (100.0%)	1,400

*Excludes Naval Air Station.

SOURCE: CRP Household Survey.

TABLE VI-7

THE ETHNIC COMPOSITION AND DISTRIBUTION OF CORPUS CHRISTI'S POPULATION*: 1970

	Area				
	Central	Flour Bluff	Northwest	Southeast	Corpus Chris
Total Population	70,298	12,213	23,791	98,223	204,525
Percent of Total City Population	34.4	6.0	11.6	48.0	100.
Anglo Population	6,850	9,986	16,565	75,247	108,6
Percent of Total Area Population	9.7	81.8	69.6	76.6	53.1
Percent of Total City Anglo Population	6.3	9.3	15.2	69.3	100.
Mexican American Population	53,005	1,429	6,709	21,904	83,03
Percent of Total Area Population	75.4	11.7	28.2	22.3	40.6
Percent of Total City Mexican American Population	63.8	1.7	8.1	26.4	100.0
Black Population	9,410	444	439	233	10,52
Percent of Total Area Population	13.4	3.6	1.8	.2	5.1
Percent of Total City Black Population	89.4	4.2	4.2	2.2	100.

*Area figures may not add to Corpus Christi total because of rounding. The census divides all persons as being "White," "Negro," or "Other." In this study the "White" population is divided into "Anglo," and "Mexican American." "Mexican Americans" are defined as those persons of Spanish language together with "Other persons of Spanish surname." Persons of Spanish language comprise persons of Spanish mother tongue and all other persons in families in which the head or wife reported Spanish as his or her mother tongue. Mother tongue is defined as the language spoken in the person's home when he was a child. The data on mother tongue may not reflect a person's current language skills.

SOURCE: U.S. Bureau of the Census.

Table VI-8

THE ETHNIC COMPOSITION OF CORPUS CHRISTI'S POPULATION, BY CENSUS TRACT: 1960 AND 1970*

Census Tract	Percent Black		Percent Mexican American		Percent Black and Mexican American	
	1960	1970	1960	1970	1960	1970
1	—	—	15.8	30.3	15.8	30.3
2	1.9	1.4	27.3	53.7	29.2	55.1
3	1.1	—	25.0	24.2	26.1	24.2
4	72.4	76.1	20.3	21.4	92.7	97.5
5	24.7	74.2	31.7	20.5	56.4	94.7
6	.5	4.7	14.0	41.4	14.5	46.1
7	—	.1	7.4	24.4	7.4	24.5
8	—	.4	8.4	33.2	8.4	33.6
9	.2	.1	87.3	94.9	87.5	95.0
10	4.4	3.2	81.4	88.3	85.8	91.5
11	7.9	6.5	79.8	85.7	87.7	92.2
12	1.4	1.0	35.8	61.1	37.2	62.1
13	—	.3	46.1	78.2	46.1	78.5
14	.3	.2	5.0	12.2	5.3	12.4
15	—	.1	49.8	81.6	49.8	81.7
16	11.8	11.5	81.4	86.1	93.2	97.6
17	21.8	26.2	74.7	74.0	96.5	100.0
18	8.2	9.6	80.6	84.8	88.8	94.4
19	—	.3	14.9	54.4	14.9	54.7
20	—	.3	5.7	38.5	5.7	38.8
21	.4	.5	3.8	13.5	4.2	14.0
22	—	.1	4.8	23.2	4.8	23.3
23	—	.1	6.2	29.1	6.2	29.2
24	.1	.1	4.4	17.8	4.5	17.9
25	.2	.1	3.4	4.5	3.6	4.6
26	.1	.1	3.1	17.2	3.2	17.3
27	—	.2	1.8	11.3	1.8	11.5
29	n.a.	7.6	n.a.	7.1	n.a.	14.7
30	n.a.	1.1	n.a.	19.6	n.a.	20.7
31	n.a.	.1	n.a.	9.4	n.a.	9.5
32	n.a.	1.9	n.a.	17.0	n.a.	18.9
33	n.a.	.1	n.a.	22.2	n.a.	22.3
34	n.a.	.1	n.a.	7.2	n.a.	7.3
35	n.a.	.1	n.a.	50.8	n.a.	50.9
36	n.a.	.4	n.a.	10.4	n.a.	10.8
37	n.a.	—	n.a.	10.2	n.a.	10.2

*The Mexican American population is defined differently in 1960 and 1970, rendering the figures noncomparable. See Table for the 1970 definition. Mexican Americans in 1960 are those people with a Spanish surname. For tracts with very large differences in the percent Mexican American between 1960 and 1970, however, these figures will generally reflect the changing ethnic composition of the population.

SOURCE: U.S. Bureau of the Census.

TABLE VI-9

DISTRIBUTION OF THE ETHNIC POPULATION
IN CORPUS CHRISTI, BY CENSUS TRACT: 1970*

Census Tract	Percent of Total Number of Blacks in City	Percent of Total Number of Mexican Americans in City
1	—	.3
2	.1	.4
3	—	.1
4	23.1	.8
5	19.3	.7
6	3.9	4.3
7	—	1.1
8	—	.4
9	.1	7.4
10	1.7	5.9
11	2.2	3.7
12	.5	4.3
13	.2	4.8
14	.1	.8
15	.1	6.2
16	13.7	12.9
17	20.3	7.3
18	8.0	9.0
19	.3	7.6
20	.2	4.0
21	.3	1.2
22	.1	1.7
23	.1	2.9
24	.1	1.8
25	.1	.3
26	.1	1.9
27	.3	1.9
29	3.8	.4
30	.4	.9
31	—	.3
32	.5	.6
33	—	1.1
34	.1	.7
35	—	1.3
36	.3	.9
37	—	.2

*Excludes Census Tract 2.99 (Crews of Vessels).
See Table 3-14 for definition of Mexican American.

SOURCE: U.S. Bureau of the Census.

will be generated for S.M.S.A. tracts and the sub-county areas. These small area projections (Table VI-10, VI-11) will then be aggregated and matched to county projections developed earlier in this report.

The basic methodology employed in this model is a variation of the "Cohort Migration-Survival Component" method described in detail in Chapter III. Comments concerning the preference for and assumption of this approach are equally applicable to this situation. Alternative approaches are being evaluated but at the moment this orientation is the most flexible since it will allow us to enter the model later to adjust intra-urban migration assumptions to accommodate (1) past trends, (2) new distribution of jobs related to retailing and commercial activities and (3) transportation constraints. These adjustments, however, have not been applied to the present projections.

Adjustments in the present model from the formulation presented in Chapter III include:

(1) The application of actual birth and death rates to each tract rather than the general survival ratio. This we feel is more realistic when tract data is employed since variation in these rates are substantial between the white, brown, and black populations of this city. Furthermore, since racial segregation is pronounced these differences are reflected at the census tract level.

(2) The application of a unitary weight to migration. This allows us to assess the direct impact of this projection process and it will be at this level that in the future we will attempt to correct for existing information on inter-urban mobility rates.

(3) The application of a different minimum out-migration constraint to census tracts than was applied to county data. Since the maximum of any single census tract during the 1960-1970 was -55%, this set the maximum for all tracts during the 70-80 and 80-90 periods. On similar grounds a maximum gain in any tract was set at 80% of its previous population. These constraints are more critical in the tract projection than in county projections since the probability of "zeroing out" a tract is much higher due to the smaller magnitudes of population that are being dealt with.

(4) Finally it was necessary to utilize ten year rather than five year projection cohorts in order to create reasonably sized groups.

Table VI-10

1980 POPULATION PROJECTION FOR CORPUS CHRISTI CENSUS TRT 1

	TOTAL	MALE	FEMALE
0- 9	51	19	32
10-19	42	16	27
20-29	44	20	24
30-39	43	23	20
40-49	34	20	14
50-59	48	26	22
60-69	64	34	30
70+	102	56	46
TOTAL	429	214	214

1980 POPULATION PROJECTION FOR CORPUS CHRISTI CENSUS TRT 2

	TOTAL	MALE	FEMALE
0- 9	29	16	14
10-19	26	14	12
20-29	28	13	16
30-39	24	12	12
40-49	17	9	8
50-59	31	18	13
60-69	44	26	17
70+	55	35	21
TOTAL	256	143	113

1980 POPULATION PROJECTION FOR CORPUS CHRISTI CENSUS TRT 3

	TOTAL	MALE	FEMALE
0- 9	30	11	20
10-19	34	7	28
20-29	68	29	39
30-39	39	18	21
40-49	21	12	9
50-59	26	13	12
60-69	20	10	10
70+	57	31	26
TOTAL	295	130	165

1980 POPULATION PROJECTION FOR CORPUS CHRISTI CENSUS TRT 4

	TOTAL	MALE	FEMALE
0- 9	426	207	219
10-19	332	161	171
20-29	293	146	147
30-39	189	88	101
40-49	133	55	78
50-59	139	56	83
60-69	150	63	87
70+	196	83	113
TOTAL	1860	860	1000

TABLE VI-10
(cont'd.)

1980 POPULATION PROJECTION FOR
CORPUS CHRISTI CENSUS TRT 5

	TOTAL	MALE	FEMALE
0- 9	522	276	245
10-19	486	249	237
20-29	455	191	263
30-39	244	111	133
40-49	301	142	160
50-59	296	138	157
60-69	170	85	85
70+	136	64	72
TOTAL	2609	1257	1353

1980 POPULATION PROJECTION FOR
CORPUS CHRISTI CENSUS TRT 6

	TOTAL	MALE	FEMALE
0- 9	1569	826	743
10-19	1300	660	639
20-29	1268	614	655
30-39	1188	604	584
40-49	678	353	325
50-59	641	288	353
60-69	716	307	409
70+	879	409	470
TOTAL	8238	4059	4178

1980 POPULATION PROJECTION FOR
CORPUS CHRISTI CENSUS TRT 7

	TOTAL	MALE	FEMALE
0- 9	696	350	346
10-19	458	215	243
20-29	628	334	295
30-39	464	240	225
40-49	311	149	161
50-59	358	158	200
60-69	336	151	186
70+	337	154	183
TOTAL	3589	1751	1838

1980 POPULATION PROJECTION FOR
CORPUS CHRISTI CENSUS TRT 8

	TOTAL	MALE	FEMALE
0- 9	187	94	94
10-19	83	37	46
20-29	147	53	93
30-39	178	85	93
40-49	95	43	52
50-59	122	47	75
60-69	114	54	60
70+	119	71	48
TOTAL	1045	484	561

TABLE VI-10
(cont'd.)

1980 POPULATION PROJECTION FOR
CORPUS CHRISTI CENSUS TRT 9

	TOTAL	MALE	FEMALE
0- 9	861	436	425
10-19	685	347	338
20-29	729	371	358
30-39	397	189	208
40-49	283	130	153
50-59	317	130	187
60-69	345	176	168
70+	351	160	191
TOTAL	3968	1940	2028

1980 POPULATION PROJECTION FOR
CORPUS CHRISTI CENSUS TRT 10

	TOTAL	MALE	FEMALE
0- 9	725	347	379
10-19	566	270	296
20-29	526	248	278
30-39	310	140	169
40-49	232	99	133
50-59	213	94	119
60-69	216	103	113
70+	722	294	428
TOTAL	3510	1596	1915

1980 POPULATION PROJECTION FOR
CORPUS CHRISTI CENSUS TRT 11

	TOTAL	MALE	FEMALE
0- 9	402	203	199
10-19	332	168	164
20-29	383	184	200
30-39	191	89	102
40-49	146	63	83
50-59	157	68	89
60-69	149	64	85
70+	252	119	133
TOTAL	2013	958	1054

1980 POPULATION PROJECTION FOR
CORPUS CHRISTI CENSUS TRT 12

	TOTAL	MALE	FEMALE
0- 9	864	432	432
10-19	574	226	348
20-29	1067	553	515
30-39	641	317	324
40-49	264	135	129
50-59	271	130	141
60-69	262	110	152
70+	634	228	406
TOTAL	4578	2131	2447

TABLE VI-10
(cont'd.)

1980 POPULATION PROJECTION FOR
CORPUS CHRISTI CENSUS TRT 13

	TOTAL	MALE	FEMALE
0- 9	1122	579	542
10-19	1006	500	506
20-29	928	447	481
30-39	600	283	317
40-49	389	193	196
50-59	341	132	209
60-69	241	91	150
70+	393	145	248
TOTAL	5020	2371	2649

1980 POPULATION PROJECTION FOR
CORPUS CHRISTI CENSUS TRT 14

	TOTAL	MALE	FEMALE
0- 9	620	291	329
10-19	599	274	324
20-29	550	249	301
30-39	756	343	413
40-49	438	205	233
50-59	324	145	179
60-69	485	180	305
70+	1020	349	671
TOTAL	4792	2036	2756

1980 POPULATION PROJECTION FOR
CORPUS CHRISTI CENSUS TRT 15

	TOTAL	MALE	FEMALE
0- 9	1546	793	753
10-19	1082	547	534
20-29	1019	471	548
30-39	457	199	259
40-49	331	121	209
50-59	292	99	192
60-69	294	79	215
70+	695	202	493
TOTAL	5715	2511	3204

1980 POPULATION PROJECTION FOR
CORPUS CHRISTI CENSUS TRT 16

	TOTAL	MALE	FEMALE
0- 9	1776	883	894
10-19	1304	648	656
20-29	1445	716	729
30-39	898	377	522
40-49	573	241	332
50-59	854	356	498
60-69	797	367	429
70+	835	394	441
TOTAL	8482	3982	4500

TABLE VI-10
(cont'd.)

1980 POPULATION PROJECTION FOR
CORPUS CHRISTI CENSUS TRT 17

	TOTAL	MALE	FEMALE
0- 9	3052	1521	1531
10-19	2142	1018	1124
20-29	2191	1021	1170
30-39	1272	569	703
40-49	1003	447	556
50-59	992	486	505
60-69	606	327	279
70+	512	238	274
TOTAL	11769	5628	6141

1980 POPULATION PROJECTION FOR
CORPUS CHRISTI CENSUS TRT 18

	TOTAL	MALE	FEMALE
0- 9	2311	1165	1146
10-19	1895	989	906
20-29	2486	1226	1261
30-39	987	456	531
40-49	979	439	540
50-59	1130	551	580
60-69	642	320	322
70+	392	177	215
TOTAL	10824	5323	5501

1980 POPULATION PROJECTION FOR
CORPUS CHRISTI CENSUS TRT 19

	TOTAL	MALE	FEMALE
0- 9	3900	1995	1905
10-19	2708	1362	1346
20-29	2847	1358	1489
30-39	2143	1047	1095
40-49	1097	523	574
50-59	903	374	529
60-69	808	331	477
70+	1040	365	675
TOTAL	15445	7356	8090

1980 POPULATION PROJECTION FOR
CORPUS CHRISTI CENSUS TRT 20

	TOTAL	MALE	FEMALE
0- 9	1563	758	805
10-19	1410	735	675
20-29	1373	696	677
30-39	1197	558	639
40-49	548	221	326
50-59	584	217	367
60-69	677	236	441
70+	972	378	594
TOTAL	8322	3799	4523

TABLE 10
(cont'd.)

1980 POPULATION PROJECTION FOR
CORPUS CHRISTI CENSUS TRT 21

	TOTAL	MALE	FEMALE
0- 9	937	454	483
10-19	792	374	417
20-29	952	432	520
30-39	1237	627	610
40-49	551	278	273
50-59	599	229	370
60-69	826	309	517
70+	1146	406	740
TOTAL	7040	3109	3932

1980 POPULATION PROJECTION FOR
CORPUS CHRISTI CENSUS TRT 22

	TOTAL	MALE	FEMALE
0- 9	1138	591	547
10-19	782	384	398
20-29	1124	527	597
30-39	1011	493	518
40-49	494	231	262
50-59	669	285	384
60-69	636	292	344
70+	486	219	267
TOTAL	6341	3022	3319

1980 POPULATION PROJECTION FOR
CORPUS CHRISTI CENSUS TRT 23

	TOTAL	MALE	FEMALE
0- 9	2801	1425	1376
10-19	2149	1040	1109
20-29	2355	1129	1227
30-39	1850	910	940
40-49	1359	663	697
50-59	1149	568	581
60-69	683	346	337
70+	320	143	177
TOTAL	12667	6223	6443

1980 POPULATION PROJECTION FOR
CORPUS CHRISTI CENSUS TRT 24

	TOTAL	MALE	FEMALE
0- 9	1463	768	695
10-19	821	431	390
20-29	1807	870	936
30-39	935	450	484
40-49	619	284	335
50-59	927	455	472
60-69	576	290	286
70+	217	76	141
TOTAL	7364	3624	3740

TABLE VI-10
(cont'd.)

1980 POPULATION PROJECTION FOR
CORPUS CHRISTI CENSUS TRT 25

	TOTAL	MALE	FEMALE
0- 9	477	245	232
10-19	530	293	237
20-29	500	263	237
30-39	565	266	299
40-49	491	226	265
50-59	541	245	296
60-69	501	219	282
70+	646	276	370
TOTAL	4251	2033	2218

1980 POPULATION PROJECTION FOR
CORPUS CHRISTI CENSUS TRT 27

	TOTAL	MALE	FEMALE
0- 9	3635	1926	1710
10-19	3422	1783	1640
20-29	4312	2145	2166
30-39	2596	1309	1287
40-49	2503	1187	1316
50-59	2611	1304	1307
60-69	1527	802	725
70+	852	358	494
TOTAL	21459	10815	10644

1980 POPULATION PROJECTION FOR
CORPUS CHRISTI CENSUS TRT 26

	TOTAL	MALE	FEMALE
0- 9	2276	1146	1129
10-19	1868	901	967
20-29	2558	1221	1337
30-39	1935	966	969
40-49	1664	809	854
50-59	1775	864	911
60-69	1263	611	652
70+	861	354	506
TOTAL	14198	6872	7326

1980 POPULATION PROJECTION FOR
CORPUS CHRISTI CENSUS TRT 29

	TOTAL	MALE	FEMALE
0- 9	1461	733	728
10-19	1151	744	407
20-29	1631	1082	549
30-39	1243	846	397
40-49	434	241	193
50-59	104	63	41
60-69	29	15	14
70+	4	2	3
TOTAL	6057	3725	2332

TABLE VI-10
(cont'd.)

1990 POPULATION PROJECTION FOR
CORPUS CHRISTI CENSUS TRT 1

	TOTAL	MALE	FEMALE
0- 9	27	10	17
10-19	23	9	14
20-29	19	7	12
30-39	20	9	11
40-49	19	11	9
50-59	15	9	6
60-69	22	12	10
70+	75	40	34
TOTAL	220	107	114

1990 POPULATION PROJECTION FOR
CORPUS CHRISTI CENSUS TRT 2

	TOTAL	MALE	FEMALE
0- 9	14	7	6
10-19	13	7	6
20-29	12	6	5
30-39	13	6	7
40-49	11	5	5
50-59	8	4	4
60-69	14	8	6
70+	45	27	17
TOTAL	129	72	57

1990 POPULATION PROJECTION FOR
CORPUS CHRISTI CENSUS TRT 3

	TOTAL	MALE	FEMALE
0- 9	27	9	17
10-19	30	5	25
20-29	46	12	35
30-39	31	13	18
40-49	18	8	10
50-59	9	5	4
60-69	12	6	6
70+	35	18	16
TOTAL	208	77	131

1990 POPULATION PROJECTION FOR
CORPUS CHRISTI CENSUS TRT 4

	TOTAL	MALE	FEMALE
0- 9	246	119	127
10-19	192	93	99
20-29	149	72	77
30-39	132	66	66
40-49	85	40	46
50-59	60	25	35
60-69	63	25	37
70+	156	66	90
TOTAL	1083	506	576

TABLE VI-10
(cont'd.)

1990 POPULATION PROJECTION FOR
CORPUS CHRISTI CENSUS TRT 5

	TOTAL	MALE	FEMALE
0- 9	533	283	251
10-19	467	239	229
20-29	321	137	184
30-39	390	156	234
40-49	209	95	115
50-59	249	119	130
60-69	171	82	89
70+	143	72	71
TOTAL	2484	1181	1303

1990 POPULATION PROJECTION FOR
CORPUS CHRISTI CENSUS TRT 6

	TOTAL	MALE	FEMALE
0- 9	1445	760	684
10-19	1290	655	635
20-29	957	463	495
30-39	1229	628	601
40-49	952	494	457
50-59	345	198	147
60-69	288	129	159
70+	1280	547	733
TOTAL	7786	3876	3911

1990 POPULATION PROJECTION FOR
CORPUS CHRISTI CENSUS TRT 7

	TOTAL	MALE	FEMALE
0- 9	548	276	272
10-19	355	164	192
20-29	335	141	194
30-39	534	319	215
40-49	324	165	159
50-59	223	86	137
60-69	246	89	157
70+	667	283	384
TOTAL	3232	1523	1710

1990 POPULATION PROJECTION FOR
CORPUS CHRISTI CENSUS TRT 8

	TOTAL	MALE	FEMALE
0- 9	207	103	103
10-19	133	62	71
20-29	125	41	83
30-39	156	55	102
40-49	206	92	114
50-59	124	51	73
60-69	109	38	71
70+	281	147	134
TOTAL	1341	590	752

TABLE VI-10
(cont'd.)

1990 POPULATION PROJECTION FOR
CORPUS CHRISTI CENSUS TRT 9

	TOTAL	MALE	FEMALE
0- 9	480	243	237
10-19	387	196	191
20-29	308	156	152
30-39	328	167	161
40-49	179	85	94
50-59	128	59	69
60-69	143	59	84
70+	390	151	239
TOTAL	2343	1116	1226

1990 POPULATION PROJECTION FOR
CORPUS CHRISTI CENSUS TRT 11

	TOTAL	MALE	FEMALE
0- 9	219	111	108
10-19	181	91	90
20-29	149	76	74
30-39	173	83	90
40-49	86	40	46
50-59	66	28	37
60-69	71	31	40
70+	180	82	98
TOTAL	1124	542	583

1990 POPULATION PROJECTION FOR
CORPUS CHRISTI CENSUS TRT 10

	TOTAL	MALE	FEMALE
0- 9	418	200	218
10-19	326	156	170
20-29	255	122	133
30-39	237	112	125
40-49	139	63	76
50-59	104	45	60
60-69	96	42	53
70+	735	274	461
TOTAL	2311	1013	1298

1990 POPULATION PROJECTION FOR
CORPUS CHRISTI CENSUS TRT 12

	TOTAL	MALE	FEMALE
0- 9	625	313	313
10-19	458	194	263
20-29	722	358	364
30-39	510	278	232
40-49	328	155	173
50-59	119	61	58
60-69	122	58	64
70+	465	152	313
TOTAL	3349	1570	1779

TABLE VI-10
(cont'd.)

1990 POPULATION PROJECTION FOR
CORPUS CHRISTI CENSUS TRT 13

	TOTAL	MALE	FEMALE
0- 9	1131	584	547
10-19	1043	519	523
20-29	795	399	395
30-39	757	361	396
40-49	450	205	245
50-59	199	91	107
60-69	154	59	94
70+	430	127	303
TOTAL	4958	2346	2612

1990 POPULATION PROJECTION FOR
CORPUS CHRISTI CENSUS TRT 14

	TOTAL	MALE	FEMALE
0- 9	535	251	284
10-19	599	274	324
20-29	461	175	286
30-39	520	234	286
40-49	683	308	375
50-59	211	106	105
60-69	146	65	81
70+	1132	340	792
TOTAL	4288	1754	2533

1990 POPULATION PROJECTION FOR
CORPUS CHRISTI CENSUS TRT 15

	TOTAL	MALE	FEMALE
0- 9	1327	680	647
10-19	851	429	422
20-29	619	289	330
30-39	750	350	399
40-49	206	89	116
50-59	149	55	94
60-69	182	45	137
70+	932	194	737
TOTAL	5014	2132	2883

1990 POPULATION PROJECTION FOR
CORPUS CHRISTI CENSUS TRT 16

	TOTAL	MALE	FEMALE
0- 9	1027	510	517
10-19	799	397	402
20-29	587	292	295
30-39	821	416	405
40-49	404	170	235
50-59	258	108	149
60-69	437	160	276
70+	1428	633	795
TOTAL	5761	2687	3075

TABLE VI-10
(cont'd.)

