THE FISHING INDUSTRY OF ICELAND

by

William G. Mattox, Jr.

A thesis submitted to the Faculty of Graduate Studies and Research in partial fulfilment of the requirements for the degree of Master of Arts.

Department of Geography,
McGill University,
Montreal.

April 1960

PREFACE

The research for this thesis was carried out in Iceland with the full cooperation of the Icelandic Government and men working in various capacities in the fishing industry. Full use has been made of extensive statistical material kindly supplied by the Statistical Bureau of Iceland (Hagstofa Islands). Because of a lengthy visit to the island, the author was able to observe the fishing industry in operation for a full twelve-month period; opportunity was taken to work on trawlers and herring vessels so that first-hand knowledge of these operations might be obtained.

The author wishes to express his appreciation to Dartmouth College under whose auspices and support he was able to study in Iceland for a year as recipient of a James B. Reynolds Foreign Scholarship; to the Ministry of Education of the Government of Iceland which supplied not only financial support but also friendly guidance and encouragement during his entire stay in Iceland; to Hrn. Knutur Hallsson and Hrn. Asgeir Petursson of the Icelandic Ministry of Education for their unyielding friendship and academic advice; to Dr. Finnur Gudmundsson and Fil. lic. Astvaldur Eydal whose vast knowledge of the Icelandic fishery was of invaluable aid. Also, although too numerous to mention by name, are many other friends and student colleagues in Iceland who helped in many ways.

Finally, I express my gratitude to my wife Joan for typing this thesis.

Note on Icelandic Pronunciation

It is not of vital importance to understand the principal keys to Icelandic pronunciation in reading a paper on Iceland, although it might be of some interest to know that the Icelandic alphabet has some letters which would look strange had they been used in the typescript. They can, however, be recognized on some of the maps, and an explanation of them is therefore in order.

þ - is properly pronounced as the th in thing and can only begin a syllable. It is typed as th in this thesis and can only represent the letter þ, as no th combination exists in Icelandic.

d - is pronounced as th in though and is most conveniently typed with the regular letter d, although this is not entirely suitable as the letter d itself appears in Icelandic. (The upper case for d is D.)

The two letters þ and d are the only ones which are likely to be at all confusing; following are the pronunciation keys of some of the main vowel and consonant combinations.

a	- ow (as in plow)	fn	- pn
æ	- ai (as in aisle)	hv	- kv
au	- oi (diphthong)	j	- y (consonant)
ei & ey	- ei (as in rein)	ll	- tl (Scottish)
i & y	- i (as in marine)	fl	- pl
u	- u (as in ruse)		

The capital city Reykjavik is pronounced Rake - ya - veek. In Icelandic the stress is almost always on the first syllable.

TABLE OF CONTENTS

		Page
PREFACE		ii
List of Tables		vi
List of Figures and Maps		vii
I.	INTRODUCTION	1
II.	NATURAL CONDITIONS AS A BASIS FOR FISHING	4
III.	THE HISTORICAL DEVELOPMENT OF THE FISHERIES	27
IV.	SEASONS, VESSELS, AND GEAR	46
	Seasons and Localities of Catch	46
	Vessels	52
	Gear	58
V.	THE CATCH (EXCLUDING HERRING)	64
	Cod	71
	Seasons and Gear	74
	Haddock	76
	Saithe	77
	Redfish	78
	Halibut	79
	Plaice	79
	Catfish	80
	Whaling	81
	Preparation	81
	Stockfish	83
	Salted fish	85
	Clipfish	86
	Fish on ice	87
	Frozen fish	90
	Cod-liver oil	92
	Fish meal	93
	Canned fish	94
	Cod Roe	94
	Frozen Shrimp and Lobster	94
	Redfish body oil	94
	Whaling products	95

VI. HERRING 96

Catch 97
Vessels and Gear 106
Utilization of the Catch 109
Introduction 109
Methods 111

VII. POPULATION AND OCCUPATIONS, THE KRONA, AND FOREIGN TRADE 121

Population and Occupations 121
The Value of the Krona 125
Foreign Trade 127

VIII. THE MAIN PROBLEMS AND CONCLUSIONS 153

Lack of Diversity 153
Marketing Problems 155
Territorial Fishing Limits 162

BIBLIOGRAPHY 183

List of Tables

Table No.		Page
1	Participation of the Fishing Fleet, 1956	49
2	Growth of the Icelandic Fleet, 1932-1957	53
3	Icelandic Ports with over 500 Tons Registry, 1957	63
4	World Catch of Fish	65
5	Fish Consumption in Europe, 1949	66
6	Fish of Importance in Icelandic Waters	70
7	Total Fish Catch by the Icelandic Trawling Fleet Elsewhere than around Iceland	72
8	Relative Disposition of World Catch	84
9	Relative Disposition of Icelandic Catch	84
10	Price and Cost Indices	128
11	Icelandic Foreign Trade by Countries (1936 and 1956)	131
12	Iceland: Difference in Exports and Imports in Thousands of Kronur	137
13	Icelandic Exports of Frozen Fish 1947-1956	151
14	Average Yields of All Species from Icelandic Waters 1952-1956	180
15	Fish Export Products 1931-1940	Back flap
16	Fish Export Products 1941-1950	Back flap
17	Fish Export Products 1951-1958	Back flap

List of Figures

Figure No.		Page
1	Location	5
2	Drainage and Ice-Cap Glaciers	6
3	Temperatures (January)	8
4	Temperatures (July)	8
5	Climate Stations	9
6	Location and Ocean Currents	11
7	Area in Grass	14
8	Sea Depth in Meters	17
9	Average Sea Temperatures - February	18
9A	Average Sea Temperatures - February 1958	19
10	Average Sea Temperatures - July	20
11	Population 1750-1957	42
12	Value of Exports 1931-1958	47
13	Average Catch of Fish in Icelandic Waters	67
14	Composition of the Catch	69
15	Total Catch of Fish 1941-1957	73
16	Monthly Cumulative Landings	75
17	Total Monthly Landings, 1956	75
18	Utilization of Catch	82
19	Distribution of Herring in the North Atlantic	98
20	Main Herring-fishing Areas in Icelandic Waters	98
21	Catch of Fresh Herring	99

Figure No.		Page
22	Utilization of the Herring Catch 1946-1957	107
23	Importance of Herring in Total Exports	112
24	Occupation Structure of the Population	123
25	United Kingdom - Imports of Fresh and Frozen Whitefish	144
26	France: Imports of Fresh and Frozen Fish	150
27	Federal Republic of Germany (West) Imports of Fresh and Frozen Whitefish	150
28	Old Fishing Limit	175
29	Fishing Limit from May 1952	175, 176
30	Fishing Limit from September 1958	176
31	Sea Depth between 50 and 100 Meters and Location of the New Fishing Limit	177

Maps

A	Iceland - Main Fishing Grounds	Back flap
B	Iceland - Towns and Fishing Villages	Back flap
C	The Fishing Industry	Back flap
D	Fish Processing and Shipyards	Back flap

I

INTRODUCTION

The aim of this study is to examine the geographic bases of Iceland's sea fisheries. Because of restrictions imposed by the natural environment Iceland is economically dependent on other countries to supply most of her basic goods. Climate and topography limit agricultural production to hay and fodder crops in addition to minor amounts of potatoes, turnips, and other leafy vegetables. Although barley is grown on an experimental basis in some of the more favorable areas of the south-west, bread grains will not usually ripen and therefore must be imported. Added to the harsh agricultural environment is the great lack of mineral resources and absence of trees which has hampered industrial growth. To finance the necessary import goods, amounting to a total of almost 88 million dollars or 550 dollars a person per year (1958), Iceland must have a compensating export trade. This is principally in fish and fish products which account for over 90 per cent of this export trade. The total catch of fish by Iceland amounts to 3 tons for each inhabitant annually; this represents the largest per capita catch in the world, over six times more than the per capita catch of any other country.

It is not surprising, therefore, to find that Iceland has reached a high level of technical development in both the catching and processing of fish. The fisheries of different countries show strong contrasts in method, vessels, types of product, etc; many of these fisheries have common geographic conditions, but few are so vital to their national

economy as is the Icelandic fishery. The high level of utilization developed in Iceland is a model for other countries where the fishing industry now faces the problems of modernization and expansion. In many ways the fishing industries of Greenland, Newfoundland, North Norway and the Faroe Islands face the same problems as Iceland. In these areas natural conditions limit productivity on the land. Human livelihood, therefore, is concentrated on the pursuit of fishing or in occupations ancillary to the fishing industry.

The problems of food supply and distribution throughout the world when related to rapid growth in world population are well-known. Although these problems are of vital importance, they are rarely as urgent as many political questions. Failure to deal effectively with the food and population problems, however, may ultimately have results which are as disastrous as not meeting the more immediate political questions.

Through Iceland's fishing industry it is possible to examine the economy of a small country which is totally dependent upon the sea for her export products. In the following chapters the utilization of Iceland's sea resources will be discussed by means of illustrating the natural conditions in Iceland, a brief history of the industry, the people and the developing country, modern fishing operations, the export trade, and concluding with a review of Iceland's present and future problems in connection with the fisheries. Among these are the utilization of the stocks and the overfishing problem which must be considered in the light of some conclusions of biological workers.

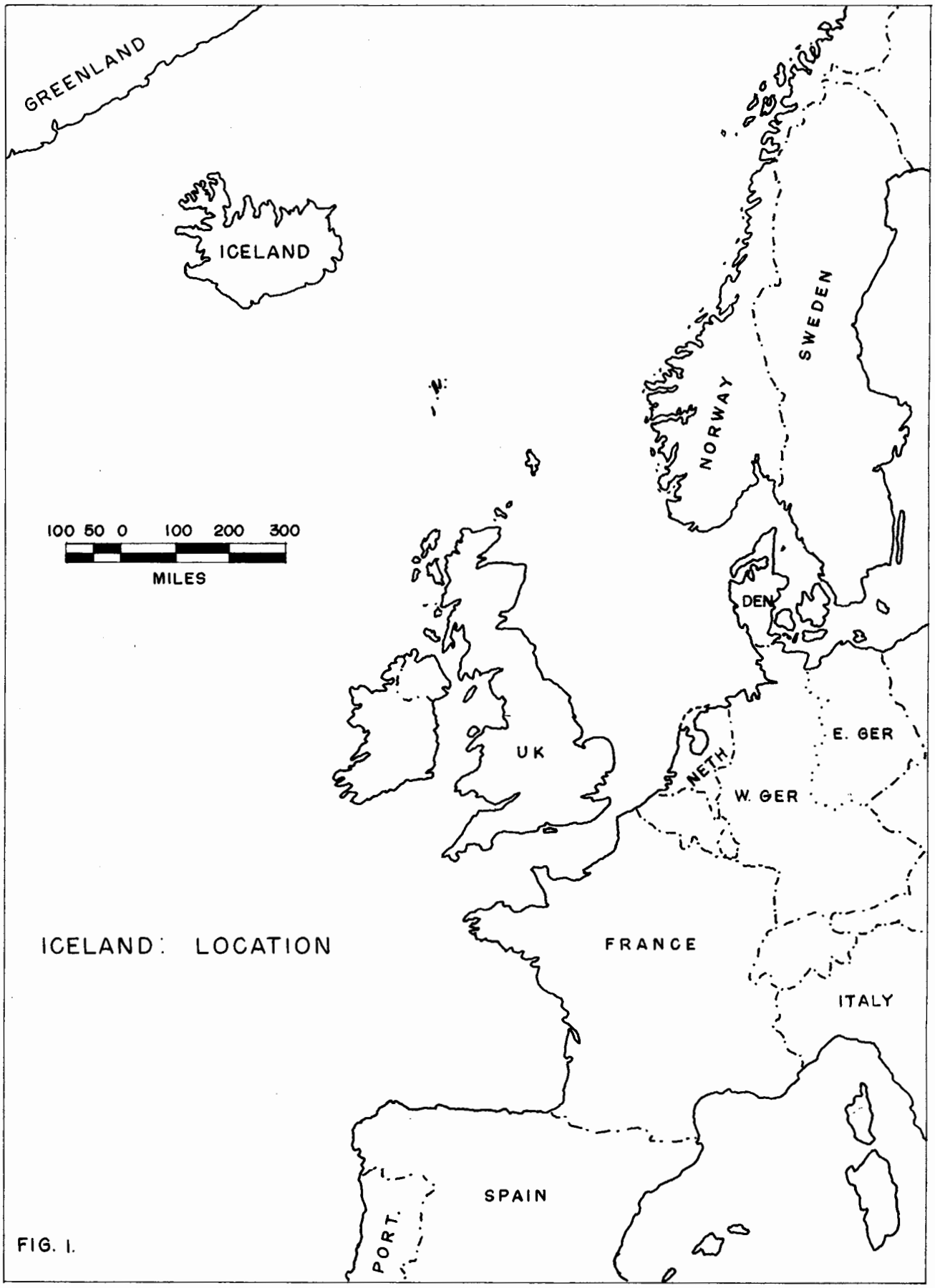
Recent developments in Iceland concerned with territorial fishing rights point up the necessity of attempting to resolve the complicated disputes with fairness and speed. A policy of jurisdiction must be decided upon by international agreement settling the fishing disputes in a manner which will protect the smaller countries dependent upon fishing and which will also protect the traditional rights of larger nations who have fished for many years in various coastal waters. Perhaps such an agreement will be impossible because of the sharply contrasting interests. Due consideration should be given, however, to protection and maintenance of the stocks of fish so that the interests of all fishing nations may be upheld. The timeliness of this study has been increased by recent developments in Iceland. According to unofficial reports, the Icelandic krona has been devaluated and the tax and subsidy program vastly overhauled. Time has not permitted a consideration of these latest developments, nor have the events of the fiscal year 1959 been incorporated because of the slowness with which official statistics become available.

II

NATURAL CONDITIONS AS A BASIS FOR FISHING

Iceland's status in the world today and the direction she takes in carrying on her affairs depend both upon fundamental geographic factors of the country and upon powerful external influences. Let us then consider the country, its geographic setting and the people who colonized it, in an appraisal of those particular factors which led Iceland to become one of the foremost fishing nations in the world.

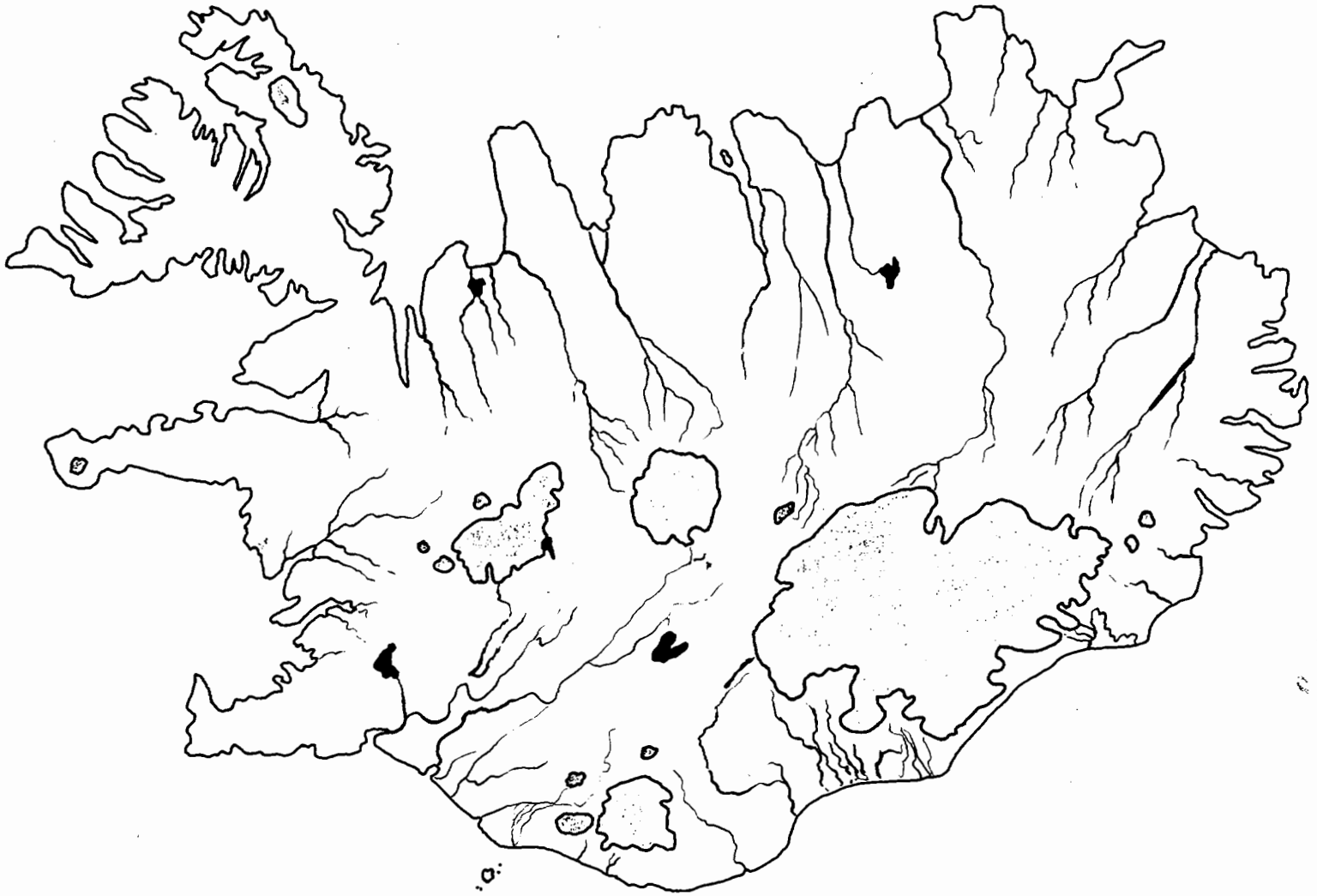
Iceland, with an area of 40,437 square miles, is the fourth largest island in the North Atlantic after Greenland, Great Britain, and Newfoundland (Fig. 1). The northern coast of Iceland lies slightly to the south of the Arctic Circle, while the island itself is located on a platform of the great submarine ridge which runs across the floor of the Atlantic Ocean from northern Scotland to the east coast of central Greenland. Like most northern lands, Iceland is not heavily populated, having 166,831 inhabitants (1957) or about 4.01 persons per square mile. It is a land of strong contrasts and of equally strong anomalies for its position on the globe. It is, geologically, a young land and of relatively simple structure. Virtually all of the rocks are of igneous origin, the earliest of which date from the Eocene. About 31,000 square miles in the interior are uninhabited, and for the most part uninhabitable, because of glaciers, lava fields and barren sands (Fig. 2). This leaves 9,500 square miles around the coasts and in some of the lowland and river valleys for habitation.



ICELAND: LOCATION

FIG. 1.

FIG. 2



ICELAND: DRAINAGE & ICE-CAP GLACIERS

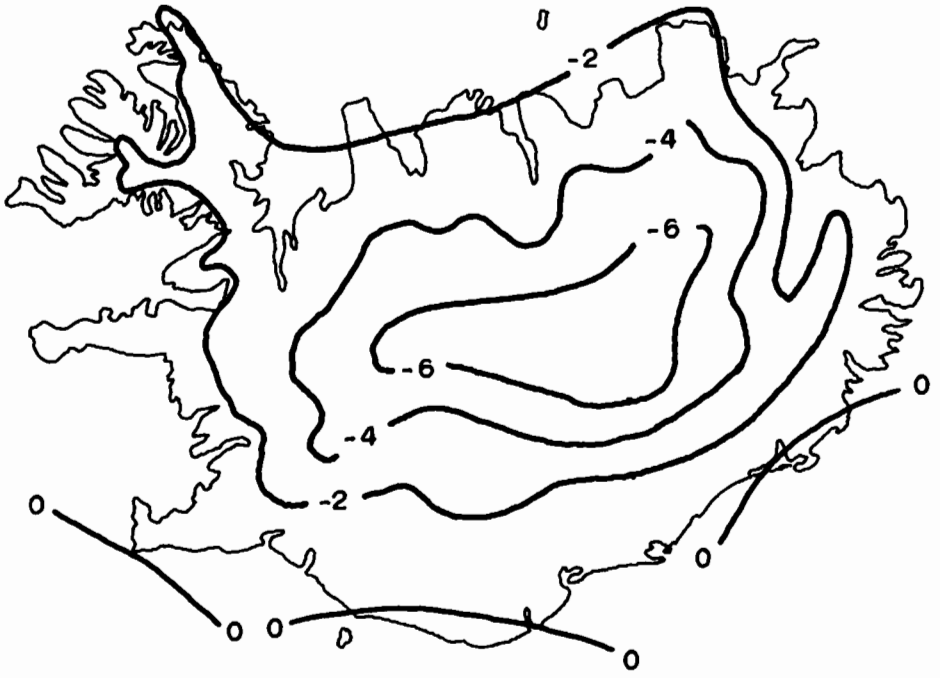
It is probable that the first inhabitants of Iceland were of Celtic origin and it is more definitely known that the Irish came to Iceland in 795 A.D. and possibly had been visiting Iceland for centuries before this date. The Irish, however, were small in number, being mostly religious monks who came to Iceland for peace and solitude. The leaders of the main colonization were Norwegians, many of whom had spent two or more generations in Scotland and Ireland before coming to Iceland. They brought with them their slaves from Britain and so the national origin of the Icelanders, although mainly Scandinavian, is also partly Celtic.

Colonization progressed rapidly, for already by the year 935 A.D. the population was 50,000.

The Vikings found Iceland a harsh land of long winters and short, cool summers, but even this unfavorable climate has an average temperature which is about 8° C. higher than might be expected for that latitude. It is largely because of the Gulf Stream that the climate is equable (Figs. 3, 4, and 5); Reykjavik, the capital, located on the southwest coast, today has a yearly mean temperature of 5.3° C. (41.6° F.). The mean temperature for Reykjavik during January is 0.33° C. (32.6° F.) and during July 11.7° C. (53.0° F.). It is believed that the climate experienced by the earliest settlers was much like that of present times. It must be pointed out, however, that these comparable conditions have existed only several decades. From the 16th century until about 1890

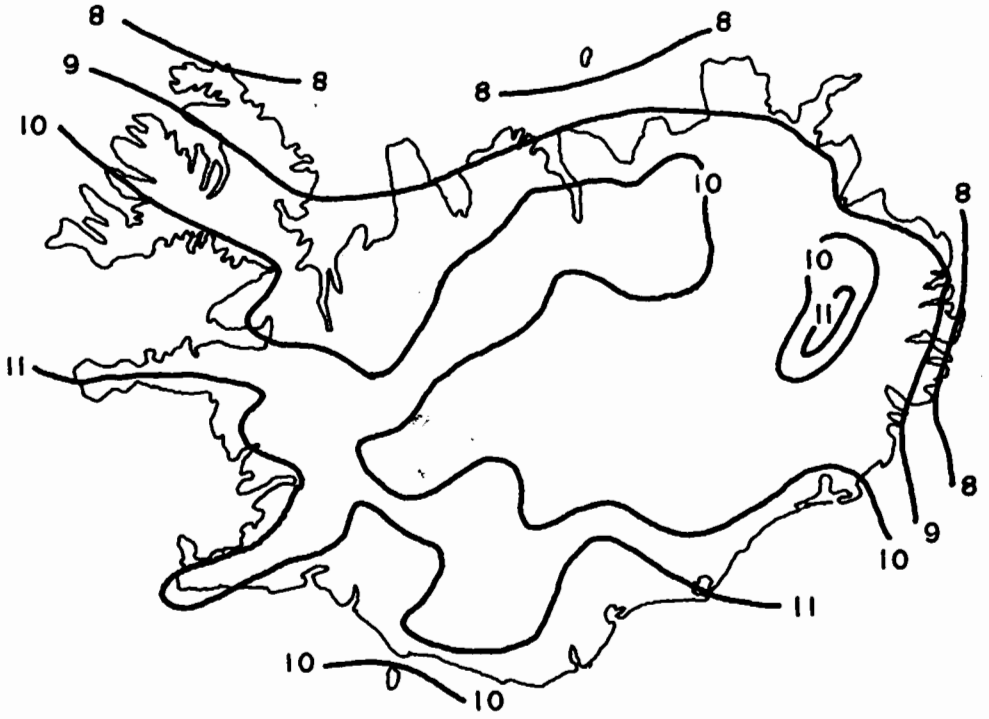
ICELAND TEMPERATURES AVERAGE 1901-1930 (DEG. CENT.)

