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TABLE OF CONTENTS

	<u>Page No.</u>
SUMMARY AND RECOMMENDATIONS.....	i - v
I. <u>Present Status of Korean Fisheries</u>	1
A. The Place of Fisheries in the Korean Economy.....	1
B. The Resources.....	2
Near Water Resources - Neighboring Seas.....	2
Distant Water Resources.....	3
C. The Fleet.....	4
Size and Characteristics.....	4
Capital Investment.....	5
D. Landings and Fishery Products.....	5
E. Fish Handling and Processing.....	7
Fish Handling.....	7
Fish Processing.....	8
F. Market Organization.....	11
Consignment Selling.....	11
Domestic Distribution.....	13
Foreign Marketing.....	14
II. <u>Trends in Fisheries</u>	16
A. Fleet Modernization.....	16
B. Other Fishery Improvements.....	17
C. Production, Exports and Domestic Consumption.....	17
Fishery Production (Landings).....	19
Output of Products.....	20
Exports.....	21
Domestic Consumption.....	25

TABLE OF CONTENTS (cont)

	<u>Page No.</u>
D. Prices.....	28
Wholesale and Export Price Movements.....	28
Prices to Fishermen.....	29
E. Employment.....	30
F. Cost Structure in Distant Water Fishery.....	33
III. <u>Institutional Background</u>	35
A. Research.....	35
B. Inspection of Fishery Products.....	37
C. Education and Training.....	38
Fishery High Schools.....	38
Junior Fishery Colleges.....	39
Pusan Fisheries College.....	39
Fisheries Research and Development Agency.....	41
United Nations Development Program (SF).....	42
D. Cooperatives.....	43
Organizational Structure.....	43
Business Activities.....	44
Scope of Activity of CFFC.....	45
E. Financial Assistance to Fishermen..	47
Fishery Loans.....	47
Loans for Vessel Construction.....	47
Subsidies or Grants.....	48
Vessel Insurance.....	49

TABLE OF CONTENTS (cont)

	<u>Page No.</u>
F. National Fisheries Administration..	49
IV. <u>Prospects for Development.....</u>	52
A. Objectives of the Second Five Year Plan.....	52
B. Investment Projects.....	52
C. Production Targets, 1966-1971.....	54
Assumptions.....	54
Evaluation.....	55
D. Means of Implementation.....	56
Central Federation of Fisheries Cooperatives.....	56
Korean Marine Industries Development Corporation.....	56
Financial Assistance Arising From the Japanese Korean Treaty on Economic Cooperation.....	57
E. Feasibility of Proposed Fleet Expansion.....	58
Fleet Expansion in Relation to Coastal and Offshore Resources.....	58
Fleet Expansion in Relation to Deep Sea Resources.....	58
Fleet Expansion in Relation to Boat Construction, Repair and Maintenance Facilities.....	59
Fleet Expansion in Relation to Landing and Processing Facilities..	59
Fleet Expansion in Relation to Market Prospects.....	60
Domestic Market.....	60
Foreign Market.....	62

TABLE OF CONTENTS (cont)

	<u>Page No.</u>
Exports from Distant Water Catch.....	63
Exports from Domestic Catch	63
Fleet Expansion in Relation to Trained Personnel.....	64

LIST OF APPENDICES

LIST OF TABLES

	<u>Page No.</u>
Table 1. Fishing Boats in 1964.....	4
2. Landings and Fishery Products.....	5
3. Volume and Value of Landings, 1963 and 1964.....	6
4. Aquiculture Production, 1963 and 1964	6
5. Volume and Value of Fish Products Cured By Fishermen, 1964.....	9
6. Number of Major Fish Processing Plants, Capacities & Output, 1964.....	9
7. Production Cost of Canned and Frozen Fish.....	10
8. Size and Characteristics of the Fishing Fleet.....	16
9. First Five-Year Plan and Results to Date.....	18
10. Landings of Fish and Other Marine Products 1955-1964.....	19
11. Output of Fishery Products, 1955-1964	20
12. Exports of Fishery Products Volume & Value, 1955-1964.....	22
13. Export of Fishery Products by Country Volume and Value, 1962-1964.....	23
14. Japanese Imports of Main Fish Items by Country, 1961-1964.....	24
15. Derived Domestic Consumption 1955-1964.....	26
16. Comparison of Wholesale Fish Price Index and General Commodity Price Index, 1960-1964.....	28
17. Export Prices of Selected Fishery Products, 1960-1964.....	29

LIST OF TABLES (cont)

	<u>Page No.</u>
Table 18. Fish Prices in Inchon Market, 1964....	30
19. Population Dependent on Fishery Industries, 1960-1964.....	31
20. Fishing Population Classified by Type of Employment, 1960-1964.....	31
21. Classification of Employment in Hunting and Fishing by Hours Worked Per Week, 1964.....	32
22. Government Subsidies or Grants to Fisheries, 1957-1964.....	48
23. Projects During 1967-1971 as Proposed by the Government.....	53

SUMMARY AND RECOMMENDATIONS

1. The present status, trends and development plans for Korea's fishing industry have been examined in this report and some of the major problems surrounding the take-off stage in fishery development have been identified and reviewed. In the course of the discussion certain conclusions were drawn and some remedial action suggested with respect to a number of the problems identified. The purpose of this summary is to integrate these conclusions in order to provide a more orderly basis for the specific recommendations to follow.

2. Fisheries constitute one of Korea's principal outlets for economic development in view of the country's relatively scarce alternative natural resources. Expansion of the fishing industry, because it is labor intensive, offers opportunities for employment not equaled in many sectors of the economy, which could serve to lighten the existing burden of unemployment in the country. Moreover, the export possibilities inherent in increased fishery production appear favorable, and this could serve to strengthen Korea's foreign exchange position and, hence, contribute significantly to the alleviation of another major impediment to economic development in the country.

3. The Korean Government plans to embark on a vast program of fishery modernization and expansion in some of the areas just identified, representing an expenditure of about \$100 million over the next five years. Because Koreans have barely begun to break away from their traditional and fairly primitive fishing status, they naturally lack the experience acquired over the years by more developed fishing nations. Largely for this reason, one can see problems inherent in the relatively speedy development proposed, which could lead to: (1) over-extension in certain fields (e.g., tuna longlining) while neglecting alternative and perhaps more favorable opportunities of investment in other fisheries, (2) the adoption of vessels and equipment unsuited to given areas, (3) the neglect of infrastructure and (4) other basic conditions consistent with an efficient fishery - in short, an improperly oriented and managed development program. Without anticipating the recommendations to follow, Korea might more easily avoid the pitfalls just indicated by seeking more expert advice in charting the course of fishery development.

4. Assuming fish availability and favorable market outlets for fishery products, conditions which admittedly should be subjected to closer scrutiny by competent specialists in the fields to which they apply, certain areas of Korea's fisheries appear favorable to profitable investment. These are:
 - (1) the offshore seining and trawling fisheries, especially in the Yellow Sea, provided vessels of proper design and construction are introduced and training programs developed to give fishermen the fishing skills required;

- (2) the saury fishery on Korea's east coast, to provide bait for the distant water longlining fleet and perhaps a low cost raw material for fish canning;
- (3) shellfish production, especially of oysters, clams and abalone, provided adequate measures are adopted to control water pollution, and
- (4) the distant water fishery, at least in the longer run, when fishermen training programs have been expanded to cope with the requirements for skilled crews imposed by additions to the fleet.

5. Korea has exerted special efforts during the last few years on building up a tuna longlining fleet for operations in distant waters. By the end of 1966 it is anticipated that it will have some 150 tuna vessels afloat, compared with about 20 at the end of 1964; and present plans are to expand still further in this direction.

6. While tuna market prospects are presently favorable, there are reasons to suggest a less accelerated approach to expansion. One is that programs of fishermen training do not as yet meet the demand for trained crews arising from the new additions to the fleet. A second is that tuna longlining catch rates per unit of fishing effort with existing small and medium range vessels have declined noticeably during the past two years on presently exploited Pacific and Atlantic tuna grounds. Thirdly, a considerable number of vessels, because of their recent acquisition, have yet to demonstrate their earning power in the light of these fishing conditions.

7. In view of the present unknowns, therefore, it would appear prudent for Korea to wait for some clearer indication of the economic performance of the existing longlining fleet before committing additional investment in this type of fishing. Meanwhile, the possibility of developing a pole and line tuna fishery, which would be subject to a different set of conditions, might be investigated. If one may judge from the experience of Japan with this type of fishing, this could be an attractive area for at least limited investment at this stage of Korea's fishery development.

8. The status of Korea's small boat, inshore fishery also constitutes a serious challenge to development planners and administrators. As stated at the beginning of this report (Chapter I), this industry is composed of over one million people who participate in the exploitation of coastal fishes and other forms of marine life along the fringes of the shore. Only about 300,000 are considered full-time fishermen, the remainder fishing either for subsistence or to supplement small-scale farming. Fishing is with unmechanized craft (over 42,000, or 87 percent of the entire fishing fleet, with capacities averaging less than 2 tons) and with small, traditional, inefficient units of gear and equipment. Productivity is low - average landings per fisherman being estimated at less than 1,000 lb. per year - and so is the economic status of fishing

villages. The problems associated with elevating the economic position of this fishery are further intensified by the fact that the fishermen are disseminated along the coast in some 1,300 hamlets or villages, while less than 50 locations are considered suitable for development as fishing harbors, that is, suited to the provision of the requisite facilities for modern, efficient fishery pursuits - landing and processing facilities, boat repair, provision of fishing supplies and other requisites.

9. While immense difficulties are attached to the modernization of a fishery of this character, socio-economic and political realities dictate that they be accorded due priority in government plans for fishery development and expansion. It can be presumed, therefore, that largely for this reason Korean Government planners have allocated a significant portion of the funds earmarked for fishery development in the Second Five-Year Plan to small boat construction and mechanization, modernization of fishing methods, improvement of fishing harbors and other approaches to higher productivity and incomes for fishermen.

10. The results to follow from investments of this type are difficult to predict, even if well directed and competently administered. Fortunately, however, many fishing countries have gone through this exercise long ago - some admittedly with greater success than others - leaving a record of experiences from which Korea can draw in the pursuit of its objectives.

Recommendation

11. While a number of factors affecting Korean fisheries have been identified as favorable to development and expansion, there are uncertainties deriving from Korea's limited experience with modern fishery pursuits. In particular, problems associated with the determination of investment priorities, as well as with the actual administration and management of projects, could easily constitute constraints to the achievement of the objectives sought. In the circumstances, it is considered that the degree of success attending fishery investments in the immediate future will be highly dependent upon the speed with which Koreans can acquire the desired technical know-how and, of course, on the assistance they receive to speed up the process.

12. Because of the stated unknowns and of the complexity of fishery situations, it is recommended that consideration be given to a more detailed study of the development opportunities and problems which could be identified during the recent mission to Korea and described in this report. It is considered that the study should be conducted by a group of specialists in the main branches of fisheries, whose terms of reference would give particular emphasis to the following main points:

- (1) Formulate project proposals for the fisheries identified in this report as favorable for investment.
- (2) Define the resource (biological) limits of the fisheries to be developed, if any, and advise on the management policies to be adopted.

- (3) Outline the technical requisites and administrative conditions within which such projects should be circumscribed.

13. In support of the above the study should:

- (1) Examine the structure of fishery administration at national and provincial levels and make recommendations on the organizational changes and/or technical assistance required.
- (2) Examine the mechanism of planning in fisheries - how priorities are established and projects formulated - and report on the need for technical assistance.
- (3) Review the past administrative performance of the Korean Marine Industries Development Corporation (KMIDC) and advise on the need for technical assistance, if any.
- (4) Study the economic performance of deep sea fishing vessels.
- (5) Study the role and effectiveness of fisheries cooperatives in production, marketing and administration of credit. Report on how best these functions might be discharged, indicating the organizational changes which could be required and how technical assistance might be applied. The evaluation of the technical assistance requirements should be made in the context of the Central Federation of Fisheries Cooperatives (CFFC) assuming the administration of planned government expenditures on inshore fisheries during the Second Five-Year Plan.
- (6) Study the mechanism of fish marketing and recommend appropriate measures for improving fish distribution in the country. Designate how technical assistance might best be applied - e.g., through pilot marketing schemes, etc.
- (7) Survey the present status of fishing operations in inshore and offshore fisheries and recommend the types of boats and gear best suited for these fisheries. Designate the type and extent of technical assistance needed for their successful introduction and operation.
- (8) Survey the fish processing industry and report on the effective capacity, the requirements for modernization and the types of processing best suited for future development, including the investment that would be involved.
- (9) Survey the fishing harbors of the country and select the sites best suited for development. Establish the criteria governing the selection made and specify the facilities to be provided for efficient fishery operations.

- (10) Study the curricula of fisheries schools and colleges with reference to fishermen training and the general needs of the fishing industry. Specify whether these needs could be filled through the reorganization of existing facilities for education in the country, or whether additional external technical assistance would be required.

FISHERIES

I. PRESENT STATUS OF KOREAN FISHERIES

A. The Place of Fisheries in the Korean Economy

1. The fishing industry of Korea, including aquiculture in coastal and inland zones, is a source of livelihood for some 1.2 million people (about 4 percent of the country's population), although for less than one-third this number is fishing a main occupation. Auxiliary industries, such as boat building and repairing, engine and gear manufacturing, etc., also provide other employment avenues. While fishery production contributes only about 3 percent to national income, it accounts for over 60 percent of the country's animal food proteins and is responsible for about one-fifth of the nation's foreign exchange earnings. The capital stock invested in the industry is estimated at about \$100 million.

2. In a country like Korea, faced with scarce (alternative) natural resources and a population density among the highest in the world, fisheries occupy a place of special importance in the economy, both now and for the future. Government planners are placing high priority on the development of this industry as a means of alleviating the country's high unemployment level and low per capita income.

3. The outlook for fishery development and expansion has improved considerably of late. This stems largely from: (i) the ratification of the Japanese-Korean normalization treaty in late 1965 whose financial terms call for the allocation by Japan of substantial sums of money for the improvement of Korean fisheries, and (ii) the relatively recent experience of Korean fishermen with distant water fishing which has encouraged increased Korean participation in the exploitation of fishery resources on the high seas.

4. There are, of course, sizable and difficult problems to overcome. One stems from the multiplicity of fishermen engaged in coastal fisheries (see Appendix 1). Of the 1.2 million people identified with fishery activities, over a million catch only coastal species along the fringes of the shore, employing unmechanized craft and small and inefficient units of gear and equipment. A large number is still at the primitive economic stage of subsistence fishing. Less than 300,000 fishermen fish as a main occupation, of which only about half (150,000) are fully employed; the remaining 900,000 or so consist of part-time fishermen who also work at agriculture, as well as family members who participate in one way or another in the utilization of the catch. The problem is further intensified by the fact that coastal fishermen are disseminated along a vast coastline (1,300 fishing hamlets and communities of various sizes), although somewhat less than 50 locations are considered suitable for the development of harbor facilities and other infrastructure basic to modern efficient fishery pursuits.

5. Along with excess numbers (of fishermen) and slight use of efficient capital equipment comes low productivity. While statistics are not sufficiently refined to permit exact measurements in many sectors of the economy, the value added per employed worker in fisheries was calculated at 42,191 won in 1964. This compared with 61,252 won in agriculture and a national average of 81,208 won in the same year.

6. Lastly, it must be stressed that the country as a whole is suffering from the lack of capital, and this is particularly serious in coastal fisheries which are by no means attractive to investment. The lack of knowledge on the part of fishermen respecting the use of modern fishing gear and equipment and the application of new fishing techniques could also discourage would-be investors in both coastal and distant water fisheries. The positive factor in this situation is that there are many fishermen who are anxious to improve their economic position, and are considered ready for training for new, modern fishery operations.

B. The Resources

Near Water Resources - Neighboring Seas

7. The traditional fishing areas of Korea have been in the seas surrounding the Korean Peninsula. These are: The Eastern Sea, whose waters run along most of the Eastern Korean Coast at depths of 100 meters and more, with but a small tidal range; the Southern Sea, or Korean Strait, which is characterized by a deeply indented coastline, sandy-mud shores, many islands and a larger tidal range; and the Western Sea, or Yellow Sea, whose entire bottom is formed by the continental shelf and where tidal differences from ebb to flow range from 5.5 meters (in Jin-Nampo) to 9.7 meters (in the Gulf of Asan and Inchon).

8. The principal marine species fished in the Eastern Sea are:

Squid..... During the summer and fall months
mainly;
Alaska pollack..... During the November-December
months;
Pacific cod..... from December to the end of
March;
Pelagic species..... including yellowtail, Spanish
Mackerel, mackerel, saury pike,
horse mackerel and sardines,
which are caught during the spring
and summer.

9. In the Southern Sea, or Korean Strait, the complex of tidal ranges, water temperatures, salinity and other factors is favorable to shellfish and seaweed production. The varieties found in quantity in the area are: oysters, short-neck clams, hard clams, cockles, abalones,

laver, dulse and kelp fueats. The important fish species caught include mackerel, horse mackerel, Spanish mackerel, anchovy, hairtail, red sea bream, sharks, sea eels, rays, flatfish, sharp-toothed eel, Pacific cod, yellowtail and mullet. Mackerels, hairtail, and yellowtail are mainly caught during the winter months.

10. The Western Sea, or Yellow Sea, especially on the Korean side, is known as the breeding ground for shrimp and many warm current fishes. These species include croakers, yellow corvenia, anchovy, Spanish mackerel, amber fish, horse mackerel, saury pike, red gurnard and rays. It is the general consensus that the resources are under-exploited in view of the relatively inefficient bull trawl and stow net methods of fishing employed.

11. Korean biologists estimate that the total fishable (sustainable) stock of pelagic and demersal species accessible to Korean fishermen in the Yellow Sea is of the order of 1.2 million tons. This is more than twice the present Korean coastal catch in all waters. In addition, the western and southern coasts, because of topography, oceanography, and other basic conditions, are ideally suited to shrimp, oyster, clam and other shellfish culture. In brief, marine resources in the seas surrounding the Korean Peninsula are not considered an impediment to significant fishery expansion (see Appendix 2 for more details on existing resources).

12. These estimates of fishery resources in the Yellow Sea, are of a global nature. A systematic and objective review of the extent and potential of these resources is needed by competent experts in this area of fishery research.

Distant Water Resources

13. Korea has been exploiting distant water fishery resources for but a short time. So far it has concentrated its activities on tuna long-lining around Samoa Island in the Pacific and Monrovia in Africa. Some of the results attained on these grounds have been encouraging, although decreasing returns per unit of fishing effort are beginning to emerge.

14. Available data on tuna stocks are far from complete and still largely imprecise. This is due to the research difficulties surrounding the determination of the size and behavior of the tuna population, (a) because of its wide distribution - broadly between latitudes 30 degrees N - 30 degrees S - and (b) because it is constantly on the move in response to changes in water temperatures, currents, and food supplies. (Tuna are known to migrate for distances of thousands of miles, often by routes that are little known.) The most precise information available concerns the location and extent of the main tuna fishing grounds; but there are still many uncertainties respecting the stocks, distribution, and migration patterns of the species. (See chart of tuna grounds, Appendix 2-L).

15. Without more precise information on the size of the tuna population, its movements and other factors just mentioned, the evaluation of the potential of the tuna resource is heavily dependent upon existing records of tuna catches. These records show that the total world catch of tuna and tuna-like fishes rose by about 31 percent since 1958 - from 1.0 million tons in 1958, to 1.3 million tons in 1964 - although the daily catch rate per vessel declined as the fishing fleet increased. However, according to biological evidence, such decreases per unit of fishing effort (to something less than 2 tons per vessel per fishing day) cannot yet be identified as the result of over-fishing or stock depletion. In the circumstances, and until signs of stock impairment emerge, it would seem that expansion of the tuna fishery, at least on a moderate scale, is justified so long as the cost of fishing and tuna market prospects remain favorable.

C. The Fleet

Size and Characteristics

16. As of the end of 1964, there were 48,749 boats of all types fishing in Korea, with a tonnage of about 167,400 gross tons. Of these, 42,253, or nearly 87 percent (tonnage 80,908), were non-powered wooden craft, leaving 6,453 vessels or 13 percent mechanized. There were only 62 vessels of steel construction. About 92 percent of all boats were less than 10 tons and the average tonnage for the fleet was 3.43 tons - 13.78 tons for powered boats and 1.91 tons for the non-powered. (Appendix 3-A).

Table 1: FISHING BOATS IN 1964

	<u>Number</u>	<u>Tonnage</u>	<u>Horse Power</u>
Powered, steel	62	7,826	15,761
Powered, wooden	6,401	78,688	173,942
Non-powered, wooden	<u>42,286</u>	<u>80,909</u>	<u>--</u>
Total	48,749	167,423	189,703

17. As of the end of October 1965, 29 steel longliners had been added to the fleet, for a total of 47 and, by the end of the year, an additional 25 were scheduled to come into operation. This means that in the course of 1965, the capacity of the deep sea fleet was expected to increase by some 10,000 tons, or about 128 percent.

Capital Investment

18. Because of the large proportion of small, wooden, non-powered craft in the fishing fleet, the capital invested in boats and vessels is lower than one would expect. This is shown in Appendix 3-C, and summarized by the following table, which gives the estimated current market value of all fishing craft, classified as in Table 1.

Table 2: ESTIMATED CURRENT MARKET VALUE OF FISHING BOATS, 1964

Wooden, non-powered boats	\$12,328,000
Wooden, powered boats	15,069,000
Steel, powered boats	<u>3,250,000</u>
Total	\$30,647,000

D. Landings and Fishery Products

19. Total landings of fish and other marine products in 1964 amounted to 597,219 tons for a value of 13,538 million won, ^{1/} or about US \$53 million (Appendix 4-A and 4-B). This represented an increase of about 12 percent in volume and 65 percent in value over the previous year, as shown in Table 3. The large increase in value is associated with the general increase in prices during 1964 (see Chapter II, paragraph 82).

20. About one-third (419,248) of the 1.2 million people associated with the primary fishing industry in Korea are fishery farmers. Their contribution to production in 1963 and 1964, was incorporated with the results of marine fishery exploitation given in Table 3, but is shown separately in Table 4 to place the status of this so-called aquiculture industry in fuller perspective.

^{1/} According to National Accounts Statistics, the value added by fisheries in 1964 was 7.51 billion won. This represents only 55 percent of gross sales, which seems to indicate that the value of fish landings contained in Fisheries Statistics, 1964, is somewhat overstated.

Table 3: VOLUME AND VALUE OF LANDINGS, 1963 AND 1964

Item	1963		1964		Percentage increase	
	Volume	Value	Volume	Value	Volume	Value
					Volume = M/T Value = Million won	
Fish	252,324	4,931	320,684	8,668	27.1	75.8
Shellfish	82,559	474	99,181	1,086	20.1	129.1
Seaweed	57,523	1,171	61,714	2,217	7.2	199.3
Other	<u>139,399</u>	<u>1,554</u>	<u>115,640</u>	<u>1,617</u>	- 17.0	<u>4.0</u>
Total	531,805	8,130	597,219	13,588	12.3	66.5

Source: Fisheries Statistics, Bureau of Fisheries, Ministry of Agriculture, ROK

21. It can be observed in Table 4 that total output declined by nearly 15 percent from 1963 to 1964, which was accounted for entirely by the reduction in oyster and laver production. The reason has been ascribed to the inadequacy of market outlets but, in the case of oysters, there is also a serious problem of water pollution which affects extensive areas of the coast.

Table 4: AQUICULTURE PRODUCTION, 1963 and 1964

Item	(metric tons)		
	1963 Volume	1964 Volume	% Change
Fish	39	39	0.0
Oysters	53,337	32,419	- 39.22
Clams	6,400	9,018	40.90
Dulse	1,624	5,023	209.29
Laver	16,783	11,081	- 33.98
Agar-agar	1,103	1,662	50.67
Other	<u>6,038</u>	<u>13,682</u>	<u>126.59</u>
Total	85,324	72,924	- 14.54

Source: Fisheries Statistics, Bureau of Fisheries, Ministry of Agriculture, ROK.

22. It is also pertinent to remark that aquiculture, which accounts for about 14 percent of total fishery production, is still highly undeveloped in Korea. There are over 1,862 million square meters of exploitable tidal flats along the coast but only about 156 million are cultivated. Moreover, fish culture in inland waters is just beginning. As shown in Table 4, only 39 tons of fish (carp and mullet) were produced in fresh and brackish waters in each of the years 1963 and 1964. Considering that Korea has 15 important rivers flowing over distances exceeding 6,600 km., as well as unused bodies of water totaling some 555,000 hectares which could be utilized for fish culture, it is obvious that modest efforts have been directed in this branch of fishery production.

23. The Government is now centering considerable attention on exploiting the possibilities of fish and marine life culture more fully both in inland and coastal regions. Expenditures for this purpose amounting to approximately 2,750 million won have been provisionally included in the budget of the Second Five Year Plan.

E. Fish Handling and Processing

Fish Handling

24. There are some 1,300 locations along the Korean coast where fish is caught and landed. Most of these are centers of subsistence fishing which make little or no contribution to commercial trade. All fish entering commercial channels for domestic consumption is sold on consignment, through public auction, in accordance with the prevailing Marine Resources Protection Decree. Altogether there are 163 such consignment sale markets in the country, through which about 60 percent of all fish landings are sold, the balance being consumed by fishermen or exported. Fish destined for export is exempt from these conditions of sale, it being Government inspected either at the point of landing, on the seller's premises or at some central collection point, then shipped at designated ports.

25. The mechanism of fresh fish handling differs little from what one encounters in most developing countries. In general, fish is landed in the state or form caught, brought to market in boxes, baskets or bags, displayed in lots or piles on the ground or market floor, and sold to the highest bidder. It then moves on to the consumer, either through retail outlets or door to door distribution, in the same round state, i.e., without evisceration or cleaning. Very little ice is used because of its price (often exceeding \$10 per ton in summer), and refrigerated transport and storage are often inadequate to preserve the quality of fish during long hauls or over a long marketing period. Except for the Pusan Fish Market, which is later discussed, refrigerated storage facilities barely exceed the requirements of the frozen fish trade, and since they are for the most part owned by processors who produce for export, little benefit accrues to the fresh fish consuming community. In consequence,

the quality of fresh or unprocessed fish is often poor outside the immediate points of landing, and waste occurs due to deterioration.

26. Two factors greatly accentuate the problem of fish spoilage or quality deterioration. One is that the small boat Korean fisherman, not unlike his counterpart in many countries, has not yet come to look upon fish as a delicate item of food. In general, one can say that fish caught by small boat fishermen receives pretty poor treatment from the moment it is caught to the time the consumer takes delivery of it. At sea when it is captured, it is frequently thrown (not too gently) in the bottom of the boat and left to a slow death; upon reaching land it is again man-handled from boat to shore; and from there it goes to market where it is left to lie unprotected, often to be tramped upon, until a sale is consummated. The consequences of such bruising and general lack of care for the quality of a highly perishable food item needs no emphasis. The other factor which greatly contributes to quality deterioration is that fish is sold in its whole or round state, for without refrigeration fish with entrails in spoils very rapidly. Unfortunately, the more sophisticated methods of handling fish, such as bleeding immediately after capture, splitting, gutting, filleting, parcelling in portions, etc. -- indeed giving fish the treatment it deserves as a food item -- are still to gain acceptance in Korea.

27. The initial handling of fish destined for processing in general differs only in degree, if at all, from the account just given. There is of course one notable exception, i.e., the shrimp and fish (mainly caught by trawlers) sold to freezing plants for export, where the use of ice and refrigeration and more careful handling are reasonably in keeping with quality maintenance. But fish which is salted, brined, dried or otherwise processed has often begun to spoil before processing begins, leading inevitably to a poor or inferior end product.

28. Without laboring the discussion further at this stage, it can be concluded that the present status of the fishing industry, especially with reference to the economic utilization of fishery resources and the problems associated with distribution and marketing, suffers greatly from the lack of proper fish handling techniques and effective measures of quality control.

Fish Processing

29. The fish processing industry of Korea falls in two divisions: (1) processing by fishermen and their families, and (2) mechanical processing in industrial plants.

30. Fish processing by fishermen and their families consists in the application of the traditional cures of salting, pickling and drying. In 1964 the volume of this production accounted for nearly 50 percent of all processed fishery products, and utilized over 90,000 tons of raw fish. About 95 percent was consumed domestically. It is a primitive industry, but it still constitutes an important source of protein food for many inhabitants of inland areas who are beyond the reach (both physical and economic) of fresh fish and other forms of proteins (Appendix 4-C).

31. The contribution of this division of the fish processing industry to food supplies in 1964 is given by the following table:

Table 5: VOLUME AND VALUE OF FISH PRODUCTS CURED BY FISHERMEN, 1964

	<u>Volume</u>	<u>Value</u>
		Volume = M/T Value = 1000 won
Dried fish	17,619	1,066,035
Salt-dried	919	64,017
Salt-cured	8,295	218,984
Salted (light)	2,803	318,663
Boiled-dried	<u>2,242</u>	<u>172,359</u>
Total	31,878	1,840,058

Source: Fisheries Statistics, Bureau of Fisheries, Ministry of Agriculture, ROK

32. Processing in fish plants has four main branches: freezing, canning, agar-agar refining and fish meal and oil reduction. Of these, fish freezing, mainly shrimp, has become by far the most important, accounting for nearly 30 percent of the volume and 40 percent of the value of the production of all plants in 1964.

33. The present status of this industry can be summarily presented in terms of number of plants in existence, processing capacity and outputs in 1964, as follows:

Table 6: NUMBER OF MAJOR FISH PROCESSING PLANTS, CAPACITIES & OUTPUT, 1964

<u>Item Processed</u>	<u>No. of Plants</u>	<u>Refrigeration</u>	<u>Freezing</u>	<u>Ice ¹ Making</u>	<u>Production Capacity</u>	<u>Output in 1964</u>
Canned fish	48	--	--	--	3,026,000 cases	192,278 cases
Frozen fish	55	17,000 M/T	571 M/T daily	1,600 M/T daily	102,780 M/T	18,439 M/T
Fish meal	3	--	--	--	5,400 M/T	472 M/T
Fish oil	--	--	--	--	3,000 M/T	620 M/T
Agar-agar	40	--	--	--	1,200 M/T	580 M/T

¹ There are about 50 additional small ice plants in operation in the country, owned privately or by co-operatives, which bring the total ice making capacity to about 2,500 tons per day.

34. The apparent conclusion emerging from this table is that there is considerable unused capacity in the industry, except for refrigeration, freezing and ice making. Output of canned products in 1964 was only 6.5 percent of capacity, frozen fish 18 percent, fish meal 19 percent, fish oil 20 percent and agar-agar 48 percent. In large measure this resulted from the lack of foreign markets, although the decline in canned fish production is also partly ascribable to the decrease in consumption by military forces in the country.

