AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search
http://ageconsearch.umn.edu
aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

Annual shelf

GIANNINI FOUNDATION OF
AGRICULTURAL ECONOMICS
LIBRARY
WITHDRAWN
OCT 13 1969

A REPORT ON THE ECONOMICS OF POLISH FACTORY TRAWLERS AND FREEZER TRAWLERS

by

Bruno G. Noetzel

Working Paper No. 9

February 1969

U.S.

BUREAU OF COMMERCIAL FISHERIES
DIVISION OF ECONOMIC RESEARCH

WORKING PAPER SERIES

1. An Application of an Investment Model to Channel Catfish Farming by R. Thompson and F. Mange.

2. The Development of Catfish as a Farm Crop and an Estimation of Its Economic Adaptability to Radiation Processing by D. Nash and M. Miller.

3. Design Study: An Optimum Fishing Vessel for Georges Bank Groundfish Fishery by A. Sokoloski (Project Monitor).

4. The Relation between Vessel Subsidy Percentages and the Rate of Return on Investment for Various Technologies and Scale Levels: The Haddock Fishery by D. Nash, A. Sokoloski and F. Bell (Project Monitors).

5. An Economic Justification for Recommended Legislative Changes in the 1964 Fishing Fleet Improvement Act by F. Bell, E. Carlson, D. Nash and A. Sokoloski.

6. The Economic Impact of Current Fisheries Management Policy on the Commercial Fishing Industry of the Upper Great Lakes by D. Cleary.

7. Cost and Earnings in the Boston Large Trawler Fleet by B. Noetzel and V. Norton.

8. Some Elements of An Evaluation of the Effects of Legal Factors on the Utilization of Fishery Resources by A. Sokoloski.

9. A Report on the Economics of Polish Factory Trawlers and Freezer Trawlers, by B. Noetzel.

10. An Inventory of Demand Equations for Fishery Products by D. Nash and F. Bell.

11. Industry Analysis of West Coast Flounder and Sole Products and an Estimation of Its Economic Adaptability to Radiation Processing by D. Nash and M. Miller.

12. Bio-Economic Model of a Fishery (Primarily Demersal) by E. Carlson.

13. The Factors behind the Different Growth Rates of U. S. Fisheries by F. Bell.

(continued on inside back cover)

PREFACE

Under Research Contract No. 14-17-0007-220 of June 29, 1964, with the Fish and Wildlife Service, Bureau of Commercial Fisheries, U. S. Department of the Interior, the Sea Fisheries Institute in Gdynia, Poland, conducted in 1965-1967 a study on the performance of Polish modern deep-sea fishing fleet. The study was directed and supervised by Mr. Krzysztof Kazmierski, an economist with the Sea Fisheries Institute. The final report in Polish, under the title: POLSKIE UPRZEMYSŁOWIONE STATKI RYBACKIE TYPOW: B-15, B-20, B-23, and B-18, has been submitted to the Bureau of Commercial Fisheries in October 1967, in the form of 5 volumes of text and tables. The report contains three parts: processing technology, fishing technique, and economics.

This report in English is confined mainly to the economic performance of the vessels under study. It has been prepared with the intention to present only information which might be of interest to American readers. It is thus a broad summary rather than a translation. Many details from the Polish report have been purposely omitted for clarity and consistency. Some data had to be changed because of an obvious error in the original tables.

Detailed information on the vessels' technical characteristics, organization and technology of production, fishing gear used on each vessel type and on different fishing grounds, as well as general information on the organization of the Polish fishing industry - are obtainable from the Branch of Economics Research, Bureau of Commercial Fisheries, 7338 Baltimore Avenue, College Park, Maryland 20740.

B.G.N.

College Park, Maryland
October 1968

CONTENTS

List of Figures	v
List of Tables	v
List of Appendix Tables	viii
Introduction	1
Scope of Analysis	2
Definitions	3
Factory Trawlers B-15	4
Main Characteristics	4
Performance	6
Effort, Catch, and Catch per Effort in ICNAF Area	12
Gross Revenue and Prices	15
Costs of Operation	18
Semi-Freezer Trawlers B-20	21
Main Characteristics	21
Performance	22
Effort, Catch, and Catch per Effort	26
Gross Revenue and Costs of Operation	26
Freezer Trawlers B-23	28
Main Characteristics	28
Performance	30
Effort, Catch and Catch per Effort	32
Gross Revenue and Costs of Operation	32

Freezer Trawlers B-18 34

Main Characteristics 34

Performance 36

Effort, Catch, and Catch Per Effort 38

Gross Revenue and Costs of Operation 38

Comparative Analysis 40

Figures 1-8 44

Tables 1-48 52

Appendix 110

Appendix Tables 1-6 115

FIGURES

1. - Catch by Poland's fishing fleet, 1961-1965 44
2. - Factory trawlers B-15. Time at sea and time fishing (in percent of annual time) 45
3. - Factory trawlers B-15. Catch composition in ICNAF area, by main species (in percent of total) 46
4. - Factory trawlers B-15, ICNAF area. Production by main products (in percent of total) 47
5. - Factory trawlers B-15. Composition of frozen products from ICNAF area, 1961-1965 (in percent of total) 48
6. - Factory trawlers B-15. Landings per trip in domestic ports, 1961-1965 49
7. - Monthly distribution of effort, catch, and catch/effort in two ICNAF subareas. Factory trawlers B-15, 1961-1965 50
8. - Factory trawlers B-15. Catch composition by months, ICNAF area (in percent of total monthly catch) 51

TABLES

1. - Factory trawlers B-15, 1961-1965. Number of vessel-years in operation 52
2. - Factory trawlers B-15. Breakdown of vessel time, 1961-1965 53
3. - Factory trawlers B-15, 1961-1965. Time spent on fishing grounds, per vessel-year 54
4. - Factory trawlers B-15. Time spent in domestic ports, 1961-1964 55
5. - Factory trawlers B-15, 1961-1965. Production by areas and species 56 & 57
6. - Factory trawlers B-15, 1961-1965. Landings in foreign and domestic ports 58
7. - Factory trawlers B-15, effort and catch by years, ICNAF area, 1961-1965 (averages per vessel) 59
8. - Factory trawlers B-15, fishing activity in ICNAF area, 1961-1965. Effort, catch, and catch per effort (by subareas and months) 60, 61, 62, 63 & 64

TABLES (continued)

9. - Factory trawlers B-15, 1961-1965. Cost and earnings per vessel 65
10.- Factory trawlers B-15. Costs of operation, per vessel, 1961-1965 66
11.- Factory trawlers B-15, 1961-1964. Average fuel and oil consumption per vessel and year (by phases of operation) 67
12.- Factory trawlers B-15. Average fuel and oil consumption per vessel and year (by vessel departments) 68
13.- Factory trawlers B-15, 1961-1964. Average use of packing materials for fish products 69
14.- Use of basic components of fishing gear on factory trawlers, B-15 (averages per trip) 70
15.- Semi-freezer trawlers B-20. Number of vessel-years in operation 71
16.- Semi-freezer trawlers B-20. Breakdown of vessel time, 1961-1965 72
17.- Operations of semi-freezer trawlers B-20, 1961-1965 73
18.- Semi-freezer trawlers B-20, 1961-1965. Production by areas and species 74 & 75
19.- Semi-freezer trawlers B-20, 1961-1965. Landings in foreign and domestic ports 76
20.- Semi-freezer trawlers B-20 (sample of 4 vessels). Effort, catch, and catch per effort, by area and years, 1961-1965 77
21.- Semi-freezer trawlers B-20 (sample of 4 vessels). Effort, catch, and catch per effort, by areas and months 1961-1965 78 & 79
22.- Semi-freezer trawler B-20, 1961-1965, Costs and earnings per vessel 80
23.- Semi-freezer trawlers B-20, costs of operation, per vessel, 1961-1965 81
24.- Semi-freezer trawlers B-20, 1961-1964. Fuel and oil consumption per vessel and year (by phases of operation 82
25.- Semi-freezer trawlers B-20, 1961-1964. Fuel and oil consumption per vessel and year (by vessel departments) 83
26.- Semi-freezer trawlers B-20. Use of basic components of fishing gear (per trip) 84

TABLES (continued)

27.- Freeze trawlers. B-23. Number of vessel-years in operation 85
28.- Freezer trawlers B-23. Breakdown of vessel time, 1963-1965 86
29.- Operations of freezer trawlers B-23, 1963-1965 87
30.- Freezer trawlers B-23. Production by areas and species, 1963-1965 88
31.- Freezer trawlers B-23. Landings in foreign and domestic ports 89
32.- Freezer trawlers B-23 (Sample of 4 vessels). Effort, catch and catch per effort, by areas and months, 1963-1965 90
33.- Freezer trawlers B-23. Costs and earnings per vessel 91
34.- Freezer trawler B-23. Costs of operation, per vessel, 1964 and 1965 92
35.- Freezer trawlers B-23, 1963-1965. Fuel and oil consumption per vessel and year (by phases of operation) 93
36.- Freezer trawlers B-23, 1963-1965. Fuel and oil consumption per vessel and year (by vessel departments) 94
37.- Use of basic components of fishing gear on freezer trawlers, B-23 (averages per trip) 95
38.- Freezer trawlers B-18. Number of vessel-years in operation 96
39.- Freezer trawlers B-18. Breakdown of vessel time, 1965-1966 97
40.- Operations of freezer trawlers B-18, 1965-1966 98
41.- Freezer trawlers B-18. Production by areas and species, 1965-1966 99
42.- Freezer trawlers B-18. Landings in foreign and domestic ports 100
43.- Freezer trawlers B-18 (sample of 4 vessels). Effort, catch, and catch per effort, by areas and months, 1965-1966 101 & 102
44.- Freezer trawlers B-18. Costs and earnings per vessel 103
45.- Freezer trawler B-18. Costs of operation, per vessel, 1965 and 1966 104

TABLES (continued)

46.- Freezer trawlers B-18, 1965-1966. Fuel and oil consumption per vessel and year (by phases of operation) 105
47.- Freezer trawlers B-18, 1965-1966. Fuel and oil consumption per vessel and year (by vessel departments) 106
48.- Characteristics and performance of four types of vessels. Summary sheet. 107, 108, & 109

APPENDIX TABLES

1.- Component parts of crews' payments on factory trawlers B-15 114 & 115
2.- Component parts of crews' payments on semi-freezers B-20 116
3.- Component parts of crews' payments on freezers B-23 117
4.- Component parts of crews' payments on freezers B-18 118 & 119
5.- Payments to crews, by vessel type (Average per vessel-year) 120
6.- Average monthly crew earnings on trawlers: B-15, B-20 and B-23 121

Introduction

Poland's modern fishing fleet described in this paper consists of the following vessel types:

factory trawlers B 15

semi-freezer trawlers B 20

freezer trawlers B 23

freezer trawlers B 18.

Figure 1 shows the contribution of this fleet to the total catch in 1961 through 1965.

By the end of 1966 there were 17 factory trawlers in operation, while five more vessels were planned to join the fleet in 1967. These factory trawlers are fishing in the North West Atlantic, mainly in the ICNAF [1/] subareas 2J, 3K, 3L, and 3M. All the vessels are operated by the Fishing Enterprise "DALMOR" in Gdynia.

The first semi-freezer trawler B 20 was delivered in August 1961 to the Fishing Enterprise "ODRA" in Swinoujscie. This series consists of 15 units, all but one with "ODRA." One vessel (Wieczno) has been adapted for exploratory fishing and transferred to the Sea Fisheries Institute in Gdynia. All the B 20 trawlers are conventional side trawlers. Areas of operation: the North Sea, the ICNAF area, and the African fishing grounds.

1/ International Commission for North-West Atlantic Fisheries

Freezer trawlers B 23 (stern ramp trawlers) were designed for fishing in the North Sea and in the Middle Atlantic, to supply the canneries with frozen herring and mackerel. The Gdynia Shipyard delivered the first freezer trawler in November 1963 to the Enterprise "ODRA", which in subsequent years obtained seven more vessels of the same type. Four additional units were built for the Fishing Enterprise "GRYF" in Szczecin. The series was completed in September 1965. About two thirds of the B 23 trawlers' production originates in the Middle Atlantic.

A new version of freezer trawlers was initiated with the delivery of M/t "FOKA", a B 18 stern ramp trawler, in May 1965. Only six of these vessels were built, all of them for "ODRA" in Swinoujscie. They operate in the Middle Atlantic, and on Georges Bank (herring).

Scope of the analysis. Operations of each vessel group will be analyzed for the period of time: from the date the first unit of a given group was commissioned, to the end of 1965. Exceptionally for the freezer trawlers B 18 this time period was extended to the end of 1966. Because of its experimental character, the first trip of the first factory trawler B 15 (end of 1960) is not included in this analysis.

In compliance with the contractor's [2] special interest in the performance of factory trawlers B 15, this group of vessels will be given most attention. Each vessel from this category is included in the complete range of the analysis. For the other three groups, only data readily available (catch, products, export, costs) refer to each vessel in a group, whereas the analysis of fishing effort and of catch per unit of effort is restricted to a sample of four vessels from each group.[3]

The following criteria for inclusion of a vessel into the sample were applied:

a. longest possible time in operation

b. fishing in all areas foreseen for a given type of vessel

c. continuous activity without breakdowns

d. average level of fishing results

e. equipment and technological solutions applied on a vessel were representative for the group.

Definitions. It was necessary for the purpose of this analysis to use three terms for days of fishing activity:

1. Fishing days (a) - a summation of hours of trawling and/or net repairs, divided into 24-hour periods.

2/ U. S. Bureau of Commercial Fisheries

3/ Data on fishing effort had to be collected additionally from primary records (log books).

2. Fishing days (b) - each calendar day in which actual fishing (trawling, net repairs) was performed for at least 6 hours. This criterion was set for the Polish fisheries statistics system.

3. Fishing days (c) - each calendar day in which any fishing was performed.

The quantities of fish caught or products landed are expressed in metric tons.

Factory Trawlers B 15

Main characteristics. The main characteristics of these stern ramp trawlers are given below. 4/

length overall	85.20	m
length between perpendiculars	75.00	m
moulded breadth	13.80	m
depth to the main deck	7.10	m
depth to the shelter deck	9.75	m
design draft	5.40	m
deadweight tonnage	1250	t
gross tonnage	2800	GRT

4/ More details are available in the Branch of Economics Research, Bureau of Commercial Fisheries.

net tonnage	1160	NRT
main engine	2400	HP
3 auxiliary motors each	375	HP
speed on trials	12.5	knots
cruising speed, with load	11.5	knots
standard crew	94	men
additional accommodation for	8	men
endurance	70	days

The vessels are equipped with filleting machines for cod (Baader 150) and for redfish (Baader 99), heading machines (Baader 312), skinning machines (Baader 46 and 47), and washing machines (Baader 666). In the processing plant there are two machine filleting lines (cod and redfish) and 9 stands for hand filleting (for larger fish). The total capacity of the processing plant is 50 tons of fish per 24 hours.

Fish fillets, dressed fish and whole fish are quick frozen in two blast freezers with a total capacity of 30 tons of products per 24 hours. The frozen fish blocks are stowed in three refrigerated holds (total volume 1433 cu.m.).

A fish meal plant can handle 25 tons of offals and by-catch per 24 hours. From cod livers, up to one tone of liver oil can be produced daily. Also fish oil is obtained as a by-product of fish meal production.

The fish meal hold has a volume of 285 cu. m. and the liver oil tanks 58 cu. m.

A separate part of the study deals with technology of fish processing on these vessels.

Performance. After the first factory trawler was commissioned in October 1960, eleven more vessels entered the fishery by the end of 1965 (table 1). This analysis covers the time period from 1961 to 1965, with a total of 27.75 vessel-years of operation.

On the average, a vessel was 270 days at sea per year, and 95 days were spent in ports and shipyards (table 2). Because of the long distance between home ports and grounds fished by these vessels, they were able to complete on the average only 2.77 trips a year. Running to and from the fishing grounds required 23.5 percent of the time spent at sea. During an average of 58 days fishing (a) per trip, 496 hauls were made, consisting of 860 hours of trawling.

Figure 2 shows the year to year changes in time spent at sea and for actual fishing. It might be of interest to note the difference between the number of fishing days (a) shown in table 2, and the number of fishing days (b) as they appear in the enterprise's statistical data:

year	fishing days (a)	(b)	$\frac{(a)}{(b)}$
1961	132	153	0.86
1962	149	165	0.90
1963	166	183	0.91
1964	171	193	0.89
1965	159	193	0.82
five-year average	161	186	0.87

Thus, in order to arrive at the number of fishing days measured as 24-hour periods of actual fishing activity, the number of fishing days (b) should be multiplied by the factor 0.87.

A more detailed account of the time spent on fishing grounds in each of the 5 years is presented in table 3. Here the hours for each activity are summed up and shown in 24-hour periods. The item "All other" includes some of the days which in table 2 were shown as part of the time spent in harbors (short calls at foreign ports close to the fishing grounds). The percentage figures in the last column of table 3 indicate that 70 percent of a day's (24 hours) time was devoted to actual fishing, and 2/3 of that fishing time - to pulling the trawl over the sea bottom.

When in domestic ports the vessels spent on the average $16\frac{1}{2}$ days between two consecutive voyages. This includes time spent for unloading of cargo, small repairs of mechanisms and equipment, taking on supplies for the next trip. With respect to the purpose for which a vessel was tied up, three more kinds of stay in a domestic port are distinguished from the one already mentioned. First - when a new vessel has been readied for her maiden trip (i.e., the time from the day of commissioning to the day the first trip started). Second - when a vessel had to be transferred to a shipyard to undergo periodic checkup and repairs (i.e., the time from the day of returning from fishing to the day of arriving at the shipyard). Third - when a vessel after repairs at a shipyard had to be reequipped for fishing (i.e., the time from the day of leaving the shipyard to the day of departure for fishing).

Table 4 shows the average duration of stays of all categories in domestic ports, with the range as a measure of variance. An analysis of a sample of five stays between two fishing trips (one stay for each of five different vessels) shows the following average values per stay:

			Hours	
Total time in harbor				397
Time lost: Waiting			41	
Interruptions			152	193
Time spent effectively				204
Operations:				
Entering the harbor			1	
Clearing by customs			2	
(s) Unloading			62	
Towing			3	
(s) Minor repairs			110	
Taking on supplies:				
(s)	Packing material	12		
(s)	Fishing gear	12		
(s)	Groceries and provisions	18		
(s)	Water	8.5		
(s)	Fuel, oil	13		
	Other	1.5	65	243

Index of concurrency = $\frac{243}{204}$ = 1.2

(s) indicates concurrent operations

Almost one half of the time spent in harbor was lost on nonproductive waiting and interruptions caused by shortage of labor. The operations sum up to a total of 243 hours. However, some of the operations are performed simultaneously, and thus the time of effective service was cut down to 204 hours. The ratio 243/204 gives the index of concurrency = 1.2.

The Northwest Atlantic was the area of fishing operations for factory trawlers. Only two vessels made exploratory trips to African waters.[5/]

In 77 trips a total of 130,095 tons of fish were caught (Table 5), thus giving an average catch of 1690 tons per trip. More than 50 percent of all fish caught in the ICNAF area were redfish. Redfish together with cod-like species (including cod, haddock, whiting, pollock) constitute almost 87 percent of this catch. Herring was caught mainly in 1965, on Georges Bank. The year-to-year changes in catch composition are pictured in Figure 3.

The total catch of 130,095 tons has been processed on board of vessels, resulting in 68,959 tons of fish products (the overall ratio of products to catch is 53 percent). Out of these, 75.6 percent were frozen fish products, 19.9 percent was fish meal, and 4.5 percent were fish oils.

5/ M/t "NEPTUN" from 10-2-1962 to 3-6-1963 (maiden trip); M/t "PEGAZ" fished there twice: from 1-1-1963 to 2-12-1963 (on her maiden trip), and from 10-13-1963 to 1-11-1964 (on her third trip); on both these trips the vessel proceeded from the African grounds to the Northwest Atlantic; these three fishing experiments with factory trawlers on African grounds are in this study accounted for as two whole trips.

From the ICNAF area alone, a total of 66,402 tons of products were landed. Figure 4 shows the share of each product in total production, and Figure 5 indicates the share of frozen fish fillets (redfish and cod-like species) in total frozen products. For the whole 5-year period, frozen redfish fillets make up 60 percent of all fish fillets produced (with a low of 43 percent in 1962, and a high of 69 percent in 1964). Although the catch of cod and cod-like species, relative to total catch, has not changed significantly over the last few years, production of cod fillets shows a decreasing trend. Consequently, increasingly more cod is landed in form of frozen dressed fish. This development in the production patterns indicates a slackening in utilization of costly equipment (filleting machines).

The major part of prozen products from African waters was unloaded in African ports (76 percent). Unloadings in North American ports amounted to almost 15 percent of total production in 1965, up from 4 percent in 1964 (Table 6). These exports are considered as an important factor in improving the efficiency of the vessels.

Landings in domestic ports were 853 tons per trip (5-year average), with 631 tons of frozen products, 181 tons of fish meal, and 41 tons of fish oils. Over the 5-year period from 1961 to 1965, the per-trip landings of frozen products rose from 495 to 675 tons, those of fish meal from 146 to 186 tons, and landings of oils from 14.5 to 51 tons (Figure 6).

Effort, catch, and catch-per-effort in ICNAF area

The average annual catch per vessel from the Northwest Atlantic (ICNAF area) increased over the five years by 78 percent. Only a little over one third of this increment may be attributed to additional fishing effort (2335 hours of trawling in 1965 versus 1878 hours in 1961), the remaining two thirds resulting from higher yield per unit of effort (Table 7). While one haul per day has been added over the 5-year period, the time of trawling per haul has been shortened on the average from 1.9 hours to 1.6 hours, so that in effect the aggregate time of trawling per day remained practically unchanged (less than 1 percent down in 1965, compared with 1961). The increase in fishing effort is thus reflected in the additional 40 days of fishing in 1965, as compared with 1961 (up 25.5 percent).

Fishing was performed in the following 5 sub-areas (1961-1965):

	Total days	Percent	Total catch (tons)	Percent
Greenland	57	1.1	1,142.2	0.9
Labrador	1,198	23.1	33,135.8	26.6
Newfoundland	3,841	74.0	88,251.4	70.7
Nova Scotia	12	0.2	99.7	0.1
Georges Bank	83	1.6	2,088.7	1.7
Totals	5,191	100.0	124,717.8	100.0

The Newfoundland and Labrador fishing grounds are the two ICNAF sub-areas which produced 97.3 percent of the total 5-year catch. The remaining 2.7 percent came from the Greenland and Nova Scotian grounds, and from Georges Bank.

