

NUECES AND MISSION-ARANSAS 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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**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 Nueces and

Mission-Aransas estuary amounted to \$490.3 million and \$914.6 million for the region and state, respectively. Of these totals, sport fishing contributed the largest impact with \$246 million or 50 percent for the region and \$468.6 million or 51 percent for the state. Direct sport fishing expenditures in the Nueces and Mission-Aransas estuary of \$128.7 million were also greater than those for other recreational activity of \$69.2 million. Sport fishermen also spent more outside the local region (\$17.9 million) than did other recreational activity participants (\$11.5 million).

Over 27 percent of the direct expenditures by sport fishermen and other recreational activity participants in the Nueces and Mission-Aransas 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 \$125 million for sport fishing and over \$69 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 8,216 and 4,717 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 \$6.3 million for sport fishing and \$3.5 million for other recreational activity statewide. Likewise, local tax revenues from sport fishing and other recreational activity were of \$11.3 million and \$6.3 million, respectively. Most of these tax revenues whether local or state were generated within the Nueces and Mission-Aransas estuary region.

Estimates were also made of the inshore-offshore commercial fish landings associated with the Nueces and Mission-Aransas estuary region. The three year (1984, 1985, 1986) average inshore annual commercial finfish and shellfish contributions were estimated at 9.034 million pounds with an ex-vessel value of \$7.813 million. Inshore and offshore landings together, however, amounted to about \$56.1 million with direct employment of 3,284 full-time job equivalents and direct personal income of \$13.6 million.

**NUECES and MISSION-ARANSAS ESTUARY:
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Introduction

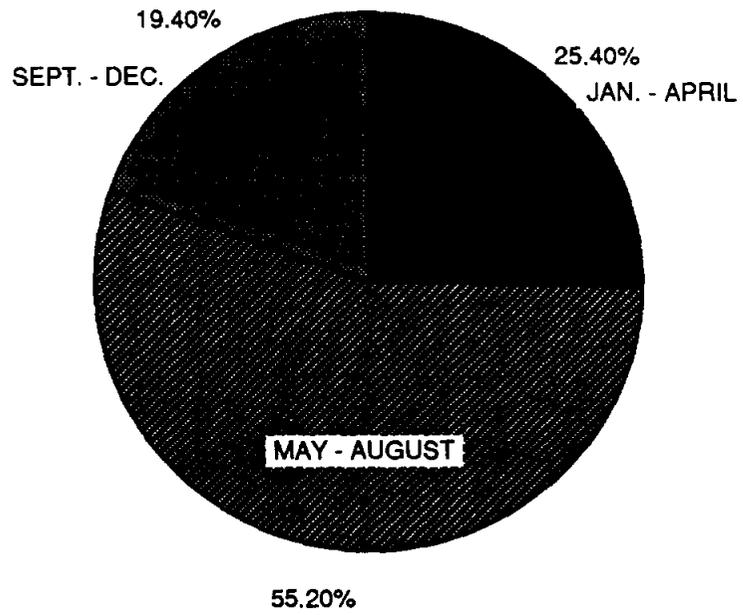
This study has been conducted as part of the Texas Water Development Board's on-going efforts to evaluate hydrological, biological, chemical and economic factors as they relate to the freshwater inflow needs of the six estuaries along the Texas Gulf Coast. Outdoor recreation, sport fishing in particular, 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 2,601,690 visits to the Nueces and Mission-Aransas estuary during calendar year of 1986; and of these visits 64.2 percent were made by households involved in sport fishing.* As shown in Chart 1, there is substantial seasonal variation; approximately 25.4 percent of these visits occurred from January through April, 1986; whereas 55.2 percent of the total occurred during the summer months (May through August); finally, 19.4 percent occurred between September 1 and December 31, 1986.

*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 Nueces and Mission-Aransas 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, 224 miles to reach their destinations located along the Nueces and Mission-Aransas estuary. This relatively long travel distance is reflected by the counties in which the visitors reside. Bexar County was overwhelmingly the largest source for visitors; 19.6 percent of the visitors to Nueces and Mission-Aransas estuary were from Bexar County; 11.2 percent of the visitors were from Nueces County and 8.4 and 8.3 percent were from Harris and Dallas Counties, respectively. Interestingly, 39.6 percent of those survey indicated they had first visited places along the Nueces and Mission-Aransas estuary within the past six years (since 1980); another 24.1 percent started visiting this area of the Texas Coast between 1970 and 1980; finally, 36.3 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 Nueces and Mission-Aransas estuary, camping and sport fishing account for 48 percent of the time allocated to recreation activity (26.9% and 21.1%, respectively). As one might expect, swimming (19.9% of the time) and sightseeing (15.5%) 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 Nueces and Mission-Aransas estuary, Sea Trout was caught most often, followed by Flounder and Red Drum. Chart 3 presents a list

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

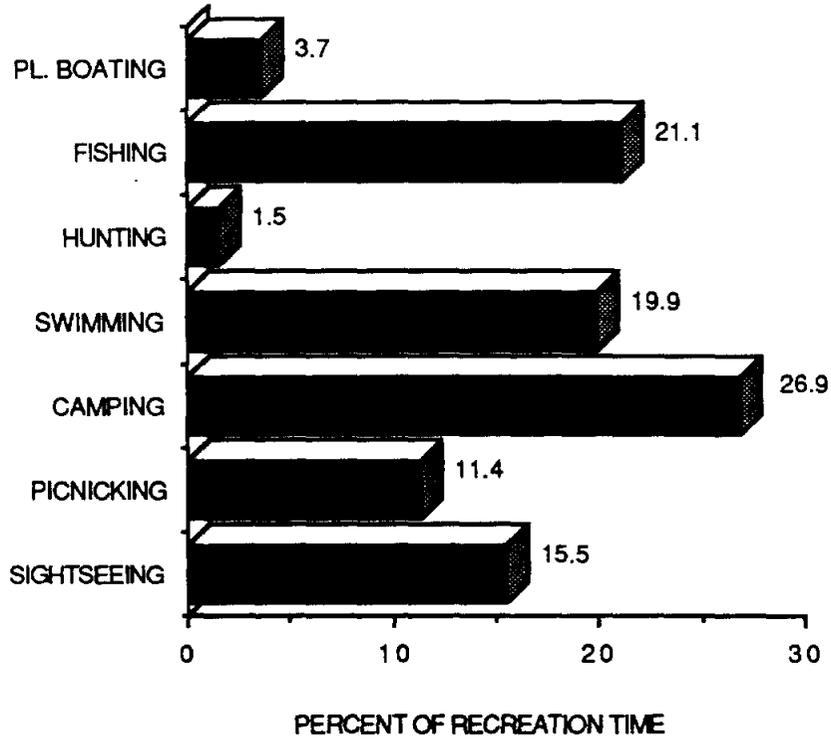
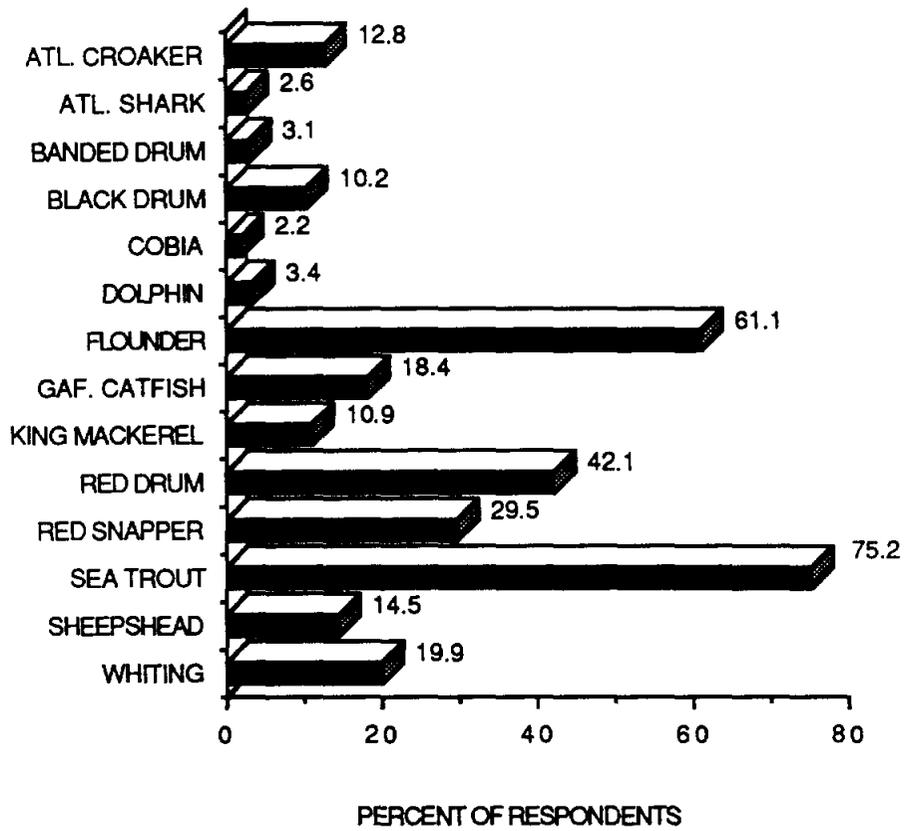


CHART 3: POPULARITY OF SELECTED FISH



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. 9.5 percent of those surveyed indicated that this area was excellent for fishing; 40.1 percent and 38.7 percent thought the area was fair or good for fishing while 11.1 percent indicated that places along the Nueces and Mission-Aransas 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 Nueces and Mission-Aransas 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 Nueces and Mission-Aransas estuary.

