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A Review of Palacios Shrimp Landings, Matagorda Bay Oyster Resources, and Statewide Economic Impacts from the Texas Seafood Supply Chain and Saltwater Sportsfishing

Prepared by Extension Specialists in the Department of Agricultural Economics

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A Review of Palacios Shrimp Landings, Matagorda Bay Oyster Resources, and Statewide Economic Impacts from the Texas Seafood Supply Chain and Saltwater Sportsfishing[a]

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Introduction and Scope of the Report

The last such report that addressed the Matagorda County seafood industry was prepared in February 2005 for the Port of Palacios. That report examined the changes in harvest location and volumes, and shed light on the contributions made by Palacios fishermen to the Texas and Southeastern U.S. shrimp-trawl fishery. Recently the Lone Star Chapter of the Sierra Club requested this report. Sierra Club representatives asked that the size and importance of the seafood industry in Matagorda County be quantified. In addition, Sierra Club staff also asked that the economic contributions made by both the seafood industry and the marine sports fishing sector be estimated.

This *"bouillabaisse"* of topics is designed to document the importance of a major renewable-resource based industry in Matagorda County, and demonstrate both the importance of maintaining quality estuarine habitat and the economic contributions that accrue from doing so. Some of the facets of importance can be pinpointed to a given port within the county. On the other hand, new, interactive, web-based tools that can estimate the varied economic contributions of both the seafood industry and the marine sports fishing sector are available, but statewide impacts are the most precise degree of detail that can be ascertained.

Data Sources

The time-series information used to classify and summarize shrimp landings and corresponding ex-vessel value is the shrimp landings data file available from the Galveston Laboratory of the National Marine Fisheries Service (NMFS). The shrimp landings data file was created in 1960 to track: (a) the location of shrimp production (a grid of management areas in the Gulf of Mexico and water depth), (b) the composition of the catch (species and size count), and ©) where that catch is offloaded. The information used that ranks the nation's most valuable fish ports comes from various annual issues of *Fisheries of the United States*, a publication produced by the Fisheries Statistics Division within the Office of Science and Technology of the National Marine Fisheries Service. The Coastal Fisheries Branch within the Texas Parks and Wildlife Department is responsible for tracking commercially-important seafood harvests, and provided information about the oyster industry. Finally, the newest publicly-available tool that estimates the economic impacts generated by the seafood sector and marine recreational fishing is a website called the Interactive Fisheries Economic Impacts Tool made available through the Science and Technology Office of NMFS.[1]

Results and Discussion

The Significance of Shrimp Production in Matagorda County

Matagorda County has two ports that are reflected in the shrimp landings data file: Matagorda/Sargent and Palacios. The Port of Palacios is the larger of the two, and since 2001 generally accounts for at least 97 percent of both shrimp landings and ex-vessel value attributable to Matagorda County.

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1. Quantifying the economic impacts of the seafood sector and/or the marine recreational fisheries sector begins with the following link: <https://www.st.nmfs.noaa.gov/apex/f?p=160:7:1720584399285375::NO>.

A look back at Palacios shrimp harvests. Historically the Port of Palacios was the logical choice for the shrimp fleet that fished the Matagorda Bay system. In the late 1980s however, landings of shrimp harvested from the Gulf of Mexico began to eclipse shrimp produced from Matagorda Bay. By the 1990s, Gulf landings (Table 1, Figure 1) and the dockside value thereof (Table 2, Figure 2) became the dominant source of shrimp landed in Palacios. In 2000, shrimp landings in Palacios jumped almost 2 million pounds from 1999 due to favorable weather patterns that resulted in a *"bumper-crop."* Because of historically high ex-vessel prices in 2000, the aggregate, ex-vessel value of Palacios shrimp landings increased by almost $9 million that year, making the port of Palacios the 16th most valuable fish port in the country, and the 3rd most valuable fish port in Texas behind the combined ports of Brownsville/Port Isabel and Port Arthur. Production-wise, the years 2006 and 2009 were record years for Palacios. In 2006 shrimp fishermen offloaded 13.6 million pounds of shrimp tails which established a new production record for the port. Unlike 2000, however, the ex-vessel value of that record harvest was $9.1 million lower than the cumulative value in 2000 owing to the sharp decline in dockside prices which began in 2001.

