NATIONAL REPORT OF VENEZUELA

Venezuelan shrimp fisheries in the Atlantic *margin of Guiana*

by

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1. INTRODUCTION

This report describes the characteristics of the shrimp fisheries of the Venezuelan industrial fleet of trawlers operating in the Atlantic zone of the country (from Bocas de Dragon in the Gulf of Paria, the zone encompassed between the South of Trinidad and the Orinoco river delta, until Boca Grande, the southern most outfill of the Orinoco river – Figure 1). It should be considered as an addendum to the reports previously presented in 1992 by Marcano *et al*. (1995) and in 1996 by Marcano *et al.* (1997). The data in this report were updated to 1996; their nature and processing were already described in an earlier report (Marcano *et al*, 1995).

Trawl fisheries take place in Venezuela in four zones: Gulf of Venezuela, central Venezuelan coast, eastern zone (Platform Unare - Píritu, northern Margarita Island and Sucre State) and Atlantic zone (Figure 2). It has been estimated that the effort level applied to benthic resources, and mainly upon shrimp, is above that required to achieve the maximum sustainable yield (MSY), with the exception of the resources in the Atlantic zone where it is still below that required to reach MSY. During 1996, the effort in the Atlantic zone decreased, representing 76% of the effort during 1994. Sixty six vessels operated in this zone, at least once a year, with an effort that would be equivalent to that made by a fleet of 30 vessels operating in the area during 220 days per year.

2. DESCRIPTION OF THE SHRIMP INDUSTRY

2.1 Fishing Activities

2.1.1 Fishing Zones

The fleet maintains the same operation areas as described in our earlier reports (Marcano *et al*., 1995 and Marcano *et al*.,1997). The area where the fleet operates is located in the Atlantic zone of Venezuela, between Bocas del Dragón in the Northern Gulf of Paria, to the Esequibo river in the South (Fig. 1), covering an area of 71 000 km². The effort has been progressively reduced since 1993, and its distribution in the zone has shifted during 1996 towards the south of the Gulf of Paria. This can be observed in the behavior of the fleet based in Güiria, which made 38% of the total effort inside the Gulf of Paria (see section 3.1). The industrial fleet operates in the area during the entire year.

The artisanal shrimp fishery also operates year round. Fishing takes place in the northern Gulf of Paria, and in front of Pedernales, in the northern region of the Orinoco River delta. The former fishery is performed by walking fishermen with beach seines, whereas the fishermen near Pedernales use small trawls, similar to the ones utilized by the fishermen from Trinidad-Tobago. The artisanal trawl fishery in Pedernales started operations in 1992.

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2.1.2 The Fleet

2.1.2.1 Vessels and enterprises

The number of fishing enterprises continues to be high, although it decreased by 40% during the last five years (from 97 in 1991, to 58 in 1996; Table 1). Likewise, the number of industrial trawling vessels decreased by 53%, from 140 in 1990, to 66 in 1996. During 1996 all vessels were based in the ports of Güiria and Cumaná. Due to the increase in the cost of fuel in March 1996, the fleet from Punta Meta stopped operating in the Atlantic zone. This also caused a considerable reduction (40%) in the effort of the fleet from Cumaná, when compared with 1995 (Tables 2, 3 and 4).

Average vessel characteristics of the fleet have not changed since 1991, in spite of the reduction in the number of vessels (Table 5).

2.1.2.2 Fishing gear

Most vessels use Florida type trawls. However, the fishing gear was changed in fifteen (15) vessels (18% of the fleet), from Florida type trawl nets to fish trawl nets.

2.1.3 The Fishing Strategies (Operations)

The number of trips per boat increased slightly (4%) in the fleet from Güiria during 1996, but it decreased by 50% for the fleet based in Cumaná. The duration of a trip was stable at 11 days for the fleet from Güiria, and increased by two days for the fleet based in Cumaná (from 17 to 19 days; Tables 2, 3 and 4).

2.1.4 The Discards

Sea bob, *Xiphopenaeus kroyeri,* which used to be discarded prior to 1991, is now landed. It is peeled in factories located in Güiria and sold in national markets.

During 1996, the by-catch remained at the levels observed in 1994, accounting for 93% of the total catch. The commercial by-catch (which accounted for 33% of the total capture) was sold in local markets, whereas the remaining 60% (noncommercial by-catch) was returned, mostly dead, to the sea.