1990 POPULATION PROJECTION FOR
CORPUS CHRISTI CENSUS TRT 17

	TOTAL	MALE	FEMALE
0- 9	4436	2211	2225
10-19	3248	1569	1679
20-29	2046	893	1153
30-39	2886	1362	1524
40-49	1541	703	838
50-59	1263	557	706
60-69	1209	576	633
70+	1463	718	745
TOTAL	18092	8589	9503

1990 POPULATION PROJECTION FOR
CORPUS CHRISTI CENSUS TRT 18

	TOTAL	MALE	FEMALE
0- 9	2802	1413	1390
10-19	2214	1150	1064
20-29	1524	756	768
30-39	2878	1439	1439
40-49	908	411	497
50-59	1034	456	578
60-69	1243	583	660
70+	1241	598	643
TOTAL	13843	6806	7037

1990 POPULATION PROJECTION FOR
CORPUS CHRISTI CENSUS TRT 19

	TOTAL	MALE	FEMALE
0- 9	5376	2750	2626
10-19	4008	2027	1981
20-29	3256	1540	1716
30-39	3419	1699	1720
40-49	1983	951	1032
50-59	845	348	497
60-69	788	264	525
70+	2215	764	1451
TOTAL	21891	10343	11548

1990 POPULATION PROJECTION FOR
CORPUS CHRISTI CENSUS TRT 20

	TOTAL	MALE	FEMALE
0- 9	1483	720	764
10-19	1458	758	699
20-29	1083	544	539
30-39	1286	635	651
40-49	855	342	513
50-59	249	99	150
60-69	263	98	165
70+	1484	509	975
TOTAL	8160	3705	4455

TABLE VI-10
(cont'd.)

1990 POPULATION PROJECTION FOR
CORPUS CHRISTI CENSUS TRT 21

	TOTAL	MALE	FEMALE
0- 9	749	363	387
10-19	746	352	394
20-29	593	246	347
30-39	994	498	497
40-49	1011	527	484
50-59	297	141	156
60-69	380	103	277
70+	1872	611	1261
TOTAL	6642	2841	3802

1990 POPULATION PROJECTION FOR
CORPUS CHRISTI CENSUS TRT 22

	TOTAL	MALE	FEMALE
0- 9	1019	529	490
10-19	763	374	389
20-29	599	257	341
30-39	1249	624	625
40-49	746	361	386
50-59	338	120	218
60-69	556	216	340
70+	1188	529	659
TOTAL	6459	3010	3448

1990 POPULATION PROJECTION FOR
CORPUS CHRISTI CENSUS TRT 23

	TOTAL	MALE	FEMALE
0- 9	4014	2042	1972
10-19	3219	1584	1635
20-29	2762	1300	1462
30-39	3176	1578	1598
40-49	2097	1043	1054
50-59	1550	749	800
60-69	1299	626	672
70+	1132	552	580
TOTAL	19249	9473	9775

1990 POPULATION PROJECTION FOR
CORPUS CHRISTI CENSUS TRT 24

	TOTAL	MALE	FEMALE
0- 9	1178	618	560
10-19	658	346	313
20-29	593	264	329
30-39	1661	845	816
40-49	421	203	218
50-59	351	131	220
60-69	741	345	395
70+	679	293	387
TOTAL	6282	3045	3237

TABLE VI-10
(cont'd.)

1990 POPULATION PROJECTION FOR
CORPUS CHRISTI CENSUS TRT 25

	TOTAL	MALE	FEMALE
0- 9	370	190	180
10-19	361	206	155
20-29	238	132	107
30-39	694	356	339
40-49	511	258	253
50-59	261	107	154
60-69	286	110	175
70+	1145	490	654
TOTAL	3866	1849	2017

1990 POPULATION PROJECTION FOR
CORPUS CHRISTI CENSUS TRT 26

	TOTAL	MALE	FEMALE
0- 9	3089	1556	1533
10-19	2676	1308	1368
20-29	2466	1141	1325
30-39	3456	1707	1749
40-49	2482	1235	1247
50-59	2226	1077	1149
60-69	2207	1040	1167
70+	2571	1154	1417
TOTAL	21173	10218	10955

1990 POPULATION PROJECTION FOR
CORPUS CHRISTI CENSUS TRT 27

	TOTAL	MALE	FEMALE
0- 9	4953	2624	2329
10-19	4567	2389	2178
20-29	4295	2192	2104
30-39	5397	2739	2658
40-49	3234	1622	1611
50-59	3159	1510	1649
60-69	2932	1450	1482
70+	2699	1286	1413
TOTAL	31236	15812	15423

1990 POPULATION PROJECTION FOR
CORPUS CHRISTI CENSUS TRT 29

	TOTAL	MALE	FEMALE
0- 9	1840	923	917
10-19	1498	918	580
20-29	1946	1266	680
30-39	931	487	444
40-49	1117	781	336
50-59	365	194	171
60-69	103	64	39
70+	35	19	17
TOTAL	7835	4652	3183

Table VI-11

MIGRATION																
Age Group	0 - 9				10 - 19				20 - 29				30 - 39			
	1980		1990		1980		1990		1980		1990		1980		1990	
Tract	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
# 1	- 22	- 38	- 12	- 21	- 28	- 35	- 10	- 17	- 33	- 28	- 13	- 16	- 29	- 20	- 15	- 13
# 2	- 18	- 15	- 9	- 8	- 16	- 20	- 8	- 7	- 15	- 15	- 7	- 9	- 12	- 10	- 7	- 7
# 3	- 6	- 4	- 6	- 4	- 12	- 5	- 5	- 5	- 24	- 28	- 18	- 24	- 16	- 12	- 11	- 12
# 4	-221	-235	-128	-135	-201	-202	- 99	-106	-121	-139	- 90	- 91	- 75	-107	- 54	- 63
# 5	- 72	- 48	- 72	- 48	-143	- 82	-143	- 82	- 60	- 62	- 60	- 62	- 31	- 35	- 31	- 35
# 6	-271	-199	-270	-198	-278	-223	-278	-222	- 61	-154	- 60	-133	-183	-198	-182	-198
# 7	-249	-216	-246	-213	-114	- 92	-111	- 90	- 74	-133	- 71	-130	-118	-106	-115	104
# 8	- 64	- 54	- 65	- 55	- 8	22	- 9	- 21	- 77	- 23	- 18	- 24	- 22	- 11	- 23	- 12
# 9	-517	-504	-292	-284	-553	-534	-232	-226	-282	-310	-248	-240	-194	-229	-127	-139
# 10	-404	-442	-234	-256	-371	-416	-183	-200	-210	-253	-168	-188	-148	-198	- 95	-115
# 11	-239	-234	-130	-127	-261	-284	-107	-105	-127	-145	-117	-128	- 90	-118	- 57	- 65
# 12	-371	-249	-312	-243	90	- 49	93	- 43	-377	-411	-369	-371	-221	-211	-216	-206
# 13	-157	-110	-158	-111	-185	-195	-185	-196	-161	-166	-162	-167	-125	-125	-126	-125
# 14	- 32	- 22	- 32	- 22	-114	- 56	-113	- 55	- 28	- 31	- 28	- 31	- 53	- 60	-110	- 60
# 15	-516	-477	-511	-472	-364	-307	-361	-304	-211	-254	-208	-251	-200	-222	-146	-191
# 16	-961	-973	-588	-596	-1063	-1081	-432	-437	-385	-409	-384	-408	-350	-403	-251	-348
# 17	-527	-430	-566	-470	-510	-395	-536	-425	- 45	- 88	- 71	-119	- 81	-130	- 96	-149
# 18	-310	-372	-322	-384	-483	-367	-493	-376	- 97	-140	-110	-153	-161	-168	-165	-174
# 19	-574	-502	-615	-541	-235	- 39	-263	- 66	- 71	-221	- 99	-251	-414	-396	-435	-418
# 20	-110	-222	-112	-224	-298	-234	-300	-235	-162	-125	-164	-126	-297	-218	-299	-220
# 21	-140	-131	-139	-130	-160	-106	-160	-105	29	- 68	30	- 67	-154	-177	-152	-176
# 22	-293	-228	-292	-227	-176	-108	-175	-107	29	- 48	30	- 47	-195	-199	-194	-198
# 23	-121	- 13	-116	- 8	55	135	59	139	227	130	231	135	- 46	- 71	- 42	- 68
# 24	-623	-564	-498	-451	-210	-100	-209	- 99	-112	-214	-111	-213	-399	-415	-292	-314
# 25	- 48	- 86	- 48	- 86	-326	-310	-172	-140	82	93	82	92	- 18	- 57	- 19	92
# 26	- 78	2	- 68	13	51	156	60	165	231	133	242	145	67	76	76	85
# 27	242	272	255	283	204	276	217	287	347	242	362	257	163	176	172	185
# 29	- 25	-357	- 49	-381	309	157	284	143	-1235	-262	-940	-280	-306	-175	-334	-188
#312	- 61	228	92	258	299	199	325	227	- 59	2	- 29	30	116	98	140	122

TABLE VI-11
(cont'd.)

MIGRATION
(Continued)

Age Group / Tract	40 - 49				50 - 59				60 - 69			
	1980		1990		1980		1990		1980		1990	
	M	F	M	F	M	F	M	F	M	F	M	F
#1	- 38	- 31	- 13	- 9	- 49	- 43	- 17	- 14	- 80	- 65	- 58	- 49
#2	- 23	- 17	- 5	- 4	- 33	- 22	- 11	- 7	- 44	- 26	- 35	- 22
#3	- 18	- 17	- 7	- 6	- 14	- 13	- 8	- 8	- 42	- 35	- 25	- 22
#4	- 78	-113	- 34	- 48	- 87	-119	- 35	- 51	-114	-155	- 91	-123
#5	- 41	- 50	- 41	- 50	- 73	- 88	- 96	-108	- 96	-108	- 96	-106
#6	-198	-217	-197	-217	-296	-284	-193	-237	-255	-253	-255	-253
#7	- 90	- 53	- 89	- 52	- 97	- 79	- 96	- 77	- 76	- 52	- 73	- 48
#8	- 7	4	- 8	3	- 24	- 30	- 25	- 31	- 21	- 12	- 22	- 13
#9	-194	-198	- 87	-103	-168	-211	- 87	-125	-239	-164	-225	-163
#10	-141	-178	- 67	- 90	-154	-163	- 64	- 80	-172	-147	-174	-149
#11	- 97	-126	- 40	- 53	- 91	-121	- 44	- 57	-152	-189	-117	-139
#12	-130	-168	- 97	- 93	-164	-214	- 94	-102	-263	-350	-244	-341
#13	-134	-121	-134	-121	-145	-168	- 95	-157	-149	-161	-149	-162
#14	-110	-161	- 53	-140	-149	-135	- 87	-108	-217	-236	-216	-235
#15	-164	-173	- 89	-154	-123	- 92	- 73	- 91	-141	-107	-139	-102
#16	-281	-260	-161	-221	-275	-280	-237	-279	-217	-178	-216	-177
#17	- 59	- 60	- 71	- 74	- 95	- 63	-107	- 76	- 60	- 17	- 75	- 31
#18	- 93	- 99	- 98	-104	-107	- 66	-113	- 72	- 25	- 30	- 30	- 36
#19	-333	-252	-344	-263	-224	-164	232	-175	-144	- 50	-159	- 74
#20	-252	-224	-154	-225	-312	-260	-151	-256	-194	-211	-195	-213
#21	-160	-141	-159	-140	-194	-125	-145	-125	-165	-103	-163	-100
#22	-141	- 78	-141	- 11	-106	- 94	-105	- 93	- 47	- 31	- 46	- 29
#23	- 44	- 33	- 42	- 31	- 53	- 23	- 51	- 21	- 34	- 34	- 32	- 32
#24	-181	-149	-181	-149	-155	-124	-154	-123	-110	- 83	-109	- 82
#25	-127	-121	-128	-122	-185	-131	-144	-132	- 24	- 22	- 24	- 23
#26	99	116	106	124	- 4	65	4	74	- 13	17	- 4	27
#27	186	182	194	191	- 4	25	5	34	- 7	54	0	63
#29	-116	- 77	-124	- 83	- 16	- 14	- 19	- 16	- 2	- 5	- 3	- 6
#312	58	- 3	76	14	-129	-114	-114	-101	-232	-127	-220	-114

We turn at this point to a delineation of the actual steps followed in the preparation and computation of the projections.

Step 1: With respect to the organization of the data inputs for each tract, the male and female populations were organized separately into age groups 0-9, 10-19, 20-29,....60-69 and 70+. These data were made available for each of the decennial census periods of 1960, and 1970.

Step 2: The 1960 age-sex cohorts were survived to 1970 applying the actual tract specific birth and death rates already discussed. This computation thus produced "expected 1970 totals" for each of the age-sex cohorts. These would be the numbers in each cohort that would have survived from 1960-1970 if only mortality were involved.

Step 3: Net migration in the tract was assumed to be the difference between the "expected 1970 totals" (as calculated in step 2) and the actual 1970 totals as recorded by the census enumerations. Thus at the termination of this step, "estimated 1960-1970 net migration totals" were produced for each of age-sex cohorts in each of the tracts.

Step 4: The next concern was the projection of the 1970 population cohorts from the 1960 actual base populations as enumerated by the census. From these actual 1960 cohort data, we advanced 1970 cohorts to 1980. We next employed the "estimated 1960-1970 net migration totals (as calculated in step 3) and computed different projections for the 1970 age-sex cohorts, assigning a fixed weight to the "estimated 1960-1970 net migration totals." A weight of (1) 100% merely employs the "estimated 1960-1970 net migration totals" as given. The obvious assumption here is that the 1970-1980 net migration for each of the age-sex cohorts is the same as the 1960-1970 net migration (as calculated in step 3). On the other hand, a weight of (6) 60% takes only 60% of the "estimated 1960-1970 net migration totals" in the development of 1970-1980 migration totals, the assumption here being that 1970-1980 net migration was only 60% of that in the 1960-1970 period. As already noted, other projections will be made for each of the age-sex cohorts, each projection dependent upon the assignment of a different weight to the "estimated 1960-1970 net migration totals."

Step 5: In this next step of the actual projection procedures, the 1980 projections were developed. Employing the birth and death rates discussed above, the 1970 age-sex cohorts were survived to 1980. The amount of 1970-1980 net migration for each age-sex cohort was then calculated.

Step 6: Upon completion of the preceding step, we had made available 1980 projections for each of the age-sex cohorts delineated earlier (see Step 1), with the obvious exceptions of the male and female 0-9 year cohorts. Since these two cohorts were not alive in 1970, we could not have survived them to 1980 as was possible with those

cohorts alive in 1970. In any event, the problem is now one of "creating" these new cohorts and placing them into the 1980 population. This objective was accomplished in the following manner:

a) determine the number of males in the age groups 0-9 and the number of females in the age groups 0-9 per 1000 women in the age group 15-49 in 1970, e.g., 1970 ratio for males 0-9=#males 0-9 in 1970/# women 15-49 in 1970.

b) from the above equations, two ratios were produced: one each for males and females in age groups 0-9. Each ratio was then taken one at a time and multiplied by the # of women 15-49 in 1980; thus if we were using the "male 0-9" ratio, the result would be the # of males in the age category 0-9 in 1980.

c) the assumptions in this operation focus on the fertility component. We assume that the ratio of males and females in the age categories 0-9 per 1000 women between the ages of 15-49, in 1970 will be the same in 1980, and in each of the other projection years.

CHAPTER VII

TRANSPORTATION

A central issue in most urban and regional transportation studies is the prediction of flows between locations or traffic zones. While aggregate interactions or "interzonal transfers" are often easily derived from overall population or employment figures. the individuals flows between pairs of zones is a more difficult problem. The "gravity model" is the simplest and most common formulation of this problem. Basically it assumes that the flow between zones is proportional to the product of the populations size or "potential" of each zone and inversely related to the distance between them.[1]

The wide application of the gravity model is stimulated by its simplicity and its empirical validity and not by the theoretical basis of the model. Although there have been many attempts to increase the credibility of its formulation[2] as well as to extend its application to new areas, the theoretical literature remains largely unsatisfactory. Furthermore there has been a rising cry concerning the dangerous use of such analogies from the physical sciences in social forecasting.[3]

Formulation

The purpose of this portion of the study is to utilize concepts in information theory as originally outlined by Wilson[4] to

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[1]See review by Isard, W. Methods of Regional Analysis (Cambridge) Mass.: M.I.T. Press, 1960) Chapter 9.

[2]A continuous issue of this type proliferates the various Regional Science journals (Papers of the Regional Science Association, Journal of Regional Science, Proceedings of the European and Asian Congresses of Regional Science).

[3]Wilson, A. G. "Notes on Some Concepts in 'Social Physics' Papers, Regional Science Association Vol. 22 1969) pp. 159-193 and Wilson, A. G. "Use of Analogies in Geography" Geographical Analysis, Vol. 1 (1969) pp. 225-233.

[4]Wilson, A. G. "The Use of Entropy Maximizing Models in the Theory of Trip Distribution, Model Split, and Route Split" Journal of Transport Economics and Policy Vol. 3 (1969) pp. 108-126 and Working Note Vol. 195 (1970) Center for Environmental Studies, London, U. K.

characterize the gravity formulation. It has been demonstrated by Charnes, Raike and Bettinger[5] that if such a formation can be specified, then the duality properties of certain non-linear programming problems follow from the Kuhn-Tucker theorem.

Theorem

$$\text{MIN } f(x)$$
$$\text{Subject to: } h_k(x)=0,\ k(=1,\ldots,K)$$
$$g_j(x)\geq 0,\ j=1,\ldots,J$$

Where $x=(x_1,\ldots x_n)$ is an n-vector and where $f(x)$, $g_j(x)$ for $j=1,\ldots J$ and $h_k(x)$ for $k=1,\ldots K$ are real functions, twice differentiable. f must be convex and each g_j must be concave with each h_k having linear affinity. If there is a vector x for which simultaneously one has all $g_j(x)>0$ or if there are no g_j constraints, then then for a vector $\bar{x}$ to be an optimal solution to the above problem, it is necessary and sufficient that u_j and w_k exist as multipliers for which

$$\frac{\partial f(\bar{x})}{\partial x_i} = \sum_{j=1}^{J} u_j \frac{\partial g_i(\bar{x})}{\partial x_i} \sum_{k=1}^{K} w_k \frac{\partial h_k(\bar{x})}{\partial x_i}$$

all $i=1,\ldots n$ and $u_j\geq 0$ where $j=1,\ldots,J$ and

either $u_j=0, g_j(x)>0$

or $u_j>0, g_j(\bar{x})=0$ (i.e. $u_j g_j(\bar{x})=0$)

or $u_j=0, g_j(\bar{x})=0$

holds for $j=1,\ldots J$.

Application

Since such a problem is solvable it is clear that the Charnes et. al. translation of the "gravity model" into an information theory framework has allowed the determination of unique solutions for particular cases. It also provides us with an expected basis for the determination of directions of change under different transformations. This model is being operationalized and applied to the Corpus Christi area for the purpose of specifying interzonal flows. Two major questions are then addressed given these characteristics. What are the constraint characteristics of the existing transport network for population distributions projected for 1980 and 1990? How will such constraints be reflected in those expected distributions?

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[5]Charnes, A., W. M. Raike, C. O. Bettinger "An Extremal and Information-Theoretic Characterization of Some Interzonal Transfer Models" Socio-Economic Planning Science Vol. 6 (1972) pp. 531-537.

(i.e. how will they retard or enhance growth of specific areas?) These questions are first asked in a status quo framework and then in a framework of highway projections of the Texas Highway Dept. for the same area.

Finally the interzonal flows (Tij) are also utilized in the retail location model to be described in Chapter VIII. We feel that the development, operationalization and utilization of this format is not only a useful and vital addition to planning tools but is also an important theoretical contribution.

CHAPTER VIII

RETAIL ALLOCATION

The allocation of new retail activities to space is dependent upon the distribution of consumers and their associated buying power and the distribution of existing centers which service the consuming public. The nature of the firm's market area, therefore, determines the entry characteristics of new retailing.

Specification

Perhaps the best way of formulating this is in probabilistic terms as given by Gambini, Huff and Jenks*.

The expected number of consumers at any point i selecting retail establishment j is determined by

$$E_{ij}=P_{ij}C_i$$

where

P_{ij} is the probability of a given consumer at i selecting j

C_i is the number of consumers at i

The total number of consumers from all locations selecting firm j is the sum of all locations i=1,....m.

$$T_j=\sum_{i=1}^{m} E_{ij}$$

The line of market equilibrium between any two firms k and h is given as

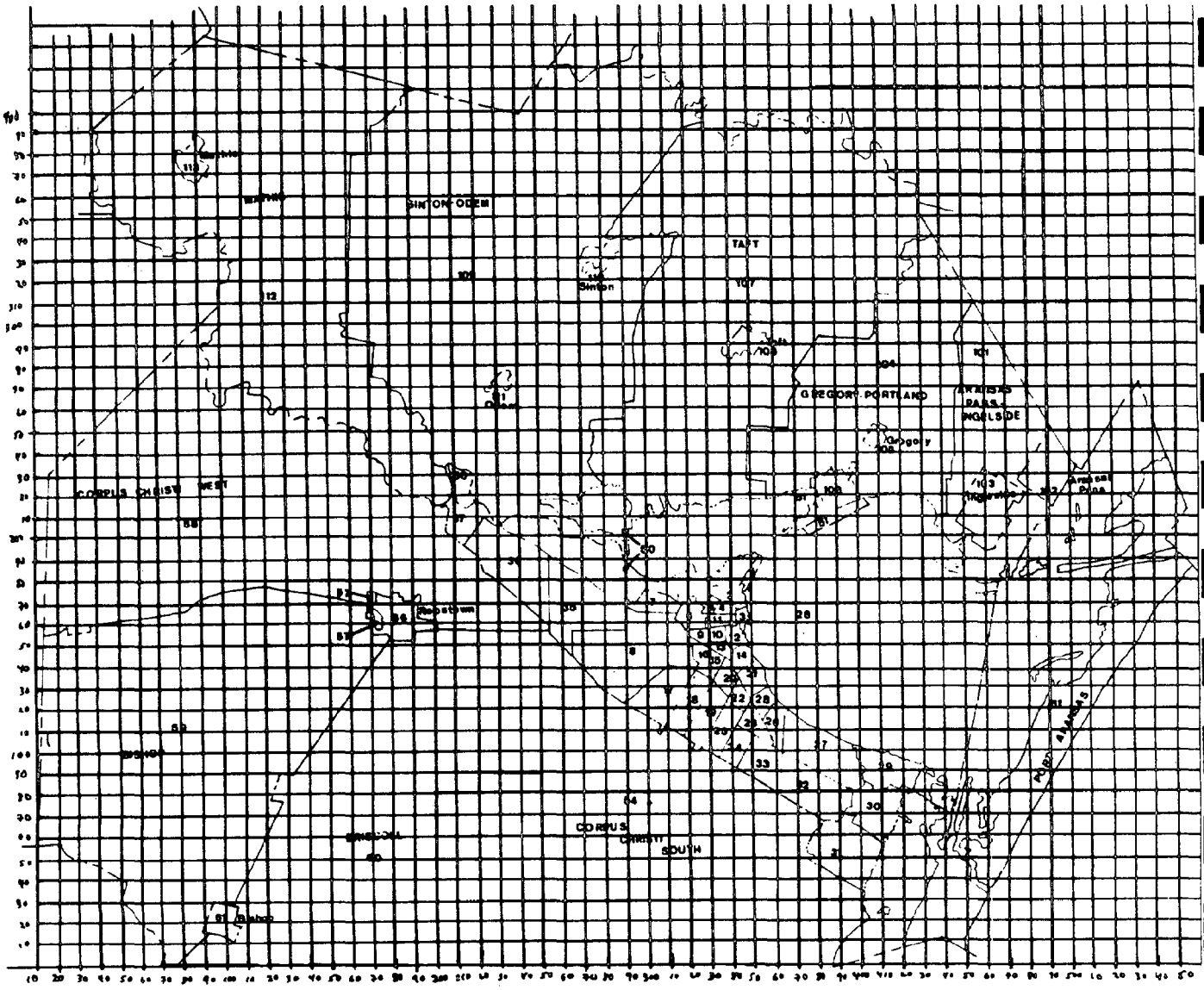
$$P_{ij}=\frac{A_j 1 D_{ij}^{\alpha}}{\sum_{j=1}^{n} A_j 1 D_{ij}^{\alpha}}$$

such that $\sum_{j=1}^{n} P_{ij}=1_i$ and, $0<P_{ij}<1$.

Where P_{ij} is the probability of a consumer located at i selecting a retail firm j

A_j is the attraction of firm j

CORPUS CHRISTI REGION



CENSUS TRACTS
AS OF 1970 CENSUS

Figure VIII-1

D_{ij} is the distance from a consumer at origin i to destination j

α is a constant that reflects the effect of distance

n is the set of retail establishments from which the consumer chooses.

The equilibrium point between firms k and h is determined by

$$\frac{A_k/D_{ik}^{\alpha}}{\sum_{j=1}^{n} A_j/D_{ij}^{\alpha}} = \frac{A_h/D_{ih}^{\alpha}}{\sum_{j=1}^{n} A_j/D_{ij}^{\alpha}}$$

or more simply

$$\frac{D_{ik}}{D_{ih}} = \left(\frac{A_k}{A_h}\right)^{1/\alpha}$$

Operationalization

In order to operationalize this model for assignment of retail activities at the tract level within the City of Corpus Christi, it was necessary to determine the distribution of consumer buying power by tract. Each tract was specified on an x, y coordinate according to its centroid. The number of families in that tract were multiplied by the retail expenditures levels to which their median income was related (see Table VIII-1). Alternative retail centers were specified by x, y coordinates and size of center (attraction index). The coefficient to which distance was raised was specified at 1 and 2 in alternate runs of the model. Once the transportation model is complete (Chapter VII) a coefficient for distance determined from that model will be introduced.

