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PRESENT STATUS OF NORTH AMERICAN SQUID FISHERIES

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Abstract

North American squid resources are not well developed as commercial fisheries. Short-finned Squid, *Illex illecebrosus*, is moderately exploited between Newfoundland and Cape Hatteras in the Northwest Atlantic. Along the east coast of the United States some exploitation of Long-finned Squid, *Loligo pealei* occurs. In California a limited traditional fishery for Market Squid, *Loligo opalescens* is conducted. While in the Gulf of California (Mexico) a fishery for Jumbo Squid *Dosidicus gigas* is developing. Elsewhere a variety of squid resources exists but these are not aggressively sought after at this time.

Traditionally, North American fisheries have not included a strong usage of squids as part of the landings base. One exception is in Newfoundland, Canada, where inshore harvesting of squid has occurred for over a century. The catch consists of *I. illecebrosus*, taken with jigs and used as bait in the cod fisheries of the Grand Bank and adjacent areas. Another exception is on the North American west coast in California, where limited fishing for *L. opalescens* has occurred since at least 1863.

Until recently squid catches off the northeastern United States have been incidental trawl and trap catches, mostly of *L. pealei* with some *I. illecebrosus* occasionally taken.

This situation has changed dramatically in the last decade (Rathjen *et al.*, 1979) with the development of directed fisheries for *L. pealei* along the edge of the northwest Atlantic continental shelf and for *I. illecebrosus* from the Canadian banks to Cape Hatteras. These fisheries, engaged in primarily by foreign fishermen, peaked in 1979 with a production of about 200 000 tons from the northwest Atlantic off Canada and the United States. More than 85 per cent of this total was *Illex*, harvested mainly from Canadian waters. These totals declined in 1980 due to limited market opportunities resulting from high world production (FAO, 1981).

Substantial quantities of squid also are known to exist in the southeastern United States and in the northeast Pacific and Bering Sea. There is very limited development of these resources at the present time. A general discussion of the situation around the perimeter of North America follows.

Northwest Atlantic—Canada

The escalation of *Illex illecebrosus* fisheries in this region has been dramatic, increasing from an average of about 4 700 metric tons for the period from 1970-1974 to over 155 000 tons in 1979 (Lemon & Rycroft, 1982). These squid fisheries have been conducted inshore and offshore with various gears including jigs, traps, and trawls (Hurley, 1980). The peak production in 1979 was a result of increased inshore jig fishing, particularly off Newfoundland (Figure 1).

During the late 1970's a substantial portion of the Canadian production was prepared as a frozen product for shipment to the Japanese markets. Increasing worldwide competition and improved fishing off Japan (Court, 1982) led to a great reduction in these market opportunities during 1980 and 1981 (Raynes, 1982).

Northwest Atlantic—United States

Two squid species of commercial significance are *L. pealei* and *I. illecebrosus*. Both of these species occur off all of the eastern United States but are sought by fishermen only north of Cape Hatteras. *Loligo* concentrates in the winter on the outer edge of the continental shelf from the southern edge of Georges Bank to Cape Hatteras. In the spring, they migrate inshore to spawn, and from May to November are distributed over most of the shelf (Figure 2). *Illex*, the lesser known of the two species, is found over the continental shelf in the summer. North of Cape Cod, *Illex* is the only species regularly found in commercial quantities. Of the two, *Loligo* is the preferred species on the

Figure 1. Portion of small boat fleet at Holyrood at the head of Concepcion Bay, Newfoundland. Here small boats from 4-14 m take Short-finned Squid (*Illex illecebrosus*) using hand operated and automatic jigging reels.
(Photo: W. F. Rathjen)

world market, commanding a price two to three times that of *Illex*.

Trawl fishing along the edge of the continental shelf has been the focus of most of the foreign fishing effort in the U.S. Fishery Conservation Zone. Target species are *Loligo* and *Illex*. *Illex* is trawled on the outer edge of the continental-shelf in the summer. In the late fall, the composition of the squid catch changes, so that by December, catches are almost entirely *Loligo*. The entire catch from this offshore fishery is frozen at sea and consumed in either Europe or Asia. The major countries involved in the fishery in recent years have been Spain, Italy, and Japan (see Table 1).

