Status of the World and U.S. Shrimp Markets

With domestic production averaging roughly 200 million pounds per year, any growth in the U.S. shrimp market beyond that level has to be supplied by imported product. Not surprisingly, imports have been a growing contributor to total U.S. shrimp supplies for decades. However, calendar 2001 signaled a departure from the gradual, annual increases in shrimp imports. Specifically, imports in 2001 exceeded 2000 levels by almost 122 million pounds, or 16 percent. In both 2002 and 2003, annual shrimp imports have set records that have been eclipsed in the following year. In 2002, even with the West Coast stevedores' strike that began in October, imports exceeded the record set in 2001 by 64 million pounds (7 percent). Finally, shrimp imports in the first ten months of 2003 are 152 million pounds ahead of imports for the same time period last year, a 20 percent increase.

Most U.S. producers and processors feel that sharply increased supplies are the root cause of the low ex-vessel prices they have received since 2001. Ironically, many shrimp farmers half a world away, who supply a growing fraction of the American marketplace, are also perplexed by the relatively low prices they are receiving. The question then becomes whether the last three years are symptomatic of a short-term imbalance between worldwide demand and supply, or whether we are seeing a fundamentally different global shrimp industry to which we must adapt. This section of the technical assistance report attempts to answer that question by reviewing what is known about (a) world shrimp production, (b) supply trends within the American marketplace, and (c) the drivers that steer the international shrimp trade.

World Shrimp Production

Shrimp are produced from practically every tropical and subtropical coastal country in the world. Historically, the source of supply has been wild harvests from the worldwide band of nearshore tropical waters. However, with many wild sources being harvested close to their maximum sustainable levels, new supplies have come from coastal shrimp farms; most located in developing countries within Southeast Asia, the Indian sub-continent, and Central America.

Between 1979 and 1999, world production of tropical shrimp grew from 1.86 billion pounds of shell-on, headless product to 4.3 billion pounds [1]. In 1979, pond-raised shrimp contributed just 88 million shell-on, headless pounds to world production (4.7 percent) while wild sources supplied 1.78 billion pounds. Twenty-one years later wild harvests stand at 2.74 billion pounds worldwide, with cultured shrimp comprising 36.5 percent of the world production base of tropical shrimp (1.57 billion shell-on, headless pounds) (Table 1, Figure 1). Over this 21-year time frame, wild harvests grew about 41

million pounds a year while pond production grew by about 84 million pounds each year [2].

Table 1. Worldwide Production of Tropical Shrimp
from Capture Fisheries and Aquaculture

Year	Shell-on, Headless Pounds			Percent Cultured
	Capture	Aquaculture	Total Supplies	
1979	1,773,416,673	88,072,110	1,861,488,783	4.7%
1980	1,804,307,202	99,875,718	1,904,182,919	5.2%
1981	1,702,061,594	123,080,079	1,825,141,673	6.7%
1982	1,794,246,977	155,604,248	1,949,851,225	8.0%
1983	1,787,352,626	197,509,347	1,984,861,973	10.0%
1984	1,841,473,910	239,339,432	2,080,813,342	11.5%
1985	2,050,588,216	296,782,173	2,347,370,389	12.6%
1986	2,157,141,578	444,073,748	2,601,215,325	17.1%
1987	2,102,309,049	686,417,911	2,788,726,960	24.6%
1988	2,135,543,073	801,477,038	2,937,020,112	27.3%
1989	2,006,452,142	863,014,994	2,869,467,136	30.1%
1990	2,034,144,847	935,179,947	2,969,324,795	31.5%
1991	2,145,651,918	1,157,905,145	3,303,557,063	35.1%
1992	2,139,891,113	1,237,293,679	3,377,184,791	36.6%
1993	2,063,872,657	1,178,313,148	3,242,185,805	36.3%
1994	2,278,169,882	1,237,160,320	3,515,330,202	35.2%
1995	2,237,239,967	1,323,777,990	3,561,017,957	37.2%
1996	2,356,067,858	1,335,178,744	3,691,246,602	36.2%
1997	2,508,452,056	1,390,439,131	3,898,891,187	35.7%
1998	2,548,422,069	1,493,166,774	4,041,588,843	36.9%
1999	2,735,697,548	1,570,763,304	4,306,460,851	36.5%

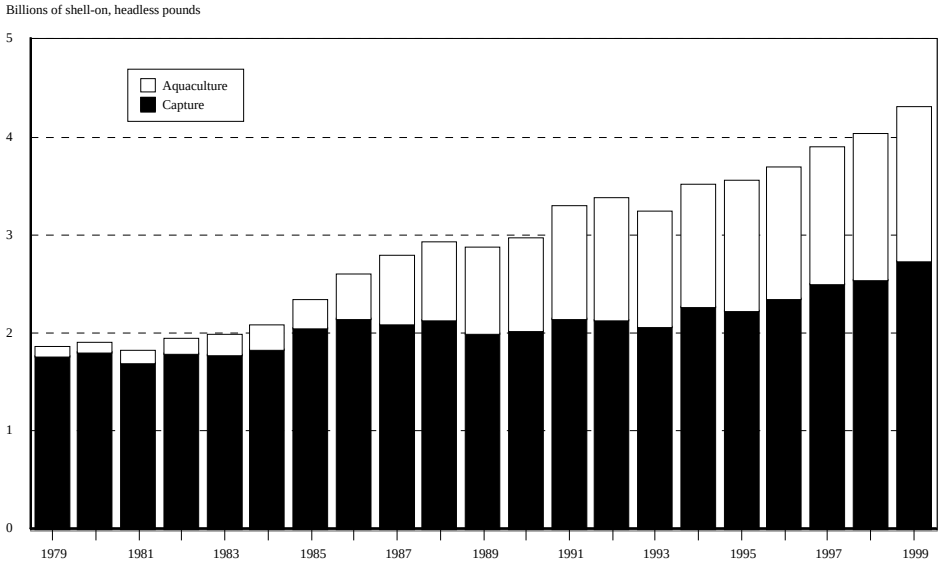

Figure 1. Annual changes in world production of tropical shrimp from capture fisheries and aquaculture

Further growth in the global shrimp supplies will continue to be fueled by aquaculture for several reasons. First, wild, tropical shrimp resources across the globe appear to be fully utilized. Second, technological advances in the culture of marine shrimp have reduced both the risk of crop failure and the cost of production. For example, feed formulations are being evaluated that replace a larger fraction of fish meal with cereal or grain-based protein thereby reducing feed cost; a major production expense. Furthermore, shrimp farming need not be exclusively located in the coastal zone. In the early days, shrimp farming was limited to coastal regions where estuarine water could be pumped into ponds. Today, however, some countries have developed farms in upland areas since species like Pacific white shrimp (*Litopenaeus vannamei*) can be grown in fresh water. Aside from the obvious advantage of greater expansion capability, moving away from the coastal zone typically reduces the environmental impacts on sensitive, estuarine areas. Third, many developing countries continue to pursue a policy of producing and processing various agricultural commodities for the export trade as a means of providing employment to a growing labor force while funding improvements in their national infrastructures.

