Cephalopod Resources of Venezuela

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ABSTRACT—The cephalopod resources of Venezuela are reviewed, based on previous literature and observations from commercial catches. The history of the squid and octopus fishery in the major fishing grounds is presented along with information on the catches and seasonality. Squids are landed in Venezuela throughout the year, with a high in February when most of the catch consists of the arrow squid, Doryteuthis plei. *Octopus,* Octopus vulgaris, *is abundant in the catches from June until October, with a peak in August-September. Methods of handling, processing, and marketing the cephalopod catch are discussed, and correctional guidelines are given. At present, the fishery is in disarray and there is an urgent need for study of Venezuela's commercial cephalopods.*

Introduction

The cephalopods in the Western Central Atlantic (FAO area 31) are an underdeveloped fishery resource. This is largely due to the present low commercial value of Venezuelan cephalopods on the world market and the low local appeal of cephalopods in the diet of Venezuelans.

In recent years however, the cephalopod landings have increased steadily throughout Area 31 (FAO, 1987).

According to FAO statistics for 1985 (FAO, 1987), the major cephalopod producing nations in the Western Central Atlantic are Mexico and Venezuela. While Venezuela has the lead in squid landings, consisting mainly of the arrow squid, *Doryteuthis plei*, Mexico leads the region in production of octopus (mainly *Octopus maya*). In Venezuela, both squid and octopus are produced as a by-catch of the shrimp fishery. Only Mexico has a directed fishery for octopus.

In the past 10 years, squid and octopus have become highly esteemed in the local Venezuelan markets, which in turn has lead to an increase in demand with corresponding economic consequences, i.e., cephalopods becoming, along with shrimp, a highly profitable product. Consequently, shrimpers have begun to look at cephalopods with a more commercial interest.

Few studies have been devoted to the knowledge of cephalopods in Venezuelan waters. There were some comments on octopus and squid production in the late 1960's (Voss, 1971, 1973) but without details on the species fished. Arocha and Urosa (1982) studied the seven octopus species common to the northeastern coast and commented on the fishery for *Octopus vulgaris*. Later, Arocha (1986) studied several aspects of the biology of *Doryteuthis plei*, *Loligo pealei*, and *Lolliguncula brevis* and the commercial cephalopod fishery in northeastern Venezuelan waters. Other studies relate to the culture and reproductive biology of noncommercial species, such as *Octopus briareus* and *Sepioteuthis sepioidea* (Robaina, 1983 and Robaina and Voglar, 1986). Most of our knowledge of Venezuelan cephalopods is restricted to the northeastern coast. However, there are unpublished data available[1] on the cephalopod resources from the rest of Venezuela. This study is an attempt to evaluate the state of the cephalopod resources in Venezuela and adjacent waters as an aid to the further development of the fishery. All observations were made by the writer, unless otherwise stated.

Table 1.—Commercial and potentially commercial cephalopods in Venezuelan waters.

Scientific name	English common name	Local common name
Neritic squids		
Doryteuthis plei	Arrow squid	Luria
Loligo pealei	Longfin squid	Luria
Loligo surinamensis	Surinam squid	Luria
Lolliguncula brevis	Brief squid	Chipiron
Sepioteuthis sepioidea	Caribbean reef squid	Chopo
Oceanic squids		
Illex coindetti	Southern shortfin squid	Pota
Ommastrephes pteropus	Orange-back squid	Calamar
Octopods		
Octopus vulgaris	Octopus	Pulpo

Resources of the Area

Twenty-two species of cephalopods are reported from Venezuela (Arocha and Urosa, 1982, 1985). Among these, five species are fished commercially (Table 1). Information on the commercially important species was given by Gines (1972, 1982), who reported on three of the five commercial species (*Doryteuthis plei*, *Loligo pealei*, and *Octopus vulgaris*) and summarized the available information on cephalopod landings from shrimp trawlers of two of the major fishing areas of Venezuela (Fig. 1), the Gulf of Venezuela and the northeastern coast from north of Tacarigua Lagoon to northeast of the Orinoco Delta. This latter region is divided into three subareas according to its landing ports. The main subarea is around Margarita

[1]The data used in this report are derived from various sources, although originating basically from the Direccion General de Desarrollo Pesquero del Ministerio de Agricultura y Cria of Venezuela. The original sources came from vessel logs, fish companies, and sales agents, and thus caution should be observed in its evaluation and use.