FIG. 3



JANUARY

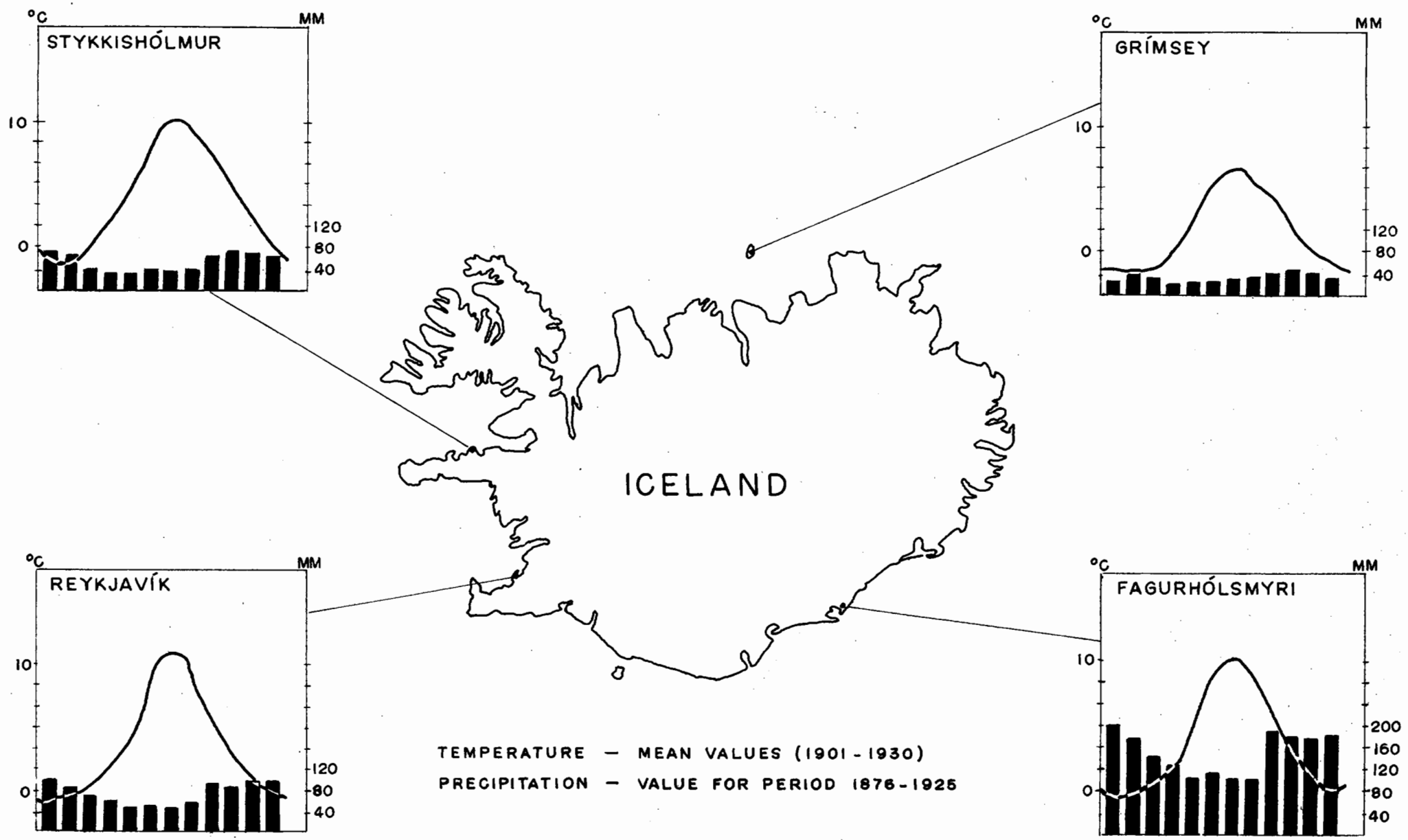
FIG. 4



JULY

AFTER EYÞÓRSSON

FIG. 5


°C
MM
STYKKISHÓLMUR
10
0
120
80
40
°C
MM
GRÍMSEY
10
0
120
80
40
ICELAND
°C
MM
REYKJAVÍK
10
0
120
80
40
°C
MM
FAGURHÓLSMYRI
10
0
200
160
120
80
40
TEMPERATURE — MEAN VALUES (1901 - 1930)
PRECIPITATION — VALUE FOR PERIOD 1876 - 1925

climatic conditions in Iceland were much cooler than at present.[1] Because of the passage of numerous cyclones, the weather is very changeable and, although the temperature is never extreme, the high average wind speed is an important factor for consideration.

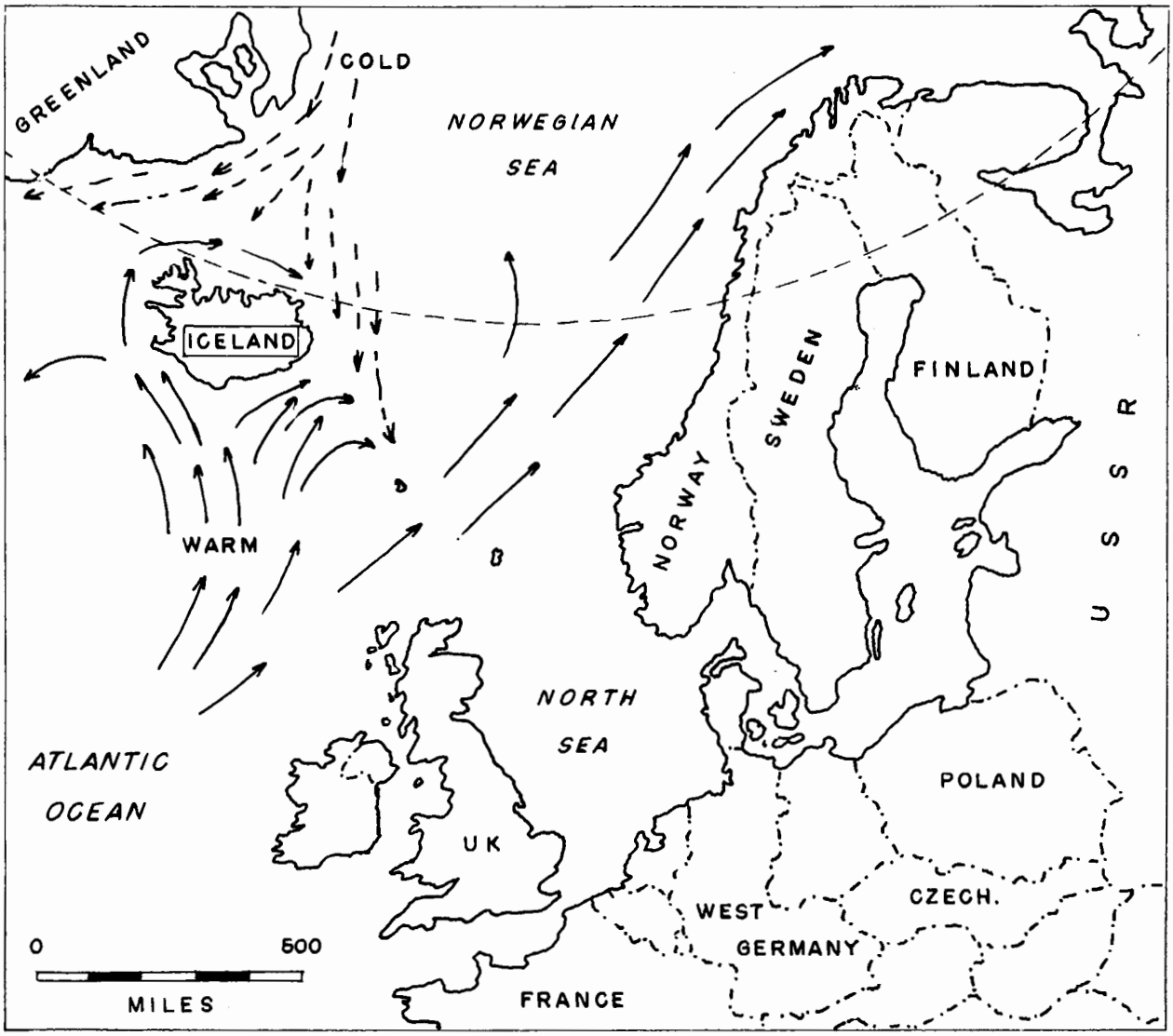
Of great significance climatically is the warm ocean current called the Gulf Stream or North Atlantic Drift a western branch of which (the Irminger Current) is divided in two before reaching Iceland, one part continuing to the north along the west and north coasts of the island, while the other flows along the south coast (Fig. 6). Near the northwest peninsula of Iceland the warm current flows under colder arctic water and continues in a clockwise direction around the island. At the same time a branch of the cold East Greenland Current curves southeastwards round the east coast of Iceland and comes in contact with Atlantic water off the southeast coast. The main East Greenland Current runs southwards along the eastern coast of Greenland laden with polar ice which, before 1920, used to fill the bays and fjords (mostly in northern and eastern Iceland) in certain years. The boundary between the cold northerly and the warm southerly currents is very marked and very close to the northwest coast, where a boat may pass from water of 4-5 degrees Centigrade at the surface to 0 or -1 degrees Centigrade. From the climatic environment of Iceland it follows that great fluctuations may be expected from one year to another. As previously noted,

---

[1]There has been a decided warming of the climate in Iceland especially since 1930, so that Figures 4 and 5 are somewhat out of date. Absence of maps showing recent isotherms precludes their inclusion here.

FIG. 6

ICELAND - LOCATION & OCEAN CURRENTS



there are many indications that the climate, on the whole, has become milder especially in the past thirty years; this is most strongly marked in the autumn and winter.

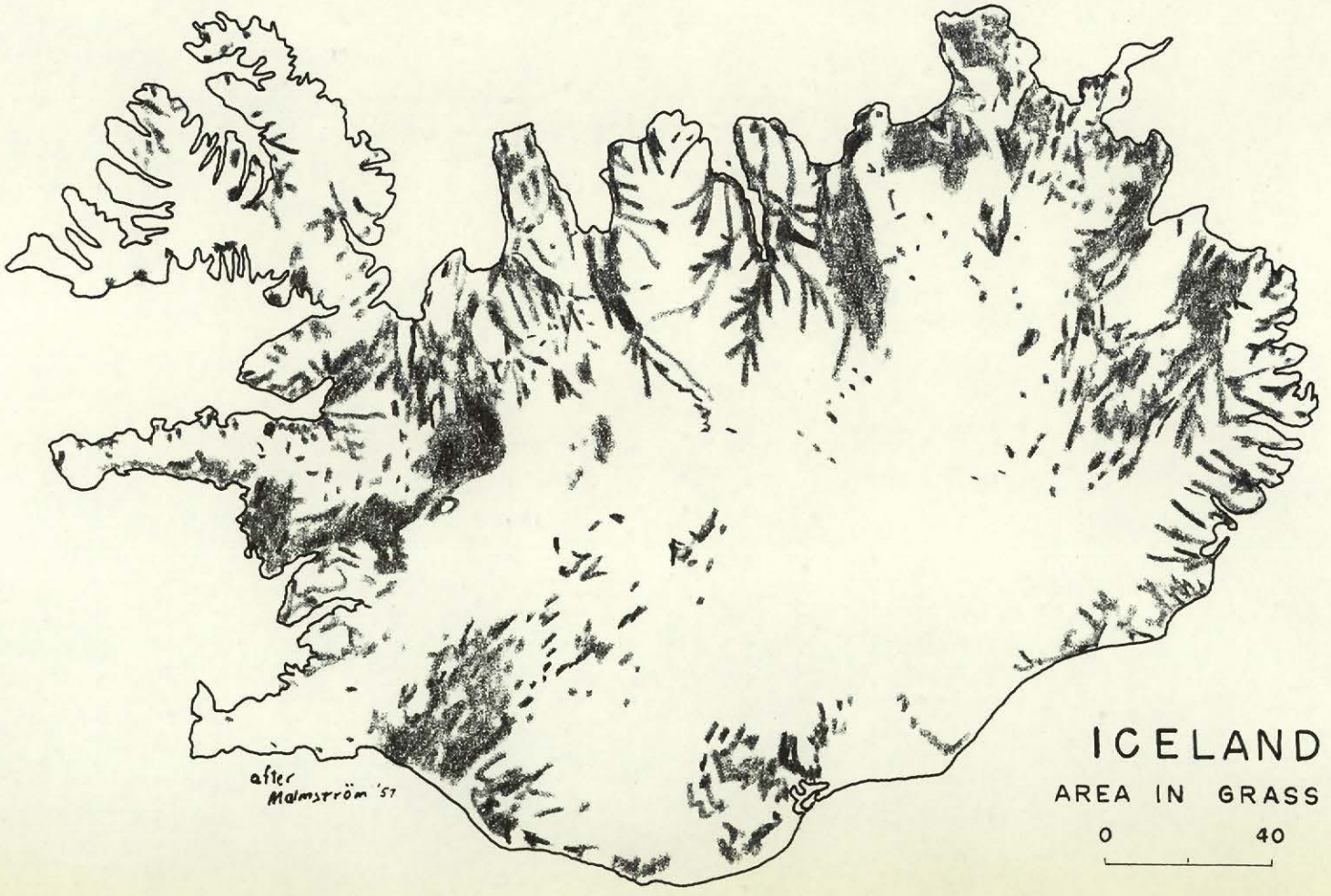
The Vikings settled in a land that was at once harsh and changeable, in addition to being subject to earthquakes, flood, and fire. The rocks of most of the island are of volcanic origin and at least twenty of Iceland's 200 post-glacial volcanos have been active in historic times. Their eruptions left a wake of destruction and, if occurring in the areas of great ice-caps, catastrophic floods would threaten the countryside. One of the best known of the volcanos is Mt. Hekla which has had 23 eruptions within historical times. Volcanic eruptions also occur near or under ice caps (Myrdalsjökull and Vatnajökull especially) and are usually accompanied by enormous floods of water and ice blocks causing great damage to any farms located near-by.

The early settlers could survive only in the lowlands which comprised only 1/5 of the island. Numerous valleys intersect the highland, but continuous lowland areas are only to be found in a few places along the coast. The largest lowland area stretches about 70 kilometers up into the country from the western part of the south coast with occasional mountains rising up from it. The Vikings found a coastline similar to that of their Norwegian homeland, with deep fjords cutting into the headlands; the coastline has been submerged which, along the south coast, resulted in the aggradation of many heavily-loaded glacial streams. Unlike the rest of the coastline, the south is very low-lying with numerous sand spits and bordering glacial outwash plains (<u>sandur</u>).

Although this low and sandy coast was unprotected and open to the full force of storms, the Atlantic influence made this area more favorable climatically than the north. The extensive south and southwest lowland area enabled the Vikings to raise the flocks which they had brought from Norway and the British Isles, and from the beginning this area grew to importance which it has not surrendered to this day. As has been mentioned, 4/5 of the island, the great central portion, is not suited to human habitation--consisting of great desert wastes, mountains, lava fields, and glaciers. The island, young geologically, is extremely poor in natural resources. There are practically no trees and even the early sagas tell of the need to import lumber. Although it is maintained by some that great forests of birch were once very extensive, it seems that these were not large trees, and, having once been exploited by the settlers for fuel, were kept from finding root again by the thin soil, high winds, and the grazing of flocks. There are no metal ores, oil, or good coal, and cement must be imported.

The two resources of increasing importance in Iceland today, hydroelectric potential and thermal heat, were of little importance to the early settlers. Two important resources remained in this barren land of harsh climate: grass for grazing (Fig. 7), and the fish which teemed around its shore. Grazing agriculture has always been of prime importance to the Icelanders and it has only been in recent years that agriculture has been replaced by industry as the leading occupation. Whereas the importance of agriculture is of such magnitude, the lack of other natural resources means that Iceland must import nearly everything it uses, and this has been true from the earliest days.

FIG. 7



For the first few centuries agricultural products, in addition to silver ornaments and native sulphur, were the only means of paying for imports; the fisheries were carried on from the earliest times but did not gain any position of recognition in export until the 13th century. Whereas agriculture was the leading occupation until quite recently,[2], it has been only through the fisheries that the Icelanders have managed to survive; indeed many people have written that Iceland would be uninhabitable were it not for the rich fishing banks surrounding the island.[3] For even if agriculture is carried on, the land is unfavorable for growing crops, less on account of inclement winters and length of growing season than of unfavorable summers. The reliability of frost-free days in summer is not great, especially in the more continental portions of the north. The strong winds and shallowness of the soil and the hummocky nature of the land all tend to give the farmer a chance only in grazing and the growing of grass for fodder. For a few centuries following the colonization period agriculture was of prime importance for domestic consumption as well as export. Although agriculture is still very important, after domestic needs are fulfilled there is not much left over for export, so that after the latter part of the 13th

---

[2]According to Bjornsson 62,000 hectares or 0.602% of the land area of Iceland was under cultivation in 1957. B. Bjornsson, "Iceland, a Geographic, Political, and Economic Survey", in Vidskiptaskrain (Commercial and Industrial Directory for Iceland), 1957, pp. 975-976.

[3]The Icelandic Efforts for Fisheries Conservation, Reykjavik: Rikisprentsmidjan Gutenberg, 1954, p. 6.

century almost total dependence was placed on the fisheries for the importation of vital necessities and they have remained the life-blood of the country to the present time.

The paucity of other natural resources, in addition to the limits set by a harsh climate, were compensated for in Iceland to a large degree by natural conditions ideal for the pursuit of fishing and participation in trade.

The most important fisheries in the world are always carried on close to land. Along the coastal strips of every land runs a submerged rim or shelf of varying width, the so-called continental shelf, which is the continuation of the land below the sea. Off the coast of Iceland (Fig. 8 and Map A) the fishing grounds are found on such a shelf and these banks are considered to be among the richest in the world. The shallow water areas are the most fruitful regions of the sea. Here is found prolific plant and animal life of all kinds. Here, too, assemble the great shoals of fish when they are ready to spawn.

Iceland's natural geographical conditions, the long coast line caused by the many deep fjords, the continuous belt of banks lying off the coast, the current and temperature conditions of the sea, the multitude and variety of fish have all combined, with the paucity and lack of possibilities of the land, to draw the people to the sea. On the south coast the warm ocean current is entirely dominant and supplies the fishing banks there with Atlantic water (Fig. 6), the surface temperature of which varies between 5° C. and 13° C. according to the time of year (Figs. 9, 9-A, and 10). From the far north, on the

FIG. 8

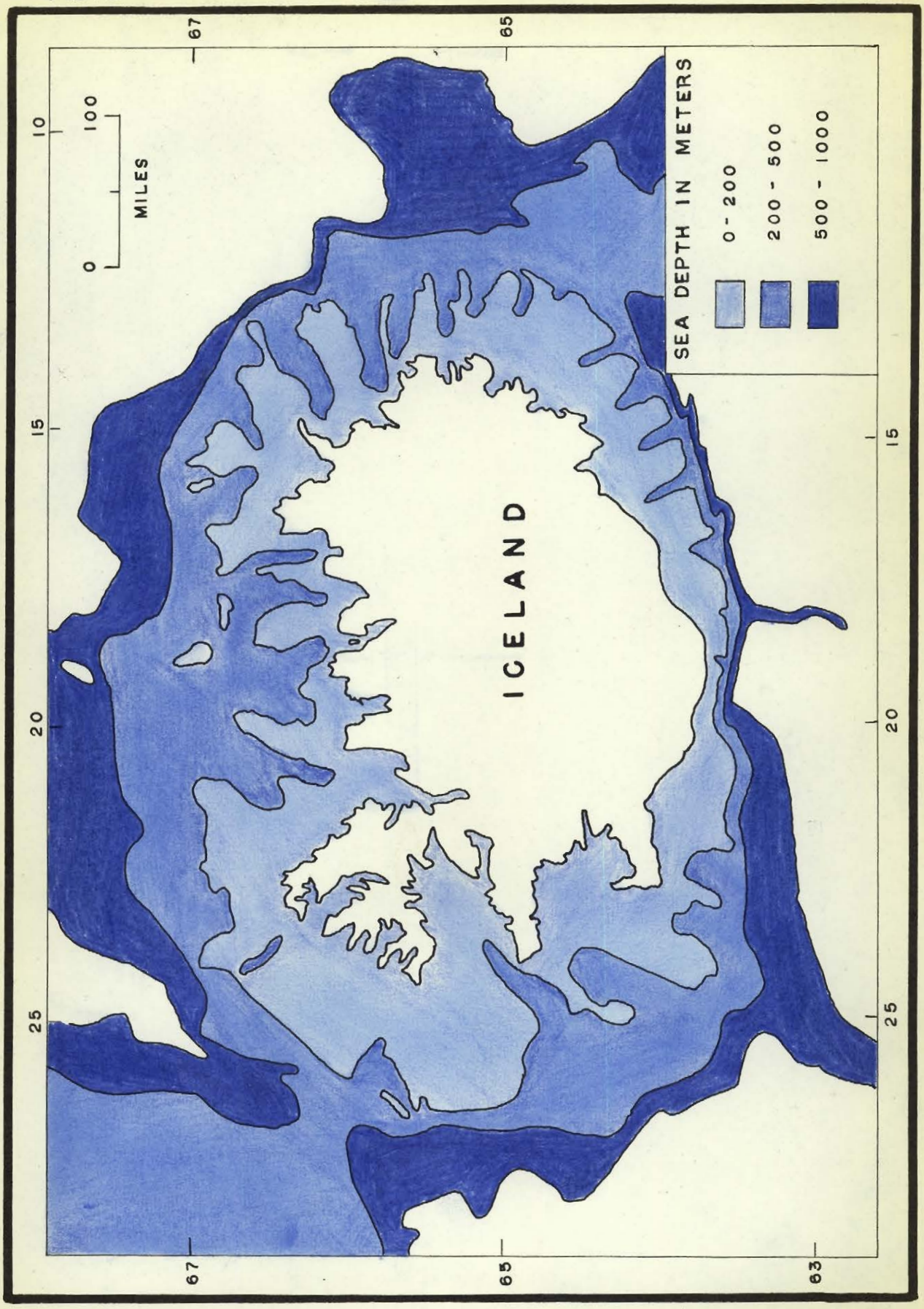
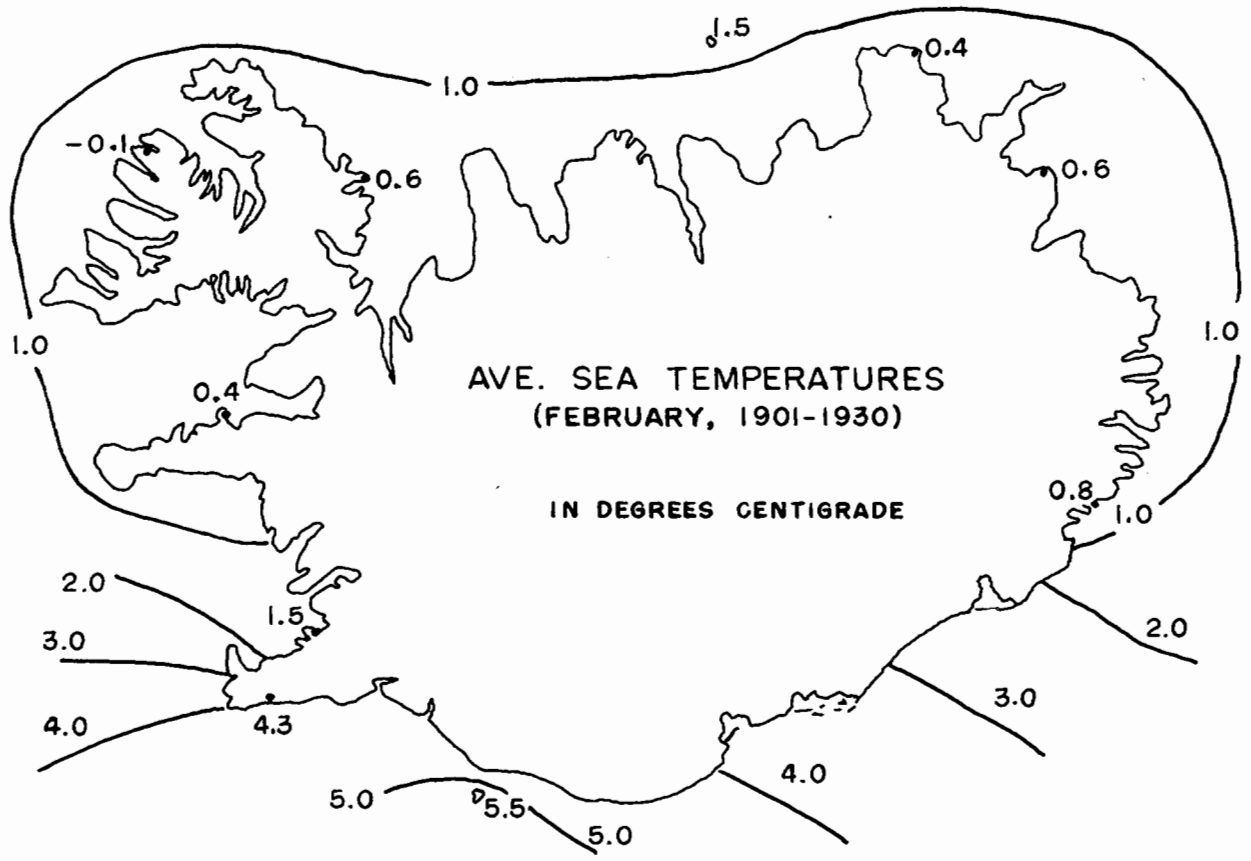