Market Growth in the Major Shrimp-consuming Countries

Historically, the major worldwide markets for shrimp have been located in Japan, the European Union (E.U.), and the U.S. The U.S. has consistently remained the largest shrimp market in the world. Until the mid-nineties, Japan was the second-largest shrimp market but then began to decline in response to slower economic growth. Today, the E.U. is the second-largest major shrimp market (Table 2, Figure 2)[1].

Table 2. Apparent Annual Consumption of Shrimp Among Major Markets

	Shell-on, headless pounds			
Year	USA	European Union	Japan	Total
1988	788,280,000	513,810,467	618,465,015	1,920,555,482
1989	738,633,000	554,359,756	670,020,120	1,963,012,876
1990	719,225,000	611,884,457	683,426,520	2,014,535,977
1991	777,954,000	662,350,887	688,806,720	2,129,111,607
1992	840,958,000	716,991,714	685,373,535	2,243,323,249
1993	817,042,000	694,483,316	713,890,800	2,225,416,116
1994	870,247,000	727,996,560	725,755,905	2,323,999,465
1995	846,644,000	695,055,646	695,648,835	2,237,348,481
1996	864,468,000	743,123,014	689,604,930	2,297,195,944
1997	930,642,000	722,002,378	641,037,600	2,293,681,978
1998	1,000,792,000	848,346,959	571,333,140	2,420,472,099
1999	1,102,047,000	816,296,490	596,265,075	2,514,608,565

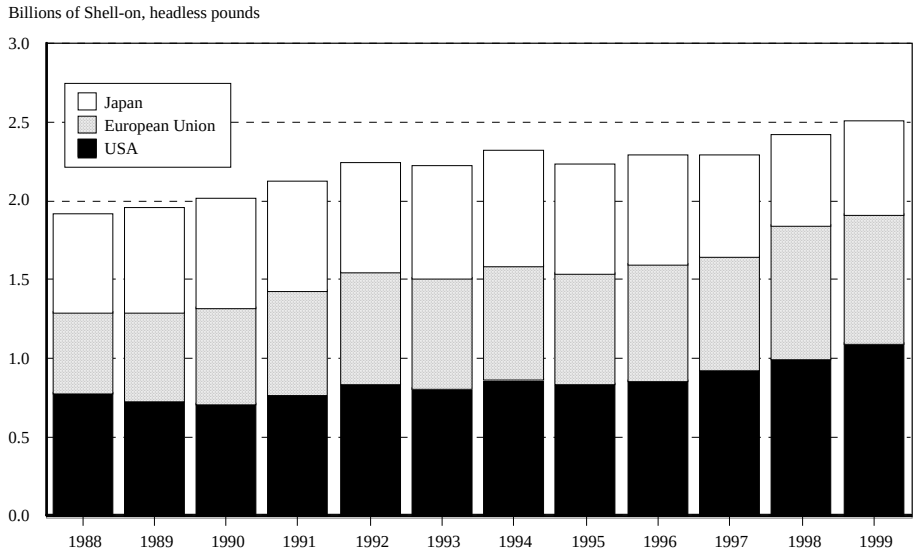

Figure 2. Apparent Consumption of Shrimp Across the Major World Markets

When worldwide supplies (Table 1, Figure 1) are compared with total apparent consumption from the three major markets (Table 2, Figure 2), it is clear that shrimp consumption across the rest of the world is also increasing. In 1988, approximately two-thirds of worldwide supplies (1.9 billion shell-on, headless pounds) were consumed in the U.S., the E.U. and Japan, with 1 billion pounds consumed in the rest of the world. In 1999 however, the U.S., the E.U. and Japan consumed 58 percent (2.5 billion pounds) of the 4.3 billion pound worldwide supply that year, with the rest of the world using approximately 1.8 billion pounds. Increasing worldwide consumption outside the major shrimp markets is a positive signal for the domestic shrimp industry because it suggests that more of the growing supply base is being consumed outside the historic major shrimp consuming regions.

Consumption and Supply Trends in the American Marketplace

Since 1980, U.S. shrimp consumption has virtually tripled, growing from around 423 million pounds to approximately 1.3 billion pounds in 2001 (Table 3, Figure 3). Between 1980 and 2001, consumption has grown by an average of 33 million pounds each year.

Table 3. The U.S. Market for Shrimp

	Thousands of Pounds of Shell-on, Headless Product						
Year	Landings	Imports	Dec. 31 Cold Storage Holdings	Cold Storage Adjustments	Exports	Apparent Consumption	Computed Trend in Consumption
1979	205,587	267,119	109,634		53,058	NA	NA
1980	207,869	255,957	109,509	125	41,054	422,897	436,048
1981	218,900	256,920	89,886	19,623	43,721	451,722	469,000
1982	175,613	319,596	76,645	13,241	37,198	471,252	501,953
1983	155,591	421,179	101,357	(24,712)	35,937	516,121	534,906
1984	188,132	422,340	81,596	19,761	26,591	603,642	567,858
1985	207,239	452,232	79,379	2,217	26,940	634,748	600,811
1986	244,409	492,005	75,633	3,746	30,450	709,710	633,764
1987	223,514	583,030	92,319	(16,686)	33,813	756,045	666,716
1988	203,350	598,210	70,816	21,503	34,784	788,279	699,669
1989	215,825	563,523	67,770	3,046	36,056	746,338	732,622
1990	213,899	579,427	78,035	(10,265)	59,682	723,379	765,574
1991	198,115	632,775	71,655	6,380	87,186	750,084	798,527
1992	207,086	694,252	69,105	2,550	81,604	822,284	831,480
1993	180,687	708,683	76,751	(7,646)	81,447	800,277	864,433
1994	174,969	749,993	70,789	5,962	77,755	853,169	897,385
1995	190,208	719,463	71,528	(739)	77,677	831,255	930,338
1996	195,902	720,852	61,857	9,671	75,130	851,295	963,291
1997	179,084	810,696	67,926	(6,069)	66,674	917,037	996,243
1998	173,304	893,578	83,891	(15,965)	65,302	985,615	1,029,196
1999	189,112	959,915	79,893	3,998	65,427	1,087,598	1,062,149
2000	218,542	1,024,476	66,633	13,260	70,383	1,185,895	1,095,101
2001	201,428	1,178,232	81,842	(15,209)	67,975	1,296,476	1,128,054

a. Apparent consumption = [landings + imports + (Dec. 31 cold storage holdings in the previous year – Dec. 31 cold storage holdings in the current year) – exports]. End-of-year cold storage adjustments reflect the amount of product withheld from the market or entered into the market as determined by changes in subsequent years. For example, end-of-year inventories between 1999 and 2000 dropped from 79,893,000 lb. to 66,633,000 lb., so an additional 13,260,000 lb. entered the market in calendar 2000.