Allocation of commercial space will parallel this retail allocation approach but with weaker constraints on travel distance and as an inverse relationship with distance from the C.B.D. This commercial index will also be evaluated with direct travel times specified through the transportation analysis.

The model compares each retail establishment with the attraction index (sq. ft.) of alternative retail locations and the weighted distance the retail location is from the adjusted buying power units (Census tracts weighted by retail expenditures rates and population). This produces an evaluation of each existing center in terms sales per sq. ft. and market share. When alternative sites are postulated for each tract then each tract is in turn evaluated as a possible location for new retailing. By knowing the amount of total retailing supported in cities of various sizes it is possible

TABLE VIII-1

PERCENTAGE OF INCOME AFTER TAXES SPENT ON RETAIL ITEMS AND SELECTED SERVICES

Average income and expenditures Items	Money income after taxes $3,000 to $3,999	$4,000 to $4,999	$5,000 to $5,999	$6,000 to $7,499	$7,500 to $9,999	$10,000 to $14,999
Average money income after taxes and other money receipts	3580.57	4608.94	5559.27	6729.63	8713.01	11,753.39
Expenditures:						
Food prepared at home	771.94	858.93	997.65	1067.72	1274.29	1410.67
Food away from home, in home city, total	126.73	167.11	202.14	250.44	360.62	415.06
Alcoholic beverages	40.27	41.99	44.08	69.00	80.84	149.06
Tobacco	82.59	88.83	106.37	116.02	125.51	141.76
Housing						
rented dwelling, repairs	4.14	1.21	3.04	1.91	3.49	.74
owned dwelling, repairs and replacements	64.10	63.31	74.60	95.13	129.44	145.08
Fuel						
coal and coke	8.34	7.53	4.89	3.75	4.48	3.34
wood, sawdust, pressed wood, logs, etc.	1.24	.87	2.19	.42	.97	3.27
kerosene	5.45	9.41	7.20	5.72	2.64	4.08
fuel oil	5.22	7.28	8.11	10.86	20.42	29.18
other solid and petroleum fuels	.29	.39	1.42	1.54	1.38	1.90
Water softening service	--	--	--	--	.19	--
Ice	.67	1.74	1.39	1.38	1.64	2.45
Food freezer rentals	.06	.05	.15	.19	.19	.10

TABLE VIII-1

Average income and expenditures	Money income after taxes					
Items	$3,000 to $3,999	$4,000 to $4,999	$5,000 to $5,999	$6,000 to $7,499	$7,500 to $9,999	$10,000 to $14,999
Household operations						
laundry supplies	27.14	31.72	34.53	36.81	41.00	44.73
cleaning supplies	15.03	15.17	18.71	22.25	20.27	24.77
household paper supplies	17.39	19.62	22.42	26.37	29.25	38.30
laundry and cleaning, sent out	37.25	46.16	45.75	50.26	56.52	69.21
domestic service	34.09	42.06	48.07	55.44	118.04	306.34
day nursery care	4.40	12.45	12.97	14.33	13.76	6.03
repairs of furniture and equipment	8.69	6.11	10.09	9.35	26.46	46.64
freight, express, and storage	11.22	6.05	6.45	7.28	4.27	13.12
House furnishings and equipment, total	210.15	218.75	334.53	336.06	449.83	608.65
Clothing, clothing materials and services	373.73	469.93	576.27	644.39	835.43	1214.19
Transportation, automobile purchase	196.04	293.40	409.57	419.86	503.08	598.22
Transportation, automobile operation						
gasoline	132.40	176.95	235.04	264.39	273.03	302.56
motor oil	9.10	11.46	16.62	19.57	15.98	16.38
lubrication, washing, etc.	9.60	14.59	17.09	23.10	21.29	24.97
tires and tubes	24.35	33.73	33.21	42.83	44.00	56.63
batteries and other equipment	10.38	13.53	10.04	17.39	16.12	19.09
operating expenses not allocated	12.14	9.21	9.04	12.57	19.61	68.38
repairs and parts	36.52	34.94	52.32	62.21	77.61	102.48
Transportation, public, in home city	26.94	26.13	22.09	20.65	22.87	32.57
Medical care, direct expenses, total	195.79	198.71	254.96	293.14	336.27	458.59
Personal care, total	133.96	146.21	185.81	192.06	234.31	306.41
Recreation						
television	35.12	44.00	46.09	44.89	54.21	68.24

TABLE VIII-1

Average income and expenditures	Money income after taxes						
	$3,000 to $3,999	$4,000 to $4,999	$5,000 to $5,999	$6,000 to $7,499	$7,500 to $9,999	$10,000 to $14,999	$15,000 to $35,000
radio	5.61	6.78	8.10	11.92	14.90	14.04	
phonographs, tape recorders, etc.	8.85	11.04	13.76	19.35	31.34	38.66	
musical instruments	14.45	7.23	3.12	11.83	28.83	38.70	
spectator admissions, total	15.47	22.39	23.09	30.93	34.09	50.27	
pets (purchase and care)	12.94	12.20	15.18	28.87	30.46	55.70	
toys and play equipment	12.89	16.64	23.32	24.28	30.40	28.52	
Reading, total	35.88	36.42	39.10	50.01	61.10	100.94	
Education, books, supplies, and equipment	5.76	6.99	8.89	12.71	19.83	32.29	
Total expenditures	2784.36	3239.25	3989.46	4429.18	5470.26	7092.31	10600.00
Percentage of money income after taxes and other money receipts	.7776	.7028	.7176	.6582	.6278	.6034	5436.00

Source: Bureau of Labor Statistics, "Family Expenditures, Income, and Savings, by Income Class, Family Size, and Region: All Urban Families and Single Consumers - South, 1960-61."

to determine a rate of expansion of new retailing and then allocate it as new retail acreage per tract without specifying the precise site.

Application

Clearly from Tables VIII-2 and VIII-3 locations 16 and 6 are the most underserved areas of the city in terms of retail capacity vs. sales. However certain locations e.g. 28 are extremely sensitive to the correct specification of the distance coefficient (Alpha). The low population growth rate projected for the 1980 implies a slow increase in retail acreage. The projected increase is only about forty acres, most of which would be allocated to tract 14 (20 acres) (I.D. unit-16) and tracts 18, 24, and 25 (6.3 acres each) (I.D. units 26, 26, and 9 respectively). Note, this low increase in retailing reflects only increased sales within the City of Corpus Christi that results from city growth alone. It does not reflect increased sales due to SMSA growth or the fact that Corpus Christi is the primary retail center for high order goods purchased within the Coastal Bend Region.

A retailing model for the S.M.S.A. has now been determined and will be implemented. Clearly this model can be refined to the enumeration district and perhaps block level while specifying the distance parameter more accurately through the transportation model. The allocation process will specify retail and commercial acreage prior to the allocation of housing since it is felt that this is a realistic reflection of the market mechanism priorities.

Table VIII-2

TOTAL ALLOCATION OF CUSTOMERS AND EXPENDITURES
FROM 38 STATISTICAL AREAS USING

Alpha = 1.000

	LOCATION SIZE	NUMBER OF CUSTOMERS	ANNUAL SALES	SALES PER SQ. FT.	MARKET SHARE
1	100000	1581.41	9443980.30	94.44	.03
2	40000	641.08	3232605.94	80.82	.01
3	100000	1931.44	9084473.56	90.84	.04
4	75000	1104.89	5713107.62	76.17	.02
5	75000	1061.11	6498671.30	86.65	.02
6	100000	1738.76	11068529.63	110.69	.03
7	100000	1125.23	6767648.06	67.68	.02
8	75000	1082.66	5190919.09	69.21	.02
9	100000	1156.05	7101507.43	71.02	.02
10	60000	831.87	5018251.11	83.64	.02
11	55000	789.98	4238598.80	77.07	.02
12	60000	773.84	4764472.99	79.41	.02
13	175000	2685.78	13933299.62	79.62	.05
14	621000	6794.08	40752401.97	65.62	.13
15	280000	3853.14	23283915.39	83.16	.08
16	25000	677.91	5757973.86	230.32	.01
17	125000	1979.51	10330721.87	82.65	.04
18	90000	1705.07	8577552.33	95.31	.03
20	150000	2360.43	11786621.16	78.58	.05
21	60000	821.04	4873335.42	81.22	.02
22	25000	397.39	1983042.95	79.32	.01
23	110000	1409.02	8650449.14	78.64	.03
24	22000	294.73	1777696.96	80.80	.01
25	75000	1015.15	6291944.54	83.89	.02
26	60000	550.13	3414527.07	56.91	.01
27	100000	1485.83	7136648.67	71.37	.03
28	100000	1467.69	8387770.05	83.88	.03
29	100000	1118.80	6708912.87	67.09	.02
30	100000	1082.12	6486104.40	64.86	.02
31	80000	853.89	5118240.62	63.98	.02
32	60000	826.61	5059256.31	84.32	.02
33	500000	5138.35	25221387.38	50.44	.10

Table VIII-3

TOTAL ALLOCATION OF CUSTOMERS AND EXPENDITURES
FROM 38 STATISTICAL AREAS USING

Alpha = 2.000

	LOCATION SIZE	NUMBER OF CUSTOMERS	ANNUAL SALES	SALES PER SQ. FT.	MARKET SHARE
1	100000	2145.79	14043631.34	140.44	.04
2	40000	673.53	3133398.40	78.33	.01
3	100000	2983.79	12270432.62	122.70	.06
4	75000	907.82	4350996.70	58.01	.02
5	75000	1038.28	6747582.49	89.97	.02
6	100000	2417.01	16431115.20	164.31	.05
7	100000	763.67	4723989.79	47.24	.02
8	75000	1391.03	5763592.47	76.85	.03
9	100000	1908.57	12594213.52	125.94	.04
10	60000	651.89	4076891.12	67.95	.01
11	55000	673.78	3489402.16	63.44	.01
12	60000	932.39	6201941.72	103.37	.02
13	175000	3410.24	16450984.70	94.01	.07
14	621000	4509.61	27732290.88	44.66	.09
15	280000	2989.47	18693094.41	66.76	.06
16	25000	1211.36	11968568.76	478.74	.02
17	125000	2278.46	11440285.89	91.52	.05
18	90000	2846.95	14214408.58	157.94	.06
20	150000	2351.38	10827845.28	72.19	.05
21	60000	803.53	5052512.63	84.21	.02
22	25000	389.00	1745899.51	69.84	.01
23	110000	1036.36	6601369.63	60.01	.02
24	22000	199.04	1227357.86	55.79	.00
25	75000	692.84	4511708.46	60.16	.01
26	60000	1481.09	10136113.78	168.94	.03
27	100000	1673.55	7052357.13	70.52	.03
28	100000	1736.60	10237267.13	102.37	.03
29	100000	726.87	4459278.48	44.59	.01
30	100000	727.62	4481860.33	44.82	.01
31	80000	591.41	3655052.27	45.69	.01
32	60000	732.40	4718635.32	78.64	.01
33	500000	3459.68	14620489.82	29.24	.07

TABLE VIII-4
PRIMARY RETAIL CENTERS

City of Corpus Christi	Size (sq. ft.)
Mission Shopping Center	175,000
Padre Staples Mall	621,000
Parkdale Plaza Shopping Center	280,000
Pope Plaza Shopping Center	25,000
Port Ayers (strip)	125,000
Saxet Shopping Center	90,000
Shell Shopping Center	50,000
6 pt. Shopping Center	150,000
South Park Shopping Center	60,000
Suburban Shopping Center	25,000
Town & Country Shopping Center (strip)	110,000
United Savings Shopping Center	22,000
Village Shopping Center	75,000
Westwood Shopping Center	60,000
Woodlawn Plaza	100,000
Downtown CBD	450,000
Alenda Shopping Strip	100,000
Arcadia Village	40,000
Ayers Shopping Center	100,000
Bell-Aire Shopping Center	75,000
Carmel Shopping Center	75,000
Country Club Plaza	100,000
Cullen Mall	100,000
Gaslight Square	75,000
Gulfway	100,000
Hamlines Shopping Center	60,000
Lamar Park Shopping Center	55,000
Meadowbrook Shopping Center	60,000
Shopper World	100,000
K-Mart	100,000
Kroeger	100,000
Handy Dan	80,000
Attonta	60,000
Remainder of S.M.S.A.	
Port Aransas	36,300
Portland	105,000
Taft	132,664
Aransas Pass	646,085
Sinton	50,000
Mathis	25,000
Bishop	25,000
Odem	15,000
Ingleside	20,000

CHAPTER IX

HOUSING

Urban Ecology

Prior to allocating housing it was necessary to capture the neighborhood character or spatial ecology of the region.[1] The purpose of this process was to understand the distribution of population by residential characteristics. If an allocation mechanism is to recognize the critical role of income, occupation and education affinity in the demand for housing, it is important that these variables can be linked to the organization of population in residential space. For this reason the first step in allocating housing was to perform an urban factorial ecology on the City of Corpus Christi and the S.M.S.A. Variables utilized included income, employment, education, dependency, crowding and demographic characteristics of the population in each census tract (Table IX-1).

Three basic factors were identified from each of the principal components analysis. These results were varimax rotated for maximum clarity. The factor loadings for both the City and the S.M.S.A. were very similar in terms of their level and ordering (Table IX-2). Since three factors were rotated, it was decided to interpret only the first two since the final factor often becomes a depository of unexplained residuals. The disaggregated distribution of variables by tract are found in the Table IX-9. However, the two basic factors that were identified can be characterized as a Socio-Economic Status Factor (I) and a Life-Cycle Factor (II).

The socio-economic factor has positive loadings on education (6), Income (1) (3), high skill occupations (18), and negative loadings on crowded dwellings (12), low income (5) and low skill occupations (15). The life-cycle factor is positively related to large families (11), children (10), family units (2) and owner occupied dwellings (4) and is negatively related to older populations (13) and unemployed males (7).

These findings imply that socio-economic status is one factor in the spatial organization of neighborhoods while the stage in the life cycle (i.e. child rearing or retirement) is another characteristic of neighborhoods. The first factor explains 35% of the common

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[1]For discussion of this approach see B. J. L. Berry (ed) Factorial Ecology, special supplement of Economic Geography, (Clark Univ, Worcester, Mass., 1972).

Table IX-1

VARIABLES UTILIZED

1. Median Family Income
2. Percent of Households with Married Heads
3. Percent of Families with Income over $7,000
4. Percent of Dwellings Owner Occupied
5. Percent of Families with Income under $2000
6. Median School Years Completed
7. Percent of Males Unemployed
8. Percent of Population Who Moved inside the S.M.S.A.
9. Percent of Population Who Moved into the S.M.S.A.
10. Percent of Population Under 19
11. Population per Household
12. Percent of Dwellings with over 1.01 persons per room
13. Percent of Population over 65
14. Percent of Females in the Labor Force.

TABLE IX-2
FACTOR LOADINGS

S.M.S.A.

FACTOR 1	
6	.9246
1	.8924
3	.8794
12	-.8471
18	.8222
5	-.8010
15	-.7687
17	-.5730
9	.5305
14	.4427

FACTOR 2	
13	-.9076
11	.9045
2	.8908
10	.7848
4	.6342
7	-.5195
16	.4274

CITY

FACTOR 1	
6	.9088
1	.8855
3	.8818
5	-.8525
15	-.8479
18	.8210
12	-.7815
17	-.6627

FACTOR 2	
13	-.8732
10	.8652
11	.8332
2	.8157
4	.7229
7	-.5891
16	.5571

variance while the second factor explains 25%. Each tract is then scored independently (Tables IX-3, IX-4) on each factor and these scores are mapped. By combining these two independent measures it is possible to locate a tract in two dimensional space (ie. X_1, X_2, X_3, X_4) and to determine the factor distance between the tracts. Each tract therefore can be evaluated in terms of their distance apart in physical space (linear road distance) and their distance apart in factor space (Figure 1). The distance in the

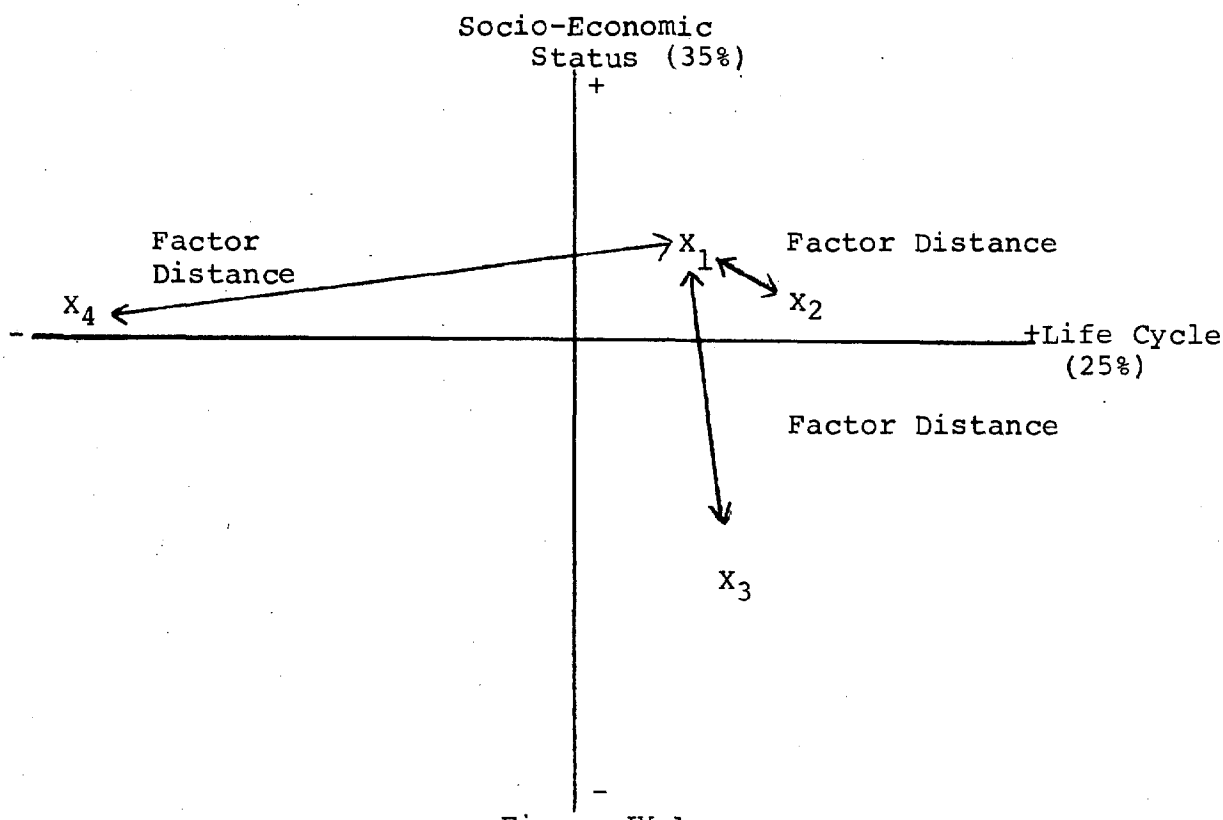


Figure IX-1

case of factor space must be weighted by the level of importance (explained variance or eigenvalue) of each factor. Not only does this exercise provide insight into the residential clustering habits of urbanites in Corpus Christi and its S.M.S.A. but it provides a mechanism for determining tract similarities. This mechanism is utilized in the housing allocation model to allocate housing to new tracts after first preference tracts are filled.

Housing Allocation

Prior to allocation the housing market is partioned into two sub-groups. The first is the apartment and multi-family dwelling unit market and the second is the single family housing market.

Table IX-3

FACTOR I-SOCIO-ECONOMIC STATUS

Tract	Score
1	.3236
2	.7084
3	.3503
4	-1.5498
5	- .6819
6	.5627
7	.4204
8	.1853
9	-1.6232
10	-1.4809
11	-1.4831
12	.0043
13	.3692
14	1.3387
15	-1.1529
16	-1.1712
17	-1.5818
18	- .6956
19	.3044
20	.8247
21	1.6279
22	1.0968
23	1.1299
24	1.3540
25	2.1239
26	1.3838
27	1.4062
29	- .1847
31	.8371
32	.8762
33	.7389
34	1.5652
36	.9781
37	1.1651
51	.7238
54	- .7922
56	.6025
57	-2.2133
59	- .6675
101	.6966
103	.6306
104	- .6567
105	-1.3781
106	1.0794
107	- .5323
108	- .6327
111	- .6299
112	- .7926
113	-1.5947

Table IX-4

FACTOR II-LIFE CYCLE

Tract	Score
1	-2.6627
2	-2.7912
3	-3.0084
4	-1.3621
5	- .3950
6	- .3259
7	.0683
8	- .6578
9	.2457
10	- .5909
11	- .6638
12	-1.4794
13	.0519
14	-1.2685
15	.0406
16	.8679
17	1.1755
18	1.6505
19	.5822
20	- .2944
21	- .8271
22	.3594
23	.6460
24	.8881
25	.5346
26	.1648
27	.7337
29	1.8310
30	- .4652
31	.5137
32	.8937
33	.5087
34	1.1315
35	.4365
36	.6432
37	.5521
50	.7701
51	-2.4778
54	.2699
56	.4312
57	.5281
58	- .0693
59	.2763
60	.1187
61	.3046
101	- .4128
102	- .3323
103	.2686
104	.5726
105	.9125

FACTOR II-LIFE CYCLE

(Continued)

Tract	Score
106	.7740
107	.4139
108	.4701
109	.1332
110	- .3025
111	.1912
112	-1.1059
113	.5383

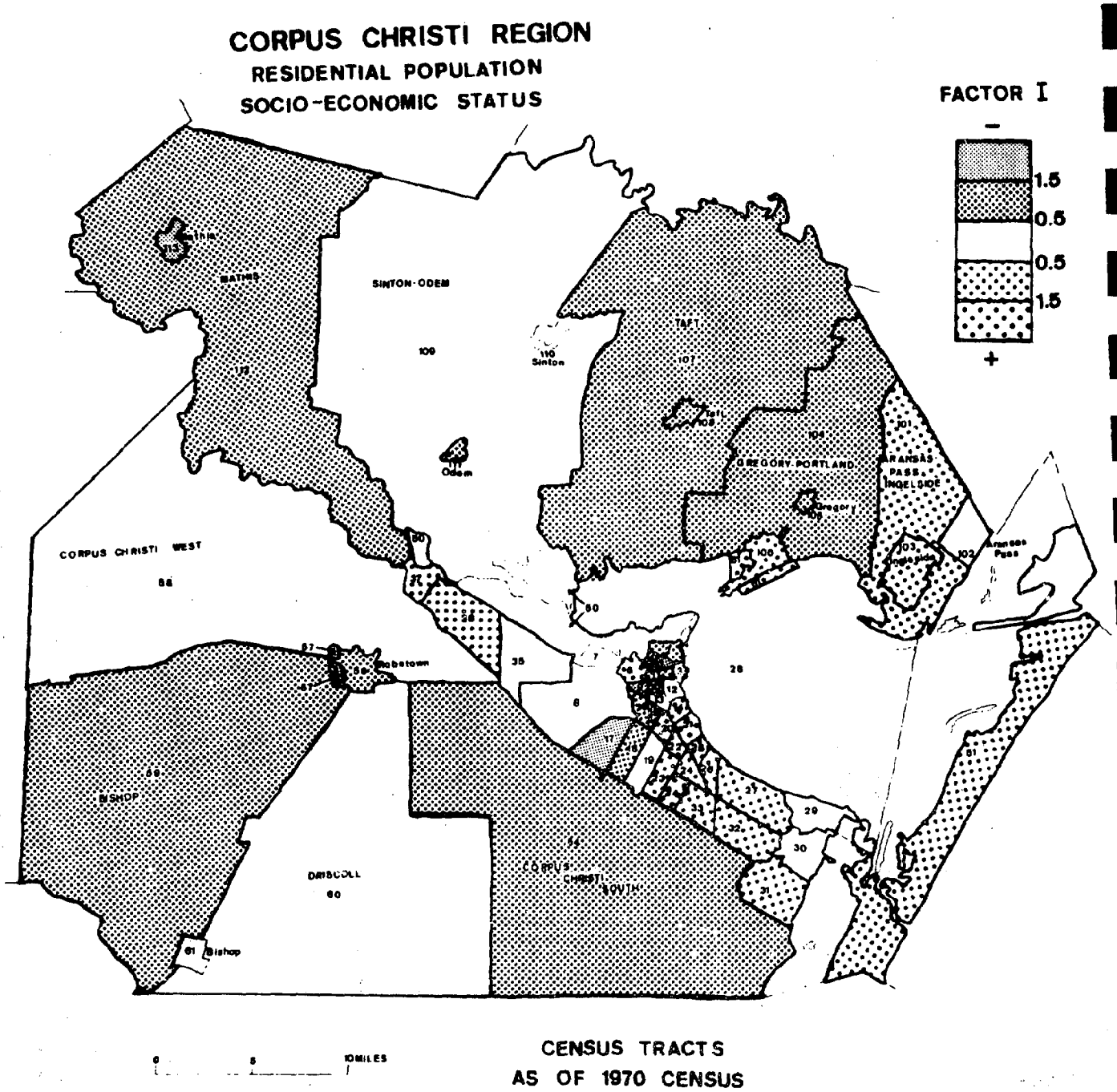

CORPUS CHRISTI REGION
RESIDENTIAL POPULATION
SOCIO-ECONOMIC STATUS
FACTOR I
-
1.5
0.5
0.5
1.5
+
SINTON-ODEM
TAFT
GREGORY-PORTLAND
ARANSAS PASS-INGLESIDE
CORPUS CHRISTI WEST
BISHOP
DRISCOLL
CORPUS CHRISTI SOUTH
Sinton
Odem
Taft
Gregory
Aransas Pass
Mathis
Robstown
Bishop
CENSUS TRACTS
AS OF 1970 CENSUS
0
5
10 MILES