35. There is, however, one important aspect not revealed by the statistics which should be recognized in evaluating the apparent unused capacity in fish processing. This is the degree of obsolescence which prevails in the industry. Many plants, more especially the canneries, which were built by Japan during the thirties, 1/ have now antiquated equipment, are poorly maintained and in need of much repair. Certainly the registered capacities in canning and freezing could never be fully utilized even if serious efforts were made to do so. Although this is a difficult matter to quantify, it is considered doubtful that more than 50 percent of capacity could ever be reached with existing equipment.

36. Despite the observations just made, it is encouraging to examine the cost patterns which are reported to prevail in certain segments of the industry. Data on processing costs obtained from private sources admittedly often lack in accuracy; and the cost figures which are shown in Table 7 could have the same pitfalls. However, they are samples obtained from Government sources, and were published by the Fish Inspection Section of the Ministry of Agriculture of Korea.

Table 7: PRODUCTION COST OF CANNED AND FROZEN FISH

<u>Product</u>	<u>Unit</u>	<u>Factory cost</u>
Canned shrimp	4- $\frac{1}{2}$ oz. tin	US \$ 0.27
Canned crab meat	$\frac{1}{2}$ lb. tin	0.36
Canned Saury Pike (in oil)	1 lb. tin	0.13
Frozen crab meat	1 lb. tin	0.34
Frozen shrimp	1 lb. tin	0.23
Frozen cooked mussel	1 lb. tin	0.38
Frozen squid	1 lb. tin	0.10

1/ This was principally to supply Japanese Manchurian armies.

37. If such figures can be taken to reflect the approximate production costs of the seven products listed, it suggests that Korean plants, once modernized and operated at increased volumes, could have a considerable comparative advantage in canning and freezing. For one thing, labor costs are certainly favorable, being 25-35¢ per day 1/ (see Appendix 5). Of course, taxes, tariffs, transport costs, and other major factors would also have to be favorable, (and this would need to be investigated fully) before Korea could be assured a substantial share of the market for such products, which is mainly international. Unfortunately, no comparative production cost data in other countries could be obtained for inclusion in this report.

F. Market Organization

Consignment Selling

38. The prevailing mechanism for fish marketing at the fisherman level in Korea had its roots in the Fishery Guilds established by Japan as early as 1929, during the Japanese occupation of the country. Altogether, 168 guilds were organized in local fishing communities to which fishermen were compelled to belong, as well as to deliver their catches on consignment for sale by public auction. The functions of these guilds also extended to providing fishermen with fishing supplies, arranging for financial assistance and, in some cases, marketing the catch directly.

39. In general, this system is still in operation in Korea, the main exception being that the guild has been displaced by the co-operative. Instead of 168 guilds there are now 163 co-operatives in the country, through which all fish entering domestic commercial channels must be sold. The co-operative in turn acts as consignment agent for the fisherman, and sells the fish received to middlemen by auction. The commission charged for the service rendered is 5-7 percent of the value of the fish sold. About 60 percent of all landings is marketed in this fashion, the balance of the catch being either consumed by fishermen and their families or exported.

40. The largest and most modern consignment market is the Pusan Fisheries Market Center. It was built with the aid of USOM at a total cost of \$1.4 million and began operation in 1963. In 1964, it handled nearly 59,000 tons of fish valued at 1.5 billion won.

1/ Comparative data on earnings per hour in the food processing industry are:

	(US \$)
Korea08
Taiwan17
Japan38

41. The Pusan Market covers an area of 13,735 sq. meters of which 9,908 sq. meters are occupied by the building, and 3,940 sq. meters by the sale yard or market floor. The facilities include:

	<u>Sq. meters</u>	<u>Ton capacity</u>
Freezing room	99	22
Cold storage	495	600
Ice freezing room	79	40
Ice storage room	310	550
General storage	254	300
Salt tank	498	560
Landing pier	276	
3 oil tanks		
2 warehouses		

42. Auctions are normally held daily in all wholesale or consignment markets, and catches are sold to the highest bidder. The buyers are middlemen or brokers who are authorized by the co-operative to buy at the auction market. They represent themselves, but usually have a working arrangement with other middlemen or distributors in the main consuming centers. The role such brokers play in the fish marketing operations of the Seoul City Fishery Market, which is fairly typical of the main marketing outlets in Korea, may serve by illustration to depict, in brief, the intrinsic pattern of fish marketing in the country.

43. The Seoul City Fishery Market was established in 1938 and incorporated under the provisions of the Central Wholesale Market Act. The Act authorized the formation of marketing companies to deal in fish, fruits and vegetables in any city of more than 50,000 people, and the Market received exclusive rights for the wholesale handling of fishery products in the city of Seoul. The Act was revised in 1951 but no substantial changes in its provisions were made.

44. Beginning then in 1938, the Seoul City Fishery Market appointed brokers to act as its representatives and buy fish from the fishery guilds (later fishery cooperatives) at fishing ports. The brokers also obtained authority from the guilds or cooperatives to participate at auction sales and act as the latter's sales agents. In return for the privilege of participating in auctions, brokers supplied the guild or cooperative with the funds to pay fishermen for their fish, and for the service they performed as sales agents they received a commission of 5 percent based on the value of the fish they purchased. Once purchased, the fish was consigned to the Seoul Market for sale once more by auction to the highest bidder, and the broker or middleman merchant paid the Market a 5-6 percent fee for the service it performed. (In such cases, where the broker performs the function of a middleman

merchant, he of course sets an irreducible minimum price at which bidding at the auction must begin.) Upon termination of the auction in the Seoul Market, middlemen purchasers would then dispose of their fish to sellers in the Market (stalls) or in isolated shops, or to door-to-door peddlers in the city.

45. From this account it follows that the broker, acting as middleman merchant, is the key figure in the entire marketing chain, assuming the major risks and reaping the maximum possible gain. Obviously, such a system easily lends itself to unscrupulous marketing manipulations capable of serious consequences for the primary producer. Actual cases of price spreads from fisherman to consumer ranging from 100 to 250 percent have been recorded, confirming the dangers inherent in the existing marketing structure. On the other hand, it must be recognized that the consignment market with its broker-middleman chain is an institution which performs a valuable service for fishermen, in the sense that it permits central selling, and gives the individual operator, however small, a ready outlet for his catch, as well as allowing for cash settlement with little delay. Without such marketing facilities, many small scale fishermen would likely find frequent obstacles to the disposal of their catch.

46. What seems to be indicated in the present circumstances is the imposition of controls to curb unfair trading practices - to break down the prevailing monopolistic and inflexible channels of trade, and, thereby, lead to a freer distribution of fish in response to demand forces permitting, at the same time, a narrowing of the gap between fishermen and consumer prices.

Domestic Distribution

47. The distribution of fish in Korea is orientated toward the larger urban centers, especially toward Seoul, the capital and largest city. Outside of Seoul, some of the principal inland consuming centers where fish is distributed are: Chinju, Kwangju, Chonju, Taegu, Kyonju, Kimchon, Andong, Taechon, Chongju, Chungju, Chonan, Suwon, Wonju and Chunchon. Transport is principally by rail, because the conditions of the roads and the costs involved render truck transport almost prohibitive. The cost by rail in unrefrigerated cars (used exclusively until 1965) is 54 won per ton for 50 km., while the cost by truck is about twice that in most areas.

48. For the most part, fish is sold in public markets, there being few fish shops and relatively little door-to-door peddling in Korea. Unfortunately, like in many public markets elsewhere, there are no facilities for the proper washing and cleaning of fish, neither for storage and preservation from one day to the next, nor for the disposal of waste and offal. As a consequence the consumer frequently encounters poor quality fish in the market, and much waste occurs due to deterioration. Even cured fish, such as dried and salted products, are often offensive to the delicate palate both because of the consequences of unrefrigerated transport from coastal centers of production and the lack of adequate storage in the market itself.

49. Because of these inadequate facilities for fish marketing in the markets now served, especially the lack of storage to maintain fish quality over long marketing periods, fish tends to move along fixed trade channels (where middlemen are well established) in quantities which the market can reasonably quickly absorb. This impedes the flow of fish in outlying areas where demand is strong or could be developed. Furthermore, this marketing practice encourages the maintenance of scarce rather than abundant supplies in the market, often resulting in high prices, artificially created, which are inconsistent with available supplies at fishing ports. To put it another way, the marketing practices just described which obstruct the free interplay of demand and supply forces are a direct outgrowth of the market organization itself and of the institutional framework which allows them to develop.

50. The extent to which fish marketing conditions can be improved in Korea will depend primarily on two things. The first is the provision of adequate facilities in public markets or other marketing centers - by now amply recognized - for washing, cleaning and storing fish, so as to preserve the product's appearance and quality. This means changing the entire approach to fish handling and might be most easily introduced by building new counters or "stalls" in public markets, equipped individually with running water, outlets for waste disposal, ice, and adequate space for proper display of the article to be sold. In addition, refrigerated storage should be provided in order to enable fish to be kept from one marketing period to another without spoilage. The second basic requirement of the market is the establishment of an efficient wholesaling system to render the services one sees performed in well-developed business communities. In brief, this implies a chain of wholesalers equipped with facilities for bulk storage and transportation, with well-developed contacts and communication with all markets and, therefore, in full knowledge of demand and supply conditions and of price movements in the markets served. With such facilities and knowledge of the market the wholesaler stands ready to move supplies at a moment's notice in response to demand and price changes and, by so doing, gives the economic community the distribution service prescribed by market forces.

Foreign Marketing

51. Korea's principal foreign markets for fishery products are Japan, Hong Kong, North America and the Republic of China. The remaining export outlets are chiefly in Europe and South East Asia. Japan is by far the most important market. In 1964 total exports were 38,782 metric tons (valued at US \$23.7 million), of which Japan absorbed about 63.5 percent (67.8 percent of exported values). This market is also expected to expand as a consequence of the recent Korean-Japanese Peace Pact and the normalization of Trade relations which it invokes.

52. There are five main export associations in Korea which, to date, have taken the major lead in export promotion. These are: Agar-agar Export Association, Cuttle Fish Export Association, Fresh Fish Export Association, Frozen Marine Products Export Association and Laver Export Association.

53. So far, the Government has been relatively inactive in promoting sales of fishery products abroad, at least in the sense that no organized agency or service has been set up for this purpose. It is felt that more attention should be focused in this direction, especially in the light of the expansion in exports planned for the period 1966-1971.

II. TRENDS IN FISHERIES

54. Certain trends in some areas of Korean fisheries are encouraging for the future expansion of the industry. This is especially to be noted from the efforts being made to modernize the fishing fleet, improve fishery facilities and increase production and exports.

A. Fleet Modernization

55. Trends have been in two main directions: (1) the construction of small boats for coastal fisheries and (2) the acquisition of larger mechanized vessels for offshore and distant water fishing.

Table 8: SIZE AND CHARACTERISTICS OF THE FISHING FLEET

<u>Year</u>	<u>Non-powered boats</u>		<u>Powered boats</u>		<u>H.P.</u>	<u>Total</u>		<u>Average ton per boat</u>
	<u>Number</u>	<u>Tonnage</u>	<u>Number</u>	<u>Tonnage</u>		<u>Number</u>	<u>Tonnage</u>	
1955	35,378	73,233	4,141	52,348	103,113	39,519	125,581	3.18
1959	24,913	48,365	3,978	52,216	118,197	28,891	100,581	3.48
1964	42,253	80,909	6,463	86,514	189,702	48,716	167,423	3.44

Source: Fisheries Statistics, Bureau of Fisheries, Ministry of Agriculture, ROK

56. As can be seen from Table 8, the number of non-powered boats increased by 17,340 from 1959 to 1964, augmenting the tonnage of the fleet by 32,544 tons. Powered boats increased by 2,485 in number and augmented the tonnage and horsepower of the fleet by 34,298 and 71,505 respectively during the same period. The overall increases were, therefore, 19,825 boats, 66,842 tons and 71,505 H.P.

57. In absolute terms, the changes in the size and power of the fleet which took place after 1959 must be considered a significant achievement. The United States contributed greatly to this development through financial assistance to help restore the fleet following the typhoon damages of 1959. However, the overall trend of development showed little departure from the patterns of the past, in the sense that no notable changes occurred in the composition of the fleet: average tonnage per boat, for example, was 3.48 in 1959 and 3.44 in 1964 - it was 3.18 in 1955 - and the ratio of powered to non-powered craft also remained about the same. Similarly, changes in fishing efficiency, if measured by catch-gross ton relationships, were far from encouraging - 2.0 to 1

in 1955, 3.8 to 1 in 1959 and 3.4 to 1 in 1964. Relatively, therefore, the gains in mechanization, vessel seaworthiness and power were quite modest; and a change of emphasis seems clearly indicated if greater modernization and efficiency in fishery exploitation are to be achieved.

58. There is one significant development not fully reflected in the analysis just made, and in keeping with the needed new approach to fleet modernization, to which attention must be drawn. This is the recent acquisition and planned construction of vessels suited for distant water fishing. The vessels in question are longliners and trawlers of upwards of 100 tons.

59. Experimentation in distant water fishing by Koreans only dates back to 1957. In 1958, one vessel, a longliner, was operated commercially and, by the end of 1964, there were 18. However, the real expansion only began in 1963 when (a) private Korean fishing companies obtained credit from foreign fish buyers and processors in the Pacific to acquire new vessels and (b) the Korean Government secured a Franco-Italian loan for \$35 million to purchase 91 vessels (76 longliners and 14 trawlers) for delivery in 1965 and 1966. Altogether, 52 new vessels were expected to enter the fishery by the end of 1965 for a total deep sea fleet of 70 vessels. Programed expansion in 1966 is for 70 additional vessels. In all, the investment in longliners and trawlers by the Government and private interests lies between US \$40 and 50 million.

B. Other Fishery Improvements

60. In addition to fleet expansion, the Korean Government implemented a program of general fishery improvement beginning with its first Five Year Plan of Economic Development in 1962 (see Appendix 8). The main targets set and achievements realized are set forth in Table 9.

C. Production, Exports and Domestic Consumption

61. Fishery production and exports have been on the increase in Korea for the past 10 years, although the most notable advances were made after 1960, and more particularly from 1962 onwards, when the Government's First Five Year Plan of Economic Development was put in action. By the end of 1964 production had reached almost 600,000 tons, more than twice the catch level of 1955, and exports were nearly eight times the volume exported 10 years back. The foreign exchange derived from the 1964 exports of fishery products was about US \$24 million, representing 19 percent of all export earnings.

Table 9: FIRST FIVE-YEAR PLAN AND RESULTS TO DATE

	(Unit)	1 9 6 2		1 9 6 3		1 9 6 4		1 9 6 5		Cumulative, 1962-1965		
		Plan	Result	Plan	Result	Plan	Result	Plan	Result*	Plan	Result	Result as % of Plan
Diesel engine installation	(H.P.)	1,840	2,130	-	-	1,658	792	2,000	992	5,498	3,914	71.2
Fish collection lamps	(units)	200	200	200	200	200	200	-	-	600	600	100.0
Fish finders	(units)	100	106	-	-	-	-	-	-	100	106	106.0
Radio stations	(units)	-	-	6	6	-	-	3	3	9	9	100.0
Wireless apparatus	(units)	50	48	-	-	-	-	-	-	50	48	96.0
Fish net replacement	(sets)	2,175	2,265	527	555	680	676	-	-	3,382	6,878	203.4
Fishery technical training	(per- sons)	400	819	-	-	-	-	-	-	400	819	204.8
Fish markets		2	2	3	2	22	22	2	2	29	28	96.6
Processing facility (salting stages, storage, etc.)		35	34	12	11	16	16	18	18	81	79	97.5
Breakwaters	(m)	1,610	1,610	1,330	1,330	1,600	1,953	2,112	2,112	6,652	7,005	105.3
Tidal flat development (oysters, clams, etc.)	thousand (m ²)	351	421	437	437	3,228	3,227	1,845	1,845	5,861	5,930	101.2
Operational fund for coop. development	(m ^{won})	148	145	69	69	57	57	8	8	282	279	98.9

Source: Bureau of Fisheries, Ministry of Agriculture and Forestry, ROK.

* To November 30, 1965

Fishery Production (Landings)

62. Fishery production is derived from two separate activities; (1) from the exploitation of marine species, and (2) from fish farming or aquiculture. The trends during the past 10 years in each sphere of activity are shown by the following series:

Table 10: LANDINGS OF FISH AND OTHER MARINE PRODUCTS 1955-1964

(in metric tons)

<u>Year</u>	<u>Marine Fishery</u>	<u>Aquiculture</u>	<u>Total</u>
1955	259,234	6,661	265,895
1956	340,916	5,654	346,570
1957	403,157	6,153	409,310
1958	395,193	8,114	403,307
1959	382,126	9,935	392,061
1960	342,471	14,663	357,134
1961	412,452	12,067	424,519
1962	451,384	18,146	469,530
1963	446,481	85,324	531,805
1964	524,295	72,924	597,219

Sources: Fisheries Statistics, Fisheries Bureau: Korea
Economics Statistics Yearbook, Bank of Korea

63. While the trend of total production during the years 1955-1964 is a continually rising one, the results of marine fishery exploitation, taken in isolation, were less positive and, in fact, subject to certain reverses during the first half of the period. From 1955 to the end of 1957, production increased by over 50 percent, largely as a consequence of more intensive fishing activity following the war and the general normalization of economic conditions in the country. This was followed by a slight decline in catch in 1958 (of about 2 percent), which was attributed to seasonal factors affecting fish availability. Then, in 1959, the east coast of Korea was hit by a typhoon which damaged and/or destroyed thousands of boats and units of fishing gear. As a result, the catch dropped to a low of 342,471 tons in 1960, or about 15 percent below the 1958 production. But the fleet was fairly quickly restored (with external financial assistance), and production surged ahead in 1961 and continued on its upward trend to the end of the period.

64. The last three years of the period, 1962-1964, of course reflect the efforts of the Government to increase production in accordance with the objectives of the First Five Year Plan. Marine landings of 524,295 tons in 1964, especially - the highest on record - are ascribable to the results of fisheries improvements introduced during the life of this plan.

65. The increases registered in aquiculture, while notable percentage-wise, are less significant in absolute terms and are still considered far short of the achievements attainable in this branch of the fishing industry. However, the imposing rising trend which the statistics portray are indicative of special efforts made to develop oyster culture on the west and south coasts of Korea, especially since 1962. In 1963, for example, oyster production amounted to 53,337 tons, or 62 percent of all aquiculture products (85,324 tons). In 1964, the corresponding figures were 32,419 tons and 44 percent, and total aquiculture production fell to 72,924 tons. This is mainly attributable to water pollution in many oyster rearing areas, which, because of the unfavorable consequences for international marketing, will likely constitute a short-term obstacle to increased production.

Output of Products

66. Changing patterns of production in fish catching and farming during the years 1955-1964 were also accompanied by changes in fish processing. These mainly affected the composition of products, especially the relative importance of some of the traditional, processed items with the emergence of new products. The general output trend was slightly downward, as observable from the following table, reflecting (a) changing patterns of domestic consumption, especially a growing preference for fresh fish, and (b) the rise and change in composition of exports.

Table 11: OUTPUT OF FISHERY PRODUCTS, 1955-1964

<u>Year</u>	(in metric tons)						<u>Total</u>
	<u>Dried</u>	<u>Salted</u>	<u>1</u> <u>Cooked</u>	<u>Canned</u>	<u>2</u> <u>Frozen</u>	<u>3</u> <u>Other</u>	
1955	13,598	19,207	-	9,104	-	5,921	41,909
1956	19,336	30,212	-	8,645	-	6,685	64,378
1957	24,015	33,478	-	8,357	-	6,665	72,515
1958	23,643	27,109	-	8,826	-	5,478	65,056
1959	24,472	28,468	-	10,330	-	6,121	69,391
1960	12,611	15,417	13,542	8,613	-	6,446	56,629
1961	20,907	23,030	9,580	6,716	53	9,149	69,435
1962	20,252	16,804	7,594	1,236	163	11,483	57,532
1963	24,495	13,580	4,735	2,207	3,590	11,481	60,288
1964	18,538	11,111	2,240	4,741	18,935	9,774	65,339

1 From 1955 to 1959 this item is included with the category "other".

2 It is known that some fish was frozen prior to 1960, at least for local use, although the quantities involved are not shown in the official series.

3 Includes agar-agar, laver and other seaweeds.

Source: Economic Statistics Yearbook, Bank of Korea.
Fisheries Statistics, Bureau of Fisheries, Korea.

67. The most striking aspect of this production pattern is the sudden introduction of frozen fish in 1961, when 53 tons were produced, and its emergence as the most important fishery item processed in 1964. The other main features of the statistics is the decreasing importance of cooked, canned and salted products. In the case of cooked fish, production declined steadily from 13,542 tons in 1960 to only 2,240 tons in 1964, which seems to indicate a rapidly diminishing demand for the product. Much the same conclusion would seem applicable to salted fish, since production declined steadily from 23,030 tons in 1961 to 11,111 tons or less than half in 1964. As far as canned fish production is concerned, the decreasing trend is probably not so conclusive since: (1) the drop in output to a low of 1,236 tons in 1962 was mainly the result of a diminishing outlet for the product in Korea due to the decrease in the procurement of canned fish for the Korean army; (2) a slight recovery in production was achieved by the end of 1964 (production of 4,741 tons), as emphasis was diverted from the traditional pelagic species of anchovy and saury pike to shrimp and other crustaceans; and (3) the world demand for canned fish appears sufficiently strong to be able to absorb a much higher Korean production so long, of course, as the production cost structure in Korea and sales promotion abroad prove favorable to international bidding.

68. At the same time, it should be stressed that the trend toward increased production of frozen fish in Korea is quite significant and that the dominant position occupied by this product is likely to continue. The frozen fish industry is still in its virgin phase, and present Government plans to improve fishery facilities and expand fishery production are expected to contribute to its growth and expansion.

Exports

69. While the trend in output of fishery products was inclined downward during the 10-year period examined, the volume of exports rose continuously to absorb an increasing share of domestic production and of total Korean exports.

70. Except for the year 1959 when exports of dried fish fell by about one-third from the previous year (from 4,493 tons to 1,530 tons), exports of all main product categories exhibited a striking growth pattern throughout the years 1955-1964. The reversal of the pattern in 1959 is explained by the decline in production of dried squid occasioned by the typhoon which, as previously mentioned, inflicted severe damages on Korea's east coast; and this is the country's major squid producing area.

71. The increases in physical terms were nearly eightfold during the period, from 5,065 tons in 1955 to 38,782 tons in 1964, while US dollar receipts rose about 25 times, from \$996 thousand to \$23.7 million. The relatively faster growth in value was brought about (a) by changes in the composition of exports, largely in favor of fresh and frozen fish and (b) by price advances, especially of laver and certain categories of dried fish (see Table 18). The contribution to total exports of

Table 12: EXPORTS OF FISHERY PRODUCTS VOLUME & VALUE, 1955-1964

Volume = metric tons
Value = '000 US \$

Year	Fresh & Frozen		D r i e d		C a n n e d		O t h e r /1		Total		Exports of Fish as all goods Value	Fish as % of Total Exports
	Volume	Value	Volume	Value	Volume	Value	Volume	Value	Volume	Value/2		
1955	826	64	561	106	-	-	3,678	826	5,067	996	17,966	5.5
1956	3,106	205	537	111	-	-	2,646	755	6,298	1,071	24,595	4.4
1957	3,331	713	2,859	1,483	-	-	3,047	1,240	9,237	3,436	22,202	15.5
1958	2,643	786	4,493	1,490	15	15	3,883	1,379	11,036	3,670	16,451	22.3
1959	2,449	729	1,530	609	22	17	3,614	2,798	7,615	4,153	19,812	21.0
1960	5,518	1,670	3,670	1,188	29	30	5,791	6,107	15,008	8,995	32,827	27.4
1961	4,745	1,769	7,419	2,913	67	68	4,730	2,566	16,961	7,316	40,878	17.9
1962	12,132	5,708	6,620	2,666	545	272	5,587	3,695	24,884	12,341	54,813	22.5
1963	13,663	5,952	5,870	2,396	355	372	6,778	4,867	26,666	13,587	86,802	15.7
1964	16,969	8,293	11,040	5,274	3,132	826	7,641	9,272	38,782	23,665	119,056	19.9

/1 Agar-agar, laver, other seaweeds and a variety of shellfish.

/2 Value of fish exports published in the Economic Statistics Yearbook of the Bank of Korea are somewhat lower than the series used here. The figure for 1964, e.g., is \$21.5 million.

Source: Bureau of Fisheries, Ministry of Agriculture & Forestry, ROK Government.

Table 13: EXPORT OF FISHERY PRODUCTS BY COUNTRY
VOLUME AND VALUE, 1962-1964

Volume - Metric tons
Value - '000 US\$

	1 9 6 2				1 9 6 3				1 9 6 4			
	Vol.	%	Value	%	Vol.	%	Value	%	Vol.	%	Value	%
Japan	17,045	68.50	7,202	58.35	16,759	62.85	8,092	59.10	24,641	63.54	16,043	67.79
Hong Kong	3,699	14.86	1,826	14.79	4,049	15.18	2,275	16.62	4,939	12.74	2,758	11.65
America	1,760	7.07	1,646	13.34	3,734	14.00	1,775	12.96	2,080	5.36	1,410	5.96
Rep. of China	367	1.47	155	1.26	477	1.79	298	2.18	1,996	5.15	848	3.58
Other countries	2,013	8.09	1,514	12.27	1,647	6.18	1,251	9.14	5,156	13.29	2,607	11.02
Total	24,884		12,343		26,666		13,691		38,782		23,666	

Source: Korea Statistical Yearbook, Economic Planning Board, ROK.

fresh and frozen and canned fish is particularly noteworthy from 1962 onwards, and especially in 1964, as it reflects the Government's efforts to develop these sectors of the fishing industry and, thereby, obtain a greater share of the world market for these preferred products.

72. Traditionally, Japan and Hong Kong have been the main export outlets for Korea's fishery products. As can be observed from the following table for the years 1962-1964, Japan still retains its dominant position, but a smaller proportion of total output goes to Hong Kong, while a larger share goes to other world markets.

73. Japan's fish production has been on the decline since 1962, from a peak of 6.9 million tons in that year to 6.3 million tons in 1964. (Figures are not available for 1965 but indications are that the catch was still lower.) This was accompanied by a phenomenal rise in imports of fish and fishery products - from 37 thousand tons in 1961 to 185.8 thousand tons in 1964, valued at US \$ million 14 and 69 respectively. The physical volume of the main fish items contained in these imports is shown in Table 14 by country of origin. 1/

Table 14: JAPANESE IMPORTS OF MAIN FISH ITEMS BY COUNTRY, 1961-1964

		(in '000 tons)			
		<u>1961</u>	<u>1962</u>	<u>1963</u>	<u>1964</u>
1.	<u>Fresh, chilled and frozen fish</u> <u>Total</u>	<u>5.6</u>	<u>13.0</u>	<u>20.7</u>	<u>45.3</u>
	U.S.A.	∅	∅	∅	7.0
	China (Mainland)	0.1	0.8	4.2	8.9
	Korea, South	4.3	10.8	9.9	13.6
	Spain	∅	-	4.1	5.2
	U.S.S.R.	1.0	0.9	1.5	7.8
	Others	0.2	0.5	1.0	2.8
2.	<u>Crustaceans and Molluscs</u>				
	<u>Other than Canned</u> <u>Total</u>	<u>6.3</u>	<u>6.2</u>	<u>14.1</u>	<u>33.7</u>
	Mexico	2.6	0.8	3.5	5.2
	China (Mainland)	1.6	1.4	2.7	5.7
	Korea, South	1.2	2.8	2.7	6.1
	Spain	-	0.1	0.8	9.5
	Others	0.9	1.1	4.4	7.2
	<u>GRAND TOTAL</u>	<u>12.6</u>	<u>20.0</u>	<u>36.5</u>	<u>82.4</u>

Source: Trade of Japan, Commodity by Country, Ministry of Finance, Japan

1/ This excludes other imports of marine origin consisting mainly of fish meal, oil and other derivatives. For the years 1961-1964, these were 25.1, 41.0, 87.3 and 106.8 thousand tons respectively.

74. These data show that Korea is Japan's principal supplier of edible fishery products and that the China Mainland is Korea's only significant competitor for that market. At the same time, the statistics also reveal that Japan is becoming reliant on more distant markets for a larger share of its rapidly increasing fish requirements, especially Spain, the U.S.S.R., the U.S.A. and Mexico, which is believed attributable to the lack of readily available supplies in Korea and other nearby resources. Unfortunately, data on Japanese imports for 1965 are not available to show Korea's share of this increasing market in relation to the participation of other exporting countries.

75. However, for the future, the prospects of increased Japanese-Korean fish trade appear quite bright, especially in view of the recent Peace Treaty ratification by the two countries. Korea's immediate future plans also call for a substantial expansion of fishery production. Since Korea produces most of the edible fishery items which are in popular demand in Japan, it is to be expected that increased Korean fish production will be accompanied by substantial increases in exports to Japan.

Domestic Consumption

76. Data on domestic consumption of fishery products are derived indirectly from recorded statistics of marine landings and exports. The result of such an exercise gives us the apparent domestic utilization. With records of direct sales (through consignment markets) it is possible to account for about 60 percent of the fish landings destined for domestic use, but this leaves about 40 percent of the overall quantities involved which cannot be conclusively identified by existing statistical mechanisms.

77. The table which follows (Table 15) was prepared in an effort to arrive at a more realistic estimate of the volume of marine products consumed or otherwise utilized domestically. The procedure consists simply of determining:

- (i) the apparent domestic consumption, by deducting exports from total landings;
- (ii) the waste arising from poor handling and lack of refrigeration, estimated at 15 percent;
- (iii) the disappearance outside commercial markets, obtained by deducting market sales from the apparent domestic consumption; and
- (iv) the total probable utilization, arrived by combining market sales with apparent domestic disappearance outside known commercial channels, less waste.

78. According to these derived figures, domestic consumption rose from 214,499 tons in 1955 to 433,758 tons in 1964. Comparing the average of the first and last three years of the period we obtain a percentage

Table 15: DERIVED DOMESTIC CONSUMPTION 1955-1964

(in metric tons)

	<u>1955</u>	<u>1956</u>	<u>1957</u>	<u>1958</u>	<u>1959</u>	<u>1960</u>	<u>1961</u>	<u>1962</u>	<u>1963</u>	<u>1964</u>
1. Marine Landings	265,895	346,570	309,310	403,307	392,061	357,134	424,519	469,530	531,805	597,219
2. Exports ^{/1}	13,543	12,655	21,089	27,932	18,035	32,959	42,807	52,668	56,870	86,916
3. Apparent Domestic Consumption (1-2)	252,352	333,915	288,221	475,375	374,026	324,175	581,712	416,862	474,935	510,303
4. Less Waste (Est.15%)	214,499	283,828	244,988	404,069	317,922	275,549	325,455	354,333	403,695	433,758
5. Sales in consignment markets	-	-	-	-	-	209,892	212,704	260,600	220,636	301,687
6. Estimated Consumption without known commercial outlets (4-5)	-	-	-	-	-	65,657	111,751	93,733	183,059	132,071
7. Estimated total domestic consumption (5 and 6)	214,499	283,828	244,988	404,069	317,922	275,549	324,455	354,333	403,695	433,758

^{/1} Exports have been converted to landed weight by applying an average conversion of 3 to 1.