The monthly distributions of effort and catch on each of the five sub-areas for the whole 5-year period are shown in Table 8.[6/] Only on the Labrador and Newfoundland fishing grounds were the vessels active all over the year. Fishing off Greenland was confined to spring months, while Georges Bank was exploited in the fall. There were only sporadic trials made in Nova Scotian waters (summer and fall).

Figure 7 presents a comparison of the distribution of effort and catch per effort over the year on the two principal fishing grounds. In the Labrador sub-area the best catches per unit of effort were obtained from December through May, whereas the Newfoundland banks yielded the highest relative results from January through May. The graphs show that during these top months the catch per day fishing was significantly higher in the Labrador sub-area than around Newfoundland. The distribution of fishing effort over the year is also different for these two sub-areas.

6/ The effort and catch data of that table are based on log records from each trip. For a given month these data represent the sums of effort or catch experienced by all vessels during that month over the 5-year period. Due to the data collecting procedure, the total catch in Table 8 is slightly lower (by 0.8 percent) from that shown before in Table 5. This discrepancy is not significant; thus it can be disregarded in this discussion of catch per unit of effort.

Each subdivision of the two main sub-areas yielded the following quantities of redfish, cod and cod-like species, and flounders (tons):

		Redfish	Cod and cod-like species	Flounders
Subdivision	2 H	192.0	2,401.3	45.4
Subdivision	2 J	14,384.7	12,874.5	2,080.7
Total, sub-area 2		14,576.7	15,275.8	2,126.1
Subdivision	3 K	41,363.1	14,236.5	5,687.6
Subdivision	3 L	6,821.2	2,697.8	3,173.2
Subdivision	3 M	2,999.3	7,997.7	476.3
Subdivision	3 N	85.0	75.1	112.4
Subdivision	3 O	44.3	74.5	5.9
Subdivision	3 P	1.3	46.0	2.3
Total, sub-area 3		51,314.2	25,127.6	9,457.7

The seasonal fluctuations in catch composition are, in general, more profound in sub-area 2 (Labrador), than they are in sub-area 3 (Newfoundland). This is shown in the graphs of Figure 8, which are based on data from Table 8. These graphs also show that in sub-area 2 redfish constituted more than 50 percent of the catch during 6 months, compared with 8 months in sub-area 3. Cod and cod-like species exceeded this 50 percent mark in sub-area 2 during 4 months, and in sub-area 3 during only 1 month. Flounders were more abundant in sub-area 3.

Gross revenue and prices

Revenues from two distinct sources contribute to the total revenue resulting from fishing operations:

1. Equivalent of U.S. dollars in Polish currency (zloties) for products sold in foreign ports during a fishing trip; the fishing enterprise is credited in internal clearing operations for its export activities. This equivalent is based on exchange rates set by the central bank for given export sales. The rates are set so as to secure the coverage of production costs and to provide some profit as incentive to increase the production of export goods.

2. The value of fish or fish products landed in domestic ports. This value is arrived at by applying fixed prices to the quantity landed.

The price system in the distribution chain for fish and fish products provides for fixed prices on each of the six stages, beginning with the so-called "fishing price", and ending on the retail level. Besides these six price lists, there is in use still another one for the purpose of establishing crew earnings. The "fishing price" covers all the operation costs except unloading costs. This price is applied in settling accounts between two fishing enterprises, or between two departments of the same enterprise (e.g. between the fishing and processing departments of a vertically integrated enterprise).

The next level in the price system is the so-called "sales price". It is this price that is used in determining the value of landings in domestic ports, as mentioned before (item 2). It is essentially the "fishing price" increased by the costs of unloading and, in some cases, of

processing, with a profit margin of about 3% included. Sales prices find application in settling accounts between a fishing enterprise (with its own processing facilities) and the CODZ.[7/] This institution serves as a link between fishing enterprises on one side and the wholesale outlets on the other, and it is compelled to buy any quantities of fish or products from the fishing segment of the industry, at fixed prices.[8/] Sales prices remain stable over longer periods of time. The prices for frozen products landed by factory trawlers remained, in general, unchanged since 1960.[9/]

The average annual gross revenue from operation of a factory trawler B-15 was 44,651,300 zloties (Table 9). The first two years (1961 and 1962) are considered as a period of searching for the proper form of operation of these entirely new fishing vessels. The process of improvement in utilization of these vessels is reflected in the exceptionally large increments of annual gross revenue per vessel: by 37 percent in 1962, and by 40 percent in 1963. For the last three years analyzed (1963-1965) the average annual gross revenue amounts to 47,283,600 zloties per vessel.

7/ This is an acronym for Centralny Osrodek Dyspozycyjny Zbytu, referred to as the Central Station.

8/ For more details see: The Organization of the Distribution of Fish in Poland, by K.J. Kazmierski and M.K. Formela, Sea Fisheries Institute in Gdynia; a paper presented at the F.A.O. Meeting on Business Decisions in Fishing Industry, organized in Rome, September 21-25, 1964.

9/ There are very few exceptions when seasonal price changes may be allowed, e.g. for salted mackerel, cod and redfish.

The operation costs from Table 9 will be discussed in more details in the following paragraphs. They range from 27.8 million to 34.4 million zloties per vessel and year. Gross revenue exceeded operation costs by 38 percent in 1965, whereas in 1961 costs surpassed the value of landed products by 17 percent.

A comparison of performance during the last three years may be made from the following setup of index numbers:

	1963	1964	1965
Total catch per vessel	100.0	97.2	92.5
Total of products per vessel	100.0	102.8	101.9
Gross revenue per vessel	100.0	106.3	104.2
Operation costs per vessel	100.0	94.9	85.1

While the catch decreased, the quantity of landed products rose slightly. This was attained by producing more frozen fish in other form than fillets (compare Figure 5). The increase in gross revenue reflects an improvement in quality of landed products, since prices remained unchanged, as stated before (prices are differentiated by quality standards). The substantial drop in costs will be discussed separately.

Costs of operation. The costs shown in itemized form in table 10 do not include any management costs (called departmental costs), and general administration costs. They do include, however, all the cost items that in the existing accounting system are ascribed directly to the operation of a particular vessel. Thus they comprise the most part of fixed costs (depreciation, maintenance, and repairs, insurance). Without a unique exchange rate applicable, it is impossible to express these costs in U. S. dollars. Thus the figures in table 10 serve only as a presentation of the cost structure. Readers might be more interested in the following presentation, in physical units, of some of the material inputs. Tables 11 and 12 show the consumption of fuel and oil in two cross-sections: by phases of operation, and by vessel departments. Also the use of packing materials for frozen fish products is presented in physical units (table 13). The average fresh water consumption was (in m. tons):

	Per vessel-year	Per trip
Drinking water	744	257
Boiler water	530	183
Total	1,274	440

The basic components of fishing gear sum up to 29 metric tons of nettings, ropes, hides, rubber, joints, and to 700 steel bobbins

and aluminum floats per trip. Five otter boards are used (or lost) on every four trips (table 14).

Wages with social security taxes are the highest cost item, amounting to 32.5 percent of total costs (average for 5 years). The crew cost is relatively higher on these vessels than it is on conventional trawlers fishing in the North Sea. This difference results partly from the relatively high number in crew on factory trawlers, and partly from higher wages on these vessels, because of the hardships connected with fishing in the Northwest Atlantic and because of the duration of trips. The number of crew was particularly high during the first years operation when many of the positions (especially officers' positions) were doubled out of the necessity of training crews for the growing fleet.

The standard crew consists now of 94 men and there are 8 more positions for trainees. Appendix table 1 lists the positions on factory trawlers B-15, with the component parts of earnings for each crew member.

Appendix table 6 shows the average monthly earnings, by positions. The system of crew renumeration is described in Appendix A.

Groceries and provisions are part of the crews renumerations, covered in full by the fishing enterprise. So are the expenses for working

clothes, which are included in the cost item "Packing and other materials". Depreciation is calculated at the average rate of about 4.5 percent of the delivery costs of a new vessel (average for twelve vessels = 107,717,000 zloties).

The substantial decline in crew costs after 1963 as well as in repairs and other costs are the main factors in cutting down the total operation costs, as was mentioned before. In 1964 some changes in the labor contract had a downward effect on the wages paid to the crew. This loss of money earnings was partly offset by improvement of living standards, reflected in higher costs of groceries and provisions. The vessel's crew is credited for cutting down the costs of repairs. Better care of equipment and machinery, as well as repairs done by the crew, are mentioned as the contributing factors.

On factory trawlers B-15, the bottom trawl 26/30 [10] is mostly used. On some fishing grounds (off Labrador) a modified bottom trawl 33/37 is used (the codend, codend extension, and parts of the belly in this modified trawl are elements of the bottom trawl 26/30).

10/ The numerator in this fraction expresses the length of the headline in meters, and the denominator - the length in meters of 1/2 of the circumference of the mouth.

Semi-Freezer Trawlers B-20

Main Characteristics

The vessels are designed for side trawling, and are engaged mainly in fishing for herring in the North Sea, although more distant grounds (north and middle Atlantic) are in their range of operations.

The main characteristics are:

length overall	61.37	m.
length between perpendiculars	55.10	m.
moulded breadth	9.80	m.
moulded depth	5.20	m.
design draft	4.41	m.
L x B x H	2950	cu. m.
deadweight	508	tons
gross tonnage	796	tons
net tonnage	323	tons
main engine (supercharged diesel)	1375	hp
speed on trials	13.2	knots
standard crew	33	men
endurance	45	days

The vessel has one continuous deck, a long forecastle and an after deck superstructure extending to the port beam.

The processing plant is located amidships on a 'tweendeck, and is equipped with a fish container, three packing stands, a horizontal plate freezer of 7.5 t/24 hrs. capacity.

Two refrigerated fish holds are provided: one of 232 cu. m. with temperature -25° C for storage of frozen fish, a one of 266 cu. m. with temperature 0 to -1° C for storage of barrels with salted fish.

The electric trawl winch gives a pull of 9 tons (Ward-Leonard transmission system). The trawl is operated from the starboard side only.

The crew quarters consist of 5 one-man and 14 two-men cabins.

Performance

Fifteen vessels of the type described were commissioned between August 1961 and March 1963 (table 15). One of the trawlers, after two years in operation, has been transferred to the Sea Fisheries Institute in Gdynia, for research work and exploratory fishing. For the period 1961 - 1965, a total of 52.28 vessel-years is being analyzed.

The breakdown of annual vessel time is shown on table 16. Days under repair refer only to periodic overhauling of the vessels at the shipyard. Small repairs were conducted during the time spent

in harbors between trips. On the average 253 days were spent at sea per vessel and year (257 days by sample vessels). The following differences between the number of fishing days (a) and the number of fishing days (b) may be noted:

Year	Fishing Days (a)	Fishing Days (b)	$\frac{(a)}{(b)}$
1961	88	167	0.53
1962	103	171	0.60
1963	131	167	0.78
1964	122	168	0.73
1965	132	174	0.76
five-year average	124	170	0.73

It is assumed that the four sample vessels are fairly representative of the whole group of semi-freezer trawlers, and thus comparisons can be made between the group and sub-group.

As further indicated by the last column in table 16, the sum of days spent on the fishing grounds (total days at sea minus running time) is almost identical for the two groups of vessels. But in the case of the entire group 46 days of actually unproductive time (the difference between 80 days for the sample vessels and 34 days for the whole group) were registered as fishing time, this shift resulting solely from two different criteria accepted for defining the fishing effort.

A more detailed account of operations of the semi-freezer trawlers is given in table 17. An average vessel made almost 6 trips per year with an average of about 11 landings. Thus on almost every trip there was one landing in a foreign port or at a base ship, in addition to the landing in home port.

The average time spent by a vessel in home port between two fishing trips was 265 hours (or roughly 11 days). This figure represents the mean value for 36 stays of 4 vessels in 1964 and 1965 (the extremes are: minimum - 64 hours, maximum -807 hours). For other categories of harbor time the averages are:

time before periodic repairs - 120 hours

time after periodic repairs - 80 hours

North Sea fishing ranks as number one in the operations of this fleet from 1961 through 1965. Out of the total of 82658 tons of fish caught, 77 percent originated in the North Sea and adjacent waters (table 18). The grounds off Africa account for almost 20 percent of total catch, and the remaining 3 percent were harvested in the Northwest Atlantic (ICNAF area). The catch is characterized as being predominately composed of palagic species (90% of total).

Products were landed in three varieties: fresh in ice, frozen, and salted. Each of these forms of conservation had the following

share in the total quantities landed from different grounds (in percent):

		fresh	frozen	salted	total
from:	North Sea	3.2	46.8	50.0	100.0
	N.W. Atlantic	-	84.5	15.5	100.0
	African grounds	27.8	72.2	-	100.0
	All fishing grounds combined	6.8	50.8	42.4	100.0

Most of the salted products were herring (97 percent of total salted). Fresh fish and frozen products were landed in the form of: fillets (0.8), dressed (8.3), drawn (3.0), deheaded (19.7), and whole (68.2); figures in parentheses indicate the percentage of total fresh and frozen products. Only cod and cod like species were utilized for production of fillets (filleting done by hand).

Out of 379 landings over the 5-year period only 19 took place in foreign ports (export). This means 5 percent of all landings (by number) and 5 1/2 percent of quantity landed (table 19).

Export landings from ICNAF area (209.1 tons) consisted of 182.2 tons of frozen cod fillets, and 26.9 tons of frozen dressed fish (various species). Whole fresh and frozen fish were landed in African ports (mackerel, jack mackerel, sea breams, and others).

The remaining 360 landings were divided between domestic ports and a base ship close to the fishing grounds (North Sea). These transshipments to a base ship are regarded as domestic landings.

Effort, catch, and catch per effort.

Data presented in table 20 indicate that a vessel was fishing during 187 days per year (average for 5 years), making 4.1 hauls per fishing day (c), with 2 1/2 hours of trawling per haul. While there is a great deal of variation in catch per effort from year to year on given grounds, and between grounds in given years, the long range averages for the three grounds are fairly close each other.

The monthly distribution of effort and catch is shown in table 21. In the North Sea fishing was performed all over the year, with 93 percent of effort (fishing days) falling into 8 month, from April to November. The catch rate, however, was highest in December, though the input of effort during this month was rather small because of weather conditions.

Fishing in the Northwest Atlantic was rather sporadic during winter and spring months. The African grounds were fished by these vessels mainly from December through March.

Gross revenue and costs of operation

The average annual quantities of landed fish and fish products per vessel were (in tons):

fresh	85.8
frozen	641.3
salted	536.0
total	1263.1

with a gross revenue value of 14,600.8 thousand zloties. The average costs of operation amounted to 10,115.4 thousand zloties. Thus gross revenue exceeded costs by 31 percent. This excess, related to the vessel's construction costs, gives a 12 percent return on investment (table 22).

A breakdown of operation costs for each year is presented in table 23. Crew costs (wages, payroll taxes, groceries and provisions) constitute over 31 percent of total operation costs (5-year average). Fuel and oil is the next highest cost item (18 percent), followed by depreciation (17 percent). Costs of base-ship services (when fishing in the North Sea area) amount to 724 thousand zloties, or 7 percent of total costs.

The consumption of fuel and oil (in physical units) per vessel and year is shown in tables 24 (by phases of operation) and 25 (by vessel departments). The use of basic components of fishing gear per trip is presented in table 26.

The bottom trawl 28/32 11/ is used on the semi-freezer trawlers B-20.

11/ For meaning of this code number see footnote 10 on page 20.

Freezer trawlers B-23

With the problem of over-fishing in the North Sea becoming increasingly serious, more distant fishing grounds off the African shelf were taken into consideration, with their stocks of mackerel and other pelagic species, which could serve as a substitute for the North Sea herring. Expansion of the fishery to the African grounds required, however, construction of a different type of vessel. Few exploratory trips with factory trawlers disclosed the unsuitableness of these vessels for those grounds, because of the great variety of species and sizes of fish, making the installation of costly filleting machines almost useless. Neither were the conventional side trawlers, the older ones with no freezing facilities and the newer ones (B-20) with only small freezing capacities, the proper solution. Thus it was decided to construct a fishing vessel with freezing capacities adequate for the total expected catch of consumption fish (frozen whole or dressed fish, no fish fillets), and with a fish meal plant (for offal and bycatch).

The first vessel of the new series, known under the name of freezer trawlers B-23, was delivered by the shipyard to the "Odra" Enterprise in November 1963. The main characteristics are given below:

length overall	69.23 m.
length between perpendiculars	63.23 m.
moulded breadth	11.01 m.
depth (main deck)	5.25 m.
depth (shelter deck)	7.55 m.
design draft	5.05 m.
L x B x H	5305 cu. m.
deadweight	598 tons
gross tonnage	1374 tons
net tonnage	560 tons
main engine	1620 hp.
2 auxiliary engines, each	178 hp.
speed on trials	14 knots
standard crew	39 men
additional accommodations for	4 men
endurance	50 days

The vessel has two continuous decks, and is divided into compartments by six watertight bulkheads. Fuel and water are carried in deep tanks. Fish meal hold (47 cu. m.) and hold No. 2 for frozen products (182 cu. m.) are located under the main deck, aft. Another hold for frozen products (No. 1, 425 cu. m.) is located forward, separated from hold No. 2 by the engine room. The total fish hold capacity is about

330 tons of frozen products. On the main deck, aft, the fish meal plant, fish oil tanks (3 cu. m.) and the processing plant are located. The electric trawl winch (with a pull of 12 tons) is mounted on the shelter deck, aft. The vessel can be operated on grounds located 4000 miles from home port. Up to 25 tons of fish daily can be processed on these vessels, equipped with two horizontal plate freezers (14 tons total capacity per 16 hours), and a fish meal plant (for 6 - 8 tons of raw material per 16 hours). Blocks of frozen fish (dressed or whole) are packed in cartons (3 x 10 kg = 30 kg in each carton).

Performance

The time of commissioning of each of the twelve vessels in this series is given in Table 27. With the last vessel commissioned in September 1965, there were 11 vessels in operation at the end of 1965, since one was stranded on the West African coast (May 1965). On the whole, 16.13 vessel-years have been analyzed (only 4 vessels, or 7.76 vessel-years, with more detail), with 5895 days in operation. On the average, a vessel was at sea 236 days per year (244 days for sample vessels), with 158 fishing days (b), Table 28 . Fishing days, regarded as 24-hour periods of fishing activity (sample vessels) amounted to 116 days per year. For two months per year a vessel was taken out of operation to undergo periodic repairs at the shipyard.

The average number of trips per vessel-year was 3.5 for the whole group, and 3.1 for the sample vessels (Table 29). Most of the trips to African grounds were made with one or two landings in an African port, and with the final landing in a domestic port. The total number of landings (foreign and domestic) for all vessels over the 3-year period was 88 (in 57 trips), thus giving an average of 5.46 landings per vessel-year (5.28 landings for sample vessels).

When in domestic ports between two fishing trips, the vessels spent on the average 476 hours (or about 20 days). For the 16 stays reported, the minimum turn-around time was 92 hours (or almost 4 days), and the maximum time--909 hours (or 38 days). The preparation of a vessel for periodic repairs in the shipyard took on the average 224 hours, whereas 110 hours were needed to prepare a vessel for fishing after periodic repairs.

The B-23 freezer trawlers were operated in two general areas: North Sea with adjacent waters, and African grounds (Mauritania and Angola). Over the three-year period of operation (16.13 vessel-years), about 36 percent of the total catch originated in the North Sea, and about 64 percent in African waters (Table 30). The total of products (frozen fish and fish meal) landed from trips to the North Sea area amounted to 10,514 tons (or 71 percent of the respective catch), and from trips to African grounds--16,760 tons (or 62 percent of the catch).

Frozen products (90 percent of total production) were landed primarily in the form of frozen whole fish (83 percent of total frozen products). Only 5 tons of fish fillets were landed (filleting by hand). The yield of fish meal was about 15-17 percent of raw material. The relatively low figure for gutted and headed frozen fish indicates that for production of fish meal mainly trash fish were used.

A sizable proportion of frozen products was landed in African ports (over 60 percent). The average quantity landed in foreign ports was 308 tons of products (including 15 tons of fish meal), as compared with 311 tons per landing in domestic ports (with 39 tons of fish meal included, Table 31).

Effort, catch, and catch per effort

Fishing in the North Sea was confined to the second part of the year, with July, August, and September as the months of highest activity in that area. Fishing on the African grounds was performed throughout the year (Table 32). Only in August the catch per unit of effort was higher in the North Sea than it was on African grounds. In all other months, where comparable, the situation was reversed. On the whole, the African grounds yielded 30 percent more fish per hour of trawling.

Gross revenue and costs of operation

Table 33 shows nearly 22 million zloties worth of products per vessel and year. The average return on sales was 31.6 percent, and return

on investment, 10.0 percent. Wages with social security taxes account for almost 25 percent of total operating costs (Table 34). With groceries and provisions accounted for, the total crew cost rises to over 30 percent. The repair costs are relatively low (new vessels). As with factory trawlers B-15, management costs and general administration costs are not shown in Table 34.

The consumption of fuel and lub oils (in physical units) is presented in Tables 35 and 36, with a breakdown by phases of operation and by vessel's main departments.

For packing of frozen fish products a total of 53,600 cartons (30 kg size) were used per vessel and year, whereas packing of fish meal required 2350 jute bags (70 kg size).

Table 37 lists the component parts of fishing gear used on an average trip.

Two versions of a bottom trawl 33/37 [12] are used on the freezer-trawler B-23, one for fishing in the North Sea area, the other one for fishing on African grounds.

12/ For the meaning of this code number, see footnote 10 on page 20.

Freezer trawlers B-18

Experience gained when fishing the African grounds with freezer trawlers B-23 led to construction of larger vessels of the same type. The processing capacity of trawlers B-23 turned out to be too small for fishing in the middle Atlantic. Thus, the new vessels were planned to handle a catch of up to 55 tons per day. The first vessel of this series was commissioned in May 1965. The main characteristics of freezer trawlers B-18 are:

length overall	87.27 m.
length between perpendiculars	82.04 m.
moulded breadth	14.17 m.
depth (main deck)	7.10 m.
depth (shelter deck)	9.75 m.
design draft	5.36 m.
L x B x H	11230 cu. m.
deadweight	1350 tons
gross tonnage	3096 tons
net tonnage	1343 tons
main engine	2250 hp.
2 auxiliary engines	480 hp. and 375 hp.
speed on trials	14 knots
standard crew	74 men
additional accommodations for	8 men
endurance	75 days

The vessel has two continuous decks and is equipped for stern trawling over the ramp, mainly for herring and other pelagic species. An electric trawl winch provides a pull of 12 tons.

