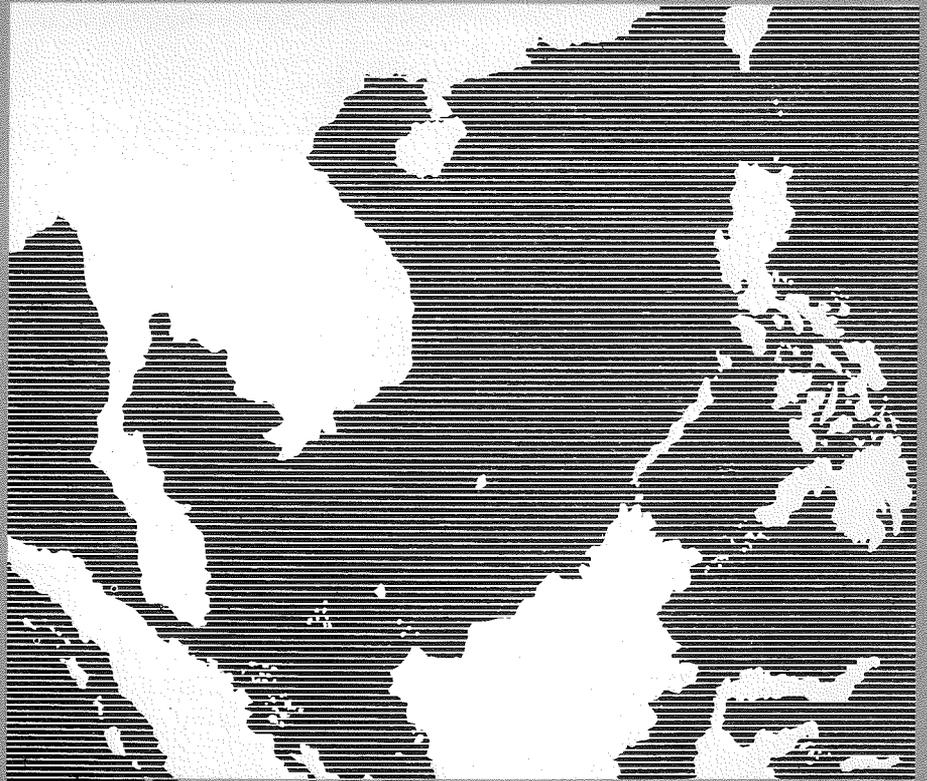


SCS/DEV/83/24
SOUTH CHINA SEA FISHERIES
DEVELOPMENT AND COORDINATING
PROGRAMME

executing agency:
FOOD AND AGRICULTURE ORGANIZATION
OF THE UNITED NATIONS

JOINT ADB/FAO (SCSP-INFOFISH) MARKET STUDIES
Vol. 4: the international market for cephalopods



UNITED NATIONS DEVELOPMENT PROGRAMME

Joint ADB/FAO (SCSP-INFOFISH) Market Studies
Vol. 4: The International Market for Cephalopods

SOUTH CHINA SEA FISHERIES DEVELOPMENT AND COORDINATING PROGRAMME
FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
Manila, 1983

The designations employed and the presentation of material in this publication do not imply the expression of any opinion whatsoever on the part of the Food and Agriculture Organization of the United Nations concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.

ISBN 92-852-1015-5

The copyright in this book is vested in the Food and Agriculture Organization of the United Nations. The book may not be reproduced, in whole or in part, by any method or process, without written permission from the copyright holder. Applications for such permission with a statement of the purpose and extent of the reproduction desired, should be addressed to the Director, Publications Division, Food and Agriculture Organization of the United Nations, Via delle Terme di Caracalla, 00100 Rome, Italy.

FAO 1983

PREFACE

This volume forms part of a series of fishery commodity studies and country market profiles prepared jointly by the Asian Development Bank and FAO. The full series comprise the following titles:

- Vol. 1 Highlights and conclusions**
SCS/DEV/83/21
- Vol. 2 The international market for tuna**
SCS/DEV/83/22
- Vol. 3 The international market for shrimp**
SCS/DEV/83/23
- Vol. 4 The international market for cephalopods**
SCS/DEV/83/24
- Vol. 5 The world market for fishmeal with particular attention to the Asian/Pacific region**
SCS/DEV/83/25
- Vol. 6 The world seaweed industry and trade**
SCS/DEV/83/26
- Vol. 7 Dried fish markets in Asia**
SCS/DEV/83/27
- Vol. 8 High-valued finfish markets in Hong Kong, Singapore and Japan**
SCS/DEV/83/28
- Vol. 9 Fishery sector profiles and briefs for selected countries**
SCS/DEV/83/29

The study represents an expanded up-date of a similar report published in 1977 and entitled 'DEVELOPMENT POTENTIAL OF SELECTED FISHERY PRODUCTS IN

THE REGIONAL MEMBER COUNTRIES OF THE ASIAN DEVELOPMENT BANK'. The first report was accomplished through the cooperative efforts of the Asian Development Bank and the Food and Agriculture Organization of the United Nations (FAO), and was coordinated by the FAO/UNDP South China Sea Fisheries Development and Coordinating Programme in Manila. The present study is a joint effort of the above programmes. INFOFISH, FAO's Marketing Information and Advisory Services for Fish Products in the Asian/Pacific region, operative since July 1981, also assisted in this programme.

The study was carried out under the ADB/FAO Cooperative arrangement, which provides a vehicle for cooperative activities on a cost-sharing basis. The studies and related appendixes were prepared by FAO staff members and individual consultants. The coordination of the study was carried out by Mr. B. Lanier of FAO Headquarters, Dr. W. Krone of INFOFISH, Mr. A. Woodland of the South China Sea Programme, and Dr. R.C. May, Senior Aquaculturist of ADB.

The main objectives of the study are to analyze the present market situation and projected future absorptive capacity of domestic markets for fishery products in developing member countries of the Bank, and also to examine export market prospects for selected fishery products important to the countries. Present and projected market needs are compared with present and potential production and export volumes; supply, demand and prices for key fishery products are forecasted for 1990. These efforts are foreseen as assisting the Bank and its member countries in planning future investments in fish production and marketing facilities in the region.

Distribution

Members of the Indo-Pacific Fisheries Commission
FAO Department of Fisheries
Other interested nations and international organizations

Bibliographic Entry

International markets and future export prospects for key fishery products, and profiles of national fishery industries and markets of regional member countries of the Asian Development Bank. 9 vols. Manila, FAO/UNDP South China Sea Programme. 1983

Vol. 4. The international market for cephalopods.
SCS/DEV/83/24. 53p.

TABLE OF CONTENTS

	<i>Page</i>
Preface	iii
List of Appendices	vi
List of Tables	vi
List of Figure	vii
Explanatory Notes	vii
Summary and Conclusions	viii
I. INTRODUCTION	1
II. MAJOR SPECIES OF CEPHALOPODS OF COMMERCIAL IMPORTANCE	1
A. Squids	1
B. Cuttlefish	2
C. Octopus	2
III. PRODUCTION TRENDS	2
A. Production by major cephalopod fishing nations	2
1. Japan	2
2. Spain	4
3. Thailand	4
4. Republic of Korea	4
5. Italy	4
6. France	4
7. Greece	4
8. Portugal	5
9. United States	5
10. Canada	5
11. Central and South America	5
12. Asia	5
13. Oceania	6
14. USSR	6
B. Production and future potential by ocean area	6
1. Northwest Atlantic (Area 21)	6
2. Northeast Atlantic (Area 27)	7
3. Western Central Atlantic (Area 31)	7
4. Eastern Central Atlantic (Area 34)	8
5. Southwest Atlantic (Area 41)	8
6. Southeast Atlantic (Area 47)	8
7. Mediterranean and Black Sea (Area 37)	8
8. Indian Ocean (Areas 51 and 57)	8
9. Northwest Pacific (Area 61)	9
10. Northeast Pacific (Area 67)	9
11. Western Central Pacific (Area 71)	9
12. Eastern Central Pacific (Area 77)	10
13. Southwest Pacific (Area 81)	10
14. Southeast Pacific (Area 87)	10
IV. UTILIZATION OF CEPHALOPODS	10
A. National trends	12
1. Japan	12
2. Republic of Korea	13
3. Thailand	13
4. Philippines	13
5. Southern Europe	13
6. North America	14
7. Chile	14

	<i>Page</i>
V. INTERNATIONAL TRADE	14
A. National trends	17
1. Japan	17
a. Squid and cuttlefish	17
i) Domestic production	18
ii) Import quota (IQ) system	18
iii) Income levels	18
iv) Exchange rates	18
b. Octopus	18
2. Spain	18
3. Italy	19
4. Greece	19
5. France	19
6. Republic of Korea	19
7. Thailand	19
8. Other countries	20
VI. RECENT PAST AND PRESENT CONSUMPTION PATTERNS	20
A. Supply sources and <i>per capita</i> consumption	21
1. The Japanese market	21
a. The role of cephalopods in the Japanese diet	21
b. Effect of <i>price and income changes on consumption</i>	24
c. Prices	25
d. Other factors influencing consumption	27
2. Spain	27
3. Italy	28
4. Greece	28
5. France	28
6. United States	28
7. The Federal Republic of Germany and the United Kingdom	29
8. Latin America	29
9. East and Southeast Asia	29
VII. FUTURE TRENDS IN CONSUMPTION	29
A. Prospects for growth in established national markets	29
1. Japan	29
2. Other important established national markets	31
B. Considerations for entry to new markets	31
C. Global outlook	32
Appendices	34

LIST OF APPENDICES

Appendix number		Page
1	Features of major cephalopod species	34
2	Japan: Utilization of squid (including cuttlefish) and octopus	35
3	Japan: Tariffs and the import quota system	36
4	Japan: Other trade requirements	38
5	Conditions of entry of imported cephalopod products into other major national markets	40
6	Methodology employed in Japanese cephalopod demand projection	44
7	Statistical annex	45
	Table A7-1 — Catch of cephalopods by major fishing nations — 1970-80	45
	Table A7-2 — Catch of cephalopods by species — 1970-80	47
	Table A7-3 — Japan: Imports of cephalopods by country of origin	48
	Table A7-4 — Japan: Imports of fresh and frozen squid and cuttlefish	49
	Table A7-5 — Spain: Imports of cephalopods by country of origin	49
	Table A7-6 — Italy: Imports of cephalopods by country of origin	50
	Table A7-7 — France: Imports of cephalopods by country of origin	51
	Table A7-8 — Japan: Exports of cephalopods by country of destination	52
	Table A7-9 — Spain: Exports of cephalopods by country of destination	52
	Table A7-10 — Thailand: Exports of cephalopods by country of destination	53
	Table A7-11 — Republic of Korea: Exports of cephalopods by country of destination	53

LIST OF TABLES

Table number		
1	World catch of cephalopods 1970-80 by regions and major countries	3
2	Japanese catch of cephalopods, 1970-80	3
3	Present catch and estimated potential of cephalopods by marine areas	7
4	Utilization of cephalopods by major producers	11
5	Japan: Disposition of squid catch, 1975-80	12
6	Imports of cephalopod products by main importing countries, 1976-80	15
7	Exports of cephalopod products by main exporting countries, 1976-80	16
8	Japan imports and exports of cephalopods	17
9	Supply of cephalopods in major consuming countries	22
10	Apparent <i>per capita</i> cephalopod consumption in selected countries	24
11	Supply of cuttlefish in Japan	25
12	Per household annual consumption of cephalopods by type of product and income groups — 1980	25
13	Price and income elasticity for cephalopods, fish and other meats	26
14	Average unit value of imported cephalopods by country of origin (CIF)	26
15	Average wholesale prices of squid, cuttlefish and octopus at Tokyo and Osaka wholesale markets	27
16	Projected demand for cephalopods in Japan in 1990	30
17	Actual supply and prospective demand for cephalopods in 1990 in selected countries	31
18	General perspective for world consumption of cephalopods in 1990	32

LIST OF FIGURE

	<i>Page</i>
Figure number	
Main concentrations of principal species of the families Ommastrephidae and Loliginidae	1

EXPLANATORY NOTES

- Ton : denotes metric ton unless otherwise noted.
— : denotes "nil".
.. : denotes "data not available"
0 or 0.0 : denotes negligible quantity (less than one-half of the unit indicated).

SUMMARY AND CONCLUSIONS

Supplies and resources

During the last decade there has been a fifty percent increase in the world production of cephalopods. World catches amounted to some 1.5 million tons (live weight) in 1980 as compared to about one million tons in the early seventies. Squid now accounts for a little over 75 percent of the total, with cuttlefish and octopus each accounting for half of the remainder. Japan, the world largest cephalopod producing nation, catches about 40 percent of the total, although its share has declined over the last decade parallel to the increase in the number of countries exploiting world cephalopod resources. The Republic of Korea, Spain and China rank among the largest producers, with annual yields on ranging from 80 000 tons (China) to 127 000 tons (Republic of Korea). But world production is on an upward trend because interest has grown in many countries in developing squid fisheries to increase export earnings, as well as to supplement supplies of food on domestic markets.

The extension of national jurisdictions through the establishment of Exclusive Economic Zones (EEZs) in the mid-seventies had important implications for world cephalopod fisheries. Virtually all major established fishing grounds came under the control of coastal states. The effects of the establishment of EEZs — on national policies and on catch distribution among countries — have already emerged on many fronts. Cephalopod production in some countries, such as Canada, Argentina and New Zealand, has increased significantly, while catches by other countries — e.g. Thailand and distant-water catches by Japan — have declined. Another result has been an increase in the number of joint-venture arrangements; Japan alone is at present involved in more than ten joint-ventures on squid fisheries.

In the long-run, the new regime of the sea can be expected to lead to a further decline in the cephalopod fisheries prosecuted by non-local vessels, and their replacement by local fleets. In the short-term, however, production is likely to increase due to the existence of under-exploited resources in several parts of the world oceans and the lucrativeness of cephalopod product sales on the international market.

Despite the rather fragmentary nature of resource data, it is clear that world cephalopod resources are quite large in relation to present catches, and by implication, large also compared with demand levels likely to emerge in the immediate future. Cephalopods are considered to be one of the under-utilized marine resources in several areas of the world oceans and offer considerable potential for greater exploitation. FAO estimates that the potential catch of squid, cuttlefish and octopus on continental shelves and the upper part of continental slopes is of the order of several million tons; but if oceanic resources are included, the potential is many times this figure. The future expansion of cephalopod supplies, particularly squid and cuttlefish, will depend to a large extent on whether further efforts are made to exploit stocks which have not yet been utilized. But the out-

look for the further expansion of cephalopod production seems bright, the main factor being whether coastal states will take full advantage of the opportunities to exploit such resources more extensively with appropriate management. The extension of national jurisdictions has focused attention on the need for better evaluation of the cephalopod resources to achieve sustained development of local fisheries as well as to allocate appropriate catch quotas for foreign vessels. In many regions, even currently exploited cephalopod resources remain under-utilized. Given appropriate development, management and control, these waters have potential for expanded exploitation.

Utilization and demand

Cephalopods are marketed in many forms: fresh, frozen, canned, dried, salted, salted-fermented, etc. All but three percent of total annual landings of cephalopods are used for human consumption. Nearly 75 percent of the production for human consumption is marketed frozen or fresh. About ten percent is generally subject to some form of curing, about ten percent is utilized for canning, and 14 percent in preparations. The growth of fresh and frozen products over the last several years has been remarkable. Input for preparations has also shown a steady increase. The quantity cured is on an upward trend, although this form of utilization seems to be quite sensitive to production trends. Production of canned squid has shown a considerable decline during the last several years. The amounts used for bait have grown, particularly in Canada and the USA. It is likely that much of any future increases in output will be utilized for fresh and frozen products, and for preparations. Further emphasis upon drying, smoking or other forms of curing may be expected in developing countries where curing is of great significance to prevent product spoilage due to the shortage of freezing equipment.

The greater part of the world catch of cephalopods is consumed in Japan, which, together with China, the Republic of Korea and other Far East countries, account for nearly 70 percent of the total world consumption. Increased consumption of cephalopods in Southeast Asian countries, in particular the Philippines and Indonesia, are worthy of note. Cephalopods are highly valued in southern European countries, of which Spain and Italy are the most important. Interest in cephalopod products has begun to grow in the northern European countries — e.g. the UK, and Federal Republic of Germany — in recent years as a result of catering for southern European workers and the excursions of holiday makers to Mediterranean countries. In North America and Oceania, consumption of cephalopods is still largely confined to ethnic and gourmet groups. Cephalopods are eaten in a number of Latin American and Caribbean countries such as Mexico, Uruguay, Argentina, Venezuela and Cuba; the level of consumption, however, is still very low. Cephalopods are not yet accepted in the Scandinavian countries.

Total world requirements for cephalopod products are expected to expand to two million tons by 1990, an increase of over one-third of the 1980 world consumption level. Whilst such marked increases will arise principally from Japan, the demand for cephalopods is likely to increase considerably in other established markets, particularly Spain, Italy, the Republic of Korea and Thailand. Increases will also be notable in developing countries where cephalopods are already known, in large measure owing to the high rate of population increases. However, the pace of growth will be somewhat slower than that in the 1970-1980 period. Available knowledge of resources indicate that world requirements are still far below the estimated potential of world cephalopod resources; there thus seems to be sufficient scope for further expansion of cephalopod fisheries and the maintenance of optimism about the economic and financial viability of harvesting and marketing these large cephalopod resources.

While cephalopod products are not as yet commonly consumed in some large fish-consuming countries, real potential does exist in these countries for obtaining consumer acceptance of cephalopod products by, for example, developing acceptable pre-cooked processed products, removing the "fishy" flavour from the protein, and other adaptations. But this will require the development of sophisticated marketing strategies suitable to local conditions.

Exports and the prospects for future expansion

World trade in fresh and frozen cephalopods has increased very rapidly over the last decade, the total quantity of such commodities entering world trade channels having grown from 90 000 tons in 1970 to nearly 360 000 tons in 1979. Increases in value have been even more notable, from US\$47 million in 1970 to US\$936 million in 1979. The main impetus to this increase in trade has been a large expansion of import demand in Japan. Imports by Spain and Italy have also increased sharply and these three countries together accounted for about 85 percent of world cephalopod imports in 1979. World trade volume in cured cephalopods has been fairly stable over the last several years, ranging from between 4 000 and 5 400 tons. World trade in canned squid has decreased over the last several years. The recent emergence of New Zealand, Canada and Argentina in the export market has been a notable outcome of the establishment of the 200-mile EEZs.

In a number of developed as well as developing countries cephalopods are now the most important fishery export item after shrimp. Prices obtained in export markets have risen steadily year after year due to an increasing demand for fresh food, raw materials for processing, and bait for other fisheries.

The outlook for further expansion in the demand for cephalopod imports is favourable in a number of developed countries. There are clearly considerable additional opportunities for the expansion of exports of cuttlefish to Japan, and for cuttlefish and squid to already-established European markets — particularly, Spain, Italy and France. Consumption is also expected to grow from its present small bases in

northern European countries — i.e. the UK and the Federal Republic of Germany — and in the USA and Australia.

It should be remembered, however, that the recent rapid development of cephalopod fisheries by numerous producing-nations for export to Japan and other major market countries, and the increasing level of participation of market countries in joint-venture arrangements, have made for increasingly severe competition among exporters in these established markets.

The cephalopod industry: investment considerations

The establishment or expansion of cephalopod-producing ventures should of course be initiated only after satisfactory answers have been obtained to questions of the resource size, the level of demand in potential markets, the capability of processing products acceptable in the target markets, existing marketing obstacles, and satisfactory returns to fishermen, processors and exporters. But market demand must exist for a venture to be viable. If significant demand obstacles exist in the domestic market, then either overseas markets or small, specialized domestic markets — catering to ethnic, gourmet or tourist groups, for example — should be established first. In this context, the recent Canadian and Argentine experience is instructive. In these nations, the rapid expansion of cephalopod production has been based almost exclusively on export marketing, primarily in Japan. Difficulties arose and production dropped sharply in Canada and Argentina in 1980 when demand for imported cephalopod products fell in Japan due to abundant Japanese domestic landings. This experience argues in favour of cephalopod-producing countries endeavouring to establish a domestic market for cephalopod products, in order to protect producers from the vagaries of the international market and to absorb surplus project output. Market diversification almost always increases the soundness of any commercial venture.

The viability of any venture also rests on the possession of the required expertise. Cephalopod fishing ventures require expertise of a high standard in, for example, the location of and operations on fishing grounds (apart from the problems of increasing operational and marketing costs). In recent years there has been a trend toward employing jigging to catch squid, as squid caught by this gear usually bring a higher price due to the higher degree of freshness. No matter what type of catching method is adopted, it is essential to identify the most suitable methods by taking into account the effects on the other fisheries, cost advantages associated with the different types of methods, and resource conditions. In this context, considerations should be given to whether cephalopods would be fished by existing fishing gear (e.g. trawling) as an incidental catch, or by specialized gears with cephalopods the target species. When the domestic market for cephalopods is small, large-scale fishing operations are often not viable unless they also aim at catching other species (e.g. hake in the case of Argentina). If this is the case, it would also be necessary to explore the market for the other species caught as well as that for cephalopods.

1. INTRODUCTION

Cephalopod fisheries in many parts of the world's oceans are playing an increasingly useful economic and nutritional role. The establishment of national Exclusive Economic Zones (EEZs), rapidly increasing fuel costs, and a world-wide increase in the demand for cephalopod products have provided many countries with the impetus to exploit cephalopod resources within their waters in order to increase export earnings as well as to procure this source of animal protein for local consumption. As a result of these factors and others, world cephalopod landings over the past decade have been increasing at a faster rate than total world landings of other marine organisms.

This report reviews recent trends in the production, utilization, international trade and consumption of cephalopods and cephalopod products in major producing and consuming countries of the world. It also examines the prospects for demand for cephalopods over the next ten years, and assesses the production potential of world cephalopod resources. Finally, the international climate which surrounds the cephalopod-based industry is reviewed, and some conclusions which may be considered for the achievement of sound development of cephalopod fisheries and markets are presented.

II. MAJOR SPECIES OF CEPHALOPODS OF COMMERCIAL IMPORTANCE

Cephalopods represent a small group of highly organized invertebrate animals of exclusively marine distribution. They derive their name from the close union of the head with the feet, and are distinguished from other classes of the phylum mollusca by their mobility; most other molluscs are unable to swim, while cephalopods are relatively fast-moving animals. All of the four groups of cephalopods, i.e. squid, cuttlefish, octopus and chambered nautilus¹, are of commercial interest. Squid are in general fast-moving pelagic animals, while cuttlefish, which are much more leisurely swimmers, hover close to the bottom in inshore waters, feeding on shrimps and shellfish.

A. Squids

Most of the commercially exploited squids belong to two main families, Ommastrephidae and Loliginidae; the distribution of the major species comprising the two main squid families is given in Figure 1. Of these two families, the Ommastrephidae are by far the most important. About three-quarters of the world squid catch is composed of the Ommastrephidae, usually taken by jigging.

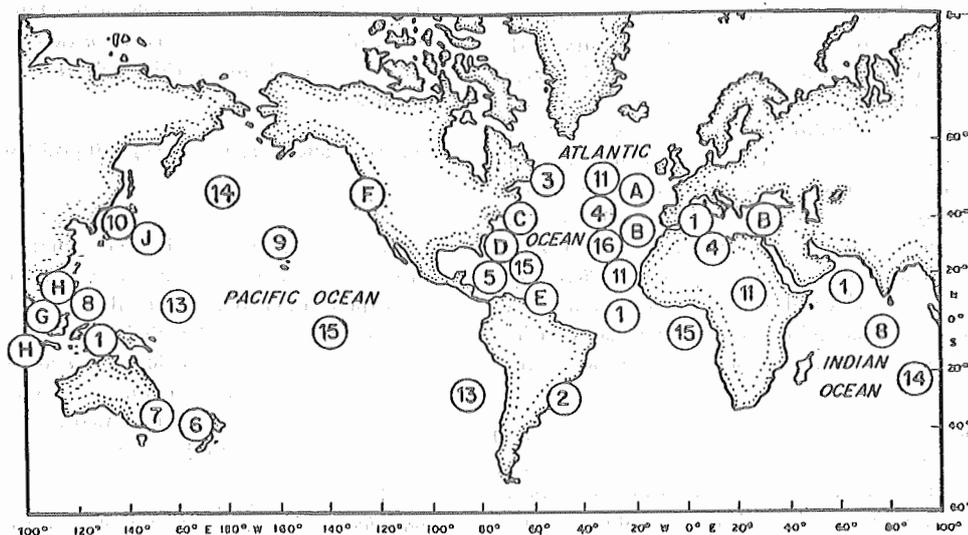


Fig. 1 Main concentrations of principal species of the families Ommastrephidae and Loliginidae

Family Ommastrephidae

- | | |
|------------------------------------|--|
| 1. <i>Todarodes eblanae</i> | 9. <i>N. s. hawaiiensis</i> |
| 2. <i>Illex argentinus</i> | 10. <i>Todarodes pacificus</i> |
| 3. <i>I. illecebrosus</i> | 11. <i>T. sagittatus</i> |
| 4. <i>I. coindetii</i> | 12. <i>Symplectoteuthis cualaniensis</i> |
| 5. <i>I. oxygonius</i> | 13. <i>Disidicus gigas</i> |
| 6. <i>Nototodarus sloani sloan</i> | 14. <i>Ommastrephes bartrami</i> |
| 7. <i>N. s. gouldi</i> | 15. <i>O. pteropus</i> |
| 8. <i>N. s. philippinensis</i> | 16. <i>O. caroli</i> |

Family Loliginidae

- | | |
|--------------------------|-------------------------|
| A. <i>Loligo forbesi</i> | F. <i>L. opalescens</i> |
| B. <i>L. vulgaris</i> | G. <i>L. edulis</i> |
| C. <i>L. pealei</i> | H. <i>L. chinensis</i> |
| D. <i>L. plei</i> | I. <i>L. duvaucelii</i> |
| E. <i>L. brailiensis</i> | J. <i>L. bleekeri</i> |

¹This group is excluded from the study.

The most important single species is *Todarodes pacificus* and related species of the genus *Todarodes*. Their production account for some 35 percent of the world squid catch. They occur from Western Canada across the North Pacific to the area of the southeast coast of China. Their distribution is also recorded around the Philippines, New Zealand, Australia and the Hawaiian Islands, in the North, Central and South Atlantic off both the European — African and American Coasts, and in the Mediterranean.

Other important ommastrephid squid are those of the genus *Illex*, namely; *Illex illecebrosus*, *Illex coindetii* and *Illex argentinus*. The distribution of these species covers an extensive range in the Atlantic from Greenland to the Caribbean and off northern Brazil; on the eastern side of the Atlantic their distribution extends from Iceland along the western coast of the British Isles and the European continent and down into the Mediterranean. *Ommastrephes caroli* is spread over the North and Central Atlantic off the European — African coast and in the Mediterranean and off the north-eastern waters of Australia. *Dosidicus gigas* is found especially along the Pacific Coast from California and Mexico down to Chile.

The species of the family Loliginidae, which are mostly taken by trawl, also form an important part of the commercial squid of the world. They have a world-wide distribution in tropical and temperate areas. *Loligo vulgaris* occurs in the Eastern Atlantic down to South Africa and in the Mediterranean. *L. pealei* is mainly distributed in the Western Atlantic from New England to the Caribbean Sea. *L. forbesi* occurs in the Mediterranean as well as European and African waters, and is recorded even in the Red Sea. The distribution of *L. opalescens* extends along the Pacific coast of North America and Mexico, while it is mainly fished off California. *L. duvaucelii* has the most extensive distribution among *Loligo* spp., occurring around the Province of Taiwan, Indonesian waters and along the coast of India and the northeast coast of Africa. While the size of this squid is small, the individual population is estimated to be large.

Besides the neritic squids (mostly of the family Loliginidae) and cuttlefish (Sepiidae), several oceanic species belonging to the Ommastrephidae family have been traditionally utilized. Among them *Ommastrephes bartrami* is by far the most important from the commercial point of view. It occurs in the Northwest Pacific off northeast Honshu and Hokkaido of Japan, and off California.

B. Cuttlefish

The two main families of cuttlefish — Sepiidae and Sepiolidae — are represented by about 130 species. Among them, *Sepia esculenta*, *S. madokai*, *S. officinalis*, *S. pharaonis*, *Sepiella japonica* are widely caught on a commercial basis. Cuttlefish live only in shallow waters extending from the shores to the upper slopes of the continental shelf. World production of cuttlefish is very much less than that of squid and possibly for this reason cuttlefish are generally more highly valued in the main consuming countries. The valuable species of both squid and cuttlefish are listed in Appendix 1.

C. Octopus

The order Octopoda is divided into some ten families, of which only the Octopodidae are commercially exploited. These animals are found from the intertidal zone to the continental slope, and inhabit holes, crevices, old shells, etc. They are carnivorous, feeding on crustaceans, other molluscs and fishes. It is estimated that there are perhaps 100 species of Octopodidae occurring in various parts of the world's oceans. *Octopus vulgaris* is considered the most valuable from the commercial point of view; *O. dofleini*, *O. eledone*, *O. maya* and *O. ocellatus* are also widely harvested.

III. PRODUCTION TRENDS

The world catch of cephalopods has increased during the last decade, and amounted to some 1.5 million metric tons live weight in 1980, compared with about 1.0 million tons in the early seventies (Table 1). Of the total, squid output now accounts for a little over 75 percent, cuttlefish 12 percent and octopus 10 percent (see also Statistical Annex Table 1).

Cuttlefish production has increased steadily over the last decade, reaching some 295 000 tons in 1980. Conversely, octopus output has declined somewhat after a peak production of nearly 230 000 tons in 1975. The first-hand value of the world cephalopod catch in the late seventies was of the order of US\$3 000 million, or a little over 8 percent of the estimated value of the world catch of all fish, crustaceans and molluscs.

A. Production by major cephalopod fishing nations

1. Japan

Japan is the world's largest cephalopod producing nation, although its share of the world total has gradually declined over the last decade. During the sixties, Japan harvested some 70 percent of the total cephalopod catch of the world, whereas in recent years its share has declined to less than 40 percent. Nevertheless, Japan remains the greatest single producer. In 1980, its production amounted to 732 000 tons, representing 7 percent of the total national fish landings (Table 2).

The most important species taken in Japan is *Todarodes pacificus*. A large decrease of *T. pacificus* in the Japanese waters is, however, a distinct feature which has been observed over the last ten years. *T. pacificus* represented 67 percent of total Japanese cephalopod catches in 1970, but dropped to 63 percent in 1975 and 45 percent in 1980. The decline in the yield of *T. pacificus* has been caused as much by excessive fishing effort as by the change in hydrographic conditions. It ranked fifth in 1980 in terms of quantity after sardine, Alaska pollack, mackerel and skipjack. During the last decade its production has fluctuated between 240 000 and 410 000 tons with an average catch of 340 000 tons.

The decrease in the production of *T. pacificus* has been compensated for by increased production *Ommastrephes bartrami*. In 1974, the catch of *O. bartrami* was only 17 000 tons, but reached 150 000 tons in 1980.

Table 1
World Catch of Cephalopods 1970-80 by Regions and Major Countries

	('000 t live weight)										
	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
WORLD TOTAL	999	983	1 192	1 068	1 074	1 182	1 210	1 232	1 330	1 516	1 504
Squid	735	715	851	724	713	803	826	845	939	1 161	1 151
Cuttlefish	101	109	137	159	149	150	175	196	201	205	186
Octopus	163	159	204	185	212	229	209	191	190	150	167
AFRICA	7	6	7	6	10	11	14	12	14	14	14
NORTH AMERICA	12	19	10	8	16	16	25	42	56	114	48
Canada	0	2	0	1	0	3	11	31	36	90	30
USA	12	17	10	7	16	13	13	11	19	22	16
LATIN AMERICA	6	8	10	10	13	12	21	17	76	123	1
Argentina	2	2	2	4	5	4	8	2	59	87	9
Mexico	2	3	4	2	4	4	6	7	9	25	27
Venezuela	0	1	1	2	2	2	1	2	0	1	1
ASIA	826	775	911	744	753	841	868	850	917	957	1 090
Hong Kong	4	4	5	4	4	6	9	6	7	9	6
Japan	616	569	671	551	550	608	564	559	585	581	732
Korea, Republic of	78	53	66	74	73	90	118	70	89	118	127
Malaysia	4	4	3	5	8	9	14	15	17	17	13
Philippines	18	19	22	22	26	31	26	27	32	29	32
Thailand	34	38	73	61	65	66	64	94	94	75	62
Yemen, Dem.	3	3	4	5	7	6	16	16	5	9	10
China	57	73	48	—	—	—	36	40	62	90	80
EUROPE	125	132	208	231	234	233	204	191	203	198	207
France	8	13	9	14	9	13	10	13	11	8	7
Greece	5	6	5	6	6	4	5	5	4	6	6
Italy	31	29	64	32	36	35	37	42	35	37	48
Portugal	4	4	6	9	5	6	6	6	10	7	11
Spain	75	77	145	157	169	159	127	105	131	103	115
OCEANIA	0	0	0	1	0	0	0	1	2	8	1
USSR	6	28	23	30	26	40	42	35	29	57	56
OTHERS	17	17	24	38	22	30	37	33	34	47	47

Note: OTHERS indicate the production of the province of Taiwan. Totals may not add nor exactly correspond with those in Statistical Annex Table A7-1 due to the rounding-off of sub-totals.

Source: FAO

Table 2
Japanese Catch of Cephalopods, 1970-80

Year	Cephalopod total	(t live weight)					
		"Surumeika" <i>Todarodes pacificus</i>	"Murasaki-ika" <i>Ommastrephes bartrami</i> ¹	"Koika" <i>Sepia esculenta</i>	"Monjoika" <i>Sepia officinalis</i>	Other	<i>Octopus</i> spp.
1970	615 044	412 240	—	14 740	—	91 937	96 127
1971	568 025	364 349	—	15 413	—	102 756	85 507
1972	666 307	464 365	—	15 090	—	119 995	66 857
1973	550 051	347 566	—	12 225	—	126 496	63 764
1974	566 698	355 018	17 000	17 190	—	100 759	76 731
1975	611 800	385 255	41 000	15 517	—	96 066	73 962
1976	579 823	312 144	84 200	19 750	11 081 ²	85 775	66 873
1977	591 974	264 239	121 800	20 421	10 460	107 125	67 929
1978	584 365	216 448	151 300	19 054	6 094	127 099	64 370
1979	580 817	212 846	127 259	14 148	10 197	164 381	51 986
1980	732 715	331 225	147 210	10 409	5 609	192 162	46 105

¹Estimated by the industries concerned

²Data are not available before 1975

Source: Annual Report on Statistics of Fishing and Aquaculture, Ministry of Agriculture, Forestry and Fisheries, Japan; and others. 1981

Cuttlefish — *Sepia esculenta* ("koika") and *S. officinalis* ("mongoika") — are commercially of great significance. Their aggregate output has been gradually declining over the past several years, to the order of 16 000 tons in 1980. The latter is not caught in Japanese waters.

In addition to squid (including cuttlefish) fishing in waters adjacent to Japan, overseas squid fishing is also carried out by Japanese vessels to meet the strong domestic market demand. The total output of such fishing amounted to 107 000 tons in 1980, accounting for some 16 percent of the national squid landings. The major fishing grounds are located off New Zealand (*Nototodarus sloani sloani*), Canada (*Illex illecebrosus*), USA (*I. illecebrosus*) and (*Loligo pealei*), Argentina (*Illex argentinus*), People's Democratic Republic of Yemen (*Sepia officinalis*), South Africa (*Loligo* spp.), West Africa (*Sepia officinalis*) and in Southwest Atlantic (*Loligo* spp.).