The major U.S. fishery for *Loligo* occurs in the spring and summer near shore off southern New England and Long Island. *Loligo* migrates inshore to spawn as the water warms up. Nantucket Sound is the site of intensive trawling for squid by vessels which make short trips, ice the catch, and then deliver it to shore-based processing plants. There is also a significant trap fishery which provides the highest quality squid, since the squid is brailed into the boats alive, not crushed in trawls, and is delivered for processing within hours of being taken from the water.

During 1981 and 1982 Japanese, Italian and American flag processing vessels received squid from small U.S. vessels off Long Island under joint venture arrangements. In 1982 a small U.S. based directed trawl fishing for *Illex* was initiated east of Delaware Bay during July and August.

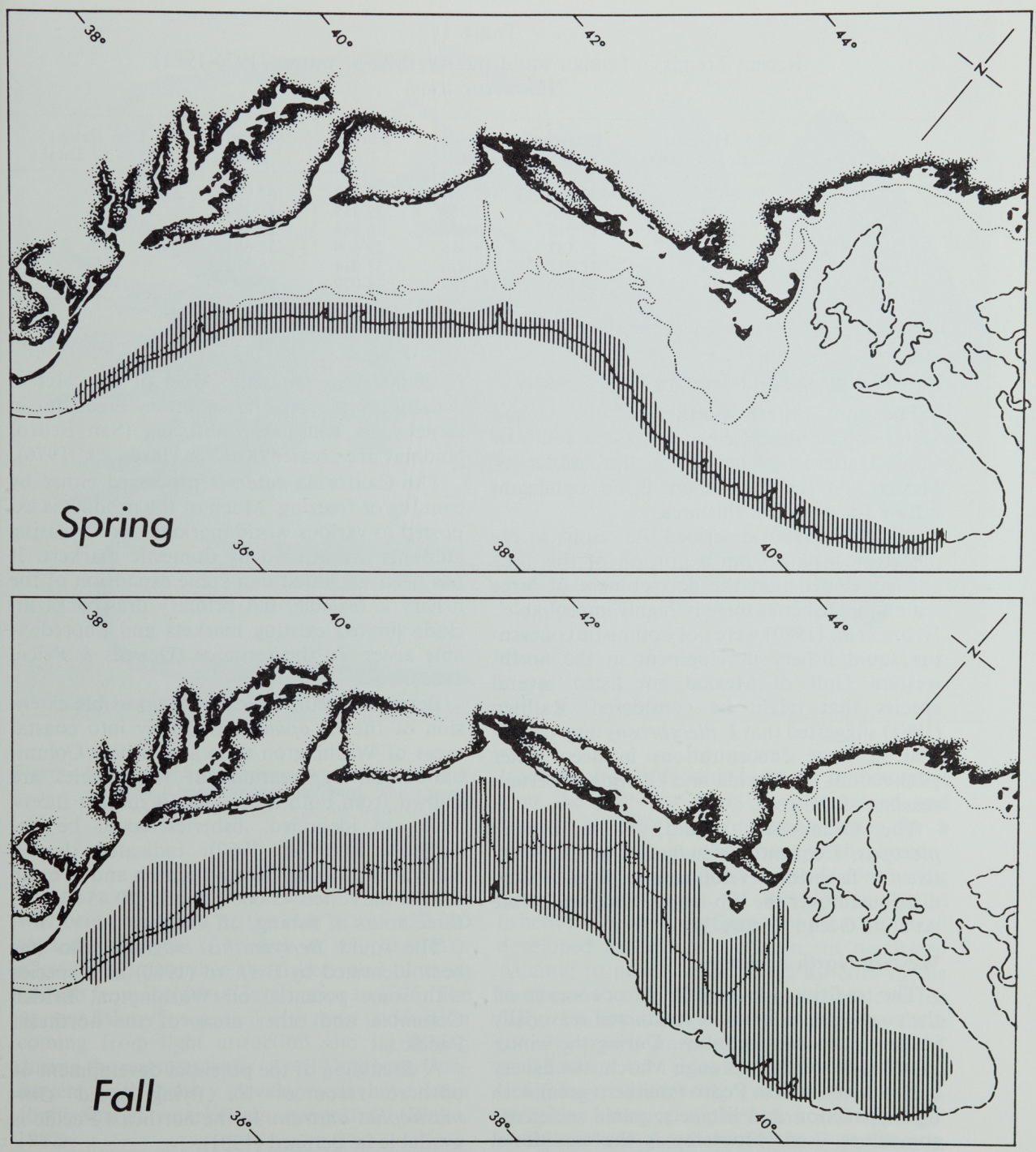

Figure 2. Shaded area represents typical distribution of long-finned squid *Loligo pealei* over continental shelf in the spring (March-May) and fall (September-November) periods. Data have resulted from Northeast Fisheries Center groundfish surveys which do not cover depths of less than 27 metres.

(From Rathjen, 1973)

TABLE 1

Recent Trends in foreign squid catches in U.S. waters (1976-1981) (in metric tons)

Year	U.S. Harvest (Loligo and Illex)	Foreign Loligo	Foreign Illex	Foreign Total	Grand Total	U.S. Catch As % of Total
1976	3830	20 636	22 564	43 200	47 030	8%
1977	1879	15 586	23 769	39 355	41 234	5%
1978	1700	17 310	9 356	26 666	28 366	6%
1979	5992	13 183	16 426	29 609	35 601	17%
1980	3998	17 944	14 870	32 814	36 812	11%
1981	3618	19 290	14 789	34 079	37 095	10%

Unpublished NMFS data on species composition of squid catches for NW Atlantic.

Potential off the Southeastern United States

The southeastern portion of the United States can be described as that area south of Cape Hatteras extending to the border of Mexico. At this time there is no significant fishery for squids in this area.

Whitaker (1980) described the results of exploratory fishing from a portion of this area and concluded that the development of large scale squid fisheries there is 'highly improbable'. Hixon *et al.* (1980) were not optimistic concerning squid fishery development in the northwestern Gulf of Mexico but listed several species that might be considered. Rathjen (1981) suggested that *I. illecebrosus* may be present in large concentrations in deep water (300-900 m) off Florida and Georgia at certain seasons of the year.

