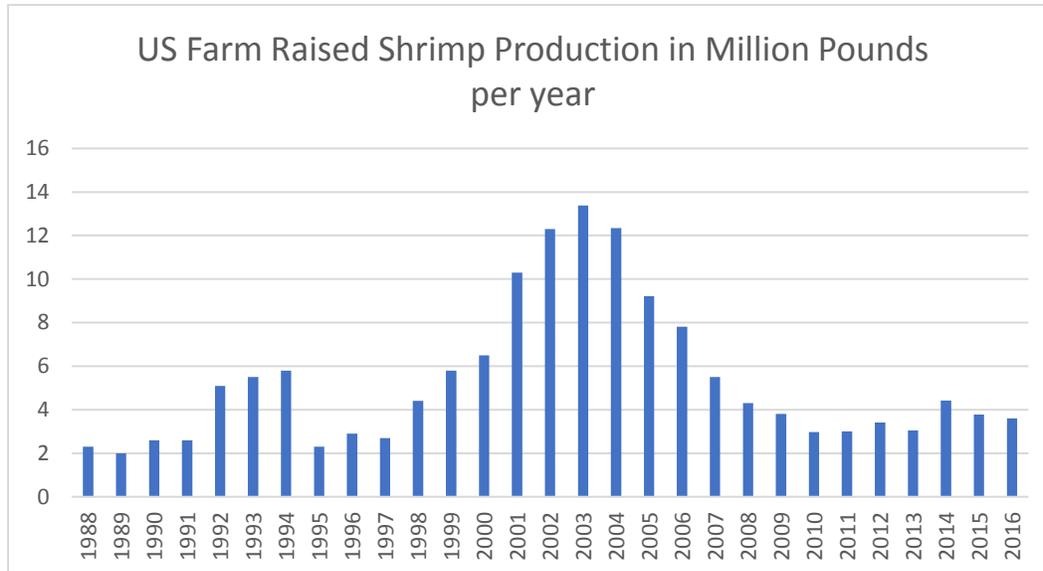


The Rise and Decline in US Shrimp Farming, from a Texas Perspective.

By Granvil Treece, Treece & Associates



The US shrimp farming industry started growing in the late 80s to about 2 million pounds a year then partly as a result of Specific Pathogen Free animals providing disease resistance climbed to a production of almost 6 million pounds in 1994. In 1995 the White Spot Syndrome Virus (WSSV) hit a Texas farm stocked with native white shrimp and the farm was drained, dried and disinfected, and the virus did not return. Taura Syndrome Virus (TSV) hit the US in South Carolina in 1995, after starting in the Taura River basin of Ecuador and moved globally. TSV hit Texas shrimp farms after it hit South Carolina. TSV resistant animals were developed by industry and government-funded labs which offered some relief and the TSV-resistant animals allowed the production to increase again. The US then began a fairly long growth and recovery period from 1998 to 2003. In 2003, the US shrimp production peaked at 13 million pounds, then began to decline until 2010. Texas production generally made up of over 70% of the US production through the years and continues to play a dominant role in US aquaculture production. This decline, from 2004 to 2010, from a Texas shrimp farmers stand point was due to a number of different reasons.

The prices of shrimp in the US market dropped around the year 2004 and the market seemed to be flooded with imported shrimp. Much of the shrimp from Asia that had been going to the European market was turned away due to antibiotics and worse, Chloramphenicol, found in muscle tissue of shrimp that exceeded the maximum limit allowed in the EU. The US maximum limit was higher, so much of that shrimp flooded the US market. The Southern Shrimp Alliance in South Carolina and US shrimp farmers sponsored a petition to the US Dept. of Commerce (DOD) for protection against dumping of shrimp on US market. The DOC found 6 countries (Brazil, Ecuador, India, Indonesia, Viet Nam and

Thailand) guilty of dumping shrimp on the US market and levied tariffs. It did not slow the foreign imports of shrimp and prices stayed low.