ICELAND
SEA DEPTH IN METERS
0 - 200
200 - 500
500 - 1000
0
100
MILES
67
65
63
10
15
20
25

FIG. 9

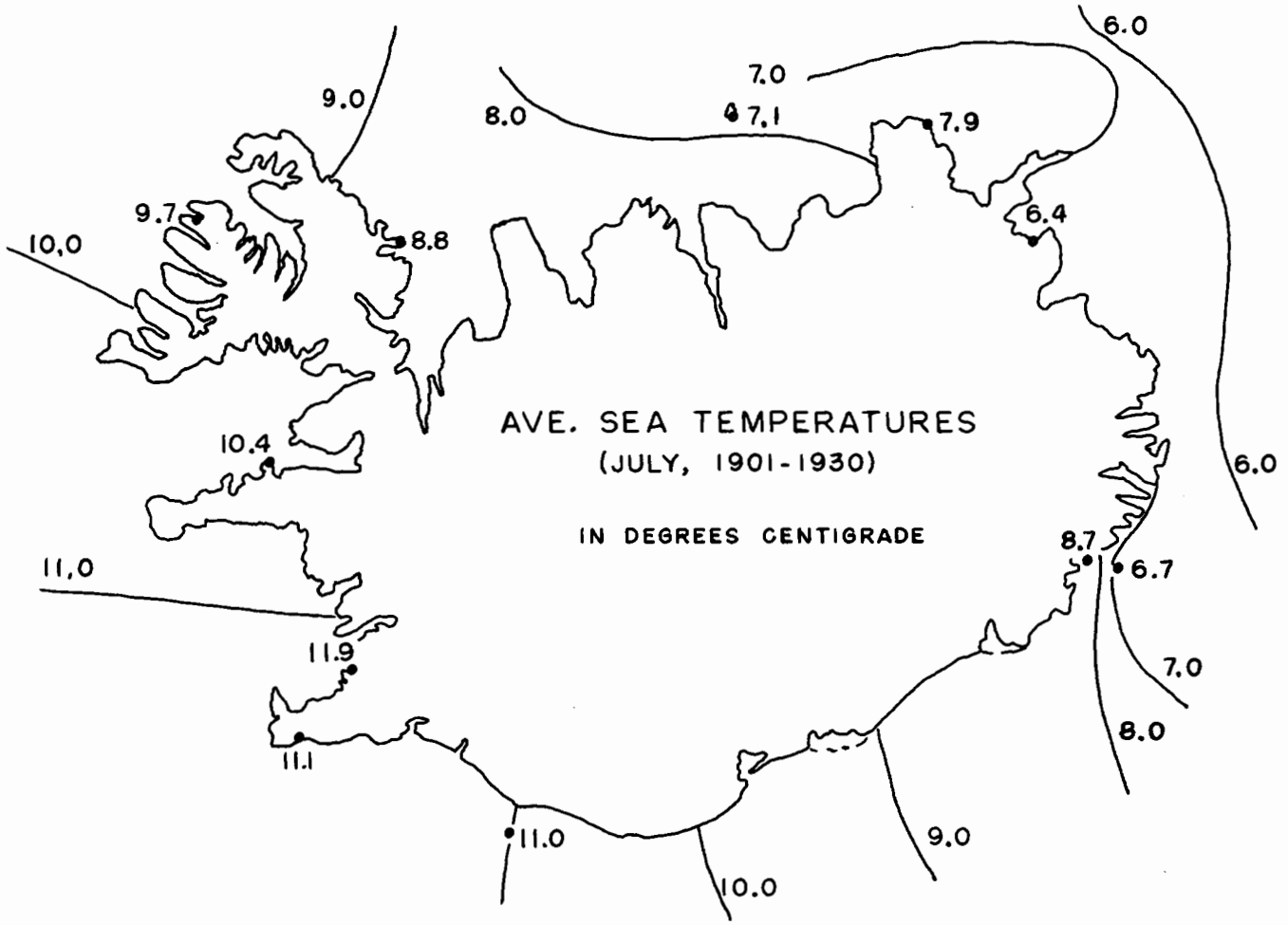


AFTER MALMSTROM

FIG. 9-A AVE. SEA TEMPS. (1958 - USN HYDRO PUB. 705)

FEBRUARY - (DEG. CENTIGRADE)

FIG. 10



AFTER MALMSTROM

other hand, there is a surface outflow of cold water[4] southwards. On the fishing banks along the Iceland coast (especially the northwest, west and southwest) the result is a stratification of the water. On the bottom there is the saline Atlantic water, over this is a layer called the bank water, and, at the top, the less saline coastal and polar water. The changes in the position and composition of these water strata, the yearly periodic variations in temperature, and the effect of the sun favor the production of abundant food supplies which are the primary requirement for a flourishing and plentiful stock of fish.

With the contact of these two distinct oceanic currents, two different faunas and floras meet in Icelandic waters. Off the south coast of the country, we find a number of north-temperate (boreal) species, whereas in the colder area of the polar current which almost entirely dominates the northern part of the east coast a number of cold water (arctic) species are found. In the winter and early spring months many of the most important food-fishes gather in great shoals on the warm water banks off the south and southwest coast in order to spawn. This yearly journey to the spawning grounds is called the "spawning migration" and some of the greatest fishing activities take place during this season. After spawning, the fish move in great shoals to the cold water area around the country and even to Greenland (cod) in search of

---

[4]Polar water is characterized by a temperature of about 29.3° F. (-1.5° C.) throughout the year and a salinity of less than 33‰. J. Corlett, "Arctic and Sub-arctic Marine Resources", FAO Fisheries Bulletin, Vol. 9, No. 2, 1956, p. 64.

food, while their fry drift along with the currents to the northwest, north and east coasts. They remain there, feeding on enormous swarms of small crustaceans, until they are mature when they then move back to the warmer waters for spawning. After spawning they visit the colder waters in search of food with the other mature fish. This is the "food migration". The cold water off the north coast is very rich in fish foods (Copepods) living on the surface, and here some of the most extensive herring fisheries take place in summer.

A general interaction is found between the warm and cold water; warm water areas provide breeding possibilities; cold water areas supply the spawned fish with food, and, in addition, form a kind of nursery for the fish larvae carried to the north by the warm water, and for the immature fish. Because of these two migrations, productivity of the different fishing grounds varies according to the season of the year; those to the southwest and west of the island are most profitable in the early months. Those to the south and southeast in May and June; those to the north and northeast in summer, particularly July and August. In the late autumn and early winter, fishing takes place principally on the north coast (Map C).

The underwater topography around Iceland, therefore, is of paramount importance since the shallow continental shelf areas are generally much greater producers than the open ocean. Organic remains from the euphotic zone are only partly decomposed in the shorter fall to the sea floor, so that there is a lot of food for the small bottom creatures which finally feed the fish. The shelf not only acts as a rich food-producing area but one which is convenient for vessels to reach and

fish. Iceland's close proximity to the surrounding fishing banks is a factor so obvious that its importance is commonly neglected, and the short distances involved were of equal importance to the early settlers fishing on a subsistence basis as to the operations on present-day scale (Map A).

Fishing in Iceland is enhanced by the fjord-type coast offering good, well-protected harbors. Fjord coasts, however, often lack sufficient areas of flat land for extensive port works and town building. In Iceland many fishing villages are located along the coast on depositional features such as hooks, spits and cuspate forelands, as in the case of Siglufjordur on the north coast. Although communication inland is often made difficult by the ruggedness of the terrain on such fjord coasts, this factor is not too important in Iceland due to the sparse inland population.

One factor which has had a most adverse effect on the pursuit of fishing is the weather, which in the early fisheries limited the activity to within the fjords very near land. The frequent passage of storms, high winds of unpredictable nature, and the icy, penetrating gales made it dangerous for the early fishermen to venture too far from land. Even to this day, gales and severe icing (with consequent weighting down and sinking of the ship) have taken their toll each year. With all the other natural advantages it is not surprising that the weather has been able to do little to keep the Icelanders from fishing with vigor around their coasts.

It has been noted earlier that in the past, especially between 1600 to 1900,[5] the arctic pack ice moved in to the northern coasts of Iceland, especially in late winter or early spring. Then a branch of the cold East Greenland Current would carry the ice eastwards along the north coast, filling every fjord and bay. From the northeastern extremity this current would carry it further southwards along the east coast, and sometimes even along the south coast to Cape Reykjanes.[6] Now, however, the mild autumns, winters, and springs have become frequent in Iceland and the drift ice has not been a serious factor since 1920.[7] The same trend of climatic amelioration seems to be the case in all the northern countries, especially ones bordering the Polar Sea. Other than the disappearance of drift ice along the northern coast, there is a good deal of other evidence indicating that these high temperatures in the air and seas around Iceland in recent years have influenced the fauna as well as the flora of the island, both of which have tended to become more southerly than previously.[8]

---

[5] L. Koch, "Two Summer Expeditions to Northeast Greenland", Arctic, Vol. 2, No. 3, 1949, p. 196.

[6] S. Thorarinsson, "The Thousand Years Struggle Against Ice and Fire", Miscellaneous Papers, No. 14, Museum of Natural History, Reykjavik, 1956, p. 7.

[7] J. Eythorsson, "Temperature Variations in Iceland", Geografiska Annaler, Vol. 31, Nos. 1-4, 1949, p. 37. And, _____, "Hafis vid Island" (Polar Ice at the Coasts of Iceland), Jökull, Vol. 2, 1952, pp. 31-32.

[8] A. Fridriksson, "Boreo-tended Changes in the Marine Vertebrate Fauna of Iceland During the Last 25 Years", Rapports et Proces Verbaux des Reunions, Conseil Permanent International pour l'Exploration de la Mer, Vol. 125, 1948, p. 30.

Fridriksson states that there are 145 species of marine fish now known from Iceland and that more than 25% of these give evidence of changes indicating higher temperature.[9] Not only are there new visitors from the Atlantic but other previously-recorded visitors have been seen more frequently in recent years. Of prime importance to the fisheries, however, are those species (cod and herring) which are extending their distribution to the colder parts of the coast. Along with the apparent climatic amelioration has come an increase in its variability as might be illustrated by the unusually low water temperature off southwest Greenland in 1937-38 which caused the death of large quantities of cod and decreased the weight of liver taken from the cod in that season.[10] A similar cool snap was noted in 1943-1944 in Greenland by Dunbar.[11] This factor of the recent climatic change is important when considering the general variability of the fish stocks themselves, which, along with the growing unpredictability of movements, is a significant consideration in any discussion of the general factors of the fishing industry itself.

The natural conditions of Iceland's fishing industry have been reviewed briefly and perhaps man and his work should be included before having a fairly complete, if brief, survey of the basis of fishing in Iceland. Iceland's population has always been sparse and there seems

---

[9] Ibid., pp. 31-33.

[10] A. J. Lee, "Forecasting Climatic Fluctuations and its Importance to the Arctic Fishery", Rapp. et Proc. Verb., Cons. Perm. Internat. Explor. Mer., Vol. 125, 1948, p. 40.

[11] M. J. Dunbar, "Greenland—An Experiment in Human Ecology", Commerce Journal, March 1947, p. 74.

to be no reason why this will not always be so. Although fishing may be carried on in or near regions of dense population, it does not itself foster dense settlement. In fact, it tends to become a leading activity in areas of very sparse population and in those areas like Iceland which are less well adapted to other occupations.

As island-dwellers, the Icelanders have a long tradition of knowledge of the sea and are generally suited very well in physical character to pursue a strenuous life of fishing.

Two of the salient considerations for the understanding of the fishery as a geographical unit are the raw material and its changing condition and the market factor, its location, reliability and character. Both of these ends of the geographical unit must be considered in the understanding of the fishing as a whole. In a later chapter the raw material and market elements will be developed as part of the consideration of the modern-day fisheries, and it will suffice only to mention them at this point.

Although necessary, it is not enough to mention the natural and human conditions upon which a fishery is based for, in an advanced area such as Iceland, the fishery is a great, complex and inter-related assemblage of vessel, fishing equipment, harbor works, machinery for fish handling, preservation, and processing, net manufacture, ropes, ice and shipbuilding. In obtaining a satisfactory geographical conception of a fishery, none of these aspects must be neglected, for they react on one another. Nor must the growth of this industry be neglected, for an appreciation of the history of fishing in Iceland will enable one to become better aware of present-day characteristics and problems.

III

THE HISTORICAL DEVELOPMENT OF THE FISHERIES

To understand the modern fishing industry in Iceland it is necessary to trace its historical development and also to note the evolution of Iceland as a nation.

Shortly after colonization, which began in 874 A.D., the fishery did not play an important role except on a small scale for domestic purposes, and it was not until the 14th century that fish products became the main export. It is interesting to note that in the year the colonization began, Ingolfur Arnarsson cast into the sea the pillars of the high seat of his viking ship and made a vow to settle wherever the sea currents should wash them ashore. Several years later they were discovered at the site of the present-day city of Reykjavik, but it took a thousand years for Reykjavik's real importance to assert itself and to prove Ingolfur's choice a good one. Submarine contours reveal a natural channel which leads to Reykjavik and offers deep anchorage. Reykjavik's hinterland now includes the longest occupied and most intensively cultivated part of the island.

But as the factors which proved Reykjavik's importance lay dormant for so long, so also did the fishing industry not find a place until shortly after 1300 when the first real fishing period in Iceland began. Until that time the settlers carried on a great deal of fishing, but only for their own needs. This was always near shore using hand lines and open boats; agriculture played a small part, although sheep were

important from an early date. The most important item in the foreign trade for the first several centuries after colonization was vadmal, a type of homespun woolen cloth which was known in the trade as early as the 10th century. In addition to vadmal, Iceland exported hides, whale oil, falcons, and sulphur.[1]

In the early years after settlement the Norsemen who followed Ingolfur Arnarsson took up the coastal lowlands. Their buildings were of sod or peat, because, although scrub birch forests were extensive when the first settlers came, not much of this was of suitable size for construction purposes.

Because of the extensive land required for the grazing of flocks, the settlement pattern which resulted was very dispersed. By the year 930 A.D., when the settlement pattern had already been fixed to a great extent, the first Althing or island-wide political gathering was held near Reykjavik. This marked the foundation of a united Icelandic commonwealth and the adoption of a common legal code for the entire country. In the year 1000 by a vote of the Althing Iceland's conversion to Christianity was proclaimed and for the first fifty years thereafter the Church affairs were administered directly from Trondheim in Norway. The first Icelandic bishop was named in 1056 and another in the north in 1106. The late 1100's and early 1200's have been called, by some, Iceland's golden age because in this period her national life of independence and culture reached their peak.

---

[1] W. C. Chamberlin, Economic Development of Iceland Through World War II, Columbia Univ. Studies in Hist., Econ., and Public Law, No. 531, 1947, p. 12.

In the early 13th century, however, two concurrent struggles for power emerged. The Viking chieftains who were the representatives to the Althing had for a time practised selling the rights of their chieftaincies and three or four of the wealthiest families of the island eventually gained powerful control. The Church, which had assumed the dominant role in most other European countries at this time, was being hindered in its attempt to strengthen its position and increase its wealth at the expense of the chieftains.

This conflict of the mid-13th century was accompanied by a deterioration in the economic life of the country. The livestock had been allowed to roam and graze at will and what scrub forests had existed seem to have been burned or cut away. All this had gone on for over three centuries so that now the effects were beginning to make themselves felt. Soil erosion increased, both by the heavy rains of the south and the strong winds of the north; large areas of grazing land which were formerly productive became desolate wasteland.

The conflicts in power and the deterioration of the trade were accompanied by a vital dependence on Norway to supply timber for the repairing and maintaining of their merchant fleet. It was not difficult in 1262, therefore, for the Norwegian king to intervene in Iceland's internal affairs and force the people of the island to enter into a personal union with him.

The king promised to carry on sufficient trade with the island so that the basic needs of the people would be met; in return he received their pledge of allegiance in addition to collecting a royal tax.

As a result of this union, the Norwegians took over control of Iceland's trade and with this changeover a significant change in exports took place. From the days of earliest settlement the chief exports had been woolen homespun cloth (vadmal) and hides, but, because the Norwegian fishermen were not able to supply all the needs of the home market, the Norwegian king demanded fish from the Icelanders, in addition to the vadmal and hides.

This demand for fish increased to such an extent that in 1320, when Iceland was asked to swear allegiance to a new Norwegian king, they refused and drew up instead a memorandum to the Norwegian Government pointing out that the pact of 1262 was a personal agreement with the king from which they could be released if the king did not keep the terms of the pact in all respects. Among other things, the Icelanders stated that: "'. . . no more codfish be exported from our land during periods of famine than the merchants need for their table.'"[2] Dried codfish (stockfish) had become one of the chief articles of the export to Norway at this time; more and more demand was created by the Hanseatic merchants in Bergen for this product, and the Norwegians correspondingly attempted to get increasing supplies from Iceland. An old Norwegian State document of 1340 says: "'Not long ago little cod-fish was imported from Iceland, which at that time was called table cod-fish. Most of the exports from there consisted of vadmal. Now, however, the

---

[2] K. Gjerset, History of Iceland, New York: Macmillan, 1924, p. 236. (quoting J. Thorkelsson and E. Arnorsson, Rikisreftina Islands, p. 14.)

most and best exports from Iceland consist of codfish and train oil.'"[3]

Now fishing, which had heretofore been carried out as a secondary occupation for private domestic purposes, rose rapidly in importance; it began to be concentrated at fishing stations in the most favorable places although it was now, as before, carried out in open boats with handlines. This rising to importance of a new line of export proved a valuable stimulus to trade and must have increased also the volume of Icelandic imports, as indicated by a lively intercourse between Iceland and Norway at this time. About the middle of the 14th century the king began to rent out his revenue-collecting rights to other representatives. As Bjornsson states: "These men only thought of enriching themselves and were guilty of intolerable tyranny and injustice towards the people."[4]

In 1397 Norway (and all her dependencies, including Iceland), Denmark and Sweden were formally united by the Kalmar "Act of Union" and placed under one queen. Because the rulers who now governed the united kingdoms were strangers who regarded the Norwegian colonies only as sources of revenue, no improvement in Icelandic affairs could be expected from the royal government. As Gjerset states in History of Iceland: ". . . the foreign-born and often incompetent rulers . . . took little interest in administrative affairs in Iceland beyond what was necessary to secure the desired revenues for the royal treasury."[5]

---

[3] Ibid., p. 244 (quoting Diplomatarium Norwegicum, Vol. 2, Pt. 1, p. 198.)

[4] B. Bjornsson, "Iceland, a Geog., Pol., and Econ., Survey", 1957, p. 977.

[5] K. Gjerset, History of Iceland, p. 245.

Around the beginning of the 1400's the English began fishing off Iceland, and from them the Icelanders learned the use of long-line fishing gear.[6] A few years later the Germans also came and educated the Icelanders in their methods, so that the earlier fishing period can be said to have ended in the beginning of the 15th century. After the ravages of the Black Death in Norway about mid-14th century, however, the trade with Iceland declined.

Gradually, in violation of the governmental decrees, the economic control of the island shifted to the cities of north Germany and to the increasingly powerful Hanseatic League merchants. Because of the continental demand the fisheries continued to develop, while through the 1400's agriculture continued to suffer a steady decline. It should be remembered that Iceland was continually the victim of the ravages of disease (Black Death wiped out 2/3 of the island's population in 1402-04), earthquakes, and volcanic explosions. Because the royal house thought only about the collection of revenue on the island the Hansa traders were given some chance to do business with Iceland. Growing competition was felt during the 15th century as the English attempted to wrest exclusive control of this trade. In the meantime less attention than ever was focused by Denmark on the island, and so intolerable did the trade conditions become that the Icelanders were again forced to voice complaints and remind the rulers of the Union agreement, which had been

---

[6] A. Fridriksson, "The Icelandic Fisheries", Le Nord, Vol. 1, 1938, p. 310.

wholly ignored. In 1419, as an act of the Althing, they pledged their formal allegiance to Erik of Pomeramia, King of Norway, Denmark and Sweden, and at the same time demanded redress of grievances with regard to commerce. The document says in part:

> But our laws provide that six ships should come hither from Norway every year, which has not happened in a long time, a cause from which Your Grace and our poor country has suffered most grievous harm. Therefore . . . we have traded with foreigners . . . but we have punished those fishermen and owners of fishing-smacks who have robbed and caused disturbance on the sea.[7]

The English fishermen and traders beginning to carry on a clandestine traffic with Iceland were building up a trade which, although it seems to have existed to some extent during the earlier periods of Icelandic history, ceased during the latter part of the 13th century and was non-existent during the 14th century.

The English started to fish rather extensively in Icelandic waters from the beginning of the 15th century and in 1413 records show that 30 English fishing-smacks came to Iceland.[8] Despite protest from the Scandinavian throne, trade with England continued to grow. In 1415, six English ships entered Hafnarfjord. One of these was loaded for the return voyage with codfish.[9] Both the English and Danish Governments attempted to stop this outlaw trade by English sea captains. The protests of the Danish king finally forced Henry V to issue instructions to his

---

[7] Gjerset, History of Iceland, p. 247. (quoting Diplomatarium Norwegicum, Vol. 2, No. 651, p. 485.)

[8] Ibid., p. 259.

[9] Ibid., p. 259.

subjects forbidding all trade with Iceland, and fisheries in Icelandic waters. This period, nevertheless, remained one of piracy and plundering in the English efforts to go against the edicts of the Scandinavian and English kings.

In the latter 15th century there was a great demand for fish throughout continental Europe, and both Norway and Iceland were important in supplying this demand. This was before the discovery of the Newfoundland fishing banks and was also before Icelandic export products became more readily available from other countries. In addition to the export of fish, Iceland also traded wool and woolen cloth, eider down, falcons, sulphur, mutton, sheepskins, butter, tallow, and train oil.[10]

The clergy in Iceland took a continuing interest in the active growth of the fishing; they had dealings in the trade and encouraged the other Icelanders to produce an increasing amount of this important export. The place of fish in the affairs of the island was perhaps well illustrated by Sebastian Munsters' early 16th century Cosmographia which engraved the Arms of Iceland as a crowned fish.[11] The situation, however, was not long to remain such, as during the 16th century a serious decline of the fisheries took place and they did not recover until the last 60 years of Icelandic history.

---

[10] Gjerset, History of Iceland, p. 273.

[11] W. R. Mead, "Renaissance of Iceland", Economic Geography, Vol. 21, 1945, p. 136.

Financial gain was, of course, the main object of the kings of the Scandinavian union. Ever since the beginning of the 14th century large numbers of estates, farms and other property gradually came into the king's possession. At the time of the Reformation around 1550, the monastaries and their possessions were taken over by the Crown, as well as part of the bishops' sees, and even part of the income from Icelandic trade. In this increase of the king's power, he appropriated the estates belonging to people who had opposed the new faith, and took over the administration of all Church affairs, with the limitation of the legislative and judicial power. The Church's influence in the fishing was therefore weakened and the number of foreign ships which from Norman times onwards were known to cast nets in Icelandic waters increased. Mr. Anthony Parkhurst, in a letter to Hakluyt (1578) mentions 100 sail of Spaniards, 20 or 30 Biscayans whaling for oil, 50 Portuguese net fishing, 150 sail of French and 50 English boats in Icelandic waters.[12]

According to the terms of the "Old Pact" of 1262 the king had been given right to interfere with the trade if he saw fit, and during the latter years of the 16th century he began to dispose of the trade at will and to lay impositions on sailings. In addition to this, he began to grant certain persons monopoly to trade at designated ports in Iceland. With increasing disregard for the Icelanders, the trade with the island was, in 1602, limited by royal decree to merchants of the Danish cities of Copenhagen, Helsingör, and Malmö, and 18 years later this moncpoly

---

[12] Ibid., p. 137.

was further restricted to a single company in Copenhagen. The king had now appropriated vast property in Iceland, had collected a tax, assumed responsibility in church affairs, created a binding trade monopoly and increased his say in legislative and judicial affairs to such an extent that it was not surprising that the Icelanders, in 1662, were forced to acknowledge the king as their absclute monarch. There was no apparent change of interest in the welfare of the Icelandic people at this time. In 1662 Iceland was divided into four trading areas or kaupsveitir, and all trade had to be carried on through one post in each area. Further, Icelanders were not allowed to trade among themselves across the trading area boundaries, and were, therefore, totally at the mercy of the Danish monopoly. They could not have any say in the establishment of prices and, although fish exports might rise, the Icelandic gain was never increased proportionally. Heavy punishments were inflicted on Icelanders who attempted to trade outside the monopoly. Long years of this type of treatment had its lasting effect on the people. These years were tragic ones for Iceland for not only was she at the mercy of the trade monopoly but she was also subjected to the plundering of pirates, disastrous volcanic eruptions, and a small pox plague which in 1707 reduced the 50,000 population by over one-third. Most of the land was held by the Crown, and the peasants working it had been reduced to a state of extreme poverty. The monopoly held sway and, as in other lands where trade charters monopolized the commerce, contact with the rest of the world was all but lost. As the monopoly license passed from company to company, the practices of these traders got no better. The prices remained high

for imports to the island and lack of competition precluded the necessity of maintaining the quality of the goods. In 1750, famine, caused by shipments of moldy meal and by successive poor hay harvests, killed between 9 and 10 thousand people.[13]

Export prices fell continuously and the Icelander had a difficult time disposing of anything except fish. The imports were so high-priced that the people had difficulty in obtaining even fishing implements—nets, boats, etc. As a result of the short-sightedness which had reduced Iceland to what Sir Joseph Banks,[14] in the 18th century, called "Egyptian bondage" and as a result of trade policies which demanded fish but did little to give the people proper fishing implements, the fisheries and the potential wealth they held fell into hopeless decay, and the large-scale fishing operations were taken over completely by foreigners.