Table 1. Pounds of Shell-on, Headless Shrimp Landed in Palacios: 1980 – 2010

Year	Gulf	Bay	Total	Year	Gulf	Bay	Total
1980	1,363,284	713,149	2,076,433	1996	4,644,716	1,345,013	5,989,729
1981	1,838,823	753,684	2,592,507	1997	4,562,909	2,048,010	6,610,919
1982	1,513,143	817,396	2,330,539	1998	6,380,859	1,561,796	7,942,655
1983	1,166,290	1,879,837	3,046,127	1999	6,818,214	830,631	7,648,845
1984	1,643,755	1,418,085	3,061,840	2000	8,303,340	1,223,066	9,526,406
1985	1,681,712	1,429,556	3,111,268	2001	7,744,931	1,843,088	9,588,019
1986	1,744,980	1,559,258	3,304,238	2002	7,986,465	1,142,177	9,128,642
1987	2,439,671	1,731,885	4,171,556	2003	8,126,098	1,011,867	9,137,965
1988	2,472,928	925,508	3,398,436	2004	7,203,842	934,683	8,138,525
1989	3,096,061	1,004,582	4,100,643	2005	8,120,689	658,270	8,778,959
1990	4,044,179	1,505,928	5,550,107	2006	13,582,779	122,138	13,704,917
1991	4,347,774	1,622,321	5,970,095	2007	7,323,667	334,346	7,658,013
1992	4,037,450	889,687	4,927,137	2008	8,345,791	111,268	8,457,059
1993	3,565,343	1,311,750	4,877,093	2009	12,320,768	167,550	12,488,318
1994	3,604,286	1,920,856	5,525,142	2010	8,355,307	343,102	8,698,409
1995	3,846,116	1,509,929	5,356,045				

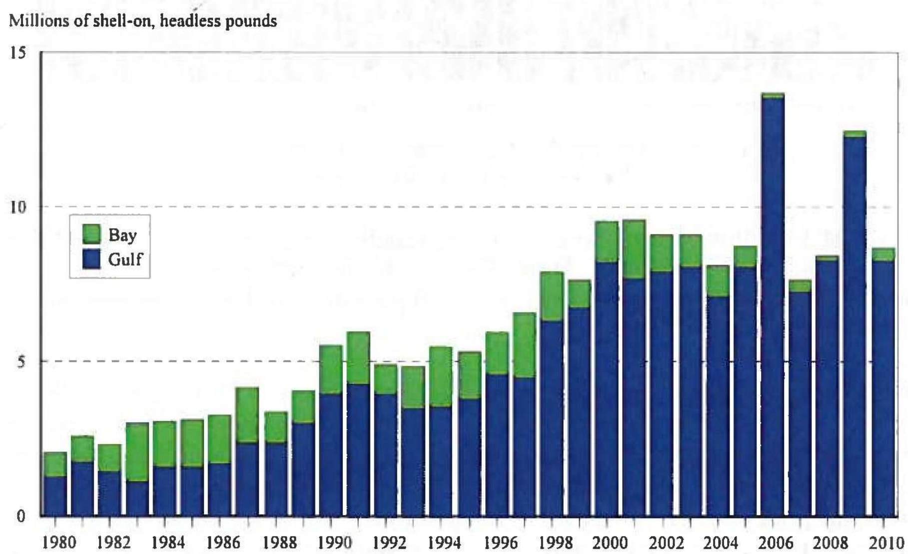

Figure 1. Pounds of Shell-on, Headless Shrimp Landed in Palacios: 1980 – 2010

Table 2. Ex-vessel Value of Shell-on, Headless Shrimp
Landed in Palacios: 1980 – 2010

Year	Gulf	Bay	Total	Year	Gulf	Bay	Total
1980	$4,592,031	$1,471,813	$6,063,844	1996	$20,319,653	$3,427,649	$23,747,302
1981	$5,668,400	$1,504,155	$7,172,555	1997	$23,957,129	$6,259,549	$30,216,678
1982	$6,403,588	$2,053,895	$8,457,483	1998	$26,827,801	$3,363,660	$30,191,461
1983	$4,875,313	$4,670,662	$9,545,975	1999	$33,110,546	$1,825,077	$34,935,623
1984	$5,933,411	$2,901,973	$8,835,384	2000	$40,088,849	$3,713,234	$43,802,083
1985	$5,999,300	$2,812,509	$8,811,809	2001	$31,367,825	$4,534,106	$35,901,931
1986	$7,679,960	$3,907,982	$11,587,942	2002	$27,242,988	$2,151,550	$29,394,538
1987	$8,759,418	$3,237,222	$11,996,640	2003	$24,164,501	$1,512,099	$25,676,600
1988	$9,889,047	$1,930,165	$11,819,212	2004	$24,937,197	$1,482,933	$26,420,130
1989	$11,426,418	$1,773,300	$13,199,718	2005	$26,976,545	$1,303,623	$28,280,168
1990	$14,021,239	$3,069,934	$17,091,173	2006	$31,469,437	$229,801	$31,699,238
1991	$16,504,594	$2,848,148	$19,352,742	2007	$23,899,313	$426,733	$24,326,046
1992	$14,383,507	$1,426,553	$15,810,060	2008	$31,129,911	$392,020	$31,521,931
1993	$13,268,733	$2,195,292	$15,464,025	2009	$26,406,958	$292,151	$26,699,109
1994	$17,817,844	$5,597,596	$23,415,440	2010	$31,116,241	$664,252	$31,780,493
1995	$17,035,905	$3,083,330	$20,119,235				