As can be seen in Table 1, visitors spent approximately \$197,917,354 during 1986. Of this total, 65.0 percent (\$128,744,000) was spent by sport fisherman. Food costs accounted for a substantial portion of expenditures by fisherman; \$32,138,806 was spent on grocery store purchases and an additional \$31,366,782 was spent in restaurants. Transportation expenditures were also high at \$23,953,167. Interestingly, for those visitors not fishing, restaurant expenditures constituted the largest share of their trip-related cost.

Table 1. Visitor Expenditures in the Nueces and Mission-Aransas Estuary*

<u>Category</u>	<u>"Fishing" Household Expenditures</u>	<u>"Nonfishing" Household Expenditures</u>	<u>Total</u>
Lodging	\$ 21,937,042	\$ 15,932,984	\$ 37,870,026
Transportation*	23,953,169	13,605,599	37,558,766
Restaurant	31,366,782	26,421,458	57,788,240
Grocery	32,136,806	10,068,625	42,205,431
Rental	2,584,431	1,250,085	3,834,516
Fees	3,289,085	1,894,603	5,183,688
Fishing-related items	13,476,687	----	13,476,687
Total	\$128,744,000	\$ 69,173,354	\$197,917,354

*For those households living outside the Nueces and Mission-Aransas 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 Nueces and Mission-Aransas 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 Nueces and Mission-Aransas 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 Nueces and Mission-Aransas 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 Nueces and Mission-Aransas estuary region were over \$128 million in 1986. Statewide expenditures that occurred as a result of recreational fishing in the Nueces and Mission-Aransas estuary exceeded \$146 million. The difference between regional and state direct expenditures is the estimated transportation expenditures made by fishermen from outside the Nueces and Mission-Aransas region. As can be observed, most direct expenditures (88 percent) accrue to the region. However, when the indirect and induced impacts are added to the direct impacts to obtain the regional total impact of over \$246 million, this figure accounts for over half (52 percent) of the gross output impacts statewide (\$468.6 million). This difference reflects economic linkages between the Nueces and Mission-Aransas 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 Nueces and Mission-Aransas estuary region and within the state. The input-output analysis estimated a total of 4,161 full time job equivalents directly related to sport fishing in the Nueces and Mission-Aransas estuary region during 1986. Statewide, an additional 1,630 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 Nueces and Mission-Aransas region was 4,968 jobs and 8,216 jobs in the state economy (Table 2).

Table 2. Direct and Total Economic Impact From Sport Fishing Expenditures, Nueces and Mission-Aransas Estuary, 1986

	Direct		Total	
	<u>Regional</u>	<u>State</u>	<u>Regional</u>	<u>State</u>
Output (million \$)	128.7	146.6	246.0	468.6
Employment (man-years)	4,161	5,791	4,968	8,216
Income (million \$)	35.6	54.0	52.8	125.6
State Tax Revenues (million \$)	a	0.67	5.6	6.3
Local Tax Returns (million \$)	a	1.9	9.9	11.3

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

Sport fishing expenditures in the Nueces and Mission-Aransas 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, about \$35.6 million and \$54 million of personal income was created directly for households within the region and state, respectively, by sport fishing expenditures within the Nueces and Mission-Aransas region. Moreover, total personal income impacts from sport fishing in the region amounted to over \$52 million within the region and over \$125 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 \$5.6 million of the total statewide state tax revenues, which amounted to over \$6.3 million, were collected in the local region. As

shown in Table 2, direct state tax revenues paid by the sport fishing industry were \$669 thousand. Table 3 also shows that the total tax revenue impacts for local jurisdictions were concentrated within the Nueces and Mission-Aransas estuary region where an estimated \$9.9 million resulted from direct, indirect, and induced sport fishing expenditures. Additionally, local governments outside the Nueces and Mission-Aransas estuary region collected an estimated \$1.4 million in taxes on travel expenditures by sport fishermen for a total impact on local governments of \$11.3 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 Nueces and Mission-Aransas 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 Nueces and Mission-Aransas non-fishing recreational participants spent just over \$69 million within the Nueces and Mission-Aransas estuary region and a total of over \$80 million in the state. These expenditures generated total economic impacts of \$133.6 and \$261.4 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 1,995 jobs were directly related to other recreational activity in the Nueces and Mission-Aransas estuary region. The analysis also estimated that an additional 1,374 jobs were generated throughout the state because of other Nueces

and Mission-Aransas 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 \$18 million of direct income and \$27.8 million of total income. Direct state income impacts were about \$29 million and total state income effects amounted to \$69.8 million.

Table 3. Direct and Total Economic Impact From Other Recreational Activity Expenditures, Nueces and Mission-Aransas Estuary, 1986

	Direct		Total	
	<u>Regional</u>	<u>State</u>	<u>Regional</u>	<u>State</u>
Output (million \$)	69.2	80.7	133.6	261.4
Employment (man-years)	1,995	3,369	2,428	4,717
Income (million \$)	18.7	29.8	27.8	69.8
State Tax Revenues (million \$)	a	0.35	3.0	3.5
Local Tax Returns (million \$)	a	1.0	5.4	6.3

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

State and local tax revenue impacts from other recreational activity for the Nueces and Mission-Aransas estuary region are also presented in Table 3. Local tax revenue for all categories are greater than state tax revenue. Eighty-five percent of the total state tax revenue is generated within the region. Total state tax revenues amounted to \$3.5 million while total local tax revenue was estimated at \$6.3 million. Local tax jurisdictions elsewhere in Texas also received an estimated \$900 thousand in tax revenues from the travel expenditures of non-fishing recreationist to the Nueces and Mission-Aransas region.

Combined Economic Impacts from Sport Fishing and Other Recreational Activity

The combined impacts from both sport fishing and other recreational activity for the Nueces and Mission-Aransas 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 57 percent of the jobs were generated locally while the other 43 percent were generated throughout the State. Both sport fishing and other recreational activity expenditures in the Nueces and Mission-Aransas region resulted in increased household personal incomes of about \$80 million for this region. In addition, household income generated outside the region was about \$114.8 million in bringing the total state personal income impact to \$195.4 million from Nueces and Mission-Aransas recreational and fishing activities in 1986.

Table 4. Direct and Total Economic Impact From Sport Fishing and Other Recreational Activity Expenditures, Nueces and Mission-Aransas Estuary, 1986

	Direct		Total	
	<u>Regional</u>	<u>State</u>	<u>Regional</u>	<u>State</u>
Output (million \$)	197.9	227.3	379.6	730.0
Employment (man-year)	6,156	9,160	7,397	12,933
Income (million \$)	54.3	83.8	80.6	195.4
State Tax Revenues (million \$)	a	1.0	8.6	9.8
Local Tax Revenues (million \$)	a	2.9	15.3	17.5

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 \$9.8 million, of which \$8.6 million was collected within the region. Local tax jurisdictions within the region received over \$15.3 million in revenues while those outside the region received an additional \$2.2 million for a total statewide tax impact on local jurisdiction exceeding \$17 million in 1986.

Economic Impact of Commercial Fishing

The analysis of the commercial fishing industry in the Nueces and Mission-Aransas 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 Nueces and Mission-Aransas bay system corresponds with the Nueces and Mission-Aransas estuary, for purposes of estimating direct and total economic impacts, the value of commercial fish landings in the Nueces and Mission-Aransas bay system were chosen to represent Nueces and Mission-Aransas 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 Nueces and Mission-Aransas estuary were reported to be 9.034 million pounds with an ex-vessel value of \$7.813 million for the 1984 through 1986 period. Of this, shrimp made up almost 86 percent of the total value of landings, while blue crab and flounder account for most of the remaining value. The combined inshore and offshore ex-vessel value of landings for this same time period were estimated at \$56.1 million. This difference in the offshore-inshore value of landings suggests the importance of offshore landings supported by the Nueces and Mission-Aransas estuary.

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

Total value of the inshore catch was \$7.8 million, direct employment in the inshore fisheries industry was 457 full-time job equivalents and personal income paid to households by the inshore fishing industry was \$1.9 million. In addition, the commercial fishing industry paid \$38 thousand directly in state taxes and \$53 thousand in local taxes (Table 5). Gross Texas business resulting from inshore commercial fishing, processing, and marketing fish attributed to the Nueces and Mission-Aransas estuary in 1986 was estimated at \$25.7 million, of which \$15.4 million was business within the estuary region. This regional inshore industry also supported a total of 503 full-time equivalent jobs and created personal income amounting to \$6.5 million throughout the state. Also generated by this industry was statewide state taxes paid of \$345 thousand and local taxes of \$540 thousand to local jurisdictions throughout Texas.