Source: Fisheries Statistics, 1964, Bureau of Fisheries, ROK.

increase of 60.3, giving a growth trend over seven years of about 7.0 percent. The increases were most significant in the consumption of fresh fish, partly in response to the Government's efforts to improve fish marketing, especially from 1962 onwards, but also in large measure because of the growing preference for fish in its fresh rather than in cured or other processed form. Yet, in the face of these advances, consumption as a percentage of total landings declined by about 15 percent during the period (from 89 percent to 74 percent).

79. It is interesting to observe that while total sales by consignment markets increased by about 44 percent from 1960-1964 (209,892 tons and 301,687 tons respectively), their share of total domestic consumption declined by 6.5 percent. This occurred despite the fact that the Pusan Fisheries Market Center, the largest consignment market in the country, came into operation in 1963, along with a number of other smaller markets established through government assistance. In view of the fact that sales through consignment markets are compulsory, if marine landings are destined for domestic channels, and also, that no other organized market or fish collection system exists for fishermen, it would appear that either (a) certain sales are consummated and not recorded, or (b) much more waste occurs than is realized, or (c) fishery statistics are in error. The possibility that fish consumption by fishermen and their families can account for that portion of recorded landings which has no commercial outlet can be discarded without further probing, since the quantity involved - as high as 183,059 in 1963 - would give fishing communities an unrealistically high per capita consumption. There is of course the likelihood that some seaweed used as fertilizer by fishermen is included in the official statistics of marine landings; however, this is a supposition which could not be verified and which in any event, could hardly serve to rectify the apparent discrepancy between landings and domestic utilization.

80. It is somewhat beyond the limits of this report to enter into the exercise needed for a clarification of the apparent statistical inconsistency noted. But it must be stressed that the problem should be looked into at the earliest opportunity. Whether or not fish is disposed of through statistically unidentified channels of trade is not of vital importance; however, if substantial quantities of fish are wasted and unutilized, this is a matter which requires urgent government attention and action. Similarly, if official fisheries statistics misrepresent the complex of fishery situations in the country, no authentic assessment of the fishing economy is possible, nor can planning or development schemes easily be made to coincide with existing needs and realities.

81. The significance of these unknowns or uncertainties in the domestic consumption equation is that the real growth rate in consumption during the period, and especially since 1960 may have been somewhat lower than indicated. Certainly for the near future one is inclined toward a more conservative estimate of demand. The maintenance of the growth rate statistically indicated for the past five years would require much greater efforts on sales promotion, handling, marketing and transport improvements than appear to be immediately intended.

D. Prices

Wholesale and Export Price Movements

82. Fish prices in general have moved fairly steadily upward since 1960 in close conformity with the general trend of commodity prices in the country. This is most clearly demonstrated by the behavior of the wholesale price index of the leading fishery products during the period 1960-1964. By comparing this index with the wholesale commodity price index for the same period, it can be observed that the two (indices) were only apart by .2 points in 1963 and 7.1 points in 1964. Furthermore, the overall increase in the fish index during the period was 94 points, compared with 101.1 points in the general commodity index.

Table 16: COMPARISON OF WHOLESAL FISH PRICE INDEX AND GENERAL COMMODITY PRICE INDEX, 1960-1964

(1960 = 100)

Year	Wholesale price index of processed fish & shellfish seaweeds and canned fish	Wholesale price index of all commodities
1960	100.0	100.0
1961	96.9	113.2
1962	113.4	123.8
1963	149.5	149.3
1964	194.0	201.1

Source: Korea Statistical Yearbook, Economic Planning Board, ROK.

83. The inference from the above indices is that the economic climate governing the general price level movement in the country is a major force underlying changes in fish prices. While this is to be admitted, it is equally true that certain fish species and products are export oriented, and are therefore sensitive to international price movements, which is not true of many commodities contained in the basket of goods forming the base of the wholesale commodity price index.

84. During the period 1960-1964, export prices for numerous fishery items which Korea produces for export rose significantly. This is shown in Table 17.

85. As can be seen from Table 17, the percentage increases in export prices during the five-year period examined were: 35.2 percent for fresh fish, 31.4 percent for frozen fish, 54.5 percent for dried

Table 17: EXPORT PRICES OF SELECTED FISHERY PRODUCTS, 1960-1964 /1

(\$ per M/T)				
<u>Year</u>	<u>Fresh fish</u>	<u>Frozen fish</u>	<u>Dried squid</u>	<u>Dried other fish</u>
1960	302.9	780.5	299.4	764.7
1961	347.9	515.6	360.6	649.2
1962	393.6	1,211.4	372.7	1,818.2
1963	362.2	839.9	365.1	2,053.1
1964	409.6	1,025.7	462.7	2,058.8
Percentage change 1960-64	35.2	31.4	54.5	169.2

/1 Derived from export Statistics.

squid and 169.2 percent for other dried fish. Since these items currently constitute over 75 percent of the volume of fish exports, it is to be expected in the absence of controls that the international market will exert considerable influence on domestic prices. And in the light of the Korean Government's emphasis on increased production for export, there is every likelihood that domestic prices will continue to be largely influenced by prices set at the international level.

Prices to Fishermen

86. Prices to fishermen are reputedly sluggish and often do not exhibit the growth trends registered by prices at wholesale, retail or for export. This is particularly true where the organization of the market gives middlemen a leading advantage, or when other trading elements interfere with competitive price determination at the fishermen level. In this connection, it will be recalled from our discussion of marketing earlier that certain inflexible trading elements are built in the existing organization of the Korean fish market which have led to the creation of sizable spreads between fishermen and consumer prices to the benefit of the trading groups in between.

87. Unfortunately, existing statistics on authentic prices received by fishermen are difficult to come by. The value of landings as recorded by official sources gives us a truer approximation of wholesale prices than of the prices accruing to fishermen net of intermediary changes. What is known, from cursory examination of fishing ports and fish markets, is that there is a wide range of prices - largely from 1-2 won to 20-30 won per kilo, depending on the species - and that there are sizable variations with seasons. Some indication of the magnitude of these variations is provided by the following data obtained from the Inchon Market for 1964.

Table 18: FISH PRICES IN INCHON MARKET, 1964

(won per kilo)

<u>Fresh fish</u>	<u>Year average</u>	<u>Low</u>	<u>High</u>
Corvenia	58.3	36	76
Skate	27.9	19	43
Shrimp	110.0	70	200
Croaker	66.3	37	86
Hairtail	43.9	31	60
Horse mackerel	39.6	31	49
Pomfret	39.5	30	61

88. Lack of storage facilities at fishing ports and marketing centers, and of a well-organized wholesale service is of course at the base of much of the price fluctuations which accompany changes in fish availability. That steps need to be taken to minimize this supply shortage and abundance cycle, as well as improve the fisherman's position, has already been amply stressed. But what may be emphasized at this point is that under the existing marketing structure, economic market forces are hampered in the performance of their functions, so that little may happen to improve the fisherman's economic position, unless the government, by itself or through organized groups, sets out to break down the existing structure.

89. It would seem desirable in the circumstances for cooperatives to participate in the marketing process beyond their present role of consignment selling to fish brokers. Through government assistance and guidance, it would seem feasible for them, because they are so widespread, to enter the wholesale field, perform the characteristic functions of organized wholesaling and capture a wider share of market returns for themselves and their members. In addition to this, and especially until the marketing process can be reorganized, the Government should consider the adoption of measures to bring about greater price stabilization. The Mission recognizes the difficulties of pursuing the goal of price stability for a product as perishable as fish; nonetheless, the severity of price fluctuations can be reduced by appropriate measures.

E. Employment

90. Korea's fishing population has grown steadily since liberation from Japan in 1945, when a recorded 380,000 people were dependent upon fishing for a livelihood. By 1964, that number had grown to over 1.2 million. The increase was particularly rapid during the late fifties and early sixties when large numbers of North Korean fishermen settled in South Korea. Of course, the lack of alternative employment opportunities also led many others to pursue fishing for a livelihood.

91. Recent trends in the population dependent on fishing are given by the following series. It will be noticed that the fishing population increased by 396,786 or about 47 percent from 1960-1964, or a growth rate of about 6.6 percent per year. Some levelling off is indicated in 1964, but it seems unlikely that a reversal in trend is about to set in, in view of the employment situation elsewhere in the economy. Furthermore, present Government plans to develop the fishing industry are likely to attract new recruits.

Table 19: POPULATION DEPENDENT ON FISHERY INDUSTRIES
1960-1964

<u>Year</u>	<u>Number</u>
1960	848,275
1961	859,025
1962	1,138,325
1963	1,264,150
1964	1,245,061

Source: Fisheries Statistics 1964, Bureau of Fisheries,
Ministry of Agriculture and Forestry, ROK

92. It must be pointed out that the above figures refer to the number of people who are classified as dependent in one degree or another on fishing for their livelihood and not to those gainfully employed in the narrow economic sense, or according to labor force statistical classification. Small scale fishing everywhere attracts many part-time fishermen; and in Korea, where incomes are low and employment outlets scarce, this is quite significant. According to the Bureau of Fisheries, the fishing population can be broken down by type of employment as follows.

Table 20: FISHING POPULATION CLASSIFIED BY TYPE OF EMPLOYMENT
1960-1964

<u>Year</u>	<u>Fishing as Main occupation</u>	<u>Part-time Occupation</u>	<u>Employees</u>	<u>Total</u>
1960	178,054	401,359	268,862	848,275
1961	238,829	436,091	184,105	859,025
1962	235,408	686,460	216,457	1,138,325
1963	290,153	710,073	263,924	1,264,150
1964	287,032	703,117	254,912	1,245,061

93. It is obvious that there is a large degree of underemployment in the industry. As was previously mentioned, there are over 42,000 small, unmechanized boats used in Korea's fishery that can only be operated along the fringes of the coast. The productivity of these primitive craft is reputedly low. Furthermore, the family of each crewman is dependent upon the proceeds of the catch for its survival, and participates in a meager way in its utilization. To quantify the extent of underemployment which this type of industry alone creates would require careful survey.

94. Some indication of the incidence of this problem in Korea's fisheries is provided by data obtained during the 1964 Economically Active Population Survey. According to this source, the number of gainfully employed in hunting and fishing in 1964 was the following:

<u>Middle week of March</u>	<u>Middle week of June</u>	<u>Middle week of August</u>	<u>Middle week of December</u>
143,000	116,000	228,000	225,000

This gives an average of only 178,000 for both hunting and fishing, compared with a registered total population of 1.2 million in fishing along.

95. The situation appears even more discomfoting if one examines the data on hours worked per week, as shown in Table 21. On the average, a fisherman appears to work 40 hours a week compared with 42 hours in agriculture and 47 hours for the whole economy.

Table 21: CLASSIFICATION OF EMPLOYMENT IN HUNTING AND FISHING BY HOURS WORKED PER WEEK, 1964

<u>Period</u>	<u>Total Number</u>	<u>1-18</u>	<u>19-29</u>	<u>30-34</u>	<u>35-39</u>	<u>40-49</u>	<u>50 and over</u>	<u>Average</u>
Mid-March	143	9	22	5	10	17	80	39
Mid-June	116	6	2	3	6	28	71	42
Mid-August	228	15	21	12	8	33	139	41
Mid-December	225	29	25	6	22	50	93	38
Average	178	15	17	7	12	32	96	40

Source: The Economically Active Population Survey, 1964, Economic Planning Board, ROK

96. While the statistical sophistication surrounding sample surveys of the type quoted is in many ways inadequate to measure the economic activity of the self-employed, it nonetheless gives us a useful index.

There is most certainly a high level of underemployment among Korea's large fishing population; and as is true of many other fishing countries, this condition is likely to persist, at least in some degree, for many years to come. There is hope, however, that the problem may be significantly minimized as the Government puts into full-scale action its program of boat mechanization, improvement of fishery facilities and aquiculture development.

F. Cost Structure in Distant Water Fishery

97. The information obtained on tuna longlining, which is the only branch of deep sea fishery operations for which data are available, is rather inconclusive and does not yet provide an adequate basis on which to forecast the economic prospects for this industry. Most of the vessels now fishing have been in operation for less than two years; and since a good proportion of these vessels had to set out with crews of little or no experience, a somewhat longer period will be needed before a realistic pattern of economic performance can be established. Another important factor which has worked against the realization of quick profits in this fishery has been that most of the vessels were acquired under loan arrangements (mostly 6 percent interest and 8 years maturity) which imposed severe financial strains on the initial receipts from fishing.

98. With this as background, a cost-revenue model may be presented to approximate the economic experience of an average 145-ton longliner during 1963 and 1964: 9 fishing trips (40-45 day trips).

Catch: 720 tons

Sale value: \$175,000

Expenses:

Food, fuel and other supplies	\$61,000
Fishing gear	8,600
Bait	8,600
Wages and bonus	47,000
Insurance	3,200
Management	20,700
Other	2,500

Total \$151,600

Gross profits ¹ 23,400

Interest 9,300

Depreciation 9,100

Net profit 5,000

¹ The gross profit-sales ratio is shown to be about 13% compared with 24% in manufacturing.

99. There are certain indications which could suggest more favorable prospects in the longer term. One is that there have been no defaults on vessel loans. A second is that Koreans, despite their shorter experience, have established daily catch rates during the past two years which have generally equaled, and in some isolated cases exceeded, those of the Japanese and Chinese fishing with similar vessels on the same grounds. A third is that with catch rates of 1.8 - 2.0 tons per fishing day in 1964 (and about 1.5 tons in 1965) a number of vessels have shown a small profit. A fourth, which also contributed partly to the positive results just indicated, is the low wage structure which prevails in the industry - \$25-30 monthly per crewman. Largely because of the latter reason, Koreans could conceivably realize economic tuna fishing operations in the future at catch rates which would be uneconomic for other fishing nations. Unfortunately, it is still early to tell.

III. INSTITUTIONAL BACKGROUND

A. Research

100. Fisheries research in Korea dates back to 1921 when the Fisheries Experimental Station was established in Pusan. Research was organized under four main divisions, viz., fishing, marine food technology, fish culture, and oceanography. A fresh fish hatchery was also established at Chinhae, in the same year, for the propagation of carp and the study of other fresh water species.

101. From 1921 to 1963, when the present Fisheries Research and Development Agency came into being, research activities underwent numerous reorganizations because of political changes, war and the aftermath of war. Largely for this reason, it was found difficult to pursue a unified and continuous approach to the study of fishery resources and the problems facing the fishing industry. The lack of adequate funds also added to the magnitude of the problem. As a consequence, research efforts tended to be piecemeal and uncoordinated, and given to overlapping.

102. In 1962 this research body, then known as the Central Fisheries Experimental Station, was reorganized with a view to contributing more effectively to the development of the fishing industry. The reorganization was only completed in 1963, when the institution became known as the Fisheries Research and Development Agency.

103. As presently organized under the Ministry of Agriculture and Forestry, the Fisheries Research and Development Agency, with headquarters in Pusan, has four regional research stations - Eastern Sea, Western Sea, Southern Sea and Jeju - one fish hatchery at Chinhae and three branch stations - Chungpyung, Yosu and Chumunjin. Broadly speaking, its research activities encompass the following fields:

- (1) Exploratory fishing (to explore new grounds)
- (2) Experimental fishing (to test gear and equipment and fishing methods)
- (3) Oceanography (physical, chemical and biological, oceanography, and marine geology)
- (4) Fishery resources (composition, population assessment, etc.)
- (5) Development of fish culture
- (6) Quality control of fishery products
- (7) Improvement and development of fishery products
- (8) Extension services to fishermen, consumers and the fishing industry.

104. To carry out its programs, the Agency occupies 15 buildings (7 of which are in Pusan) and operates 8 research vessels. Its total personnel numbers 298, of which only 46 are scientists. Its budget in 1964 was 45.4 million won.

105. While it is beyond the purview of this report and, in fact, outside the competence of the writer to evaluate the approach to research in many of the fields mentioned, as well as to assess results in terms of the human and physical resources employed, expenditures and the needs of a developing industry, the following general observations are judged worthy of consideration:

- (1) The activities of the Fisheries Research and Development Agency have been spread over a very wide range of research in relation to the number of trained scientists available. There is a great need for more trained scientists both in the laboratories and for scientific and applied research at sea.
- (2) There is a tendency to expand the physical facilities of the Agency in terms of number of buildings and vessels without sufficient emphasis on the improvement of the facilities already in existence. For example, a new building and vessel are now being built out of funds provided in the 1965 budget while the existing premises and vessels, 15 and 8 respectively, are lacking in equipment and in need of improved maintenance.
- (3) More emphasis should be placed upon experimental and exploratory fishing, in order to meet more quickly and effectively the priority needs of a developing industry.
- (4) Similarly, added attention ought to be centered on the quality control and maintenance of fishery products and, especially, on solving the problem of water pollution which affects many shellfish producing areas of the coast.
- (5) There is need for greater coordination of the work of the Agency and the Bureau of Fisheries, which could facilitate the solution of the problems mentioned in (3) and (4), as well as others which are of great economic interest to the fishing industry.
- (6) The Agency needs a much larger budget to cope effectively with the research requirements of the fishing industry. Funds are needed both for the acquisition of more and better equipment, and to allow for the training of scientists abroad in well-developed centers of fisheries research.

B. Inspection of Fishery Products

106. Inspection of marine products began in Korea in 1908 when a system of voluntary inspection of seaweeds was instituted by the Mokpo Chamber of Commerce. In 1913, a Seaweeds Inspection Regulation was proclaimed by the Government and, in 1918, inspection of certain designated fishery products was made compulsory. In 1935, the Fishery Products Inspection Station was established, which was the forerunner of the present Central Fisheries Inspection Station.

107. The present Central Fisheries Inspection Station is an agency of the ROK responsible to the Ministry of Agriculture and Forestry. The existing regulations governing the inspection services rendered are provided by the ROK Law No. 116, which was proclaimed in 1950 and revised in 1962 by Law No. 1072. All marine products destined for export are inspected, graded and certified. In addition, certain specified products consumed domestically are also inspected and graded.

108. The Central Fisheries Inspection Station has its headquarters in Seoul. It is organized in three sections: Inspection Section, Inquiry Section and General Affairs Section (Administration). It has nine branches and five sub-branches distributed along the coast. The total personnel numbers 129.

109. The duties of the headquarters in Seoul are: to formulate and develop inspection programs, collect information on foreign and domestic market conditions, collect data on the inspection and packaging of products, train inspectors and supervise the operations of branch offices. It also carries out some inspections and product analyses upon request by field offices.

110. The duties of the field offices are (a) to inspect processing plants, to insure that specified standards of sanitation are maintained, and (b) to inspect the quality of fishery products. Some 50 kinds of fishery products are inspected, the chief items being: agar-agar, dried laver, dried squid, canned fish, frozen fish, frozen shrimp, shellfish, fish liver oil and fishmeal. Inspection is chiefly according to the organoleptic method, i.e., by sight, taste, smell and touch, as laboratory facilities only allow for limited scientific testing and analysis.

111. The widespread application of scientific methods of testing the quality of fishery products is a problem in most fishing countries. This is especially true when it comes to the practical application of scientific methods of testing in the fishing port or in the fish plant where fish is processed. In Korea, the situation is more serious than it is in many countries, in view of the fact that existing laboratory facilities permit very little chemical and bacteriological analyses in the laboratory itself; as previously mentioned, most of the products which are subject to inspection are tested by subjective methods.

112. It is felt that the Government should center more attention on this problem to elevate the standard of quality of fishery production in the country. The first step in this direction seems to be to increase the budget of the Central Fisheries Inspection Station to allow for the acquisition of laboratory equipment and staff at field offices providing, therefore, a better scientific basis for the evaluation of quality.

C. Education and Training

113. There are three levels of formal fishery education in Korea: Fishery High Schools, Fishery Junior Colleges and the Pusan Fishery College. In addition, the Central Fisheries Development Agency gives short courses in specialized fields and the United Nations Development Project, which began in 1964, will give intensive training in deep sea fishing for a period of 4 years.

Fishery High Schools

114. There are 12 fishery high schools in the country located in fishing ports along the coast. The entrants are students who have successfully completed 6 years of primary school and 3 years of middle school. The period of instruction is 3 years, as in the middle schools; and while considerable emphasis continues to be placed on general courses - languages, mathematics, history, etc. - subjects dealing with fishery matters have been interspersed in the general curriculum, giving the orientation toward fisheries which has led to the designation, "fishery high schools".

115. There are usually three courses dealing with fisheries given in these high schools: fishing, which is a general course on fishing techniques, fishing gear and fishing boat operation; fish processing, which is mainly descriptive of the various processes in Korea, including a general review of plant management; and aquaculture, which covers, again in a general way, the methods of culture and the principles of conservation. In some schools, where facilities exist, additional instruction is given in engine operation and maintenance, and in the rudiments of radio communication and navigation.

116. The graduates from these schools have varied from year to year but have totaled 10,868 during the period 1943-1964. In 1964, there were 923 graduates, classified by specialty as follows: fishing 472, processing 247, aquaculture 135, engines 44, and navigation 25.

117. The contribution of these schools to the training of young men to take their place in the fishing industry is not as imposing as appears at first sight. Students get little more than a general orientation toward the fishing industry, for the time allotted to fishery courses is too short - a matter of hours in some cases - to produce much better results. It is also believed, although not verified by concrete surveys, that the schools are lacking greatly in equipment and staff. To sum it all, it is felt that considerable reorganization of the school system is

called for, involving substantial increases in budgets (to allow for the acquisition of more and better equipment and more competent staff), if the needs of the fishing industry for adequately trained fishermen and fishery technicians are to be met.

Junior Fishery Colleges

118. There are two Junior Fishery Colleges in Korea, the Pohang Fishery Junior College, established as a private school in 1954, and the Kunsan Fishery Junior College, which opened in 1962. Both give 2-year courses in fisheries.

119. In general, the program of education in the Junior Colleges is a continuation of the curriculum of the Fishery High Schools. Instruction, of course, is at a higher level, and more emphasis is centered on naval architecture and food technology than prevails in the high schools.

120. Average registration in the Junior Colleges is about 600 per year. The number of graduates in 1964 was 107, of which 24 had specialized in fishing, 9 in processing, 70 in fishery management and 4 in food technology. Over 300 students were expected to graduate in 1965, reflecting the results from the Kunsan College, which only began full-scale operation in 1963.

121. As far as could be determined during the Korean Mission, without the benefit of detailed surveys, much the same constructive criticism may be leveled at the performance of the Junior Colleges as was mentioned in the case of the high schools. There is a lack of adequate equipment and properly trained staff to give thorough training in the disciplines needed and, in particular, far too little emphasis given to practical training both on land and at sea. The instruction received leans heavily toward the theoretical and, as such, prepares students more for the pursuit of higher learning than for practical assignments in the fishing industry.

122. It should also be observed, as was done in the section on Research that there is a tendency in education to expand horizontally rather than vertically, in the sense that new structures are built without first improving the facilities and capacities of those already existing. This is not to say that there are necessarily too many fishery colleges or schools in Korea; rather, the inference is that expenditures might be re-directed so as to give, at least in some cases (in the more urgent fields), competent training to a few rather than an appearance of know-how to many.

Pusan Fisheries College

123. The Pusan Fisheries College was founded by the Japanese in 1941, known then as the National Fisheries College. It is the only institution for higher education in fisheries in Korea.

124. Prior to liberation in 1945, only 32 Koreans graduated from the College. The Japanese allowed only 10 percent of the total student enrollment to be Koreans. Since then (to the end of 1964), there has been a

total of 2,098 graduates. The minimum requirement for entrance is graduation from high school, and the average enrollment per year is now slightly over 200.

125. The objective of the College is to produce well-informed fisheries scientists, "and strong emphasis is laid on the instruction of profound scientific theories along with practical exercises that will be of importance to future careers." It gives a 4-year course.

126. The program of education of the College is organized in five departments. These are:

- (1) Fishing Technology, covering mainly oceanography, science on the fishing ground (tactics), fishing gear and methods, meteorology, navigation, seamanship and deep sea fisheries.
- (2) Food Technology, covering mainly organic and inorganic chemistry, analytical chemistry, biology, physics, mathematics, bio-chemistry, micro-biology, engineering and marine processing.
- (3) Fisheries Biology, covering mainly zoology and botany, embryology and histology, oceanography, marine zoology, ecology, marine botany, planktology, aquiculture and fisheries resources.
- (4) Fisheries Administration, covering mainly general fisheries sciences, fisheries economics, fisheries administration, statistics, bookkeeping, accounting, economic geography, fisheries marketing and fisheries policy.
- (5) Education, covering mainly general fisheries sciences, principles of education, guidance, methods of teaching, educational measurement and evaluation, and school and the community.

127. It seems pertinent to observe that the form of higher education which the Pusan College has been aiming to develop in fisheries is greatly required in Korea. However, as at other levels of education, there are two main obstacles in the way of attaining the desired achievements. These are: inadequate equipment for research, demonstration and practical training, and the lack of sufficient competently trained staff. There is an obvious need for a substantial increase in the College's budget to allow for: (a) improvement in the maintenance of buildings, equipment, vessels and other facilities, (b) acquisition of new and improved equipment, (c) training of students in modern fishing technology and (d) training of scientists abroad and exchange of scientific experience.

128. One particularly pressing need which the Pusan Fisheries College is failing to meet is that of trained fishermen and fisheries technicians. Neither the programs of instruction nor the training facilities are designed to give students the practical education and sea experience they need to cope with the technical realities of modern fishing upon graduation.

129. Deep sea longlining and trawling, into which Korea is rapidly moving, are skilled techniques of fishing requiring fairly long and specialized training. According to experienced fishermen, the minimum period of sea training for a crewman on a longliner is 12 months, with an additional period of 12-18 months to qualify him for the position of captain. For trawl fishing, the sea time required is even longer. Since students at Pusan Fisheries College spend only 60 days at sea (on a 100-ton longliner), it follows that they graduate lacking competence as fishermen.

130. It is becoming more generally recognized that fisheries education both in schools and colleges is not well oriented to produce fishermen; and many graduates are even not eager to go to sea, being more willing candidates for vacancies at research centers, colleges, universities and the Government. In view of the expanding deep sea fleet - from 18 vessels in 1964 to about 150 by the end of 1966, requiring more than 2,000 additional ship officers and crewmen - the need for a new approach to technical or vocational training is quite apparent.

131. An example of this new approach is given by the United Nations Development Program (Special Fund), discussed later, which was established through Korean Government initiative in 1964, specifically to train fishermen in deep sea fishing. The duration and size of this project place definite limits on the results attainable, and much more effort will be required in this direction if the supply of trained fishermen is to catch up with the demand.

132. A logical next step seems to be the re-organization of at least some of the extensive facilities for fishery education which already exist in the country. External assistance may be needed, and should perhaps be sought, in order to implement the required changes for accelerated training in conformity with the expanding demands of industry.

Fisheries Research and Development Agency

133. The organization and functions of this Agency have already been discussed in Chapter II-A, so that the reference here is limited specifically to its contribution to the general field of education and training. This is done at the risk of repetition in hopes of putting the treatment of this latter topic in better overall perspective.

134. The contribution of the Agency to fisheries education is primarily in the form of extension services. These can be divided into three separate categories as follows:

- (1) Technical Guidance Service. This is the promulgation of knowledge among the fishermen of poor villages respecting the technical handling and processing of fish and the possible development of auxiliary employment.

- (2) Education and Training Service. This encompasses:
 - (a) the training of rural village leaders in improved methods of fishing, processing and culture, and
 - (b) the training of fishery inspectors in processing standards, sanitation and quality control.

- (3) Technical Information Service. This refers to the distribution of fisheries information through magazines, books, films and radio.

United Nations Development Program (SF)

135. With the support of the United Nations Development Program (UNDP) a Training Center was established in Pusan in 1964, for a period of 4 years. Its purpose is to produce qualified fishery technicians quickly and efficiently.

136. The training program consists in 4 months of instruction at the Center in navigation, engines, radio and fishing gear and equipment, and 8 months of sea training, i.e., 4 months on each of the two vessels the Center operates. One vessel is a 320 ton tuna longliner and the other is a 150 ton stern trawler. Existing facilities will permit the training of about 150 men per year.

137. Instruction at the Center is given by 5 teachers, one of whom is part time, and 3 technical instructors. All teaching is in Korean, given by graduates of the Pusan Fisheries College. Sea training on each vessel is in the charge of a master fisherman.

138. The speed with which this Special Fund Program was put into operation to assist the fishing industry is to be commended. During little more than a year and a half, a school was built, equipped and staffed, a 4-month course was given at the Center to over 40 students who then spent 4 months at sea on the Center's newly acquired tuna longliner, a second group of 50 students initiated their training at the Center, and a new stern trawler was acquired (in December 1965). It is also encouraging to note that the students who registered at the Center are fairly promising, serious with their work and quick to learn.

139. Unfortunately, the success which is almost sure to accompany the efforts of the Special Fund in Pusan during the course of its 4-year project will do little more than "scratch the surface", so to speak, as far as Korea's need for trained fishermen is concerned. At the most, the Center will produce 150 men per year trained in navigation, engines, radio equipment and gear. This will barely be enough to meet the crew requirements of 30 vessels. (In time, of course, these same 600 men could be the officers of about 100 vessels.) As has already been mentioned, Korea aims to expand its fishing fleet at a rate which far exceeds the present turn-out of trained officers and crews, so that a more ambitious fishermen training program is indicated.