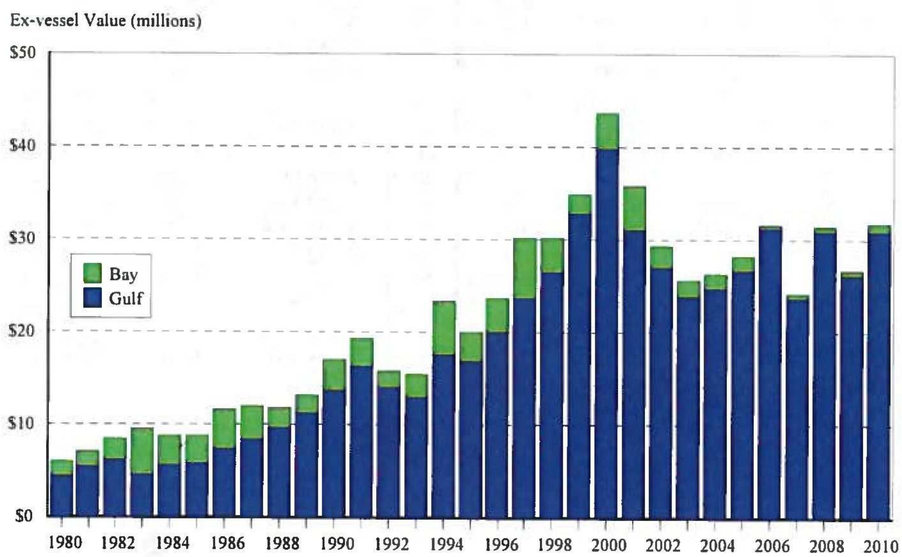

Figure 2. Ex-vessel Value of Shell-on, Headless Shrimp
Landed in Palacios: 1980 – 2010

Crushing operational conditions due to excessive shrimp supplies. Beginning in 2001, a worldwide revenue crisis gripped the domestic shrimp industry. From 2000 to 2006, the average annual ex-vessel price per pound in Palacios (and all other shrimp ports too) lost roughly 60 percent of the high-water mark set in 2000 (e.g., $4.60/lb. in 2000 vs. $2.31/lb. in 2006).

Four unrelated conditions combined to create a *"perfect economic storm"* that engulfed shrimp fishermen and their suppliers, and in the first year those processors and marketers who rely on local shrimp harvests [1]. Growing supplies of cultured shrimp coincided with a global economic slowdown that began in the second half of 2000. This set the stage for a general softening of prices. Additional downward pressure on U.S. ex-vessel and wholesale prices resulted from three other contributing factors. First, aggressive enforcement by the European Union (EU) for banned antibiotics resulted in **destruction** of non-compliant product shipped to that trading block; not just refusal as has been the case in the U.S. This aggressive enforcement led to additional quantities of suspect shrimp being rerouted to the U.S. Second, a sharply-higher tariff rate imposed by the EU on shrimp imported from certain Asian countries in December 2001 made those shrimp less expensive in competing markets like the U.S. Third, the dollar was quite strong against other currencies which also made imports less expensive in the American market. These four conditions have resulted in record imports to the U.S. market since 2001.

Imports have always been an important source of supply in the American marketplace. With an annual harvest of roughly 200 million pounds but the domestic market several times larger, imports have been an integral part of U.S. shrimp supplies for decades. Today the U.S. imports some 1.2 billion pounds a year (product weight basis), much of it value-added, worth $3.7 to $4.3 billion. Thus, it is no surprise that shrimp leads the nation's seafood trade deficit.

Beginning in 2001, the steadily increasing supply of imported shrimp turned into a raging torrent. In the eleven years between 1990 and 2000, the average annual increase (growth) in shrimp imports was 29.3 million pounds per year. Between 2001 and 2009, average annual growth in shrimp imports more than doubled from 29.3 million lb. per year to 72 million lb. per year which indicates a statistically-significant structural change in the U.S. shrimp market [2]. The effect of doubling the average annual volume increase is also economically significant. Specifically, every three years, import growth alone exceeds annual shrimp production from the Southeastern U.S. shrimp-trawl fishery!

The industry took a proactive stance during the early years of this crisis, amassing funds to sue six major exporting countries for dumping shrimp on the U.S. market.[2] In early 2005, the International Trade Commission approved the first-ever set of tariffs on imported shrimp from all six of the named shrimp-exporting countries. Winning all six cases was a moral victory for the domestic shrimp industry, but with shrimp imports originating from over 100 countries, foreign exporters in the affected countries remained a step ahead of the Customs and Border Protection Service, so the leveling effect of tariffs was muted.

How have Palacios shrimp fishermen fared since 2001? Every shrimp fishermen experienced the revenue crisis. In some instances, operators were forced to exit the shrimp fishery within months of the 2001 price decline. Others with stronger balance sheets were able to weather the *"perfect economic storm"* but ultimately a portion of those producers also moved on.