A total of 50 - 55 tons of fish can be processed on board of the vessel daily. The end products are: frozen whole fish, dressed fish and fish steaks, fish meal, and fish oils.

No filleting machines are installed. Little filleting of demersal species is done by hand (the plant is geared to handle fish caught mainly in tropical and subtropical areas).

A heading machine (Baader 413), a steak-cutting machine (Baader 383) and 2 washing machines are the only ones installed in the processing plant.

The freezing plant consists of 1 blast freezer (capacity 15 t/day), and 3 horizontal plate freezers (capacity 5 t/day, each).

The fish meal plant has a capacity of 15 tons/day of raw material (trash fish and offal). Liver oil can also be produced when the vessel is fishing in the northern Atlantic (plant capacity = 2 tons of liver per day).

Frozen products are stowed in 3 refrigerated fish holds (total volume = 1317 cu. m.). For storage of fish meal 300 cu. m. of space is provided. Fish oil tanks have a volume of 57 cu. m.

Performance

Six vessels were delivered till July 1966 to the "Odra" Enterprise in Swinoujscie. A total of 6.66 vessel-years will be analyzed, with 2429 days in operation (Table 38). As in the case of B-20 and B-23 trawlers, only four vessels are analyzed in more detail (5.41 vessel-years, 1974 days in operation).

The breakdown of annual vessel time (Table 39) shows an average of 236 days at sea, including 143 fishing days (b). The ratio of these fishing days to days at sea was 60.6 percent.

Days spent in harbors and in shipyards totaled 131 days per year, that is, a little over 1/3 of a year. For periodic repairs and maintenance alone a vessel was taken out of operation for 2½ months.

During the two analyzed years a vessel made on the average about 2 trips per year, and almost 2 landings per trip (Table 40). There were about 6 hauls made during a fishing day (c), with a total of 12.5 hours of trawling.

The turn-around time in domestic ports between two consecutive fishing trips is shown for two stays only, with 578 and 1275 hours. The average time used for preparation of a vessel for periodic repairs was 134 hours (average of 4 observations), whereas after repairs it took 151 hours to prepare the vessel again for fishing (average of 4 observations).

The African fishing grounds (Mauritania and Angola) were the primary areas of operation for trawlers B-18 (77 percent of their total catch). They were operating also in the Northwest Atlantic (ICNAF subarea 5Z), fishing mainly for herring (Table 41). Occasionally some fishing took place in the North Sea, on the way to the more distant grounds (175 tons of fish were caught in the North Sea; i.e., 0.5 percent of the trawlers' total catch). With 14.5 trips made, the average catch per trip was 2084 tons. The share of herring in the catch from ICNAF area was 62 percent, and 30 percent was unspecified fish used almost entirely for reduction into fish meal.

On the African grounds mackerel and Jack mackerel together constituted 41 percent of the catch from these grounds, and 53 percent was labeled as unspecified, of which 4/5 was used for fish meal production.

Frozen products in various forms amounted to 16,377 tons (i.e., 85-90 percent of round weight), whereas 2061 tons of fish meal were produced from offal and trash fish (yield = 17 to 18 percent of raw material).

Little over one half of all frozen products was landed in African ports (export). The average landing in those ports consisted of 625 tons of frozen products and 32 tons of fish meal (Table 42). In domestic ports the trawlers landed on the average 777 tons of all products.

Effort, catch, and catch per effort

The four vessels analyzed with respect to fishing effort spent 79 percent of their total fishing time on the African grounds, 18 percent in ICNAF area 5Z, and 3 percent in the North Sea (Table 43). As already mentioned elsewhere, fishing in the North Sea was only incidental, on the way to more distant grounds. The catch per hour of trawling was rather low (1.1 tons).

Fishing on Georges Bank was performed in May, June, August, and September, with the highest catch per effort in September (43 tons per fishing day).

The trawlers were fishing on African grounds from October till July. January was the month of highest catch per hour of trawling (2.9 tons), whereas the highest catch per day fishing falls in July (much more hours of trawling per day in July than in January).

Gross revenue and costs of operation

The average value of products landed per vessel and year was 31.2 million zloties (as compared with 44.6 million on factory trawlers B-15, and 22 million on freezer trawlers B-23). The average return on sales for the 2-year period was 20.3 percent, and ROI = 5.4 percent. (table 44).

Wages are the highest single item of costs (29 percent), followed by depreciation (21 percent) and fuel costs (18 percent, Table 45). The consumption of fuel and lub oils in physical units is shown in

tables 46 and 47. A vessel used 1874 m. tons of propulsion fuel oil, and over 50 m. tons of lub oils per year.

Around 65,100 cartons per vessel and year are used for packing of frozen fish products (30 kg. size), and 4500 jute bags for fish meal (50 kg. size).

Freezer trawlers B-18 are fishing with a bottom trawl 33/37.[13/]

13/ For the meaning of this fraction see footnote 10 on page 20.

Comparative analysis

The four vessel types presented in this report differ from each other in many respects. For each series to be built, specific fishing areas were anticipated. The distance of those grounds from domestic ports, species of fish available, their abundance, and their qualification for specific preservation treatment (salting, freezing) and level of processing (fillets, dressed fish, fish meal), the effectiveness of planned production - all these were factors which determined the special technical design and technological solutions applied on each vessel type. Thus the four types of trawlers differ in size, horsepower, processing facilities, hold capacity, and number of crewmen. These differences are reflected in construction costs, ranging from 37 to 117 million zloties (table 48).

The factory-trawler is the most advanced type of vessel in the entire group. Although the annual quantity of fish products landed by a factory-trawler is exceeded by that of a freezer trawler B-18 (2485 tons versus 2783 tons), it is the form of products (frozen fish fillets in blocks) which gives the former a 43 percent lead over the latter, when the values of landed products are compared.

It should however be reminded, that prices for landed products are not established on the market as a result if demand and supply, but are set up by the government. Those fixed prices may or may not reflect the actual level of preparation of a product for consumption, since in conducting the price policy other aspects besides economics, are also taken into account. For many products (cod fillets were

given as an example) the ex-vessel price was higher than the retail price paid by the consumer. These remarks should be kept in mind when the gross revenue figures for each vessel type, as well as gross profits and rates of return on investment, are being compared.

The level of hold capacity utilization is similar on all three types of stern trawlers (around 90 percent). Salted fish in barrels (mostly herring) landed by the smaller side trawlers B-20 serves as an explanation for the utilization coefficient being on these vessels significantly lower (74 percent).

As stated elsewhere, management costs and general administration costs are not included in the costs figures presented in this report. It is assumed that these management and administration costs amount to about 15 percent of operating costs.[14/] With this adjustment applied to the gross profit figures shown in table 48, the rates of return on sales and return on investment are approximately as follows (in percent):

trawler:	B - 15	B - 20	B - 23	B - 18
return on sales:	19.7	20.3	20.5	8.3
R. O. I.:	8.2	8.0	6.6	2.2

14/ This assumption is based on data from a paper by B. Noetzel, Sea Fisheries Institute, Gdynia, Poland, presented at the Technical Meeting on Costs and Earnings of Fishing Enterprises, 8-13 September 1958, London, organized by the Food and Agriculture Organization of the U. N.

The significantly lower rates of return on trawlers B-18 can be attributed, at least in some part, to the fact that only one year of operation of a relatively small group of vessels has been analyzed.

Costs per ton of frozen products on vessels landing fish meal and oil as by-products, were calculated under the simplifying assumption, that costs and revenue value of by-products were equal. This assumption, however, leads to a false conclusion, that it costs more to produce a ton of fish meal on a freezer-trawler (11.6 thousand zloties) than to produce a ton of frozen fish (8.7 thousand zloties).

On a factory-trawler the unit cost of fish meal is assumed to be 12.3 thousand zloties per ton (versus 12.5 for frozen fillets and other frozen products).

The costs of catching and processing one ton of fish (costs per ton of catch in table 48) were 20 percent higher on a factory trawler than they were on a freezer trawler B-18 (6.6 versus 5.5 thousand zloties).

This indicator, however, may be misleading, since the catch is processed on board and different end products are landed by each vessel type. The value of these products is represented by the gross revenue figures in table 48. The ratio of gross revenue to operating costs indicates how much value was created by a unit of costs.

It turns out that this ratio is 1.25 on a factory trawler, and 1.09 on a freezer trawler B-18. On the two remaining types of vessels, semi-freezer B-20 and freezer trawler B-23, this ratio is 1.26; i.e. similar to that for a factory trawler. Here again it should be remembered that only the first year of operation of vessels B-18 was analyzed. Over a longer period of time the gap in these ratios would probably be much smaller.

Figure 1. - Catch by Poland's fishing fleet, 1961-1965.

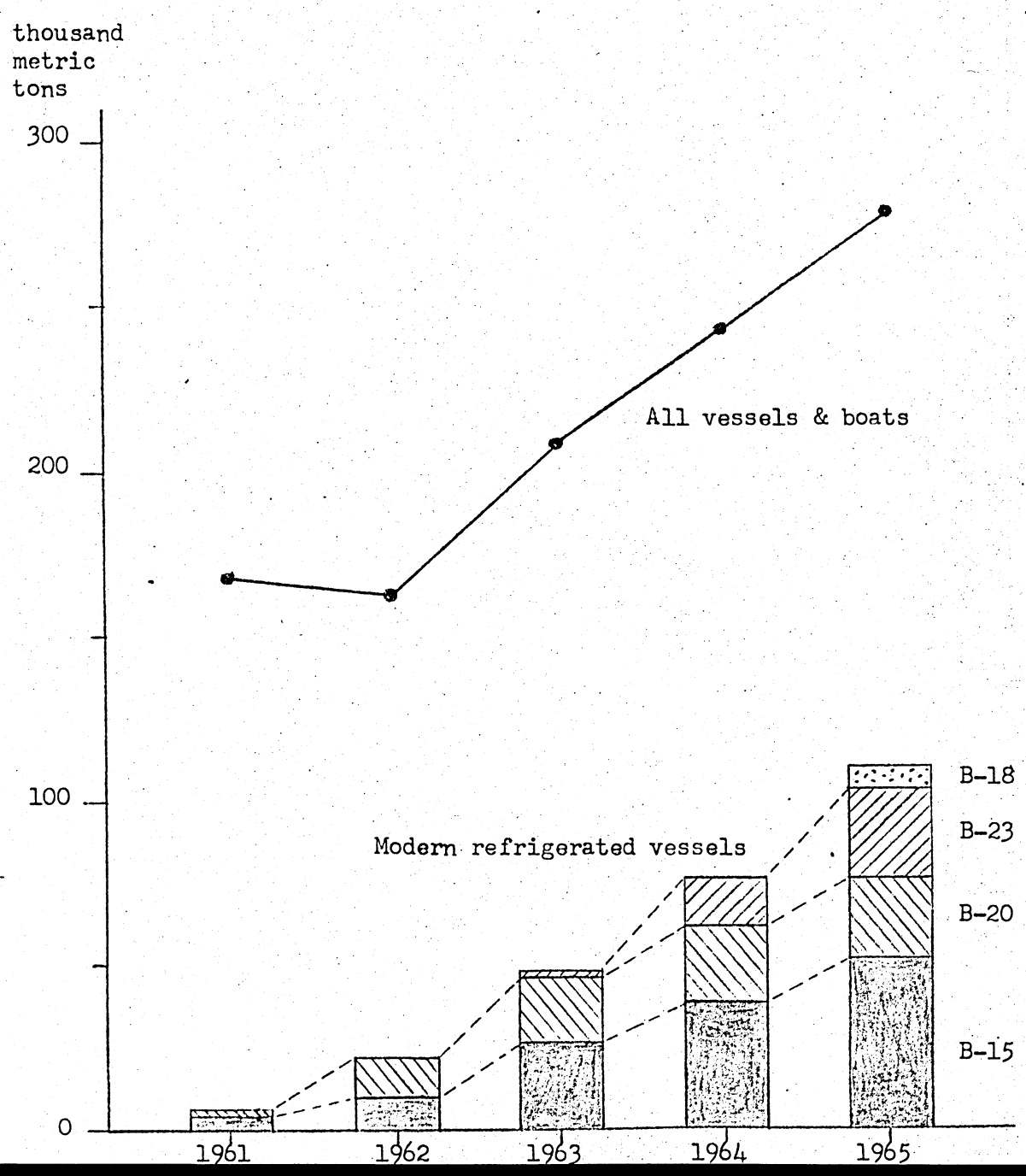


Figure 2. - Factory trawlers B-15. Time at sea and time fishing (in percent of annual time).

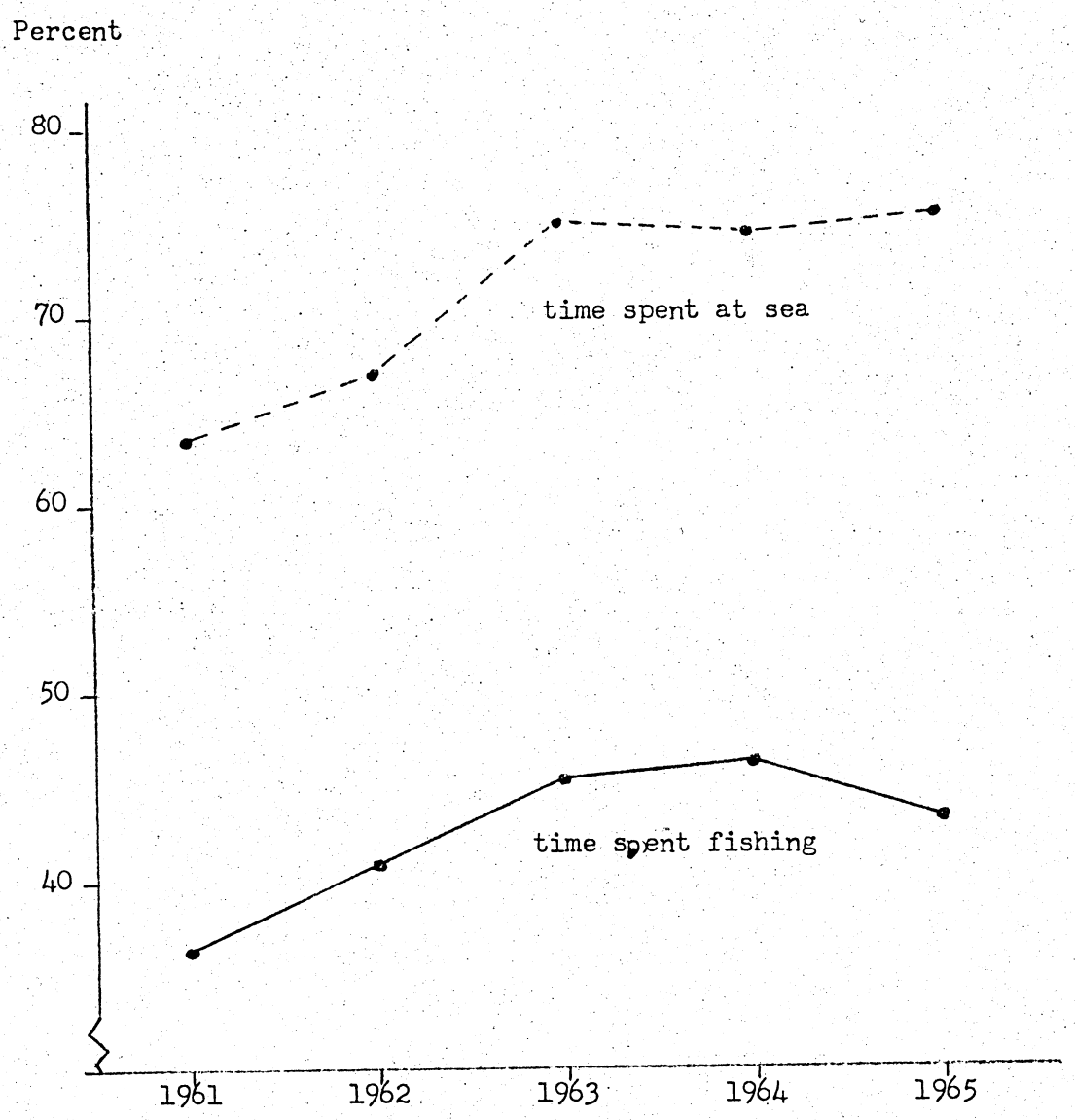


Figure 3. - Factory trawlers B-15. Catch composition in ICNAF area, by main species (in percent of total).

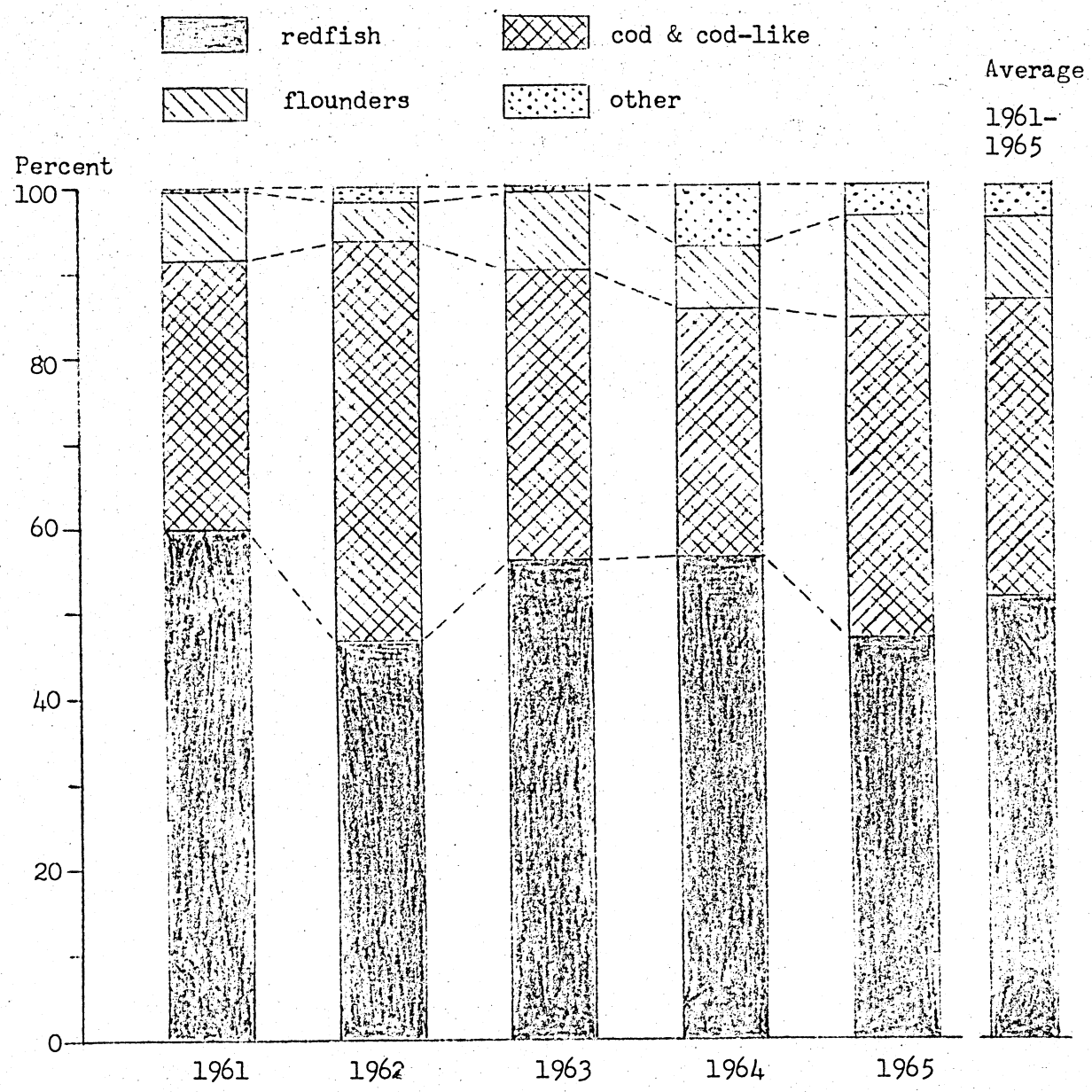


Figure 4. - Factory trawlers B-15, ICNAF area. Production by main products (in percent of total).