Figure IX-2

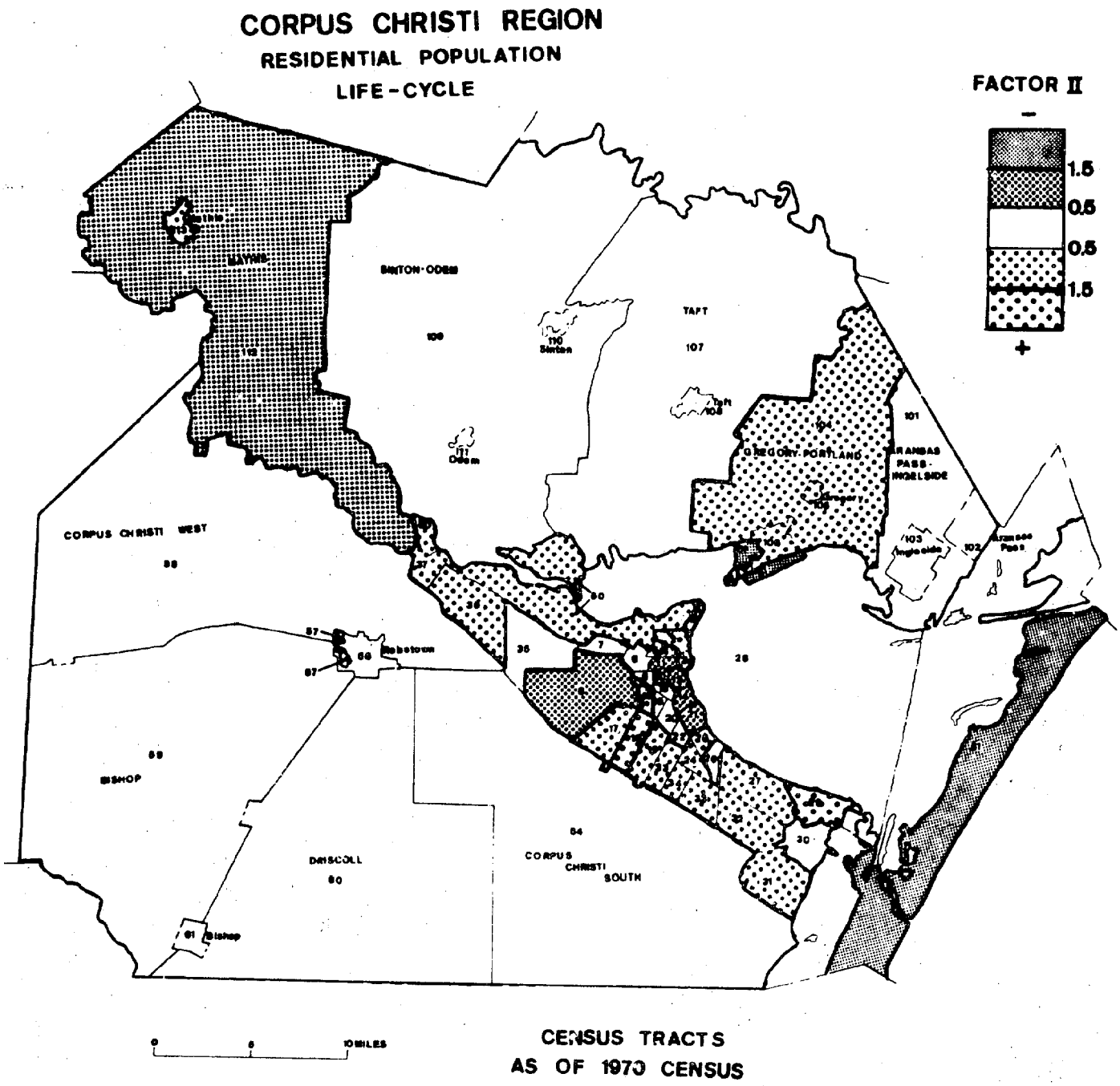

CORPUS CHRISTI REGION
RESIDENTIAL POPULATION
LIFE-CYCLE
FACTOR II
-
1.5
0.5
0.5
1.5
+
SINTON-ODEM
TAFT
GREGORY-PORTLAND
ARANSAS PASS-INGLESIDE
CORPUS CHRISTI WEST
BISHOP
DRISCOLL
CORPUS CHRISTI SOUTH
0
5
10 MILES
CENSUS TRACTS
AS OF 1970 CENSUS

Figure IX-3

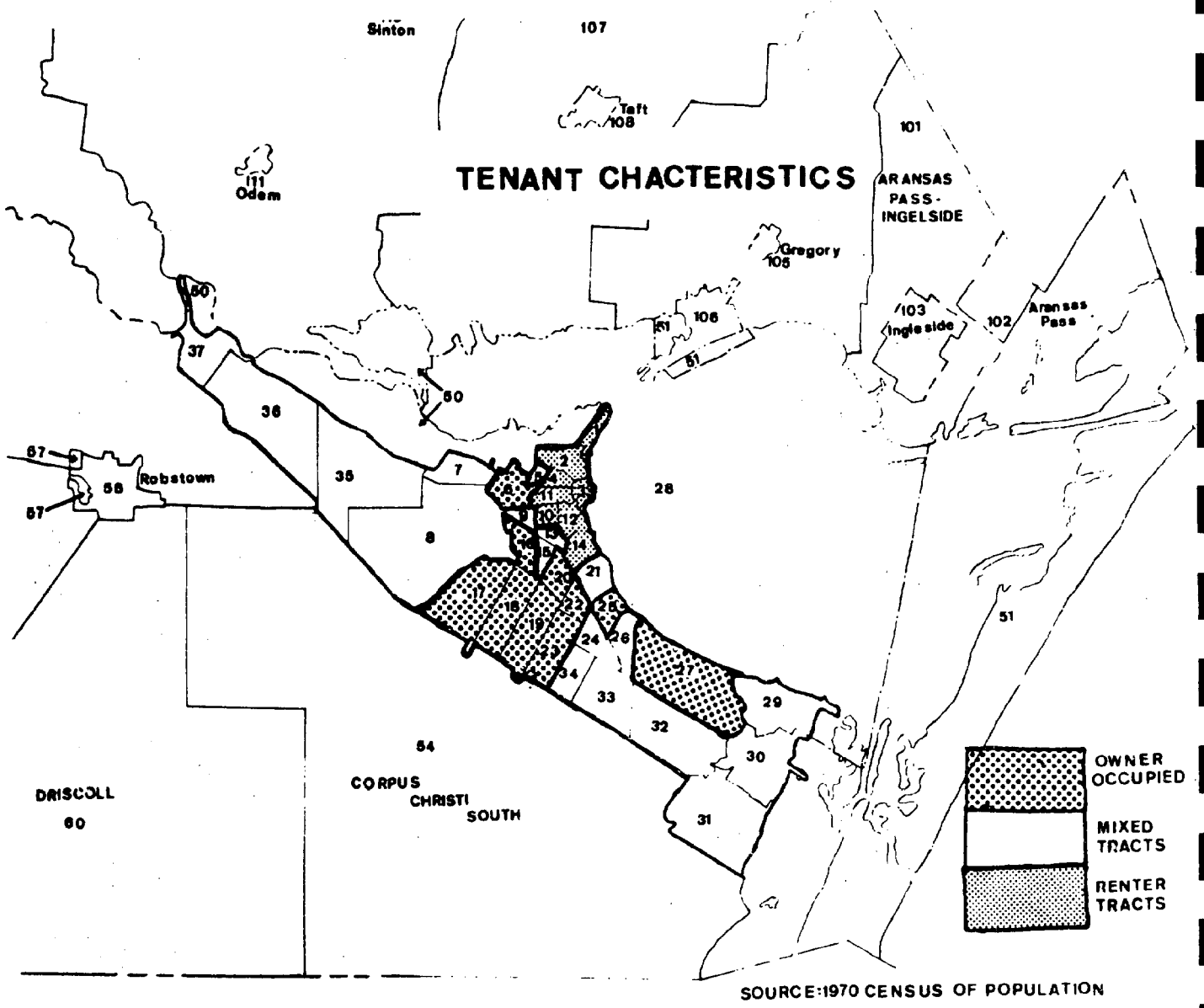

TENANT CHACTERISTICS
Sinton
107
Taft
108
101
111
Odem
ARANSAS
PASS-
INGELSIDE
Gregory
105
60
106
103
Ingleside
102
Aransas
Pass
37
36
60
35
7
28
57
58
Robstown
57
8
21
51
24
26
27
34
33
29
32
30
54
CORPUS
CHRISTI
SOUTH
31
DRISCOLL
60
OWNER
OCCUPIED
MIXED
TRACTS
RENTER
TRACTS
SOURCE:1970 CENSUS OF POPULATION

Figure IX-4

Apartments and multi-family dwellings are allocated first on the premise that they can out-bid single family housing for the site they prefer. A matrix of rent paid by apartments and multi-family units per tract is developed. (Figure IX-5).

Figure IX-5

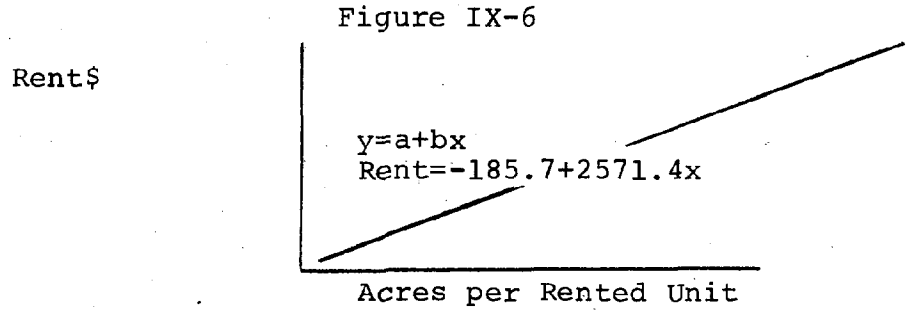
Tracts	1	2	3	---	6	Rent Categories
1						
2			X			
-						
-						
-						
n						

x=No. of Rental Units in tract 2 paying rent in rent category three ($60-$80) in time (t_1)

For the City of Corpus Christi such a matrix is given for 1960 and 1970 in Table IX-5. The change in each category provides the markov transition probability[2] in the creation of a new distribution for 1980 under the constraint that (1) no category becomes negative (ie. it can only go to zero) and (2) the total increase in units is within the range of increase expected for 1980 (ie. we match the total expected number of units per population with the number of units generated). The new 1980 distribution is presented in Table IX-6.

Although the aggregate number of units is constrained to remain within that level demanded by the 1980 population the number of units assigned to each tract is <u>not</u> limited to the amount of acreage

Figure IX-6



[2]W.A.V. Clark "Markov Chain Analysis in Geography: An Application to the Movement of Rental Housing Areas" <u>Annals of the Association of American Geographers</u> (June, 1965), pp. 351-359.

Table IX-5
Matrix of Rental Categories By Census Tract 1960 & 1970

60 MATRIX

TRACT	1	112	214	98	17	0	13
TRACT	2	66	211	51	0	4	4
TRACT	3	49	161	50	26	0	35
TRACT	4	513	647	121	0	0	0
TRACT	5	12	113	184	46	17	0
TRACT	6	35	257	283	153	18	0
TRACT	7	20	137	175	53	4	0
TRACT	8	15	42	49	0	0	0
TRACT	9	333	597	87	8	0	0
TRACT	10	484	599	169	20	0	0
TRACT	11	452	528	85	12	0	0
TRACT	12	213	729	617	209	52	20
TRACT	13	57	249	231	67	0	0
TRACT	14	17	75	217	160	202	21
TRACT	15	517	224	124	117	48	0
TRACT	16	220	410	122	16	0	0
TRACT	17	130	80	20	0	0	0
TRACT	18	0	18	53	14	4	0
TRACT	19	5	73	209	220	91	0
TRACT	20	51	149	305	208	90	4
TRACT	21	4	25	250	294	188	32
TRACT	22	8	12	59	77	78	9
TRACT	23	0	12	63	66	84	8
TRACT	24	12	50	111	57	140	20
TRACT	25	0	0	4	4	25	26
TRACT	26	0	13	65	139	96	8
TRACT	27	8	12	15	72	134	15
TRACT	50	82	121	115	51	31	4
TRACT	51	8	31	19	0	4	0
TRACT	52	8	239	174	182	109	0
TRACT	53	73	263	145	37	12	8
TRACT	54	42	54	73	7	16	0
TRACT	56	299	173	110	64	16	0
TRACT	57	274	8	4	0	0	0
TRACT	58	27	39	28	16	4	0
TRACT	59	71	26	37	21	4	8
TRACT	60	10	23	30	9	0	0
TRACT	61	26	34	58	32	38	0

70 MATRIX

TRACT	1	76	109	88	20	16	1
TRACT	2	30	115	69	9	3	1
TRACT	3	6	60	39	20	66	35
TRACT	4	305	406	121	6	2	0
TRACT	5	22	151	170	21	1	0
TRACT	6	37	186	314	151	147	22
TRACT	7	25	66	129	87	42	19
TRACT	8	12	22	20	11	13	1
TRACT	9	224	383	103	4	2	0
TRACT	10	326	457	113	19	2	2
TRACT	11	280	367	99	12	6	2
TRACT	12	113	481	606	298	108	81
TRACT	13	26	199	284	66	35	0
TRACT	14	19	71	166	215	195	54
TRACT	15	485	272	203	42	6	0
TRACT	16	138	396	132	17	0	0
TRACT	17	113	265	108	10	5	2
TRACT	18	4	56	132	22	12	0
TRACT	19	7	98	260	243	292	4
TRACT	20	28	141	226	274	169	12
TRACT	21	9	41	296	339	334	136
TRACT	22	3	12	68	99	184	34
TRACT	23	9	9	65	91	236	203
TRACT	24	21	66	126	123	472	410
TRACT	25	1	2	2	0	28	100
TRACT	26	4	6	80	142	293	423
TRACT	27	3	12	28	102	374	431
TRACT	50	58	137	176	95	126	46
TRACT	51	44	14	25	13	13	6
TRACT	52	2	28	6	3	178	18
TRACT	53	64	198	241	151	308	115
TRACT	54	27	21	20	32	33	0
TRACT	56	336	191	128	33	23	2
TRACT	57	142	33	6	1	0	0
TRACT	58	32	27	24	7	6	1
TRACT	59	53	22	2	0	1	0
TRACT	60	30	12	8	0	1	0
TRACT	61	26	40	63	38	12	7

Table IX-6

Matrix of Rental Categories By Census Tract
1980 (Projected)

80 MATRIX

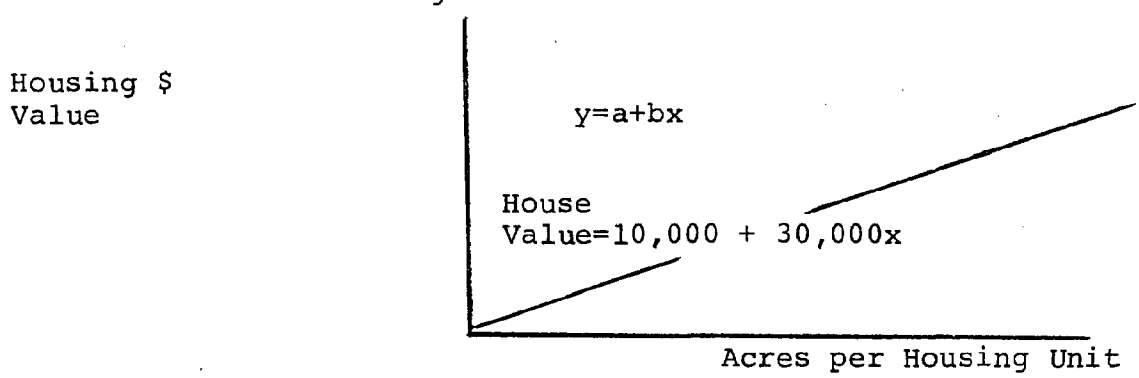
TRACT	1	57	30	82	20	18	0
TRACT	2	20	14	80	10	3	0
TRACT	3	3	0	34	19	112	35
TRACT	4	161	184	121	6	2	0
TRACT	5	53	971	0	0	0	0
TRACT	6	38	67	402	148	318	26
TRACT	7	31	0	0	228	118	36
TRACT	8	11	6	0	15	19	1
TRACT	9	145	118	108	4	2	0
TRACT	10	180	273	95	19	2	2
TRACT	11	125	177	103	12	6	2
TRACT	12	39	0	562	471	148	113
TRACT	13	0	0	2793	55	239	0
TRACT	14	20	61	0	637	146	118
TRACT	15	0	865	932	0	0	0
TRACT	16	5	331	148	17	0	0
TRACT	17	106	445	143	10	5	2
TRACT	18	4	72	208	23	13	0
TRACT	19	7	106	303	261	484	4
TRACT	20	13	115	0	695	479	14
TRACT	21	9	43	334	381	469	175
TRACT	22	3	12	72	113	308	39
TRACT	23	9	9	65	97	330	307
TRACT	24	21	67	128	133	661	603
TRACT	25	1	2	2	0	29	200
TRACT	26	4	6	82	143	385	703
TRACT	27	3	12	29	106	503	689
TRACT	50	52	146	222	113	177	54
TRACT	51	74	10	28	16	15	7
TRACT	52	2	16	4	2	204	19
TRACT	53	63	174	284	183	477	138
TRACT	54	20	9	2	46	43	0
TRACT	56	580	258	173	13	26	2
TRACT	57	0	41	6	1	0	0
TRACT	58	41	8	18	3	7	1
TRACT	59	42	21	1	0	0	0
TRACT	60	59	6	0	0	1	0
TRACT	61	26	160	220	152	0	31

in that tract. The result is that overassignment occurs. In order to determine the level of overassignment an equation relating rent paid and land consumption was calculated. The land consumption based on the median rent for each category was multiplied by the number of units in the category to determine the amount of acreage consumed by new units. These could then be summed for each tract and compared with the land vacant in that tract in the initial period. Of the 38 tracts considered, eight had been overassigned (tracts 5, 13, 14, 15, 20, 22, 23, 26). If the loses, tear-down or conversion in these tracts were less than the acreage needed for new units and space was not available, dwelling unit acreage was reassigned.

Acreage was reassigned based on the factor similarity measures and spatial continguity. After the most similar and near tracts are filled the next nearest (physical distance) and most similar (factor distance) tract is allocated any remaining units by acreage.

A similar process occurs in the allocation of single family units. First a matrix of tracts by housing value (six categories) is constructed for 1960 and 1970 (Table IX-7). Again we develop markov transition probabilities for each tract category and project a 1980 distribution (Table IX-8). The equation relating housing value to land consumption is then identified for the median housing value

Figure IX-7



in each category, and equivalent land consumption value are determined. By multiplying the land consumption value for a particular category by the number of units in that category and summing across the tract, total acreage assigned to that tract is determined. This acreage is compared to available (vacant) acreage in that tract plus tear-down ratio. If overassignment has occurred then the overassigned acres are distributed to near-by (linear distance) and similar (factor distance) tracts until all overassignments are allocated.

This allocation process determines the amount of acreage in

Table IX-7

Matrix of Housing Categories (Single Family) by Census Tract 1960 & 1970

60 MATRIX

TRACT	1	19	10	8	2	1	5
TRACT	2	9	15	1	1	0	4
TRACT	3	4	3	2	2	2	8
TRACT	4	48	121	39	10	3	2
TRACT	5	31	281	89	7	1	0
TRACT	6	75	828	745	134	38	47
TRACT	7	31	426	156	24	7	9
TRACT	8	3	35	14	3	0	10
TRACT	9	620	305	16	1	1	0
TRACT	10	276	271	39	6	2	0
TRACT	11	144	146	46	11	5	6
TRACT	12	50	244	90	31	19	31
TRACT	13	56	679	93	12	1	0
TRACT	14	2	172	547	269	123	189
TRACT	15	6	552	156	5	0	0
TRACT	16	1050	1098	77	7	0	1
TRACT	17	501	362	8	2	1	0
TRACT	18	321	1202	109	1	0	0
TRACT	19	87	1303	496	10	2	1
TRACT	20	60	783	913	143	13	4
TRACT	21	3	141	705	382	143	200
TRACT	22	18	358	675	211	95	22
TRACT	23	12	379	606	62	1	2
TRACT	24	105	457	941	465	85	5
TRACT	25	1	2	121	279	311	529
TRACT	26	16	434	550	44	12	41
TRACT	27	8	373	833	274	140	180
TRACT	50	324	480	259	174	58	64
TRACT	51	42	77	26	0	4	9
TRACT	53	283	271	85	12	12	9
TRACT	54	112	89	37	17	0	0
TRACT	56	723	527	186	88	48	32
TRACT	57	962	57	4	4	0	0
TRACT	58	101	84	16	4	8	0
TRACT	59	146	15	4	0	0	0
TRACT	60	76	28	18	0	0	0
TRACT	61	247	261	168	39	13	13
TRACT	-0	-0	-0	-0	-0	-0	-0

70 MATRIX

TRACT	1	4	14	1	1	1	0
TRACT	2	1	6	2	0	0	3
TRACT	3	1	2	1	1	1	1
TRACT	4	26	60	19	10	2	6
TRACT	5	37	253	104	17	3	1
TRACT	6	68	724	700	171	41	37
TRACT	7	40	297	208	45	24	11
TRACT	8	10	31	13	0	5	1
TRACT	9	326	384	37	9	3	0
TRACT	10	192	249	63	16	0	0
TRACT	11	81	116	18	10	3	2
TRACT	12	39	178	90	25	7	14
TRACT	13	41	523	192	15	0	1
TRACT	14	8	117	504	336	122	220
TRACT	15	10	446	180	10	3	1
TRACT	16	627	1105	305	33	6	4
TRACT	17	301	651	172	46	13	3
TRACT	18	41	1073	413	111	8	6
TRACT	19	49	1162	791	56	10	4
TRACT	20	37	644	991	188	24	6
TRACT	21	1	126	606	390	199	267
TRACT	22	6	281	650	283	123	66
TRACT	23	8	271	659	268	194	151
TRACT	24	49	303	961	1010	950	821
TRACT	25	0	3	108	247	345	609
TRACT	26	2	392	612	175	212	479
TRACT	27	3	233	730	458	363	905
TRACT	50	227	494	313	484	298	112
TRACT	51	27	63	41	43	26	35
TRACT	53	154	286	319	413	135	72
TRACT	54	84	45	21	3	5	14
TRACT	56	642	684	301	141	50	73
TRACT	57	642	198	21	1	1	0
TRACT	58	86	73	81	94	47	35
TRACT	59	135	53	18	7	3	1
TRACT	60	58	37	34	19	4	13
TRACT	61	146	219	209	80	35	51
TRACT	-0	-0	-0	-0	-0	-0	-0

Table IX-8
Matrix of Housing Categories (Single Family)
By Census Tract 1980 (Projected)

80 MATRIX

TRACT	1	2	16	0	0	1	0
TRACT	2	0	3	2	0	0	3
TRACT	3	0	2	0	0	0	0
TRACT	4	20	23	15	10	2	6
TRACT	5	74	0	364	45	4	1
TRACT	6	64	126	450	221	42	34
TRACT	7	53	0	594	79	39	12
TRACT	8	24	6	10	0	10	0
TRACT	9	0	549	41	9	3	0
TRACT	10	0	175	83	18	0	0
TRACT	11	41	89	14	10	3	2
TRACT	12	35	73	90	24	6	12
TRACT	13	32	0	467	16	0	1
TRACT	14	18	0	0	4838	98	1584
TRACT	15	11	0	243	11	3	1
TRACT	16	0	1156	760	39	6	4
TRACT	17	108	1254	262	52	13	3
TRACT	18	0	0	7021	754	11	8
TRACT	19	38	215	2140	71	10	4
TRACT	20	4	0	3964	513	34	6
TRACT	21	0	0	0	598	942	1460
TRACT	22	4	0	108	962	238	163
TRACT	23	8	211	730	381	271	197
TRACT	24	48	280	970	1280	1354	1150
TRACT	25	0	3	88	132	515	1315
TRACT	26	2	371	661	205	267	750
TRACT	27	3	196	645	553	455	1647
TRACT	50	188	506	343	748	424	121
TRACT	51	22	52	49	67	33	47
TRACT	53	126	292	425	647	158	78
TRACT	54	56	21	17	2	5	16
TRACT	56	461	1058	422	167	50	83
TRACT	57	0	368	23	0	1	0
TRACT	58	80	69	107	136	56	41
TRACT	59	106	92	23	8	3	1
TRACT	60	34	45	47	27	4	17
TRACT	61	0	0	8778	3360	805	1989
TRACT	*0	0	0	0	0	0	0