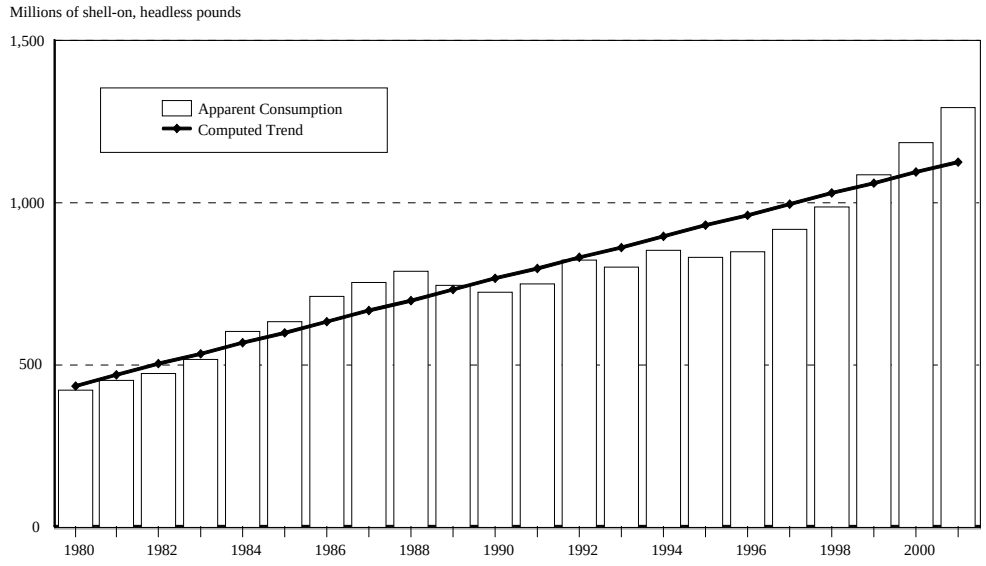

Figure 3. The U.S. market for shrimp (shell-on, headless basis)

Since 1980, domestic landings of tropical shrimp have remained relatively steady. Therefore, with consumption increasing by an average of 33 million pounds each year, imports have accounted for all expansion in the market. Because of significant growth in the total domestic shrimp market, the market share of domestic producers has gradually

slipped from 44.6 percent in 1980 to 14.6 percent in 2001 (Table 4, Figure 4). It is important to realize that the domestic market share has dropped because of market growth, not declining production levels in the domestic shrimp fishery.

Table 4. Domestic and Import Market Shares of the U.S. Shrimp Market

	Thousands of Pounds			Market Share			Thousands of Pounds			Market Share	
Year	Landings	Imports	Total	Domestic	Import	Year	Landings	Imports	Total	Domestic	Import
1979	205,587	267,119	472,706	43.5%	56.5%	1991	198,115	632,775	830,890	23.8%	76.2%
1980	207,869	255,957	463,826	44.8%	55.2%	1992	207,086	694,252	901,338	23.0%	77.0%
1981	218,900	256,920	475,820	46.0%	54.0%	1993	180,687	708,683	889,370	20.3%	79.7%
1982	175,613	319,596	495,209	35.5%	64.5%	1994	174,969	749,993	924,962	18.9%	81.1%
1983	155,591	421,179	576,770	27.0%	73.0%	1995	190,208	719,463	909,671	20.9%	79.1%
1984	188,132	422,340	610,472	30.8%	69.2%	1996	195,902	720,852	916,754	21.4%	78.6%
1985	207,239	452,232	659,471	31.4%	68.6%	1997	179,084	810,696	989,780	18.1%	81.9%
1986	244,409	492,005	736,414	33.2%	66.8%	1998	173,304	893,578	1,066,882	16.2%	83.8%
1987	223,514	583,030	806,544	27.7%	72.3%	1999	189,112	959,915	1,149,027	16.5%	83.5%
1988	203,350	598,210	801,560	25.4%	74.6%	2000	218,542	1,024,476	1,243,018	17.6%	82.4%
1989	215,825	563,523	779,348	27.7%	72.3%	2001	201,428	1,178,232	1,379,660	14.6%	85.4%
1990	213,899	579,427	793,326	27.0%	73.0%						

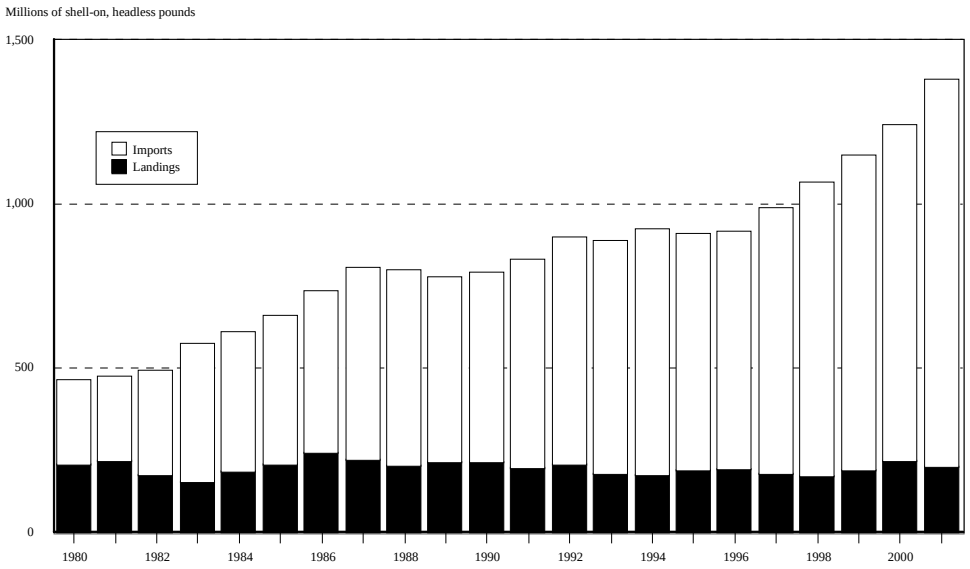

Figure 4. The contribution domestic landings and imports make to the U.S. shrimp market.