D. Cooperatives

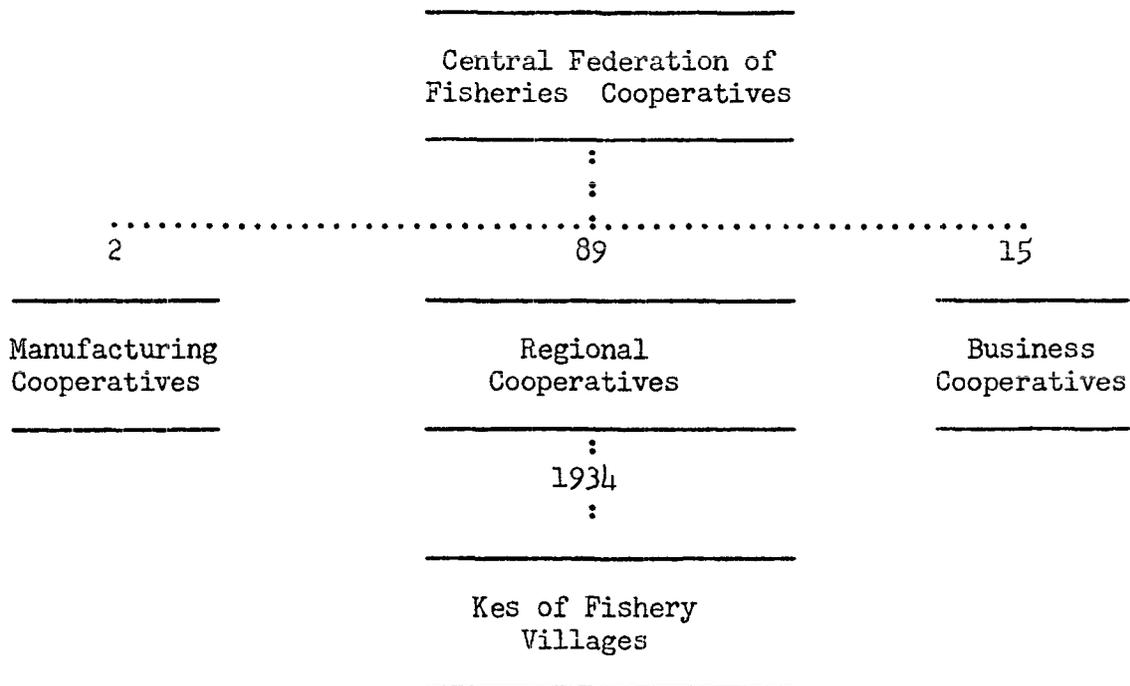
140. The fisheries cooperatives of Korea stem from the guild system established by the Japanese as early as 1929. Since then, several re-organizations and consolidations have taken place, especially following liberation in 1945 and the communist invasion of 1950, culminating in the enactment of the Fisheries Cooperative Law of January 1962, which established the organizational pattern of the cooperatives which exist today.

Organizational Structure

141. There are three types of cooperatives at present in Korea authorized by law and organized under a Central Federation of Fisheries Cooperatives (CFFC). These are: regional cooperatives, made up of the members of a fixed jurisdictional district; business cooperatives, consisting mainly of members engaged in the same type of fishing, such as trawler fishermen, stow-net fishermen, etc.; and manufacturing cooperatives, which engage in fish processing.

142. In addition, regional cooperatives consist of sub-units or community cooperatives, formed by their members, which are known as "Kes of Fishery Villages". Each Ke may cover more than one village, and it is to this unit that the majority of the fishermen belong.

143. The organizational pattern just described can be seen more clearly from the following chart:



144. It can be observed that the Central Federation of Fisheries Cooperatives has a total of 106 member cooperatives - 2 manufacturing, 89 regional and 15 business types. There are also 1934 "Kes of Fishery Villages", to which 112,516 fishermen belonged in November, 1965.

145. While it is not compulsory for fishermen to belong to a co-operative, they usually find it in their interest to do so, for purposes of marketing, financial assistance, etc. The only stipulation to membership is that a fisherman must fish for over 60 days in a year and buy more than one share of the capital stock of the cooperative. After allowing for the number of casual fishermen who fish less than the stipulated number of days, as well as for the laborers in the culture industry, it can be concluded from the present "Ke" membership that fishery households are well represented in cooperatives. (There are now 200,000 fishery households, and 112,516 are members of "Kes" village cooperatives.)

Business Activities

146. A cooperative may perform any or all of the following functions for the benefit of members:

- (1) Guidance and protection
- (2) Procurement of supplies
- (3) Custody and sale of products
- (4) Improved utilization of resources
- (5) Administer mutual relief and welfare projects
- (6) Execute projects and administer funds from Government loans or subsidies
- (7) Enter into collective agreements for the promotion of members' economic interests
- (8) Other activities pursuant to the furtherance of cooperative action and the improvement of the economic status of the community.

147. While these avowed purposes are noble and capable of great attainments, many are still to be effectively pursued in the typical cooperative community. In practice, the main achievements of cooperative action have been, (a) in the pooling of the fisherman's catch for central selling, (b) in pooling orders for supplies and bringing about deliveries which would be denied the fisherman living in isolation, and (c) in formulating collective demands for financial assistance to fishermen and in the administration of funds when received. Each of these, of course, constitutes an important area of economic action, and the fisherman is reaping benefits which he would not be apt to enjoy if he were left on his own.

148. There are two fundamental requirements for the growth of cooperative action at all levels of organization to elevate the economic status of fishing communities. One is the availability of funds, which reflects the status of the CFFC, as well as the degree of assistance available from Government sources. The other, which is as vital, if not more, is the individual's conviction of the need and desirability of community endeavors, as well as his willingness to forego selfish ends in the interest of the common good. This requirement has no substitute and in Korea, as well as elsewhere in the world, is only attainable through extensive training and education. 1/ The emphasis to be given to both aspects of development can be seen more clearly from the economic position and scope of activities of CFFC described below.

Scope of Activity of CFFC

149. The purpose of CFFC is to direct and supervise the business of member cooperatives, promote their development and enhance their common interest. In pursuit of these ends the Federation was organized with a headquarters in Seoul and nine local agencies or provincial branches. The scope of its activities and financial resources in 1965 were as follows:

<u>Type of Activity</u>	<u>Funds (won)</u>
(a) <u>Guidance</u>	<u>12,491,700</u>
Expansion of Organization	1,704,000
Research & Statistics	536,000
Training of Personnel	2,379,200
Publications	1,939,200
Fishing Guidance	2,108,600
Fishing Grounds Cultivation	1,500,000
Wireless Station Management	1,984,700
Scholarships	340,000
(b) <u>Business</u>	<u>4,717,149,000</u>
Purchasing	427,158,000
Oil Supply (boats)	1,086,456,000
Marketing	3,189,500,000
Processing	14,035,000
(c) <u>Credit</u>	<u>2,348,495,000</u>
Budgetary	1,087,277,000
Counterpart	377,210,000
UNKRA	13,558,000
Borrowing	603,650,000
Deposits	93,000,000
Other	173,800,000
<u>(Working Fund)</u>	
Loans	1,428,131,000
Business Supply	177,000,000
Other	103,364,000

1/ However, in view of Korea's high literacy (90%) this problem is of lesser magnitude than in most parts of the world.

<u>Type of Activity (cont)</u>	<u>Funds (won)</u>
(d) <u>Mutual Relief Fund</u>	<u>141,965,000</u>
Fishing Boats	47,349,000
Fishermen	1,500,000
Unspent as of December 1, 1965	93,116,000

Source: CFFC, ROK

150. As the above record of operations shows, the activities of CFFC are largely of a business nature, especially for purchasing supplies, marketing (consignment sale markets) and fish processing. This accounts for over 5.7 billion won. By contrast, expenditures on guidance activities, such as training, improvement of fishing operations, fish culture, etc., are only about 12.5 million won, or less than \$50,000. Even loans to members are less than a third of the business budget, 1.4 billion won as against 4.7 billion won, although the dire need of coastal fishermen is for financial assistance to improve fishing boats and gear, acquire new equipment and raise the general efficiency level of fisheries operations. Unfortunately, as will be seen in the section to follow on Financial Assistance to Fishermen, the terms on which CFFC extends loans to fishermen are apparently not sufficiently attractive to generate a higher volume in business.

151. The CFFC is a young organization, instituted as recently as 1962, and, for this reason, has had a short life and experience to evolve the changes in fishery organizations and services dictated by the needs of undeveloped fishing communities. While admitting this, the following comments are offered to pinpoint two of the priority areas in need of strengthening, if cooperative endeavor is to become an integral part of fishery development and a more effective instrument of community economic improvement:

- (1) Education. The educational program must be intensified, through better staffing and more extended fieldwork, to improve the organizing, re-organizing, servicing and supervision of cooperatives; to educate fishermen in developing fishery plans, in elementary accounting, marketing and principles of cooperation; to guide and assist fishermen in special fishery projects; to assist fishermen in the more effective use of credits; and to improve the fisherman's returns from the market through a better marketing and distribution of fishery products.
- (2) Credit. Credit services to fishing villages should be expanded. However, these should be more integrated with the provision of supplies and the improvement of gear and fishing methods. It is hoped that part of the fisheries fund of 6.2 billion won which is to be allocated to co-operatives (see Second Five Year Plan, Appendix 9-B) will

be managed in such a way as to satisfy these requirements. It is hoped that emphasis will be placed upon the accumulation of community savings, so that a greater share of loans will eventually come from the savings of fishermen themselves. Only through this savings and capital accumulation can fishing communities even hope to approach a state of economic independence or self sufficiency.

E. Financial Assistance to Fishermen

Fishery Loans

152. There are three sources of fishery loans available to fishermen: Government guaranteed loans, loans from U.S. Counterpart Funds and bank loans.

153. Government guaranteed loans are made by the Central Federation of Fisheries Cooperatives (CFFC) and the Korean Reconstruction Bank (KRB). They are earmarked for capital investment such as, for instance, acquisition of vessels, construction of consignment markets and ice plants, etc., and are secured by mortgages. Depending on the purpose of the loan, the repayment period is 5-10 years and the interest charges 8-12% per annum.

154. Loans available from U.S. Counterpart Funds and administered by CFFC are of two types - production loans and small boat modernization loans. Production loans are to individual fishermen, through cooperatives, and are for a period of but one year. The only security is the fisherman's catch, and collection is made at the consignment market when the fish is sold. The other type of loan, viz., for small boat modernization, is given to boat owners. It is also secured by marketing agreement with the borrower's cooperative, and the loan repayment period is up to three years. Both types of Counterpart Fund loans bear interest at 10 percent per annum.

155. Bank loans, so-called, are made by CFFC to member cooperatives for the purpose of "joint activities" such as, for example, the construction of marketing facilities or for improvements in fish collection. The loans are secured by the collateral of the cooperative and the repayment period is 1-10 years, depending on the nature of the investment project. The interest rate charged is 10 percent per annum.

Loans for Vessel Construction

156. Loans for fishing vessel construction are made to fishermen by the Korean Reconstruction Bank. They are secured by a mortgage on the vessel or other acceptable collateral, and are guaranteed repayment by CFFC in case of default. The vessel must also be insured under the insurance scheme administered by CFFC. Collection of loan principal and interest payments is through the cooperative's consignment sale market, and is usually at the rate of 15 percent of the value of sales.

157. The maximum loan obtainable under present arrangements is 75 percent of the construction cost of a vessel. Repayment is over a period of up to 10 years for vessels of over 20 gross tons and 5 years for vessels under 20 gross tons. Interest charges, depending on vessel size, range from 8 to 12 percent.

Subsidies or Grants

158. According to present regulations governing the extension of fishery subsidies or grants in Korea, the Ministry of Agriculture may grant assistance within the scope of the annual budget for the following purposes:

- (1) establishment of ice-making, freezing, storage and consignment sale (market) facilities;
- (2) construction or repair of breakwaters and piers;
- (3) aquiculture development - utilization of flatlands, improved methods of culture, etc.;
- (4) construction of deep sea vessels;
- (5) construction of fish processing plants and improvement of fish utilization.

159. The details of this assistance by project are given in Appendix 7 for the years 1957-1964. Total aid during the period has been of limited magnitude, as shown by the following figures.

Table 22: GOVERNMENT SUBSIDIES OR GRANTS TO FISHERIES
1957-1964

<u>Year</u>	<u>Amount</u> (000 won)
1957	41,563
1958	66,537
1959	88,065
1960	108,026
1961	106,389
1962	229,173
1963	163,967
1964	119,738

Vessel Insurance

160. The Mutual Relief Insurance System for small fishing boats in Korea was established in 1955 and is presently under the administration of CFFC. Insurance is on a voluntary basis and is renewable yearly. Premiums vary from 1.8 to 3.8 percent of the appraised value of the boat, and are based upon the age, size, equipment and other characteristics of the craft.

161. While the insurance rates are reasonably low, they are generally considered high by low income fishermen. Of about 25,000 boats that are eligible for insurance, less than 20 percent are insured.

F. National Fisheries Administration

162. The Bureau of Fisheries of the Ministry of Agriculture and Forestry is responsible for the administration of fisheries in Korea. In addition, each provincial government has a fishery section which performs functions similar to those of the Bureau.

163. The Bureau of Fisheries is organized into six sections as follows: administration, pelagic fishing, processing, aquaculture, marine resources, and fishing boats and ports. The responsibilities and function of each are:

- (1) Fisheries Administration Section. It is responsible for the planning and coordination of fishery policies, enforcement of regulations, finance, supervision of fisheries cooperatives, planning and evaluation of fishery development projects, supervision of the administration of the mutual Relief Insurance Scheme for fishing boats, as well as other matters pertaining to fisheries which are not delegated to other sections.
- (2) Pelagic Fishing Section. It is responsible for the supervision and management of pelagic fisheries - study and evaluation of pelagic fishery resources, issuing of licenses, etc. - review of international fishery agreements, improvement of fishing boats and gear, and development of distant water fisheries.
- (3) Processing Section. It is responsible for the general supervision, management, promotion and improvement of fishery production in the country. Specifically, this includes the licensing of fish plants, the supervision of plant processes and handling methods, the promotion of new and improved processes and methods, and the promotion of improved standards of quality and methods of inspection.

- (4) Aquiculture Section. It is responsible for managing and promoting inshore and aquiculture fisheries, managing and promoting laver and shellfish culture, surveys of tide lands and inland water areas, supervision and guidance of the artificial incubation of species, and control of illegal fishing.
- (5) Marine Resources Section. It is responsible for the compilation of statistics on fishing operations, the study of the economic status of fishing villages, the compilation of information on international fisheries, the promotion and furtherance of research on marine resources and the distribution of information to fishermen on fishing conditions, fishing grounds and fishing techniques.
- (6) Fishing Boat and Port Section. It is responsible for: supervising and advising on vessel design and construction; advising on the selection of engines and fishing equipment; inspecting and registering fishing vessels; planning both construction and repair projects; planning the development or construction of fishing ports; reviewing the demand and supply situation respecting oil, nets, ropes and other fishing requisites; and supervising the management of joint fishing facilities in fishing ports.

164. In the execution of these functions the Bureau is confronted with certain problems which impede the efficiency and effectiveness of its administration. Some have their origin in the structure of the organization itself; others stem from the inexperience and incompetence of some of the personnel which constitute it. The comments set forth below on this issue are made objectively, in the interest of signaling the areas which need redress if the fishing industry is to receive the guidance and management it requires at this stage of development.

165. On the organizational side, consideration should be given to:

- (1) Greater division of responsibility, to prevent overlapping, as well as avoid spreading personnel too thinly in many fields, and entrusting them with responsibilities which are outside their best interest and competence.
- (2) There are frequent shifts of personnel both within the Bureau and between the Bureau, the Research and Development Agency and the Inspection Station which, in many instances, are opposed to the building up of a competent, experienced and specialized staff. The policy of the Bureau in this matter should be reviewed in the light of the benefits to be derived from experience and continuity of service.

- (3) Centralization of fisheries statistics under one head to facilitate tabulation and analysis, as well as minimize the problems of standardization associated with methods of collection, compilation, analysis and presentation.
- (4) Establishment of a separate Economic Section for much needed economic studies of fishing operations, fish processing and marketing. At the moment there is an excessive scarcity of trained economists in the Bureau.
- (5) Establishment of a separate office or section for planning and formulation of development projects. At the moment project formulation is very much a piecemeal exercise, and the problems of eventually fitting the pieces together into an integrated whole are discomfoting, to say the least.

166. On the personnel side, it may be observed that several of the professionals are inadequately suited by training for the specialized functions they are asked to perform. Most of them are graduates of the Pusan Fisheries College, and while this affords them a reasonably good background in fisheries disciplines, they are still without the proficiency and experience called for in certain specialized fields.

167. It is considered that the Bureau should strive at the earliest opportunity either to acquire new, adequately trained staff, or else open avenues for additional training of its own personnel, especially in the fields of food technology, vessel design and construction, fishing technology, economics and resource management.

IV. PROSPECTS FOR DEVELOPMENT

A. Objectives of the Second Five Year Plan

168. The main objectives formulated in the Second Five-Year Economic Development Plan for the years 1966-71 are to increase fishery production and exports. The targets, as tentatively set, are: to increase the annual catch from about 608,000 tons in 1965 to about one million tons by 1971; to raise the export of marine products from the level of about US \$27 million in 1965 to about US \$95 million in 1971.

169. In order to achieve these objectives, the Government plans to modernize its fleet and acquire a large number of vessels suited for deep sea fishing, improve its port and fish processing facilities, increase the domestic production of fishing materials and equipment, increase and elevate the level of fishermen training, and foment and assist cooperative action in the fields of marketing and financial assistance to fishermen.

B. Investment Projects

170. The details of the Second Five-Year Plan for fishery development, including the resources needed to finance it are not yet finalized. Provisionally (November, 1965 estimates), the investment expenditure has been set at 27.6 billion won, or about US \$100 million. This compares with public expenditures of only about 5 billion won during the First Five-Year Plan, assuming that budgeted expenditures of 1,255.6 million won for the current year are realized. Ten percent, or US \$10 million of the total investment in the new Plan is to come from the private sector of the economy, and the foreign exchange requirement is placed at US \$27 million (See Appendices 8, 9-A and 9-B).

171. In all, there are 12 investment projects in the Plan, involving an expenditure of some 21.4 billion won. The remaining sum of 6.2 billion won is earmarked for the establishment of a fisheries fund, a price stabilization fund and fisheries insurance, and to improve the structure of fisheries organization and administration. The nature of the 12 projects and the expenditure proposed for their execution can be summarily presented as shown in Table 23.

172. In comparing these expenditure figures with the volume of physical units of gear, equipment, etc., to be acquired during the life of the projects (Appendix 9-D), certain inconsistencies can be observed. This applied particularly in the case of fishing boats, where the number to be acquired seems high in relation to the funds provided. (In the case of other projects in the Plan, data on physical inputs are not available in the detail necessary for such comparisons.) Admittedly the figures are provisional, and will likely be revised substantially before projects

receive final approval; nevertheless, it is considered useful at this stage to indicate where the discrepancies lie, and their apparent magnitudes, in order to come to a closer approximation of the investment funds required, if the physical projects and production targets from which they derive are to be realized on the scale proposed.

Table 23: PROJECTS DURING 1967-1971 AS PROPOSED BY
THE GOVERNMENT

(in million won)

1. Fishing boats for offshore fishery	2,552.0
2. Fishing boats for ocean fishery	1,249.0
3. Fishing boats for coastal fishery	7,444.2
4. Fish processing:	1,150.7
Cold storages, freezing plants, ice plants, drying plants, etc.	
5. Aquiculture:	2,751.6
Seed culture, flat land development, etc.	
6. New fishing bases (10)	1,174.9
7. Fishing port improvement	1,947.4
8. Research and guidance	2,030.1
9. Improvement of fishing gear	516.4
10. Diesel engine manufacture	15.3
11. Chemical fiber manufacture	500.0
12. Net manufacture	<u>100.0</u>
<u>Total</u>	<u>21,431.6</u>

173. It can be seen from the above figures that 11,245.2 million won, or US \$41.0 million, have been allocated for the construction or purchase of fishing boats. As shown in Appendices 9-B and 9-D, 823 boats are to be acquired, 716 for coastal and offshore fisheries, and 62 for operations in distant waters. Considerable details are missing on the type of design, construction, etc. which will be adopted, but assuming reasonably modern design, a rough calculation of current construction costs points to the following expenditure requirements: (\$ '000)

Coastal and offshore boats.....	\$28,000
Distant water boats.....	<u>22,000</u>
<u>Total</u>	<u>\$50,000</u>

174. It follows from this calculation that planned expenditures are \$10 million short of anticipated costs; and unless the budget is revised to conform with the requirements indicated, the production targets will need to be modified accordingly.

C. Production Targets, 1966-1971

175. According to the projections contained in the Second Five-Year Plan (Appendix 9-C), total production from marine fisheries and aquiculture is to increase from 608,000 tons in 1965 to 1,053,685 tons in 1971 as follows:

1965	608,000
1966	714,619
1967	805,935
1968	881,652
1969	955,095
1970	1,009,770
1971	1,053,685

This gives an increase of about 73 percent during the 6-year period, or a growth rate of the order of 12 percent per year.

176. Using 1965 as base year, the production increases are calculated from the physical inputs to be added yearly during the period. By main input categories, the expected results by the end of the six-year period are:

1. Engine Replacement, 867 units	8,670 tons
2. Fishery Facility Improvement, landing piers, ice floats, etc., 1246 units	12,460 tons
3. Aquiculture: development of 18,990,000 m ² of tidal flats and 5 seed culture centers	68,489 tons
4. Fishing Boats, 823	<u>356,066</u> tons
<u>Total</u>	<u>445,685</u> tons

Assumptions

177. The main assumptions underlying the above calculations are:

- (1) Each engine replaced or newly installed in a fishing boat will lead to a production increase of 10 tons per year.
- (2) Each center or fishing site provided with improved facilities will add 10 tons to production per year.
- (3) Each 1,000 m² brought under marine cultivation will add about 3.6 tons to production.

(4) Inshore and coastal boats will contribute to yearly production as follows:

(a)	20 ton boat:	75 tons of fish
(b)	50 ton shrimp trawler:	100 " " "
(c)	70 ton boat:	300 " " "
(d)	100 ton boat:	350 " " "
(e)	Purse seining unit:	1500 " " "
(f)	80 ton whale boat:	300 " " "

(5) Distant water fishing boats will contribute as follows:

(a)	Longliners, over 200 tons	- 3.7 tons per fishing day
(b)	Trawlers, over 300 tons	-12.5 tons per fishing day

Evaluation

178. Two vital considerations must preface the evaluation presented below. The first is that it is known that the production projections as they now appear in the Second Five-Year Plan are in a preliminary stage and that substantial revisions are likely to be incorporated in the final Plan. The second is that because plans were still in their developmental phase when the Mission visited Korea in November-December 1965, it was not possible to obtain all the data needed for a detailed and fully realistic appraisal. For these reasons, the conclusions reached cannot be considered definitive. They are judgments arrived at on the basis of available information and limited time for analysis.

179. On the whole, the preliminary production targets of the Second Five-Year Plan are considered quite optimistic and a number of assumptions and criteria of estimation ought to be seriously re-examined. These are:

- (1) The contribution to production of the addition of physical inputs, such as vessels, gear or other facilities, is assumed to be of the same magnitude in the first year as in subsequent years of the Plan. This makes no allowance for normal construction, procurement, installation and other delays, for breaking-in periods, trial runs, etc., and assumes that new assets can be introduced in the production process at the beginning of the production period at their maximum scale of efficiency. This is unrealistic. In general, a 50 percent performance in the first year is perhaps as much as one should expect in fisheries.
- (2) The increase in aquiculture production assumed seems very ambitious in the light of the problem which water pollution has created in many areas of the coast. The technical difficulties inherent in the eradication of pollution cannot be assessed without expert opinion, but it is considered that they could easily lead to a significant slow down of expansion in aquiculture. A reduction of the forecast aquiculture production by half might even be conservative.

- (3) The increase in catch expected from the expansion of the coastal fleet is considered somewhat exaggerated and should be closely reviewed in the light of present day experience. Following the first year of adjustment, 20 ton boats will not add more than 50 tons to annual production, the 70 ton boats not more than 275 tons, and the 100 ton boats not more than 350 tons.
- (4) The performance expected of the distant water fleet also appears overstated. According to present day fishing experience and assuming no substantial change in fish availability, the following results would seem more realistic:

	<u>Per year</u>
(a) Longliners under 200 tons	- 300-350 tons per vessel
(b) Longliners over 200 tons	- 400-450 tons per vessel
(c) Trawlers under 250 tons	- 500 tons per vessel
(d) Large trawlers	- 2,000 tons per vessel

180. Taking these considerations into account, without going into other aspects of fishery production which, though important, cannot confidently be appraised without additional investigation and analysis (not rendered possible by the recent survey), a production target of 950,000 tons by 1971 would seem sufficiently optimistic. Taking 1965 as base year, with an estimated production of 625,000 tons, this indicates a total increase of 52 percent, or a compound growth rate of about 7.2 percent.

D. Means of Implementation

Central Federation of Fisheries Cooperatives

181. The organization and role of cooperatives in fisheries until the present have already been described. The Government plans to strengthen the Central Federation of Fisheries Cooperatives by allocating at least a substantial share of the fisheries fund of 6.2 billion won contained in the projected expenditures of the Second Five-Year Plan so that this entity can administer the credit and investment requirements of the development planned for coastal fisheries.

182. It must be emphasized that the CFFC management would appear to need strengthening and close Government supervision to cope with the financial tasks inherent in the coastal fishery development which is proposed.

Korean Marine Industries Development Corporation

183. This corporation was established in 1963 to manage and administer a US \$35 million loan negotiated by the Korean Government with French and Italian builders for the construction of 91 fishing vessels. The corporation also operates the vessels as deliveries are made.

184. It was originally intended that this entity would administer the funds earmarked for the expansion of the deep sea fleet envisaged in the Second Five-Year Plan. However, the Mission learned in Korea that the KMIDC was undergoing managerial difficulty and that returns from the newly acquired vessels were not too encouraging.

185. It is important to stress the need for an efficient organization to manage the financial aspects of the offshore and distant water fishery expansion program.

Financial Assistance Arising From the Japanese Korean Treaty on Economic Cooperation

186. The main points of this treaty, ratified in December 1965 are:

- (1) Outright grants to Korea in Japanese goods and services totaling US \$300 million over a 10-year period.
- (2) Japanese Government credit for the acquisition of Japanese goods and services of US \$200 million over a 10-year period. The repayment terms specified are:
 - (a) 14 installments in 13 years, commencing 7 years after the signing of the plan;
 - (b) Japanese commercial credit of some US \$300 million, of which US \$90 million is earmarked for fishery development.

187. It is not known what exact portion of the Japanese grants and credits will be made available to fisheries. At the time of writing, it was learned that \$90 million in loans had been approved for fishery purposes over a ten-year period and that about \$16 million in grants would be made available in 1966.

188. The new credit source, if available on acceptable terms, would be more than ample to cover the foreign exchange component (\$27 million) of projected investments during the Second 5-year Plan. It would appear, therefore, that the Government should be able to finance the expansion it proposes in distant-water fisheries.

189. It seems likely that political pressures in Korea will lead to the allocation of a large portion of Japanese grant money for the improvement of coastal fisheries. Of the \$16 million reported approved for 1966, about three-quarters are to be allocated for this purpose.

190. It is also to be hoped that the funds made available through Japanese reparation grants, not only this year but also in years to come, will be used to bring about improvements of fishery facilities in areas which are best endowed relatively for fishery development. At the same time, this should lead to more concentration and greater efficiency in fishery operations than is possible at present in Korea, with the fishermen scattered in so many small and isolated communities.

E. Feasibility of Proposed Fleet Expansion

Fleet Expansion in Relation to Coastal and Offshore Resources

191. It is believed that the resources of the eastern, southern and western seas adjoining Korea can withstand the pressures which the proposed fleet modernization and expansion will exert on them. The production increase foreseen is at a rate of about 5.7 percent per year to give a total coastal marine landing of approximately 765,000 tons in 1971, excluding the production of aquaculture. This is well within the stock limits estimated by Korean marine biologists.

192. The achievement of the production targets envisaged, as well as the economic performance of the vessels to be operated, will hinge upon two important requisites; (a) that the vessels acquired are of the proper type, design and size; (b) that adequately trained crews are available for the new craft added to the fleet. In the small boat fishery, of course, positive returns are almost sure to result from the use of more seaworthy craft and greater mechanization. However, in the case of modern trawling, Danish seining and purse seining, the success of fishing is largely dictated by the technical competence of fishermen. In view of the existing state of knowledge of fishermen, investments for the extension of such fishing techniques could be most unrewarding unless accompanied by appropriate emphasis on technical training.

Fleet Expansion in Relation to Deep Sea Resources

193. It is considered unlikely that the introduction of a fishing effort of the magnitude proposed by Korea could have any appreciable effect on the state of world fish stocks, even if the production targets originally envisaged were to be realized. Existing knowledge of world fish populations does not suggest that it should be regarded as a constraint to expansion. At the same time, it is pertinent to point out that the incidence of the Korean effort on fish stocks is not expected to be as significant as was originally forecast.

194. As previously stated, daily catch rates of 3.7 tons for longliners and 12.5 tons for trawlers were assumed by planners in their original calculation of Korea's deep sea catch during 1966-1971. These are considered optimistic in the light of present day fishing experience (e.g., by Koreans, Japanese and Taiwanese during 1964 and 1965); rates of 1.5 - 2.0 tons for longliners and of 3-10 tons for trawlers appear much more realistic. In consequence, the results from deep sea fishing may not represent much more than half the catch included in the preliminary projections contained in the Second Five-Year Plan. The original target was for a catch increase of from about 4,000 tons in 1965 to approximately 137,000 tons in 1971. Using catch rates on the revised scale suggested, a total deep sea catch in the neighborhood of 77,000 tons by 1971 would appear indicated. This is not considered of a magnitude sufficient to generate concern over existing fish stocks.

195. However, the nature of the resource is such that marginal catches have been falling noticeably in response to the addition of vessels to the fleet; and such diminishing returns or increasing costs should feature importantly in considerations of fleet expansion. Admittedly, as was discussed in Chapter II, Korea's low wage structure gives it a comparative advantage in deep sea fishing and, other things being equal, its fishermen could likely operate successfully at catch rates which would render fishing unprofitable for many of their competitors. But, as was also indicated in the same connection, the "ceteris paribus" condition does not hold, and Korea is greatly deficient in trained fishing crews who can match the skills of more experienced fishermen; and this is considered a factor which could easily nullify the competitive advantage derived from a low wage bill.

196. It is therefore urged, as repetitively done already in this report, that due emphasis be given to the training of fishermen, and that programs of fleet expansion be in closer conformity with the availability of trained fishing crews.

Fleet Expansion in Relation to Boat Construction, Repair and Maintenance Facilities

197. The building, repair and maintenance facilities of the Pusan Shipyard are considered adequate by naval architects to meet the requirements of the proposed deep sea vessel expansion. Repair yards will of course be needed in suitably located areas of the coast if repair and maintenance services are to be provided for coastal and offshore boats. Provision is being made in the Second Five-Year Plan to meet a part of these requirements.

Fleet Expansion in Relation to Landing and Processing Facilities

198. There is a need for much improvement in landing and processing facilities throughout Korea. This was treated at some length in the Chapter dealing with the present status of the fishing industry. Even in Pusan, where the country's largest fish market is located, landing facilities are extremely crowded for the boats presently in operation, and freezing and holding rooms are inadequate to avoid market gluts and considerable waste. Processing plants, especially for canning, are operating far below capacity both in Pusan and in other ports (there are 45 canneries in the country); and the equipment used in these plants, as well as in freezing, salting and drying establishments are generally in a serious state of obsolescence. Expansion of canned and frozen fish production will, of course, hinge upon the development of foreign markets, for Korea lacks the domestic outlets for these expensive products.