The yield of octopus ranged from 46 000 to 96 000 tons per annum during 1970-80. The catch from Japanese waters has been of the order of 40 000 tons over the last decade. The Japanese catch of octopus in distant waters, in particular in the Eastern Central Atlantic off Morocco and Mauritania, has been declining in recent years; it had been 25 000 tons per annum until 1977, but dropped to 20 000 tons in 1978, 10 000 tons in 1979, and finally nil in 1980, due to the fishery management policy of the coastal states. Catches in domestic waters are generally taken by trawling, long-lining and pots; *Octopus vulgaris* ("madako") is most widely taken, and *Octopus dofleini* ("mizu-dako") and *Octopus ocellatus* ("ii-dako") are also harvested on a commercial basis.

2. Spain

Spain's catch of cephalopods, after having reached a peak of 170 000 tons in 1974, has since been on a somewhat downward trend. Octopus is the most important species taken, in terms of quantity, and represent more than 45 percent of the total national cephalopod catch. It is mostly taken on the Sahara Bank and off Mauritania in the Eastern Central Atlantic, although minor quantities are harvested in the Northeast Atlantic and the Mediterranean.

The cuttlefish catch has been maintained on the order of 24 000 tons per annum over the last several years. As in the case of octopus, the great majority originates from the Eastern Central Atlantic and small quantities are taken in the North-east Atlantic and the Mediterranean. Production of squid has fluctuated from between 20 000 and 48 000 tons over the last ten years. Squid have been caught conventionally in nearby waters with a constant level of catch; the greater part of the Spanish squid output, however, has been harvested in the Northeast-Atlantic trawlers.

3. Thailand

At present, cephalopod fishing grounds for Thai fishermen are restricted to Thai waters in the Gulf of Thailand and the Andaman Sea on Thailand's west coast. The waters off Kampuchea and Malaysia, formerly important squid fishing grounds, are no longer accessible to Thai fishermen due to

the establishment of the 200-mile EEZ by those nations. Cephalopod production by Thailand reached a peak of 94 000 tons in 1977, 2.7 times higher than the catch in 1970. More recently, however, catches have been declining as a result of over-exploitation of resources in the Gulf of Thailand, and the establishment of EEZs by neighbouring countries. *Loligo chinensis* is the dominant species caught, and most of the catch is taken by trawl or cast nets.

4. Republic of Korea

There has been a gradual increase in cephalopod production by the Republic of Korea in the last ten years, the total reaching 127 000 tons in 1980. *Todarodes pacificus* is by far the most important species in terms of quantity. From time to time, Korean squid boats share the fishing grounds with Japanese vessels in the Sea of Japan, so that there is a tendency for the catches of *T. pacificus* of these two nations to show a similar production curve. At present, there are no mutual restrictions on squid grounds between them.

Since 1971, Korean distant water fleets have exploited cephalopod resources off West Africa, in particular in Mauritanian waters. Republic of Korea has maintained a fairly constant catch of cephalopods from this area, of the order of 20 000 tons per annum and accounting for some 15 percent of the total Korean landings of cephalopods. Korean fleets are also engaged in operations off New Zealand, catching a few thousand tons of squid annually.

5. Italy

Annual cephalopod production of Italy has fluctuated from between 30 000 and 64 000 tons, averaging 39 000 tons per annum throughout the last decade. Squid, cuttlefish and octopus have long been caught, with squid accounting for a little over 40 percent of the total landings in 1980. The Italian cephalopod catch in the Mediterranean represents some 70-80 percent of the total landings, the remainder coming from the Northwest and Eastern Central Atlantic. The catch of cephalopods represented 10 percent of the total Italian fish production in terms of quantity in 1980, but 28 percent in value terms.

6. France

Cephalopod landings by France have fluctuated between 7 000 and 14 000 tons over the last ten years. The important fishing grounds are located in the Mediterranean and the Bay of Biscay, whilst a few thousand tons of squid are also taken in the Northwest Atlantic.

7. Greece

Domestic production of cephalopods by Greece have ranged between 4 000 and 6 500 tons per annum over the last decade. Cuttlefish, accounting for more than a half of the total, are normally harvested off West Africa under licence agreements or joint-venture arrangements. The other important fishing ground is, of course, the Mediterranean. Squid are not separately identified by species, but it is estimated that *Loligo* spp. are the principal species taken.

8. Portugal

The cephalopod production of Portugal has gradually increased over the last ten years, reaching 11 000 tons in 1980. Octopus is the most important item taken, but an increased catch of squid in recent years is notable. Cuttlefish production has ranged from 1 000 to 1 500 tons per annum during the period under review. Apart from substantial production in nearby waters, Portuguese fishermen take squid in the Northwest Atlantic, off West Africa and Namibia, although the quantities are minimal.

9. United States

Until the present, squid has been an under-utilized fish species in U.S.A. waters. Recently, however, a great deal of interest has been shown in exploring national squid resources, particularly those off the New England and Middle Atlantic States, for the development of a domestic squid fishery. There has been an upward trend in production; output reached 22 000 tons in 1979 and 16 000 tons in 1980. At present, the biggest part of the catch consists of *Loligo opalescens*, caught by lampara nets and purse-seines in the California current on the west coast, with fishing operations extending up to Alaska. *Dosidicus gigas* have also been landed from time to time but never in sufficient quantity to support a sustained fishery. American landings along the Pacific coast have averaged 11 000 tons over the last decade.

On the northeastern coast squid are harvested incidentally to fishing for other fish species on inshore grounds. American fishermen operating in the Atlantic have yet to fully exploit offshore stocks because squid have been of little importance, due to the limited domestic market. The long-finned squid *Loligo pealei* and short-finned squid *Illex illecebrosus* are the major species caught along the Atlantic coast. The former is mainly landed along the middle Atlantic coast southward to the Gulf of Mexico, whilst the latter is landed in New England with a relatively steady production of 1 000-2 000 tons over the last 15 years.

10. Canada

A notable feature in recent years has been the rapid increase in cephalopod production by Canada. The Canadian catch reached 90 000 tons in 1979, up from almost negligible quantities prior to 1974. Squid fishery development measures taken by the Canadian Government (e.g. special subsidies) in conjunction with the establishment of the 200-mile EEZ has contributed to the expansion to a major degree, with the result that Canada has become one of the larger squid-producing countries in the world. *Illex illecebrosus* is the primary species caught along the Atlantic coast, mainly around Newfoundland and Nova Scotia. A commercial squid fishery on the west coast of the country does not yet exist.

11. Central and South America

The production of cephalopods in Central and South America has increased remarkably over the last ten years, reaching 123 000 tons in 1979 as compared with only

5 800 tons in 1970. Whilst incomplete statistics make it difficult to give a complete picture of the landings in this area, it is known that there are five countries which harvest squid and octopus on a commercial basis (i.e. Argentina, Mexico, Uruguay, Brazil and Venezuela). Of these Argentina is by far the largest producer of cephalopods. The main species caught is *Illex argentinus*, with fishing grounds extending from the estuary of La Plata up to 48° South Latitude, ranging along some 1 600 km of the coastline. The fishing season lasts from December to August, with a gradual shift of fishing grounds from south to north. In 1979, Argentine production amounted to 90 000 tons, although it dropped drastically to 9 000 tons in the following year due to unfavourable conditions in the markets to which the product was destined. When squid fishing takes place within the country's EEZ it is conducted under joint-venture arrangements. Most joint-ventures are operated with Spain.

The recent rapid expansion of the cephalopod catches of Mexico is notable, caused by the exploitation of squid (*O. bartrami* and *O. gigas*) grounds in the Baja California current centering off Ensenada. There are joint-venture arrangements between Mexico and Japan to catch squid in this area, and reportedly in 1980, 15 Japanese vessels were engaged in such operations. The yield of squid reached a little over 20 000 tons in 1980, compared with 4 000 tons in 1975. There has been a steady growth in the catch of octopus over the last decade, harvested almost exclusively in the Gulf of Mexico.

The domestic catch of squid by Uruguay has risen remarkably over the last several years, reaching 4 700 tons in 1979 as compared to only 520 tons in 1975. *I. argentinus* is the major species taken, at the latitude 35°.39° South, its main fishing season lasting from late March to August. The great majority of catches is landed at Montevideo. *Loligo brasiliensis* is also caught, but the quantity is of minor importance. In Colombia and Peru squid is taken incidental to other fish, so that production has stayed at a few hundred tons per annum during the last several years. Cephalopods are not important in traditional small-scale fisheries in Chile and Ecuador.

12. Asia

Cephalopods are widely consumed in the Philippines, where catches have been increasing steadily over the last ten years to reach 32 000 tons in 1980 as compared to 18 000 tons in 1970. There are several fishing grounds in the Philippines, mostly in the coastal inter-island waters, where *Loligo* spp. and *Sepia* spp. are taken by otter trawls, purse-seines, round haul seines, lift nets and scoop nets all the year round; octopus is usually caught on the reefs by hand at night using torches. Increased attention is being given to squid fishery development in order to meet the demand of both domestic and export markets. Technical assistance was extended in testing midwater trawling to improve squid catch under the German Technical Aid Programme.

The annual catch of cephalopods by Hong Kong has recently fluctuated from between 6 000 to 8 000 tons, 70-80 percent of which are squid. *Loligo edulis* and *L. chinensis* are the major species which inhabit the continental shelf in this area, being mainly caught by pair and stern trawlers. About 2 000 tons of cuttlefish (*Sepia* spp.) are landed, whilst octopus are of minor importance, with an annual output of about 200 tons. Landings of squid in Hong Kong show both seasonal and annual changes, with a high abundance from July to September, probably the result of spawning and recruitment of the squid population at this time. The change in annual landings seems to follow a three-to-four year cycle².

The cephalopod production of Indonesia has been on an upward trend over the last several years, reaching 14 000 tons in 1980, a two-fold increase from the 7 000 tons in 1970. Squid (*Loligo edulis*) constitutes the major part of landings, whilst 2 000-2 500 tons of cuttlefish (*Sepia* spp.) are also taken annually. The production of octopus is minimal.

Cephalopods can be found almost everywhere in the Indonesian waters and are caught by different kinds of gears. Both squid and cuttlefish landings come from coastal small-scale operations, whilst octopus are limited to coral reef waters. In most parts of the Indonesian waters cephalopod landings are considered as by-catches.

A rather specialized squid fishery is conducted during the west monsoon period from September to March in Alas Strait located between Lombok and Sumbawa linking the Flores Sea. The total annual catch from this area amounted to some 1 700 tons in 1980.

Reports by research vessels mention the abundance of high sea or oceanic big squid along the Indian Ocean coastal waters but up until the present no commercial landings have been recorded.

The People's Republic of China is a great producer of cephalopods, with catches amounting to 80 000 tons in 1980. Although the official statistics do not distinguish between species, it is believed that squid (*Loligo* spp.) constitute the greater part of the national catch. Octopus are also taken along the coast of China, but the quantity is of minor importance.

13. Oceania

Within New Zealand's 200-mile EEZ there are three species of commercial interest, of which *Nototodarus sloani* is by far the most important. It is fished by squid jigging boats and by trawlers. Apart from squid, there is little else jigged by the New Zealand domestic fleet. Mostly, they are caught by foreign vessels under licence agreements or joint-venture operations. The licensed foreign jig fleet is at present almost exclusively Japanese, with a limited input from the Republic of Korea. The trawlers involved in squid fishing are primarily licensed foreign vessels (USSR, Japan, Republic of Korea) and joint-venture vessels (USSR, Republic of Korea, Japan and Poland). Licensed foreign vessels do not land their catch in New Zealand. The catches are either

returned to their home port, or part or all of the squid catch is sold in the international market before the vessels return to their home country (e.g. USSR). The joint-venture catch is often landed in New Zealand where some processing may take place. Joint-venture squid are sold as a product of New Zealand on overseas markets.

Cephalopods have long been taken by fishermen in Australia. There has been a gradual increase in production over the last several years due to export demand by Japan, the Republic of Korea and China. Province of Taiwan. The yield of squid and cuttlefish in 1980 was 1 100 tons. There are several species of commercial interest, among these *Nototodarus gouldi* is the principal item. Exploratory and joint-venture fishing for this species had been undertaken by Japanese jigging vessels since the early seventies. However, these ventures were suspended in 1980 due to increasing fuel costs.

14. USSR

Whilst no detailed information is available, over the last ten years, the USSR has given considerable attention to squid, the production of which ranged from 40 000 to 85 000 tons during 1975-80. Soviet fleets frequently appear in the main cephalopod fishing grounds, such as the North West Atlantic, Eastern Central Atlantic, North West Pacific, and those off New Zealand and the People's Republic of Yemen (PDRY).

B. Production and future potential by ocean area³

Recent trends in catches as well as an assessment of the potential yield of cephalopod resources in each of the major marine areas are reviewed in this section. Table 3 provides a summary of the data presented.

1. Northwest Atlantic (Area 21)

Nearly all the major fish stocks except for cephalopods have been intensively exploited or over-fished in this region. Squid production has trended upward over the last decade, reaching more than 176 000 tons in 1979 as compared to 16 000 tons in 1970 — a nearly tenfold increase. Canada, Spain, Japan and the USSR are the major fishing nations in this region. One of the noticeable features in this context is the sudden emergence of Canada in the last few years — harvesting some 80 000 tons in 1979, representing over 45 percent of the total cephalopod catch in the area. This is due largely to the national policy of promoting squid fishing, the resources of which are considered to moderately exploited as compared to other species. The Canadian catch (all for export) dropped to 30 000 tons in 1981, however, a result of marketing problems in Japan, which had a high domestic production of its own that year.

Most of the Northwest Atlantic catch in recent years consists of two species: the short-finned squid, *Illex illecebrosus* and the long-finned squid, *Loligo pealei*, the former being more important in terms of quantity. These species, or subspecies, range from the Bristol Channel and Northern European waters to Iceland, Greenland, Labrador and Newfoundland, southward along the eastern coast of the United States to Florida.

²P.K.S. Shin, 1982.

³FAO nomenclature (Area no.) is utilized throughout this report.

Table 3
Present Catch and Estimated Potential of Cephalopods by Marine Areas

		1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	Estimated potential	State of exploitation
Atlantic	NW (Area 21)	15.5	27.6	40.0	66.2	56.0	69.7	98.8	123.7	97.1	176.8	113.0	Unknown	Moderately exploited
	NE (Area 27)	41.5	46.9	35.6	28.3	25.7	31.0	24.9	27.4	27.2	15.6	28.2	Unknown	Virtually unexploited
	WC (Area 31)	2.1	3.5	5.6	4.3	7.3	6.5	6.5	8.4	3.5	7.7	8.3	100	Virtually unexploited
	EC (Area 34)	134.3	149.7	179.6	192.6	224.8	203.1	179.7	148.7	161.6	124.1	129.3	Squids, 40, Cuttlefish 40, Octopus 100	Over-exploited
	SW (Area 41)	2.3	2.6	2.5	5.2	5.5	5.3	9.3	3.4	74.9	124.1	31.1	Few hundreds	Lightly exploited
	SE (Area 47)	1.7	1.2	1.5	1.6	5.1	6.7	4.3	7.5	11.3	11.8	8.4	Unknown	—
Mediterranean and Black Sea	(Area 37)	43.8	42.9	48.1	41.6	44.8	46.8	47.9	47.4	45.3	44.3	52.5	Unknown	—
Indian	W (Area 51)	3.4	4.9	7.3	14.3	14.4	10.4	25.1	26.5	9.8	17.9	18.0	Unknown	—
	E (Area 57)	0.2	0.3	0.2	1.2	2.1	2.0	2.0	10.5	10.1	8.6	13.5	Unknown	—
Pacific	NW (Area 61)	656.4	605.0	726.8	574.5	533.3	639.5	655.4	610.4	669.8	762.9	871.2	Squids 500-600	Fully exploited
	NE (Area 67)	—	—	0.2	0.4	0.3	0.7	0.6	4.3	3.8	2.9	4.2	Unknown	—
	WC (Area 71)	85.4	82.6	87.5	115.7	116.5	128.8	125.5	148.9	157.9	137.4	125.6	Unknown	—
	EC (Area 77)	11.3	14.6	9.3	5.6	13.4	11.5	10.6	10.3	19.8	27.4	30.7	Squids 500-1 000	Lightly exploited
	SW (Area 81)	—	—	0.1	15.5	24.6	19.8	19.7	55.4	36.8	54.6	69.2	Not available	Unknown
	SE (Area 87)	0.8	0.9	0.7	1.1	0.1	0.5	1.1	0.3	0.3	0.3	0.3	Few hundreds	Virtually unexploited
Total		998.7	982.7	1 192.4	1 068.1	1 073.9	1 182.3	1 210.4	1 231.5	1 330.2	1 516.4	1 503.5		

Source: FAO Yearbooks of Fishery Statistics

Review of the State of World Fishery Resources. FAO Fisheries Circular No. 710, Revision 2, FAO, 1981

Illex illecebrosus is mainly harvested off Newfoundland by large trawlers, although an inshore fishery utilizing jigs and fish traps is locally important in Newfoundland and Nova Scotia. (Northwest Atlantic Fishery Organization (NAFO) set a precautionary quota of 150 000 tons on catches in 1981).

L. pealei is a benthic species which is distributed from Cape Cod southward to Florida and the Gulf of Mexico. Catches have been somewhat irregular over the last few years, with an average of 15 000 tons per annum.

Although the magnitude of the squid potential has not been precisely assessed, it is believed that the resources have been relatively moderately exploited. A further modest expansion in output, subject to development of marketing outlets, is possible particularly in the case of Canada; but this will depend on the implementation of national resources management. Annual yield also appears very dependent on environmental factors which vary from year to year.

2. North-east Atlantic (Area 27)

Although the North-east Atlantic is one of the centres of modern fishing development, the cephalopod resources have, so far, been only lightly exploited. Annual catches of cephalopods have fluctuated between 25 000 to 45 000 tons over the last decade. Most of the catch is taken by Spain, France, Portugal and Italy; the catch of squid by northern European nations is taken incidental to bottom trawling for scalefish as no regular fishery is pursued by them. *Loligo vulgaris*, the common European squid and the important species harvested in this region, ranges from the North Sea along the European coast to Africa.

The major cuttlefish of the Atlantic coast of Europe is *Sepia officinalis*, production of which represents some 25 per cent of the total cephalopod output. *Octopus vulgaris* is also of commercial importance, being chiefly harvested by Spain and Portugal off the French coast and the Channel Islands, with a total average catch of 8 000 tons per annum over the last few years. Little work has been published concerning the stocks of the cephalopods in this region. However, on the basis of the limited evidence available, stocks are thought to be only moderately exploited, with a modest potential for further expansion.

3. Western Central Atlantic (Area 31)

There seems no doubt that octopus and squid form a large resource in this region, and that their commercial exploitation has just begun. The cephalopod fisheries in this area are currently small and landings are in many cases incidental to scalefish and shrimp trawling. Annual catches have ranged between 2 000 and 8 400 t over the last decade, with octopus being by far the most important species. These are mainly harvested by Mexico. It should be noted that if unreported landings and discards plus by-catches from the shrimp fisheries were added, the total output would greatly exceed published figures.

There are six potential commercial squids in this region, of which *Illex coindetti*, *Loligo pealei*, *Lollinguncula brevis* and *Ommastrephes pteropus* appear to be the most important. At least four species of octopus are caught for food and marketed, *Octopus vulgaris* being the most well known.

Octopus maya is considered a promising species for further exploitation. The potential of cephalopods is estimated to be in excess of 100 000 tons per year, but data are inadequate to improve on this guess at present.

4. Eastern Central Atlantic (Area 34)

The cephalopod stocks, which represent one of the most valuable resources in the Eastern Central Atlantic, have been already over-exploited, especially by medium and large stern trawlers from European countries (i.e. Spain, Greece, Italy), and Japan, the Republic of Korea and the USSR. The participation of local fleets (i.e. Senegal, Ghana, Mauritania) has become a notable feature of recent years. The catch has fluctuated from between 150 000 and 225 000 tons per annum over the last decade. Three major species are fished — *Sepia officinalis*, *Loligo vulgaris* and *Octopus vulgaris*. Octopus accounts for some 55 percent of the total catch, squid 15 percent and cuttlefish 30 percent.

After having reached a peak of 225 000 tons in 1974, there has been a declining trend in production. This decline affects all the three species groups. However, it is less marked for squids, which may be only moderately exploited.

The report of the *ad hoc* Working Group in the Assessment of Cephalopod Stocks⁴ states that the catch per unit fishing effort (cpue) has drastically declined over the last 15 years. For example, cpue of Japanese cuttlefish vessels continued to decrease from 319 kg/h in 1966, 102 kg/h in 1970 and 35 kg/h in 1977. Likewise, the Spanish cpue dropped from 61 kg/h in 1969 to 28 kg/h in 1977. These figures demonstrate how rapidly cephalopod fisheries have expanded in this region.

Fishing operations for octopus and cuttlefish are to a large extent concentrated within four major grounds: Cape Garnett, Cape Barbas, Cape Blanc, Nouakchott, Cape Verde (south). The location of the squid fishing grounds is somewhat different. The availability of commercial concentrations is relatively more sporadic and consequently their exploitation is initially of secondary importance and less intensive, although their unit economic value is the highest of the three species categories.

The potential productivity of the three species are estimated to be 40 000 tons for squids, 40 000 tons for cuttlefish and 100 tons for octopus. The last two groups of cephalopod have been already over-exploited in this area.

5. Southwest Atlantic (Area 41)

Cephalopods have been lightly exploited in this area. The demand for fishery products in general is small, there being very good local supplies of meat. However, in 1978 there was a drastic increase in production due to increased production in Argentina, plus the new entry of Japanese and Polish fishing fleets. Annual production jumped to 75 000 tons in 1978 and to 124 000 tons in 1979, from volumes which had fluctuated between 2 000 and 9 000 tons up until 1977.

The most common squids are Liliigid squid, "calamarete de Brazil" or *Loligo brasiliensis*, caught off Brazil, and Ommastrephid squid, "calamar de Argentina" or *Illex argentinus*, taken off Argentina from Mar del Plata in the north to Rawson in the south. They are also taken incidental to the shrimp and langostino fishery. Among several species of octopus, *O. vulgaris* is the most common and is taken along the coasts of Brazil, Uruguay and Argentina almost incidentally to shrimp trawling and sometimes by hand in the subsistence fisheries. Little is known concerning the stocks of cephalopods in this region, although it has been noted that squid (*Illex* spp.) has a similar distribution to hake, which feed intensively on it, and from this it has been estimated that one squid potential alone is in the range of a few hundred thousand tons (although this level of harvest might have a significant impact on the hake stock).

6. Southeast Atlantic (Area 47)

Fishing grounds for cephalopods are found off Namibia, where the upwelling caused by the Benguela Current occurs throughout the year. A considerable quantity of octopus, cuttlefish and squid is believed to be present, mainly on the continental shelf and upper slope along the coast from Angola to the Cape of Good Hope. Although the resources have remained under-exploited, due largely to the long distance from major consuming countries and the restricted local markets, there has been an upward trend in production over the last several years, reaching some 11 000 tons in 1978 as compared with the average catch of 1 500 tons in the early 1970s. Cephalopods from this area have so far been taken by Japan, Spain, South Africa, the USSR and Angola. There are several species of commercial interest, such as *Octopus vulgaris*, *Sepia officinalis*, *Sepiella cyanea* and *Loligo reynaudi*. The total absence of relevant data makes it difficult to assess the stock of cephalopods, but it is estimated that the potential productivity is much higher than the present level of catches.

7. Mediterranean and Black Sea (Area 37)

Cephalopods have for centuries been a traditional item of consumption along the coast of the Mediterranean Sea. Catches have remained very stable, being of the order of 40 000 tons per annum over the last decade. The commercially important species are *Loligo vulgaris*, *Todarodes sagittatus*, *Illex coindetii*, *Sepia officinalis* and *Octopus vulgaris*. In quantity terms, octopus appears to be the most important, with an average catch of 20 000 tons, followed by cuttlefish at about 15 000 tons, and squid at 11 000 tons. The Mediterranean is basically not a very productive area. Cephalopods are not found in the Black Sea.

8. Indian Ocean (Areas 51 and 57)

The total catch of cephalopods in the Western Indian Ocean has increased remarkably over the last ten years — reaching 37 000 tons in 1977 as compared to 3 600 tons in 1969 — due to the commercial fishing for cuttlefish by

⁴CECAF/ECAF Series 78/11, FAO, 1979.

Japanese trawlers in the Arabian Sea, which was initiated in 1967. In the initial stages, operations were carried out in all coastal waters extending from Oman to Somalia. Subsequently, the operations have been concentrated in the waters along the coast of People's Democratic Republic of Yemen (PDRY). Four species of cuttlefish are commonly found in the fishing grounds off PDRY: they are *Sepia pharaonis*, *S. savignyi*, *S. prashadi* and *Sepiella inermis*. It seems that *S. pharaonis* is most abundant among them and predominant in the catch of cuttlefish by trawlers on these grounds.

In the eastern Indian Ocean (Area 57) catches have gradually increased, reaching some 13 500 tons in 1981, due to the expansion of squid/cuttlefish fishing in Thailand and Indonesia.

Cephalopods are abundant both in number and species throughout most of the coastal waters of the Indian Ocean, but in the absence of reliable and comprehensive statistics, production potentials cannot be properly assessed, though it is at least certain that the cephalopod resources of this region remain under-exploited. *S. pharaonis* *Symplectoteuthis oualaniensis* (in the western area), *Nototodarus sloani* (in the eastern area), are considered to be the promising species in the region as a whole.

9. Northwest Pacific (Area 61)

In this area is concentrated the world's most important cephalopod fisheries, and most stocks are now being fully exploited. The total catch from this area reached a peak in 1980 of nearly 870 000 tons; the production had ranged from between 530 000 and 870 000 tons during 1970-80, representing nearly 50 percent of the total world output.

Japan is the largest producer of squid in this region, whose production accounts for 75-80 percent of the total squid output. China, the Republic of Korea, the USSR and Hong Kong are other important countries which are engaged in squid fishing.

Almost two-thirds of the squid catch is normally taken along the Pacific coast of Northern Japan and Hokkaido and the Sea of Japan by Japanese jigging vessels. *Todarodes pacificus* is the most important species from a commercial point of view, but *Loligo bleekeri*, *Loligo chinensis* and *Loligo edulus* also constitute significantly important species. Besides the neritic squids, several oceanic species belonging to the *Ommastrephidae* family have been utilized traditionally. The commercial exploitation of *Ommastrephes bartrami* in the North-west Pacific off Hokkaido has been remarkable over the last few years, reaching some 150 000 tons per annum in 1980. Cuttlefish, *Sepia esculenta*, *S. lycidas* and *Sepiella japonica*, are also commercially of great importance.

Japan used to be the predominant nation to harvest cuttlefish in this region, but the recent emergence of the

Republic of Korea is notable; Korean production amounted to 56 000 tons in 1979. Hong Kong has caught approximately 1 900 tons of cuttlefish per annum over the last five years.

Another important species is *Octopus vulgaris*, whose production has varied from between 55 000 and 60 000 tons, accounting for some 25 percent of the world octopus catch. More than 85 percent is taken by Japan, the remainder by the Republic of Korea and Taiwan.

The cephalopod fisheries of this area have experienced large annual fluctuation. In view of the short life-span of the animals (one to two years), conventional techniques of stock assessment are more difficult to apply than in the case of fish populations, but variations in availability seem to be due to environmental conditions, although the precise cause and effect in the relationship is not well understood. The stocks of squid seem to have been fully or even over-exploited in the region. The potential of squids alone is estimated to be 500 000 to 600 000 tons.

10. Northeast Pacific (Area 67)

Loligo opalascens and *Ommastrephes bartrami* are known to be widely distributed from California to Vancouver Island. It is also reported that *Todarodes pacificus* is distributed further north with a substantial biomass. Because the local market landings by Canada and the USA are very small, at present Japanese vessels take the majority of the catch from the region, amounting to 3 000-5 000 tons. The octopus fishery of the region is practically non-existent. It is estimated that there are considerable unexploited stocks of *Octopus dofleini* off Alaska and along the coast of Western Canada and the USA. Squid are also believed to form an important resource, although not very much is known about it.

11. Western Central Pacific (Area 71)

Until 1978, production of cephalopods in this area continued to increase. This rise can be attributed to the rapid growth of the Thai squid fishery, which now stands fourth in the world, following Japan, the Republic of Korea, Spain and China. The increase in production, however, seems to have come to a halt in recent years.

Catches by other major fishing nations, i.e. the Philippines, Malaysia and Indonesia, have also shown a general trend of increase. This region is known to have a number of suitable cephalopod species and to provide a rich-habitat. The lack of good statistics and biological information has made it difficult to estimate the total potential of cephalopod resources. The best-studied area is the Gulf of Thailand, where two species of *Loligo* and four of *Sepia* have been intensely exploited. Some stocks of squid have clearly increased in the Gulf of Thailand, possibly as a result of the reduction in the abundance of species that compete with, or prey on, squids⁵. Other stocks of squid, particularly offshore in deeper water (Oceanic squid) have up to the present been little exploited.

⁵Report of the Second Session of the IPFC-Standing Committee on Resources Research and Development (SCORRAD), FAO, 1980.

Over the last few years, there has been a remarkable increase in the production of cephalopods in this area, reaching some 31 000 tons in 1980. The marked rise can be attributable to the increased production of *Loligo opalescens* and *Ommastrephes bartrami*.

12. Eastern Central Pacific (Area 77)

The bulk of cephalopods in this area are taken by the USA and Mexico. The emergence of Mexican squid fishing has been notable over the last few years. Although joint-ventures have been established to catch squid, squid is still often taken incidentally to shrimp fishing in Mexico. Along the coast of Baja California to northern Peru, cephalopod resources are under-exploited, although several marketable species are known to be present in these waters (e.g. *Dosidicus gigas*). There are substantial unexploited or under-exploited resources of squid in the region of Mexico and the USA. The potential yield of squid in the region is estimated to be 500 000 to 1 million tons.

13. Southwest Pacific (Area 81)

The fisheries in this region, and the conditions under which they operate, are changing substantially, as a result of the general extension of national jurisdiction. All the major fishing grounds for squid have come under the control of the coastal states. Largely as a result of increased foreign fishing by each of the major non-local countries (Japan, the Republic of Korea and the USSR), catches of squids in the region increased sharply to some 15 000 tons in 1973 from almost non-existent catches before 1972. At present, some 55 000-70 000 tons of squid are harvested annually. Catches by local fleets, particularly from New Zealand, have gradually increased, although they still form a minor part of the total output.

The major species taken are *Nototodarus sloani sloani* and *N. sloani gouldi*, the southern counterparts of *Todarodes pacificus*.

In general, estimates of potential catches for the resources in the region are poor. However, it seems not unrealistic to assume that there are still opportunities for reasonable development of cephalopods fishing.

14. Southeast Pacific (Area 87)

So far as cephalopod resources are concerned, this area is one of the least exploited in the world. Landings of squid have been little more than one thousand tons per annum over the last ten years, *Ommastrephid* squid, *Dosidicus gigas* and *Loligo* spp. being taken as trawl by-catches. Octopus is rarely caught due to the very narrow to non-existent continental shelf.

Although information on the state of the resources in the region is poor, cephalopod resources are apparently unexploited and it seems not to be unrealistic to estimate the potential yield around some hundred thousand tons.

IV. UTILIZATION OF CEPHALOPODS

Data describing the quantitative disposition of world cephalopod catches from 1975 to 1981, based upon data from the 12 major countries which together account for 90 percent of the total cephalopod catch are summarized in Table 4. All but about 3 percent of the landings of these 12 countries is used for human consumption. Nearly 75 percent of the disposal to human consumption is normally marketed frozen or fresh, and there has been little change in this proportion during the period under review. Some 9 to 10 percent is generally subject to some form of curing, 1 to 2 percent is used in canning, and some 14 percent is used in preparations.

The growth of fresh and frozen products over the last several years is worthy of note, and can be ascribed to gradual increases that have taken place in Japan (frozen), Spain (frozen), the Republic of Korea (fresh/frozen) and China (fresh). Another contributing factor is that newly emerging countries, such as Canada, Argentina and Mexico have processed almost their entire catches into fresh/frozen products. Input for preparations (used almost entirely by Japan) has also shown a steady increase. In 1975, some 160 000 tons were processed into preparations, increasing to 224 000 tons in 1979, a growth of 40 percent. The quantity cured is on an upward trend, although this trend seems likely to be very sensitive to production levels. Production of canned cephalopods has shown a considerable decline, from an input of 46 000 tons in 1975 to 25 000 tons in 1980. The amounts used for reduction to meal in the Republic of Korea have remained static, whilst the amounts used for bait have grown in Canada and the USA.

Changes in demand as well as new processing techniques and development of freezing, mainly in developed countries, have altered the overall disposal pattern of cephalopod usage on a global basis. It is likely that much of any future increases in output will be converted into fresh, frozen (either round or tubes) and prepared products. Further emphasis on drying, smoking or other forms of curing may be expected, however, in developing countries where curing is of great significance to prevent product spoilage. In some instances (e.g. "sashimi"—slices of raw squid eaten with soy sauce in Japan) cephalopods are consumed raw, but their industrial treatment produces an extremely wide range of commodities, including, apart from the usual salted, smoked and dried products, even fermented and canned preparations. In addition, the viscera are used to produce squid oil and also the livers are used in the manufacture of squid oil and sauce.

Uses of non-edible parts of cuttlefish are rich in variety. The inky pigment is, for example, employed in preparing dyes or ink. The Ancient Romans used the squid's shell or cuttlebones in the preparation of cosmetics. It is used today in the preparation of fine abrasives and dentifrices. It is also frequently placed in bird cages for the birds to peck. In China, the shell is used as a herbal medicine. National or regional utilization patterns vary substantially and will, therefore, be considered separately.

