

# TRINITY-SAN JACINTO ESTUARY:

*ECONOMIC IMPACT OF RECREATIONAL  
ACTIVITY AND COMMERCIAL FISHING*

A REPORT TO  
TEXAS WATER DEVELOPMENT BOARD

BY

DEPARTMENT OF RECREATION AND PARKS  
DEPARTMENT OF AGRICULTURAL ECONOMICS

AUGUST, 1987

TEXAS AGRICULTURAL EXPERIMENT STATION  
TEXAS A&M UNIVERSITY SYSTEM

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BY

DANIEL R. FESENMAIER  
SEOHO UM  
WESLEY S. ROEHL  
ALLAN S. MILLS

TEOFILO OZUNA, JR.  
LONNIE L. JONES  
RAMON GUAJARD Q.

For: Visitation and Direct  
Expenditure Estimation

For: Input-Output Models  
Total Impact Estimation

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Summary

The quantification of sport fishing, other recreational activity, and commercial fishing along with the estimation of the economic impacts of these activities on the local and state economies has been carried out in this study. The methodology employed in doing so has involved the use of various statistical survey instruments, published statistical series on commercial fishing, and the development and construction of state and regional input-output models. The economic impacts for this study have focused on the contribution of these three economic activities to the economies of the local region and the state in the form of output, employment, income, and state and local tax revenues.

Sport fishing, like other recreational activity and commercial fishing, exerts an effect upon the economies of the local region where these activities occur and upon the entire state. These effects can be classified as to direct and indirect business impacts. Direct business impacts include expenditures for goods and services (transportation, food, lodging, equipment rental, fees and related fishing expenses) purchased by sport fishermen, other recreational activity participants, and commercial fishermen. Indirect business impacts are the dollar value of goods and services produced to supply the businesses which make direct sales to these three groups of participants. Still other indirect impacts include wages, salaries and other forms of income to employees, owners and stockholders.

Total economic output impacts from sport fishing, other recreational activity, and commercial fishing (both inshore and offshore) in the Trinity-San Jacinto estuary amounted to \$911.8 million and \$1,211.2 million for the region

and state, respectively. Of these totals, sport fishing contributed the largest impact with \$433.2 million or 48 percent for the region and \$576.7 million or 48 percent for the state. Direct sport fishing expenditures in the Trinity-San Jacinto estuary of \$171.5 million were also greater than those for other recreational activity of \$122.4 million. Sport fishermen also spent more outside the local region (\$9.7 million) than did other recreational activity participants (\$9.4 million).

Over 31 percent of the direct expenditures by sport fishermen and other recreational activity participants in the Trinity-San Jacinto estuary region resulted in increased personal income for regional households directly affected by the sport fishing and other recreational activity industry. Statewide, the income impacts amounted to over \$154 million for sport fishing and over \$113 million for other recreational activity. Sport fishing and other recreational activity expenditures not only generate additional personal income but they also create additional employment opportunities both within the region and elsewhere in Texas. The estimated total employment impacts to the state economy were 10,106 and 7,726 full-time job equivalents for sport fishing and other recreational activity, respectively.

Increased economic activity due to gross dollar flows from the sport fishing and other recreational activity industry also impact positively the revenues to state and local governments. The total state tax revenues amounted to \$7.8 million for sport fishing and \$5.7 million for other recreational activity statewide. Likewise, local tax revenues from sport fishing and other recreational activity were over \$13 million and \$10 million, respectively. Most of these tax revenues whether local or state were generated within the Trinity-San Jacinto estuary region.

Estimates were also made of the inshore-offshore commercial fish landings associated with the Trinity-San Jacinto estuary region. The three year (1984, 1985, 1986) average inshore annual commercial finfish and shellfish contributions were estimated at 11.3 million pounds with an ex-vessel value of \$12.5 million. Inshore and offshore landings together, however, amounted to about \$63.6 million with direct employment of 3,476 full-time job equivalents and direct personal income of \$18 million.

TRINITY-SAN JACINTO ESTURARY:  
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Introduction

This study has been conducted as part of the Texas Water Development Board's on-going efforts to evaluate hydrological, biological, chemical and economic factors as they relate to the freshwater inflow needs of the six estuaries along the Texas Gulf Coast. Outdoor recreation, sport fishing in particular, has been long recognized to exert significant economic impacts on local economies of the Texas Gulf Coast region. The primary focus of this study was to evaluate the economic impact of the estuarine-dependent fisheries resource; sport fishing and commercial fishing. However, since sport fishing is generally enjoyed as part of a complex of recreation activities, six other activities were included in the study. These are pleasure boating, hunting, camping, swimming, picknicking and sightseeing.

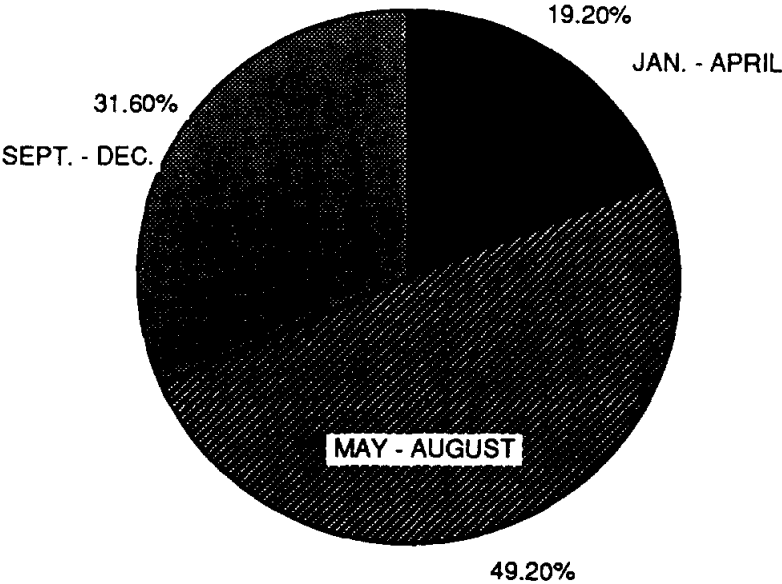
Visitation Patterns

The results of the study indicate that there were approximately 6,689,000 visits to the Trinity-San Jacinto estuary during calendar year of 1986; and of these visits 54.4 percent were made by households involved in sport fishing.\* As shown in Chart 1, there is substantial seasonal variation; approximately 19 percent of these visits occurred from January through April, 1986; whereas 49 percent of the total occurred during the summer months (May through August); finally, 32 percent occurred between September 1 and December 31, 1986.

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\*The methods and procedures for developing the participation and expenditure estimates are presented in Appendix A.

**CHART 1: SEASONAL VISITATION**



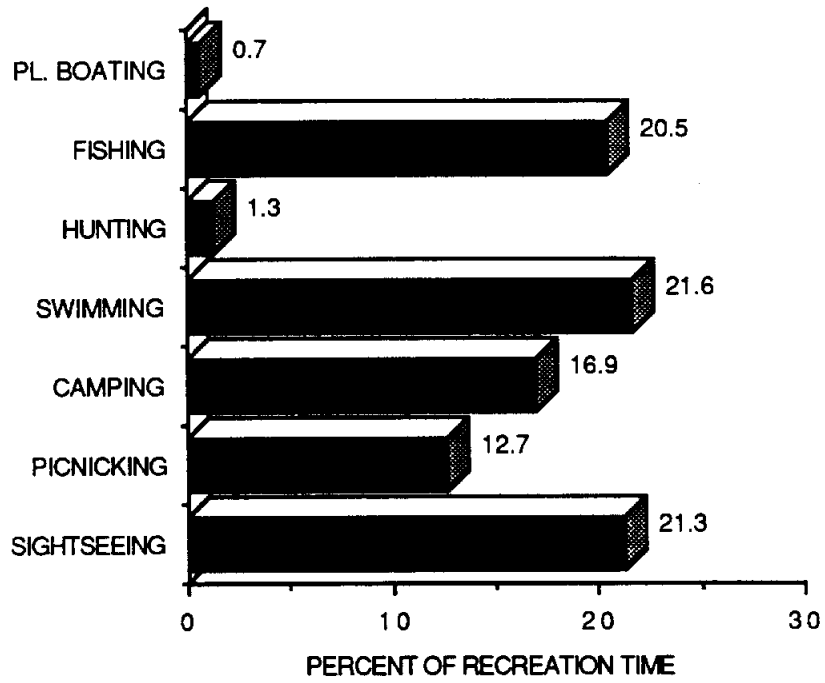
As part of the mail survey, information was collected concerning each household's current county of residence, the distance required to travel to each of the places visited along the Trinity-San Jacinto estuary, as well as the number of years members of the household had been visiting each place. The survey results indicate that Texas' households travel, on average, 118 miles to reach their destinations located along the Trinity-San Jacinto estuary. This relatively short travel distance is reflected by the counties in which these visitors reside. Harris county was overwhelmingly the largest source for visitors; 46.2 percent of the visitors to the Trinity-San Jacinto estuary were from Harris County; 10.1 percent of the visitors were from Brazoria County and 5.6 percent were from Galveston County, respectively. Interestingly, only 28.2 percent of those surveyed indicated they had first visited places along the Trinity-San Jacinto estuary within the past six years (since 1980); another 25.9 percent started visiting this area of the Texas Coast between 1970 and 1980; finally, 45.9 percent of those survey indicated that they have been visiting the same place for over 16 years.

One of the important assumptions guiding the study was that a trip to the Texas Coast involved a number of recreation activities. The results of the study support this assumption; for the Trinity-San Jacinto estuary, camping and sport fishing account for 37.4 percent of the time allocated to recreation activity (20.5% and 16.9%, respectively). As one might expect, sightseeing (21.3% of the time) and swimming (21.6%) were also popular activities (see Chart 2).

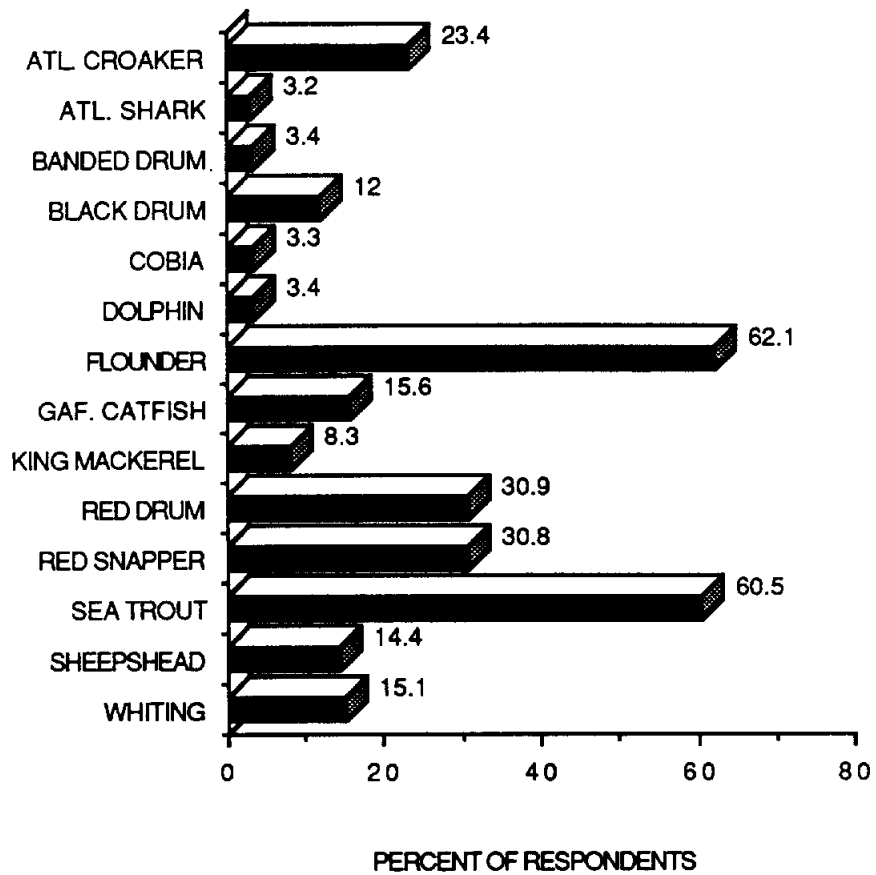
As indicated previously, a primary focus of this study was on the economic importance of sport fishing to communities along the Texas Gulf Coast. For those fishing in the Trinity-San Jacinto estuary, Flounder was caught most often, followed by Sea Trout, Red Drum and Red Snapper. Chart 3 presents a list



**CHART 2:  
RELATIVE POPULARITY OF RECREATION ACTIVITY**



**CHART 3: POPULARITY OF SELECTED FISH**



identifying the popularity of fish caught in this estuary. As part of the survey, fisherman were asked to evaluate the overall quality of the Texas Gulf Coast in the vicinity of the place(s) they went fishing. 8.5 percent of those surveyed indicated that this area was excellent for fishing; 40.3 percent and 42.9 percent thought the area was fair or good for fishing while only 10.8 percent indicated that places along the Trinity-San Jacinto estuary were poor to very poor.