The previous analysis indicates that the American shrimp market has been dominated by imports for more than two decades. However, a closer examination of these imports between 1997 and 2001 should provide a clear assessment of competitive conditions present in the marketplace and may help answer the question stated at the outset: *"Are the last three years symptomatic of a short-term imbalance between worldwide demand and supply, or is this the new reality to which we must adapt?"*. This assessment begins by measuring how much of our supply originates from wild-harvested and farm-raised imports. Next, we consider the volume of imports by exporting country. Finally, the types of shrimp products exported to the U.S. are reviewed.

The Contribution Made by Source and Production Method to the U.S. Shrimp Market

Between 1997 and 2001, the supply of shrimp available for utilization in the U.S. market grew by 31 percent or 257 million pounds (expressed as actual product weight) (Table 5, Figure 5) [3]. Over this five-year period, domestic landings increased by 22 million pounds, wild-harvested imports increased by 38 million pounds, and farm-raised imports increased by 197 million pounds. By 2001, cultured imports represented 65.2 percent of the beginning annual supply (708 million pounds), with domestic landings and wild-harvested imports respectively accounting for 18.6 percent (201 million pounds) and 16.2 percent (176 million pounds) of total beginning supplies. Imported, farm-raised shrimp have accounted for roughly 80 percent of total shrimp imports over the five-year time series.

Table 5. Sources of Shrimp Available for the U.S. Market Contributed from Domestic Landings, Wild-harvested Imports, and Farm-raised Imports

		Imports (actual product wt.)			The Contribution of Farm-raised Shrimp to:	
Year	Dom. Landings (shell-on, hdls. wt.)	Wild-harvested	Farm-raised	Available Supplies	Total Imports	Beginning Supplies
1997	179,084,000	138,332,748	510,636,951	828,053,699	78.7%	61.7%
1998	173,304,000	139,976,804	556,231,212	869,512,016	79.9%	64.0%
1999	189,112,000	133,704,146	598,609,008	921,425,154	81.7%	65.0%
2000	218,542,000	152,658,192	609,553,902	980,754,094	80.0%	62.2%
2001	201,428,000	176,223,677	707,814,567	1,085,466,244	80.1%	65.2%

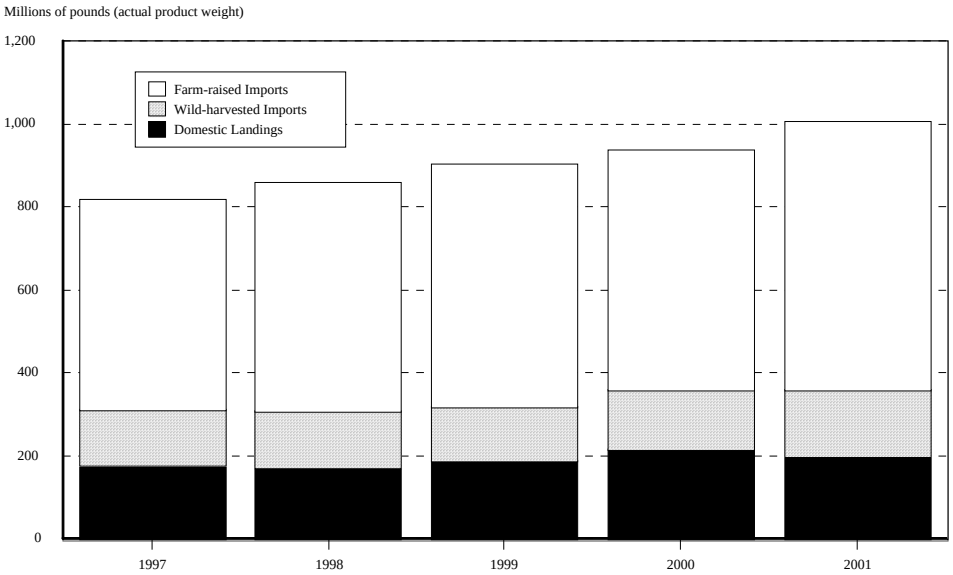

Figure 5. Sources of shrimp available for the U.S. market contributed from domestic landings, wild-harvested imports, and farm-raised imports

With farm-raised imports accounting for 65 percent of beginning supplies in the American marketplace, the quality attributes of aquacultured production have become the new standard against which all other shrimp products are judged. This upgraded standard represents a significant, fundamental change in the expectations of corporate procurement officers.

"Conformance to specifications" or standards is the first set of attributes used to define overall shrimp quality. Two primary "conformance-to-specifications" elements are considered in evaluating the quality of shell-on, headless shrimp: pack-style and product condition. Pack-style attributes include (a) accurate net weights and counts, (b) count uniformity, (c) presence/absence of damaged tails or pieces which, in most food service applications, are considered unusable elements, (d) the fraction of black-spotted shrimp, (e) soft-shelled product, etc. Product condition parameters include those elements that have bearing on edibility and enjoyment such as (a) dehydration, (b) texture, and (c) mild, "fresh-caught" odor, etc.

"Conformance-to-specifications" criteria are particularly important as a screening mechanism throughout the supply chain. In other words, products that do not conform to predetermined specifications are immediately eliminated from consideration, regardless of other attributes. "Conformance-to-specifications" criteria drive purchase decisions because they represent the cost-side of non-compliant quality for the purchaser. For instance, a sample of shell-on, headless shrimp that is non-compliant across pack-style criteria (e.g., incorrect average count size, or the presence of pieces or damaged tails) implies a higher cost per serving compared with a pack that does not contain these defects. A similar argument can be made about product condition defects.

The Contribution Made by Shrimp-exporting Country to the U.S. Shrimp Market

According to import data maintained by the International Trade Commission (ITC), in any year about 100 countries export shrimp to the U.S. In 2001, 83 percent of total imports or roughly 737 million pounds (actual product weight basis) originated from just ten countries, with the remaining countries collectively exporting about 147 million pounds to the U.S. (Table 6, Figure 6) [3]. Slightly more than half of total shrimp imports originate from just three countries: Thailand, Viet Nam, and India (Table 6, Column 7). Thailand is the largest shrimp exporter to the U.S. In 2001, Thai shrimp accounted for 34 percent of total imports (roughly 300.3 million pounds) and 28 percent of total, beginning supplies. Nine of the top-ten shrimp exporting countries generate at least two-thirds of their production from farming systems (Table 6, column 5). Collectively, farm-raised shrimp comprises 87 percent of all shrimp imported to the U.S. by the top-ten shrimp-exporting countries (615 million farm-raised pounds out of 737 million total pounds). Among the other shrimp-exporting countries, farm-raised shrimp accounts for a smaller fraction of their total exports to the U.S. (63 percent).