Table 4
Utilization of Cephalopods by Major Producers

('000 t live weight equivalent)

		Japan	Spain	Rep. of Korea	China	Thailand	USSR	Italy	Canada	Argentina	Philippines	USA	Mexico	Others	World	(ICS)
Total production	1970	616	94	78	57	34	5	31	—	2	13	12	2	55	999	1 019
	1975	608	159	89	50	66	40	35	3	4	31	13	4	130	1 232	1 251
	1976	564	127	117	36	64	42	36	11	8	26	13	6	161	1 211	1 229
	1977	558	105	70	40	94	85	42	31	2	27	11	7	160	1 232	1 248
	1978	585	131	89	62	94	29	35	35	59	32	19	9	206	1 330	1 348
	1979	581	103	118	90	75	57	36	90	87	29	22	25	203	1 516	1 578
	1980	732	115	127	80	62	56	48	31	9	32	16	27	167	1 504	1 589
	1981	—	—	—	—	—	—	—	(44)	—	—	—	—	—	—	—
Fresh	1970	71	62	16	54	9	5	27	—	1	12	1	2	46	306	
	1975	114	90	38	46	24	40	30	—	—	19	3	3	116	522	
	1976	79	70	74	32	22	42	15	—	—	24	3	4	138	503	
	1977	59	53	46	38	25	85	22	—	—	10	4	5	132	479	
	1978	23	60	52	59	6	29	26	—	3	27	8	8	105	406	
	1979	3	29	61	131	7	57	26	—	9	22	9	24	140	518	
	1980	124	55	70	133	6	56	32	—	—	25	6	25	124	656	
	1981	—	—	—	—	—	—	—	32	—	—	—	—	—	—	—
Freezing	1970	254	26	5	—	4	—	4	—	1	—	—	—	3	297	
	1975	231	60	13	—	16	—	5	—	2	—	—	1	7	335	
	1976	218	50	22	—	22	—	21	—	5	—	—	2	5	345	
	1977	205	46	14	—	39	—	20	—	2	—	—	2	13	341	
	1978	245	65	18	—	55	—	9	—	56	—	—	1	31	489	
	1979	252	65	39	—	40	—	10	36	78	—	—	1	46	567	
	1980	283	(65)	(39)	—	(33)	—	16	30	9	—	—	2	24	501	
	1981	—	—	—	—	—	—	—	(12)	5	—	—	—	—	—	—
Curing	1970	57	—	53	3	21	—	—	—	—	1	—	—	3	138	
	1975	66	—	25	4	23	—	—	—	—	2	—	—	7	127	
	1976	63	—	11	4	18	—	—	—	—	1	—	—	12	109	
	1977	62	—	6	2	27	—	—	—	—	6	—	—	11	114	
	1978	71	—	17	3	27	—	—	—	—	4	—	—	12	129	
	1979	69	—	16	2	25	—	—	—	—	5	—	—	12	129	
	1980	84	—	(16)	2	(20)	—	—	—	—	(5)	—	—	10	137	
	1981	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total production	1970	9	6	1	—	—	—	—	—	—	—	8	—	2	26	
	1975	9	9	10	—	—	—	—	—	2	10	5	—	1	46	
	1976	6	7	7	—	—	—	—	—	3	1	4	—	6	34	
	1977	6	6	3	—	1	—	—	—	—	11	4	—	4	35	
	1978	6	7	1	—	3	—	—	—	—	1	5	—	6	29	
	1979	5	9	1	—	1	—	—	—	—	2	3	—	3	24	
	1980	6	(9)	(1)	—	(1)	—	—	—	—	(2)	3	—	3	25	
	1981	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Preparations	1970	195	—	—	—	—	—	—	—	—	—	—	—	1	196	
	1975	158	—	—	—	3	—	—	—	—	—	—	—	—	161	
	1976	168	—	—	—	2	—	—	—	—	—	—	—	—	170	
	1977	196	—	—	—	2	—	—	—	—	—	—	—	—	198	
	1978	201	—	—	—	3	—	—	—	—	—	—	—	—	204	
	1979	222	—	—	—	2	—	—	—	—	—	—	—	—	224	
	1980	205	—	—	—	(2)	—	—	—	—	—	—	—	—	207	
	1981	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Reduction/feed/bait	1970	30	—	3	—	—	—	—	—	—	—	3	—	—	36	
	1975	30	—	3	—	—	—	—	3	—	—	5	—	—	41	
	1976	30	—	3	—	—	—	—	11	—	—	6	—	—	50	
	1977	30	—	1	—	—	—	—	31	—	—	3	—	—	65	
	1978	30	—	1	—	—	—	—	36	—	—	6	—	—	73	
	1979	30	—	(1)	—	—	—	—	54	—	—	10	—	2	97	
	1980	30	—	(1)	—	—	—	—	7	—	—	(5)	—	3	46	
	1981	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Notes:

- China — cuttlefish production unknown up to 1978 included
 The Democratic People's Republic of Korea — production unknown
 India — production unknown
 Freezing — excludes frozen bait

Source: FAO. Interlinked Computerized System for Agricultural Statistics

A. National trend

1. Japan

The most varied pattern of utilization is to be found in Japan (see Appendix 2). A summary picture of squid utilization in that nation is provided in Table 5, from which it may be seen that more than half of the annual landings are processed, the rest consumed fresh squid as bait is included with fresh, and amounts to some 30 000 to 40 000 tons per annum). It is interesting to note that variations in the total catch of squid are reflected mainly in the fresh market and that the quantities used for processing have gradually risen over the past five years.

Traditionally, the most important processed squid products have been dried squid ("surume") and seasoned squid ("tsukudani")⁶, mainly because these items have good keeping qualities and can be stored for considerable periods. These items have somewhat declined in importance over the last two decades and in 1980 some 7 percent of the total squid catch was used for this purpose. Dried squid products are prepared from *Todarodes pacificus*, *Nototodarus sloani* and *Loligo edulis*.

Among them, *L. edulis* ("kensaki-ika") yields a better quality product and consequently has a higher commercial value. With the decline in dried squid production, other squid preparations have become of greater importance; among these cooked products, i.e. roasted squid in the form of "saki-ika"⁷, is the most prominent. In 1980, about 260 000 tons of raw squid were used for producing 65 000 tons of squid preparations. Demand for these products — consumed mainly as snacks or as accompaniment to alcoholic drinks — has grown steadily. The reasons for the increase in demand can be attributed to the following:

- (a) increased availability of large quantities of relatively cheap squid, such as *Ommastrephes bartramii*;
- (b) increased imports of squid from Canada and Argentina at reasonable prices; and
- (c) exploitation of processing technology, for example "daruma"⁸.

Normally, poor quality squid and sizes unsuitable for higher-value products uses are used for processing. Price is

Table 5
Japan: Disposition of Squid Catch, 1975-80

	Total catch	Fresh and frozen	Total processed	Dried	Smoked	Preparations	Salted fermented	Canned	Salted, salted dried
	(t live weight equivalent)								
1975	522 321	267 945	254 376	48 940	2 460	178 784	14 735	8 266	1 191
1976	482 119	228 397	253 722	34 596	4 860	190 376	16 422	6 190	1 278
1977	492 214	202 132	290 082	37 716	7 064	222 424	16 071	5 583	1 224
1978	500 941	162 753	338 188	30 384	15 292	267 832	17 889	5 671	1 120
1979	544 683	183 425	361 258	23 700	16 052	296 540	18 648	5 140	1 178
1980	654 000	304 029	349 971	45 960	15 232	261 968	18 826	6 304	1 681
	(Percentage)								
1975	100.0	51.3	48.7	9.4	0.5	34.2	2.8	1.6	0.2
1976	100.0	47.4	52.6	7.1	1.0	39.5	3.4	1.3	0.3
1977	100.0	41.1	58.9	7.7	1.4	45.2	3.3	1.1	0.2
1978	100.0	32.5	67.5	6.1	3.1	53.4	3.6	1.1	0.2
1979	100.0	33.7	66.3	4.4	2.9	54.5	3.4	0.9	0.2
1980	100.0	46.5	53.5	7.0	2.3	40.0	2.9	1.0	0.3

Note: Fresh and frozen consumption includes squid as bait, amounting to 30-40 tons

Source: Annual Reports on Distribution of Fishery Projects, Ministry of Agriculture, Forestry and Fisheries, Japan, 1975-80

⁶"Tsukudani" is a secondary processed form in which "surume" is cut into strings or strips and boiled with soy sauce; it is therefore excluded in Table 5.

⁷Flavoured, roasted and shredded squid.

⁸The intermediate processed product from which "saki-ika" is made.

the most important factor and processors employ a variety of techniques to compensate for poor quality in freshness or colour and seek the cheapest possible supplies.

Although smoked fish (or other food) was not very popular in the past, production of smoked squid has become important in recent years. It is now consumed as snacks or in the form of squid preparations for consumption with alcoholic beverages.

It should be noted that there has been a move from dried squid to smoked squid among processors, due to a higher flesh/bone ratio in smoked squid. Increased production can also be seen in salted-fermented squid "shiokara", for which 19 000 tons of raw squid was used in 1980, as compared to 10 000 tons in 1970. The most common "shiokara" is made from squid and the viscera of skipjack. *T. pacificus* is generally used as the raw material, and "shiokara" with yeast has gained considerable popularity over the last decade. Imported squid, e.g. *Illex argentinus* are also used to make "shiokara".

Production of canned squid is at present relatively unimportant, amounting to 4 000 tons (product weight) in 1980, as compared to 5 900 tons in 1970 and 9 000 tons in 1965. Economically, canned squid is an "inferior" product (i.e. having a negative income elasticity), and its decline is due almost entirely to the rise in living standards and a switch to more-preferred food items.

Size grading and the pattern of consumption of octopus are as follows: large sized (T1-T2) are used for vinegared "su-dako", medium sized (T3-T5) for boiling or steaming ("Ni-dako" or "mushi-dako"), and small sized (T6-T8) for seasoned "ajitsuke-dako". Roughly, it can be said some 70 percent of total consumption is used for boiled, 20 percent for seasoned, and 10 percent for vinegared products. *Octopus vulgaris* imported from Africa and Europe are mostly used for boiled or steamed products and to a lesser extent for vinegared products. Some 60 percent of *O. ocellatus* imported from Asia is destined to be boiled, 30 percent seasoned, and 10 percent for tsukudani.

2. Republic of Korea

Cephalopods are used in a variety of forms in the Republic of Korea — i.e. fresh, frozen, canned, dried, seasoned, as preparations, pickled, salted — and for reduction to meal. Before 1970, the proportion cured was large, representing over 65 percent of the total catch of cephalopods. However, a decline has been fairly noticeable in recent years. Instead, a large increase has been observed in the frozen market. Production of frozen cephalopods has grown from 13 000 tons (product weight) in 1975 to nearly 40 000 tons in 1980. Canning has gradually declined, reflecting a diminishing trend both in domestic and export markets; sales amounted to 1 000 tons (live weight equivalent) in 1980. Use for reduction to meal has remained static, at around 1 000 tons per annum since 1977.

3. Thailand

Much of the catch of Thailand was utilized for curing in the early seventies, whilst in recent years the proportion of frozen has increased and now accounts for half of the total landings. About 30 percent of the disposal for human use is now marketed cured. Production of squid preparations has remained fairly static over the last decade, accounting for only 2-3 percent of the total catch.

Squid (*Loligo edulis* and *Doryteuthis bleekeri*) have long been eaten dried, boiled, roasted or fried in Thailand. Squid dried under the sun for two days are highly valued, but those dried for more than three days, and which have generally lost all moisture, are graded as inferior as the products are liable to be tinted red². Squid are harvested throughout the year, thus drying presents a problem during the rainy season when catches generally must be sold fresh.

Cuttlefish (*Sepia esculenta* and *Sepioteuthis lessoniana*) has been landed only since the trawl fishery became prosperous in the late sixties. At the landing places, the viscera of both squid and cuttlefish are removed, the skin is peeled off and the product is packaged in flexible filmy bags for further packing in bamboo baskets with ice for shipping. Squid canning is also performed, but the production is minimal. From time to time squid sauces are produced in minor quantities.

4. Philippines

Squid and cuttlefish are widely eaten in the Philippines and are in great demand both fresh, dried and prepared in the form of "sakiika". Most of the squid taken is iced at sea and sold fresh. Cold storage facilities for fresh fish in the Philippines are very limited, so that squid landings are disposed of immediately to fresh fish markets or to processors. In 1979, 78 percent of landings were marketed fresh. The most popular method of preserving squid is drying. Dried squid command a higher price than fresh squid. Squid canning operations in the Philippines normally take an input of some 2 000 tons per annum of raw squid. Although it is known that squid preparations are manufactured, relevant statistics are not available.

Cuttlefish, *Sepia pharaonia* and *S. latimanus*, are often frozen for export, but are also dried for domestic consumption. They are split open, the cuttlebone removed along with the viscera, and the mantle, head and arms are dried in the sun without salt. Squid of 3 to 5 inches in length are preferred, while smaller squid do not have the viscera removed. It should be noted that large cuttlefish caught by harpoon are sometimes regarded as a low-value product by the Japanese market because of the big holes made by that gear.

5. Southern Europe

In Spain cephalopods are mostly marketed either fresh or frozen. In 1980, out of 129 000 tons of landings some 120 000 tons were consumed fresh or frozen. The quantity used for canning has remained static for years, and that for

²JETRO, Japan, 1973.

various forms of curing and reduction is not statistically identified. The canning sector's share of utilization has remained at a level of 7 000-9 000 tons in the past few years, while much of the increase in landings has been utilized for fresh and frozen items, the increase of which has been remarkable in the period under review.

In Italy the great majority of cephalopod landings are disposed of fresh, most of the remainder being frozen. The quantities used for other various forms of processing are not separately identified in the available statistics, but they are thought to be minimal.

6. North America

In the U.S.A. in the late sixties about a half of the total California landings of cephalopods were normally canned for export, but with rapid growth of local markets over the last several years this proportion has declined. As compared with 8 000-9 000 tons in the early seventies, about a half, or 3 000-5 000 tons, of squid were absorbed annually by the canning sector between 1975 and 1980 and exported to European markets, Latin American countries and to the Orient, particularly to the Philippines. Squid are canned with or without its ink in brine, in oil, and in tomato sauce. Domestic consumption is mostly in frozen form and a considerable amount is also used as bait in both commercial and recreational fisheries. Squid taken by commercial vessels are usually sold to freezer plants first because of the higher price, the cannery receiving the excess beyond the processing capacity of the freezer plants. Thus, in times of high availability, more squid is canned.

It is estimated that some 5 000-6 000 tons have been used annually as bait in the last several years. *Illex illecebrosus* and to a lesser extent, *Loligo pealei*, which are taken in the Atlantic, have been mainly exported as bait for cod fisheries, in Canada, Portugal and the Scandinavian countries. It should be noted that a considerable quantity of landings on the west coast is being sold fresh, as it is becoming an increasingly popular item in west coast restaurants.

In Mexico the great majority of squid landings are consumed fresh or frozen; landings by Japan-Mexico joint-ventures are almost entirely frozen. Squid channeled to the internal market are gutted, split, and cleaned at the processing plants. Production of canned squid is still minimal. The majority of landings of octopus are consumed fresh and frozen.

In Canada at present frozen squid is by far the most important squid product type. Over the past century, squid has primarily been an export commodity (dried) to oriental countries. Prior to 1950, some 3 500 tons (live weight) of squid were exported annually to China, Hong Kong, Singapore, Thailand, the Philippines and Burma, while sales were also made to the USA, Jamaica, etc. Up until recent years, the primary use of squid had been as bait for cod fisheries in the Northwest Atlantic for both the local and foreign

line fisheries. Portugal, Norway and the Faroe islands have been the major importers. It was reported¹⁰ that in recent years, there has been a revival in the art of drying squid in order to gain export earnings.

7. Chile

In Chile, squid landings are relatively minor. *Dosidicus gigas* is commercially exploited¹¹ with purse-seiners or angling and the catches are used as bait, fish meal and sometimes for canned squid in ink.

V. INTERNATIONAL TRADE

World trade in fresh and frozen cephalopods has increased very rapidly over the last decade, the total quantity of imports of such commodities having grown from 60 000 tons in 1970, to over 250 000 tons in 1976, and nearly 360 000 tons in 1979. As can be seen from Table 6, the main impetus to this expansion in trade has been a large increase in demand from Japan, whose imports have quadrupled over the last decade, reaching 218 000 tons in 1979.

Increases in value have been even more notable. There has been an increase from US\$348 million in 1976 to US\$736 million in 1979 — a some 110 percent increase — as compared with a little over 40 percent increase in terms of quantity during the same period. The average value per ton increased from US\$1 380 in 1976 to US\$2 045 in 1980.

Trade in cured cephalopods has been fairly stable over the past several years, ranging from between 4 000 and 5 400 tons. However, the unit value has sharply increased and in 1979 it was more than double that of 1976. Trade in canned cephalopods (mainly squid) has largely decreased over the last few years, registering 2 400 tons in 1980 compared to 11 000 tons in 1976.

Details of exports are given in Table 7. Due to the poor identification of cephalopod products in many national trade statistics, the discrepancy between total imports and total exports at the world level is unusually large, particularly in fresh and frozen.

Judging from the large surplus of identified imports over exports, it seems likely that other countries are now exporting cephalopods, but in quantities not sufficiently large to be itemized separately in national trade statistics. (For example, Canada included cephalopods with "molluscs" until 1978). Table 7 indicates that Spain remains the largest exporter of cephalopods — with an average of 63 000 tons per annum during the 1976-79 period — followed by Thailand. Japan and the Republic of Korea also export considerable amounts. The recent emergence of New Zealand, Canada and Argentina in the export market as an outcome of the establishment of the 200-mile economic zones is noteworthy. The gradual diversification of production away from a few countries is expected to continue, stimulated by strong market demand and widening acceptability of cephalopods products, which influence the growth of international trade.

¹⁰M. Juanico, 1980.

¹¹G.V. Hurley, 1980.

Table 6
Imports of Cephalopod Products by Main Importing Countries, 1976-80
(Quantity: '000 tons product weight; value US\$1 million)

		1976	1977	1978	1979	1980
Fresh, frozen						
WORLD	Q (Quantity)	251.3	218.2	318.4	359.6	286.5
	V (Value)	347.7	306.1	485.1	735.6	611.3
Brazil	Q	0.2	0.3	0.2	2.0	0.2
	V	0.2	0.6	0.3	1.6	0.2
France	Q	0.5	7.3	9.7	11.5	10.6
	V	12.1	10.6	16.1	23.7	22.8
Germany, Federal	Q	1.7	1.7	2.3	2.3	2.9
	V	2.5	2.8	4.7	5.3	6.9
Greece	Q	5.2	4.9	5.1	—	—
	V	5.1	5.3	6.0	—	—
Hong Kong	Q	1.2	1.1	1.3	1.4	2.7
	V	1.3	1.3	1.8	1.9	3.3
Italy	Q	32.2	28.7	40.9	45.4	43.6
	V	32.4	29.8	61.9	69.6	81.8
Japan	Q	162.9	138.1	196.6	218.3	157.8
	V	256.1	222.8	328.6	525.9	408.4
Korea, Rep. of	Q	—	6.0	12.2	12.5	8.1
	V	—	3.7	11.6	12.9	6.9
Philippines	Q	—	—	3	0	—
	V	—	—	12	4	—
Portugal	Q	3.5	1.9	0.0	1.4	1.7
	V	3.3	1.6	0.0	0.9	1.8
Singapore	Q	—	—	—	10.4	8.4
	V	—	—	—	6.9	3.2
Spain	Q	34.4	23.2	42.8	41.1	49.5
	V	33.4	24.3	49.6	73.3	85.8
Thailand	Q	—	0.0	—	0.3	0.2
	V	—	0.0	—	0.3	0.2
United Kingdom	Q	0.4	0.4	0.6	1.0	0.8
	V	0.3	0.5	0.7	1.5	1.0
Salted, dried						
WORLD	Q	5.4	4.0	4.8	5.4	4.5
	V	15.1	17.7	29.0	38.3	30.2
Hong Kong	Q	3.6	2.4	1.9	1.8	1.2
	V	9.5	8.1	8.8	8.6	6.1
Japan	Q	0.7	1.3	1.6	1.6	1.9
	V	4.4	9.1	13.7	17.1	16.8
Korea, Rep. of	Q	—	0.0	0.1	0.1	—
	V	—	0.1	0.7	0.8	—
Philippines	Q	—	—	—	—	0.0
	V	—	—	—	—	0.0
Portugal	Q	0.2	—	0.0	—	—
	V	0.2	—	0.0	—	—
Singapore	Q	—	—	—	0.8	1.3
	V	—	—	—	4.2	6.4
Spain	Q	0.6	—	—	—	—
	V	0.6	—	—	—	—
Thailand	Q	0.2	0.2	0.1	0.1	0.1
	V	0.3	0.3	0.2	0.2	0.1
Canned						
WORLD	Q	10.8	7.3	8.4	4.6	2.9
	V	31.8	18.0	17.4	13.2	9.7
Japan	Q	5.8	3.0	2.5	2.1	1.9
	V	28.3	14.5	11.8	10.5	7.8
Greece	Q	2.2	1.2	4.1	—	—
	V	1.4	1.0	3.9	—	—
Malaysia	Q	0.1	0.1	—	—	—
	V	0.1	0.1	—	—	—
Philippines	Q	2.3	2.8	1.6	1.8	—
	V	1.3	2.0	1.2	1.5	—
Singapore	Q	—	—	—	0.4	0.5
	V	—	—	—	0.4	0.6
Spain	Q	0.2	0.2	0.1	0.2	0.5
	V	0.5	0.4	0.1	0.5	1.3

Table 7
Exports of Cephalopod Products by Main Exporting Countries, 1976-80
(Quantity: '000 tons product weight; value US\$1 million)

	1976	1977	1978	1979	1980
Fresh, frozen					
WORLD Q (Quantity)	168.5	121.5	202.7	312.1	204.6
V (Value)	197.8	150.4	282.8	509.8	360.2
Argentina	3.0	1.0	48.0	68.0	10.0
Canada	2.0	1.0	41.0	57.0	7.0
France	—	—	—	36.0	29.7
Germany, Federal	—	—	—	23.6	22.6
Hong Kong	5.3	9.9	6.3	3.8	3.3
India	7.5	12.0	8.6	6.8	7.5
Italy	0.0	0.0	0.7	0.4	2.4
Japan	0.0	0.0	0.5	0.4	1.5
Korea, Rep. of	1.7	0.5	0.6	1.4	1.1
Morocco	3.7	1.0	1.6	4.2	4.1
New Zealand	1.1	1.7	3.4	3.4	2.9
Philippines	1.2	2.7	6.0	7.8	7.0
Portugal	1.4	2.9	1.8	2.1	2.4
Senegal	1.9	4.0	3.6	5.0	5.1
Singapore	25.0	12.5	9.0	27.6	16.4
Spain	—	—	13.1	25.5	27.8
Thailand	—	—	—	23.0	13.6
Tunisia	—	—	—	52.1	31.7
Uruguay	—	—	—	—	—
United Kingdom	18.8	15.6	15.7	11.1	11.1
	1.2	1.2	4.8	2.2	3.8
	1.2	2.3	4.8	2.2	3.8
	0.0	0.3	1.0	0.3	32.0
	0.0	0.2	1.3	0.1	32.0
	0.1	0.2	0.4	0.3	—
	0.5	0.7	1.4	1.0	—
	0.0	0.1	0.0	0.0	0.1
	0.1	0.2	0.4	0.4	0.4
	3.8	2.7	2.3	2.4	3.0
	7.3	5.6	5.9	6.1	5.7
	—	—	—	—	0.1
	—	—	—	1.3	1.0
	76.1	47.0	64.1	80.1	24.8
	81.1	35.7	91.3	10.3	12.1
	21.3	23.7	34.0	30.4	30.4
	31.0	22.0	30.0	71.7	42.1
	2.5	2.7	4.3	3.4	1.0
	7.0	7.0	—	—	—
	0.7	0.0	1.7	1.7	1.7
	0.3	0.0	1.3	2.4	0.0
	0.0	0.5	0.5	0.2	0.2
	0.7	1.3	1.2	0.2	1.7

A. National trends

1. Japan

a. Squid and cuttlefish

Notwithstanding the national system of control¹², Japanese imports of squid and cuttlefish increased tremendously during the seventies — i.e. from US\$11 million in 1970 to US\$525 million in 1979, over 47 times in value terms. After reaching a record high in 1979, however, imports have declined somewhat, to a total value of US\$213 million and US\$228 million in 1981 (Table 8).

In any case, squid and cuttlefish are at present one of the most important fish items imported by Japan and in 1980 accounted for some 12 percent of the value of all fish imports, ranking third after shrimp and tuna.

Although the relevant import statistics do not make any distinction between squid and cuttlefish, it has been estimated¹³ that in 1980 squid accounted for some 55 percent of the total and cuttlefish for the remainder (see Table III of Statistical Annex). In the past, imports of cuttlefish were greater than that of squid, but recent increased imports of squid from Canada and Argentina have resulted in a change in the relative importance of the two. Unit import values of cuttlefish are on average three times as high as those of squid. For example, in 1980 the unit value of cuttlefish imported from

Spain averaged US\$3 177 per ton, as against that of squid imported from Canada at US\$1 060 per ton. There are also considerable variations in import prices even in the same species and according to the country of origin. Moroccan cuttlefish fetched the highest price at an average US\$3 400 per ton in 1980. Argentina *Illex* was more expensive than Canadian *Illex*.

In all, nearly 42 countries exported to Japan in 1980, the main suppliers being the Republic of Korea, Thailand, Spain, Argentina, Canada, Morocco, Poland and the PDRY (see Table III of Statistical Annex).

The great majority of the imports from the Republic of Korea, Spain, Morocco, Mauritania, PDRY, Senegal and Libya consist of cuttlefish or *Sepia officinalis* ("mongoika"), whilst Canada, the USA, Mexico, Argentina, Uruguay and Poland export squid (*Illex* spp. and *Ommastrephes* spp.); Thailand and Hong Kong export to Japan both cuttlefish (*Sepia* spp.) and squid (*Loligo* spp.).

Exports of frozen cephalopods have fluctuated considerably over the last several years, but their significance to total Japanese fishery exports is relatively minor. Much of the export relates to landings by Japanese vessels in New Zealand, the Canary Island, and Mauritania, a considerable

Table 8
Japan Imports and Exports of Cephalopods

	Quantity ('000 tons product weight)						Value (million US dollars)					
	1976	1977	1978	1979	1980	1981	1976	1977	1978	1979	1980	1981
IMPORTS												
Fresh, frozen	162.9	138.1	196.6	218.3	157.9	167.2	256.1	222.9	328.6	525.9	408.5	377.9
Squid and cuttlefish	68.5	74.7	118.1	155.9	94.4	68.8	134.9	141.4	204.5	347.3	212.6	196.7
Octopus	94.4	63.4	78.5	62.4	63.5	100.5	121.2	81.5	124.1	178.6	195.9	181.2
Salted or dried												
Squid and cuttlefish	0.7	1.3	1.6	1.6	1.9	1.8	4.4	9.1	13.7	17.1	16.8	19.4
Preparations												
Squid and cuttlefish	5.8	3.0	2.5	2.1	1.9	1.6	28.3	14.5	11.8	10.5	7.8	7.9
EXPORTS												
Fresh, frozen	25.0	12.5	31.5	59.2	16.3	15.0	19.1	11.3	13.0	25.5	27.8	21.8
Squid and cuttlefish	16.1	7.5	6.1	20.6	16.0	11.5	16.2	9.2	11.3	22.6	26.2	16.0
Octopus	8.9	5.0	2.9	7.1	0.3	0.5	2.9	2.1	1.7	2.9	1.6	5.8
Canned												
Squid	3.8	3.0	2.9	1.9	1.9	0.1	0.1	0.1	0.1	0.1	0.1	0.3

Source: Japan Exports and Imports, Japan Tariff Association, 1976-1981

¹²All Japanese imports of fishery products fall under two categories; those which are not subject to quotas (Automatic Approval System, abbreviated AA) and those which are subject to quotas (Import Quota System, abbreviated IQ). Squid and cuttlefish are subject to quota regulations but the permitted amounts of imports have expanded year by year to permit a very considerable increase in trade. For greater details refer to Appendix III, "The Import Quota System for Squid in Japan".

¹³Fisheries Agency, Japan.

proportion of which is re-exported direct to Japan. Exports of canned squid have shown a sharp decline from 38 000 tons in 1976 to 19 000 in 1980. The principal outlets in recent years have been the USA and Saudi Arabia, although small quantities are shipped to the U.K., France, Singapore and Brazil.

Import duties apply to squid and cuttlefish at the rate of 6.9 percent of fresh, chilled and frozen products, 12 percent on smoked products and 15 percent on other products, such as salted or dried preparations, and canned. Import quotas for squid are determined quarterly on the basis of the demand and supply situation¹⁴. Fresh and frozen "mongoika" are liberalized items and thus free from import restrictions.

The Japanese squid import market is significantly affected by the following factors:

i) Domestic production

Imports are heavily influenced by the level of domestic landings of *T. pacificus* and its substitute, or *O. bartrami*.

ii) Import quota (IQ) system

The IQ system is intended to protect local fishermen from foreign competition by regulating domestic squid supplies in order to maintain a high market price. The quota is set twice a year on the basis of estimated landings and may subsequently be adjusted as conditions warrant. See Appendix 3 for details.

iii) Income levels

Imports are also susceptible to the changing fortunes of the Japanese economy. Demand for luxury products, such as "mongoika", tends to rise along with increases in real disposable income levels.

iv) Exchange rates

Foreign exchange rate movements influence imports very basically. Imports are likely to increase when the yen becomes strong. Subsequently, speculative buying often tends to take place, aimed at obtaining marginal profits from the fluctuation of the exchange rate. This occurred notably in 1978. Recently, government guidance to industries on the enforcement of strict self-discipline has been underway. Therefore, although abnormally excessive buying competition is not likely to occur when the yen rate rises, the general trend will in any case be oriented towards a rise in imports.

b. Octopus

Octopus imports are not subject to quotas, as the domestic fishery is a subsidiary operation with no fishermen solely dependent on catching octopus. The imports of fresh and frozen octopus have fluctuated from between 62 000 tons and 94 000 tons during the period 1976-80. In 1980, octopus imports amounted to 64 000 tons, worth US\$196 million, ranking fourth in value terms as the single most important species following shrimp, tuna and squid. Spain is by far the

the leading supplier of octopus to Japan, accounting for some 60 percent of total imports in both quantity and value terms. The Republic of Korea, Morocco and Libya are also important sources of supply, and the imports from these four countries represent 86 percent in quantity and 93 percent in value of the aggregate imports of octopus. The great majority of octopus imported consist of *Octopus vulgaris* taken in the East Central Atlantic off Morocco and Mauritania. *Octopus ocellatus* is, however, the main species imported from Asian countries such as Thailand, North Korea, China, Malaysia and the Philippines, quantities of which amounted to some 4 600 tons, worth US\$4 million or 7 percent and 2 percent of the total, respectively. In 1980, Japan imported octopus from 22 countries.

Over the past five years, the average unit import value of octopus has risen in a striking manner. In 1976, it was US\$1 280 per ton, but it increased nearly 2.5 times to reach US\$3 100 per ton in 1980. *Octopus vulgaris* taken off West Africa is much higher in price than *Octopus ocellatus* harvested in the Asian region. For example, octopus imported from Spain averaged US\$3 300 per ton in 1980, whilst those imported from Thailand averaged only US\$870 per ton.

As in the case of squid and cuttlefish, the import of octopus is sensitive to domestic production and foreign exchange rates. Demand is also clearly affected by price levels, particularly in relation to those of competitive and substitute products.

Since octopus grounds are mainly confined to West Africa, imports are subject to production trends in that area. Import duties apply to fresh/frozen octopus at rates of 10 percent (the general rate) and 5 percent (the preferential rate).

2. Spain

There has been a rapid growth in imports of frozen cephalopods by Spain (principally squid) over the last decade, rising from 10 600 tons in 1971 to 34 000 tons in 1976 and 41 000 tons in 1979. In the same period, the import value increased tremendously, from US\$5.5 million in 1971 to US\$33 million in 1976 and US\$73 million in 1980. Japan, the Republic of Korea and the USSR used to be among the leading suppliers, but imports from a number of developing countries, particularly Argentina, have risen markedly. The major species imported are *Loligo vulgaris*, *Illex illecebrosus* and *I. argentinus*; among these *L. vulgaris* is considered the most valuable. Total Spanish imports of *L. vulgaris* in 1979 were estimated to have been of the order of 5 000 tons, principally from Poland, with minor quantities from Japan, the USSR and France. In recent years, *Illex* varieties have been an increasingly important part of the Spanish market because of their low prices and because Spanish consumers are gradually becoming used to preparing and eating these varieties. The average unit value of frozen squid import increased from US\$2 000 per ton in 1977 to US\$2 650 in 1979.

¹⁴See Table A of Appendix 3.

Spain is also a substantial exporter of cephalopods — mainly frozen octopus, which is not widely consumed domestically. The greater part — about 90 percent — of these exports go to Japan; this trade has been maintained fairly stable with an average of 57 000 tons per annum over the last ten years. In 1979, the quantity of frozen cephalopods exported was 66 000 tons, worth nearly US\$192 million, or more than 2.5 times the value of imports of such products.

The movement of the dollar in recent years has reportedly brought only short-term advantages since higher returns in peseta terms have been soon offset by higher gear and fuel costs resulting from the strong dollar. Any strengthening of the dollar tends to be offset often by a drop in purchase price offers from overseas markets. Frozen squid imports into Spain attract a duty of 8 percent plus an additional Home Tax Compensation Levy of 6 percent levied on the duty paid value. The latter tax applies only to fresh and chilled product.

3. Italy

The predominant cephalopod item imported by Italy is frozen squid (*Ommastrephes* spp. and *Loligo* spp.), mainly from Japan and Thailand, and to a lesser extent from Poland, France and the Republic of Korea. Squid imports increased remarkably, from 8 500 tons, valued at US\$3 million, in 1971, to 30 000 tons, costing US\$45 million, in 1979. In 1980, imports fell to 23 000 tons, but the import value, at US\$41 million, remained at a high level.

The market for imported cuttlefish is rather small, with an average amount of about 8 000 tons per annum over the last several years. As in the case of squid, the market share taken by Thailand has been increasing, although it remains small. The import market for octopus has considerably expanded over the last few years, reaching 12 000 tons, worth US\$24 million, in 1980. The unit import price of octopus is the highest of the three, being about US\$2 000 per ton.

Italian exports of cephalopods are relatively small in terms of both quantity and value. Octopus have accounted for over a half of Italian cephalopod exports in the last few years, but cuttlefish exports appear to be of increasing importance.

4. Greece

There was a steady increase in the import of cephalopods by Greece during 1970-78, reaching 5 100 tons of frozen items, and 4 100 tons of canned squid in 1978. Imports came from a large number of countries, the most prominent of which was China (the province of Taiwan), Italy, Spain, South Africa, Thailand and the USA (mainly canned squid).

5. France

Imports of squid by France increased from less than 1 800 tons in 1971 to 4 700 tons in 1976 and 5 300 tons in 1980. The species of *Loligo* and *Ommastrephes sagittatus* are aggregated in French import statistics. Imports of cuttlefish, principally from Thailand, have tended to rise, reaching 2 300 tons in 1980. It is interesting to note that the 1980 average import price paid by France for cuttlefish from

Thailand was US\$2 040 per ton, compared with the Italian average price for Thailand cuttlefish of US\$1 800 per ton, due largely to the fact that French imports are generally in a more highly processed form than is the case of imports into Italy and Spain. Most imports and exports are in tube or fillet form. Imports of octopus are still minimal.

6. Republic of Korea

Japan is by far the most important trading partner of the Republic of Korea. Some 90 percent of cephalopod exports by Republic of Korea are shipped to Japan, consisting mainly of cuttlefish.

Encouraged by the liberalization of cuttlefish "mongoika", which took place in the Japanese market in 1979, exports jumped to 23 000 tons in the same year from 14 000 tons in the previous year. Exports of octopus have shown a downward trend over the last several years, reflecting the stringent quota policy pursued by countries in West Africa where Korean fleets fish for cephalopods. The Republic of Korea also exports dried, salted as well as canned squid products, which amounted to a few hundred tons in 1980. The export of these products has been declining, reflecting trends on the Japanese market.

The Republic of Korea is a significant importer of squid. During 1978-80, it imported an average of 11 000 tons of frozen squid, mainly from Argentina. Until 1976 imports of squid were almost non-existent in Korea. The development of the Argentinian squid fishery has brought an important source of supply to Korean processors. Most of this product is reprocessed and exported to Japan.

7. Thailand

Over the last decade, there has been a remarkable increase in Thailand's cephalopod exports, from 6 000 tons in 1971 to 21 000 tons in 1976, and to 39 000 tons in 1979, worth US\$4 million, US\$12.9 million, and US\$30.0 million, respectively. Cuttlefish is the major species exported. This notable increase has been made possible by the development of cuttlefish fisheries. Although landings have been stagnant in recent years, exports have continued to trend upward. In terms of value, Japan takes nearly 60 percent of these exports, but recent export market developments in Italy should be noted. France, Hong Kong and Spain are other important outlets. Marked rises in the unit price have been even more noticeable: the average export price of cuttlefish to Japan, for example, increased from US\$2 600 per ton in 1976 to US\$3 120 per ton in 1981.