Table 5. Direct and Total Economic Impact of Commercial Fishing in the Nueces and Mission-Aransas Estuary, 1986

	<u>Landings</u>		<u>Total Impacts</u>			
	<u>Inshore</u>	<u>Inshore - Offshore</u>	<u>Inshore Region</u>	<u>State</u>	<u>Inshore-Offshore Region</u>	<u>State</u>
Output (million \$)	7.8	56.1	15.4	25.7	110.7	184.6
Employment (man-years)	457	3,284	503	559	3,621	4,021
Income (million \$)	1.9	13.6	2.9	6.5	20.9	46.5
State Tax Rev. (million \$)	0.04	0.27	a	0.34	a	2.5
Local Tax Rev. (million \$)	0.05	0.38	a	0.54	a	3.9

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

The total value of offshore and inshore landings was reported to be about \$56.1 million. Direct employment associated with this output was estimated at 3,284 full-time job equivalents. Personal income paid to households by inshore and offshore fishing industry was \$13.6 million. The combined inshore and offshore state tax revenues from this industry was estimated at \$272 thousand, while the local tax revenues were estimated to be \$382 thousand (Table 5).

Gross Texas business resulting from inshore and offshore commercial fishing, processing, and marketing fish attributed to the Nueces and Mission-Aransas estuary in 1986 was estimated at \$184.6 million of which almost \$110.7 million was business within the estuary region. The combined inshore and offshore regional commercial fishing industry also supported a total of 4,021 full-time equivalent jobs and generated personal income of over \$46 million throughout the state. The commercial fishing industry

generated statewide local tax revenue of \$2.5 million and local taxes of \$3.9 million to 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 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 Nueces and Mission-Aransas estuary during 1986. As defined by the Texas Water Development Board, the Nueces and Mission-Aransas estuarine system includes Aransas, Copano, Corpus Christi, Mission, Nueces, Redfish and St. Charles Bays and Laguna Madre above Corpus Christi Pass. The economic area for this estuary includes Aransas, Bee, Jim Wells, Nueces, Refugio and San Patricio Counties. The second phase 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 Nueces and Mission-Aransas estuary;

THF_i - the total number of households residing in region i that went fishing at the Nueces and Mission-Aransas 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 Nueces and Mission-Aransas estuary;

PF_i - the proportion of households from region i that traveled to the Texas Gulf Coast and went fishing at the Nueces and Mission-Aransas 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 Nueces and Mission-Aransas estuary;

TTF_i - the total number of trips by fishing households residing in region i to the Nueces and Mission-Aransas estuary;

THN_i - same as before;

THF_i - same as before;

TRN_i - the mean number of trips per "nonfishing" household taken to the Nueces and Mission-Aransas estuary from region i;

TRF_i - the mean number of trips per "fishing" household taken to the Nueces and Mission-Aransas estuary from region i;

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

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

where:

TEN_k - the total expenditures by "nonfishing" households that visited the Nueces and Mission-Aransas Jacinto estuary for expenditure category k;

TEF_k - the total expenditures by "fishing" households that visited the Nueces and Mission-Aransas 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 Nueces and Mission-Aransas estuary;

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

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

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

where:

TEN - the total expenditure level by "nonfishing" households that visited the Nueces and Mission-Aransas estuary;

TEF - the total expenditure level by households that fished in the Nueces and Mission-Aransas estuary;

TEN_k - the same as before;

TEF_k - the same as before;

$$TE = TEN + TEF$$

(9)

where:

TE - the total expenditure level by Texas residents that visited places along the Nueces and Mission-Aransas 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 Nueces and Mission-Aransas 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 Nueces and Mission-Aransas 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 households throughout Texas made to the Nueces and Mission-Aransas estuary as well as the total dollars expended during these trips. Estimates of thje total visitation and expenditure levels were developed for "fishing" and "nonfishing" households residing in each of the seven regions and traveling to the Nueces and Mission-Aransas 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 Nueces and Mission-Aransas estuary were calculated using equations 7-9 where the estimated total expenditures 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 Nueces and Mission-Aransas 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 Nueces and Mission-Aransas 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 Nueces and Mission-Aransas 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 Nueces and Mission-Aransas Estuary Region Input-Output Model is available from the Texas Water Development Board.

**Direct Requirements Coefficients for the
Nueces and Mission-Aransas Estuary Region, 1986**

```

*****
*   Sector 1 * Sector 2 * Sector 3 * Sector 4 * Sector 5
*****
1 Irrigated Agri      .00359482   .00277118   .01709346   .00001405   .00001624
2 Dryland Agri       .00010727   .01286973   .03465798   .00006644   .00007961
3 Lvestock & Pdt     .00000000   .00000000   .11374500   .01830001   .00012797
4 Agri Services      .07218381   .07906195   .02791369   .02278942   .00014110
5 Forestry           .00000000   .00000000   .00000000   .00000000   .16930090
6 Fisheries          .00000000   .00000000   .00000196   .00000000   .00000000
7 Petro & NL,NGL     .00000000   .00000000   .00000000   .00016796   .00000000
8 Other Mining       .00000000   .00000000   .00000000   .00000000   .00015595
9 Construction       .00288581   .00344510   .00075880   .01446867   .00677432
10 Food & Kindred    .00000000   .00000000   .03823914   .00046602   .00009680
11 Text & Apparel    .00000000   .00000000   .00000070   .00003425   .00000000
12 Lum & Pap Pdt     .00021338   .00000969   .00015357   .00000361   .00950354
13 Print & Publih    .00000000   .00000000   .00000631   .00057419   .00000000
14 Chemicals         .05954107   .06930304   .00689888   .14085680   .00076990
15 Petro Refining    .03765839   .06544629   .01064910   .03281003   .00014621
16 Rub Leath Plas    .00010991   .00001542   .00000541   .00000914   .00000136
17 Glas Ston Clay    .00000000   .00000000   .00000305   .00006271   .00001246
18 Prim Metal Pdt    .00002579   .00006681   .00000200   .00000000   .00000000
19 Fab Metal Pdt     .00014710   .00016198   .00023654   .00008957   .00004143
20 Non-Elec Mach     .00035414   .00042292   .00010293   .00211556   .00000419
21 Elec Machinery    .00002028   .00005335   .00001933   .00002814   .00002626
22 Transpor Equip    .00189219   .00225900   .00035309   .00060338   .00000000
23 Instruments       .00000000   .00000000   .00000000   .00000000   .00000000
24 Misc Manufactu    .00000797   .00000896   .00000674   .00002257   .00000387
25 Transportation    .00339207   .00345724   .00694306   .00591036   .03774634
26 Communications    .00070654   .00076883   .00088606   .00265612   .00203765
27 Utilities         .12155080   .00281416   .00957557   .04232423   .00204876
28 Wholesale Trde    .00790699   .01053527   .02196195   .03623098   .04706499
29 Eat&Drink Estb    .00000000   .00000000   .00008118   .00031315   .00004627
30 Other Ret Trde    .02409278   .03252567   .02840368   .01325256   .01307329
31 F.I.R.E.          .02814509   .02670800   .02329492   .02116909   .00133242
32 Health Service    .00000000   .00000000   .00000000   .00000000   .00000000
33 Educ Services     .00109393   .00114489   .00085680   .00037586   .00001401
34 Other Services    .00436523   .00024960   .00076269   .01397909   .01376093
35 Households        .19809260   .24934250   .16590250   .18884830   .09987146

```

Direct Requirements, Cont'd.

	* Sector 6	* Sector 7	* Sector 8	* Sector 9	* Sector 10
1 Irrigated Agri	.00004213	.00000000	.00000000	.00000000	.00777868
2 Dryland Agri	.00020212	.00000000	.00000000	.00000088	.01349235
3 Lvestock & Pdt	.00034899	.00000000	.00000000	.00000000	.12649720
4 Agri Services	.00035750	.00000000	.00000000	.00368134	.00000000
5 Forestry	.00000000	.00000000	.00000000	.00000000	.00010046
6 Fisheries	.00167069	.00000000	.00000000	.00000000	.00679948
7 Petro & NL,NGL	.00014883	.13240600	.00000000	.00000030	.00472361
8 Other Mining	.00000000	.00020170	.00086753	.01270012	.00013074
9 Construction	.01541106	.00093143	.00319902	.00132579	.00136892
10 Food & Kindred	.00765010	.00002127	.00009196	.00000291	.05153754
11 Text & Apparel	.00308145	.00001579	.00008608	.00024765	.00083313
12 Lum & Pap Pds	.00071434	.00002098	.00001938	.00116880	.00189564
13 Print & Publih	.00000000	.00027180	.00008615	.00029025	.00101052
14 Chemicals	.00114260	.00220896	.02352327	.00481593	.00484567
15 Petro Refining	.11774530	.00941689	.02985810	.02304116	.01034541
16 Rub Leath Plas	.00000127	.00000092	.00012899	.00008192	.00005369
17 Glas Ston Clay	.00000000	.00009406	.00163336	.01635766	.00384359
18 Prim Metal Pdt	.00002113	.00000956	.00127519	.00472489	.00016581
19 Fab Metal Pds	.00002614	.00008997	.00120946	.01435064	.00765094
20 Non-Elec Mach	.00002075	.00110850	.00871918	.00175552	.00021310
21 Elec Machinery	.00001531	.00064124	.00154297	.00169242	.00007377
22 Transpor Equip	.01905485	.00002821	.00223289	.00042466	.00004044
23 Instruments	.00000000	.00000667	.00000000	.00027388	.00004016
24 Misc Manufactu	.00000767	.00000220	.00000000	.00007847	.00012381
25 Transportation	.00739243	.00475655	.02407157	.00772484	.01119449
26 Communications	.00173310	.00198073	.00211232	.00413194	.00804484
27 Utilities	.00357662	.00954685	.03825008	.00445644	.02317964
28 Wholesale Trde	.02649096	.00439243	.00318723	.01393740	.01754556
29 Eat&Drink Estb	.00053289	.00044316	.00000000	.00039591	.00498863
30 Other Ret Trde	.01205621	.00176992	.00446048	.00652783	.00643453
31 F.I.R.E.	.04688581	.01578130	.03312346	.03066080	.00816739
32 Health Service	.00000000	.00012899	.00000000	.00000426	.00013820
33 Educ Services	.00038353	.00453167	.00276173	.00037446	.00030448
34 Other Services	.00946833	.01281069	.01907170	.04501187	.00994045
35 Households	.24203060	.23338200	.21279640	.23608880	.10014490

Direct Requirements, Cont'd.

