Comparing the Economic Impacts of Marine Recreational Fisheries of Texas and Louisiana on Coastal Economies

Prepared for Ocean Conservancy

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II. Executive Summary

Marine recreational fishing is important to coastal economies, and was estimated to generate $11 billion (B) in economic expenditures across the Gulf of Mexico region in 2016, with 2.7 million (M) Gulf Coast residents marine angling across 19.5 million trips with over 144 million fish caught in 2016. Stock and harvest management are essential to maintaining fishing opportunities and fishing economies in the future. The primary function of this analysis is to compare trends in recreational landings between the states of Texas and Louisiana and explore how these trends relate to local coastal economic activity. The reason for comparing Texas and Louisiana is the apparent difference in the magnitude and variability of recreational landings, where Texas landings are comparatively low and consistent compared to the neighboring state of Louisiana. There are several possible explanations for these observed trends in Texas. It could be that effort is low and consistently constrained and biomass is relatively high. It is also possible that landings data in Texas do not fully capture true effort. Conversely, Louisiana could be overestimating recreational catch.

This study assumes that the average economic impact on local communities from landing a marine recreational fish in Texas would be similar to the average economic impact on local communities from landing the same species of recreational fish in Louisiana. It first compares the relationship between marine recreational landings and economic activities in coastal counties in the two states. It also creates an average economic contribution per pound of recreational fish landed for each state, averaging landings of three key recreational species: the #1 and #2 landed species by count in Texas and Louisiana marine waters, the spotted seatrout and the red drum (*Sciaenops ocellatus*), and the iconic red snapper. The study assumes that the expenditures on these three recreational species are generally representative of recreational fishing as a whole in Texas and Louisiana, and that these three species capture the range of gear, food and services used by recreational anglers in the two states.

Recreational fishing landings should be reflected in the activity of economic sectors in coastal counties of Texas and coastal parishes of Louisiana. First, an Ordinary Least Squares (OLS) analysis examined the probability that total landing estimates for the three key species (red drum, red snapper, and spotted seatrout) correlate with local economic impact on industries that angler expenditures support.[1] In Louisiana, with the exception of three economic sectors, the analysis showed a strong correlation between recreational fish landings and the economic impacts on industries supported by marine expenditures. However, for Texas, that relationship fails, every industrial sector analyzed indicated a low probability that economic output or employment vary closely with landings (Table 7). Results from OLS analysis are not conclusive – they simply warrant a deeper look at the relationship between recreational catch and local economic impact.

The effects of marine recreational fishing expenditures across the two states were analyzed using IMPLAN (an industry-standard tool for developing economic impact analyses). Marine angler expenditures reflect purchases across many industries, and IMPLAN models show how dollars spent in one part of the economy circulate to affect other sectors and the economy as a whole. The annual economic contribution of each pound of recreational fish landed to a county's economy was also calculated using IMPLAN software.

From 2010-2016, the economic output per pound of recreational fish landed in Louisiana ranged from \$68 to \$84, with an average of \$71. Texas values were considerably higher,

[1] Each regression returns a p-value that informs whether landings and economic impact in that sector are correlated. Low p-values (< 0.1) indicate that sector's economic output or employment moves relatively closely with landings. High p-values (> 0.1) indicate that sector's economic output or employment does not move closely with landings. When regressing total catch on the employment and economic output of partially affected sectors, Louisiana p-values are always lower than Texas p-values. This means that total landings in Louisiana correlate more closely to output and employment for each economic sector that marine expenditures support than those in Texas.

ranging from $129 to $196, with an average of $163 over the same time period. While the output per pound for Louisiana and Texas are estimates, their ranges are far from each other, and show that Louisiana consistently has a lower amount of output in dollars per reported fish (Figure 3).

Further examination of the relationship between economic output and pound of recreational fish landed shows a closer relationship between output and pound of fish for Louisiana than for Texas. Louisiana's catch varies far more in total poundage than Texas's catch over time, but the relationship between the economic impact of marine recreational fishing expenditures and that catch is relatively tight. Texas's catch also varies over time, however the relationship between the impact of marine recreational fishing expenditures and that catch is noticeably less coordinated.

The focus for this analysis was a comparison of marine recreational expenditures with underlying recreational landings data. The processes to generate the data used for analysis here are complex, but the metric for comparison is not: a fraction with marine recreational expenditures on top, and pounds of fish landed on the bottom, and an expectation that the ratios would be similar. Given that the source of marine expenditures was consistently derived, the highly variable expenditures to landings ratios suggest that the landings data are the source of the discrepancies. Assuming the quality of the recreational expenditures data is consistent across the two states, there are two possible conclusions to be determined from the analysis, that Louisiana is overestimating recreational landings or Texas is underestimating recreational landings. Louisiana's switch from MRIP to the LA Creel Survey in 2014, and the corresponding reductions in landings estimates and related economic output further complicates the analysis and adds some uncertainty to the results. Although fishery biologists are constantly refining stock assessments and population models, some degree of scientific uncertainty is inevitable in estimating recreational fishery landings. The use of economic tools and methodologies can help to identify potential sources of error, or help to ground truth uncertain landing estimates; and this analysis takes a first step to that end.

III. Background

Commercial fishing in the Gulf of Mexico region yielded 18% of landings and 16% of the value of all U.S. commercial fisheries in 2016. Marine recreational fishing was estimated to generate $11 billion(B) in economic expenditures across the Gulf of Mexico region in 2016,[2] with 2.7 million (M) Gulf Coast residents marine angling across 19.5 million trips with over 144 million fish caught in 2016.[3] Commercial and recreational anglers can both target the same species, as happens in the Gulf with red snapper (*Lutjanus campechanus*), the second largest recreational landing fish by weight in the Gulf, after spotted seatrout (*Cynoscion nebulosus*). In 2016, recreational fishers took approximately two-thirds of the red snapper landings (5.5M lbs.) to commercial fishers' one-third (2.8M lbs.), with red snapper allocations between commercial and recreational fishermen set by the Gulf of Mexico Regional Fishery Management Council at 51% and 49% respectively.[4] Recreational fishers also took over 90% of seatrout catch.[5] Red Drum rounds out the top three in terms of recreational landings, comprising on average about 20% of recreational landings from private and charter boats in Louisiana, and about 15% of the landings from private and charter boats in Texas, from 2010-2013.

Red snapper is a valuable Gulf of Mexico species, one of the Gulf's signature fish, and are popular among recreational fishermen and at restaurant tables and seafood markets. In the past, red snapper biomass was as low as 2.6% of the spawning potential as a result of overfishing and other management challenges.[6] The stock is currently in a rebuilding plan and is on track to rebuild by 2032. Management of the stock, which spans across five states in the Gulf of Mexico and includes restrictions for both recreational and commercial sectors, is complicated. The commercial red snapper fishery has been managed by quota since 1990, and was put under an IFQ system in 2007. The recreational fishery was managed with a recreational quota established in 1997 in response to the Sustainable Fisheries Act, but quotas were replaced by Annual Catch Limits (ACLs) in 2011. In 2014, the red snapper recreational fishery was separated into two sectors with separate ACLs—the for-hire sector and the private recreational sector. The recreational quota allocates 57.7% to private anglers and 42.3% to federal for-hire fishing.[7]

While commercial fishermen have not exceeded their individual fishing quotas since 2007, recreational red snapper landings in the Gulf have exceeded targeted catch limits sixteen times in the past 20 years.[8] For 2018 and 2019, the private recreational sector is being managed

[2] NOAA. 2018. (FEUS 2016)
[3] NOAA. 2017 (FUS 2016)
[4] GMFMC. 2018.
[5] NOAA. 2018. (FEUS 2016)
[6] SEDAR. 2009.
[7] GMFMC. 2018.
[8] Ibid.

under an Exempted Fishing Permit, which is allowing states to manage the fishery in state and federal waters. Disputes over measures of abundance and appropriate federal and state recreational fishing season lengths for red snapper have culminated in a congressionally funded $10 million multi-state effort from 2017-2019 to count red snapper in 2019.

Good management of a renewable resource requires good data – appropriate, methodologically consistent, reliable, and, if possible, public and with ongoing improvements. Fisheries data is difficult and expensive to collect, and the lack of consistent high-quality data can complicate fishery management for species like red snapper. Recreational landings of red snapper have been highly variable across the five states in the Gulf of Mexico for the last few decades (Table 1 and Figure 1). However, there are two notable exceptions—the states of Mississippi and Texas. Reported red snapper landings in Mississippi range from a low of 3,399 lbs. to a high of 632,172 lbs. in 2007 (see Table 1).[9] Because the overall catch from Mississippi is so much lower than the other four states, this variation is difficult to see at the scale in Figure 1. Reported red snapper landings in Texas (Figure 1, red line) also appear to be relatively flat, particularly in comparison with landings from the neighboring state of Louisiana (Figure 1, blue line). Together, these states fish what is considered the "western Gulf" portion of the red snapper stock for stock assessments, though the stock is managed as a single unit gulf-wide. The data in Table 1 and Figure 1 include private, charter and headboat landings for each state, and are intended only to gain a clearer picture of the differences in landings between states over time. Headboat data is excluded from the regressions and economic impact analysis performed for this report.

Table 1. Total Recreational Red Snapper Landings in lbs. by State

YEAR	FLW	AL	MS	LA	TX
1997	1,007,178	2,650,058	632,172	1,074,486	1,325,784
1998	1,387,761	1,446,734	189,014	698,957	1,104,927
1999	1,420,582	1,975,892	143,799	776,530	588,085
2000	1,690,908	1,405,597	24,591	881,480	707,746
2001	2,095,912	2,221,042	108,454	309,510	509,885
2002	2,525,347	2,620,872	227,551	404,563	743,411
2003	2,201,846	2,315,502	365,829	544,732	666,133
2004	3,484,522	1,937,219	25,571	376,280	636,652
2005	2,242,439	1,361,826	5,222	484,250	582,181
2006	2,106,536	826,955	32,809	504,844	659,988
2007	3,295,292	1,134,693	3,399	908,429	466,979
2008	2,332,925	695,131	39,193	638,159	350,466
2009	2,630,439	1,207,913	43,574	1,054,595	660,337
2010	1,482,107	564,655	10,834	133,601	456,171
2011	1,975,772	3,606,454	69,478	600,358	482,045
2012	2,445,940	2,701,304	314,154	1,446,106	616,737
2013	3,777,372	4,424,247	422,529	589,642	489,112
2014	1,644,841	1,158,780	45,118	591,098	395,599
2015	1,631,295	2,468,809	44,694	1,214,971	600,382
2016	2,536,397	2,810,915	373,366	1,221,975	493,797
2017	3,461,051	3,599,760	284,280	930,719	586,961

The primary function of this analysis is to compare trends in recreational landings between the states of Texas and Louisiana and explore how these trends

[9] SOURCES for Table 1: SEFSC MRIP-Based Recreational ACL Data (July 2017; June 2018); SEFSC SEDAR-31 Update (2014) APAIS-adjusted red snapper data. Estimates for years 1981-1996 are displayed in Figure 1, but omitted in Table 1, which focuses on years after the recreational quota for red snapper was established in 1996 for enforcement in 1997.