In Thailand, wholesalers purchase cuttlefish from fishermen at landing places and partially process them (i.e. removal of cuttlebone, skin, tentacles, viscera, etc.) before they sell to processors. The great majority of cuttlefish and squid to be exported are treated in this manner. It is therefore estimated that actual quantities of cuttlefish and squid, when converted into a round weight, are three times higher than the present level of exports. Thai processors often undertake export activities. The highest qualities of semi-processed cuttlefish

are sold to the Japanese sashimi market. The strong demand prevailing among Japanese importers has had a far reaching effect upon Thai processors. The latter must be careful to avoid excessive competition in the procurement of raw materials from fishermen to keep prices from reaching extraordinary high levels.

It has been reported that the individual body size of squid and cuttlefish has become smaller over the last several years, an indication of over-exploitation of the resources. Presently, some 50-60 percent of the total catch is represented by 41-60 cuttlefish per kg (in a peeled state). These small-sized products are not suitable for the Japanese market and are mainly exported to Italy, France and Hong Kong.

8. Other countries

Exports of squid by Canada, which until 1975 were almost non-existent, rose very dramatically reaching some 36 000 tons in 1978. Japan is the major trading partner and she absorbed some 30 000 tons in that year. Although exports have slackened in recent years, Canada still maintains a high level of exports to the Japanese market, ranging from between 15 000-20 000 tons per annum. Canada also exports squid, round or whole, to European countries such as Bulgaria, Spain, Norway, Italy and Portugal. It is believed that much of the trade to Bulgaria is re-exported to Japan.

Argentina's exports have fluctuated widely during the last several years, but reached a peak of 68 000 tons in 1979. The Government is keen to further develop the squid fishery. When fishing takes place within the country's 200-miles economic zone, it is conducted under joint-venture arrangements. Most of the joint-ventures are operated with Spain, partly because of the traditionally close relationship with that country and partly because of preferential treatment (i.e. tariff exemption) given by the Spanish authorities to the products produced by joint-ventures in which Spanish partners own more than 40 percent of the total share.

In the USA, New England squid landings are mainly marketed locally — fresh or frozen — or used for bait. However, the bulk of the California squid catch is canned or frozen and exported to Europe and Southeast Asia. Exports of canned squid during 1976-80 averaged 3 700 tons per annum. Greece and the Philippines are the principal markets. The former country imported some 3 200 tons of canned squid from the USA in 1980.

In 1981, Hong Kong imported some 3 000 tons of frozen squid and cuttlefish — mainly from Thailand — at a total value of US\$1.2 million. The average unit value of this fresh/frozen squid was US\$1 600 per ton, which was marginally up on the 1980 value. New Zealand product was priced at less than the values quoted above, at an average of US\$830 per ton. This difference was attributed to the state of preparation of the product. Exports to Hong Kong are either dressed (e.g. Thai exports) or whole (e.g. New Zealand). Imports of squid into Hong Kong are not subject to duties or quotas. There is a market for both whole and filleted squid, i.e. without wings and head. Either block frozen or IQF fish are acceptable and

are commonly packed in blocks of 2 kg or 3 kg in 12 kg paper cartons. Prices vary according to size and origin of the product, the most popular size being 21-40 squid per lb (40-90 per kg).

Recent growth in the cephalopod trade in Singapore is quite remarkable. Imports of fresh/frozen squid and cuttlefish have increased from 3 240 tons in 1975 to 7 700 tons in 1981, indicating a 2.4 times increase. The USSR was by far the most important supplier (3 800 tons) followed by Malaysia (2 400 tons) and New Zealand (1 300 tons); the Republic of Korea also exported a few hundred tons. It is believed that the majority of imports from the USSR is transhipped to Japan. Singapore also imported salted and dried squid, which amounted to 1 200 tons in 1981, worth US\$6.3 million. Major suppliers are Canada, China, Thailand and Hong Kong. Imports of cuttlefish canned and prepared amounted to 325 tons worth US\$950 000, mainly supplied by Malaysia, Thailand and China.

There has been a gradual increase in squid imports in recent years by the Federal Republic of Germany. In 1981, imports of frozen squid and cuttlefish into Germany totalled 4 700 tons worth some US\$6.7 million. Imported squid must be completely cleaned, boneless, headless and wingless. Imports are preferred frozen in 5 lb blocks, 6 blocks to a carton. Main suppliers were Poland, followed by Thailand and USA. Some 2 000 tons of squid was reexported to Italy.

In 1980, the U.K. imported some 800 tons of squid, most of which was of the *Ommastrephes* and *Loligo* species originating in the USA. The U.K. catch, at a few hundred tons per annum in the last several years, is quite sufficient to meet local demand for fresh squid; the excess is exported. However, there is interest in importing frozen squid; price is dependent on the size of the squid, large sizes being preferred and fetching about US\$1 300 per ton in 1980. The import duty as in other EEC countries is 6 percent.

VI. RECENT PAST AND PRESENT CONSUMPTION PATTERNS

The consumption of cephalopods, like that of most other fishery products, depends largely upon traditional habits and consumer tastes. At the same time, in some countries, notably Japan, certain species of cephalopods (particularly cuttlefish) are regarded as luxury-type food products and *per capita* consumption has risen in response to higher income levels; conversely, demand for the more abundant squid species — regarded as less desirable — has tended to decline.

Income levels, however, seems to have much less influence upon cephalopod consumption than basic consumer acceptance. Cephalopods form an important and frequent component of the diets of inhabitants of Mediterranean countries, e.g. Spain, Portugal, Italy, France and Greece. They are likely to be in demand in increasing quantities as population rises. It is also an important menu item in Mediterranean hotels and restaurants, and this will have an influence on demand outside the area since the tourist trade is expanding in Mediterranean countries. The market for cephalopods

in other countries of Western Europe — e.g. the U.K., West Germany, the Netherlands — and in the USA is small, but is recognized as having potential for growth. In these countries cephalopods, in particular squid and cuttlefish, tend to be a gourmet dish featured mainly on restaurant menus rather than in everyday diets, except among certain ethnic groups. But the influence of such groups, together with the effects of tourism (i.e. introduction to cephalopod products), has led to increases in consumption in these countries. Cephalopods are, however, generally regarded with a certain repugnance throughout Scandinavian countries and Canada.

The greater part of the world cephalopod catch is consumed with Japan, which, together with China, the Republic of Korea, and other Far East countries accounts for nearly 70 percent of the total world consumption. But the increased consumption of cephalopods in Southeast Asian countries, particularly the Philippines and Indonesia, is worthy of note (Table 9).

Some 18 percent of the total world supplies is consumed in the southern Mediterranean countries, and Spain is second only to Japan in *per capita* terms as a market for cephalopods. Total consumption in the Mediterranean countries is of the order of 260 000 tons per annum. Elsewhere, cephalopod consumption appears to be negligible, with the exception of a few of Latin American countries.

Fresh, packaged octopus is fairly widely available in Mexico, and recent developments in squid fishing in Argentina and Mexico has offered greater opportunities to provide squid to the domestic markets of these nations. Various cephalopods are said to be quite commonly eaten in the West Indies. In Venezuela, the consumption of fresh and canned octopus and squid has been on the increase, much of the demand arising from the Spanish and Italian immigrant communities. In general, however, Latin America is not at present a cephalopod consuming area, and it does not seem probable that this continent will become an importer of cephalopod products, even in the middle-term¹⁵. The low level of present and potential consumption in Latin America is thought to be a product of the following factors: (a) strong incentives to export, as a matter of official policy, in order to increase foreign exchange earnings; (b) elaborate products like squid fetch high prices which the lower-income population groups cannot pay; (c) people are in general not accustomed to eating marine products. Further, lower-income communities are more traditional and conservative in their dietary habits; and (d) lack of efficient marketing and distribution systems for seafood.

A. Supply sources and *per capita* consumption

Supplies of cephalopods on the Japanese domestic market have tended to rise over the last decade. Remarkable increases in imports have significantly contributed to this. *Per capita* consumption of cephalopods in Japan remained at about 7.6 kg per annum in 1980, very much greater than anywhere else in the world (see Table 10). The predominant position

of Japan in the world cephalopod market merits a detailed review, provided in the following section. An analysis of cephalopod supplies and consumption in other important consuming nations may be found in subsequent sections.

1. The Japanese market

This section reviews in some detail the very large Japanese market for cephalopods, recent trends of which are of obvious relevance to any examination of the prospects for world production and trade in cephalopods as a whole.

Recent data indicate a declining growth rate for Japanese household expenditures for fish products — i.e., up 7.2 percent in 1977, up 5.2 percent in 1978, and up 2.8 percent in 1979. Likewise, there has been a decline in the *per capita* consumption of fishery products. In terms of animal protein consumption, the downward trend in fish consumption has been accompanied by an increase in the consumption of protein from livestock products. There are several factors which have contributed to the creation such a demand pattern for food: e.g. the “westernization” of Japanese dietary habits, particularly among the younger generation; constraints in supply and distribution in cities as a result of their expansion and the consequent rise of fish prices; and cross-price elasticities between fish and meat. In addition, demand for fish and fish products is shifting toward more convenience-oriented products which require less effort in preparation and cooking in the home.

The general increase of fish prices have created a phenomenon, coined “the move away from fish”, in recent years in Japan. Thus consumer resistance, along with weakened exports — due to the Yen appreciation — and increased imports helped to push up the levels of fish holdings in Japan.

Another feature is the increase in expenditures on dining out; such expenditures increased in real terms by 22 percent during 1975-79. The income elasticity of expenditure on meals taken outside the home¹⁶ is now much higher than during the sixties and early seventies. Further qualitative upgrading of the diet and higher expenditure on food are to be expected since the outstanding feature in Japan's domestic food demand over the last decade is the increasing preference for tastier and higher-quality food, even in face of higher prices. Demand for luxury-type items such as tuna, yellow-tail, sea bream, etc. has increased steadily despite the fact that their prices have continued to rise.

a. The role of cephalopods in the Japanese diet

In Japan, cuttlefish is usually categorized as a high-grade item, octopus as middle-grade, and squid as an abundant species. Japan is by far the most important national market in the world cephalopods, with a little over 760 000 tons (of which squid and cuttlefish account for some 600 000 tons; the rest is octopus) live weight available for consumption annually, equivalent to some half of total world production. There has

¹⁵M. Juanico, 1980.

¹⁶1; 1963-1979: 1.28; 1963-1972: 1.40; 1970-1979: 2.78.

Table 9
Supply of Cephalopods in Major Consuming Countries
('000 tons live weight)

	1976	1977	1978	1979	1980
WESTERN EUROPE					
France					
Production	10 264	13 237	10 893	7 950	7 273
Imports	8 475	7 328	9 713	11 524	10 647
Exports	5 276	9 875	6 274	3 773	3 332
Total supply	13 463	10 690	14 332	15 701	14 588
Greece					
Production	4 964	4 652	4 070	6 439	—
Imports	8 367	6 715	11 251	9 168	—
Exports	2 746	3 820	3 290	6 053	—
Total supply	10 585	7 547	12 031	4 554	—
Italy					
Production	35 780	42 395	34 756	36 465	47 916
Imports	33 370	29 495	43 083	45 546	43 400
Exports	1 724	4 312	2 056	2 324	2 400
Total supply	67 426	68 478	75 782	82 684	88 916
Poland					
Production	7 623	3 905	6 415	26 077	13 698
Imports	—	—	—	—	—
Exports ^a	—	—	—	—	—
Total supply	7 623	3 905	6 415	26 077	13 698
Portugal					
Production	6 315	6 000	9 466	6 625	11 173
Imports	3 485	1 936	73	1 407	1 732
Exports	211	752	243	366	587
Total supply	9 589	4 184	9 296	7 666	12 315
Spain					
Production	126 806	105 431	130 094	103 309	128 542
Imports	34 408	24 891	43 062	41 683	47 826
Exports ^a	75 998	50 813	68 177	69 906	44 340
Total supply	85 216	79 509	105 789	75 086	132 028
USSR					
Production	41 905	84 996	28 675	56 744	55 963
Imports	—	—	—	—	—
Exports	—	—	—	—	—
Total supply	41 905	84 996	28 615	56 744	55 963
ASIA					
China (excl. Taiwan)					
Production	35 752	40 391	61 955	132 554	135 300
Imports	—	—	—	—	—
Exports	5 134	2 057	3 419	3 622	3 029
Total supply	30 618	38 334	58 536	128 932	132 271
India					
Production	10 826	10 005	15 931	15 032	11 336
Imports	—	—	—	—	—
Exports	1 145	1 695	3 407	3 446	(4 457)
Total supply	9 681	8 310	12 524	11 586	6 879
Indonesia					
Production	10 124	9 586	10 560	14 896	14 061
Imports	—	—	—	—	—
Exports	—	—	—	—	—
Total supply	10 124	9 586	10 560	14 896	14 061

	1976	1977	1978	1979	1980
Hong Kong					
Production	7 824	6 177	7 131	7 850	5 918
Imports	5 760	4 178	3 591	3 634	4 304
Exports	3 008	2 389	1 814	2 259	1 917
Total supply	10 576	7 966	8 908	9 230	8 305
Japan					
Production	563 720	558 317	584 921	580 839	731 848
Imports	174 430	147 052	205 345	226 422	166 557
Exports	25 108	12 563	9 199	27 940	16 440
Total supply ^b	713 042	692 806	781 067	763 300	851 965
Korea, Rep. of					
Production	117 459	69 883	89 255	118 346	127 209
Imports	—	6 112	12 764	13 599	8 079
Exports	39 176	27 302	28 797	41 793	24 678
Total supply ^b	75 283	47 693	72 222	90 152	110 610
Malaysia					
Production	13 802	14 642	17 463	16 749	12 716
Imports	276	114	92	—	—
Exports	1 140	1 580	—	—	—
Total supply	13 802	14 642	17 463	16 749	12 716
Philippines					
Production	26 384	27 096	32 335	29 252	31 732
Imports	3 810	4 650	2 675	2 973	—
Exports	290	613	928	1 140	—
Total supply	29 904	31 133	34 082	31 086	—
China, province of Taiwan					
Production	37 051	32 582	33 463	46 920	46 554
Imports	720	3 059	9 324	13 636	18 128
Exports	5	5 030	8 705	8 434	6 165
Total supply	37 766	30 611	34 085	52 132	58 517
Thailand					
Production	63 952	93 694	93 654	75 102	62 295
Imports	13 121	594	318	312	268
Exports	21 678	34 540	44 865	49 478	43 717
Total supply ^b	43 278	59 748	49 107	25 936	18 010
SOUTH AMERICA					
Argentina					
Production	7 628	2 241	59 246	87 275	9 315
Imports	6	44	406	—	—
Exports	3 223	913	48 014	68 000	9 735
Total supply ^c	4 411	1 372	11 638	19 275	(-420)
Cuba					
Production	3 513	4 719	4 105	4 017	2 003
Imports	—	—	—	—	—
Exports	—	—	—	—	—
Total supply	3 513	4 719	4 105	4 017	2 003
Mexico					
Production	5 512	6 960	9 110	25 058	26 911
Imports	—	—	—	—	—
Exports	—	—	—	—	—
Total supply	5 512	6 960	9 110	25 058	26 911

^aExports not identifiable in the national trade classification.

^bUnbalance due to quantities used for reduction or feed.

^cStock accruals and withdrawals not known.

Table 10
Apparent *Per Capita* Cephalopod Consumption in Selected Countries

(kg live weight)

Country	1976	1977	1978	1979	1980
WESTERN EUROPE					
France	0.25	0.20	0.27	0.29	0.27
Spain	2.37	2.19	2.88	2.03	3.50
Italy	1.20	1.21	1.34	1.46	1.57
Greece	1.16	0.82	1.31	1.03	—
Portugal	1.00	0.74	0.96	0.78	1.25
Poland	0.22	0.11	0.18	0.74	0.38
ASIA					
Japan	6.02	5.98	6.44	6.10	6.82
Korea, Rep. of	2.09	1.30	1.94	2.38	2.88
Hong Kong	2.34	1.70	1.85	1.86	1.63
Thailand	1.01	1.36	1.09	0.56	0.38
Philippines	0.68	0.69	0.73	0.65	—
Malaysia	1.08	1.12	1.30	1.22	0.90
China (M + T)	0.07	0.07	0.10	0.18	0.19
India	0.02	0.01	0.02	0.02	0.01
Indonesia	0.07	0.07	0.07	0.10	0.09
LATIN AMERICA					
Mexico	0.09	0.11	0.14	0.37	0.39
Argentina	0.17	0.05	0.44	0.72	—
Cuba	0.37	0.50	0.43	0.42	0.21
USSR	0.16	0.33	0.11	0.22	0.21

been a rise in apparent consumption *per capita* from 6.0 kg in 1970 to 6.6 kg in 1980. However, considerable changes have occurred over this period in the pattern of cephalopod consumption, with more being eaten outside the home and less cephalopods consumed in households. Annual consumption of fresh squid and other cephalopods, as well as octopus, in Japanese households has trended downwards from 7.9 kg in 1970 to 6.6 kg in 1979. This decrease may be attributed largely to the high level of prices for these commodities. Among cephalopods, cuttlefish are least affected by the price factor due to increased inclination to eat luxury types of fish. Consumption of squid and octopus is, however, heavily influenced by price variations. The impact of price on consumption in these items is, for example, evidenced by the fact that in 1980 squid consumption at household levels was 20 percent higher than that in the previous year as the price dropped by 11 percent; in the same year octopus consumption decreased by 20 percent when the price increased by 16 percent.

In any case, squid including cuttlefish, are still among the most popular of all fish products eaten in Japan. A survey of family income and expenditure conducted by the Prime Minister's Office of Japan in 1980 revealed that squid and cuttlefish per household consumption of 7.5 kg per annum represented 16 percent of total fresh fish consumption, a proportion more than double that achieved by other "popular" fish species¹⁷.

Household consumption of fresh and frozen cephalopods has varied between 190 000 and 230 000 tons during 1976-80, with a further 100 000 tons absorbed by the institutional and catering sectors. The consumption of dried squid, once substantial (5.3 kg product weight per annum per household in 1963) has declined to only 22 grams in 1980. Household consumption of smoked squid has been quite stable at 300-400 grams per annum. The demand for octopus at household level has also varied, but recently it appears to be declining.

Table 11 indicates that domestic consumption of cuttlefish has continued to rise over the last decade, from 29 000 tons to 103 000 tons in 1980, an increase of 3.5 times. The more expensive species of cephalopods, such as *mongoika*, are mainly eaten outside the home — e.g. at expensive restaurants and sushi shops.

b. Effect of price and income changes on consumption

The main factors affecting the level of demand for cephalopod products include changes in the prices of these products, changes in the prices of competing products or substitutes, as well as variations in income. The latter factor affects the demand for cephalopod products both directly and indirectly through its effect on the demand for other items.

The direct effect of income growth on the demand for cephalopod products is illustrated in Table 12, where it can

¹⁷e.g. shrimp and crab: 8.0 percent; tuna: 7.4 percent; mackerel: 5.8 percent.

Table 11
Supply of Cuttlefish in Japan

	(t live weight)										
	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Domestic production	14 740	15 413	15 090	12 225	17 190	15 517	19 750	20 415	18 772	14 148	12 733
Imports	8 257	22 187	29 278	28 279	47 439	57 245	63 997	64 030	73 602	94 456	61 412
Exports											
Inventories	3 622	-17 681	(-7 735)	14 847	2 704	10 619	15 612	3 664	6 101	13 790	(-28 602)
Domestic consumption	29 375	52 281	52 103	25 657	61 925	62 143	68 135	80 781	86 273	94 814	102 747
<i>Per capita annual consumption</i>	0.28	0.50	0.49	0.24	0.56	0.60	0.71	0.75	0.75	0.82	0.88

Source: Prepared on the basis of the Annual Report on Statistics of Fishing and Aquaculture and Statistics on Trade of Fishery Products, Ministry of Agriculture, Forestry and Fisheries, 1973-80

Table 12
Per Household Annual Consumption of Cephalopods by Type of Product and Income Groups — 1980
Expenditure: Yen
Quantity: 100 g

Annual income range by group (Yen '000/year)	Squid including cuttlefish		Octopus		Dried squid		Smoked squid	
	Expenditure	Quantity	Expenditure	Quantity	Expenditure	Quantity	Expenditure	Quantity
Average	7 940	95.44	1 647	9.93	692	2.04	1 158	3.96
Group I < 2 530	6 495	92.13	1 235	9.71	527	1.59	788	2.77
Group II 2 530 ~ 3 340	7 606	92.62	1 517	9.33	644	1.99	1 094	3.87
Group III 3 340 ~ 4 220	8 090	93.82	1 630	9.91	681	2.00	1 250	4.28
Group IV 4 200 ~ 5 570	8 503	95.56	1 822	10.93	823	2.36	1 297	4.40
Group V 5 570 ~	9 004	101.54	2 029	11.75	782	2.24	1 363	4.49

Source: Annual Report of the Family and Expenditure Survey, 1980, Office of the Prime Minister, Japan.

be seen that for all categories purchased quantities and expenditures are higher for consumers in the fifth and more wealthy group than they are for those in the first and poorest group. It can to this extent be said that increased income (abstracted from other influences) is likely to bring about a rise in the consumption of the identified cephalopod products. Except for dried squid, all other cephalopod commodities indicate a substantial growth in purchase and expenditure as incomes rise from the numerically important groups I, II and III. This suggests that rising living standards over a wide range of the Japanese population are likely to be reflected in higher consumption of fresh squid and cuttlefish, as well as smoked squid and octopus. The strongly rising trends in expenditure from low-to-high income groups on this latter item suggest that the prospects for this commodity are good.

Table 13 indicates the sensitivity of the consumption of various items of fish in relation to meat. Fresh fish exhibited income elasticities of 0.56 and 0.15 in the two forms of analysis (i.e. cross-section and time series, respectively), much less than beef and other meat. This suggests that as incomes rise consumption of meat tends to increase substantially more

than fish, given no change in relative price. Compared with high-valued fishes, squid and octopus have relatively lower income elasticities, indicating that the prospect for a continued growth in consumption of squid and octopus is lower than that of shrimp/crabs, tuna, yellow tail, etc. It should be mentioned, however, that the relevant statistical classification places squid and cuttlefish together as one item, making it impossible to identify specific values for cuttlefish. It is clear from the analysis in the preceding section that cuttlefish have brighter prospects than squid. Price elasticity statistics show the responsiveness of consumption to changes in price. The table indicates that consumption of squid and octopus will not show changes as notable as other fishes against price variations. For example, consumption of shrimp/crab is very sensitive whilst that of pork is fairly insensitive to prices. In general, price elasticities for fish are quite high compared with meat, suggesting a relatively high degree of substitution between species. It can also be said that meat in general has a much more rigidly defined market than fish.

c. Prices

Table 14 shows the average unit import values (CIF) of cuttlefish, squid and octopus by country of origin during

Table 13
Price and Income Elasticity for
Cephalopods, Fish and Other Meats

	Income Elasticity		Price Elasticity
	Cross-section analysis (1979)	Time series analysis (1970-79)	Time series (1970-79)
Squid/cuttlefish	0.40	0.92	-0.81
Octopus ^a	0.46	1.05	-0.78
Tuna	R 0.42	1.41	-1.17
Horse mackerel	R 0.24	0.36	-1.37
Flounder	R 1.00	1.03	-1.17
Saury	R 0.08	1.34	-1.52
Yellow tail	0.71	1.58	-0.99
Shrimp/crab	0.75	3.80	-3.11
Fresh fish	0.56	0.15	-0.31
Beef	1.20	1.81	-1.01
Pork	0.56	1.58	-0.14
Chicken	0.40	1.62	-0.40

^aAs the time series for 1970-79 gave insignificant results statistically, the data for 1963-79 were used.

Note: R indicates the result is of questionable statistical significance.
Source: Food Demand Analysis, Ministry of Agriculture, Forestry and Fisheries, 1981, Japan.

the period 1976-81. It should, however, be borne in mind that the table gives only some general indications on price trends since factors such as size, species and quality affect prices of cephalopods, and these features are obscured in this table.

It is quite apparent that cuttlefish are more highly valued than squid, and among cuttlefish those from Spain and Thailand have fetched higher prices, possibly due to better quality. In the case of squid, USA and Argentinian squid have received higher prices than others. Most imported squid is purchased as raw material for processing and therefore brings a relatively low price. It should be noted that squid caught by trawl is slightly misshapen and below standard quality and it often sells at 20 to 25 percent less than those caught by jigging. In most cases, import prices of octopus for Japan are determined at Las Palmas, where octopus are landed by fishing vessels from a number of countries. The volume of landings, price trends at Las Palmas, and the absorptive capacity of the Japanese market are the major factors affecting import prices. It is noticeable that octopus prices have increased tremendously over the last several years, and the unit price sometimes surpassed that of cuttlefish. (1981?).

Table 15 shows the wholesale prices of cephalopods at the Tokyo Central Wholesale Market during the period 1977-81. The wholesale prices of imported cephalopods are influenced by prices of locally produced products, general trends in supply and demand, and the price levels of other fish, particularly those which substitute cephalopods. When comparing the import price with the wholesale price, one can make the following observations.

Cuttlefish have been sold at an average of 50-90 percent higher than the import price, squid 120-230 percent, and octopus 30-50 percent. This applies to only those products which pass through the normal distribution channel, i.e. the

Table 14
Average Unit Value of Imported Cephalopods by Country of Origin (CIF)

(US\$/t)

	1976	1977	1978	1979	1980	1981
CUTTLEFISH	2 265	2 264	2 182	3 114	2 846	2 844
Korea, Rep. of	1 716	1 899	1 869	2 502	2 444	2 859
Spain	2 169	2 269	2 096	3 318	3 172	3 177
Thailand	2 627	2 277	2 763	4 170	3 235	3 118
Yemen, PDR of	2 563	—	2 000	3 120	2 942	2 636
Senegal	2 250	2 611	—	2 461	2 438	2 682
SQUID	670	827	978	1 047	1 177	1 015
Canada	839	946	1 088	1 006	1 124	1 005
Argentina	625	0.0	847	1 170	1 224	782
Poland	—	—	—	1 143	1 176	895
Mexico	—	—	—	750	1 111	968
USA	545	708	1 000	1 167	1 250	1 427
OCTOPUS	1 333	1 756	1 542	2 460	2 894	1 880
Spain	1 258	1 303	1 654	3 254	3 385	1 790
Korea, Rep. of	1 393	1 510	1 606	2 500	3 153	1 959
Mauritania	1 349	1 123	1 365	1 625	2 143	1 891

Source: "Japan Export and Import", Japan Tariff Association, 1976-81.

Table 15
Average Wholesale Prices of Squid, Cuttlefish and Octopus at Tokyo and Osaka Wholesale Markets
(US\$/t)

	1977	1978	1979	1980	1981
CUTTLEFISH					
Tokyo	4 296	3 389	4 526	4 556	4 211
SQUID					
Fresh	3 216	3 413	3 413	2 821	2 546
Frozen	2 698	2 683	2 625	2 604	1 447
OCTOPUS	2 405	2 237	3 518	3 826	2 285

Source: Monthly Statistics of Agriculture, Forestry and Fisheries. Ministry of Agriculture, Forestry and Fisheries, Japan, 1977-81.

wholesale market. There are many wholesalers and agents dealing with the import of cephalopods who are not incorporated into the wholesale market distribution mechanism. It is estimated that some 85 percent of the total imports of squid and cuttlefish and some 90 percent of octopus are marketed through the normal channels. In any case, the price difference between the products marketed outside and within the ordinary distribution system is not too large.

Squid has shown a very high rate of increase at the wholesale level and this may apply only to expensive squid eaten raw, such as *Loligo edulis* (imported in small quantities). The majority of imported squid is sold directly to processors by special agents, such as fish processors associations, and therefore the above shown high rate of increase is not relevant in this case.

d. Other factors influencing consumption

In addition to the effects of prices and incomes on consumption volumes, psychological, seasonal, ethnic and regional characteristics also influence demand for specific products. Although cephalopods have achieved the status of a national food due to the development of freezing at sea, and improvements in the transport and storage of perishables on land, notable regional differences in consumption trends still remain.

Regional characteristics are often particularly important in determining consumption habits. In Japan, the quantity of squid consumed differs greatly by region. Per household annual expenditures on squid are especially high in large cities adjacent to squid landing places. For example, in Aomori City which is adjacent to major squid landing and processing centres, the household expenditure for squid was Yen 11 874 per annum in 1979, while in Tokyo it was less than half this (Yen 6 691). Taking into account that prices of squid are generally higher in Tokyo than in any other city, the quantitative consumption of squid in Tokyo is in fact much lower than that suggested by the above expenditure. For cuttlefish "mongoika" there is a strong geographical preference in central Japan (from Tongo to Nagoya) and the Osaka area. In Kyushu there is not much demand, and in Northern Japan demand is rare for this item.

Squid consumption is particularly high in Hokkaido, Northern Japan (Pacific coast) and Western Japan (Japan Sea side), all areas where large quantities of squid are regularly landed. Smaller amounts of squid are purchased in inland areas and at ports along the coast where squid is not marketed at the port, e.g. Nagasaki.

Regional factors seem to be more conspicuous in the case of octopus; the largest quantities are consumed in Hokkaido and central to western Japan (Pacific coast) and Shikoku, where octopus are landed and the expenditure declines rapidly as distance from points of landing increases.

Consumption of smoked squid is heavily concentrated in Northern Japan where processing of such product is well developed. Consumption of dried squid (surumi) seems to be more evenly distributed throughout the country.

Seasonal factors also affect consumption patterns, especially of dried squid and octopus. For example, expenditures in December are normally about seven or nine times those in the summer, principally as a result of demand for such products for year-end ceremonial purposes. A similar increase in smoked squid consumption can also be observed in December. This pattern arises from the fact that people tend to purchase more smoked squid for the year-end and New Year holidays as accompaniments to alcoholic drinks, intake of which increases in that period.

2. Spain

Total supplies of cephalopods in Spain have tended to fluctuate over the last ten years, but have generally exhibited a somewhat declining trend. Domestic production has recently fallen sharply as a result of political divergencies with Mauritania over fishing rights in that country's waters, and this may have created an opening for further imports. Nevertheless, the recent increase in imports was insufficient to counterbalance the substantial decrease in domestic output. *Per capita* consumption is now about 2.0 kg per annum, compared with 3 kg per annum during the first half of the seventies.

The consumption of squid on the Spanish market is apparently larger than that of cuttlefish. About two-thirds

of the Spanish supplies of squid are estimated to be purchased for consumption in the home, where it is usually eaten as the main part of the meal, but also as an appetizer; the balance being sold through bars and restaurants. The market for squid is divided into three main categories. The preferred species are *Loligo* spp., caught in the waters off West Africa and Spain. *Illex* spp. from the USA are regarded as of lower quality, as are "potas" or *Todarodes sagittatus*, supplied by the USSR, Poland and West Germany.

The major outlets for cuttlefish are the catering sector and the canning industry, although certain amounts of cuttlefish are used in the home. Squid and cuttlefish are mainly consumed in paella, as deep-fried rings, grilled, or cooked in sauces. Frozen ready-to-eat food based on squid and cuttlefish is a fast-expanding market segment and is expected to increase even more in importance in the future. Octopus is used as an appetizer and, among lower income groups on the Northwest coast, as a main meal. It is cheaper than most other fish or meat in 1978 for example, the average price of octopus at landing places was less than half of that of squid), and its utilization in prepared dishes is reported to have increased recently, although not significantly.

As stated above, Spanish consumption of cephalopods has decreased considerably over the last several years, mainly as a result of a decline in domestic output. Since there is a strong potential demand on the domestic market, recovery in consumption and further expansion of the market is believed to be possible, depending primarily upon the availability of these products. Although no information is available to quantify the factors affecting demand, it is the general opinion among Spanish importers and distributors that increased incomes has resulted in a marked increase in the consumption of squid and cuttlefish. Further expansion of the market is likely to be dependent, along with supplies, on the increase of real income of the lower socio-economic groups.

3. Italy

In Italy, the major market for cephalopods in Europe after Spain, there has been little change in domestic output, but a marked increase in imports has raised *per capita* consumption by about 30 percent since the early seventies to reach 1.6 kg per annum in 1980. There seems to be no preference for any particular species of cuttlefish. Among squid, *Loligo vulgaris* is preferred to other types of squid, such as the *Illex* variety, which Italian consumers consider to have a tougher flesh than the *Loligo* spp. However, the *Illex* share of the market has grown in recent years due to the attractive level of prices. It is expected that *Illex* species will gain further ground at the expense of *Loligo* if the price differential continues to prevail, since packers and consumers are becoming more experienced in preparing and cooking *Illex* species.

Domestic landings of cuttlefish account for a little over half of the total cuttlefish supplies available for consumption, and appear to have been stable — at about 18 000 tons — over the last several years. The supplies of octopus available for

consumption have increased remarkably in recent years and are estimated to be about 20 000-24 000 tons per annum, a nearly two-fold increase compared with the levels of the early seventies; a notable rise in imports is a contributing factor here. Squid are eaten in Italy primarily by middle- and upper-income groups, and consequently consumption is highest in the north. "Fried squid rings" is one of the most popular fish dishes both at home and in restaurants. Octopus and cuttlefish are eaten throughout the country.

4. Greece

Supplies of cephalopods in Greece have varied considerably over the last several years and *per capita* consumption has fluctuated between 0.8 and 1.3 kg per annum, on a somewhat declining trend.

Increasing exports are considered the direct reason for this. There seems to be no marked preference for any particular species of cuttlefish in Greece, while the preferred species of squid are *Loligo vulgaris*. The demand for the *Illex* varieties is at present very limited because of the tough consistency of the flesh. The low price of *Illex* spp. may, however, give some impetus to the increase of *Illex* consumption.

5. France

In France, supplies of cephalopods have been relatively stable over the past five years and *per capita* consumption has remained between 0.20 and 0.27 kg per annum. Consumption of cephalopods used to be confined mainly to the Mediterranean areas and Paris. In recent years, however, squid has been marketed in regions outside the traditional consuming areas through a larger supermarket chain.

With regard to cuttlefish, there seems to be no preference for any particular species. Among squid, *Loligo vulgaris* and other *Loligo* spp. are more preferred by the French consumer. The market share of *Illex* species is gaining ground due to their lower prices.

The share of squid and cuttlefish used in frozen food convenience dishes, such as paella-type and other prepared dishes, is estimated to be 20-25 percent of the total market, and is expected to grow in the future. Other popular dishes are squid rings fried in oil and cuttlefish fillets boiled in tomato sauce. Spring and summer are the main seasons for squid and cuttlefish consumption.

6. United States

In the USA, the market for cephalopods is still very limited. About half of the total landings, averaging 16 000 tons during 1976-80, is canned for export. A large portion of the remainder is sold as bait for recreational and commercial fisheries, and the rest used for human consumption through restaurant or retail outlets. Consumption of squid has increased in recent years, but is still largely confined to ethnic and gourmet groups. The appearance of whole squid and octopus is unattractive to many Americans, despite its relatively low retail price (US\$1.85 per kg). The average con-

sumer does not know how to clean or prepare whole squid for consumption. Sea food restaurants serving squid find the demand low and hand-cleaning costs high.

7. The Federal Republic of Germany and the United Kingdom

In the Federal Republic of Germany, interest in squid has grown in recent years as a result of catering for southern European workers and holiday makers. Government institutions and the trade consider that there still exists the aversion among German consumers to eat cephalopods; they do not expect a significant increase in demand in the near future. Imported squid must be completely cleaned, boneless, headless and wingless.