This segment considers the Port of Palacios in a collective sense. When the Port of Palacios is compared against all other shrimp ports in Texas, the data suggest that since 2000 Palacios has accounted for a growing percent of landings along the Texas coast as well as a growing fraction of ex-vessel value (Table 3, Figure 3 and Table 4, Figure 4). In addition, the 9 percent decline in landings through the Port of Palacios between 2000 and 2010 (i.e., 9.5 million pounds landed in 2000 vs. 8.7 million pounds landed in 2010) is about one-half of the 17 percent decline collectively experienced in other Texas Ports between these two years (i.e., 47.6 million pounds in 2000 vs. 39.3 million pounds in 2010). Dollar-wise, Palacios shrimp fishermen experienced a $12 million (27 percent) decline in cumulative ex-vessel value in 2010 while other Texas ports experienced an $80.2 million (37 percent) decline over the same two years.

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2. Those six countries included Brazil, China, Ecuador, India, Thailand, and Vietnam.

Table 3. Palacios Shrimp Landings Compared Against
All Other Texas Ports: 1980 – 2010

Year	Palacios	Other Texas Ports	Palacios Percent	Year	Palacios	Other Texas Ports	Palacios Percent
1980	2,076,433	43,465,804	4.6%	1996	5,989,729	40,760,377	12.8%
1981	2,592,507	56,306,474	4.4%	1997	6,610,919	34,122,369	16.2%
1982	2,330,539	41,066,883	5.4%	1998	7,942,655	42,574,790	15.7%
1983	3,046,127	41,565,124	6.8%	1999	7,648,845	36,498,132	17.3%
1984	3,061,840	54,244,883	5.3%	2000	9,526,406	47,662,401	16.7%
1985	3,111,268	49,263,872	5.9%	2001	9,588,019	41,129,764	18.9%
1986	3,304,238	56,912,898	5.5%	2002	9,128,642	37,407,285	19.6%
1987	4,171,556	51,728,404	7.5%	2003	9,137,965	39,850,191	18.7%
1988	3,398,436	43,693,452	7.2%	2004	8,138,525	35,356,930	18.7%
1989	4,100,643	45,243,630	8.3%	2005	8,778,959	34,893,296	20.1%
1990	5,550,107	50,611,005	9.9%	2006	13,704,917	51,334,633	21.1%
1991	5,970,095	53,324,552	10.1%	2007	7,658,013	38,406,115	16.6%
1992	4,927,137	42,321,633	10.4%	2008	8,457,059	31,383,878	21.2%
1993	4,877,093	37,952,557	11.4%	2009	12,488,318	38,782,544	24.4%
1994	5,525,142	40,390,476	12.0%	2010	8,698,409	39,334,553	18.1%
1995	5,356,045	40,780,673	11.6%				

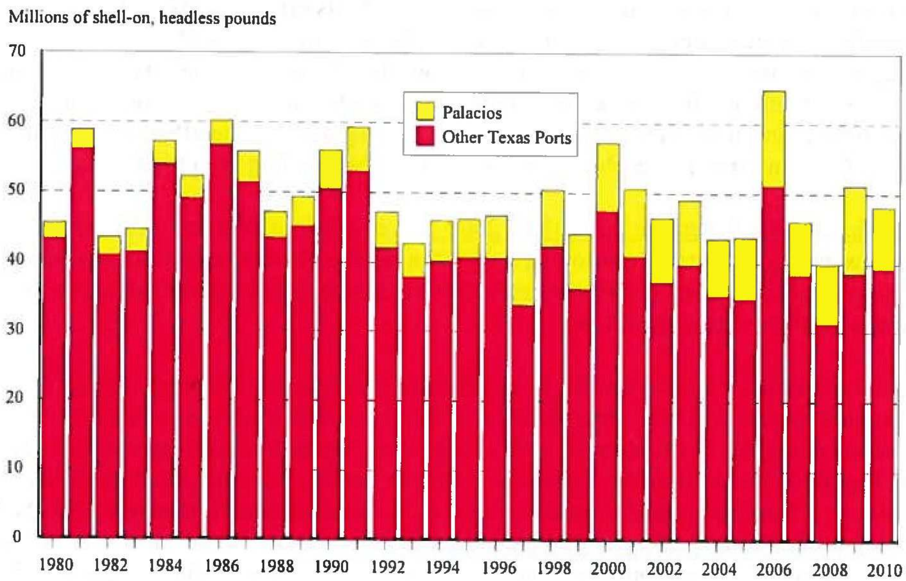

Figure 3. Palacios Shrimp Landings Compared Against
All Other Texas Ports: 1980 – 2010

Table 4. Ex-vessel Value of Palacios Shrimp Landings Compared
Against All Other Texas Ports: 1980 – 2010