### Direct Expenditures

During the survey, respondents were asked to indicate their expenditures while on a "typical" or "average" trip to each particular place along the Trinity-San Jacinto estuary. Specifically, respondents were asked to estimate their total expenditures for seven types of goods and services: (1) overnight lodging (2) transportation (3) grocery store purchases (4) restaurants and other eating establishments (5) rental of recreation equipment (6) entrance, participation, and guided tour fees and (7) fishing-related items including bait and boat fuel. Based upon the estimation procedures discussed in Appendix A, the results of the study were used to estimate the total expenditures by Texans visiting places along the Trinity-San Jacinto estuary. As can be seen in Table 1, visitors spent approximately \$293,902,576 during 1986. Of this total, 58.4 percent (\$171,502,159) was spent by sport fisherman. Food costs accounted for a substantial portion of expenditures by fisherman; \$39,231,876 was spent on grocery store purchases and an additional \$34,421,778 was spent in restaurants. Transportation expenditures were also high at \$43,845,249. Interestingly, for those visitors not fishing, restaurant expenditures constituted the largest share of their trip-related cost.

Table 1. Visitor Expenditures in the Trinity-San Jacinto Estuary\*

Category	"Fishing" Household Expenditures	"Nonfishing" Household Expenditures	Total
Lodging	\$ 13,531,858	\$ 13,869,586	\$ 27,401,444
Transportation*	43,845,249	36,855,780	80,701,029
Restaurant	34,421,778	41,724,666	76,146,444
Grocery	39,231,876	17,494,440	56,726,316
Rental	5,609,455	4,042,619	9,652,074
Fees	10,008,183	8,413,326	18,421,509
Fishing-related items	24,853,760	-----	24,853,760
<b>Total</b>	<b>\$171,502,159</b>	<b>\$122,400,417</b>	<b>\$293,902,576</b>

\*For those households living outside the Trinity-San Jacinto region, transportation costs were reduced by 50 percent to provide a better estimate of "true" costs.

#### Economic Impact Analyses

Sport fishing and other recreational activities provide economic impacts or benefits to the economies of the local region where these activities occur and throughout the entire state. These economic impacts can be classified into direct and secondary impacts. Direct impacts are the direct sales of goods and services to recreationists and sport fishermen. For this study, the actual expenditures by recreationist and sport fishermen for goods and services constitute the direct or initial business impacts on the local economy and the state. These include expenditures with local restaurants, hotels and motels, grocery stores, bait shops and other recreational and sport fishing related businesses.

Direct expenditures associated with sport fishing and other recreational

activities have a multiplying effect or impact on the economy of the local region and the state in the form of secondary or indirect impacts. Secondary impacts arise because local and non-local businesses produce and sell inputs to eating and drinking establishments, hotels and motels, piers and guides, bait shops, and other recreational and sport fishing related businesses in order that they may serve their customers.

The total business effects or impacts of the sale of goods and services to recreationists and sport fishermen upon the local and state economies include both the direct and secondary impacts resulting from direct sport fishing and other recreational expenditures. This total impact in turn provides other economic benefits in the form of employment and wages, salaries, rents, profits and governmental revenues of which a portion is spent on goods and services. In this study, input-output analysis is used to estimate the total economic impact, both local and statewide, arising from fishing and other recreational expenditures.

Since economic impacts were estimated separately for the Trinity-San Jacinto estuary region and the state, it was necessary that both a regional and statewide input-output model be developed. State impacts are estimated using the 1986 Texas Input-Output Model developed specifically for this study. Likewise, regional impacts are estimated using the 1986 Trinity-San Jacinto six county regional input-output model also developed for purposes of this study. The methods and procedures for developing these models are presented in Appendix B.

#### Sport Fishing Economic Impact Analysis.

The results of the surveys conducted for this study were used to estimate the total expenditures by sport fishermen on the six types of goods and services

presented earlier. These estimated expenditures are presented in Table 1 by type of expenditure and between sport fishing and other recreational activities.

To estimate the total economic impacts of sport fishing, expenditures by sport fishermen were multiplied by their respective Type II multipliers obtained from the 1986 Texas Input-Output Model and the Trinity-San Jacinto Input-Output Model. The results of these calculations are summarized and presented in Table 2. As indicated in the table, regional sport fishing expenditures (output) in the Trinity-San Jacinto estuary region were over \$171.5 million in 1986. Statewide expenditures that occurred as a result of recreational fishing in the Trinity-San Jacinto estuary exceeded \$181.2 million. The difference between regional and state direct expenditures is the estimated transportation expenditures made by fishermen from outside the Trinity-San Jacinto region. As can be observed, most direct expenditures (95 percent) accrue to the region. When the indirect and induced impacts are added to the direct impacts to obtain the regional total impact of over \$433 million, this figure accounts for more than half (75 percent) of the gross output impacts statewide (\$576.7 million). This statewide impacts reflect the economic linkages between the Trinity-San Jacinto recreational fishing industry and product input suppliers throughout Texas.

The regional and statewide input-output models developed for this study enabled the estimation of employment impacts of recreational fishing within the Trinity-San Jacinto estuary region and within the state. The input-output analysis estimated a total of 5,164 full time job equivalents directly related to sport fishing in the Trinity-San Jacinto estuary region during 1986. Statewide, an additional 1,953 full-time job equivalents were estimated to be directly related to the expenditures of sport fishermen. Taking account of

the indirect and induced impacts along with the direct impacts, the total employment impact on the Trinity-San Jacinto region was 6,848 jobs and 10,106 jobs in the state economy (Table 2).

Table 2. Direct and Total Economic Impact From Sport Fishing Expenditures, Trinity-San Jacinto Estuary, 1986

	Direct		Total	
	<u>Regional</u>	<u>State</u>	<u>Regional</u>	<u>State</u>
Output (million \$)	171.5	181.2	433.2	576.7
Employment (man-years)	5,164	7,117	6,848	10,106
Income (million \$)	53.6	66.4	104.0	154.5
State Tax Revenues (million \$)	a	0.84	7.4	7.8
Local Tax Returns (million \$)	a	2.3	13.1	13.9

a. Local data were insufficient to estimate local tax effects.

Sport fishing expenditures in the Trinity-San Jacinto region not only created employment but also generated personal income to households both within the region and elsewhere in Texas. As shown in Table 2, over \$53 million and \$66 million of personal income was created directly for households within the region and state, respectively, by sport fishing expenditures within the Trinity-San Jacinto region. Moreover, total personal income impacts from sport fishing in the region amounted to about \$104 million within the region and over \$154 million within the state.

Increased economic activity due to gross dollar flows from the sport fishing industry also impact positively the revenues to state and local governments. About \$7.4 million of the total statewide state tax revenues,

which amounted to over \$7 million, were collected in the local region. As shown in Table 2, direct state tax revenues paid by the sport fishing industry were \$841 thousand. Table 2 also shows that the total tax revenue impacts for local jurisdictions were concentrated within the Trinity-San Jacinto estuary region where an estimated \$13.1 million resulted from direct, indirect, and induced sport fishing expenditures. Additionally, local governments outside the Trinity-San Jacinto estuary region collected an estimated \$800 thousand in taxes on travel expenditures by sport fishermen for a total impact on local governments of \$13.9 million statewide in 1986.

#### Other Recreational Activity Economic Impacts

Table 3 presents 1986 expenditures and related economic impacts from all recreational activity other than sport fishing in the Trinity-San Jacinto estuary region. As with recreational fishing, regional and statewide economic impacts of other recreational activity expenditures were estimated using the regional and state input-output models. It is estimated that in 1986 Trinity-San Jacinto non-fishing recreational participants spent just over \$122 million within the Trinity-San Jacinto estuary region and a total of over \$131 million in the state. These expenditures generated total economic impacts of about \$311 and \$425.2 million within the region and state, respectively (Table 3).

Other economic benefits from recreational activity other than fishing, including local and statewide employment, personal income and state and local tax revenues were estimated as shown in Table 3. Hence, it is estimated that a total of 3,265 jobs were directly related to other recreational activity in the Trinity-San Jacinto estuary region. The analysis also estimated that an additional 2,266 jobs were generated throughout the state because of other Trinity-San Jacinto recreational activity. Table 3 also shows the impacts



accruing to household income due to other recreational activity expenditures in the region. Regional income impacts amounted to over \$38 million of direct income and \$74.4 million of total income. Direct state income impacts were about \$48 million and total state income effects amounted to \$113.3 million.

State and local tax revenue impacts from other recreational activity for the Trinity-San Jacinto estuary region are also presented in Table 3. Local tax revenue for all categories are greater than state tax revenue. Ninety-three percent of the total state tax revenue is generated within the region. Total state tax revenues amounted to \$5.7 million while total local tax revenue was estimated at \$10.2 million. Local tax jurisdictions elsewhere in the state also received an estimated \$700 thousand in tax revenues from the travel expenditures of non-fishing recreationist to the Trinity-San Jacinto region.

**Table 3. Direct and Total Economic Impact From Other Recreational Activity Expenditures, Trinity-San Jacinto Estuary, 1986**

	Direct		Total	
	<u>Regional</u>	<u>State</u>	<u>Regional</u>	<u>State</u>
Output (million \$)	122.4	131.9	311.0	425.2
Employment (man-years)	3,265	5,531	4,464	7,726
Income (million \$)	38.2	48.2	74.4	113.3
State Tax Revenues (million \$)	a	0.57	5.3	5.7
Local Tax Returns (million \$)	a	1.6	9.5	10.2

a. Local data were insufficient to estimate local tax effects.

Combined Economic Impacts from Sport Fishing and Other Recreational Activity

The combined impacts from both sport fishing and other recreational activity for the Trinity-San Jacinto estuary in 1986 are presented in Table 4. Total state output was more than twice that of total regional output. The total employment impacts show that 63 percent of the jobs were generated locally while the other 37 percent were generated throughout the State. Both sport fishing and other recreational activity expenditures in the Trinity-San Jacinto region resulted in increased household personal incomes of about \$178.5 million for this region. In addition, household income generated outside the region was about \$89.3 million bringing the total state personal income impact to \$267.8 million from Trinity-San Jacinto recreational and fishing activities in 1986.

Table 4. Direct and Total Economic Impact From Sport Fishing and Other Recreational Activity Expenditures, Trinity-San Jacinto Estuary, 1986

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	Direct		Total	
	Regional	State	Regional	State
Output (million \$)	293.9	313.0	744.2	1,001.9
Employment (man-year)	8,429	12,648	11,312	17,832
Income (million \$)	91.8	114.6	178.5	267.8
State Tax Revenues (million \$)	a	1.4	12.7	13.5
Local Tax Revenues (million \$)	a	3.9	22.6	24.0

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a. Local data were insufficient to estimate local tax effects.

Most of the state and local tax revenues were generated within the region. Total state tax revenues amounted to an estimated \$13.5 million, of which \$12.7

million was collected within the region. Local tax jurisdictions within the region received over \$22 million in revenues while those outside the region received an additional \$1.4 million for a total statewide tax impact on local jurisdiction exceeding \$24 million in 1986.