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*****
*   Sector 11 *   Sector 12 *   Sector 13 *   Sector 14 *   Sector 15
*****
1 Irrigated Agri      .00400575      .00014718      .00021834      .00028381      .00000131
2 Dryland Agri       .00335636      .00030261      .00044902      .00058529      .00000269
3 Lvestock & Pdt     .00211969      .00200382      .00296318      .00383017      .00001765
4 Agri Services      .00000000      .00000000      .00000000      .00000048      .00000000
5 Forestry           .00003450      .05756396      .00027948      .00039572      .00000166
6 Fisheries          .00001976      .00010612      .00015825      .00020460      .00000094
7 Petro & NL,NGL     .00166682      .00879858      .01302135      .04356515      .19067440
8 Other Mining       .00005161      .00036654      .00036545      .00231128      .00019484
9 Construction       .00045618      .00506897      .00212185      .00870628      .00559325
10 Food & Kindred    .00007941      .00043494      .00064416      .00087742      .00000667
11 Text & Apparel    .01275939      .00054114      .00026876      .00010939      .00002997
12 Lum & Pap Pdt     .00063879      .00645766      .00432943      .00040705      .00024372
13 Print & Publih    .00199720      .00039659      .02087243      .00057775      .00015983
14 Chemicals         .00381800      .02438916      .01353726      .16051660      .05827928
15 Petro Refining    .00319998      .00753515      .01353216      .11241410      .11106620
16 Rub Leath Plas    .00001059      .00012447      .00002512      .00005289      .00000499
17 Glas Ston Clay    .00003158      .00012705      .00017647      .00025547      .00005504
18 Prim Metal Pdt    .00068251      .00077981      .00038099      .00110634      .00041647
19 Fab Metal Pdt     .00117477      .00081487      .00076237      .00113132      .00161034
20 Non-Elec Mach     .00032556      .00162817      .00092917      .00089230      .00025983
21 Elec Machinery    .00006196      .00009992      .00015937      .00020060      .00021253
22 Transpor Equip    .00001933      .00003571      .00007832      .00010714      .00001426
23 Instruments       .00000686      .00002798      .00066292      .00010380      .00007312
24 Misc Manufactu    .00070853      .00001918      .00062189      .00005684      .00000437
25 Transportation    .00894017      .01529145      .01206877      .01411920      .02404389
26 Communications    .00343882      .00367909      .00905417      .00266351      .00098709
27 Utilities         .03316351      .04986218      .02277952      .10409830      .03716093
28 Wholesale Trde    .00605607      .02756977      .01190481      .01673744      .01254478
29 Eat&Drink Estb    .00062908      .00032251      .00104599      .00032214      .00005328
30 Other Ret Trde    .00092632      .01218819      .00417601      .00479217      .00025489
31 F.I.R.E.          .02598137      .01222856      .01001919      .00936597      .01278679
32 Health Service    .00001821      .00000876      .00001706      .00004553      .00001325
33 Educ Services     .00074647      .00006096      .00024059      .00043961      .00118360
34 Other Services    .01005980      .00501415      .01418504      .00778554      .00866120
35 Households        .26965870      .16666970      .24242960      .07155857      .03720358

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Direct Requirements, Cont'd.

	* Sector 16 *	* Sector 17 *	* Sector 18 *	* Sector 19 *	* Sector 20
1 Irrigated Agri	.00003508	.00004050	.00013090	.00010591	.00008523
2 Dryland Agri	.00380282	.00008417	.00026985	.00021824	.00017452
3 Lvestock & Pdt	.00049191	.00054817	.00177094	.00144221	.00125801
4 Agri Services	.00000000	.00000000	.00000000	.00000000	.00000000
5 Forestry	.00004548	.00005195	.00016716	.00013528	.00012276
6 Fisheries	.00002331	.00002940	.00009466	.00007577	.00006097
7 Petro & NL,NGL	.00255354	.00241610	.00777204	.00632953	.00507520
8 Other Mining	.00007049	.03723319	.00827080	.00019783	.00015241
9 Construction	.00200086	.00107813	.00464738	.00265133	.00203068
10 Food & Kindred	.00195825	.00042375	.00048590	.00056657	.00026602
11 Text & Apparel	.00096282	.00001998	.00008763	.00009084	.00068207
12 Lum & Pap Pdts	.00068194	.00141364	.00016999	.00033768	.00029604
13 Print & Publih	.00071048	.00029398	.00029355	.00094494	.00057838
14 Chemicals	.15596740	.00417098	.01261641	.01473251	.00509615
15 Petro Refining	.00371277	.00367666	.01371703	.00834831	.00707416
16 Rub Leath Plas	.00033865	.00003956	.00003325	.00011877	.00034846
17 Glas Ston Clay	.00003542	.01474012	.00047592	.00114422	.00076587
18 Prim Metal Pdt	.00019934	.00021141	.01497417	.00938970	.00749605
19 Fab Metal Pdts	.00059061	.00022725	.00112328	.01210612	.01015063
20 Non-Elec Mach	.00148276	.00041866	.00068785	.00118237	.00489553
21 Elec Machinery	.00008562	.00002876	.00048222	.00056671	.00231855
22 Transpor Equip	.00001039	.00004791	.00004674	.00047453	.00014183
23 Instruments	.00000685	.00000464	.00002554	.00004036	.00068129
24 Misc Manufactu	.00006485	.00003329	.00008513	.00009502	.00009890
25 Transportation	.01749333	.05872479	.02049715	.01920656	.00943479
26 Communications	.00417413	.00419905	.00223851	.00505246	.00481104
27 Utilities	.04424455	.11330740	.10623220	.03941485	.01984470
28 Wholesale Trde	.01423613	.01362533	.01719571	.02095595	.02399970
29 Eat&Drink Estb	.00029535	.00027921	.00016394	.00071575	.00070716
30 Other Ret Trde	.00765843	.00519369	.03314559	.00396678	.00523963
31 F.I.R.E.	.01115871	.01626793	.01074990	.01390963	.01732149
32 Health Service	.00001362	.00006071	.00007758	.00003793	.00005893
33 Educ Services	.00022136	.00080070	.00026200	.00038682	.00028838
34 Other Services	.00640452	.01399000	.01478253	.01014001	.01079995
35 Households	.19222350	.16584680	.15866460	.22625540	.24283530

Direct Requirements, Cont'd.

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*****
* Sector 21 * Sector 22 * Sector 23 * Sector 24 * Sector 25
*****
1 Irrigated Agri .00008006 .00005652 .00008309 .00003574 .00000000
2 Dryland Agri .00016565 .00011584 .00017520 .00007875 .00000000
3 Lvestock & Pdt .00108343 .00076711 .00121003 .00052134 .00000000
4 Agri Services .00000000 .00000000 .00001473 .00000000 .00000000
5 Forestry .00010213 .00007253 .00010798 .00004928 .00000000
6 Fisheries .00005800 .00004025 .00006130 .00002757 .00000000
7 Petro & NL,NGL .00502300 .00338198 .00534105 .00239658 .00030656
8 Other Mining .00015483 .00010312 .00014817 .00006436 .00021238
9 Construction .00098086 .00216323 .00156483 .00076956 .00238884
10 Food & Kindred .00025411 .00021940 .00216505 .00016568 .00018204
11 Text & Apparel .00004820 .00021837 .00004098 .00360015 .00004289
12 Lum & Pap Pdts .00026696 .00075042 .00037927 .00280474 .00015082
13 Print & Publih .00092339 .00180735 .00195898 .00417989 .00057239
14 Chemicals .01158199 .01444459 .00917241 .05554326 .00149839
15 Petro Refining .00457867 .00502262 .00712799 .00424435 .07704464
16 Rub Leath Plas .00022630 .00016476 .00021953 .00071900 .00010996
17 Glas Ston Clay .00019913 .00148236 .00282651 .00174335 .00025170
18 Prim Metal Pdt .00276591 .00345195 .00506768 .00213120 .00017820
19 Fab Metal Pdts .00169695 .00866953 .00346244 .00598782 .00062060
20 Non-Elec Mach .00078476 .00132241 .00567775 .00090780 .00049944
21 Elec Machinery .01147190 .00224868 .00066362 .00417461 .00077034
22 Transpor Equip .00081650 .00826032 .00001938 .00260212 .00688754
23 Instruments .00028500 .00018125 .00865459 .00318396 .00036981
24 Misc Manufactu .00012777 .00009039 .00076728 .00046511 .00001314
25 Transportation .00438158 .01188582 .01712991 .00754440 .02259807
26 Communications .00757849 .00348768 .00780432 .00587409 .01643240
27 Utilities .01565145 .02000852 .04311561 .01971564 .02350680
28 Wholesale Trde .01400856 .02006341 .01582911 .02009195 .01238032
29 Eat&Drink Estb .00015674 .00013552 .00206143 .00036254 .00056008
30 Other Ret Trde .00465974 .00449772 .00244483 .00524983 .00457731
31 F.I.R.E. .01443993 .00650767 .01825980 .01531879 .04660166
32 Health Service .00003629 .00003211 .00107565 .00000000 .00000070
33 Educ Services .00025448 .00038800 .00053848 .00054441 .00074681
34 Other Services .01028948 .01054827 .02060354 .01465895 .01630967
35 Households .29926840 .21616270 .21407710 .26740050 .27978890

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Direct Requirements, Cont'd.