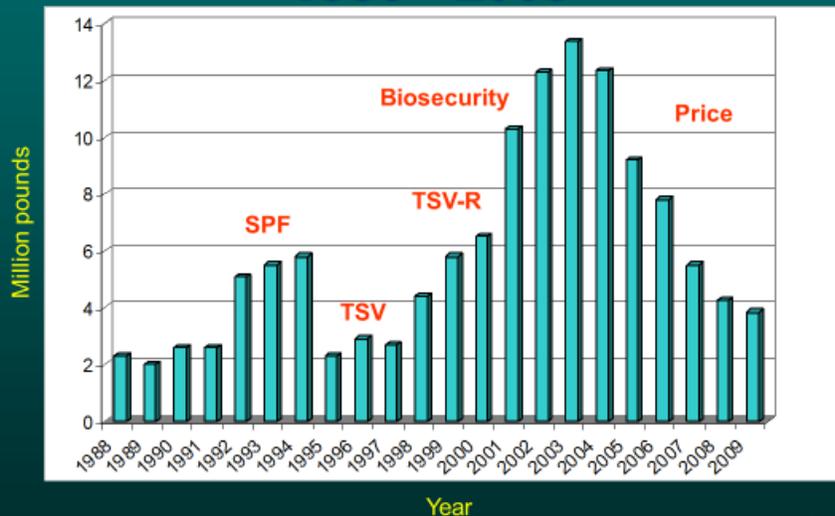
Additionally, in the US and especially in Texas, increased regulations made operations more difficult and expensive to conduct aquaculture. The Texas Natural Resources Conservation Commission (TNRCC) as it was called then (now Texas Commission on Environmental Quality, TCEQ) made discharge from aquaculture so difficult to comply with that the farms were forced to retrofit the sites and change from flow-through water systems to recirculation water systems. Most farms were forced to spend hundreds of thousands of dollars to comply with the new, stricter regulations, and the operations suffered production decreases due the new systems. Texas Parks and Wildlife also played a role in the forced retrofit of all the farms to help control the threat of diseases spreading to wild stocks. TPWD required 3 screens to be placed on the effluents to prevent the release of animals. One such farm in South Texas with 85, 5-acre ponds was forced to move into recirculation with all the expense involved and production dropped from 5,700 lbs/ac to 4,500 lbs/ac and dropped even more over time. It closed and a portion of the farm, under several separate owners are struggling to survive.

Another big expense that the shrimp farmers were faced with in 2003 to 2007 and continued into 2008 was an average 25% increase in aquaculture feeds. Feed and seed are the two most expensive operating costs on Texas shrimp farms. The price of ingredients in those feeds went up and the costs were passed on to the farmers. Soy, corn, fish meal, and other ingredients all added to the higher costs. Corn, even though a small portion of the feed (up to 14% now in a sustainable diet developed by Dr. Allen Davis at Auburn Univ.) went up in price due to the ethanol industry. As a rancher and deer hunter I experienced first-hand the price of corn going from \$3/ 50 lb bag to \$9/ 50 lb bag (200% increase), then back to where it is today at \$6/ 50 lb bag (100% increase over the original price). China also contributed to the higher cost of fish meal, used in shrimp diets. The fish meal used in US shrimp diets comes mainly from Gulf and South Atlantic harvest of the fish *Menhaden brevardia*. One major company, Omega Protein, does most of the harvest and processing at their plant in Reed, Va. China stepped in and bought the whole crop or harvest for one year. Therefore, there was no negotiating with suppliers on the price of fish meal. It is considered too expensive to import from the Anchovy industry in Peru. Squid meal is also used in some shrimp diet formulas by some companies and is very expensive. Substitutes for fish meal has been the topic of many researchers and feed companies for some good many years. Progress has been made in substituting fish meal, but the diets are still very expensive thus far. See Sookying and Davis, 2011 for one such diet, which uses 47%, 14% corn by-products to replace fish meal and still provide high protein and results.

The high price of feed hurt many operations, both finfish and shrimp, across the country. A number of the Texas shrimp farms decided to leave shrimp and try catfish, tilapia, striped bass and red drum. Harlingen Shrimp Farms in Bayview shifted partially to red drum and cut back on shrimp and closed their shrimp hatchery, and eventually closed the farm. Part of the reason given at the time was price of shrimp on the market in the US. Harlingen Shrimp Farms also had a hatchery and growout in Mexico and were getting more for their shrimp in Mexico than they were in Texas.