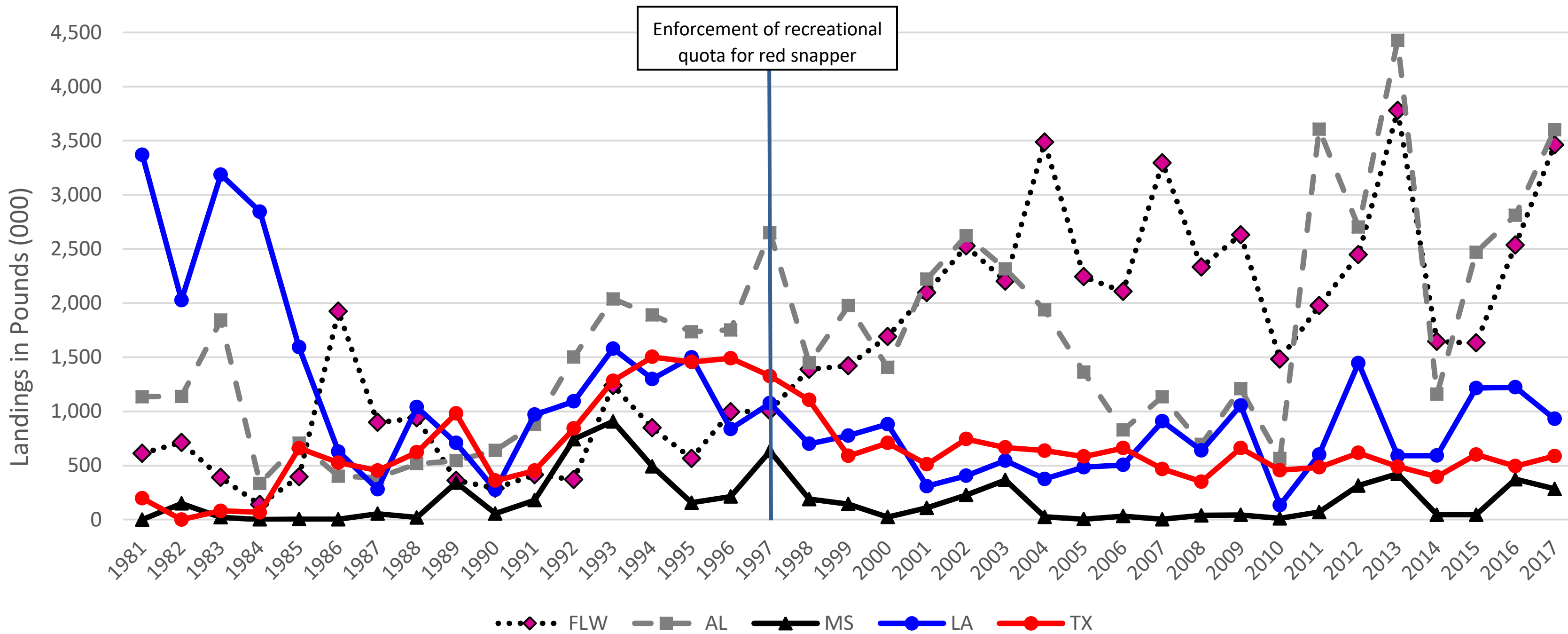

Figure 1. Private, Charter and Headboat Red Snapper Recreational Angler Landings in pounds by State, 1981- 2017

SOURCES: SEFSC MRIP-Based Recreational ACL Data (July 2017; June 2018); SEFSC SEDAR-31 Update (2014) APAIS-adjusted red snapper data.

relate to local coastal economic activity. The reason for comparing Texas and Louisiana is because, at first glance, there is an apparent difference in the magnitude and variability of recreational landings; Texas landings are comparatively low and consistent, and there is greater variability observed across the other Gulf states. There are several possible explanations for these observed trends in Texas. It could be that effort is low and consistently constrained and biomass is relatively high. It is also possible that landings data in Texas do not fully capture true effort. Conversely, Louisiana could be overestimating recreational landings.

The data collection program for Texas catch estimates has some known limitations, including:

- sampling time frames that could potentially miss a number of boats returning in the evening;
- coverage that does not include private launch ramps, docks, or marinas, including where many for-hire vessels depart and moor;
- a set of estimates for only two periods in a year (NOAA publishes estimates for 6 periods per year);
- data from the Texas Parks and Wildlife Division (TPWD) that is not publicly released or accessible; and
- annual estimates of the number Texas anglers are not available, instead effort estimates used in FEUS are based on an estimate of anglers that was completed in 2011.

In its 2017 review of the Marine Recreational Information Program (MRIP), the National Academy of Sciences noted "it is highly advisable that the Texas survey be reviewed by an independent panel so that its applicability to regional fisheries assessment and management can be objectively assessed."[10]

If the Texas data collection program does not capture variability in recreational landings to the same degree as its Gulf neighbor states, this could present an issue of scientific interest and management concern given many stakeholders with interests in the stock. Data collection concerns related to red snapper are not new. Congressional concerns regarding stock estimates for red snapper resulted in the Great Red Snapper Count being performed by HRI and other partners.

Recreational anglers support local economies by buying or renting equipment, specialized materials and services, and general goods and services. More anglers will mean more boats, more ice, more beer, more scaling knives and other goods that are traditionally purchased for recreational fishing. With existing fishing effort and catch data, economists have gauged the economic contribution of current catch for all recreational species for the Gulf,[11] and for Texas.[12] The economic contribution of marine recreational angling in Texas should be roughly the same as for other places with similar fisheries and of similar size. For example, an average

[10] The National Academies of Science, Medicine and Engineering. 2017.
[11] NOAA. 2018. (FEUS 2016)
[12] Lovell, S. J., Steinback, S., & Hilger, J. 2013.

angler may not be expected to buy much more bait, line, specialized clothing, gas, boat repair services, or food in Texas for a similar fishing trip than in a neighboring environment like Louisiana. If fishers are rational economic actors, they are getting adequate “bang” for their recreational “buck,” which will result in similar expected relationships between fishing and economic output.

The most direct way to examine the differences between Texas and Louisiana recreational landings would be to run paired surveys in the both states. However, this method would be time-consuming and costly. Instead, this study uses the economic impacts of recreational fishing expenditures to cross-check catch estimates between the two states. The analysis examines the relationship between marine recreational catch and the economic impacts on local economies in Texas and in Louisiana.

This study assumes that the average economic impact on local communities from landing a marine recreational fish in Texas would be similar to the average economic impact on local communities from landing the same species of recreational fish in Louisiana. It first uses an ordinary least squares analysis to determine whether there are similar connections between spending patterns and recreational fishing in both states. Once those connections were determined through regression analysis, a second assessment estimating the economic contribution of recreational fishing expenditures to the local coastal economy helped to test the plausibility of recreational catch estimates. It also identifies an average economic contribution per pound of recreational fish landed for each state, averaging landings of three key, or target species: the #1 and #2 landed species by count in Texas and Louisiana marine waters, the spotted seatrout and the red drum (*Sciaenops ocellatus*), and the red snapper. Scaling marine recreational catch by these three species should have little effect on the relationship between catch estimates and economic impact from angler expenditures. The study assumes that similar gear, food, and services are purchased by anglers in Louisiana and Texas, regardless of which of the top species, by numbers landed, they catch—that the expenditures on these three recreational species are generally representative of recreational fishing as a whole in Texas and Louisiana. It also assumes that if average levels of expenditures vary substantially when angling for other fish, that those signals would be tempered by the size of the spotted seatrout, red drum, and red snapper catches.

As noted above, this study assumes that anglers in both states value recreational fishing similarly, with similar expenditures per angler trip resulting in similar economic contributions in local counties. If the average economic contribution for Texas is substantially higher than for Louisiana, this may indicate that landings are higher than Texas estimates would suggest. Such a finding would suggest that there are more fish caught recreationally than estimated in Texas, and the size of the difference in “expenditures-per-pound-of-fish-landed” may be one indicator of the degree of underestimation. The expenditures-per-pound metric controls for a range of other variables, like habitat and angler effort, by collapsing them into a single metric associated with data available for both states, comparing modeled economic impacts to the reported catch estimates.

If expenditures associated with marine recreational fishing are similar or change similarly with catch data, then total recreational catch estimates should support local businesses to roughly the same degree. Even a simple linear regression can shed insights on the relationship between recreational catch and the economic contributions to local economies. If there is a significant contrast in the relationship between catch and economic contribution across these two states with similar fisheries, this could indicate that: a) marine recreational fishers behave differently in Texas than in Louisiana, b) the coastal fishing economies are significantly different between Texas and Louisiana, or c) the catch estimates may not be reliable in one of these states.

This study presents two different analyses with different geographic scopes. The first compares recreational landings to a subset of directly affected industrial sectors in the coastal counties of Louisiana and Texas (Figure 2). The second analysis has a statewide geographic scope, examining recreational expenditures across the states of Louisiana and Texas to determine the economic output per pound of recreational fish landed.

TX Gulf Coast Counties	LA Gulf Coast Parishes
Aransas, Brazoria, Calhoun, Cameron, Chambers, Galveston, Harris, Jefferson, Kenedy, Kleberg, Matagorda, Nueces, Refugio, San Patricio, Willacy	Cameron, Iberia, Jefferson, Lafourche, Orleans, Plaquemines, Saint Bernard, Saint Mary, Saint Tammany, Terrebonne, Vermilion

Figure 2. Coastal Counties and Parishes included in Analysis

IV. Methodology

This analysis uses two separate methodologies to answer the research questions posed. First, and ordinary least squares (OLS) analysis was performed as a first attempt to understand if there are similar connections between spending patterns and recreational fishing in the coastal counties of Texas and Louisiana. Once it was determined through the OLS if spending patterns were similar, an economic contribution analysis using IMPLAN software was then used to further explore the relationships between recreational fishing expenditures and recreational landings between the two states.

Data Sources

Table 2 provides a listing of the different types of data used for this analysis, and the source for each. Landings data were obtained from three sources—NOAA Fisheries, NOAA Fisheries Economics of the United States (FEUS), and TPWD. Until 2013, recreational landings data in Louisiana were collected by NOAA's Marine Recreational Information Program (or MRIP, formerly known as the Marine Recreational Fisheries Statistical Survey). These data were obtained through the MRIP online query program.[13] Data in Texas have been collected since 1974 through TPWD's Texas Marine Sport-Harvest Monitoring Program. These data are not publicly available, but were obtained by placing an email request to Mark Fisher, Science Director, at TPWD.

Overall, recreational landings are separated by fishing mode, including private anglers on boats, shore anglers, charter for-hire operators, and headboat operators. Headboat landings are reported through the Southeast Region Headboat Survey. However, the project team was unable to obtain these data for all the years of the study, so headboats were excluded from the analysis. Similarly, TPWD only conducts occasional shore fishing surveys, as a result, shore fishing data were not included in the analysis. As a result, landings data included private boat and charter for-hire fishing for Texas and Louisiana from 2001-2013 (See Table 3).[14] The team obtained data for three important species: red snapper (*Lutjanus campechanus*), red drum (*Sciaenops ocellatus*), and spotted seatrout (*Cynoscion nebulosus*). Red snapper is an important species targeted primarily offshore, while the red drum and spotted seatrout are important inshore species. Together, these three fish make up a significant portion of overall recreational landings in Texas and Louisiana (see Table 4).

Because the ultimate goal of this research is to develop a ratio between economic output and pounds of key species of recreational fish landed in each state, landings are required for each of

[13] Retrieved from https://www.st.nmfs.noaa.gov/recreational-fisheries/data-and-documentation/queries/index/ February 11, 2019.
[14] Sources: Texas landings data from TPWD. Louisiana landings data from MRIP. All landings in number of fish.

the years that the IMPLAN analysis was run for. The project team had access to seven years of IMPLAN data and marine expenditures (2010-2016). As described above, private recreational and charter boat landings data from 2010-2013 were obtained from NOAA Fisheries and TPWD. However, private recreational and charter boat landings for 2014-2016 were developed differently. The team determined the average ratio of total recreational landings (for all fishing modes – private recreational, charter boat, and headboat) to landings for private recreational and charter boat modes from 2010-2013, and then applied this ratio to FEUS total recreational landings for the years 2014-2016. This allowed the use of recreational landings (that excluded headboats) in the comparison of economic output vs. pounds of key recreational species for the years 2014-2016. It also introduces some additional uncertainty into the findings for the years 2014-2016, however, the headboat to "non-headboat" ratios were fairly consistent from 2010-2013 which increases confidence in the findings.

Table 2. Types of data and sources used in each analysis

Analysis	Data	Years	Sources
Ordinary Least Squares (OLS)	Landings of all species and angler modes	2001-2013	NOAA, TWPD
OLS	Employment and Economic Output by Sector	2001-2013	IMPLAN
Input/Output Analysis (I/O)	Landings three key species	2010-2013	NOAA, TWPD
I/O Analysis	Landings three key species	2014-2016	NOAA, TWPD, applied the average proportion of total landings to three key species from 2010-2013 to 2014-2016 total landings from FEUS
I/O Analysis	Marine Recreational Expenditures	2010-2016	National Marine Angler Expenditure Survey, FEUS

Table 3. Total Combined Landings by State by Year for Red Drum, Red Snapper, and Spotted Seatrout

	Private rec (number of fish)				Charter boat (number of fish)			
	2010	**2011**	**2012**	**2013**	**2010**	**2011**	**2012**	**2013**
Red Drum LA	5,128,843	4,548,267	3,458,029	4,523,043	189,907	248,563	203,875	305,864
Red Drum TX	196,658	246,921	207,271	208,791	67,652	100,531	116,073	60,042
Red Snapper LA	12,189	58,951	130,282	98,597	0	4,336	22,783	14,816
Red Snapper TX	25,638	29,475	29,154	42,549	7,674	6,786	5,029	5,106
Spotted Seatrout LA	14,465,717	17,697,004	17,938,247	12,928,606	532,220	687,155	744,307	656,484
Spotted Seatrout TX	509,336	718,575	605,878	550,963	222,459	418,746	204,115	244,908

Table 4. Proportion of landings of Red Drum, Red Snapper and Spotted Seatrout to Overall Landings, by trip type Averaged over 4 years (2010-2013)

State	Private	Charter
Texas	62.0	73.5
Louisiana	82.6	92.6

Economic data for Louisiana and Texas covering the years 2010-2017 was purchased from IMPLAN. In the private sector, IMPLAN provides comprehensive data sets that can be purchased to analyze the economic impacts of any direct impacts on a specific industry or set of industries. IMPLAN provides standard economic impact statistics including jobs, wages, output (sales revenue), sales impacts, and value-added.[15] As the intent of this study was only to assess the relationship between recreational fishing effort and economic activity, only two statistics were examined, employment and output. IMPLAN data and analysis tools were used in both analyses.