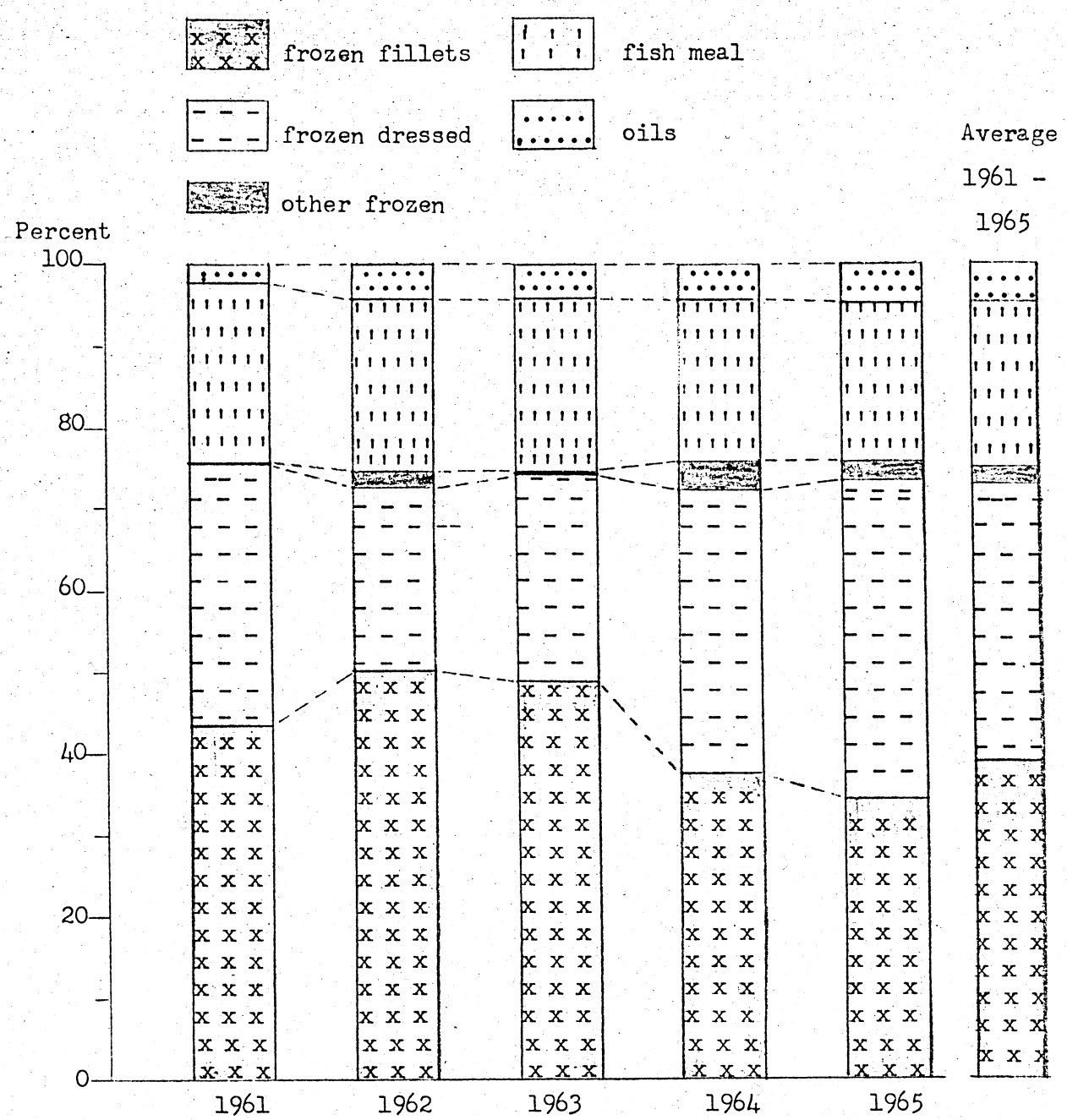


Figure 5. - Factory trawlers B-15. Composition of frozen products from ICNAF area, 1961 - 1965. (in percent of total)

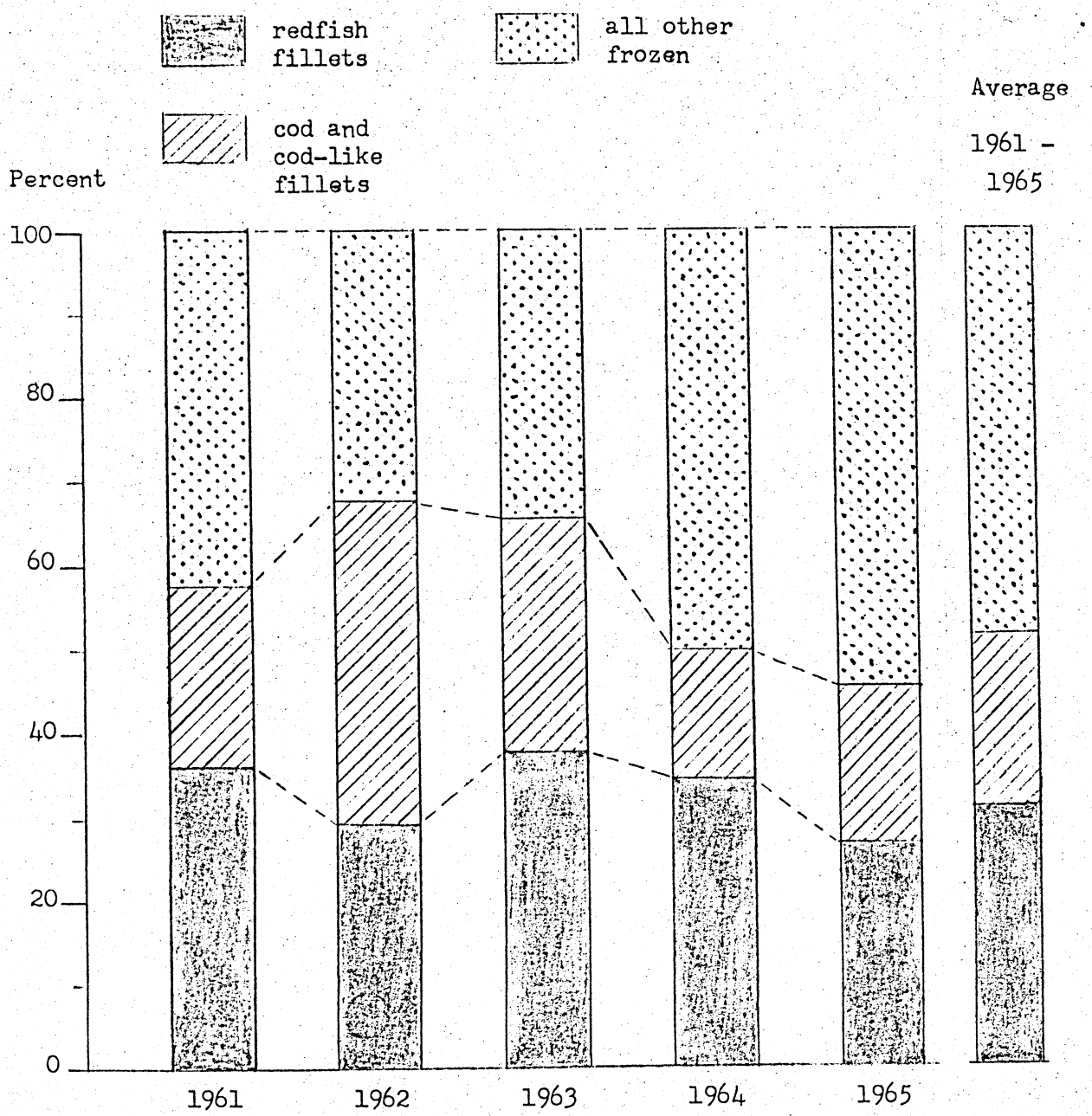


Figure 6. - Factory trawlers B-15. Landings per trip in domestic ports, 1961 - 1965.

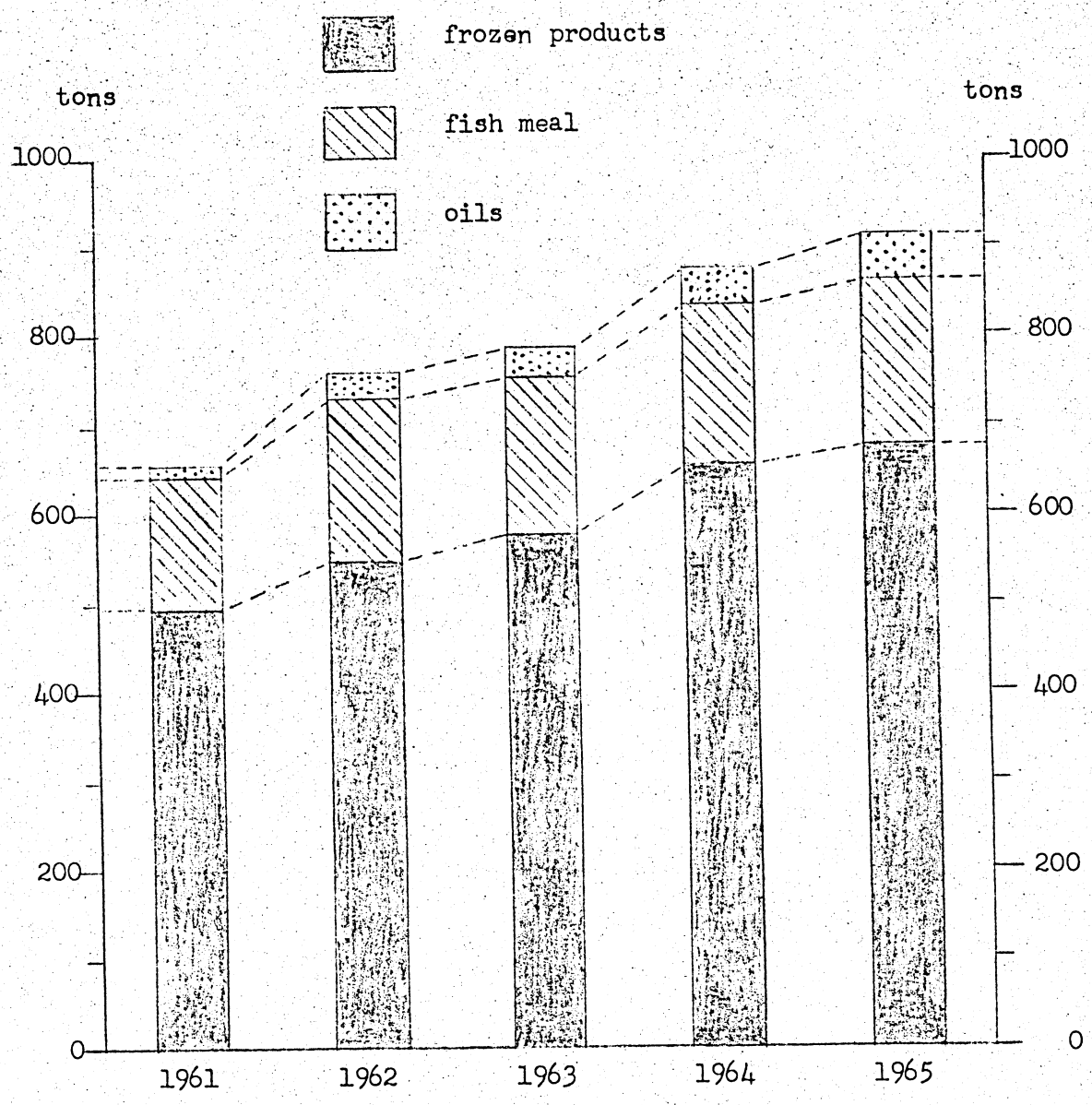
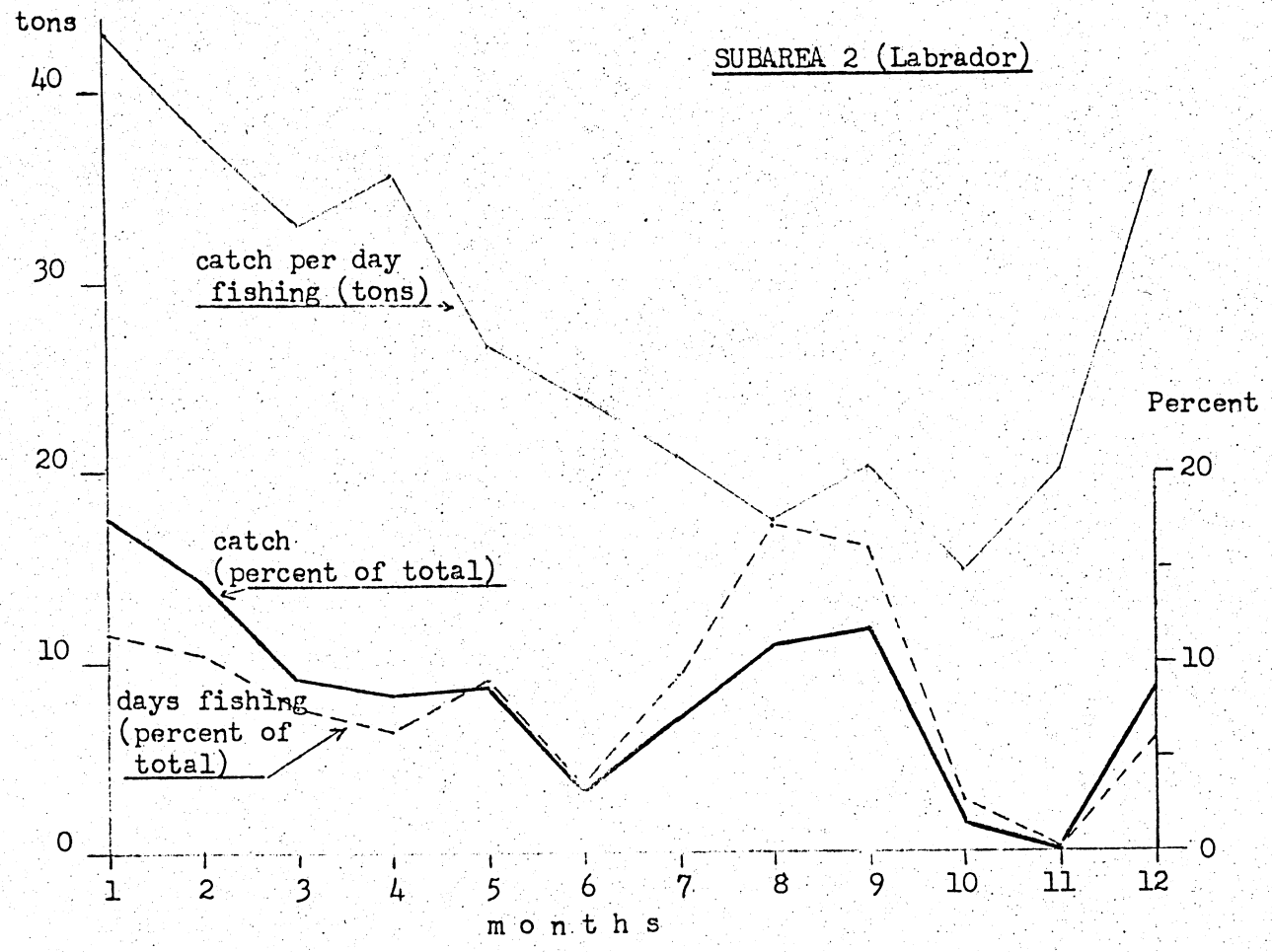


Figure 7. - Monthly distribution of effort, catch, and catch/effort in two ICNAF Subareas. Factory trawlers B-15, 1961-1965.



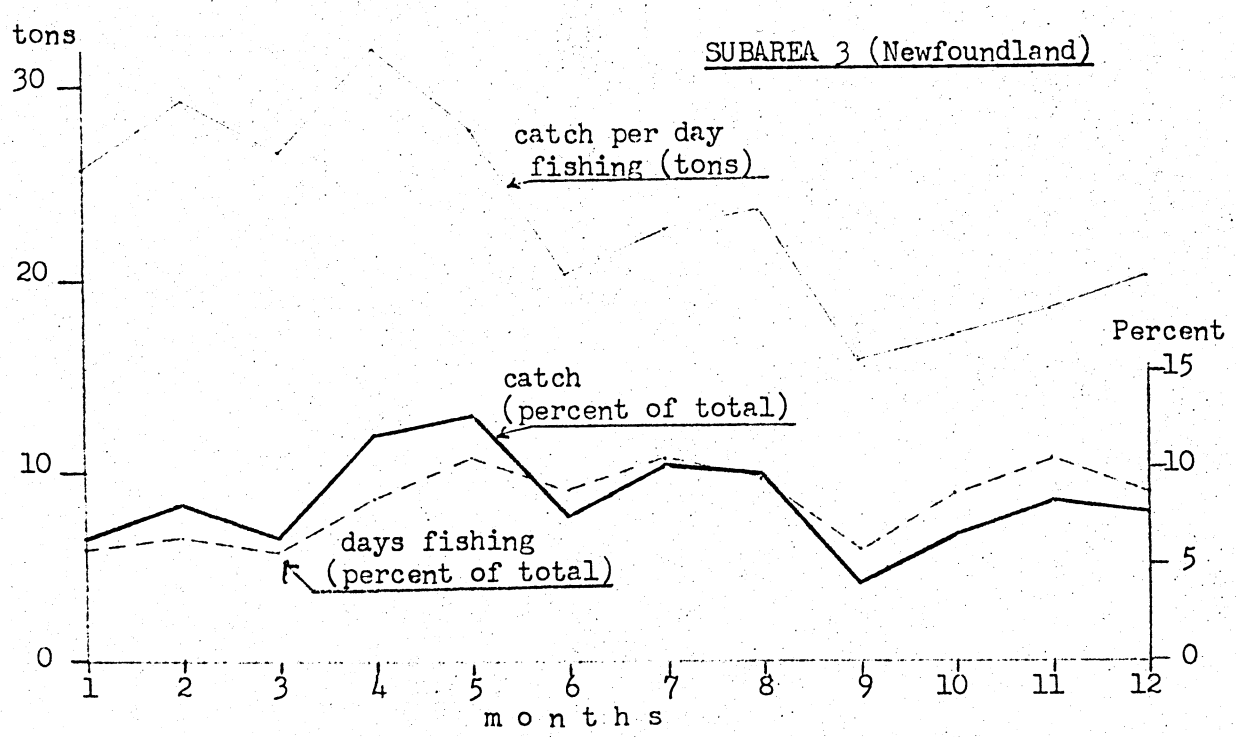


Figure 8. - Factory trawlers B-15. Catch composition by months, ICNAF area (in percent of total monthly catch).

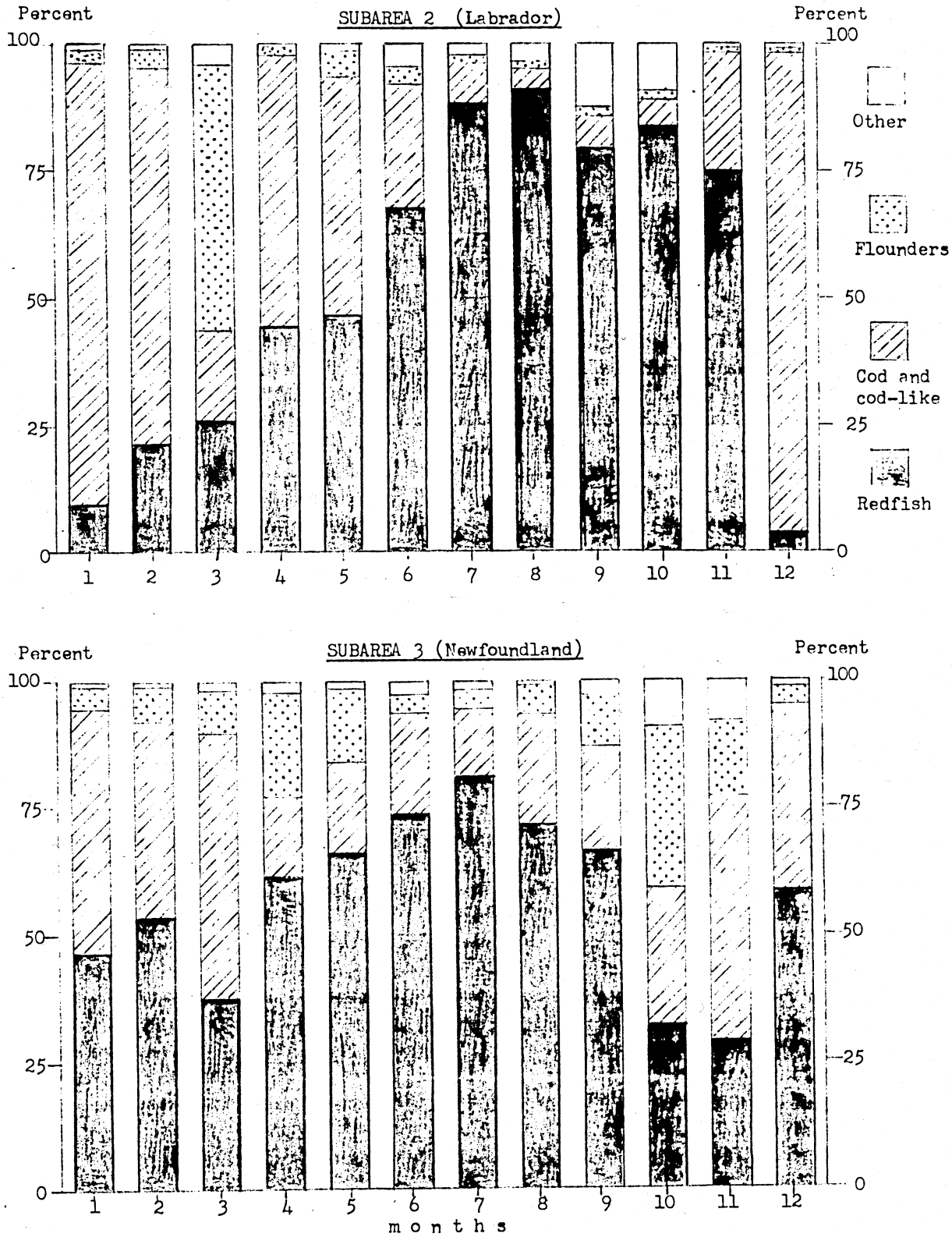


Table 1 - Factory trawlers B-15, 1961-1965. Number of vessel-years in operation

Name of vessel	Date of commissioning mon/day/year	Number of vessel-years in operation 1961	1962	1963	1964	1965	Total vessel-years	Total days in operation
Dalmor*	10/22/60	1.00	1.00	1.00	1.00	1.00	5.00	1826
Kastor	7/12/61	0.47	1.00	1.00	1.00	1.00	4.47	1634
Uran	9/15/62		0.30	1.00	1.00	1.00	3.30	1204
Neptun	9/26/62		0.27	1.00	1.00	1.00	3.27	1193
Pegaz	12/16/62		0.04	1.00	1.00	1.00	3.04	1112
Jupiter	12/15/63			0.05	1.00	1.00	2.05	748
Jowisz	1/ 1/64				1.00	1.00	2.00	731
Feniks	6/30/64				0.50	1.00	1.50	550
Merkury	11/19/64				0.12	1.00	1.12	408
Virgo	1/ 1/65					1.00	1.00	365
Andromeda	4/ 1/65					0.75	0.75	275
Gen. Rachimow	10/ 2/65					0.25	0.25	91
	Totals	1.47	2.61	5.05	7.62	11.00	27.75	10137

* 71 days in operation in 1960 are not included in the analysis (regarded as trials).