Austwell Aqua Farms shifted from shrimp to catfish and tilapia and is still operating today. R&G in Port Lavaca had about 200 acres of shrimp and shifted to red drum and hybrid striped bass. St. Martin's Seafood shifted part of their farm from shrimp to red drum. Southern Star was the largest shrimp farm for a while (1,880 acres with 1,100 acres of ponds), but closed their doors. Bowers leased 460 acres of that farm for a few years, but closed Bowers Valley in 2010 and pulled back to Collegeport, with shrimp processing in Palacios. They expanded into catfish (hatchery, growout and processing). Bowers is still producing shrimp on 350-acre farm and has catfish on separate operations. El Sauz Ranch in South Texas got in and built 122 acres of shrimp ponds, then got out. Bobby Edwards at Texas Seabreeze in Winnie/Anahuac area had 30 acres and said regulations drove him out of business. All of these farms and others, activities and actions contributed to the slow and steady decline in US shrimp farming from 2004 to 2010.

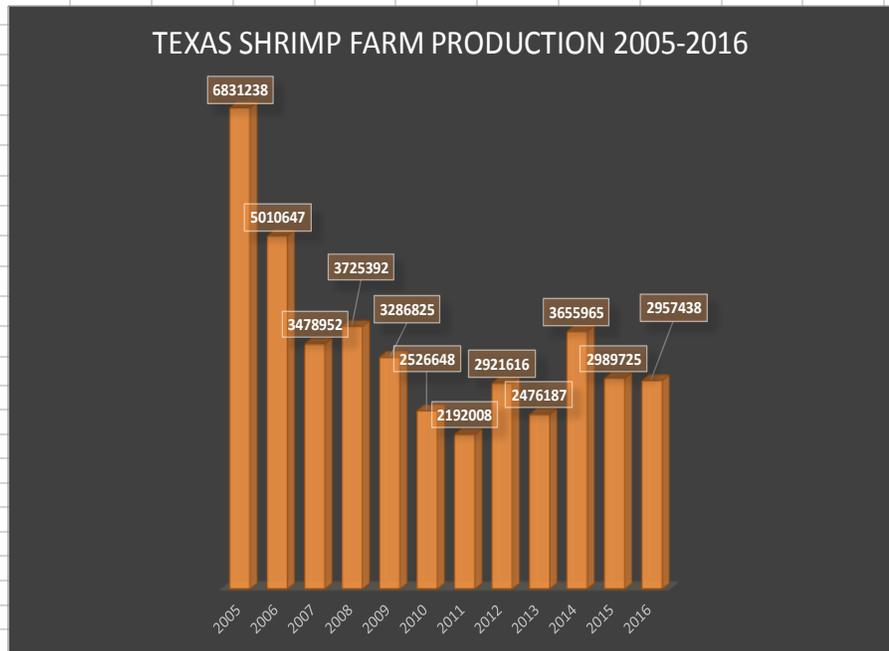
U.S. Shrimp Production 1988 - 2009



The graph above from USDA US Marine Shrimp Farming Program in 2010 shows what they thought happened to the US industry from 1988 to 2010. Since disease did not play a major role in the production decline from 2004 to 2010, it was their opinion that it was price of shrimp being low on the market. I can also say from working directly with the Texas shrimp farmers during my 30 years with Texas A&M University as an aquaculture specialist, specializing in shrimp culture, and offering a Shrimp Farming Short Course for 27 years, that the farmers complained most about low prices of shrimp on the market, high prices of feed, increasing regulations from federal (EPA) and state government (TCEQ and TPWD), decreasing survival on most of the farms, and PL quality.

Pacific White Shrimp (*Litopenaeus vannamei*) culture in Texas peaked in 2003 when it set a state production record at 4,081 metric tons (9 million pounds worth \$18 million farm-gate). The industry production declined until 2011 and seems to have stabilized now each year at around 2.5 to 2.9 million pounds. There were 2.9 million pounds produced on 10 Texas farms and 990 acres in 2016, worth approximately \$8.3 million.