Cephalopods are not consumed in large quantities in the UK. However, the growing number of Mediterranean and other ethnic groups who eat squid as part of their daily diet, together with the influence of Mediterranean holidays, is causing an increase in consumption and this trend is expected to continue.

8. Latin America

In Latin America, a marked increase in *per capita* consumption has taken place in Mexico and Argentina as a result of increased local production, particularly in the former nation, where no exports of squid have been recorded. *Per capita* consumption was 0.37 kg per annum in 1980 in Mexico and 0.72 kg per annum in 1979 in Argentina.

9. East and Southeast Asia

The Republic of Korea is also one of the major markets for cephalopods, with an annual total consumption of some 110 000 tons (live weight) in 1980. Cephalopods are mostly marketed fresh, chilled and frozen, although there is some demand for dried and canned squid. *Per capita* consumption reached nearly 3.0 kg in recent years, compared with 1.3 kg during the first half of the seventies. Squid prices, however, have risen markedly in Korea over the past decade in response to strong local and overseas demand. Between 1970 and 1979 average fish prices in Korea almost doubled, while squid prices went up fifteen-fold.

In Thailand, supplies of cephalopods on the domestic market, after reaching a record high of 62 000 tons in 1973, seem to be on a somewhat declining trend. *Per capita* consumption in 1979 was 0.6 kg per annum, about half of the amount available during the first half of the seventies. Scarcity of raw materials as a result of declining domestic output and increasing exports is considered as the immediate cause for this. Cephalopods are now a widely demanded food item eaten by all income groups, and with recent improvements in the distribution system, they can be purchased in all areas of the country. Domestic market prices, particularly of cuttlefish, are normally boosted when raw materials are scarce for processors — who are often exporters as well and prefer to export rather than sell on the domestic market.

Cephalopods are a common table fish in Hong Kong, where local production provides 70-80 percent of total supplies. *Per capita* consumption, at about 1.8 kg per annum, has shown little change over the last five years.

Supplies in the Philippines have also remained fairly constant, with growing domestic output compensating for declining imports and increasing exports, and permitting a maintenance of *per capita* consumption at approximately 0.7 kg per annum.

Domestic production of cephalopod in Singapore is small and demand far exceeds supply of these commodities. Imports of frozen squid and cuttlefish have grown in recent years, reaching some 8 400 tons in 1980, from 3 240 tons in 1975. Consumers in Singapore, like those in most other squid-eating countries, prefer fresh squid, but the imported frozen product finds a ready market, as supplies of fresh product cannot satisfy demand. This is particularly true with the increasing demand from the hotel and tourist trade.

Supplies of cephalopods in Malaysia have fluctuated between 13 000 and 17 000 tons per annum during 1976 to 1980. This represents remarkable growth when compared to the 4 700 tons of 1970. Domestic supplies are met almost entirely from local landings, and much of the demand arises from the Chinese community.

VII. FUTURE TRENDS IN CONSUMPTION

The worldwide pattern of demand for cephalopods, as for food in general, is determined largely by cultural factors and tradition as well as by availability and income. Apart from growth in the market brought about by population increases, future trends in consumption depend on the one hand on the possibility of raising *per capita* consumption in countries where cephalopods are already accepted, and on the other, on developing markets in countries where they are as yet unfamiliar items.

A. Prospects for growth in established national markets

1. Japan

The previous sections have given some indication of trends in the predominant Japanese market. These include a decline in the demand for canned and salted squid, as well as for dried squid "surume". On the other hand, demand for fresh or frozen cephalopods (especially cuttlefish) of high quality, as well as for more elaborately processed products and specialty preparations, has notably increased. This shift in consumption to luxury and semi-luxury products is largely the result of higher incomes, and can be expected to continue with further rises in the Japanese standard of living.

These factors have been taken into account in the projections of demand provided in Table 16. The data available permits a fairly sophisticated treatment of fresh and frozen cephalopods eaten in the home, a sector which accounts for about 35 percent of the total market. Projection of a much more simple nature are also presented for the institutional

Table 16
Projected Demand for Cephalopods in Japan in 1990

	1980 Estimated '000 tons live weight	1990 Projected	1980 Estimated kg per capita	1990 Projected
FRESH/FROZEN				
Home consumption	234.2	249.0	2.02	2.30
Squid/cuttlefish	234.2	249.0	2.02	2.30
Octopus	43.3	48.0	0.37	0.44
Sub-total	277.5	297.0	2.39	2.79
Institutional catering				
Squid/cuttlefish	85.3	130.0	1.22	1.54
Octopus	51.0	65.0		
Sub-total	136.3	195.0	1.18	1.54
PROCESSED				
Preparations	316.5	331.5	2.73	2.77
Others				
canned	5.1	4.0		
dried, salted, smoked	41.0	45.0	0.56	0.56
salted fermented	18.6	22.0		
Sub-total	381.2	402.5	3.29	3.33
TOTAL HUMAN FOOD	795.0	894.5	6.86	7.66
Bait	36.0	30.0		
TOTAL DEMAND	831.0	924.5		

Note: Differences between this table and Table 9 due to inventories.

and processing sectors; finally, a rough account is taken of requirements for bait, etc. The year 1980 has been taken as the base year and 1990 as the "target" year; where possible, squid (including cuttlefish) and octopus are considered separately.

In the case of fresh or frozen cephalopods consumed at home, details of the projection methodology adopted are set out in Appendix IV. In summary, the projections take into account the following factors and assumptions. The compound annual rate of growth of personal consumption expenditure in real terms from 1980 to 1990 was assumed to be 4-5 percent, the median assumption employed in the report prepared by the Government of Japan in 1980 on long-term perspectives of demand and production of agricultural products. It was assumed that relative prices of squid would rise at a compound rate of 5 percent per annum, and those of octopus by 4 percent, in line with past trends. A 0.9 percent increase per annum in population was assumed, in accordance with estimates prepared by the Japanese Ministry of Health and Welfare, implying a growth from 116 million in 1980 to 126.3 million in 1990. A double logarithmic demand function was employed in conjunction with price and income elasticities for squid (including cuttlefish) of -0.8066 and 0.9171 and octopus — 1.70170 and 0.9860.

For fresh or frozen cephalopods consumed in restaurants, institutions, etc., estimates for 1990 were derived by simple extrapolation of recent trends, with population growth being a major factor. Estimates were similarly derived for prospective demand for processed cephalopod products, an attempt being made to consider product groupings (e.g. canned, cured, preparations, etc.) separately. To complete the picture, crude estimates were finally added to represent possible future use for bait.

The resulting projections set out in Table 16 suggest that total Japanese demand for cephalopods may increase by a little over 10 percent over the next decade or so, the major factor in the projected expansion being continued population growth. *Per capita* consumption in 1990 seems likely to be rather higher than at present, but with growth levels apparently less than those achieved in the early seventies. The main growth in demand, both in tonnage and *per capita* terms, is postulated to be most likely in the consumption at home of fresh and frozen cephalopods, particularly cuttlefish; consumption in the institutional and catering sectors seems likely to increase remarkably due to increasing practice of dining out on account of rising incomes. Continued growth seems likely in the demand for specially prepared products, whilst the consumption of most other processed cephalopod

items will probably show little change compared to present levels. Taking into account the use of cephalopods for bait — which is unlikely to increase, total demand by Japan for cephalopods could be on the order of some 925 000 tons by 1990.

One of the main factors likely to hold down the growth in consumption is the rise in prices for cephalopod products relative to those for competing products. The effect of price on consumption has already been referred to previously, the analysis suggesting that the demand for certain cephalopod products is rather sensitive to price changes. Certainly, price rises have been a major cause for the declining trend in consumption which started in the early seventies (see Statistical Annex Table XI). The growing difficulties of supply, i.e. the heavy exploitation of local waters, problems with distant water fishing, and rising costs of fishing, suggest that rising prices are likely to continue to dampen growth in consumption induced by higher incomes.

2. Other important established national markets

For other countries where cephalopods are presently consumed, some growth in *per capita* consumption over previously attained levels can be looked for. For these countries, sufficient data do not exist to permit a detailed breakdown of the market segments as was done for Japan, nor is there empirical evidence in the form of household budgetary surveys of the relationship between changes in income and changes in consumption of cephalopods. Nevertheless, recent past trends in Spain, Italy, France, Thailand, and the Republic of Korea suggest that consumption is fairly sensitive to changes in income; thus there is justification for making estimates of future consumption in these countries

on this basis. The estimates provided in Table 17 were obtained using basic macro-economic estimates of national economic growth (done by FAO), and utilize an income elasticity applicable to somewhat broader group of shellfish. These estimates also assume constant relative prices, since insufficient information is available to allow for the effect of relative prices on consumption in these countries.

Projection of demand on a similar basis was not considered justified in a number of other established national markets. In Malaysia, Indonesia, Greece and Portugal it is difficult to determine any discernible trend in recent past consumption. Demand to 1990 in all these countries is assumed to be constant (see Table 14), but clearly under the right conditions (e.g. political stability, economic growth and relatively free trade) these countries could offer expanding markets for cephalopod products. Venezuela and Argentina also offer potential for market expansion, although on account of the small *per capita* consumption in these nations the increase in total demand is unlikely to be large in the foreseeable future.

B. Considerations for entry to new markets

The major markets for cephalopods exports have already been developed in Japan, the Republic of Korea, Spain, France, Italy and Greece. But interest has begun to grow in the potential offered by Northern European countries — e.g. the U.K. and the Federal Republic of Germany, the USA, and to a much lesser extent, by Australia. So far, only limited success has been obtained in introducing cephalopods into Canada and Scandinavian markets. To achieve diversification and expansion of market outlets, market obstacles (e.g. tariffs, quotas, etc.), as well as product development chal-

Table 17
Actual Supply and Prospective Demand for Cephalopods in 1990 in Selected Countries

Country	1980		1990	
	<i>per capita</i> kg	Total '000 tons	<i>per capita</i> kg	Total '000 tons
Mexico	0.39	27.0	0.41	38
Japan	6.82	763	7.08	895
Korea, Rep. of	2.16	110.6	2.63	118
Philippines	0.67	33.0	0.79	50
Thailand	0.83	26.0	0.97	56
France	0.28	14.6	0.32	18
Italy	1.57	89.1	1.85	108
Spain	3.50	132.0	3.73	151

lenges (e.g. marketable form) will have to be overcome. Trade barriers are not likely to be insurmountable in most new national markets showing some potential, but attention must be devoted to product development. In this context, it would be very useful to conduct tests of consumer acceptance of appropriate product forms in selected, promising countries.

A major problem to be overcome is the repugnance generally felt by most consumers in these markets to the peculiar physical appearance of whole cephalopods. A market study conducted in the USA revealed that US consumers hold a strong bias against both the name "squid" and the traditional method of selling it — in the whole, unprocessed form — as they are not accustomed to eviscerate and dress the squid to make it suitable for meal preparation. The study suggests that if squid were processed into fillet-like form consumer acceptance would be increased; similarly, the use of an alternative name — e.g. "calamari" (Italian for squids) — would also increase consumer acceptance. These considerations are of course part of the overall consumer acceptance picture, which would also include the development of products suited to prevailing consumers' taste, such as tenderness of flesh, and flavour.

It seems to be important to promote awareness of cephalopod quality and nutritional value, such as the low-fat content and high protein content, as this will make the product more interesting and appealing to consumers in today's market.

For the entry into the expansion in already-established markets, the most important factors to be taken into account are the investigation of the acceptability of products with respect to consumer familiarity with the product, its quality and specifications. This differs significantly according to countries; familiarity essentially means the degree of similarity to species already available in the target markets. There is little doubt that quality affects taste, colour, flesh firmness, texture and overall appearance; this is of utmost importance in countries like Japan, where they are eaten raw. Product specifications, such as size-grading, product form, weight allowance, packaging and quality standards should be well understood by exporters as they have a bearing directly on demand and prices. Cephalopod exporting countries should place particular emphasis, in this context, on quality control and plant sanitation, along with the development of freezing plants and distribution facilities. Any export scheme could be more effectively implemented through collaboration between exporting and importing countries. For example, Japanese importers often send experts to exporting countries to assist them in improving processing, packaging and shipping.

Regarding marketing strategies, the aforementioned study suggests two approaches to expand the domestic US squid market: (1) the introduction of the product through large-scale consumers and restaurants; and (2) introduction through small-scale local seafood and ethnic restaurants as a speciality item (in various forms such as stuffed squid and cuttlefish, breaded squid rings and strips, etc.). To overcome con-

sumer lack of familiarity with squid and gain mass market acceptance, promotion programmes by large seafood processors or restaurant chains must be initiated.

C. Global outlook

An attempt is made below in Table 18 to sketch some broad perspectives of possible total world requirements of cephalopods by 1990. The estimates are essentially broad orders of magnitude and should be treated as such, but they may serve as useful indicators of likely regional and, in some cases, national trends in demand.

Table 18
General Perspectives for World
Consumption of Cephalopods in 1990

	Approximate present con- sumption (1980)	'000 tons consumption in 1990	
		low ^a	high ^b
WORLD TOTAL^c	1 447.6	1 674	1 946
Africa	2.0	3	5
Latin America	32.0	43	53
Mexico	27.0	35	38
Other	5.0	8	15
Asia and Middle East	1 127.9	1 314	1 518
Japan	795.0	845	895
Korea, Rep. of	110.6	129	157
Philippines	33.0	42	50
Thailand	18.3	48	56
Other Asian	171.0	250	360
Europe	265.7	284	325
France	14.6	15	18
Italy	89.1	91	108
Spain	132.0	142	151
Other European	30.0	36	48
Other developed countries	20.0	30	45

^aAssuming no increase in *per capita* consumption.

^bIncluding the effect of income increases for all, and also for price effects in the case of Japan.

^cExcluding bait (approximately 46 000 tons) and inventories.

Where possible the prospects for 1990 have been derived by multiplying possible *per capita* levels of consumption (globally projected in the light of recent trends in this variable) by the United Nations Medium variant for population estimates in 1990.

Overall, total world food requirements of cephalopods, on the basis of present trends and 1980 relative prices, will be between 1.7-1.9 million tons by 1990, some 227 000 to 499 000 tons higher the present level. Consumption should grow to at least the lower limit of this range since this is the quantity required merely to maintain present levels of *per*

capita consumption. The eventual increase is therefore more likely to approach the upper limit of the range. Much of this increase will take place in Japan, the Republic of Korea, and established European markets (over 40 percent of the total increase). Increases will also be notable in developing countries where cephalopods are already well known, in large measure owing to the greater rate of population increase. However, the expected pace of growth will be somewhat slower than that experienced in the recent past.

Through 1990, the annual rate of growth in world consumption is seen being about 3 percent per annum, which is much lower than that which was achieved during the period 1970-1980 (4.8 percent per annum). This can be attributed to the slower growth expected in the Japanese market, as well as to the static demand postulated for Spain. Consumption could, however, grow by more than 499 000 tons under the impact of any of a number of factors — e.g. if income in the main consuming countries were to rise more rapidly than suggested by present trends, if there is a decline in the relative price of cephalopods, or more particularly, if they become more widely consumed in markets where cephalopods are at present not or little accepted.

Areas where cephalopods are not generally accepted include both developed and developing countries. In those high-income countries where cephalopods are not presently consumed, it may be possible to create a market among the affluent through the introduction of attractive product forms. Increasing opportunities for nationals of these countries to travel for holidays to the Mediterranean and Asian countries may contribute to an expansion of their home markets (i.e. northern European countries and, to a less extent, North America).

In developing countries (e.g. some African and Asian countries), where the existing food supply is now quite varied and more than meets nutritional requirements, it seems unlikely that cephalopods (as such) will become items with wide market appeal. But *per capita* consumption is expected to increase more rapidly in developing countries than in the developed world. However, present price levels in most parts of the world probably make squid too expensive to create a similarly widespread market in the poorest of the developing countries. However, they could almost certainly be marketed at prices within the reach of urban populations in the middle- and upper-income range of developing countries. The possibilities of this have already been demonstrated in Thailand, the Philippines, Indonesia and Mexico.

Appendix 1
FEATURES OF MAJOR CEPHALOPOD SPECIES

Scientific Name	Average size (length of trunk)	Habitat
<i>Loligo duvauaeelii</i>	16 cm 55 cm	South East Asia, along the Coast of India and the Arabic Peninsula, Eastern Coast Africa
<i>Loligo forbesi</i>	55 cm	Around UK — South Africa, Mediterranean
<i>Loligo vulgaris</i>	42 cm (male) 32 cm (female)	Northeast Atlantic, UK, South Africa, Mediterranean
<i>Loligo pealei</i>	20 cm	U.S. east coast to the Gulf of Mexico
<i>Loligo plei</i>	35 cm	Gulf of Mexico, Caribbean Sea
<i>Loligo opalescens</i>	16 cm	Off California
<i>Loligo edulis</i>	35 cm	Southwestern Japan, East China Sea
<i>Loligo chinensis</i>	30 cm	Off Hong Kong and around Taiwan province of China
<i>Loligo bleekeri</i>	40 cm	Around Japan
<i>Illex illecebrosus</i>	25-28 cm	Atlantic Ocean (Greenland-East Coast of Canada and USA centering around Newfoundland, and off New York and Iceland
<i>Illex coindetii</i>	25 cm	Atlantic Ocean (around U.K.-South Africa), Mediterranean Gulf of Mexico, Caribbean Sea, Vertical distribution ranges from the surface to 400 m deep
<i>Illex argentinus</i>	30 cm	Confined to the shelf off Patagonia
<i>Ommastrephes caroli</i>	10 cm	Northeast Atlantic-South Africa, Northwest Atlantic-Brazil, Mediter- ranean, Gulf of Mexico, Caribbean Sea
(including <i>O. pteorpus</i>)	38 cm	
<i>Ommastrephes bartrami</i>	45 cm	Occurs extensively throughout the world oceans; Largely concentrated to North Pacific and off California to Northern Mexico
<i>Todarodes sagittatus</i>	45 cm sometimes reaches	North Sea (Barents Sea, Kara Sea, Iceland); Atlantic Ocean (Scandinavia, South Africa);
	75 cm	Western Indian Ocean, Mediterranean
<i>Todarodes pacificus</i>	30 cm	Around Japanese Islands (Okhotsk-Honshu-Okinawa) — East China Sea
<i>Nototodarus sloani sloani</i>	40 cm	New Zealand — Fiji Islands, Tasmania
<i>Nototodarus sloani gouldi</i>	40 cm	Tasmania
<i>Nototodarus sloani philippinensis</i>	30 cm	Philippine waters, around Sri Lanka
<i>Dosidicus gigas</i>	64 cm	Pacific Ocean (Mexico — Chile)
<i>Sepia officinalis</i>	30 cm	North Sea, France-South Africa, Mediterranean
<i>Sepia pharaonis</i>	36 cm	West Indian Ocean, largely concentrated off Arabian Peninsula
<i>Sepia latimanus</i>	50 cm	South East Asia including north of Australia
<i>Sepia esculenta</i>	18 cm	South Western Japan, East China Sea, Republic of Korea and Hong Kong
<i>Sepiella joponica</i>	20 cm	Around Japan, Yellow Sea, East China Sea

Appendix 2
JAPAN: UTILIZATION OF SQUID (INCLUDING CUTTLEFISH) AND OCTOPUS

Product Form	Specialized Product	Raw Materials		
SQUID, INCLUDING CUTTLEFISH				
trunk and tentacles	Fresh	—	Various squids, in particular <i>Todarodes pacificus</i> , <i>Sepia officinalis</i> <i>Sepia exculenta</i> , etc.	
	Dried	Ichiban-surume Niban-surume Kotsuki-ika Ika-tokkuri	<i>Loligo edulis edulis</i> <i>T. pacificus</i> <i>Sepia exculenta</i> / <i>Illex</i> spp.	
	Salted	Shio-ika	<i>T. pacificus</i> <i>Loligo bleekeri</i>	
	Canned	—	Various squids, in particular <i>T. pacificus</i> , <i>Ommastrephes bartrami</i>	
	Smoked	—	<i>L. bleekeri</i> , <i>T. pacificus</i>	
	Fermented	Paste Fermented-salted "Shiokara" Kasuzuke, misozuke	<i>T. pacificus</i> , <i>O. bartrami</i> Various squids, in particular <i>T. pacificus</i>	
	Kneaded	Kamaboko Chikuwa	<i>T. pacificus</i>	
	Preparations	Sausage	—	—
		Daruma	—	—
		Saki-ika Sugata-yaki Nobashi-surume	<i>T. pacificus</i> <i>O. bartrami</i> <i>Illex</i> spp.	
Seasoned "Tsukudani"	Kizami-surume	Various species		
Other	Fresh	Vitamin B Squid sauce Squid oil Sepia pigment	Liver Liver Liver Ink sac	
	OCTOPUS			
	Edible part (trunk and tentacles)	Fresh (after boiling)	—	Various octopus
		Dried	Dried octopus	Small-sized octopus in particular <i>O. vulgaris</i> <i>O. dofleini</i>
Boiled and dried		Nagaashi-dako Sliced octopus "Kezuri-dako"	Various octopus	
		Chopped octopus "Sogi-dako"	—	
Seasoned		Vinegared "Su-dako" Seasoned "Ajitsuke-dako"	Boiled octopus of various species	
	Preparations "Chinmi-dako"	—		
Smoked	Hot smoked octopus "Onkum-dako" Tako-chin	Boiled octopus of various species <i>O. ocellatus</i>		

¹Offal from cephalopods also used for reduction to fishmeal.

Appendix 3
JAPAN: TARIFFS AND THE IMPORT QUOTA SYSTEM

Tariffs imposed on imported cephalopod products by Japan are shown below.

Table A3-1
Japanese Tariff Structure for Cephalopod Products
Unit: Percentage of CIF Value

	Fresh, chilled or frozen squid	Fresh, chilled or frozen octopus	Smoked squid	Processed and preserved preparations
Base rate	8.8 ^a	10	12	15
Concession rate	5	5		7.5

^aOther items enter free

In addition to tariffs, the Import Quota (IQ) System was set up in an attempt, primarily, to protect domestic fishermen from the inflow of low-priced products from abroad, as well as to make products available to the domestic market at reasonable prices.

Octopus is a "liberalized" item and therefore free from the IQ System. Thus, the IQ System is applicable only to squid and cuttlefish products.

Imported squid is classified into two categories and nine sub-categories, as follows: 1) "raw squid", which includes (i) live, (ii) fresh, (iii) frozen, (iv) chilled, (v) salted and (vi) brine-soaked; and 2) "dried squid", which includes (vii) dried, (viii) smoked, and (ix) prepared¹. "Raw squid" are subdivided into cuttlefish and squid. Of the various species of cuttlefish imported, only *Sepia officinalis* ("mongoika") is liberalized, but other cuttlefish such as "*Sepia edulis*" and "koika" are not liberalized. Squid is a non-liberalized item.

The quota for squid and cuttlefish (i.e. other than "mongoika") is determined twice a year, and quantities under quota may be imported from any country.

The quota is distributed to three different sectors, i.e. trading firms, fisheries development (joint resources), and processors. Their relative proportions vary each year and in 1979 were approximately 70, 25 and 5 percent, respectively.

The IQ is divided into two categories. One category is set aside exclusively for the Republic of Korea for dried squid and is determined once a year in value terms; this is adopted only by trading firms. The other category is the IQ for General Fishery products on raw squid, which was applicable to 99 countries including the Republic of Korea in 1981. In this instance, the quota is determined twice a year in quantity terms and distributed to trading firms, fisheries development (joint-ventures), and processors.

¹Includes canned, boiled, seasoned, salted fermented and preparations.

²W.G. Court, 1980.

Altogether, over 200 firms hold import quotas, sometimes as little as 10 tons apiece. Several processors associations hold quota allocations and distribute them to their members. However, these associations do not carry out the importing procedures themselves and imports under processors allocations are conducted by trading firms on behalf of the associations. It should be mentioned that although quotas are intended to regulate imports and even cut prices, they are not always fully utilized.

The USSR is excluded from quotas and therefore all Soviet catches imported by Japan originate in some other countries, usually Singapore. In a similar fashion, catches from other areas, such as Argentina, are transshipped through Korea and enter Japan as "Korean origin".

The table below shows the Japanese import quota of fresh, chilled and frozen squid during 1974 and 1981.

Table A3-2
Japanese Import Quota of Fresh, Chilled and Frozen Squid
(1974-1981)

Fiscal Year	April- September	October- March	Total
1974	7 200	7 700	14 900
1975	7 700	8 200	15 900
1976	8 200	10 000	18 200
1977	15 000	25 000	40 000
1978	25 000	35 000	60 000
1979	40 000	36 500	76 500
1980	—	18 000	18 000
1981	—	25 000	25 000

As indicated above, there were yearly increases in squid imports during 1974-1979. Five reasons are behind this², and they still seem to be relevant, although in recent years there has been a substantial decrease in quota levels. They are as follows:

- (i) *Toradodes pacificus* stocks have not recovered;
- (ii) Access to foreign squid resources has been restricted;
- (iii) Japanese participation in joint-venture squid fisheries overseas has increased;
- (iv) The government favourably considers import quota requests from ventures involving Japanese boats; and
- (v) Foreign and some domestic groups have been strongly pressuring the government to make such increases. But the import quota amount is there to protect domestic landings, and if landings increase sufficiently, reductions in the quota can result as happened in 1980 and 1981.

The description of the IQ System for squid and cuttlefish is summarized below.

Table A3-3
Description of IQ System for Squid and Cuttlefish

Items	Sub-items	Kind of IQ system and countries	Firms to which IQ system is applicable	Types and number of quota allotment
Raw squids	Cuttlefish mongoika	Can be imported from any country	No restriction	Free
	Squids and cuttlefish other than mongoika	IQ for general fishery products (applicable to 99 countries)	1. Domestic trading firms 2. Joint-ventures participating in export-oriented programmes	In quantity terms twice a year
Dried squids	Dried squids	1. IQ for Korean Republic fishery products applicable only to Korea Rep.)	Trading firms	In value terms once a year
		2. IQ for general fishery products (applicable to 99 countries)	1. Trading firms 2. Joint-ventures participating in export-oriented programmes 3. Processors	In quantity terms once a year

Appendix 4
JAPAN: OTHER TRADE REQUIREMENTS

Under the Japanese Food Sanitation Law (Law No. 233, December 1941) all incoming foodstuff has to be inspected to ensure compliance with standards of freshness, wholesomeness and labelling requirements. This inspection is carried out by the Ministry of Health and Welfare with the day-to-day administration conducted by the Food Sanitation Division of the Ministry. No imported foods are allowed to pass through customs without a written permit issued by a food sanitation inspector. When a consignment arrives, the importer submits the notification, along with necessary documents, to the Food Sanitation Office at the port of entry. The inspector then decides whether or not to carry out a sampling inspection of the product. His decision is based on a sensory inspection of the product (i.e. smell, visual), as well as on past records of the exporting country for the particular food, and on reports of outbreaks of disease, such as cholera.

Product form

Squid and cuttlefish are imported as follows:

- (1) whole, head off, fresh, chilled, frozen
- (2) whole, salted in brine, dried
- (3) fillets or tubes skinned, prepared smoked, canned.

Octopus is imported as follows:

- (1) whole, frozen. (To be eviscerated)

Size grading

Jigged squid frozen on-board is packed as follows: size grading is very important, and in any block the squid should be uniform in size.

Count	Net weight frozen
10 under	8.5 kg
11-15	"
16-20	"
21-25	"
26-30	"
31-35	"
36-40	"
41-45	"
46-50	"
51-60	"
61-70	"
71-80	"
81-90	"
91 up	"

Generally, jigged squid in the 16-30 count size range are considered most suitable for sashimi or other table uses; other sizes and trawled squid are used mainly for processing.

In Spain, size grading of cuttlefish for shipment to Japan is as follows:

Classification	Weight per cuttlefish (kg)
K-0	over 3 kg
K-1	2.0-3.0 kg
K-2	1.0-2.0 kg
K-3	0.7-1.0 kg
K-4	0.4-0.7 kg
K-5	0.3-0.4 kg

Size grading for octopus prepared for shipment to Japan from Spain and Italy is as follows:

Classification	Weight per octopus (kg)
T1	over 4 kg
T2	3.0-4.0
T3	2.0-3.0
T4	1.5-2.0
T5	1.0-1.5
T6	0.5-1.0
T7	0.3-0.5
T8	less than 0.3
R	Mix. (defect)

Generally, one package of frozen octopus is 10 kg.

Octopus *ocellatus* imported by Japan from South East Asia are normally put in a package of one kg. The composition is as follows:

one package (1 kg)	15-25 octopus
"	26-40
"	41-60
"	61-80

Presentation

Squids are arranged in rows cross the trays with their tentacles folded along the sides. In the standard tray larger squid are packed in two layers, while smaller ones are packed in three layers. As the trays are fairly standardized (48 x 30 x 8 cm), and sizing and laying practice is standardized, the finished products (blocks) have a uniform presentation.

Quality standards

Cephalopods should meet the following sanitary standards:

- (1) Number of bacteria should be 5 million or less per gram;
- (2) *E. coli* should be negative; and
- (3) Volatic basic nitrogen should be 25 milligrammes or less per 100 grammes.

The product should not have a bad odour and possess their natural bloom. It should not be blue or in any other way discoloured and should not be smeared with ink.

Other requirements

(1) The form — trimmed or untrimmed — should be good, having no cuts, splits or any other wounds, and having the head and tentacles sectioned; the cuttlebone, the pin and the outer skin should be removed. This applies mainly in cuttlefish, as most squid is imported whole.

(2) Freshness is the most important factor. Cephalopods must be frozen immediately after capture at a temperature of -30° to -40°C , and defrosted only once because squid protein is easily soluble. The temperatures of the squid and cuttlefish should be minus 18°C .

(3) The package weight should be identical to the disclosed weight. Cephalopods should be of the same size and should not be packed with the outer skin, cuttlebone, suckers, etc. still attached.

(4) No foreign substance should be attached to or mixed with the product.

(5) Packing material and methods should be sufficient for the quality and the use of the foodstuff in question.

(6) The flesh of the product should be firm.

Commercial practices

Trading companies or fishing companies which do not hold their own allocation for import quotas, or which wish to import beyond their allocated quantity must acquire allocation from another party and import (nominally) on their behalf.

The processor associations¹ which administer quota allocations on behalf of their members do not actually carry out the importing procedures, but transfer this function to trading companies. Imports under processor allocations are in practice conducted by traders on behalf of the associations. The practice has become established, however, of trading companies paying fees to the processor associations to acquire import allocations for the trading companies' own entrepreneurial purposes. The licences held by other trading companies can also be bought for a fee.

As the importing is done nominally on behalf of the official allocation holder, the performance record for imports is ascribed to the holder. Allocations each year are made on the basis of import performance record, so the same holders continue to be given allocations whether they actually use them for their own purposes or whether they sell them off to other parties.

Squid for bait

The main non-food use of squid is bait for distant-water tuna operations. Small squid (150-200 gm) are used for this purpose. Regular block size (8.5 kg), consistent size and grading, and neat packing are essential. Fishermen thaw a given number of cartons prior to fishing and must have confidence that they are preparing the right number of squid. Inconsistent size grading can mean too many or too few squid thawed. Neat laying is necessary so that squid can be quickly and easily taken from the thawed block.

¹(a) National Federation of Processed Fishery Products Associations.

(b) All Japan Dried Squid Processing Cooperatives.

(c) National Federation of Chinmi Seasoned Food Cooperatives.

(d) All Japan Convenience Food Cooperatives.

(e) Japan Canned Fish Manufacturers Cooperatives.

Appendix 5
**CONDITIONS OF ENTRY OF IMPORTED
 CEPHALOPOD PRODUCTS INTO OTHER MAJOR NATIONAL MARKETS**

Tariffs

The customs treatment of cephalopods by major importing countries seems to have had only a moderate effect on the trade. Customs duties levied in fresh, chilled or frozen and processed or preserved items are not generally considered significant constraints to the expansion of international trade in cephalopod products. Tariff levels, by product type, for most major cephalopod market countries (excluding Japan — see Appendix 3 in Table A3-1).

Within European Economic Community (EEC) countries there is a common external tariff on squid of 6 percent and a duty on other cephalopods of 8 percent, calculated on the basis of the CIF value. In addition, certain duties are levied

on imports of squid and other cephalopods by individual EEC nations. For example, France levies a further parafiscal tax of 0.08 percent of the CIF value, calculated on the duty-paid value. In addition, minor health inspection charges are payable. In the case of Italy, there is a turn-over tax of 3 percent of the CIF value. The Federal Republic of Germany levies a turn-over tax of 5.5 percent, and Belgium 6 percent. Greece levies an import duty of 25 percent, plus a stamp duty, expressed as a percentage of the duty paid value of 2 percent. In Spain fresh cephalopods are not subject to an import duty but are subject to a consumption tax, calculated at the rate of 6 percent of the CIF value, and also are subject to the home protection tax of Pts. 15/kg (approximately US\$250/ton).

Table A5-1
 Tariffs for Cephalopods and Cephalopod Products in Major Importing Countries (as of April 1982)

Unit: percentage on the basis of CIF value

	Fresh, chilled frozen squid/ cuttlefish	Fresh, chilled frozen octopus	Salted, in brine dried or salted	Canned	Preparations
Brazil	155	145	155	185	185
France	Auto ¹ : 8 Conven ² : 6	Auto: 8 Conven: 8	Auto: 20 Conven: 20	Auto: 20 Conven: 20	Auto: 20 Conven: 20
Greece	EEC: 25 General: 25	EEC: 25 General: 25	EEC: 20 General: 20	EEC: 20 General: 20	EEC: 20 General: 20
Hong Kong	—	—	—	—	—
Italy	Auto: 8 Conven: 6	Auto: 8 Conven: 8	Auto: 20 Conven: 20	Auto: 20 Conven: 20	Auto: 20 Conven: 20
Japan	Base: 8.8 ³ Concession: 5 (Cuttlefish or <i>Sepia officinalis</i> is free from duty)	Base: 10 Concession: 5	Base: 10 Concession: 5	Base: 15 Concession: 7.5	Base: 15 Concession: 7.5
Korea Rep. of	30 ⁴	30	30	30	30
Malaysia	—	—	—	20	—
Philippines	100	100	100	20	20
Portugal	Maximum: 4 Minimum: 2	Maximum: 4 Minimum: 2	Maximum: 4 Minimum: 2	Maximum: 36 Minimum: 18	Maximum: 36 Minimum: 18
Singapore	—	—	—	—	—
Spain	General: 8 Countervailing: 6	General: 8 Countervailing: 6	General: 8 Countervailing: 6	<i>Octopus</i> General: 17.5 Countervailing: 11 <i>Squid/cuttlefish</i> General: 22.5 Countervailing: 11	<i>Octopus</i> General: 17.5 Countervailing: 11 <i>Squid/cuttlefish</i> General: 22.5 Countervailing: 11
Thailand	30	30	80	80	80
Uruguay	20	20	20	20	20
U.K.	Auto: 8 Conven: 6 (for squid) Auto: 8 Conven: 6 (for cuttlefish)	Auto: 8 Conven: 6	Auto: 8 Conven: 6 (for squid) Auto: 8 Conven: 6 (for cuttlefish)	Auto: 20 Conven: 20	Auto: 20 Conven: 20

¹Autonomous rates apply to countries which have not concluded any special agreement with EEC.

²Conventional: Conventional rates or most favoured nation rates apply to contracting parties of GATT or countries which EEC has granted a favourable rate.

³The Japanese Government committed to reduce the duty of 8.8 percent to 5 percent by 1988.