Table IX-9

URBAN ECOLOGY VARIABLES BY TRACT

TRACT NO. 1	
MED. FAMILY INCOME	6567,000
PCT HH W MARR. HEADS	24,805
PCT FAMS W INC≥$7000	37,229
PCT DWELLS OWNER OCC	12,727
PCT FAMS W INC<$2000	10,823
MED. SCHOOL YEARS	9,500
PCT MALES UNEMPLOYED	7,345
PC MOVED INSIDE SMSA	29,122
PC MOVED INTO SMSA	25,993
PCT POP ≤19 YRS OLD	23,105
POP PER HOUSEHOLD	1,079
PCT DWLS W ≥1.01 PRM	7,792
PCT POP ≥65 YRS OLD	19,495
PCT FEMS IN LAB FORS	27,372
PCT LABS IN LAB FORS	5,861
NO MINO MEMS IN TRCT	831,000
PCT PVT HHWORK IN LF	2,198
PCT PROAMGR IN LF	34,066
PCT CRFTAOPS IN LF	33,700

TRACT NO. 2	
MED. FAMILY INCOME	3895,000
PCT HH W MARR. HEADS	30,592
PCT FAMS W INC≥$7000	23,478
PCT DWELLS OWNER OCC	6,250
PCT FAMS W INC<$2000	26,957
MED. SCHOOL YEARS	8,600
PCT MALES UNEMPLOYED	22,388
PC MOVED INSIDE SMSA	25,455
PC MOVED INTO SMSA	10,707
PCT POP ≤19 YRS OLD	24,444
POP PER HOUSEHOLD	1,628
PCT DWLS W ≥1.01 PRM	8,224
PCT POP ≥65 YRS OLD	16,768
PCT FEMS IN LAB FORS	33,750
PCT LABS IN LAB FORS	15,278
NO MINO MEMS IN TRCT	495,000
PCT PVT HHWORK IN LF	2,315
PCT PROAMGR IN LF	12,037
PCT CRFTAOPS IN LF	24,537

TRACT NO. 3	
MED. FAMILY INCOME	5409,000
PCT HH W MARR. HEADS	22,430
PCT FAMS W INC≥$7000	28,421
PCT DWELLS OWNER OCC	3,738
PCT FAMS W INC<$2000	13,684
MED. SCHOOL YEARS	12,000
PCT MALES UNEMPLOYED	8,108
PC MOVED INSIDE SMSA	24,194
PC MOVED INTO SMSA	8,525
PCT POP ≤19 YRS OLD	18,894
POP PER HOUSEHOLD	1,352
PCT DWLS W ≥1.01 PRM	5,919
PCT POP ≥65 YRS OLD	19,585
PCT FEMS IN LAB FORS	71,724
PCT LABS IN LAB FORS	0,000
NO MINO MEMS IN TRCT	434,000
PCT PVT HHWORK IN LF	0,000
PCT PROAMGR IN LF	15,578
PCT CRFTAOPS IN LF	25,628

TRACT NO. 4	
MED. FAMILY INCOME	3510,000
PCT HH W MARR. HEADS	25,193
PCT FAMS W INC≥$7000	15,429
PCT DWELLS OWNER OCC	11,747
PCT FAMS W INC<$2000	22,143
MED. SCHOOL YEARS	9,100
PCT MALES UNEMPLOYED	2,270
PC MOVED INSIDE SMSA	20,201
PC MOVED INTO SMSA	,818
PCT POP ≤19 YRS OLD	43,738
POP PER HOUSEHOLD	2,456
PCT DWLS W ≥1.01 PRM	12,210
PCT POP ≥65 YRS OLD	9,283
PCT FEMS IN LAB FORS	50,000
PCT LABS IN LAB FORS	11,810
NO MINO MEMS IN TRCT	3178,000
PCT PVT HHWORK IN LF	22,571
PCT PROAMGR IN LF	3,619
PCT CRFTAOPS IN LF	21,524

TRACT NO. 5	
MED. FAMILY INCOME	4897,000
PCT HH W MARR. HEADS	51,506
PCT FAMS W INC≥$7000	31,832
PCT DWELLS OWNER OCC	45,080
PCT FAMS W INC<$2000	11,261
MED. SCHOOL YEARS	9,900
PCT MALES UNEMPLOYED	1,314
PC MOVED INSIDE SMSA	30,716
PC MOVED INTO SMSA	3,927
PCT POP ≤19 YRS OLD	41,908
POP PER HOUSEHOLD	2,736
PCT DWLS W ≥1.01 PRM	13,755
PCT POP ≥65 YRS OLD	7,266
PCT FEMS IN LAB FORS	60,952
PCT LABS IN LAB FORS	5,405
NO MINO MEMS IN TRCT	2725,000
PCT PVT HHWORK IN LF	19,764
PCT PROAMGR IN LF	8,953
PCT CRFTAOPS IN LF	16,723

TRACT NO. 6	
MED. FAMILY INCOME	8033,000
PCT HH W MARR. HEADS	68,551
PCT FAMS W INC≥$7000	57,833
PCT DWELLS OWNER OCC	64,001
PCT FAMS W INC<$2000	7,596
MED. SCHOOL YEARS	11,300
PCT MALES UNEMPLOYED	3,840
PC MOVED INSIDE SMSA	28,535
PC MOVED INTO SMSA	10,270
PCT POP ≤19 YRS OLD	36,437
POP PER HOUSEHOLD	2,896
PCT DWLS W ≥1.01 PRM	10,572
PCT POP ≥65 YRS OLD	8,410
PCT FEMS IN LAB FORS	36,721
PCT LABS IN LAB FORS	5,590
NO MINO MEMS IN TRCT	8656,000
PCT PVT HHWORK IN LF	1,648
PCT PROAMGR IN LF	19,388
PCT CRFTAOPS IN LF	31,539

Table IX-9
(cont'd.)

TRACT NO. 7	
MED. FAMILY INCOME	7851.000
PCT HH W MARR. HEADS	72.285
PCT FAMS W INC≥$7000	60.281
PCT DWELLS OWNER OCC	62.723
PCT FAMS W INC<$2000	5.416
MED. SCHOOL YEARS	11.000
PCT MALES UNEMPLOYED	3.909
PC MOVED INSIDE SMSA	13.784
PC MOVED INTO SMSA	23.816
PCT POP ≤19 YRS OLD	39.649
POP PER HOUSEHOLD	3.045
PCT DWLS W ≥1.01 PRM	12.318
PCT POP ≥65 YRS OLD	6.067
PCT FEMS IN LAB FORS	33.308
PCT LABS IN LAB FORS	5.340
NO MINO MEMS IN TRCT	3758.000
PCT PVT HHWORK IN LF	.585
PCT PROAMGR IN LF	12.802
PCT CRFTAOPS IN LF	36.942

TRACT NO. 8	
MED. FAMILY INCOME	6048.000
PCT HH W MARR. HEADS	67.477
PCT FAMS W INC≥$7000	29.461
PCT DWELLS OWNER OCC	58.663
PCT FAMS W INC<$2000	6.639
MED. SCHOOL YEARS	10.300
PCT MALES UNEMPLOYED	0.000
PC MOVED INSIDE SMSA	32.892
PC MOVED INTO SMSA	9.277
PCT POP ≤19 YRS OLD	30.000
POP PER HOUSEHOLD	2.523
PCT DWLS W ≥1.01 PRM	9.119
PCT POP ≥65 YRS OLD	8.434
PCT FEMS IN LAB FORS	38.000
PCT LABS IN LAB FORS	3.509
NO MINO MEMS IN TRCT	830.000
PCT PVT HHWORK IN LF	4.094
PCT PROAMGR IN LF	20.468
PCT CRFTAOPS IN LF	33.918

TRACT NO. 9	
MED. FAMILY INCOME	4062.000
PCT HH W MARR. HEADS	60.311
PCT FAMS W INC≥$7000	20.320
PCT DWELLS OWNER OCC	42.911
PCT FAMS W INC<$2000	22.825
MED. SCHOOL YEARS	5.200
PCT MALES UNEMPLOYED	5.957
PC MOVED INSIDE SMSA	23.507
PC MOVED INTO SMSA	2.213
PCT POP ≤19 YRS OLD	47.620
POP PER HOUSEHOLD	3.544
PCT DWLS W ≥1.01 PRM	33.942
PCT POP ≥65 YRS OLD	6.123
PCT FEMS IN LAB FORS	25.223
PCT LABS IN LAB FORS	13.255
NO MINO MEMS IN TRCT	6598.000
PCT PVT HHWORK IN LF	3.050
PCT PROAMGR IN LF	11.672
PCT CRFTAOPS IN LF	26.041

TRACT NO. 10	
MED. FAMILY INCOME	4008.000
PCT HH W MARR. HEADS	48.340
PCT FAMS W INC≥$7000	23.077
PCT DWELLS OWNER OCC	32.324
PCT FAMS W INC<$2000	22.479
MED. SCHOOL YEARS	6.400
PCT MALES UNEMPLOYED	7.207
PC MOVED INSIDE SMSA	27.068
PC MOVED INTO SMSA	3.954
PCT POP ≤19 YRS OLD	43.843
POP PER HOUSEHOLD	3.225
PCT DWLS W ≥1.01 PRM	25.510
PCT POP ≥65 YRS OLD	12.207
PCT FEMS IN LAB FORS	34.080
PCT LABS IN LAB FORS	14.141
NO MINO MEMS IN TRCT	5538.000
PCT PVT HHWORK IN LF	6.912
PCT PROAMGR IN LF	7.483
PCT CRFTAOPS IN LF	29.613

TRACT NO. 11	
MED. FAMILY INCOME	4017.000
PCT HH W MARR. HEADS	44.962
PCT FAMS W INC≥$7000	19.543
PCT DWELLS OWNER OCC	20.914
PCT FAMS W INC<$2000	19.924
MED. SCHOOL YEARS	6.200
PCT MALES UNEMPLOYED	2.059
PC MOVED INSIDE SMSA	30.830
PC MOVED INTO SMSA	2.954
PCT POP ≤19 YRS OLD	44.726
POP PER HOUSEHOLD	3.010
PCT DWLS W ≥1.01 PRM	23.201
PCT POP ≥65 YRS OLD	10.239
PCT FEMS IN LAB FORS	29.402
PCT LABS IN LAB FORS	12.621
NO MINO MEMS IN TRCT	3555.000
PCT PVT HHWORK IN LF	6.699
PCT PROAMGR IN LF	8.252
PCT CRFTAOPS IN LF	24.854

TRACT NO. 12	
MED. FAMILY INCOME	5365.000
PCT HH W MARR. HEADS	43.856
PCT FAMS W INC≥$7000	33.047
PCT DWELLS OWNER OCC	18.624
PCT FAMS W INC<$2000	14.807
MED. SCHOOL YEARS	10.600
PCT MALES UNEMPLOYED	1.181
PC MOVED INSIDE SMSA	26.642
PC MOVED INTO SMSA	17.208
PCT POP ≤19 YRS OLD	32.687
POP PER HOUSEHOLD	2.212
PCT DWLS W ≥1.01 PRM	10.896
PCT POP ≥65 YRS OLD	13.976
PCT FEMS IN LAB FORS	42.851
PCT LABS IN LAB FORS	8.439
NO MINO MEMS IN TRCT	5724.000
PCT PVT HHWORK IN LF	2.405
PCT PROAMGR IN LF	19.983
PCT CRFTAOPS IN LF	22.868

Table IX-9
(cont'd.)

TRACT NO. 13

MED. FAMILY INCOME	6093,000
PCT HH W MARR. HEADS	63,677
PCT FAMS W INC≥$7000	43,755
PCT DWELLS OWNER OCC	52,338
PCT FAMS W INC<$2000	8,969
MED. SCHOOL YEARS	9,100
PCT MALES UNEMPLOYED	2,614
PC MOVED INSIDE SMSA	25,551
PC MOVED INTO SMSA	8,809
PCT POP ≤19 YRS OLD	43,072
POP PER HOUSEHOLD	3,287
PCT DWLS W ≥1.01 ⊳RM	20,243
PCT POP ≥65 YRS OLD	7,659
PCT FEMS IN LAB FORS	37,514
PCT LABS IN LAB FORS	4,857
NO MINO MEMS IN TRCT	5131,000
PCT PVT HHWORK IN LF	2,629
PCT PRO⊳MGR IN LF	12,629
PCT CRFT⊳OPS IN LF	33,429

TRACT NO. 14

MED. FAMILY INCOME	9758,000
PCT HH W MARR. HEADS	56,603
PCT FAMS W INC≥$7000	63,667
PCT DWELLS OWNER OCC	61,034
PCT FAMS W INC<$2000	5,533
MED. SCHOOL YEARS	12,500
PCT MALES UNEMPLOYED	,760
PC MOVED INSIDE SMSA	14,999
PC MOVED INTO SMSA	16,285
PCT POP ≤19 YRS OLD	24,645
POP PER HOUSEHOLD	2,297
PCT DWLS W ≥1.01 ⊳RM	3,171
PCT POP ≥65 YRS OLD	17,496
PCT FEMS IN LAB FORS	44,610
PCT LABS IN LAB FORS	1,707
NO MINO MEMS IN TRCT	5287,000
PCT PVT HHWORK IN LF	,583
PCT PRO⊳MGR IN LF	38,010
PCT CRFT⊳OPS IN LF	13,072

TRACT NO. 15

MED. FAMILY INCOME	4473,000
PCT HH W MARR. HEADS	56,755
PCT FAMS W INC≥$7000	30,578
PCT DWELLS OWNER OCC	36,932
PCT FAMS W INC<$2000	19,312
MED. SCHOOL YEARS	8,700
PCT MALES UNEMPLOYED	3,984
PC MOVED INSIDE SMSA	33,344
PC MOVED INTO SMSA	7,209
PCT POP ≤19 YRS OLD	50,127
POP PER HOUSEHOLD	3,487
PCT DWLS W ≥1.01 ⊳RM	22,378
PCT POP ≥65 YRS OLD	9,178
PCT FEMS IN LAB FORS	32,575
PCT LABS IN LAB FORS	10,536
NO MINO MEMS IN TRCT	6298,000
PCT PVT HHWORK IN LF	5,299
PCT PRO⊳MGR IN LF	11,035
PCT CRFT⊳OPS IN LF	27,307

TRACT NO. 16

MED. FAMILY INCOME	5547,000
PCT HH W MARR. HEADS	70,313
PCT FAMS W INC≥$7000	34,786
PCT DWELLS OWNER OCC	69,271
PCT FAMS W INC<$2000	17,202
MED. SCHOOL YEARS	7,100
PCT MALES UNEMPLOYED	2,626
PC MOVED INSIDE SMSA	20,578
PC MOVED INTO SMSA	3,202
PCT POP ≤19 YRS OLD	49,577
POP PER HOUSEHOLD	4,035
PCT DWLS W ≥1.01 ⊳RM	32,617
PCT POP ≥65 YRS OLD	5,493
PCT FEMS IN LAB FORS	36,327
PCT LABS IN LAB FORS	11,972
NO MINO MEMS IN TRCT	12397,000
PCT PVT HHWORK IN LF	8,309
PCT PRO⊳MGR IN LF	8,176
PCT CRFT⊳OPS IN LF	28,219

TRACT NO. 17

MED. FAMILY INCOME	4949,000
PCT HH W MARR. HEADS	69,558
PCT FAMS W INC≥$7000	27,654
PCT DWELLS OWNER OCC	63,740
PCT FAMS W INC<$2000	14,630
MED. SCHOOL YEARS	7,200
PCT MALES UNEMPLOYED	1,935
PC MOVED INSIDE SMSA	19,838
PC MOVED INTO SMSA	6,375
PCT POP ≤19 YRS OLD	55,329
POP PER HOUSEHOLD	4,221
PCT DWLS W ≥1.01 ⊳RM	34,026
PCT POP ≥65 YRS OLD	3,569
PCT FEMS IN LAB FORS	32,744
PCT LABS IN LAB FORS	16,055
NO MINO MEMS IN TRCT	8126,000
PCT PVT HHWORK IN LF	9,934
PCT PRO⊳MGR IN LF	8,239
PCT CRFT⊳OPS IN LF	27,825

TRACT NO. 18

MED. FAMILY INCOME	7160,000
PCT HH W MARR. HEADS	80,665
PCT FAMS W INC≥$7000	52,226
PCT DWELLS OWNER OCC	82,380
PCT FAMS W INC<$2000	7,135
MED. SCHOOL YEARS	9,100
PCT MALES UNEMPLOYED	2,213
PC MOVED INSIDE SMSA	15,528
PC MOVED INTO SMSA	4,911
PCT POP ≤19 YRS OLD	53,655
POP PER HOUSEHOLD	4,572
PCT DWLS W ≥1.01 ⊳RM	35,499
PCT POP ≥65 YRS OLD	2,262
PCT FEMS IN LAB FORS	35,317
PCT LABS IN LAB FORS	9,547
NO MINO MEMS IN TRCT	8797,000
PCT PVT HHWORK IN LF	3,332
PCT PRO⊳MGR IN LF	10,183
PCT CRFT⊳OPS IN LF	33,096

Table IX-9
(cont'd.)

TRACT NO. 19

MED. FAMILY INCOME	8065.000
PCT HH W MARR. HEADS	75.055
PCT FAMS W INC≥$7000	61.611
PCT DWELLS OWNER OCC	66.428
PCT FAMS W INC<$2000	3.359
MED. SCHOOL YEARS	11.300
PCT MALES UNEMPLOYED	2.695
PC MOVED INSIDE SMSA	30.237
PC MOVED INTO SMSA	11.303
PCT POP ≤19 YRS OLD	45.566
POP PER HOUSEHOLD	3.620
PCT DWLS W ≥1.01 ⌂RM	16.755
PCT POP ≥65 YRS OLD	5.462
PCT FEMS IN LAB FORS	40.235
PCT LABS IN LAB FORS	4.373
NO MINO MEMS IN TRCT	11625.000
PCT PVT HHWORK IN LF	1.546
PCT PROAMGR IN LF	16.816
PCT CRFTAOPS IN LF	30.901

TRACT NO. 20

MED. FAMILY INCOME	8385.000
PCT HH W MARR. HEADS	67.583
PCT FAMS W INC≥$7000	63.981
PCT DWELLS OWNER OCC	65.538
PCT FAMS W INC<$2000	6.185
MED. SCHOOL YEARS	12.300
PCT MALES UNEMPLOYED	3.083
PC MOVED INSIDE SMSA	29.944
PC MOVED INTO SMSA	12.036
PCT POP ≤19 YRS OLD	36.955
POP PER HOUSEHOLD	2.888
PCT DWLS W ≥1.01 ⌂RM	7.643
PCT POP ≥65 YRS OLD	8.577
PCT FEMS IN LAB FORS	43.966
PCT LABS IN LAB FORS	3.799
NO MINO MEMS IN TRCT	8616.000
PCT PVT HHWORK IN LF	1.125
PCT PROAMGR IN LF	25.971
PCT CRFTAOPS IN LF	22.482

TRACT NO. 21

MED. FAMILY INCOME	10873.000
PCT HH W MARR. HEADS	60.897
PCT FAMS W INC≥$7000	75.415
PCT DWELLS OWNER OCC	54.929
PCT FAMS W INC<$2000	2.231
MED. SCHOOL YEARS	12.900
PCT MALES UNEMPLOYED	.842
PC MOVED INSIDE SMSA	22.954
PC MOVED INTO SMSA	20.094
PCT POP ≤19 YRS OLD	28.909
POP PER HOUSEHOLD	2.397
PCT DWLS W ≥1.01 ⌂RM	1.912
PCT POP ≥65 YRS OLD	11.140
PCT FEMS IN LAB FORS	51.440
PCT LABS IN LAB FORS	1.263
NO MINO MEMS IN TRCT	7271.000
PCT PVT HHWORK IN LF	.861
PCT PROAMGR IN LF	40.086
PCT CRFTAOPS IN LF	13.544

TRACT NO. 22

MED. FAMILY INCOME	10204.000
PCT HH W MARR. HEADS	79.140
PCT FAMS W INC≥$7000	74.286
PCT DWELLS OWNER OCC	74.738
PCT FAMS W INC<$2000	2.619
MED. SCHOOL YEARS	12.400
PCT MALES UNEMPLOYED	3.403
PC MOVED INSIDE SMSA	23.861
PC MOVED INTO SMSA	14.862
PCT POP ≤19 YRS OLD	39.245
POP PER HOUSEHOLD	3.209
PCT DWLS W ≥1.01 ⌂RM	6.604
PCT POP ≥65 YRS OLD	4.524
PCT FEMS IN LAB FORS	51.832
PCT LABS IN LAB FORS	2.229
NO MINO MEMS IN TRCT	6123.000
PCT PVT HHWORK IN LF	1.806
PCT PROAMGR IN LF	27.325
PCT CRFTAOPS IN LF	24.020

TRACT NO. 23

MED. FAMILY INCOME	10664.000
PCT HH W MARR. HEADS	75.473
PCT FAMS W INC≥$7000	82.723
PCT DWELLS OWNER OCC	63.351
PCT FAMS W INC<$2000	1.659
MED. SCHOOL YEARS	12.500
PCT MALES UNEMPLOYED	2.413
PC MOVED INSIDE SMSA	30.491
PC MOVED INTO SMSA	20.592
PCT POP ≤19 YRS OLD	45.467
POP PER HOUSEHOLD	3.292
PCT DWLS W ≥1.01 ⌂RM	9.948
PCT POP ≥65 YRS OLD	2.264
PCT FEMS IN LAB FORS	49.136
PCT LABS IN LAB FORS	2.844
NO MINO MEMS IN TRCT	8173.000
PCT PVT HHWORK IN LF	.464
PCT PROAMGR IN LF	31.777
PCT CRFTAOPS IN LF	25.255

TRACT NO. 24

MED. FAMILY INCOME	11617.000
PCT HH W MARR. HEADS	84.350
PCT FAMS W INC≥$7000	88.990
PCT DWELLS OWNER OCC	75.633
PCT FAMS W INC<$2000	1.416
MED. SCHOOL YEARS	12.600
PCT MALES UNEMPLOYED	1.609
PC MOVED INSIDE SMSA	25.784
PC MOVED INTO SMSA	19.972
PCT POP ≤19 YRS OLD	44.199
POP PER HOUSEHOLD	3.521
PCT DWLS W ≥1.01 ⌂RM	8.012
PCT POP ≥65 YRS OLD	2.440
PCT FEMS IN LAB FORS	47.395
PCT LABS IN LAB FORS	2.962
NO MINO MEMS IN TRCT	8482.000
PCT PVT HHWORK IN LF	.440
PCT PROAMGR IN LF	31.642
PCT CRFTAOPS IN LF	22.493

Table IX-9
(cont'd.)