#### Economic Impact of Commercial Fishing

The analysis of the commercial fishing industry in the Trinity-San Jacinto estuary region was carried out using data available from the Texas Parks and Wildlife Department (TPWD) in conjunction with the regional and state input-output models developed for this study. The annual TPWD data consists of detailed information on the value and volume of both inshore (bay system) and offshore commercial finfish and shellfish landings. Since offshore landings are reported only as a total for the state of Texas, it was necessary to allocate these landings to the different bay systems of the Texas Gulf Coast based on a weighting scheme developed for previous fisheries resource studies conducted by the Texas Water Development Board.

Given that the Trinity-San Jacinto bay system corresponds with the Trinity-San Jacinto estuary, for purposes of estimating direct and total economic impacts, the value of commercial fish landings in the Trinity-San Jacinto bay system were chosen to represent Trinity-San Jacinto estuary commercial fishing industry direct value of output. In addition, since commercial fish landings may vary significantly from year to year, an average of landings in 1984, 1985 and 1986 were computed to represent a typical current year. This procedure reduces the influence of annual variations. Hence, while reference is made to 1986 commercial fish landings, the values are, in fact, an average of the most recent three years.

The average annual inshore commercial fish landings (finfish and shellfish)

for the Trinity-San Jacinto estuary were reported to be 11.3 million pounds with an ex-vessel value of \$12.5 million for the 1984 through 1986 period. Of this, eastern oyster, shrimp and flounder made up almost 91 percent of the total value of landings. The combined inshore and offshore ex-vessel value of landings for this same time period was about \$63 million. This difference in the offshore-inshore value of landings suggests the importance of offshore landings supported by the Trinity-San Jacinto estuary.

The regional and statewide total economic impacts resulting from commercial fish catch attributed to the Trinity-San Jacinto estuary were estimated using the 1986 Trinity-San Jacinto Input-Output Model and the 1986 Texas Input-Output Model. These impacts, including total business activity, employment, personal income and state and local tax revenue estimates are presented in Table 5.

Table 5. Direct and Total Economic Impact of Commercial Fishing in the Trinity-San Jacinto Estuary, 1986

	<u>Landings</u>		<u>Total Impacts</u>			
	<u>Inshore</u>	<u>Offshore</u>	<u>Inshore Region</u>	<u>State</u>	<u>Offshore-Region</u>	<u>Inshore State</u>
Output (million \$)	12.5	63.6	32.9	41.1	167.6	209.3
Employment (man-years)	683	3,476	799	896	4,063	4,558
Income (million \$)	3.5	18.0	7.3	10.4	37.2	52.7
State Tax Rev. (million \$)	0.06	0.31	a	0.55	a	2.8
Local Tax Rev. (million \$)	0.08	0.43	a	0.86	a	4.4

a. Local data were insufficient to estimate local tax effects.

Total value of the inshore catch was \$12.5 million, direct employment in the inshore fisheries industry was 683 full-time job equivalents and personal income paid to households by the inshore fishing industry was \$3.5 million. In addition, the commercial fishing industry paid about \$61 thousand directly in state taxes and about \$81 thousand in local taxes (Table 5). Gross Texas business resulting from inshore commercial fishing, processing, and marketing fish attributed to the Trinity-San Jacinto estuary in 1986 was estimated at \$41.1 million, of which \$32.9 million was business within the estuary region. This regional inshore industry also supported a total of 896 full-time equivalent jobs and created personal income amounting to \$10.4 million throughout the state. Also generated by this industry was statewide state taxes paid of about \$553 thousand and local taxes of \$865 thousand to local jurisdictions throughout Texas.

The total value of offshore and inshore landings was reported to be \$63.6 million. Direct employment associated with this output was estimated at 3,476 full-time job equivalents. Personal income paid to households by the inshore and offshore fishing industry was \$18 million. The combined inshore and offshore state tax revenues from this industry was estimated at \$309 thousand, while the local tax revenues were estimated to be \$433 thousand (Table 5).

Gross Texas business resulting from inshore and offshore commercial fishing, processing, and marketing fish attributed to the Trinity-San Jacinto estuary in 1986 was estimated at \$209.3 million of which over \$167 million was business within the estuary region. The combined inshore and offshore regional commercial fishing industry also supported a total of 4,558 full-time equivalent jobs and generated personal income of over \$52 million throughout the state. Also, generated by this commercial fishing industry were statewide local tax

revenue of more than \$2.8 million and local taxes of \$4.4 million to local jurisdictions throughout the state.

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**Appendix A**  
**Participation and Expenditure**  
**Estimation Methodology**

## Description of Database

There are a number of approaches one might take in developing estimates of economic impact. In this study a particular approach is adopted which attempts to generate reliable estimates of expenditure levels while minimizing the cost of data collection and analysis. The study design takes advantage of recent advances in geographical, marketing, and transportation research indicating that people's travel patterns tend to be consistent and repetitive over time. That is, people tend to consistently visit places with which they are familiar while visiting "new" places very infrequently. In addition, because people tend to repeatedly visit the same place, they also can provide reliable information concerning the time and money spent at these places. The questionnaire used in this study focused upon the place (s) chosen for recreational outings. For each place identified, information was obtained which described a "typical" or "usual" trip to that place. This emphasis on the places (s) visited offers a number of methodological benefits including improved reliability of estimated expenditure levels and increased stability of the estimates against "unique" events that may effect travel patterns in the short term.

Data collection involved a two step strategy which incorporated the best aspects of both telephone and mail survey formats. In the first stage, information was obtained from a randomly drawn sample of Texans concerning their travel to the Texas Gulf Coast in order to develop weighting factors that can be used to estimate expenditures for the entire state population. A telephone survey was used in this step as a "filter" with which to identify those Texas households having traveled to the Texas Gulf Coast during 1986. The telephone format was adopted because it is relatively efficient in terms of cost per response and because personal communication affords greater

control over the quantity and quality of the responses.

The telephone survey first asked the respondent whether or not any member of the household visited the Texas Gulf Coast during 1986; a second question focused the respondent's attention onto travel to the Texas Coast for recreation-related purposes. Socioeconomic information was also gathered in order to incorporate into the estimation procedure differences between households that visited and those that did not visit the Texas Coast during 1986. Lastly, each respondent that indicated they had traveled to the Coast was informed of the need for additional information and asked if he/she would respond to a follow-up mail questionnaire. This telephone interview process required between two to three minutes of contact time.

Having agreed to complete a more indepth follow-up survey, a questionnaire was mailed to the household. The respondent was first asked to identify the place visited (along the Texas Gulf Coast) most often and then asked to estimate the time and money spent, the daily hours of participation in each of seven recreation activities as well as an evaluation of the quality of that place for the specific activities considered. Similar questions were asked for the place visited second most often and, with an abridged set of questions, for the place visited third most often. Finally, a series of attitude/evaluation questions were asked concerning the quality of respondents' experiences with particular emphasis on sport fishing.

In order to reduce recall error, the study utilized a "two phase" strategy. A fall survey was conducted which focused on trips made between January 1, 1986 and August 30, 1986. A spring survey was conducted to obtain information concerning travel to the Texas Gulf Coast from September 1, 1986 to December 31, 1986.

The sampling strategy of Texas households was designed to efficiently obtain information describing travel to the Texas Gulf Coast. First, it recognized that there are significant differences in travel patterns among Texans. Previous studies conducted for the Texas Department of Parks and Wildlife indicated that over fifty percent of those households living near the Coast (within 100 miles) regularly visit coastal areas. This contrasts sharply with those households living in El Paso and Amarillo where less than five percent travel to the Coast during any given year. Based upon the results of these previous studies, twelve state regions were identified to reflect the sharp behavioral differences throughout Texas. For each of the respective regions, households were randomly sampled from a panel of names provided by National List, Inc. (a subsidiary of Dun and Bradstreet, Inc.). The list was comprised of a large random sample of those households who own telephones in the state Texas.

Sample sizes for each region were determined with three goals in mind. First, the total number of households contacted should generate as large as possible the number of "completed" surveys for each estuary. Second, a minimum number of completed questionnaires must be generated in each region in order to allow adequate regional analysis and to guarantee sufficient variation within the data. This minimum was established at 100 completed questionnaires. With these first two goals in mind and using the results of previous studies for estimates, those regions where a "high" proportion of households visited the Texas Coast were targeted to generate a relatively large sample of households. Those regions showing low participation in Texas Gulf Coast related activities, on the other hand, were allocated only that number of households needed to generate the "minimum" number of completed surveys. This "step" or "targeted" sampling strategy improved substantially

the efficiency of the population based survey and guaranteed the variability and regional representation required for accurate and reliable statewide expenditures.

The results of the survey are presented in Table A1. For the fall telephone survey, 37,000 telephone numbers of Texas households were obtained and dialed; of these, 30,909 (83.5%) were contacted and resulted in 21,305 completed interviews (68.9%). 9,493 households either refused to participate or terminated the interview while in progress. Completion of the fall telephone phase took ten weeks and required, in total, 57,331 telephone calls.

Written questionnaires were mailed to all households (6152) that indicated they had visited the Texas Gulf Coast between January 1, 1986 and

**Table A1. Results of Fall and Spring Survey**

	Fall	Spring
Sample Size of Telephone Survey (Households)	37,000	16,678
# of Completed Telephone Surveys	21,305	9,486
# of Mailed Surveys	6,152	1,275
# of Returned Surveys	3,516	702
# of Completed Mail Surveys	2,711	513
Response Rate	(57.1%)	(55.1%)



August 31, 1986. To improve response rate of the mail surveys, two follow-up surveys were administered. As a result of this effort, 3516 questionnaires were returned (57.1%). However, 805 of these mail questionnaires were non-usable because they had not been completed correctly. Therefore, 2,711 completed mail interviews were generated by the fall survey effort.

In the second wave (the spring survey), the same procedures were employed to obtain information concerning travel to the Texas Gulf Coast between September 1, 1986 and December 31, 1986. Table 1 presents the results of this survey effort. 16,678 telephone numbers of Texas households were again obtained from National List, Inc. Of these, 12,766 households (76.5%) were contacted, resulting in 9,486 interviewed (56.9%). Follow-up mail surveys were sent to 1,275 households and resulted in 702 returned questionnaires. However, 189 of these questionnaires were deleted because they had not been completed correctly.