The Orangeback Squid, *Ommastrephes pteropus*, frequently is suggested as an objective for fisheries development as it is broadly distributed over the sub-tropical and temperate Atlantic Ocean (Figure 3).

Western North America

The traditional fishery for *L. opalescens* off the coast of California is conducted seasonally inshore from two locations. During the winter months, November through March, the fishery is conducted at San Pedro (southern area) with light attraction and lift nets; purse seines are sometimes used. Monterey is the traditional center of the northern fishery with most of the landings there being taken by lampara seine (Figure 4) from April to July. The overall landings in the California fishery range from 6 000 to 20 000 tons annually. Most of the catch is usually taken from the Monterey area, but in some years southern California (San Pedro) landings are greater (Kato & Hardwick, 1976).

The California catch is processed either by canning or freezing. Much of the product is exported to various world markets but increasing amounts are utilized by domestic markets. It has been suggested that some expansion of the fishery is feasible, but primary drawbacks include limited existing markets and unpredictable access to the resource (Dewees & Price, 1982).

Bernard (1980), indicated the possible extension of the *L. opalescens* fishery into coastal areas of Washington state and British Columbia. Local aggregations of this species are known from both areas and, if market incentives are identified, fisheries could be developed. Robbins (1982), indicated that a fisherman utilizing light attraction and a 'brail' lift net harvested 45 000 pounds (20 454 kg) in three hours of fishing, off Oregon.

The squid *Berryteuthis magister* also has been identified by Bernard (1980) as a species with some potential off Washington, British Columbia and other areas of the northeast Pacific.

A discussion of the potential development of offshore resources for flying squid *Ommastrephes bartrami* in the northeast Pacific is available in Bernard (1981).