2.1.5 Artisanal Shrimp Fishery

The Venezuelan artisanal trawling fishery in the area has had a late development, starting operations in 1992. However, there have been artisanal trawl vessels from Trinidad-Tobago operating in the region since 1986. The Venezuelan artisanal trawling fleet operates in the area around Pedernales and sells its catch to processing plants located in Güiria and Soro (Northern Gulf of Paria). It is composed of 28 wood vessels (7 to 9 m long), propelled by 2 outboard engines 48 to 75 HP.

2.2 Processing Activities

2.2.1 Industrial Shrimp Processing

Shrimps from the industrial fleet are landed either whole or headless. Since 1989, the problem raised with the restrictions on the use of sodium bisulfite as a shrimp preservative induced some managers to request the removal of the heads on board. Once in the plant, the shrimps are classified by size according to the international market categories, and boxed in 1 kg or 5 lb. packs. Headless shrimp are exported to the North American market, while whole shrimp are exported to Europe. The small shrimp (penaeids and seabob) are peeled and sold in national markets. The number of processing plants which fillet fish and pack shrimp has remained stable, around 13, in the eastern region of Venezuela.

Approximately 80% of the captured shrimp are exported. However, since *P. subtilis* from the Atlantic zone is smaller than the other three shrimp species, most of it is sold in the Venezuelan market, either whole or peeled.

2.2.2 Processing of the Artisanal Catches

The artisanal catch from the Northern Gulf of Paria, receives very little processing, except for the cleaning of the shrimps with sea water after the seines are brought to the beach. The catch is sold to local buyers at the beach. The artisanal trawl boats conserve the shrimp catch on ice. This catch is taken daily to a freezer facility in Perdenales, from where it is carried to the processing plants in Güiria or Soro. Part of this catch is exported.

3. RESULTS OF THE EXPLOITATION

3.1 Effort

The total effort made in the area by all three fleets decreased by 48% for 1996, when it reached 6727 days-at-sea, in comparison with the 13011 days-at-sea reported in 1991 (Table 7). The number of trips made by the trawling units has decreased, from 1026 in 1991 to 498 in 1996 (a decrease of 51%). The greatest decrease was observed in the fleet of Cumaná, which reduced the number of trips by 67% from 460 in 1991 to 153 in 1996 (Tables 2, 3 and 4). As mentioned before, the fleet from Punta Meta stopped operating in the Atlantic zone during 1996.

Apart from a reduction in the effort level by the vessels from Cumaná, the duration of the trips has increased, from 17 to 19 days-at-sea in 1996. The boats from Güiria have maintained the duration of their trips in the Atlantic zone at 11 days-at-sea (Tables 2 and 3).

The geographic distribution of the effort during 1996 was evaluated using the results of the fleet from Güiria. It can be observed that trawling was mostly performed in three squares: 10621 (35%), 09604 (25%) and 09613 (19%), from a total of 10 squares that were used by the fleet (Table 6). The square 10621 is located in the southern Gulf of Paria, whereas the other two squares are located between Trinidad and the Orinoco river delta (Figure 1). Most of the vessels from Cumaná use fish trawls and operate in the southern Orinoco river delta, which is characterized by its abundance in fish, more than shrimp resources.

3.2 Catch and Landings

Since 1991, shrimp capture has maintained a decreasing trend, from 1433 t landed in 1991 to 510 t in 1996 (Table 7), representing a decrease of 65%. This trend is probably a result of the observed reduction in the effort during the previous three years in the area. The reduction affected the landings of brown shrimp more than those of white shrimp (70% vs. 47%, respectively; Table 7). The fleet from Güiria provided the greatest landings during 1996 (401 t; 79%; Table 8).

The distribution of shrimp captures by fishing area (squares) during 1996, shows a high concentration in the same 3 squares that were formerly described for the effort. From a total of 10 squares used by the fleet, more than 80% of the landed shrimp were captured in squares 10621, 09613, 09604 (Table 6). The analysis of the geographical distribution of captures by shrimp species indicates that, during 1996, both brown and white shrimps were most abundant in the three squares mentioned above.