#### Recreation Visitation and Expenditure Estimation Procedures

Total visitation and resulting expenditures were estimated following a two phase process. The first phase focused on estimating the total number of households that visited the Trinity-San Jacinto estuary during 1986. As defined by the Texas Water Development Board, the Trinity-San Jacinto estuarine system includes Trinity, Galveston, East and West Bays. The TWDB identified an economic area around this estuary that includes Brazoria, Chambers, Fort Bend, Galveston, Liberty and Harris Counties. The second phase of the estimated the total number of trips and the total dollars spent for transportation, food (restaurant and groceries), equipment rental, guide fees and bait and boat fuel by those households visiting this area along the Texas Gulf Coast. Based upon the results of these two stages, total visitation and expenditure estimates were

developed using the following equations:

$$THN_i = POP_i * P1_i * PN_i \quad (1)$$

$$THF_i = POP_i * P1_i * PF_i \quad (2)$$

where:

$THN_i$  - the total number of households residing in region  $i$  that visited but did not fish at the Trinity-San Jacinto estuary;

$THF_i$  - the total number of households residing in region  $i$  that went fishing at the Trinity-San Jacinto estuary;

$POP_i$  - the population of households in region  $i$ ;

$P1_i$  - the proportion of households from region  $i$  that visited the Texas Gulf Coast during 1986;

$PN_i$  - the proportion of households from region  $i$  that traveled to the Texas Gulf Coast and visited (but did not fish at) places located along Trinity-San Jacinto estuary;

$PF_i$  - the proportion of households from region  $i$  that traveled to the Texas Gulf Coast and went fishing at the Trinity-San Jacinto estuary.

$$TTN_i = THN_i * TRN_i \quad (3)$$

$$TTF_i = THF_i * TRF_i \quad (4)$$

where:

$TTN_i$  - the total number of trips by "nonfishing" households residing in region  $i$  to the Trinity-San Jacinto estuary;

$TTF_i$  - the total number of trips by fishing households residing in region  $i$  to the Trinity-San Jacinto estuary;

$THN_i$  - same as before;

$THF_i$  - same as before;

$TRN_i$  - the mean number of trips per "nonfishing" household taken to the Trinity-San Jacinto estuary from region  $i$ ;

$TRF_i$  - the mean number of trips per "fishing" household taken to the Trinity-San Jacinto estuary from region  $i$ ;

$$TEN_k = \sum_i TTN_i * EXPN_{ik} \quad (5)$$

$$TEF_k = \sum_i TTF_i * EXPF_{ik} \quad (6)$$

where:

$TEN_k$  - the total expenditures by "nonfishing" households that visited the Trinity-San Jacinto estuary for expenditure category k;

$TEF_k$  - the total expenditures by "fishing" households that visited the Trinity-San Jacinto estuary for expenditure category k;

$TTN_i$  - same as before;

$TTF_i$  - same as before;

$EXPN_{ik}$  - the mean expenditure per trip in category k by "nonfishing" households that reside in region i and visit the Trinity-San Jacinto estuary;

$EXPF_{ik}$  - the mean expenditure per trip in category k by "fishing" households that reside in region i and fish in the Trinity-San Jacinto estuary;

$$TEN = \sum_k TEN_k \quad (7)$$

$$TEF = \sum_k TEF_k \quad (8)$$

where:

$TEN$  - the total expenditure level by "nonfishing" households that visited the Trinity-San Jacinto estuary;

$TEF$  - the total expenditure level by households that fished in the Trinity-San Jacinto estuary;

$TEN_k$  - the same as before;

$TEF_k$  - the same as before;

$$TE = TEN + TEF \quad (9)$$

where:

$TE$  - the total expenditure level by Texas residents that visited places along the Trinity-San Jacinto estuary;

$TEN$  - same as before;

$TEF$  - same as before.

In the initial phase of the estimation procedure, households throughout the State were assigned to one of seven regions based upon their county of residence. Six of the regions corresponded to the six estuary "economic" regions developed by the Texas Water Development Board and the seventh region included all "non-estuary" counties. This regionalization process was necessary since visitation behavior including expenditure levels were likely to differ substantially for those households staying close to home (i.e., those who live near to the Coast) as compared to households that must travel farther to visit the Texas Gulf Coast. Based upon this regional distinction, data from the telephone interviews was used to calculate the proportion of households within each area that visited the Texas Gulf Coast during calendar year 1986. Data from the follow-up mail survey was then used to calculate the proportion of those households (given that they have traveled to the Coast) that visited places located along the Trinity-San Jacinto estuary. The total number of households visiting the estuary during 1986 was estimated by multiplying the respective proportions by the total number of households residing within each region (see equation 1). The total number of sport fisherman visiting the Trinity-San Jacinto estuary was estimated following the same procedure and is summarized in equation 2.

The second phase of procedure focused on developing accurate and reliable estimates of the total number of trips each household throughout Texas made to the Trinity-San Jacinto estuary as well as the total dollars expended during these trips. Estimates of total visitation and expenditure levels were developed for "fishing" and "nonfishing" households residing in each of the seven regions and traveling to the Trinity-San Jacinto estuary following equations 3-6. As part of this step in the estimation procedure, statistical analyses were conducted to test for regional differences in visitation and

expenditure levels. These analyses confirmed prior expectations that visitation and expenditure levels vary substantially across Texas. Finally, estimates of the total dollars expended in the Trinity-San Jacinto estuary were calculated using equations 7-9 where the estimated total expenditure per category was summed across categories and then summed for "fishing" and "nonfishing" households.

**Appendix B**  
**Input-Output Methodology**

## Appendix B

### Input-Output Methodology

#### Input-Output Methodology

Both the 1986 Texas Input-Output Model and the Trinity-San Jacinto Input-Output Model developed for this study are of the Leontief structure. As such these models may be expressed in matrix form as:

$$X = (I-A)^{-1} Y \quad (1)$$

where:

- X - a vector of each sector's total value of output
- I - an identity matrix
- A - a matrix of direct requirement coefficients
- Y - a vector of final demand

The X vector in this equation contains the dollar value for each sector that measures that sector's total value of output. The A matrix contains direct requirements coefficients which reflect the degree of interaction among sectors within the regional economy. Each column of this matrix shows the dollar value of purchases made from each sector of the economy per dollar of output by another sector. The Y vector contains values for each sector that measures that sector's total sales to final demand. It is from this model that the final demand, employment and income multipliers, both Type I and Type II, were estimated. A distinct advantage of this input-output technique over other methods is that it provides estimates of both direct and indirect effects of changes in the economy.

State Input-Output Model Development. In this study, a procedure was designed to update the 1979 Texas Input-Output Model to 1986 by a non-survey

technique. This procedure involved; (1) setting up the definitional structure of the 1986 input-output sectors and then aggregation of the 1979 Texas Input-Output Model into these sectors, (2) the construction of state control totals and price indices for each sector, and (3) the development of microcomputer programs to perform the non-survey updating technique and complete the input-output analysis.

The 1986 Texas Input-Output Model was defined as having forty-one sectors. This model contains 34 processing sectors, seven final demand sectors, and seven final payment sectors. It was into this definitional structure that the 1979 Texas Input-Output Model was aggregated. Sector control totals for the 1986 Texas Input-Output Model were first obtained from secondary data for the year 1982. These control totals were then adjusted to 1986 by using wage data from the Texas Employment Commission. Various checks were performed to ascertain the accuracy of each of the 1986 sector control totals estimated. The 1986 price indices for each of the sectors were also obtained from published secondary sources. The methodology employed in constructing the 1986 vector of price indices was essentially the same as that used by the Texas Department of Water Resources in the updating of the Texas Input-Output Model from 1972 to 1979. All price indices in this study use 1979 as a base.

The final step involved in developing the 1986 Texas Input-Output Model was the modification and adoption of the fortran programs designed to update an input-output model and to complete the input-output analysis. The updating procedure first uses the price indices to price adjust the 1979 transaction table and then uses the control totals along with a modified interactive RAS technique to update and near-balance the 1979 transaction table. The program



then uses a balancing routine to completely balance the new 1986 input-output transaction table. Once the 1986 input-output transaction table is formed, the procedure constructs the direct requirements; direct and indirect requirements; and direct, indirect, and induced requirements tables, and the necessary multipliers tables (Types I and II) that are used in this study. The 1986 Texas Input-Output Model developed for this study is available from the Texas Water Development Board.

Regional Input-Output Model Development. Having constructed the 1986 Texas Input-Output Model and its subsequent multipliers, this model is then used to create the Trinity-San Jacinto Estuary Input-Output Model. To estimate this model regional control totals were first constructed using wage data from the Texas Employment Commission and the 1986 state control totals. These regional control totals were then used in conjunction with the location quotient technique to estimate the Trinity-San Jacinto Estuary Input-Output Model. This computerized location quotient program provided the necessary Type II input-output tables and Type II final demand, income, and employment multipliers used to calculate the total regional impacts. Direct requirement coefficients, interdependence coefficients and all multipliers developed for this study are presented in the tables of this appendix. The complete 1986 Trinity-San Jacinto Estuary Region Input-Output Model is available from the Texas Water Development Board.

**Direct Requirement Coefficients for the  
Trinity-San Jacinto Estuary Region, 1986**

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*****
* Sector 1 * Sector 2 * Sector 3 * Sector 4 * Sector 5
*****
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	* Sector 1	* Sector 2	* Sector 3	* Sector 4	* Sector 5
1 Irrigated Agri	.00205381	.00158325	.00976593	.00000803	.00000928
2 Dryland Agri	.00002367	.00284048	.00764938	.00001466	.00001757
3 Lvestock & Pdt	.00000000	.00000000	.02966766	.00477312	.00003338
4 Agri Services	.01686981	.01847727	.00652361	.00532603	.00003298
5 Forestry	.00000000	.00000000	.00000000	.00000000	.04891840
6 Fisheries	.00000000	.00000000	.00000196	.00000000	.00000000
7 Petro & NL,NGL	.00000000	.00000000	.00000000	.00016796	.00000000
8 Other Mining	.00000000	.00000000	.00000000	.00000000	.00021892
9 Construction	.00655001	.00781944	.00172227	.03283992	.01537585
10 Food & Kindred	.00000000	.00000000	.03699024	.00045080	.00009363
11 Text & Apparel	.00000000	.00000000	.00000014	.00000666	.00000000
12 Lum & Pap Pdts	.00093674	.00004255	.00067417	.00001585	.04172008
13 Print & Publih	.00000000	.00000000	.00001116	.00101513	.00000000
14 Chemicals	.05954106	.06930304	.00689888	.14085680	.00076990
15 Petro Refining	.03765839	.06544629	.01064910	.03281003	.00014621
16 Rub Leath Plas	.00322722	.00045272	.00015890	.00026823	.00003986
17 Glas Ston Clay	.00000000	.00000000	.00000535	.00011005	.00002187
18 Prim Metal Pdt	.00010047	.00026029	.00000778	.00000000	.00000000
19 Fab Metal Pdts	.00048626	.00053546	.00078191	.00029607	.00013695
20 Non-Elec Mach	.00172062	.00205477	.00050009	.01027858	.00002036
21 Elec Machinery	.00005505	.00014483	.00005248	.00007640	.00007130
22 Transpor Equip	.00191371	.00228470	.00035710	.00061024	.00000000
23 Instruments	.00000000	.00000000	.00000000	.00000000	.00000000
24 Misc Manufactu	.00003828	.00004304	.00003238	.00010842	.00001858
25 Transportation	.00503802	.00513482	.01031209	.00877829	.05606225
26 Communications	.00047626	.00051825	.00059727	.00179042	.00137352
27 Utilities	.10626240	.00246020	.00837118	.03700078	.00179107
28 Wholesale Trde	.01631268	.02173501	.04530906	.07474709	.09709843
29 Eat&Drink Estb	.00000000	.00000000	.00008118	.00031315	.00004627
30 Other Ret Trde	.02411779	.03255943	.02843316	.01326631	.01308685
31 F.I.R.E.	.06086852	.05776057	.05037921	.04578174	.00288158
32 Health Service	.00000000	.00000000	.00000000	.00000000	.00000000
33 Educ Services	.00081701	.00085507	.00063991	.00028071	.00001046
34 Other Services	.00777772	.00044473	.00135891	.02490716	.02451844
35 Households	.23157480	.29148720	.19394390	.22076810	.11675210

Direct Requirements, Cont'd.