Recent interest has developed in the Gulf of California (Mexico) concerning the exploitation and commercial use of the jumbo squid *Dosidicus gigas*. This species is attracted to light and

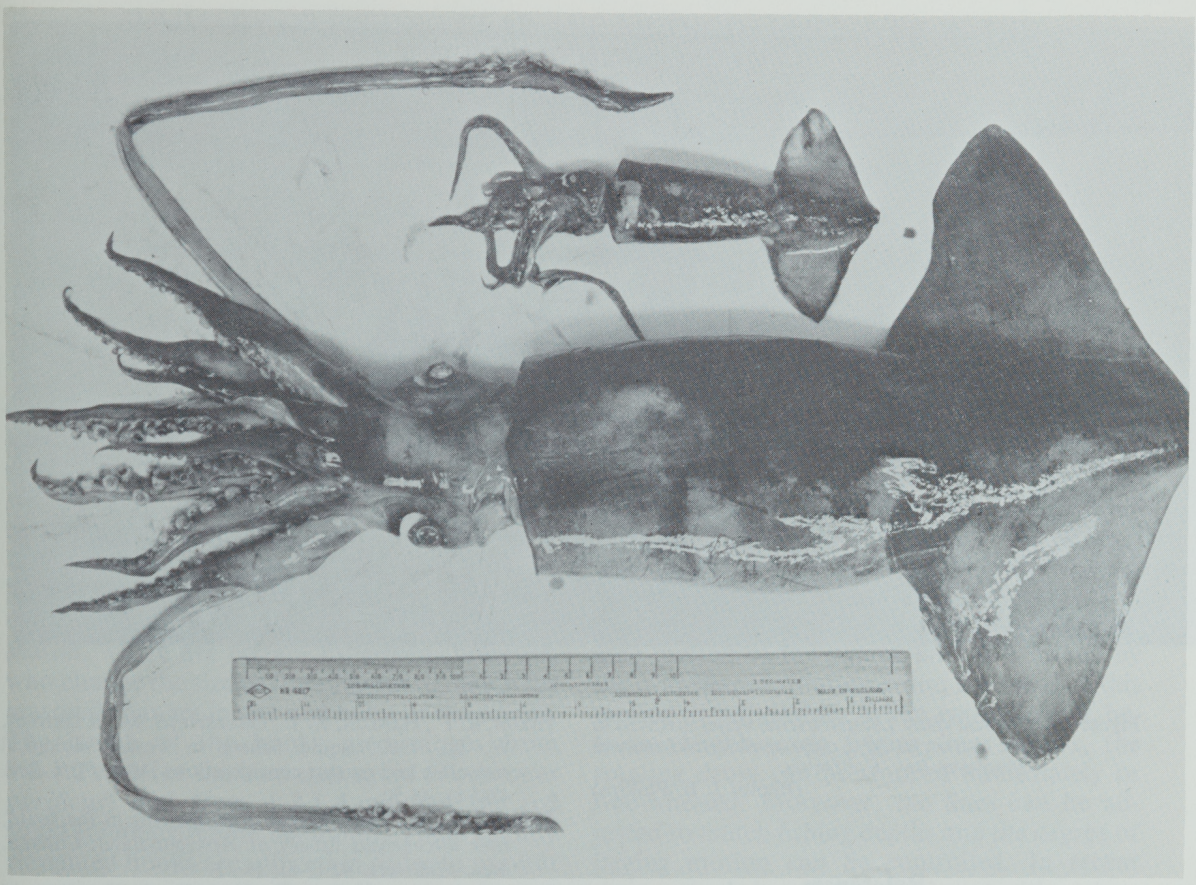

Figure 3. Large and small specimens of the Orangeback Squid (*Ommastrephes pteropus*). This species is widely distributed over the warm oceanic Atlantic.

(Photo: W. F. Rathjen)

was being exploited at the rate of over 22 000 tons during 1980 (Ehrhardt *et al.*, in press). Klett (1982) describes the fishery and plots its growth from incidental levels prior to 1976. The present fishery is seasonal with most production coming from light attraction and jig fishing during the warm months (April-October). Concurrent with fishery development have been sophisticated marketing programs (Blake, 1982).

The major external constraint to expansion of the West Coast squid industry are uncertain markets. Demand for squid has been growing, partly as a result of declining catches from traditional world fishing areas, but supplies over the past few years have increased and become unstable due to new fisheries for a variety of squids in many parts of the world.