In 1761 a sheep disease killed 300,000 animals and 20 years later the poisonous ash from the huge volcanic eruption of Laki contaminated the vegetation to such a degree that it caused the death of 50 per cent of the cattle, 76 per cent of the horses, 77 per cent of the sheep; in the resulting famine 1/5 of the island's total population died. After this disaster the population totaled less than 40,000 or about one-half of what it had been during the Golden Period before 1262. This calamity brought Iceland's problems into sharp focus in Denmark. Some aid was sent to the island and finally in 1787 the trade monopoly was partially lifted. Upon revocation of the charter, commerce was opened to all

---

[13] Gjerset, History of Iceland, p. 340

[14] Mead, "Renaissance of Iceland", p. 138

Dano-Norwegian traders but, because of the general poverty of the Icelanders and agreements between merchants to keep prices up, little improvement resulted. This was a turning point however, and in the years that followed some towns received rights of self-government; one of these, Reykjavik, a small fishing settlement of 200 persons, was beginning to benefit from her favorable position. With this partial improvement of affairs the Icelanders began to gain interest in establishing industries in their country. Fishing smacks were purchased abroad. The fishermen were aided in constructing larger boats so that they could fish in the open sea, and the people began to learn the best methods of salting mutton and fish. Hermansson quoting Sir Joseph Banks writes: "'In the years 1797, '98 & '99, a very considerable traffic in fish was carried on from Iceland to Spain and the Mediterranean;'".[15]

This indicates that trade at this time was carried on in opposition to even the new regulations. Certainly the partial lifting of the monopoly was not entirely a success as far as either Iceland or Denmark was concerned, for in the Napoleonic wars, Denmark sided with the French emporer. This resulted in a general blockade which cut off trade and communication; and, as Denmark's activities were focused elsewhere, little attention was paid to Iceland.

Some interesting observations about the fishing of the Icelanders at this time are offerred by Olafsen and Povelsen writing in 1805:

---

[15]H. Hermansson, "Sir Joseph Banks and Iceland", Islandica, Cornell University Library: 1928, Vol. 18, p. 82.

". . . they mostly have a wan look, because they are continually fishing up to the middle in the sea . . ."[16] The boats used still seemed to be small at this time, the largest holding only four persons and the smallest for one man; all were rowboats. Among the fish being taken, in addition to the cod, were chub, sole and thornback (skate or ray), extracting an excellent oil from the liver of the latter.[17] Olafsen and Povelsen also recorded the fact that, although the trade monopoly had been partially lifted, the peasantry were obliged to work in the king's boats from Candlemas (2 February) to Easter.[18]

If not the British naval blockade, at least Danish preoccupation with the Napoleonic war, led to widespread suffering and starvation on the island, since Denmark was depended upon by Iceland for meal and cereal grains. After 1814 Denmark again began the improvement of trade and economic conditions in Iceland which she had started before 1807. There came an increasing development of the fisheries which at this time were second in importance only to animal husbandry. The seasonal migration of labor, still important today, was cited by a writer in 1818:

> From the 3d of February to the 12th of May, is what the Icelanders call the ver-tima or fishing season; at which period vast numbers of the inhabitants flock to the southern and western shores from the districts in the north and east, where the fishing is generally impracticable at this time, owing to the bays and creeks being filled with polar ice.[19]

---

[16] Olafsen and Povelsen, Travels in Iceland, London: Richard Phillips, 1805, p. 12.

[17] Ibid., p. 35.

[18] Ibid., p. 17

[19] E. Henderson, Iceland, or the Journal of a Residence in that Island during the Years 1814 and 1815, Edinburgh: Oliphant, Waugh, & Innes, 1818, Vol. 1, pp. 360 and 361.

Cod was the principal fish and, according to Henderson, it was spread on cliffs to dry from which it gets the name of Klipfish. Sometimes fish were hung up and dried in houses called hiallar and open to the wind. Fish dried in this way were called hengi-fiskur or hung-fish. These passages indicate a change which took place in the export around the time of the Napoleonic war. Stockfish, which had been the most important export from 1300, had suffered a decline in sales around 1600 which resulted in a total decrease in the fishing trade at that time, and around 1800 cured saltfish (klipfish) rose to importance with exports to Spain, Brazil, Cuba and the Mediterranean countries.

The fisheries began to show considerable development especially during the later decades of the period 1800-1860. The number of fishing boats had increased from 2000 in 1800 to 3186 in 1866.[20] Even while the population was growing and domestic consumption increasing the fish export grew from 758 tons in 1801 to 4250 tons in 1855.[21] In 1850 82 per cent of the population was engaged in agriculture and only 7 per cent in fisheries.

After the pioneering of Jon Sigurdsson (called Jon Forseti or "The President" today by the Icelanders), there was a general improvement in conditions and a gradual political and economic emancipation took place. The parliament, which had met at Thingvellir near Reykjavik for the last time in 1800, reconvened in 1843. In 1854 the trade monopoly

---

[20] Gjerset, History of Iceland, p. 363.

[21] Ibid., p. 363.

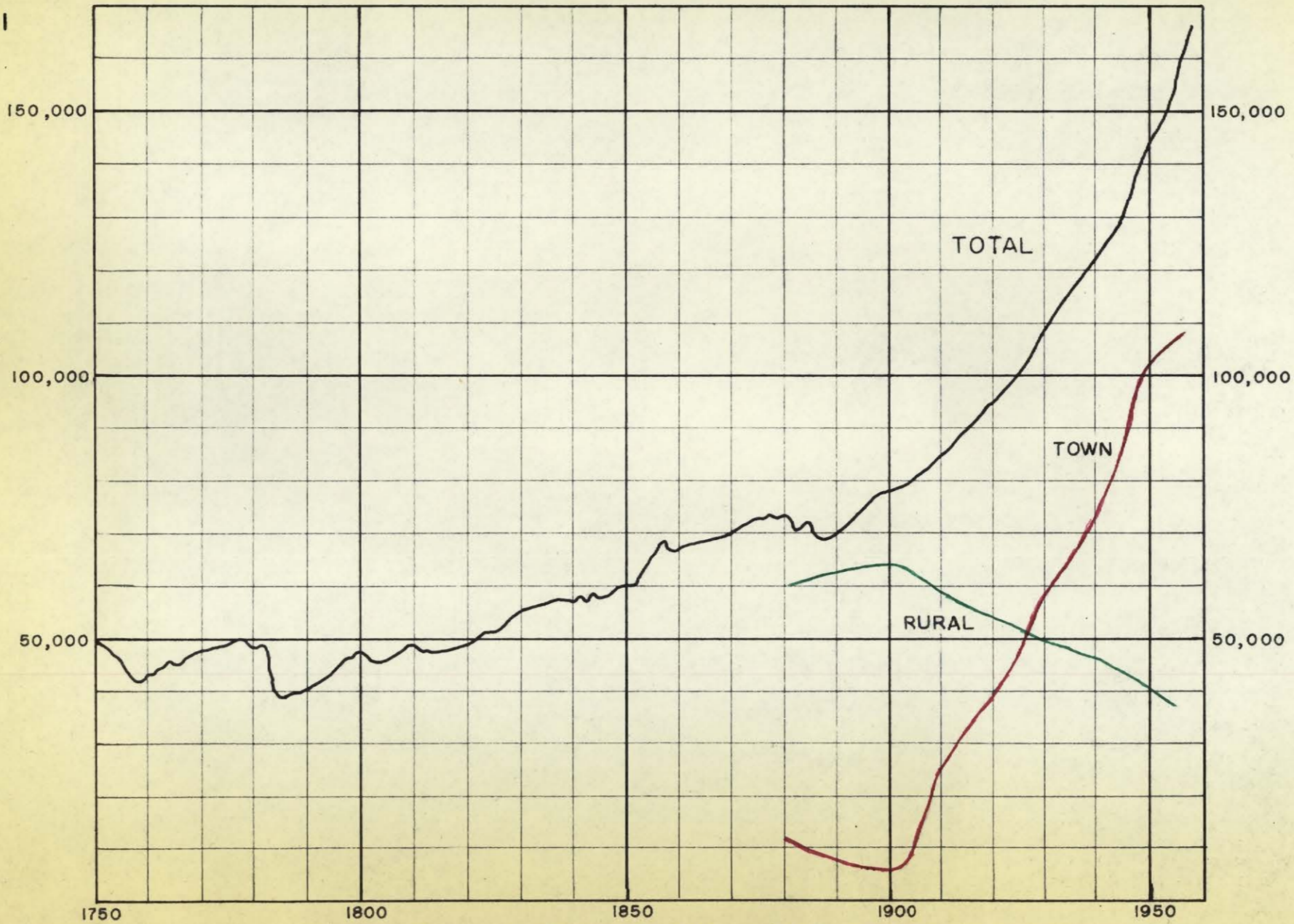
was entirely abolished, and commerce was made free to all nations. The six previously-given town charters were recalled and equal privileges were given to all trading centers. In 1874 the king gave the country a new constitution; which, among other things, gave them control over their own finances. Around this time there were over 3,000 rowing boats in the country, but decked sailing vessels were beginning to be brought in. In 1880 there were 38 decked vessels in Iceland. This was the beginning of the period in which fishing was no longer a part-time connection with agriculture. This change in the fishing industry, which was only just beginning, would eventually alter the picture of the distribution of population and occupations in Iceland. This does not mean that the importance of agriculture declined. To the contrary, in 1890, with a population of 71,000, over 90 per cent of the people in Iceland lived in rural districts (Fig. 11). Farming was the main occupation and the stock was supported by hay. At this time the fisheries were still suffering lack of suitable gear. There were between 50 and 60 small decked vessels fishing the coasts.[22] The herring had yet to await the introduction of larger vessels for any extensive development of this fishery.

Around the turn of the century and up until about 1920 some of the greatest changes took place in Iceland's fishery. Before this time the lack of boats, ships, and proper equipment had so handicapped the people that the fishing industry could not be developed in any way proportional

---

[22]Bjornsson, "Iceland, a Geog., Pol., and Econ. Survey", p. 987.

FIG. 11



ICELAND: POPULATION - 1750-1957

to the limits of its potentialities. By 1890 the percentage of population engaged in this industry was 18, as opposed to 64 per cent in farming. The pattern of trade woven into a regime of liberal trading reflected an exclusively fisher-farmer community. The lowered percentage of population engaged in agriculture at this time, increased consumption at home, and the opening up of markets for sea products for export, all tended to hide the important fact of increasing agricultural production. If the growing importance of the fisheries was exaggerated at this time, the basic fact still remained that Iceland was resource-poor and could not live very long without the vital exports. Agriculture did play an important part but it was still necessary to import cereal grains and other basic food items to feed a growing population. In 1896 the fish export brought a total income of over a million dollars. From 1895 to 1902 the fishing fleet doubled to 144 vessels and just before 1900 the first experiments with the steam trawler were carried out.[23] Before this time the larger vessels were under sail, but with the same primitive equipment as the small open boats. They did afford a greater radius of operation, but the methods used were so primitive that there could be little hope of expansion.

With the introduction of steam trawlers and other smaller motor-driven boats fishing began to become a full-time job which caused the greatest changes in occupational and geographical distribution patterns of the Icelanders. These larger vessels and more intricate equipment demanded a larger capital investment for gear and processing facilities.

---

[23]Gjerset, History of Iceland, p. 453.

This resulted in a concentration of the population. The population was increasing; towns and villages sprung up to grow at the expense of rural areas which began to suffer absolute population decreases, even with the growing country. Although the development of modern fishing methods led to increased urbanization because it demanded a supply of labor and pooling of resources, the new towns took on other functions in the development of cooperatives and the role of social-cultural centers for the neighboring areas. At the turn of the century 9,000 people lived in towns out of a population of 79,000. By 1915 this number had risen to 20,705 out of a population 89,059.[24]

The divorce of farming and fishing from one another was one of the inevitable results of modernization. As Hanson wrote in 1928: "Almost any farmer can fish from a rowboat at certain times of the year, but it takes all of a man's time and energy to belong to the crew of a trawler or a large motor boat."[25]

Shortly after 1860 the Norwegians began fishing herring off Iceland and in 1875 the Icelanders began to take herring, but not on any important scale until the introduction of larger motor vessels after 1900. The impact of the herring and growing variability of its catch will be discussed subsequently. It may be said here, however, that although the cod has been by far the most important fish since the Vikings settled the island, in the past decades the herring has often assumed a more important position and generally accounted for 1/3 of the exports up until the past 15 years.

---

[24]Gjerset, History of Iceland, p. 454.

[25]E. P. Hanson, "The Renaissance of Iceland", Geographical Review, Vol. 18, 1928, p. 48.

The 20th century has witnessed a complete technological and social change in Iceland. Her rising exports have found markets varied and changeable and, at times, suddenly cut off. The Second World War gave her opportunity to sever her last political tie with Denmark, and also gave her means by which she could expand and modernize to the fullest the fishing basis of her export trade. Although the number of trawlers gradually decreased up until World War II and several ships were lost carrying fish during the war, this presperous trade gave Iceland the incentive and financial means to build up and modernize the fleet.

The political situation of the present time has prevented total independence and a normal development of the country according to the resources to which she is limited. As a member of NATO Iceland has sought with trepidation the presence of an American air base and this, among other external factors, has influenced Iceland's course in the last years. The presence of foreigners on the island has provided Iceland with a source of income, but this situation cannot be considered as "normal". Construction requirements at the air base have caused great shortages of labor in the manning of the fishing fleet, and this new source of income and occupation has tended to cloud the real importance of the fishing industry to Iceland's well-being.

IV

SEASONS, VESSELS, AND GEAR

In dealing with the fishing industry of modern Iceland, it is necessary to re-emphasize the almost total dependence of the country upon fishing as a means of providing export products to pay for the many essential imports (Fig. 12). When this is realized, discussion of the industry takes on new meaning; it no longer remains a description of one pursuit which happens to be carried on in a country, but becomes the pursuit upon which everyone, in one way or another, is totally dependent.

The Icelandic catch is composed mainly of two species, cod and herring. These two will be considered subsequently in turn; with the cod will be grouped other gadoids (cod-like fish), flatfish, and some of the more pelagic forms. First, however, an over-all description of the fishing industry is given by considering the seasons, vessels, and gear characteristic in Iceland. This is followed in Chapter V by the catch of fish (excluding herring) and by Chapter VI, the herring fishery; Chapter VII, the development of Iceland's various markets.

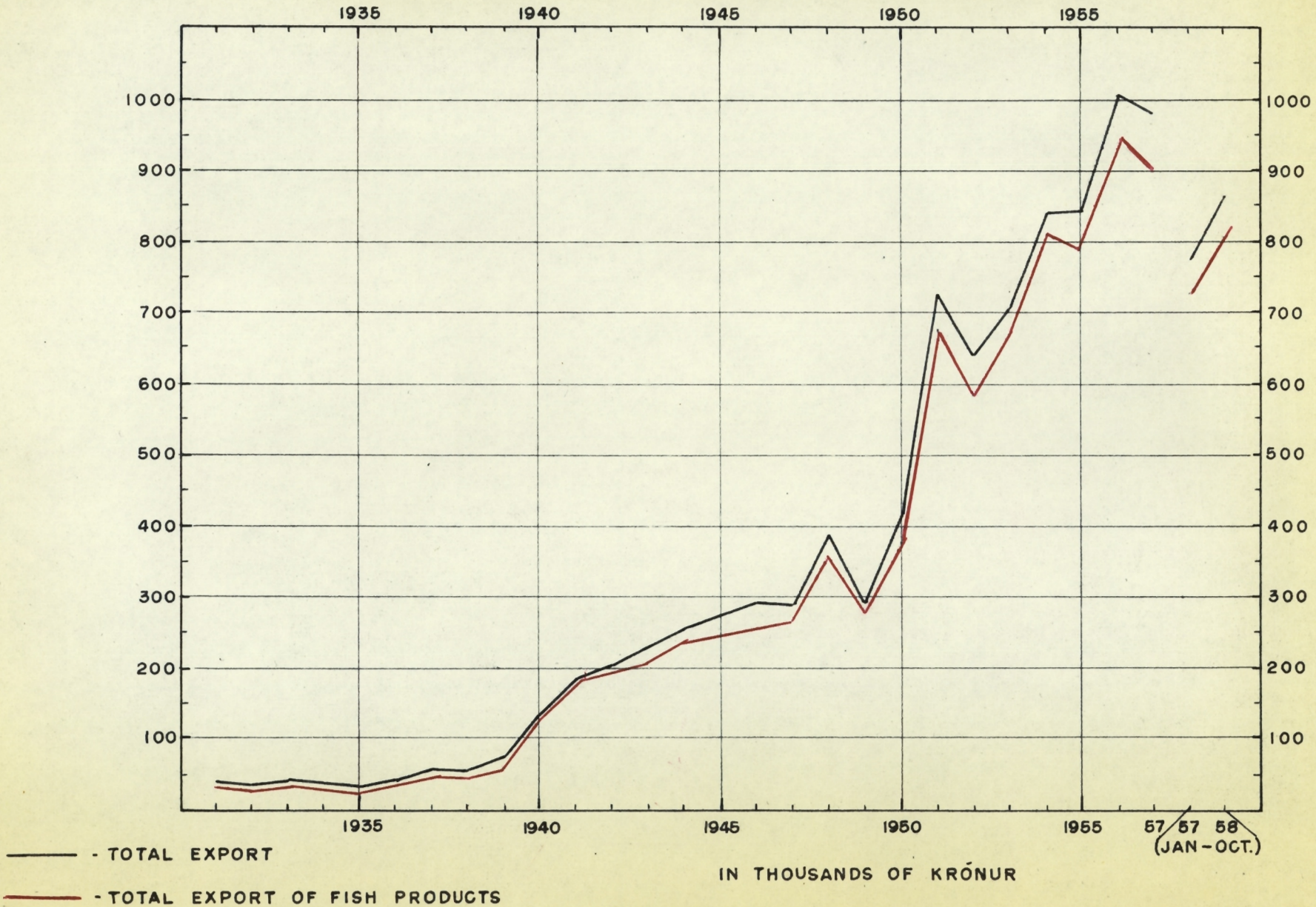
Seasons and Localities of Catch

From Map C a good general idea of the regional nature of catch, seasons, and gear used around Iceland can be obtained. The regional breakdown is logical enough and not too arbitrary, since some of the available statistics are grouped in this way.

The fishing seasons vary in length for the off-shore fishing with the larger trawlers and for the inshore fishing from smaller motor

FIG. 12

ICELAND - VALUE OF EXPORTS, 1931-1958



boats. The trawlers and the larger motor vessels, representing a large capital outlay, operate as nearly year-round as possible except when they are stopped for re-fitting between the main seasons. On the average, the trawlers of Iceland are active between ten and eleven months of the year. The smaller craft depend greatly on the weather and on the fishing grounds in the vicinity of their home port. Therefore, their fishing season may vary in length from a few weeks to six months or more depending upon locality and other circumstances. Table 1 shows the monthly participation of the various kinds of vessels of the fishing fleet in 1956. The motorboats find their chief fishing during the first four or five months of the year (winter fishing) off the south and southwest coast. This is the main season for the cod fisheries, mostly in the south, southwest, and northwest areas. In addition to the main fisheries, activity on a small scale is carried on all around the coast throughout the year, with cod playing the most important role. The herring is caught mainly during the summer season in the north and east with the purse seine, whereas drift net catches of herring in the southwest and south during August to November are of comparatively less importance. In recent years, herring has been caught only twice in big quantities in the southwest area, during the winters 1946-47, and 1947-48.

Other than the main cod season in the beginning of the year and the summer herring season from July to September in the north and east, redfish is caught in deep water by the big trawlers from July to October and smaller quantities of flatfish are taken with seine nets; smaller quantities of halibut, pollock, catfish, haddock and cod are caught with the long line.

Table 1

PARTICIPATION OF THE FISHING FLEET, 1956*

Month	Trawlers	Motorboats		Other
		Over 12T	Under 12T	
January	40	225	16	34
February	42	319	20	44
March	43	339	22	51
April	30	336	27	136
May	43	262	41	217
June	39	107	51	306
July	34	212	41	192
August	37	266	39	171
September	40	213	33	136
October	42	151	31	122
November	41	113	28	90
December	41	96	14	42

*B. Bjornsson, "Iceland, a Geographic, Political, and Economic Survey", Vidskiptaskrain (Commercial and Industrial Directory for Iceland), 1957, p. 989.

According to available statistics the bulk of the catch in the beginning of the century was taken off the south and southwest coasts (cod) and off the north coast (herring). A present-day regional breakdown of catch would show that the northwest has grown in importance to such an extent that this region today accounts for the largest bulk of catch. This does not include the herring which, for the most part, has been of a very fluctuating nature and, in the past fifteen years, has shown a notable decrease in catch. It should be pointed out, however, that this is a rise in importance of the northwest as a catching area. An increase of landings northward has not kept pace with the increased catch in these waters; as a result, big ports in the southwest (Reykjavik, Hafnarfjord, Keflavik, Akranes) account for great landings of fish, alot of which is actually caught in the northwest (Map C). One of the most noteworthy features of the Icelandic fishery is the general fall-off of catch to the east. This region contributed only 3 per cent of the total catch in 1953. These two phenomena--the northward movement of the main catching areas and the disappearance of the herring from the north coast (presumably moving out into deeper waters to the north and east)--may be indicative of a general northward movement of spawning areas and, in the case of the herring, a northward movement of its principal food.

Many scientists agree that these changes taking place in Iceland in later years of the present century may be, to some degree, the result of a general climatic amelioration presently going on in the arctic and sub-arctic areas.[1] Iceland, being located on a climatic borderline,

---

[1] Fridriksson, "Boreo-tended Changes", p. 31.

is especially sensitive to these changes and any fluctuation would tend to be most noticeable in such a locality. As far back as 1932 an Icelandic scientist, Bjarni Saemundsson, described some of the influences of the present warming on the marine fauna in Icelandic waters.[2] He cited decreasing frequency of drift ice coming to Iceland's northern shores from Greenland, and simultaneous with this ice scarcity the winters were exceedingly mild, especially in February and March. Another factor of greater importance was pointed out, that of the higher temperature of the sea around Iceland, with the increasing frequency of southerly winds. The greatest changes in temperature mentioned were for the east and northeast coasts with the highest relative increase during February and March (Fig. 9-A). Concurrent with these observed changes has been a modification in the localities of spawning fish. The cod, which usually spawned only near the south and southwest coasts, was found after 1924 in great shoals of mature fish on the north and northeast coasts during the spawning period. In spite of the new cod to the north, the southern population had not diminished.

One of the main foods of cod is the capelin which used to visit the southern coasts in the spring of the year, spawning in the lagoons and estuaries. Saemundsson pointed out its disappearance from the southern coasts simultaneous with its appearance in great numbers off the north coast, due to unusually high temperatures in these tracts. A 6° Centigrade water temperature is necessary for the hatching of

---

[2] B. Saemundsson, "Probable Influence of Changes in Temperature on the Marine Fauna of Iceland", Rapp. et Proces Verb., Cons. Perm. Internat. Explor. Mer, Vol. 86, 1934.

the capelin's eggs and these high temperatures made it unnecessary for this sub-arctic fish to go as far south as before to find suitable spawning grounds. The change of the cod concentrations has undoubtedly been the result of a modification of the capelin's habits, and has, in the past 25 years, caused a gradual shifting of the bulk of catch northward. Research has been carried out on the wanderings of the herring and some of these will be noted when that fish is discussed in more detail. Although nothing has been definitely proven, results of investigations indicate that the change in occurrence of the herring in certain parts of the year is a climatic-oceanographic control.