Year	Palacios	Other Texas Ports	Palacios Percent	Year	Palacios	Other Texas Ports	Palacios Percent
1980	$6,063,844	$133,785,441	4.3%	1996	$23,747,302	$149,162,097	13.7%
1981	$7,172,555	$156,658,150	4.4%	1997	$30,216,678	$150,419,150	16.7%
1982	$8,457,483	$165,282,582	4.9%	1998	$30,191,461	$152,229,985	16.6%
1983	$9,545,975	$161,031,640	5.6%	1999	$34,935,623	$154,085,402	18.5%
1984	$8,835,384	$170,302,019	4.9%	2000	$43,802,083	$218,831,973	16.7%
1985	$8,811,809	$152,034,314	5.5%	2001	$35,901,931	$155,396,378	18.8%
1986	$11,587,942	$216,655,877	5.1%	2002	$29,394,538	$114,408,030	20.4%
1987	$11,996,640	$172,860,631	6.5%	2003	$25,676,600	$110,149,160	18.9%
1988	$11,819,212	$151,397,522	7.2%	2004	$26,420,130	$107,684,391	19.7%
1989	$13,199,718	$143,393,237	8.4%	2005	$28,280,168	$111,088,612	20.3%
1990	$17,091,173	$158,303,619	9.7%	2006	$31,699,238	$132,204,698	19.3%
1991	$19,352,742	$181,319,816	9.6%	2007	$24,326,046	$121,498,964	16.7%
1992	$15,810,060	$140,386,085	10.1%	2008	$31,521,931	$122,418,451	20.5%
1993	$15,464,025	$123,175,267	11.2%	2009	$26,699,109	$90,550,842	22.8%
1994	$23,415,440	$171,742,417	12.0%	2010	$31,780,493	$138,678,900	18.6%
1995	$20,119,235	$154,368,256	11.5%				

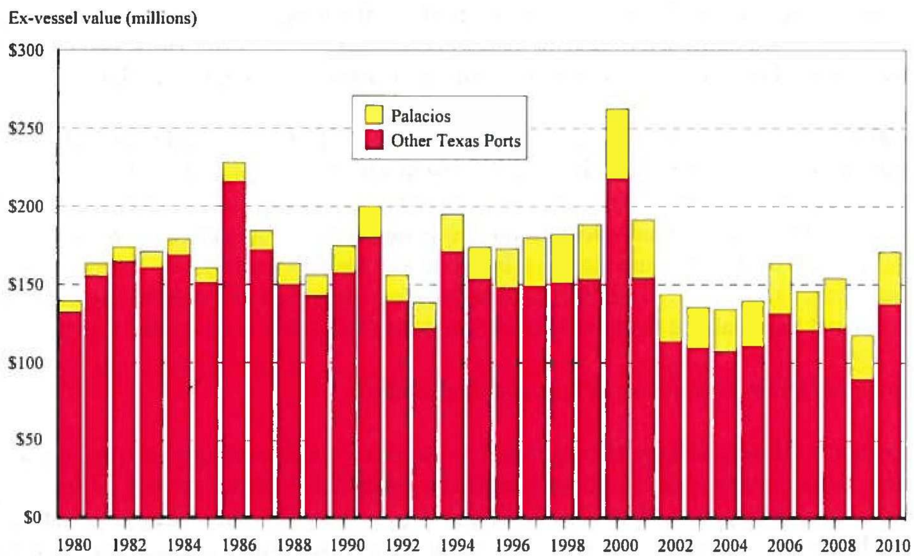

Figure 4. Ex-vessel Value of Palacios Shrimp Landings Compared
Against All Other Texas Ports: 1980 – 2010

In 2005 and seven years later the same conclusions exist. The Matagorda County shrimp industry, centered in the port city of Palacios, is a large contributor to the supply of Texas shrimp. Palacios, together with Port Arthur and Brownsville / Port Isabel, are annually among the nation's most valuable fish ports. Furthermore, once processed, shrimp offloaded in Palacios find their way onto grocers' shelves and the menus of many food service establishments across Texas and many regions of the U.S.

What will drive economic sustainability in the domestic shrimp industry? Between 2001 and 2005 below-average Texas landings, coupled with record low prices for those shrimp, pushed many producers out of the business. Since 2006, federal fishery managers have noted that fishing effort in the 10 to 30 fathom band across the Gulf of Mexico has declined by 78 percent compared to reported effort in that water depth between 2001 and 2003.

The business of shrimp fishing has changed. In the decades prior to 2001, fishermen used relatively low-cost inputs to catch relatively high-dollar shrimp. This sounds like the dream of every business owner; notably, to operate in an industry where it costs very little to produce high-dollar output. But in those days, being able to catch enough shrimp was the most common limit to generating adequate annual profits. Between 1965 and 2009, there were only ten "banner years" off Texas when shrimp production exceeded the long-term (45-year) average by 20 percent or more. These years included 1967, 1970, 1971, 1972, 1977, 1981, 1986, 1991, 2000, and 2009. If catching enough shrimp was the limit to profitability, then the formula for success was to *"out-fish"* competitors by being able to get to the grounds faster, cover more bottom, and remain on the grounds longer. This strategy required investing in larger, more powerful vessels that could pull larger gear and support extended cruises with on-board freezing capability. All operators who could, increased their catching capacity in the years prior to 2001.