TRACT NO. 25

MED. FAMILY INCOME	17400.000
PCT HH W MARR. HEADS	83.837
PCT FAMS W INC≥$7000	92.038
PCT DWELLS OWNER OCC	86.728
PCT FAMS W INC<$2000	2.264
MED. SCHOOL YEARS	14.300
PCT MALES UNEMPLOYED	1.215
PC MOVED INSIDE SMSA	18.880
PC MOVED INTO SMSA	16.376
PCT POP ≤19 YRS OLD	35.789
POP PER HOUSEHOLD	3.202
PCT DWLS W ≥1.01 #RM	2.431
PCT POP ≥65 YRS OLD	8.557
PCT FEMS IN LAB FORS	37.739
PCT LABS IN LAB FORS	3.429
NO MINO MEMS IN TRCT	4873.000
PCT PVT HHWORK IN LF	.768
PCT PROAMGR IN LF	55.681
PCT CRFTAOPS IN LF	6.448

TRACT NO. 26

MED. FAMILY INCOME	11653.000
PCT HH W MARR. HEADS	71.481
PCT FAMS W INC≥$7000	80.569
PCT DWELLS OWNER OCC	59.418
PCT FAMS W INC<$2000	2.121
MED. SCHOOL YEARS	12.700
PCT MALES UNEMPLOYED	2.388
PC MOVED INSIDE SMSA	23.367
PC MOVED INTO SMSA	20.662
PCT POP ≤19 YRS OLD	39.059
POP PER HOUSEHOLD	3.005
PCT DWLS W ≥1.01 #RM	5.486
PCT POP ≥65 YRS OLD	4.893
PCT FEMS IN LAB FORS	40.854
PCT LABS IN LAB FORS	2.446
NO MINO MEMS IN TRCT	9094.000
PCT PVT HHWORK IN LF	.598
PCT PROAMGR IN LF	40.690
PCT CRFTAOPS IN LF	19.217

TRACT NO. 27

MED. FAMILY INCOME	12213.000
PCT HH W MARR. HEADS	79.815
PCT FAMS W INC≥$7000	84.251
PCT DWELLS OWNER OCC	69.954
PCT FAMS W INC<$2000	1.930
MED. SCHOOL YEARS	12.800
PCT MALES UNEMPLOYED	1.742
PC MOVED INSIDE SMSA	23.279
PC MOVED INTO SMSA	23.250
PCT POP ≤19 YRS OLD	43.463
POP PER HOUSEHOLD	3.359
PCT DWLS W ≥1.01 #RM	6.170
PCT POP ≥65 YRS OLD	2.994
PCT FEMS IN LAB FORS	42.599
PCT LABS IN LAB FORS	1.591
NO MINO MEMS IN TRCT	13828.000
PCT PVT HHWORK IN LF	.530
PCT PROAMGR IN LF	40.739
PCT CRFTAOPS IN LF	17.102

TRACT NO. 29

MED. FAMILY INCOME	6878.000
PCT HH W MARR. HEADS	95.133
PCT FAMS W INC≥$7000	47.719
PCT DWELLS OWNER OCC	.348
PCT FAMS W INC<$2000	4.444
MED. SCHOOL YEARS	12.500
PCT MALES UNEMPLOYED	.154
PC MOVED INSIDE SMSA	4.622
PC MOVED INTO SMSA	69.160
PCT POP ≤19 YRS OLD	40.238
POP PER HOUSEHOLD	6.042
PCT DWLS W ≥1.01 #RM	10.429
PCT POP ≥65 YRS OLD	.058
PCT FEMS IN LAB FORS	37.306
PCT LABS IN LAB FORS	5.702
NO MINO MEMS IN TRCT	5214.000
PCT PVT HHWORK IN LF	4.386
PCT PROAMGR IN LF	14.912
PCT CRFTAOPS IN LF	0.000

TRACT NO. 30

MED. FAMILY INCOME	6130.000
PCT HH W MARR. HEADS	59.042
PCT FAMS W INC≥$7000	45.000
PCT DWELLS OWNER OCC	39.820
PCT FAMS W INC<$2000	5.818
MED. SCHOOL YEARS	11.500
PCT MALES UNEMPLOYED	3.732
PC MOVED INSIDE SMSA	13.740
PC MOVED INTO SMSA	37.478
PCT POP ≤19 YRS OLD	38.709
POP PER HOUSEHOLD	2.384
PCT DWLS W ≥1.01 #RM	11.796
PCT POP ≥65 YRS OLD	5.149
PCT FEMS IN LAB FORS	31.599
PCT LABS IN LAB FORS	3.150
NO MINO MEMS IN TRCT	3981.000
PCT PVT HHWORK IN LF	0.000
PCT PROAMGR IN LF	8.563
PCT CRFTAOPS IN LF	36.713

TRACT NO. 31

MED. FAMILY INCOME	10406.000
PCT HH W MARR. HEADS	72.319
PCT FAMS W INC≥$7000	72.360
PCT DWELLS OWNER OCC	59.040
PCT FAMS W INC<$2000	5.215
MED. SCHOOL YEARS	12.400
PCT MALES UNEMPLOYED	3.386
PC MOVED INSIDE SMSA	14.877
PC MOVED INTO SMSA	31.577
PCT POP ≤19 YRS OLD	44.334
POP PER HOUSEHOLD	3.083
PCT DWLS W ≥1.01 #RM	11.645
PCT POP ≥65 YRS OLD	3.645
PCT FEMS IN LAB FORS	30.011
PCT LABS IN LAB FORS	4.539
NO MINO MEMS IN TRCT	3018.000
PCT PVT HHWORK IN LF	0.000
PCT PROAMGR IN LF	31.479
PCT CRFTAOPS IN LF	27.233

Table IX-9
(cont'd.)

TRACT NO. 32

MED. FAMILY INCOME	9663.000
PCT HH W MARR. HEADS	82.843
PCT FAMS W INC≥$7000	73.120
PCT DWELLS OWNER OCC	64.461
PCT FAMS W INC<$2000	1.253
MED. SCHOOL YEARS	12.600
PCT MALES UNEMPLOYED	3.318
PC MOVED INSIDE SMSA	18.894
PC MOVED INTO SMSA	40.481
PCT POP ≤19 YRS OLD	43.750
POP PER HOUSEHOLD	3.412
PCT DWLS W ≥1.01 PRM	7.966
PCT POP ≥65 YRS OLD	2.335
PCT FEMS IN LAB FORS	32.349
PCT LABS IN LAB FORS	2.949
NO MINO MEMS IN TRCT	2784.000
PCT PVT HHWORK IN LF	2.949
PCT PROAMGR IN LF	28.205
PCT CRFTAOPS IN LF	25.513

TRACT NO. 33

MED. FAMILY INCOME	10289.000
PCT HH W MARR. HEADS	72.948
PCT FAMS W INC≥$7000	71.926
PCT DWELLS OWNER OCC	62.994
PCT FAMS W INC<$2000	5.131
MED. SCHOOL YEARS	12.200
PCT MALES UNEMPLOYED	2.322
PC MOVED INSIDE SMSA	39.347
PC MOVED INTO SMSA	20.478
PCT POP ≤19 YRS OLD	45.455
POP PER HOUSEHOLD	3.210
PCT DWLS W ≥1.01 PRM	13.298
PCT POP ≥65 YRS OLD	4.498
PCT FEMS IN LAB FORS	35.011
PCT LABS IN LAB FORS	3.778
NO MINO MEMS IN TRCT	4224.000
PCT PVT HHWORK IN LF	.713
PCT PROAMGR IN LF	24.234
PCT CRFTAOPS IN LF	30.364

TRACT NO. 34

MED. FAMILY INCOME	13554.000
PCT HH W MARR. HEADS	84.633
PCT FAMS W INC≥$7000	92.135
PCT DWELLS OWNER OCC	72.620
PCT FAMS W INC<$2000	2.911
MED. SCHOOL YEARS	13.000
PCT MALES UNEMPLOYED	1.308
PC MOVED INSIDE SMSA	28.254
PC MOVED INTO SMSA	38.072
PCT POP ≤19 YRS OLD	45.370
POP PER HOUSEHOLD	3.555
PCT DWLS W ≥1.01 PRM	4.080
PCT POP ≥65 YRS OLD	2.346
PCT FEMS IN LAB FORS	40.530
PCT LABS IN LAB FORS	1.019
NO MINO MEMS IN TRCT	7843.000
PCT PVT HHWORK IN LF	.328
PCT PROAMGR IN LF	47.688
PCT CRFTAOPS IN LF	14.161

TRACT NO. 35

MED. FAMILY INCOME	7156.000
PCT HH W MARR. HEADS	70.462
PCT FAMS W INC≥$7000	49.333
PCT DWELLS OWNER OCC	62.462
PCT FAMS W INC<$2000	6.476
MED. SCHOOL YEARS	9.300
PCT MALES UNEMPLOYED	1.778
PC MOVED INSIDE SMSA	26.923
PC MOVED INTO SMSA	15.064
PCT POP ≤19 YRS OLD	44.551
POP PER HOUSEHOLD	3.360
PCT DWLS W ≥1.01 PRM	21.385
PCT POP ≥65 YRS OLD	4.212
PCT FEMS IN LAB FORS	33.981
PCT LABS IN LAB FORS	9.608
NO MINO MEMS IN TRCT	2184.000
PCT PVT HHWORK IN LF	4.736
PCT PROAMGR IN LF	10.149
PCT CRFTAOPS IN LF	34.912

TRACT NO. 36

MED. FAMILY INCOME	10398.000
PCT HH W MARR. HEADS	81.302
PCT FAMS W INC≥$7000	75.617
PCT DWELLS OWNER OCC	76.848
PCT FAMS W INC<$2000	3.980
MED. SCHOOL YEARS	12.200
PCT MALES UNEMPLOYED	1.013
PC MOVED INSIDE SMSA	24.528
PC MOVED INTO SMSA	18.216
PCT POP ≤19 YRS OLD	43.090
POP PER HOUSEHOLD	3.396
PCT DWLS W ≥1.01 PRM	10.328
PCT POP ≥65 YRS OLD	5.116
PCT FEMS IN LAB FORS	38.348
PCT LABS IN LAB FORS	3.249
NO MINO MEMS IN TRCT	6939.000
PCT PVT HHWORK IN LF	.560
PCT PROAMGR IN LF	24.496
PCT CRFTAOPS IN LF	33.159

TRACT NO. 37

MED. FAMILY INCOME	10578.000
PCT HH W MARR. HEADS	78.251
PCT FAMS W INC≥$7000	88.611
PCT DWELLS OWNER OCC	75.650
PCT FAMS W INC<$2000	1.667
MED. SCHOOL YEARS	12.200
PCT MALES UNEMPLOYED	1.304
PC MOVED INSIDE SMSA	26.685
PC MOVED INTO SMSA	18.329
PCT POP ≤19 YRS OLD	43.539
POP PER HOUSEHOLD	3.366
PCT DWLS W ≥1.01 PRM	8.270
PCT POP ≥65 YRS OLD	5.540
PCT FEMS IN LAB FORS	39.540
PCT LABS IN LAB FORS	6.979
NO MINO MEMS IN TRCT	1424.000
PCT PVT HHWORK IN LF	.997
PCT PROAMGR IN LF	31.894
PCT CRFTAOPS IN LF	27.409

Table IX-9
(cont'd.)

TRACT NO. 50

MED. FAMILY INCOME	7379.000
PCT HH W MARR. HEADS	64.789
PCT FAMS W INC≥$7000	58.036
PCT DWELLS OWNER OCC	66.549
PCT FAMS W INC<$2000	14.286
MED. SCHOOL YEARS	8.600
PCT MALES UNEMPLOYED	1.911
PC MOVED INSIDE SMSA	.604
PC MOVED INTO SMSA	3.122
PCT POP ≤19 YRS OLD	47.633
POP PER HOUSEHOLD	3.496
PCT DWLS W ≥1.01 #RM	26.056
PCT POP ≥65 YRS OLD	4.330
PCT FEMS IN LAB FORS	37.176
PCT LABS IN LAB FORS	3.540
NO MINO MEMS IN TRCT	993.000
PCT PVT HHWORK IN LF	.885
PCT PROAMGR IN LF	44.248
PCT CRFTAOPS IN LF	12.979

TRACT NO. 51

MED. FAMILY INCOME	7029.000
PCT HH W MARR. HEADS	22.547
PCT FAMS W INC≥$7000	48.049
PCT DWELLS OWNER OCC	21.491
PCT FAMS W INC<$2000	0.000
MED. SCHOOL YEARS	11.900
PCT MALES UNEMPLOYED	4.780
PC MOVED INSIDE SMSA	29.216
PC MOVED INTO SMSA	13.905
PCT POP ≤19 YRS OLD	28.772
POP PER HOUSEHOLD	.840
PCT DWLS W ≥1.01 #RM	4.161
PCT POP ≥65 YRS OLD	14.349
PCT FEMS IN LAB FORS	54.599
PCT LABS IN LAB FORS	4.518
NO MINO MEMS IN TRCT	1352.000
PCT PVT HHWORK IN LF	2.259
PCT PROAMGR IN LF	32.831
PCT CRFTAOPS IN LF	12.199

TRACT NO. 54

MED. FAMILY INCOME	6136.000
PCT HH W MARR. HEADS	61.820
PCT FAMS W INC≥$7000	39.933
PCT DWELLS OWNER OCC	35.461
PCT FAMS W INC<$2000	6.489
MED. SCHOOL YEARS	7.900
PCT MALES UNEMPLOYED	3.058
PC MOVED INSIDE SMSA	21.109
PC MOVED INTO SMSA	9.159
PCT POP ≤19 YRS OLD	48.444
POP PER HOUSEHOLD	3.304
PCT DWLS W ≥1.01 #RM	21.277
PCT POP ≥65 YRS OLD	5.295
PCT FEMS IN LAB FORS	27.735
PCT LABS IN LAB FORS	7.264
NO MINO MEMS IN TRCT	2795.000
PCT PVT HHWORK IN LF	4.479
PCT PROAMGR IN LF	12.833
PCT CRFTAOPS IN LF	19.976

TRACT NO. 56

MED. FAMILY INCOME	6616.000
PCT HH W MARR. HEADS	66.559
PCT FAMS W INC≥$7000	44.413
PCT DWELLS OWNER OCC	64.300
PCT FAMS W INC<$2000	11.865
MED. SCHOOL YEARS	7.900
PCT MALES UNEMPLOYED	4.167
PC MOVED INSIDE SMSA	16.876
PC MOVED INTO SMSA	3.245
PCT POP ≤19 YRS OLD	46.688
POP PER HOUSEHOLD	3.621
PCT DWLS W ≥1.01 #RM	26.307
PCT POP ≥65 YRS OLD	7.694
PCT FEMS IN LAB FORS	32.138
PCT LABS IN LAB FORS	8.790
NO MINO MEMS IN TRCT	11217.000
PCT PVT HHWORK IN LF	2.848
PCT PROAMGR IN LF	19.449
PCT CRFTAOPS IN LF	30.995

TRACT NO. 57

MED. FAMILY INCOME	3930.000
PCT HH W MARR. HEADS	59.204
PCT FAMS W INC≥$7000	13.810
PCT DWELLS OWNER OCC	64.748
PCT FAMS W INC<$2000	20.381
MED. SCHOOL YEARS	3.100
PCT MALES UNEMPLOYED	4.011
PC MOVED INSIDE SMSA	14.820
PC MOVED INTO SMSA	2.647
PCT POP ≤19 YRS OLD	52.684
POP PER HOUSEHOLD	3.760
PCT DWLS W ≥1.01 #RM	38.948
PCT POP ≥65 YRS OLD	5.671
PCT FEMS IN LAB FORS	18.585
PCT LABS IN LAB FORS	18.777
NO MINO MEMS IN TRCT	5290.000
PCT PVT HHWORK IN LF	3.319
PCT PROAMGR IN LF	7.074
PCT CRFTAOPS IN LF	41.834

TRACT NO. 58

MED. FAMILY INCOME	7906.000
PCT HH W MARR. HEADS	62.489
PCT FAMS W INC≥$7000	58.693
PCT DWELLS OWNER OCC	52.339
PCT FAMS W INC<$2000	9.935
MED. SCHOOL YEARS	11.100
PCT MALES UNEMPLOYED	0.000
PC MOVED INSIDE SMSA	28.634
PC MOVED INTO SMSA	11.118
PCT POP ≤19 YRS OLD	44.503
POP PER HOUSEHOLD	2.842
PCT DWLS W ≥1.01 #RM	13.063
PCT POP ≥65 YRS OLD	6.832
PCT FEMS IN LAB FORS	27.043
PCT LABS IN LAB FORS	2.854
NO MINO MEMS IN TRCT	3220.000
PCT PVT HHWORK IN LF	1.903
PCT PROAMGR IN LF	15.319
PCT CRFTAOPS IN LF	30.542

Table IX-9
(cont'd.)

TRACT NO. 59

MED. FAMILY INCOME	5712.000
PCT HH W MARR. HEADS	65.826
PCT FAMS W INC≥$7000	41.328
PCT DWELLS OWNER OCC	45.518
PCT FAMS W INC<$2000	9.963
MED. SCHOOL YEARS	8.700
PCT MALES UNEMPLOYED	.780
PC MOVED INSIDE SMSA	19.844
PC MOVED INTO SMSA	10.127
PCT POP ≤19 YRS OLD	46.576
POP PER HOUSEHOLD	3.416
PCT DWLS W ≥1.01 PRM	21.148
PCT POP ≥65 YRS OLD	6.150
PCT FEMS IN LAB FORS	21.341
PCT LABS IN LAB FORS	9.746
NO MINO MEMS IN TRCT	2439.000
PCT PVT HHWORK IN LF	3.531
PCT PROAMGR IN LF	10.593
PCT CRFTAOPS IN LF	23.729

TRACT NO. 60

MED. FAMILY INCOME	5875.000
PCT HH W MARR. HEADS	64.493
PCT FAMS W INC≥$7000	50.984
PCT DWELLS OWNER OCC	42.029
PCT FAMS W INC<$2000	5.709
MED. SCHOOL YEARS	8.400
PCT MALES UNEMPLOYED	2.408
PC MOVED INSIDE SMSA	24.789
PC MOVED INTO SMSA	3.649
PCT POP ≤19 YRS OLD	46.061
POP PER HOUSEHOLD	3.257
PCT DWLS W ≥1.01 PRM	19.710
PCT POP ≥65 YRS OLD	8.678
PCT FEMS IN LAB FORS	23.925
PCT LABS IN LAB FORS	4.615
NO MINO MEMS IN TRCT	2247.000
PCT PVT HHWORK IN LF	4.056
PCT PROAMGR IN LF	10.070
PCT CRFTAOPS IN LF	24.755

TRACT NO. 61

MED. FAMILY INCOME	8392.000
PCT HH W MARR. HEADS	72.609
PCT FAMS W INC≥$7000	63.479
PCT DWELLS OWNER OCC	71.508
PCT FAMS W INC<$2000	5.645
MED. SCHOOL YEARS	11.000
PCT MALES UNEMPLOYED	.459
PC MOVED INSIDE SMSA	13.329
PC MOVED INTO SMSA	16.532
PCT POP ≤19 YRS OLD	42.325
POP PER HOUSEHOLD	3.218
PCT DWLS W ≥1.01 PRM	13.556
PCT POP ≥65 YRS OLD	7.992
PCT FEMS IN LAB FORS	29.392
PCT LABS IN LAB FORS	5.119
NO MINO MEMS IN TRCT	3466.000
PCT PVT HHWORK IN LF	2.834
PCT PROAMGR IN LF	20.384
PCT CRFTAOPS IN LF	31.718

TRACT NO. 101

MED. FAMILY INCOME	8100.000
PCT HH W MARR. HEADS	61.756
PCT FAMS W INC≥$7000	61.053
PCT DWELLS OWNER OCC	60.482
PCT FAMS W INC<$2000	5.684
MED. SCHOOL YEARS	12.100
PCT MALES UNEMPLOYED	1.220
PC MOVED INSIDE SMSA	34.083
PC MOVED INTO SMSA	18.397
PCT POP ≤19 YRS OLD	39.965
POP PER HOUSEHOLD	2.456
PCT DWLS W ≥1.01 PRM	8.499
PCT POP ≥65 YRS OLD	8.131
PCT FEMS IN LAB FORS	33.002
PCT LABS IN LAB FORS	6.000
NO MINO MEMS IN TRCT	1734.000
PCT PVT HHWORK IN LF	1.000
PCT PROAMGR IN LF	26.833
PCT CRFTAOPS IN LF	37.333

TRACT NO. 102

MED. FAMILY INCOME	6830.000
PCT HH W MARR. HEADS	62.757
PCT FAMS W INC≥$7000	50.000
PCT DWELLS OWNER OCC	58.699
PCT FAMS W INC<$2000	7.176
MED. SCHOOL YEARS	10.600
PCT MALES UNEMPLOYED	4.629
PC MOVED INSIDE SMSA	32.514
PC MOVED INTO SMSA	6.762
PCT POP ≤19 YRS OLD	41.006
POP PER HOUSEHOLD	2.828
PCT DWLS W ≥1.01 PRM	14.230
PCT POP ≥65 YRS OLD	9.691
PCT FEMS IN LAB FORS	30.486
PCT LABS IN LAB FORS	8.105
NO MINO MEMS IN TRCT	5087.000
PCT PVT HHWORK IN LF	.536
PCT PROAMGR IN LF	26.103
PCT CRFTAOPS IN LF	31.943

TRACT NO. 103

MED. FAMILY INCOME	9595.000
PCT HH W MARR. HEADS	71.525
PCT FAMS W INC≥$7000	70.494
PCT DWELLS OWNER OCC	67.060
PCT FAMS W INC<$2000	6.330
MED. SCHOOL YEARS	11.200
PCT MALES UNEMPLOYED	3.513
PC MOVED INSIDE SMSA	17.247
PC MOVED INTO SMSA	12.703
PCT POP ≤19 YRS OLD	42.865
POP PER HOUSEHOLD	3.170
PCT DWLS W ≥1.01 PRM	14.406
PCT POP ≥65 YRS OLD	6.458
PCT FEMS IN LAB FORS	35.153
PCT LABS IN LAB FORS	4.886
NO MINO MEMS IN TRCT	3763.000
PCT PVT HHWORK IN LF	.788
PCT PROAMGR IN LF	22.380
PCT CRFTAOPS IN LF	42.632

Table IX-9
(cont'd.)

RACT NO. 104

MED. FAMILY INCOME	5750,000
PCT HH W MARR. HEADS	68,647
PCT FAMS W INC≥$7000	35,965
PCT DWELLS OWNER OCC	41,914
PCT FAMS W INC<$2000	7,895
MED. SCHOOL YEARS	9,600
PCT MALES UNEMPLOYED	1,969
PC MOVED INSIDE SMSA	15,754
PC MOVED INTO SMSA	6,916
PCT POP ≤19 YRS OLD	49,376
POP PER HOUSEHOLD	3,436
PCT DWLS W ≥1.01 ⊳RM	20,132
PCT POP ≥65 YRS OLD	3,650
PCT FEMS IN LAB FORS	31,690
PCT LABS IN LAB FORS	3,557
NO MINO MEMS IN TRCT	1041,000
PCT PVT HHWORK IN LF	3,953
PCT PRO⊳MGR IN LF	13,043
PCT CRFT⊳OPS IN LF	31,225

RACT NO. 105

MED. FAMILY INCOME	5528,000
PCT HH W MARR. HEADS	70,714
PCT FAMS W INC≥$7000	41,324
PCT DWELLS OWNER OCC	65,357
PCT FAMS W INC<$2000	9,132
MED. SCHOOL YEARS	5,400
PCT MALES UNEMPLOYED	5,156
PC MOVED INSIDE SMSA	29,163
PC MOVED INTO SMSA	7,881
PCT POP ≤19 YRS OLD	53,072
POP PER HOUSEHOLD	4,011
PCT DWLS W ≥1.01 ⊳RM	34,821
PCT POP ≥65 YRS OLD	4,274
PCT FEMS IN LAB FORS	27,041
PCT LABS IN LAB FORS	25,746
NO MINO MEMS IN TRCT	2246,000
PCT PVT HHWORK IN LF	5,808
PCT PRO⊳MGR IN LF	12,559

106

MILY INCOME	11254,000
W MARR. HEADS	79,282
S W INC≥$7000	82,308
LLS OWNER OCC	75,368
S W INC<$2000	3,048
HOOL YEARS	12,600
ES UNEMPLOYED	4,218
ED INSIDE SMSA	22,857
ED INTO SMSA	24,747
P ≤19 YRS OLD	45,946
R HOUSEHOLD	3,362
LS W ≥1.01 ⊳RM	7,090
P ≥65 YRS OLD	3,657
MS IN LAB FORS	42,749
BS IN LAB FORS	3,727
O MEMS IN TRCT	7302,000
T HHWORK IN LF	1,789
O⊳MGR IN LF	34,961
FT⊳OPS IN LF	21,655

107

AMILY INCOME	6294,000
W MARR. HEADS	66,414
MS W INC≥$7000	42,029
ELLS OWNER OCC	27,273
MS W INC<$2000	15,942
SCHOOL YEARS	8,500
ALES UNEMPLOYED	0,000
VED INSIDE SMSA	9,577
VED INTO SMSA	3,113
OP ≤19 YRS OLD	48,843
ER HOUSEHOLD	3,164
WLS W ≥1.01 ⊳RM	19,697
OP ≥65 YRS OLD	5,666
EMS IN LAB FORS	31,231
ABS IN LAB FORS	2,849
NO MEMS IN TRCT	1253,000
VT HHWORK IN LF	5,413
RO⊳MGR IN LF	19,373
RFT⊳OPS IN LF	11,966

TRACT NO. 108

MED. FAMILY INCOME	5798,000
PCT HH W MARR. HEADS	65,481
PCT FAMS W INC≥$7000	43,907
PCT DWELLS OWNER OCC	64,163
PCT FAMS W INC<$2000	13,483
MED. SCHOOL YEARS	8,900
PCT MALES UNEMPLOYED	1,530
PC MOVED INSIDE SMSA	18,377
PC MOVED INTO SMSA	5,151
PCT POP ≤19 YRS OLD	48,226
POP PER HOUSEHOLD	3,491
PCT DWLS W ≥1.01 ⊳RM	25,099
PCT POP ≥65 YRS OLD	8,019
PCT FEMS IN LAB FORS	32,559
PCT LABS IN LAB FORS	9,032
NO MINO MEMS IN TRCT	5300,000
PCT PVT HHWORK IN LF	5,393
PCT PRO⊳MGR IN LF	18,843
PCT CRFT⊳OPS IN LF	23,392

RACT NO. 109

MED. FAMILY INCOME	6902,000
PCT HH W MARR. HEADS	60,623
PCT FAMS W INC≥$7000	52,567
PCT DWELLS OWNER OCC	49,965
PCT FAMS W INC<$2000	12,423
MED. SCHOOL YEARS	8,400
PCT MALES UNEMPLOYED	1,687
PC MOVED INSIDE SMSA	22,597
PC MOVED INTO SMSA	9,434
PCT POP ≤19 YRS OLD	48,001
POP PER HOUSEHOLD	3,081
PCT DWLS W ≥1.01 ⊳RM	20,830
PCT POP ≥65 YRS OLD	6,671
PCT FEMS IN LAB FORS	31,384
PCT LABS IN LAB FORS	6,551
NO MINO MEMS IN TRCT	4452,000
PCT PVT HHWORK IN LF	2,736
PCT PRO⊳MGR IN LF	12,455
PCT CRFT⊳OPS IN LF	26,494

Table IX-9
(cont'd.)