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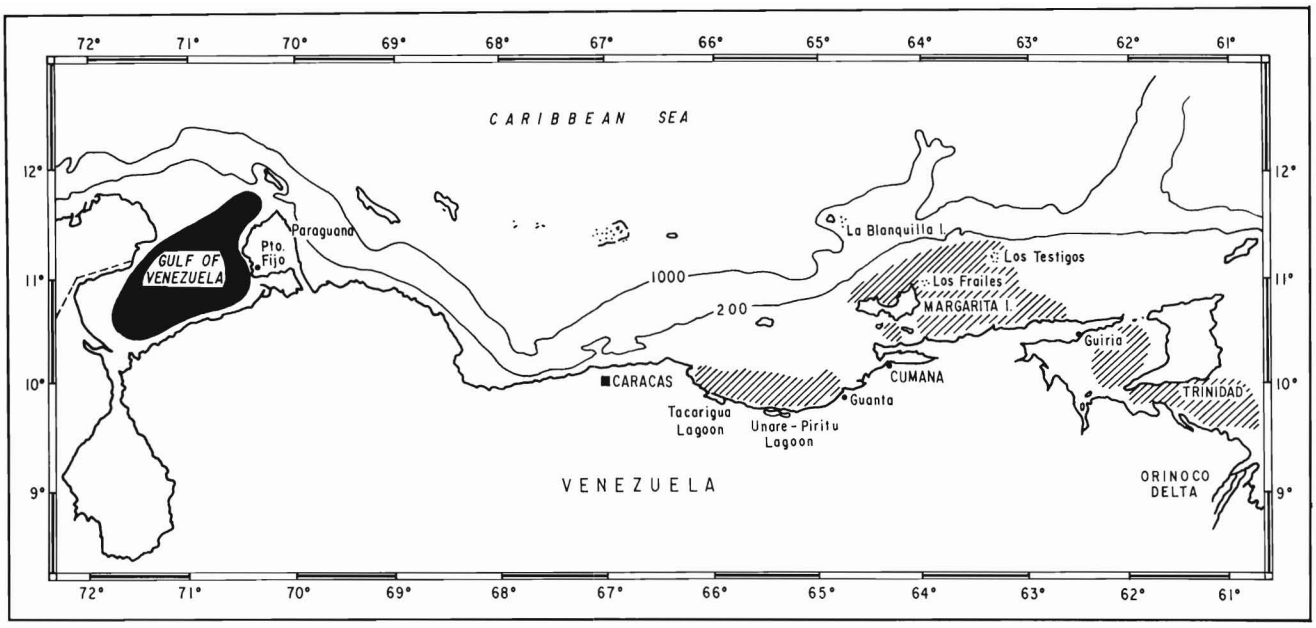

Figure 1.—Major fishing areas: The northwest area (NW) (black area) is in the Gulf of Venezuela and the northeast area (NE) (hatched area) is divided into three subareas: I, Unare-Piritu Lagoon; II, N, E, Margarita Island and III, N, NE of the Orinoco Delta. Depths in meters.

Island, followed by the subarea north of Unare-Piritu Lagoon and the subarea northeast of the Orinoco Delta, having as their landing ports Cumana, Guanta, and Güiria, respectively.

According to later knowledge, some of the geographical distributions presented by Gines (1972, 1982) are incomplete and inaccurate. It is now known from unpublished records and from interviews with fishing company officials, that *Doryteuthis plei* is the most abundant species in the squid landings from the Gulf of Venezuela and, to a lesser extent, *Loligo pealei* and *Lolliguncula brevis*. A similar situation is found in the northeastern coast, with the addition of *Loligo surinamensis* in the squid catches (Arocha, 1986).