Table 2 --Factory trawlers B-15. Breakdown of vessel time, 1961-1965

Item	Years 1961	1962	1963	1964	1965	5-year average
	- - - - number of days/vessel-year - - - -					
Days at sea: total	231.6	244.6	275.0	272.2	276.6	269.7
Including:						
fishing days (a)	131.8	148.9	166.3	170.9	159.4	161.4
changing grounds, storms, and other	37.9	41.8	41.4	34.9	55.1	44.9
running time	61.9	53.9	67.3	66.4	62.1	63.4
Days in harbors (at docks)	102.3	71.1	56.2	54.1	67.0	63.7
Days in repair	31.1	49.3	33.8	39.7	21.4	31.8
Total	365	365	365	366	365	365.2

Table 3 - Factory trawlers B-15, 1961-1965. Time spent on fishing grounds, per vessel-year

Item	1961	1962	1963	1964	1965	5-year average	Percent of total time
	- - - - - - - - - - - - - days (24 hours) - - - - - -						
Setting and hauling of trawl	39.71	46.72	49.52	57.00	51.24	51.48	23.85
Trawling	78.24	90.66	103.18	107.18	97.31	99.45	46.08
Gear repairs	13.94	11.39	13.56	6.73	10.86	10.43	4.83
Drifting	5.17	6.28	3.57	3.54	5.34	4.60	2.13
Storming	8.75	4.39	5.67	6.10	6.10	6.00	2.78
All other*	25.29	41.22	40.83	31.91	56.61	43.85	20.33
Totals	171.10	200.66	216.33	212.46	227.46	215.81	100.00

* This item includes: changing grounds, short calls to foreign ports (without time for unloadings or repairs), running to and from these ports (mainly St. John's, Newfoundland).

Table 4. Factory trawlers B-15. Time Spent in domestic ports, 1961-1964

Category of stay	Total number of stays	Duration of one stay		
		average	maximum	minimum
		hours		
Before maiden trip	7	140	178	93
Between two trips	42	394	765	231
Before periodic repairs	12	131	212	43
After periodic repairs	12	118	184	53

Table 5 -Factory trawlers B-15, 1961-1965. Production by areas and species.

Item	Unit	Years 1961	1962	1963	1964	1965	5-year totals
Number of vessel-years	number	1.47	2.61	5.05	7.62	11.00	27.75
Total catch	m. tons	3923.0	10035.6	25907.4	38005.0	52223.6	130094.6
including:							
A. ICNAF area - total	m. tons	3923.0	8685.7	23048.0	37859.0	52223.6	125739.3
main species: redfish	m. tons	2377.7	4067.9	13000.5	21409.4	24559.9	65415.4
cod and cod-like	m. tons	1221.7	4058.1	7787.3	10865.6	19707.4	43640.1
flounders	m. tons	312.6	420.8	2131.9	2842.4	6133.8	11841.5
halibuts	m. tons	11.0	63.8	128.3	2063.1	1252.7	3518.9
red hake	m. tons	--	--	--	603.9	--	603.9
herring	m. tons	--	696.6	--	35.3	531.7	636.6
unspecified	m. tons	--	5.5	--	39.3	38.1	82.9
B. African fishing grounds - total	m. tons	--	1349.9	2859.4	146.0	--	4355.3
Number of trips - total	number	3	7.5	16	22	28.5	77
ICNAF area	number	3	7.0	14.5	22	28.5	75
African shelf	number	--	0.5	1.5	--	--	2
Total catch per trip	m. tons	1307.7	1338.1	1619.2	1727.5	1832.4	1689.5 (5-year average)

Table 5 (continued)

Item	Unit	Years 1961	1962	1963	1964	1965	5-year totals
Products: frozen	m. tons	1484.8	3742.9	9859.4	15251.8	21809.3	52148.2
fish meal	m. tons	437.8	1090.6	2656.6	3977.3	5570.7	13733.0
oils	m. tons	43.6	183.8	473.8	927.5	1449.2	3077.9
TOTAL	m. tons	1966.2	5017.3	12989.8	20156.6	28829.2	68959.1
Ratio of total products to catch	percent	50.1	50.0	50.1	53.0	55.2	53.00
Products from ICNAF area - total	m. tons	1966.2	4314.3	11207.9	20084.0	28829.2	66401.6
including: frozen fish fillets	m. tons	857.1	2165.4	5462.4	7566.9	9853.9	25905.7
frozen fish, dressed	m. tons	627.3	954.6	2855.9	6909.8	11314.1	22661.7
frozen fish, gutted	m. tons	0.4	1.3	23.7	2.9	3.2	31.5
frozen fish, whole	m. tons	--	75.1	0.4	658.6	585.7	1319.8
other frozen products (skins, livers)	m. tons	--	1.8	--	50.7	52.4	104.9
total frozen products	m. tons	1484.8	3198.2	8342.4	15188.9	21809.3	50023.6
fish meal	m. tons	437.8	932.3	2391.7	3967.6	5570.7	13300.1
oils	m. tons	43.6	183.8	473.8	927.5	1449.2	3077.9
Products from African waters - total	m. tons	--	703.0	1781.9	72.6	--	2557.5
including: frozen fish (dressed, gutted, whole)	m. tons	--	544.7	1517.0	62.9	--	2124.6
fish meal	m. tons	--	158.3	264.9	9.7	--	432.9

Table 6 -- Factory trawlers B-15, 1961-1965. Landings in foreign and domestic ports.

Item	Unit	Years 1961	1962	1963	1964	1965	Total
I. Foreign ports							
A. ICNAF area							
Number of landings	number	--	--	1	9	25	35
Landings: frozen products	m. tons	--	--	30.6	826.6	3590.2	4447.4
fish meal	m. tons	--	--	--	--	550.1	550.1
oils	m. tons	--	--	--	--	71.1	71.1
B. Africa							
Number of landings	number	--	3	3	--	--	6
Landings: frozen products	m. tons	--	458.7	1160.0	--	--	1618.7
II. Domestic ports							
Number of landings	number	3	6	15	22	27	73
Landings: frozen products	m. tons	1484.8	3284.2	8668.8	14425.2	18219.1	46082.1
fish meal	m. tons	437.8	1090.6	2656.6	3977.3	5020.6	13182.9
oils	m. tons	43.6	183.8	473.8	927.5	1378.1	3006.8
Average landings: frozen products	m. tons	495.0	547.4	577.9	655.7	674.8	631.2 (5-year mean)
fish meal	m. tons	145.9	181.8	177.1	180.8	186.0	180.6 (5-year mean)
oils	m. tons	14.5	30.6	31.6	42.1	51.0	41.2 (5-year mean)
TOTAL	m. tons	655.4	759.8	786.6	878.6	911.8	853.0 (5-year mean)

Table 7 -Factory trawlers B-15, effort and catch by years, ICNAF area, 1961-1965
(averages per vessel)

Item		1961	1962	1963	1964	1965	5-year average
Fishing effort							
days fishing (c)	number	157.1	156.7	171.5	198.9	197.2	187.1
hauls	number	982.3	1073.5	1202.9	1439.5	1447.4	1341.0
hours of trawling	number	1878.2	1989.6	2192.2	2559.7	2335.4	2314.2
Catch: total	m. tons	2668.7	3327.8	4564.0	4968.4	4747.6	4531.2
redfish	percent	60.6	46.8	56.4	56.6	47.0	52.0
cod-like	percent	31.1	46.7	33.8	28.7	37.7	34.7
flounders	percent	8.0	4.8	9.2	7.5	11.7	9.4
Catch per effort							
per day fishing (c)	m. tons	16.99	21.24	26.61	24.98	24.08	24.22
per haul	m. tons	2.72	3.10	3.79	3.45	3.28	3.38
per hour of trawling	m. tons	1.42	1.67	2.08	1.94	2.03	1.96

Table 8- Factory trawlers B-15, fishing activity in ICNAF area, 1961-1965. Effort, catch, and catch per effort (by subareas and months)

	Totals & means	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Greenland													
Days fishing (c)	57	---	---	11	11	8	20	----	7	----	---	---	---
Number of hauls	417	---	---	77	69	6.5	162	----	44	----	---	---	---
Hours of trawling	425	---	---	78	70	70	143	----	64	----	---	---	---
Catch, in m. tons: total	1142.2	---	---	292.0	168.2	220.0	408.8	----	53.2	----	---	---	---
including: redfish	235.4	---	---	117.7	59.7	4.0	43.6	----	10.4	----	---	---	---
cod-like	872.0	---	---	156.4	96.6	215.4	363.6	----	40.0	----	---	---	---
flounders	30.8	---	---	15.0	11.2	0.2	1.6	----	2.8	----	---	---	---
Catch per effort, in m. tons:													
per day fishing (c)	20.04	---	---	26.54	15.29	27.50	20.44	----	7.60	----	---	---	---
per haul	2.74	---	---	3.79	2.44	3.38	2.52	----	1.21	----	---	---	---
per hour trawling	2.69	---	---	3.74	2.40	3.14	2.86	----	0.83	----	---	---	----

Table 8 (Continued)

	Totals & means	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Labrador													
Days fishing (c)	1198	136	125	91	76	108	46	112	206	192	34	2	70
Number of Hauls	8480	901	824	603	539	757	330	786	1474	1402	231	16	617
Hours of trawling	13,199	1254	1094	908	780	1252	600	1456	2283	2428	415	29	700
Catch, in m. tons: total	33,135.8	5884.6	4722.5	3004.9	2708.1	2884.0	1106.3	2335.3	3578.3	3879.7	499.0	40.1	2493.0
including: redfish	14,576.7	571.2	1000.0	784.9	1193.5	1355.8	746.8	2051.7	3239.7	3092.8	418.8	29.9	91.6
cod-like	15,275.8	5132.5	3496.0	524.0	1471.2	1341.0	265.0	198.5	172.3	271.9	26.1	9.5	2367.8
flounders	2,126.1	149.9	177.7	1563.1	38.2	91.9	41.0	21.9	21.0	6.1	6.2	0.1	9.0
Catch per effort, in m. tons:													
per day fishing (c)	27.66	43.27	37.78	33.02	35.63	26.70	24.05	20.85	17.37	20.21	14.68	20.05	35.61
per haul	3.91	6.53	5.73	4.98	5.02	3.81	3.35	2.97	2.43	2.77	2.16	2.51	4.04
per hour trawling	2.51	4.69	4.32	3.31	3.47	2.30	1.84	1.60	1.57	1.60	1.20	1.38	3.56

Table 8 (Continued)

	Total & means	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Newfoundland													
Days fishing (c)	3841	226	249	222	329	410	341	402	365	225	333	400	339
Number of hauls	27403	1510	1595	1415	2300	3167	2456	2951	2744	1569	2399	2898	2399
Hours of trawling	49412	2727	2867	2388	3734	5261	4572	5224	5030	3000	4714	5718	4177
Catch, in m. tons: total	88251.4	5811.9	7259.1	5897.0	10478.7	11310.0	6823.9	9012.9	8531.2	3505.5	5615.9	7256.7	6748.6
including: redfish	51314.2	2646.6	3919.6	2193.7	6473.6	7442.0	5029.3	7305.3	6147.0	2342.2	1812.2	2074.4	3928.3
cod-like	25127.6	2823.0	2762.7	3091.6	1886.3	2071.2	1335.1	1210.8	1803.4	720.1	1466.0	3476.7	2480.7
flounders	9457.7	308.6	523.3	549.3	1845.6	1585.1	267.2	336.0	516.7	348.5	1822.9	1092.3	262.2
Catch per effort, in m.tons:													
per day fishing (c)	22.98	25.72	29.15	26.56	31.85	27.58	20.01	22.42	23.37	15.58	16.86	18.14	19.91
per haul	3.22	3.85	4.55	4.17	4.56	3.57	2.78	3.05	3.11	2.23	2.34	2.50	2.81
per hour trawling	1.79	2.13	2.53	2.47	2.81	2.15	1.49	1.72	1.70	1.17	1.19	1.27	1.61

Table 8 (Continued)

	Total & means	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Nova Scotia													
Days fishing (c)	12	----	----	----	----	1	----	5	----	2	4	----	----
Number of hauls	59	----	----	----	----	1	----	38	----	6	14	----	----
Hours of trawling	88	----	----	----	----	1	----	55	----	10	22	----	----
Catch, in m. tons: total	99.7	----	----	----	----	x/	----	71.4	----	x/	28.3	----	----
including: cod-like	79.4	----	----	----	----	x/	----	69.0	----	x/	10.4	----	----
flounders	10.3	----	----	----	----	x/	----	2.4	----	x/	7.9	----	----
Catch per effort, in m. tons:													
per days fishing (c)	8.31	----	----	----	----	x/	----	14.28	----	x/	7.07	----	----
per haul	1.69	----	----	----	----	x/	----	1.88	----	x/	2.02	----	----
per hour trawling	1.13	----	----	----	----	x/	----	1.30	----	x/	1.29	----	----

x/ Few fish caught.

Table 8 (Continued)

	Total & means	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Georges Bank													
Days fishing (c)	83	----	----	----	----	----	----	----	----	34	40	9	----
Number of hauls	853	----	----	----	----	----	----	----	----	474	310	69	----
Hours of trawling	1095	----	----	----	----	----	----	----	----	476	483	136	----
Catch, in m. tons: total	2088.7	----	----	----	----	----	----	----	----	1151.5	633.2	304.0	----
including: redfish	0.2	----	----	----	----	----	----	----	----	0.2	----	----	----
cod-like	1030.0	----	----	----	----	----	----	----	----	927.7	94.3	8.0	----
flounders	20.4	----	----	----	----	----	----	----	----	17.8	2.6	----	----
Catch per effort, in m. tons:													
per day fishing (c)	25.16	----	----	----	----	----	----	----	----	33.87	15.83	33.78	----
per haul	2.45	----	----	----	----	----	----	----	----	2.43	2.04	4.41	----
per hour trawling	1.91	----	----	----	----	----	----	----	----	2.42	1.31	2.23	----

Table 9 -- Factory trawlers B-15, 1961-1965. Costs and earnings per vessel.

Item	Unit	1961	1962	1963	1964	1965	5-year mean (weighted)
Gross revenue:							
frozen products	1000 zl.*	19461.5	26382.0	37490.5	39545.1	39909.8	37013.8
fish meal	1000 zl.	3952.4	5179.7	6695.8	7122.2	5641.4	6107.0
oils	1000 zl.	386.4	960.2	1293.9	1677.4	1825.4	1530.5
total	1000 zl.	23800.3	32521.9	45480.2	48344.7	47376.6	44651.3
Operation costs	1000 zl.	27847.9	30398.0	34392.0	32645.0	29273.0	31160.8
Gross profit (loss)	1000 zl.	-4047.6	2123.9	11088.2	15699.7	18103.6	13490.5
Profit rate: relative to revenue	percent	-17.01	6.53	24.38	32.47	38.21	30.21
Return on investment	percent	- 3.76	1.97	10.29	14.57	16.81	12.52

*zloties

Table 10 -- Factory trawlers B-15. Costs of operation, per vessel, 1961-1965.

Cost item	1961	1962	1963	1964	1965	5-year average	Percent of total
	- - - - - - - - years - - - - - - - - -						
	- - - - - - - - 1000 zloties - - - - - - - - - -						
Fuel and oils	3410	3731	3720	3830	4543	4061.1	13.03
Fishing gear	1137	1587	3804	4629	3908	3722.0	11.94
Packing and other materials	2910	4021	2491	2352	2467	2609.4	8.37
Wages and social security taxes	9355	9876	13186	10986	8309	10134.4	32.52
Groceries and provisions	1150	649	966	1902	1835	1547.4	4.97
Depreciation	4807	4734	5052	5059	5003	4991.6	16.02
Repairs	1841	2560	1860	1461	1310	1597.2	5.13
Insurance	1220	1157	1134	1505	1219	1276.3	4.10
Harbor and canal fees	152	129	155	152	87	124.6	0.40
Other costs	1866	1954	2024	769	592	1096.8	3.52
Total operating costs	27848	30398	34392	32645	29273	31160.8	100.00

Table 11-Factory trawlers B-15, 1961-1964. Average fuel and oil consumption per vessel and year (by phases of operation).

Item	Unit	Running to and from fishing grounds	Fishing	Other at sea	In ports	Repairs	Totals
Propulsion fuel oil	kg	575514	1278922	43765	81839	34838	2014878
	percent	28.57	63.47	2.17	4.06	1.73	100.00
Burning fuel oil	kg	89359	434215	6864	27956	5455	563849
	percent	15.85	77.01	1.22	4.96	0.97	100.00
Motor oil	kg	3315	7770	135	11505	3295	26020
	percent	12.74	29.86	0.52	44.22	12.66	100.00
Cylinder oil	kg	4446	11818	312	917	566	18059
	percent	24.62	65.44	1.73	5.08	3.13	100.00
Other lub. oils	kg	383	3656	46	497	292	4874
	percent	7.86	75.01	0.94	10.20	5.99	100.00
Grease	kg	3	430	0.5	1.5	2	437
	percent	0.69	98.46	0.11	0.34	0.46	100.00
Average vessel time per year	24 hours	63.42	161.36	14.90	63.75	31.82	365.25

Note: Average number of trips per vessel and year in 1961-1964 = 2.9.

Table 12-Factory trawlers B-15. Average fuel and oil consumption per vessel and year.
(by vessel departments)

Item	Unit	Boiler	Main engine	Auxiliary engines and mechanisms	Processing plant	Refrigerating plant	Totals
Propulsion fuel oil	kg	43137	1455299	516442	---	---	2014878
Burning fuel oil	kg	563849	---	---	---	---	563849
Motor oil	kg	---	24942	1013	65	---	26020
Cylinder oil	kg	---	16924	1135	---	---	18059
Other lub. oils	kg	---	---	2247	811	1816	4874
Grease	kg	---	---	35	382	20	437

Note: Average number of trips per vessel and year in 1961-1964 = 2.9.

Table 13 - Factory trawlers B-15, 1961-1964. Average use of packing materials for fish products.

Item	Unit	Per vessel year	Per trip
Cartons	Number	63868	22057
Absolutes	Number	64242	22187
Cardboard inserts	Number	27097	9358
Parchment paper	kg	3179	1098
Tape (with glue)	kg	2033	702
Twine	kg	49	17
Glue	kg	174	60
Labels	Number	237000	81840
Sacks	Number	10200	3524

Table 14.--Use of basic components of fishing gear on factory trawlers, B-15 (averages per trip)*

Name of Vessel	Nettings and ropes made from: Stylon	Sisal	Steel Wire	Steel & Sisal	Rigging elements: Links, hooks, shackles & swivels	Rawhides & leather straps	Rubber discs	Steel Bobbins	Aluminum floats	Otter boards
	kilograms							number		
Dalmor	3780	1245	15650	1620	3869	1952	500	120	520	1.50
Kastor	3670	955	13470	1390	3322	1889	188	131	586	1.31
Uran	3467	1019	17314	1232	3986	1486	869	124	459	1.00
Neptun	3810	1290	20400	1420	3734	1656	832	101	718	1.44
Pegaz	3370	1130	16500	1530	4312	1482	278	126	625	1.38
Jupiter	3750	1080	22600	1720	4262	2297	842	132	698	1.00
Jowisz	3350	1170	15900	1280	4302	1924	563	136	428	1.33
Feniks	2350	863	14300	1270	3076	1048	612	97	525	0.40
Merkury	3130	1003	15100	813	3365	1923	805	107	616	1.00
Virgo	3400	1010	28200	1640	6034	1496	1380	146	636	1.33
Andromeda	2580	1150	19950	1583	3514	1587	900	176	405	0.50
Gen. Rachimow	5495	1324	12860	1708	7086	2370	400	105	1000	1.00
Average for fleet	3510	1100	17100	1430	3928	1747	600	123	574	1.23

* Based on data for 1961 through 1965.

Table 15-- Semi-freezer trawlers B-20. Number of vessel-years in operation.

Name of vessel	Date of commission mon/day/yr	Number of vessel-years in operation 1961	1962	1963	1964	1965	Total vessel-years	Total days in operation
Miedwie	8/23/61	0.36	1.00	1.00	1.00	1.00	4.36	1592
Mielno	9/28/61	0.26	1.00	1.00	1.00	1.00	4.26	1556
Mamry*	10/14/61	0.22	1.00	1.00	1.00	1.00	4.22	1540
Morag	11/22/61	0.11	1.00	1.00	1.00	1.00	4.11	1501
Morskie Oko*	1/10/62		0.97	1.00	1.00	1.00	3.97	1452
Wigry	3/11/62		0.81	1.00	1.00	1.00	3.81	1392
Wieczno**	4/1/62		0.75	1.00	0.33		2.08	761
Wicko	5/24/62		0.61	1.00	1.00	1.00	3.61	1318
Sniardwy	6/28/62		0.51	1.00	1.00	1.00	3.51	1283
Szczytno	8/27/62		0.35	1.00	1.00	1.00	3.35	1223
Sejno*	10/2/62		0.25	1.00	1.00	1.00	3.25	1187
Gardno	11/24/62		0.11	1.00	1.00	1.00	3.11	1134
Goplo	12/29/62		0.01	1.00	1.00	1.00	3.01	1099
Jamno	2/18/63			0.87	1.00	1.00	2.87	1048
Jasien*	3/31/63			0.76	1.00	1.00	2.76	1007
	TOTALS	0.95	8.37	14.63	14.33	14.00	52.28	19093
4 TRAWLERS* ONLY		0.22	2.22	3.76	4.00	4.00	14.20	5186

* Trawlers subjected to more detailed analysis (see Introduction).
** This trawler has been transferred to the Sea Fisheries Institute in Gdynia in 1964 and adapted for exploratory work.

Table 16-- Semi-freezer trawlers B-20. Breakdown of vessel time, 1961-1965.

Item	Years 1961	1962	1963	1964	1965	5-year average
	number of days/vessel year					
I. All vessels:						
Days at sea: total	259	268	259	242	250	253.37
including:						
fishing days (b)	167	171	167	168	174	169.79
changing grounds, storms, and other	60	45	32	28	34	34.03
running time	32	52	60	46	42	49.55
Days in harbors (at dock)	41	73	88	80	82	80.87
Days in repair	65	24	18	44	33	30.96
Total	365	365	365	366	365	365.2
II. Sample of 4 vessels:						
Days at sea: total	254.14	252.63	277.14	241.00	257.00	257.04
including:						
fishing days (a)	87.80	102.94	130.72	122.00	131.75	123.52
changing grounds, storms, and other	134.01	92.60	83.06	70.00	77.25	80.00
running time	32.33	57.09	63.36	49.00	48.00	53.52
Days in harbors (at dock)	60.04	76.86	75.88	65.50	61.75	68.87
Days in repair	50.82	35.51	11.98	59.50	46.25	39.29
Total	365	365	365	366	365	365.2

Table 17 -- Operations of semi-freezer trawlers B-20, 1961-1965.