Beginning in late 2001, the strategy that focused on boosting catching power began to unravel. In 2006, offshore producers received about $2.50 a pound for their shrimp, but that year the average, annual diesel price was $2.12 per gallon. Faced with continued low dockside prices and significantly higher fuel costs, additional operators left the industry. Even with the skyrocketing catch rates most <u>remaining</u> operators are experiencing, the economic benefits expected from larger catches have <u>not</u> materialized. While the *"perfect economic storm"* began as a revenue crisis, over time it has morphed into a classic cost-price squeeze for remaining operators as the cost of inputs has escalated. Annual abundance of shrimp is still controlled by Springtime meteorological conditions that create ecological changes in the coastal bay systems; yet, remaining operators have experienced sharp increases in catch per unit of effort. However, the prices received are still below ex-vessel prices paid a decade ago and input costs are much, much higher.

Remaining viable in the future will require a different approach. Today, remaining operators use relatively high-cost inputs to harvest record quantities of a lower-valued product. Therefore, to generate profitability from shrimp trawling today, operators need to focus on reducing avoidable costs while taking advantage of record catch rates. The past technological advances generated by the industry are still important, but tomorrow's successful operators must also consider both (a) routine investments in less-resistive, modern fuel-saving trawl gear as well as (b) investments in fuel-saving propellers and nozzles that further reduce fuel consumption beyond that realized from investments in newly-designed and adapted trawl gear.

The Significance of Oyster Production in Matagorda County

The Eastern oyster is the second-largest contributor to the Texas seafood supply, and among all states from Texas to Maine, Texas is second only to Louisiana in supplying the Eastern oyster [3]. Historically, most of the Texas oyster harvest originates from the Galveston Bay system, the state's largest estuary and the only one where leaseholds for cultivating oysters are permitted. On average, the Matagorda Bay system contributes just over four percent to the total Texas oyster harvest. In the 27 years between 1980 and 2007, Matagorda Bay produced, on average, 183,527 pounds of oyster meats a year. The years 1984 and 1989 were banner years for the Matagorda Bay oyster harvest, producing 448,637 pounds of meats in 1984, and a whopping 864,285 pounds five years later. In 1989, the Matagorda Bay harvest accounted for 36 percent of all oysters that came from Texas waters!

<u>Oysters not only provide food but also a variety of environmental services.</u> Oysters are among the world's first aquatic foods, being consumed by indigenous peoples for thousands of years. In addition to their importance as both an ancient and modern food, oysters also inexpensively provide key public environmental benefits that are increasingly important to the health, productivity, and enjoyment of estuarine ecosystems. These include: (a) maintaining the environmental quality of estuarine waters, (b) maintaining conditions that promote the health of other essential estuarine habitats like submerged aquatic vegetation, and ©) providing habitat for recreationally- and commercially-important fishes.

Oysters eat by pumping and filtering water. Under ideal conditions, one average-sized oyster can filter up to 50 gallons of water per day. In particular, the physiological process of pumping and filtering water reduces both (a) phytoplankton biomass generated as a result of nutrient-loading from both municipal wastewater treatment systems and storm runoff, and (b) the inorganic suspended solids in the water column. Modern wastewater treatment plants are quite efficient in treating domestic and industrial wastewater. In most instances, though, storm water runoff cannot be economically collected or treated. This is where oyster reefs become extremely cost-effective in improving estuarine water quality. The pumping and filtering process also contributes to production of microscopic, unicellular algae, an important first step in the food web.

Estuaries that also support trans-ocean waterborne commerce require periodic dredging to widen and deepen navigation channels. Maintaining navigation contributes to additional turbidity in the water column. Large scale restoration efforts have shown that oysters can remove suspended sediment by tenfold. By filtering sediments and phytoplankton from the water, oyster reefs maintain the conditions necessary to support the health of other preferred estuarine habitats. A classic example is submerged aquatic vegetation. Oysters minimize the negative effects of eutrophication and turbidity which, in turn, increases light penetration thus allowing submerged aquatic vegetation to thrive. The pumping and filtering of estuarine water reduces turbidity and directly benefits submerged aquatic vegetation, an extremely important nursery habitat for most of the commercially- and recreationally-important finfish and crustaceans.

Unlike clams that burrow into the bay bottom, oysters live in the water column--mostly as part of large reefs in the estuary. The structures formed by upright oyster aggregations create habitat for dense assemblages of other mollusks, as well as polychaete worms, crustaceans, and a host of other invertebrates. Juvenile fish and crustaceans recruit to, and utilize, oyster reefs as refuges and foraging grounds. It is estimated that a reef provides fifty times the surface area compared with a flat bottom. Crevices throughout the reef provide habitat for a variety of vertebrate and invertebrate species. A Louisiana study of recreational anglers who regularly fished oyster reefs indicated a willingness to pay to fish over oyster reefs of $13.21 (2003 dollars) per angler. This same study indicated that approximately 23 percent of the total marine-angling days each year occurred over oyster reefs, resulting in an estimated $2 million in annual benefits for Louisiana coastal waters [18].

Public ecological services provided by oyster reefs include water quality improvement, erosion prevention and stabilization, and creation of various types of beneficial habitat. These ecological services translate into direct economic benefits. Primary benefits include (a) increased harvests of oysters, shrimp, fish, and crab from the reef or adjacent areas, (b) the take of recreationally-important game fish through creation of preferred habitat and a food web that ultimately establishes forage for higher-order predators like red drum, and ©) increased water-based, contact-recreation opportunities.