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*****
*   Sector 26 * Sector 27 * Sector 28 * Sector 29 * Sector 30
*****
1 Irrigated Agri .00000000 .00000000 .00007863 .00572912 .00111382
2 Dryland Agri .00000000 .00000000 .00016232 .00000766 .00000000
3 Lvestock & Pdt .00000000 .00000000 .00017289 .01892062 .00001384
4 Agri Services .00000000 .00000000 .00000714 .00000000 .00000000
5 Forestry .00000000 .00000000 .00010015 .00000000 .00000000
6 Fisheries .00000000 .00000000 .00005675 .00013589 .00000048
7 Petro & NL,NGL .00000000 .22767670 .00630064 .00001830 .00008580
8 Other Mining .00000000 .00473175 .00013598 .00000000 .00000023
9 Construction .00028509 .00121235 .00293927 .00123033 .00067086
10 Food & Kindred .00000000 .00000000 .00025233 .07974329 .00085105
11 Text & Apparel .00001766 .00007845 .00013120 .00012477 .00035737
12 Lum & Pap Pdt .00077317 .00057599 .00019384 .00025347 .00009382
13 Print & Publih .00911595 .00072970 .00332322 .00654216 .01313255
14 Chemicals .00013950 .00272018 .00442134 .00039929 .00028213
15 Petro Refining .01199047 .00541332 .01600232 .00313711 .01131074
16 Rub Leath Plas .00000345 .00000707 .00007388 .00000336 .00000606
17 Glas Ston Clay .00006698 .00085849 .00010816 .00001153 .00000237
18 Prim Metal Pdt .00003096 .00005278 .00018373 .00000039 .00000166
19 Fab Metal Pdt .00004338 .00154960 .00048417 .00042622 .00003614
20 Non-Elec Mach .00005231 .00006196 .00033458 .00132952 .00014124
21 Elec Machinery .00188906 .00013165 .00014452 .00033826 .00045012
22 Transpor Equip .00017175 .00002905 .00044978 .00029494 .00125014
23 Instruments .00002394 .00008441 .00003110 .00000000 .00000000
24 Misc Manufactu .00000601 .00000477 .00009308 .00041129 .00012736
25 Transportation .00302053 .00213746 .01490012 .00184047 .00280232
26 Communications .01060754 .00258181 .01810808 .00927700 .01649866
27 Utilities .02217214 .19018380 .04832440 .04496827 .02837375
28 Wholesale Trde .00127742 .00374821 .00935824 .01965373 .02557551
29 Eat&Drink Estb .00070471 .00000000 .00293213 .00017502 .00081628
30 Other Ret Trde .00007395 .00236688 .00772051 .00662511 .02960478
31 F.I.R.E. .02920948 .01758523 .04562536 .04138237 .04826302
32 Health Service .00002663 .00000000 .00003717 .00000718 .00015173
33 Educ Services .00535478 .00370403 .00098001 .00033430 .00071126
34 Other Services .01075465 .01099868 .02028026 .03332123 .01649414
35 Households .23205360 .10129500 .28739790 .23588050 .26092150

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Direct Requirements, Cont'd.

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*****
*   Sector 31 * Sector 32 * Sector 33 * Sector 34 * Households
*****
1 Irrigated Agri .00000000 .00000000 .00000000 .00000000 .00022273
2 Dryland Agri .00000000 .00000000 .00000000 .00000000 .00091856
3 Lvestock & Pdt .00000000 .00004804 .00000000 .00000590 .00090088
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 .00000237 .00000000
9 Construction .00558923 .00103914 .00076384 .00289135 .00125875
10 Food & Kindred .00008632 .00255251 .01867848 .00236439 .03332733
11 Text & Apparel .00002911 .00025018 .00008532 .00050538 .00216670
12 Lum & Pap Pdts .00016490 .00015105 .00078730 .00018878 .00013083
13 Print & Publih .00286540 .00201269 .00343576 .00578046 .00179583
14 Chemicals .00025176 .00617367 .00433987 .00711581 .00349167
15 Petro Refining .00079362 .00196303 .00357552 .01351199 .03702909
16 Rub Leath Plas .00000097 .00001919 .00002897 .00020772 .00005909
17 Glas Ston Clay .00016463 .00004931 .00009102 .00013010 .00018672
18 Prim Metal Pdt .00000696 .00000899 .00006285 .00024959 .00007542
19 Fab Metal Pdts .00009543 .00048205 .00066211 .00353024 .00026491
20 Non-Elec Mach .00000459 .00013271 .00039414 .00160399 .00002631
21 Elec Machinery .00004946 .00041512 .00081973 .00054575 .00011377
22 Transpor Equip .00000467 .00018271 .00006798 .00183590 .00387544
23 Instruments .00000000 .00192547 .00397194 .00180606 .00012108
24 Misc Manufactu .00003540 .00012826 .00019612 .00045104 .00005883
25 Transportation .00083841 .00587744 .00206653 .00706388 .01300965
26 Communications .01635869 .01307880 .00831600 .01927910 .00691763
27 Utilities .02502461 .04749621 .04794794 .03058608 .03845744
28 Wholesale Trde .00272657 .01687125 .00475369 .01434985 .03451806
29 Eat&Drink Estb .00090239 .00243755 .00020562 .00235989 .01920691
30 Other Ret Trde .00014560 .00344723 .00184312 .00477145 .06899405
31 F.I.R.E. .09048261 .04914667 .02500105 .04163260 .04589563
32 Health Service .00079061 .02044891 .00021599 .00121707 .04549408
33 Educ Services .00139328 .00063299 .00005151 .00058049 .00248915
34 Other Services .02617473 .03434993 .01410619 .02642369 .02938091
35 Households .29013720 .34411120 .47246760 .32881670 .04745235

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**Interdependence Coefficients for the
Nueces and Mission-Aransas Estuary Region, 1986**

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*****
* Sector 1 * Sector 2 * Sector 3 * Sector 4 * Sector 5
*****
1 Irrigated Agri 1.00400100 .00326761 .02027649 .00077352 .00023369
2 Dryland Agri .00083878 1.01386300 .04106445 .00155732 .00048317
3 Lvestock & Pdt .00437306 .00491789 1.13794700 .02449684 .00171594
4 Agri Services .07438089 .08243810 .03733796 1.02427300 .00031482
5 Forestry .00008737 .00007819 .00005639 .00011950 1.20462500
6 Fisheries .00015362 .00017413 .00044071 .00017814 .00008649
7 Petro & NL,NGL .07399082 .04599229 .02423532 .05650358 .01155801
8 Other Mining .00129230 .00067876 .00038671 .00123710 .00048192
9 Construction .00664583 .00758488 .00325235 .01824697 .00928650
10 Food & Kindred .01334611 .01503746 .05768353 .01424532 .00809891
11 Text & Apparel .00085453 .00095001 .00079306 .00086926 .00052037
12 Lum & Pap Pdt .00052610 .00026813 .00044107 .00032497 .01165009
13 Print & Publih .00226997 .00243386 .00212251 .00277362 .00149746
14 Chemicals .09234028 .10848260 .02581556 .18094420 .00471807
15 Petro Refining .07704840 .11266370 .04006977 .08100049 .01709063
16 Rub Leath Plas .00015105 .00005944 .00004358 .00005851 .00003494
17 Glas Ston Clay .00047403 .00038719 .00042834 .00067617 .00030177
18 Prim Metal Pdt .00028616 .00036353 .00014545 .00042945 .00012972
19 Fab Metal Pdt .00118188 .00108995 .00118119 .00131655 .00058531
20 Non-Elec Mach .00084005 .00091310 .00039614 .00260295 .00018946
21 Elec Machinery .00028288 .00030579 .00020000 .00031471 .00019843
22 Transpor Equip .00358233 .00417963 .00204784 .00225683 .00131805
23 Instruments .00017914 .00017374 .00013230 .00019738 .00013104
24 Misc Manufactu .00007114 .00007680 .00006629 .00009471 .00004936
25 Transportation .01400092 .01553836 .01623490 .01790317 .05180810
26 Communications .00808494 .00844572 .00781633 .01028970 .00802474
27 Utilities .19711100 .05716445 .05010836 .10871700 .02541778
28 Wholesale Trde .02960940 .03471154 .04309933 .05751478 .06792925
29 Eat&Drink Estb .00713877 .00802804 .00674432 .00730032 .00450076
30 Other Ret Trde .05262874 .06480593 .05929632 .04091845 .03255364
31 F.I.R.E. .06585415 .06556372 .05898517 .05757419 .02410892
32 Health Service .01623789 .01831484 .01461044 .01562086 .00976716
33 Educ Services .00344630 .00304562 .00245603 .00235943 .00094735
34 Other Services .02574179 .02196910 .01788406 .03479067 .02869360
35 Households .34719190 .39202160 .31253910 .33378170 .20886280
TOT INT COEF 2.12624400 2.09598800 1.98633900 2.10226200 1.73791300

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Interdependence Coefficient, Cont'd.