North America shows several contrasting situations in terms of developing squid fisheries. These range from comparatively well developed fisheries in the adjacent northwest Atlantic to poorly understood fisheries in the northeast Pacific. The various requirements for fully understanding and managing these resources rarely stand by themselves in terms of assignment of priority, e.g., harvesting technology, processing, assessment, oceanography, biology, conservation and management, marketing and economics. Experience in developing squid fisheries in the northwest Atlantic has demonstrated that progress in any one discipline is to some extent interdependent upon more than one additional area of interest.

Figure 4. Typical small Lampara seine vessel involved in the Market Squid (*Loligo opalescens*) fishery in Monterey Bay, California.
(Photo: J. B. Phillips)

References

BERNARD, F. R., 1980. Preliminary report of the potential commercial squid of British Columbia. *Canad. Tech. Rep. Fish. Aquat. Sci.* No. 942: 1-51.

BERNARD, F. R., 1981. Canadian west coast flying squid experimental fishery. *Canad. Ind. Rep. Fish. Aquat. Sci.* No. 122: 1-23.

BLAKE, D. A., 1982. The successful introduction and promotion of a new product: Grande calamari, pp. 287-294. In *Proceedings International Squid Symposium*. New York, Unipub.

COURT, W., 1982. Japan's squid market,pp. 295-316. In: *Proceedings International Squid Symposium*. New York, Unipub.

DEWEES, C. & PRICE, R. J., 1982. Overview of the squid fishery of the Pacific coast of the United States, pp. 197-221. In *Proceedings International Squid Symposium*. New York, Unipub.

EHRHARDT, N. M., JAQUEMIN, P. S., F. GARCIA B., G. GONZALEZ, D., J. M. López, B., J. Ortiz, C., & A. SOLÍS, N. (in press). On the fishery and biology of the giant squid *Dosidicus gigas* in the Gulf of California, Mexico. *Mem. Nat. Mus. Victoria.* (present volume), pp.??????

FAO., 1981. Yearbook of fisheries statistics 1980. FAO, Rome, 50: 1-386.

HIXON, R. F., HANLON, R. T., GILLESPIE, S. M., & GRIFFIN, W. L., 1980. Squid fishery in Texas: biological economic and market considerations. *Mar. Fish. Rev.* 42(7-8): 44-50.

HURLEY, G. V., 1980. Recent developments in the squid, *Illex illecebrosus* fishery of Newfoundland, Canada. *Mar. Fish. Rev.* 42 (7-8): 15-22.

KATO, S., & HARDWICK, J. E., 1976. The California squid fishery. *FAO Fish. Rep.* 170 (Suppl. 1): 107-127.

KLETT, A., 1982. Jumbo squid fishery in the Gulf of California, Mexico, pp. 81-100. In: *Proceedings International Squid Symposium*; New York, Unipub.

LEMON, D. & RYCROFT, J., 1982. Canadian harvesting experience, pp. 101-121. In: *Proceedings International Squid Symposium*, New York, Unipub.

RATHJEN, W. F., 1973. Northwest Atlantic squids. *Mar. Fish. Rev.* 35(12): 20-26.

RATHJEN, W. F., 1981. Exploratory squid catches along the Eastern United States Continental Slope. *J. Shellfish Res.*, 1(2): 153-159.

RATHJEN, W. F., HIXON, R. F., & HANLON, R. T., 1979. Squid fishery resources and development in the northwest Atlantic and Gulf of Mexico. *Proc. Gulf Carribb. Fish. Inst.* 31: 145-157.

RAYNES, G. W., 1982. The Canadian experience in marketing squid, pp. 323-328. In *Proceedings International Squid Symposium*, New York, Unipub.

ROBBINS, S., 1982. Oregon fishermen struggle with uncertainty of marketing underutilized species. *Nat. Fishermen.* 63(4): 12-13.

WHITAKER, J. D., 1980. Squid catches resulting from trawl surveys off the Southeastern United States. *Mar. Fish. Rev.* 42(7-8): 39-43.