3.3 Catch per Unit of Effort

The trend the in catch per unit effort (cpue) for shrimp in the zone has been negative since 1986, reaching the lowest value (76 kg/day) during 1996. This is the lowest cpue measured in the 24 year history of the fishery in the area (Table 7). This trend has been associated with different factors, including a shift of the effort towards areas with greater fish density, or a reduction in shrimp recruitment to the areas where the industrial fleet operates. The former explanation is related with the movement of the larger vessels in the industrial fleet towards the southern Orinoco river delta, where fish are abundant but shrimp density is low. The second explanation might pertain to the increasing effort applied by artisanal trawlers in the northern Orinoco river delta, which target shrimp juveniles.

The trend in cpue for brown shrimp follows a similar trend to that in the general shrimp captures in the area, since this species represents 63% of the shrimp landings. On the other hand, the cpue for white shrimp shows more stable values, around 30 kg/day, during the last 7 years (Table 7).

The areas with greater shrimp density were located in the northern section of the Orinoco river delta and in the southern Gulf of Paria (fishing squares 09613, 09614, 09603 and 09604; Table 6).

4. ASSESSMENT OF THE RESOURCES

4.1 Length Frequency Distribution by Species/Sex

4.1.1 Penaeus subtilis

Brown shrimp is the dominant species in the landings of shrimp from the Atlantic zone of Venezuela. Morphometric characteristics were evaluated from samplings at the processing plants of Güiria and Cumaná in 1985 (Table 11). The total length (postorbital - telson length) interval for females was 57 - 146 mm, with an average of 93.1 mm (SD 13.8 mm; n=2300). The total length interval for males was 65 - 119 mm, with an average of 93.9 mm (SD 8.4 mm; n=294). The sex ratio was extremely biased towards females (8.5:1). Model I regression procedures were employed in all estimates since high correlation coefficients were obtained in all cases.

4.1.2 Penaeus schmitti

White shrimp represents 16 - 29% of the shrimp landings. As with the previous species, samples were obtained from the processing plants of Güiria and Cumaná in order to evaluate the morphometric characteristics (Table 12). Total length interval for females was 99 - 212 mm with an average of 150 mm (SD 20.9 mm; n= 1120). For males, the total length interval was 101 - 182 with an average 141 mm (SD 11.9; n= 1463). Other convenient morphometric equations were also estimated and can be used in population studies (Tables 11 and 12).

5. SECONDARY RESOURCES

An increasing tendency in by-catch landings was observed in the period 1987-96 mainly due to changes in the level of the fishing effort. The cpue has similarly increased, from 482 kg/day in 1987 to 649 kg/day in 1996, with some variations (Table 9).

Geographically, fish are distributed more homogeneously than shrimp in the area, with cpue values near 500 kg/day (Table 10). From 1992, the newer fishing areas explored by the fleet in the southern Orinoco river delta showed the highest cpue values. The by-catch landed by the fleet is composed exclusively of fish (Table 9). The main species in this capture is the king weakfish (*Macrodon ancylodon*) which represents 60% of the landings (Figure 3).

6. MANAGEMENT REGULATIONS

6.1 Regulations

Two seasons were imposed in 1992 to shrimp trawling in the eastern zone of Venezuela (16 May/15 June and 16 Dec./15 Jan.). These seasons apply only to fishing between 3-12 miles from shore. Their goal was to reduce the level of the fishing effort, particularly in those areas with signs of over exploitation of the demersal resources. Since they are fixed by law, this strategy becomes a tool easy to apply but hard to manage, since different measures could be taken according to the condition of the resources during a particular year.

The use of the Turtle Excluder Device (TED), required by law on all shrimp trawling vessels since 1993, is still in effect. Studies have continued to measure the impact of the TED upon commercial captures in shrimp vessels (Marcano & Alio, 1995). There have also been discussions among shrimp exporting countries to implement other measures, more effective with respect to the protection of marine turtles and that induce fewer or no losses to the shrimp trawling businesses.

Starting in January 1996, the Venezuelan Fisheries Office (SARPA) established the Local Committees for the Follow Up of the Trawling Fleets (CLOSE), one for each fishing region. They are integrated by representatives of the trawling businesses, the artisanal fishermen, the scientific community, the Ministry

of Defense, the Ministry of Transportation and Communication, and SARPA. The last named coordinates the meetings. SARPA established the maximum effort that can be applied by the fleet in each region, according to the state of the shrimp and ground fish resources, based on evaluations performed by the scientific community. Thus, the fishing time is allocated among the vessels in a region. The main goal of each CLOSE is to verify that the allotment of fishing time is complied with, and to set rules to distribute the extra time when the total allocated time is not used by some vessels. The committees also take decisions on how to improve the performance of the fleet and approve the introduction of new vessels as substitutes for old ones (introduction of new trawling vessels has been restricted in Venezuela since 1990).