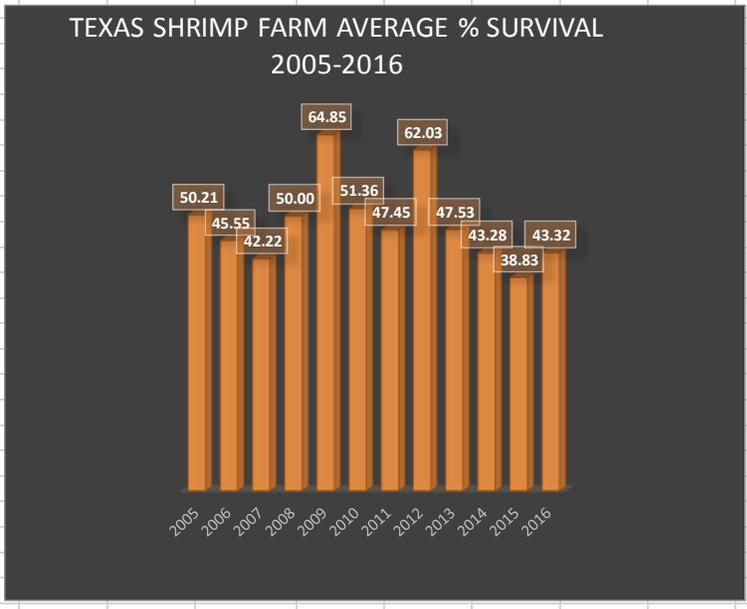
Year	lbs prod
2005	6831238
2006	5010647
2007	3478952
2008	3725392
2009	3286825
2010	2526648
2011	2192008
2012	2921616
2013	2476187
2014	3655965
2015	2989725
2016	2957438



Source: Texas Parks and Wildlife. Compiled by Treece & Associates Jan. 19, 2017

Over the last 24 years, the Texas marine shrimp aquaculture industry has produced 104,018,335 lbs of shrimp with a farm-gate value of approximately \$272,728,634 contributing an estimated 6-fold amount or \$1,636,371,804 to the state's economy. The 2015 farm gate price was again \$2.80/lb, and Texas Parks and Wildlife estimated is the same for 2016 (\$2.80/lb at the farm). The state survival average was low at 47% in 2013 and even lower at 43% in 2014 and even lower again in 2015 at 38.83%. The average Texas shrimp survival in 2016 was 43%. This survival did not reflect what happened on most farms. Bowers, the largest farm, stocks advanced PLs from an indoor biofloc nursery twice a year on his 350 acre farm and expects smaller shrimp, but his survival was highest in the state at 54%. The reasoning seems to be working better than on the other farms because their survivals ranged from 1.7% to a high of 32%. The majority of farms experience chronic mortality in growout, especially if they kept the shrimp in the ponds the whole growing season. Average survivals for the farms over the last 12 years can be seen in the graph below.

Year	% Survival
2005	50.21
2006	45.55
2007	42.22
2008	50.00
2009	64.85
2010	51.36
2011	47.45
2012	62.03
2013	47.53
2014	43.28
2015	38.83
2016	43.32



Source: Texas Parks and Wildlife. Compiled by Treece & Associates, January 2017

What is current status with Texas shrimp farming?

There were 10 farms producing shrimp in 2016 and reported production to Texas Parks and Wildlife as part of their requirement for an exotic species permit. Production was about the same in Texas in 2015 and 2016. The 2016 production results can be seen on the table below with survivals.

2016 Texas shrimp farm production

Farms	ac	lbs	PLs stocked	# Harvest	% survival
1	45	103,101	9,600,000	2,188,972	22.80%
2	85	161,028	12,700,000	4,061,484	32.00%
3	50	182,518	11,000,000	3,178,243	28.90%
4	35	91,000	8,100,000	1,990,000	24.60%
5	21	54,241	3,616,000	1,100,000	30.40%
6	700	2,177,709	93,369,997	50,970,681	54.60%
7	40	110,688	8,000,000	2,064,914	25.80%

8	0.5	122	150,000	2,500	1.70%
9	13.2	76,879	6,535,000	876,728	13.40%
10	0.8	152	300,000	10,000	3.30%
Total	990.5	2,957,438	153,370,997	66,443,522	43.32%

ha 400.8

Total kg 1,344,290

kg/ha 3353.8

Value \$8,280,826.40 Price/lb \$2.80

Value/ha \$20,660

Source of above data: Dr. Ya-Sheng Juan, Texas Parks and Wildlife, Brownsville, Texas. 1-18-2017

Texas farm detail :

USDA, FSA TAAF, re-authorized in 2010.