	* Sector 6	* Sector 7	* Sector 8	* Sector 9	* Sector 10
1 Irrigated Agri	.00002407	.00000000	.00000000	.00000000	.00444416
2 Dryland Agri	.00004461	.00000000	.00000000	.00000019	.00297790
3 Lvestock & Pdt	.00009103	.00000000	.00000000	.00000000	.03299376
4 Agri Services	.00008355	.00000000	.00000000	.00086035	.00000000
5 Forestry	.00000000	.00000000	.00000000	.00000000	.00002903
6 Fisheries	.00167069	.00000000	.00000000	.00000000	.00679948
7 Petro & NL,NGL	.00014883	.13240600	.00000000	.00000030	.00472361
8 Other Mining	.00000000	.00028313	.00121777	.01782746	.00018352
9 Construction	.03497890	.00211409	.00726091	.00300918	.00310708
10 Food & Kindred	.00740024	.00002057	.00008896	.00000281	.04985431
11 Text & Apparel	.00059892	.00000307	.00001673	.00004813	.00016193
12 Lum & Pap Pdts	.00313590	.00009210	.00008507	.00513096	.00832178
13 Print & Publih	.00000000	.00048053	.00015230	.00051314	.00178654
14 Chemicals	.00114260	.00220896	.02352327	.00481593	.00484567
15 Petro Refining	.11774530	.00941689	.02985810	.02304116	.01034541
16 Rub Leath Plas	.00003734	.00002715	.00378740	.00240534	.00157661
17 Glas Ston Clay	.00000000	.00016505	.00286611	.02870333	.00674447
18 Prim Metal Pdt	.00008231	.00003723	.00496784	.01840705	.00064596
19 Fab Metal Pdts	.00008642	.00029740	.00399800	.04743746	.02529095
20 Non-Elec Mach	.00010082	.00538572	.04236268	.00852928	.00103537
21 Elec Machinery	.00004156	.00174080	.00418880	.00459452	.00020026
22 Transpor Equip	.01927158	.00002853	.00225829	.00042949	.00004090
23 Instruments	.00000000	.00002642	.00000000	.00108517	.00015913
24 Misc Manufactu	.00003685	.00001057	.00000000	.00037694	.00059479
25 Transportation	.01097951	.00706460	.03575197	.01147321	.01662647
26 Communications	.00116824	.00133516	.00142386	.00278522	.00542280
27 Utilities	.00312676	.00834607	.03343906	.00389592	.02026415
28 Wholesale Trde	.05465273	.00906190	.00657548	.02875385	.03619774
29 Eat&Drink Estb	.00053289	.00044316	.00000000	.00039591	.00498862
30 Other Ret Trde	.01206872	.00177175	.00446511	.00653460	.00644121
31 F.I.R.E.	.10139850	.03412973	.07163508	.06630918	.01766336
32 Health Service	.00000000	.00011252	.00000000	.00000372	.00012055
33 Educ Services	.00028644	.00338453	.00206263	.00027967	.00022741
34 Other Services	.01687014	.02282536	.03398088	.08019961	.01771133
35 Households	.28293940	.27282900	.24876390	.27599330	.11707170

Direct Requirements, Cont'd.

	* Sector 11 *	* Sector 12 *	* Sector 13 *	* Sector 14 *	* Sector 15
1 Irrigated Agri	.00228859	.00008409	.00012474	.00016215	.00000075
2 Dryland Agri	.00074078	.00006679	.00009910	.00012918	.00000059
3 Lvestock & Pdt	.00055287	.00052265	.00077287	.00099901	.00000460
4 Agri Services	.00000000	.00000000	.00000000	.00000011	.00000000
5 Forestry	.00000997	.01663273	.00008076	.00011434	.00000048
6 Fisheries	.00001976	.00010612	.00015825	.00020460	.00000094
7 Petro & NL,NGL	.00166682	.00879858	.01302135	.04356515	.19067440
8 Other Mining	.00007245	.00051452	.00051299	.00324440	.00027350
9 Construction	.00103540	.01150518	.00481601	.01976088	.01269514
10 Food & Kindred	.00007681	.00042073	.00062312	.00084876	.00000645
11 Text & Apparel	.00247995	.00010518	.00005224	.00002126	.00000583
12 Lum & Pap Pdts	.00280426	.02834883	.01900600	.00178694	.00106991
13 Print & Publih	.00353093	.00070115	.03690126	.00102143	.00028256
14 Chemicals	.00381800	.02438916	.01353726	.16051660	.05827928
15 Petro Refining	.00319998	.00753515	.01353216	.11241410	.11106620
16 Rub Leath Plas	.00031080	.00365471	.00073747	.00155302	.00014665
17 Glas Ston Clay	.00005542	.00022295	.00030965	.00044828	.00009658
18 Prim Metal Pdt	.00265891	.00303795	.00148423	.00431004	.00162247
19 Fab Metal Pdts	.00388332	.00269364	.00252008	.00373969	.00532315
20 Non-Elec Mach	.00158174	.00791058	.00451443	.00433531	.00126238
21 Elec Machinery	.00016819	.00027127	.00043266	.00054457	.00057698
22 Transpor Equip	.00001955	.00003611	.00007921	.00010836	.00001442
23 Instruments	.00002720	.00011085	.00262665	.00041129	.00028972
24 Misc Manufactu	.00340373	.00009212	.00298751	.00027305	.00002098
25 Transportation	.01327827	.02271142	.01792498	.02097035	.03571086
26 Communications	.00231801	.00247997	.00610316	.00179540	.00066537
27 Utilities	.02899227	.04359061	.01991436	.09100508	.03248690
28 Wholesale Trde	.01249410	.05687841	.02456048	.03453054	.02588077
29 Eat&Drink Estb	.00062908	.00032251	.00104599	.00032214	.00005328
30 Other Ret Trde	.00092729	.01220084	.00418034	.00479715	.00025515
31 F.I.R.E.	.05618911	.02644633	.02166819	.02025549	.02765360
32 Health Service	.00001589	.00000765	.00001488	.00003972	.00001156
33 Educ Services	.00055751	.00004553	.00017968	.00032833	.00088399
34 Other Services	.01792399	.00893393	.02527411	.01387184	.01543204
35 Households	.31523740	.19484080	.28340580	.08365364	.04349186

Direct Requirements, Cont'd.

	* Sector 16 *	* Sector 17 *	* Sector 18 *	* Sector 19 *	* Sector 20
1 Irrigated Agri	.00002004	.00002314	.00007478	.00006051	.00004870
2 Dryland Agri	.00083932	.00001858	.00005956	.00004817	.00003852
3 Lvestock & Pdt	.00012830	.00014298	.00046191	.00037617	.00032812
4 Agri Services	.00000000	.00000000	.00000000	.00000000	.00000000
5 Forestry	.00001314	.00001501	.00004830	.00003909	.00003547
6 Fisheries	.00002331	.00002940	.00009466	.00007577	.00006097
7 Petro & NL,NGL	.00255354	.00241610	.00777204	.00632953	.00507520
8 Other Mining	.00009895	.05226510	.01160991	.00027769	.00021394
9 Construction	.00454140	.00244705	.01054828	.00601780	.00460909
10 Food & Kindred	.00189429	.00040991	.00047003	.00054806	.00025733
11 Text & Apparel	.00018714	.00000388	.00001703	.00001766	.00013257
12 Lum & Pap Pdts	.00299369	.00620580	.00074625	.00148241	.00129958
13 Print & Publih	.00125608	.00051974	.00051897	.00167060	.00102253
14 Chemicals	.15596740	.00417098	.01261641	.01473251	.00509615
15 Petro Refining	.00371277	.00367666	.01371703	.00834831	.00707416
16 Rub Leath Plas	.00994363	.00116157	.00097625	.00348749	.01023174
17 Glas Ston Clay	.00006215	.02586497	.00083512	.00200780	.00134389
18 Prim Metal Pdt	.00077658	.00082359	.05833587	.03658009	.02920286
19 Fab Metal Pdts	.00195233	.00075120	.00371312	.04001800	.03355392
20 Non-Elec Mach	.00720410	.00203409	.00334195	.00574461	.02378522
21 Elec Machinery	.00023243	.00007809	.00130911	.00153847	.00629429
22 Transpor Equip	.00001050	.00004846	.00004727	.00047993	.00014344
23 Instruments	.00002715	.00001837	.00010119	.00015991	.00269943
24 Misc Manufactu	.00031152	.00015991	.00040895	.00045645	.00047512
25 Transportation	.02598173	.08722020	.03044311	.02852628	.01401289
26 Communications	.00281367	.00283046	.00150892	.00340572	.00324299
27 Utilities	.03867956	.09905584	.09287051	.03445733	.01734867
28 Wholesale Trde	.02937015	.02811004	.03547598	.04323363	.04951309
29 Eat&Drink Estb	.00029535	.00027921	.00016394	.00071575	.00070716
30 Other Ret Trde	.00766638	.00519908	.03317999	.00397089	.00524507
31 F.I.R.E.	.02413259	.03518215	.02324847	.03008192	.03746065
32 Health Service	.00001188	.00005296	.00006768	.00003309	.00005141
33 Educ Services	.00016532	.00059801	.00019568	.00028890	.00021538
34 Other Services	.01141121	.02492659	.02633868	.01806690	.01924274
35 Households	.22471380	.19387880	.18548270	.26449780	.28388020

Direct Requirements, Cont'd.

	* Sector 21 *	* Sector 22 *	* Sector 23 *	* Sector 24 *	* Sector 25
1 Irrigated Agri	.00004574	.00003229	.00004747	.00002042	.00000000
2 Dryland Agri	.00003656	.00002557	.00003867	.00001738	.00000000
3 Lvestock & Pdt	.00028259	.00020008	.00031561	.00013598	.00000000
4 Agri Services	.00000000	.00000000	.00000344	.00000000	.00000000
5 Forestry	.00002951	.00002096	.00003120	.00001424	.00000000
6 Fisheries	.00005800	.00004025	.00006130	.00002757	.00000000
7 Petro & NL,NGL	.00502300	.00338198	.00534105	.00239658	.00030656
8 Other Mining	.00021733	.00014476	.00020799	.00009034	.00029812
9 Construction	.00222629	.00490993	.00355173	.00174669	.00542201
10 Food & Kindred	.00024581	.00021224	.00209434	.00016027	.00017610
11 Text & Apparel	.00000937	.00004244	.00000797	.00069973	.00000834
12 Lum & Pap Pdts	.00117195	.00329431	.00166500	.01231269	.00066209
13 Print & Publih	.00163250	.00319528	.00346337	.00738980	.00101195
14 Chemicals	.01158199	.01444459	.00917241	.05554326	.00149839
15 Petro Refining	.00457867	.00502262	.00712799	.00424435	.07704464
16 Rub Leath Plas	.00664477	.00483771	.00644595	.02111181	.00322864
17 Glas Ston Clay	.00034942	.00260114	.00495977	.00305912	.00044167
18 Prim Metal Pdt	.01077536	.01344800	.01974252	.00830265	.00069423
19 Fab Metal Pdts	.00560942	.02865799	.01144545	.01979332	.00205146
20 Non-Elec Mach	.00381281	.00642500	.02758567	.00441058	.00242653
21 Elec Machinery	.03114343	.00610461	.00180156	.01133304	.00209128
22 Transpor Equip	.00082579	.00835427	.00001960	.00263172	.00696587
23 Instruments	.00112925	.00071818	.03429157	.01261561	.00146527
24 Misc Manufactu	.00061377	.00043422	.00368592	.00223436	.00006314
25 Transportation	.00650768	.01765325	.02544197	.01120522	.03356349
26 Communications	.00510845	.00235095	.00526068	.00395956	.01107662
27 Utilities	.01368284	.01749189	.03769261	.01723584	.02055017
28 Wholesale Trde	.02890066	.04139225	.03265658	.04145112	.02554149
29 Eat&Drink Estb	.00015674	.00013552	.00206143	.00036254	.00056008
30 Other Ret Trde	.00466457	.00450239	.00244736	.00525528	.00458206
31 F.I.R.E.	.03122880	.01407394	.03948991	.03312948	.10078400
32 Health Service	.00003166	.00002801	.00093832	.00000000	.00000061
33 Educ Services	.00019006	.00028978	.00040217	.00040660	.00055777
34 Other Services	.01833322	.01879432	.03671023	.02611850	.02905966
35 Households	.34985180	.25269920	.25026120	.31259750	.32707970

Direct Requirements, Cont'd.