199. The Government is cognizant of the problems and is taking some steps in its Second Five-Year Plan to improve existing conditions. However, the financial provisions which are being made will only go part-way in setting up the facilities needed to cope with domestic catches (from coastal and offshore grounds). There will also be a need for a greater number of technicians capable of renovating, remodelling and maintaining Korea's fish handling and processing facilities as required.

200. No provision is being made to process the distant water catch at home. The deep-sea fleet operates out of foreign ports, and the catch is sold in its landed form to foreign processors. Preliminary consideration is being given to the establishment of fishing bases nearer the fishing grounds - "Advance bases" - with cold storage and other facilities for trans-shipment to foreign markets. About 1.2 billion won (\$4.4 million) have been allocated for this in the Second Plan (see Appendix 9-B). Future development of a home processing industry should not be ruled out, but premature venture in this direction is discouraged.

Fleet Expansion in Relation to Market Prospects

Domestic Market

201. In the discussion of domestic consumption in Chapter II-C, considerable doubt was expressed as to the validity of the statistics from which apparent consumption was derived for the period 1955-1964. As will be recalled, the residual of landings minus exports showed a compound growth rate of about 7 percent per year, after allowing for 15 percent disappearance through waste. Without waste allowance, the apparent domestic consumption was 510,303 tons in 1964.

202. That the reservations expressed were justified seems confirmed by the preliminary demand projections contained in the Second Five-Year Plan. In absolute figures, domestic consumption for the years 1966-1971 has been estimated at:

1966	601,133 tons
1967	629,967 tons
1968	663,390 tons
1969	682,890 tons
1970	680,080 tons
1971	669,505 tons

This represents a growth of only about 2 percent per year, denoting a significant and somewhat peculiar change in consumer behavior from the patterns established (statistically) during the period 1955-1964.

203. In evaluating this domestic market outlook, the first thing which stands out most conspicuously is that domestic consumption is given as a residual of production less exports. If we take back the series to 1964, when the domestic disappearance of fish was recorded at 510,303 tons, we can trace a yearly growth of 10 percent to the end of 1966, then a drop in the rate of increase to 5 percent per year to 1969 followed by an absolute decline in consumption. This follows the anticipated production-export pattern, gradually gaining momentum as the Second Plan is being implemented.

204. While it is conceded that major efforts are to be made to promote exports from now until 1971, it is difficult to accept a pattern of consumption of the nature just described. The overall consumption figure of 669,000 by 1971 would appear reasonably acceptable, but this is con-

sidered accidental and not to be construed as the result of a 2 percent annual growth rate over a five-year period. The series should be reformulated to reflect more realistically and consistently the effects of the recognized determinants of consumer demand.

205. In general, fish consumption is principally influenced by changes in population, income and prices, as well as by consumer taste and preferences. In Korea, as in many developing countries, expansion of the market is also dependent upon improvements in transportation and marketing facilities for fish distribution in inland areas. While these are difficult to measure, it is felt that insufficient weight has been given to their likely influence on consumption in the projections just noted.

206. One factor which can be fairly easily and safely quantified is the influence of population. According to calculations made by the Mission, prospects are for a reduction in the population growth rate of from 2.9 percent in 1964 to 2.3 percent in 1971, or for an average growth of 2.6 percent per year. Since it is generally accepted that a given percentage increase in population gives rise to a corresponding increase in consumption, it can be assumed in a low income country like Korea, where fish is fairly abundant and other animal proteins are scarce, that demand for fish will rise by more than 2 percent per year, i.e., by more than the total annual increase from all causes envisaged in the Second Five-Year Plan.

207. As far as income and price effects are concerned, they are less easily measured due to the lack of time series and other statistical tools of analysis. Yet it is reasonable to expect incomes to rise significantly during the course of economic development in the next five years and that fish prices will remain fairly stable, or perhaps decline slightly in real terms. According to income and price elasticities calculated for far eastern countries (excluding Japan) by FAO - Agricultural Commodities - Projections for 1970 - an increase of demand of the order of 3 percent would seem likely to be realized.

208. With reference to the other important market determinant mentioned, viz., improvements in fish transportation, distribution, handling and sale promotion, it may have a relatively small impact on consumption in view of the emphasis to be channeled on exports. However, modest increases at least must be assumed as the business community grows, and as distributive and merchandizing methods are developed to conform with the requisites of development.

209. Summing the probable effects of the demand factors just described, it is estimated that a growth rate in consumption of about 5 percent per year can be expected during the period 1965-1971. Using 1965 as base year, with domestic fish disappearance estimated at 525,000 tons, domestic fish consumption (after allowing for wastage) could therefore grow from about 455,000 tons in 1965 to 610,000 in 1971.

210. It must be recognized that projections of consumption become highly precarious without the pertinent calculations of income and price elasticities and other numerous determinants of demand, which are only possible with appropriate market data. The need of market studies must therefore be emphasized.

Foreign Market

211. According to the revisions of production and consumption targets for the Second Five-Year Plan set forth in Chapter IV-C, and IV-E, exports can be expected to increase to about 162,000 tons of product weight (landed weight of 268,000 tons) by 1971 from an estimated 47,500 tons of product weight (landed weight of 100,000 tons) in 1965. Value-wise, this is expected to represent an increase of US \$48 million - from about US \$27 million in 1965 to US \$75 million in 1971 - or a growth rate of about 18.5 percent per year. Cumulative earnings during the six-year period are estimated at about US \$347 million. Preliminary estimates by the Economic Planning Board were for exports valued at US \$95 million in 1971 and for a cumulative total of US \$418 for the period 1966-1971.

212. This phenomenal growth is to result in large measure from the rapid expansion of Korea's deep sea fleet which, alone, is expected to contribute 77,000 tons to exports by 1971. This assumes that Korea will make serious efforts to train and prepare fishermen in the skills needed to operate the new boats. The increase in exports from domestic landings is calculated to have a growth potential of about 12 percent per year. This is shown below, along with projected increases in catches and domestic consumption:

	<u>1965</u>	<u>1971</u>	<u>Annual growth rate %</u>
(1) Total landings	625,000	950,000	7.2
(2) Exports from domestic catch	96,000	191,000	12.2
(3) Exports from deep sea catch	4,000	77,000	
(4) Total exports	100,000	268,000	17.9
(5) Domestic disappearance	525,000	682,000	
(6) Wastage ¹	70,000	72,000	
(7) Domestic consumption	455,000	610,000	5.0

¹ It was assumed that fish wastage would decline with improved methods of handling, from an estimated 15 percent in 1964 (Table 15) to 13.3 percent in 1965 and 10.5 percent in 1971.

213. In arriving at these volume estimates, it was assumed that market conditions would remain favorable to Korea throughout the period and that production would constitute the chief limiting factor to rapid export advances. The growth of domestic consumption was limited to a

conservative 5 percent per year, in view of Korea's need for foreign exchange and the efforts it plans to exert on increasing fish exports rather than expanding the local market. It was further assumed that the entire deep sea catch would be sold abroad.

214. Exports from Domestic Catch. Japan, Korea's traditional market for fishery products, is still the key factor in the export prospect for the domestic catch. Since 1962, and more particularly since 1963, Japan's fishery production has been declining, resulting in a fish shortage at home. Indications are that a number of Japanese fishing interests are inclined to rationalize their investments and reduce expenditures in certain types of fisheries, in view of rising fishing costs and difficulties of keeping crews at sea for extended periods. The expected consequence is that Japan will increase its imports of fish from those countries more economically and socially attuned to these fisheries. In this connection, it can be recalled from earlier mention that Korea's fish exports to Japan in 1964 were 24,600 tons, worth US \$16 million, representing increases over 1963 of 63 percent and 68 percent respectively.

215. Increases in exports of this magnitude cannot, of course, be expected to be maintained. However, the increasing economic intercourse which the recent Peace Treaty is expected to generate between Korea and Japan will likely induce Japan to supplement its own fish shortage with increased Korean imports. At this juncture, past trends are of little help in determining the volume of trade which may be involved; but it is anticipated that Korea will encounter no difficulty in disposing of its surplus catch. A growth in exports of 12 percent per year seems easily attainable in view of Korea's other markets, especially Hong Kong for dried fish and Europe for frozen shellfish.

216. Exports from Distant Water Catch. It is assumed that Korea will find no difficulty in disposing of its entire deep sea catch in foreign markets. Not unlike market prospects for domestically caught fish, the outlook for Korea's expanding ocean fishery is based on recent developments rather than dictated by past trends. The main determining factors in the current appraisal are (a) shortages in tuna supplies and (b) Japan's retrenchment in deep-sea fishing operations.

217. The present shortage of tuna supplies, especially in the United States, but also in Japan and EEC countries, stems from an incident of botulism poisoning in the United States in the first half of 1963. This led to greatly reduced sales of canned tuna in the United States for the balance of 1963, as well as for 1964, with a significant down-turn in prices. (United States quoted or listed tuna prices often had no relation to reality because of promotions and special deals.) With falling prices and inventory build-ups in the world's major market for canned tuna, tuna fleets were placed in a very unfavorable position, since they had been built up on the prospects of increased canned tuna production and sales.

218. In the United States, the over-supply created by the poison scare was relieved by tying up fleets or curtailing factory production. This was not so easy for Japan, since its fleet was spread out in many parts of the Pacific and Atlantic and could not react so quickly to demand and price changes. However, it did succeed in disposing of a considerable portion of its catch in Italy and also in Yugoslavia, at least in 1963.

219. Low prices and heavy inventories prevailed in the United States until about the middle of 1965, with the logical consequence that imports from Japan fell off. Such reduction in exports, combined with lower prices and rising crew wages and depreciation costs, put many Japanese fishing companies in a continuing loss position; and many vessels were returned to Japan to be converted to trawlers, scrapped or otherwise retired from the fishery. Many of the vessels, because of their condition could never return to tuna fishing grounds; furthermore, because of the financial burdens and impaired confidence inflicted on a number of Japanese fishing interests by the period 1963-1965, it is not expected that Japan's tuna fleet will be reinstated to its original size.

220. The market situation in the United States has improved appreciably since the latter half of 1965, principally in response to competitive promotional campaigns by tuna canners to increase sales. Although statistics are not yet available, it is believed that sales in 1965 exceeded those of 1964 by as much as 12 percent. Prices have also soared to reach unprecedented levels - from about \$250 per ton to well over \$300 per ton to fishermen. Demand is expected to rise at about last year's rate for this year and to continue to grow at about 7 percent thereafter for the reasonable future.

221. The market outlook is also promising outside the United States, particularly in Japan, where fresh tuna is in great demand, but also in EEC countries, especially Italy, which has substantial tuna processing facilities and no available domestic supplies. The latter market, as well as Western Germany, has been growing continuously during the past few years, and a growth of 5-10 percent per year is considered sustainable if prices adjust to a reasonable equilibrium level.

222. The significance of this market situation is that a notable increase in world fishing effort seems needed to satisfy the demand which was built up and the growth momentum which developed during the past two years. This augurs well for the new Korean deep sea fleet. In consequence, it is considered that the tuna export targets calculated for the period 1966-1971 are possible of attainment, if Koreans space their investments in new vessels in such a way as to allow for the fishermen training necessary for efficient vessel performance.

Fleet Expansion in Relation to Trained Personnel

223. The rate of output of fishermen trained in the new skills which longlining, trawling, Danish seining and other sophisticated techniques demand, is considered well below that required to match the fleet expansion which is proposed. As emphasized in earlier sections of this report,

graduates from fisheries schools and colleges, though numerous, are not up to the new challenge without additional lengthy training and experience; private industry is slow and seemingly unwilling to fill the gap because of the time and cost involved; the United Nations Development Program (SF) can only turn out about 150 men per year with existing facilities.

224. There is a great need for an expanded and accelerated training program to meet the new requirements of the fleet, now, and especially by the end of 1966, when close to 150 distant water vessels will be in operation. To contemplate adding vessels to the fleet of the type proposed without first coming to grips with this problem would be highly short-sighted and unwise.

LIST OF APPENDICES

1. Employment in Korean Fishery Industries
- 2A. Fishing Conditions of Saury in the Adjacent Waters of Korea
- 2B. Observations on Shrimp Fishery and its Fishery Biology in the Eastern Korean Waters
- 2C. Study of the Fishing Effort and Catch per Unit Effort in Large Trawl Fishery
- 2D. Horse Mackerel (Trachurus Japonicus) Distributed in Adjacent Waters to Korea
- 2E. Observations on the Catch Statistics of Large Trawl Fishery in Pusan
- 2F. Distribution, Spawning Area and Migration of Croaker
- 2G. Distribution, Spawning Area and Migration of Hairtail
- 2H. Distribution, Spawning Area and Migration of Horse Mackerel
- 2I. Distribution, Spawning Area and Migration of Mackerel
- 2J. Distribution, Spawning Area and Migration of Sea Bream
- 2K. Distribution, Spawning Area and Migration of Shrimp
- 2L. Tuna Fishing Grounds
- 3A. Classification of Fishing Boats by Size and Age, 1964
- 3B. Classification of Powered Wooden Vessels by Age
- 3C. Calculation of Market Value of Fishing Boats, 1964
- 4A. Total Landings of Fish and Other Marine Products, 1955-1964
- 4B. Fish Landings by Main Species, Volume and Value 1960-1964
- 4C. Output of Fishery Products by Main Categories, Volume and Value 1960-1964
5. Cost of Production of Some of the Main Fishery Products
6. Characteristics of the Fishing Fleet
7. Government Subsidies in Fisheries, 1960-1964
8. First Five-Year Plan, 1962-1966 - Government Investment in Fisheries
- 9A. Second Five-Year Plan, 1967-71 - Government Investment in Fisheries
- 9B. Investment Expenditures in Fisheries During Second Five-Year Plan, 1967-71
- 9C. Second Five-Year Plan of Fisheries Production, 1966-1971
- 9D. Second Five-Year Plan - Production Plan by Year and Project
10. Revised Estimates of Fishery Production, 1966-1971

APPENDIX 1

EMPLOYMENT IN KOREAN FISHERY INDUSTRIES

1. Total Employment, 1955 - 1964

1955	678,779
1956	728,155
1957	779,630
1958	806,938
1959	789,342
1960	848,275
1961	859,025
1962	1,138,325
1963	1,264,150
1964	1,245,061

2. Employment by Type of Industry, 1955 - 1964

<u>Year</u>	<u>Fishing</u>	<u>Fish Culture</u>	<u>Processing</u>	<u>Total</u>
1955	422,831	202,607	53,341	678,779
1956	456,727	223,532	47,896	728,155
1957	507,286	224,849	47,495	779,630
1958	531,550	230,532	44,856	806,938
1959	536,942	218,302	35,019	789,342
1960	569,942	238,954	39,379	848,275
1961	545,525	271,291	42,209	859,025
1962	617,738	421,925	44,662	1,138,325
1963	793,369	431,130	39,651	1,264,150
1964	791,743	419,248	34,070	1,245,061

3. Breakdown of Fishing Population by Type of Employment, 1958-1964

<u>Year</u>	<u>Fishing as Main Occupation</u>	<u>Fishing as Part-Time Occupation</u>	<u>Employees</u>	<u>Total</u>
1958	184,155	381,606	241,177	806,938
1959	228,137	361,251	199,954	789,342
1960	178,054	401,359	268,862	848,275
1961	238,829	436,091	184,105	859,025
1962	235,408	686,460	216,457	1,138,325
1963	290,153	710,073	263,924	1,264,150
1964	287,032	703,117	254,912	1,245,061

Source: Bureau of Fisheries
Ministry of Agriculture and Forestry
ROK Government

APPENDIX 2-A

FISHING CONDITIONS OF SAURY IN THE ADJACENT WATERS OF KOREA 1/

Summary

1. This report is based on records of both fishing conditions for Pacific saury, Cololabis saira (BREVOORT), and of oceanographic conditions along the coast of the Eastern Sea of Korea collected by our agency during the period from 1926 to 1963.
2. We directed particular attention to data covering gill net fishing for saury which forms the main part of the saury yield in Korea.
3. It is the main objective here to evaluate the relationship between the fishing conditions for saury and the oceanographic conditions, and to provide evidence that water mass boundary zone affects formation of saury fishing ground.
4. The results obtained from the studies are summarized as follows:
 - (1) In Korea the total annual catches of saury attain 0.7-0.9% (14-year average 4.2%) of total annual catches of all fisheries and those by fishery gill net fishery attain 96% and over.
 - (2) Annual catches of saury have gradually increased in amount since 1951, showing 30×10^3 M/T in 1959, 40×10^3 M/T in 1962, but it remarkably decreased to 12.6×10^3 M/T in 1963. The average annual catch for the past 14-year is 15.6×10^3 M/T, and the variation coefficient C x is 0.72; thus it shows irregular fluctuations by year. The remarkable decrease in 1963 is due perhaps to varying availability affected by oceanographic conditions.
 - (3) Saury gill net fishing in the Eastern Sea area of Korea begins around mid-January, reaches its peak in April, May or June and terminates in July, in northward moving term. In southward moving of fall-winter season, it begins again in October and terminates in December. Annual catches of saury migrating northward by gill net fishing attain 94.5% of those in Korea, while those of saury migrating southward attain 5.5%.

APPENDIX 2-A (Page 2)

- (4) Of the five years from 1959 to 1963 C.P.U.E. for saury migrating northward showed 14.6 kg., while in the southward moving it showed 8.1 kg. and that of average showed 14.0 kg. during the whole fishing season. C.P.U.F. showed higher value in the years 1959, 1961 and 1962 than in the years 1960 and 1963.
- (5) Its fishing ground was formed within connecting line of Tsushima, Ulnung-do and Kojin. Differing from the usual trend as noted above, there was an exceptional case as recognized in 1963 when the fishing ground extended to within 120-150 miles off the coast.
- (6) Regarding the relation between the oceanographic conditions and the formation of fishing grounds, we find that:
 - (i) The northward moving of the fishing ground varies in its tempo by year; when the warm current is strong the tempo is quick and vice versa.
 - (ii) In the year when the cold current was strong and the fishing ground was elongated to the eastward being apart from the coast, fishing conditions showed poor catches.
 - (iii) In those years when the cold water and the warm current are strong, and the water mass boundary zone is well recognized in the waters near and off Kangwon Province, the saury catches are good, above the average.
 - (iv) When the boundary zone formed by recognized coastal upswelling along the coast and the distribution of surface water temperature shows quite a different form from that of the middle layer, good fishing ground is formed in this area.
 - (v) It seems that the zone of favorable catch coincides with water mass boundary zones, especially in the northward moving season.
- (7) The surface water temperature in which saury are caught during the whole fishing season varies from 9 degrees C to 22 degrees C in the Eastern Sea area of Korea. Judging from the oceanographic conditions and the following equations, $N = Noe$, the optimum water temperature for saury migration seems to be 14-18 degrees C, showing that 16 degrees C is the most favorable temperature for catch.
- (8) Based on comparison of sea surface temperatures and landings from 1957 to 1963, it is suggested that warm water does not always indicate good fishing, but widespread cold water is detrimental to the fishery.

APPENDIX 2-A (Page 3)

- (9) In the northward moving term, saury were caught in the saline (33.000/00) water. As for the seasonal change of T-S relation, saury were not caught in the summer when the high temperature (22°C), low saline (32.000/00) water was widespread in the fishery area.
- (10) The migratory route of saury was estimated to be the oceanographic conditions and fishing conditions.
- (11) Saury gill net fishery is conducted in the Korea Strait near Pusan and Taibeon in November-February. This proves that a small group of saury population hibernates in this area.

APPENDIX 2-B

OBSERVATIONS ON SHRIMP FISHERY AND ITS
FISHERY BIOLOGY IN THE EASTERN KOREAN WATERS 1/

Summary

1. Pink shrimp (*pandalus borealis* KROYER) and hump back (*Pandalus hypsinotus* BRANDT) are fished with commercial shrimp trawling and Danish seining fishery in the eastern waters of Korea. This report deals with shrimp fishery, its changes in abundance and its fishery biological studies during the period from 1961 to 1965.
2. Judging from the fisheries fluctuation between 1959 and 1964, the total catch is increased annually, but the catch per unit effort, with the exception of increase during the period from 1959 to 1961, is decreased after 1962.
3. It seems that the larva of hump back inhabits in the coastal region during the period between spring and summer, but migrates to the deep waters as the winter comes.
4. Pink shrimp is mostly found more deeply than hump back.
5. The relationships between carapace length (X) and total body (Y) in pink shrimp and hump back are designated as following equations:
$$Y = 4.97 + 3.39X \text{ (Pink Shrimp)}$$
$$Y = 2.33 + 4.37X \text{ (Hump back)}$$
6. Carapace length in pink shrimp is 1.1 cm to 5.0 cm in female and 1.1 cm to 4.0 cm in both male and neuter, and the mode is 3.1 cm to 4.0 cm female and 2.1 cm to 3.0 cm in both male and neuter.
7. In general, the major spawning season is confined during the period from the end of April to May.
8. It is most likely that the chief hatching is carried out within the very short period during March to April.
9. Eggs are carried for 10 months or more.
10. The moulting of females occurs mainly just before spawning of March to May and immediately after hatching.
11. The extent of the optimum water temperature with respect to living is 2.7°C to 6.9 C in hump back and 2.3°C to 6.9°C in pink shrimp. The southern limit in distribution is adjacent to lat. 35°N and bottom water temperature of the most catch is 9.2 C in both.

1/ Prepared by Bu Kwan Chung and Seong Jae Yoo, ROK.

APPENDIX 2-B (Page 2)

12. From the fact that the appearance rate of neutral small individuals is greater in the southern part than in the northern part, it seems that the sexual transition depends upon water temperature.

APPENDIX 2-C

STUDY OF THE FISHING EFFORT AND CATCH
PER UNIT EFFORT IN LARGE TRAWL FISHERY 1/

Summary

1. According to the monthly catch, number of cruise and tow, the main fishing season of the large trawl fishery by the region is as follows:

<u>Region</u>	<u>Main Fishing Season</u>
2nd	Nov. to Feb.
3rd	Nov. to May (March to May is the most favorable season)
4th	Feb. to Mar., Nov. to Dec.
5th & 6th (Danish seine)	Mar. to Apr., Nov. to Dec.
" " " (Two-boat type) (Pusan)	Mar. to Apr., Nov. to Dec.
" " " (Two-boat type) (Yeosu)	Nov. to Feb.

2. After 1958, the total catch is increased in proportion to the fishing effort for the two-boat type fishery in the 5th and 6th regions, but on the contrary, is not increased in the 3rd and 4th regions.

3. Statistically, the catch per cruise shows the normal distribution during the main fishing season, and shows logarithmic normal distribution in the other season; therefore, the catch per cruise generally shows the stable conditions during the fishing seasons.

4. The mean catch per unit effort was 0.19 ton in the 3rd region, 0.18 in the 4th region, 0.22 ton for danish seine and 0.36 ton for the two-boat type in the 5th and 6th regions. The highest mean catch per unit effort is 0.36 ton for the two-boat type in the 5th and 6th regions and it is much the same as in 1960, but in the other regions it is decreased. In the main fishing season, the catch was generally increased.

5. The mean catch per unit effort in the operational districts was the highest in the No. 7th, and it was over 700 kgr.; Nos. 6th, 7th and 5th follow which were between 600 - 300 kgr.

6. The total catch of the large trawl fishing in 1961 is 46,000 tons and holds ten percent of the total landings of Korea. It is decreased by 7.3 percent in comparison with that of 1958, which was 50,021 tons.

1/ Prepared by Kim Yong An

APPENDIX 2-C (Page 2)

7. The catch is highest in the 5th and 6th regions and shows 77.3 percent of the total catch; the 4th, 3rd and 2nd regions follow in order.

8. The catch on the important species (mix ratio) is highest on flounders which shows 169 percent, and follows in order: yellow sea corvenia, cod, dog fish, skate, stingray, halibut.

9. The catch in order by the regions is as follows:

<u>Region</u>	<u>Catch, in order</u>
2nd	Alaska pollack, sand fish, cod, flounder (Pseudoplenronectes herzensteini)
3rd	Flounder (P. herzensteini), shrimp, crab, alaska pollack, dog fish
4th	Sea bass, dog fish, flounders, flounder (Pseudoplenronectes herxensteini)
5th & 6th (Danish seine)	Cod, flounder (P. herzensteini), flounders, dog fish, halibut
5th & 6th (Two-boat type) (Pusan)	Yellow sea corvenia, skate, stingray, croaker
5th & 6th (Two-boat type) (Yeosu)	Yellow sea corvenia, flounder (P. her- zensteini), croaker, gangdali

10. Generally the catch per tow on the important species increased on the flounders, dog fish, sea bass and shrimp, etc., but decreased on flounders (P. herzensteini), specially on yellow sea corvenia, hair tail and white corvenia, etc.

APPENDIX 2-C (Page 3)

Table 1: MONTHLY TOTAL CATCH AND FISHING EFFORTS IN EACH REGION IN 1960

<u>Month</u>	<u>Regions</u>								
	<u>2nd</u>			<u>3rd</u>			<u>4th</u>		
	<u>Total</u> <u>Catch</u> <u>M/T</u>	<u>No.</u> <u>of</u> <u>Trip</u>	<u>No.</u> <u>of</u> <u>Haul</u>	<u>Total</u> <u>Catch</u> <u>M/T</u>	<u>No.</u> <u>of</u> <u>Trip</u>	<u>No.</u> <u>of</u> <u>Haul</u>	<u>Total</u> <u>Catch</u> <u>M/T</u>	<u>No.</u> <u>of</u> <u>Trip</u>	<u>No.</u> <u>of</u> <u>Haul</u>
1	138.6	166	1,029	308.9	153	964	584.4	29	2,059
2	157.2	139	834	266.6	249	1,494	816.7	50	3,775
3	136.1	136	830	201.6	218	1,483	632.0	36	2,538
4	107.9	163	973	281.8	239	1,769	305.2	34	1,982
5	61.7	80	480	518.2	260	1,612	224.1	21	1,262
6	-	-	-	351.9	130	937	48.4	6	226
9	64.0	56	392	35.0	30	156	553.5	60	2,784
10	183.4	195	1,268	120.8	139	1,015	402.7	52	1,971
11	261.7	118	755	212.5	157	1,115	709.7	51	3,549
12	338.6	120	804	339.7	173	1,073	518.0	46	2,792
<u>Total</u>	<u>1,449.2</u>	-	-	<u>2,637.0</u>	<u>1,748</u>	<u>11,618</u>	<u>4,794.7</u>	<u>385</u>	<u>22,918</u>

<u>Month</u>	<u>Regions</u>								
	<u>5th & 6th</u> <u>(Danish Seine)</u>			<u>5th & 6th</u> <u>(Two-boat Type)(Pusan)</u>			<u>5th & 6th</u> <u>(Two-boat Type)(Yeosu)</u>		
	<u>Total</u> <u>Catch</u> <u>M/T</u>	<u>No.</u> <u>of</u> <u>Trip</u>	<u>No.</u> <u>of</u> <u>Haul</u>	<u>Total</u> <u>Catch</u> <u>M/T</u>	<u>No.</u> <u>of</u> <u>Trip</u>	<u>No.</u> <u>of</u> <u>Haul</u>	<u>Total</u> <u>Catch</u> <u>M/T</u>	<u>No.</u> <u>of</u> <u>Trip</u>	<u>No.</u> <u>of</u> <u>Haul</u>
1	116.9	6	426	-	-	-	1,149.0	33	3,128
2	330.7	13	764	-	-	-	720.5	21	2,139
3	758.7	35	2,741	-	-	-	809.5	25	2,685
4	422.2	25	2,408	-	-	-	844.2	24	2,309
5	322.1	17	1,408	-	-	-	376.6	18	1,666
6	45.5	3	204	-	-	-	144.6	8	653
9	658.8	52	2,376	48.0	15	1,271	388.3	11	994
10	1,148.5	78	4,399	994.5	26	2,509	556.8	20	1,518
11	1,597.0	75	6,398	882.6	23	2,318	982.2	17	1,569
12	1,841.0	109	7,717	1,038.4	23	2,059	906.8	23	1,656
<u>Total</u>	<u>7,241.4</u>	<u>413</u>	<u>28,841</u>	<u>3,395.5</u>	<u>87</u>	<u>8,157</u>	<u>6,878.5</u>	<u>200</u>	<u>18,317</u>

APPENDIX 2-C (Page 4)

Table 2: MONTHLY TOTAL CATCH AND FISHING EFFORTS IN EACH REGION IN 1961

<u>Month</u>	<u>Regions</u>								
	<u>2nd</u>			<u>3rd</u>			<u>4th</u>		
	<u>Total</u>	<u>No.</u>	<u>No.</u>	<u>Total</u>	<u>No.</u>	<u>No.</u>	<u>Total</u>	<u>No.</u>	<u>No.</u>
<u>Catch</u>	<u>of</u>	<u>of</u>	<u>Catch</u>	<u>of</u>	<u>of</u>	<u>Catch</u>	<u>of</u>	<u>of</u>	
<u>M/T</u>	<u>Trip</u>	<u>Haul</u>	<u>M/T</u>	<u>Trip</u>	<u>Haul</u>	<u>M/T</u>	<u>Trip</u>	<u>Haul</u>	
1	452.5	270	1,647	347.1	239	1,399	450.5	44	2,552
2	236.5	154	924	299.5	210	1,171	622.7	66	2,792
3	273.9	223	1,360	388.1	220	1,373	636.4	59	2,973
4	186.5	180	1,080	242.3	208	1,552	420.8	47	2,694
5	14.7	18	108	182.7	90	1,584	312.7	36	2,308
6	-	-	-	242.7	82	836	82.3	7	509
9	48.9	42	294	83.6	58	426	317.9	36	1,962
10	331.3	197	1,281	103.1	100	807	387.0	35	2,332
11	289.8	304	1,946	209.9	184	1,466	657.2	79	3,579
12	286.3	348	2,332	269.9	211	1,725	445.9	34	2,049
<u>Total</u>	<u>2,120.4</u>	<u>1,736</u>	<u>10,972</u>	<u>2,368.</u>	<u>1,602</u>	<u>12,339</u>	<u>4,33.4</u>	<u>443</u>	<u>24,650</u>

<u>Month</u>	<u>Regions</u>								
	<u>5th & 6th</u>			<u>5th & 6th</u>			<u>5th & 6th</u>		
	<u>(Danish Seine)</u>			<u>(Two-Boat Type)(Pusan)</u>			<u>(Two-Boat Type)(Yeosu)</u>		
<u>Total</u>	<u>No.</u>	<u>No.</u>	<u>Total</u>	<u>No.</u>	<u>No.</u>	<u>Total</u>	<u>No.</u>	<u>No.</u>	
<u>Catch</u>	<u>of</u>	<u>of</u>	<u>Catch</u>	<u>of</u>	<u>of</u>	<u>Catch</u>	<u>of</u>	<u>of</u>	
<u>M/T</u>	<u>Trip</u>	<u>Haul</u>	<u>M/T</u>	<u>Trip</u>	<u>Haul</u>	<u>M/T</u>	<u>Trip</u>	<u>Haul</u>	
1	1,773.2	125	7,352	471.0	14	1,278	899.9	31	1,806
2	1,907.1	176	8,166	697.7	20	2,168	859.0	30	2,251
3	1,954.2	137	8,534	690.4	26	2,784	823.3	25	2,160
4	2,009.3	138	9,831	1,351.9	28	3,330	866.0	24	2,624
5	1,229.4	99	7,308	805.9	18	1,537	667.0	26	1,664
6	136.6	19	1,143	110.9	4	396	76.5	6	404
9	579.1	48	2,907	302.7	12	1,099	340.8	15	905
10	780.8	43	3,440	455.5	19	1,444	641.2	29	2,239
11	1,887.8	114	9,164	825.5	23	2,337	1,021.9	29	3,246
12	1,845.2	88	6,409	1,797.9	38	4,144	1,368.5	38	3,647
<u>Total</u>	<u>14,152.7</u>	<u>987</u>	<u>64,254</u>	<u>7,779.4</u>	<u>202</u>	<u>22,714</u>	<u>7,564.1</u>	<u>253</u>	<u>20,946</u>

APPENDIX 2-D

HORSE MACKEREL (TRACHURUS JAPONICUS) DISTRIBUTED IN ADJACENT WATERS TO KOREA 1/

Introduction

1. The yearly product of horse mackerel (*Trachurus japonicus*) is about 20,000 M/T and they have been caught mainly by Purse-seine fishery which is the biggest unit scale fishery of all. So the rise and fall of the resources have much influence on our fishery. According to the importance of the resources the fundamental research has been done since 1958 as continuous research of the resource field. We have now made a resource report here by the following data and methods.