	1961	1962	1963	1964	1965	5-year average
All vessels:						
Number of vessels	0.95	8.37	14.63	14.33	14.00	
Number of trips per vessel-year	6.31	7.05	5.47	5.41	5.25	5.66
Average duration of a trip (days)	42.67	40.59	50.94	46.27	50.08	47.27
Fishing days (b) per trip	26.50	24.24	30.59	31.16	33.05	30.00
Sample of 4 vessels:						
Number of vessels	0.22	2.22	3.76	4.00	4.00	
Number of trips per vessel-year	4.54	7.88	6.25	5.12	5.25	5.88
Number of landings per vessel-year	18.18	9.68	10.50	9.75	11.62	10.60
Number of fishing days (c): per trip	42.00	20.63	31.83	35.22	37.48	31.86
per landing	10.50	16.79	18.94	18.51	16.92	17.67
Number of hauls: per trip	195.00	85.31	134.42	147.61	147.48	131.38
per landing	48.75	69.44	79.97	77.59	66.60	72.89
Number of hours trawling: per trip	403.00	205.48	318.13	380.34	397.14	330.68
per landing	100.75	167.25	189.26	199.92	179.35	183.47

Table 18 -- Semi-freezer trawlers B-20, 1961-1965. Production by areas and species

Item	Unit	1961	1962	1963	1964	1965	5-year totals	5-year average
Vessel-years	number	0.95	8.37	14.63	14.33	14.00	52.28	
Total catch	tons	1468.5	11824.9	21258.8	23726.9	24378.8	82657.9	
Including:								
A. North Sea and adjacent waters total	tons	1468.5	9279.9	14415.8	19112.0	19469.7	63745.9	
Species: herring	tons	1425.5	6882.7	11034.0	15145.6	16169.7	50657.5	
mackerel	tons	26.4	1853.3	1861.8	2517.9	1173.3	7432.7	
cod and cod-like	tons	15.8	432.0	547.5	845.1	1935.6	3776.0	
unspecified	tons	0.8	111.9	972.5	603.4	191.1	1879.7	
B. ICNAF area - total	tons		495.7	281.7		1638.9	2416.3	
Species: herring	tons		214.9	256.5			471.4	
cod and cod like	tons		145.5	22.1		1270.0	1437.6	
unspecified	tons		135.3	3.1		368.9	507.3	
C. African fishing grounds - total	tons		2049.3	6561.3	4614.9	3270.2	16495.7	
Species: mackerel	tons		1613.9	1483.8	1004.1	697.2	4799.0	
dorades & pagrus	tons		n.s.	3147.9	2593.8	1193.2	6934.9	
jack mackerel	tons		n.s.	1516.4	828.8	1247.6	3592.8	
unspecified	tons		435.4	413.2	188.2	132.2	1169.0	
Trips by all vessels	number	6	59	80	77.5	73.5	296	
Total catch per trip	tons	244.8	200.4	265.7	306.2	331.7		279.2
Catch per fishing day (b):								
North Sea	tons	9.24	8.89	8.89	10.58	10.71		9.56
ICNAF area	tons		12.09	11.74		9.53		10.19
African grounds	tons		15.76	8.19	7.59	7.45		8.34
Products (landed weight) total:	tons	1287.4	9067.2	16581.8	19054.9	20043.2	66034.5	
including: fresh	tons	161.4	834.6	1186.6	1423.5	881.1	4487.2	
frozen	tons	506.5	4926.8	9505.7	8620.0	9966.4	33525.4	
salted	tons	619.5	3305.8	5889.5	9011.4	9195.7	28021.9	
A. North Sea and adjacent waters:								
fresh	tons	161.4	602.5	394.8	289.1	251.7	1699.5	
frozen	tons	506.5	4049.0	6171.3	6700.0	7804.9	25231.7	
fresh & frozen-tot.	tons	667.9	4651.5	6566.1	6989.1	8056.6	26931.2	
herring only	tons	642.0	2753.6	4468.7	4172.2	5151.5	17188.0	
salted: herring	tons	619.0	3161.7	5578.2	8746.5	8938.2	27043.6	
other	tons	.5	52.0	212.8	264.9	257.5	787.7	

Table 18 -- continued

Item	Unit	1961	1962	1963	1964	1965	5-year totals	5-year average
B. ICNAF area: frozen products - tot.	tons		179.6	153.7		711.5	1044.8	
herring only	tons		96.2	137.7			233.9	
salted herring			92.1	98.5			190.6	
C. African grounds: fresh	tons		232.1	791.8	1134.4	629.4	2787.7	
frozen	tons		698.2	3180.7	1920.0	1450.0	7248.9	

Table 19 -- Semi-freezer trawlers B-20, 1961-1965. Landings in foreign and domestic ports.

Item	Unit	1961	1962	1963	1964	1965	Total	Average per landing
I. Foreign ports								
A. - ICNAF area								
Number of landings	number					3	3	
Landings: frozen prod.	tons					209.1	209.1	69.7
B. - Africa								
Number of landings	number			9	2	5	16	
Landings: fresh and frozen fish (whole)	tons			1935.0	409.1	1062.3	3406.4	
Average landings	tons			215.0	204.6	212.5		212.9
II. Domestic Ports								
Number of landings	number	9	61	96	94	100	360	
Landings:								
A. - From North Sea:								
fresh and frozen	tons	667.9	4651.5	6566.1	6989.1	8056.6	26931.2	
salted	tons	619.5	3213.7	5791.0	9011.4	9195.7	27831.3	
total	tons	1287.4	7865.2	12357.1	16000.5	17252.3	54762.5	
B. From ICNAF area:								
fresh and froz.	tons		179.6	153.7		502.4	835.7	
salted	tons		92.1	98.5			190.6	
total	tons		271.7	252.2		502.4	1026.3	
C. From Africa:								
fresh and froz.	tons		930.3	2037.5	2645.3	1017.1	6630.2	
All domestic landings:								
fresh and froz.	tons	667.9	5761.4	8757.3	9634.4	9576.1	34397.1	
salted	tons	619.5	3305.8	5889.5	9011.4	9195.7	28021.9	
total	tons	1287.4	9067.2	14646.8	18645.8	18771.8	62419.0	
Average domestic land.	tons	143.0	148.6	152.6	198.3	187.7		173.4

Table 20--Semi-freezer trawlers B-20 (sample of 4 vessels). Effort, catch, and catch per effort, by area and years, 1961-1965.

Item		1961	1962	1963	1964	1965	5-year totals	5-year averages
Fishing Effort								
Fishing days (c):	Total	42	361	748	722	787	2660	
Including :	North Sea	42	296	501	522	611	1972	
	Northwest Atlantic		16	34		24	74	
	African grounds		49	213	200	152	614	
Number of hauls :	Total	195	1493	3159	3026	3097	10970	
Including :	North Sea	195	1208	2193	2224	2441	8261	
	Northwest Atlantic		67	147		66	280	
	African grounds		218	819	802	590	2429	
Hours of trawling:	Total	403	3596	7476	7797	8340	27612	
Including:	North Sea	403	3026	5167	5610	6585	20791	
	Northwest Atlantic		184	408		105	697	
	African grounds		386	1901	2187	1650	6124	
Catch in tons:	Total	333.0	2178.5	5990.3	6288.9	7057.3	22388.0	
including from:	North Sea	333.0	2019.9	4235.3	5021.9	5858.3	17468.4	
	Northwest Atlantic		155.9	277.3		134.8	568.0	
	African grounds		542.7	1477.7	1267.0	1064.2	4351.6	
Catch per effort (in tons)								
North Sea:	per fishing day (c)	7.93	6.82	8.45	9.62	9.59		8.86
	per haul	1.71	1.67	1.93	2.26	2.40		2.11
	per hour trawling	0.83	0.67	0.82	0.90	0.89		0.84
Northwest Atlantic:	per fishing day (c)		9.74	8.16		5.62		7.68
	per haul		2.33	1.89		2.04		2.03
	per hour trawling		0.85	0.68		1.28		0.81
African grounds:	per fishing day (c)		11.08	6.94	6.34	7.00		7.09
	per haul		2.49	1.80	1.58	1.80		1.79
	per hour trawling		1.41	0.78	0.58	0.64		0.71
Effort and catch per vessel year:								
	Fishing days (c)	191	163	199	180	197		187
	Number of hauls	886	672	840	756	774		772
	Hours of trawling	1832	1620	1988	1949	2085		1944
	Catch in tons	1513.6	1224.6	1593.2	1572.2	1764.3		1576.6

Table 21 -- Semi-freezer trawlers B-20 (sample of 4 vessels). Effort, catch, and catch per effort, by areas and months 1961-1965

	Totals and means	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
North Sea													
Fishing days (c)	1972	7	7	43	153	254	254	281	297	250	197	152	77
Number of hauls	8261	22	26	175	627	1079	1128	1253	1344	1043	731	562	271
Hours of trawling	20791	68	80	547	1724	3043	3289	3265	2578	2254	2045	1140	758
Catch in tons: all species	17468.4	1.3	21.9	213.3	1037.8	1696.2	2133.7	2434.3	3533.3	2696.9	1526.5	1085.6	1087.6
including: herring	14205.4		11.1	123.4	538.0	889.1	1636.5	2176.5	3221.6	2498.8	1371.4	1013.6	725.4
mackerel	1912.9		6.4	27.9	386.8	690.7	255.8	154.0	160.1	79.9	41.3	30.3	79.7
other	1350.1	1.3	4.4	62.0	113.0	116.4	241.4	103.8	151.6	118.2	113.8	41.7	282.5
Catch per effort(in tons):													
per fishing day (c)	8.6	0.18	3.13	4.96	6.78	6.68	8.40	8.66	11.90	10.79	7.75	7.14	14.1
per haul	2.11	0.06	0.84	1.22	1.66	1.57	1.89	1.94	2.63	2.59	2.09	1.93	4.0
per hour trawling	0.84	0.02	0.27	0.39	0.60	0.56	0.65	0.74	1.37	1.20	0.75	0.95	1.4
Northwest Atlantic													
Fishing days (c)	74	3	24	13		22	12						
Number of hauls	280	8	73	52		92	55						
Hours of trawling	697	9	135	145		259	149						
Catch in tons: all species	568.0	13.6	184.7	92.4		141.8	135.5						
including: cod-like	169.6		66.7	81.9		12.3	8.7						
redfish	66.0	12.3	53.7										
herring	325.8		60.5	10.5		129.5	125.3						
other	6.6	1.3	3.8				1.5						
Catch per effort (in tons)													
per fishing day (c)	7.68	4.53	7.69	7.11		6.45	11.29						
per haul	2.03	1.70	2.53	1.78		1.54	2.46						
per hour trawling	0.81	1.51	1.37	0.64		0.55	0.91						
African grounds													
Fishing days (c)	614	109	151	104	11						7	67	165
Number of hauls	2429	413	598	408	52						25	278	655
Hours of trawling	6124	1122	1727	1080	133						39	597	1426
Catch in tons: all species	4351.6	826.9	926.6	754.3	79.5						83.0	629.4	1051.9
including: mackerel & jack mackerel	1910.2	329.6	343.8	313.2	18.0						72.0	437.6	396.0
dorades	726.0	213.5	258.1	192.9	61.5								
pagrus pagrus	1476.1	269.0	294.9	182.4							3.0	123.3	603.5
other	239.3	14.8	29.8	65.8							8.0	68.5	52.4

Table 21--Semi-freezer trawlers B-20 (sample of 4 vessels). Effort, catch, and catch per effort, by areas and months 1961-1965 (cont'd)

	Totals and means	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Catch per effort (in tons)													
per fishing day (c)	7.09	7.59	6.14	7.25	7.23						11.86	9.39	6.3
per haul	1.79	2.00	1.55	1.85	1.53						3.32	2.26	1.6
per hour trawling	0.71	0.73	0.54	0.70	0.59						2.13	1.05	0.7

Table 22-- Semi-freezer trawler B-20, 1961-1965, Costs and earnings per vessel

	Unit	1961	1962	1963	1964	1965	Weighted mean
Gross revenue from sales of:							
fresh fish	1000 zl.*	2208.6	671.8	512.8	645.3	499.1	601.7
frozen products	1000 zl.	7784.1	6239.7	8383.0	7969.4	9439.8	8198.6
salted fish	1000 zl.	7499.3	4872.7	4474.5	6936.2	6463.3	5800.5
total	1000 zl.	17492.0	11784.2	13370.3	15550.9	16402.2	14600.8
Operating costs	1000 zl.	9314.1	8420.8	9750.9	10867.0	10794.3	10115.4
Gross profit	1000 zl.	8177.9	3363.4	3619.4	4683.9	5607.9	4485.4
Return on sales	percent	46.7	28.6	27.0	30.2	34.3	30.7
Return on investment	percent	22.2	9.1	9.8	12.7	15.2	12.2

* zloties

Table 23 -- Semi-freezer trawlers B-20, costs of operation, per vessel, 1961-1965.

Cost item	Years 1961	1962	1963	1964	1965	5-year average	Percent of total
	1000 zloties						
Fuel and oils	1510.4	1565.9	1707.7	2020.7	1856.1	1806.9	17.86
Fishing gear	966.5	418.5	895.2	623.4	548.4	652.8	6.45
Packing & other materials	681.7	564.2	567.8	700.2	1221.9	780.8	7.72
Wages & social security taxes	2840.3	2288.9	2553.7	2606.8	2678.8	2564.6	25.35
Groceries & provisions	658.3	656.9	577.9	589.5	571.9	593.6	5.87
Depreciation	1228.3	1698.8	1726.9	1772.9	1694.7	1717.4	16.98
Repairs	4.4	310.0	590.5	938.6	634.2	642.0	6.35
Insurance	304.4	336.7	434.6	411.8	340.9	385.2	3.81
Harbor & canal fees	85.7	86.2	84.7	78.6	79.9	82.0	0.81
Base-ship services	902.6	399.7	527.9	901.6	929.4	724.1	7.16
Other costs	131.5	95.0	84.0	222.9	238.1	166.0	1.64
Total operating costs	9314.1	8420.8	9750.9	10867.0	10794.3	10115.4	100.00

Table 24- Semi-freezer trawlers B-20, 1961-1964. Fuel and oil consumption per vessel and year (by phases of operation)

Item	Unit	Running to and from fishing grounds	Fishing	Other at sea	In ports	Repairs	Totals
Propulsion fuel oil	kg	220524	525618	72805	41333	3658	863738
	percent	25.53	60.86	8.43	4.76	0.42	100.0
Motor oil	kg	2431	6513	1272	1773	210	12199
	percent	19.93	53.37	10.43	14.54	1.73	100.0
Other lub. oils	kg	44	499	90	358	120	1111
	percent	3.96	44.82	8.09	32.33	10.80	100.0
Grease	kg	3	19	3	10	---	35
	percent	8.60	54.20	8.60	28.60	---	100.0
Aver. vessel time per yr.	24 hours	53.52	123.52	80.00	68.67	39.29	365.20

Note: Average number of trips per vessel and year in 1961-1964 = 6.1

Table 25- Semi-freezer trawlers B-20, 1961-1964. Fuel and oil consumption per vessel and year (by vessel departments)

Item	Boiler	Main engine	Auxiliary engines and mechanisms	Refrigerating plant	Totals
	kilograms				
Propulsion fuel oil	63280	473902	326556	---	863738
Motor oil	---	7910	4289	---	12199
Other lub. oils	---	984	---	127	1111
Grease	---	35	---	---	35

Note: Average number of trips per vessel and year in 1961-1964 = 6.1

Table 26 . Semi-freezer trawlers B-20. Use of basic components of fishing gear (per trip).

Name of vessel	Nettings and ropes made from: Stylon	Sisal	Steel wire	Steel & sisal	Links, hooks, shackles, swivels	Raw hides & leather straps	Rigging elements: Rubber discs	Aluminum floats	Kites	Dan-lenos	Otter boards
	kilograms							number			
Miedwie	227	75	890	323	136	5.1	47	49	2.72	0.56	0.28
Mamry	185	70	590	442	159	13.9	30	29	2.26	0.61	0.17
Mielno	236	85	835	433	147	31.9	31	43	2.37	0.79	0.47
Morag	185	63	750	319	127	3.7	22	29	1.88	1.00	0.5
Morskie Oko	176	55	740	347	140	2.7	10	24	1.79	0.71	0.46
Wigry	178	54	795	320	138	7.6	34	38	2.76	0.95	0.33
Wicko	157	56	720	310	182	7.6	--	33	1.95	0.57	0.52
Sniardwy	235	76	888	324	151	10.1	19	38	2.22	0.89	0.11
Szczytno	286	72	933	374	237	20.7	--	42	3.39	0.94	0.41
Sejno	266	74	862	350	158	3.5	40	29	2.16	0.89	0.166
Gardno	258	70	952	357	150	2.1	24	52	2.80	0.87	0.47
Gopło	162	71	725	394	143	19.5	53	41	1.66	0.89	0.39
Jamno	280	86	898	314	279	22.6	49	60	3.29	1.06	0.82
Jasien	334	81	1040	276	217	3.5	40	46	2.06	1.05	0.33
Average for fleet	221	69.8	820	349	165	10.6	28	39	2.38	0.83	0.38

Table 27 --Freeze trawlers. B-23. Number of vessel-years in operation.

Name of vessel	Date of commission mon/day/yr	Number of vessel years 1963	1964	1965	Total vessel-years	Total days in operation
I. Enterprise "Odra"						
Albakora *	11/6/63	0.15	1.00	1.00	2.15	787
Barbata *	12/22/63	0.03	1.00	1.00	2.03	741
Barakuda *	1/16/64		0.96	1.00	1.96	716
Belona *	5/20/64		0.62	1.00	1.62	591
Dorada	6/23/64		0.52	1.00	1.52	555
Tarpon **	10/8/64		0.23	0.40	0.63	229
Tasergal	11/24/64		0.10	1.00	1.10	403
Ramada	12/31/64			1.00	1.00	366
II. Enterprise "GRYF"						
Barwena	3/31/64		0.76	1.00	1.76	641
Granik	7/16/64		0.46	1.00	1.46	534
Murena	6/5/65			0.57	0.57	210
Konger	9/1/65			0.33	0.33	122
	TOTALS	0.18	5.65	10.30	16.13	5895
4 TRAWLERS* ONLY		0.18	3.58	4.00	7.76	2835

*Trawlers subjected to more detailed analysis (see Introduction)
**This trawler was stranded on May 25, 1965 on West African Coast.

Table 28. Freezer trawlers B-23. Breakdown of vessel time, 1963-1965

Item	1963	1964	1965	3-year average
	------number of days/vessel year----------			
All vessels:				
Days at sea: total	277	252	227	236.31
including:				
fishing days (b)	188	164	155	158.52
changing grounds, storms, and other	--	34	31	31.70
running time	89	54	41	46.08
Days in harbors (at dock)	88	64	68	66.82
Days in repair	--	50	70	62.20
total	365	366	365	365.33
Sample of 4 vessels:				
Days at sea: total	287.58	255.56	231.75	243.95
including:				
fishing days (a)	149.32	110.44	119.00	115.72
changing grounds, storms and other	71.90	73.54	66.25	69.72
running time	66.36	71.58	46.50	58.51
Days in harbors (at dock)	77.42	60.11	52.50	56.56
Days in repairs	--	50.33	80.75	64.82
total	365	366	365	365.33

Table 29-Operations of freezer trawlers B-23, 1963-1965

Item	1963	1964	1965	3-year average
All vessels:				
Number of vessels	0.18	5.65	10.30	---
Number of trips per vessel-year	5.55	3.36	3.59	3.53
Average duration of a trip (days)	59.00	81.47	73.32	72.67
Fishing days (b) per trip	35.00	48.79	45.43	44.88
Sample of 4 vessels:				
Number of vessels	0.18	3.58	4.00	---
Number of trips per vessel-year	5.55	2.65	3.37	3.09
Number of landings per vessel-year	5.55	4.89	5.62	5.28
Number of fishing days (c): per trip	35.00	63.16	47.78	53.33
per landing	35.00	34.28	28.67	31.22
Number of hauls: per trip	221.00	327.89	242.00	275.12
per landing	221.00	178.00	145.20	161.05
Number of hours trawling: per trip	408.00	715.58	542.59	605.46
per landing	408.00	388.46	325.55	354.41

Table 30-Freezer trawlers B-23. Production by areas and species, 1963-1965.