TRACT NO. 110	
MED. FAMILY INCOME	6709.000
PCT HH W MARR. HEADS	59.115
PCT FAMS W INC≥$7000	48.614
PCT DWELLS OWNER OCC	57.090
PCT FAMS W INC<$2000	12.360
MED. SCHOOL YEARS	9.100
PCT MALES UNEMPLOYED	4.470
PC MOVED INSIDE SMSA	28.743
PC MOVED INTO SMSA	8.251
PCT POP ≤19 YRS OLD	42.243
POP PER HOUSEHOLD	2.965
PCT DWLS W ≥1.01 PRM	17.751
PCT POP ≥65 YRS OLD	9.168
PCT FEMS IN LAB FORS	41.244
PCT LABS IN LAB FORS	11.407
NO MINO MEMS IN TRCT	5563.000
PCT PVT HHWORK IN LF	2.663
PCT PROAMGR IN LF	20.101
PCT CRFTAOPS IN LF	21.106

TRACT NO. 111	
MED. FAMILY INCOME	6256.000
PCT HH W MARR. HEADS	64.006
PCT FAMS W INC≥$7000	42.566
PCT DWELLS OWNER OCC	70.266
PCT FAMS W INC<$2000	10.183
MED. SCHOOL YEARS	8.300
PCT MALES UNEMPLOYED	2.817
PC MOVED INSIDE SMSA	26.761
PC MOVED INTO SMSA	11.455
PCT POP ≤19 YRS OLD	44.460
POP PER HOUSEHOLD	3.333
PCT DWLS W ≥1.01 PRM	21.283
PCT POP ≥65 YRS OLD	8.967
PCT FEMS IN LAB FORS	36.714
PCT LABS IN LAB FORS	6.772
NO MINO MEMS IN TRCT	2130.000
PCT PVT HHWORK IN LF	6.340
PCT PROAMGR IN LF	11.239
PCT CRFTAOPS IN LF	34.156

TRACT NO. 112	
MED. FAMILY INCOME	4043.000
PCT HH W MARR. HEADS	43.387
PCT FAMS W INC≥$7000	26.667
PCT DWELLS OWNER OCC	41.960
PCT FAMS W INC<$2000	25.686
MED. SCHOOL YEARS	8.400
PCT MALES UNEMPLOYED	4.276
PC MOVED INSIDE SMSA	15.053
PC MOVED INTO SMSA	6.873
PCT POP ≤19 YRS OLD	40.997
POP PER HOUSEHOLD	1.966
PCT DWLS W ≥1.01 PRM	15.033
PCT POP ≥65 YRS OLD	9.293
PCT FEMS IN LAB FORS	28.246
PCT LABS IN LAB FORS	5.833
NO MINO MEMS IN TRCT	2066.000
PCT PVT HHWORK IN LF	3.333
PCT PROAMGR IN LF	15.417
PCT CRFTAOPS IN LF	22.500

TRACT NO. 113	
MED. FAMILY INCOME	4532.000
PCT HH W MARR. HEADS	59.762
PCT FAMS W INC≥$7000	28.465
PCT DWELLS OWNER OCC	58.041
PCT FAMS W INC<$2000	22.512
MED. SCHOOL YEARS	5.200
PCT MALES UNEMPLOYED	1.652
PC MOVED INSIDE SMSA	20.164
PC MOVED INTO SMSA	10.036
PCT POP ≤19 YRS OLD	52.607
POP PER HOUSEHOLD	3.541
PCT DWLS W ≥1.01 PRM	32.363
PCT POP ≥65 YRS OLD	7.419
PCT FEMS IN LAB FORS	23.616
PCT LABS IN LAB FORS	10.910
NO MINO MEMS IN TRCT	5351.000
PCT PVT HHWORK IN LF	3.540
PCT PROAMGR IN LF	12.861
PCT CRFTAOPS IN LF	18.064

Table IX-10
ACRES

Tract	In Use 1970	Vacant 1970	Apartments and Multi-Family, 1980	Single Family Homes, 1980	Vacant 1980
1	88.8	101.7	0.2	0.0	101.5
2	472.1	70.0	1.1	69.8	0.0
3	168.8	12.5	12.5	0.0	0.0
4	188.2	41.9	0.0	41.9	0.0
5	165.2	24.4	24.4	0.0	0.0
6	698.6	47.4	29.9	17.5	0.0
7	2,490.4	262.4	28.3	234.7	0.0
8	12,627.8	2,245.2	46.7	2,198.5	0.0
9	251.8	40.0	40.0	0.0	0.0
10	234.0	24.7	24.7	0.0	0.0
11	391.0	39.7	37.8	1.9	0.0
12	229.7	43.4	43.4	0.0	0.0
13	244.9	13.4	13.4	0.0	0.0
14	482.2	14.7	0.0	0.0	0.0
15	297.4	18.4	18.4	0.0	0.0
16	472.4	70.3	70.3	0.0	0.0
17	2,597.6	259.7	19.7	240.0	0.0
18	1,540.3	205.1	70.0	135.1	0.0
19	1,519.1	145.6	77.1	68.5	0.0
20	567.9	10.6	10.6	0.0	0.0
21	702.7	66.0	43.3	22.7	0.0
22	461.9	11.4	11.4	0.0	0.0
23	1,613.7	60.2	33.7	26.5	0.0
24	760.4	38.1	38.1	0.0	0.0
25	494.2	26.7	21.4	5.3	0.0
26	748.9	29.6	29.6	0.0	0.0
27	1,807.6	522.9	54.6	468.3	0.0
30					
31	4,061.0	6,959.0	31.6	6,927.4	0.0
32					
33	1,555.1	513.2	0.0	513.2	0.0
34	776.0	317.2	21.2	296.0	0.0
35					
36	23,000.0	2,401.8	13.7	2,387.1	0.0
37					
50					
54	10,000.0	90,000.0	2.7	12,252.6	77,745.7
56	1,963.1	645.0	30.4	346.5	268.1
57	327.2	109.0	0.7	100.0	8.3
61	1,177.9	392.0	42.6	349.4	0.0

each tract which is likely to become used for retail and commercial purposes (see Chapter VIII), for apartments and multi-family dwellings and for single family dwellings. Incorporated in the housing determination is the area needed for the supply of support facilities such as utilities and feeder roads but not the supply of trunk lines. Housing determination is carried out for each of six rental categories and six housing value categories. This summer the program for areal determination of housing will be computerized so that it may be re-run under differing conditions (i.e. zoning, density, etc.) Implicit in the present approach is that zoning is simply a temporally constant lag function on the market mechanism.

CHAPTER X

ENVIRONMENTAL-LAND USE INTEGRATION PROCEDURE

It is anticipated that land use management policies will be implemented by legislation based upon the concept of "critical environmental units."[1] The definitions of "environmental units" and "resource capability units" are being developed for both land and marine areas by the Texas Land Office and the Bureau of Economic Geology of the University of Texas. These units comprise broadly defined geological structures for which admissible types and intensities of use will be established based upon both surface and subsurface geological considerations. It will also be necessary to include the consideration of biologic assemblages that are coincident or interactively dependent on these surficial conditions. The development of these units and the establishment of associated use criteria will provide a direct means of incorporating environmental zoning considerations into the land use planning process. The development of these criteria and their application in the planning process is the primary focus of this study.

A secondary focal point deals with the fundamental character of ports. Port cities have been of major importance in the economic development of the coastal zone. Ports as transportation nodes and as industrial and residential centers affect bays, estuaries and littoral environments. The influence of port cities on marine environments may manifest itself through depletion of fresh water inflows, canalization, waste inflows and recreational demands. Construction on littoral areas often conflicts with conservation policies derived from both political and environmental consideration.

Multi-Level Models

In order to evaluate the impact of land use management policies on the type, location and intensity of industrial and residential activity in the coastal zone, a series of coupled linear programming models are developed. The overall model has a multi-level structure with the variables at each level being coupled to those at the next by appropriate constraints.

This model draws upon the work of Charnes, Cooper, Niehaus et. al. [2] on manpower planning developed in the research program of

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[1] All pending federal legislation on land use, the most publicized of which is The Jackson Bill, refers to the need for protection and maintenance of "critical environments."

[2] Charnes, A., W. W. Cooper and R. J. Niehaus. "Studies in Manpower Planning," Office of Civilian Manpower Management. Department of the Navy, (Washington, D. C.: July, 1972).

the U. S. Department of the Navy. Originally these models were developed to aid in the management, projection and assignment of civilian and naval manpower. In this approach the central set of models are multi-level, multi-period, goal programs which incorporate input-output analysis in order to determine manpower requirements and utilize Markov processes to model manpower transitions, (e.g. geographical movements, skill changes and retirements of manpower). These transitions are linked to decision variables such as new hiring policies and involuntary retirements.

An Environmental-Land Use Model

The present study utilizes a similar hierarchical multi-level model with three divisions. At the top level the aggregate allocation of population and industrial activity between areas within the coastal zone is determined. At the second level, housing and industry are located spatially within each area and at the third level, water, waste treatment and demographic models are included. The independent models have been developed by others or are being developed by team members. Therefore, the following outline is directed primarily toward elucidating the nature of the coupling mechanisms between these models of population, industrial output and land use within a multi-level multi-period context.

The Coastwide - Inter COG Level

At the highest level we consider the allocation of industry (including agriculture) between coastal Council of Government (COG) areas. A COG is an agency set up under state legislation to coordinate plans and initiate policies for groups of counties. COG's were set up to conform as far as possible to local trading areas by basing the division of counties upon core Standard Metropolitan Statistical Areas. COG's thus provide a means of incorporating policy making bodies into the models in a way which is coherent with economic considerations.

For each COG an input-output table and final demand projections is determined for each of a series of planning periods. We have for the rth COG in the tth planning period

$$x_i^r(t) - \sum_j L_{ij} x_j^r(t) + \sum_s e_i^{rs}(t) - \sum_s e_i^{sr}(t) + g_i^{r+}(t) - g_i^{r-}(t) = d_i^r(t)$$

where

$x_i^r(t)$ is the output of the ith economic sector in period t

L_{ij} is the input from sector j required to produce unit output in sector i.

$e_i^{rs}(t)$, $e_i^{sr}(t)$ are dollar amounts of exports and imports respectively for COG r and area s which include coastwide, international

and domestic trade.

$g_i^{r+}(t)$, $g_i^{r-}(t)$ are deviations from the final demand goals $d_i^r(t)$. Restrictions on trade reflecting port capacities and balance of payments considerations may be represented schematically as:

$$E_{1S}^{rL}(t) \leq \sum_{s \in S} e_i^{rs}(t) \leq E_{1S}^{rU}(t)$$

$$E_{2S}^{rL}(t) \leq \sum_{s \in S} e_i^{sr}(t) \leq E_{2S}^{rU}(t)$$

where $E_{1S}^{rU}(t)$, $E_{1S}^{rL}(t)$ are upper and lower bounds on exports for a subset S of sectors in COG r and E_{2S}^{rU}, E_{2S}^{rL} are upper and lower bounds on inputs. The formalization of this at the COG level and above draws heavily upon the work of Isard et. al. in interregional linear programming.[3]

Intra COG Level

At this level we consider the allocation of industrial and residential activity spatially within each COG. We have the coupling conditions:

$$x_i^r(t) - \sum_{k_r \in \bar{K}^r} x_{ik_r}^r(t) = 0.$$

where $\bar{K}^r$ is the set of land tracts in the rth COG. For subsets K^r of land tracts we have population projections $p_{hK^r}^r(t)$ for the hth type of household. These subsets may correspond to cities, counties, or other geographic or political units. We partition this population into labor force and non-labor force participating (e.g. retired people, second-home owners) components as follows:

$$p_{hK^r}^r(t) - \rho_h \lambda_{hK^r}^r(t) - \mu_{hK}^r(t) = 0.$$

where $\lambda_{hK^r}^r(t)$ is the amount of labor of type h in tract K^r in period t

ρ_h is the ratio of households to labor for type h.

$\mu_{hK^r}^r(t)$ is the number of non-labor force participating households in tracts K^r of type h in period t.

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[3] Isard, W., et.al. Methods of Regional Analysis, (Cambridge, Mass.: 1960).

We have relationships be labor and output given by labor coefficients ρ_{ih}:

$$\sum_i \sum_{k_r \varepsilon K^r} \rho_{ih} x_{ik_r}(t) - \lambda^r_{hK}(t) + \bar{g}^{r+}_{hK^r}(t) - \bar{g}^{r-}_{hK^r} = 0$$

where $\bar{g}^{r+}_{hK^r}(t)$, $\bar{g}^{r-}_{hK^r}(t)$ are deviations from labor requirements of the type h in land tract K^r in period t.

Land constraints take the following form:

$$\sum_h b_{hk_r} p^r_{hk_r}(t) + \sum_i a_{ik_r} x^r_{ik_r}(t) \leq A^r_{k_r}$$

where b_h is the land required for a household of type h located in tract k_r and a_{ik_r} is the land requirement for a unit of output of sector i in tract k_r. These coefficients reflect the zoning considerations specified for the environmental unit k_r.

Also $$\sum_{k_r \bar{K}_r} p^r_{hk_r}(t) = p^r_{hK^r}(t)$$

That is, each subset of tracts K^r for which population projections are made must house that population.

Water constraints are derived in a similar way to those on land and take the form:

$$\sum_h \sum_{k_r \varepsilon \bar{K}_r} e_{hk_r} p^r_{hk_r}(t) + \sum_i \sum_{k_r \varepsilon \bar{K}_r} f_{ik_r} x^r_{ik_r}(t) \quad q_{\bar{K}_r}(t)$$

where e_{hk_r}, f_{ik_r}, are unit water requirements for households and industry respectively and $q_{\bar{K}_r}(t)$ is the available water to subset $\bar{K}_r$ of land tracts in period t. This will generally include water from both surface and artesian sources.

Population, Water, and Waste Models

The population within the coastal zone is coupled both spatially and temporally by means of Markov transition matrices to reflect the migration and aging respectively of the population.[4]

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[4]Rogers, Andrei. Matrix Analysis Interregional Population Growth & Dist. (Berkley, California. Univ. of California Press, 1968).

These couplings are made at a third level within the model structure to the variables $\mu^r_{hk_r}$ (t) and $\lambda^r_{hk_r}$(t) for non-labor force participants and labor force participants respectively.

Water and waste models are developed based upon the Ph. D. work (under Charnes, Logan, and Gotaas) of Heaney[5], Lynn[6] and Deininger[7] which are variations and specializations of the original (unpublished) 1958 multi-page models of Charnes, Logan and Pipes.[8]

We may couple the variables $q^r_{\bar{K}_r}$ (t) to a water distribution system in the following way:

Let $q^r_{\bar{K}_r}(t) = W^r_{\bar{K}_r}(t) + Z^r_{\bar{K}_r}(t)$ where $Z^r_{\bar{K}_r}(t)$ is surface water usage and $W^r_{\bar{K}_r}$ (t) is ground water availability in the set of tracts $\bar{K}_r$ in period t.

For the surface water distribution system the tracts $\bar{K}_r$ may themselves correspond to environmental or resource capability units as illustrated in Figure X-1. The quantities $Z^r_{\bar{K}_r}(t)$ would then correspond to the net quantities of water withdrawn as shown in Figure X-2. Seasonal demand and supply variation, storage and precipitation, and return flows are considered in detail in Heaney's work and need not be elaborated upon here.

Once the type, intensity and location of industrial and residential activities are known, we turn to consideration of waste treatment models. Deininger's work provides an approach to the determination of the scale and location of treatment facilities in order to meet prescribed quality at minimum cost. Lynn considers the design and staged expansion of waste treatment plants over time in order to provide treatment for prescribed quantities of waste

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[5]Heaney, J. P. Mathematical Programming Model for Long Range River Basin Planning with Emphasis on the Colorado River Basin Unpublished Ph.D. Dissertation (Northwestern University: 1968).

[6]Lynn, W. R. Process Design and Financial Planning of Sewage Treatment Water. Unpublished Ph.D. Dissertation (Northwestern University: 1963).

[7]Deininger, R. A. Water Quality Management: The Planning of Economically Optimal Pollution Control Systems. Unpublished Ph.D. Dissertation (Northwestern University: 1965).

[8]Charnes, A., Logan and Pipes "Multi-Page Water and Waste Water Models" Systems Research Group, Northwestern University, Unpublished, Mimeograph, 1958.

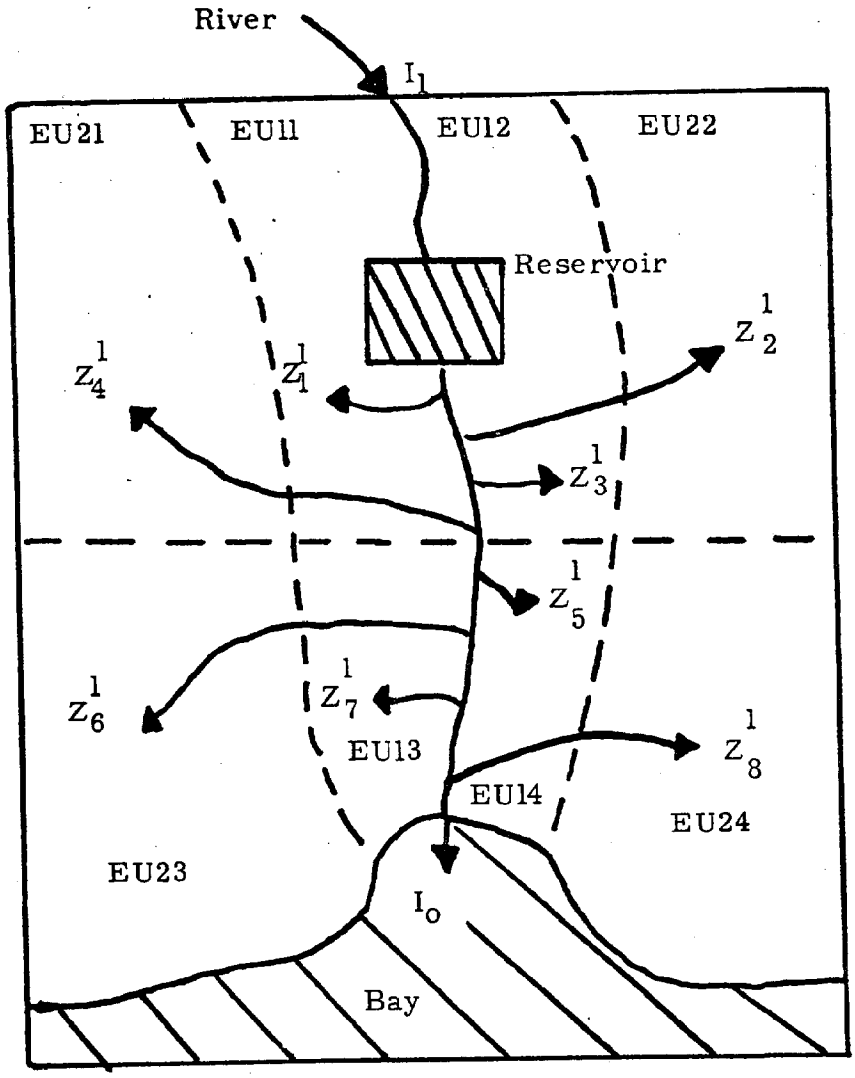

Figure X-1

EU 12 represents an environmental or resource capability of type 1 in location 2 within the COG.

inputs at minimum cost including considerations of financing and service charges to the people served.

Objective

We seek to minimize a weighted sum of deviations from regional growth goals $g_i^{r+}(t)$, $g_i^{r-}(t)$ subject to the constraints (1) - (8), (see Figure 2). We also have goals of minimizing unemployment $\bar{g}_{hk_r}^{r+}$ and job vacancies $\bar{g}_{hk_r}^{r}$ on a local basis. The objective may then be represented schematically as:

$$\text{Minimize } \Sigma c_i^{r+}(t) g_i^{r+}(t) + \Sigma c_i^{r-}(t) g_i^{r-}(t) + \Sigma \bar{c}_{hK}^{r+} r(t) + \Sigma \bar{c}_{hK}^{r-} r(t) \bar{g}_{hK}^{r-} r(t)$$

where the weights $c_k^{+r}(t)$, $\bar{c}_i^{r}(t)$, $\bar{c}_{hk_r}^{r+}(t)$, $\bar{c}_{hk_r}^{r-}(t)$ may reflect both political and economic factors.

Summary and Extensions

The model reported here is directed toward environmental policy appraisal. The multi-level multi-period structure which has been outlined was developed in response to the need to model the micro-level implications of macro-level zoning policy decisions. With this structure, varying degrees of detail and of emphasis may be incorporated in the overall model. In particular we wish to focus upon subareas within the coastal zone based on their ecological significance. For example, marsh and salt flat environmental units which are adjacent to bays and estuaries are major sources of nutrients for marine species.

Subsets of environmental units may become increasingly important due, for example, to the growth of port cities. In view of this, more detailed research is being directed toward the development of a dynamic model for port oriented urban growth.

Minimize					$\sum c_i^{r+}(t)\, g_i^{r+}(t) + c_i^{r-}(t)\, g_i^{r-}(t) + \bar{c}_{hK^r}^{r+}\, \bar{g}_{hK^r}^{r+}(t) + \bar{c}_{hK^r}^{r-}\, \bar{g}_{hK^r}^{r-}(t)$		
LEVEL 1							
Input Output	$x_i^r(t) - \sum_j L_{ij} x_j^r(t) + \sum_s e_i^{rs}(t) - \sum_s e_i^{sr}(t)$				$+ g_i^{r+}(t) - g_i^{r-}(t)$	$= d_i^r(t)$	(1)
Trade Restrictions	$E_{1S}^{rL}(t) \le \sum_{s \in S} e_i^{rs}(t) \le E_{1S}^{rU}(t)$						(2)
	$E_{2S}^{rL}(t) \le \sum_{s \in S} e_i^{sr}(t) \le E_{2S}^{rU}(t)$						
LEVEL 2							
Spatial Distribution of Industry	$x_i^r(t) - \sum_{k_r \in \bar{K}^r} x_{ik_r}^r(t)$					$= 0$	(3)
Demographic Relationships			$p_{hK^r}^r(t) - \rho_h^r \lambda_{hK^r}^r(t) - \mu_{hK^r}^r(t)$			$= 0$	(4)
Employment	$\sum_i \sum_{k_r \in \bar{K}^r} \rho_{ih} x_{ik_r}(t)$		$-\lambda_{hK^r}^r(t)$		$\bar{g}_{hK^r}^{r+}(t) - \bar{g}_{hK^r}^{r-}$	$= 0$	(5)
Spatial Distribution of Households		$\sum_{k_r \in \bar{K}_r} p_{hk_r}^r(t)$	$- p_{hK^r}^r(t)$			$= 0$	(7)
Land Restrictions	$\sum_i a_{ik_r} x_{ik_r}^r(t)$	$\sum_h b_{hk_r} p_{hk_r}^r(t)$				$\le A_{k_r}^r$	(6)
Water Restrictions	$\sum_i \sum_{k_r \in \bar{K}_r} f_{ik_r} x_{ik_r}^r(t)$	$+ \sum_h \sum_{k_r \in \bar{K}_r} e_{hk_r} p_{hk_r}^r(t)$		$- q_{K_r}(t)$		≤ 0	(8)
LEVEL 3							
	WASTE TREATMENT MODELS		DEMOGRAPHIC MODELS	WATER SUPPLY MODELS			

FIGURE X-2

APPENDIX D

THE REGIONAL IMPACT OF AN ENVIRONMENTAL POLICY: POLLUTION ABATEMENT ON THE HUDSON, THE REFUSE ACT OF 1899.*

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ABSTRACT

THE REGIONAL IMPACT OF AN ENVIRONMENTAL POLICY: POLLUTION ABATEMENT ON THE HUDSON, THE REFUSE ACT OF 1899.