Methods and Data

2. We have done catch survey of trawl and stow net fisheries by sampling survey methods in fisheries markets of Inchon, Gunsan, Mokpo, Teosu and Pusan, and the data being taken in this report are from sampled boats that have had the catch of horse mackerel only; catch statistics of Purse-seine fishery has been arranged by fishing grounds, month and 10 days interval with daily report of fishing aspects issued by the Purse-seine Fisheries Cooperative Association. For the ecological studies we have bought 30 fresh fish samples once every 10 days, which are unloaded fish in the Pusan Fish Market, and have done precise measurement on meristic characters body length, body weight, number of dorsal fin, number of pectoral fin, number of anal fin, sex identification and age determination in the laboratory and in every measurement the nearest centimeter has been taken. The body length taken in this report is standard length to keel and the age of the fish has been determined by otolith.

Summary

3. Annual catch of horse mackerel has decreased since 1959.
4. The catch has decreased and the fishing term has been shortened in the western water fishing grounds - main one in former years - and the fishing grounds of Je-joo and Keu-moon Island have been the main ones in recent years.
5. Shoaling nature of the fish is greatest in June - August.

1/ Prepared by Chang Ki Ree and Seong Taek Jeun, ROK.

APPENDIX 2-D (Page 2)

6. Fishing conditions between southwestern waters and western waters of Korea have nothing in common.
7. Judging from the catch of mixed ratio, less than 3% in large trawl fishery and 1.5% in stow net fishery, the horse mackerel have diversal natures during bottom living terms.
8. Sufficient relation reckoned by the annual catch of mackerel and horse mackerel - XY 0.1138; they are not supposed to be competitive in race to each other.
9. The result of tests by methods of mean value show no significance in the number of soft ray of the second dorsal fin, anal fin and pectoral fin of two groups - one group in western waters and the other group in southwestern waters; there is significant difference in the composition of body length.
10. The length composition by fishing grounds shows that the group migrating to western waters are bigger in size, mode of 30 cm., and medium sized ones, mode of 25 cm., migrate to southwestern waters. Hence, the migrating and feeding ground of bigger-sized ones is the western sea region while that of the medium and less than medium-sized is the south sea region.
11. The lowest living temperature of the fish is 6°C.
12. The bigger-sized fish appears early, in the Je-joo fishing grounds, and later, in O'chong fishing grounds.
13. The horse mackerel migrating to Korean waters is supposed to be in two groups: one passing through the eastern coast of Je-joo to the southern waters, and the other, passing through the western coast to western waters.
14. The annual sex composition shows that the female is 61-68% and the female composition ratio is higher in the terminal fishing terms.
15. Fatness shows the lowest in June to September, and lower in western waters than in southern waters - in the same fishing terms. By the above result the main spawning ground might be western waters.
16. Judging from the results of items 4. and 10. above, the number of adults in the total migrating group has decreased; therefore, resources are in unstable conditions.

APPENDIX 2-E

OBSERVATIONS ON THE CATCH STATISTICS 1/
OF LARGE TRAWL FISHERY IN PUSAN

Summary

1. In the large trawl fishery which is based in Pusan, this year the catch is 25,333 M/T and occupied 55.3 percent of the total catch (42,529 M/T), fished by this fishery throughout the country. The catch according to the scale of fishing boats is as follows:

<u>Scale of Boats</u>	<u>Number of Boats</u>	<u>Catch</u>
Class 3 (30-50 M/T)	390	3,842.5 M/T
Class 4 (50-100 M/T)	890	11,291.3 M/T
Class 5 (more than 100 M/T)	264	10,099.5 M/T

2. With respect to the relationship between the number of cruise days and the catch per cruise, the former is correlative highly to the latter as the fishing boats are increase in its scale, as it were the correlation coefficient shows 0.69 in class 3, 0.74 in class 4, and 0.77 in class 5.

3. The catch per cruise has a negative correlation to the coefficient variation, which is 0.71-0.21 in class 3, 0.67-27 in class 4 and 0.53-0.27 in class 5; judging from the deviation of the coefficient variation the class 5 is most stable in the management of fishery.

4. Fish, which are included within the tenth rank in the catch, are sand fish, red sea bream, shrimp and crab in class 3; sand fish, white corvenia and red sea bream in class 4, white corvenia and cod in class 5; fish, which are slipped out of position within the tenth rank as compared with 1961 are puffer, cod and bastard in class 3, and red gannard in class 4. In comparison with 1961, sand fish in the eastern waters of Korea and cod in the western waters are increased considerably in catch.

5. In each fish, the region and season the rate of mixed catch is highest are as follows:

<u>Fish</u>	<u>Season</u>	<u>Region</u>
Yellow corvenia	September	F (the western sea)
Sole	April May	V (the southern sea)
Ray	April May	A, B (the western sea)
Sand Fish	October	T (the eastern sea)
Cod	March April	C (the western sea)
Sea Bass	May June	L, M)the southern sea)

1/ Prepared by Chung Soon Kwak, ROK.

APPENDIX 2-E (Page 2)

6. Since 1960 in class 3 and 1958 in class 4, the catch per cruise has been decreased as days of cruise have been decreased. In class 5, since 1960 days of cruise have been decreased but the numbers of tow per cruise have been increased, so the catch per cruise seems nearly constant, but the catch per tow tends to decrease together in each scale of fishing vessels.

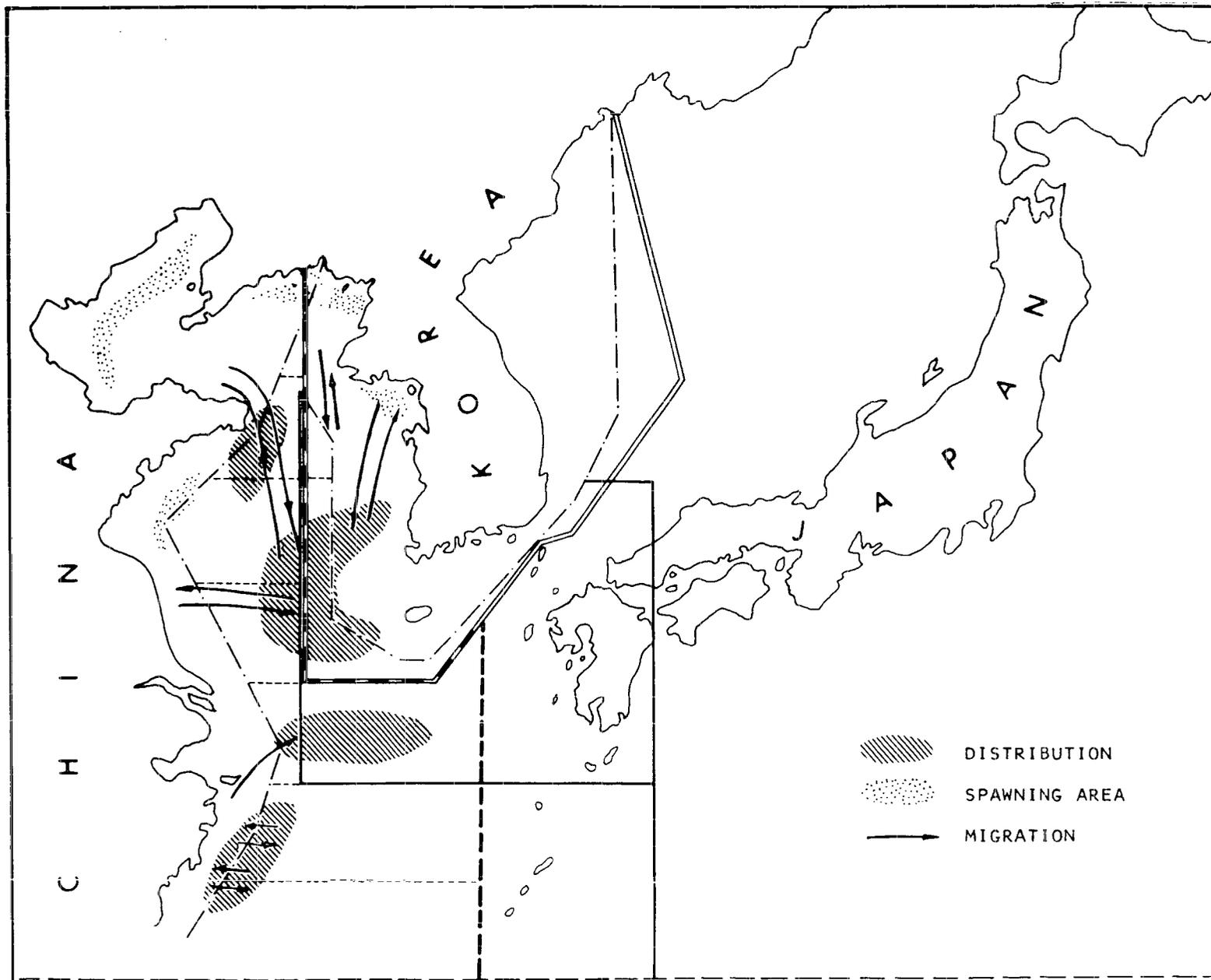
APPENDIX 2-E (Page 3)

Table 1: FISHING EFFORTS AND CATCH PER UNIT EFFORT, 1962

<u>Month</u>	<u>Class 3 (30 - 50)</u>					
	<u>Total</u>	<u>Monthly</u>	<u>Monthly</u>	<u>Average Catch</u>	<u>Average Catch</u>	<u>Monthly</u>
	<u>Catch</u>	<u>Trips</u>	<u>Hauls</u>	<u>Per Trip</u>	<u>Per Haul</u>	<u>Coefficient</u>
	<u>M/T</u>			<u>In Month</u>	<u>In Month</u>	<u>Variation</u>
				<u>M/T</u>	<u>M/T</u>	
1	601.4	60	3,114	9.90	19	0.28
2	294.9	39	1,787	7.70	16	0.71
3	401.8	31	2,121	12.90	19	0.21
4	248.1	23	1,349	10.80	18	0.36
5	284.9	45	1,829	6.30	16	0.50
6	247.6	30	1,259	8.20	19	0.55
9	299.6	42	1,551	7.10	19	0.62
10	645.1	44	2,112	14.60	30	0.39
11	355.3	35	1,956	10.20	18	0.43
12	464.2	41	2,216	11.30	21	0.34
<u>Total</u>	<u>3,842.5</u>	<u>390</u>	<u>19,288</u>	<u>Average</u>	<u>Average</u>	<u>Average</u>
				<u>9.80</u>	<u>20</u>	<u>0.44</u>
<u>Class 4 (30 - 50)</u>						
1	1,266.4	82	4,958	15.40	25	0.63
2	1,290.2	99	6,420	13.00	20	0.69
3	1,514.7	89	5,991	17.00	25	0.40
4	1,305.2	94	5,790	13.90	23	0.43
5	1,157.2	103	7,004	11.20	17	0.48
6	374.4	45	2,148	8.30	17	0.67
9	707.3	88	3,300	8.00	21	0.75
10	1,775.5	100	6,345	17.80	27	0.32
11	933.9	66	5,194	14.20	18	0.27
12	966.5	84	5,613	11.50	17	0.48
<u>Total</u>	<u>11,291.3</u>	<u>850</u>	<u>52,769</u>	<u>Average</u>	<u>Average</u>	<u>Average</u>
				<u>13.30</u>	<u>22</u>	<u>0.47</u>
<u>Class 5 (100 -)</u>						
1	545.9	18	1,271	30.30	43	0.29
2	1,416.9	34	3,824	41.60	37	0.33
3	1,145.8	25	2,433	45.80	47	0.33
4	1,438.9	32	3,451	44.90	42	0.29
5	1,208.6	29	3,120	41.70	38	0.37
6	-	-	-	-	-	-
9	583.5	21	1,064	27.70	54	0.31
10	1,317.6	38	4,823	34.60	27	0.53
11	1,700.1	43	4,342	39.50	39	0.43
12	742.2	24	2,563	30.90	29	0.47
<u>Total</u>	<u>10,099.5</u>	<u>264</u>	<u>26,891</u>	<u>Average</u>	<u>Average</u>	<u>Average</u>
				<u>38.20</u>	<u>38</u>	<u>0.45</u>