Table 6. 2001 Shrimp Import Volumes from both the Top Ten and Remaining Shrimp-exporting Countries Delineated by Production Method

Country	Farm-raised	Wild-harvested	Total Imports	Farmed / Wild Pct.	Cumulative			
					Total Imports		Farm-raised Imports	
	pounds (actual product weight)				Pounds	Pct.	Pounds	Pct.
Thailand	288,556,574	11,710,412	300,266,986	96 / 04	300,266,986	34.0%	288,556,574	40.8%
Viet Nam	56,704,216	16,699,300	73,403,516	77 / 23	373,670,502	42.3%	345,260,790	48.8%
India	48,563,155	24,092,672	72,655,827	67 / 33	446,326,329	50.5%	393,823,944	55.6%
Mexico	55,435,504	10,764,047	66,199,551	84 / 16	512,525,880	58.0%	449,259,448	63.5%
China	41,441,804	20,643,295	62,085,099	67 / 33	574,610,979	65.0%	490,701,252	69.3%
Ecuador	58,544,647	460,238	59,004,885	99 / 01	633,615,864	71.7%	549,245,899	77.6%
Indonesia	26,700,743	8,243,300	34,944,043	76 / 24	668,559,907	75.6%	575,946,642	81.4%
Guyana	458,807	25,316,889	25,775,696	02 / 98	694,335,603	78.5%	576,405,450	81.4%
Brazil	18,322,373	3,327,601	21,649,974	85 / 15	715,985,577	81.0%	594,727,823	84.0%
Honduras	20,526,162	828,563	21,354,725	96 / 04	737,340,302	83.4%	615,253,984	86.9%
All Other Countries	92,560,583	54,137,359	146,697,942	63 / 37	884,038,244	100.0%	707,814,567	100.0%

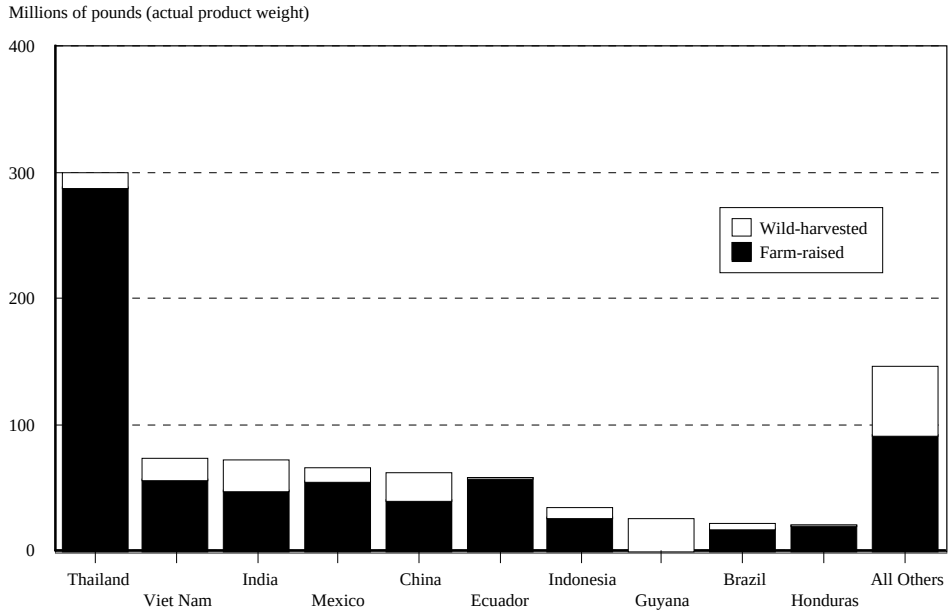

Figure 6. 2001 Import Volumes from Both the Top Ten and the Remaining Shrimp-exporting Countries Delineated by Production Method

Between 1997 and 2001, annual exports of shrimp from all exporting countries grew, on average, by 53.6 million pounds per year (actual product weight). The volume of exports to the U.S. by the top-ten countries grew by 49.3 million pounds per year while exports from the remaining shrimp-exporting countries grew by 4.3 million pounds per year; less than one-tenth of the rate computed for those countries among the top-ten. Considering a few of the top-ten countries individually, the computed average annual growth rates of shrimp exported from Thailand, Viet Nam, and India between 1997 and 2001 were respectively 35.2 million pounds per year, 15.5 million pounds per year, and 7.6 million

pounds per year. Importantly, two of the countries in the top-ten actually experienced negative growth rates in the amount of shrimp they exported to the U.S. between 1997 and 2001. Specifically, the computed average, annual growth rate for Mexico over the five-year interval was -3.1 million pounds each year while the average annual growth rate for Ecuador was -26 million pounds each year.

The Contribution Made by Product Form to the U.S. Shrimp Market

Understanding the product forms imported to the American marketplace is important as the domestic industry addresses how best to tailor wild, domestic shrimp products to specific segments of the U.S. market. The product forms of shrimp that enter the U.S. span the continuum of convenience; from raw, frozen, shell-on, headless product to hand-peeled, cooked shrimp that, once thawed, are ready-to-eat. For reporting purposes, the spectrum of shrimp products is generally collapsed into four primary forms. These include (a) shell-on, headless product, (b) raw, peeled shrimp, (c) canned or breaded shrimp, and (d) "other" preparations which mostly consists of cooked, peeled product. Of the four categories listed above, the last three represent the value-added products.

Between 1997 and 2001, total annual shrimp imports were about equally split between the various sizes of shell-on, headless product and all of the value-added market forms combined (e.g., peeled, canned or breaded, and "other"). Over that five-year interval, total imports grew by 36 percent. Within this same time frame, shell-on, headless volumes increased by 25 percent (98 million product weight pounds) while the value-added component increased by 45 percent (137.1 million product weight pounds) (Table 7, Figure 7) [3].