<http://www.apfo.usda.gov/FSA/webapp?area=home&subject=prsu&topic=mpp-ta>

Money, maximum \$12,000 each farmer (\$24,000 farmer and wife) if they qualified. They had to show receipts for 25% increase in feed at local Farm Service Agency office and fill out application. They then did some local training hours or could do the lessons on the Internet. University of MN. organized the whole program for USDA FSA and paid consultants to do the training in the field and sent us to Maine for workshop to learn their Business Management procedures. As one of their business management consultants I assisted 60 catfish and shrimp farms around the country complete business plans to qualify for full benefits. Enjoyed visiting all the farms again. At the same time USDA FSA did shrimp farming, they also had a shrimp harvest industry program, as well as separate programs for lobster farmers and blueberry farmers.

In surveying shrimp farms and feed mills for Texas Department of Agriculture (TDA) I found there were 44,000 tons or 88,000,000 million pounds of aquaculture feed sold in Texas in 2007, according to an estimation from production and using an average of 2:1 FCR, and also from feed sales requested by TDA of each of the major aquaculture feed mills supplying Texas aquaculture. The Texas Dept. of Agriculture (Jason Fenton, Federal Liaison Officer for TDA) gathered this information for the USDA feed assistance program. It was learned that FCRs vary highly among species. For example: average catfish FCR is 2.4 to 2.9; tilapia 2:1; red drum 2:1; hybrid striped bass 2.6 and higher; shrimp 1.8.

Current (2017) information and farm details for Texas:

King's Aqua Farm in Arroyo City, Texas is for sale and is 1680 acres with 900 acres of ponds.

Austwell Aqua Farms in Austwell is for sale and is 256 acres with 120 acres of ponds.

El Terco a relatively new farm in Lasara and has not produced well the last two years, but the owner and the biologist are doing well at the farm across the border in Mexico due to different seed source.

Global Blue Technologies in Rockport area has closed indoor system and hatchery that can supply about 20 million PLs a year. Their larvae did well in 2015, but did not do well in 2016.

Bowers did well in 2016 with good survival because he had two short crops before the mortality hit. He harvested 2.2 million pounds from 350 acres-double cropped or 700 acres.

The Arroyo farms did okay on their first crop, but poorly on the second crop.

View of US Shrimp Farming Industry rise and fall from other perspectives outside Texas.

According to Dr. James Wyban, former founder of company High Health Aquaculture (HHA) in Hawaii, "Genetics and broodstock supply was a major factor impacting the US shrimp farm production in the early 2000s. High Health Aquaculture was the exclusive supplier of SPF broodstock to Harlingen Shrimp Farm (HSF) from 1993-2003. HSF was exclusive PL supplier to the industry throughout that time. HHA developed Taura Virus Resistant (TVR) stock selected to be both TSV-resistant and fast growing. From 1998 to 2003 using our TVR stock, the US industry grew 20% per year. In 2003, we had a pricing dispute with HSF and they stopped buying our animals. From then on, they got broodstock from Shrimp Improvement Systems (SIS) or the Oceanic Institute/US Marine Shrimp Farming Program in Hawaii. A similar phenomenon happened a few years later in Thailand. From 2003 to 2009 HHA was the main supplier of SPF broodstock to Thailand and production grew from zero (PV that is) to 600,000 MT. In 2009, Thailand closed their border and we were out of the market. Since then, Thai production has dropped to less than half previous. Not all SPF broodstock is the same." The high health animals definitely made a big difference in the rise of US shrimp aquaculture from 2000 to 2003.

According to Durwood Dugger in Florida and a former shrimp farmer in South Texas, "my take on the 'mid-2000 shrimp bubble' is a little different. I think the jump in US shrimp production came off the early WSSV and other disease wipe outs overseas in the Americas and Asia and the resulting shortages and higher (more tempting) prices in the US and global shrimp markets because of them. Higher prices pushes increased stocking in less disease affected areas. I do agree that growing disease problems also produced more attention to antibiotic usage which effected specific international shrimp import and export regulations - and their respective local market pricing.