The southern shortfin squid, *Illex coindetti*, the orange-back squid, *Ommastrephes pteropus*, and the rhomboid squid, *Thysanoteuthis rhombus*, are the only oceanic, oegopsid squids known from Venezuelan waters. There is little information on these species, except for *Ommastrephes pteropus* which is known to occur in large numbers along the northeastern coast off La Blanquilla Island, where it is fished at night from tuna "baitboats." *O. pteropus* is attracted to the surface by lights and caught with manually operated jigs. *Illex coindetti* is known from Venezuelan waters from only two specimens taken east of the Paraguaná Peninsula (Roper et al., 1969), although it is known from unpublished data that *I. coindetti* is common throughout the waters of the upper slope of the shelf (200 m) along the Venezuelan coasts. The lower Caribbean is thought to be the center of its geographical range in the Western Atlantic[2]. *Thysanoteuthis rhombus* is also known from only two specimens, one from the Gulf of Cariaco (Villa, 1973) and another fished east of Margarita Island (unpubl. data).

Octopus vulgaris is the only octopus fished commercially. However, small numbers of *O. burryi* and *O. zonatus* are mixed with the octopus landings from the northeastern coast, particularly from the area around Margarita Island. Although *O. macropus* had not been reported from Venezuelan waters, it is occasionally caught north of Los Frailes Island and landed mixed with *O. vulgaris*. The other species of octopus reported from Venezuela occur in small numbers, are of relatively small size, and have no commercial value.

Over 90 percent of the cephalopod catch of Venezuela is taken by double-rigged trawlers in the shrimp fleet. In 1987 the mean yearly catch of squid and octopus made by a trawler based at Cumana was 22.8 metric tons (t) and 10.8 t, respectively (source Venepesca). The standard commercial otter trawl used has a vertical opening of 3–4 m and a footrope of 29 m. The main body of the net has a stretched mesh of 5.2 cm with a stretched mesh of 4.2 cm in the codend. The trawl is fished at a constant speed of 2 knots. This method of squid fishing has its drawbacks because of the low speed at which the net is fished and the small opening of the net. Thus a substantial improvement in the squid catches could be made by increasing the trawling speed and the opening of the net. The rest of the cephalopod catch is taken by artisanal fishermen, mainly along the northeastern and, to a lesser

[2]Gilbert L. Voss. 1988. Rosenstiel School of Marine and Atmospheric Science, University of Miami, Miami, Fla. Personal Commun.

extent, from the central coasts. The greater part of the artisanal squid catch (mostly *Doryteuthis plei*) is taken by hand jigging, while the octopus are caught in traps made of sections of used tires, called "longanizo."

Squid landings from the shrimp trawlers consist mainly of *Doryteuthis plei* from the Gulf of Venezuela, the central, and the northeastern coasts. East of the Orinoco Delta the main catch, although small, consists of *Lolliguncula brevis*, which occurs throughout the year and can withstand the low salinities of the area. *Doryteuthis plei* from the Delta area is only caught during the first half of the year when the salinity in the fishing area is 34–35‰. *D. plei* occurs from the southern United States southward to Brazil (Cohen, 1976; Roper et al., 1984). This tropical species is the largest loliginid in the area, and is near the center of its geographical distribution. It has a maximum mantle length of 370 mm northeast of Los Testigos Islands (Arocha, 1986). Most of the catches of this species are from depths of 20–55 m. It occurs throughout the year with a peak between February and April. *Loligo pealei* is a northern species, occuring from the Canadian Maritimes to the northern coasts of South America (Summers, 1983). The center of its range is in the middle Atlantic States (Voss and Brakoniecki, 1985). It attains a mantle length of up to 305 mm northeast of Los Testigos I. This species occurs in the Gulf of Venezuela and along the northeastern coast. This squid is taken from depths of more than 30 m from October to February when it is most abundant in the trawl catches. *Lolliguncula brevis* is widely distributed in the Western Atlantic, extending from Maryland to southern Brazil, but always associated with estuaries (Voss, 1973). In the southern Caribbean it attains a maximum size of 110 mm mantle length. It is a small species common throughout the year northeast of the Orinoco Delta. It is caught by shrimp trawlers in depths between 20–30 m. It also occurs in shallow waters around Margarita Island and in the Gulf of Venezuela. *Loligo surinamensis*, a species occuring in the southeastern Caribbean, is known only from northeastern Venezuela, particularly northeast of the Orinoco Delta and east of Margarita Island. It contributes a small part of the catch.