Table 7. Market Form Composition of Imported Shrimp: 1997 – 2001

Year	Shell-on, headless	Peeled	Canned or Breaded	Other	Total, All Market Forms	Total, Value-added	Percent Value-added
	pounds (actual product weight)						
1997	343,704,554	235,592,263	4,072,027	65,600,855	648,969,699	305,265,145	47.0%
1998	341,956,637	264,426,404	4,024,368	85,800,607	696,208,016	354,251,379	50.9%
1999	344,962,926	275,587,569	5,233,648	106,602,103	732,386,246	387,423,320	52.9%
2000	338,798,460	285,815,207	7,887,444	129,740,299	762,241,410	423,442,950	55.6%
2001	441,658,079	276,567,415	11,376,135	154,436,615	884,038,244	442,380,165	50.0%

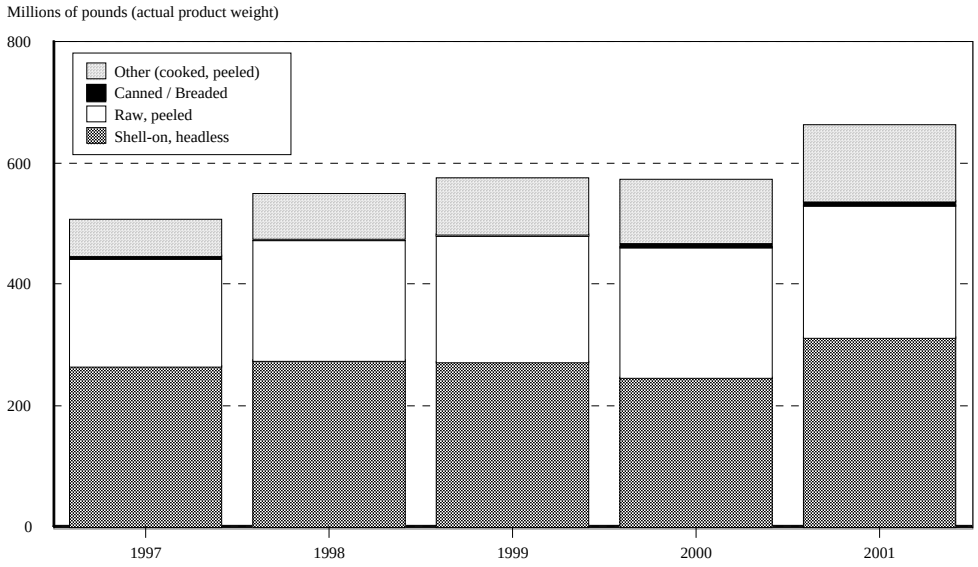

Figure 7. Market Form Composition of Imported Shrimp: 1997 – 2001

Computing and examining growth trends among each of the four major product forms imported over the five-year interval illustrates two important points: (a) there is no statistically significant trend in the growth of shell-on, headless shrimp imports and (b) within the value-added complex, the two categories of raw, peeled and "other" exhibit statistically significant trends, with average, annual increases of 10.3 million pounds and 22.1 million pounds respectively. Closer inspection of the ITC shrimp import database illustrates a highly significant trend in the growth of both the peeled and "other" categories among the top-ten countries, with peeled shrimp estimated to have grown, on average, by 16 million pounds each year while "other" preparations have grown by 19.7 million pounds each year. Among the other shrimp-exporting countries, there is no statistically significant trend for raw, peeled shrimp, but within the "other" category the average, annual growth rate is 2.5 million pounds.

Insight from a Review of the U.S. Shrimp Market

Continued Dependence upon Imported, Farm-raised Shrimp

In each year between 1997 and 2001 imported, farmed shrimp accounted for at least 62 percent of the supplies available for domestic utilization and roughly 80 percent of all shrimp imports (Table 5). In addition, imported, farmed shrimp were responsible for approximately 71 percent of the average, annual growth that occurred in beginning U.S. shrimp supplies between 1997 and 2001. With farm-raised shrimp accounting for roughly two-thirds of beginning, annual shrimp supplies, the quality standard has been raised. This suggests that domestically produced and processed products are now judged against these higher standards.

Major Shrimp-exporting Countries

In 2001, 84 percent of total shrimp imports were supplied by just ten countries. Between 1997 and 2001, the volume of exports to the U.S. by the top ten countries grew, on average, by 49 million pounds per year. Exports to the U.S. are becoming more geographically concentrated, even among the top ten countries, with exports from Thailand, Viet Nam, and India accounting for slightly more than 50 percent of total imports. Exports from Thailand alone account for almost the same volume that is collectively exported to the U.S. by those countries that occupy the second through the sixth places within the top ten – Viet Nam, India, Mexico, China, and Ecuador (Table 6).

Growth in the Value-added Fraction of Imported Shrimp

Value-added shrimp products – peeled, canned or breaded, and "other" items (mostly cooked, peeled shrimp) – accounted for roughly 50 percent of total imports each year between 1997 and 2001 (Table 7). The average, annual growth rate for the value-added fraction is computed to be 34.3 million pounds per year. Growth in the value-added fraction accounts for 64 percent of the annual growth of total shrimp imports. Virtually all of the increase in the value-added fraction has occurred within two categories: (a) raw, peeled product and (b) cooked, peeled preparations.

A growing, value-added fraction of total shrimp imports should come as no surprise. First, several of the top ten countries (e.g., Thailand, Viet Nam, and India) have a growing, dependable supply of raw materials. Second, convenience can be added to this dependable supply at a relatively low cost because wage rates in most shrimp-exporting countries are much lower than those in the U.S. For example, the reported wage rate for Thai food, beverage, and tobacco workers in 1999 was 78¢ an hour, while hourly wage rates for U.S. employees in similar occupations were reported to average roughly $12 per hour [6]. Third, shrimp can be grown to a predetermined count size that meshes with menu requirements and advertising plans. Thus, the value-added market forms from the top-ten countries appear to target the specific, convenience requirements of the largest food service operators. For most of the casual dining establishments around the country, purchasing the precise market form required for a particular shrimp preparation enables the operator to minimize on-site preparation time and concentrate on those specialized in-store functions that support retail success.

What Drives the International Shrimp Trade?

The recent history of imported shrimp demonstrates an unprecedented increase between 2001 and 2003. However, questions remain about why shrimp imports increased so dramatically in 2001 and continued through 2003. Answering this question requires that three issues be considered: (a) tariffs, (b) currency exchange rates, and (c) enforcement of food safety regulations. Importantly, these institutional considerations can create national demand/supply imbalances that result in dramatic changes in both producer and wholesale prices.

Tariff Issues

Shrimp are routinely traded on the world market, but individual countries have differing approaches in taxing imported shrimp. All market forms of shrimp enter the U.S. market duty-free [4]. However, in some countries the tariff rates can change almost overnight, or can be applied differently to various market forms of the same product. Other things being equal, tariffs result in the exporter netting less money on the transaction. Of course if the price offer takes the tariff into account, then other factors like currency exchange rates and differences in transportation costs direct the flow of shrimp from producing to consuming country.