Vessels

The factors that determine the size and type of fishing vessels in any country are stage of technology, capital resources, distance from the fishing grounds, market locations, duration of the voyage, type of eventual processing, the abundance of fish, and weather conditions. One outstanding feature of the Icelandic fishery that might tend to make it appear less modern than in other countries is the overwhelming proportion of small boats (Table 2). There are several factors influencing this trend in Iceland. It should first be considered that when fishing methods are made more efficient as illustrated by the present widespread displacement of long-lining by the trawl, owners' profits may increase only relatively little. This is due to the increased cost of equipment and maintenance and is dependent upon prevailing market conditions for those products supplied by the larger trawlers: dried and salted fish and fresh fish on ice. In Iceland with the fishing grounds close at hand, and limited capital available for expenditure on equipment, the trend has been for individuals to join

Table 2

GROWTH OF THE ICELANDIC FLEET, 1932-1957*

Year	Trawlers		Motor Vessels		Steam Vessels	
	No.	G.R.T.	No.	G.R.T.	No.	G.R.T.
1932	39	12,934	281	7,162	32	3,499
1933	37	12,477	281	7,004	30	3,383
1934		x		x		x
1935	37	12,430	282	7,361	31	3,515
1936	37	12,794	310	7,796	29	3,221
1937	37	12,767	307	7,915	29	3,350
1938	36	12,428	310	8,312	29	3,356
1939	36	12,408	334	9,335	27	3,120
1940	35	12,091	339	9,645	29	3,321
1941		x		x		x
1942	31	10,435	354	11,633	18	3,073
1943	30	9,973	376	12,708	18	3,174
1944	29	9,652	371	13,052	17	3,073
1945	31	9,988	372	x	7	x
1946	24	8,145	444	18,841	11	2,583
1947	37	18,268	485	22,761	11	2,583
1948	49	26,663	483	23,278	11	2,583
1949	52	29,043	476	23,290	12	3,394
1950	49	27,632	465	22,365	9	1,626
1951	56	32,587	563	22,708	12	2,438
1952	53	32,342	550	22,374	11	2,140
1953	53	32,342	547	22,275	11	2,140
1954	51	31,621	561	22,915	10	1,991
1955	45	28,476	589	24,355	7	1,367
1956	43	27,799	623	26,106	5	1,407
1957	42	27,533	633	26,706	5	1,407

x - unavailable

*Statistical Bulletin, 1932-1957.

together in the purchase of a small boat. The processing of an increasing amount of the catch as frozen fish (which has been going on since the last war) also benefits the small boat operator in that he is able to compete favorably with the larger trawlers in supplying to the freezing plants a prime fish of high quality as soon as possible after catching. The usual duration of a trawler voyage is three weeks, or even longer if the catch is to be salted entirely. The bigger ships cannot economically shorten their trips and are, therefore, not able to supply as fresh a fish to the freezing plants. The author worked aboard one trawler, however, that, at the end of 19 days of cod fishing on salt, spent three days off the northwestern coast trawling for redfish. Having filled up the remaining capacity with redfish on ice, the ship sailed immediately to the home port in order that the redfish could be landed in good condition within the time limit set by law; this part of the catch was filletted and quick-frozen. The cod catch was processed into wet-salted cod and some of it eventually into clipfish. Since there is a limited amount of merchant shipping in Iceland (19 dry cargo ships, total tonnage 29,738 g.r.t.), many trawlers have caught cod and redfish on ice and then transported the catch directly from the grounds to foreign ports (Hamburg and various ports in England). In the past seven years the trend has been away from this method. After the war, with other nations building up their own fishing fleets again, Iceland began to meet growing competition. Fresh fish on ice is a relatively low-value product, with high bulk and weight because of the ice. The trend towards

quick freezing has been towards a higher quality product and has, therefore, brought out the importance of the smaller vessels. Previously, nations importing fresh fish received only frozen fish which had lain for a long time on ice before being frozen. They, therefore, were very mistrustful about quick-frozen fish.

At the end of cod fishing in the beginning of May, many small boats are engaged in seine net fishing for plaice and lemon sole, which are filletted and frozen. At the same time the trawlers, after the fishing on salt has ended, might go after redfish for one or two months until the herring season begins. Others begin fishing on ice and carry their catch directly to European ports, as mentioned above. Trawling for redfish is also carried on in the fall after the herring season.

The mechanization of the fishing industry of Iceland, as in other countries, began shortly before the turn of the last century. In 1876 there were 3,208 Icelandic rowing boats fishing off the coasts, as well as 38 decked sailing vessels. At that time there were 8,700 persons (or 12 per cent of the population) engaged in fishing. In 1895 Iceland had only 70 large fishing vessels, all of them under sail.[3] The sailing vessels reached their greatest number in 1906 with 165, after which alot of them were equipped with motor. In 1902 the first Icelandic vessel was built with a motor, but mechanization did not rise to great importance until before the First World War. In 1904 the first trawlers came into operation and reached their greatest number (until the past 11 years)

---

[3]Gjerset, History of Iceland, p. 453.

in the early 1930's after which their number steadily declined because of bad fishing and the difficulties in selling the catch. From 1905 to 1920 the gross registered tonnage increased 65 per cent and was marked by a great change in the distribution among various types of vessels. The sailing vessels, which had represented 95 per cent of the tonnage at the turn of the century, decreased in importance to 9 per cent. In 1920 steam trawlers were 64 per cent of the tonnage and motor boats 26 per cent. The motor boats are the only branch of the fleet which have been steadily developing from the beginning even through the years of the depression. The introduction of power to fishing vessels in the beginning of the century had numerous advantages in increasing speed, range, and particularly in making fish landings more dependable and less controlled by wind and weather. It also opened up the possibility of the use of power in the fishing operation itself. In 1920 there were 20 steam trawlers, over 100 sail and motor cutters, 600 decked motor boats and about 1000 rowing boats, the whole fleet giving employment to about 10,000 people or 1/8 of the population.[4] During World War II the Icelandic fleet suffered a 1/3 loss. Table 2 shows development of fleet from 1932 to present.

In 1945 there were 31 trawlers, seven other steamers, 372 decked motor vessels, 179 open motor boats and 26 rowing boats. The total number of men employed in the boats was 4,604.[5] In that year the State

---

[4]Gjerset, History of Iceland, p. 453.

[5]T. Thorsteinsson (ed.), Iceland - 1946, 4th ed.; Reykjavik: Rikisprentsmidjan Gutenberg, 1946, p. 110.

initiated plans for increasing the fishing fleet. It let contracts in Sweden for 50 modern motor ships and in Britain for 30 trawlers. An additional 30 motor ships were to be built in Iceland, with financing from both the National and Fisheries Banks (Landsbanki Islands and Utvegsbanki Islands). Many tank tests were carried out in Sweden in connection with the rebuilding of the fleet, and most of Iceland's new British-built super-trawlers are the product of extensive tank testing in Britain. More than 250 motor boats have been added since the war. Fifty new herring drifters were secured in 1951.

In 1953 there were 604 vessels with a total gross registered tonnage of 55,853. This included 53 trawlers totaling 32,342 gross registered tons, or 58 per cent of the total tonnage. Of these, 48 were steam vessels with 29,215 g.r.t. and 5 were motor ships with 3,127 g.r.t.[6]

Iceland has 61 ports of registry, of which only 15 register a total of over 500 tons, with 1/3 of all the ports having under 100 tons of shipping, and 3/5 of the ports (36) having under 200 tons. The pattern of shipping is very well spread out all around the coasts with large concentrations at Reykjavik (31.7 per cent of the tonnage), Hafnarfjordur, and Akureyri. The 15 ports with registries of over 500 tons as of 1953 are shown in Table 3.

The latest figures (1957) show that there are now 42 trawlers in Iceland with a total gross registered tonnage of 27,533. This is a decrease from 1951 when there were 56 trawlers of 32,589 g.r.t. The

---

[6] V. H. Malmstrom, A Regional Geography of Iceland, Washington, D. C.: National Academy of Sciences-National Research Council, Pub. 584, 1957, pp. 164-166.

trend has been for replacement of some of the older vessels by larger and more modern ones. Many of the older trawlers were sold in other countries. In all, 45 new trawlers have been taken into the Icelandic fleet since 1945. There are 633 motor vessels with a total tonnage of 26,706 g.r.t., and five other steam vessels of 1,407 tons. The trawlers average 645 tons and the other fishing vessels 44 tons.[7]

Because fishing banks surround the island the ports registering the smaller boats are very widespread, but the trawlers do not necessarily have to be located in close proximity to the grounds; the factors of harbor conditions, labor market, banks, etc. are more important.

Gear

The vessels may be divided not only according to their tonnage but also by what gear they employ. Boats below 10 gross tons are intended for fishing with long line and hand line. They are of light construction, built with $\frac{3}{4}$" - 1" boards, originally on sawn frames, but now with bent frames which make a lighter construction.

Hand lines used on this type craft are of local importance mostly. They are lines carrying one or a small number of hooks, baited or with lures. They may be allowed to rest touching the sea floor with their lower ends, or may be trailed from a slowly-moving vessel. This method in Iceland is suitable for some of the grounds, particularly those less favorable for trawling. It requires a small capital outlay, and each man is paid according to his catch.

Boats from 10-30 gross tons are intended for fishing with long line

---

7 Statistical Bulletin (Hagtidindi), Vol. 27, No. 1. 1958, p. 2.

and cod-net. They are strongly built of curved oak planking on sawn frames of oak. The long lines may be up to 15 miles in length with over 5,000 hooks on short tie-ins or snoods. Their main future use in Iceland will be in local fishing, in inshore waters that are protected from trawlers, to supply fresh and unbruised fish to their immediate neighborhoods. Like the hand line, little capital outlay is required, and they may be used over rocky bottom where trawling is unprofitable.

Boats from 30-50 tons are used with the same gear as smaller ones, except that they also fish for herring with the drift net. Those from 50 to 100 tons may use all the mentioned methods in addition to the purse seine. About one-half of all boats up to 100 tons have diesel engines and the others have hot-bulb engines with speed varying from seven to nine knots.[8]

The larger vessels in the past several years have adopted the new method of Danish seining, largely for taking flatfish (plaice and sole).[9] A long length of rope is run out by a slowly-moving vessel, then a net of similar appearance to a trawl is "shot", followed by more rope as the boat makes round to the starting point. The two ropes are then mechanically taken in and the catch hauled on board largely by hand. This method produces fish of high quality in good condition. The system of operation of the otter trawl is well known.

---

[8] J.O. Traung (ed.), Fishing Boats of the World, London: Ludgate House, 1955, p. 211.

[9] FAO Fisheries Bulletin, Vol. 6, No. 3, 1953, pp. 63-87.

Both the trawl and the Danish seine must be used on smooth-bottomed grounds, or expensive replacement must be made frequently, which also shortens time available for fishing.

Iceland has had a hand in the development of trawls which are capable of being adjusted to work in mid-water at any required depth. This type is becoming increasingly more important in the herring fishery.

This device is not too complicated, and its invention grew out of the late use of the echo sounder which made it possible for the first time to register the precise depth of shoals of fish.

The typical type is a conical net about 150 feet long and 50 feet wide at the mouth, towed behind two vessels sailing side by side on the same course. After a shoal has been located and its depth determined by echo sounder, the net is adjusted for depth by the length of towing cable, change of towing speed, weighting, or adjusting the vanes.[10]

Recording echo sounders are relied heavily upon also in the cod fishery as indicators of fish shoals. This is supplemented by the knowledge of the captain of the fishing banks and slight irregularities of the sea floor. The latter applies equally to trawling, long-lining, and the Danish seine net.

Iceland, of course, is still dependent mainly on outside sources for fishing equipment and supplies. Some equipment is, however, produced locally among which are cod gill nets (8,412 produced in 1949),

---

[10] FAO Fisheries Bull., Vol. 5, No. 3-4, 1952, p. 99. Note: The Larsen Mid-Water trawl is dealt with in an extensive paper in FAO Fisheries Bulletin, Vol. 9, No. 3, 1956, pp. 113-119.

fishing lines (5,058 dozen in 1949), and snoods (17,128,000 in 1949).[11]

It is generally true that adoption of technical innovation and investment in any fishing industry has lagged behind that in other industries including agriculture. This may be explained in part by the great riskiness of investment in the fishing industry which in turn derives largely from the general characteristics and important factors of variability of raw material. Icelandic policies, like those of many other important fishing nations, have been influenced strongly by the transition from laissez-faire of pre-war policies to a high degree of active government intervention in the post-war period.

In the reconstruction after World War II with small motorboat capacity increasing and the number of trawlers increasing three-fold from 1945 to 1948, alot of the financing was accomplished through grants from the National Bank (Landsbanki Islands) and the Fishery Bank (Utvegsbanki Islands), while the Currency Retention Scheme also assisted the motorboat owners.

Growth in size of craft employed, as more complex gear is introduced, tends to lead to ownership by business organizations and to the loss by the individual fisherman of a strong feeling of personal association with the industry. In Iceland the increased capital required for more expensive boats and gear has sometimes been raised by the formation of producers cooperatives. To keep up the incentive of personal effort and the sense of being directly concerned with the catch of the boat, a system of giving bonus shares on the proceeds of the catch is common.

---

[11] Statistical Bulletin (Hagtidindi), Vol. 20, No. 1, 1951, p. 8.

Shipbuilding costs have increased greatly with the post-war rise in the cost of labor and materials, especially steel, timber, and machinery. The spectacular increase in the cost of cordage, particularly sisal and manilla reacted sharply on the fisheries where consumption is heavy. There is a prospect of cordage costs being reduced through the gradual introduction of synthetic fibers, but the initial investments are necessarily considerable.[12]

In 1944 the National Planning Board (Nybyggingarrad) was created whose function was the planning for reconstruction in Iceland's economic life. At this time 300 million kronur of foreign exchange holdings were set aside to finance new means of production and to defray the expense of other reconstructive work in Icelandic industry. Two-thirds of this amount was spent buying ships, motors, and ship-building material from abroad. Another important organization in aiding the general growth and modernization of equipment is the Icelandic Fishery Fund which grants long-term loans on favorable terms to fishing ship owners.

The ship owners have banded together for mutual benefit in the Union of Icelandic Fishing Vessel Owners (Landssamband islenzkra utvegsmanna) which represents 85 per cent of the total tonnage. The owners of the larger ships formed an association in 1916 soon after trawlers started to become important, the Association of Icelandic Steam Trawler Owners (Felag islenzkra botnvorpuskipalegenda).

---

[12] A. von Brandt, "Net Materials of Synthetic Fibers", FAO Fisheries Bulletin, Vol. 10, No. 4, 1957, pp. 182-210.

Table 3

ICELANDIC PORTS WITH OVER 500 TONS REGISTRY, 1957*

Port	Trawlers		Other Vessels		All Vessels	
	No.	G.R.T.	No.	G.R.T.	No.	G.R.T.
Reykjavik	22	13,532	66	4,156	88	17,688
Hafnarfjordur	9	5,121	27	1,851	36	6,972
Akureyri	5	3,187	18	1,436	23	4,623
Vestmannaeyjar	1	660	73	3,188	74	3,848
Akranes	2	1,316	15	1,107	17	2,423
Isafjordur	2	1,387	28	899	30	2,286
Neskaupstadur	2	1,311	22	862	24	2,173
Keflavik	1	657	28	1,460	29	2,117
Siglufjordur	2	1,331	8	476	10	1,807
Vatneyri	2	1,377	11	251	13	1,628
Eskifjordur	1	708	5	258	6	966
Seydisfjordur	1	655	14	297	15	962
Dalvik	0	0	7	684	7	684
Thingeyri	1	394	4	169	5	563
Skagastrond	1	337	7	166	8	503

*Statistical Bureau of Iceland (Hagstofa Islands)

V

THE CATCH (EXCLUDING HERRING)

Iceland's annual fish catch is relatively insignificant in comparison with that of other nations (Table 4); but on a per capita basis, i.e., in proportion to population, Iceland leads in catch, weight of export, foreign trade, and is second in fish consumption. Table 5 gives a rough estimate of fish consumption in some countries of Europe in 1949. Iceland's present annual fish consumption per capita is estimated to be upwards of 70 kilograms, but even the 1949 figure seems rather high. No accurate statistics are available, however, on consumption of fish in Iceland, but it has always been about the same as that of Norway at any given time.

There are some kinds of fish which never have been in great demand in the home market of Iceland; herring is used to some extent, but only for bait. Herring oil is used in the manufacture of margarine, and herring meal is finding a growing use for livestock feed. Fish liver oil consumption has always been high. Two of the favorites are salt-fish and dried catfish; the latter is not important in the export.

We are, of course, concerned mainly with the Icelandic fishing activities and not particularly with those operations carried out in Icelandic waters by ships of other countries. Figure 13, however, shows the relative catch of the countries fishing in the water around Iceland, averaged in the years 1952-1956. As might be expected, Iceland is the dominant participant, but significant catches have been

Table 4

WORLD CATCH OF FISH*

	1951	1957
	metric tons	
Africa	900,000	1,860,000
USA and Alaska	2,345,000	2,741,100
Rest of North America	1,455,000	1,198,900
South America	500,000	970,000
Asia	5,200,000	4,841,000 (except China and Japan)
China	3,000,000 (1949 approx.)	2,640,000 (1956)
Japan	3,796,000	5,399,000
Oceania	200,000	130,000
USSR	2,500,000	2,540,000
Iceland	420,000	502,700
Norway	1,819,000	1,738,900
United Kingdom	1,086,000	1,014,700
Rest of Europe	3,095,000	4,383,700
World Catch	26,316,000	29,960,000

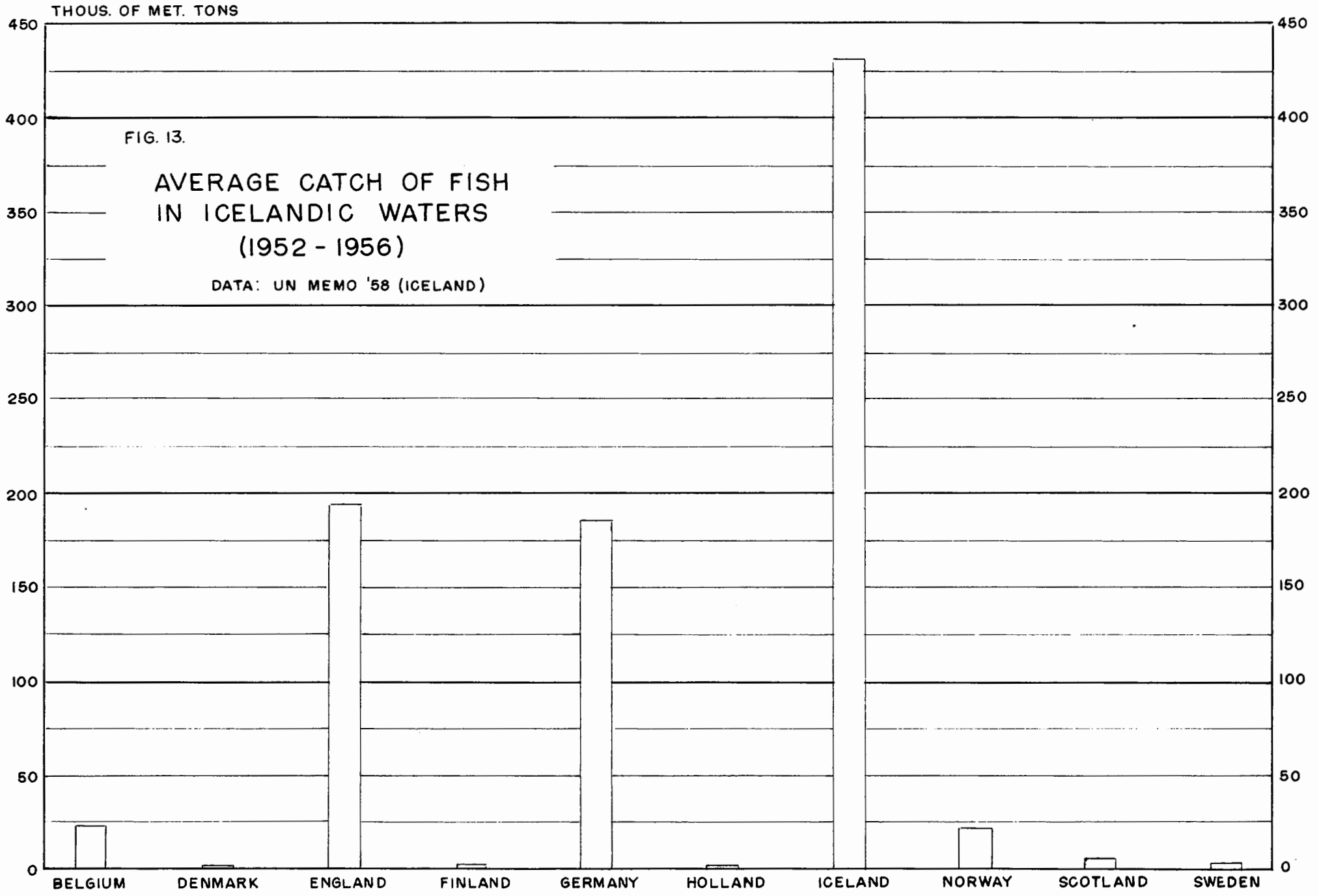
*FAO Yearbook of Fishery Statistics, Vol. 4, Pt. 2, and Vol. 7.

Table 5

FISH CONSUMPTION IN EUROPE, 1949*

	Metric Tons	Population (thousands)	Per head/ annum in kg.
Denmark	66,500	4,290	15.5
France	325,700	40,000	8.1
West Germany	815,000	50,700	16.1
Iceland	7,000	143	50.0
Italy	350,000	46,400	7.5
Norway	175,000	3,280	53.4
Sweden	140,000	7,050	20.0
United Kingdom	1,200,000	50,800	23.7

*FAO Fisheries Bulletin, Vol. 5, No. 1, 1952, p. 2.


THOUS. OF MET. TONS
450
400
350
300
250
200
150
100
50
0
FIG. 13.
AVERAGE CATCH OF FISH
IN ICELANDIC WATERS
(1952 - 1956)
DATA: UN MEMO '58 (ICELAND)
BELGIUM
DENMARK
ENGLAND
FINLAND
GERMANY
HOLLAND
ICELAND
NORWAY
SCOTLAND
SWEDEN

made by England and West Germany for many years. Russian trawlers have been observed in the waters off Iceland but the figures of their catches are unavailable. In the earlier part of the present century it was customary for the fishing vessels of foreign countries to enter Icelandic harbors in order to prepare, pack and ship their catch. In 1922 a law was passed preventing foreign ships from entering Icelandic ports for this purpose. In 1932 a treaty was signed with Norway permitting that country to sell a limited quantity of herring direct to Icelandic factories.

There has been a tendency in recent years for Iceland to account for an increasing proportion of the catch in the area surrounding the island. In 1937, Great Britain accounted for 39.4 per cent of the catch of demersal fish in Icelandic waters, Iceland for 30.1 per cent and Germany for 22.3 per cent. An average of the years 1954-56 shows that Iceland now takes 48 per cent of the demersal fish caught, Great Britain 25 per cent and Germany 21 per cent.[1] Iceland has regularly taken about 80 per cent of the herring caught in the last two decades. In 1940 Iceland's population was 121,168 and this increased to 160,000 people in 1955 which means that the catch of fish per capita has risen from 1.3 tons per inhabitant to over 2.5 tons annually.[2]

The Icelandic catch of fish consists mostly of cod, though considerable catches of coalfish or saithe, and haddock are also taken (Fig. 14, Table 6). In the past there has been a very important summer catch of

---

[1] The Problem of the Fisheries Around Iceland, Memorandum Submitted to the General Assembly of the United Nations by the Government of the United Kingdom, 1958, p. 14.

[2] Statistical Bulletin (Hagtidindi), 1955.