Expenditures were taken from "The Economic Contribution of Marine Angler Expenditures in the United States, 2011," also referred to as the National Marine Angler Expenditure Survey (NMAES 2011).[16] Detailed durable expenditures were taken from the 2014 update of the National Marine Expenditure Survey, released in 2016 (NMAES 2014).[17] Fishing effort data (angler trips) was taken from Fisheries Economics of the United States (FEUS) reports, published annually by NOAA. National CPI measurements were obtained from the Minneapolis Federal Reserve,[18] and Gulf Coast retail gasoline prices were obtained from the U.S. Energy Information Administration.[19]

Ordinary Least Squares (OLS) Analysis

To first identify connections between recreational anglers and economic impacts on the local economy, ordinary least squares (OLS) regressions were run comparing landings of the three key species for each state (red drum, red snapper, and spotted seatrout), from 2001-2013, to economic activity in the most directly affected industrial sectors. To assess the activity directly attributable to anglers, for the OLS analysis, the study area was restricted to the coastal counties in each of the states. The intent of this exercise was simply to see if there was any notable relationship between angler spending that could be observed for the two states. The OLS was not intended to imply any statistical significance, but rather determine if further study and analysis were warranted.

The sectors appropriate to include in the analysis were chosen using three methods. The first was to use "best judgment" to determine which of the 536 sectors in IMPLAN might be supported by marine recreational anglers. The second method was searching for codes used by the North American Industry Classification System (NAICS) that had relevant keywords (marina, boat, fishing, etc.) and matching these to the IMPLAN sectors that included them. The third method was to compare the list determined in the first two steps with sectors used in the

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[15] The difference between an industry's or an establishment's total output and the cost of its intermediate inputs. Value-added is a measure of the contribution to GDP made by an individual producer, industry or sector.
[16] Lovell, S. J., Steinback, S., & Hilger, J. 2013.
[17] Lovell, S. J., Steinback, S., Hilger, J., & Hunt, C. 2016.
[18] https://www.minneapolisfed.org/community/financial-and-economic-education/cpi-calculator-information/consumer-price-index-and-inflation-rates-1913-
[19] https://www.eia.gov/petroleum/gasdiesel/

NMAES 2011 and NMAES 2014 which are reports published by NOAA economists studying similar economic contributions at the national level. The combination of the last two steps, for example excluded "ship building" and "ship repair" industries from this work, as recreational anglers use boats, not ships, as defined by NAICS. Table 5 shows the ten most affected sectors by employment in Texas in 2011, Table 6 shows the ten most affected sectors for Louisiana in 2011.

Once Employment ("employment") and Economic Output ("output") were determined for each sector, the relationship between the reported landings in each state and each industrial sector was tested. Employment is defined by the number of full-time jobs which are created by the expenditures. Output is defined as the gross output in the affected sectors due to the expenditures. OLS regressions were run, with reported landings as the independent variable, and employment and output of the affected sector partials as the dependent variables. The purpose behind these regressions was to test how landings were related to economic activity within fishing sectors. Our hypothesis was that there would be a significant positive relationship between landings and economic activity within fishing sectors.

Table 5. Ten Most Affected Sectors by Employment in Texas, 2011

Number	Sector	Description	Jobs*	Labor Income ($000)	Value Added ($000)	Output ($000)
1	396	Retail - Motor vehicle and parts dealers	764	$52,978	$69,955	$71,907
2	404	Retail - Sporting goods, hobby, musical instrument and book stores	647	$17,257	$25,491	$31,816
3	501	Full-service restaurants	417	$9,694	$11,226	$21,056
4	502	Limited-service restaurants	317	$6,646	$15,053	$27,293
5	400	Retail - Food and beverage stores	305	$10,578	$15,695	$19,438
6	504	Automotive repair and maintenance, except car washes	302	$18,509	$21,402	$29,713
7	395	Wholesale trade	274	$26,683	$49,081	$67,901
8	440	Real estate	251	$5,577	$26,013	$39,510
9	17	Commercial fishing	223	$2,746	$7,199	$11,035
10	526	Other local government enterprises	206	$15,371	$14,657	$59,489

Table 6. Ten Most Affected Sectors by Employment in Louisiana, 2011

Number	Sector	Description	Jobs*	Labor Income ($000)	Value Added ($000)	Output ($000)
1	396	Retail - Motor vehicle and parts dealers	2598	$146,752	$218,195	$226,306
2	404	Retail - Sporting goods, hobby, musical instrument and book stores	2164	$50,663	$86,798	$107,857
3	504	Automotive repair and maintenance, except car washes	1750	$89,498	$110,421	$158,154
4	364	Boat Building	686	$59,981	$51,160	$146,908
5	526	Other local government enterprises	560	$35,320	$28,632	$149,839
6	395	Wholesale trade	551	$42,032	$83,224	$122,009
7	496	Other amusement and recreation industries	504	$7,794	$10,070	$27,392
8	400	Retail - Food and beverage stores	487	$14,366	$24,849	$30,847
9	17	Commercial fishing	452	$5,292	$11,526	$19,523
10	398	Retail - Electronics and appliance stores	415	$17,490	$18,440	$21,187

The employment and output of recreational fishing-related sectors were regressed against key species landings in each state for the years 2000-2013. Since these sectors have activity throughout the state unrelated to recreational fishing, employment and output was restricted to counties that have coastline. P-values less than 0.1 in the regression indicate that changes in recreational landings are related to changes in each industry's employment or output.

The geographic scope of the OLS analysis is restricted to isolate the most direct economic impacts on the coastal economy of marine recreational fishing. Coastal counties in Texas and coastal parishes in Louisiana were included and inland counties were excluded (as were any economic multiplier effect that including them might offer).

Input-Output Analysis

The effects of marine recreational fishing expenditures across the two states were analyzed using input-output models. Angler expenditures reflect purchases across many industries (referred to as industrial sectors, "industries," or "sectors"). Input-output models show how dollars spent in one part of the economy circulate to affect other sectors and the economy as a whole (where the geographic scope of "the economy" must be preset). The effects of spending can be classified as direct, indirect, and induced. Direct effects occur when money is spent in the local economy on goods and services. Indirect effects measure the impact of local industries buying goods and services from other local industries. Induced effects occur when employees of businesses involved in direct and indirect effects then spend again through their own household purchases. The IMPLAN model was selected for modeling the economic contribution of angler expenditures to local economies.

This study used the entire states of Texas and Louisiana as study areas for the Input-Output analysis. This reflects respondents' activity in NMAES surveys, where they are asked about expenditures made within the state, without regard to proximity to a coastline. Many angling-related expenditures made by residents are likely made statewide, such as fishing gear, clothes, or second vehicle purchases.

The annual economic contribution of each recreational fish landed for the three key species to a county's economy was calculated using IMPLAN software. For the years 2010-2015, total output related to marine recreational fishing was calculated using expenditures data from the NMAES 2011. Expenditures presented in NMAES 2011 had to be adjusted for inflation and changes in gas prices. In 2016, NMAES 2014 was released which detailed durable expenditures for the year 2014. Durable expenditures in the 2014 and 2015 models were adjusted to reflect the NMAES 2014.

As noted above, FEUS reports provide estimates of total angler trips for Texas, which are not further distinguished by type (as for-hire, private boat, or shore trips) or by total number of anglers. To account for this lack of assigned distribution, FEUS data were distributed by trips according to their distribution in the NMAES 2011. Louisiana trips are reported by type and total anglers for the years 2010-2013, and so their FEUS levels are used here. Expenditures were allocated according to the IMPLAN 536 equivalent of the IMPLAN 440 sectors used in the study. When expenditures occurred over multiple sectors or commodities, expenditures were distributed among the sectors based on the proportion of output or household demand accounted for by that sector in the study area.

Margins of Expenditures/Partials

In IMPLAN, "margins" are used to reflect how retail-level prices paid by anglers translate into producer values and economic effects throughout the economy. Retail purchase coefficients (RPCs) reflect how much of a retail good is produced within the region. IMPLAN default RPC settings (scaled to less than 100%) were used in all cases except for the purchase of live bait. Live bait is caught locally, so 100% RPCs were used.

In NMAES surveys, respondents are asked the percentage of time a durable purchase is used to fish.[20] This avoids over-counting the use of durable purchases for fishing. For example, if

[20] Lovell, Steinback, and Hilger 2015, p. 8

someone buys a pickup truck to go fishing, but reports only using the truck for fishing for 60% of its use, and uses it for other purposes 40% of the time, only 60% of the truck's value is counted as fishing expenditures. Goods used less than 50% of the time for fishing were not counted. By design, NMAES expenditures already account for the partial use of durable goods.

Because TX and LA do not collect data on the same list of finfish species, we chose to focus on three key species (red drum, red snapper, and spotted seatrout) that made up a large proportion of overall landings in the two states. Since the three key species do not make up total landings, the proportion of key species landings to total landings was used to scale output. This scalar was developed by taking the average proportion of total landings for the key species for the years 2010-2013. The resulting scaled output was then divided by landings of the key species to find output per landings.

V. Analysis

Ordinary Least Squares (OLS) Analysis

Recreational fishing landings should be reflected in the activity of economic sectors in coastal counties of Texas and coastal parishes of Louisiana. OLS analysis examined the probability that total landing estimates for the three key species (red drum, red snapper, and spotted seatrout) correlate with local economic impact on industries that angler expenditures support. For each industry sector that is impacted by angling expenditures in each state, an OLS regression was run. Each regression returns a p-value that informs of the probability that landings and economic impact in that sector are correlated. Low p-values (< 0.1) indicate high probability that sector economic output or employment move relatively closely with landings. High p-values (> 0.1) indicate low probability that sector economic output or employment vary closely with landings. High p-values (highlighted in yellow in Table 3) indicate that landings and the economic sectors they support are not correlated. The name of the industries included in the analysis, their IMPLAN sector numbers, and regression results are presented in Table 7.

When regressing total catch on the employment and economic output of partially affected sectors, Louisiana p-values are always lower than Texas p-values. This means that total landings in Louisiana correlate more closely to output and employment for each economic sector that marine expenditures support than those in Texas. In Louisiana, except for three economic sectors, we see what we would expect to see in terms of the relationship between recreational fish landings and the impact on industries supported by marine expenditures in coastal counties. That is that the Louisiana p-values indicate a high probability of correlation (i.e. are < 0.1) and marine recreational landings are driving output and employment in related industries. However, for Texas, that relationship fails, as the p-values for every industrial sector analyzed indicate a low probability that sector economic output or employment vary closely with landings.

"In Louisiana…we see what we would expect to see in terms of the relationship between recreational fish landings and the impact on industries supported by marine expenditures in coastal counties… However, for Texas, that relationship fails,"

There are three economic sectors in Louisiana where there was no significant relationship with landings, sector 364 – boat building (both economic output and employment), sector 440 – real estate (economic output only), and sector 499 – hotels, motels, casinos (employment only).

Table 7. P-values of Regressions – Total Recreational Landings per State Against Economic Output and Employment of Selected Industry Partials

Economic Output			
Sector	Description	TX p-value	LA p-value
364	Boat building	0.685	0.109
404	Retail - Sporting goods hobby musical instrument and book stores	0.403	0.017
414	Scenic and sightseeing transportation and support activities for transportation	0.401	0.007
440	Real estate	0.252	0.122
496	Other amusement and recreation industries	0.257	0.028
499	Hotels and motels including casino hotels	0.350	0.018
501	Full-service restaurants	0.236	0.054
Employment			
Sector	Description	TX p-value	LA p-value
364	Boat building	0.580	0.483
404	Retail - Sporting goods hobby musical instrument and book stores	0.641	0.003
414	Scenic and sightseeing transportation and support activities for transportation	0.533	0.003
440	Real estate	0.276	0.013
496	Other amusement and recreation industries	0.297	0.060
499	Hotels and motels including casino hotels	0.391	0.349
501	Full-service restaurants	0.225	0.120

Given the high-levels of offshore oil and gas development in the Gulf[21] it is likely that the building of ships to support and transport the development of oil and gas from pipelines in the Gulf swamps any economic signal from recreational fishing for IMPLAN sector 364 – boat building for both states. The connections between the real estate sector (IMPLAN sector 440) and marine angling expenditures are just above the level of significance for Louisiana (0.12), whereas the Texas p-values are more than double Louisiana p-values, indicating that landings and the resulting economic expenditures are not correlated with real estate activity in Texas. The lack of correlation for employment in the hotels, motels, and casinos sector (IMPLAN sector 499) in Louisiana, is likely driven by employment in casinos in coastal parishes along with non-fishing-related recreation and tourism in the city of New Orleans.