DISTRIBUTION, SPAWNING AREA AND MIGRATION OF CROAKER

APPENDIX 2F

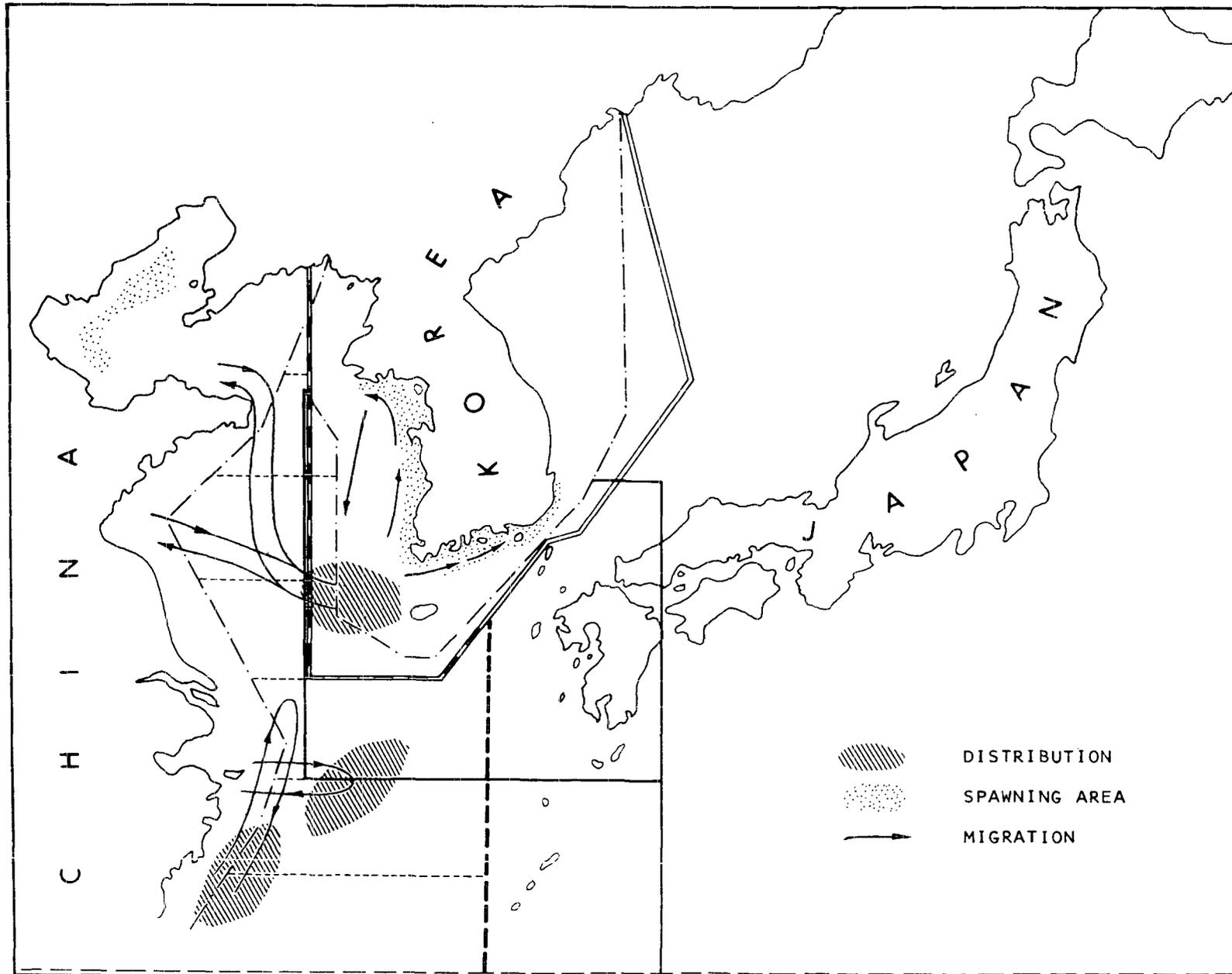


MAY 1966

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DISTRIBUTION, SPAWNING AREA AND MIGRATION OF HAIRTAIL

APPENDIX 26

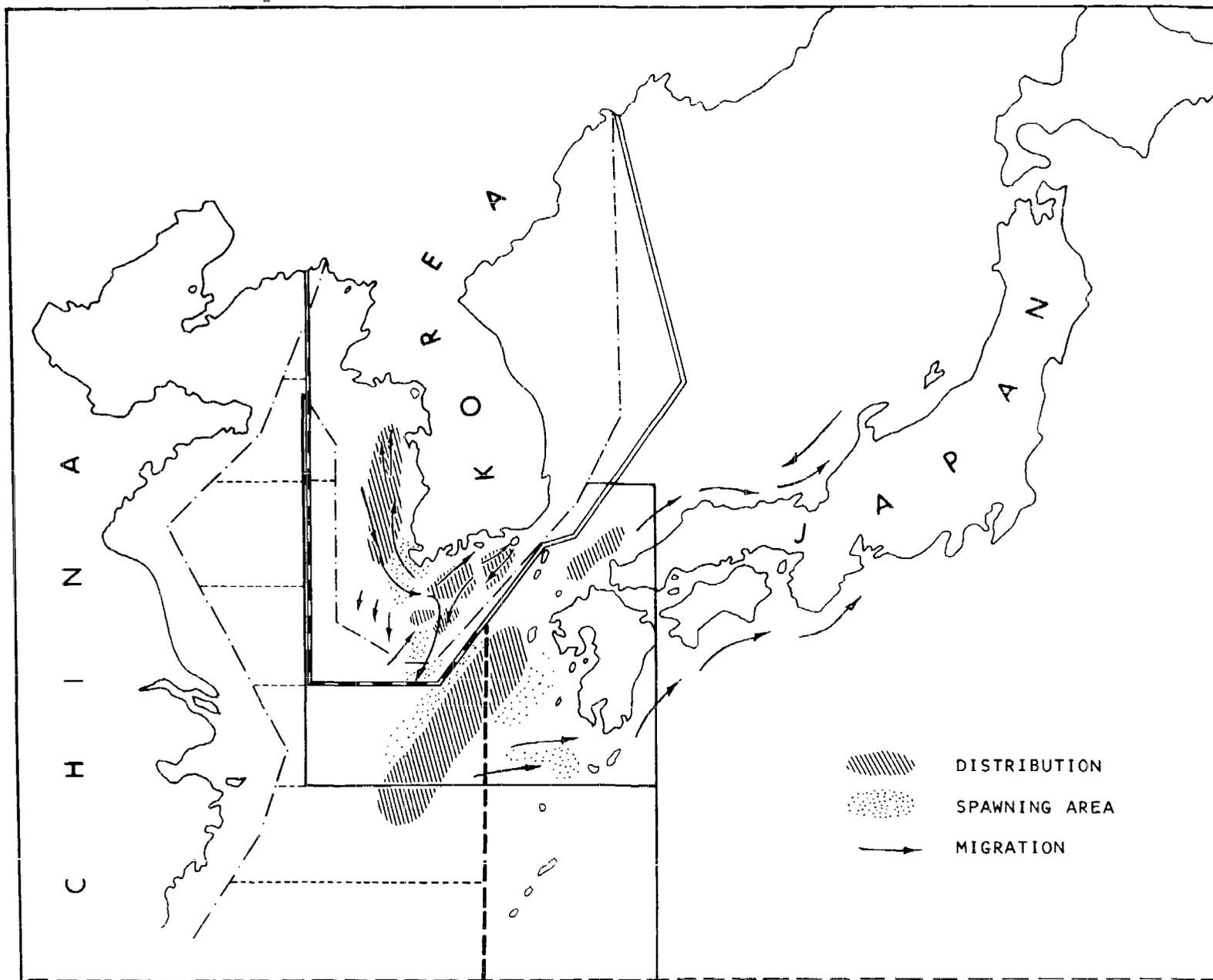


MAY 1966

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DISTRIBUTION, SPAWNING AREA AND MIGRATION OF HORSE MACKEREL

APPENDIX 2H

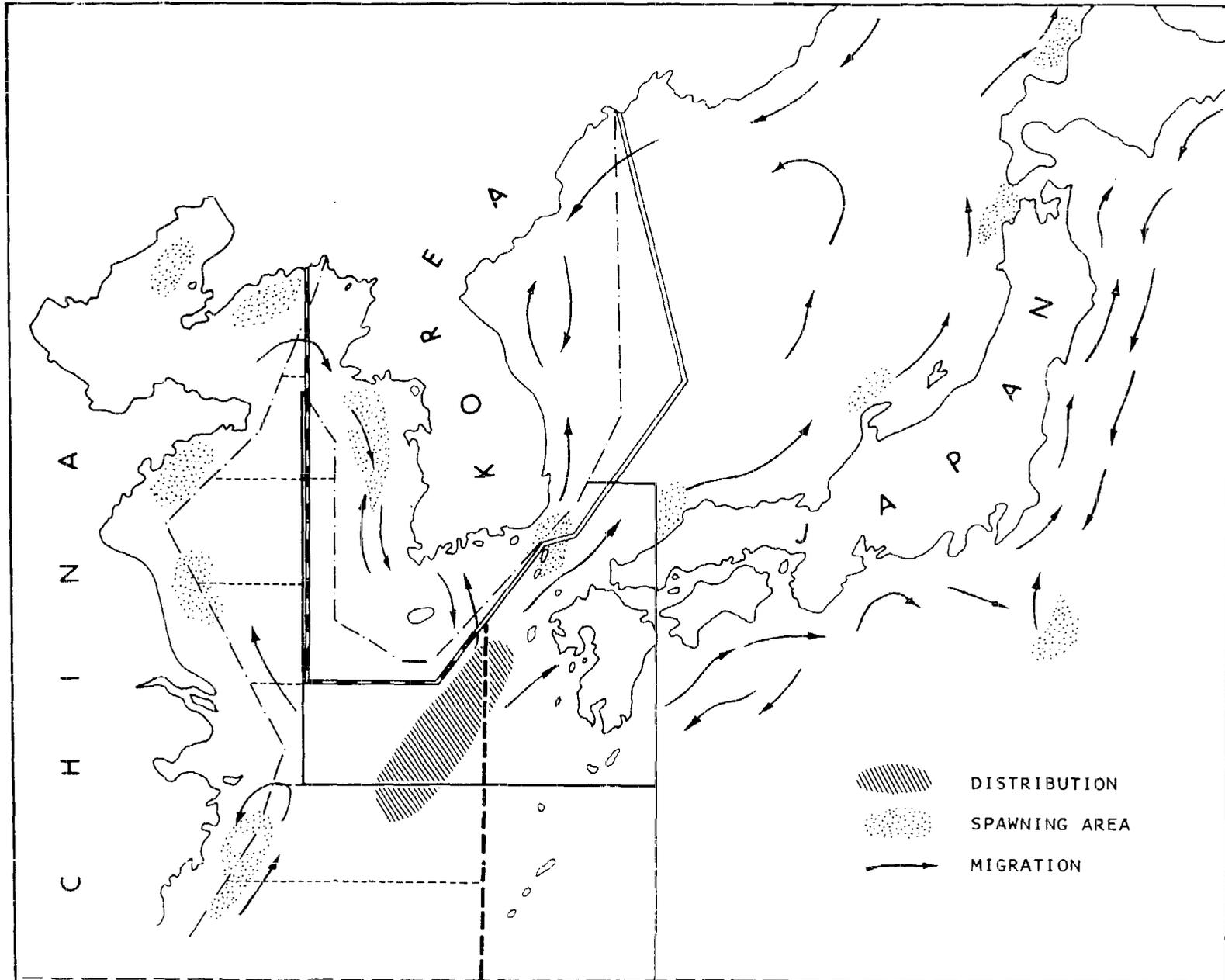


MAY 1966

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DISTRIBUTION, SPAWNING AREA AND MIGRATION OF MACKEREL

APPENDIX 21

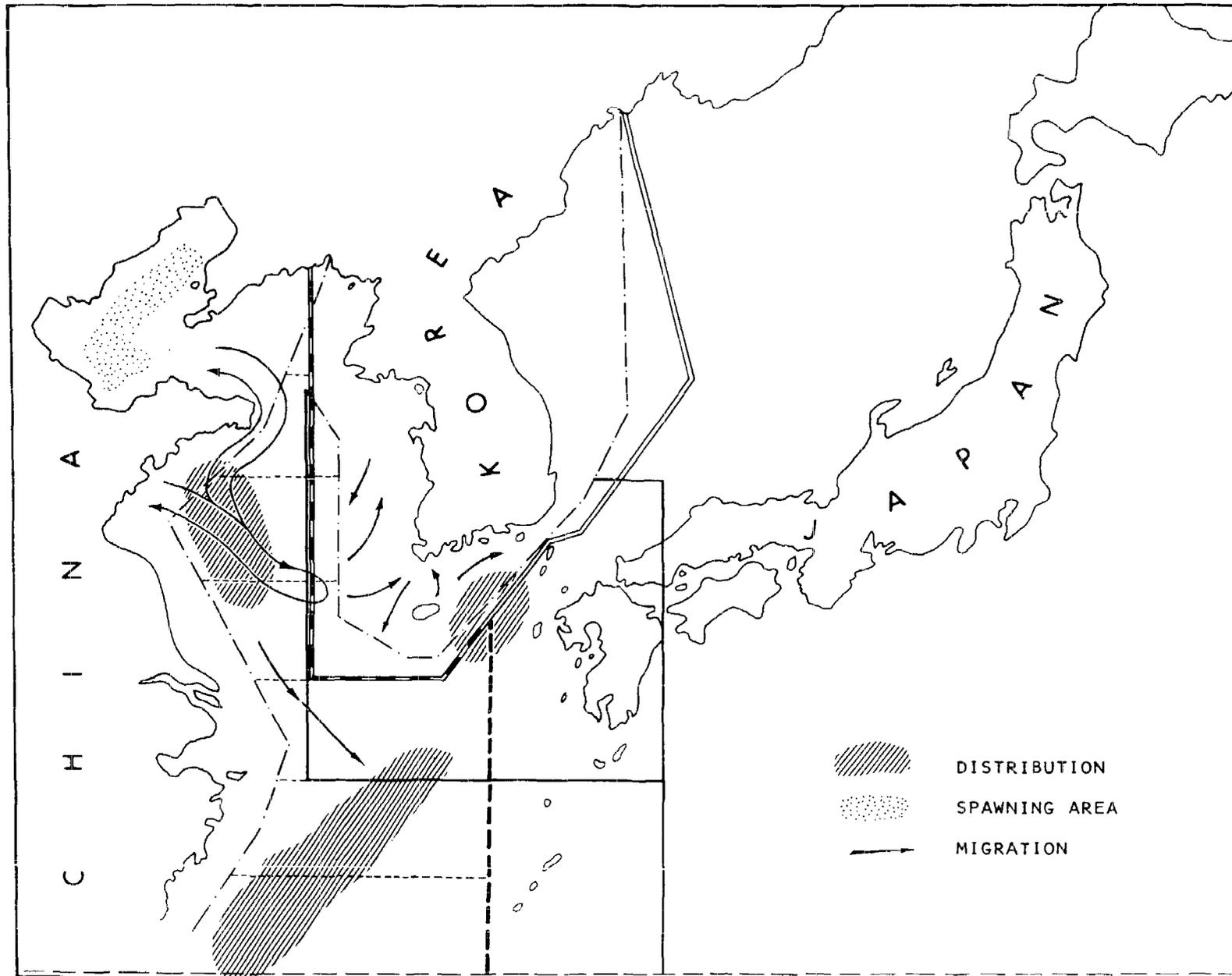


MAY 1966

IBRD-1775

DISTRIBUTION, SPAWNING AREA AND MIGRATION OF SEA BREAM

APPENDIX 2J

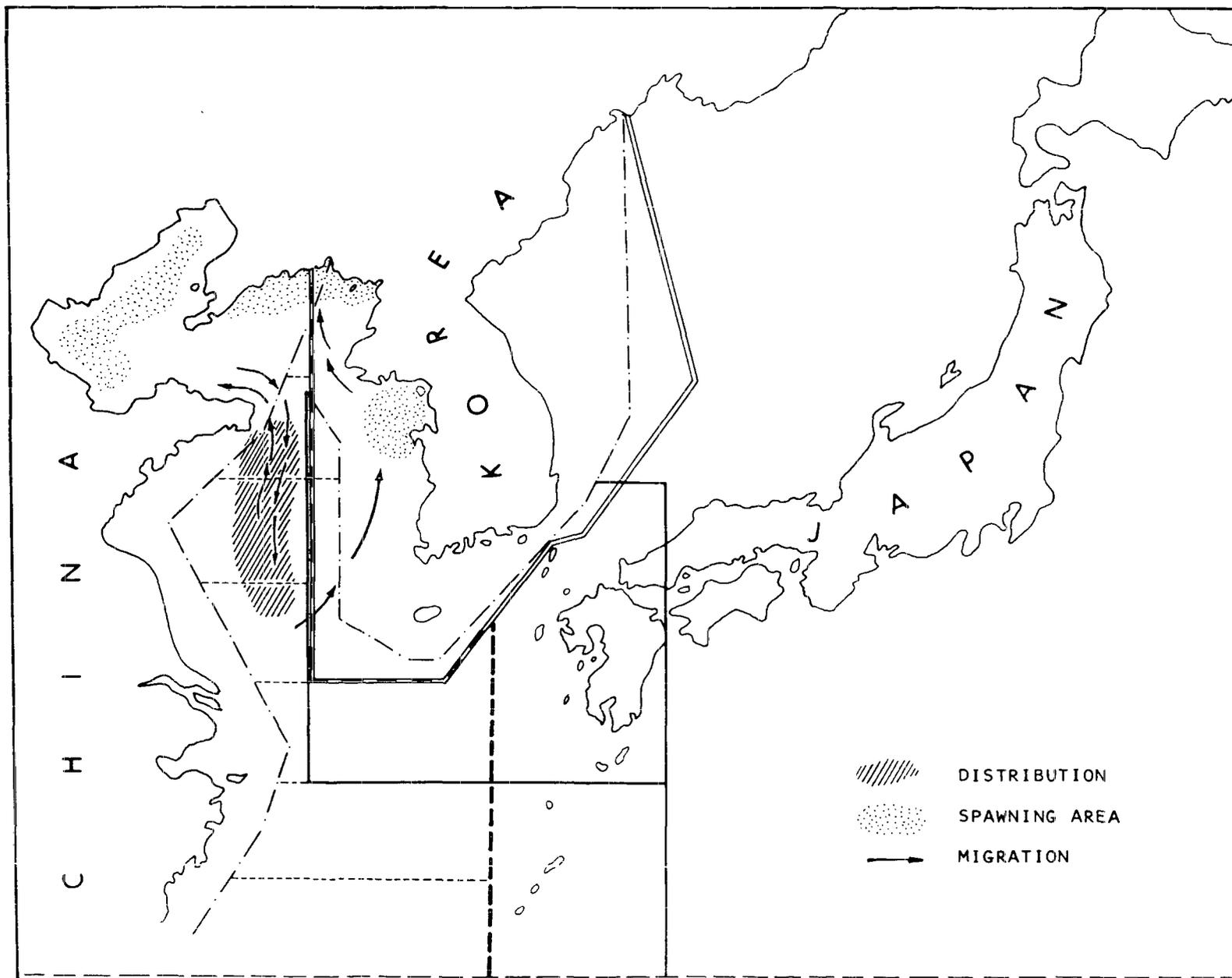


MAY 1966

IBRD-1773

DISTRIBUTION, SPAWNING AREA AND MIGRATION OF SHRIMP

APPENDIX 2K

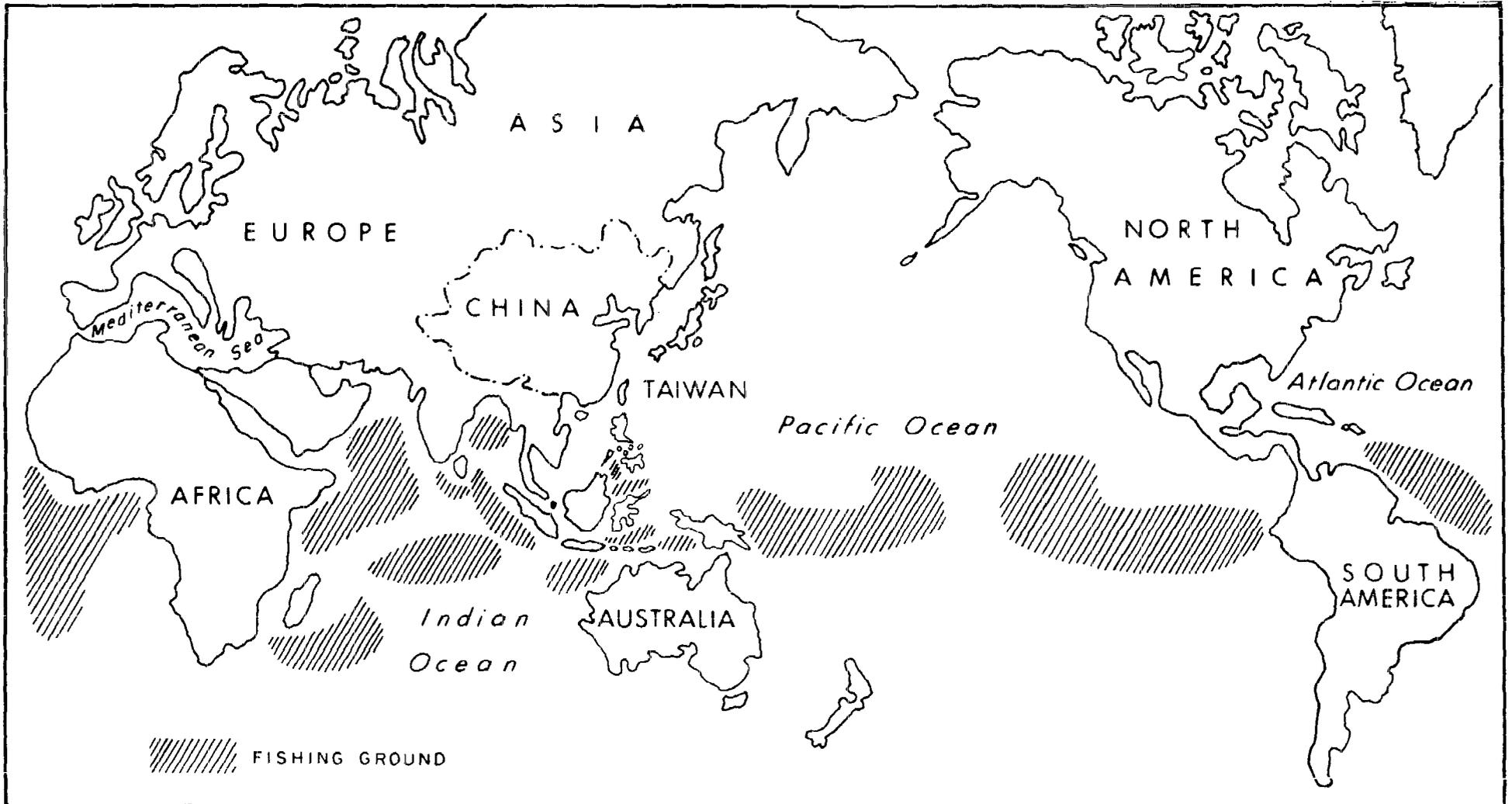


MAY 1966

IBRD-1774

TUNA FISHING GROUNDS

APPENDIX 2L



MAY 1966

IBRD-1768

APPENDIX 3-A

CLASSIFICATION OF FISHING BOATS BY SIZE AND AGE, 1964

<u>Wooden-Non-Powered</u>		<u>Under</u> <u>5 yrs.</u> <u>(30.4%)</u>	<u>5-10 yrs.</u> <u>(34.45%)</u>	<u>10-15 yrs.</u> <u>(15.2%)</u>	<u>15-20 yrs.</u> <u>(7.7%)</u>	<u>Over</u> <u>20 yrs.</u> <u>(12.3%)</u>
<u>Tonnage</u>	<u>Total</u> <u>Number</u>	<u>Number</u>	<u>Number</u>	<u>Number</u>	<u>Number</u>	<u>Number</u>
Under 2	32,400	9,850	11,146	4,925	2,495	3,985
2 - 2	7,347	2,233	2,527	1,117	566	904
5 - 10	1,456	443	501	221	112	178
10 - 15	567	172	195	86	44	70
15 - 20	443	135	152	67	34	55
Over 20	40	12	14	6	3	5
<u>Sub-Total</u>	<u>42,253</u>	<u>12,845</u>	<u>14,535</u>	<u>6,422</u>	<u>3,254</u>	<u>5,197</u>
 <u>Wooden Powered</u>						
Under 2	345	139	89	43	27	47
2 - 5	2,137	833	448	295	200	361
5 - 10	1,568	511	546	122	133	256
10 - 20	1,578	462	456	137	120	403
Over 20	773	196	155	158	155	109
<u>Sub-Total</u>	<u>6,401</u>	<u>2,141</u>	<u>1,694</u>	<u>755</u>	<u>635</u>	<u>1,176</u>
 <u>Steel</u>						
Under 100 tons	23	-	-	6	12	5
Over 100 tons	39	26	1	-	8	4
<u>Sub-Total</u>	<u>62</u>	<u>26</u>	<u>1</u>	<u>6</u>	<u>20</u>	<u>9</u>
 <u>GRAND TOTAL</u>	 <u>48,716</u>	 <u>15,012</u>	 <u>16,230</u>	 <u>7,183</u>	 <u>3,909</u>	 <u>6,382</u>

Source: Fisheries Statistics, 1964 - Bureau of Fisheries, Ministry of Agriculture, ROK

APPENDIX 3-B

CLASSIFICATION OF POWERED WOODEN VESSELS BY AGE

	<u>Under 2 Tons</u>	<u>2-5</u>	<u>5-10</u>	<u>10-20</u>	<u>20-30</u>	<u>30-50</u>	<u>50-100</u>	<u>Over 100 Tons</u>
<u>New Vessels</u>	7	33	40	33	8	2	5	-
1 year	12	95	88	89	24	12	5	-
2 year	32	191	91	124	36	11	9	-
3 "	40	250	151	97	23	10	6	-
4 "	48	234	141	119	19	6	20	-
5 "	36	165	115	130	10	1	14	-
6 "	15	89	99	112	9	10	7	-
7 "	11	76	160	81	16	7	16	1
8 "	9	56	83	77	18	1	16	-
9 "	18	62	89	56	6	5	18	-
10 "	3	60	25	28	2	10	13	1
11 "	10	59	24	22	-	2	25	1
12 "	14	72	25	26	7	14	53	-
13 "	3	50	23	21	-	-	8	1
14 "	13	54	25	40	7	3	11	-
15 "	8	39	39	34	4	5	12	-
Over 15	<u>66</u>	<u>552</u>	<u>350</u>	<u>489</u>	<u>58</u>	<u>88</u>	<u>96</u>	<u>1</u>
<u>Total</u>	<u>345</u>	<u>2,137</u>	<u>1,568</u>	<u>1,578</u>	<u>247</u>	<u>187</u>	<u>334</u>	<u>5</u>

Source: Fisheries Statistics, 1964, Bureau of Fisheries, Ministry of Agriculture, ROK

APPENDIX 3-C

CALCULATION OF MARKET VALUE OF FISHING BOATS, 1964

1. The market value ascribed to the fishing fleet was arrived at in the following way:

- (1) The fleet was divided into three boat categories, viz., non-powered wooden boats, powered wooden boats and steel boats.
- (2) Each category was classified by size and age according to the standard groupings adopted by the Bureau of Fisheries of ROK.
- (3) Using available data on construction costs for certain boat categories and sizes, average new boat values were established for each size group and category. The basic value scale arrived at was:

(a) New non-powered wooden boats:

Under 2 tons	-	\$	200
2 - 5 tons	-		1,200
5 - 10 tons	-		3,200
10 - 15 tons	-		5,200
15 - 20 tons	-		7,200
Over 20 tons	-		10,000

(b) New powered wooden boats:

Under 2 tons	-	\$	300
2 - 5 tons	-		1,300
5 - 10 tons	-		4,000
10 - 20 tons	-		7,500
Over 20 tons	-		20,000

(c) New steel boats:

Under 100 tons	-	\$50,000
Over 100 tons		
- Longliners	-	150,000
- Trawlers, etc.		94,000

- (4) Depreciation was set at 6% per year.
- (5) Boats exceeding 20 years of age were not given any market value, it being assumed that craft attaining that age were fully depreciated and used up.

APPENDIX 3-C (Page 2)

Table 1: CALCULATED MARKET VALUE OF WOODEN BOATS BY SIZE AND AGE GROUPS
1 9 6 4

Non-Powered Wooden Boats	Under 5 years		5 - 10 Years		10 - 15 Years		15 - 20 Years					
	Number	Unit Value (\$)	Total Value (\$)	Number	Unit Value (\$)	Total Value (\$)	Number	Unit Value (\$)	Total Value (\$)			
Under 2 tons	9,850	164	1,615,400	11,146	104	1,159,184	4,925	44	216,700	2,495	10	24,950
2 - 5 tons	2,233	984	2,197,272	2,527	624	1,576,848	1,117	264	294,888	566	60	33,960
5 - 10 tons	443	2,624	1,162,432	501	1,664	833,664	221	704	155,584	112	160	17,920
10 - 15 tons	172	4,264	733,408	195	2,704	527,280	86	1,144	98,384	44	260	11,440
15 - 20 tons	135	5,904	797,040	152	3,744	569,088	67	1,584	106,128	34	310	10,540
Over 20 tons	12	8,200	98,400	14	5,200	72,800	6	2,200	13,200	3	500	1,500
Sub-Total	12,845		6,603,952	14,535		4,738,864	6,422		884,884	3,254		100,310
<u>Powered Wooden Boats</u>												
Under 2 tons	139	246	34,194	89	156	13,884	43	66	2,838	27	30	810
2 - 5 tons	833	1,230	1,024,950	448	780	349,440	295	330	97,350	200	165	33,000
5 - 10 tons	511	3,280	1,676,080	546	2,080	1,135,680	122	880	107,360	133	200	26,600
10 - 20 tons	462	6,150	2,841,300	456	3,900	1,778,400	137	1,650	226,050	120	375	45,000
Over 20 tons	196	16,400	3,214,400	155	10,400	1,612,000	158	4,400	695,200	155	1,000	155,000
Sub-Total	2,141		8,790,564	1,694		4,889,404	755		1,128,798	635		260,410

Table 2: CALCULATED MARKET VALUE OF STEEL BOATS, BY SIZE AND AGE GROUPS
1 9 6 4

Under 100 tons	-	-	-	-	-	-	6	11,000	66,000	12	2,500	30,000
Over 100 tons	26	118,000	3,068,000	1	48,880	48,880	-	-	-	8	4,700	37,600
Sub-Total	26		3,068,000	1		48,880	6		66,000	20		67,600
<u>GRAND TOTAL</u>	<u>15,012</u>		<u>18,462,516</u>	<u>16,230</u>		<u>9,677,068</u>	<u>7,183</u>		<u>2,079,682</u>	<u>3,909</u>		<u>428,320</u>

APPENDIX 4-A

TOTAL LANDINGS OF FISH AND OTHER MARINE PRODUCTS, 1955-1964

(a) Fish, Excluding Culture Products

<u>Year</u>	<u>Metric Tons</u>
1955	259,234
1956	340,916
1957	403,157
1958	395,193
1959	382,126
1960	342,471
1961	412,452
1962	451,384
1963	446,481
1964	524,295

(b) Fish Culture Products

1955	6,661
1956	5,654
1957	6,153
1958	8,114
1959	9,935
1960	14,663
1961	12,067
1963	85,324 *
1964	72,924 *

(c) Total Landings (a) and (b)

1955	265,895
1956	346,570
1957	409,310
1958	403,307
1959	392,061
1960	357,134
1961	424,519
1962	451,384 ^{1/}
1963	531,805
1964	597,219

* The main increases were in oyster and laver production.

^{1/} Excluding culture products

Sources: Fisheries Statistics, Bureau of Fisheries;
Korean Statistical Yearbook, Economic Planning Board,
ROK

APPENDIX 4-B

Table 1: FISH LANDINGS BY MAIN SPECIES, VOLUME AND VALUE

Units: Volume - Metric Ton
Value - 1000 Won

	1 9 6 0		1 9 6 1	
	<u>Volume</u>	<u>Value</u>	<u>Volume</u>	<u>Value</u>
Fish:				
Sole	8,152	81,559	6,671	78,534
Mackerel	2,094	27,971	1,762	22,112
Saury	14,884	72,296	28,467	240,121
Bastard	3,363	40,895	3,037	43,718
Cod	1,803	25,646	1,546	27,495
Red Sea Bream	1,265	30,264	1,059	27,863
Horse Mackerel	24,816	261,196	23,552	241,655
Alaska Pollock	16,541	259,972	13,726	232,257
Anchovy	37,310	287,828	39,656	276,729
Croaker	2,091	41,838	2,160	36,668
Eel	231	3,442	294	577
Pomfret	1,068	14,306	1,343	21,432
Sea Eel	511	5,515	902	11,813
Spanish Mackerel	3,258	70,480	3,576	89,195
Shark	6,042	81,727	6,527	86,050
Sand Lance	2,897	10,896	3,525	21,406
Yellow Corvenia	22,559	361,025	22,194	444,386
Hair Tail	41,656	302,834	29,809	305,910
Sand Fish	634	3,838	1,289	7,784
Other	50,563	565,299	53,919	618,449
Sub-Total	241,738	2,548,827	245,014	2,834,154
Shellfish:				
Cockle	1,675	15,342	1,848	20,887
Oyster	11,523	258,916	14,526	191,351
Short-Necked Clam	3,939	36,415	4,574	38,478
Hard Clam	1,315	7,260	1,292	11,033
Common Spiny Whelk	1,324	7,529	1,172	7,490
Abalone	502	24,162	393	18,537
Sea Mussel	1,694	11,299	2,223	13,066
Other	3,903	24,963	4,347	35,035 *
Sub-Total	25,875	385,886	30,375	335,877

Source: Fisheries Statistics, 1964
Bureau of Fisheries, Ministry of Agriculture and Forestry, ROK

APPENDIX 4-B (Page 2)

Table 1: FISH LANDINGS BY MAIN SPECIES, VOLUME AND VALUE (Cont.)

	1962		1963		1964	
	Volume	Value	Volume	Value	Volume	Value
Fish:						
Sole	8,639	114,930	11,410	182,491	10,252	220,357
Mackerel	4,058	65,049	5,406	121,272	2,441	87,342
Saury	39,972	343,615	12,544	195,731	25,370	512,530
Bastard	2,297	39,192	2,178	41,455	2,011	62,137
Cod	1,389	29,669	853	20,807	1,465	37,326
Red Sea Bream	1,651	52,178	1,032	38,789	2,235	96,493
Horse Mackerel	18,419	298,476	12,440	273,363	19,521	525,746
Alaska Pollock	22,792	457,346	22,600	465,718	20,653	625,527
Anchovy	46,955	480,708	32,392	520,076	35,592	814,068
Croaker	2,943	80,377	3,358	98,379	4,174	214,193
Eel	614	18,424	567	11,457	1,819	45,491
Pomfret	2,250	46,191	87	2,059	20	547
Sea Eel	1,341	20,695	1,072	22,767	1,202	36,705
Spanish Mackerel	3,432	135,807	2,956	210,160	4,465	377,517
Shark	7,053	121,192	7,098	134,802	4,309	156,254
Sand Lance	6,691	36,056	2,100	14,460	6,461	63,767
Yellow Corvenia	21,653	530,433	23,049	644,765	47,018	1,730,289
Hair Tail	39,307	487,406	30,451	539,488	29,961	877,673
Sand Fish	5,751	29,302	2,439	23,940	2,659	32,552
Other	61,031*	857,319	78,292*	1,368,738	98,996*	2,151,980*
Sub-Total	298,238*	4,244,365	252,324*	4,930,717	320,684*	8,668,494*
Shellfish:						
Cockle	2,246	10,204	6,526	53,255	15,491	121,784
Oyster	11,196	193,172	56,866	196,936	42,659	526,525
Short-Necked Clam	6,438	41,343	7,561	77,234	18,721	159,332
Hard Clam	1,473	12,016	2,327	20,655	2,812	33,365
Common Spiny Whelk	1,146	8,995	1,938	21,954	1,439	22,030
Abalone	1,833	53,393	391	38,281	1,647	78,471
Sea Mussel	3,120	19,239	3,101	23,210	4,240	42,847
Other	4,572	33,841	3,849	42,272	12,172	101,474
Sub-Total	32,024	372,203	82,559	473,797	99,181	1,085,828

Source: Fisheries Statistics, 1964
 Bureau of Fisheries, Ministry of Agriculture and Forestry, ROK.

APPENDIX 4-B (Page 3)

Table 1: FISH LANDINGS BY MAIN SPECIES, VOLUME AND VALUE (Cont.)

	1 9 6 0		1 9 6 1	
	<u>Volume</u>	<u>Value</u>	<u>Volume</u>	<u>Value</u>
Sea Weeds:				
Horse Tailtang	2,840	2,332	2,756	2,191
Dulse	11,447	83,088	19,690	136,723
Irish Moss	281	1,523	313	1,379
Agar-Agar	2,670	33,589	3,014	49,302
Buddha's Ear	2,911	20,943	4,090	20,512
Laver	1,141	210,924	2,508	192,623
Fusiforme	6,125	6,823	5,207	6,920
Other	2,282	10,290	2,434	10,849
Sub-Total	29,697	369,512	40,012	420,499
Other:				
Crab	1,500	10,766	1,713	15,241
Whale	1,014	11,585	930	16,061
Octopus	1,308	15,511	1,392	10,833
Squid	42,128	175,953	82,935	393,620
Sea Urchin	254	2,800	71	1,093
Sea Cucumber	1,105	13,179	454	11,313
Shrimp (large)	660	13,337	383	9,075
Shrimp (medium)	962	10,032	1,084	13,000
Shrimp (small)	9,382	57,567	17,268	101,949
Other	1,511	15,649	2,888	33,936
Sub-Total	59,824	326,379	109,118	606,121
<u>GRAND TOTAL</u>	<u>357,134</u>	<u>3,630,604</u>	<u>424,519</u>	<u>4,196,651</u>

* Adjusted figures.

Source: Bureau of Fisheries, Ministry of Agriculture, ROK

APPENDIX 4-B (Page 4)

Table 1: FISH LANDINGS BY MAIN SPECIES, VOLUME AND VALUE (Cont.)

	1 9 6 2		1 9 6 3		1 9 6 4	
	<u>Volume</u>	<u>Value</u>	<u>Volume</u>	<u>Value</u>	<u>Volume</u>	<u>Value</u>
Sea Weeds:						
Horse Tailtang	1,715	1,696	713	1,080	689	2,049
Dulse	27,138	221,076	19,989	226,719	22,757	224,691
Irish Moss	337	13,157	434	6,402	534	24,119
Agar-Agar	4,781	103,166	3,684	112,377	5,401	211,607
Buddha's Ear	2,348	21,971	1,272	17,609	1,986	41,376
Laver	6,054	292,501	22,226	774,729	14,978	1,582,761
Fusiforme	5,473	5,866	5,342	7,268	4,066	22,386
Other	3,819	43,862	3,863	25,084	11,303*	98,461*
Sub-Total	51,665	703,295	57,523	1,171,268	61,714*	2,207,450*
Other:						
Crab	3,544	31,305	2,348	41,445	2,179	54,160
Whale	1,036	18,112	623	19,857	681	35,773
Octopus	2,351	23,722	1,599	27,629	1,238	37,236
Squid	56,938	443,628	116,876	1,110,376	86,628	844,024
Sea Urchin	95	2,818	251	17,731	301	10,201
Sea Cucumber	332	10,153	391	16,549	1,049	32,814
Shrimp (large)	559	20,758	696	38,431	1,425	66,227
Shrimp (medium)	1,162	28,661	1,281	31,746	1,485	42,293
Shrimp (small)	18,662	164,691	12,109	198,745	15,201	386,860
Other	2,924	36,770*	3,225	51,476*	5,453*	66,897
Sub-Total	87,603	780,618*	139,399	1,553,985*	115,640*	1,576,435*
<u>GRAND TOTAL</u>	<u>469,530</u>	<u>6,100,481</u>	<u>531,805</u>	<u>8,129,767</u>	<u>597,219*</u>	<u>13,538,257*</u>

* Adjusted figures

Source: Bureau of Fisheries, Ministry of Agriculture, ROK

APPENDIX 4-C

Table 1: OUTPUT OF FISHERY PRODUCTS BY MAIN CATEGORIES, VOLUME AND VALUE

Units: Volume - Metric Ton
Value - 1000 Won

<u>Products</u>	<u>1 9 6 0</u>		<u>1 9 6 1</u>	
	<u>Volume</u>	<u>Value</u>	<u>Volume</u>	<u>Value</u>
Dried	11,985	304,148	20,182	519,574
Salted and Dried	626	11,243	725	14,893
Pickled	8,157	74,456	13,116	114,587
Salted and Preserved	7,260	92,503	9,914	108,534
Cooked	13,542	312,458	9,580	281,176
Canned	8,613	243,252	6,716	198,062
Edible Sea Weeds	3,938	271,772	5,886	348,336
Inedible Sea Weeds	1,827	53,814	2,320	53,433
Fertilizer	659	12,581	793	18,999
Frozen	-	-	53	4,663
Other	22	1,593	150	3,417
<u>TOTAL</u>	<u>56,629</u>	<u>1,377,820</u>	<u>69,435</u>	<u>1,665,674</u>

<u>Products</u>	<u>1 9 6 2</u>		<u>1 9 6 3</u>		<u>1 9 6 4</u>	
	<u>Volume</u>	<u>Value</u>	<u>Volume</u>	<u>Value</u>	<u>Volume</u>	<u>Value</u>
Dried	18,872	629,381	23,576	1,074,484	17,619	1,066,035
Salted and Dried	1,380	45,331	919	24,736	919	64,017
Pickled	11,112	154,066	8,539	208,649	8,308	219,509
Salted and Preserved	5,692	122,497	5,041	122,146	2,803	318,663
Cooked	7,594	302,510	4,735	267,337	2,240	172,254
Canned	1,236	56,002	2,207	147,470	4,741	272,906
Edible Sea Weeds	8,006	391,407	7,768	606,245	4,184	1,013,131
Inedible Sea Weeds	2,585	78,123	2,355	128,346	4,231	232,754
Fertilizer	845	20,021	1,179	40,855	1,309	54,788
Frozen	163	16,946	3,590	338,425	18,935	2,123,707
Other	47	1,195	279	15,204	50	14,622
<u>TOTAL</u>	<u>57,532</u>	<u>1,817,479</u>	<u>60,288</u>	<u>2,973,897</u>	<u>65,339</u>	<u>5,552,386</u>

Source: Fisheries Statistics, 1964
Bureau of Fisheries, Ministry of Agriculture and Forestry
ROK Government

APPENDIX 5

COST OF PRODUCTION OF SOME OF THE MAIN FISHERY PRODUCTS

1. Cost of Production of Canned Shrimp (1963)

Unit: 48-4 $\frac{1}{2}$ oz. cans

	<u>Won</u>	<u>US \$</u>
Raw Material	2,346	8.69
Empty Cans	625	2.315
Wages and Salaries	45	0.167
Citric Acid	82	0.304
Fuel and Electricity	21	0.078
Packing	60	0.222
Transportation	30	0.111
Inspection and Bank Fee	26	0.096
Warehouse Fee	4	0.015
Correspondence	12	0.044
Other (samples etc.)	22	0.081
Ocean Freight	220	0.815
Depreciation	<u>2</u>	<u>0.007</u>
<u>TOTAL</u>	<u>3,531</u>	<u>13.078</u>
Sales Income	4,482	16.60
Profit	951	3.522

Source: Processing Section
Bureau of Fisheries
Ministry of Agriculture and Forestry
ROK Government

APPENDIX 5 (Page 2)

2. Cost of Production of Canned Crabmeat (1963)

Unit: 48- $\frac{1}{2}$ lb. cans
US \$: 270 Won

	<u>Won</u>	<u>US \$</u>
Raw Material	3,620	13.407
Empty Cans	611	2.263
Wages and Salaries	45	0.167
Fuel and Electricity	21	0.078
Packing	60	0.222
Transportation	20	0.074
Warehouse Fee	4	0.015
Inspection and Bank Fee	37.56	0.139
Correspondence	9	0.033
Ocean Freight	217.60	0.806
Depreciation	<u>2.06</u>	<u>0.008</u>
<u>TOTAL</u>	<u>4,647.22</u>	<u>17.212</u>
Sales Income	5,400.00	20.00
Profit	753	2.79

Source: Processing Section
Bureau of Fisheries
Ministry of Agriculture and Forestry
ROK Government

APPENDIX 5 (Page 3)

3. Cost of Production of Canned Saury Pike in Natural Oil (1963)

Unit: 48-1 lb. cans
US \$: 270 Won

	<u>Won</u>	<u>US \$</u>
Raw Material	766	2.837
Empty Cans	578	2.141
Wages and Salaries	35	0.130
Fuel and Electricity	16	0.059
Packing	60	0.222
Transportation	25	0.093
Warehouse Fee	4	0.015
Inspection and Bank Fee	12.50	0.046
Correspondence	9	0.033
Ocean Freight	163.20	0.604
Depreciation	<u>1.15</u>	<u>0.004</u>
<u>TOTAL</u>	<u>1,669.85</u>	<u>6.184</u>
Sales Income	1,782	6.60
Profit	110	0.41

Source: Processing Section
Bureau of Fisheries
Ministry of Agriculture and Forestry
ROK Government

APPENDIX 5 (Page 4)

4. Cost of Production of Frozen Crabmeat (1963)

		<u>Won</u>
Raw Material Cost - - - - -		662,500
Raw Crab (25,000 lb.)	625,000	
Transport Cost	12,500	
Commission	25,000	
Processing Cost - - - - -		152,100
Direct Cost	136,720	
(Wages 95,000)		
Indirect Cost	15,390	
(Quality Control, etc.)		
Prime Cost Repayment - - - - -		25,616.44
Packaging Cost - - - - -		34,800
Management Cost - - - - -		43,536
Other - - - - -		7,000
		<hr/>
<u>TOTAL COST</u>		<u>925,562.44</u>

Yield = 10,000 lb. (40%)

Cost per 50 lb. case = 4,627.81 Won
 Cost per lb. = 92.56 Won
 or about 34¢

Source: Central Fisheries Inspection Station
 Ministry of Agriculture and Forestry
 ROK Government

APPENDIX 5 (Page 5)

5. Cost of Production of Frozen Shrimp (1963)

	<u>Won</u>
Raw Material Cost - - - - -	593,420
Raw Shrimp (23,185 kg.)	556,000
Transport Cost	30,580
Ice	840
Commission	6,000
Processing Cost - - - - -	138,100
Direct Cost	79,300
(Wages 72,100)	
Indirect Cost	58,800
(Quality Control, etc.)	
Prime Cost Repayment - - - - -	34,179
Equipment	24,315.99
Buildings	9,863.01
Packaging Cost - - - - -	89,290
Management Cost - - - - -	38,811
Other - - - - -	<u>40,320.81</u>
<u>TOTAL COST</u>	<u>934,120.81</u>

Yield = 15,000 lb. (30%)
(300 case x 50 lb.)