	* Sector 26 *	* Sector 27 *	* Sector 28 *	* Sector 29 *	* Sector 30
1 Irrigated Agri	.00000000	.00000000	.00004492	.00327319	.00063635
2 Dryland Agri	.00000000	.00000000	.00003583	.00000169	.00000000
3 Lvestock & Pdt	.00000000	.00000000	.00004509	.00493499	.00000361
4 Agri Services	.00000000	.00000000	.00000167	.00000000	.00000000
5 Forestry	.00000000	.00000000	.00002894	.00000000	.00000000
6 Fisheries	.00000000	.00000000	.00005675	.00013589	.00000048
7 Petro & NL,NGL	.00000000	.22767670	.00630064	.00001830	.00008580
8 Other Mining	.00000000	.00664207	.00019088	.00000000	.00000033
9 Construction	.00064708	.00275170	.00667133	.00279252	.00152266
10 Food & Kindred	.00000000	.00000000	.00024409	.07713886	.00082326
11 Text & Apparel	.00000343	.00001525	.00002550	.00002425	.00006946
12 Lum & Pap Pdts	.00339418	.00252855	.00085096	.00111272	.00041188
13 Print & Publih	.01611647	.00129007	.00587526	.01156616	.02321759
14 Chemicals	.00013950	.00272018	.00442134	.00039929	.00028213
15 Petro Refining	.01199047	.00541332	.01600232	.00313711	.01131074
16 Rub Leath Plas	.00010119	.00020773	.00216921	.00009865	.00017788
17 Glas Ston Clay	.00011752	.00150642	.00018979	.00002023	.00000416
18 Prim Metal Pdt	.00012061	.00020562	.00071578	.00000150	.00000645
19 Fab Metal Pdts	.00014341	.00512237	.00160047	.00140891	.00011947
20 Non-Elec Mach	.00025417	.00030101	.00162560	.00645955	.00068623
21 Elec Machinery	.00512834	.00035739	.00039235	.00091828	.00122195
22 Transpor Equip	.00017370	.00002938	.00045489	.00029829	.00126436
23 Instruments	.00009487	.00033446	.00012324	.00000000	.00000000
24 Misc Manufactu	.00002888	.00002292	.00044715	.00197580	.00061180
25 Transportation	.00448619	.00317463	.02213020	.00273353	.00416211
26 Communications	.00715024	.00174032	.01220615	.00625336	.01112129
27 Utilities	.01938337	.16626290	.04224626	.03931225	.02480496
28 Wholesale Trde	.00263541	.00773283	.01930671	.04054704	.05276410
29 Eat&Drink Estb	.00070471	.00000000	.00293213	.00017502	.00081628
30 Other Ret Trde	.00007402	.00236933	.00772852	.00663198	.02963551
31 F.I.R.E.	.06317044	.03803104	.09867255	.08949637	.10437690
32 Health Service	.00002323	.00000000	.00003243	.00000626	.00013236
33 Educ Services	.00399927	.00276639	.00073193	.00024968	.00053121
34 Other Services	.01916203	.01959683	.03613423	.05936989	.02938833
35 Households	.27127610	.11841620	.33597490	.27574980	.30502330

Direct Requirements, Cont'd.

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*****
* Sector 31 * Sector 32 * Sector 33 * Sector 34 * Households
*****
1 Irrigated Agri .00000000 .00000000 .00000000 .00000000 .00012725
2 Dryland Agri .00000000 .00000000 .00000000 .00000000 .00020274
3 Lvestock & Pdt .00000000 .00001253 .00000000 .00000154 .00023497
4 Agri Services .00000000 .00000000 .00000000 .00000000 .00000000
5 Forestry .00000000 .00000000 .00000000 .00000000 .00000000
6 Fisheries .00000000 .00000000 .00000000 .00000000 .00011573
7 Petro & NL,NGL .00026838 .00000000 .00000000 .00000000 .00071411
8 Other Mining .00000000 .00000000 .00000000 .00000332 .00000000
9 Construction .01268603 .00235857 .00173370 .00656257 .00285701
10 Food & Kindred .00008350 .00246914 .01806844 .00228717 .03223885
11 Text & Apparel .00000566 .00004863 .00001658 .00009823 .00042113
12 Lum & Pap Pdts .00072391 .00066310 .00345620 .00082873 .00057435
13 Print & Publih .00506587 .00355832 .00607422 .01021953 .00317493
14 Chemicals .00025176 .00617367 .00433987 .00711581 .00349167
15 Petro Refining .00079362 .00196303 .00357552 .01351199 .03702909
16 Rub Leath Plas .00002845 .00056353 .00085058 .00609932 .00173503
17 Glas Ston Clay .00028888 .00008652 .00015972 .00022829 .00032764
18 Prim Metal Pdt .00002711 .00003503 .00024483 .00097235 .00029380
19 Fab Metal Pdts .00031546 .00159346 .00218868 .01166955 .00087568
20 Non-Elec Mach .00002230 .00064477 .00191494 .00779309 .00012785
21 Elec Machinery .00013426 .00112696 .00222536 .00148157 .00030886
22 Transpor Equip .00000472 .00018479 .00006876 .00185678 .00391952
23 Instruments .00000000 .00762918 .01573777 .00715603 .00047974
24 Misc Manufactu .00017007 .00061614 .00094213 .00216677 .00028262
25 Transportation .00124524 .00872939 .00306928 .01049153 .01932241
26 Communications .01102694 .00881605 .00560558 .01299550 .00466298
27 Utilities .02187706 .04152223 .04191715 .02673903 .03362034
28 Wholesale Trde .00562511 .03480658 .00980721 .02960476 .07121322
29 Eat&Drink Estb .00090239 .00243755 .00020562 .00235989 .01920691
30 Other Ret Trde .00014576 .00345081 .00184503 .00477640 .06906566
31 F.I.R.E. .19568400 .10628800 .05406900 .09003754 .09925707
32 Health Service .00068967 .01783810 .00018842 .00106168 .03968562
33 Educ Services .00104058 .00047275 .00003847 .00043355 .00185905
34 Other Services .04663666 .06120278 .02513362 .04708024 .05234925
35 Households .33917720 .40227400 .55232570 .38439440 .05547290

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Interdependence Coefficients for the  
Trinity-San Jacinto Estuary Region, 1986

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*****
* Sector 1 * Sector 2 * Sector 3 * Sector 4 * Sector 5
*****
1 Irrigated Agri 1.00230100 .00186463 .01048907 .00033187 .00017411
2 Dryland Agri .00020213 1.00304500 .00817442 .00025778 .00013768
3 Lvestock & Pdt .00095918 .00106684 1.03264300 .00601121 .00061262
4 Agri Services .01702300 .01868686 .00710932 1.00544300 .00006336
5 Forestry .00006242 .00004542 .00004506 .00006613 1.05225000
6 Fisheries .00020206 .00022517 .00043256 .00024414 .00013754
7 Petro & NL,NGL .07043045 .04780640 .02377949 .06079671 .01825553
8 Other Mining .00190264 .00119740 .00063739 .00236608 .00105513
9 Construction .01576439 .01768924 .00780844 .04437580 .02160881
10 Food & Kindred .01769838 .01964244 .05470246 .01970597 .01212013
11 Text & Apparel .00023058 .00025277 .00019349 .00025834 .00016277
12 Lum & Pap Pdts .00275493 .00166295 .00214895 .00215096 .04623446
13 Print & Publih .00604938 .00642990 .00520435 .00778781 .00463351
14 Chemicals .08532353 .09918074 .01787134 .18123750 .00820275
15 Petro Refining .08243981 .11754480 .03980372 .09272092 .02741004
16 Rub Leath Plas .00515752 .00246054 .00171598 .00286836 .00193282
17 Glas Ston Clay .00123131 .00114451 .00095733 .00219387 .00106811
18 Prim Metal Pdt .00177230 .00210345 .00095234 .00314184 .00130009
19 Fab Metal Pdts .00536998 .00520896 .00463043 .00749477 .00379568
20 Non-Elec Mach .00418762 .00446718 .00193672 .01381799 .00201554
21 Elec Machinery .00103494 .00112379 .00070733 .00137798 .00086845
22 Transpor Equip .00430998 .00493163 .00240321 .00327171 .00208807
23 Instruments .00113927 .00112356 .00081775 .00145052 .00098340
24 Misc Manufactu .00053005 .00055864 .00044516 .00073902 .00043244
25 Transportation .02549664 .02796873 .02614229 .03457680 .07551640
26 Communications .00866311 .00904821 .00766959 .01146686 .00853110
27 Utilities .17793530 .05918296 .04805139 .11116080 .03726910
28 Wholesale Trde .07086939 .08152824 .09000691 .13730550 .14127580
29 Eat&Drink Estb .01009895 .01118472 .00864329 .01134053 .00718598
30 Other Ret Trde .06218548 .07469364 .06120072 .05453419 .04044909
31 F.I.R.E. .18737760 .18857040 .15427820 .18590740 .09467436
32 Health Service .01973079 .02191943 .01623267 .02105876 .01332371
33 Educ Services .00294124 .00273014 .00202577 .00237013 .00116343
34 Other Services .06218069 .05659345 .04364374 .08703674 .06474872
35 Households .48268840 .53696690 .39729530 .51478120 .32594910
TOT INT COEF 2.43824400 2.42984900 2.08079900 2.63164900 2.01762900

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Interdependence Coefficients, Cont'd.

	* Sector 6	* Sector 7	* Sector 8	* Sector 9	* Sector 10
1 Irrigated Agri	.00033521	.00022326	.00023635	.00027384	.00521478
2 Dryland Agri	.00027354	.00017106	.00018409	.00020946	.00353378
3 Lvestock & Pdt	.00134365	.00083381	.00089789	.00102823	.03640903
4 Agri Services	.00014299	.00001953	.00002678	.00089085	.00040089
5 Forestry	.00010014	.00002759	.00004090	.00013708	.00021661
6 Fisheries	1.00195700	.00019398	.00020725	.00023730	.00730579
7 Petro & NL,NGL	.05637405	1.17636000	.04246996	.03450761	.03079179
8 Other Mining	.00152398	.00094436	1.00260700	.02052189	.00128345
9 Construction	.04513228	.00806804	.01541081	1.01204500	.00839781
10 Food & Kindred	.02923599	.01851170	.01885457	.02163756	1.06545100
11 Text & Apparel	.00088016	.00023791	.00026455	.00033203	.00032172
12 Lum & Pap Pdt	.00522559	.00130111	.00172047	.00718894	.01016830
13 Print & Publih	.00714448	.00570234	.00612998	.00788468	.00592458
14 Chemicals	.01960933	.01038050	.03938791	.01913773	.01406532
15 Petro Refining	.17048860	.04104721	.07084980	.06465100	.03585699
16 Rub Leath Plas	.00245732	.00184749	.00641445	.00542840	.00316311
17 Glas Ston Clay	.00209702	.00094787	.00411791	.03067233	.00799514
18 Prim Metal Pdt	.00256934	.00115865	.00828867	.02334382	.00267011
19 Fab Metal Pdt	.00730344	.00382141	.01026055	.05493898	.03054427
20 Non-Elec Mach	.00277311	.00781907	.04563946	.01252019	.00276558
21 Elec Machinery	.00135389	.00280650	.00558522	.00601994	.00089673
22 Transpor Equip	.02238642	.00244840	.00500857	.00352062	.00185105
23 Instruments	.00140698	.00121891	.00149902	.00295098	.00099222
24 Misc Manufactu	.00065538	.00048258	.00056588	.00112992	.00099518
25 Transportation	.03738632	.02447883	.05714395	.03867792	.03211091
26 Communications	.01151849	.00864561	.01023816	.01325281	.01135738
27 Utilities	.06010471	.04945446	.08855060	.06449888	.05738284
28 Wholesale Trde	.11878070	.05862793	.06244907	.09346427	.07453889
29 Eat&Drink Estb	.01292280	.01092640	.01071538	.01282184	.01170819
30 Other Ret Trde	.05721522	.03981398	.04391540	.05250654	.03195340
31 F.I.R.E.	.25812040	.14722360	.20294180	.21642260	.10062210
32 Health Service	.02395424	.02074005	.02091606	.02402936	.01248295
33 Educ Services	.00243161	.00542324	.00391932	.00230194	.00143095
34 Other Services	.08376315	.07319434	.08975673	.14505320	.05294607
35 Households	.58540360	.50508890	.51111510	.58625530	.30216250
TOT INT COEF	2.63437100	2.23019100	2.38833000	2.58049200	1.96591200

Interdependence Coefficients, Cont'd.