In general, I have noticed a correlation between international shrimp disease outbreaks/resulting shrimp shortage induced market price elevation - and the entrepreneurial investment interests, and number of project startups in shrimp RAS project development both in the US and abroad. This does seem like a logical extension of higher prices and higher open pond system disease risk factors. Unfortunately, neither the shrimp price increases or these entrepreneur forays into closed environment RAS shrimp production have produced a sufficiently enough long lived public or private sustained research effort to overcome shrimp RAS's economic challenges necessary to produce economically viable commercial shrimp RAS successes - yet. When disease out-breaks cool off and production comes back - shrimp prices drop, margins tighten once again and the smaller scaled and less economically efficient shrimp RAS ventures (to date) are usually forced to close their doors."

According to John Birkett, location unknown, "In my perspective you are right shrimp prices for 2001 where record high due to the outbreak of WSSV in the Americas, so if Ecuador survived with 12% survivals in ponds and a dollarized country anybody could do business growing shrimp in the World. By 2003, 2004 prices plummeted but production went up, due to tolerant WSSV broodstock so its a mix of bad genetics, and free trade what has USA shrimp production in problems, one can disagree, but that's how it looks."

According to Donelson Berger of California, "In 1999 total U.S. shrimp imports went from 331,444 M/T to 504,493 M/T in 2003, an increase of 52%. This was the result of Asian farmers switching from *monodon* to *vannamei*. I would put forth that US shrimp farmers were no different than the Asian farmers, they saw an opportunity to greatly increase output and pursued it. At the same time the ADCV action against shrimp in 2003 could have created an opportunity for domestic farmers to seize market share. But it was soon evident that the ADCV action did nothing to stem the tide of shrimp imports and by 2006, Imports were 590,299 M/T, an increase of 17% over 2003 and 78% over 1999."

Current Status of the US Shrimp Farming Industry (2017) and 2016 Production (Compiled by Treece)

Alabama	247,400 lbs.
Florida	357,695 lbs.
Texas	2,957,438 lbs.
Hawaii	850,000 lbs.

US Mainland total 3,647,533 lbs.

NOTE: does not include Fresh Shrimp USA, LLC or Ithuba Shrimp in Florida; Marvesta in Maryland; RDM in Indiana and other small indoor production systems in Mich., Mass., Iowa and Saipan.

Information provided by the following: David Coddington, Green Prairie Aqua Farms, Alabama; Mark Godwin, Gulf American Shrimp, Florida; Cliff Morris, Florida Organic Aquaculture, Inc.; Robin Pearl, American Mariculture, Inc., Florida; Fritz Jaenike in Hawaii; Dr. Ya-Sheng Juan, Texas Parks & Wildlife Dept., Brownsville, Texas.

Hawaii

According to Fritz Jaenike "The Sunrise Capital, Inc. Farm produced 670,000 lbs. of shrimp in 2016. I don't know much about the shrimp farms on Oahu. I heard of Fumi Shrimp Farm and via their website they produce 160,000 lbs./yr (not verified). There is also a farm named Paradise but no idea of production volume. From their web material I would guess less than 50,000 lbs/yr. I would guess 800-850,000 lbs. shrimp for Hawaii."

Current World and US Status of Seafood Consumption

Global per capita fish consumption rose above 20 kilograms a year (FAO, 2016).

FAO's latest "State of World Fisheries and Aquaculture" [report](#) (see web link: <http://www.fao.org/news/story/en/item/421871/icode/>) states that global per capita fish consumption has risen to above 20 kilograms a year for the first time, thanks to stronger aquaculture supply, among other factors.

But in the [U.S. seafood consumption](#) (see web link http://www.st.nmfs.noaa.gov/Assets/commercial/fus/fus14/documents/09_PerCapita2014.pdf.) has declined since its historic high in 2006 and lags far behind much of the world in [per capita consumption](#).
<https://www.statista.com/statistics/264327/per-capita-consumption-of-fishery-products-by-country/>