Octopus vulgaris is the largest species of octopus common to Venezuela. Little is known of the biology of this species in local waters. Studies on its ecology in Venezuela (Arocha and Urosa, 1982) show that it inhabits all types of bottoms: Sand, rock, mud, coral, and turtle grass (*Thalassia*) beds. It is nocturnal and feeds on mollusks and crustaceans. This species is caught from depths of 5–72 m, although high concentrations are reported from 24–38 m by the fishing companies. It is abundant from June until October with a peak in August–September when the animals come into shallow water to breed.

Cephalopod Production

Cephalopod landings in Venezuela are closely related to the history of the shrimp trawl fishery which originated in the Gulf of Venezuela in the early 1950's (Cadima et al., 1972). Squid were the only cephalopods reported in the landings from 1956 until the late 1960's and early 1970's, when the northeastern trawl fishery began to develop. From then on squid and octopus regularly appeared in the fishery statistics from the three major landing ports, Punto Fijo, Guanta, and Cumana.

Squid production in Venezuela can be roughly divided into four periods in terms of catch. Before 1969, squid catches were restricted to the Gulf of Venezuela where the shrimp fishery originated. From then on, part of the trawl fleet moved to new fishing grounds along the northeastern coast, mainly due to the depletion of the shrimp stocks in the Gulf of Venezuela in the late 1960's. An increase in the annual squid catch occurred, caused by the development of new fleets and discovery of new fishing grounds. The changes in the four periods can be outlined as follows (Fig. 2).

Period 1

The first period, from 1956 to 1969 (105–649 t, average 329 t), was when the trawl fishery was developing in the Gulf of Venezuela. During the 1950's, fishing was conducted by Italian stern-trawler-type vessels. Later, in the early 1960's, the fleet began to develop and new vessels arrived, mostly of the Florida shrimper type. During this period the production increased along with the fishing effort. From 1964 on, the fleet grew out of proportion to the fishery and, as a result, the fishing effort increased affecting almost all of the commercial stocks. The catch decreased even with an increased effort (Racca and Griffiths, 1972).

Period 2

The second period, from 1970 to 1978 (369–2,117 t, average 1,316 t),

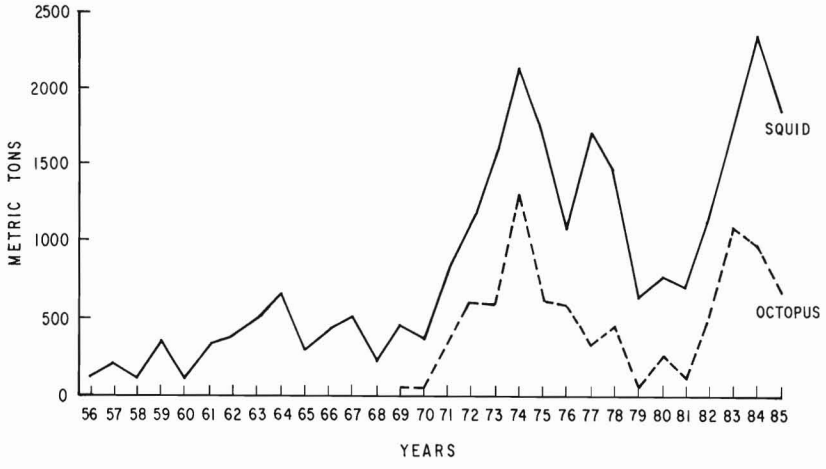

Figure 2.—Evolution of the annual cephalopod landings in Venezuela during 1956–85.

covers the expansion of the trawl fishery, with vessels operating in the three principal fishing grounds for shrimp and cephalopods: Gulf of Venezuela, north of Unare-Piritu Lagoon, and around Margarita Island. During this period an overall catch increase was reported. The decrease seen in 1976 is difficult to explain because of the lack of information on the fishery biology of the species involved, but was not due to a reduction of the fishing effort.