	* Sector 11 *	* Sector 12 *	* Sector 13 *	* Sector 14 *	* Sector 15
1 Irrigated Agri	.00253920	.00029561	.00037861	.00037676	.00015345
2 Dryland Agri	.00092847	.00022597	.00029132	.00029237	.00011787
3 Lvestock & Pdt	.00144691	.00129638	.00173326	.00186972	.00060350
4 Agri Services	.00007621	.00003444	.00003342	.00005164	.00002733
5 Forestry	.00009133	.01804597	.00047578	.00021885	.00005872
6 Fisheries	.00022329	.00028252	.00037373	.00039331	.00013842
7 Petro & NL,NGL	.03137026	.04736247	.04734115	.14639280	.28249310
8 Other Mining	.00089022	.00180740	.00146043	.00596476	.00176429
9 Construction	.00724971	.01840384	.01159489	.03147717	.02131941
10 Food & Kindred	.01927787	.01567833	.01953895	.01396774	.01131288
11 Text & Apparel	1.00273200	.00030694	.00029908	.00019759	.00015593
12 Lum & Pap Pdts	.00429840	1.03132600	.02172599	.00391553	.00252325
13 Print & Publih	.00908705	.00581144	1.04386800	.00596883	.00442724
14 Chemicals	.01237430	.03802648	.02613160	1.20917000	.08511733
15 Petro Refining	.03464916	.04031917	.04943171	.17909640	1.16070700
16 Rub Leath Plas	.00222143	.00560676	.00290826	.00365699	.00181388
17 Glas Ston Clay	.00086520	.00134990	.00128273	.00217688	.00128675
18 Prim Metal Pdt	.00396818	.00495424	.00317481	.00760550	.00375701
19 Fab Metal Pdts	.00752679	.00702230	.00684403	.01050833	.01029538
20 Non-Elec Mach	.00319980	.01019322	.00691893	.00817856	.00479070
21 Elec Machinery	.00096886	.00117235	.00140202	.00188560	.00192021
22 Transpor Equip	.00257002	.00222356	.00266479	.00210920	.00185212
23 Instruments	.00119984	.00111133	.00406843	.00161459	.00133207
24 Misc Manufactu	.00390236	.00052928	.00361844	.00075120	.00041123
25 Transportation	.03059966	.04169429	.03776751	.04677683	.05723626
26 Communications	.00997778	.00981894	.01406425	.00922162	.00727181
27 Utilities	.07549135	.09372719	.06834763	.17109990	.08381279
28 Wholesale Trde	.06312906	.10502120	.07816183	.08548633	.06766886
29 Eat&Drink Estb	.01148491	.00911097	.01176830	.00788587	.00669755
30 Other Ret Trde	.04051385	.04533524	.04360925	.03376644	.02489556
31 F.I.R.E.	.17365360	.13184020	.13665350	.13091840	.12775150
32 Health Service	.02146856	.01693834	.02096040	.01432310	.01252155
33 Educ Services	.00225545	.00164410	.00191259	.00252615	.00312019
34 Other Services	.06811415	.05496085	.07655516	.06462702	.06084466
35 Households	.52564420	.41469120	.51333520	.34846680	.30456260
TOT INT COEF	2.17599000	2.17816800	2.26069600	2.55293900	2.35476200

Interdependence Coefficients, Cont'd.

	* Sector 16 *	* Sector 17 *	* Sector 18 *	* Sector 19 *	* Sector 20
1 Irrigated Agri	.00027664	.00024263	.00031133	.00031139	.00030795
2 Dryland Agri	.00104199	.00018571	.00022476	.00024065	.00024271
3 Lvestock & Pdt	.00116593	.00095945	.00128053	.00132315	.00129517
4 Agri Services	.00004439	.00002266	.00003358	.00003033	.00002885
5 Forestry	.00012774	.00016556	.00010416	.00010846	.00010028
6 Fisheries	.00025600	.00021847	.00028125	.00029225	.00028320
7 Petro & NL,NGL	.05497034	.05831783	.06511320	.04523061	.03735360
8 Other Mining	.00187942	.05523684	.01402077	.00196369	.00157601
9 Construction	.01445108	.00998677	.01797239	.01352913	.01202737
10 Food & Kindred	.01897591	.01776515	.01683343	.01956556	.02015991
11 Text & Apparel	.00041095	.00023061	.00023317	.00026319	.00039253
12 Lum & Pap Pdt	.00488217	.00818483	.00243036	.00314658	.00293266
13 Print & Publih	.00671246	.00625299	.00665062	.00757269	.00717154
14 Chemicals	.19674720	.01538330	.02516680	.02803847	.01767918
15 Petro Refining	.05819549	.04353217	.04971751	.04586137	.04289844
16 Rub Leath Plas	1.01221500	.00360215	.00307915	.00580436	.01283129
17 Glas Ston Clay	.00119898	1.02775200	.00217493	.00321688	.00248444
18 Prim Metal Pdt	.00317518	.00251791	1.06362000	.04191263	.03443868
19 Fab Metal Pdt	.00698396	.00552008	.00885555	1.04613200	.03989161
20 Non-Elec Mach	.01010479	.00661324	.00630507	.00824366	1.02668000
21 Elec Machinery	.00126574	.00138910	.00249878	.00265353	.00761958
22 Transpor Equip	.00244126	.00310557	.00251841	.00318976	.00285778
23 Instruments	.00120311	.00137269	.00134572	.00140362	.00409069
24 Misc Manufactu	.00081823	.00066503	.00094122	.00100563	.00105827
25 Transportation	.04827807	.11182700	.05130533	.05070993	.03601906
26 Communications	.01062166	.01177490	.00973107	.01188794	.01199425
27 Utilities	.10611900	.16627350	.15989730	.09204214	.07149421
28 Wholesale Trde	.08378734	.08007591	.08693740	.09919550	.10744270
29 Eat&Drink Estb	.00997442	.01023273	.00955577	.01156784	.01208312
30 Other Ret Trde	.04403013	.04225402	.07061046	.04503714	.04790203
31 F.I.R.E.	.13831990	.16617890	.14219320	.15348880	.16483000
32 Health Service	.01876824	.01935534	.01820317	.02113190	.02216535
33 Educ Services	.00197656	.00273279	.00215779	.00212766	.00202628
34 Other Services	.06201132	.08054429	.07890025	.07243417	.07499254
35 Households	.45939840	.47206630	.44344660	.51689590	.54168720
TOT INT COEF	2.38282900	2.43253800	2.36465100	2.35755800	2.36903800

Interdependence Coefficients, Cont'd.

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* Sector 21 * Sector 22 * Sector 23 * Sector 24 * Sector 25
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1 Irrigated Agri .00031564 .00025254 .00031045 .00030689 .00028096
2 Dryland Agri .00024862 .00019730 .00023985 .00025244 .00021651
3 Lvestock & Pdt .00129483 .00102826 .00133355 .00122805 .00104540
4 Agri Services .00002651 .00002449 .00003185 .00002743 .00002873
5 Forestry .00008822 .00011672 .00010607 .00028941 .00005138
6 Fisheries .00029166 .00023160 .00029053 .00027830 .00024344
7 Petro & NL,NGL .03472776 .03210977 .04429468 .04103747 .05172674
8 Other Mining .00117426 .00131367 .00181921 .00152702 .00136742
9 Construction .00908724 .01111754 .01110983 .01065632 .01491700
10 Food & Kindred .02166137 .01725768 .02154189 .02177472 .02301351
11 Text & Apparel .00028362 .00026364 .00026258 .00098546 .00030149
12 Lum & Pap Pdt .00272575 .00481550 .00351881 .01465227 .00251160
13 Print & Publih .00778196 .00844401 .00983221 .01429228 .00830624
14 Chemicals .02395170 .02643245 .02213662 .08075294 .01734133
15 Petro Refining .04081048 .03732595 .04378686 .04958202 .12655790
16 Rub Leath Plas .00903116 .00695744 .00932323 .02400269 .00571483
17 Glas Ston Clay .00127644 .00363035 .00635011 .00427634 .00164212
18 Prim Metal Pdt .01328250 .01693892 .02437765 .01179384 .00250965
19 Fab Metal Pdt .00995986 .03389637 .01777884 .02563673 .00746362
20 Non-Elec Mach .00591061 .00861079 .03155501 .00762550 .00487747
21 Elec Machinery 1.03303400 .00722235 .00313534 .01279856 .00335114
22 Transpor Equip .00365169 1.01079400 .00274892 .00557503 .01023836
23 Instruments .00243976 .00185333 1.03701600 .01450930 .00303707
24 Misc Manufactu .00117761 .00092730 .00441961 1.00292700 .00069486
25 Transportation .02677361 .03658873 .04778435 .03567150 1.05876000
26 Communications .01356424 .00965463 .01425050 .01334829 .02156584
27 Utilities .06419019 .06377758 .09565153 .07967821 .07976584
28 Wholesale Trde .08704261 .09081420 .08994742 .10519370 .08994041
29 Eat&Drink Estb .01229953 .00987793 .01309005 .01268272 .01361135
30 Other Ret Trde .04943870 .04075838 .04327530 .05094789 .05189243
31 F.I.R.E. .15688420 .11915640 .16818820 .16887280 .25927220
32 Health Service .02395958 .01900394 .02224616 .02397351 .02553062
33 Educ Services .00201975 .00182920 .00228668 .00237783 .00279633
34 Other Services .07370199 .06557810 .09347656 .08610377 .09526522
35 Households .58687930 .46524420 .52003350 .58708520 .62412260
TOT INT COEF 2.32098700 2.15404600 2.40755000 2.51272300 2.60996100

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Interdependence Coefficients, Cont'd.

	* Sector 26 *	* Sector 27 *	* Sector 28 *	* Sector 29 *	* Sector 30
1 Irrigated Agri	.00020548	.00018289	.00033730	.00398044	.00092900
2 Dryland Agri	.00015772	.00013990	.00025255	.00050164	.00020791
3 Lvestock & Pdt	.00077518	.00068261	.00111241	.00881346	.00103410
4 Agri Services	.00001703	.00001834	.00003263	.00014440	.00003501
5 Forestry	.00009217	.00007902	.00008559	.00007541	.00005284
6 Fisheries	.00017939	.00015889	.00030197	.00091439	.00024021
7 Petro & NL,NGL	.02586277	.33392410	.04898605	.03716322	.03434891
8 Other Mining	.00063443	.00871582	.00136466	.00106922	.00088182
9 Construction	.00627775	.00931232	.01511780	.01099944	.00970733
10 Food & Kindred	.01692340	.01498803	.02330407	.10238660	.02263176
11 Text & Apparel	.00021791	.00021090	.00031927	.00031067	.00035082
12 Lum & Pap Pdts	.00496966	.00424198	.00275046	.00373010	.00252602
13 Print & Publih	.02160907	.00635894	.01341951	.01926975	.03180242
14 Chemicals	.00740972	.01148759	.01573949	.01039507	.00988405
15 Petro Refining	.03960895	.03518517	.05655632	.03901468	.04804340
16 Rub Leath Plas	.00171163	.00187793	.00455427	.00268602	.00241619
17 Glas Ston Clay	.00080412	.00264874	.00138354	.00161345	.00097349
18 Prim Metal Pdt	.00101130	.00150456	.00220153	.00161827	.00120489
19 Fab Metal Pdts	.00318590	.00959391	.00652211	.00845184	.00439587
20 Non-Elec Mach	.00167939	.00388080	.00388956	.00892554	.00271283
21 Elec Machinery	.00596872	.00169463	.00149800	.00198806	.00224916
22 Transpor Equip	.00235575	.00205106	.00358358	.00313350	.00416131
23 Instruments	.00120268	.00150369	.00166563	.00165813	.00144836
24 Misc Manufactu	.00050351	.00046030	.00109732	.00271630	.00130158
25 Transportation	.01961007	.02046394	.04410086	.02427041	.02500616
26 Communications	1.01402800	.00896805	.02248177	.01669290	.02154230
27 Utilities	.05880726	1.23644100	.10211580	.09787460	.08022607
28 Wholesale Trde	.04703706	.05258516	1.08156300	.10169800	.11291940
29 Eat&Drink Estb	.01024203	.00863696	.01596846	1.01259900	.01333278
30 Other Ret Trde	.03458349	.03421437	.05506515	.05088950	1.07539100
31 F.I.R.E.	.16835480	.15342940	.25356330	.23712630	.25709230
32 Health Service	.01887207	.01670982	.02558299	.02330795	.02442218
33 Educ Services	.00549596	.00568216	.00294744	.00228775	.00258701
34 Other Services	.06388526	.07181399	.10106760	.12185360	.09229368
35 Households	.46145000	.40768920	.62462460	.56850930	.59351680
TOT INT COEF	2.04572900	2.46753600	2.53515600	2.52866900	2.48186900

Interdependence Coefficients, Cont'd.