FIG. 14

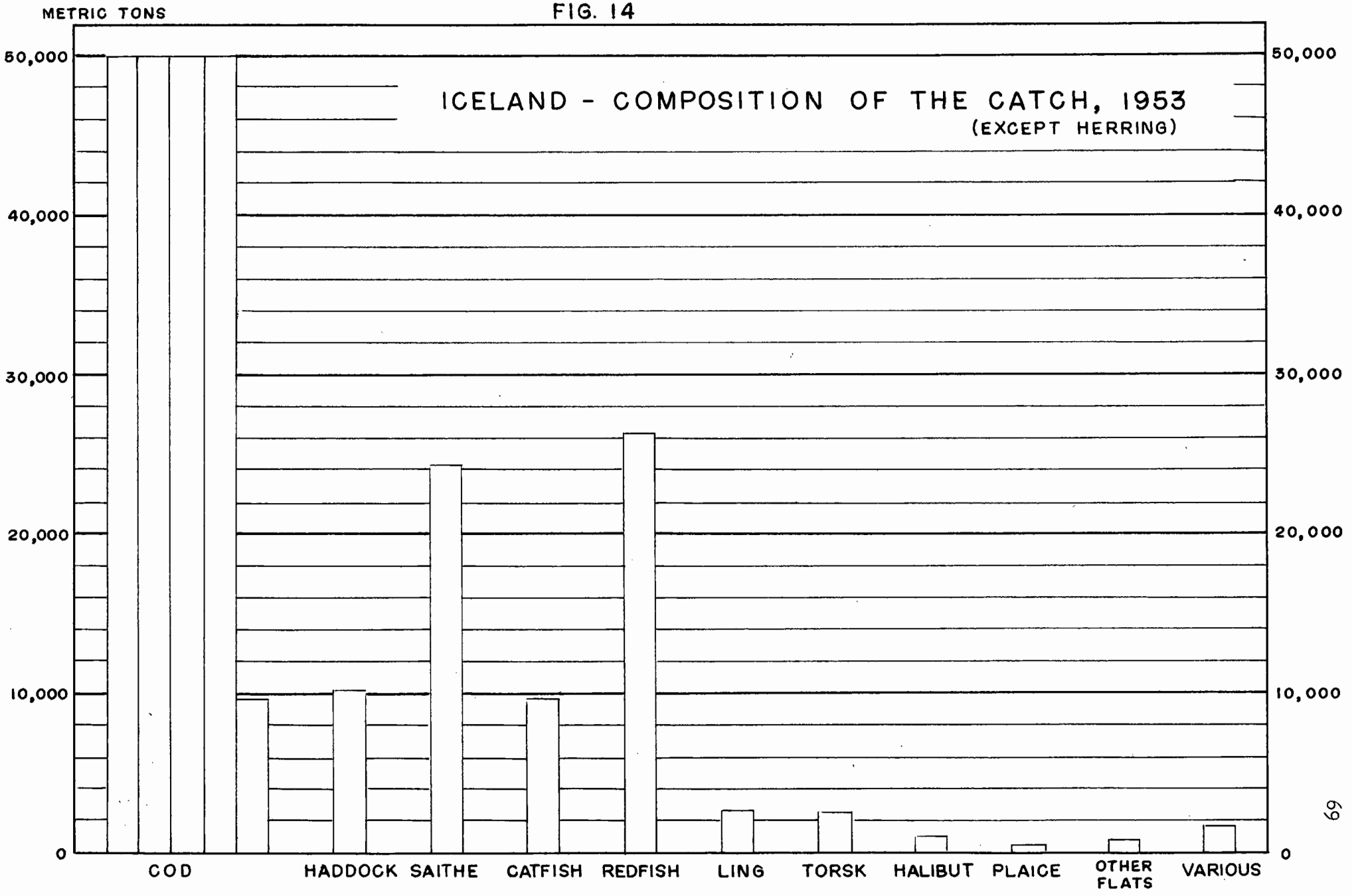

METRIC TONS
ICELAND - COMPOSITION OF THE CATCH, 1953
(EXCEPT HERRING)
50,000
40,000
30,000
20,000
10,000
0
COD
HADDOCK
SAITHE
CATFISH
REDFISH
LING
TORSK
HALIBUT
PLAICE
OTHER FLATS
VARIOUS

Table 6

FISH OF IMPORTANCE IN ICELANDIC WATERS

	Latin	English	Icelandic
1	Sebastes marinus (c)	Redfish (rosefish, Norway haddock, ocean perch)	Karfi
1	Mallotus villosus	Capelin	Lodna
1	Gadus callarias	Cod	Thorskur
1	Gadus aeglefinus	Haddock	Ysa
1	Gadus virens	Saithe, coalfish	Ufsi
2	Molva vulgarus	Ling	Langa
2	Hippoglossus vulgarus	Halibut	Heilagfiski, Flydra, Luda, Spraka
2	Pleuronectes platessa	Plaice	Skarkoli, Raudspretta
1	Clupea harengus	Herring	Sild
2	Raja batis	Common Skate	Skata
2	Anarhichas lupus	Catfish	Steinbitur
2	Brosmius brosme	Tusk (Torsk) (cusk)	Keila
2	Pleuronectes microcephalus	Lemon sole	Thykkvalura
2	Cyclopterus lumpus	Lumpsucker	Hrognkelsi, Raudmagi (male) Grasleppa (fem.)
2	Pleuronectes cynoglossus	Witch	Langlura

1 - of major importance

2 - of secondary importance

herring along the north coast, and a lesser one in the spring in the neighborhood of Faxafloi. At times the sporadic herring has rivaled and even surpassed the cod in importance, especially prior to World War II, but its great fluctuations and unpredictability precluded the herring from being depended upon as a steady export year after year. Many other species of commercial importance are caught in smaller quantities, the most notable being: redfish, ling, plaice, halibut and catfish. Owing to the annual variations in catch, further generalization as to the relative importance of the different species may be misleading (Map C).

The discussion concerns only the catch of fish in Icelandic waters, although in recent years Icelandic vessels have caught an increasing amount of fish in Greenland and Newfoundland waters (Table 7). In 1953, Icelanders took 12,502 metric tons of cod in Greenland waters, this amounting to 5.6 per cent of the total catch of cod in that year. In the same year, 7,700 tons of redfish (22.9 per cent of Iceland's total redfish catch) and 15 tons of halibut (1.8 per cent of the total halibut catch) were landed. This amount of fish landed off Greenland was 6.5 per cent of the total Icelandic catch in 1953 (Fig. 15).

Cod

It is a well-known fact that the waters around Iceland are teeming with cod; it is one of the most frequent of Icelandic fish and equally distributed all around the country out to a depth of 300-400 meters. The old sagas relate that the first settlers carried on cod fishing around the coasts, and this fish has remained to present times the backbone of Iceland's fishing industry.

Table 7

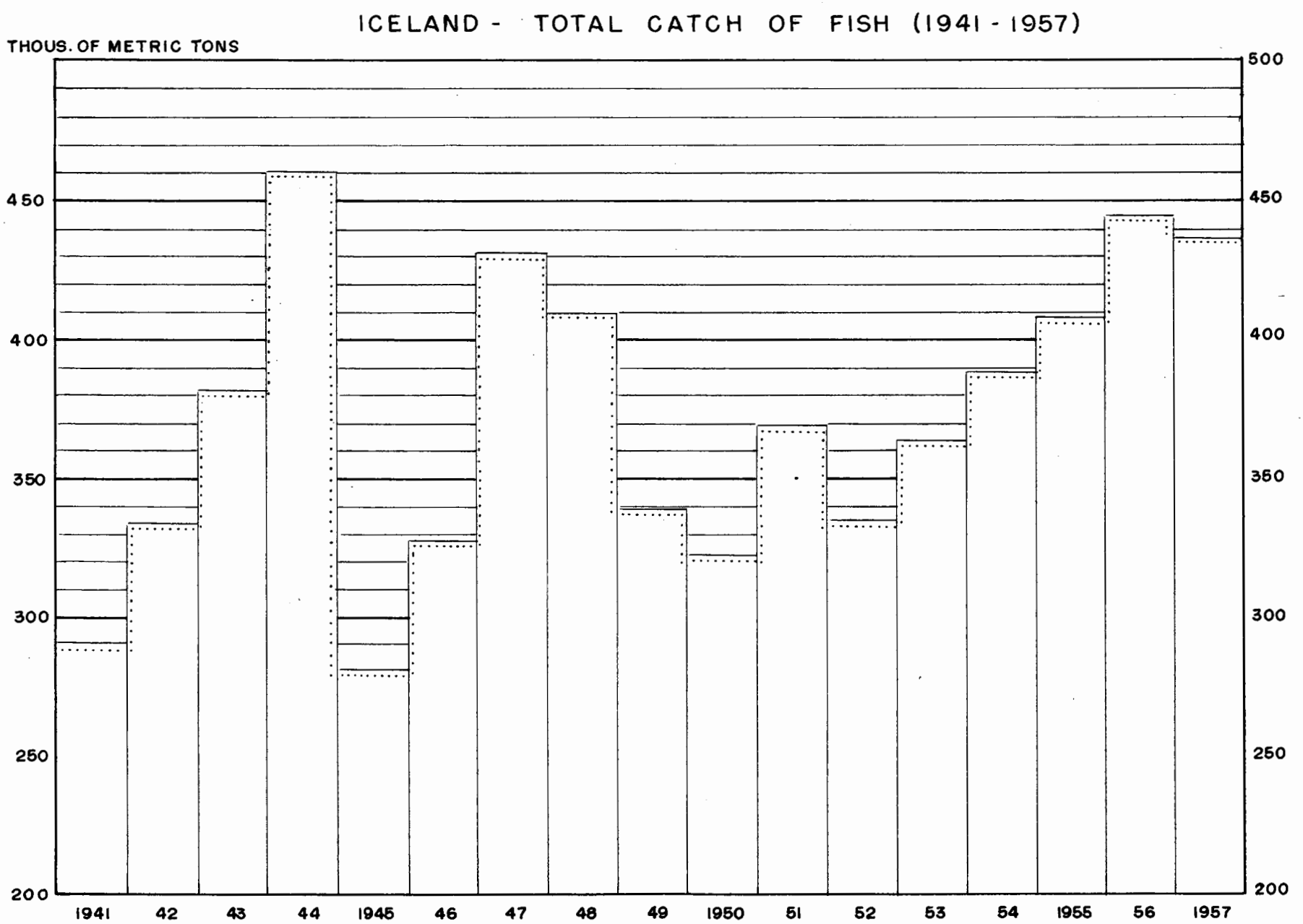
TOTAL FISH CATCH BY THE ICELANDIC TRAWLING FLEET

ELSEWHERE THAN AROUND ICELAND *

	Thousands of Metric Tons
Average 1936-1938	Insignificant
1950	5
1951	16
1952	50
1953	26
1954	41
1955	57
1956	49
1957	Unavailable

*Bulletin Statistique, Conseil Permanent International pour l'Exploration de la Mer.

FIG. 15.


ICELAND - TOTAL CATCH OF FISH (1941 - 1957)
THOUS. OF METRIC TONS
500
450
400
350
300
250
200
1941
42
43
44
1945
46
47
48
49
1950
51
52
53
54
1955
56
1957

The cod is a boreal inhabitant of the continental shelf of the countries bordering the North Atlantic and the adjacent arctic sea. Over vast tracts of the colder part of its area of distribution it is only a summer visitor in search for food, while its real home, the spawning ground, is much more limited (as a rule, 50-200 meters depth and water temperature of 6° - 7° C.).

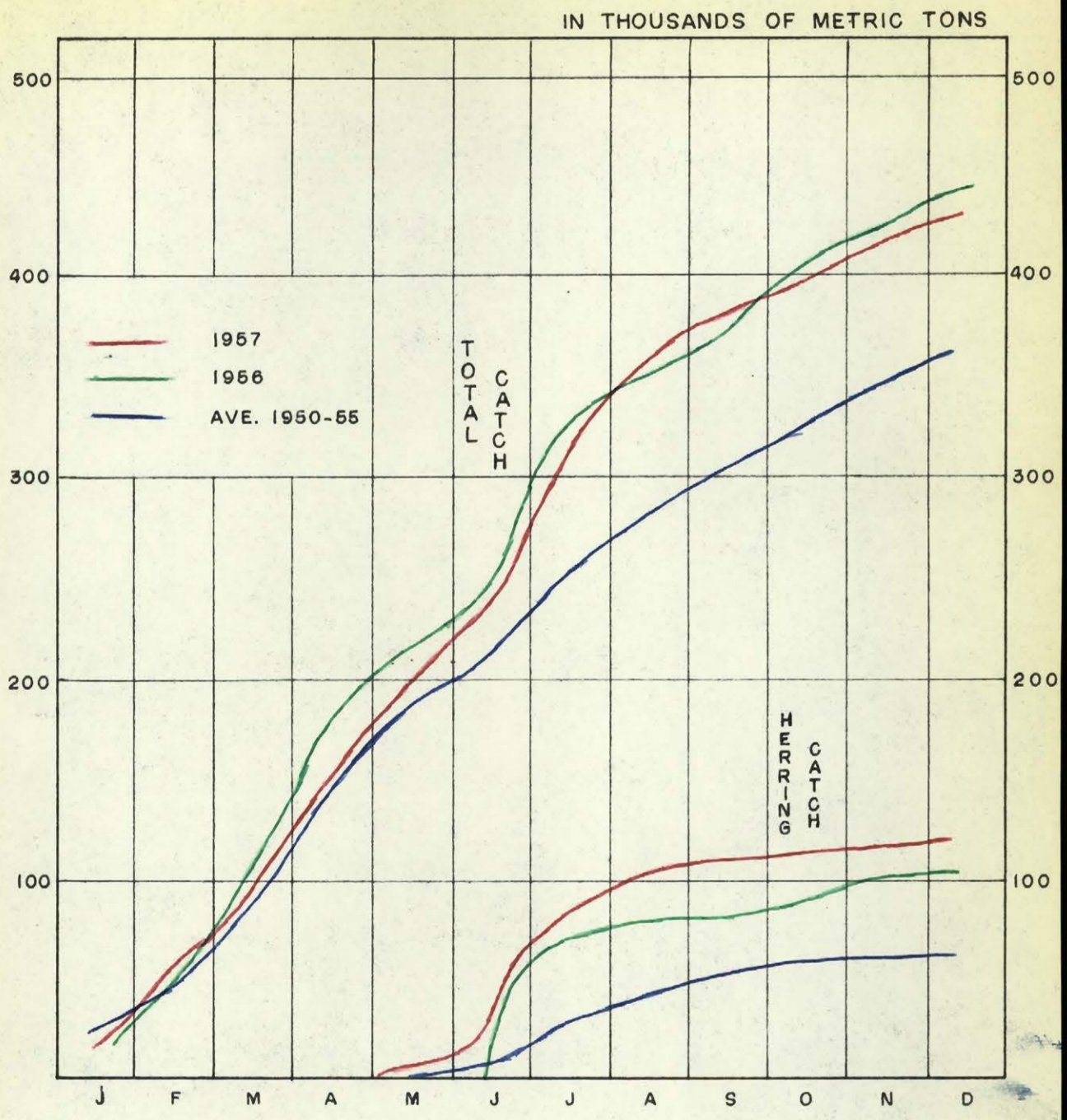
The cod is a true bottom fish which feeds on every kind of sedentary and bottom animal it comes across and is able to devour. In addition, it captures small fish, especially the Lesser Sand eel. Because the spawning grounds do not provide sufficient food for mature fish they must take to richer areas of the seas; in Iceland the north and east are colder but very rich in different kinds of small fish, as are the coasts of southern Greenland and Newfoundland.

Seasons and Gear

Cod fishing in Iceland is carried on throughout the year in contrast to the summer herring fishery. The main season occurs during the winter and spring months (January - May) when the cod gathers at the southwest coast to spawn in the warm waters of the shallow banks (Map C, Figs. 16 and 17). Some young fish complete their development on the banks but the bulk are carried by the currents in a clockwise direction around the north and east coasts; some travel across Denmark Strait to the southwest coast of Greenland. They reach maturity (in 4-7 years for male and 5-9 for female) in the cold water before returning to the southwest to spawn for the first time. On the banks in the latter part of April when the spawning is over, the cod begin to go away from the spawning grounds, and then proceed northwards along the coasts in their

FIG. 16

ICELAND: MONTHLY CUMULATIVE FISH LANDINGS



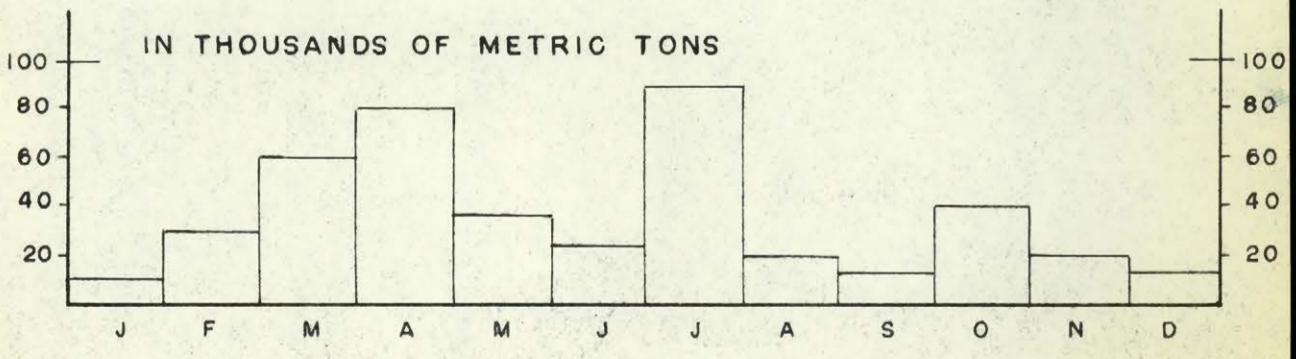


FIG. 17 TOTAL MONTHLY LANDINGS IN 1956

quest for food. Then they are joined by small, immature cod which approach the coast and enter the fjords.

During the spawning time at the southwest the cod is fished with the trawl, but smaller boats use mostly the long line. The trawlers pursuing the catch in the southwest go also to the west and east near the areas of meeting of the warm and cold currents, where the catch seems most lucrative. During this period, when 3/5 of the annual cod landings are made, practically all Icelandic shipping is engaged in cod fishing, both ships and workers streaming to the south of Iceland as long as the season lasts. After spawning when the quest for food begins, the cod is pursued by small boats and the summer season begins at the north coast. This continues until autumn, but as it occupies only the smaller vessels, it has little effect on the total catch.

Haddock

The haddock has a range similar to the cod, being abundant all around the island, but it is less extensive. It is one of the most common food fish, though evidently much more frequent in the warmer area; in the north it does not go into such cold water to feed, and its abundance seems to depend on whether the year is a "warm" one or "cold" one hydrographically. It is one of the fish especially sensitive to the recent climatic amelioration, and will probably extend its range further north with increasing stocks should the climatic trend continue. In Iceland it is found especially off the south and southeast coasts, but also in Faxafloi, Skagafjordur and Skjalfandi. It lives at all depths from about 10-200 meters, but usually between 30 and 150 meters. It is, like the cod, a true bottom fish feeding on various small gregarious

fishes such as sand eels, capelin and young herring. It also makes long wanderings along the coasts corresponding to those of the cod: after having finished spawning in deep water off the south and west coasts in May and June, the adult fish seeks the shallower grounds of the northwest, north, and east coasts in search for food. The young are carried as pelagic fry to these coasts. In 1922 Icelanders landed 13,235 metric tons of haddock, 4,053 in 1937 and 11,916 in 1953. It is rather sporadic in its appearance, and before the last war a pronounced diminution of the stock was noted.

Saithe or coalfish

The saithe is common all around the island; it is a more southerly fish than the haddock, being extremely numerous in the warmer waters off the south and west coasts down to about 200 meters in depth. Less is known about the stock and potentialities of this kind; its spawning seems to correspond fairly well with the haddock, but it takes place earlier, lasting from mid-February to the vernal equinox. When spawning is over, the fish seeks the distant grounds off the northwest, north and east coasts for food, but, as far as is known, without leaving the grounds of the country. It is captured in large quantities by the Icelanders, with increasing catches to the northwest. In 1922 the Icelanders caught 10,467 metric tons, in 1937 6,929, and in 1953, 24,208. In preparation for export the catch is iced, salted and dried, with very little consumed locally.

Redfish (rosefish, Norway haddock)

This fish of growing importance is found all around the island, although rather scarce along the northeast coast. It is a widely-ranging type living pelagically in the open ocean from 30 meters down to 1000 meters and is found most numerous on the edges of banks at depths of 100-300 meters where strong Atlantic influence meets the colder currents. As a rule it is a bottom fish often occurring in great shoals, but at time it rises to the surface in search for food which mainly consists of small Decapods and young or small fishes of various kinds. It spawns near Iceland sometime in the early spring, mainly in deep water far off the southeast, south and west coasts. This fish is of very great importance today, although not long ago it was thrown back into the sea if caught. It was discovered that high-quality fillets could be cut from it; also Dr. Thordur Thorbjarnasson discovered that the high oil content of the liver was rich in vitamins, and that the body itself was of high oil content and therefore important in oil and meal processing. In 1953 it represented 10 per cent of the catch (excluding herring).

In recent years more and more redfish is being caught by Icelandic boats in Greenland waters. This fishery is quite new, and before 1954 the fishing was carried out exclusively in West Greenland waters, but in that year fishing for redfish in East Greenland waters was started. This area soon became the most important, although notable catches are

still taken on the west coast with 14,500 metric tons taken in 1954 and 18,000 tons in 1955.[3]

Halibut

The halibut occurs commonly all around Iceland, but it is evidently more frequent in the warmer water to the south and west. It is found in water up to 1000 meters deep, but the adult fish obviously prefers deep water especially off the south and west coasts where it occurs during the cold season. In summer it seeks the shallow grounds with rapid currents near land. It spawns in deep water from March to May, with the young fish going further inshore to complete their development. The halibut grounds off Iceland have been the richest in Europe, and the Faxafloi the best nursery ground near Iceland for the young fish. In 1922, 398 metric tons were caught by Icelanders, 256 metric tons in 1937 and 855 in 1953. It is fished by line in all areas.

Plaice

The plaice is abundant and fairly evenly distributed all around the country, occurring at all depths from the low water mark to 120 meters. During the cold season the mature fish move from the coastal zone to deeper waters, to re-appear again sometime in the spring after spawning is over. It spawns mainly to the south and west. The plaice is one of the most important of the Icelandic food fishes and is in great demand by foreign fishermen, who pursue it with trawls and Danish seines. It

---

[3]J. Magnusson, "Icelandic Research Report, 1956", (Redfish), Annual Proceedings, Internat. Comm. for NW Atlantic Fisheries, Vol. 7, 1956-57, pp. 40-41.

has been fished by English trawlers for 50 years and, being one of the most sought-after fish, it has suffered marked depletion of stocks. Catches declined quickly after first discovery and again after the good fishing following the two World Wars. In 1922, 864 metric tons were caught by Icelanders, in 1939 1,565 and in 1953 278 metric tons.

Catfish

The catfish is very common, and is to be found at depths between 10 and 200 meters though not numerous at depths shallower than 30 meters or deeper than 150 meters. It is most frequent off the west and northwest coasts between the Reykjanes peninsula and Djupall and is scarce off the southern and northern coasts except in Skjalfandi.

During the warm season the fish at the southwest and west coast go into the shallow coastal waters, retiring at the approach of winter to deeper (100-200 meters) tracts, which they leave again in early spring to go to shallower feeding grounds. Very little is known about its spawning; it goes through no long migrations. The catfish has fine, tasty flesh when in good condition. It is liked very well by Icelanders who eat it fresh, but preferrably dried. It is caught mostly with long lines and trawls. In 1937 Icelanders caught 565 tons and in 1953 9,826 metric tons.

Other fish of importance in the industry are Skate, Lumpsucker, Tusk (Torsk), Lemon Sole, Witch, Capelin, and Dab. Most are well-liked and much sought after but their volume of catch is incidental.

Whaling

At the beginning of the present century whale products were of considerable importance in the export trade. In the years between 1901-1905 they accounted for 18 per cent of the total export value and 12 per cent in the years 1906-1910. The importance of these products decreased after whaling was prohibited during the years 1915-1934. Whales had formerly been abundant in the waters off Iceland but after systematic hunting (mostly by Norwegians) their numbers diminished.

In 1935 a company was granted a concession to carry on whaling out of Talkanafjordur, which they did for only six years. In 1948 another company was given the right to carry on whaling from Midsandur in Hvalfjordur (Whale Fjord). This company is still in operation, employing four catcher ships, based at the land factory at Midsandur. An average of about 300 whales have been taken since resumption of operations in 1948. During the 1955-56 season, 440 whales were taken, an infinitesimal part (0.7 per cent) of the total world catch of 58,158 whales taken during that season.[4] A considerable amount of whale meat is consumed in Iceland and it is the oil therefore which has accounted for upwards of 50 per cent of the export value gained through the whaling operations.

Preparation (Fig. 18, Map D)

Formerly all the fish catch was prepared for the foreign market merely by drying it in the open air without any addition of salt. It

---

[4] FAO Yearbook of Fishery Statistics, Rome, Italy, 1956-57, Vol. 7.

FIG. 18. ICELAND'S SEA FISHERIES – UTILIZATION OF CATCH (1941-1957)

NOTE: 1. REFERS TO GUTTED WET FISH WITH HEAD, DELIVERED FOR PROCESSING, EXCEPT FISH TO FACTORIES (MEAL & OIL), WHICH IS WHOLE.

2. OTHER FISH TO FACTORIES INCLUDES HOME CONSUMPTION (AVE. 2,939 M. TONS 1944-57), AND CANNED FISH (AVE. 275 M. TONS 1942-57).

3. FOR UTILIZATION OF HERRING, SEE FIG. 22

SOURCES: HAGTIÐINDI, FAO YEARBOOK.

was not until the beginning of the 19th century that the salting of fish became common. In 1849, 2,783 tons of salted fish were exported as opposed to 561 tons of dried fish and in 1872 the ratio had further increased to 4,030 tons of salted fish and 78 tons of dried fish, so that at the beginning of the present century the export of stockfish had disappeared entirely. At that time also the icing and freezing of fish began and increased in importance. The various methods of preparation shall be considered in turn (Tables 8 and 9).

Stockfish

In this process the fish (cod, coalfish or haddock) are split and gutted and hung up to dry on racks in the open air. This method of preparation, therefore, depends very much on the weather, since dry air and sunshine are required. The labor demand is high because of the need to turn the fish periodically and protect it from the rain. After a period of from 4-6 weeks the finished product is packed in bundles or sacks of standard weight. As stated above, until the beginning of the 19th century, the catch of cod was prepared for export in this way only. Then salting began and gradually replaced this old method entirely. At the instigation of the Fiskimalanefnd (The Fish Industry Board) the preparation of stockfish resumed again. This was one of the attempts to relieve the economic difficulties in the 1930's and for a while it seemed that this method of preparation had a future.