Item	Unit	1963	1964	1965	Total	3-year average
Vessel-years	number	0.18	5.65	10.30	16.13	---
Total catch	tons	428.0	14430.0	26988.9	41846.9	---
including:						
A. North Sea-total	"	---	3734.0	11168.0	14902.0	---
Species: herring	"	---	2200.4	5224.3	7424.7	---
mackerel	"	---	409.0	303.6	712.6	---
cod like	"	---	225.9	2655.1	2881.0	---
unspecified	"	---	898.7	2985.0	3883.7	---
B. African fishing ground-total	"	428.0	10696.0	15820.9	26944.9	---
Species: mackerel	"	105.5	1906.5	1899.2	3911.2	---
dorades & pagrus pagrus	"	130.5	2035.0	1598.5	3764.0	---
jack mackerel	"	27.0	631.3	2759.2	3417.5	---
unspecified	"	165.0	6123.2	9564.0	15852.2	---
Trips by all vessels	number	1	19	37	57	---
Total catch per trip	tons	428.0	759.5	729.4		734.2
Catch per fishing day (b):						
North Sea	"	---	13.43	13.93	---	13.80
African grounds	"	12.22	16.48	18.00	---	17.24
Products (landed weight): total	"	---	8816.8	18456.9	27273.7	---
including: frozen products	"	---	7964.1	16750.9	24715.0	---
fish meal	"	---	852.7	1706.0	2558.7	---
A. North Sea: frozen cod fillets	"	---	0.1	---	0.1	---
frozen fish gutted and/or headed	"	---	360.0	1800.2	2160.2	---
frozen whole (mainly herring)	"	---	2238.4	5236.7	7475.1	---
total frozen products	"	---	2598.5	7036.9	9635.4	---
fish meal	"	---	172.1	706.3	878.4	---
B. African grounds: frozen fillets	"	---	5.3	---	5.3	---
frozen fish gutted and/or headed	"	---	679.4	1255.9	1935.3	---
frozen whole	"	---	4680.9	8458.1	13139.0	---
total frozen products	"	---	5365.6	9714.0	15079.6	---
fish meal	"	---	680.6	999.7	1680.3	---

Table 31- Freezer trawlers B-23. Landings in foreign and domestic ports

Item	Unit	1963	1964	1965	Total	Average
I. Foreign Ports						
Africa:						
Number of landings	Number	--	11	25	36	
Landings: frozen products	tons		3092.4	7443.2	10535.6	
fish meal	tons	--	169.9	381.0	550.9	
Average Landings: frozen products	tons	--	281.13	297.73		292.66
fish meal	"	--	15.44	15.24		15.30
total	"	--	296.57	312.97		307.96
II. Domestic Ports						
Number of Landings	Number	--	20	32	52	
Landings:						
A. From North Sea: frozen products	tons	--	2598.5	7036.9	9635.4	
fish meal	"	--	172.1	706.3	878.4	
B. From Africa: frozen products	"	--	2273.2	2270.8	4544.0	
fish meal			510.7	618.7	1129.4	
Average Landings: frozen products	"	--	243.58	290.86		272.68
fish meal	"	--	34.14	41.41		38.61
total	"	--	277.72	332.27		311.29

Table 32 - Freezer trawlers B-23 (Sample of 4 vessels). Effort, catch and catch per effort, by areas and months, 1963-1965

Item	Totals and means	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
North Sea													
Fishing days (c)	279	---	---	---	---	---	---	73	90	76	22	7	11
Number of hauls	1358	---	---	---	---	---	---	348	434	391	110	26	49
Hours of trawling	3070	---	---	---	---	---	---	798	842	907	322	72	129
Catch in tons: all species	3095.1	---	---	---	---	---	---	785.6	999.6	933.4	218.8	37.7	120.0
including: herring	1850.2	---	---	---	---	---	---	392.0	737.6	534.1	60.6	28.8	57.0
mackerel	102.1	---	---	---	---	---	---	38.8	32.0	25.6	5.2	0.5	---
cod-like	517.6	---	---	---	---	---	---	174.8	44.2	135.5	131.8	8.4	23.0
other	625.2	---	---	---	---	---	---	180.0	185.9	238.2	21.2	---	---
Catch per effort (in tons):													
per fishing day (c)	11.10	---	---	---	---	---	---	10.76	11.11	12.28	9.94	5.38	10.91
per haul	2.28	---	---	---	---	---	---	2.26	2.30	2.40	1.99	1.45	2.45
per hour trawling	1.00	---	---	---	---	---	---	0.99	1.19	1.03	0.69	0.53	0.93
African fishing grounds													
Fishing days (c)	1001	42	98	62	57	105	98	43	48	67	119	116	146
Number of Hauls	5245	198	527	309	319	568	560	245	280	366	609	488	776
Hours of trawling	11461	412	1241	751	807	1274	1337	511	644	689	1217	933	1645
Catch in tons: all species	14869.0	515.0	1445.0	774.3	895.2	1908.5	1450.8	771.4	404.7	958.3	194.4	1590.6	2209.0
including: dorades	3046.0	179.9	634.9	178.5	202.5	239.1	541.2	194.6	189.4	104.2	149.4	101.4	330.9
mackerel	2661.0	13.0	142.9	14.1	19.5	34.7	---	---	5.2	337.2	900.3	736.5	457.6
jack mackerel	2353.7	68.6	121.9	276.0	359.9	672.6	145.6	160.6	13.5	73.6	135.3	134.7	191.2
other	6808.4	253.5	546.1	305.7	313.4	962.1	764.0	416.2	196.6	443.3	760.3	618.0	1229.3
Catch per effort (in tons):													
per fishing day (c)	14.86	12.57	14.75	12.49	15.70	18.18	14.81	17.94	8.44	14.31	16.36	13.71	15.13
per haul	2.84	2.61	2.74	2.51	2.80	3.35	2.59	3.15	1.44	2.61	3.19	3.27	2.85
per hour trawling	1.30	1.26	1.16	1.04	1.11	1.51	1.08	1.50	0.63	1.39	1.59	1.70	1.35

Table 33-Freezer trawlers B-23. Costs and earnings per vessel

Item	Unit	1963	1964	1965	Average
Gross revenue:					
frozen products	1000 zl*	---	19279.5	20955.2	20134.3
fish meal	" "	---	1948.4	1811.8	1839.5
total	" "	---	21227.9	22767.0	21973.8
Operating costs	" "	---	14947.4	15331.4	15195.4
Gross profit	" "	---	6280.5	7435.6	6778.4
Return on sales	percent	---	29.6	32.6	30.8
Return on investment	percent	---	9.3	11.0	10.0

*zloties

Table 34 -- Freezer trawler B-23. Costs of operation, per vessel, 1964 and 1965.

Cost item	1964	1965	2-year average	Percent of total
	- - - - - 1000 zloties - - - -			
Fuel and oils	2883.5	2711.2	2772.2	18.24
Fishing gear	2029.2	1460.6	1662.0	10.94
Packing & other materials	1466.2	1501.6	1489.1	9.80
Wages & social security taxes	3809.1	3752.0	3772.2	24.83
Groceries & provisions	1001.0	732.0	827.3	5.45
Depreciation	3017.6	3211.0	3142.5	20.68
Repairs	297.9	1024.9	767.4	5.05
Insurance	239.9	730.3	556.6	3.66
Harbor & canal fees	98.2	92.2	94.3	0.62
Base-ship services	1.1	2.2	1.8	0.01
Other costs	103.7	113.4	110.0	0.72
Total operating costs	14947.4	15331.4	15195.4	100.00

Table 35 -- Freezer trawlers B-23, 1963-1965. Fuel and oil consumption per vessel and year (by phases of operation)

Item	Unit	Running to and from fishing grounds	Fishing	Other at sea	In ports	Repairs	Totals
Propulsion fuel oil	kg	279828	537300	311645	26422	35964	1191159
	percent	23.49	45.11	26.16	2.22	3.02	100.0
Motor oil	kg	5678	11181	6678	591	1257	25385
	percent	22.36	44.04	26.31	2.34	4.95	100.0
Other lub. oils	kg	---	310	433	---	---	743
	percent	---	41.7	58.3	---	---	100 0
Grease	kg	98	130	26	20	11	285
	percent	34.38	45.76	9.18	6.88	3.80	100.0
Aver. vessel time per yr.	24 hours	58.51	115.72	69.72	56.56	64.82	365.33

Note: Average number of trips per vessel and year in 1963-1965 = 3.1.

Table 36-Freezer trawlers B-23, 1963-1965. Fuel and oil consumption per vessel and year. (by vessel departments)

Item	Boiler	Main engine	Auxiliary engines and mechanisms	Processing plant	Refrigerating plant	Totals
Propulsion fuel oil	104346	754241	332572	---	---	1191159
Motor oil	---	19744	5641	---	---	25385
Other lub. oils	---	---	174	179	390	743
Grease	---	65	174	39	7	285

Note: Average number of trips per vessel and year in 1963-1965 = 3.1

Table 37 --Use of basic components of fishing gear on freezer trawlers, B-23
(averages per trip)

Name Vessel	Nettings and ropes made from: Stylon	Sisal	Steel wire	Steel & Sisal	Rigging elements: Links, hooks, shackles & swivels	Rawhides & leather straps	Rubber discs	Aluminum floats	Kites	Otter boards
	kilograms								number	
Albakora	2051	281	1523	164	465	183	508	145	3.62	0.75
Barbata	2946	307	4095	69	962	329	1000	239	7.5	2.25
Barakuda	1812	130	1691	105	363	132	240	97	3 71	0.86
Belona	2030	270	2409	185	438	144	636	135	4.00	0.50
Dorada	3574	292	2834	277	601	201	96	158	7.20	1.40
Tarpon	4221	343	7261	400	1447	294	1270	260	6 0	4 50
Tasergal	2378	429	2368	253	621	166	226	154	6.68	1.00
Ramada	1810	124	1500	205	709	100	110	146	4.50	0.25
Barbena	2453	164	1941	102	212	84	255	77	1.50	0 125
Granik	2213	183	2845	74	829	72	---	144	2.50	0.375
Murena	3142	223	1834	26	1061	504	2140	158	3.0	-----
Konger	1409	30	1260	43	599	198	2200	---	2.0	-----
Average for fleet	2417	227	2392	146	608	176	509	139	4.01	0.80

Table 38 -- Freezer trawlers B-18. Number of vessel-years in operation.

Name of vessel	Date of commissioning mon/day/yr	Number of vessel-years 1965	1966	Total	Total days in operation
Foka*	5/23/65	0.61	1.0	1.61	588
Finwal*	7/1/65	0.51	1.0	1.51	549
Pilotwal*	9/21/65	0.28	1.0	1.28	467
Orka*	12/27/65	0.01	1.0	1.01	370
Homar	4/3/66	--	0.75	0.75	273
Langusta	7/3/66	--	0.50	0.50	182
Totals		1.41	5.25	6.66	2429
4 trawlers* only		1.41	4.00	5.41	1974

* Trawlers subjected to more detailed analysis (see Introduction).

Table 39 --Freezer trawlers B-18. Breakdown of vessel time, 1965-1966.

Item	1965	1966	average
	Number of days/vessel - year		
I. All Vessels			
Days at sea: total	240	232	234
including:			
fishing days (b)	148	142	143
changing grounds, storms, and other	33	34	34
running time	59	56	57
Days in harbors (at dock)	58	54	55
Days in repairs	67	79	76
Total	365	365	365
II. Sample of 4 vessels			
Days at sea: total	236.9	236.7	236.8
including:			
fishing days (a)	145.4	150.3	148.2
changing grounds, storms, and other	44.7	40.2	42.1
running time	46.8	46.2	46.5
Days in harbors (at dock)	56.1	45.3	49.2
Days in repairs	72.0	83.0	79.0
Total	365	365	365

Table 40 -- Operations of freezer trawlers B-18, 1965-1966.

Item	1965	1966	Average
All vessels			
Number of vessels	1.41	5.25	
Number of trips per vessel-year	2.48	2.10	2.18
Average duration of a trip (days)	108.57	122.73	119.31
Fishing days (b) per trip	59.43	67.64	65.65
Sample of 4 vessels			
Number of vessels	1.41	2.56*	
Number of trips per vessel-year	2.48	1.62	1.93
Number of landings per vessel-year	3.90	3.48	3.63
Number of fishing days (c): per trip	62.86	83.0	73.75
per landing	40.00	38.7	39.2
Number of hauls: per trip	384.86	484.0	438.0
per landing	244.91	226.0	233.0
Number of hours trawling: per trip	809.43	1040.0	934.0
per landing	515.09	485.0	496.0

* Reports for only part of the year were made available.

Table 41 -- Freezer trawlers B-18. Production by areas and species, 1965-1966

Item	Unit	1965	1966	Total	Average
Vessel-years	number	1.41	5.25	6.66	
Total catch*	tons	6442.9	23778.6	30221.5	
including:					
A. ICNAF area (5Z) - total	tons	2362.9	4295.7	6658.6	
species: herring	tons	1116.4	2967.4	4083.8	
cod and cod-like	tons	486.8	126.8	613.6	
unspecified	tons	759.7	1201.5	1961.2	
B. African fishing grounds - total	tons	3994.1	19393.2	23387.3	
species: mackerel	tons	680.9	4799.9	5480.8	
jack mackerel	tons	818.9	3247.5	4066.4	
dorades & pagrus pagrus	tons	263.0	1077.8	1340.8	
unspecified	tons	2231.3	10268.0	12499.3	
Trips by all vessels	number	3.5	11	14.5	
Total catch per trip	tons	1840.8	2161.7		2084.2
Catch per fishing day (b)					
North Sea	tons	10.7	12.8		11.7
ICNAF Area	tons	38.1	32.5		34.3
African grounds	tons	28.1	32.1		31.3
Products (landed weight): total**	tons	3932.8	14600.2	18533.0	
including: frozen products	tons	3434.3	12942.5	16376.8	
fish meal	tons	483.4	1578.0	2061.4	
oils	tons	15.1	79.7	94.8	
A. ICNAF Area: frozen cod fillets	tons	--	0.3	0.3	
frozen, gutted & headed	tons	287.3	86.5	373.8	
frozen, whole (mostly herring)	tons	1116.4	2960.8	4077.2	
total frozen products	tons	1403.7	3047.6	4451.3	
fish meal	tons	153.4	196.0	349.4	
oils	tons	15.1	15.6	30.7	
B. African grounds:					
frozen, gutted & headed	tons	--	2198.0	2198.0	
frozen, headed	tons	--	240.2	240.2	
frozen, whole	tons	1967.3	6962.3	8929.6	
total frozen products	tons	1967.3	9870.1	11837.4	
fish meal	tons	330.0	1374.5	1704.5	
oils	tons	--	64.1	64.1	

* Included are: 85.9 tons in 1965 and 89.7 tons in 1966, caught in the North Sea on the way to ICNAF and African grounds.

**Including: 63.3 tons of frozen products in 1965, and 24.8 tons of frozen products and 7.5 tons of fish meal in 1966 - from North Sea.

Table 42 -- Freezer trawlers B-18. Landings in foreign and domestic ports.

Item	Unit	1965	1966	Total	Average
I. Foreign ports					
Africa:					
Number of landings	number	3	11	14	
Landings: frozen products	tons	1966.0	6782.4	8748.4	
fish meal	tons	258.2	196.8	455.0	
Average landings: frozen products	tons	655.33	616.58		624.89
fish meal	tons	86.07	17.89		32.50
total	tons	741.40	634.47		657.39
II. Domestic ports					
Number of landings	number	2	10	12	
including: from ICNAF area	number	2	4	6	
from African grounds	number	-	6	6	
Landings:					
A. from ICNAF area: frozen products	tons	1451.1	3072.4	4523.5	
fish meal	tons	153.4	203.5	356.9	
oils	tons	15.1	15.6	30.7	
B. from Africa: frozen products	tons	17.2*	3087.7	3104.9	
fish meal	tons	71.8*	1177.7	1249.5	
oils	tons	--	64.1	64.1	
Average landings: frozen products	tons	734.15	616.01		635.70
fish meal	tons	112.60	138.12		133.87
oils	tons	7.55	7.97		7.90
total	tons	854.30	762.10		777.47

* Transhipped in Africa, for unloading in domestic port.

Note: Quantities from North Sea are included: 15.9 tons in 1965 - foreign ports landings, the balance - in domestic ports landings, 1965 and 1966 (together with products from ICNAF area).

Table 43-Freezer trawlers B-18 (sample of 4 vessels). Effort, catch, and catch per effort, by areas and months, 1965-1966*

Item	Totals and means	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
North Sea													
Fishing days (c)	16				7	3		5	1				
Number of hauls	65				36	6		21	2				
Hours of trawling	164				100	15		45	4				
Catch in tons: all species	179.8				93.9	15.9		70.0	-				
including: herring	58.6				42.7	15.9							
mackerel	36.3				36.3								
cod-like	75.6				5.6			70.0					
unspecified	9.3				9.3								
Catch per effort (in tons):													
per fishing day (c)	11.24				13.41	5.30		14.00					
per haul	2.77				2.61	2.65		3.33					
per hour trawling	1.10				0.94	1.06		1.55					
ICNAF Area													
Fishing days (c)	101					10	29		24	38			
Number of hauls	696					69	197		164	266			
Hours of trawling	1320					138	394		286	502			
Catch in tons: all species	3285.2					179.0	743.3		720.6	1642.3			
including: herring	1779.0					142.5	520.2		401.1	715.2			
cod and cod-like	508.2					12.6	48.8		96.2	350.6			
unspecified	998.0					23.9	174.3		223.3	576.5			
Catch per effort (in tons):													
per fishing day (c)	32.53					17.90	25.63		30.02	43.22			
per haul	4.72					2.59	3.77		4.39	6.17			
per hour trawling	2.49					1.30	1.89		2.52	3.27			

Table 43 (Continued)

Item	Totals and means	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
African fishing grounds													
Fishing days (c)	447	71	102	42	58	23	21	25		1	26	34	44
Number of hauls	2250	434	587	230	323	120	118	177		2	153	187	259
Hours of trawling	5665	684	1217	539	879	347	247	364		5	356	427	600
Catch in tons: all species	11864.9	1986.1	2320.9	894.2	1791.2	730.4	643.4	805.2		-	518.2	835.7	1339.3
including: dorades	997.9	156.9	264.0	100.7	122.6	85.9	58.7	85.8			49.1	43.8	30.4
mackerel	2406.4	949.8	673.1	71.9	20.8	9.5	10.7	11.3			113.1	231.9	314.3
jack mackerel	2566.8	170.5	235.7	267.8	760.5	235.1	252.2	271.5			100.0	118.8	154.7
pagrus pagrus	517.0	72.6	151.1	58.6	86.2	72.2	3.3					20.1	52.9
unspecified	5376.8	636.3	997.0	395.2	801.1	327.7	318.5	436.6			256.0	421.1	787.0
Catch per effort (in tons):													
per fishing day (c)	26.54	27.97	22.75	21.29	30.88	31.76	30.64	32.21			19.93	24.58	30.44
per haul	4.58	4.58	3.95	3.89	5.54	6.09	5.45	4.54			3.38	4.47	5.17
per hour trawling	2.09	2.90	1.91	1.66	2.04	2.10	2.60	2.21			1.46	1.96	2.23

* In 1966 - 7 months only.

Table 44 -- Freezer trawlers B-18. Costs and earnings per vessel.

	Unit	1965	1966	Average
Gross revenue:				
frozen products	1000 zl.*	26178.1	27827.2	27478.1
fish meal and oils	1000 zl.	4119.0	3678.1	3771.4
total	1000 zl.	30297.1	31505.3	31249.5
Operating costs	1000 zl.	28468.1	23951.5	24907.7
Gross profit	1000 zl.	1829.0	7553.8	6341.8
Return on sales	percent	6.04	23.98	20.29
Return on investment	percent	1.6	6.4	5.4

* zloties

Table 45 -- Freezer trawler B-18. Costs of operation, per vessel, 1965 and 1966.

Cost item	1965	1966	2-year average	Percent of total
	- - - - 1000 zloties - - - -			
Fuel and oils	6777.1	3920.2	4525.0	18.17
Fishing gear	2261.4	1010.8	1275.6	5.12
Packing & other materials	3219.9	1610.0	1950.8	7.83
Wages & social security taxes	5678.9	7577.8	7175.8	28.81
Groceries & provisions	2141.4	1658.3	1760.6	7.07
Depreciation	4982.3	5438.7	5342.1	21.45
Repairs	1676.5	1243.2	1334.9	5.36
Insurance	1401.8	1059.2	1131.7	4.54
Harbor & canal fees	138.2	146.1	144.4	0.58
Other costs	190.6	287.2	266.8	1.07
Total operating costs	28468.1	23951.5	24907.7	100.00

Table 46-Freezer trawlers B-18, 1965-1966. Fuel and oil consumption per vessel and year (by phases of operation)

Item	Unit	Running to and from fishing Grounds	Fishing	Other at sea	In ports	Repairs	Totals
Propulsion fuel oil	kg	361092	1068139	300713	87620	56256	1873820
	percent	19.27	57.01	16.05	4.67	3.00	100.0
Motor oil	kg	7665	23364	6695	2115	6468	46007
	percent	16.66	50.78	14.55	4.60	13.41	100.0
Other lub. oils	kg	298	2378	601	393	915	4585
	percent	6.50	51.86	13.11	8.57	19.96	100.0
Grease	kg	51	243	20	9	29	352
	percent	14.49	69.03	5.86	2.56	8.24	100.0
Aver. vessel time per yr.	24 hours	41.6	132.8	37.5	44.4	108.7	365.0

Note: Average number of trips per vessel and year in 1965-1966 = 1.76

Table 47--Freezer trawlers B-18, 1965-1966. Fuel and oil consumption per vessel and year (by vessel departments)

Item	Boiler	Main engine	Auxiliary engines and mechanisms	Processing plant	Refrigerating plant	Totals
	kilograms					
Propulsion fuel oil	219050	1333785	320985	---	---	1873820
Motor oil	---	42676	3331	---	---	46007
Other lub. oil	---	65	1300	267	2953	4585
Grease	---	27	154	171	---	352

Note: Average number of trips per vessel and year in 1965-1966 = 1.76

Table 48 -- Characteristics and performance of four types of vessels. Summary sheet.

		B - 15	B - 20	B - 23	B - 18
Type of trawler		factory	semi-freezer	freezer	freezer
Method of fishing		stern trawling	side trawling	stern trawling	stern trawling
Length overall	m	85.2	61.4	69.2	87.3
Gross tonnage	GRT	2800	796	1374	3096
Main engine	hp	2400	1375	1620	2250
Crew (standard)	men	94	33	39	74
Endurance	days	70	45	50	75
Hold capacity: frozen prod.	tons	720	150	320	650
salted fish	tons	-	85	-	-
fish meal	tons	180	-	30	150
Fish oil tank capacity	tons	50	-	-	45
Construction cost	million zl.	107.7	36.9	67.7	117.4
Operations: (per annum)					
Days at sea		270	253	236	234
Days of fishing (b) - total		186	170	159	143
including: North Sea		-	128	65	2

Table 48 -- continued.

		B - 15	B - 20	B - 23	B - 18
N. W. Atlantic		181	4	-	29
African grounds		5	38	94	112
Number of trips		2.8	5.7	3.5	2.2
Number of landings		2.8	7.2	5.5	3.9
Catch: round fresh	tons	4688	1581	2594	4538
Landed products: total	tons	2485	1263	1691	2783
including: fresh in ice	tons	-	86	-	-
frozen	tons	1879	641	1532	2459
salted	tons	-	536	-	-
fish meal	tons	495	-	159	310
fish oils	tons	111	-	-	14
Average per landing in domestic ports - total	tons	853	173	311	778
including: frozen products	tons	631	95	273	636
salted fish	tons	-	78	-	-
fish meal	tons	181	-	39	134
fish oils	tons	41	-	-	8
Hold capacity utilization	percent	89.8	73.6	88.9	92.0

Table 48 -- continued.

Revenue and operating costs		B - 15	B - 20	B - 23	B - 18
Gross revenue	1000 zl.	44651.3	14600.8	21973.8	31249.5
Operating costs	1000 zl.	31160.8	10115.4	15195.4	24907.7
Costs per ton of frozen products (for B-20, fresh and salted included)	1000 zl.	12.5	8.0	8.7	8.6
Costs per ton of catch	1000 zl.	6.6	6.4	5.8	5.5
Gross profit	1000 zl.	13490.5	4485.4	6778.4	6341.8
Return on sales	percent	30.2	30.7	30.8	20.3
Return on investment	percent	12.5	12.2	10.0	5.4
Labor productivity					
Catch per crewman	tons	49.9	47.9	66.5	61.3
Gross revenue per crewman	1000 zl.	475.0	442.4	563.4	422.3

APPENDIX. Crew Remuneration System

I. Basic remuneration

According to the clauses of the Collective Agreement[1/] crewmen receive remuneration of three different types:

1) for work on board of vessels at sea.