IMPLAN Expenditures Analysis

The OLS regression results indicate that a deeper analysis of the relationship between landings and the economic impact of angler expenditures is warranted. IMPLAN results tables are available in the Data Appendix. Analysis here will focus on summary tables and figures and related analytic measures.

Table 8 presents the economic contribution of angler expenditures per pound of landed red drum, red snapper, and spotted seatrout (combined) for Louisiana and for Texas, from 2010 to 2016. Economic Output (output) refers to the direct contribution to the local economy from a given angler expenditure. Output is the gross sales made by the businesses in the region affected by the economic activity associated with marine recreational fishing, whereas "value added" from the FUS 2017 report for the year 2016 in this table is the contribution to the gross domestic product of the region attributable to marine recreational fishing. "Adjusted Economic Output per Pound of Key Species Fish refers to the scaled economic contribution when only the three key species landings are compared from total recreational landings in Louisiana and Texas. These "Output per Pound" columns and the last column are the essential results in Table 8.

Before reviewing the numbers in the table, the construction of the data here should be made clearer. First, in 2014, Louisiana switched from NOAA's Marine Recreational Information Program (MRIP) to the state's own Creel data. Under MRIP, Louisiana's estimates of angler trips hovered around four million per year; after the switch to creel data, that number dropped to two million. Comparing the ratios of economic output per pound of fish landed, Louisiana output per landing for 2014 stayed in the same range as for the years 2010-2013, while the output per pound was low in 2015. This suggests that, even under the switch to LA Creel, Louisiana's system stayed consistent in terms of economic output per pound of recreational fish landed. One caveat to this analysis is that it should not be used as absolute contributions to the economy from the catching of fish. Each of the data collection programs used in this

[21] Texas and Louisiana are ranked first and second in the nation, respectively, in terms of contributions to wages, employment, and establishments from the offshore mineral extraction sector of the ocean economy. https://coast.noaa.gov/enowexplorer/#/employment/extraction/2016/22000

analysis provides estimates with varying levels of uncertainty. This report is meant to compare

Table 8. Total Recreational Catch with Economic Output from Recreational Fishing of Red Drum, Red Snapper, and Spotted Seatrout, and Dollars per Pound of Fish Landed[22]

State	LA				TX				
Year	Total Recreational Catch of Key Species in Lbs. (000)	Economic Output from Recreational Fishing Expenditures ($000)	Scalar of Key Species Catch to Total Catch	Adjusted Economic Output per Pound of Key Species Fish	Total Recreational Catch of Key Species in Lbs. (000)	Economic Output from Recreational Fishing Expenditures ($000)	Scalar of Key Species Catch to Total Catch	Adjusted Economic Output per Pound of Key Species Fish	Ratio of TX Economic Impact/lb and LA Economic Impact/lb
2010	19,970	$1,647,151	0.83	$68	3,047	$840,633	0.65	$179	2.62
2011	25,503	$2,180,833	0.83	$71	5,143	$1,020,702	0.65	$129	1.82
2012	20,093	$1,772,314	0.83	$73	3,802	$970,551	0.65	$166	2.26
2013	21,966	$2,212,146	0.83	$84	3,929	$936,457	0.65	$155	1.85
2014	10,571	$955,332	0.83	$75	3,164	$835,089	0.65	$171	2.28
2015	15,468	$958,317	0.83	$51	3,244	$736,869	0.65	$147	2.87
2016	11,501	$1,003,379	0.83	$72	4,089	$1,237,327	0.65	$196	2.71
AVERAGES	*15,735*	*$1,532,782*		***$71***	*3,568*	*$939,661*		***$163***	***2.34***

[22] Due to changes in data collection methods, the source for total catch data for 2014-2016 is different than for 2010-2013 for both states, as noted by the timeline break after 2013 in Figure 3 below. Louisiana 2014-2016 catch and expenditures are disproportionately lower than for Texas. The "Economic Output from Recreational Fishing Expenditures" values for 2016 are from FEUS 2016, and represent value added (not strictly output). This change may affect "$ per fish lb." for 2016. The Louisiana value for $ per fish lb. in 2016 is within the range of the calculated ratios for the other years in this set, and the TX value is not, but the TX–LA ratio in the last column for 2016 is within the range of the other six data years. See "Data Sources" discussion on pages 10-11 for more detail.

the ability of the two programs to estimate landings, based on the assumption that those landings will be based on relatively similar sets of expenditures.

A second point about the data in Table 8, is that Fisheries of the United States 2016 was used to fill a seventh data year. Therefore, the table is not formally a statistical panel of time series data. It is a collection of seven points for each state – for Louisiana, four from a single time series generated the same way, and three more that each match by year to other estimates available or generated by our economic modeling. Running statistics on these seven points for each state is not a recommended practice, and would yield high levels of statistical uncertainty. Column averages appear in the table to provide a general benchmark.

Third, the scaling of catch by the three target species should not affect the ratios of expenditures to catch significantly, because anglers spend similarly in the state economy for a range of inshore and offshore fish. This study focuses on the two highest species by number of fish landed for Texas and for Louisiana (#1 spotted seatrout, #2 red drum), and on the iconic Gulf red snapper. Anglers spend their fishing dollars expecting to catch these fish.

As shown in Table 8, from 2010-2016, the economic output per pound of recreational fish landed in Louisiana ranged from $51 to $84, with an average of $71. Texas values were considerably higher, ranging from $129 to $196, with an average of $163 over the same time period. While the output per pound for Louisiana and Texas are estimates, their ranges are far from each other, and show that Louisiana consistently has a lower amount of output in dollars per reported fish. Results show that from 2010-2016, marine recreational anglers in Texas spent an average of $92 more per pound landed of three key species than marine anglers in Louisiana spent for the same fish. This result may be explained in a few ways.

"Results show that from 2010-2016, marine recreational anglers in Texas spent an average of $92 more per pound landed of three key species than marine anglers in Louisiana spent for the same fish."

One explanation is that people who fish in Texas and Louisiana may have fundamentally different economic preferences. However, because Texas and Louisiana coastal counties are geographic neighbors with many cultural and economic factors in common, we would expect similar preferences across the angler population. The average 2017 income for a Texan was around $57,000 and for a Louisianan around $48,000, meaning a difference in the statewide average income in the 15-19% range.[23] This difference alone does not suggest that anglers in Texas (resident and non-resident) would be more tolerant of a low return in fish for the "extra" investment of their recreational dollars.

[23] U.S. Department of Commerce, Bureau of Economic Analysis, Regional Data, GDP and Personal Income, SAGDP10N Per capita real GDP by state, www.apps.bea.gov, accessed 31Jan 2019.

Another explanation is that catch estimates may not be reliable in one of the two states; Louisiana methodologies may overestimate marine recreational landings, or Texas methodologies may underestimate marine recreational landings. However, these regional economies are similar, and landings restricted to and scaled by the same three key species of fish. Given the strong correlation between Louisiana landings, recreational expenditures, and the economic impacts on related industries, and noted issues with Texas methodologies, TPWD survey methodologies may underestimate recreational landings.

Figure 3 allows further analysis of the numbers in Table 8. Figure 3, "Economic Output per Pound of Recreational Red Drum, Red Snapper, and Spotted Seatrout Landings, by State," shows a closer relationship between output and pound of fish (a flatter distribution) for Louisiana than for Texas.

Comparing Table 8 and Figure 3, we see that Louisiana's catch varies far more in total poundage than Texas's catch over time, but the relationship between the impact of marine recreational fishing expenditures and that catch is relatively tight. Texas's catch also varies over time, however the relationship between the impact of marine recreational fishing expenditures and that catch is noticeably less coordinated in the figure. The wider distribution for the Texas datapoints indicates a much wider span in dollars of Output per pound than for Louisiana's relatively flatter distribution. The Texas points in the figure have a standard deviation of $20.45, a dispersal more than twice the standard deviation for the Louisiana points in the figure of $9.02.

Remembering the assumption that the economic expenditures of anglers are relatively consistent in terms of demand for certain goods and services, and that these expenditures necessarily drive a certain portion of the economy, one would expect a consistent relationship between expenditures and catch. The Louisiana time series and time points display a visibly consistent relationship, while the Texas time series and time points do not.

Another way to see this is to look at the difference from any one datapoint to the next. Consistent data will tend to have small differences, and inconsistent data will tend to have large differences. Table 9 shows the year-to-year difference in economic output per pound for the three key species, by state. Even though the seven catch and economic output data points do not represent a time series, it should be noted that the magnitude of the change from year to year (i.e. the absolute value of the difference) in dollars is always smaller for Louisiana, except between 2014 and 2015, when they were equal. This indicates that the economic output per pound of fish is more consistent in Louisiana than in Texas.

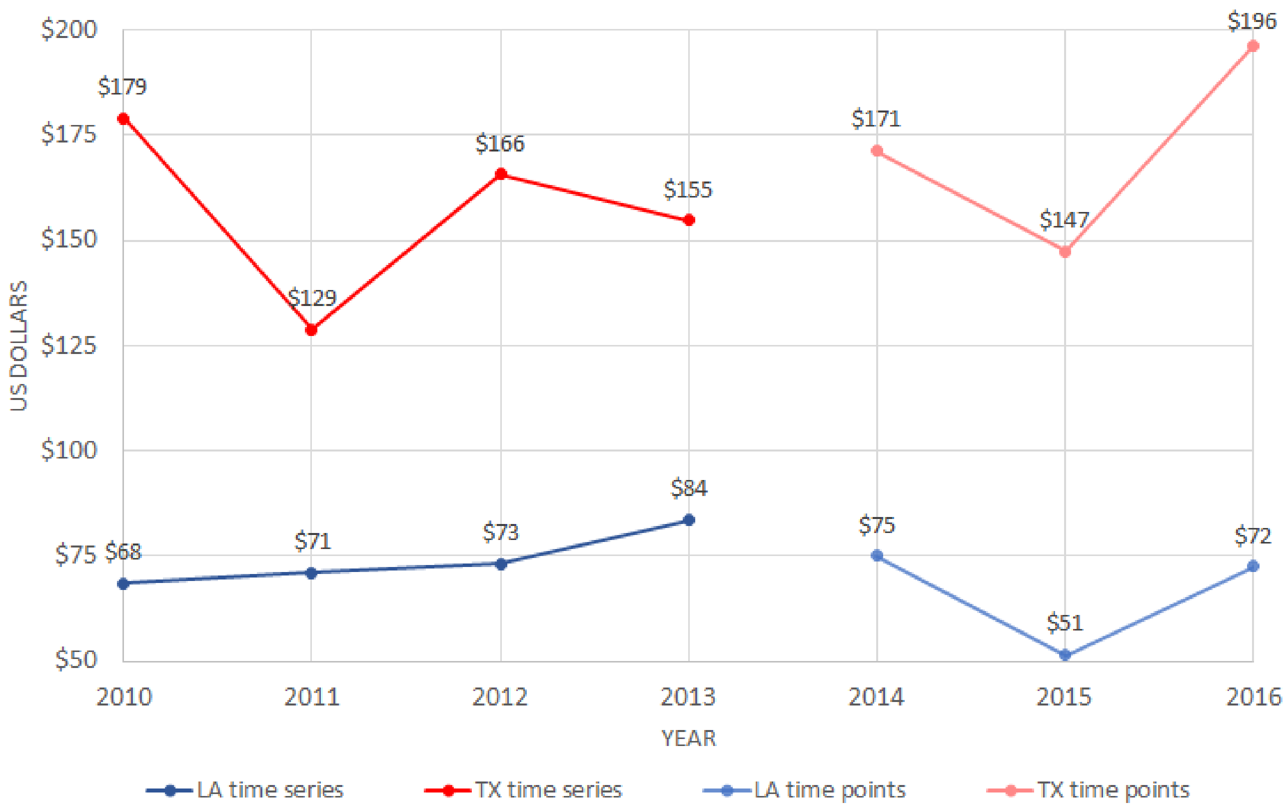

Figure 3. Economic Output per Pound of Recreational Red Drum, Red Snapper, and Spotted Seatrout Landings, by State

Table 9. Year-to-Year Differences in Economic Output per Pound of Fish Landed in Table 8 and Figure 3, by State

Years	LA	TX
2011 - 2010	$3	-$50
2012 - 2011	$2	$37
2013 - 2012	$10	-$11
2014 - 2013	-$9	$17
2015 - 2014	-$24	-$24
2016 - 2015	$21	$49

VI. Limitations and Uncertainties

This study uses a quantitative economic measure to assess the plausibility of Texas marine recreational catch estimates and compare them to those in a neighboring state, Louisiana. The study was conducted under time and budget constraints that did not allow the possibility to conduct statistically reliable separate field sampling of Texas fishing activity. Instead, the study undertakes a known and reliable method of estimating the actual economic contribution of an industry to an economy. The quantitative work presents alternative measures of Louisiana and Texas marine recreational fishing activity based on known patterns of economic activity, to explicitly compare and contrast the estimates with the recreational fishing data reported at state and federal levels. This approach follows a standard logical test of validity, using common tools and methods of economic analysis in an innovative focused application. This method presents evidence that may or may not support inference that would also be based on background information, logic, and expert judgment. No modeling of economic demand for any commodity, or economic projections were undertaken.