	* Sector 6 *	* Sector 7 *	* Sector 8 *	* Sector 9 *	* Sector 10
1 Irrigated Agri	.00049478	.00031258	.00029863	.00033038	.01119357
2 Dryland Agri	.00104141	.00061426	.00058508	.00063792	.02024109
3 Lvestock & Pdt	.00426515	.00250602	.00242468	.00267965	.15335750
4 Agri Services	.00067715	.00015350	.00015805	.00393213	.00685980
5 Forestry	.00008746	.00002207	.00003981	.00011465	.00029769
6 Fisheries	1.00187700	.00013733	.00013208	.00014238	.00731906
7 Petro & NL,NGL	.04773880	1.17124100	.03592432	.02315086	.02968610
8 Other Mining	.00055518	.00050719	1.00151200	.01368308	.00068052
9 Construction	.01795335	.00236676	.00509112	1.00320300	.00312100
10 Food & Kindred	.02227483	.01348837	.01234569	.01357497	1.06953800
11 Text & Apparel	.00403007	.00085069	.00086603	.00111485	.00146726
12 Lum & Pap Pdts	.00098474	.00018521	.00022954	.00139130	.00221954
13 Print & Publih	.00216510	.00198934	.00185380	.00238524	.00259957
14 Chemicals	.01572790	.00777553	.03486905	.01352183	.01548168
15 Petro Refining	.15582640	.03129864	.05721761	.04804833	.03309582
16 Rub Leath Plas	.00004481	.00003515	.00017006	.00012996	.00008726
17 Glas Ston Clay	.00057703	.00033599	.00198433	.01690065	.00436226
18 Prim Metal Pdt	.00034263	.00011996	.00154534	.00510819	.00036541
19 Fab Metal Pdts	.00127063	.00064946	.00205991	.01528926	.00875239
20 Non-Elec Mach	.00031627	.00143391	.00900085	.00214657	.00045068
21 Elec Machinery	.00030664	.00090338	.00178896	.00194300	.00024904
22 Transpor Equip	.02099550	.00162261	.00387682	.00217703	.00144359
23 Instruments	.00018114	.00018198	.00019066	.00049920	.00016307
24 Misc Manufactu	.00007471	.00005626	.00005742	.00015277	.00017789
25 Transportation	.01905012	.01250696	.03261740	.01758373	.01939828
26 Communications	.00930563	.00790974	.00849810	.01134336	.01362578
27 Utilities	.04412527	.04101028	.07981764	.04189037	.05791574
28 Wholesale Trde	.04616540	.02061031	.01929461	.03160316	.03430460
29 Eat&Drink Estb	.00822351	.00763812	.00656715	.00771903	.00998159
30 Other Ret Trde	.04056629	.02816980	.02888741	.03371239	.02978724
31 F.I.R.E.	.08431870	.04617001	.06410790	.06422528	.03600976
32 Health Service	.01741457	.01665366	.01504296	.01665100	.01069784
33 Educ Services	.00220274	.00658001	.00435662	.00192281	.00168337
34 Other Services	.03030990	.03063475	.03620224	.06375611	.02335769
35 Households	.37220280	.35341740	.32145420	.35525030	.22556370
TOT INT COEF	1.97369400	1.81008900	1.79106800	1.81791500	1.83553600

Interdependence Coefficients, Cont'd.

	* Sector 11 *	* Sector 12 *	* Sector 13 *	* Sector 14 *	* Sector 15
1 Irrigated Agri	.00445174	.00046717	.00061251	.00065129	.00019749
2 Dryland Agri	.00417522	.00090857	.00121509	.00130376	.00038897
3 Lvestock & Pdt	.00507916	.00443761	.00606993	.00695241	.00169850
4 Agri Services	.00081918	.00027210	.00033133	.00040099	.00012604
5 Forestry	.00011189	.06983048	.00068266	.00063513	.00007897
6 Fisheries	.00016464	.00022446	.00030552	.00034153	.00009080
7 Petro & NL,NGL	.02718421	.04292999	.04093560	.14641100	.27929660
8 Other Mining	.00047433	.00103263	.00080277	.00393949	.00100301
9 Construction	.00191438	.00711861	.00370206	.01267436	.00827991
10 Food & Kindred	.01414110	.01094820	.01396778	.00961421	.00715688
11 Text & Apparel	1.01379500	.00121410	.00110295	.00067858	.00049695
12 Lum & Pap Pdts	.00084424	1.00736000	.00464366	.00076493	.00046129
13 Print & Publih	.00382399	.00206385	1.02310400	.00219413	.00142015
14 Chemicals	.00989216	.03401091	.02210552	1.20609700	.08253412
15 Petro Refining	.02480123	.02981649	.03759064	.16901250	1.15119600
16 Rub Leath Plas	.00004666	.00015803	.00006288	.00009397	.00003546
17 Glas Ston Clay	.00028836	.00046764	.00046014	.00082188	.00041575
18 Prim Metal Pdt	.00081626	.00096789	.00054549	.00158460	.00069915
19 Fab Metal Pdts	.00178029	.00149638	.00142640	.00245550	.00251126
20 Non-Elec Mach	.00049826	.00185864	.00116905	.00145881	.00080691
21 Elec Machinery	.00023375	.00029514	.00036525	.00054188	.00057390
22 Transpor Equip	.00171301	.00141112	.00171119	.00130434	.00108810
23 Instruments	.00016770	.00016140	.00084590	.00027880	.00021977
24 Misc Manufactu	.00077279	.00006727	.00069080	.00011184	.00004595
25 Transportation	.01647814	.02521436	.02023191	.02709119	.03457639
26 Communications	.00955785	.00952912	.01522564	.00873597	.00619405
27 Utilities	.07094140	.09048096	.05918413	.18331950	.08260752
28 Wholesale Trde	.02259221	.04491655	.02841053	.03392711	.02594131
29 Eat&Drink Estb	.00807959	.00596417	.00808027	.00494164	.00401990
30 Other Ret Trde	.02858234	.03452442	.03034079	.02325912	.01531075
31 F.I.R.E.	.05703484	.03903257	.03927057	.03954276	.03930591
32 Health Service	.01723404	.01276074	.01612325	.01019755	.00867292
33 Educ Services	.00233328	.00155515	.00181487	.00283786	.00361348
34 Other Services	.02726758	.02090821	.03105782	.02589593	.02464937
35 Households	.36866630	.27294820	.34489670	.21634370	.18405890
TOT INT COEF	1.74675700	1.77735300	1.75908500	2.14641500	1.96977200

Interdependence Coefficients, Cont'd.

	* Sector 16 *	* Sector 17 *	* Sector 18 *	* Sector 19 *	* Sector 20 *
1 Irrigated Agri	.00043244	.00032879	.00046727	.00045009	.00043128
2 Dryland Agri	.00459593	.00064146	.00086065	.00088724	.00084324
3 Lvestock & Pdt	.00387966	.00283266	.00416839	.00418305	.00395442
4 Agri Services	.00053427	.00016807	.00024750	.00024097	.00022661
5 Forestry	.00022107	.00019194	.00024976	.00022337	.00019866
6 Fisheries	.00019741	.00015059	.00021306	.00021483	.00019969
7 Petro & NL,NGL	.05141575	.05537388	.06130167	.03741503	.02791915
8 Other Mining	.00113462	.03875446	.00936665	.00085262	.00061347
9 Construction	.00510477	.00283303	.00634856	.00426277	.00349272
10 Food & Kindred	.01397638	.01181757	.01124949	.01322777	.01331524
11 Text & Apparel	.00173652	.00074832	.00078305	.00088230	.00150627
12 Lum & Pap Pdts	.00096990	.00168510	.00041103	.00054562	.00048215
13 Print & Publih	.00253255	.00207031	.00233711	.00271312	.00237583
14 Chemicals	.19231910	.01116524	.02100543	.02296192	.01118428
15 Petro Refining	.04741511	.02895488	.03691837	.03183925	.02829742
16 Rub Leath Plas	1.00038200	.00008398	.00006936	.00015676	.00038696
17 Glas Ston Clay	.00041477	1.01537500	.00089269	.00147831	.00105680
18 Prim Metal Pdt	.00055414	.00039712	1.01537300	.00979233	.00786568
19 Fab Metal Pdts	.00151028	.00105152	.00195860	1.01291700	.01090596
20 Non-Elec Mach	.00186371	.00099615	.00101844	.00141045	1.00511300
21 Elec Machinery	.00032748	.00032854	.00073356	.00077845	.00253717
22 Transpor Equip	.00156386	.00190997	.00153150	.00209741	.00173829
23 Instruments	.00017460	.00018755	.00018863	.00019781	.00084186
24 Misc Manufactu	.00012534	.00008576	.00014073	.00015016	.00015564
25 Transportation	.02781847	.06869633	.02854165	.02744318	.01723715
26 Communications	.01054130	.01111165	.00863298	.01122817	.01094990
27 Utilities	.10561010	.17140890	.16159770	.08030284	.05474241
28 Wholesale Trde	.03232709	.02902450	.03241978	.03700261	.04006549
29 Eat&Drink Estb	.00665384	.00640988	.00593719	.00746453	.00768252
30 Other Ret Trde	.03221954	.02847119	.05617284	.02934809	.03126276
31 F.I.R.E.	.04152144	.04928596	.04081522	.04339889	.04670532
32 Health Service	.01441007	.01399089	.01313925	.01545577	.01601687
33 Educ Services	.00199114	.00285558	.00215590	.00197448	.00175765
34 Other Services	.02394611	.03215574	.03169178	.02686490	.02736313
35 Households	.30804880	.29780780	.27913530	.33011340	.34167850
TOT INT COEF	1.93846900	1.88935000	1.83807400	1.76047600	1.72110400

Interdependence Coefficients, Cont'd.