⁴The product of joint-ventures in which Korean vessels are involved enters at 10 percent tariff.

Source: Register of Import Regulations for Fish and Fishery Products FAO, 1980, and others.

Frozen cephalopods are liable to an import duty of 6 percent; in addition, there is an import duty of 6 percent. Finally, there is an import compensation levy of 6 percent on the CIF value plus a variable home production protection tax of Pts. 10/ton.

Portugal levies P.Esc. 200-400/kg on imports of cephalopods. Imports of cephalopods to North America (Canada and the USA) and Scandinavian countries are not subject to *ad valorem* tariffs.

Europe: Non-tariff and Other Trade Requirements

Food sanitation laws or regulations, certification system and quality standards have been established in many countries. These deal with such matters as grading regulations, minimum quality requirements, permissible additives, and marketing and labelling requirements.

Size grading

Size grading is considered an important feature in European markets. Although there is no standard procedure, the following classifications are fairly widely accepted.

Length of body	Weight
Less than 9 cm	50-100 g
10-15 cm	100-200 g
15-20 cm	150-200 g
20-25 cm	200-300 g
25-30 cm	300-400 g
over 30 cm	over 400 g

Marketing and labelling requirements

The following information is generally required for imports into European markets, using the language of the country of destination.

- (1) Country of origin
- (2) Name of producer or exporter and distributor
- (3) Name of coldstore plant
- (4) Commercial and Latin name of the species
- (5) Form in which offered (e.g., whole, ring, etc.)
- (6) Fishing date of the product
- (7) Net weight (in kilogrammes)
- (8) Stamp of the inspecting authority
- (9) Marks

A. Spanish market requirements

Product form

Squid is imported in the following forms:

- (1) whole, frozen;
- (2) cleaned, head-off and fillets or tube, skinned (for body length over 20 cm);
- (3) rings cut from the tube prepared as above;
- (4) there is also a small market for tentacles.

Cuttlefish is imported in the following forms:

- (1) wings;
- (2) tentacles;
- (3) strips cut from the body;
- (4) tubes or fillets.

Octopus is imported in the following forms:

- (1) frozen whole;
- (2) frozen gutted;
- (3) frozen gutted, headless.

Size grading

Grading for size is an important feature of the Spanish market. The statutory market requirements of grading are as follows:

Squid:	Large	700 g
	Medium	300-700 g
	Small	300 g
Cuttlefish:	Large	2 kg
	Medium	1-2 kg
	Small	1 kg
Octopus:	Large	3 kg
	Medium	1-3 kg
	Small	1 kg

This statutory requirement is often exceeded, the best system of grading being of 50 g unit sizes as mentioned earlier.

Presentation

Squid should be block-frozen. The standard Japanese presentation is 5-kg blocks, packed four-to-a-carton, the individual blocks being wrapped in flexible film envelopes. This presentation is highly acceptable in the Spanish and other European markets.

Quality standards

Spanish authorities provide for several grades. Extra-quality squid should have all its tentacles and the skin intact, without rips. First-quality squid may have only one or two tentacles missing with no more than 30 percent of the skin missing. Second or standard quality squid may have four tentacles missing at maximum and the skin present in small shreds only.

Other requirements

- (1) The health regulations provide that the mercury content should be less than 0.5 mg/kg.
- (2) Certificates of Health as well as those of origin are required to accompany consignments.
- (3) Import licences should be obtained by the importer.
- (4) Packing should be done as follows: Frozen squid should be packed with ordinary glazing or covered with

materials of an inert and flexible nature, slightly permeable to water vapour and impermeable to gases, odours and grease, with with great opacity to light. The packing should be light, but sufficiently strong to protect the frozen product.

(5) During sea transport the maximum temperature in the hold should be -18° , and on -22°C land.

(6) All species of less than 300 g should be marked "P" and those of more than 300 g should be marked "M".

Commercial practices

Virtually all imports of cephalopods into Spain are conducted on a letter-of-credit (L.C.) basis, or on a cash-against-document basis. Normally, when a new business relationship is initiated, transactions are done on a LC basis. However, when the relationship has matured into one of mutual trust, terms are relaxed in order to cut down on financial costs and the amount of capital tied up in the operation.

B. Italian market requirements

Product form

Squid and cuttlefish is imported as:

- (1) whole, frozen;
- (2) tubes (squid) or fillet (cuttlefish);
- (3) tentacles, block frozen.

Size grading

Large	less than 5	pieces per kg
	5-10	"
Medium	10-20	"
	20-40	"
Small	40-60	"
	up 60	"

Presentation

Squid tubes and cuttlefish fillets cleaned with tentacles on, frozen in blocks of 2 kg, or individually frozen in packages of the same size with 6 to 10 units in each master carton.

Health certificate

Certificates of Health are required. The Italian health regulations provide that the mercury content of fish should be less than 0.7 mg/kg.

Health tax

There is a Health Tax of Lit. 150/ton.

Labelling

Regarding labelling requirements, the specific name of the products, followed by the word "frozen" is required. Also, instructions on the conservation of the product by the consumer, specifying the maximum time it may be kept in a refrigerator, and the maximum time it may be kept at ambient temperature after defreezing are to be mentioned.

Health regulations

The product should undergo an efficient freezing process and then be stored in -18°C or less until the time of shipment.

No colouring substances and/or chemical additives should be used, except chloride of sodium.

Commercial practices

Conditions of management are usually letters of credit, and in some cases cash against documentations when importers and exporters have a relationship of long standing. As Italian health authorities have tightened their import controls and sometimes reject shipments on sanitary grounds; there is an increasing preference among Italian importers for establishing contracts with a rejection clause.

C. Greek market requirements

Product form

Squid or cuttlefish are imported as:

- (1) whole, frozen, including ink sac.

Size grading

Large	less than 10	pieces per kg
Medium	10-20	"
	20-40	"
Small	40-60	"
	60-80	"
	more than 80	"

Presentation

The standard pack consists of frozen blocks of 2 kg, each block wrapped in polyethylene in a master carton of 10 blocks. At present tubes and fillets are not popular, but in the future some importers might wish to handle blocks of 1 kg, as this size is more handy for sales to consumer groups.

Labelling

The information first mentioned in this Appendix under marketing and labelling requirements for Europe should be printed on the master carton and on each individual block contained in the master carton. The stamp of the veterinary authorities of the country of origin is to be attached on the carton.

Processing and packaging requirements

The products should be processed from fresh, raw materials and frozen at a temperature of below -35°C . The temperature in storage and transport should not exceed -18°C .

Commercial practices

Most exporters to Greece work through commercial agents who are in continuous contact with the importers, presenting samples, supplying market intelligence and taking care of documents and the clearing of the products. For these services, an agent normally charges 3-5 percent of the invoice value.

When a deal is concluded, a proforma invoice, with a copy of the offer, is presented to the Greek Chamber of Commerce, which must approve the price. A letter of credit can then be opened, and the exporter can proceed with the shipment.

Normally, all transactions with new contacts are done on a Letter of Credit basis. When the parties involved have done satisfactory business and developed a relationship of mutual trust, the importer in some cases only opens a Letter of Credit for 10 percent or 20 percent of the invoice, and pays the balance against documents, thus avoiding a tie-up capital for a long period. At the same time, the Letter of Credit for part of the total payment gives the exporter a certain guarantee that the importer will take delivery of the goods.

In the case of squid, an import deposit is required, amounting to 7 percent of the CIF value of the *pro forma* invoice, which must be lodged with the Bank of Greece for some months.

D. French market requirements

Product form

- (1) whole, frozen;
- (2) tubes (squid); fillets (cuttlefish).

Size grading

		pieces per kg
Large	less than 10	
Medium	10-20	"
	20-40	"
Small	40-60	"
	60-80	"
	more than 80	"

Presentation

(1) Squid tubes and cuttlefish fillets, cleaned, without tentacles, block-frozen in blocks of 2 kgs, or individually quick frozen in packages of the same size, in master cartons of 20 kgs.

This is, by far, the most important packing format, and IQF is becoming increasingly popular.

(2) Block frozen tentacles in the same pack sizes.

(3) Whole, frozen squid and cuttlefish in the same pack sizes.

Labelling

The following indications must be given on inner boxes, polyethylene bags, and master cartons:

- (1) Importer's name (with full address);
Packers' name
- (2) In French language;
 - name of the product;
 - date of freezing: day, month, year "C" (exact date of freezing);
 - net weight (kg);
 - size;
 - origin;
 - latest date of consumption
months from date of freezing.

Health regulations

A sanitary certificate is required.

Commercial practices

Offers made to French importers are usually made CIF or C & F, French port. Conditions of payment are usually Letters of Credit, and in some cases cash against documents when the importer and exporter have a long relationship of good standing. Because of the stricter vigilance of French health authorities, there is an increasing interest in making contracts with a rejection clause, or in obtaining a rejection insurance.

Import should be made through a customs post in full exercise. Apart from the normal commercial documents (i.e. invoice, airway bill or bill of lading, certificate of origin), a health certificate issued by the competent authorities of the exporting country should be presented to customs officials along with a favourable report from the veterinary inspection of the importing country.

Appendix 6
 METHODOLOGY EMPLOYED IN JAPANESE CEPHALOPOD DEMAND PROJECTION

Source of data used

(a) Family Income and Expenditure Survey, Office of Prime Minister, Government of Japan, 1980.

(b) Food Demand Analysis, Minister's Secretariat, Ministry of Agriculture and Forestry, Government of Japan, 1980.

Period of survey

1980-1990 (11 years).

Date processing (time-series)

(a) Quantity consumed: annual per household consumption was divided by the number of family members to obtain *per capita* consumption.

(b) Prices: average price of the quantity purchased by one household per annum was divided by consumer's price index to obtain relative prices.

(c) Incomes: annual per household consumption expenditure was divided by the number of family members to obtain *per capita* consumption expenditure. It was further divided by consumer's price index to deflate or to obtain real consumption expenditure.

Demand function

The double logarithmic function was used.

$$\log y = a + b \log x_1 + c \log x_2$$

a: constant	x ₂ : <i>per capita</i> consumption expenditure in real terms
y: <i>per capita</i> consumption (quantity)	b: price elasticity
x ₁ : relative price	c: income elasticity

Results of calculation

(a) *Squid (including cuttlefish)*

$$\log y = 3.7440 - 0.8066 \log x_1 + 0.9171 \log x_2$$

correlation coefficient:	
price elasticity:	-0.8066
income elasticity:	0.9171

(b) *Octopus*

$$\log y = -2.5792 - 1.7070 \log x_1 + 0.9860 \log x_2$$

correlation coefficient:	
price elasticity:	-1.7070
income elasticity:	0.9860

Appendix 7
STATISTICAL ANNEX

Table A7-1
Catch of Cephalopods by Major Fishing Nations — 1970-80

	'000 tons live weight										
	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
WORLD TOTAL	998.7	982.7	1 192.4	1 068.1	1 073.9	1 182.3	1 210.4	1 231.5	1 330.2	1 516.4	1 503.5
Squid	735.0	714.6	850.9	723.9	712.8	802.8	826.4	845.1	939.6	1 161.3	1 151.4
Cuttlefish	100.6	108.5	137.3	159.0	149.4	149.8	174.7	196.0	201.1	204.7	185.5
Octopus	163.1	159.6	204.2	185.2	211.6	229.7	209.4	190.4	189.5	150.4	166.6
AFRICA	6.6	5.7	6.5	6.2	10.0	10.5	13.5	12.4	13.9	13.5	14.1
Squid	2.5	1.8	1.7	3.3	5.6	2.7	2.9	3.1	3.6	4.1	3.6
Cuttlefish	2.0	1.9	1.2	1.1	3.0	4.9	7.6	5.3	5.3	5.0	5.5
Octopus	2.1	2.0	3.6	1.8	1.4	2.9	3.0	4.0	5.0	4.4	5.0
NORTH AMERICA	12.3	18.7	10.4	7.0	15.7	16.0	24.6	42.4	56.3	113.5	48.3
Squid	12.3	17.1	10.4	7.9	15.7	16.0	24.6	42.4	56.3	113.5	48.3
Cuttlefish	—	—	—	—	—	—	—	—	—	—	—
Octopus	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CANADA	0.1	1.6	0.0	0.6	0.1	3.3	10.9	30.5	36.0	89.6	30.4
Squid	0.1	1.6	0.0	0.6	0.1	3.3	10.9	30.5	36.0	89.6	30.4
Cuttlefish	—	—	—	—	—	—	—	—	—	—	—
Octopus	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
USA	12.2	17.1	10.4	7.3	15.6	12.7	13.1	11.3	18.7	22.1	16.0
Squid	12.2	17.1	10.4	7.3	15.6	12.7	13.1	11.3	18.7	22.1	16.0
Cuttlefish	—	—	—	—	—	—	—	—	—	—	—
Octopus	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LATIN AMERICA	5.8	7.8	9.5	10.4	13.0	12.4	21.4	17.2	76.1	123.1	41.0
Squid	3.5	4.1	4.4	7.0	8.1	8.0	16.1	11.0	73.6	116.3	34.3
Cuttlefish	—	—	—	—	—	—	—	—	—	—	—
Octopus	2.3	3.7	5.1	3.4	4.9	4.4	5.3	6.2	2.5	6.8	6.7
ARGENTINA	1.5	1.8	1.7	4.1	5.1	4.2	7.6	2.2	59.2	87.2	9.3
Squid	1.5	1.8	1.7	4.1	5.1	4.2	7.6	2.2	59.2	87.2	9.3
Cuttlefish	—	—	—	—	—	—	—	—	—	—	—
Octopus	—	—	—	—	—	—	—	—	—	—	—
MEXICO	1.7	2.6	3.9	2.0	3.5	4.1	5.5	7.0	9.2	25.1	26.9
Squid	0.2	0.2	0.2	0.1	0.2	0.5	1.0	0.8	6.8	18.4	20.4
Cuttlefish	—	—	—	—	—	—	—	—	—	—	—
Octopus	1.5	2.4	3.7	1.9	3.3	3.6	4.5	6.2	2.4	6.7	6.5
VENEZUELA	0.4	0.8	1.2	1.7	2.2	1.6	1.2	1.9	0.3	0.7	0.8
Squid	0.4	0.8	1.2	1.7	2.2	1.6	1.2	1.9	0.3	0.7	0.8
Cuttlefish	—	—	—	—	—	—	—	—	—	—	—
Octopus	—	—	—	—	—	—	—	—	—	—	—
ASIA	825.9	774.5	911.1	744.2	753.3	840.6	868.0	850.0	916.8	956.6	1 145.3
Squid	664.9	611.4	745.6	577.1	568.5	649.5	649.0	627.8	691.1	693.5	712.2
Cuttlefish	59.5	68.4	87.6	88.0	90.4	92.3	117.7	128.3	133.6	231.0	217.9
Octopus	101.5	94.7	77.9	79.1	94.4	98.8	101.3	93.9	92.1	74.5	81.9
HONG KONG	4.3	3.7	4.7	4.1	4.4	6.3	7.8	6.2	7.2	7.8	5.9
Squid	3.2	2.4	3.7	3.0	3.3	4.5	6.1	4.2	5.0	6.1	4.1
Cuttlefish	1.1	1.3	1.0	1.1	1.1	1.8	1.7	2.0	2.2	1.7	1.8
Octopus	—	—	—	—	—	—	—	—	—	—	—
JAPAN	615.6	568.7	670.8	551.2	550.3	608.3	563.7	558.8	584.9	580.7	732.0
Squid	487.6	446.8	563.7	451.5	439.3	507.9	466.1	460.0	494.3	504.4	670.0
Cuttlefish	31.4	35.9	40.0	35.8	34.2	26.4	30.7	30.9	25.1	24.3	16.0
Octopus	96.6	86.0	67.1	63.9	76.8	74.0	66.9	67.9	65.5	52.0	46.0
KOREA, REP. OF	78.1	52.5	66.3	73.9	72.6	89.5	117.5	69.9	89.2	118.4	127.2
Squid	72.1	40.4	57.2	56.6	51.8	58.9	73.0	38.1	41.8	48.0	69.8
Cuttlefish	3.1	5.4	4.0	5.2	6.5	10.9	16.5	14.8	30.0	55.7	38.9
Octopus	2.9	6.7	5.1	12.1	14.3	19.7	28.0	17.0	17.4	14.7	18.5
MALAYSIA	3.5	3.7	3.4	5.0	7.7	8.8	13.8	14.7	17.4	16.7	12.7
Squid	0.0	0.1	0.3	0.7	1.0	0.9	0.6	1.1	0.8	12.0	9.0
Cuttlefish	3.5	3.6	3.1	4.3	6.7	7.9	13.2	13.6	16.6	4.7	3.7
Octopus	—	—	—	—	—	—	—	—	—	—	—
PHILIPPINES	18.1	18.6	21.8	22.4	25.6	31.1	26.3	27.1	32.3	29.3	31.7
Squid	17.0	17.5	2.05	21.1	24.2	29.6	23.6	20.5	26.1	25.5	27.0
Cuttlefish	—	—	—	—	—	—	0.6	1.4	4.9	2.4	3.1
Octopus	1.1	1.1	1.3	1.3	1.4	1.5	2.1	0.7	1.3	1.4	1.6

Appendix 7 (continued)

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
THAILAND	34.1	37.5	72.8	61.3	64.6	65.9	64.0	93.7	93.7	75.2	62.4
Squid	21.4	23.5	44.7	37.5	42.0	37.8	36.2	52.3	52.1	41.8	32.9
Cuttlefish	12.1	13.3	23.9	22.2	21.0	25.0	23.8	34.4	34.5	27.7	23.8
Octopus	0.6	0.7	4.2	1.6	1.6	3.1	4.0	7.0	7.1	5.7	5.7
VIETNAM	4.0	5.0	10.7	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9
Squid	—	—	—	—	—	—	—	—	—	—	—
Cuttlefish	4.0	5.0	1.07	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9
Octopus	—	—	—	—	—	—	—	—	—	—	—
YEMEN, DEM.	3.2	2.8	3.6	5.3	7.1	5.8	15.5	15.5	5.0	9.0	9.6
Squid	—	—	—	—	—	—	—	—	—	—	—
Cuttlefish	3.2	2.8	3.6	5.3	7.1	5.8	15.5	15.5	5.0	9.0	9.6
Octopus	—	—	—	—	—	—	—	—	—	—	—
CHINA	56.6	73.3	47.8	—	—	—	35.8	40.4	62.0	90.1	79.5
Squid	56.6	73.3	47.8	—	—	—	35.8	40.4	62.0	90.1	79.5
Cuttlefish	—	—	—	—	—	—	—	—	—	—	—
Octopus	—	—	—	—	—	—	—	—	—	—	—
EUROPE	125.4	132.3	207.6	230.9	233.6	232.5	203.6	191.1	202.8	197.9	206.6
Squid	39.1	46.2	55.2	75.3	75.5	67.9	68.6	67.9	75.4	92.4	85.7
Cuttlefish	29.7	29.3	37.3	56.5	47.7	41.7	36.0	45.6	44.1	41.9	48.3
Octopus	56.6	56.8	115.1	99.1	110.4	122.9	99.0	77.6	83.3	63.6	73.3
FRANCE	8.0	12.5	9.1	13.8	8.8	12.9	10.2	13.2	10.9	7.9	7.2
Squid	8.0	12.5	9.1	13.8	3.6	4.4	4.8	5.0	5.5	4.8	3.5
Cuttlefish	—	—	—	—	4.2	6.9	4.1	7.0	4.4	2.2	2.7
Octopus	—	—	—	—	1.0	1.6	1.3	1.2	1.0	0.9	1.0
GREECE	5.4	6.4	5.4	5.5	5.7	4.0	5.0	4.6	4.2	6.3	6.3
Squid	0.9	1.2	1.0	1.1	2.1	1.1	1.2	0.7	0.9	0.8	0.6
Cuttlefish	3.0	3.3	2.8	2.8	2.1	1.8	2.9	3.0	2.2	4.4	4.4
Octopus	1.5	1.9	1.6	1.6	1.5	1.1	0.9	0.9	1.1	1.1	1.1
ITALY	30.9	29.3	63.6	32.4	36.0	35.3	37.0	42.4	34.8	36.5	47.9
Squid	7.6	7.1	7.1	9.6	11.8	11.7	13.2	18.5	12.0	16.1	20.6
Cuttlefish	12.1	11.6	14.3	12.0	13.2	11.8	11.9	12.3	10.3	9.7	15.3
Octopus	11.2	10.6	12.9	10.8	11.0	11.8	11.9	11.6	12.5	10.7	12.0
PORTUGAL	4.0	4.2	5.8	8.9	5.1	6.4	6.3	6.0	9.5	6.7	11.2
Squid	0.8	0.6	1.5	1.3	1.2	0.8	0.9	1.1	1.4	2.8	4.8
Cuttlefish	1.4	1.3	1.3	1.2	1.4	1.1	0.9	1.2	1.5	1.1	1.0
Octopus	1.8	2.3	3.0	6.4	2.5	4.5	4.5	3.7	6.6	2.8	5.4
SPAIN	74.8	77.1	145.2	156.6	169.3	159.0	126.7	105.4	130.9	103.2	115.4
Squid	20.0	22.3	29.0	36.2	48.4	35.5	29.4	23.6	43.3	30.9	35.8
Cuttlefish	12.9	12.9	18.7	40.3	26.5	19.8	17.1	21.7	25.5	24.3	21.9
Octopus	41.9	41.9	97.5	80.1	94.4	103.7	80.2	60.1	62.1	48.0	57.7
OCEANIA	0.4	0.4	0.4	0.8	0.4	0.3	0.3	0.9	2.2	8.1	1.4
Squid	0.3	0.3	0.3	0.7	0.3	0.2	0.3	0.8	2.2	8.0	1.3
Cuttlefish	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Octopus	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.1
AUSTRALIA	0.3	0.3	0.3	0.7	0.3	0.2	0.2	0.3	0.4	0.6	1.1
Squid	0.3	0.3	0.3	0.7	0.3	0.2	0.2	0.3	0.4	0.6	1.0
Cuttlefish	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Octopus	—	—	—	—	—	—	—	—	—	—	—
USSR	5.6	28.4	23.2	29.8	26.2	39.6	41.9	85.0	28.6	56.8	56.0
Squid	4.6	28.4	23.2	29.8	26.1	39.6	41.9	75.3	21.4	55.8	51.0
Cuttlefish	1.0	—	—	—	0.1	—	—	1.9	1.2	0.9	2.4
Octopus	—	—	—	—	—	—	—	7.8	6.0	0.1	2.6
OTHERS	16.7	16.5	23.7	37.9	21.7	30.4	37.1	32.5	33.5	46.9	46.6
Squid	7.8	5.3	10.1	22.8	13.0	18.9	23.0	16.8	16.0	30.0	26.5
Cuttlefish	8.4	8.9	11.2	13.4	8.3	10.9	13.4	14.9	16.9	16.0	19.0
Octopus	0.5	2.3	2.4	1.7	0.4	0.6	0.7	0.8	0.6	0.9	1.1

Source: FAO Yearbooks of Fishery Statistics, Catches and Landings Series, Vols. 40-50

Table A7-2
Catch of Cephalopods by Species — 1970-80

	'000 tons live weight										
	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
SQUID	735.0	714.6	850.9	723.9	712.8	802.8	826.4	845.1	939.6	1 161.3	1 151.4
Long-finned squid (<i>Loligo pealei</i>)	15.7	14.8	21.7	28.0	26.2	24.6	21.3	16.5	10.7	17.4	5.7
Common squid (<i>Loligo</i> spp.)	86.0	96.3	115.7	113.3	131.7	124.2	103.0	114.9	138.9	132.8	119.1
Short-finned squid (<i>Illex illecebrosus</i>)	3.0	14.2	17.1	30.1	32.3	40.2	78.1	108.0	153.5	275.2	105.9
Mediterranean flying squid (<i>Illex coindetii</i>)	0.4	0.4	0.3	0.3	0.4	0.2	0.3	0.3	0.3	0.2	0.2
European flying squid (<i>Todarodes sagittatus</i>)	4.8	5.3	4.6	2.5	2.8	4.4	4.7	4.3	3.5	5.3	5.4
Japanese flying squid (<i>Todarodes pacificus</i>)	484.3	401.9	518.0	378.3	341.5	398.7	325.7	225.9	234.3	239.0	261.9
Tasmanian flying squid (<i>Nototodarus sloani</i>)	—	—	—	13.8	24.6	18.8	19.7	27.1	27.5	28.3	22.9
Squids, n.e.i. (<i>Loliginidae</i>) (<i>Ommastrephidae</i>)	140.8	181.7	173.5	157.6	153.3	191.7	273.6	348.1	370.9	367.7	620.3
CUTTLEFISH	100.6	108.5	137.3	159.0	149.4	149.0	174.7	196.0	201.1	204.7	185.5
Common cuttlefish (<i>Sepia officinalis</i>)	12.6	12.1	14.8	12.5	13.6	12.2	11.1	10.9	8.6	9.4	14.4
Cuttlefishes, n.e.i. (<i>Sepia</i> spp.) (<i>Sepida</i> spp.)	88.0	96.4	122.5	146.5	135.8	137.6	163.6	185.1	192.5	195.3	171.1
OCTOPUS	163.1	159.6	204.2	185.2	211.6	229.7	209.4	190.4	189.5	150.4	166.6
Common octopus (<i>Octopus vulgaris</i>)	60.9	48.4	38.5	30.9	40.8	39.0	40.0	42.8	32.6	25.6	26.8
Curled and musky octopus (<i>Eledone</i> spp.)	3.0	2.6	3.5	2.7	2.7	2.6	2.5	2.4	3.1	2.4	2.1
Octopus, n.e.i. (<i>Octopodidae</i>)	99.2	108.6	162.2	151.6	168.1	188.1	166.9	145.2	153.8	122.4	137.7

Source: FAO Yearbooks of Fishery Statistics, Catches and Landings Series, Vols. 40-50.

Table A7-3
Japan: Imports of Cephalopods by Country of Origin

	Quantity ('000 t product weight)						Value (million US\$)					
	1976	1977	1978	1979	1980	1981	1976	1977	1978	1979	1980	1981
SQUID AND CUTTLERFISH												
Fresh, frozen	68.5	74.7	118.1	155.9	94.4	68.8	134.9	141.4	204.5	347.3	212.6	196.7
Canada	3.1	7.4	27.2	15.5	18.5	3.1	2.6	7.0	29.6	15.6	20.8	3.1
Korea, Rep. of	21.8	19.9	27.5	31.7	17.8	16.0	37.4	37.8	51.4	79.3	43.5	45.7
Spain	7.7	7.8	13.6	15.1	9.9	12.0	16.7	17.7	28.5	50.1	31.4	38.1
Thailand	7.5	8.3	10.1	10.6	8.1	9.3	19.7	18.9	27.9	44.2	26.2	29.0
Yemen, P.D.R. of	3.2	5.3	2.2	2.5	5.2	7.3	8.2	0.5	4.4	7.8	15.3	6.2
Argentina	0.8	0.0	9.8	22.3	4.9	0.3	0.5	0.0	8.3	26.1	6.0	0.0
Cuba	—	—	—	2.8	4.1	0.0	—	—	—	2.6	3.2	0.0
Poland	—	—	—	8.4	3.4	0.4	—	—	—	9.6	4.0	3.3
Mexico	0.0	—	—	1.2	1.8	1.7	—	—	—	0.9	2.0	1.7
France	0.7	2.4	1.8	1.9	1.7	0.4	1.5	4.1	2.0	1.8	2.0	5.9
Senegal	2.0	1.8	—	1.3	1.6	2.2	4.5	4.7	2.6	3.2	3.9	5.9
USA	1.1	2.4	1.9	3.0	1.6	2.2	0.6	1.7	1.9	3.5	2.0	3.2
Others, n.e.s.	20.6	19.4	24.0	39.6	15.8	18.9	43.2	49.0	47.9	102.6	52.3	54.6
Prepared or preserved excluding smoked or in airtight containers	5.8	3.0	2.5	2.1	1.9	1.6	28.3	14.5	11.8	10.5	7.8	7.9
Thailand	1.3	0.7	1.2	0.9	0.6	0.8	6.0	2.8	6.7	5.7	3.7	5.0
Korea, Rep. of	3.9	1.5	0.3	0.4	0.4	0.5	20.7	9.1	3.3	3.3	2.2	2.4
China	0.0	0.1	0.0	0.3	0.4	0.0	0.0	0.0	0.0	0.2	0.7	0.0
Yemen, P.D.R. of	0.3	0.1	0.3	0.4	0.3	0.1	0.8	0.2	0.7	0.7	0.3	0.0
Argentina	0.1	0.0	0.0	0.0	0.1	0.2	0.1	0.0	0.0	0.2	0.5	0.0
Others, n.e.s.	0.2	0.6	0.7	0.1	0.1	0.0	0.8	2.4	1.1	0.4	0.4	0.5
Salted or dried	0.8	1.3	1.6	1.6	1.9	1.8	4.4	9.1	13.7	17.1	16.8	19.4
Thailand	0.6	0.8	1.0	1.2	1.2	1.6	4.0	6.5	10.3	13.8	12.4	18.2
Korea, Rep. of	0.2	0.4	0.6	0.4	0.6	0.1	0.4	2.0	3.4	2.9	4.0	0.0
Others, n.e.s.	0.0	0.1	0.0	0.0	0.1	0.1	0.0	0.6	0.0	0.4	0.4	1.2
OCTOPUS												
Fresh, frozen	94.4	63.4	78.5	62.4	63.5	100.5	121.2	81.5	124.1	178.6	195.9	181.2
Spain	59.6	39.3	49.7	40.1	36.4	54.8	75.0	51.2	82.2	130.5	123.2	98.2
Korea, Rep. of	17.3	10.4	10.4	6.2	7.2	15.7	24.1	15.7	16.7	15.5	22.7	30.7
Morocco	1.0	1.0	5.2	4.1	5.8	10.6	1.6	1.5	8.7	11.3	19.2	20.1
Libya	—	—	0.2	1.9	4.5	4.1	—	—	0.3	7.5	14.3	8.3
Thailand	2.8	4.3	3.0	6.0	4.3	4.5	2.2	3.1	2.3	5.4	3.8	3.6
Mauritania	4.3	5.7	6.3	0.8	2.8	9.1	5.8	6.4	8.6	1.3	6.0	17.3
Others, n.c.p.	9.4	2.7	3.7	3.3	2.5	1.7	12.5	3.5	5.4	7.2	6.7	3.0

Source: Japan Exports and Imports, Japan Tariff Association, 1976-80

Table A7-4
Japan: Imports of Fresh and Frozen Squid and Cuttlefish

	(tons live weight)											
	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
Total	15 225 (100)	21 330 (100)	27 884 (100)	28 980 (100)	44 762 (100)	58 580 (100)	68 533 (100)	74 732 (100)	118 142 (100)	155 868 (100)	94 375 (100)	687
Squid	2 284 (15.0)	5 482 (25.7)	6 971 (25.0)	8 781 (30.3)	10 877 (24.3)	17 691 (30.2)	22 821 (33.3)	28 996 (38.8)	65 569 (55.5)	94 456 (60.0)	52 095 (55.2)	
Cuttlefish	13 041 (85.0)	15 848 (74.3)	20 913 (75.0)	20 199 (69.7)	33 885 (75.7)	40 889 (69.8)	45 712 (66.7)	45 736 (61.2)	52 573 (44.5)	61 412 (39.4)	42 280 (44.8)	

Note: Parenthesis indicate the percentage of the total

Source: Japan Exports and Imports, 1970-80. Japan Tariff Association

Table A7-5
Spain: Imports of Cephalopods by Country of Origin

	Quantity ('000 t product weight)					Value ('000 US\$)				
	1976	1977	1978	1979	1980	1976	1977	1978	1979	1980
Fresh, frozen	35.0	24.6	46.8	43.8		34 174	25 739	56 109	73 977	
Italy	0.8	0.8	0.3	0.3		1 454	532	310	637	
France	0.8	2.6	4.1	1.2		1 669	2 673	2 386	2 335	
Japan	2.9	0.8	0.7	1.8		3 696	1 244	1 150	4 934	
USSR	8.7	4.0	2.0	0.5		3 783	1 639	1 141	390	
Korea, Rep.	7.8	6.3	1.9	0.9		9 134	8 638	3 001	2 463	
USA	1.0	0.5	0.0	1.0		1 352	723	65	1 537	
Thailand	1.3	0.9	0.8	1.2		2 486	1 468	915	1 242	
Argentina	1.5	0.5	9.9	8.2		1 825	682	14 228	11 253	
Panama	1.2	0.4	6.1	7.5		1 421	718	9 040	19 038	
Poland	2.1	2.0	3.9	3.1		727	587	2 573	2 673	
Others, n.e.s.	6.9	5.8	17.1	18.1		6 627	6 835	21 300	27 475	
Others (dried, salted and smoked)	0.5	0.6	0.7	0.3		579	976	1 125	520	
Italy	0.0	0.0	0.0	0.0		12	0.2	1	0.0	
Korea, Rep.	0.3	0.1	0.1	0.0		144	264	299	0.0	
Netherlands	0.4	0.4	0.4	0.1		32	586	539	263	
Others, n.e.s.	0.2	0.1	0.3	0.2		390	193	289	257	

Source: Dirección General de Aduanas

Table A7-6
Italy: Imports of Cephalopods by Country of Origin

	Quantity ('000 t product weight)					Value ('000 US\$)				
	1976	1977	1978	1979	1980	1976	1977	1978	1979	1980
SQUID										
Fresh, frozen	19.5	15.6	23.0	30.3	22.5	20 861	12 329	41 574	45 213	40 618
Japan	5.5	1.9	2.7	2.9	6.8	5 829	2 539	6 923	7 312	13 496
Thailand	1.9	2.2	6.3	7.3	5.4	2 180	3 040	10 692	13 096	10 642
Korea, Rep. of	2.2	1.3	1.2	0.0	0.0	2 798	2 250	2 447	0.0	0.0
Malaysia	0.0	0.3	0.0	0.7	0.8	0.0	464	0.0	1 457	1 643
Panama	0.0	0.0	1.0	1.4	0.9	0.0	4	2 859	4 723	2 888
South Africa	0.0	0.3	0.8	1.3	0.6	0.0	388	1 555	3 011	1 912
France	0.5	0.8	0.9	0.5	0.3	799	1 579	1 888	637	983
Germany, F.R.	0.0	0.0	0.0	2.2	0.0	0.0	0.0	0.0	0.0	1 915
Poland	0.6	2.4	0.0	2.5	0.7	232	960	0.0	2 043	786
Others, n.e.s.	8.8	6.4	10.1	3.7	4.8	9 023	1 105	15 210	12 934	6 353
CUTTLEFISH										
Fresh, frozen	6.1	8.3	9.4	7.5	9.0	6 119	8 964	11 376	12 467	17 397
Thailand	1.5	2.2	1.8	3.1	4.2	1 814	2 732	2 290	4 838	8 078
Panama	0.0	0.0	1.7	2.0	1.2	0.0	13	2 116	3 795	3 604
France	0.4	2.3	1.6	0.4	0.6	513	2 222	1 598	836	1 426
Tunisia	0.0	0.4	0.4	0.6	0.4	0.0	359	481	976	870
Korea, Rep. of	2.3	1.7	2.7	0.1	0.0	1 916	1 684	3 277	157	0.0
Others, n.e.s.	1.9	1.7	1.2	1.3	2.6	1 876	1 954	1 614	1 865	3 419
OCTOPUS										
Fresh, frozen	6.3	4.8	8.5	7.6	11.9	5 382	3 956	8 966	11 873	23 806
Spain	0.0	0.7	0.0	0.0	2.8	0.0	498	0.0	0.0	6 395
Tunisia	0.0	0.3	1.2	2.1	0.8	0.0	326	1 683	3 894	2 324
Panama	0.0	0.0	1.5	2.2	3.9	0.0	14	1 628	4 582	8 794
Thailand	1.6	1.0	2.4	2.4	2.3	1 254	826	2 000	2 267	2 616
Malaysia	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	460
Korea, Rep. of	3.0	1.7	1.8	0.1	0.0	2 569	1 395	1 928	200	0.0
Others, n.e.s.	1.7	1.1	1.6	0.8	1.7	1 559	897	1 727	930	3 217