The E.U. exemplifies a trading block of nations where tariffs for certain products are in a state of flux. Specifically, certain nations that exported shrimp to the E.U. experienced tariff treatment different from that accorded to other shrimp-producing countries. In the fourth quarter of 2001, Thai shrimp marketers were surprised to learn that the lower tariffs the E.U. had imposed under the generalized system of preferences had ended, and the tariff on Thai shrimp would be 12 percent on frozen, raw products and 20 percent on cooked shrimp [5]. E.U. duties on processed shrimp (e.g., peeled or cooked, peeled varieties) from other countries such as Peru, Indonesia, India and Vietnam were taxed at between 3.6 percent and 7 percent, while a tariff rate of 4.2 percent was applied to frozen shell-on, headless shrimp. Importantly, such tariff increases make shrimp from countries affected by these higher tariffs appear less expensive in competing markets like the U.S.

Currency Exchange Rates

Exchange rates for currency are important issues for most shrimp-exporting countries because the revenues earned from the sale of shrimp in many developing countries are used to fund improvements in national infrastructure. Generally speaking, national infrastructure such as aircraft, road-building services, petroleum development, electrical power and its distribution, etc. is priced in U.S. Dollars, Euros, or Yen.

When the exchange rates are factored into the pricing formula along with tariffs, the final destination of shrimp exported from a producing country can clearly be seen. Tables 8 through 10 illustrate three scenarios that compute different ending prices when tariffs and currency exchange rates change. In Table 8, a hypothetical Thai marketer offers shrimp to an E.U. buyer under the provisions of a 4.2 percent tariff and a Dollar/Euro exchange rate of 1.0823. As shown in Table 8, after accounting for the tariff and the exchange rate, the price of 5 Euros per pound offered by the E.U. buyer nets the marketer $4.426 per pound.

Table 8. Computing a U.S. Dollar Equivalent Price for Thai Shrimp Offered for Sale in the E.U. with a 4.2 Percent Tariff and an Exchange Rate where One U.S. Dollar Equals 1.0823 Euros

Conditions: Current E.U. tariff is 4.2 percent ● Exchange rate: 1 Euro = $0.924 ● Exchange rate: $1.00 = 1.0823 Euro	
A firm in the E.U. bids 5.00 Euros/lb.	A bid is also solicited from a U.S. firm.
Determine E.U. bid price in U.S. dollars after accounting for tariff and exchange rate issues: = (5.00 Euro / lb. * (1 - % tariff)) * ($1.00 / 1.0823 Euro) = (5.00 Euro / lb. * (0.958)) * ($1.00 / 1.0823 Euro) = 4.79 Euro / lb. * $0.924 / Euro = 4.79 Euro / lb. * $0.924 / Euro = $4.426 / lb. **After paying the tariff and accounting for the exchange rate, that bid of 5.00 Euros/lb. is worth $4.426 U.S.**	If the U.S. bid price is at least equal to $4.426 / lb. then the Thai processor would sell his shrimp in the U.S. assuming that transportation costs are equal.

In Table 9 only the tariff rate has changed; this time to 12 percent. After the tariff increase, the Thai marketer would net $4.065 per pound on the same bid of 5 Euros per pound; an 8.2 percent reduction. If the freight cost from Bangkok, Thailand to either the U.S. or Europe is the same, then should a U.S. buyer offer a price just above the $4.065 the seller would net in the E.U., then those shrimp would likely be shipped to the U.S.

Table 9. Computing a U.S. Dollar Equivalent Price for Thai Shrimp Offered for Sale in the E.U. with a 12 Percent Tariff and an Exchange Rate where One U.S. Dollar Equals 1.0823 Euros

Conditions: Current E.U. tariff is 12 percent ● Exchange rate: 1 Euro = $0.924 ● Exchange rate: $1.00 = 1.0823 Euro	
A firm in the E.U. bids 5.00 Euros/lb.	A bid is also solicited from a U.S. firm.
Determine E.U. bid price in dollars after accounting for tariff and exchange rate issues: = (5.00 Euro / lb. * (1 - % tariff)) * ($1.00 / 1.0823 Euro) = (5.00 Euro / lb. * (0.88)) * ($1.00 / 1.0823 Euro) = 4.40 Euro / lb. * $0.924 / Euro = 4.40 Euro / lb. * $0.924 / Euro = $4.065 / lb. **After paying the tariff and accounting for the exchange rate, that bid of 5.00 Euros/lb. is worth $4.065 U.S.**	If the U.S. bid price is at least equal to $4.065 / lb. then the Thai processor would sell his shrimp in the U.S. assuming that transportation costs are equal.

Table 10 presents conditions where one U.S. Dollar is worth less than one Euro. In this situation, the 5 Euro per pound bid would actually be worth $5.72 per pound. In this scenario, the American shrimp buyer would have to offer something at least equal to $5.72 for shrimp to be delivered to the United States.

Table 10. Computing a U.S. Dollar Equivalent Price for Shrimp Offered for Sale in the E.U. with a 12 Percent Tariff and an Exchange Rate where One U.S. Dollar Equals 0.769 Euros

Conditions: Current E.U. tariff is 12 percent ● Exchange rate: 1 Euro = $1.30 ● Exchange rate: $1.00 = 0.769 Euro	
A firm in the E.U. bids 5.00 Euros/lb.	A bid is also solicited from a U.S. firm.
Determine E.U. bid price in dollars after accounting for tariff and exchange rate issues: = (5.00 Euro / lb. * (1 - % tariff)) * ($1.00 / 0.769 Euro) = (5.00 Euro / lb. * (0.88)) * ($1.00 / 0.769 Euro) = 4.40 Euro / lb. * $1.30 / Euro = 4.40 ~~Euro~~ / lb. * $1.30 / ~~Euro~~ = $5.72 / lb. **After paying the tariff and accounting for the exchange rate, that bid of 5.00 Euros/lb. is worth $5.72 U.S.**	If the U.S. bid price is at least equal to $5.72 / lb. then the Thai processor would sell his shrimp in the U.S. assuming that transportation costs are equal.

Thus, when the dollar is valued higher than the native currency in the country (or trading block) where the shrimp are sold, the shrimp appear less expensive in the American market, and product would be expected to flow to the U.S. Conversely, when the native currency in the country (or trading block) where the shrimp are sold is valued higher than the dollar, the shrimp would have to command a relatively high price in the U.S. to remain competitive with the bid offered in another country. In this situation, the exporter may find it easier to sell his shrimp in the E.U. because to equal the bid of 5 Euros per pound, a U.S. firm would have to offer at least $5.72 per pound.