The oyster resources of the Matagorda Bay system make an important contribution to the overall Texas oyster harvest. Simultaneously, Matagorda Bay oyster resources create a number of key environmental services that maintain estuarine water quality and provide key habitat for a variety of commercially- and recreationally-important species.

Assessing the Economic Contributions Made by the Seafood Industry and the Marine Sports Fishing Sector to the State of Texas

The concept of economic impacts. Two ideas drive the study of economic impacts. The primary idea behind estimating economic impacts is the fact that an initial sale spawns a variety of economic activities among supplying firms and employees upstream and downstream of where the sale was made. The second idea is geographic specificity. Economic impacts can be measured at the municipal level, the county/multi-county level, statewide, regionally, and for the entire U.S.

A hypothetical example may help explain the notion of numerous economic events triggered by the sale of shrimp. Once a trawler docks and offloads the catch, it is sold, subsequently processed, packaged, put on a truck and taken to a retail distribution center for staging where it can then be store-door delivered. Estimating the economic effects begins with the direct effect. In this example, the direct effect was a fishermen selling his catch, but the economic activity does not stop there. That sale, in turn, creates a host of indirect effects by the purchaser such as buying labor, trucking, electricity, packaging materials, etc. Each supplying firm upstream or downstream of the original purchaser makes subsequent purchases to: (a) restore inventories, (b) manufacture products sold to the original purchaser, or (c) perform routine maintenance on delivery vehicles, etc. Finally, the employees of both the original purchaser and the supplying firms make purchases too. These are called induced effects. The sum of the direct, indirect, and induced effects create the total economic impact. As the original purchase (direct impact) goes through round after round of indirect and induced effects, the economic impact of the original purchase is multiplied, benefitting many industries and individuals [4]. Likewise, the reverse is true. If a particular item or industry is removed, the economic loss is greater than the original retail sale.

In addition to the three types of effects, there are also four different impact categories that are generally computed. These include output (or sales) impacts, value-added impacts, income impacts, and employment impacts. The first three impact categories are denominated in dollars while the employment impact category measures jobs created. Dudensing and Falconer note that the output multiplier provides the largest impact value and is the most widely reported; yet, the sales impact does not communicate how an economic event affects the welfare of households or the profitability of businesses [5]. The better impact category for assessing those concerns is the value-added impact category which includes labor and proprietary income. The authors continue by stating that the income impact category, broken out from the value-added impact category, is best for discerning the benefit of an economic event to residents of the region under study.

Seafood industry impacts. In the Interactive Fisheries Economic Impacts Tool, users can opt to include or exclude imported seafood. Since the purpose of this report is to explore economic contributions made by the Texas seafood industry to the state's economy, imports were not included. When imports are omitted, the economic effects attributable to some elements of the Texas seafood supply chain are reduced. Examples include brokers and importers, secondary processors and distributors, food service establishments and supermarkets.

In 2009, the statewide economic output contribution from seafood production was $846.5 million (Table 5). Of that total, $318.5 million is attributable to fishermen, $97.3 million to primary dealers and processors, $56.3 million to secondary wholesalers and distributors, and $328.5 million to restaurants, with $45.8 million attributable to grocers. Of the $846.5 million in total output, the state's seafood sector contributed $429.9 million to Texas' Gross Domestic Product (Table 6) which includes $306.1 million in labor income (Table 7), and created 14,135 jobs across Texas, most of which are in food service (Table 8).

Table 5. 2009 Total, Texas Output (Sales) Estimates (in thousands of dollars) for the Seafood Industry

	Harvesters	Primary dealers and processors	Secondary wholesalers and distributors	Restaurants	Grocers	Total Sfd. Sector
Direct Impacts	150,232	44,868	27,983	168,715	22,991	414,789
Indirect Impacts	115,853	27,698	6,784	66,535	10,339	227,209
Induced Impacts	52,464	24,754	21,521	93,219	12,519	204,477
Total Impacts	318,549	97,320	56,288	328,469	45,849	846,475

Table 6. 2009 Total, Texas Value-Added Estimates (in thousands of dollars) for the Seafood Industry

	Harvesters	Primary dealers and processors	Secondary wholesalers and distributors	Restaurants	Grocers	Total Sfd. Sector
Direct Impacts	68,904	21,693	10,680	92,265	14,339	207,881
Indirect Impacts	49,376	13,388	3,781	40,672	6,160	113,377
Induced Impacts	28,565	13,137	11,547	48,818	6,613	108,680
Total Impacts	146,845	48,218	26,008	181,755	27,112	429,938

Table 7. 2009 Total, Texas Income Impact Estimates (in thousands of dollars) for the Seafood Industry

	Harvesters	Primary dealers and processors	Secondary wholesalers and distributors	Restaurants	Grocers	Total Sfd. Sector
Direct Impacts	64,641	20,351	10,019	86,557	13,452	195,020
Indirect Impacts	10,544	8,706	2,189	23,291	3,955	48,685
Induced Impacts	16,041	7,554	6,573	28,420	3,819	62,407
Total Impacts	91,226	36,611	18,781	138,268	21,226	306,112