The IMPLAN input-output modeling tool was carefully specified to compare characteristics of marine recreational fishing in Texas to similar fishing in Louisiana. Analysis considered the same three target species (red drum, red snapper, and spotted seatrout) that together comprise known and significant portions of total recreational catch (estimated to average 83% for Louisiana and 65% for Texas over seven recent years).

Any use of the IMPLAN tool relies on several assumptions and modeling choices that limit what can be inferred from the results. Misapplication of the IMPLAN tool and inflated projections of economic impact – often by non-economists who do not restrict impacts of one activity to its partial effects on other widely defined industrial sectors in the economy of the study area – are known problems that this study design and methodology avoid. Misapplication of IMPLAN occurs in part when the IMPLAN model is used to project economic impacts without considering how investments might otherwise be spent (i.e., considering "opportunity costs" of construction or investment). No such projection was done here, only a straight assessment of current economic impacts (in the study years) with no change to industry. The study does not use IMPLAN in the way most commonly criticized when economic impacts are presented using IMPLAN results.[24,25] This study made every attempt to use world-realistic economic multipliers in a coastal recreational fishing economy of carefully defined scope.

The connections and dependencies between industries in an economy that are used to estimate indirect and induced economic effects of production or spending in one industry must be fixed (as non-variable assumptions of the model) during any run of the IMPLAN software.

[24] Davies, Coleman, and Ramchandani. 2013.
[25] Tyrell and Johnson. 2006.

IMPLAN developers gather actual economic data and frequently recalibrate their algorithms based on real-world factors that affect economies within their geographic units of analysis. This method is iterative, but it is still a model. Any changes in the economy or economic shocks not appreciated in IMPLAN would upset the confidence of the calculations to some degree, even if it may be slight. For example, if the world steel market is upset, most industrial relations between local suppliers and purchasers of many products that use little or no steel will be only minorly affected in a handful of Texas coastal counties. This study carefully restricted the scope of analyzed industries, used "partials/partial effects" to minimize risk of over-counting multiplier effects in the analysis, and did not model an economic shock (like loss or introduction of an industry) or make any projections into the future (in which technology changes and economic shocks can change the relationships between affected industries).

Despite the best attempts to set reasonable "partials" supported by known use and available information, there could be deviation between the economic multiplier factors ("partials") used in this modeling, and what a team conducting a more in-depth analysis of the local economies would set. The rigor and investment in updating the analytical precepts and algorithms (the "engine") of the IMPLAN product – a product used by government agencies, universities, non-governmental organizations, and hundreds of consultancies – helps to ensure that IMPLAN's multipliers and algorithms tend to be accurate and reliable. There cannot be perfect confidence in the results, but the method here implies high confidence in the results, and very low risk of having committed mistakes associated with use of the IMPLAN modeling tool.

As the same methodology was used for the Texas and the Louisiana runs of the IMPLAN model, there is a low risk that any accidental bias in the careful selection of "partial" attributions of economic effect would bias the results used to compare Texas to Louisiana. The same economic multipliers by economic sector were used for both states. Any faulty assignment for one would be used identically for the other, effectively cancelling this as a source of divergence in output and employment estimates.

Simplifying assumptions were required to match data between federal or Louisiana numbers and Texas numbers– such as pounds of fish landed by species, or shore catches from beach and pier fishing. Texas landings were converted to pounds, and a fraction was applied to Louisiana and Texas landings to scale overall catch to the three target species. Given these data limitations, this report offers results that are exploratory and indicative rather than presuming causality.

With additional time and resources, this analysis could be applied to longer time spans (each of which presents serious data-matching problems that can undermine confidence in quantitative results) and for more Gulf states compared to Texas than just Louisiana. This work adequately represents an effective probe of the key questions for research.

VII. Conclusions

This study examines whether Texas's self-reported marine recreational fishing catch and effort estimates are consistent with the neighboring Gulf coastal fishing state of Louisiana. A regression test on data from 2001-2013 indicates that there is a strong correlation between recreational landings of the two most commonly caught fish in Texas and Louisiana waters, (spotted seatrout and red drum) and the iconic Gulf red snapper and the local economic impact of the marine recreational fishing industry in Louisiana. Results from the regression also show that relationship does not exist in Texas coastal communities.

Use of a different economic tool and methodology (IMPLAN Expenditures Analysis) and the same data inputs yields results that also suggest a lack of coordinated movement between the economic impacts from angler activity in Texas and catch estimates. Summary of the IMPLAN analysis (See Table 8) suggests that from 2010-2016, marine recreational fishers in Texas spent 2.34 times as much—or $92 more—on average, per pound of landed fish than marine recreational fishers in Louisiana for the same three species of landed fish. Recreational marine fishing expenditures are public data, and the modeling of the impact on the local economy of these used a standard input-output method and the same assumptions for Texas as for Louisiana. The ratio of economic output to pounds landed focuses attention on the estimates of pounds landed. Analysis shows (See Figure 3) that from 2010-2016, Texas marine anglers spent between 1.82 and 2.87 times more than marine anglers in Louisiana to catch a similar pound of fish. While one would expect a stable relationship between angler expenditures and catch at a state-by-year level, the Texas ratio of economic output to pounds landed varies significantly more than does the same ratio for Louisiana, despite Louisiana's much larger variation in catch in millions of pounds.

This result can be explained in a few ways. For example, people who fish in Texas and Louisiana may have fundamentally different economic preferences. However, because Texas and Louisiana coastal counties are geographic neighbors with many cultural and economic factors in common, we would not expect to see significant differences in preferences across anglers at the state level. Differences in the structure of coastal economies in each state were incorporated in the IMPLAN model, and are unlikely to explain the high relative spending per pound of landed fish in Texas marine waters. Differences in income between the two states were noted, but are unlikely to be large enough to explain the level of discrepancies on expenditures between the two states, averaging $163 per landed pound for Texas to $71 for Louisiana from 2010-2016. The more likely explanation is that the landings data is the source of the discrepancy.

The focus for this analysis was a comparison of marine recreational expenditures with underlying catch data. The processes to generate the data used for analysis here are complex, but the metric for comparison is not: a fraction with marine recreational expenditures on top, and pounds of three key fish species landed on the bottom, and an expectation that the ratios would be similar. Given that the source of marine expenditures was consistently derived, the highly variable expenditures to landings ratios suggest that the landings data are the source of the discrepancies. Assuming the quality of the recreational expenditures data is consistent across the two states, there are two possible conclusions to be determined from the analysis, that Louisiana is overestimating recreational landings or Texas is underestimating recreational landings. Louisiana's switch from MRIP to the LA Creel Survey in 2014, and the corresponding reductions in landings estimates and related economic output further complicates the analysis and adds some uncertainty to the results. The change in Louisiana data collection could introduce greater variability in the Louisiana catch-to-output ratios than in the Texas ratios. The change does not do that, relative to the Texas ratios. This further supports that the inconsistency may be associated with Texas data collection.

Data problems are common in fisheries and fishing data panels. The methods of analysis in this report present one way to explore questions that arise from data that may not appear to be consistent. Other methods exist to answer the questions examined in this report, including finding more and higher quality data. Alternatively, a research team might check collection methods directly, or collect their own data to build data panels large enough to support the running of structural economic models to establish causality. Results from the analytic method used in this report provide initial evidence that there is indeed some discrepancy and that investing in more complicated deeper analysis to explore the nature of the discrepancy is likely warranted.

Further analysis would be needed to provide additional information on the relationship between landings and recreational spending. Adding a third Gulf state to the analysis might shed more light on the expected ratio of marine angler expenditures to pounds of fish landed, as would looking at two states with more consistent methods of reporting recreational catch and effort. Given the inconsistencies in data collection methods, another possibility would be to re-run this analysis after a few more years of the LA Creel survey have been completed. Although, fishery biologists are constantly refining stock assessments and population models, some degree of scientific uncertainty is inevitable in estimating recreational fishery landings. The use of economic tools and methodologies can help to identify potential sources of error, or to ground truth uncertain landing estimates, and this analysis takes a first step to that end.

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IX. Appendix B: Data Tables

Table B1. 100 Economic Sectors Most Affected by Employment from Marine Recreational Fishing Expenditures (Red Drum, Red Snapper, Spotted Seatrout) in Texas, 2011

Number	Sector	Description	Jobs*	Labor Income ($000)	Value Added ($000)	Output ($000)
1	396	Retail - Motor vehicle and parts dealers	764	$52,978	$69,955	$71,907
2	404	Retail - Sporting goods, hobby, musical instrument and book stores	647	$17,257	$25,491	$31,816
3	501	Full-service restaurants	417	$9,694	$11,226	$21,056
4	502	Limited-service restaurants	317	$6,646	$15,053	$27,293
5	400	Retail - Food and beverage stores	305	$10,578	$15,695	$19,438
6	504	Automotive repair and maintenance, except car washes	302	$18,509	$21,402	$29,713
7	395	Wholesale trade	274	$26,683	$49,081	$67,901
8	440	Real estate	251	$5,577	$26,013	$39,510
9	17	Commercial fishing	223	$2,746	$7,199	$11,035
10	526	Other local government enterprises	206	$15,371	$14,657	$59,489
11	496	Other amusement and recreation industries	189	$3,923	$6,061	$12,687
12	402	Retail - Gasoline stores	183	$6,988	$10,547	$13,526
13	403	Retail - Clothing and clothing...	155	$3,925	$9,759	$10,934
14	414	Scenic and sightseeing transportation and support activities for transportation	144	$11,024	$14,226	$26,120

15	364	Boat building	138	$10,423	$9,680	$28,979
16	406	Retail - Miscellaneous store retailers	116	$2,690	$3,365	$4,205
17	411	Truck transportation	114	$6,813	$7,724	$18,541
18	438	Insurance agencies, brokerages, and related activities	97	$4,970	$6,663	$13,726
19	62	Maintenance and repair construction of nonresidential structures	92	$5,599	$7,102	$15,058
20	464	Employment services	81	$3,390	$5,003	$6,219
21	59	Construction of new single-family residential structures	78	$4,237	$5,921	$10,142
22	482	Hospitals	77	$6,313	$6,561	$11,780
23	437	Insurance carriers	71	$7,160	$15,244	$34,416
24	436	Other financial investment activities	69	$1,874	$2,039	$8,936
25	468	Services to buildings	68	$1,482	$1,615	$2,597
26	405	Retail - General merchandise stores	66	$2,098	$3,076	$4,134
27	61	Construction of other new residential structures	65	$4,138	$5,627	$18,820
28	398	Retail - Electronics and appliance stores	65	$3,355	$3,541	$3,928
29	475	Offices of physicians	52	$5,534	$5,358	$8,137
30	433	Monetary authorities and depository credit intermediation	51	$3,870	$6,411	$11,961
31	503	All other food and drinking places	48	$1,419	$1,051	$1,925
32	480	Home health care services	42	$1,420	$1,148	$1,685
33	407	Retail - Nonstore retailers	41	$738	$2,907	$3,036
34	448	Accounting, tax preparation, bookkeeping, and payroll services	40	$2,799	$3,278	$4,461
35	416	Warehousing and storage	39	$1,928	$3,241	$5,118
36	449	Architectural, engineering, and related services	38	$4,067	$4,223	$7,413
37	483	Nursing and community care facilities	38	$1,428	$1,500	$2,578

38	461	Management of companies and enterprises	38	$3,867	$4,726	$8,486
39	487	Child day care services	38	$706	$710	$1,193
40	465	Business support services	38	$1,591	$1,609	$2,513
41	499	Hotels and motels, including casino hotels	37	$1,159	$2,336	$4,031
42	434	Nondepository credit intermediation and related activities	35	$2,573	$2,858	$5,858
43	415	Couriers and messengers	33	$1,118	$1,894	$3,505
44	469	Landscape and horticultural services	32	$854	$1,034	$1,665
45	454	Management consulting services	31	$2,709	$2,745	$4,399
46	509	Personal care services	30	$920	$849	$1,237
47	467	Investigation and security services	30	$991	$1,097	$1,591
48	517	Private households	30	$357	$357	$364
49	385	Sporting and athletic goods manufacturing	29	$1,759	$2,333	$5,316
50	447	Legal services	29	$2,723	$4,037	$5,953
51	401	Retail - Health and personal care stores	27	$1,202	$1,512	$1,925
52	399	Retail - Building material and garden equipment and supplies stores	26	$1,140	$1,703	$2,277
53	474	Other educational services	25	$719	$690	$1,160
54	512	Other personal services	24	$747	$621	$983
55	518	Postal service	24	$2,230	$1,478	$2,656
56	460	Marketing research and all other miscellaneous professional, scientific, and technical services	24	$1,585	$1,555	$2,344
57	20	Extraction of natural gas and crude petroleum	23	$5,891	$13,428	$17,896
58	457	Advertising, public relations, and related services	21	$1,512	$3,043	$5,185
59	477	Offices of other health practitioners	20	$1,287	$1,474	$2,101