Cost per case = 3,114 Won
Cost per pound = 62.28 Won or
about 23¢

Source: Central Fisheries Inspection Station
Ministry of Agriculture and Forestry
ROK Government

APPENDIX 5 (Page 6)

6. Cost of Production of Frozen, Cooked Mussel (1963)

	<u>Won</u>
Raw Material Cost - - - - -	158,555
Raw Material (12,495 kg.)	139,650
Transport Cost	14,700
Commission	2,205
Other	2,000
Processing Cost - - - - -	21,657
Direct Cost	18,882
(Wages 13,630)	
Indirect Cost	2,775
(Quality Control, etc.)	
Prime Cost Repayment - - - - -	1,886.57
Packaging Cost - - - - -	22,260
Management Cost - - - - -	10,250
Other - - - - -	<u>1,120</u>
<u>TOTAL COST</u>	<u>215,728.57</u>

Yield = 1,050 kg. (.08%)

Cost per kg. = 205.46 Won or 76¢
Cost per lb. = 38¢

Source: Central Fisheries Inspection Station
Ministry of Agriculture and Forestry
ROK Government

APPENDIX 5 (Page 7)

7. Cost of Production of Frozen Squid (1963)

	<u>Won</u>
Raw Material Cost - - - - -	1,263,050
Raw Squid (162,500 kg.)	1,125,000
Commission	56,250
Other	81,800
Processing Cost - - - - -	595,330
Direct Cost	289,100
(Wages 198,000)	
Indirect Cost	306,230
(Quality Control, etc.)	
Prime Cost Repayment - - - - -	109,255.53
Packaging Cost - - - - -	276,900
Management Cost - - - - -	263,000
Other - - - - -	<u>266,672</u>
 <u>TOTAL COST</u>	 <u>2,774,207.53</u>

Yield = 50,010 kg. (about 30%)

Cost per kg. = 55.50 Won or 20.5¢
Cost per lb. = about 10¢

Source: Central Fisheries Inspection Station
Ministry of Agriculture and Forestry
ROK Government

APPENDIX 6

CHARACTERISTICS OF THE FISHING FLEET

1. Number and Tonnage of Fishing Boats, 1955-1964

<u>Year</u>	<u>Non-Powered Boats</u>		<u>Powered Boats</u>		<u>Total Number</u>	<u>Total Tonnage</u>	<u>Average Ton per Boat</u>
	<u>Number</u>	<u>Tonnage</u>	<u>Number</u>	<u>Tonnage</u>			
1955	35,378	72,233	4,141	52,348	39,519	125,581	3.18
1956	35,011	64,155	4,623	52,938	39,634	117,093	2.95
1957	33,154	53,105	4,598	52,241	37,752	105,346	2.79
1958	32,241	48,390	5,891	62,015	38,132	110,405	2.90
1959	24,913	48,365	3,978	52,216	28,891	100,581	3.48
1960	30,089	49,238	4,349	57,979	34,438	107,217	3.11
1961	37,285	79,412	5,015	65,457	42,300	144,869	3.42
1962	39,005	76,316	5,703	72,229	44,708	148,545	3.32
1963	41,110	79,707	6,107	80,336	47,217	160,043	3.39
1964	42,253	80,909	6,463	86,514	48,716	167,423	3.44

2. Classification of Fishing Boats by Age and Type of Construction, 1964

<u>A g e</u>	<u>Wooden Non-Powered</u>	<u>Wooden Powered</u>	<u>Steel Powered</u>	<u>Total Number</u>	<u>% of Grand Total</u>
Under 5 years	12,650	2,141	26	14,817	30.4
6 - 10 years	15,038	1,694	1	16,733	34.3
11 - 15 years	6,649	755	6	7,410	15.2
16 - 20 years	3,122	588	20	3,730	7.7
21 - 25 years	2,819	521	1	3,341	6.9
26 - 30 years	999	440	3	1,442	3.0
Over 30 years	976	262	5	1,243	2.5
<u>TOTAL</u>	<u>42,253</u>	<u>6,401</u>	<u>62</u>	<u>48,716</u>	
% of Grand Total	86.73	13.14	.13		100.0

Source: Fisheries Statistics, 1964, Bureau of Fisheries
Ministry of Agriculture, ROK

APPENDIX 7

Table 1: GOVERNMENT SUBSIDIES IN FISHERIES, 1960-1964

	1960 ('000 Won)		1961	
	<u>Subsidy %</u>	<u>Subsidy</u>	<u>Subsidy %</u>	<u>Subsidy</u>
Tackle Alteration		0		0
Fishery Substation			0	0
Technical Expert Training Expenses				
Fishing Boat Building	20	949	20	716
Diesel Engine				
Establishment	50	603	50	2,118
Fishing Port Repair	20	9,647	20	7,972
Fish Collection Camp and Generator	50	2,010	50	3,000
Fish Finder	50	500		
Wireless	40	530		
Winch				
Netzonde				
Fisheries Processing Facilities				
Fish Markets	30	735	40	838
Warehouses	30	1,230		
Ice Making and Refrigeration				
Cold Storage for Fresh Fish				
Shell Processing				
Others	30	2,118	20	1,728
Oyster (Stenmethod)	50	6,019	50	7,236
Pine Tree Method	50	2,828	50	1,090
String Hanging Method	50	285	50	210
Liffler Neck	50	1,568	50	1,008
Ark-Shell	50	1,291	50	834
Sea-Mussel	50	210	50	220
Hard Clam	50	704	50	744
Cyclina Sinensis				
Agar-Agar	50	3,340	50	3,416
Sea-Mustard	50	472	50	496
Laver Chopper				
Shellfish for Export				
Shrimp Culture				
Graciluria				
Fish Culture				
<u>TOTAL</u>		<u>108,026</u>		<u>106,389</u>

Source: Bureau of Fisheries, Ministry of Agriculture, ROK.

APPENDIX 7 (Page 2)

Table 1: GOVERNMENT SUBSIDIES IN FISHERIES, 1960-1964 (Cont.)
('000 Won)

	1 9 6 2		1 9 6 3		1 9 6 4	
	Subsidy %	Subsidy	Subsidy %	Subsidy	Subsidy %	Subsidy
Tackle Alternation	60	38,790	20	49,620	30	6,120
Fishery Substation	0	0	0	0	0	0
Technical Expert						
Training Expenses	0	0				
Fishing Boat Building	50	45,000	60	29,127	70	28,465
Diesel Engine						
Establishment	50	9,188			50	4,360
Fishing Port Repair	20	6,484	20	6,115	20	7,420
Fish Collection Camp	50	3,000	50	3,000	50	3,500
and Generator						
Fish Finder	50	4,918				
Wireless	50	3,750				
Winch						
Netzonde						
Fisheries Processing						
Facilities						
Fish Markets	88	82,192	50	5,849	30	3,165
Warehouses					30	1,431
Ice Making and						
Refrigeration	50	10,680	50	6,137		
Cold Storage for						
Fresh Fish					50	1,500
Shell Processing						
Others	50	14,666	20	4,747		
Oyster (Stenmethod)	30	3,012	30	4,800	50	6,000
Pine Tree Method	30	816				
String Hanging Method	50	2,250			50	4,500
Liftle Neck	30	378				
Ark-Shell	30	270				
Sea-Mussel						
Hard Clam	30	345			50	735
Cyclina Sinensis	30	132				
Agar-Agar	30	3,000			50	4,650
Sea-Mustard	30	447			50	990
Laver Chopper					50	3,000
Shellfish for Export						
Shrimp Culture						
Graciluria						
Fish Culture						
<u>TOTAL</u>		<u>229,173</u>		<u>163,967</u>		<u>119,738</u>

Source: Bureau of Fisheries, Ministry of Agriculture, ROK.

APPENDIX 8

Table 1: FIRST FIVE-YEAR PLAN, 1962-1966
GOVERNMENT INVESTMENT IN FISHERIES

(In Million Won)

	1 9 6 2		1 9 6 3		1 9 6 4	
	<u>Budgeted</u>	<u>Realized</u>	<u>Budgeted</u>	<u>Realized</u>	<u>Budgeted</u>	<u>Realized</u>
1. Construction of Fishing Boats and Improvement of Fishing Facilities	290.6	287.8	89.6	87.8	78.8	71.5
2. Propagation of Products - Aquiculture	45.7	45.4	33.6	32.9	20.4	20.1
3. Fishery Processing Facilities	49.7	39.3	56.2	42.1	25.3	23.9
4. Fishery Harbour Rehabilitation	28.7	28.6	25.7	23.0	92.5	90.5
5. Fishery Credit	200.0	126.6	235.7	235.7	150.0	150.0
6. Disaster Rehabilitation	85.6	23.5	101.4	89.7	-	-
7. Fishery Research	2.2	1.9	734.0	734.0*	36.1	35.9
8. Investment for Korean Marine Industries Development Corporation	-	-	-	-	1100.0	100.0
<u>TOTAL</u>	702.5	553.1	1,276.2	1,245.2	503.1	491.9

* A large part of the amount could be included under item #8.

Source: Public Accounts, ROK

APPENDIX 8 (Page 2)

Table 1: FIRST FIVE-YEAR PLAN, 1962-1966
GOVERNMENT INVESTMENT IN FISHERIES (Cont.)

(In Million Won)

	<u>1965</u> <u>Budgeted</u>	<u>1966</u> <u>Budgeted</u>	<u>Total</u> <u>Realized 1962-64 & Budgeted 1964-66</u>
1. Construction of Fishing Boats and Improvement of Fishing Facilities	186.6	144.8	778.5
2. Propagation of Products - Aquiculture	24.4	34.4	157.2
3. Fishery Processing Facilities	37.4	57.4	200.1
4. Fishery Harbour Rehabilitation	78.4	138.4	358.9
5. Fishery Credit	480.0	300.0	1,292.3
6. Disaster Rehabilitation	-	-	113.2
7. Fishery Research	147.6	80.6	1,000.0
8. Investment for Korean Marine Industries Development Corporation	450.0	500.0	1,050.0
<u>TOTAL</u>	1,404.4	1,255.6	4,950.2

Source: Public Accounts, ROK

Second Five-Year Plan, 1967-1971 - Government Investment in Fisheries

	1967	1968	1969	1970	(In million won) 1971
1 Construction of Fishing Boats and Improvement in Fishing Facilities	3,508.0	2,390.4	2,360.6	1,329.4	1,250.7
2 Propagation of Products (aquaculture)	354.5	298.7	355.6	795.9	782.3
3 Fish Processing Facilities	176.7	195.7	241.6	75.8	79.2
4 Fishing Harbour Rehabilitation	537.9	822.1	393.8	484.0	416.4
5 Fishery Credit	1,275.0	827.0	632.0	300.0	194.0
6 Fishery Research and Guidance	513.8	434.7	453.4	327.4	300.8
7 Price Stabilization Fund	900.0	520.0	470.0	320.0	210.0
8 Fisheries Insurance	30.0	30.0	30.0	25.0	21.0
9 Improvement of Fisheries Structure	155.5	155.5	103.6	-	-
TOTAL	7,451.4	5,674.1	5,040.6	3,657.5	3,257.4

Source: Ministry of Agriculture, ROK

APPENDIX 9 B

Total Investment Expenditures in Fisheries
During Second 5-Year Plan, 1967-1971

	1967					1968				
	Gov't	Private	Total	Domestic Currency	Foreign Currency US 000 \$	Gov't	Private	Total	Domestic Currency	Foreign Currency US 000 \$
	----- Million won -----					----- Million won -----				
1. Offshore Fishery	805.0	202.0	1,007.0	1,007.0	-----	721.0	180.0	901.0	901.0	-----
2. Ocean Fishery	-----	-----	-----	-----	-----	505.0	127.0	632.0	632.0	-----
3. Coastal Fishery	2,464.6	64.6	2,529.2	495.315	8,827.0	984.6	64.6	1,049.2	352.285	2,733.0
4. Fishery Processing	176.7	80.55	257.25	257.25	-----	195.7	115.765	311.465	311.465	-----
5. Aquiculture	354.5	22.5	377.0	377.0	-----	298.7	16.3	315.0	315.0	-----
6. Advance Fishing Base	298.725	-----	298.725	289.8	35.0	538.014	78.516	616.58	341.18	1,080.0
7. Fishing Port	239.164	59.791	298.953	264.53	135.0	284.16	71.04	355.2	296.55	230.0
8. Research and Guidance	513.825	-----	513.825	-----	2,015.0	434.65	-----	434.65	105.7	1,290.0
9. Improvement of Fishing Gear	238.425	-----	238.425	-----	935.0	179.775	-----	179.775	-----	705.0
10. Diesel Engine Manufacture	-----	15.3	15.3	15.3	-----	-----	-----	-----	-----	-----
11. Chemical Fiber Manufacture	-----	500.0	500.0	500.0	-----	-----	-----	-----	-----	-----
12. Fishing Net Manufacture	-----	100.0	100.0	100.0	-----	-----	-----	-----	-----	-----
13. Fisheries Fund	1,275.0	-----	1,275.0	1,275.0	-----	827.0	-----	827.0	827.0	-----
14. Price Stabilization Fund	900.0	-----	900.0	900.0	-----	520.0	-----	520.0	520.0	-----
15. Fisheries Insurance	30.0	-----	30.0	30.0	-----	30.0	-----	30.0	30.0	-----
16. Improvement of Fisheries- Structure	155.5	-----	155.5	155.5	-----	155.5	-----	155.5	155.5	-----
<u>Total</u>	<u>7,451.439</u>	<u>1,044.741</u>	<u>8,496.18</u>	<u>5,449.695</u>	<u>11,947.0</u>	<u>5,674.149</u>	<u>653.221</u>	<u>6,327.37</u>	<u>4,787.68</u>	<u>6,038.0</u>

Total Investment Expenditures in Fisheries
During Second 5-Year Plan, 1967-1971

	1969					1970				
	Gov't	Private	Total	Domestic Currency	Foreign Currency US 000 \$	Gov't	Private	Total	Domestic Currency	Foreign Currency US 000 \$
	----- Million won -----					----- Million won -----				
1. Offshore Fishery	515.0	129.0	644.0	644.0	-----	-----	-----	-----	-----	-----
2. Ocean Fishery	494.0	123.0	617.0	617.0	-----	-----	-----	-----	-----	-----
3. Coastal Fishery	1,294.2	32.3	1,326.5	538.55	3,090.0	1,288.6	-----	1,288.6	615.4	2,640.0
4. Fishery Processing	241.6	146.65	388.25	388.25	-----	75.8	18.95	94.75	94.75	-----
5. Aquiculture	355.64	22.56	378.2	378.2	-----	795.92	52.68	848.6	848.6	-----
6. Advance Fishing Base	152.0	-----	152.0	152.0	-----	81.6	-----	81.6	81.6	-----
7. Fishing Port	241.804	66.451	302.255	278.83	95.0	1,024.4	100.6	1,125.0	503.0	-----
8. Research and Guidance	453.45	-----	453.45	165.30	1,300.0	327.36	-----	327.36	222.3	412.0
9. Improvement of Fishing Gear	57.375	-----	57.375	-----	225.0	40.8	-----	40.8	-----	160.0
10. Diesel Engine Manufacture	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
11. Chemical Fiber Manufacture	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
12. Fishing Net Manufacture	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
13. Fisheries Fund	632.0	-----	632.0	632.0	-----	300.0	-----	300.0	300.0	-----
14. Price Stabilization Fund	470.0	-----	470.0	470.0	-----	320.0	-----	320.0	320.0	-----
15. Fisheries Insurance	30.0	-----	30.0	30.0	-----	25.0	-----	25.0	25.0	-----
16. Improvement of Fisheries Structure	103.6	-----	103.6	103.6	-----	-----	-----	-----	-----	-----
<u>Total</u>	<u>5,040.669</u>	<u>513.916</u>	<u>5,554.585</u>	<u>4,396.93</u>	<u>4,540.0</u>	<u>3,657.48</u>	<u>172.23</u>	<u>3,829.71</u>	<u>3,010.65</u>	<u>3,212.0</u>

Total Investment Expenditures in Fisheries
During Second 5-Year Plan, 1967-1971

	1971					T O T A L				
	Gov't	Private	Total	Domestic Currency	Foreign Currency US '000 \$	Gov't	Private	Total	Domestic Currency	Foreign Currency US '000 \$
	Million won					Million won				
1. Offshore Fishery	-----	-----	-----	-----	-----	2,041.0	511.0	2,552.0	2,552.0	-----
2. Ocean Fishery	-----	-----	-----	-----	-----	999.0	250.0	1,249.0	1,249.0	-----
3. Coastal Fishery	1,250.7	-----	1,250.7	689.7	2,200.0	7,282.7	161.5	7,444.2	2,473.75	19,490.0
4. Fishery Processing	79.2	19.8	99.0	99.0	-----	769.0	381.715	1,050.715	1,150.715	-----
5. Aquiculture	782.26	50.54	832.8	832.8	-----	2,587.02	164.58	2,751.6	2,751.6	-----
6. Advance Fishing Base	26.0	-----	26.0	26.0	-----	1,096.389	78.516	1,174.905	890.58	1,115.0
7. Fishing Port	390.4	97.6	488.0	488.0	-----	1,557.928	389.482	1,947.41	1,830.11	460.0
8. Research and Guidance	300.84	-----	300.84	222.3	308.0	2,030.125	-----	2,030.125	715.6	5,155.0
9. Improvement of Fishing Gear	-----	-----	-----	-----	-----	516.375	-----	516.375	-----	2,025.0
10. Diesel Engine Manufacture	-----	-----	-----	-----	-----	-----	15.3	15.3	15.3	-----
11. Chemical Fiber Manufacture	-----	-----	-----	-----	-----	-----	500.0	500.0	500.0	-----
12. Fishing Net Manufacture	-----	-----	-----	-----	-----	-----	100.0	100.0	100.0	-----
13. Fisheries Fund	194.0	-----	194.0	194.0	-----	3,228.0	-----	3,228.0	3,228.0	-----
14. Price Stabilization Fund	210.0	-----	210.0	210.0	-----	2,420.0	-----	2,420.0	2,420.0	-----
15. Fisheries Insurance	24.0	-----	24.0	24.0	-----	139.0	-----	139.0	139.0	-----
16. Improvement of Fisheries Structure	-----	-----	-----	-----	-----	414.6	-----	414.6	414.6	-----
<u>Total</u>	<u>3,257.4</u>	<u>167.94</u>	<u>3,425.34</u>	<u>2,785.8</u>	<u>2,568.0</u>	<u>25,081.137</u>	<u>2,552.093</u>	<u>27,633.23</u>	<u>20,430.755</u>	<u>28,245.0</u>

APPENDIX 9 C

Second 5-Year Plan of Fisheries Production,
1966-1971

Unit: Metric ton

	1965	1966		1967		1968		1969		1970		1970	
	Base Year	Increase Over base	Total Production	Increase Over Base	Total Prod.								
Fish ¹	330,000	102,000	432,000	177,556	507,556	237,513	567,513	295,316	625,316	331,461	661,461	356,196	686,196
Shellfish ²	46,000	1,000	47,000	2,000	48,000	3,000	49,000	4,000	50,000	5,000	51,000	6,000	52,000
Seaweed ³	43,000	500	43,500	1,000	44,000	1,500	44,500	2,000	45,000	2,500	45,500	3,000	46,000
Other ⁴	116,000	2,000	118,000	4,000	120,000	6,000	122,000	8,000	124,000	10,000	126,000	12,000	128,000
Total Marine Landings	<u>535,000</u>	<u>105,500</u>	<u>640,500</u>	<u>184,556</u>	<u>719,556</u>	<u>248,013</u>	<u>783,013</u>	<u>309,316</u>	<u>844,316</u>	<u>348,961</u>	<u>883,961</u>	<u>377,196</u>	<u>912,196</u>
Aquiculture ⁵	73,000	1,119	74,119	13,379	86,379	25,639	98,639	37,779	110,779	52,809	125,809	68,489	141,489
<u>Grand Total</u>	<u>608,000</u>	<u>106,619</u>	<u>714,619</u>	<u>197,935</u>	<u>805,935</u>	<u>273,652</u>	<u>881,652</u>	<u>347,095</u>	<u>955,095</u>	<u>401,770</u>	<u>1,009,770</u>	<u>445,685</u>	<u>1,053,685</u>

1 Increase is based on fleet expansion and improvements in fisheries equipment and facilities

2 A constant increase of 1,000 tons per year (about 2%)

3 " " " " 500 " " " (about 1.2%)

4 " " " " 2,000 " " " (about 1.7%)

5 Increase based on improvements of flatlands

Source: Bureau of Fisheries, Ministry of Agriculture, ROK

Second Five-Year Plan -

APPENDIX 9 D

Production Plan by Year and Project

Unit: Metric ton

	1966			1967			1968		
	Scale of Project	Increase of Production	Production	Scale of Project	Increase of Production	Production	Scale of Project	Increase of Production	Production
Replacement of Engine	12,655 HP (146)	1,460		12,655 HP (146)	1,460	2,920	12,655 HP (146)	1,460	4,380
Boat construction for coastal fishery	1,200 (60)	4,500		1,200 (60)	4,500	9,000	1,200 (60)	4,500	13,500
Boat construction for trawler (large)	2,600 (26)	10,400		2,600 (26)	10,400	20,800	2,600 (26)	10,400	31,200
Boat construction for trawler (shrimp and medium)	500 (10)	1,000		500 (10)	1,000	2,000	500 (10)	1,000	2,000
Boat construction of purse seines	3 units = 18 boats	4,500		3 units = 18 boats	4,500	9,000	3 units = 18 boats	4,500	13,500
Boat construction for whale catches	160	600		160	600	1,200	80	300	1,500
Boat construction for in-shore Fishery	280 (4)	1,260		280 (4)	1,200	2,400	280 (4)	1,200	3,600
Improvement of facility	204	2,040		204	2,040	4,080	204	2,040	6,120
		25,700			25,700	51,400		25,400	76,800
Import of large trawler	3,700 (37)	14,800		3,700 (37)	14,800	29,600	3,700 (37)	14,800	44,400
Import of purse seine boat	1,560 3 units=18 boats	4,500		1,560 3 units=18 boats	4,500	9,000	1,560 3 units=18 boats	4,500	13,500
Total		19,300				28,600			57,900

Second Five-Year Plan -

APPENDIX 9 D (Cont'd)

Production Plan by Year and Project

Unit: Metric ton

	1969			1970			1971		
	Scale of Project	Increase of Production	Production	Scale of Project	Increase of Production	Production	Scale of Project	Increase of Production	Production
Replacement of Engine	12,655 HP (146)	1,460	5,840	12,466 HP (146)	1,420	7,260	12,346 HP (146)	1,410	8,670
Boat construction for coastal Fishery	1,200 (60)	4,500	18,000	1,300 (60)	4,875	22,875	1,300 (60)	4,875	27,750
Boat construction for trawler (large)	2,600 (26)	10,400	41,600	2,400 (24)	9,600	51,200	2,400 (24)	9,600	60,800
Boat construction for trawler (shrimp and medium)	500 (10)	1,000	4,000	500 (10)	1,000	5,000	500 (10)	1,000	6,000
Boat construction of purse seines	3 units= 18 boats	4,500	18,000	3 units = 18 boats	4,500	22,500	2 units= 12 boats	3,000	25,500
Boat construction for whale catches	80 (1)	300	1,800	80 (1)	300	2,100	80 (1)	300	2,400
Boat construction for in-shore fishery	280 (4)	1,200	4,800	280 (4)	1,200	6,000	280 (4)	1,200	7,200
Improvement of facility	204	2,040	8,160	215	2,150	10,310	215	2,150	12,480
		25,400	102,200		25,045	127,245		23,535	150,780
Import of large trawler	3,700 (37)	14,800	59,200			59,200			58,200
Import of purse seine boat	1,560 (3 units= 18 boats)	4,500	18,000			18,000			18,000
Total			77,200			77,200			77,200

Second Five-Year Plan -
Production Plan by Year and Project

APPENDIX 9 D (Cont'd)

Unit: Metric ton

	Korean Industries Marine Development Corporation											
	1966		1967		1968		1969		1970		1971	
	No. of Trips	Fishery Product	No. of Trips	Fishery Product	No. of Trips	Fishery Product	No. of Trips	Fishery Product	No. of Trips	Fishery Product	No. of Trips	Fishery Product
1 Pacific Boats (under 200 tons)	102	6,843.18	78	5,233.02	102	6,843.18	90	6,038.1	90	6,038.1	90	6,038.1
		7,518.42*		5,749.38*		7,518.42*		6,633.9*		6,633.9*		6,633.9*
2 Atlantic Boats (under 200 tons)	316	23,131.2	414	30,304.8	414	30,304.8	414	30,304.8	414	30,304.8	414	30,304.8
3 Atlantic Boats (620 tonners)	40	11,320	54	15,957	55	16,252.5	54	15,957	54	15,957	54	15,957
4 Stern Trawlers (1,300 tonners)	9	4,050	11	4,950	11	4,950	10.6	4,770	10.6	4,770	10.6	4,770
5 Inshore Side Trawlers	36	1,623.6	107	4,825.7	111	5,006.1	110	4,961	110	4,961	110	4,961
6 Inshore Stern Trawlers	10	532.8	26	1,385.28	26	1,385.28	26	1,385.28	26	1,385.28	26	1,385.28
Total	513	48,000.78	680	62,656.8	720	64,113.06	704.6	63,415.18	704.6	63,415.18	704.6	63,415.18

* Production measured in short tons.

Unit: Metric ton

Second Five-Year Plan - Production Plan by Year and Project

Ocean Fishing (Private)

	1966		1967		1968		1969		1970		1971	
	Production	Scale of Investment										
Import of Tuna Long Liner	9,000	-	18,000	-	18,000	-	18,000	-	18,000	-	18,000	-
Import of Tuna Long Liner		3,750 (15)	4,500	3,750 (15)	13,500	3,750 (15)	22,500	2,500 (10)	30,000	-	30,000	-
Stern Trawler Ocean Stern Trawler		3,000 (2)	2,400	3,000 (2)	7,200	3,000 (2)	12,000	1,500 (1)	15,600	-	16,800	-
	9,000		24,900		38,700		52,500		63,600		64,800	

APPENDIX 10

Table 1: REVISED ESTIMATES OF FISHERY PRODUCTION, 1966-1971

	1965	1966		1967		1968	
	Base Year	<u>In-</u> <u>puts</u>	<u>Pro-</u> <u>duction</u> (M/T)	<u>In-</u> <u>puts</u>	<u>Pro-</u> <u>duction</u> (M/T)	<u>In-</u> <u>puts</u>	<u>Pro-</u> <u>duction</u> (M/T)
1. Longliners under 200 tons - 300 tons per vessel per year		54	8,100	-	16,200	-	16,200
2. Longliners over 200 tons - 400 tons per vessel per year		37	7,400	15	17,800	15	23,800
3. Trawlers under 250 tons - 500 tons per vessel per year		12	3,000	-	6,000	-	6,000
4. Trawlers over 250 tons - 2,000 tons per vessel per year		2	2,000	2	6,000	2	10,000
5. Coastal boats of 20 tons - 50 tons per boat per year	60		1,500	60	4,500	60	7,500
6. Shrimp trawlers of 50 tons - 100 tons per vessel per year		10	500	10	1,500	10	2,500
7. Coastal trawlers of 70 tons - 275 tons per boat per year	4		550	4	1,650	4	2,750
8. Whale boats of 80 tons - 300 tons per boat per year	2		300	2	900	1	1,350
9. Coastal trawlers of 100 tons - 350 tons per boat per year		63	11,025	63	33,075	63	55,125
10. Purse seiners of 40-150 tons - 1,500 tons per unit per year		6	4,500	6	13,500	6	22,500
11. Replacement of engines - 10 tons per year per engine /1		146	730	146	2,190	146	3,650
12. Improved fishing facilities - 10 tons per center /2		<u>204</u>	<u>1,020</u>	<u>204</u>	<u>3,060</u>	<u>204</u>	<u>5,100</u>
<u>Total Fish Catches</u>		600	40,625	511	106,375	511	156,475
13. Other marine landing /3		-	2,500		7,000		10,500
14. Aquiculture /4		-	600		7,000		13,000
<u>GRAND TOTAL</u>		<u>625,000</u>	<u>43,725</u>		<u>120,375</u>		<u>179,975</u>

/1 Estimates of the Bureau of Fisheries reduced by 50% the first year that inputs are introduced.

/2 Same as /1

/3 Same as /1 and /2

/4 Estimates of the Bureau of Fisheries reduced by 50% primarily because of water pollution impediments to expansion.

APPENDIX 10 (Page 2)

Table 1: REVISED ESTIMATES OF FISHERY PRODUCTION, 1966-1971 (Cont.)

	1 9 6 9		1 9 7 0		1 9 7 1	
	<u>In-</u> <u>puts</u>	<u>Pro-</u> <u>duction</u> (M/T)	<u>In-</u> <u>puts</u>	<u>Pro-</u> <u>duction</u> (M/T)	<u>In-</u> <u>puts</u>	<u>Pro-</u> <u>duction</u> (M/T)
1. Longliners under 200 tons - 300 tons per vessel per year	-	16,200	-	16,200	-	16,200
2. Longliners over 200 tons - 400 tons per vessel per year	15	29,800	10	34,800	-	36,800
3. Trawlers under 250 tons - 500 tons per vessel per year	-	6,000	-	6,000	-	6,000
4. Trawlers over 250 tons - 2,000 tons per vessel per year	2	14,000	1	17,000	-	18,000
5. Coastal boats of 20 tons - 50 tons per boat per yr.	60	10,500	65	13,625	65	16,875
6. Shrimp trawlers of 50 tons - 100 tons per vessel per year	10	3,500	10	4,500	10	5,500
7. Coastal trawlers of 70 tons - 275 tons per boat per yr.	4	3,850	4	4,950	4	6,050
8. Whale boats of 80 tons - 300 tons per boat per yr.	1	1,650	1	1,950	1	2,250
9. Coastal trawlers of 100 tons - 350 tons per boat per yr.	63	77,175	24	92,400	24	100,800
10. Purse seiners of 40-150 tons - 1,500 tons per unit per year	6	31,500	3	38,250	2	42,000
11. Replacement of engines - 10 tons per year per engine /1	146	5,110	142	6,550	141	7,965
12. Improved fishing facilities - 10 tons per center /2	<u>204</u>	<u>7,140</u>	<u>215</u>	<u>9,225</u>	<u>215</u>	<u>11,385</u>
<u>Total Fish Catches</u>	511	206,425	475	245,450	462	269,825
13. Other marine landing /3	-	14,000		17,500		21,000
14. Aquaculture /4	-	19,000		26,000		34,000
<u>GRAND TOTAL</u>		<u>239,425</u>		<u>288,950</u>		<u>324,825</u>

/1 Estimates of the Bureau of Fisheries reduced by 50% the first year that inputs are introduced.

/2 Same as /1

/3 Same as /1 and /2

/4 Estimates of the Bureau of Fisheries reduced by 50% primarily because of water pollution impediments to expansion.