	* Sector 31 *	* Sector 32 *	* Sector 33 *	* Sector 34 *	* Households
1 Irrigated Agri	.00028905	.00034996	.00046867	.00033504	.00058163
2 Dryland Agri	.00022152	.00026215	.00035413	.00025500	.00045316
3 Lvestock & Pdt	.00108333	.00134711	.00206581	.00128031	.00218541
4 Agri Services	.00003542	.00003021	.00003769	.00003269	.00004234
5 Forestry	.00005188	.00005683	.00011160	.00006297	.00005241
6 Fisheries	.00025127	.00030600	.00045994	.00029266	.00051065
7 Petro & NL,NGL	.03154124	.04213872	.04435255	.03973150	.04167008
8 Other Mining	.00111275	.00117287	.00119298	.00116286	.00100477
9 Construction	.02213702	.01193811	.01081094	.01577071	.01094482
10 Food & Kindred	.02408497	.02989867	.05037883	.02821410	.04924363
11 Text & Apparel	.00031249	.00039789	.00041735	.00043117	.00061541
12 Lum & Pap Pdts	.00264174	.00276108	.00585783	.00302560	.00249777
13 Print & Publih	.01317082	.01234777	.01473649	.01869310	.01121819
14 Chemicals	.00911922	.01813377	.01688844	.02101189	.01490380
15 Petro Refining	.03780509	.04613277	.05217115	.05776130	.07010370
16 Rub Leath Plas	.00241664	.00346925	.00383504	.00901659	.00381285
17 Glas Ston Clay	.00168292	.00134453	.00159217	.00157489	.00147791
18 Prim Metal Pdt	.00143013	.00170228	.00218903	.00344243	.00164014
19 Fab Metal Pdts	.00540311	.00724357	.00819300	.01789265	.00621689
20 Non-Elec Mach	.00215956	.00340542	.00471847	.01071920	.00250760
21 Elec Machinery	.00118149	.00235676	.00346813	.00278097	.00138035
22 Transpor Equip	.00310948	.00378469	.00406661	.00529449	.00610048
23 Instruments	.00164227	.00993498	.01804272	.00919702	.00218413
24 Misc Manufactu	.00086893	.00144760	.00176435	.00295510	.00096655
25 Transportation	.02203907	.03369982	.03036572	.03536603	.03810906
26 Communications	.02242980	.02100364	.01719546	.02428254	.01490799
27 Utilities	.07938637	.11057010	.11334800	.09053385	.08695899
28 Wholesale Trde	.06899197	.10809400	.09154811	.10009240	.12039000
29 Eat&Drink Estb	.01460835	.01797558	.01799878	.01701770	.02756426
30 Other Ret Trde	.04915364	.05933136	.06625267	.05787973	.10027550
31 F.I.R.E.	1.37249400	.28705020	.23132520	.25745870	.23699880
32 Health Service	.02757079	1.04843300	.03532169	.02972084	.05540185
33 Educ Services	.00327838	.00296967	1.00268800	.00277286	.00356041
34 Other Services	.11747180	.13773900	.10340740	1.11855500	.10789860
35 Households	.65484630	.73966750	.86153400	.70033620	1.36326700
TOT INT COEF	2.59602300	2.76849700	2.81915900	2.68495000	2.38764700

**TYPE II FINAL DEMAND AND OUTPUT MULTIPLIERS  
FOR THE TRINITY-SAN JACINTO ESTUARY REGION**

	MULTIPLIER (Final Demand)	DIAGONAL COEFFICIENT	MULTIPLIER (Output)
1 Irrigated Agri	2.438244	1.002301	2.432647
2 Dryland Agri	2.429849	1.003045	2.422474
3 Lvestock & Pdt	2.080799	1.032643	2.015023
4 Agri Services	2.631649	1.005443	2.617402
5 Forestry	2.017629	1.052250	1.917444
6 Fisheries	2.634371	1.001957	2.629226
7 Petro & NL,NGL	2.230191	1.176360	1.895841
8 Other Mining	2.388330	1.002607	2.382120
9 Construction	2.580492	1.012045	2.549781
10 Food & Kindred	1.965912	1.065451	1.845145
11 Text & Apparel	2.175990	1.002732	2.170061
12 Lum & Pap Pdts	2.178168	1.031326	2.112008
13 Print & Publih	2.260696	1.043868	2.165691
14 Chemicals	2.552939	1.209170	2.111315
15 Petro Refining	2.354762	1.160707	2.028731
16 Rub Leath Plas	2.382829	1.012215	2.354074
17 Glas Ston Clay	2.432538	1.027752	2.366853
18 Prim Metal Pdt	2.364651	1.063620	2.223211
19 Fab Metal Pdts	2.357558	1.046132	2.253596
20 Non-Elec Mach	2.369038	1.026680	2.307476
21 Elec Machinery	2.320987	1.033034	2.246767
22 Transpor Equip	2.154046	1.010794	2.131042
23 Instruments	2.407550	1.037016	2.321613
24 Misc Manufactu	2.512723	1.002927	2.505390
25 Transportation	2.609961	1.058760	2.465112
26 Communications	2.045729	1.014028	2.017429
27 Utilities	2.467536	1.236441	1.995676
28 Wholesale Trde	2.535156	1.081563	2.343975
29 Eat&Drink Estb	2.528669	1.012599	2.497207
30 Other Ret Trde	2.481869	1.075391	2.307875
31 F.I.R.E.	2.596023	1.372494	1.891464
32 Health Service	2.768497	1.048433	2.640604
33 Educ Services	2.819159	1.002688	2.811602
34 Other Services	2.684950	1.118555	2.400374
35 Households	2.387647	1.363267	1.751416



**TYPE II INCOME MULTIPLIERS  
FOR THE TRINITY-SAN JACINTO ESTUARY REGION**

	DIR EFFECT (Per \$1.00)	TOT EFFECT (F DEMAND)	MULTIPLIER (F DEMAND)	TOT EFFECT (OUTPUT)	MULTIPLIER (OUTPUT)
1 Irrigated Agri	.231575	.482688	2.084373	.481580	2.079589
2 Dryland Agri	.291487	.536967	1.842163	.535337	1.836571
3 Lvestock & Pdt	.193944	.397295	2.048506	.384736	1.983751
4 Agri Services	.220768	.514781	2.331773	.511994	2.319149
5 Forestry	.116752	.325949	2.791806	.309764	2.653179
6 Fisheries	.282939	.585404	2.069007	.584260	2.064967
7 Petro & NL,NGL	.272829	.505089	1.851302	.429366	1.573755
8 Other Mining	.248764	.511115	2.054619	.509786	2.049277
9 Construction	.275993	.586255	2.124165	.579278	2.098884
10 Food & Kindred	.117072	.302163	2.581003	.283601	2.422451
11 Text & Apparel	.315237	.525644	1.667455	.524212	1.662912
12 Lum & Pap Pdts	.194841	.414691	2.128359	.402095	2.063712
13 Print & Publih	.283406	.513335	1.811308	.491762	1.735188
14 Chemicals	.083654	.348467	4.165591	.288187	3.445000
15 Petro Refining	.043492	.304563	7.002749	.262394	6.033178
16 Rub Leath Plas	.224714	.459398	2.044372	.453854	2.019701
17 Glas Ston Clay	.193879	.472066	2.434853	.459319	2.369106
18 Prim Metal Pdt	.185483	.443447	2.390771	.416922	2.247769
19 Fab Metal Pdts	.264498	.516896	1.954254	.494102	1.868077
20 Non-Elec Mach	.283880	.541687	1.908154	.527611	1.858568
21 Elec Machinery	.349852	.586879	1.677509	.568112	1.623866
22 Transpor Equip	.252699	.465244	1.841099	.460276	1.821438
23 Instruments	.250261	.520034	2.077963	.501471	2.003791
24 Misc Manufactu	.312597	.587085	1.878087	.585372	1.872607
25 Transportation	.327080	.624123	1.908167	.589485	1.802266
26 Communications	.271276	.461450	1.701035	.455066	1.677503
27 Utilities	.118416	.407689	3.442850	.329728	2.784483
28 Wholesale Trde	.335975	.624625	1.859141	.577520	1.718939
29 Eat&Drink Estb	.275750	.568509	2.061685	.561436	2.036033
30 Other Ret Trde	.305023	.593517	1.945808	.551908	1.809395
31 F.I.R.E.	.339177	.654846	1.930691	.477122	1.406703
32 Health Service	.402274	.739667	1.838715	.705498	1.753775
33 Educ Services	.552326	.861534	1.559830	.859225	1.555649
34 Other Services	.384394	.700336	1.821921	.626108	1.628816

**TYPE II EMPLOYMENT MULTIPLIERS  
FOR THE TRINITY-SAN JACINTO ESTUARY REGION**

	D EFFECT PER MIL \$	T EFFECT F DEMAND	MULTIPLI F DEMAND	T EFFECT OUTPUT	MULTIPLI OUTPUT	NUMBER OF EMPLOYEES
1 Irrigated Agri	11.295	19.577	1.733	19.532	1.729	1151.
2 Dryland Agri	4.745	13.114	2.764	13.074	2.755	494.
3 Lvestock & Pdt	1.142	7.958	6.967	7.706	6.747	401.
4 Agri Services	11.947	21.293	1.782	21.177	1.773	470.
5 Forestry	1.564	8.550	5.467	8.125	5.195	66.
6 Fisheries	54.655	63.889	1.169	63.765	1.167	3473.
7 Petro & NL,NGL	5.624	12.771	2.271	10.856	1.930	76412.
8 Other Mining	3.454	11.639	3.369	11.609	3.361	1487.
9 Construction	7.128	17.494	2.454	17.286	2.425	92380.
10 Food & Kindred	3.688	10.009	2.714	9.394	2.547	12915.
11 Text & Apparel	17.839	24.493	1.373	24.426	1.369	1374.
12 Lum & Pap Pdt	12.290	19.468	1.584	18.877	1.536	7669.
13 Print & Publih	15.667	23.535	1.502	22.546	1.439	16941.
14 Chemicals	2.497	10.388	4.161	8.591	3.441	36798.
15 Petro Refining	.880	8.098	9.200	6.977	7.926	16433.
16 Rub Leath Plas	9.818	17.287	1.761	17.078	1.739	5585.
17 Glas Ston Clay	10.776	19.249	1.786	18.729	1.738	6488.
18 Prim Metal Pdt	4.633	13.482	2.910	12.675	2.736	5330.
19 Fab Metal Pdt	8.545	16.527	1.934	15.798	1.849	21777.
20 Non-Elec Mach	8.457	16.684	1.973	16.251	1.922	31385.
21 Elec Machinery	7.153	14.770	2.065	14.298	1.999	8629.
22 Transpor Equip	3.387	10.281	3.035	10.172	3.003	4798.
23 Instruments	7.569	16.262	2.149	15.681	2.072	4941.
24 Misc Manufactu	11.242	20.266	1.803	20.206	1.797	2148.
25 Transportation	6.685	15.753	2.356	14.879	2.226	39533.
26 Communications	14.981	21.149	1.412	20.857	1.392	18139.
27 Utilities	3.417	11.762	3.442	9.513	2.784	30967.
28 Wholesale Trde	8.522	17.702	2.077	16.367	1.921	113456.
29 Eat&Drink Estb	17.621	27.191	1.543	26.852	1.524	65712.
30 Other Ret Trde	36.686	46.497	1.267	43.237	1.179	188882.
31 F.I.R.E.	4.908	14.363	2.927	10.465	2.132	90821.
32 Health Service	28.309	39.410	1.392	37.590	1.328	73455.
33 Educ Services	45.869	55.928	1.219	55.778	1.216	12697.
34 Other Services	20.353	30.597	1.503	27.354	1.344	220618.

TOTAL EMPLOYMENT - 1213825.