6.2 Fishing Agreements

The fishing agreement between the governments of Trinidad - Tobago and Venezuela ended in 1995 and a new agreement is under discussion.

7. REFERENCES

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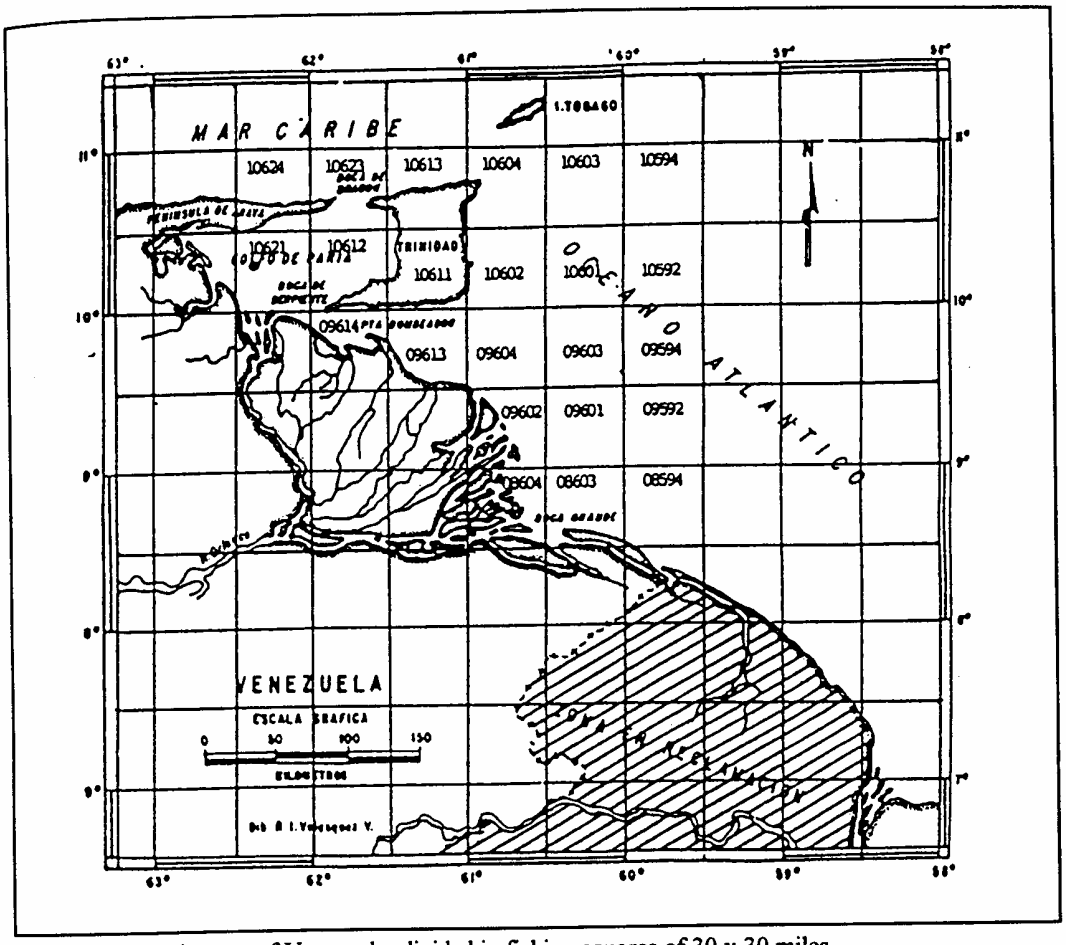

Figure 1: Atlantic zone of Venezuela, divided in fishing squares of 30 x 30 miles.