Period 3

The third period, from 1979 to 1981 (636–778 t, average 706 t), is distinctive for the abrupt decline in the catches. There are several possible explanations. One is the reduction of a considerable number of vessels in the three major fleets due to social and political factors and another is the heavy imports of cephalopods from Europe and the United States (California). The local fishing companies claim that this last factor was the main cause of the decline in the squid and octopus production due to an excess of cephalopods in the market and buyer preference for the imported squid.

Period 4

The fourth and last period, from 1982 to 1985 (1,171–2,370 t, average 1,794 t), is one of increase. Seafood imports were closed in late 1981 and the fleets again began to fish for squid. An important factor was the price increase combined with a steadily growing demand since 1982.

The squid production by areas and subareas is shown in Table 2. Of the two major areas, the Gulf of Venezuela and the northeastern coast, the highest squid production comes from the Gulf with a mean of 787.59 t during 1969–85 and 587.90 t for the whole period (1956–85). In the northeast, the mean catch reached 473.35 t, the subarea of Margarita Island accounting for 76.97 percent of the total catch with the subarea north of Unare-Piritu Lagoon accounting for the rest. In the northeastern area, squid are landed throughout the year with the highest frequency of catches in February and March and the lowest during the summer months (June–August). It is possible that a similar situation is present in the Gulf area where no monthly data are available.

The octopus production first appears in the statistics from about 1969 (Fig. 2), when the trawl fishery increased and fishing operations expanded to the present fishing grounds. It peaked in 1974 when 1,301 t were landed from the combined catches of the western and eastern fleets. After 1974 octopus production decreased steadily to its lowest level in 1979 and did not begin to recuperate until 1982. The low octopus production during the period between 1979 and 1981 was attributed to the same reasons of the low squid production during the period, competition with high imports. Another factor is that after 1974 octopus landings in the Gulf of Venezuela decreased to their lowest levels and they have hardly surpassed 100 t since (Table 3). There are no explanations for this decrease as there is a lack of biological information on the species.

Thus the northeastern fleet now produces the great majority of the octopus landings of Venezuela (85.6 percent). The major octopus production is from around Margarita Island with an average of over 300 t. The catch of the subarea north of Unare-Piritu Lagoon barely exceeds 95 t. In the northeastern area the octopus catch has a very marked seasonality. In the first 3–4 months of the year (January–April), octopus landings are almost nonexistant; they begin to appear in the statistics from late April on, with the highest peak in August–September. The landings drop to nearly zero by December. The primary octopus harvest in Venezuela is thus from late May till late October. Before and after this period the animals are small with no commercial value and appear in very low quantities.

Handling, Processing, and Marketing

On the vessels, squid and octopus are sorted from the haul and packed, regardless of size and overall condition of the specimens, in 12–14 kg plastic boxes with crushed ice on top. In port, octopus and squid are weighed and packed in 11 kg plastic bags with chilled water and repacked in plastic boxes. This method of handling squid and octopus produces a poor quality product, that cannot compete in the international markets. To improve the quality of squid and octopus some

Table 2.—Squid landings (t) from the major fishing areas and subareas[1] (1956–85).

	Areas and subareas				
	NW	NE			
Year		I	II	I+II	Total
1956	125				125
1957	221				221
1958	105				105
1959	345				345
1960	109				109
1961	320				320
1962	392				392
1963	503				503
1964	649				649
1965	303				303
1966	431				431
1967	521				521
1968	224				224
1969	361	10	84	84	455
1970	294	28	47	75	369
1971	508	157	115	272	780
1972	742	198	159	357	1,091
1973	1,286	115	231	346	1,532
1974	1,499	134	489	365	2,117
1975	747	370	578	948	1,695
1976	513	142	434	576	1,089
1977	917	243	551	794	1,711
1978	292	232	926	1,158	1,451
1979	190	66	380	446	636
1980	435	64	279	343	778
1981	372	37	294	331	703
1982	766	80	325	405	1,171
1983	1,205	82	492	574	1,779
1984	1,817	79	474	553	2,370
1985	1,445	74	336	410	1,855

[1]Subarea I = N of Unare-Piritu Lagoon and Subarea II = N, E of Margarita Island.