The decentralized nature of the Hudson River measures and the all-or-nothing character of the permit issuing procedure complicate the development of a symbolic model for the impact assessment of public policy. Even predictive statements of expected behavior of Hudson River firms is obscured by the inability of these firms to negotiate with neighboring municipalities in an open and friendly fashion. By modifying Bohm's model of the "Theory of External Effects" and applying it to this situation we have attempted to develop some decision guidelines for the firm as well as a quantitative evaluation of the basic public policy issues of equity and efficiency. Despite the limitations of this symbolic approach it is preferable to a numerical model since by the time comprehensive data is available, massive technological adjustments will have occurred commensurate with the enforcement of antipollution laws.

Key Words: ENVIRONMENT, PUBLIC POLICY, DECISION MAKING, IMPACT ANALYSIS.

The Hudson River begins in the Adirondack Mountains of upstate New York, and flows to New York Bay, supporting 10.5 million people employed by riverbank industries [2]. Of these industries, 305 firms are considered polluters by the U. S. Army Corps of Engineers. Many of the employees of these firms belong to the powerful Hudson River Fishermen's Association, which has frequently brought suit against the major Hudson polluters, and finally, little more than a year ago, achieved the revival of the Refuse Act of 1899, in order to stop the Penn Central Railroad from dumping oil into the Hudson at Harmon, N. Y.[2]. The Act has been widely applied since, and is administered by the Corps of Engineers.

In essence, the Refuse Act of 1899 [2,4,22] provides that no private firm may perform work in or discharge effluents into any navigable waterway in the United States without a permit from the Corps of Engineers. No permits are issued for the discharge of "harmful" effluents, harmfulness being determined by the Corps of Engineers "environmental impact" analysis[7]. Furthermore no "harmless" effluent can be discharged if it causes a harmful reaction with the permitted effluent of another firm up or downstream. Rejection of a firm's application for permit means that the firm must arrange for treatment of its effluent (with removal of all harmful waste), or effect some more basic change in the activity of the firm.

The Act provides for prosecution of noncomplying firms, public permit hearings, and advisory assistance to the firms from the Corps of Engineers[22]. The firm must also comply with any local and state discharge laws.

Municipalities along the Hudson are currently subject to state laws requiring the construction of sewage treatment facilities. Adjacent municipalities are urged to build joint facilities, of sufficient capacity to enable local private firms to tie in. The state has issued bonds for the purpose of subsidizing these efforts, and cities are now doing the same[2]. As of October 1971, according to the Associated Press ;

> ...15 of the 16 major municipal and industrial polluters...have tied into treatment plants completed under New York State's program...Some 150 of the Hudson's...polluters in New York have built or tied into treatment facilities that are now operating. Some 110 others, including 47 municipalities, face a mid-1972 deadline for beginning plant construction.[2]

In this paper we wish to (a) point out the ways in which the Hudson River situation lends itself to the development of policy guidelines, (b) review the Refuse Act as an antipollution measure, within the broad framework of a welfare economics and

(c) from the same framework, offer some decision guidelines for a polluting firm located on the Hudson.

Although we are concerned with a welfare economics formulation, it should be clear that there is little sense in pursuing Pareto optimality. Pareto optimality is destroyed by, among other things, externalities, monopolistic elements, and interdependent utility functions between firms or consumers. All of these factors are present and have significant influence on the problem at hand.

The negative externality of pollution of the Environment is of great magnitude. Monopolistic influences make nationwide antipollution measures nearly impossible to enforce. For example, a popular weekly reported it "learned that Attorney General..... had promised some big-business men that his Department would never take them to court for failure to apply for permits to discharge effluents under the 1899 Refuse Act."[16] The production functions, and hence the utility functions, of firms subject to the Refuse Act are interdependent in that, the issue of a permit to one firm is contingent upon the nature of other firms' discharges[17]. In a more general way, issue of a permit depends on the momentary water quality standards and the currently assessed assimilative capacity of the water, as well as on the nature of the effluent.*

Samuelson[20] holds that any external economy or diseconomy is sufficient motivation for a conpensatory tax or subsidy program. Kneese[8] disagrees, maintaining that centralized institutional measures can be more effective.

Yet the current situation on the Hudson is similar to none of these.

According to Bohm[1], the Refuse Act would be a "too-strong policy measure"--extremely inefficient from the point of view of the theory of external effects. Yet the recent special environmental issue of Fortune [6,8,19] presents clear evidence that businessmen welcome strong government policy measures--as long as the measures are applied as well to their competitors. This enables the firm to yield to popular sentiment by engaging in cleanup activities without placing itself at a disadvantage within the industry. Under these conditions, 85% of businessmen interviewed stated a willingness to comply with government antipollution policies at great expense to themselves[8]. From this point of view, the Refuse Act is a reasonable measure.

Hazleton[11] brings up the point that we may, in trying to determine who should pay for pollution abatement measures, overlook the most efficient ways of actually effecting abatement. This is question of "equity vs. efficiency." A strong policy measure such as

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* Hass[10] presents a model of a centralized administration for a taxation-purification program, given a set of water quality standards. This is not applicable here, as the setting of standards and the treatment-affiliation decisions are made by separate and varied agencies.

the Refuse Act could be quite effective in combating pollution. It may even be wise to drop theoretical equity calculations and ask people involved the extent to which they would support clean up.* In the case of the Hudson area, voters have supported a number of antipollution bond issues to a known extent, as well as a number of tax programs[2]. If we assume this result, plus the apparent attitude expressed above by businessmen, to be the limit of present public support (as well as a measure of the utility attached by the public to pollution abatement), we may work on the efficiency problem with that as a basis. We will attempt to incorporate that philosophy into the theoretical outline below.

Any theoretical statements we may make on abatement action, must be limited by the amount of information available, i.e. how much we actually know about the effects of pollution and about the public's desires with respect to environmental quality.[19]

The present level of such information in most regions is incredibly low, making it impossible to derive adequate utility functions and hence a major obstacle to even the theoretical modelling of environmental quality situations[11]. As a consequence many see this as an indication that trial and error, heuristic, stopgap measures will prove most effective in pollution abatement for a long time to come. Bohm[1], however, states that,"...pollution is a subject of political concern, on the basis of which economic policy measures are actually being undertaken. Therefore, measurement must be seen as a difficult problem rather than as an insurmountable obstacle....".

In fact, the current situation on the Hudson offers concrete support for Bohm's statement. The enforcement of the 1899 Refuse Act, "inefficient" though the measure may be, has resulted in pioneering work in the techniques of gathering and organizing environmental information.

Much information leading to convictions of or cleanup activities by Hudson polluters has been gathered by the Hudson River Fishermen's Association. The association makes constant efforts to determine public opinion concerning the state of the Hudson, and makes studies of the revenue lost locally due to polluted recreational facilities[2]. The testimonies of individuals at the public permit hearings provided by the Refuse Act result in information on the behavior of firms in the area [4,22]. Comprehensive information is required on the permit application itself[5], and federally enforced penalties are provided for the firm submitting false information[22].

Governmental agencies aid the firm with the task of gathering accurate information. "Regional offices of the Environmental Protection Agency will provide technical advice as to the meaning and content of water quality standards and information about available technology for controlling pollution[22]." The Environmental Impact

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* After outlining some of the medical and property-value benefits of pollution abatement, Sanford[19] concludes that from the point of view of society, any future cost-benefit analysis will show that <u>any</u> cost of pollution abatement is justifiable.

Statement[17], mentioned above, can attach dollar values to health and sanitation-oriented consequences of pollution in an area. Title II of the Environmental Policy Act of 1969[4] "will insure that presently unquantified environmental amenities and values may be given appropriate consideration in decision making along with economic and technical considerations."

Hass[10] shows that the necessity of perfect information depends on the degree of centralization of the proposed abatement program. In this light, programs such as the extremely decentralized Hudson scheme may be ideal for pollution abatement during the early stages of environmental information technology.

What alternatives are open to a polluting firm under the Refuse Act, and what are the pertinent costs associated with each? Should the firm decide, in compliance with the Act, to treat its effluent, it may (a) build its own treatment facility, (b) collaborate with other firms in the same area or whose effluents are of a similar nature on the construction of a common treatment plant, (c) negotiate for affiliation with an existing private treatment plant, or (d) contract with a nearby municipality for connection with an existing or planned municipal sewage treatment facility[2]. Each of these schemes has, in practice, involved a sunk cost to the firm for initial connection, and then a treatment price per unit of effluent, adding to the marginal cost of the product. With similar cost consequences, a municipality may choose to build a facility for itself alone, build one for itself and surrounding firms and neighboring municipalities, or contract for connection to the facility of a nearby municipality.

The firm may alternatively (e) discontinue the product whose manufacture leaves the polluting residue, (f) abandon the plant, or (g) shut down the plant long enough to change the equipment or the product or until the water standards are such that the proposed discharge is acceptable. To each of these alternatives is associated a cost[21], manifested in personnel changeover costs, zoning permit costs, costs of new equipment, and so forth. On the other hand, the firm may decide to (h) relocate. For the case of relocation, we will allow the possibility of a firm relocating to an area where treatment of its effluent will be cheaper -- not to an area where they may pollute. The latter will be prohibited since it is a general goal among antipollution measures that the measures be enforced uniformly throughout a large region, so that there might be no geographical havens for polluters[3]. The firm may, by presenting the District Chief Engineer with an acceptable plan for eliminating an effluent in the near future (i) obtain a conditional permit[22]. Finally the firm may, choose (j) to pay noncompliance fines, or (k) litigate, which has been quite effective in the short run. Both of these last measures, (j) (k), although costly, are commonly chosen by polluting industries.

The consumer suffers the costs of administering the Refuse Act,

as well as the effects of any company lay offs due to converted or discontinued operations.

The utterly decentralized character of the Hudson River measures, as well as the all-or nothing nature of the permit-issuing procedure render difficulty any attempt at an interesting symbolic model of the situation. This, and the demonstrated inability of the Hudson River firms to negotiate with neighboring municipalities in a friendly fashion[2] stymie the hope for either quantitative guidelines for public policy or predictive statements concerning the behavior of the firms. However, a modification of Bohm's ideas[1] provides a basis for some decision guidelines for the firm, as well as for some quantitative statements concerning equity and efficiency.

Let H be the set of Hudson River firms and municipalities. Assume single-product firms. Bohm's notation, modified, is used. Let

P_A=the pollution of firm or city A, measured according to the Environmental Impact of Q_A, where

Q_A=output of A's product per unit time.

L_A=consumer's loss of welfare from P_A (extra health care costs, drops in property value, cost of traveling to alternative recreation spots and others[3,19].)

Then

$$P_A=F_A(Q_A) \qquad F(0)=0,\ F'>0,\ F''\gtreqless 0.$$

$$L_A=f_A(P_A) \qquad f(0)=0,\ f'>0,\ f''\lesseqgtr 0.$$

Δ AB=cost to firm B resulting from P_A. If A is upstream from B, Δ may be lost revenue to a fishing firm B, or cost to B of filtering water as input to a production process.

$$\Delta\ AB=g_{AB}(P_A) \qquad g(0)=0,\ g'\geq 0,\ g''\lesseqgtr 0.$$

The total value of negative external effects resulting from A's operation is

$$h_A(Q_A)=L_A + \sum_{j\varepsilon D_A} \Delta\ Aj \qquad =f_A(P_A) + \sum_{j\varepsilon D_A} g_{Aj}(PA)$$

$$h(0)=0$$

D_A=set of all firms and municipalities downstream from A. The marginal external effect with respect to Q_A:

$$h'_A\ (Q_A)=F'_A(Q_A)\{f'_A\ (P_A) + \sum_{j\varepsilon D_A} g'_{Aj}(P_A)\}$$

$$h'\geq 0, \qquad h''\lesseqgtr 0.$$

The net benefit of A's operation at level Q_A is

$$\pi A = pQ_A - C(Q_A) - h(Q_A) \quad \text{, where}$$

$C(Q)$ =total costs to a firm of output level A,

p=unit price of A's product

At this point it seems reasonable for the water authority to require as a condition for the continued operation of firm X that there exist a Q_X^* such that

(i) $\pi X(Q_X^*) > 0$, and

(ii) X conforms to all provisions of the Refuse Act. For were there not a Q_X^* so that $\pi_X > 0$ legally, then X would be nothing but a "pollution mill", and generally undesirable. More difficult to deal with is the π of a municipality. Castleton, N. Y. (pop. 1700), in order to comply with New York law, needs a treatment plant before mid-1972 that will cost $1,000,000 more than the total assessed value of the village[2]. Back to this later--it is obviously a relevant problem,

We have so far omitted the implicit subscript to: i.e. functions such as $L_A = f_A(P_A)$ may change from day to day, depending on the buildup (failure to degrade) of yesterday's pollution in the water. We may say that if $L_A = f_A(P_A, t)$, then $\frac{\partial}{\partial t} L_A > 0$, assuming consumers do not "get used to" the pollution.

External effect theory tells us[1] that at this point a tax should be imposed on A at unit rate T (where T is a tax rate, not time), such that

$$T = h'(\bar{Q}_A) = p - MC(\bar{Q}_A)$$

where $\bar{Q}_A$ is the level of output A adjusts to after the imposition of the tax, and MC is the marginal cost at output level Q.

The firm on the Hudson now chooses from the list of alternatives presented above, and picks the least-possible-cost measure, which costs $C_A^*(Q_A)$. We are interested in the case where C* is not a one-shot cost, such as for plant abandonment, and where at least the variable component of C* is nonvanishing (thus discounting the possibility of, say, a fixed-fee treatment contract with a municipality).

Thus

$$C^*(Q) > 0 \quad , \quad C^{*\prime}(Q) > 0$$

We now consider the choice on the part of firm A to connect with an available municipal plant or with a private plant. We recall that the price to a firm for connecting with a municipal facility may be unexpectedly low for several reasons: A city on the Hudson must remove only 90% of municipal sewage wastes before discharging into the river[2], whereas a private firm in the area must remove 100%. Practically, this means a city must remove 100% of clearly identifiable industrial pollutant from contracted private waste sources, but only 90% of contracted industrial wastes that cannot be identified as municipal sewage. As well, municipal treatment facilities are largely financed by municipal and state bonds (which are free of federal tax, and which we will consider neither a benefit nor loss to consumers) and by tax revenues which we will assume to have been subsumed under ΣL_x. On the other hand, a differentiated and more expensive $x \varepsilon H$ facility may often be needed to process both sewage and chemical wastes of industry. One further assumption: It is legal in nearly all states (precedent: Bessemer, Alabama) for a city to float municipal bonds to build a manufacturing plant which it then leases to a firm[18]. Legally we believe that the effluents of such a leasing firm may not without further contract be considered municipal waste. For the purposes of this paper, we will assume that this is true.

We thus assume that muncipality M can offer to a firm A a link to its treatment plant at a rate

$$C_A^{*\prime}(Q_A^*)=T+r$$

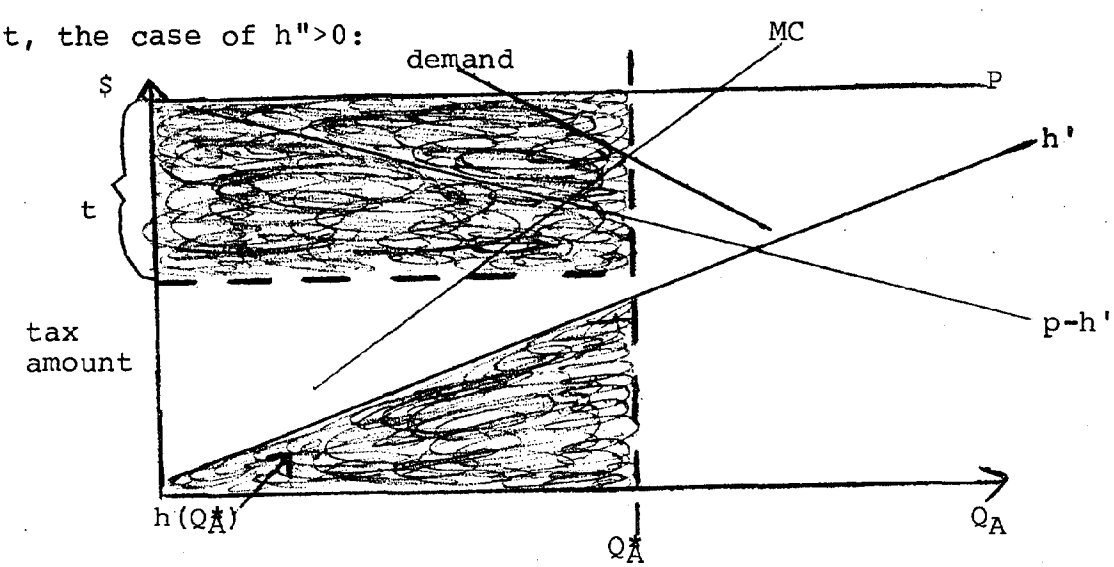
The city offers this rate using as a base the "fair" price T (which was determined above) incremented by $r \gtreqless 0$, which takes the assets of the previous paragraph into account to bring $C_A^{*\prime}$ in correspondence to the marginal costs of operating the facility. The argument below is largely adapted from Bohm[1].

A adjusts its output to Q_A^*, so that

$$MC(Q_A^*) + (T+r) = p$$

The sign of $h''(Q_A)$ is now relevant. We must assume h" to be of the same sign over the entire domain of Q_A.

First, the case of h">0:



It is interesting to note here, that at level Q_A^*, the treatment prive per unit time, if r=0, exceeds the total negative value of A's pollution during that time:

$$\text{total external effect} = H(Q_A^*) = \int^{Q_A^*} h'(Q_A)\, dQ_A$$
$$\leq Q_A^* \cdot h'(Q_A^*)$$
$$= TQ_A^* \quad = \text{tax amount}$$

Obviously if r<0, i.e. the unit price of treatment less than the marginal external effect, it is advantageous for the firm to contract for waste disposal with M. In fact, if

$$r < \frac{H(Q_A^*) - Q_A^* \; h'(Q_A^*)}{Q_A^*} < 0 \;, \; h''>0,$$

then the total value of daily pollution is less than the daily treatment price, and A enjoys what we may call a "polluter's surplus." There is then no question that it is profitable for A to contract with M. If r>0, though, A may wish to collaborate with other firms in the construction of a private treatment plant.

Examining the case of h"<0, we obtain a surprising result. For r=0 (and h' now a decreasing function),

$$H(Q_A^*) = \int_0^{Q_A^*} h'(Q_A)\, dQ_A \geq Q_A^* \; h'(Q_A^*)$$
$$= tQ_A^*$$

i.e. A enjoys the "polluter's surplus" for r=0, and in fact for all r such that

$$0 < r < \frac{h(Q_A^*) - Q_A^* \, h'(Q_A^*)}{Q_A^*}$$

although paying a marginal treatment rate, when r>0, greater than the marginal value of pollutant.

We must now recall the requirement that

$$\pi \; A(Q_A^*) > 0.$$

Thus, except for the cases

(i) $\{h''>0\}$ $r>0$

(ii) $h''<0$ $\left\{ r > \frac{h(Q_A^*) - Q_A^* \; h'(Q_A^*)}{Q_A^*} \right\}$

or even in these cases in the absence of a less-cost alternative, we see firm A will have considerable incentive to contract with M. In reality, difficulty of negotiation weakens this result somewhat.

However, we have the consolation of having shown the Refuse Act scheme to be superior to the pure taxation scheme in one significant way. The introduction of the firm-independent price term r (and the concomitant reduced necessity of exactly determining T) eliminates one problem pointed out by Bohm. For in the tax scheme, as soon as the complete determination of T by Q becomes evident to the firm, the firm will adjust Q to a level where marginal net revenue equals marginal cost, so that

$$\frac{d(pQ-C(Q)\ -h(Q)Q)}{dQ} = 0,$$

$$\text{i.e. } p-h'(\bar{Q}) - h''(\bar{Q})\bar{Q} = MC \qquad (1)$$

thus destroying optimality by setting output too large or too small by a factor of $\bar{Q}h''(\bar{Q})$, depending on $h'' \lesseqgtr 0$. Thus the term r encourages stability of whatever optimality may have been obtained.

In time, the firm will enjoy benefits stemming from its efforts at pollution control. The technological advances stimulated by strict antipollution legislation will have made available more efficient production equipment, some of which will make use of recycled wastes[19]. Pollution control "makes cities more liveable. And people who work in more liveable places don't have to be paid quite as much as those who work in less liveable places."[19] Progress has also been made in the generation of power from the combustion of sewage wastes, notably the financially sound operation of the municipal treatment-generation plant in Hempstead, New York.

So far, we have assumed no adjustment by the firm of p, its product's unit price. This is unrealistic, as the effluent treatment price (and hence the firm's marginal cost) are dependent on the nature of the effluent, not on the nature of the product. Thus not only the prices of products will change, but the <u>relative</u> prices of products will change under legislation of the Refuse Act type, and will result in a period of chaotic price fluctuations--probably without the traditional concomitant of higher employment.* Any wide-area assertion about the direction of prices would then depend on the validity of the assumption that the least-cost method of effluent treatment will be similar (at least in cost) for firms within the same industry. This would seem to be a necessary condition for stability of an industry, and a considerable amount of plant

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* For discussion of the macroeconomics of pollution, see[19] and Boulding, Kenneth, "Economics of Coming Spaceship Earth", in DeBell, Garrett, (ed.), <u>The Environmental Handbook</u>, Ballantine, 1969.

relocation may occur before it is achieved.

Despite the limitations of symbolic models, a numerical model would not be appropriate at this time, because it would not account for technological change[19]. By the time comprehensive numerical data is available, massive technological changes will have occurred due to the pressure of strict antipollution laws.

A detailed report of the decisions taken and costs incurred by the Hudson River firms during the first year of the new enforcement of the 1899 Refuse Act has not yet been compiled. Such a report can be expected soon since there is great legal and nationwide conservation interests in local applications of this Act. The Hudson River case will provide guidelines for future regional policies (To some extent it already has, in the cases of the Delaware Valley and the Miami River of Ohio), and, whether eventually judged either successful or infeasible, it will have contributed momentarialy to the methodology of environmental management policy.

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CHAPTER XI

DATA MANAGEMENT - INFORMATION SYSTEM

SYSTEM 2000 is a general-purpose data base management system which operates on the University of Texas at Austin CDC 6600 computer. The basic system 2000, with special optional features, provides the basis for developing an information system tailored to the requirements of this study and the variety of possible users. Features of the SYSTEM 2000 include a report writer, a user-oriented language providing on-line access to non-programmers, a procedural language interface for programmer use, and sequential file processing.

The University of Texas System 2000

This system provides the user with a comprehensive set of data base management capabilities. These include the ability to define new data bases, modify the definition of existing data bases, and to retrieve and update values in these data bases. The components of data base definitions are data elements and repeating groups. Values are stored in data elements. Repeating groups describe the structure for storing multiple sets of data values and also provide a hierarchical linking mechanism.

Values for each element and entry (record) may vary in length. The user may specify without restriction which elements in the data base are to be inverted and become key fields, and what hierarchical relationship an element will have with other elements in the data base. Data security is maintained by password control to each component and additional password control to the data base itself.

The procedural language feature enables users to manipulate data in a data base from a procedural programming language such as COBOL, FORTRAN, or assembly language. This feature provides the mechanism for addressing any part of the data base of interest to the procedural program, to retrieve data in a sequence and format suitable for procedural processing, and to update the data base from the program. Interrelationships between two or more data bases can be established which permit network data structures to be defined. Data base qualification is performed by use of an internal file, facilitating the screening of data of interest. The sequential file feature makes possible the processing of a major part of the data base from sequential media, such as magnetic tape. This option enables the processing for storage of census tapes for the region and enables the utilization of existing land-use information tapes.

Due to system 2000 application high flexibility, its availability on the U T system and the thorough documentation, it was chosen as the main information-management tool for the land-use part of the study.

Our first step was to define a basic grid structure over the study area to which all data could be interrelated. This basic structure allows overlay-like procedures to be carried out by the computer, making mapping and other graphics a natural form of output.

Preparation for formulating a base map of the study area, that could be generated by the computer at any desired scale, was begun. All county lines, towns and highways have been digitized on a magnetic tape for input when the plotting routines are completed. Presently we are preparing to digitize the census tract boundaries and complete the plotting routines.

This plotting data has been augmented by information dealing with land types such as: fresh water marsh, tidal flats, etc. An attribute structure has been implemented to allow all of the data to be placed in a system 2000 data base. The data base has been defined, built and loaded with a representative string of data. It has been successfully tested to see if relevant questions could be answered and to identify the complexity level of such questions.

We are now in the process of finding out what other catagories of data need to be introduced into the system and what kinds of questions need to be answered. We believe that this approach will be critical in the second stage of the project when various policy alternatives are being evaluated. The completion of this information-management system with graphs and tabular outputs together with simple allocation algorithums will be a vital tool for interaction between the various task forces.

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