In 1935 the production was only 152 tons but by 1937 had increased to 855 tons. During the war, however, the production fell continuously and never accounted for more than one-half of one per cent of the total

Table 8

RELATIVE DISPOSITION OF WORLD CATCH (METRIC TONS)

	1951	% of Tons	1956	% of Tons
Fresh	11,600,000	44.6	12,200,000	41.2
Frozen	900,000	4.0	2,400,000	8.1
Cured	8,300,000	32.0	7,200,000	24.3
Reduced to meal or oil	2,700,000	10.4	4,100,000	13.9
Canned	1,700,000	6.5	2,700,000	9.1
Other	700,000	2.5	1,000,000	3.4
Total	25,900,000	100.0	29,600,000	100.0

*FAO Yearbook of Fishery Statistics, Vol. 4, Pat. 2, 1952-1953, and Vol. 7, 1956-1957.

Table 9

RELATIVE DISPOSITION OF ICELANDIC CATCH (METRIC TONS)

	1951	% of Tons	1956	% of Tons
Fresh	52,300	14.1	18,283	4.1
Frozen	98,243	26.5	177,277	40.0
Cured	89,929	24.3	199,774	45.0
Reduced to meal or oil	126,820	34.2	44,684	10.1
Canned	125	.03	163	.03
Other	3,238	.87	3,438	.77
Total	370,655	100.0	443,709	100.0

*Statistical Bulletin, (Hagtidindi), 1952 and 1957.

export value. About 1950 a market opened for dried fish and the production of stockfish began again, with a slightly different method used. Before, the fish was gutted, head removed, and then flattened before it was hung up to dry, but it is now not flattened. In 1951 the production shot up to over 1,000 tons and to 12,935 tons in 1954. In that year stockfish was the second highest export product and accounted for 14.7 per cent of the total value of exports. Production then fell by one-half in 1955 only to double again in 1956. Since then production has fallen somewhat with the changing emphasis on type of product.

Salted fish

From the beginning of the 19th century when salting of cod and other whitefish began, salt fish grew to great importance in the economic life of the Icelanders, and in time became very well known for its high quality. The raw material is excellent and an effective quality control was able to be built up, which never seemed to have been the case in some of the other forms of preparation.

For salting, the fish must be as white as possible. To achieve this the fish are killed immediately after capture so as much blood as possible is lost. After it has bled, the fish is cut in a prescribed way (heads, intestines, and the greater part of the spinal cord removed) and after it is cleaned and rinsed it is placed in tiers with coarse salt between each tier.

Some is also salted in brine bins and in certain cases also in barrels. But the first method is the one most used. The fish lies thus salted for three to four weeks, rearranged at intervals and strewn with

new salt. At the end of this period it is "full salted" and ready for export as "wet salted" or uncured fish, but this salting is mainly a stage in the making of clipfish.

Clipfish

Clipfish is produced by taking fully salted fish (uncured) and drying it either in the open air or artificially in drying factories. In the former, dry air, wind and sunlight are obviously required.[5] After 1920 artificial curing increased considerably, especially in the winter months, and a number of fish-curing houses were built both in Reykjavik and elsewhere. In this way the precise water content of the final product, depending on the needs of the purchasing countries, could be more accurately controlled. The preparation of this type takes from four to six weeks and is a highly skilled operation which can be done successfully only by workers of long experience. When the clipfish is to be exported it is packed in various ways: cartons, paper or jute sacking, or wooden cases depending upon the demands of the various markets.

In the early 1930's with the general marketing difficulties and a slump in prices the saltfish export price dropped. As the low price

---

[5]Due to Iceland's high latitude and the prevalence of cloudy skies, the amount of sunshine is, in Reykjavik, for example, an average of 1340 hours annually (1931-1950). This represents 30.5 per cent of the total possible sunshine in that latitude. Akureyri recorded an annual average of 986.5 hours (or 23.5 per cent of the total possible) of sunshine during the same period. Bjornsson, "Iceland, a Geog., Pol., and Econ. Survey", p. 973.

continued it was considered desirable to give more variety to the fish products. In 1934 the Althing created Fiskimalanefnd (The Fish Industry Board) whose purpose was to find new markets, effecting trial sales of Icelandic fish (in countries where a certain type of fish product had not yet been introduced), experimenting with new fish-catching methods and curing for export. Most of its important work was carried on with respect to quick freezing, stockfish production, canning, and redfish-oil and meal production.

In the years before the Second World War the quantity of cured saltfish diminished steadily owing chiefly, in addition to the Spanish War, to other import restrictions to foreign markets. Clipfish, which had accounted for 50 per cent of the total value of all exports in 1932 fell steadily in importance until in 1940 it accounted for only 11.4 per cent and throughout the rest of the war years dropped to below 1 per cent of the export value. Wet salted fish had been responsible for an average of 10 per cent of the export trade and in the years immediately preceding the war was on the increase. Since the war its importance has fluctuated greatly from year to year with the changing markets. In 1952 it represented 1/4 of all exports, whereas the year before it was only 9 per cent by value of the export. It has since been approximately twice as valuable as clipfish in the export.

Fish on ice

The highest quality fish is that delivered to the market in a condition as near to the original fresh fish as possible. This is aided in part by rapid transportation, but other essentials are some form of refrigeration—on ice or quick freezing. Throughout the 1930's in the

years before the war trawlers went ice fishing in the autumn after the herring season closed and took their catches right to British and German ports. During this period iced and frozen fish (which until 1948 were included together in the statistics) accounted for about 10 per cent of the export trade. During the war as many trawlers as possible went ice-fishing all year round and delivered their catches directly to British ports, enabling Iceland to gain great amounts of foreign credits. At this time refrigerated fish accounted for well over 50 per cent of all Icelandic exports. It must be remembered that with as many ships fishing and transporting to Great Britain as possible many men and ships (approximately 1/3 of her total tonnage) were lost. In 1941, 60 per cent of the year's catch was iced, 30 per cent salted, and 8 per cent frozen. In 1945 70 per cent was on ice, 27 per cent frozen and 1.5 per cent salted.[6]

It was not expected during the war that most of the fish would be exported on ice upon return to peacetime conditions. The war created unusual conditions and the nations fighting it (especially Great Britain which was the only one accessible for trade) constituted a market of unlimited demand. Upon return to normal, each country would be expected to once again supply most of their own needs in this line, and Iceland's problems would reoccur. One disadvantage of icing fish is the weight of the ice itself and the difficulty of keeping the fish completely iced enroute to market. On the other hand, there is no processing to go through other than the covering with ice. With the other methods of

---

[6] Statistical Bulletin (Hagtidindi), 1942 and 1946.

preparation far greater amounts of fish are required to be caught to give the same export weight after processing (stockfish 6 times and saltfish from 2 to 4 times). With the lower price brought by iced fish, the greater bulk of product per unit of value, and the number of voyages necessary to produce the same value, came the realization that Iceland must seek a higher quality, lower bulk product which could find a ready market.

After the war when Iceland put in a new territorial limit the British Trawler Owners Association retaliated and took the opportunity to ban landing of Icelandic fish on ice in British ports. This will be discussed in the next section, but it is necessary to point out here that this was not the sole reason for the decline of Icelandic fresh fish on ice export in recent years. Two years before the ban, Iceland's iced fish export dropped from 26.2 per cent of the total export value to 5.7 per cent. This was as a result of decreased catches and also the increased processing of salted fish. The trawler owners' ban in Britain did, however, accelerate the need for new markets and increased emphasis on some forms of products. Fish on ice has fallen in the past ten years to a relatively insignificant place (even after the lifting of the trawler ban in 1956 Iceland never filled her allowed quota) and now represents only 3 per cent of the export. On the other hand, quick freezing has increased greatly in importance and now represents over one-third of the total export value.

Frozen Fish

The first quick freezing plant in Iceland was built in 1930, actually for the freezing of herring for bait. It was not until 1935 that steps were taken on the initiative of Fiskimalanefnd to make the quick freezing of fish an important branch of the industry.

In pre-war times the chief market for frozen fish was Great Britain. Small amounts were sent to the United States, Poland and a few other countries, but these markets proved very unstable. During the war almost all the frozen fish production was sold direct to the British Ministry of Food at prices fixed by an agreement between the two governments. At first mostly flatfish were frozen, because of the preference of the British consumers. Later on, other kinds of fish were added and by 1945 92 per cent of the frozen fish was cod or haddock. In 1940 there were 31 quick freezing plants, and in 1945 this number had swelled to 68 with a total capacity of 600 tons of fillets in 24 hours. In 1953 there were 76 plants with a capacity of over 700 tons in 24 hours (Map D).

Great stress was laid on careful preparation and packaging of the fish; for a long time Fiskimalanefnd handled the sale and exportation of the frozen fish on behalf of the producers to ensure proper treatment and good quality. In 1943 the Icelandic Freezing Plants Corporation (Sölumidstod hradfrystihusanna) was formed to take over the sale and exportation of its members. At present this organization's associated companies produce 85 per cent of the frozen fish exports. The plants owned by cooperative societies were outside this corporation and the sale of their products is managed by the Union of Icelandic Cooperative Societies (Samband islenzkra samvinnufelaga). The production is under

the supervision of an inspector who has island-wide jurisdiction. As a first-class raw material is required for the making of frozen fillets, the catch is dispatched by the quickest route to the freezing plant where it is filletted under strict hygienic supervision and quick frozen at -25° F. in small cardboard boxes.

The different kinds of fish entering the freezing plants for processing yield different amounts of fillets. There is most waste with redfish and least with cod. It is estimated that redfish fillets amount to 20 to 25 per cent by weight of the gutted fish with head, and cod fillets 29 to 35 per cent.

Because of the widespread location of the grounds and the limited range of the motor boats supplying the fresh fish, Iceland's freezing plants are scattered all around the coasts. Theoretically it would be more economical to reduce the number of freezing plants and consolidate, thereby cutting down on the number of employees and administration tasks of the various small freezing companies. Iceland today is characterized by a great shortage of labor, and this situation could be alleviated by a measure of consolidation.

Many freezing plants were constructed with a surprising lack of engineering knowledge but this has now, by and large, been rectified. Most freezing plants were built where, traditionally, there has been a fishing town for a long time, and where labor was available. Labor and close location to the raw material are the prime considerations in location, source of power being secondary in importance. Latest statistics show that Iceland's production of frozen fillets had reached 62,310

metric tons by October 15, 1958, or more than the entire 12-month production of 1957.[7] Most of this was based on increasing catches of redfish (ocean perch).

Cod Liver Oil

Cod liver oil has increased greatly in importance in recent years, and brings a large return in proportion to its bulk. In earlier times, especially at the end of the last century, the production of shark liver oil exceeded that from the cod, but after 1920 production was abandoned and cod liver oil rose to first position.

The livers are processed by being heated in steam vats. The liver cells are ruptured when the heat reaches a certain point and the oil, owing to its low specific weight, collects at the top of the vat. It is then removed by skimming or centrifuging, cold cleared (whereby relatively highly fusible constituents are removed), filtered, and packed for export in drums, cans, or bottles.

In recent years the amount of oil extracted from fish liver has risen considerably, due to more efficient processing. In 1928 trawlers began steam rendering their liver catches on board by live steam and high pressure and the output increased considerably from that time. The average yield of oil from any given amount of liver is 55 per cent, but the efficiency is greater when the liver is rendered on land than at sea on trawlers. In addition to cod liver, that of the saithe (coal fish) is also used; the oil rendered from this fish is of the highest quality and favored especially for domestic consumption.

---

[7] Statistical Bulletin (Hagtidindi), 1958.

In Iceland the fish oil producers formed associations in various places, as in Reykjavik (Iceland Steam Trawlers Cod-liver Oil Union - Lysissamlag Islenzkra Botnvörpunga), where, in 1930, a factory was built with modern equipment for cold-filtering (distearinating) the fish oil. The oil could then be exported in a consummable state. At this same time the direct sale of oil to the United States was started. Prior to 1930 all cod liver oil had been handled by Norwegian fish oil merchants. At Vestmannaeyjar a Cod-liver Union was established by the fish producers, and another factory was built with machinery for preparing medicinal oil, industrial oil and cod-liver meal. By 1942 90 per cent of the cod liver oil production in Iceland was medicinal oil and by 1946 there were four factories (3 in Reykjavik and 1 Vestmannaeyjar). Map D shows the present distribution of cod-liver oil plants.

Fish meal

With the increasing fish-production the amount of fish waste or offal has increased proportionally, and this now goes almost wholly to the fish meal factories along with fish that, for some reason or other, cannot be used for other purposes. The first meal factory was erected in 1916 and most of the others were built between 1938 and 1940. Before World War II this product had good markets in various European countries and during the war the entire export went to Great Britain. An increasing amount of meal is now being used domestically for fodder. Of the fish used for meal other than herring, redfish, saithe, cod and haddock are the most important. Fish meal (excluding herring) accounted for over 7 per cent of the export trade in 1957.

Canned Fish

This form of processing has never been important in Iceland, but it is one to be considered in terms of future possibilities. Before the First World War a few canneries had been established but failed because of inexperience in the operation and because of the inability to gain a foothold in any of the markets.

The year 1958 showed some improvement, as in the first nine months of that year twice as much canned fish was exported as during the whole of 1957. This product, however, comprises less than one per cent of the total export value.

Cod Roe

This product is exported iced, frozen or salted, and has always been of insignificant importance in the export, all the types accounting for less than 2 per cent of the export value.

Frozen Shrimp and Lobster

Although produced in small quantities these have been well received in some foreign markets. The production during the first ten months (137 metric tons) of 1958 was triple the amount produced during a similar period the year before, although the export value gained was only doubled. This form of product is quite new and, although it forms under one per cent of the exports, there are possibilities for future expansion.

Red Fish Body Oil

The production of red fish body oil has declined somewhat in the past three years, due to lower prices on the world market. Prices

dropped by almost one-half from 1951 to 1955, and this product remains relatively unimportant, forming less than one per cent of the export value. Redfish can be processed into meal and oil in herring factories, and the increasing catch of this fish has alleviated somewhat the drastic situation caused by the drop in herring catch.

Whaling products

A factory at the whaling station of Midsandur processes the catch into meal, oil, and meat. The prices for oil have dropped somewhat since 1950, but this form of product still accounts for over one-half of the value gained from whaling products. Increasing home consumption since 1956 caused the decrease in the export of whale meat, and meal has not been sold abroad since 1955. In the past several years, whaling products have accounted for about two per cent of the total export value.

VI

HERRING

The modern Icelandic herring fishery is not built upon old traditions. It has existed for only about 90 years. Fishing is certainly spoken of in the Icelandic sagas but, during the Middle Ages with its unfavorable political and economic situation, the pursuit of herring was rendered impossible. During the last part of the 19th century when political liberty increased and freedom of trade was introduced, an economic upswing followed enabling Icelanders to begin fishing the herring off their coasts. After 1870 herring fishing began to be pursued on a large scale first by the Norwegians from whom the Icelanders soon learned the fishing methods. At this time the herring went to the narrow fjords on the east coast where the conditions for fishing with land-drawn and placed nets were especially favorable. In the year 1881 there was an unusually large catch and 150,000 barrels were salted.[1] That year the Icelanders and the Norwegians fished in the long and narrow Eyafjordur on Iceland's north coast. Ten years later the herring fishing had decreased to a minimum because the herring were no longer found to go into the fjords. In 1889 drift net fishing from decked vessels began, mainly by the Icelanders near the south coast and by Norwegians near the north coast. At this time the center of

---

[1] A. Eydal, Havets Silver, En Bok om Sillen, Uppsala, Sweden: Almqvist & Wiksells Boktryckeri Aktiebolag, 1945, p. 108.

the industry moved to the north coast where it remained until the last 10 years when the main fishing has shifted further to the east.

Five years after the fishing with drift net began, purse seines were used for the first time in Iceland. It was at this time that fishing vessels were first equipped with engines, and sailing vessels which had been used in drift netting soon disappeared altogether. During the fishing with purse seine, steam vessels were used in the beginning with an increasing number of motor boats. This introduction of new fishing methods and vessels marked the beginning of the Icelandic herring fishery's great era. With this mechanization the fishing with purse seine, and to some extent with drift net, could be carried on in the open sea (Figs. 19 and 20). Without being limited to the fjords, the fishing possibilities became greater and all the effort became more regular. The catch increased although not without the great fluctuations which have always been the hallmark of herring fishing.

Catch

The catch of herring in Iceland has been variable from the beginning. In 1881 150,000 barrels were fished but the amount dropped greatly as a result of the failure to find herring in the fjords and bays. It began to increase again with the introduction of new gear and during the years 1906-1914 the catch averaged 200,000 barrels. As can be seen from Figure 21, the catch from 1922-1926 averaged 20,000 to 30,000 tons and from 1927-1932 60,000 tons annually. With the increase in the capacity of the oil and meal factories the annual catch since then has varied between 100,000 to 200,000 tons except in the past 10 years when the

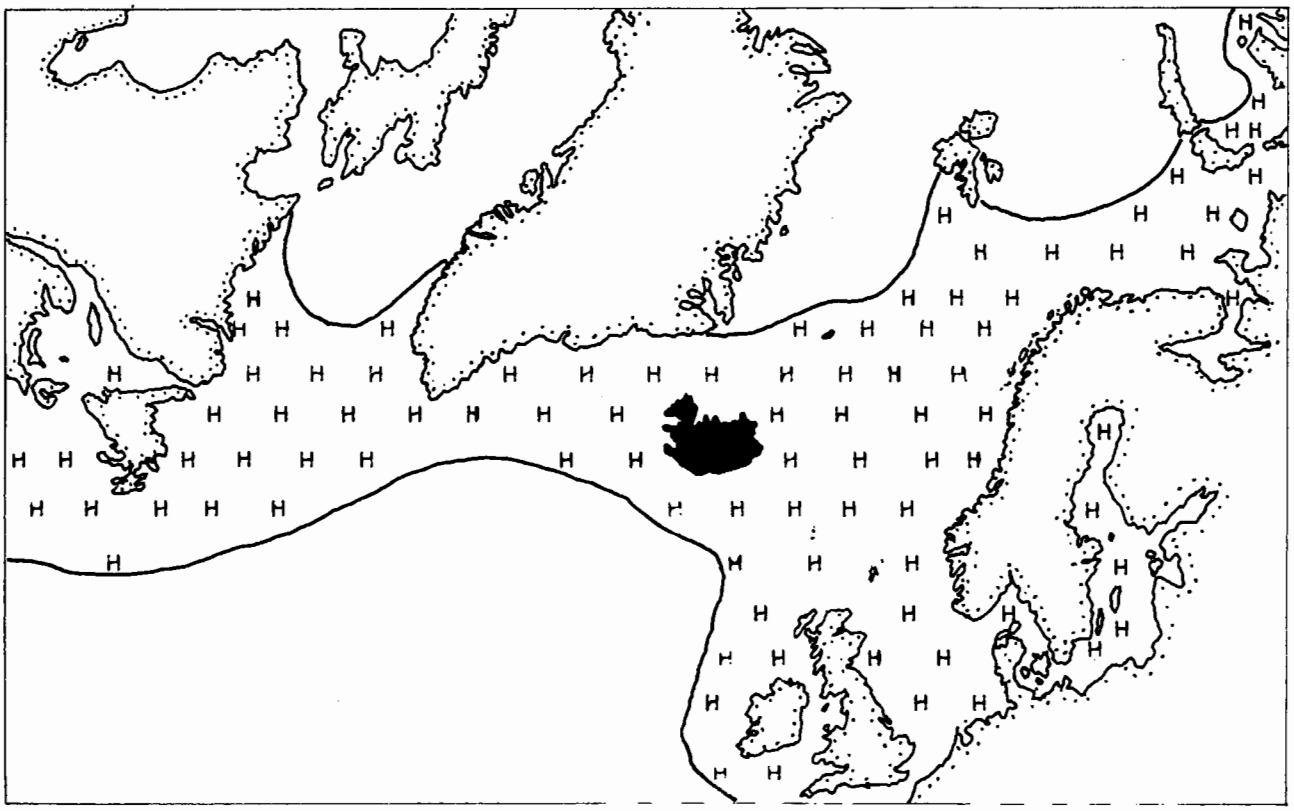


FIG. 19. DISTRIBUTION OF HERRING IN THE NORTH ATLANTIC.

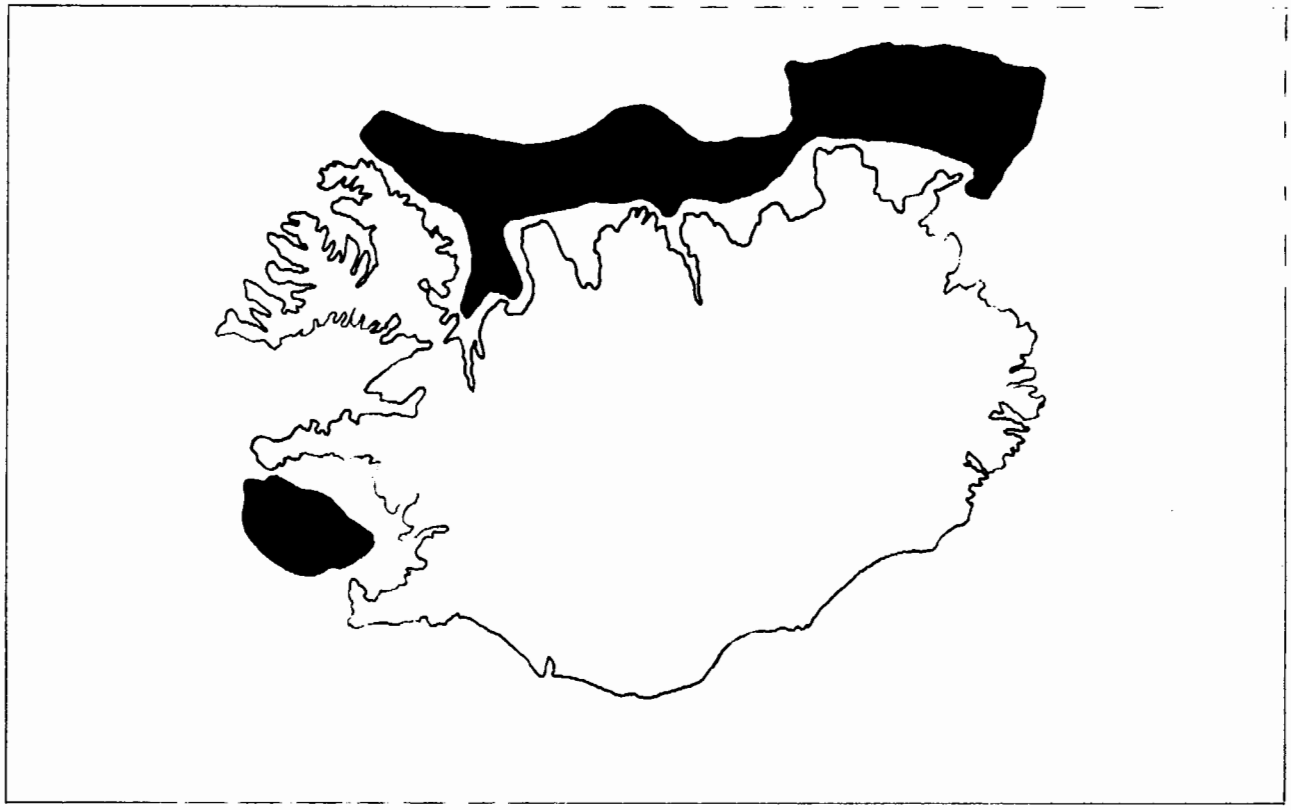
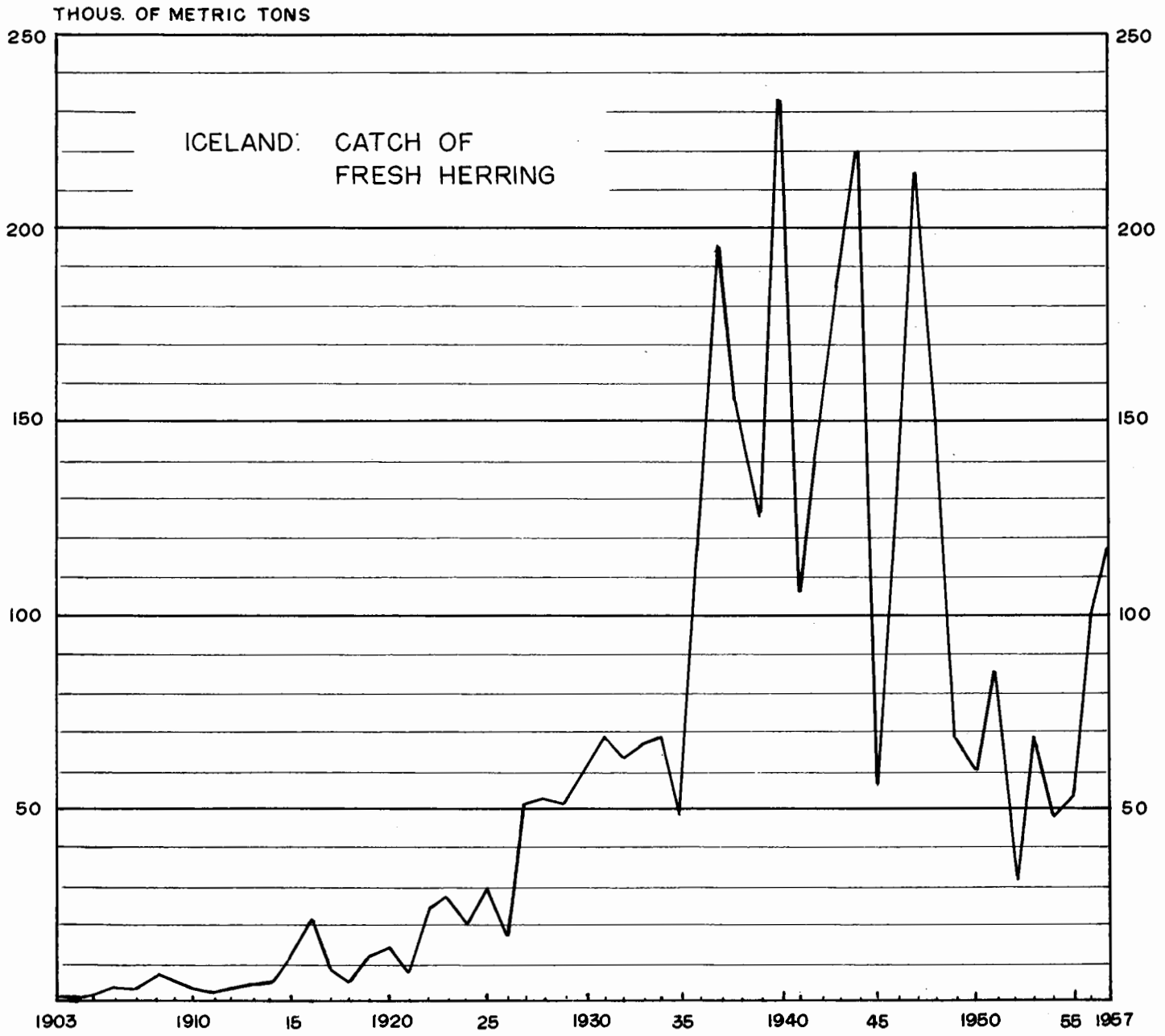


FIG. 20. MAIN HERRING-FISHING AREAS IN ICELANDIC WATERS.