	* Sector 21 *	* Sector 22 *	* Sector 23 *	* Sector 24 *	* Sector 25
1 Irrigated Agri	.00046390	.00035664	.00043727	.00043139	.00037022
2 Dryland Agri	.00092172	.00070268	.00084859	.00083840	.00072141
3 Lvestock & Pdt	.00413914	.00315636	.00412129	.00364315	.00295302
4 Agri Services	.00023688	.00018702	.00024595	.00021511	.00018798
5 Forestry	.00017394	.00017331	.00019051	.00031885	.00004240
6 Fisheries	.00021802	.00016581	.00020791	.00019284	.00016182
7 Petro & NL,NGL	.02748151	.02528929	.03614382	.03202651	.04418177
8 Other Mining	.00054400	.00057146	.00081423	.00070453	.00069552
9 Construction	.00251036	.00353224	.00311180	.00288332	.00467217
10 Food & Kindred	.01539399	.01180339	.01472602	.01468363	.01574775
11 Text & Apparel	.00099088	.00094937	.00082142	.00456162	.00102057
12 Lum & Pap Pdts	.00046506	.00093632	.00059952	.00307312	.00040024
13 Print & Publih	.00289176	.00342067	.00380426	.00628582	.00287798
14 Chemicals	.01900863	.02187955	.01616592	.07216226	.01293333
15 Petro Refining	.02829139	.02560024	.02907203	.03464863	.11187120
16 Rub Leath Plas	.00026733	.00020045	.00026105	.00076466	.00015465
17 Glas Ston Clay	.00046891	.00177348	.00318974	.00208126	.00059927
18 Prim Metal Pdt	.00298405	.00375063	.00538919	.00245870	.00038771
19 Fab Metal Pdts	.00234336	.00940537	.00426139	.00682408	.00152922
20 Non-Elec Mach	.00097918	.00152403	.00597154	.00120030	.00075875
21 Elec Machinery	1.01179200	.00246050	.00089122	.00444165	.00105769
22 Transpor Equip	.00261885	1.00977800	.00159837	.00439058	.00893949
23 Instruments	.00045508	.00032613	1.00891100	.00339690	.00057636
24 Misc Manufactu	.00018844	.00014187	.00083321	1.00053800	.00008025
25 Transportation	.01257436	.01914701	.02509384	.01700637	1.03355600
26 Communications	.01405520	.00890993	.01411699	.01275972	.02437844
27 Utilities	.05208733	.05276193	.08356551	.06493226	.06774408
28 Wholesale Trde	.03200790	.03466552	.03152017	.03886620	.03229610
29 Eat&Drink Estb	.00822998	.00634517	.00866772	.00813359	.00892936
30 Other Ret Trde	.03456518	.02767143	.02698394	.03424525	.03531927
31 F.I.R.E.	.04616864	.03211715	.04789917	.04806438	.08560950
32 Health Service	.01867222	.01424391	.01611441	.01776274	.01918100
33 Educ Services	.00186453	.00170538	.00212637	.00222090	.00274488
34 Other Services	.02840747	.02528173	.03738835	.03341434	.03761438
35 Households	.39933420	.30444150	.32094230	.38023770	.41006590
TOT INT COEF	1.77379500	1.65537500	1.75703500	1.86040800	1.97035900

Interdependence Coefficients, Cont'd.

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* Sector 26 * Sector 27 * Sector 28 * Sector 29 * Sector 30
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1 Irrigated Agri .00028180 .00025019 .00047909 .00734243 .00150931
2 Dryland Agri .00055482 .00048926 .00090947 .00301153 .00069959
3 Lvestock & Pdt .00227763 .00199825 .00327936 .03625240 .00292965
4 Agri Services .00013678 .00012663 .00022849 .00183397 .00026127
5 Forestry .00007784 .00006954 .00016575 .00007092 .00004169
6 Fisheries .00012422 .00010963 .00022294 .00086503 .00015945
7 Petro & NL,NGL .02139088 .33819440 .04302846 .03166717 .02713286
8 Other Mining .00031209 .00617047 .00072693 .00055310 .00041272
9 Construction .00154982 .00299582 .00483629 .00313195 .00241802
10 Food & Kindred .01211178 .01067225 .01627948 .09965103 .01560871
11 Text & Apparel .00076623 .00076626 .00112668 .00110384 .00129331
12 Lum & Pap Pdts .00097980 .00086469 .00045354 .00067143 .00036802
13 Print & Publih .01090432 .00247841 .00577845 .00900951 .01596535
14 Chemicals .00480198 .00906304 .01168414 .00742734 .00612320
15 Petro Refining .03048247 .02686730 .04274859 .02685159 .03457181
16 Rub Leath Plas .00003348 .00003886 .00011704 .00005143 .00004571
17 Glas Ston Clay .00027815 .00131693 .00046620 .00065027 .00028303
18 Prim Metal Pdt .00012422 .00019068 .00033533 .00015695 .00012347
19 Fab Metal Pdts .00054362 .00244555 .00127706 .00184821 .00070362
20 Non-Elec Mach .00019687 .00062974 .00057101 .00158725 .00034114
21 Elec Machinery .00206877 .00052155 .00039883 .00056339 .00067905
22 Transpor Equip .00158300 .00133323 .00241932 .00207190 .00303817
23 Instruments .00018658 .00026622 .00023836 .00021682 .00018782
24 Misc Manufactu .00005937 .00005460 .00016414 .00049631 .00020249
25 Transportation .00945288 .01019551 .02404406 .01106976 .01115004
26 Communications 1.01597900 .00880422 .02603227 .01751970 .02442425
27 Utilities .05253875 1.26248300 .09519681 .09152669 .06896467
28 Wholesale Trde .01535115 .01871093 1.02866300 .03945420 .04388845
29 Eat&Drink Estb .00711104 .00580912 .01141887 1.00828400 .00875930
30 Other Ret Trde .02350383 .02428445 .03901082 .03660871 1.05933000
31 F. I. R. E. .05596258 .05110204 .08426767 .07859547 .08540488
32 Health Service .01483738 .01307733 .01951303 .01749955 .01822712
33 Educ Services .00671604 .00715692 .00300869 .00218499 .00249266
34 Other Services .02565681 .03114608 .04143294 .05361122 .03634854
35 Households .31696750 .27869300 .41635830 .37323180 .38624610
TOT INT COEF 1.63590300 2.11937700 1.92688200 1.96667200 1.86033500

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Interdependence Coefficients, Cont'd.

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* Sector 31 * Sector 32 * Sector 33 * Sector 34 * Households
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1 Irrigated Agri .00036763 .00048267 .00073852 .00045650 .00102143
2 Dryland Agri .00072272 .00091963 .00143090 .00086622 .00204922
3 Lvestock & Pdt .00295661 .00401938 .00712992 .00374584 .00825329
4 Agri Services .00019844 .00023707 .00038527 .00022960 .00048932
5 Forestry .00003693 .00004652 .00009676 .00005156 .00004843
6 Fisheries .00016149 .00021271 .00037125 .00020035 .00045504
7 Petro & NL,NGL .02333758 .03464866 .03745450 .03119431 .03613454
8 Other Mining .00045319 .00059199 .00061885 .00051869 .00050703
9 Construction .00746877 .00312921 .00287586 .00488873 .00312651
10 Food & Kindred .01593353 .02164850 .04290720 .02020820 .04495851
11 Text & Apparel .00101868 .00143727 .00154107 .00161811 .00276971
12 Lum & Pap Pdt .00039966 .00043235 .00112780 .00047131 .00041655
13 Print & Publih .00527740 .00480038 .00632599 .00846369 .00464567
14 Chemicals .00511779 .01362067 .01242028 .01527847 .01153143
15 Petro Refining .02297404 .03017777 .03667051 .04189762 .05843013
16 Rub Leath Plas .00004223 .00007167 .00008576 .00025721 .00009455
17 Glas Ston Clay .00053594 .00042678 .00057398 .00051044 .00058164
18 Prim Metal Pdt .00013817 .00016948 .00024970 .00046919 .00022415
19 Fab Metal Pdt .00083103 .00138444 .00171405 .00444404 .00127083
20 Non-Elec Mach .00020000 .00040066 .00065718 .00186768 .00029990
21 Elec Machinery .00026726 .00068270 .00108793 .00081657 .00036881
22 Transpor Equip .00185811 .00243845 .00275204 .00396872 .00510116
23 Instruments .00020929 .00223421 .00425179 .00205430 .00038625
24 Misc Manufactu .00010710 .00021866 .00028820 .00053415 .00014167
25 Transportation .00882964 .01603718 .01390737 .01697438 .02062865
26 Communications .02445964 .02245462 .01774020 .02776304 .01517425
27 Utilities .06472831 .10044820 .10516240 .07703274 .07988209
28 Wholesale Trde .02116712 .03953940 .03170370 .03561339 .04940940
29 Eat&Drink Estb .00939851 .01256362 .01262561 .01179959 .02386055
30 Other Ret Trde .03094065 .04035001 .04729651 .03935940 .08746361
31 F.I.R.E. 1.13093900 .09413987 .07231423 .08248937 .07976370
32 Health Service .02033149 1.04395400 .02882864 .02286573 .05586258
33 Educ Services .00322821 .00284931 1.00253600 .00262425 .00394273
34 Other Services .04739439 .05930108 .04130685 1.04911900 .04703650
35 Households .41655410 .49325170 .61303340 .46239890 1.19950500
TOT INT COEF 1.86858500 2.04932100 2.15021000 1.97305100 1.84583500