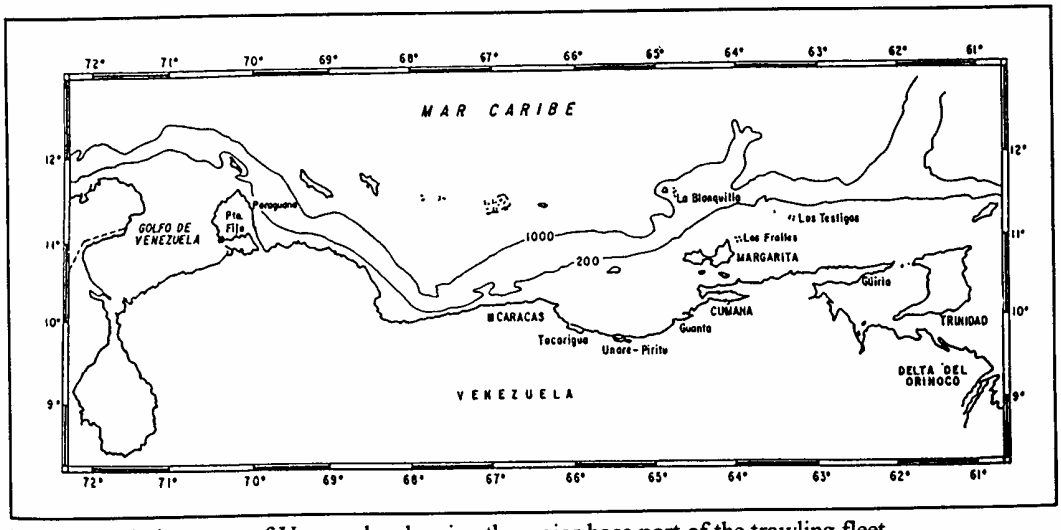

Figure 2: Marine coast of Venezuela, showing the major base port of the trawling fleet.

Figure 1 (top): Atlantic zone of Venezuela, divided into fishing squares of 30X30 miles

Figure 2 (below): Marine coast of Venezuela, showing the major base ports of the trawler fleet

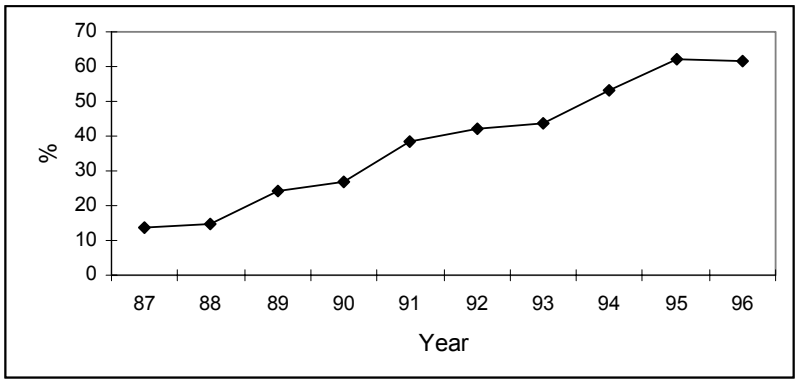

Figure 3: Percent of *M. ancylodon* in the general ground fish catch from the Venezuelan trawl fleet operating in the Gulf of Paria and Orinoco region during the period 1987-96

Table 1: Distribution of the number of fishing enterprises and trawling vessels operating in the Atlantic zone of Venezuela, by base port, in 1996

Base port	N° Enterprises	N° vessels
Güiria	14	38
Cumaná	40	28
Guanta	4	0
Total	58	66

Table 2: Fishing effort made by the trawling fleet based in Güiria, operating in the Atlantic zone of Venezuela

Year	Boat-years	Boat-months	No. Trips	Days at sea	No. Trips per boat	Days per trip
1973	91	207	211	4656	1.0	22
1974	43	64	93	1130	1.5	12
1975	62	176	430	3350	2.4	8
1976	48	190	300	3008	1.6	10
1977	57	208	338	3189	1.6	9
1978	25	145	249	2333	1.7	9
1979	21	144	296	2446	2	8
1980	22	179	356	3588	2	10
1981	30	189	336	3643	1.8	11
1982	33	171	259	3386	1.5	13
1983	39	213	271	3722	1.3	14
1984	28	-	-	-	-	-
1985	34	-	-	-	-	-
1986	28	108	135	1850	1.3	14
1987	30	143	205	3051	1.4	15
1988	31	276	362	4501	1.3	12
1989	35	303	369	3819	1.2	10
1990	56	294	415	3917	1.4	9
1991	58	359	504	4995	1.4	10
1992	47	263	381	3454	1.4	9
1993	68	358	358	4238	1	12
1994	50	238	319	3444	1.3	11
1995	40	200	333	3652	1.7	11
1996	38	178	346	3838	1.9	11