Enforcement of Food Safety Regulations [6]

Food safety considerations are not new issues in the international shrimp trade. In the seventies and eighties, shipments from certain exporting countries were automatically detained pending sampling for bacterial pathogens. Today, the primary food safety issue in the world shrimp trade is residue of banned antibiotics in farmed product. For some shrimp-farming countries the food safety requirements in receiving countries have become much more important than tariffs or currency exchange rates in steering international trade. Expectations of regulatory oversight and scrutiny of incoming shipments for compliance with a country's food safety requirements can be the paramount issue in deciding where shrimp are sold; particularly if non-compliant product can be destroyed by the importing country's food safety authority.

Beginning in August 2001, chloramphenicol, a broad-spectrum antibiotic was detected in shrimp offered for sale in the E.U. [7]. This compound has been banned in most countries for over a decade. With a zero tolerance for this compound, public health authorities in the E.U. blocked importation of non-compliant shrimp; much of it from China, Southeast Asia and the Indian sub-continent [7]. Citing the risk associated with sending potentially non-compliant shrimp to the E.U., Peter Redmayne, writing for Seafoodbusiness.com, noted in May 2002 that *"The European market for Asian shrimp is dead, since other Asian producers can't afford to risk having their containers seized and destroyed by E.U.*

regulators. As a result, shrimp that used to go to Europe is going to the United States, which is putting pressure on prices" [7].

Many in the domestic industry questioned why the aggressive lead taken in the E.U. was not followed by the U.S. Food and Drug Administration. In the first few months after the initial detection of chloramphenicol in the E.U., the U.S. was reeling from the 911 terrorist attacks and the subsequent distribution of anthrax through the U.S. Postal Service. Understaffed, and preoccupied with new bio-terrorism concerns in the nation's food supply, the Food and Drug Administration performed limited testing for chloramphenicol in 2001. A maximum level of 5 parts per billion (ppb) had been in force for some time, but imported shrimp was not scrutinized for the compound. In summer of 2002, public health officials in several Gulf States initiated their own sampling plans to determine the presence and level of chloramphenicol in imported shrimp products. Early sampling has shown the presence of the compound in farm-raised shrimp and crawfish from some Southeastern Asian countries. In late 2002, the Food and Drug Administration lowered the federal action level from 5 parts per billion (ppb) to 1 ppb; then, in the first half of 2003 FDA adopted the worldwide standard for residual chloramphenicol of 0.3 ppb, so differences in this particular food safety standard are beginning to fade among the major shrimp-importing countries. This is a positive signal that should help level the worldwide *"playing field."*

Changing an action level to a lower limit is an important step in harmonizing food safety requirements, but it is the periodic operational oversight and sampling that makes such action levels effective. In fact, FDA is beginning a more aggressive sampling plan. On August 26, 2003 *"The National Fisheries Institute announced that the FDA has initiated a new sampling assignment to test for chloramphenicol in shrimp. An FDA assignment is an instruction to FDA field offices to collect a specific number of samples over a period of time. The FDA has not announced the number [of samples to be taken] for this assignment, but has asked its field offices to collect about 12 samples per week"* [7].

The additive effects of high tariffs in the E.U., a strong U.S. dollar, and inconsistent food safety standards among shrimp-importing countries have pushed record levels of relatively low-priced shell-on, headless shrimp into the American marketplace. Given that the domestic industry maintains about a 15 to 20 percent market share (depending on market form), relatively low commodity prices for the remaining 80 percent of the market imply that domestic producers will also receive much lower prices for their harvests. As shown in Table 8 and 9 (above), when E.U. tariffs increase while the dollar is strong, prices offered in competing markets like the U.S. can as much as drop 8 percent overnight. Factor in the impact of a *"distressed sale"* (i.e., shrimp sold in the American marketplace that could not be sold elsewhere in the world because it could not comply with stated food safety standards) to an already falling price, and the price-taking domestic producer receives prices he has not seen in years.

What Does a Review of the World and U.S. Shrimp Markets Suggest?

At the beginning of this section the question many producers have asked was raised. Specifically, *"Are the last three years symptomatic of a short-term imbalance between worldwide demand and supply, or whether we are seeing a fundamentally different global shrimp industry to which we must adapt?"* The short answer is *"some of both."*

On the fundamental side, global supplies of shrimp are growing in response to breakthroughs in shrimp farming and the economic opportunities an agricultural export provides. In the future, the American marketplace will increase its dependence on imported, farm-raised shrimp products. A larger fraction of these farm-raised imports will likely come from fewer countries such as Thailand, Viet Nam, and India. In addition, it is clear that the major shrimp-exporting countries will continue to increase their percentage of value-added shrimp products destined for the U.S. Furthermore, with farm-raised shrimp accounting for the *"lion's share"* of the domestic shrimp market, the quality standard for the domestic market has also been significantly upgraded. Products that cannot meet the new standard for pack style and product condition will be relegated to a lower tier within the market, and will be priced accordingly.

Focusing on the effects of a short-term imbalance between demand and supply, 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 that has affected every member of the worldwide shrimp industry. Additional downward pressure on U.S. ex-vessel and wholesale prices resulted from three other regulatory and institutional issues. First, aggressive enforcement by the European Union (E.U.) for banned antibiotics prevented non-compliant imports from entering that trading block. This preemption resulted in additional quantities being rerouted to the only other major market in the world – the U.S. Second, a sharply-higher tariff rate imposed by the E.U. on shrimp imported from certain Asian countries in December 2001 made those shrimp less expensive in competing markets like the U.S. Third, until recently, 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. This onslaught of lower-priced imports has dramatically reduced ex-vessel shrimp prices by $1.00 to $2.00 per pound depending upon the size count.

In the future, the world will have a greater supply of varied shrimp products than ever before. Importantly, the historic data suggest that a growing fraction of these shrimp will be consumed outside the three major shrimp markets of the U.S., the E.U., and Japan. This is a very positive signal for the domestic shrimp industry. Other issues such as tariffs and currency exchange rates will always be part of the steering currents that determine the ultimate destinations for exported shrimp. For example, the dollar is currently falling against other major currencies which makes imported shrimp more expensive in the American market. So long as this condition prevails, the prices of all shrimp products should be lifted. Finally, the antibiotic residue issues that surfaced in 2001 – and continue

to this day – will be addressed in a uniform fashion among all major shrimp-importing countries. For this food safety issue it is a question of *"when, not if."*

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Prepared by Michael G. Haby, Texas Cooperative Extension / Sea Grant College Program, Texas A&M University