Source: Italian Foreign Trade Statistics

Table A7-7
France: Imports of Cephalopods by Country of Origin

	Quantity ('000 t product weight)					Value ('000 US\$)				
	1976	1977	1978	1979	1980	1976	1977	1978	1979	1980
SQUID										
Fresh, frozen	4.7	3.2	4.8	6.7	5.3	6 765	4 758	8 610	13 503	10 974
Thailand	1.5	1.0	1.2	1.6	1.6	2 172	1 232	1 682	2 372	3 133
Morocco	0.5	0.7	0.9	0.3	0.0	982	1 603	2 770	1 977	248
UK	0.4	—	0.0	0.0	—	463	—	67	0.0	—
USA	0.5	0.6	0.7	2.0	1.5	400	593	764	2 428	1 784
Italy	0.3	—	—	0.8	0.6	604	—	—	2 309	1 469
Japan	0.4	0.1	0.0	0.1	0.0	485	224	136	466	202
Others, n.e.s.	1.1	0.8	2.0	4.8	1.6	1 659	1 106	3 191	3 951	4 138
CUTTLEFISH										
Frozen	2.9	3.1	3.9	3.8	4.8	4 391	4 655	6 193	8 425	11 297
Thailand	1.2	1.7	1.9	1.5	2.3	1 491	2 124	2 579	2 494	4 696
Morocco	0.2	0.2	0.0	0.0	0.0	299	328	180	74	0.0
Malaysia	0.1	0.0	0.1	0.0	0.0	133	61	155	73	0.0
Italy	0.2	0.2	0.5	0.1	0.1	353	292	87	313	230
Senegal	0.0	0.0	0.2	0.1	0.1	151	83	381	247	308
Korea, Rep. of	0.7	0.3	0.1	1.0	1.1	1 297	715	235	3 361	3 344
Others, n.e.s.	0.5	0.7	1.1	1.1	1.2	677	1 052	2 576	1 863	2 719
OCTOPUS										
Frozen	0.8	1.0	1.0	0.9	0.6	903	1 170	1 325	1 726	1 758
Tunisia	0.6	0.9	0.9	0.8	0.4	629	1 042	1 177	1 548	1 333
Morocco	—	—	0.0	0.0	0.0	—	—	96	0.0	153
Others, n.e.s.	0.2	0.1	0.1	0.1	0.2	274	128	52	178	272

Source: Comité Central des Pêches Maritimes

Table A7-8
Japan: Exports of Cephalopods by Country of Destination

	Quantity ('000 t product weight)						Value ('000 US\$)					
	1976	1977	1978	1979	1980	1981	1976	1977	1978	1979	1980	1981
SQUID AND CUTTLEFISH												
Fresh, frozen	16.1	7.5	6.1	20.6	16.0	11.5	16 203	9 188	11 344	22 616	26 218	15 983
Italy	6.1	3.2	2.2	2.7	6.8	3.4	6 115	3 921	5 338	4 947	12 223	5 966
New Zealand	—	—	—	—	5.5	2.2	—	—	—	—	6 758	1 776
Canary Islands	3.2	1.2	1.4	2.5	1.1	2.6	3 781	1 728	3 072	5 401	2 772	2 962
Australia	0.2	0.2	—	0.1	1.0	0.0	253	539	—	206	1 063	2
USA	0.3	0.2	0.2	0.3	0.3	0.6	391	397	403	618	996	1 344
Others, n.e.s.	3.6	2.9	2.3	15.0	1.3	2.7	5 893	4 153	2 531	11 444	2 406	3 933
OCTOPUS												
Fresh, frozen	8.9	5.0	2.9	7.1	0.3	3.5	2 907	2 061	1 733	2 872	1 568	5 952
USA	0.3	0.4	0.4	0.4	0.3	0.4	597	875	1 080	1 104	1 324	1 058
Canada	0.0	0.0	0.1	0.0	0.0	0.0	27	15	86	55	106	24
Italy	—	—	—	—	0.0	—	—	—	—	—	75	—
Mauritania	8.5	4.6	2.4	6.6	—	3.1	2 133	1 140	531	1 496	—	4 787
Others, n.e.s.	0.1	0.0	0.0	0.1	0.0	0.0	150	31	136	217	63	83
SQUID												
In airtight containers ^a	38.4	30.3	28.7	18.7	19.0	0.1	95.7	97.0	124.6	96.9	100.8	0.4
USA	27.3	15.4	17.4	10.6	10.5	0.1	63.3	44.2	74.5	49.1	51.7	0.0
Saudi Arabia	—	—	1.1	0.2	4.4	0.0	—	—	8.5	2.4	22.6	0.0
Singapore	0.1	1.7	1.8	2.8	1.4	0.0	0.4	9.4	10.9	14.2	8.9	0.0
Others, n.e.s.	11.0	13.2	8.4	5.2	2.7	0.0	32.0	43.4	30.7	31.2	17.6	0.4

Source: Japan Exports and Imports, Japan Tariff Association, 1976-81

^aQuantity: tons product weight

Table A7-9
Spain: Exports of Cephalopods by Country of Destination

	Quantity ('000 t product weight)					Value ('000 US\$)				
	1976	1977	1978	1979	1980	1976	1977	1978	1979	1980
Fresh, frozen	76.2	47.1	65.3	66.2		85 300	56 769	96 333	186 663	
Japan	71.8	42.3	59.1	63.9		81 526	52 105	85 654	181 390	
Portugal	2.6	1.2	0.0	0.0		1 853	1 116	74	0	
USA	1.2	1.2	1.4	0.8		1 300	1 579	2 389	1 999	
Argentina	0.0	0.6	0.4	0.5		436	378	574	1 313	
Italy	0.4	0.7	3.2	0.2		1 472	461	6 125	400	
Others, n.e.s.	0.2	1.1	1.2	0.8		1 287	1 130	1 517	1 561	

Source: Dirección General de Aduanas

Table A7-10
Thailand: Exports of Cephalopods by Country of Destination

	Quantity ('000 t product weight)					Value ('000 US\$)				
	1976	1977	1978	1979	1980	1976	1977	1978	1979	1980
Fresh, frozen	21.3	25.7	34.1	39.4	12 892	11 517	20 773	20 773	30 028	
Hong Kong	0.6	1.0	0.8	1.0		198	409	403	399	
Japan	10.5	12.9	14.0	16.1		8 141	8 296	12 280	18 195	
France	2.7	1.3	3.1	2.9		1 299	519	1 318	1 322	
Germany, F.R.	0.1	0.3	0.5	0.3		86	178	344	272	
Italy	6.4	6.3	11.4	15.9		1 996	2 547	4 938	8 680	
Netherlands	0.4	2.4	1.8	0.1		173	1 044	918	100	
Spain	1.1	0.5	0.5	1.0		751	274	167	300	
Others, n.e.s.	0.5	1.0	2.0	2.1		248	1 750	405	760	

Source: Foreign Trade Statistics of Thailand, Department of Customs, Bangkok

Table A7-11
Republic of Korea: Exports of Cephalopods by Country of Destination

	Quantity ('000 t product weight)					Value ('000 US\$)						
	1976	1977	1978	1979	1980	1981	1976	1977	1978	1979	1980	1981
CUTTLEFISH/SQUID												
Fresh, chilled, frozen	14.9	10.5	13.5	22.1	12.5	9.2	17 503	13 379	24 309	49 540	27 554	25 922
Japan	12.0	9.2	13.0	20.5	10.0	8.5	14 004	12 117	21 279	43 005	20 344	21 614
China	0.4	0.6	—	—	0.2	—	474	463	—	—	145	—
Hong Kong	0.0	—	0.0	—	—	—	83	—	28	—	—	—
France	0.7	0.3	0.0	1.2	1.0	0.4	1 409	487	142	3 450	2 468	1 025
Italy	0.2	0.3	0.0	0.2	0.4	0.0	184	92	591	396	851	111
Spain	0.1	—	0.2	0.0	0.8	0.0	263	—	879	647	2 680	19
USA	0.2	0.0	0.0	0.2	0.1	0.0	238	33	1 013	1 959	987	2 591
Others, n.e.s.	1.3	0.1	0.3	0.0	0.0	—	848	187	377	83	79	758
OCTOPUS												
Fresh, chilled, frozen	2.6	0.7	0.5	0.3	0.4	1.2	2 305	1 054	874	971	1 393	4 850
Japan	2.1	0.5	0.4	0.3	0.3	1.2	1 778	632	570	885	1 353	4 850
Spain	—	—	0.1	—	—	—	—	—	94	—	—	—
USA	0.0	0.0	0.0	—	—	—	2	1	38	—	—	—
CUTTLEFISH/SQUID												
Dried, smoked	1.9	1.5	1.1	1.0	0.6	0.3	6 982	7 998	6 619	7 518	3 731	1 587
Japan	0.6	0.7	0.5	0.4	0.5	0.1	1 545	3 295	2 673	3 018	3 225	730
China	1.3	0.8	0.5	0.5	—	—	5 256	4 580	2 480	3 393	—	—
Others, n.e.s.	0.0	0.0	0.1	0.1	0.1	0.2	181	123	1 466	1 107	506	857
CUTTLEFISH												
Smoked, seasoned	—	—	—	—	—	0.3	—	—	—	—	—	1 495

Source: Department of Customs Administration, Republic of Korea

PUBLICATIONS OF THE
SOUTH CHINA SEA FISHERIES DEVELOPMENT AND COORDINATING PROGRAMME

WORKING PAPERS

- SCS/74/WP/1 RABANAL, H.R. The potentials of aquaculture development in the Indo-Pacific Region. Manila, South China Sea Fisheries Programme, 1974. 34p.
- SCS/74/WP/2 CRUTCHFIELD, J.A., D.A. LAWSON and G.K. MOORE. Malaysia — Legal and institutional aspects of fisheries development. Manila, South China Sea Fisheries Programme, 1974. 27p.
- SCS/74/WP/3 MARR, J.C. Republic of Vietnam — Legal and institutional aspects of fisheries development. Manila, South China Sea Fisheries Programme, 1974. 20p.
- SCS/75/WP/4 LARSSON, S.O.R., G.C.A. VAN NOORT and E.O. OSWALD. Malaysia — A report on artisanal fisheries of Peninsular Malaysia with particular reference to Kuala Besut. Manila, South China Sea Fisheries Programme, 1975. 58p.
- SCS/75/WP/5 RABANAL, H.R. Irian Jaya, Indonesia — Survey of possibilities and recommendations for development of brackishwater fish production. Manila, South China Sea Fisheries Programme, 1975. 27p.
- SCS/75/WP/6 TUSSING, A.R. Fishery development perspectives. Sub-Region V: South China Sea. Manila, South China Sea Fisheries Programme, 1975. (IPFC/74/Sym/7). 23p.
- SCS/75/WP/7 MURDOCH, W.R. and M.A. MYERS. Republic of Singapore — An assessment of the Jurong Fishing Harbour complex and expansion site on the east bank of the Jurong River. Manila, South China Sea Fisheries Programme, 1975. 46p.
- SCS/75/WP/8 PETERSON, C.L., K.J. ROSENBERG and A.C. SIMPSON. Regional — Trip reports of chartered purse seine vessels Royal Venture and Southward Ho covering Voyages 1 and 2. December 1-13, 1974 and January 5-February 3, 1975. Manila, South China Sea Fisheries Programme, 1975. 37p.
- SCS/75/WP/9 OSWALD, E.O. and R.E.K.D. LEE. Regional — A proposal for live bait pole-and-line tuna fishing survey in the South China Sea and adjacent waters. Manila, South China Sea Fisheries Programme, 1975. 38p.
- SCS/75/WP/10 ROSENBERG, K.J. and A.C. SIMPSON. Regional — Trip reports of chartered purse seine vessels Royal Venture and Southward Ho covering Voyage 3. 9 February-26 March 1975. Manila, South China Sea Fisheries Programme, 1975. 28p.
- SCS/75/WP/11 PETERSON, C.L. Regional — Resource survey of larger pelagic fish. Manila, South China Sea Fisheries Programme, 1975. 32p.
- SCS/75/WP/12 ROSENBERG, K.J., A.C. SIMPSON and C.M. RENWICK. Regional — Trip reports of chartered purse seine vessels Royal Venture and Southward Ho covering Voyage 4. 9 April-24 May 1975. Manila, South China Sea Fisheries Programme, 1975. 36p.
- SCS/75/WP/13 BAUM, G.A. Kuala Besut II — A supplementary report on selected socio-economic aspects and problems in a fishermen's community on the east coast of Peninsular Malaysia. Manila, South China Sea Fisheries Programme, 1975. 43p.
- SCS/75/WP/14 CUERDEN, C. Library services for the South China Sea Fisheries Programme and its participating countries. Manila, South China Sea Fisheries Programme, 1975. 48p.
- SCS/75/WP/15 LAWSON, R.M. Malaysia — An interim report on socio-economic aspects of the development of artisanal fisheries on the east coast of Malaysia. Manila, South China Sea Fisheries Programme, 1975. 29p.
- SCS/75/WP/16 JAMANDRE, T.J. and H.R. RABANAL. Engineering aspects of brackish-water aquaculture in the South China Sea region. Manila, South China Sea Fisheries Programme, 1975. 96p.
- SCS/75/WP/17 MURDOCH, W.R. Malaysia — Assessment of the viability and potential of the joint-venture. MAJUIKAN Mid-east Sdn Bhd, Kuching, Sarawak as requested by Lembaga MAJUIKAN, Malaysia. Manila, South China Sea Fisheries Programme, 1975. 16p. (Restricted)
- SCS/75/WP/18 CLEAVER, W.D. Malaysia — A preliminary design and general arrangement for an offshore purse seine vessel for the east coast of West Malaysia. Manila, South China Sea Fisheries Programme, 1975. 35p.
- SCS/75/WP/19 PISCHEDDA, J.L. Republic of the Philippines — Legal and institutional aspects in the development of the fishing industry. Preliminary observations and identification of the main obstacles. Manila, South China Sea Fisheries Programme, 1975. 35p.
- SCS/75/WP/20 SIMPSON, A.C. Regional — Acoustic surveys of pelagic resources. Report No. 1. Gulf of Thailand, July 1975. Manila, South China Sea Fisheries Programme, 1975. 28p.
- SCS/75/WP/21 CINTAS, D. and C.M. RENWICK. Regional — Report of aerial survey for schooling pelagic fish. 1. Philippine waters, 12-29 June 1975. Manila, South China Sea Fisheries Programme, 1975. 28p.
- SCS/76/WP/22 BAUM, G.A. and J.A. MAYNARD. Tobuan/Sual, Pangasinan Province, Central Luzon — A socio-economic study on a rural fishing population in Central Luzon in connection with the Municipal Fisheries Pilot Programme, 1976. 44p.
- SCS/76/WP/23 BAUM, G.A. and J.A. MAYNARD. Panigayan, Lampinigan, Baluk-Baluk and Managal, Basilan Province. A socio-economic study on four fishermen's communities affiliated to the Basilan Fishing Association (BFA/Isabela in connection with the Municipal Fisheries Pilot Programme). Manila, South China Sea Fisheries Programme, 1976. 62p.
- SCS/76/WP/24 BARICA, J. Nutrient-dynamics in eutrophic inland waters and for aquaculture in some countries bordering the South China Sea with particular reference to mass fish mortalities. Proposal for monitoring programmes, Philippines, Thailand and Hong Kong. Manila, South China Sea Fisheries Programme, 1976. 43p.
- SCS/76/WP/25 ROSENBERG, K.J., A.C. SIMPSON and J.A. MAYNARD. Regional — Trip reports of chartered purse seine vessels Royal Venture and Southward Ho covering Voyages 5 and 6. 13 June-10 September 1975. Manila, South China Sea Fisheries Programme, 1976. 52p.
- SCS/76/WP/26 MOORE, G.K. Malaysia — Legal and institutional aspects of fisheries development. (2nd working paper). Manila, South China Sea Fisheries Programme, 1976. 38p.
- SCS/76/WP/27 WHEELAND, H.A. Malaysia — Preliminary observations and recommendations concerning the fisheries statistics programme of Peninsular Malaysia. Manila, South China Sea Fisheries Programme, 1976. 22p.
- SCS/76/WP/28 MAYNARD, J.A. Regional — Report of aerial survey for schooling pelagic fish. II. Thailand — 20 November-1 December 1975. Manila, South China Sea Fisheries Programme, 1976. 20p.
- SCS/76/WP/29 BAUM, G.A. and J.A. MAYNARD. Salay, Misamis Oriental Province — A socio-economic study on the fishing population of the seven coastal barrios of Salay Municipality in connection with the Municipal Fisheries Pilot Programme. Manila, South China Sea Fisheries Programme, 1976. 47p.
- SCS/76/WP/30 MURDOCH, W.R. Hong Kong — A preliminary feasibility study to prosecute offshore pelagic stocks from Hong Kong. Manila, South China Sea Fisheries Programme, 1976. 27p.
- SCS/76/WP/31 JOHNSON, R.F. Preliminary report on aquatic pollution in the South China Sea region. Manila, South China Sea Fisheries Programme, 1976. 34p.
- SCS/76/WP/32 WHEELAND, H.A. Preliminary observations and recommendations concerning the fisheries statistics programme of Singapore. Manila, South China Sea Fisheries Programme, 1976. 21p.
- SCS/76/WP/33 BAUM, G.A. and J.A. MAYNARD. Coron/Tagumpay — Buswanga Island/Calamianes Group (Palawan Province). A socio-economic study of two rural fishing populations in northern Palawan in connection with the Municipal Fisheries Pilot Programme. Manila, South China Sea Fisheries Programme, 1976. 112p.
- SCS/76/WP/34 JONES, R. Mesh regulations in the demersal fisheries of the South China Sea area. Regional. Manila, South China Sea Fisheries Programme, 1976. 79p.
- SCS/76/WP/35 SIMPSON, A.C. and S. CHIKUNI. Progress report on fishing for tuna in Philippine waters by FAO chartered purse seiners. Manila, South China Sea Fisheries Programme, 1976. 38p.
- SCS/76/WP/36 BONGA, O.B. Vessel specifications and drawings for two 10 m multi-purpose fishing vessels for the small-scale fisheries project — Kuala Besut. Manila, South China Sea Fisheries Programme, 1976. 36p.
- SCS/76/WP/37 SHANG, Y.C. Economics of various management techniques for pond culture of finfish. Manila, South China Sea Fisheries Programme, 1976. 36p.
- SCS/76/WP/38 JOHNSON, H.N. Malaysia — A preliminary study of investment opportunities for the development of small-scale fisheries on east coast of Peninsular Malaysia. Manila, South China Sea Fisheries Programme, 1976. 21p.
- SCS/76/WP/39 SHANG, Y.C. Follow-up programmes on economics of aquaculture in the South China Sea region. Manila, South China Sea Fisheries Programme, 1976. 19p.
- SCS/76/WP/40 COOK, J.L. Problems in shrimp culture in the South China Sea region. Manila, South China Sea Fisheries Programme, 1976. 50p.
- SCS/76/WP/41 JOHNSON, H., J. DIBBS and R. NASOETION. Indonesia — A preliminary assessment for small-scale fisheries development in Riau North Sumatra and West Kalimantan Provinces. Manila, South China Sea Fisheries Programme, 1976. 51p.
- SCS/76/WP/42 BAUM, G.A. and J.A. MAYNARD. Bayawan Municipality, Negros Oriental Province/Negros. A socio-economic study on the rural fishing population of Bayawan municipality in connection with the Municipal Fisheries Pilot Programme. Manila, South China Sea Fisheries Programme, 1976. 33p.
- SCS/76/WP/43 MAYNARD, J.A. Philippines — Report on aerial survey for schooling pelagic fish in waters of the South China Sea and Sulu Sea adjacent to Palawan Island, 9-12 March 1976. Manila, South China Sea Fisheries Programme, 1976. 17p.
- SCS/76/WP/44 CHAKRABORTY, D. Fisheries statistics in the Philippines — A plan for a new and expanded data collection programme. Manila, South China Sea Fisheries Programme, 1976. 70p.
- SCS/76/WP/45 MARR, J.C., G. CAMPLEMAN and W.R. MURDOCH. Thailand — An analysis of the present and recommendations for future fishery development and management policies, programmes and institutional arrangements. Manila, South China Sea Fisheries Programme, 1976. 185p. (Restricted)
- SCS/76/WP/46 CLEAVER, W. and O.B. BONGA. Thailand — Preliminary design, general arrangement and lines plans for two pelagic purse seine/midwater trawl research vessel, 27.5 m and 24 m lengths. Manila, South China Sea Fisheries Programme, 1976. (Not issued)
- SCS/76/WP/47 CLEAVER, W. Hong Kong — A preliminary design, general arrangement and specifications for a combination pelagic/demersal research vessel. Manila, South China Sea Fisheries Programme, 1976. (Not issued)
- SCS/76/WP/48 SIMPSON, A.C. and W.R. MURDOCH. Regional — Trip reports of chartered purse seine vessel Royal Venture — Trips Nos. 7 & 8. 1 October-February 1976. Area — Moro Gulf. Manila, South China Sea Fisheries Programme, 1976. 17p.
- SCS/76/WP/49 _____ Regional — Trip reports of chartered vessel Southward Ho — Trips 7 & 8. 11 September 1975-March 1976. Areas — Malaysia and Thailand. Manila, South China Sea Fisheries Programme, 1976. 33p.
- SCS/76/WP/50 _____ Regional — Trip reports of chartered purse seine vessel Royal Venture and Southward Ho — Trip No. 9. Manila, South China Sea Fisheries Programme, 1976. 22p.
- SCS/76/WP/51 _____ Regional — Trip reports of chartered purse seine vessel Southward Ho — Trips 10 and 11. 15 April-8 August 1976. Area — East, North and West Coasts Luzon Island, Bohol Sea, Sulu Sea, Moro Gulf. Manila, South China Sea Fisheries Programme, 1976. 20p.

- SCS/76/WP/52 WHEELAND, H.A. Statistics for fisheries development. Regional. Manila, South China Sea Fisheries Programme, 1976. 11p.
- SCS/76/WP/53 CHRISTY, L.C. Republic of the Philippines — Legal and institutional aspects of fisheries development. Manila, South China Sea Fisheries Programme, 1976. 65p. (Restricted)
- SCS/76/WP/54 MAYNARD, J.A. Philippines — Province of Tawi-Tawi project identification and semi-detailed feasibility study relative to improving the status of small-scale fishermen and creating an integrated fishing industry in the Province of Tawi-Tawi. Manila, South China Sea Fisheries Programme, 1976. 110p.
- SCS/77/WP/55 OSWALD, E.O. and J.A. MAYNARD. Thailand — Proposed small-scale fisheries pilot project for Ban Ao Nakam Pom, Rayong Province. Manila, South China Sea Fisheries Programme, 1977. 38p.
- SCS/77/WP/56 MURDOCH, W.R. and P.S. WALCZAK. Regional — Trip reports of chartered purse seine vessel, Southward Ho covering Voyage 12. Area — waters of the Sulu Sea. Manila, South China Sea Fisheries Programme, 1977. 11p.
- SCS/77/WP/57 MURDOCH, W.R. and P.S. WALCZAK. Regional — Trip reports of chartered purse seine vessels Southward Ho and Royal Venture covering Voyage 13. Area mainly Moro Gulf, Philippines. Manila, South China Sea Fisheries Programme, 1977. 18p.
- SCS/77/WP/58 SIMPSON, A.C., W.R. MURDOCH. Regional — Trip reports of chartered purse seine vessel Southward Ho covering Voyages Nos. 14 and 15. Area — Moro Gulf, Manila, South China Sea Fisheries Programme, 1977. 15p.
- SCS/77/WP/59 MURDOCH, W.R. and P.S. WALCZAK. Regional — Trip reports of chartered purse seine vessel Southward Ho covering Voyages Nos. 16 and 17. Area — waters of the Moro Gulf. Manila, South China Sea Fisheries Programme, 1977. 23p.
- SCS/77/WP/60 DOTY, M.S. Seaweed resources and their culture in the countries of the South China Sea region. Manila, South China Sea Fisheries Programme, 1977. 19p.
- SCS/77/WP/61 RABANAL, H.R. *et al.* Shellfisheries of Thailand: Background and proposal for development. Manila, South China Sea Fisheries Programme, 1977. 14p.
- SCS/77/WP/62 CHAKRABORTY, D. Observations and recommendations concerning the fisheries statistics programme of Hong Kong. Manila, South China Sea Fisheries Programme, 1977. 14p.
- SCS/77/WP/63 ———. Observations and recommendations concerning the inland fisheries statistics programme of Thailand. Manila, South China Sea Fisheries Programme, 1977. 15p.
- SCS/77/WP/64 HANSEN, K.A., P. LOVSETH and A.C. SIMPSON. Acoustic surveys of pelagic resources. Report No. 2. Hong Kong, November 1976. Manila, South China Sea Fisheries Programme, 1977. 24p.
- SCS/77/WP/65 CHRISTY, L.C. Republic of the Philippines — Legal and institutional aspects of fisheries development. Manila, South China Sea Fisheries Programme, 1977. 55p.
- SCS/77/WP/66 MURDOCH, W.R. *et al.* A proposal for a small-scale fisheries pilot project in the Pulau Tujuh (Seven Islands) area, Riau Archipelago District, Riau Province, Indonesia. Manila, South China Sea Fisheries Programme, 1977. 69p.
- SCS/77/WP/67 MOORE, G. Malaysia — A new fisheries oil. Manila, South China Sea Fisheries Programme, 1977. 56p.
- SCS/77/WP/68 GEDNEY, R.H. Water supply of the fishery development centre in the freshwater aquaculture at Sukabumi, West Java, Indonesia.
- SCS/78/WP/69 CHAN, W.L. *et al.* Cage culture of marine fish in east coast Peninsular Malaysia. Manila, South China Sea Fisheries Programme, 1978. 66p.
- SCS/78/WP/70 LEE, R.E.K.D. Results of small-scale live bait pole-and-line fishing explorations for tuna in the Philippines. Manila, South China Sea Fisheries Programme, 1978. 41p.
- SCS/78/WP/71 MOORE, G. Legal and institutional aspects of fisheries management and development — a new licensing system, Thailand. Manila, South China Sea Fisheries Programme, 1978. 23p. (Restricted)
- SCS/78/WP/72 ANGELES, H.G. Preliminary fish and resources survey along the coast of Peninsular Malaysia. Manila, South China Sea Fisheries Programme, 1978.
- SCS/78/WP/73 DE LA CRUZ, Y.T. Malaysia — Small-scale fishermen credit and subsidy programmes — Implementing guideline recommendations (with particular reference to the Kuala Besut Fishermen's Association). Manila, South China Sea Fisheries Programme, 1978. 50p.
- SCS/78/WP/74 CHIKUNI, S. Report on fishing for tuna in Philippine waters by FAO chartered purse seiners. Manila, South China Sea Fisheries Programme, 1978. (Published as SCS/DEV/78/18).
- SCS/78/WP/75 FYSON, J.E. Fishing vessel design proposals for small-scale artisanal fisheries in the Philippines. Manila, South China Sea Fisheries Programme, 1978. 23p.
- SCS/78/WP/76 LAU, F. and CHENG CHOR LUK. Recent innovations in the cage culture activity at Kuala Besut small-scale fisheries pilot project, Malaysia. Manila, South China Sea Fisheries Programme, 1978. 16p.
- SCS/78/WP/77 WHEELAND, H.A. Proposal for further development of fishery statistics programmes in developing countries with particular reference to the South China Sea region. Manila, South China Sea Fisheries Programme, 1978. 6p.
- SCS/78/WP/78 MOORE, G. Legal and institutional aspects of fisheries management and development — A second Interim Report (Thailand) Manila, South China Sea Fisheries Programme, 1978. 37p. (Restricted)
- SCS/79/WP/79 JONASSON, G. and PAISAL KATANYUWONG. Review of fishing activities of the small-scale fisheries project in Kuala Besut, Malaysia. Manila, South China Sea Fisheries Programme, 1979. 23p.
- SCS/79/WP/80 CANSDALE, G.S. Low-cost water filtration system. Manila, South China Sea Fisheries Programme, 1979. 73p.
- SCS/79/WP/81 LISAC, H. Some technical aspects of small-scale fish landing facilities. Manila, South China Sea Fisheries Programme, 1979. 32p.
- SCS/79/WP/82 CHAKRABORTY, D. Catch and analysis of fishermen in Kuala Besut, Peninsular Malaysia. Manila, South China Sea Fisheries Programme, 1979. 59p.
- SCS/79/WP/83 THOMPSON, B.G. Thailand — Management of fisheries data — feasibility of computerization. Manila, South China Sea Fisheries Programme, 1979. 24p.
- SCS/79/WP/84 CANSDALE, G.S. Report on second regional consultancy low-cost water filtration. Manila, South China Sea Fisheries Programme, 1979. 48p.
- SCS/79/WP/85 NEW, M. Report of consultancy on the fish nutrition programme at Changi Marine Fisheries Research Centre, Primary Production Department, Singapore. Manila, South China Sea Fisheries Programme, 1979. 8p.
- SCS/79/WP/86 WOYNAROVICH, E. and W.W. KUHNHOLD. Report of consultancy to Penang, Malaysia, regarding animal waste management problem. Manila, South China Sea Fisheries Programme, 1979. 59p.
- SCS/79/WP/87 THOMSON, D.B. Intermediate technology and alternative energy systems for small-scale fisheries. Manila, South China Sea Fisheries Programme, 1979. 69p.
- SCS/80/WP/88 HECHANOVA, R.G. and B. TIENSONGRUSMEE. Report of assistance on selection of site, design, construction and management of the Ban Merbok, Kedah, Malaysia Brackishwater Aquaculture Demonstration Project. Manila, South China Sea Fisheries Programme, 1980. 154p.
- SCS/80/WP/89 TIENSONGRUSMEE, B. and R.G. HECHANOVA. Malaysia — Evaluation of the site selected, design of project and proposed construction and operations of the MAJUIKAN Tanjung Tualang Freshwater Aquaculture Centre. Manila, South China Sea Fisheries Programme, 1980. 52p.
- SCS/80/WP/90 SKILLMAN, R.A. Tuna statistics Indo-Pacific and Indian Ocean. Manila, South China Sea Fisheries Programme, 1980. 45p.
- SCS/80/WP/91 TRONO, G.C., JR., H.R. RABANAL and I. SANTIKA. Report of technical assistance on seaweed farming in Indonesia. Manila, South China Sea Fisheries Programme, 1980. 56p.
- SCS/80/WP/92 BILAL, J. and W.W. KUHNHOLD. Marine oil pollution in Southeast Asia. Manila, South China Sea Fisheries Programme, 1980. 85p.
- SCS/80/WP/93 EVANS, E.D. Legal and policy consideration for use of the chartered fishing vessels in Philippine waters. Manila, South China Sea Fisheries Programme, 1980. 35p. (Restricted)
- SCS/80/WP/94 GOMEZ, E.D. The present state of mangrove ecosystems in Southeast Asia and the impact of pollution — Regional. Revised. Manila, South China Sea Fisheries Programme, 1980. 102p.
- SCS/80/WP/94a SOEGIARTO, A. The present state of mangrove ecosystems in Southeast Asia and the impact of pollution — Indonesia. Revised. Manila, South China Sea Fisheries Programme, 1980. 65p.
- SCS/80/WP/94b SASEKUMAR, A. The present state of mangrove ecosystems in Southeast Asia and the impact of pollution — Malaysia. Manila, South China Sea Fisheries Programme, 1980. 80p.
- SCS/80/WP/94c GOMEZ, E.D. The present state of mangrove ecosystems in Southeast Asia and the impact of pollution — Philippines. Revised. Manila, South China Sea Fisheries Programme, 1980. 88p.
- SCS/80/WP/94d ZOOLOGY DEPARTMENT, UNIVERSITY OF SINGAPORE. The present state of mangrove ecosystems in Southeast Asia and the impact of pollution — Singapore. Revised. Manila, South China Sea Fisheries Programme, 1980. 76p.
- SCS/80/WP/94e TWESUKDI, P. The present state of mangrove ecosystems in Southeast Asia and the impact of pollution — Thailand. Revised. Manila, South China Sea Fisheries Programme, 1980. 108p.
- SCS/80/WP/95 WHEELAND, H.A. and P.J. HOOKER. Organizational implications of a fisheries information system for the Philippines: specific recommendations regarding BFAR's statistics programme; and a plan for implementation. Manila, South China Sea Fisheries Programme, 1980. 33p.
- SCS/80/WP/96 HECHANOVA, R.G. Technical assistance on the design of government coastal aquaculture projects in Peninsular Malaysia. (A pattern for planning and design of aquaculture facility). Manila, South China Sea Fisheries Programme, 1980. 78p.
- SCS/80/WP/97 LISAC, H. Some aspects of fish utilization in small-scale fisheries. Manila, South China Sea Fisheries Programme, 1980. 32p.
- SCS/80/WP/98 HECHANOVA, R.G. Indonesia — The engineering aspects of selected aquaculture projects. Manila, South China Sea Fisheries Programme, 1980. 79p.
- SCS/81/WP/99 HOOKER, P.J. and E.J. SAVARIRAJ. A fisheries information system for Peninsular Malaysia. Manila, South China Sea Fisheries Programme, 1981. 40p.
- SCS/81/WP/100 HECHANOVA, R.G. Engineering aspects of selected aquaculture projects in Thailand. Manila, South China Sea Fisheries Programme, 1981. 15p. (Annexes A to D)
- SCS/81/WP/101 NAIR, R. Malaysia — A new fisheries bill — 1982. Manila, South (FL/WPSCS/81/2) China Sea Fisheries Programme, 1981. 15p. (Confidential and restricted)
- SCS/82/WP/102 DELA CRUZ, C. Republic of the Philippines — Fishpen and cage culture development project in Laguna de Bay. Manila, South China Sea Fisheries Programme, 1982. 27p.
- SCS/82/WP/103 GLUDE, J.B., M.A. STEINBERG and R.C. STEVENS. The feasibility of oyster and mussel farming by municipal fishermen in the Philippines. Manila, South China Sea Fisheries Programme, 1982. 100p.

- SCS/82/WP/104 NAIR, R. Regional compendium of fisheries legislation. Vol. I. (Regional (FL/WPSCS/82/1) Fisheries Law Advisory Programme Western Pacific and South China Sea region). Manila, South China Sea Fisheries Programme, 1982. 42p.
- SCS/82/WP/105 NAIR, R. Regional compendium of fisheries legislation. Vol. II (Legislation) (Regional Fisheries Law Advisory Programme Western Pacific and South China Sea region). Manila, South China Sea Fisheries Programme, 1982. 585p.
- SCS/82/WP/106 NAIR, R. Draft fisheries regulation — Malaysia. Manila, South China (FL/WPSCS/82/3) Sea Fisheries Programme, 1982. 9p. (Restricted)
- SCS/82/WP/107 NAIR, R. Draft bilateral access agreement — Malaysia. Manila, South (FL/WPSCS/82/4) China Sea Fisheries Programme, 1982. 8p. (Restricted)
- SCS/82/WP/108 NAIR, R. Law of the sea and Fiji. Manila, South China Sea Fisheries (FL/WPSCS/82/5) Programme, 1982. (Restricted)
- SCS/82/WP/109 NAIR, R. EEZ — Malaysia legislation. Part I. Manila, South China Sea (FL/WPSCS/82/6) Fisheries Programme, 1982. 5p. (Restricted)
- SCS/82/WP/110 GLUDE, J.B. The potential for seafarming in the Riau Archipelago district of Indonesia. Manila, South China Sea Fisheries Programme, 1982. 28p.
- SCS/82/WP/111 DE JESUS, A.S. Tuna fishing gears of the Philippines. Manila, South IPTP/82/WP/2 China Sea Fisheries Programme, 1976. 47p.
- SCS/82/WP/112 WHITE, T.F. and M. YESAKI. The status of tuna fisheries in Indonesia IPTP/82/WP/3 and the Philippines. Manila, South China Sea Fisheries Programme, 1982. 62p.