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**TYPE II FINAL DEMAND AND OUTPUT MULTIPLIERS
FOR THE NUECES AND MISSION-ARANSAS ESTUARY REGION**

	MULTIPLIER (Final Demand)	DIAGONAL COEFFICIENT	MULTIPLIER (Output)
1 Irrigated Agri	2.126244	1.004001	2.117770
2 Dryland Agri	2.095988	1.013863	2.067330
3 Lvestock & Pdt	1.986339	1.137947	1.745546
4 Agri Services	2.102262	1.024273	2.052442
5 Forestry	1.737913	1.204625	1.442701
6 Fisheries	1.973694	1.001877	1.969996
7 Petro & NL,NGL	1.810089	1.171241	1.545445
8 Other Mining	1.791068	1.001512	1.788364
9 Construction	1.817915	1.003203	1.812111
10 Food & Kindred	1.835536	1.069538	1.716195
11 Text & Apparel	1.746757	1.013795	1.722989
12 Lum & Pap Pdts	1.777353	1.007360	1.764368
13 Print & Publih	1.759085	1.023104	1.719362
14 Chemicals	2.146415	1.206097	1.779637
15 Petro Refining	1.969772	1.151196	1.711066
16 Rub Leath Plas	1.938469	1.000382	1.937729
17 Glas Ston Clay	1.889350	1.015375	1.860741
18 Prim Metal Pdt	1.838074	1.015373	1.810245
19 Fab Metal Pdts	1.760476	1.012917	1.738025
20 Non-Elec Mach	1.721104	1.005113	1.712348
21 Elec Machinery	1.773795	1.011792	1.753123
22 Transpor Equip	1.655375	1.009778	1.639346
23 Instruments	1.757035	1.008911	1.741517
24 Misc Manufactu	1.860408	1.000538	1.859409
25 Transportation	1.970359	1.033556	1.906389
26 Communications	1.635903	1.015979	1.610175
27 Utilities	2.119377	1.262483	1.678736
28 Wholesale Trde	1.926882	1.028663	1.873190
29 Eat&Drink Estb	1.966672	1.008284	1.950514
30 Other Ret Trde	1.860335	1.059330	1.756144
31 F.I.R.E.	1.868585	1.130939	1.652242
32 Health Service	2.049321	1.043954	1.963038
33 Educ Services	2.150210	1.002536	2.144772
34 Other Services	1.973051	1.049119	1.880674
35 Households	1.845835	1.199505	1.538831

**TYPE II INCOME MULTIPLIERS
FOR THE NUECES AND MISSION-ARANSAS ESTUARY REGION**

	DIR EFFECT (Per \$1.00)	TOT EFFECT (F DEMAND)	MULTIPLIER (F DEMAND)	TOT EFFECT (OUTPUT)	MULTIPLIER (OUTPUT)
1 Irrigated Agri	.198093	.347192	1.752675	.345808	1.745690
2 Dryland Agri	.249343	.392022	1.572221	.386661	1.550724
3 Lvestock & Pdt	.165903	.312539	1.883872	.274652	1.655500
4 Agri Services	.188848	.333782	1.767459	.325872	1.725574
5 Forestry	.099871	.208863	2.091316	.173384	1.736072
6 Fisheries	.242031	.372203	1.537834	.371505	1.534953
7 Petro & NL,NGL	.233382	.353417	1.514331	.301746	1.292928
8 Other Mining	.212796	.321454	1.510619	.320969	1.508339
9 Construction	.236089	.355250	1.504732	.354116	1.499928
10 Food & Kindred	.100145	.225564	2.252374	.210898	2.105932
11 Text & Apparel	.269659	.368666	1.367159	.363650	1.348555
12 Lum & Pap Pdts	.166670	.272948	1.637660	.270954	1.625695
13 Print & Publih	.242430	.344897	1.422668	.337108	1.390541
14 Chemicals	.071559	.216344	3.023310	.179375	2.506689
15 Petro Refining	.037204	.184059	4.947344	.159885	4.297569
16 Rub Leath Plas	.192224	.308049	1.602555	.307931	1.601943
17 Glas Ston Clay	.165847	.297808	1.795681	.293298	1.768490
18 Prim Metal Pdt	.158665	.279135	1.759279	.274909	1.732643
19 Fab Metal Pdts	.226255	.330113	1.459030	.325904	1.440424
20 Non-Elec Mach	.242835	.341678	1.407038	.339940	1.399880
21 Elec Machinery	.299268	.399334	1.334368	.394680	1.318817
22 Transpor Equip	.216163	.304441	1.408391	.301493	1.394753
23 Instruments	.214077	.320942	1.499190	.318108	1.485949
24 Misc Manufactu	.267401	.380238	1.421978	.380033	1.421214
25 Transportation	.279789	.410066	1.465626	.396753	1.418043
26 Communications	.232054	.316968	1.365924	.311982	1.344441
27 Utilities	.101295	.278693	2.751301	.220750	2.179277
28 Wholesale Trde	.287398	.416358	1.448717	.404757	1.408350
29 Eat&Drink Estb	.235881	.373232	1.582292	.370165	1.569292
30 Other Ret Trde	.260921	.386246	1.480316	.364614	1.397408
31 F.I.R.E.	.290137	.416554	1.435714	.368326	1.269488
32 Health Service	.344111	.493252	1.433408	.472484	1.373056
33 Educ Services	.472468	.613033	1.297514	.611483	1.294232
34 Other Services	.328817	.462399	1.406251	.440750	1.340411

**TYPE II EMPLOYMENT MULTIPLIERS
FOR THE NUECES AND MISSION-ARANSAS ESTUARY REGION**

	D EFFECT PER MIL \$	T EFFECT F DEMAND	MULTIPLI F DEMAND	T EFFECT OUTPUT	MULTIPLI OUTPUT	NUMBER OF EMPLOYEES
1 Irrigated Agri	21.506	28.306	1.316	28.193	1.311	445.
2 Dryland Agri	6.944	14.098	2.030	13.905	2.003	380.
3 Lvestock & Pdt	2.043	8.809	4.312	7.741	3.789	319.
4 Agri Services	13.415	19.570	1.459	19.106	1.424	262.
5 Forestry	1.757	6.391	3.637	5.305	3.019	47.
6 Fisheries	58.542	64.553	1.103	64.432	1.101	3288.
7 Petro & NL,NGL	5.123	9.832	1.919	8.394	1.638	10203.
8 Other Mining	4.413	9.057	2.052	9.043	2.049	157.
9 Construction	8.642	14.521	1.680	14.475	1.675	8354.
10 Food & Kindred	5.269	10.724	2.035	10.027	1.903	2213.
11 Text & Apparel	17.662	22.032	1.247	21.732	1.230	812.
12 Lum & Pap Pdts	11.977	16.416	1.371	16.297	1.361	252.
13 Print & Publih	15.178	19.825	1.306	19.377	1.277	1077.
14 Chemicals	1.902	6.846	3.599	5.676	2.984	2963.
15 Petro Refining	.359	4.962	13.830	4.310	12.013	2379.
16 Rub Leath Plas	12.661	17.305	1.367	17.298	1.366	49.
17 Glas Ston Clay	13.340	18.430	1.382	18.151	1.361	531.
18 Prim Metal Pdt	3.298	8.910	2.701	8.775	2.661	113.
19 Fab Metal Pdts	10.808	15.208	1.407	15.015	1.389	808.
20 Non-Elec Mach	8.659	13.037	1.506	12.971	1.498	1014.
21 Elec Machinery	8.400	12.890	1.535	12.740	1.517	433.
22 Transpor Equip	28.542	32.649	1.144	32.333	1.133	4553.
23 Instruments	9.618	14.296	1.486	14.170	1.473	214.
24 Misc Manufactu	12.947	18.048	1.394	18.039	1.393	93.
25 Transportation	6.327	11.896	1.880	11.509	1.819	2090.
26 Communications	10.477	14.249	1.360	14.025	1.339	2388.
27 Utilities	1.824	7.595	4.165	6.016	3.299	2455.
28 Wholesale Trde	10.598	16.274	1.536	15.820	1.493	6841.
29 Eat&Drink Estb	19.020	25.418	1.336	25.209	1.325	8226.
30 Other Ret Trde	39.625	45.941	1.159	43.368	1.094	23644.
31 F.I.R.E.	6.763	12.203	1.804	10.790	1.596	6654.
32 Health Service	25.165	32.129	1.277	30.776	1.223	8684.
33 Educ Services	33.176	39.443	1.189	39.343	1.186	1481.
34 Other Services	29.055	35.181	1.211	33.534	1.154	17991.

TOTAL EMPLOYMENT - 121413.