("-" = data not available)\

Table 3: Fishing effort made by the trawling fleet based in Cumaná, operating in the Atlantic zone of Venezuela ("-", data not available)

Year	Boat-years	Boat-months	No. Trips	Days at sea	No. Trips per boat	Days per trip
1973	45	140	245	3552	1.8	15
1974	49	194	285	3422	1.5	12
1975	43	235	364	4362	1.5	12
1976	42	227	332	4267	1.5	13
1977	60	304	472	5767	1.6	12
1978	33	117	166	1923	1.4	12
1979	30	140	235	2433	1.5	10
1980	36	110	175	1799	1.6	10
1981	38	158	243	3027	1.5	13
1982	52	191	239	2734	1.3	11
1983	31	115	178	1752	1.5	10
1984	36	-	-	-	-	-
1985	32	-	-	-	-	-
1986	47	-	-	-	-	-
1987	64	219	279	3767	1.3	14
1988	67	164	183	2670	1.1	15
1989	100	242	306	4891	1.3	16
1990	72	378	482	6833	1.3	14
1991	72	345	460	6715	1.3	15
1992	68	301	311	5395	1	17
1993	67	349	424	7084	1.2	17
1994	63	222	250	4432	1.1	18
1995	68	274	310	5337	1.1	17
1996	28	143	153	2879	1	19

Table 4: Fishing effort made by the trawling fleet based in Guanta, operating in the Atlantic zone of Venezuela. This fleet did not operate in the zone during 1996

Year	Boat-year	Boat-month	No. Trips	Days at sea	No. Trips per boat	Days per trip
1990	12	105	109	2502	1	23
1991	6	61	62	1301	1	21
1992	6	35	46	1103	1.3	24
1993	6	56	60	1440	1.1	24
1994	6	38	39	975	1	25
1995	6	22	30	750	1.3	25

Table 5: Characteristics of the trawling vessels operating in the Atlantic Zone of Venezuela in the period 1989 - 96. ("N/I" = no information was available).

LENGTH	1989		1990		1991		1992		1993		1994		1995		1996	
meters	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%
11-15	0	0	1	1	0	0	0	0	1		0	0	0	0	0	0
16-20	21	16	13	9	20	15	15	12	18	13	16	15	13	11	10	15
21-25	78	57	88	63	78	57	63	52	73	55	52	48	59	52	31	47
26-30	32	24	31	22	30	22	38	31	34	24	34	32	25	22	16	24
31-35	1	1	1	1	1	1	2	2	3	2	2	2	3	3	1	2
N/I	3	2	6	4	7	5	3	3	8	3	3	3	14	12	8	12
Power	**1989**		**1990**		**1991**		**1992**		**1993**		**1994**		**1995**		**1996**	
HP	**No**	**%**	**No**	**%**	**No**	**%**	**No**	**%**	**No**	**%**	**No**	**%**	**No**	**%**	**No**	**%**
<250	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
251-400	17	13	18	13	18	13	12	10	14	10	16	15	15	11	5	8
401-550	44	33	40	29	30	22	28	23	36	27	30	28	26	23	17	26
551-700	37	27	42	30	44	32	40	34	41	30	25	23	34	30	15	22
701-850	32	24	30	21	34	26	35	29	35	25	29	27	27	23	20	30
>850	2	1	3	2	3	2	3	2	3	2	4	4	2	2	1	2
N/I	3	2	6	4	7	5	3	2	8	6	3	3	14	12	8	12
BRT	**1989**		**1990**		**1991**		**1992**		**1993**		**1994**		**1995**		**1996**	
tonnes	**No**	**%**	**No**	**%**	**No**	**%**	**No**	**%**	**No**	**%**	**No**	**%**	**No**	**%**	**No**	**%**
50-100	31	23	27	19	32	24	33	28	36	26	24	22	21	18	15	23
101-150	50	37	57	41	50	36	38	32	42	31	33	31	32	28	16	24
151-200	30	22	30	21	31	23	28	23	29	22	28	26	28	25	15	23
201-250	16	12	14	10	11	8	15	12	15	11	16	15	15	13	10	15
251-300	4	3	5	4	4	3	4	3	5	4	2	2	3	3	2	3
301-350	1	1	1	1	1	1	0	0	1	0	1	1	1	1	0	0
351-400	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N/I	3	2	6	4	7	5	3	2	9	6	3	3	14	12	8	12
TOTAL	**135**		**140**		**136**		**121**		**137**		**107**		**114**		**66**	