- SCS/82/WP/113 YESAKI, M. Illustrated key to small and/or immature species of tuna IPTP/82/WP/4 and bonitos of the Southeast Asian Region. Manila, South China Sea Fisheries Programme, 1982. 16p.
- SCS/82/WP/114 WHITE, T.F. The Philippine tuna fishery and aspects of the population IPTP/82/WP/5 dynamics of tunas in Philippine waters. Manila, South China Sea Fisheries Programme, 1982.
- SCS/82/WP/115 EDESON, W. EEZ — Malaysia legislation. Part II. Manila, South China Sea Fisheries Programme, 1982. (Restricted).
- SCS/82/WP/116 EDESON, W. Comments on the fisheries bill — Malaysia. Manila, FL/WPSCS/82/10 South China Sea Fisheries Programme, 1982. 4p.
- SCS/83/WP/117 GEDNEY, R.H., Y.C. SHANG and H.L. COOK. Comparative study of tidal and pumped water supply for brackishwater aquaculture ponds in Malaysia. Manila, South China Sea Fisheries Programme, 1983. 40p.
- SCS/83/WP/118 YESAKI, M. The pelagic fisheries of the Philippines. Manila, South IPTP/83/WP/6 China Sea Fisheries Programme, 1983. 15p.
- SCS/83/WP/119 YESAKI, M. Observations on the biology of yellowfin (*Thunnus alba-IPTP/83/WP/7* *cares*) and skipjack (*Katsuwonomus pelamis*) tuna in the Philippine waters. Manila, South China Sea Fisheries Programme, 1983.
- SCS/83/WP/120 EDESON, W. Revised draft fisheries regulations — Malaysia. Manila, FL/WPSCS/82/11 South China Sea Fisheries Programme, 1983. 26p. (Restricted).

WORKSHOP REPORTS

- SCS/GEN/74/1 Report on the workshop on planning and coordinating of resources survey and evaluation in the South China Sea. 28 August-4 September 1974. Manila, South China Sea Fisheries Programme, 1974. 197p.
- SCS/GEN/76/2 Report of the workshop on the fishery resources of the Malacca Strait. Part I. Jakarta, 29 March-2 April 1976. Manila, South China Sea Fisheries Programme, 1976. 89p.
- SCS/GEN/76/3 Report of workshop on legal and institutional aspects of fishery resources management and development. 5-8 April 1976. Manila, South China Sea Fisheries Programme, 1976. 95p.
- SCS/GEN/76/4 Report on the training workshop for field enumerators of the Bureau of Fisheries and Aquatic Resources — Philippines. 22-31 March 1976. Manila, South China Sea Fisheries Programme, 1976. 32p.
- SCS/GEN/76/5 UNDP/FAO Training course on the management of small-scale fishery enterprises. Kuala Trengganu, Malaysia. 25 August-26 September 1975. Rome, FAO, 1976. 14p.
- SCS/GEN/76/6 Report of the workshop on the fishery resources of the Malacca Strait — Part II. Jakarta, 29 March-2 April 1976. South China Sea Fisheries Programme, 1976. 85p.
- SCS/GEN/76/7 Report of the BFAR/SCSP workshop on the fishery resources of the Visayan and Sibuyan Area. Tighauan, Iloilo, Philippines. 18-22 October 1976. Manila, South China Sea Fisheries Programme, 1976. 26p.
- SCS/GEN/76/8 Philippines — Report seminar on the fisheries statistics survey of the Bureau of Fisheries and Aquatic Resources. 23 July 1976. DNR/BFAR/SCSP, Manila, South China Sea Fisheries Programme, 1976. 17p.
- SCS/GEN/77/9 Report of the consultative group meeting on small-scale fisheries development in the South China Sea Region. 13-15 December 1976. Manila, South China Sea Fisheries Programme, 1977. 140p.
- SCS/GEN/77/10 Report on the training workshop on fisheries statistics, Malaysia. 12-21 October 1976. Manila, South China Sea Fisheries Programme, 1977. 27p.
- SCS/GEN/77/11 Report on the BFAR/SCSP workshop on fishery resources of the Sulu Sea and Moro Gulf areas, 25-29 April 1977. Cagayan de Oro. Manila, 1977. 58p.
- SCS/GEN/78/12 Report of the workshop on the demersal resources, Sunda Shelf. Part I. 31 October-4 November 1977. Penang, Malaysia. Manila, South China Sea Fisheries Programme, 1978. 58p.
- SCS/GEN/78/13 Report of the workshop on the demersal resources. Sunda Shelf. Part II. 31 October-4 November 1977. Penang, Malaysia. Manila, South China Sea Fisheries Programme, 1978. 120p.
- SCS/GEN/78/14 Joint SCSP/SEAFDEC workshop on aquaculture engineering (with emphasis on small-scale aquaculture projects) Vol. I — General Report. Manila, South China Sea Fisheries Programme, 1978. v.p.
- SCS/GEN/78/15 Joint SCSP/SEAFDEC workshop on aquaculture engineering (with emphasis on small-scale aquaculture projects) Vol. II — Technical Report. Manila, South China Sea Fisheries Programme, 1978. 463p.
- SCS/GEN/78/16 A layout of standard tables of fishery statistics in the Philippines. Manila, South China Sea Fisheries Programme, 1978. 162p.
- SCS/GEN/78/17 Report of the workshop on the biology and resources of mackerels (*Rastrelliger* spp) and round scads (*Decapterus* spp) in the South China Sea. Part I. Manila, South China Sea Fisheries Programme, 1978. 70p.
- SCS/GEN/78/18 Report of the workshop on management of resources of the Sunda Shelf, Malacca Strait and related areas. Manila, South China Sea Fisheries Programme, 1978. 14p.
- SCS/GEN/78/19 Report of the BFAR/SCSP workshop on the fishery resources of the Pacific Coast of the Philippines. 18-22 September 1978. Manila, South China Sea Fisheries Programme, 1978. 48p.
- SCS/GEN/79/20 Report of the workshop on demersal and pelagic fish resources of the Java Sea. 5-9 December 1978. Semarang, Indonesia. Manila, South China Sea Fisheries Programme, 1979. 60p.
- SCS/GEN/79/21 Report of the workshop on the tuna resources of Indonesia and Philippine waters. Jakarta, 20-23 March 1979. Manila, South China Sea Fisheries Programme, 1979. 35p.
- SCS/GEN/79/22 Report of the BFAR/SCSP workshop on the fishery resources of the north Luzon and western coasts of Luzon. 18-20 April 1979, Manila, Philippines. Manila, South China Sea Fisheries Programme, 1979. 57p.
- SCS/GEN/79/23 Report on training course in fishery statistics. 2 October-10 November 1978. Manila, Philippines. Manila, South China Sea Fisheries Programme, 1979. v.p.
- SCS/GEN/79/24 Report of the consultation meeting on management of tuna resources of the Indian and Pacific Oceans. 26-29 June 1979. Manila, Philippines. Manila, South China Sea Fisheries Programme, 1979. 155p.
- SCS/GEN/80/25 Report of the workshop on application and results of acoustic methods for resource appraisal surveys in the South China Sea. Manila, South China Sea. Manila, South China Sea Fisheries Programme, 1980. 19p. Annexes I to 4.
- SCS/GEN/80/26 Report of the workshop on the biology and resources of penaeid shrimps in the South China Sea area. Part I. 30 June-5 July 1980. Kota Kinabalu, Sabah, Malaysia. Manila, South China Sea Fisheries Programme, 1980. 162p.
- SCS/GEN/81/27 Report of the workshop on application and results of acoustic methods for resource appraisal surveys in the South China Sea. Part II. 19-23 November 1979. Manila, South China Sea Fisheries Programme, 1981. 102p.
- SCS/GEN/80/28 Report of the training course in prawn farming for Asia and the Pacific. Jepara, Central Java, Indonesia. 5 October-15 November 1980. Manila, South China Sea Fisheries Programme, 1980. 138p.
- SCS/GEN/81/29 Report on the training course on *Gracilaria* algae. (A training subproject under FAO/UNDP Project RAS/79/041 implemented through RAS/74/013). Manila, Philippines. 1-30 April 1981. Manila, South China Sea Fisheries Programme, 1981.
- SCS/GEN/81/30 Report of the workshop on the biology and resources of penaeid shrimps in the South China Sea area. Part II. 30 June-5 July 1980. Kota Kinabalu, Sabah, Malaysia. Manila, South China Sea Fisheries Programme, 1981.
- SCS/GEN/81/31 Report of the regional seminar on monitoring, control and surveillance of fisheries in exclusive economic zones. 30 November-4 December 1981. Jakarta, Indonesia. Manila, South China Sea Fisheries Programme, 1981. v.p.
- SCS/GEN/82/32 A selected bibliography of tuna fisheries in the South China Sea region. Manila, South China Sea Fisheries Programme, 1982. 24p.
- SCS/GEN/82/33 Working party on small-scale shrimp/prawn hatcheries in Southeast Asia. Vol. I — General report. Manila, South China Sea Fisheries Programme, 1982. 30p.
- SCS/GEN/82/34 Report of the training course on small-scale pen cage culture for finfish. 26-31 October and 1-12 November 1981. Laguna, Philippines. Manila, South China Sea Fisheries Programme, 1982. 246p.
- SCS/GEN/82/35 Training on assessment of coastal aquaculture potential, Malaysia. Manila, South China Sea Fisheries Programme, 1982. 62p.
- SCS/GEN/82/36 Provisional list of shrimp and prawn aquaculturists in Southeast Asia. Manila, South China Sea Fisheries Programme, 1982. 16p.
- SCS/GEN/82/37 Report of the training course on growing food organisms for fish hatcheries. Tigbauan, Iloilo, Philippines. 3-22 August 1981. Manila, South China Sea Fisheries Programme, 1982. 225p.
- SCS/GEN/82/38 Report on the regional training courses on fishery stock assessment and statistics. Part I. General Report. Samutprakarn, Thailand. 1 September-9 October 1981. Manila, South China Sea Fisheries Programme, 1982. 67p.
- SCS/GEN/82/39 Report of the training course on seabass spawning and larval rearing. Songkhla, Thailand. 1-20 June 1982. Manila, South China Sea Fisheries Programme, 1982. 105p.
- SCS/GEN/82/40 Working party on small-scale shrimp/prawn hatcheries in Southeast Asia. Semarang, Central Java, Indonesia. 16-21 November 1981. Vol. II. Technical Report. Manila, South China Sea Fisheries Programme, 1982. 125p.

- SCS/GEN/82/41 Report on the regional training course on fishery stock assessment, 1 September-9 October 1981, Samutprakarn, Thailand. Part II — Technical Report, Vol. 1. Manila, South China Sea Fisheries Programme, 1982. 238p.
- SCS/GEN/82/41a Report on the regional training course on fishery statistics, 1 September-9 October 1981, Samutprakarn, Thailand. Part II — Technical Report, Vol. 2. Manila, South China Sea Fisheries Programme, 1982. v.p.
- SCS/GEN/82/42 Report of the consultation/seminar on coastal fishpond engineering, 4-12 August 1982, Surabaya, Indonesia. Manila, South China Sea Fisheries Programme, 1982. 211p.
- SCS/GEN/82/43 Report of the workshop on the development of rural coastal fisheries, 15-24 March 1982, Manila, Philippines. Manila, South China Sea Fisheries Programme, 1982. 52p.
- SCS/GEN/82/44 Joint IDRC/SCSP fish quarantine workshop, 6-11 December 1982, Jakarta, Indonesia. Manila, South China Sea Fisheries Programme, 1982.
- SCS/GEN/79/45 Regional training workshop on joint venture agreements in fisheries, Manila, 15-27 January 1979. Manila, South China Sea Fisheries Programme, 1979. (Report was not made but papers are available at the SCSP Library).
- SCS/GEN/82/46 Consultation meeting of the joint Indonesian/Philippine tuna working group, Manila, South China Sea Fisheries Programme, 1982. 64p.
- SCS/GEN/83/47 Report of the workshop on Philippine and Indonesian research activities, IPTP/83/GEN/4 Manila, Philippines, 5-8 February 1983. Manila, South China Sea Fisheries Programme, 1983. 16p.

SCS MANUALS

- SCS Manual No. 1 Handbook on field identification of fishes, crustaceans, molluscs, shells, and important aquatic plants. Manila, South China Sea Fisheries Programme, 1978. 60p.
- SCS Manual No. 2 Manual for the collection of historical data on tuna and tuna-like species
- IPTP Manual No. 1 in the Indo-Pacific Region. Colombo, Indo-Pacific Tuna Development and Management Programme, 1982. (for printing)
- SCS Manual No. 3 A guide to the organization and management of small fishery library. Manila, South China Sea Fisheries Programme, 1982.
- SCS Manual No. 4 Floating netcage fish culture manual. Manila, South China Sea Fisheries Programme, 1982. (In preparation)
- SCS Manual No. 5 Fishpond engineering: a regional manual for small and medium scale coastal fishponds. Manila, South China Sea Fisheries Programme, 1982. (for printing)

PERIODIC PROGRESS REPORTS

- SCS/PR/74/1 WOODLAND, A.G. Project progress report of the South China Sea Fisheries Development and Coordinating Programme. 1 July-31 December 1974. Manila, South China Sea Fisheries Programme, 1974. 19p.
- SCS/PR/75/2 _____ . Project progress report of the South China Sea Fisheries Development and Coordinating Programme. 1 January-30 June 1975. Manila, South China Sea Fisheries Programme, 1975. 40p.
- SCS/PR/75/3 _____ . Project progress report of the South China Sea Fisheries Development and Coordinating Programme. 1 July-31 December 1975. Manila, South China Sea Fisheries Programme, 1975. 38p.
- SCS/PR/76/4 _____ . Project progress report of the South China Sea Fisheries Development and Coordinating Programme. 1 January-31 December 1976. Manila, South China Sea Fisheries Programme, 1976. 47p.
- SCS/PR/77/5 _____ . Project progress report of the South China Sea Fisheries Development and Coordinating Programme. 1 January-30 June 1977. Manila, South China Sea Fisheries Programme, 1977. 37p.
- SCS/PR/77/6 _____ . Project progress report of the South China Sea Fisheries Development and Coordinating Programme. 1 July-31 December 1977. Manila, South China Sea Fisheries Programme, 1977. 19p.
- SCS/PR/78/7 _____ . Project progress report of the South China Sea Fisheries Development and Coordinating Programme. 1 January-30 June 1978. Manila, South China Sea Fisheries Programme, 1978. 12p.
- SCS/PR/78/8 _____ . Project progress report of the South China Sea Fisheries Development and Coordinating Programme. 1 July-31 December 1978. Manila, South China Sea Fisheries Programme, 1978. 11p.
- SCS/PR/79/9 _____ . Project progress report of the South China Sea Fisheries Development and Coordinating Programme. 1 January-30 June 1979. Manila, South China Sea Fisheries Programme, 1979. 12p.
- SCS/PR/79/10 _____ . Project progress report of the South China Sea Fisheries Development and Coordinating Programme. 1 July-31 December 1979. Manila, South China Sea Fisheries Programme, 1979. 65p.
- SCS/PR/80/11 _____ . Project progress report of the South China Sea Fisheries Development and Coordinating Programme. 1 January-30 June 1980. Manila, South China Sea Fisheries Programme, 1980. 28p.
- SCS/PR/80/12 _____ . Project progress report of the South China Sea Fisheries Development and Coordinating Programme. 1 July-31 December 1980. Manila, South China Sea Fisheries Programme, 1980. 25p.
- SCS/PR/81/13 _____ . Project progress report of the South China Sea Fisheries Development and Coordinating Programme. 1 January-30 June 1981. Manila, South China Sea Fisheries Programme, 1981. 20p.
- SCS/PR/81/14 _____ . Project progress report of the South China Sea Fisheries Development and Coordinating Programme. 1 July-31 December 1981. Manila, South China Sea Fisheries Programme, 1981. 14p.
- SCS/PR/82/15 _____ . Project progress report of the South China Sea Fisheries Development and Coordinating Programme. 1 January-30 June 1982. Manila, South China Sea Fisheries Programme, 1982. 13p.
- SCS/PR/82/16 _____ . Project progress report of the South China Sea Fisheries Development and Coordinating Programme. 1 July-31 December 1982. Manila, South China Sea Fisheries Programme, 1982.

COORDINATING COMMITTEE REPORTS

- SCSP/74/1 REP Report of the *Ad Hoc* Coordinating Committee Meeting of the South China Sea Fisheries Development and Coordinating Programme. Manila, 18-19 June 1974. 27p.
- SCSP/74/2 REP Report of the first session of the Coordinating Committee of the South China Sea Fisheries Development and Coordinating Programme. Jakarta, Indonesia, 6 November 1974. Rome, FAO, 1974. 22p.
- SCSP/76/3 REP Report of the second session of the Coordinating Committee of the South China Sea Fisheries Development and Coordinating Programme. Manila, 9 April 1976. 16p.
- SCSP/77/4 REP Report of the third session of the Coordinating Committee of the South China Sea Fisheries Development and Coordinating Programme. Manila, 24-25 February 1977. 19p.
- SCSP/77/5 REP Report of the fourth session of the Coordinating Committee of the South China Sea Fisheries Development and Coordinating Programme. Manila, 11-12 October 1977. 21p.
- SCSP/78/6 REP Report of the fifth session of the Coordinating Committee of the South China Sea Fisheries Development and Coordinating Programme. Manila, 11 March 1978. 16p.
- SCSP/78/7 REP Report of the sixth session of the Coordinating Committee of the South China Sea Fisheries Development and Coordinating Programme. Manila, 28-29 September 1978.
- SCSP/79/8 REP Report of the seventh session of the Coordinating Committee of the South China Sea Fisheries Development and Coordinating Programme. Rome, 11-16 October 1979.

FISHERIES TECHNICAL PAPERS

- SCS/DEV/74/1 WOODLAND, A.G. *et al.* The South China Sea Fisheries: A proposal for accelerated development. Rome, FAO, 1974. 162p.
- SCS/DEV/73/2 YAMAMOTO, T. Review of marine fishery statistical system in countries bordering the South China Sea, and proposals for their improvement. Rome, FAO, 1973. 46p. (Cover title: The South China Sea Fisheries Statistical Systems)
- SCS/DEV/73/3 AOYAMA, T. The demersal fish stocks and fisheries of the South China Sea. Rome, FAO, 1973. 80p. (Cover title: The South China Sea Fisheries Demersal Resources)
- SCS/DEV/73/4 KUME, S. Tuna resources in the South China Sea. Rome, FAO, 1973. 18p.
- SCS/DEV/73/5 LING, S. Status, potential and development of coastal aquaculture in the countries bordering the South China Sea. Rome, FAO, 1973. 51p. (Cover title: The South China Sea Fisheries Aquaculture Development)
- SCS/DEV/73/6 MENASVETA, D. *et al.* Pelagic fishery resources of the South China Sea and prospects for their development. Rome, FAO, 1973. (Cover title: The South China Sea Fisheries Pelagic Resources)
- SCS/DEV/73/7 MISTAKIDIS, M.N. The crustacean resources and related fisheries in the countries bordering the South China Sea. (Cover title: The South China Sea Fisheries Crustacean Resources)
- SCS/DEV/73/8 RUCKES, E. Fish utilization, marketing and trade in countries bordering the South China Sea — status and programme proposals. Rome, FAO, 1973. 33p. (Cover title: The South China Sea Fisheries Marketing and Trade)
- SCS/DEV/73/9 DOUCET, F.J. *et al.* Institutional and legal aspects affecting fishery development in selected countries bordering the South China Sea. Rome, FAO, 1973. 32p. (Cover title: The South China Sea Fisheries Institutional Legal Aspects)
- SCS/DEV/73/10 LABON, A. Malaysian long-term fisheries development plan until 1995. Rome, FAO, 1973. 91p. (Cover title: The South China Sea Fisheries Malaysian development plan 1995)
- SCS/DEV/76/11 Development potentials of selected fishery products in the regional member countries of the Asian Development Bank. Manila, South China Sea Fisheries Programme, 1976. 107p. (ADB/FAO Market Studies)
- SCS/DEV/76/11 Fishery country profiles. Manila, South China Sea Fisheries Programme, (Appendix 1) 1976. 173p. (ADB/FAO Market Studies)
- SCS/DEV/76/12 The international market for shrimp. Manila, South China Sea Fisheries Programme, 1976. 105p. (ADB/FAO Market Studies)
- SCS/DEV/76/13 The international market for tuna. Manila, South China Sea Fisheries Programme, 1976. 69p. (ADB/FAO Market Studies)
- SCS/DEV/76/14 The international market for crab. Manila, South China Sea Fisheries Programme, 1976. 46p. (ADB/FAO Market Studies)
- SCS/DEV/76/15 The international market for lobster. Manila, South China Sea Fisheries Programme, 1976. 46p. (ADB/FAO Market Studies)
- SCS/DEV/76/16 The international market for cephalopods. Manila, South China Sea Fisheries Programme, 1976. 95p. (ADB/FAO Market Studies)
- SCS/DEV/76/17 The European canned fish market: Prospects for *Rastrelliger* spp. Manila, South China Sea Fisheries Programme, 1976. 56p. (ADB/FAO Market Studies)
- SCS/DEV/78/18 CHIKUNI, S., A.C. SIMPSON and W.R. MURDOCH. Test fishing for tuna and small pelagic species: Reports on the operation of FAO chartered purse seiners in Philippine and South China Sea waters, 1974-1977. Manila, South China Sea Fisheries Programme, 1978. v.p.
- SCS/DEV/79/19 POPE, J. Stock assessment in multispecies fisheries with special reference to the trawl fishery in the Gulf of Thailand. Manila, South China Sea Fisheries Programme, 1979. 106p.
- SCS/DEV/80/20 Implications of the extension of national jurisdiction for fisheries management and development. Report of an FAO Mission to the Government of Indonesia, 7 January-2 February 1980. Manila, South China Sea Fisheries Programme and Food and Agriculture Organization of the United Nations, 1980. 90p. (Restricted)
- SCS/DEV/83/21 to Second Asian fish market study. Joint ADB/FAO (SCSP-INFOFISH)
- SCS/DEV/83/29 market studies. Manila, South China Sea Fisheries Programme, 1983. 9 vols.
- FAO species identification for fishery purposes. Eastern Indian Ocean (Fishing area 57) and Western Central Pacific (Fishing area 71). Rome, FAO, 1974. 4 vols.

TECHNICAL REPORTS CONTRIBUTED TO SYMPOSIA/MEETINGS, ETC

- RABANAL, H.R. FAO activities in inland fisheries and aquaculture with particular reference to Asia and the Far East. Manila, South China Sea Fisheries Programme, 17p. (Contributed to the First Fisheries Research Congress, Philippine Council for Agriculture and Resources Research, 7-10 March 1975, Legaspi City, Philippines).
- _____. Preliminary report on the Macrobrachium fishery in the Indo-Pacific region. 1975 Manila, South China Sea Fisheries Programme, 20p. (Contributed to the International Conference on Prawn Farming, Vung Tau, Vietnam, 31 March-4 April 1975).
- _____. Distribution and occurrence of milkfish *Chanos chanos* (Forsk.) in the South China Sea. Manila, South China Sea Fisheries Programme, 1975. 18p. (Contributed to the National Bangon Symposium, Manila, 25-26 July 1975).
- _____. Mangrove and their utilization for aquaculture. Manila, South China Sea Fisheries Programme, 20p. (Contributed to the National Workshop on Mangrove Ecology held in Phuket, Thailand, 10-16 January 1976).
- _____. Report of project identification mission to Bangladesh on inland fisheries 1976 and aquaculture. Manila, Asian Development Bank, 56p.
- _____. Aquaculture 1976: Focus Southeast Asia. Manila, South China Sea Fisheries Programme, 12p. (Talk delivered at the National Convention of the Federation of Fish Producers of the Philippines, Iloilo City, 26 August 1976).
- SIMPSON, A.C. Some proposals for research related to the understanding of mangrove 1976 ecology and the utilization of mangrove areas. Manila, South China Sea Fisheries Programme, 10p. (Contributed to the National Workshop on Mangrove Ecology held in Phuket, Thailand, 10-16 January 1976).
- COOK, H.L. Some aspects of shrimp culture research with particular reference to Philippine 1976 species. Manila, South China Sea Fisheries Programme, 7p. (Contributed to the Philippine Council for Agriculture and Resources Research (PCARR) Fisheries Workshop, Subic, Zambales, Philippines, 15-17 January 1976).
- RABANAL, H.R. The resources in inland waters: their utilization and management. Manila, 1976 South China Sea Fisheries Programme, 21p. (Talk delivered before the Phi Sigma Biological Society as a contribution to the Deogracias V. Villadolid Memorial lecture series. Manila, Philippines, 26 November 1976).
- _____. Aquaculture in the Philippines. Manila, South China Sea Fisheries Programme, 1977. 15p. (Talk delivered before the United States Peace Corps Volunteers, Los Baños, Laguna, Philippines, 11 January 1977).
- RABANAL, H.R. Aquaculture in Southeast Asia. Manila, South China Sea Fisheries Programme, 1977. 10p. (Paper contributed to the Fifth FAO/SIDA Workshop on Aquatic Pollution in relation to Protection of Living Resources. Manila, Philippines, 17-27 February 1977).
- SIMPSON, A.C. Fisheries research and development in the Philippines: Some recommendations with special reference to resource assessment. Manila, South China Sea Fisheries Programme, 16p.
- RABANAL, H.R. Aquaculture management. Manila, South China Sea Fisheries Programme, 1977. 12p. (Contribution to the BFAR/FAO-UNDP Training of Regional Trainers in Aquaculture. Lucena, Quezon, Philippines, 19 September-27 October 1977).
- _____. Recent trends in aquaculture. Manila, South China Sea Fisheries Programme, 1977. 13p. (Paper contributed to the Seminar/Workshop for Fishery Schools' Administrators, conducted by the Bureau of Fisheries and Aquatic Resources, Manila, Philippines, 24-28 October 1977).
- _____. Forest conservation and aquaculture development of mangroves. Manila, South China Sea Fisheries Programme, 15p. (Paper contributed to the International Workshop on Mangrove and Estuarine Area Development for the Indo-Pacific region, 14-19 November 1977, Manila, Philippines).
- THOMSON, D.B. Lecture notes on fishing methods, equipment and deck layout of fishing 1978 vessels. Manila, South China Sea Fisheries Programme, 1978. 151p. (Paper presented at the FAO NORAD Course on Fishing Vessel Design, Bangkok, Thailand, October-November 1978).
- RABANAL, H.R. International traffic of live and fish eggs and control of the spread of fish 1978 diseases. Manila, South China Sea Fisheries Programme, 1978. 21p. (Contributed to the Workshop on Tropical Fisheries — their causes and control in Southeast Asia, Puncak, West Java, Indonesia, 28 November-1 December 1978).
- RABANAL, H.R. and R.O. JULIANO. Aquaculture extension: How it could be a potent 1979 force in fisheries development in the ASEAN region. Manila, South China Sea Fisheries Programme, 1979. (Paper contributed to the First ASEAN Seminar/Workshop on Fisheries Extension, Manila, 18-25 February 1979).
- THOMSON, D.B. Marine fisheries extension. Manila, South China Sea Fisheries Programme, 1979. 41p. (Paper contributed to the First ASEAN Seminar/Workshop on Fisheries Extension, Manila, 18-25 February 1979).
- _____. Training requirements of the fisheries of Southeast Asia. Manila, South China Sea Fisheries Programme, 1979. 11p. (Paper presented at the SEAFDEC Consultative Meeting on Fisheries Training, Bangkok, 14-18 May, 1979).
- KUHNHOLD, W.W. Aquatic pollution: Classes of pollutants, their occurrence, transport and 1979 dispersion. Manila, South China Sea Fisheries Programme, 1979. 22p. (Lecture given at the Seventh FAO/SIDA Workshop on Aquatic Pollution in Relation to Protection of Living Resources — Analyses of Metals and Organochlorines in Biota. Manila, Philippines, 7 May-9 June 1979).
- _____. Effects of aquatic pollution on fish and fisheries. Manila, South China Sea Fisheries Programme, 1979. (Lecture given at the Seventh FAO/SIDA Workshop on Aquatic Pollution in Relation to Protection of Living Resources — Analyses of Metals and Organochlorines in Biota. Manila, Philippines, 7 May-9 June 1979).
- RABANAL, H.R. The design of research in brackishwater aquaculture. Manila, South China Sea Fisheries Programme, 1979. 7p. (Paper contributed to the Seminar/Workshop on Research Methodology and Technical Report Writing, conducted by the Fisheries Training Division, Bureau of Fisheries and Aquatic Resources, Fisheries Training Centre, Cavite City, Philippines, 10-29 June 1979).
- RABANAL, H.R. Production and recent innovations in design and management in aqua- 1979 culture industry in Southeast Asia. Manila, South China Sea Fisheries Programme, 1979. 7p. (Paper contributed to the Asian Seminar and Tour sponsored by the Bank of America, Manila, 6-9 November 1979).
- THOMSON, D.B. The challenge of the 1980's for fisheries education, training and extension. 1979 Manila, South China Sea Fisheries Programme, 1979. 11p. (Paper presented at the First International Symposium on Fishery Education, Fish Processing and Marketing Systems. Mexico, December 1979).
- KUHNHOLD, W.W. Some aspects of the impact of aquatic oil pollution on fishery resources. 1980 Manila, South China Sea Fisheries Programme, 1980. 25p. (Paper contributed to the International Workshop on the Prevention, Abatement and Combating of Pollution from Ships in East Asian Waters, 3-8 November 1980, Manila, Philippines).

- RABANAL, H.R. Small-scale shrimp/prawn hatcheries: an overview. *In* FAO/UNDP 1981 Working Party on Small-Scale Shrimp/Prawn Hatchery. Semarang, Indonesia, 15-22 November 1981. Manila, South China Sea Fisheries Programme, 1981. (SCS/GEN/82/40: CP-1:15-18).
- DELMENDO, M. and H.R. RABANAL. The organization and administration of aquaculture development in Asian countries. Part I. Agricultural Administration 9(1982)61-75.
- RABANAL, H.R. and V. SOESANTO. Introduction to the taxonomy, biology and fishery 1982 of the giant seaperch or seabass, *Lates calcarifer*. *In* Report of Training Course on Seabass Spawning and Larval Rearing. Songkhla, Thailand, 1-20 June 1982. Manila, South China Sea Fisheries Programme, 1982. (SCS/82/LEC. 1:2-9).

- SOESANTO, V. Some notes on programmes on seabass. *In* Report of Training Course on 1982 Seabass Spawning and Larval Rearing. Songkhla, Thailand, 1-20 June 1982. Manila, South China Sea Fisheries Programme, 1982. (SCS/82/SBTC/LEC. 22:62-63).
- CHAN, W.L. Management of the nursery of seabass fry. *In* Report of Training Course on 1982 Seabass Spawning and Larval Rearing. Songkhla, Thailand, 1-20 June 1982. Manila, South China Sea Fisheries Programme, 1982. (SCS/82/SBTC/LEC. 15:34-37).
- RABANAL, H.R. Status of aquaculture fisheries in the Indo-Pacific region. Manila, South China Sea Fisheries Programme, 1982. 12p. (Contribution to the FAO IPFC Workshop on Inland Fisheries for Planners, Manila, Philippines 2-6 August 1982).

**PUBLICATIONS OF THE
INDO-PACIFIC TUNA DEVELOPMENT AND MANAGEMENT PROGRAMME
(INT/81/034)**

WORKING PAPERS

- IPTP/82/WP/1 SKILLMAN, R.A. Tuna fishery statistics for the Indian Ocean and the Indo-SCS/80/WP/90 Pacific. Colombo, Indo-Pacific Tuna Development and Management Programme, 1982. 86p.
- IPTP/82/WP/2 DE JESUS, A.S. Tuna fishing gears of the Philippines. Colombo, Indo-SCS/82/WP/111 Pacific Tuna Development and Management Programme, 1982. 47p.
- IPTP/82/WP/3 WHITE, T.F. and M. YESAKI. The status of tuna in Indonesia and the SCS/82/WP/112 Philippines. Colombo, Indo-Pacific Tuna Development and Management Programme, 1982. 62p.
- IPTP/82/WP/4 YESAKI, M. Illustrated key to small and/or immature species of tuna SCS/82/WP/113 and nonitos of the Southeast Asian region. Colombo, Indo-Pacific Tuna Development and Management Programme, 1982. 16p.
- IPTP/82/WP/5 WHITE, T.F. The Philippine tuna fishery and aspects of the population SCS/82/WP/114 dynamics of tunas in Philippine waters. Colombo, Indo-Pacific Tuna Development and Management Programme, 1982. (for printing).
- IPTP/83/WP/6 YESAKI, M. The pelagic fisheries of the Philippines. Colombo, Indo-SCS/83/WP/118 Pacific Tuna Development and Management Programme, 1983. 15p.
- IPTP/83/WP/7 YESAKI, M. Observations on the biology of yellowfin (*Thunnus albacares*) SCS/83/WP/119 and skipjack (*Katsuwonus pelamis*) tunas in the Philippine waters. Colombo, Indo-Pacific Tuna Development and Management Programme, 1983. (for printing).

GENERAL REPORTS

- IPTP/82/GEN/1 Report of the consultation meeting on management of tuna resources of SCS/GEN/79/24 the Indian and Pacific Oceans. Manila, Philippines. 26-29 June 1979. Colombo, Indo-Pacific Tuna Development and Management Programme, 1982. 155p.
- IPTP/82/GEN/2 A selected bibliography on tuna fisheries in the South China Sea region. SCS/GEN/82/32 Colombo, Indo-Pacific Tuna Development and Management Programme, 1982. 24p.
- IPTP/82/GEN/3 Report of the consultation meeting of the joint Indonesian/Philippine SCS/GEN/82/46 Tuna Working Group. Manila, Philippines, 21-23 October, 1981. Manila, South China Sea Fisheries Development and Coordinating Programme or Colombo, Indo-Pacific Tuna Development and Management Programme, 1982. 64p.
- IPTP/83/GEN/4 Report of the workshop on Philippine and Indonesian research activities. SCS/GEN/83/47 Manila, Philippines. Colombo, Indo-Pacific Tuna Development and Management Programme, 1983.

MANUALS

- IPTP Manual No. 1 Manual for the collection of historical data on tuna and tuna-like species
SCS Manual No. 2 in the Indo-Pacific Region Tuna Development and Management Programme, 1982.

PERIODIC PROGRESS REPORT

- IPTP/PR/82/1 HOOKER, P.J. Project progress report of the Interregional Tuna Development and Management Programme. 1 January-30 June 1982. v.p.
- IPTP/PR/82/2 _____ Project progress report of the Interregional Tuna Development and Management Programme. 1 July-30 December 1982.