60	63	Maintenance and repair construction of residential structures	19	$1,143	$1,432	$3,175
61	443	General and consumer goods rental except video tapes and discs	18	$1,316	$1,683	$2,228
62	435	Securities and commodity contracts intermediation and brokerage	18	$1,769	$622	$1,865
63	439	Funds, trusts, and other financial vehicles	17	$619	$1,253	$3,464
64	476	Offices of dentists	17	$1,176	$1,731	$2,553
65	492	Independent artists, writers, and performers	16	$248	$250	$523
66	462	Office administrative services	15	$1,171	$1,154	$1,384
67	427	Wired telecommunications carriers	15	$1,486	$2,918	$6,259
68	508	Personal and household goods repair and maintenance	15	$912	$1,061	$1,531
69	485	Individual and family services	13	$427	$431	$735
70	408	Air transportation	13	$1,318	$2,117	$5,380
71	472	Elementary and secondary schools	12	$519	$523	$760
72	450	Specialized design services	12	$749	$770	$1,142
73	470	Other support services	12	$445	$458	$971
74	471	Waste management and remediation services	12	$896	$1,527	$2,863
75	473	Junior colleges, colleges, universities, and professional schools	12	$786	$989	$1,569
76	344	Light truck and utility vehicle manufacturing	11	$1,260	$9,049	$33,784
77	516	Labor and civic organizations	11	$283	$687	$867
78	507	Commercial and industrial machinery and equipment repair and maintenance	11	$890	$1,267	$1,852
79	497	Fitness and recreational sports centers	10	$169	$269	$531

80	154	Printing	10	$516	$667	$1,500
81	397	Retail - Furniture and home furnishings stores	10	$444	$735	$896
82	107	Manufactured ice	9	$483	$609	$3,001
83	442	Automotive equipment rental and leasing	9	$627	$1,683	$2,541
84	349	Travel trailer and camper manufacturing	9	$420	$585	$2,003
85	511	Dry-cleaning and laundry services	9	$268	$343	$546
86	520	Other federal government enterprises	8	$399	$827	$1,961
87	430	Data processing, hosting, and related services	8	$840	$946	$2,830
88	418	Periodical publishers	8	$465	$895	$2,270
89	484	Residential mental retardation, mental health, substance abuse and other facilities	8	$292	$265	$353
90	452	Computer systems design services	8	$873	$874	$1,318
91	478	Outpatient care centers	8	$600	$858	$1,501
92	11	Beef cattle ranching and farming, including feedlots and dual-purpose ranching and farming	8	$82	$262	$570
93	455	Environmental and other technical consulting services	8	$729	$620	$927
94	495	Gambling industries (except casino hotels)	7	$206	$519	$976
95	412	Transit and ground passenger transportation	7	$265	$355	$577
96	425	Radio and television broadcasting	7	$743	$645	$1,579
97	417	Newspaper publishers	7	$358	$528	$923
98	49	Electric power transmission and distribution	7	$1,056	$4,095	$10,499
99	486	Community food, housing, and other relief services, including rehabilitation services	7	$233	$235	$533
100	453	Other computer related services, including facilities management	6	$645	$750	$1,118

Table B2. 100 Economic Sectors Most Affected by Employment from Marine Recreational Fishing Expenditures (Red Drum, Red Snapper, Spotted Seatrout) in Louisiana, 2011

Number	Sector	Description	Jobs*	Labor Income ($000)	Value Added ($000)	Output ($000)
1	396	Retail - Motor vehicle and parts dealers	2598	$146,752	$218,195	$226,306
2	404	Retail - Sporting goods, hobby, musical instrument and book stores	2164	$50,663	$86,798	$107,857
3	504	Automotive repair and maintenance, except car washes	1750	$89,498	$110,421	$158,154
4	364	Boat building	686	$59,981	$51,160	$146,908
5	526	Other local government enterprises	560	$35,320	$28,632	$149,839
6	395	Wholesale trade	551	$42,032	$83,224	$122,009
7	496	Other amusement and recreation industries	504	$7,794	$10,070	$27,392
8	400	Retail - Food and beverage stores	487	$14,366	$24,849	$30,847
9	17	Commercial fishing	452	$5,292	$11,526	$19,523
10	398	Retail - Electronics and appliance stores	415	$17,490	$18,440	$21,187
11	440	Real estate	367	$6,157	$45,285	$65,365
12	402	Retail - Gasoline stores	356	$13,945	$23,072	$28,699
13	501	Full-service restaurants	316	$6,946	$7,813	$15,232
14	403	Retail - Clothing and clothing accessories stores	313	$6,964	$22,955	$25,123
15	502	Limited-service restaurants	287	$5,306	$12,829	$23,886
16	411	Truck transportation	246	$14,783	$18,358	$41,678
17	59	Construction of new single-family residential structures	233	$12,703	$17,443	$30,108
18	414	Scenic and sightseeing transportation and support activities for transportation	215	$18,553	$24,876	$42,753
19	62	Maintenance and repair construction of nonresidential structures	212	$12,567	$15,840	$34,163

20	482	Hospitals	210	$14,654	$16,350	$30,562
21	61	Construction of other new residential structures	194	$11,426	$16,597	$55,899
22	405	Retail - General merchandise stores	162	$4,660	$7,628	$10,234
23	468	Services to buildings	137	$2,325	$2,510	$4,481
24	464	Employment services	133	$5,429	$8,489	$10,489
25	475	Offices of physicians	131	$11,814	$11,490	$18,395
26	438	Insurance agencies, brokerages, and related activities	130	$7,297	$11,557	$20,865
27	406	Retail - Miscellaneous store retailers	122	$3,015	$3,895	$4,756
28	503	All other food and drinking places	109	$3,215	$2,660	$4,650
29	483	Nursing and community care facilities	106	$3,476	$3,753	$6,751
30	437	Insurance carriers	105	$9,464	$32,987	$62,542
31	461	Management of companies and enterprises	103	$8,340	$10,324	$20,463
32	433	Monetary authorities and depository credit intermediation	103	$6,486	$10,479	$21,610
33	449	Architectural, engineering, and related services	84	$7,929	$8,195	$15,216
34	448	Accounting, tax preparation, bookkeeping, and payroll services	83	$5,179	$6,067	$8,441
35	436	Other financial investment activities	82	$1,071	$1,287	$9,602
36	487	Child day care services	80	$1,353	$1,385	$2,399
37	407	Retail - Nonstore retailers	76	$992	$4,941	$5,204
38	485	Individual and family services	75	$1,774	$2,026	$3,743
39	416	Warehousing and storage	75	$4,425	$5,958	$9,604
40	447	Legal services	75	$5,586	$8,424	$13,187
41	509	Personal care services	73	$1,936	$1,931	$2,868
42	469	Landscape and horticultural services	73	$1,359	$1,621	$3,053
43	401	Retail - Health and personal care stores	70	$3,087	$4,089	$5,153
44	480	Home health care services	64	$3,403	$2,872	$3,766
45	467	Investigation and security services	63	$1,748	$1,915	$2,933

46	465	Business support services	63	$1,710	$1,714	$3,176
47	434	Nondepository credit intermediation and related activities	60	$2,768	$3,025	$8,142
48	399	Retail - Building material and garden equipment and supplies stores	60	$2,563	$4,281	$5,563
49	512	Other personal services	56	$1,447	$1,385	$2,210
50	474	Other educational services	49	$1,031	$1,034	$1,931
51	518	Postal service	46	$4,200	$2,781	$5,071
52	460	Marketing research and all other miscellaneous professional, scientific, and technical services	45	$2,880	$2,823	$4,339
53	477	Offices of other health practitioners	45	$2,840	$3,255	$4,682
54	415	Couriers and messengers	44	$1,579	$2,801	$4,954
55	107	Manufactured ice	43	$2,052	$2,690	$14,022
56	473	Junior colleges, colleges, universities, and professional schools	41	$2,535	$3,445	$5,478
57	517	Private households	38	$725	$725	$738
58	476	Offices of dentists	38	$2,222	$3,234	$5,022
59	462	Office administrative services	36	$1,970	$1,937	$2,465
60	508	Personal and household goods repair and maintenance	36	$1,803	$2,148	$3,243
61	470	Other support services	33	$1,511	$1,501	$2,883
62	454	Management consulting services	33	$2,294	$2,329	$4,076
63	457	Advertising, public relations, and related services	32	$2,112	$4,330	$7,551
64	484	Residential mental retardation, mental health, substance abuse and other facilities	32	$927	$890	$1,227
65	439	Funds, trusts, and other financial vehicles	32	$1,190	$1,621	$5,618
66	471	Waste management and remediation services	31	$1,996	$3,272	$6,749
67	472	Elementary and secondary schools	29	$1,318	$1,357	$1,913

68	435	Securities and commodity contracts intermediation and brokerage	27	$1,825	$983	$2,896
69	495	Gambling industries (except casino hotels)	26	$889	$2,785	$4,459
70	507	Commercial and industrial machinery and equipment repair and maintenance	25	$1,745	$2,455	$3,770
71	427	Wired telecommunications carriers	25	$1,963	$3,727	$9,356
72	492	Independent artists, writers, and performers	24	$269	$306	$726
73	497	Fitness and recreational sports centers	24	$284	$370	$974
74	478	Outpatient care centers	23	$1,368	$1,908	$3,706
75	397	Retail - Furniture and home furnishings stores	22	$882	$1,751	$2,115
76	486	Community food, housing, and other relief services, including rehabilitation services	20	$568	$688	$1,625
77	455	Environmental and other technical consulting services	20	$1,456	$1,303	$2,083
78	20	Extraction of natural gas and crude petroleum	20	$2,821	$13,573	$17,529
79	412	Transit and ground passenger transportation	19	$550	$722	$1,304
80	511	Dry-cleaning and laundry services	19	$576	$766	$1,215
81	417	Newspaper publishers	19	$916	$1,622	$2,735
82	425	Radio and television broadcasting	19	$1,177	$970	$3,461
83	450	Specialized design services	18	$976	$995	$1,531
84	516	Labor and civic organizations	18	$386	$1,039	$1,329
85	514	Grantmaking, giving, and social advocacy organizations	15	$575	$1,930	$2,464
86	63	Maintenance and repair construction of residential structures	14	$854	$1,061	$2,393
87	459	Veterinary services	14	$554	$615	$1,341
88	481	Other ambulatory health care services	14	$858	$956	$1,567
89	408	Air transportation	14	$1,116	$1,794	$5,095
90	49	Electric power transmission and distribution	13	$1,616	$9,271	$22,071
91	520	Other federal government enterprises	13	$389	$559	$2,370

92	506	Electronic and precision equipment repair and maintenance	13	$779	$1,028	$1,769
93	428	Wireless telecommunications carriers (except satellite)	11	$602	$3,672	$14,951
94	154	Printing	11	$470	$609	$1,532
95	505	Car washes	11	$421	$490	$683
96	515	Business and professional associations	10	$452	$1,420	$1,861
97	491	Promoters of performing arts and sports and agents for public figures	10	$174	$611	$1,397
98	442	Automotive equipment rental and leasing	10	$819	$1,947	$2,911
99	385	Sporting and athletic goods manufacturing	10	$429	$535	$1,610
100	499	Hotels and motels, including casino hotels	10	$343	$759	$1,225

* "Jobs" refers to the IMPLAN definition of Employment. This includes an annual average of full- and part-time work that traces back to the source activity, here marine recreational fishing. This definition adjusts for seasonality but does not designate number of hours worked per day. Labor income is from these full- and part-time jobs.