Table 6: Catch (t), effort (days-at-sea) and cpue (kg/day) for penaeid shrimps (brown and white), by fishing square, reported by the trawling fleet from Güiria, operating in the Atlantic zone of Venezuela during the period 1995 - 96. For identification of fishing squares see text. (" - ", there were no captures of that species; " * ", no fishing took place in that square)

		10621	10612	9603	9604	9613	9614	9592	9594	8603	8594	8593	8582	TOTAL
1995	Brown	108	15	2	128	72		2	4	2	22	21	10	386
Catch	White	57	5	2	53	38		5	5	1	20	11	3	200
	Total	133	20	4	181	110		7	9	3	42	32	13	586
Effort		1339	82	17	1000	751	*	50	27	10	252	99	25	3652
Cpue	Brown	81	182	117	128	33		40	148	200	87	212	400	106
	White	43	61	117	53	-		100	185	100	79	111	120	55
	Total	123	243	235	181	33		140	333	300	167	323	520	160
1996	Brown	98	5	1	56	43	21		2		12	2		242
Catch	White	52	4	1	37	34	16		2		12	1		158
	Total	150	9	1	93	77	37		4		24	3		400
Effort		1363	95	10	972	735	345	*	24	*	253	33	*	3846
Cpue	Brown	72	53	100	58	59	61		83		47	61		63
	White	38	42	-	38	46	46		83		47	30		41
	Total	110	95	100	97	105	107		163		94	91		104

Table 7: Catch, effort and cpue for brown and white shrimps from the Atlantic zone of Venezuela

YEAR	CATCH (t)					EFFORT (days)	CPUE (t/day)		
	BROWN	%	WHITE	%	TOTAL		BROWN	WHITE	TOTAL
1973	1395	70	605	30	2000	8208	170	73	273
1974	666	95	35	5	701	4552	146	8	154
1975	1012	72	386	28	1398	7712	131	50	181
1976	1344	91	129	9	1473	7275	185	18	202
1977	2022	97	53	3	2075	6956	226	6	232
1978	792	97	26	3	818	4256	186	6	192
1979	810	86	130	14	940	4879	167	27	193
1980	733	76	227	24	960	5387	136	43	178
1981	853	93	66	7	919	6670	127	10	137
1982	809	69	371	31	1180	6120	132	61	193
1983	568	60	378	40	946	5474	104	69	173
1984	624	97	22	3	646	3305	188	7	195
1985	445	79	121	21	566	3223	138	38	179
1986	360	87	55	13	415	1850	195	30	225
1987	762	91	74	9	836	6719	113	11	124
1988	714	81	171	19	885	7175	100	24	124
1989	859	79	228	21	1087	8710	99	26	125
1990	1191	84	230	16	1421	13252	89	17	106
1991	1078	75	355	25	1433	13011	83	27	110
1992	780	84	182	16	1162	9952	98	18	117
1993	888	71	369	29	1257	12762	69	29	98
1994	531	77	161	23	692	8851	60	18	78
1995	610	66	316	34	927	9348	65	34	99
1996	322	63	188	37	510	6727	48	28	76

Table 8: Catch (t) of shrimps (all species combined), reported by the trawling fleet operating in the Atlantic zone of Venezuela by base port during the period 1987 to 1996. The Guanta fleet started operations in the zone during 1990 and did not operate during 1996. ("-" = data not available)

YEAR	BASE PORT			
	GÜIRIA	CUMANA	GUANTA	TOTAL (t)
1987	475	361	-	836
1988	604	281	-	885
1989	644	443	-	1087
1990	878	322	221	1421
1991	867	318	248	1433
1992	639	362	161	1162
1993	734	354	169	1257
1994	413	175	109	697
1995	573	318	36	927
1996	400	110	-	510

Table 9: Catch (t) of the main fish species landed, general cpue (kg/day) and effort (days-at-sea) of the trawling fleet operating in the Atlantic zone of Venezuela, during the period 1987-1996