Table 8. 2009 Total, Texas Employment Impact Estimates (in FTE jobs) for the Seafood Industry

	Harvesters	Primary dealers and processors	Secondary wholesalers and distributors	Restaurants	Grocers	Total Sfd. Sector
Direct Impacts	2,829	846	221	6,940	674	11,510
Indirect Impacts	459	147	42	405	69	1,122
Induced Impacts	387	182	158	684	92	1,503
Total Impacts	3,675	1,175	421	8,029	835	14,135

<u>Sports fishing in the marine environment.</u> Recreational activities do not result in sales for the participant, but the activity certainly requires a number of expenditures. The Interactive Fisheries Economic Impacts website addresses the economic effects of recreational marine sports fishing by examining the purchase of durable equipment and the cost to gain access to preferred fishing locations, either via "for-hire" enterprises like charter and head boats, aboard a private boat, or on the shore, a pier, jetty, etc. Durable equipment related to marine recreational fishing includes: expenditures on fishing tackle and gear, other fishing-related equipment, boats and trailers, and slip rental, as well as vehicles and even second homes [6]. The statewide economic output contribution from marine sports fishing in 2009 was $2.9 billion (Table 9). Of that total amount, $2.6 billion is attributable to durable equipment, $45.8 million to "for-hire" fishing trips, $153 million on private vessels, and $27.3 million for paid access. Salt water sports fishermen contributed $1.435 billion to Texas' Gross Domestic Product (Table 10) which includes $910 million in labor income (Table 11), and created 22,126 jobs (Table 12). The economic activity associated with durable equipment dominates every impact category.

Table 9. 2009 Total, Texas Output (Sales) Estimates (in thousands of dollars) for the Sportfishing Industry

	Durable Equipment	For-Hire	Private Boat	Shore	All Gear
Total Impacts	2,620,846	45,787	152,916	27,309	2,846,858

Table 10. 2009 Total, Texas Value Added Estimates (in thousands of dollars) for the Sportfishing Industry

	Durable Equipment	For-Hire	Private Boat	Shore	All Gear
Total Impacts	1,312,749	25,522	81,717	14,745	1,434,733

Table 11. 2009 Total, Texas Income Estimates (in thousands of dollars) for the Sportfishing Industry

	Durable Equipment	For-Hire	Private Boat	Shore	All Gear
Total Impacts	841,046	14,465	46,109	8,391	910,011

Table 12. 2009 Total, Texas Employment Impact Estimates (in FTE jobs) for the Sportfishing Industry

	Durable Equipment	For-Hire	Private Boat	Shore	All Gear
Total Impacts	20,047	498	1,331	250	22,126

Summary and Conclusions

Matagorda County is a major contributor to the Texas seafood economy. Since 2001 Palacios has accounted for 20 percent of the state shrimp harvest and landed value. Going forward, domestic shrimp fishermen are experiencing phenomenal catch rates due to reduced effort in the fishery, but those harvests are worth less and cost more to produce than in the decades prior to 2001. Finding ways to reduce avoidable costs--notably fuel--will certainly help ensure a sustainable economic future.

Over roughly three decades, oyster production from the Matagorda Bay system has accounted for 4 percent of the Texas oyster harvest. In 1989, oysters pulled from Matagorda Bay comprised 36 percent of statewide oyster production. Oysters are perhaps the only seafood product that also provide important environmental services to their estuarine habitat. By filtering sediments and phytoplankton from the water, oyster reefs maintain the conditions necessary to support the health of other preferred estuarine habitats. In particular, the pumping and filtering of water reduces turbidity and directly benefits submerged aquatic vegetation, an extremely important nursery habitat for most commercially- and recreationally-important finfish and crustaceans. Until they are harvested, oysters create real economic benefits for other commercially-important seafoods, sports fishermen, those desiring contact, water-based recreation endeavors, and those interested in investing in pristine coastal property, either as a primary residence or a second home.

Using the NMFS Interactive Fisheries Economic Impacts tool, the economic contributions from both the Texas seafood industry and the Texas sports fishing sector were estimated. In 2009 seafood-linked firms created a total economic impact to Texas of $846.5 million. The seafood sector contributed $430 million to Texas' Gross Domestic Product and created 14,135 jobs. Texas' residents along the coast certainly enjoy sports fishing! Total economic output from marine sports fishing was $2.9 billion in 2009, dominated by durable equipment purchases. Saltwater sports fishing contributed $1.435 billion to Texas' Gross Domestic Product, and created 22,126 jobs. In 2009 total economic output from the seafood sector amounted to 23 percent of the total economic output from both the seafood and saltwater sports fishing sectors. Similar relationships have been reported in studies that have estimated the economic contributions of U.S. commercial and recreational fisheries [4]. Future work in the economic effects arena may consider the economic impacts in a smaller, more defined geographic region.

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