Table B3. Sample IMPLAN Inputs for Texas, 2011

Activity Type	Activity Name	Activity Level	Activity Year				
Industry Change	Durable Industry	425250	2018				
Sector	Event Value	Employment	Employee Compensation	Proprietor Income	Event Year	Retail?	Local Direct Purchase
59	$20.42	$0	$6	2.44	2011	No	1.00
61	$37.91	$0	$1	7.92	2011	No	1.00
63	$4.44	$0	$1	0.52	2011	No	0.99
437	$54.00	$0	$12	0.02	2011	No	0.70
440	$26.25	$0	$2	1.51	2011	No	0.81
496	$28.65	$0	$10	-0.37	2011	No	0.82
504	$54.07	$0	$21	13.43	2011	No	0.99
526	$117.07	$0	$32	0	2011	No	0.87
Activity Type	Activity Name	Activity Level	Activity Year				
Industry Change	For-Hire Industry	77274	2018				
Sector	Event Value	Employment	Employee Compensation	Proprietor Income	Event Year	Retail?	Local Direct Purchase
400	$32.68	$0	$4	0.66	2011	Yes	0.97
406	$12.24	$0	$2	1.06	2011	Yes	0.96
408	$3.23	$0	$1	0.01	2011	No	0.74
414	$207.94	$0	$75	15.81	2011	No	0.99
442	$5.32	$0	$1	0.51	2011	No	0.98
443	$6.52	$0	$2	1.58	2011	No	0.99
499	$45.64	$0	$14	0.54	2011	No	0.08
501	$16.06	$0	$7	0.55	2011	No	0.99
502	$19.63	$0	$4	0.5	2011	No	0.99
526	$1.57	$0	$0	.	2011	No	0.87
Activity Type	Activity Name	Activity Level	Activity Year				
Industry Change	Private Boat Industry	503422	2018				
Sector	Event Value	Employment	Employee Compensation	Proprietor Income	Event Year	Retail?	Local Direct Purchase
400	$31.53	$0	$4	0.64	2011	Yes	0.97
406	$2.22	$0	$0	0.19	2011	Yes	0.96
408	$1.53	$0	$0	.	2011	No	0.74
442	$1.00	$0	$0	0.1	2011	No	0.98
443	$1.88	$0	$1	0.46	2011	No	0.99
499	$22.28	$0	$7	0.26	2011	No	0.08
501	$10.88	$0	$5	0.37	2011	No	0.99
502	$13.30	$0	$3	0.34	2011	No	0.99
526	$1.67	$0	$0	.	2011	No	0.87

Activity Type	Activity Name	Activity Level	Activity Year				
Industry Change	Shore Industry	634304	2018				
Sector	Event Value	Employment	Employee Compensation	Proprietor Income	Event Year	Retail?	Local Direct Purchase
400	$33.08	$0	$4	0.67	2011	Yes	0.97
406	$3.61	$0	$1	0.31	2011	Yes	0.96
408	$0.30	$0	$0	.	2011	No	0.74
442	$0.30	$0	$0	0.03	2011	No	0.98
499	$35.00	$0	$10	0.41	2011	No	0.08
501	$11.00	$0	$5	0.38	2011	No	0.99
502	$13.43	$0	$3	0.34	2011	No	0.99
526	$2.35	$0	$1	.	2011	No	0.87
Activity Type	Activity Name	Activity Level	Activity Year				
Commodity Change	Durable Commodity	423250	2018				
Sector	Event Value	Event Year	Retail?	Direct Purchase			
3123	$2.21	2011	Yes	0.17			
3127	$10.41	2011	Yes	0.02			
3128	$19.71	2011	Yes	0.06			
3132	$7.06	2011	Yes	0.10			
3272	$7.06	2011	Yes	0.00			
3305	$16.19	2011	Yes	0.04			
3343	$99.06	2011	Yes	0.06			
3344	$134.61	2011	Yes	0.68			
3349	$20.32	2011	Yes	0.30			
3364	$397.80	2011	Yes	0.22			
3385	$214.56	2011	Yes	0.14			
3418	$9.44	2011	Yes	0.47			
Activity Type	Activity Name	Activity Level	Activity Year				
Commodity Change	For-Hire Commodity	77274	2018				
Sector	Event Value	Event Year	Retail?	Direct Purchase			
3017	$3.84	2011	Yes	1.00			
3107	$4.73	2011	Yes	0.79			
3156	$62.18	2011	Yes	0.84			

Activity Type	Activity Name	Activity Level	Activity Year				
Commodity Change	**Private Boat Commodity**	**503422**	**2018**				
Sector	Event Value	Event Year	Retail?	Direct Purchase			
3017	$13.36	2011	Yes	1.00			
3107	$4.12	2011	Yes	0.79			
3156	$77.18	2011	Yes	0.84			
Activity Type	**Activity Name**	**Activity Level**	**Activity Year**				
Commodity Change	**Shore Commodity**	**634304**	**2018**				
Sector	Event Value	Event Year	Retail?	Direct Purchase			
3017	$12.17	2011	Yes	1.00			
3107	$2.92	2011	Yes	0.79			
3156	$44.73	2011	Yes	0.84			

X. Appendix C: OLS Regression Tables

Tables C1—C36. Recreational Catch Related to Economic Contributions to Local Economy, By Sector

Table C1. LA employment – 496 Other amusement and recreation industries

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.5337
R Square	0.2849
Adjusted R Square	0.2199
Standard Error	225.8308
Observations	13

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	223479.1459	223479.1	4.381983	0.06029353
Residual	11	560995.048	50999.55		
Total	12	784474.194			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	381.3387	444.5130763	0.85788	0.409262	-597.0279799	1359.705	-597.02798	1359.70539
X Variable 1	4.58E-05	2.18914E-05	2.093319	0.060294	-2.35697E-06	9.4E-05	-2.357E-06	9.4008E-05

Table C2. LA output– **496 Other amusement and recreation industries**

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.6060
R Square	0.3673
Adjusted R Square	0.3097
Standard Error	12.1984
Observations	13

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	950.0739256	950.0739	6.384832	0.028132006
Residual	11	1636.818928	148.8017		
Total	12	2586.892853			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	-0.898573	24.01072903	-0.03742	0.970818	-53.74583161	51.94868	-53.745832	51.9486849
X Variable 1	2.99E-06	1.18248E-06	2.526822	0.028132	3.85296E-07	5.59E-06	3.853E-07	5.5905E-06

Table C3. TX employment – **496 Other amusement and recreation industries**

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.3137
R Square	0.0984

Adjusted R Square	0.0164
Standard Error	465.4535
Observations	13

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	260056.7104	260056.7	1.200371	0.296655556
Residual	11	2383116.067	216646.9		
Total	12	2643172.777			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	6806.425	998.0613018	6.819646	2.88E-05	4609.706967	9003.143	4609.70697	9003.14319
X Variable 1	0.000291	0.000265517	1.095615	0.296656	-0.000293494	0.000875	-0.0002935	0.0008753

Table C4. TX output– **496 Other amusement and recreation industries**

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.3389
R Square	0.1148
Adjusted R Square	0.0344
Standard Error	56.5978
Observations	13

ANOVA

	df	SS	MS	F	Significance F
Regression	1	4571.083648	4571.084	1.42699	0.257378392
Residual	11	35236.36176	3203.306		
Total	12	39807.44541			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	277.8219	121.3612804	2.289214	0.042837	10.70756139	544.9363	10.7075614	544.936316
X Variable 1	3.86E-05	3.2286E-05	1.194567	0.257378	-3.24933E-05	0.00011	-3.249E-05	0.00010963

Table C5. LA employment – 414 Scenic and sightseeing transportation and support activities for transportation

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.7490
R Square	0.5610
Adjusted R Square	0.5211
Standard Error	1032.2777
Observations	13

ANOVA

	df	SS	MS	F	Significance F
Regression	1	14978938.93	14978939	14.05685	0.003214127
Residual	11	11721569.71	1065597		
Total	12	26700508.64			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	2208.572	2031.879341	1.08696	0.300299	-2263.564263	6680.708	-2263.5643	6680.70829
X Variable 1	0.000375	0.000100066	3.749246	0.003214	0.000154928	0.000595	0.00015493	0.00059542

Table C6. LA output– **414 Scenic and sightseeing transportation and support activities for transportation**

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.7046
R Square	0.4964
Adjusted R Square	0.4507
Standard Error	385.1285
Observations	13

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	1608496.392	1608496	10.84448	0.007165242
Residual	11	1631563.422	148323.9		
Total	12	3240059.814			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	-842.0671	758.0659808	-1.11081	0.290341	-2510.559093	826.4249	-2510.5591	826.424855

X Variable 1	0.000123	3.73332E-05	3.293096	0.007165	4.0772E-05	0.000205	4.0772E-05	0.00020511

Table C7. TX employment – **414 Scenic and sightseeing transportation and support activities for transportation**

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.1904
R Square	0.0363
Adjusted R Square	-0.0514
Standard Error	9273.1917
Observations	13

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	35588163.07	35588163	0.413854	0.533201519
Residual	11	945912929.1	85992084		
Total	12	981501092.2			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	12166.08	19884.29512	0.611844	0.553077	-31598.95957	55931.12	-31598.96	55931.1174
X Variable 1	0.003403	0.005289867	0.643315	0.533202	-0.008239869	0.015046	-0.0082399	0.01504597

Table C8. TX output– **414 Scenic and sightseeing transportation and support activities for transportation**

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.2546
R Square	0.0648
Adjusted R Square	-0.0202
Standard Error	1838.9219
Observations	13

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	2577585.202	2577585	0.762231	0.401288301
Residual	11	37197969.88	3381634		
Total	12	39775555.08			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	451.4165	3943.15854	0.114481	0.910919	-8227.416953	9130.25	-8227.417	9130.24991
X Variable 1	0.000916	0.001049008	0.873058	0.401288	-0.001393006	0.003225	-0.001393	0.0032247

Table C9. LA employment – 501 Full-service restaurants

SUMMARY OUTPUT

Regression Statistics

Multiple R	0.4535
R Square	0.2057
Adjusted R Square	0.1334
Standard Error	922.7979
Observations	13

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	2425153.451	2425153	2.847909	0.119609068
Residual	11	9367115.502	851556		
Total	12	11792268.95			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	12970.19	1816.385244	7.140662	1.89E-05	8972.356457	16968.03	8972.35646	16968.0304
X Variable 1	0.000151	8.94532E-05	1.687575	0.119609	-4.59262E-05	0.000348	-4.593E-05	0.00034784

Table C10. LA output – 501 Full-service restaurants

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.5448
R Square	0.2968
Adjusted R Square	0.2329
Standard Error	83.2711
Observations	13

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	32200.35429	32200.35	4.643785	0.05417891
Residual	11	76274.82039	6934.075		
Total	12	108475.1747			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	266.7497	163.9062915	1.627453	0.131919	-94.00559353	627.505	-94.005594	627.505037
X Variable 1	1.74E-05	8.07205E-06	2.154944	0.054179	-3.71643E-07	3.52E-05	-3.716E-07	3.5161E-05

Table C11. TX employment – 501 Full-service restaurants

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.3616
R Square	0.1308
Adjusted R Square	0.0517
Standard Error	10344.222
Observations	13

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	177066067.4	1.77E+08	1.654778	0.224725125
Residual	11	1177032233	1.07E+08		

	df	SS	MS	F	Significance F
Total	12	1354098301			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	66137.29	22180.8813	2.981725	0.012481	17317.49693	114957.1	17317.4969	114957.078
X Variable 1	0.007591	0.005900833	1.286382	0.224725	-0.005396923	0.020578	-0.0053969	0.02057837

Table C12. TX output – 501 Full-service restaurants

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.3535
R Square	0.1250
Adjusted R Square	0.0454
Standard Error	777.9483
Observations	13

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	950691.6549	950691.7	1.570863	0.236067178
Residual	11	6657239.457	605203.6		
Total	12	7607931.112			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	1861.978	1668.136975	1.116202	0.288125	-1809.56686	5533.523	-1809.5669	5533.52259
X Variable 1	0.000556	0.000443778	1.253341	0.236067	-	0.001533	-0.0004205	0.00153296

					0.000420544			

Table C13. LA employment – 499 Hotels and motels, including casino hotels

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.2829
R Square	0.0800
Adjusted R Square	-0.0036
Standard Error	139.9928
Observations	13

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	18750.09701	18750.1	0.956736	0.349032506
Residual	11	215577.8195	19597.98		
Total	12	234327.9165			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	2195.344	275.554219	7.967013	6.79E-06	1588.853335	2801.835	1588.85334	2801.83483
X Variable 1	1.33E-05	1.35705E-05	0.978129	0.349033	-1.65947E-05	4.31E-05	-1.659E-05	4.3142E-05

Table C14. LA output – 499 Hotels and motels, including casino hotels

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.6431
R Square	0.4136
Adjusted R Square	0.3603
Standard Error	15.3872
Observations	13

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	1836.960158	1836.96	7.758593	0.017731032
Residual	11	2604.410626	236.7646		
Total	12	4441.370784			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	113.9885	30.28724402	3.763581	0.003135	47.32671992	180.6503	47.3267199	180.650269
X Variable 1	4.15E-06	1.49158E-06	2.785425	0.017731	8.71742E-07	7.44E-06	8.7174E-07	7.4377E-06