SPECIES	YEAR									
	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Croaker	620	922	870	818	745	611	840	488	324	166
Curvina	887	567	910	858	974	798	1226	733	1017	557
King weakfish	446	535	1363	1927	2682	2574	4082	3610	4143	2696
Lane snapper	105	155	80	110	148	145	148	119	63	34
Cat Fish	113	165	27	456	519	257	436	230	220	200
Atlantic. moonfish	164	136	195	518	449	291	526	266	309	158
Atlantic. cutlassfish	38	20	52	159	140	-	221	125	139	137
Sharks	223	235	314	219	170	153	196	130	143	65
Other	644	591	1574	2120	1165	1290	1665	1080	312	355
TOTAL	**3244**	**3569**	**5630**	**7186**	**6987**	**6119**	**9340**	**6781**	**6670**	**4368**
CPUE	482	497	646	542	537	615	732	766	714	649
EFFORT	6719	7175	8710	13252	13011	9952	12762	8851	9348	6727

Table 10: Capture of fish (t), effort (days at sea) and cpue (kg/day) by fishing square (zone), reported by the trawling fleet based in Güiria, operating in the Atlantic zone of Venezuela during the period 1995 - 96. ("*" = no fishing took place in that square)

	FISHING ZONE (in bold)												
1995	**10621**	**10612**	**9603**	**9604**	**9613**	**9614**	**9592**	**9594**	**8603**	**8594**	**8593**	**8582**	**TOTAL**
Catch	1217	49	13	618	613		66	38	4	113	55	36	2822
Cpue	909	598	765	618	816		1320	1407	400	448	556	1440	772
Effort	1339	82	17	1000	751	*	50	27	10	252	99	25	3652
1996	**10621**	**10612**	**9603**	**9604**	**9613**	**9614**	**9592**	**9594**	**8603**	**8594**	**8593**	**8582**	**TOTAL**
Catch	787	65	11	609	448	153		9		127	24		2233
Cpue	577	631	1100	627	610	443		375		502	727		512
Effort	1363	103	10	972	735	345	*	24	*	253	33	*	3838

Table 11: Morphometric relationships for *Penaeus subtilis* from the Atlantic zone of Venezuela

Sex	**Relationship**	**N**	**Correlation coefficient**
MALES	$L_{c+rostrum} = 5.85153 + 1.5057\ L_C$	80	0.951
	$W = 6.87 \times 10^{-6} * TL^{3.01267}$	301	0.918
	$TL = 15.8871 + 3.78568\ L_c$	302	0.928
	$TL = 14.327 + 1.43883\ L_{tail}$	307	0.976
	$W = 1.99 \times 10^{-4} * L_c^{2.57297}$	284	0.892
	$W = 1.53 \times 10^{-3} * L_{tail}^{2.72603}$	294	0.902
FEMALES	$L_{c+rostrum} = 4.21879 + 1.5608\ L_c$	284	0.964
	$W = 8.39 \times 10^{-6} * TL^{2.97758}$	2290	0.964
	$TL = 14.3893 + 3.8131\ L_c$	2274	0.979
	$TL = 2.58064 + 1.61362\ L_{tail}$	2288	0.990
	$W = 2.34 \times 10^{-3} * L_c^{2.59766}$	2287	0.947
	$P = 5.16 \times 10^{-5} * L_{col}^{2.90261}$	2237	0.956

L_c, ,length of carapace;
$L_{c+rostrum}$, length of carapace + rostrum;
L_{tail}, length of tail;
TL, total length;
W, weight

Table 12: Morphometric relationships for *Penaeus schmitti* from the Atlantic zone of Venezuela

Sex	Relationship	N	Correlation coefficient
MALES	$W = 1.35 \times 10^{-6} * TL^{3.36293}$	743	0.98
	$TL = 37.7891 + 3.32704\ L_c$	1172	0.97
	$TL = 2.98141 + 1.57279\ L_{tail}$	1196	0.99
FEMALES	$W = 1.07 * TL^{3.40832}$	1338	0.99
	$TL = 40.1378 + 3.24463\ L_C$	1612	0.98
	$TL = -13.5779 + 1.78332\ L_{tail}$	883	0.99
	$W = 2.39 \times 10^{-6} * L_{tail}^{3.60542}$	701	0.97
	$W = 4.51 \times 10^{-3} * L_c^{2.48519}$	678	0.97
COMMON	$TL = -11.3575 + 1.74575\ L_{tail}$	2080	0.99

$L_{c,}$,=length of carapace;
L_{tail}, = length of tail;
TL, = total length;
W, = weight