Table 3.—Octopus landings (t) from the major fishing areas and subareas[1] (1969–85).

	Areas and Subareas				
	NW	NE			
Year		I	II	I+II	Total
1969	0	4	60	64	64
1970	9	12	14	26	35
1971	17	226	93	319	336
1972	143	272	200	472	615
1973	297	88	213	301	598
1974	755	134	412	546	1,301
1975	40	122	460	582	622
1976	43	100	451	551	594
1977	105	76	156	232	337
1978	66	63	332	395	461
1979	5	4	55	59	64
1980	201	13	80	93	294
1981	13	3	111	114	127
1982	8	132	357	489	537
1983	43	115	934	1,049	1,092
1984	134	133	717	850	984
1985	135	51	486	537	672

[1]Subarea I = N of Unare-Piritu Lagoon and Subarea II = N, E of Margarita Island.

Table 4.—Ex-Vessel box price and total income in Venezuelan bolivares (Bs)[1] obtained from cephalopod revenues.

	Squid		Octopus	
Year	Bs/box	Million Bs	Bs/box	Million Bs
1978	110	15.96	120	5.53
1979	105	6.67	115	0.74
1980	85	5.40	140	4.11
1981	105	7.38	170	2.16
1982	105	12.29	165	8.86
1983	160	28.46	170	18.56
1984	225	53.32	230	22.63
1985	300	55.65	300	20.16
1986	400		400	
1987	700		700	

Cephalopod prices at different market levels in August 1985.

Item	Squid (Bs/k)	Octopus (Bs/k)
Ex-vessel	21.80	21.80
Distribuitor ("Cavero")	27.25	27.25
Wholesale	29.10 – 34.55	31.80 – 36.35
Retail	40.00 – 45.00	50.00 – 55.00

[1]From 1978–82, 1 US$ = 4.30 Bs; 1983, 1 US$ = 10.00 Bs; 1984–85, 1 US$ = 14.50 Bs; 1986–87, 1 US$ = 27.00 Bs (after 1983, the exchange rates are approximate).

quality control procedures must be introduced.

On the trawlers the squid and octopus should be packed in plastic boxes with crushed iced on top and bottom and with a plastic sheet between the ice and the product to avoid skin damage and deterioration. In the processing plant the squid and octopus should be graded in size and quality according to present international standards, packed, and frozen for marketing (Anonymous, 1982). Good quality control will bring better prices for a product that can compete in the export market. Squid and octopus are sold immediately upon arrival at the port, sometimes even before the ship docks. The buyer is a "Cavero" (middleman or dealer) who takes the product to the main wholesale fish market in Caracas or sells it directly to restaurants. In the main wholesale fish market, the cephalopods are sold to other local wholesale and retail markets or transported to markets throughout the nation.

All of the squid and octopus landed by the shrimp fleet is sold in the domestic market where there is a steadily rising demand that maintains the price at a competitive level (Table 4). There is little interest from the producer's point of view in exporting the product because of the domestic demand which does not require grading and classifying the product or quality control. On the other hand, the way the local product is handled is the reason why consumers preferred high quality imported cephalopods over the local product. It was the decrease in the demand for the local squid and octopus that caused the decline in the landings during 1979–81. The local fishery was rescued by excluding cephalopod imports, and if cephalopods imports are again permitted, the local fishery will survive only if proper handling, grading, and quality control is required.

Conclusions

This report shows that little is known about the biology of the squid and octopus species fished in Venezuela, despite the great local demand for them. Likewise, there is little information on stock sizes, populations, population dynamics, species distributions and spawning grounds of the commercially important species. There is an urgent need for such studies if this growing fishery is to be maintained and properly managed. A program to gather and analyze catch statistics would be a first step. At present the fishery is in disarray, and without proper management while still in its infancy it could suffer disastrous changes in the coming years.

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