Table C15. TX employment – 499 Hotels and motels, including casino hotels

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.2602
R Square	0.0677
Adjusted R Square	-0.0170
Standard Error	1227.2659
Observations	13

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	1203591.366	1203591	0.799101	0.390501603
Residual	11	16567997.42	1506182		
Total	12	17771588.78			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	15499.96	2631.598491	5.889942	0.000105	9707.85406	21292.07	9707.85406	21292.0725
X Variable 1	0.000626	0.00070009	0.893925	0.390502	-0.000915061	0.002167	-0.0009151	0.00216672

Table C16. TX output – 499 Hotels and motels, including casino hotels

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.2822
R Square	0.0796
Adjusted R Square	-0.0040
Standard Error	224.0904
Observations	13

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	47790.25528	47790.26	0.951685	0.350256785
Residual	11	552381.3566	50216.49		

Total	12	600171.6119

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	1077.843	480.5118758	2.243113	0.046447	20.24307288	2135.442	20.2430729	2135.44209
X Variable 1	0.000125	0.000127832	0.975543	0.350257	-0.00015665	0.000406	-0.0001567	0.00040606

Table C17. LA employment – 440 Real estate

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.6651
R Square	0.4423
Adjusted R Square	0.3916
Standard Error	1988.4323
Observations	13

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	34496234.69	34496235	8.724691	0.013120904
Residual	11	43492494.21	3953863		
Total	12	77988728.91			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	7079.436	3913.922164	1.808783	0.09787	-	15693.92	-1535.0489	15693.9203

X Variable 1	0.000569	0.000192753	2.953759	0.013121	1535.048884 0.000145099	0.000994	0.0001451	0.00099359

Table C18. LA output – 440 Real estate

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.4512
R Square	0.2036
Adjusted R Square	0.1312
Standard Error	338.4240
Observations	13

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	322074.5549	322074.6	2.812122	0.121709517
Residual	11	1259838.803	114530.8		
Total	12	1581913.358			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	1646.942	666.1354059	2.472384	0.03099	180.7881584	3113.096	180.788158	3113.09644
X Variable 1	5.5E-05	3.28058E-05	1.676938	0.12171	-1.71918E-05	0.000127	-1.719E-05	0.00012722

Table C19. TX employment – 440 Real estate

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.3268
R Square	0.1068
Adjusted R Square	0.0256
Standard Error	17676.1
Observations	13

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	411036006.8	4.11E+08	1.315549	0.275728439
Residual	11	3436889564	3.12E+08		
Total	12	3847925571			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	73055.06	37902.46089	1.927449	0.080133	-10367.69672	156477.8	-10367.697	156477.811
X Variable 1	0.011565	0.010083283	1.146974	0.275728	-0.010627895	0.033758	-0.0106279	0.03375842

Table C20. TX output – 440 Real estate

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.342255
R Square	0.117138
Adjusted R Square	0.036878
Standard Error	3235.821

Observations	13

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	15281549.31	15281549	1.459481	0.252344194
Residual	11	115175891.3	10470536		
Total	12	130457440.6			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	10193.13	6938.49709	1.469069	0.169824	-5078.401446	25464.66	-5078.4014	25464.6568
X Variable 1	0.00223	0.001845865	1.20809	0.252344	-0.001832751	0.006293	-0.0018328	0.00629269

Table C21. LA employment – 404 Retail - Sporting goods, hobby, musical instrument and book stores

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.7455
R Square	0.5558
Adjusted R Square	0.5154
Standard Error	222.6254
Observations	13

ANOVA

	df	SS	MS	F	Significance F
Regression	1	682066.4171	682066.4	13.76186	0.003442962
Residual	11	545182.8072	49562.07		
Total	12	1227249.224			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	999.0006	438.2037635	2.279763	0.043554	34.52058945	1963.481	34.5205894	1963.48055
X Variable 1	8.01E-05	2.15806E-05	3.709698	0.003443	3.2559E-05	0.000128	3.2559E-05	0.00012756

Table C22. LA output – 404 Retail - Sporting goods, hobby, musical instrument and book stores

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.6453
R Square	0.4164
Adjusted R Square	0.3634
Standard Error	23.0347
Observations	13

ANOVA

	df	SS	MS	F	Significance F
Regression	1	4165.272992	4165.273	7.850131	0.017218974
Residual	11	5836.590497	530.5991		
Total	12	10001.86349			

	Coefficients	Standard	t Stat	P-value	Lower 95%	Upper	Lower	Upper

		Error				95%	95.0%	95.0%
Intercept	-3.189989	45.34032609	-0.07036	0.945173	-102.9833739	96.6034	-102.98337	96.6033959
X Variable 1	6.26E-06	2.23292E-06	2.801809	0.017219	1.34159E-06	1.12E-05	1.3416E-06	1.1171E-05

Table C23. TX employment – 404 Retail - Sporting goods, hobby, musical instrument and book stores

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.1433
R Square	0.0205
Adjusted R Square	-0.0685
Standard Error	870.4833
Observations	13

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	174645.5807	174645.6	0.230482	0.640571352
Residual	11	8335152.195	757741.1		
Total	12	8509797.776			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	10181.16	1866.557558	5.454513	0.000199	6072.896454	14289.43	6072.89645	14289.4274
X Variable 1	0.000238	0.000496565	0.480085	0.640571	-0.000854538	0.001331	-0.0008545	0.00133133

Table C24. TX output – **404 Retail - Sporting goods, hobby, musical instrument and book stores**

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.2535
R Square	0.0643
Adjusted R Square	-0.0208
Standard Error	94.6241
Observations	13

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	6763.501203	6763.501	0.755384	0.403342497
Residual	11	98490.96404	8953.724		
Total	12	105254.4652			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	318.3519	202.9003582	1.569006	0.144945	-128.2287884	764.9326	-128.22879	764.932566
X Variable 1	4.69E-05	5.39781E-05	0.869128	0.403342	-7.18911E-05	0.000166	-7.189E-05	0.00016572

Table C25. LA employment – **396 Retail - Motor vehicle and parts dealers**

SUMMARY OUTPUT

Regression Statistics

Multiple R	0.1057
R Square	0.0112
Adjusted R Square	-0.0787
Standard Error	193.8859
Observations	13

ANOVA

	df	SS	MS	F	Significance F
Regression	1	4675.084318	4675.084	0.124365	0.73101243
Residual	11	413509.2454	37591.75		
Total	12	418184.3297			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	6211.235	381.6345098	16.27535	4.81E-09	5371.262614	7051.206	5371.26261	7051.2064
X Variable 1	-6.63E-06	1.87947E-05	-0.35265	0.731012	-4.79949E-05	3.47E-05	-4.799E-05	3.4739E-05

Table C26. LA output – 396 Retail - Motor vehicle and parts dealers

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.3527
R Square	0.1244
Adjusted R Square	0.0448
Standard Error	98.6515
Observations	13

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	15204.43849	15204.44	1.562295	0.237268008
Residual	11	107053.2823	9732.117		
Total	12	122257.7208			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	279.6435	194.1802345	1.440123	0.177681	-147.7443546	707.0313	-147.74435	707.031274
X Variable 1	1.2E-05	9.56298E-06	1.249918	0.237268	-9.09503E-06	3.3E-05	-9.095E-06	3.3001E-05

Table C27. TX employment – 396 Retail - Motor vehicle and parts dealers

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.2898
R Square	0.0840
Adjusted R Square	0.0007
Standard Error	962.5074
Observations	13

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	934533.0189	934533	1.008757	0.336783378
Residual	11	10190625.08	926420.5		

	df	SS	MS	F	Significance F
Total	12	11125158.1			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	31672.07	2063.882799	15.34586	8.96E-09	27129.48992	36214.64	27129.4899	36214.6407
X Variable 1	-0.000551	0.00054906	-1.00437	0.336783	-0.001759931	0.000657	-0.0017599	0.00065701

Table C28. TX output – 396 Retail - Motor vehicle and parts dealers

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.2189
R Square	0.0479
Adjusted R Square	-0.0387
Standard Error	615.9773
Observations	13

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	209972.875	209972.9	0.553393	0.47252625
Residual	11	4173708.706	379428.1		
Total	12	4383681.581			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	1619.65	1320.826237	1.22624	0.245711	-1287.469185	4526.769	-1287.4692	4526.76871

X Variable 1	0.000261	0.000351383	0.743904	0.472526	-0.000511993	0.001035	-0.000512	0.00103478

Table C29. LA employment – 395 Wholesale trade

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.0632
R Square	0.0040
Adjusted R Square	-0.0865
Standard Error	1102.0860
Observations	13

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	53639.96598	53639.97	0.044163	0.837392684
Residual	11	13360528.76	1214594		
Total	12	13414168.73			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	25603.01	2169.286185	11.80251	1.38E-07	20828.44819	30377.58	20828.4482	30377.5816
X Variable 1	-2.25E-05	0.000106833	-0.21015	0.837393	-0.000257589	0.000213	-0.0002576	0.00021269

Table C30. LA output – 395 Wholesale trade

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.6675
R Square	0.4456
Adjusted R Square	0.3952
Standard Error	2315898
Observations	13

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	4.74223E+13	4.74E+13	8.841857	0.012665253
Residual	11	5.89972E+13	5.36E+12		
Total	12	1.06419E+14			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	6796279	4520869.102	1.503313	0.160914	-3154086.565	16746645	-3154086.6	16746645
X Variable 1	2907.803	977.8972909	2.973526	0.012665	755.4656918	5060.141	755.465692	5060.14054

Table C31. TX employment – 395 Wholesale trade

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.3175
R Square	0.1008
Adjusted R Square	0.0191

Standard Error	12209.55
Observations	13

ANOVA

	df	SS	MS	F	Significance F
Regression	1	183882228	1.84E+08	1.233503	0.290414298
Residual	11	1639804916	1.49E+08		
Total	12	1823687144			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	122181.5	26180.66729	4.666859	0.000686	64558.21248	179804.7	64558.2125	179804.733
X Variable 1	0.007735	0.006964906	1.110632	0.290414	-0.007594208	0.023065	-0.0075942	0.0230651

Table C32. TX output – 395 Wholesale trade

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.3619
R Square	0.1310
Adjusted R Square	0.0520
Standard Error	492715.7
Observations	13

ANOVA

	df	SS	MS	F	Significance F

Regression	1	4.02589E+11	4.03E+11	1.658321	0.224262355
Residual	11	2.67046E+12	2.43E+11		
Total	12	3.07305E+12			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	3018666	567047.7164	5.323478	0.000243	1770602.482	4266730	1770602.48	4266729.7
X Variable 1	21.75423	16.89309982	1.287758	0.224262	-15.42723288	58.93569	-15.427233	58.9356911

Table C33. LA employment – 364 Boat building

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.2139
R Square	0.0457
Adjusted R Square	-0.0410
Standard Error	3038409
Observations	13

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	4.86821E+12	4.87E+12	0.527324	0.482899958
Residual	11	1.01551E+14	9.23E+12		
Total	12	1.06419E+14			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	21812358	2500451.848	8.723366	2.84E-06	16308900.45	27315815	16308900.4	27315815.3
X Variable 1	-2509.783	3456.18927	-0.72617	0.4829	-10116.80381	5097.239	-10116.804	5097.23877

Table C34. LA output – 364 Boat building

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.4654
R Square	0.2166
Adjusted R Square	0.1453
Standard Error	2753059
Observations	13

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	2.30468E+13	2.3E+13	3.040736	0.109040825
Residual	11	8.33727E+13	7.58E+12		
Total	12	1.06419E+14			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	21560281	1132075.226	19.04492	9.03E-10	19068599.85	24051961	19068599.9	24051961.4
X Variable 1	-4256.295	2440.85695	-1.74377	0.109041	-9628.584495	1115.995	-9628.5845	1115.99536

Table C35. TX employment – 364 Boat building

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.1692
R Square	0.0286
Adjusted R Square	-0.0597
Standard Error	520929.2
Observations	13

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	88006046538	8.8E+10	0.324306	0.580474287
Residual	11	2.98504E+12	2.71E+11		
Total	12	3.07305E+12			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	3846387	254079.72	15.1385	1.03E-08	3287161.392	4405613	3287161.39	4405612.78
X Variable 1	-162.3355	285.0598257	-0.56948	0.580474	-789.7479718	465.0769	-789.74797	465.076921

Table C36. TX output – 364 Boat building

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.1246
R Square	0.0155

Adjusted R Square	-0.0740
Standard Error	524433.1
Observations	13

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	47714817526	4.77E+10	0.173489	0.685040716
Residual	11	3.02533E+12	2.75E+11		
Total	12	3.07305E+12			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	3791340	211535.9871	17.92291	1.73E-09	3325752.29	4256927	3325752.29	4256927.43
X Variable 1	-171.2036	411.03262	-0.41652	0.685041	-1075.880274	733.4731	-1075.8803	733.47312