2) for work on board of vessel in port and for work on shore.

3) for time on leave or training.

1) Payment for work on board of vessel at sea.

On a fishing trip payments to fishermen consist of:

percent share in catch (part)

operational supplement

foreign currency supplement

The percent share in the value of products, for each position on a B-15 trawler, is shown in Appendix table 1, column 4. For example, the captain's share is 0.37%, that of the fishing master 0.20%, and so on. Appendix tables 2-4 show the crews' payments on semi-freezer and freezer trawlers. The value of landed fish and fish products from which the percent share is calculated is not the same as the value shown by sales settlements of the fishing enterprise. A special price list for crews' settlements is one of the many price lists mentioned elsewhere. Prices are differentiated by species and by quality of fish at the time of landing.

1/ Signatories of this Agreement are: The Seamans Union as the bargaining agent for the crews, and the Ministry of Shipping, as the representative of fishing enterprises.

Operational supplement in the amount shown in column 4 is paid for each day spent at sea. The day of departure from and the day of arrival at the home port are counted as a full day at sea.

For each day at sea and in foreign ports the crews receive a foreign currency supplement in the amount shown in columns 5-7. Zone I covers the North Sea and English Channel, and adjacent waters up to 62°N latitude and 7°W longitude. ZoneII comprises the Northwest Atlantic, grounds off Iceland, the Norwegian Sea, Barents Sea, and the Middle Atlantic north of the Tropic of Cancer. Zone III covers the Atlantic Ocean south of the Tropic of Cancer. The crew is entitled to this supplement after the vessel has passed the Sund Straights or the Kiel Canal (i.e. no supplement for days in the Baltic Sea). The foreign currency supplement is paid during a foreign port call, in the amount of at least 1/3 of the accrued sum to date. The captain is obliged to pay the whole amount of the supplement accrued to date, if requested by the crew. Any balance not paid to the crews when in foreign ports will be paid in their home port in form of bonds. These bonds are exchanged only for merchandise in special stores with imported goods (priced in U. S. dollars).

A monthly minimum salary for work at sea and/or on shore is guaranteed in the amount shown in column 8 (under the heading: Basic salary). It ranges from 800 zloties (junior fishermen) to 2600 zloties (captain) per month.

When a fishing vessel is at sea for other purposes than fishing, the crew receives twice the minimum pay, on a per day basis, for the duration of the trip. If such a trip takes the vessel beyond the Baltic Sea, the supplement in foreign currency finds application also.

For exploratory fishing, the crew is paid the amount of either twice the guaranteed minimum, or the percent share (part payment), whichever is the higher. Both of these payments take place when a vessel during her fishing trip has been assigned to exploratory fishing (through a special order from the management).

2) Payment for work on board of vessel in port and for work on shore. The crew on a vessel being built in a domestic or foreign shipyard receives monthly payments in the amount equal to 90 percent of average monthly payments earned during the last year by crews (in respective positions) on 3 vessels of the same type and operated over the entire year: with highest, average, and lowest results.

The minimum guarantee (basic salary, as described before) is paid for timework of crewmen: a) on shore, b) on a vessel taken out of operation, c) on a vessel undergoing repairs, d) on a vessel during her stay between trips, and for work on holidays. The standard work time is 25 days a month, and 8 hours a day.

3) Payments for time on leave or training.

For the time of annual leave a crewman receives an amount equal to the product of: the number of working days during his leave, and the average earnings (without awards, bonuses, and supplements in foreign currency) for each working day of the 12 months preceding his leave.

A crewman delegated by the enterprise to attend a training course receives a monthly salary in the amount shown in column 9 (Trainees' monthly salary).

II. Additional elements of remuneration

These comprise payments for overtime work (including work on holidays), for work in hazardous conditions at sea and on shore, for continuous work on vessels (5, 10, 15 years), bonuses for repairs performed on schedule, bonuses for savings in fuel consumption, special awards for fulfillment of the production plan, and others.

III. Fringe benefits are provided in the form of: medical care and hospitalization, several types of insurance (social security, life, disability, personal belongings), payments in case of death (in addition to insurance benefits), free board and working clothes, fish allowance, free transportation, recreation facilities for crewmen and their families, and many others.

Appendix Table 1 -- Component parts of crews' payments on factory trawlers B-15

Position	Number of positions	Minimum salary (monthly)	Percent share	Operational supplement (per day)	Foreign currency supplement Zone I	Zone II	Zone III	Trainees monthly salary
		zloties	percent	zloties	- - - - U. S. dollars - - - -			zloties
Standard crew	94	103950	14.14	1760	33.68	50.52	67.36	176800
Captain	1	2600	0.37	43	0.60	0.90	1.20	3750
I. Navigational & fishing crew	24	28100	3.89	469	9.08	13.62	18.16	48400
First officer	1	1800	0.26	30	0.48	0.72	0.96	3100
Second officer	1	1500	0.22	25	0.46	0.69	0.92	2950
Third officer	1	1400	0.20	23	0.42	0.63	0.84	2700
Fishing master	1	1400	0.20	23	0.42	0.63	0.84	2700
First radio operator	1	1500	0.21	25	0.46	0.69	0.92	2950
Second radio operator	1	1400	0.20	23	0.42	0.63	0.84	2500
Deck boatswain	1	1200	0.17	20	0.42	0.63	0.84	2250
Fishing boatswain	2	1200	0.17	20	0.42	0.63	0.84	2250
Senior fishermen	11	1100	0.15	18	0.36	0.54	0.72	1750
Fishermen	2	900	0.12	16	0.30	0.45	0.60	1500
Junior fishermen	2	800	0.10	15	0.30	0.45	0.60	1250
II. Engine room crew	17	22450	3.07	372	6.72	10.08	13.44	39800
Chief engineer	1	2200	0.32	37	0.54	0.81	1.08	3400
First engineer	1	1500	0.24	25	0.48	0.72	0.96	2950
Second engineer	1	1400	0.21	23	0.42	0.63	0.84	2700
Third engineer	1	1300	0.20	22	0.42	0.63	0.84	2500
First electrician	1	1500	0.21	25	0.46	0.69	0.92	2950
Second electrician	1	1400	0.20	23	0.42	0.63	0.84	2700
Mechanic-refrigerator plant	1	1500	0.21	25	0.46	0.69	0.92	2950
Mechanic-processing plant	1	1500	0.21	25	0.46	0.69	0.92	2950
Senior motorman	3	1150	0.15	19	0.36	0.54	0.72	1900
Motorman	3	1100	0.13	18	0.30	0.45	0.60	1750
Machinist-refrigerator plant	1	1100	0.13	18	0.36	0.54	0.72	1750
Repairman-processing plant	1	1200	0.17	20	0.36	0.54	0.72	2250
Lathe operator	1	1100	0.13	18	0.36	0.54	0.72	1750

Appendix Table 1 -- continued

Position	Number of positions	Minimum salary (monthly)	Percent share	Operational supplement (per day)	Zone I	Zone II	Zone III	Trainee' monthl salary
		zloties	percent	zloties	- - - - U. S. dollars - - - -			zloties
III. Service crew & infirmary	11	11900	1.63	195	3.98	5.97	7.96	20900
Intendant	1	1500	0.21	25	0.46	0.69	0.92	2950
Physician	1	1500	0.21	25	0.46	0.69	0.92	2950
Chief cook	1	1200	0.17	20	0.42	0.63	0.84	2250
Cook	2	1100	0.15	18	0.36	0.54	0.72	1750
Chief steward	1	1200	0.18	20	0.42	0.63	0.84	2250
Steward	3	900	0.12	15	0.30	0.45	0.60	1500
Mess boy	1	800	0.10	12	0.30	0.45	0.60	1250
Cook's helper	1	800	0.10	12	0.30	0.45	0.60	1250
IV. Processing plant crew	41	38900	5.18	681	13.30	19.95	26.60	63950
Technologist	1	1500	0.22	25	0.46	0.69	0.92	2950
Foreman	2	1200	0.17	20	0.42	0.63	0.84	2250
Senior processor	10	1100	0.15	18	0.36	0.54	0.72	1750
Processor	16	900	0.12	16	0.30	0.45	0.60	1500
Junior processor	12	800	0.10	15	0.30	0.45	0.60	1250
B. Apprentices	8	8800	1.20	144	2.88	4.32	5.76	14000
Assistant	8	1100	0.15	18	0.36	0.54	0.72	1750
Total	102	112750	15.34	1904	36.56	54.84	73.12	190800

Appendix Table 2. Component parts of crews' payments on semi-freezers B-20

Position	Number of positions	Minimum salary (monthly)	Percent share	Operational supplement (per day)	Foreign currency supplement Zone I	Zone II	Zone III	Trainees' monthly salary
		zloties	percent	zloties	in U.S. dollars			zloties
A. Standard crew	29	32,500	19.99	546	11.02	16.53	22.04	55,375
Captain	1	1,800	1.55	30	0.60	0.90	1.20	3,000
I. Navigational & fishing crew	14	15,500	9.33	259	5.20	7.80	10.40	26,125
First officer	1	1,400	1.00	23	0.48	0.72	0.96	2,500
Second officer	1	1,350	0.95	22	0.46	0.69	0.92	2,375
Radio operator	1	1,200	0.74	20	0.42	0.63	0.84	2,250
Deck boatswain	1	1,150	0.69	20	0.42	0.63	0.84	2,250
Fishing boatswain	1	1,150	0.69	20	0.42	0.63	0.84	2,250
Senior fisherman	7	1,100	0.64	18	0.36	0.54	0.72	1,750
Fisherman	3	900	0.49	16	0.30	0.45	0.60	1,500
II. Engine room crew	7	8,550	5.51	143	2.94	4.41	5.88	15,000
First engineer	1	1,600	1.25	27	0.54	0.81	1.08	2,750
Second engineer	1	1,350	0.96	22	0.48	0.72	0.96	2,500
Third engineer	1	1,150	0.69	20	0.42	0.63	0.84	2,250
First electrician	1	1,150	0.69	20	0.42	0.63	0.84	2,250
Motorman	3	1,100	0.64	18	0.36	0.54	0.72	1,750
III. Service crew	2	1,900	0.95	30	0.66	0.99	1.32	3,000
Cook	1	1,100	0.64	18	0.36	0.54	0.72	1,750
Cook's helper	1	800	0.31	12	0.30	0.45	0.60	1,250
IV. Processing plant crew	5	4,750	2.65	84	1.62	2.43	3.24	8,250
Foreman	1	1,150	0.69	20	0.42	0.63	0.84	2,250
Processor	4	900	0.49	16	0.30	0.45	0.60	1,500
B. Apprentices	3	2,400	1.16	42	0.96	1.44	1.92	3,750
Assistant	1	1,100	0.64	18	0.36	0.54	0.72	1,750
Apprentice	2	650	0.26	12	0.30	0.45	0.60	1,000
TOTAL	32	34,900	21.15	588	11.98	17.97	23.96	59,125

Appendix Table 3. Component parts of crews' payments on freezers B-23

Position	Number of positions	Minimum salary (monthly)	Percent share	Operational supplement (per day)	Foreign currency supplement Zone I	Zone II	Zone III	Trainees' monthly salary
		zloties	percent	zloties	in U.S. dollars			zloties
A. Standard crew	39	41,100	21.64	750	14.66	21.99	29.32	73,875
Captain	1	1,800	1.27	36	0.60	0.90	1.20	3,000
I. Navigational & fishing crew	11	11,800	6.25	219	4.24	6.36	8.48	21,625
First officer	1	1,350	0.82	26	0.48	0.72	0.96	2,500
Second officer	1	1,300	0.78	24	0.46	0.69	0.92	2,375
Third officer	1	1,100	0.57	23	0.42	0.63	0.84	2,250
Radio operator	1	1,150	0.61	22	0.42	0.63	0.84	2,250
Deck boatswain	1	1,100	0.57	20	0.42	0.63	0.84	2,250
Fishing boatswain	1	1,100	0.57	20	0.42	0.63	0.84	2,250
Senior fisherman	4	1,050	0.52	18	0.36	0.54	0.72	1,750
Fisherman	2	800	0.41	16	0.30	0.45	0.60	1,500
II. Engine room crew	9	10,600	5.81	188	3.76	5.64	7.52	19,250
First engineer	1	1,600	1.02	26	0.54	0.81	1.08	2,750
Second engineer	1	1,300	0.79	22	0.48	0.72	0.96	2,500
Third engineer	1	1,100	0.57	21	0.42	0.63	0.84	2,250
First electrician	1	1,100	0.57	22	0.42	0.63	0.84	2,250
Mechanic - refrig. plant	1	1,300	0.78	25	0.46	0.69	0.92	2,500
Motorman	3	1,050	0.52	18	0.36	0.54	0.72	1,750
Machinist - refrig. plant	1	1,050	0.52	18	0.36	0.54	0.72	1,750
III. Service crew	3	2,650	1.08	42	0.96	1.44	1.92	4,250
Cook	1	1,050	0.52	18	0.36	0.54	0.72	1,750
Cook's helper	2	800	0.28	12	0.30	0.45	0.60	1,250
IV. Processing plant crew	15	14,250	7.23	265	5.10	7.65	10.20	25,750
Technologist	1	1,250	0.67	25	0.42	0.63	0.84	2,500
Foreman	1	1,100	0.57	20	0.42	0.63	0.84	2,250
Senior processor	6	1,050	0.52	18	0.36	0.54	0.72	1,750
Processor	7	800	0.41	16	0.30	0.45	0.60	1,500
B. Apprentices	2	1,850	0.82	33	0.66	0.99	1.32	3,000
Assistant	1	1,050	0.52	18	0.36	0.54	0.72	1,750
Junior fisherman	1	800	0.30	15	0.30	0.45	0.60	1,250
TOTAL	41	42,950	22.46	783	15.32	22.98	30.64	76,875

Appendix Table 4. Component parts of crews' payments on freezers B-18

Position	Number of Positions	Minimum salary (monthly)	Percent share	Operational supplement (per day)	Foreign currency supplement Zone I	Zone II	Zone III	Trainees' monthly salary
		zloties	percent	zloties	in U.S. dollars			zloties
A. Standard crew	84	93,750	22.50	1,585	30.22	45.33	60.44	
Captain	1	2,600	0.66	43	0.60	0.90	1.20	
I. Navigational & fishing crew	21	24,200	5.87	407	7.88	11.82	15.76	
First officer	1	1,800	0.46	30	0.48	0.72	0.96	
Second officer	1	1,500	0.39	25	0.46	0.69	0.92	
Third officer	1	1,400	0.36	23	0.42	0.63	0.84	
Radio operator	1	1,500	0.38	25	0.46	0.69	0.92	
Deck boatswain	1	1,200	0.30	20	0.42	0.63	0.84	
Fishing boatswain	2	1,200	0.30	20	0.42	0.63	0.84	
Senior fisherman	10	1,100	0.26	18	0.36	0.54	0.72	
Fisherman	2	900	0.21	16	0.30	0.45	0.60	Not yet determined.
Junior fisherman	2	800	0.18	16	0.30	0.45	0.60	
II. Engine room crew	16	20,950	5.09	347	6.26	9.39	12.52	
Chief engineer	1	2,200	0.57	37	0.54	0.81	1.08	
First engineer	1	1,500	0.43	25	0.48	0.72	0.96	
Second engineer	1	1,400	0.38	23	0.42	0.63	0.84	
Third engineer	1	1,300	0.36	22	0.42	0.63	0.84	
First electrician	1	1,500	0.38	25	0.46	0.69	0.92	
Second electrician	1	1,400	0.36	23	0.42	0.63	0.84	
Mechanic - refrig. plant	1	1,500	0.38	25	0.46	0.69	0.92	
Senior motorman	3	1,150	0.26	19	0.36	0.54	0.72	
Motorman	3	1,100	0.23	18	0.30	0.45	0.60	
Machinist - refrig. plant	2	1,100	0.23	18	0.36	0.54	0.72	
Repairman & lathe operator	1	1,200	0.30	20	0.36	0.54	0.72	
III. Service crew & infirmary	10	9,900	2.39	163	3.26	4.89	6.52	
Physician	1	1,500	0.38	25	0.46	0.69	0.92	
Intendant	1	1,500	0.38	25	0.46	0.69	0.92	
Chief cook	1	1,200	0.30	20	0.42	0.63	0.84	
Cook	2	1,100	0.26	18	0.36	0.54	0.72	
Steward	3	900	0.21	15	0.30	0.45	0.60	
Cook's helper	1	800	0.18	12	0.30	0.45	0.60	

Appendix Table 4. Continued.

Position	Number of positions	Minimum salary (monthly)	Percent share	Operational supplement (per day)	Foreign currency supplement Zone I	Zone II	Zone III	Trainees' monthly salary
		zloties	percent	zloties	in U.S. dollars			zloties
IV. Processing plant crew	37	36,100	8.49	625	12.22	18.33	24.44	Not yet determined.
Technologist	1	1,500	0.39	25	0.46	0.69	0.92	
Foreman	2	1,200	0.30	20	0.42	0.63	0.84	
Senior processor	12	1,100	0.26	18	0.36	0.54	0.72	
Processor	14	900	0.21	16	0.30	0.45	0.60	
Junior processor	8	800	0.18	15	0.30	0.45	0.60	
B. Apprentices	4	4,400	1.04	72	1.44	2.16	2.88	
Assistant	4	1,100	0.26	18	0.36	0.54	0.72	
TOTAL	88	98,150	23.54	1,657	31.66	47.49	63.32	

Appendix Table 5 - Payments to crews, by vessel type. (Average per vessel-year).

	B-15	B-20	B-23	B-18
	- - - - - - - - 1000 zloties - - - - - - - -			
Percent share	6546.8	1824.1	2814.4	4856.6
Operational supplement	665.1	33.9	--	415.9
Foreign currency supplement	353.6	81.3	149.6	300.9
Exploratory fishing	74.0	--	--	
Fish allowance	188.2	61.3	75.2	193.5
Construction work	157.6	33.3	42.7	
Minimum guarantee	269.6	41.8	53.4	
Reserve	162.0	56.7	61.6	
Leave	642.8	106.3	158.2	
Overtime	24.4	9.7	12.1	923.1
Repair bonuses	8.5	6.4	1.6	
Continuous work	19.8	12.8	17.5	
Military service	8.7	4.5	7.5	
Training	4.8	24.8	18.9	
Other	0.2	163.9	71.0	
TOTAL	9126.1	2460.8	3483.7	6690.0

Appendix Table 6. Average monthly crew earnings on trawlers: B-15, B-20 and B-23

Position	Type of trawler B-15	B-20	B-23
	- - - 1000 zloties - - -		
Captain	14.5	15.4	17.9
First officer	9.1	9.8	12.1
Second officer	7.8	9.4	10.8
Third officer	7.3	7.2	8.0
Fishing master	8.0		
First radio operator	8.1	7.3	8.3
Second radio operator	8.3		
Deck boatswain	7.0		
Fishing boatswain	7.0	7.1	8.0
Senior fisherman	6.0	6.1	7.2
Fisherman	5.0	3.5	6.1
Junior fisherman	4.5		
Chief engineer	10.6		
First engineer	8.6	12.7	14.4
Second engineer	7.8	9.5	11.7
Third engineer	7.4	7.5	8.5
First electrician	8.7	6.7	8.5
Second electrician	8.0		
Mechanic - refrigerator plant	7.7		10.5
Mechanic - processing plant	8.1		
Senior motorman	5.9		
Motorman	5.5	6.4	7.2
Machinist - refrigerator plant	5.8		7.4
Repairman - processing plant	6.9		
Lathe operator	6.1		
Intendant	8.9		
Physician	8.2		
Chief cook	6.6		
Cook	5.8	6.1	7.1
Chief steward	7.7		
Steward	5.3		
Mess boy	4.2		
Cook's helper	4.1	3.1	5.2
Technologist	9.0		11.0
Foreman	7.0	6.9	8.5
Senior processor	6.0		7.1
Processor	5.0	3.9	6.1
Junior processor	4.5		
Assistant	5.8	6.6	7.1

(continued from inside front cover)

14. A Price Incentive Plan for Distressed Fisheries by A. A. Sokoloski and E. W. Carlson.

15. Demand and Prices for Shrimp by D. Cleary.

16. Industry Analysis of Gulf Area Frozen Processed Shrimp and an Estimation of Its Economic Adaptability to Radiation Processing by D. Nash and M. Miller.

17. An Economic Evaluation of Columbia River Anadromous Fish Programs by J. A. Richards.

18. Economic Projections of the World Demand and Supply of Tuna, 1970 - 90 by F. Bell.

19. Economic Feasibility of a Seafood Processing Operation in the Inner City of Milwaukee by D. Cleary.

20. The 1969 Fishing Fleet Improvement Act: Some Advantages of its Passage by the Division of Economic Research.

21. An Economic Analysis of Policy Alternatives for Managing the Georges Bank Haddock Fishery by L. W. Van Meir.

22. Some Analyses of Fish Prices by F. Waugh and V. Norton.

23. Some Economic Characteristics of Pond-Raised Catfish Enterprises by J. E. Greenfield

24. Elements Crucial to the Future of Alaska Commercial Fisheries by D. Nash, A. Sokoloski, and D. Cleary.

25. Effects on the Shrimp Processing Industry of Meeting the Requirements of Wholesome Fishery Products Legislation by D. Nash and M. Miller.

The goal of the Division of Economic Research is to engage in economic studies which will provide industry and government with costs, production and earnings analyses; furnish projections and forecasts of food fish and industrial fish needs for the U. S.; develop an overall plan to develop each U. S. fishery to its maximum economic potential and serve as an advisory service in evaluating alternative programs within the Bureau of Commercial Fisheries.

In the process of working towards these goals an array of written materials have been generated representing items ranging from iterim discussion papers to contract reports. These items are available to interested professionals in limited quantities of offset reproduction. These "Working Papers" are not to be construed as official BCF publications and the analytical techniques used and conclusions reached in no way represent a final policy determination endorsed by the U. S. Bureau of Commercial Fisheries.