FIG. 21.


THOUS. OF METRIC TONS
ICELAND: CATCH OF FRESH HERRING
250
200
150
100
50
1903
1910
15
1920
25
1930
35
1940
45
1950
55
1957

catch has fluctuated greatly and, in general, rather slim. Even the years of good returns were marked by wide fluctuation. In 1940 there had been a record catch of 2,400,000 hectoliters (234,000 metric tons) and another high of 217,891 metric tons in 1944. In 1952 only 32,040 metric tons were taken. This fall in the catch was also accompanied by a shift in area of landings. In 1944 99.5 per cent of the landings were in the north but only 24.4 per cent (7,827 metric tons) were landed in the north in 1952.[2] The newly constructed processing plants in the western half of the north coast, if they had not stood idle, operated at a much reduced capacity. The pattern of the catch moved eastwards and those plants on the eastern part of the north coast were operating almost beyond capacity.

The difficulties in economic development and planning under the conditions of shifting and falling catch are obvious. The concentration of plants at Siglufjordur, once in central location with respect to areas of catch, now represents an economic liability. Herring salting time is short in the summer and the export of salted products depends on a large shifting labor force from other parts of the island. The meal and oil processing, on the other hand, requires considerable outlay of capital for plant and requires a more steady source of labor. The population of Siglufjordur was 2,740 in 1955; unemployment is generally very high as the meal and oil plants sit idle.

---

[2]Malmstrom, A Regional Geography of Iceland, p. 155.

The reason for the drop in herring catch was purely biological, for there was neither a reduction in the number of vessels engaged nor in the capacity of the processing plants. It has only been in the early 1900's that anything was known of its morphology and biology.

The herring is a pelagic fish which belongs to the great open seas. Saemundsson (1897) proved that there was only one specie of herring in Icelandic waters (Clupea harengus). He also formed the basis of distinguishing between two races of Icelandic herring—the spring spawning and the summer spawning—because he observed that the herring caught off the north coast in summer were not in spawning condition, and herring caught at the same time in the southwest (Faxafloi) were spawning.[3]

Saemundsson expressed the belief, held for many years, that the spring-spawning herring of the south coast, after they have spawned, move up the west coast to the north coast where they form the basis of the extensive summer fisheries there. It never was known where they go in May and June; after the autumn equinox the herring disappears from the north coast and moves far from land, probably to the south and west.

Fridriksson (1944) expressed doubt about the north coast spring-spawning herring laying their eggs on the south coast. He claimed there were very few traces seen of extensive herring spawnings off the south coast. He added that the shallow sloping coast and surf far out, prevailing wind, and soft bottom make the south coast at this time

---

[3]B. Saemundsson, "Sild og Sildveidar", Andvari, Vol. 26, 1901, pp. 124-127.

anything but favorable for spawning. He thought at that time that the north coast herring may spawn in Norwegian waters, spending the earlier part of their life there and moving into colder water with age. It has been shown that the herring off the north coast is much older (average age 8-10 years) than either the southwest coast or Norwegian spring-spawning herring, and therefore larger. In general it is larger and heavier and with a greater growth rate in the western part of the north coast as compared with the east. The enigmatic wandering of this fish when it disappears entirely from the areas it has visited for many years is the subject of controversy and, as expressed above, of quite an economic impact on the economy in general.[4]

Fridriksson, through a series of herring-tagging experiments, showed recently that the Icelandic summer herring stock has its home in the Norwegian Sea.[5] In winter the herring makes for the Norwegian coast to spawn. This influx is the basis for the great Norwegian winter herring fisheries which take place on the western coast from January to April. After spawning, a few weeks pass before the eggs hatch; the tiny herring larvae are then carried away by the current. Large quantities of young herring drift out to sea; others develop and grow up along the Norwegian coast. These may remain in coastal waters from three to five years. After this they head for the open sea and do not return until 4-7 years old and on a spawning migration. These same herring after

---

[4] A. Fridriksson, "Nordurlands Sildin" (The Herring of the North Coast of Iceland), Rit Fiskideildar, No. 1, 1944, pp. 1-340.

[5] _____, and O. Aasen, "The Norwegian-Icelandic Herring-Tagging Experiments", Rept. on Norwegian Fish and Marine Investigations, Vol. 9, No. 11, 1950.

spawning make their way to Iceland where they form the basis of the summer fishing off the north coast. In summer of 1950 it was discovered that large shoals of herring spend their time in the open sea between Jan Mayen and the east coast of Iceland; this might account for their disappearance from Iceland's north coast. Later in the autumn and winter of the same year the Norwegian oceanic exploration vessel "G. O. Sars" observed how the herring assembled in the North Atlantic and began their spawning migration to the Norwegian coast.

In the past few summers Icelandic and Norwegian research ships have been engaged in the investigation of the sea currents and of the herring migration in the sea between Iceland and Norway. It seems that ocean currents are probably the chief factor influencing the migration of the herring. From the research it may be concluded that the herring goes northwest from Norway and then in a southerly direction to the north coast of Iceland. A rather extensive record of temperature measurements seems to indicate that the optimum temperature for the herring fisheries is between 6° C. and 8° C. On the route southward to Iceland a branch of the cold Arctic current is encountered; this current is flowing south in a direction towards an area somewhat north-east of the Faroe Islands. Fridriksson and other biologists are of the opinion that this cold current retards the migration of the herring in a westerly direction to Iceland and that it is the strength and direction of this cold water which is causing the disappearance of the herring from the north coast. It is also to be noted that the temperature

of the sea off the north coast during the summer months has been higher than previously and this might also be a factor in the eastward trend of the shoals.[6]

The Icelandic summer spawning herring spawns at the south and southwest coast in March and April and also partly in June and July.[7] Little is known about its migration and it is mainly in the summer and autumn that this herring has been caught, mostly in the vicinity of Reykjanes. It has twice moved into the fjords of the southwest, and then formed the basis for the good fishing in the winters of 1946-47 (140,000 hl.) and 1947-48 (1,800,000 hl.). This unusual catch came during a bad period for the north coast fisheries, but even with the southwest catch only about 130,000 barrels were salted in the period 1945-1951. From 1949-1951 one-half the salted herring was prepared in the south of the country, mostly at Akranes and in the Westmann Islands.

In December 1946 herring was detected by echo sounder in a small bay near Reykjavik and fishing started on a rather large scale in January 1947. The herring were there in great abundance but owing to the lack of suitable fishing gear, not many boats participated. Even so, it was the first time that herring fishing on such a large scale was carried out at the south coast and the total catch was 12,600 metric tons.

In the end of October 1947, after a disappointing summer season, herring were discovered in great abundance in Hvalfjordur a few hours

---

[6] Fridriksson, "Boreo-tended Changes", p. 30.

[7] A. Eydal, "Some Aspects of the Herring Fishery and Herring Industry of Iceland", Proceedings, 8th Gen'l. Assoc. and 17th Internat. Geog. Congress (IGU), 1952, p. 613.

sail north of Reykjavik. A few boats started fishing there until the end of November but there was unfavorable weather and the catches were not good. The fishing increased by mid-December and continued until February 1948. There were some 150 boats operating and the total catch was 171,000 metric tons. Even in the regular summer season off the north coast, it is not usual to fish this great a quantity. Most of the catch was transported at great expense by truck and ship to Siglufjordur to be processed in the meal and oil factories. Because of the disappointing summer seasons, these unusual winter catches were of great importance and new plants were built in Faxa Bay to take care of the catch in future years. A factory ship was ordered in the United States, which could have repaid its cost in a good month, but the herring has not since returned to the southwest and these investments could not be used. This equipment was financed through an ECA loan of 2.3 million dollars and, because of subsequent failure in the herring catch, Iceland incurred a reduction of foreign exchange proceeds.

In some of the most recent investigations on herring distribution and hydrographic conditions carried out in the summer of 1954 to the north and northeast of Iceland, it was found that its main food (Calanus) was rather scarce at all times and was mostly found in isolated areas where in most cases the herring was also observed. It was found that north of 67° N the concentration of herring increased and off the northwest coast near the boundary of the East Greenland Current the shoals seemed to be especially dense and numerous. Herring was also

observed in the whole area between Langanes and Jan Mayen.[8] This seems to substantiate the belief that the herring has moved further out to sea to the northeast.

Not too much work has been done recently on the two types of herring in Icelandic waters. It seems to be thought now that the catch in the north is a variable admixture of Southern Icelandic herring and "the oceanic herring which resembles the Norwegian tribe".[9]

In 1952 50 new herring drifters replaced the wartime losses, and ironically enough in that year the catch was the lowest since 1925. The catch remained low until 1956 when 100,500 metric tons were landed. Another good year in 1957 enabled a growth in exports, which Iceland greatly needed to offset increased import and consumption at home. Before the widely fluctuating catch of recent years, herring exports averaged 1/3 of the total value from exports (Fig. 22).

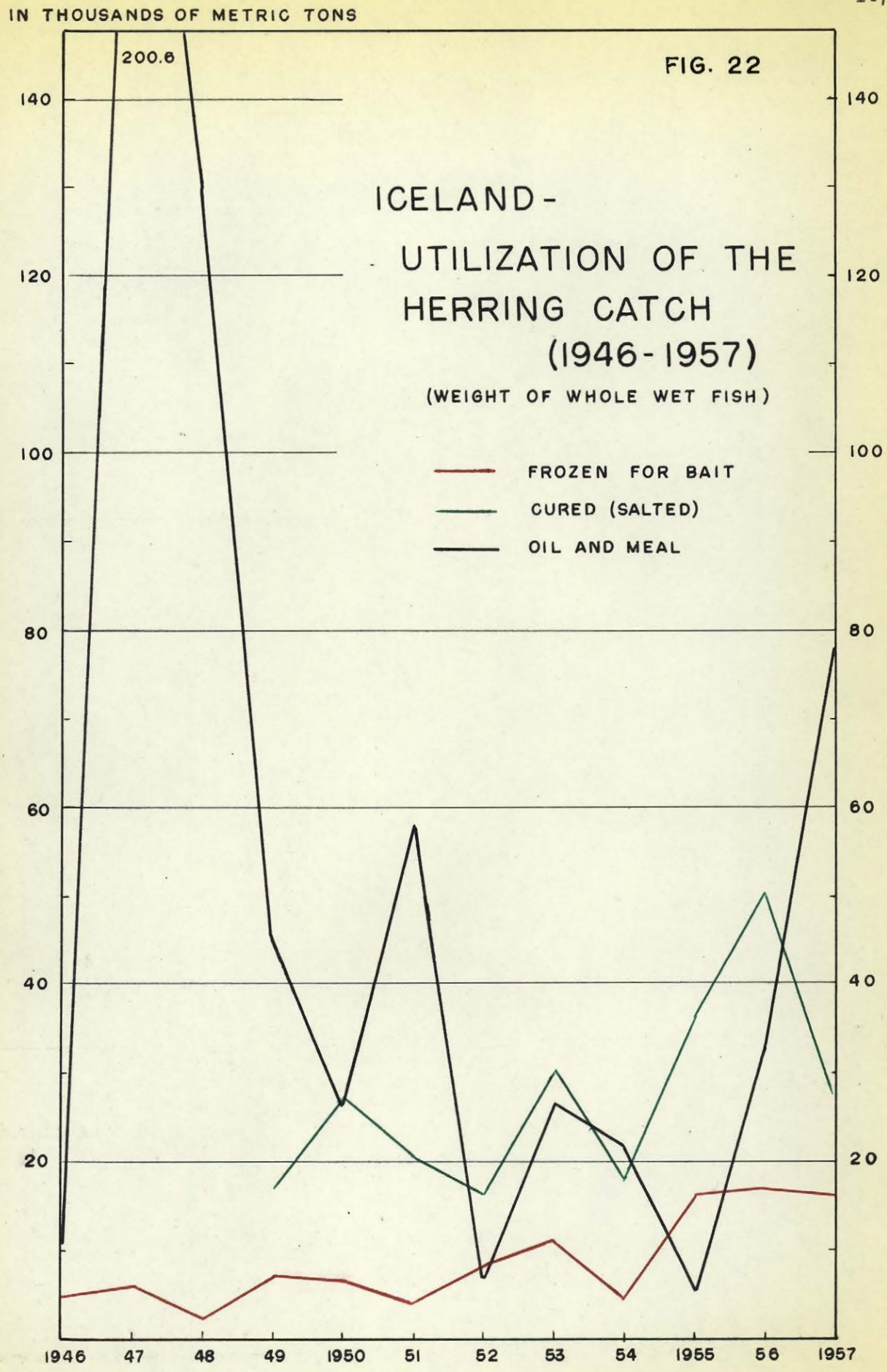
Vessels and Gear

Before World War II, steam ships as well as motor boats were active in the herring fishery; of the 300 vessels participating, 20 per cent were steam, half of which were trawlers. The many trawlers engaged in the herring fishing during the summer season of 1939 were responsible for one-fourth of the catch. Throughout the war years, however, they fished exclusively for cod and ran the iced fish to the British Isles. The steam vessels and trawlers are very suitable for supplying the oil

---

[8] J. Jonsson and U. Stefansson, "Sildarrannsoknir 'Aegis' Sumarid 1954" (Herring Investigations with the Research Vessel 'Aegir' in the Summer of 1954), Fjolrit Fiskideildar, No. 5, 1955, p. 20.

[9] Ibid., p. 22.


IN THOUSANDS OF METRIC TONS
200.6
FIG. 22
ICELAND -
UTILIZATION OF THE
HERRING CATCH
(1946 - 1957)
(WEIGHT OF WHOLE WET FISH)
FROZEN FOR BAIT
CURED (SALTED)
OIL AND MEAL
140
120
100
80
60
40
20
1946
47
48
49
1950
51
52
53
54
1955
56
1957

and meal factories; they can range farther than the smaller boats, and are especially navigable and speedy. The smaller boats are used mostly for supplying the herring to be processed by salting. They are cheaper in management than the steam vessels, but the hold capacity is considerably less. Some of the smallest motorboats of 10-20 gross tons fish with drift nets; others work together in two's and three's with a purse seine, their average size being about 50 gross tons.

The purse seine is by far the most important method used to catch herring and supplies 95 per cent of the catch. Two other methods are used to a lesser extent: the set net (sättgarn) and the drift net (drivgarn). The latter is used almost exclusively by foreign fishermen around Iceland. The herring caught in this way are larger and of better quality than those caught in a purse seine, and demand the best price.

The purse seine method is well-known and is based on the fact that herring go in schools and feed near the surface. The airplane and helicopter have become especially useful in tracking herring shoals and thereby save the herring fleet a laborious search. Purse seine fishing near Iceland has been profitable at times of herring abundance, but for it to succeed requires many years of expert training and experience. The fishermen meet all possible difficulties, which need skill and perserverance to overcome. It may be difficult to sail sufficiently close to the herring shoal. If the herring are feeding on crayfish which are slow swimmers, this is not a problem. But if they are feeding on small fish which are good swimmers, the shoal will be small and great difficulty will be experienced in encircling it with the net.

The weather has a great influence upon purse net fishing. Storms, of course, hinder such fishing outside of where the coast gives protection. If the water surface is cool, the herring go down to a greater depth than equipment can reach. There is the same result after a rain or when the sun is shining brightly. The best fishing weather is during a cloudy day, at dawn or at dusk.

Near Iceland the cuttlefish is the herring fisherman's worst enemy. It often appears in summer, when the water is warm, and follows the herring shoals in a large school. It forces the herring to scatter close into the coast which renders purse seining impossible.

Utilization of the Catch--Introduction

In the early years after the beginning of the herring fishery the entire catch was sold to Norway for salting; during World War I, herring began to be processed in Iceland and in 1928 a state monopoly took over marketing and production. Around the beginning of 1900 the use of herring for bait was increased; a freezing plant had been built in 1895 for bait freezing, and only eight years later forty freezing places had been erected. Because of the great fluctuations in herring catch, the market for bait and salted herring became glutted when the catch was rich. At these times large quantities of fish could not be marketed and much was wasted. To take care of the surplus and of the waste from the salting, herring oil and meal factories were built. The first was built in 1911 and before the outbreak of war in 1914, five factories had been built; but the bulk of the catch was still salted until 1930 when the herring industry began to develop rapidly. The

year 1927 was such a good one for herring that part of the catch was turned over to make herring meal and oil which was to become an increasingly important product. The First World War and the following crisis had hindered development, but near the middle of the 30's a new expansion wave began in which the processing capacity was trebled. During World War I much herring had been fished near Iceland, and nearly all was salted and sold at good prices. But after 1930 an average of 70 per cent of the catch was sent to the oil and meal factories. By 1937, 90 per cent of the catch was being turned into meal and oil and the amount being salted depended entirely on the market conditions at the time. In that year Iceland fished 2 1/2 times more herring than ever before in her history. Other Scandinavian countries were active in Icelandic waters but only accounted for 38,000 out of the total catch of 234,321 tons. Half of the foreign take was landed in Icelandic ports to swell the islanders already large catch of 196,000 tons. The following year, although not as productive, saw more of the fish cured by various methods, and 348,000 barrels were turned out.

Salted herring is a more valuable product than meal or oil and the Icelandic herring is of especially high quality; great effort was expended in standardizing the maintenance of quality and uniformity in the processing operation. In 1934 the Icelandic Herring Board (Sildarutvegsnefnd) was created whose function was to issue salting and fishing licenses, establish a minimum price for fresh herring delivered to the salteries, and a minimum export price for the salt herring.

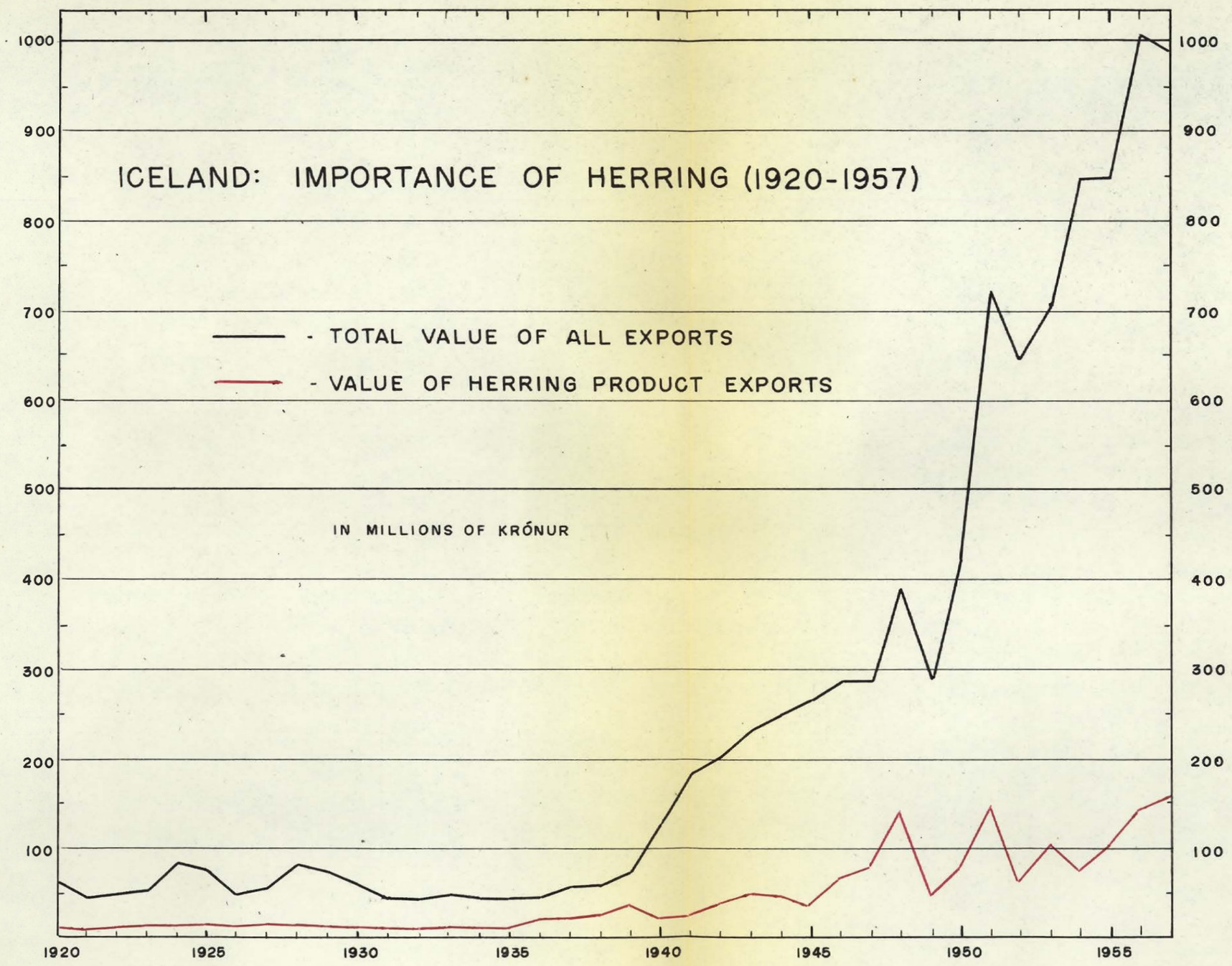
Utilization of the Catch--Methods

The herring is preserved with more varying and diverse methods than any other fish (Fig. 23). To heighten its flavor the herring is variously dried, smoked, salted, hermetically canned, spiced, or frozen. Unlike most other European countries, Iceland now uses a considerable part of the catch for the production of meal and oil. First, however, a consideration of the other processed forms: icing is the cheapest, but although iced herring from the spring catch of the south or east coast used to be sent to Germany, this method is no longer important.

The herring is still sold for bait, but now usually in frozen form. It is frozen during the summer herring season and sold to the small boats fishing cod with long line in the beginning of the late winter-spring season. During recent years the quantity frozen for bait has usually been about 5,400 metric tons annually, and if there is an autumn catch off the southwest coast, it is used for this purpose.

The oldest method of preparation is hard salting, a process which dominated the industry until the end of the 1920's. Coarse salt is used, the proportion being about 80 pounds of salt to a ton of herring. This method produces a very durable and lasting product which can be stored for a year or more. All the salting processes are done in barrels, either with fresh herring or after it has been rubbed with salt in large troughs. The herring is placed in a barrel and layered with salt which finally dissolves in the water contained in the fish. The herring settles and the volume diminishes after a few hours after which more herring is added so that the barrels are completely topped up

FIG. 23


ICELAND: IMPORTANCE OF HERRING (1920-1957)
- TOTAL VALUE OF ALL EXPORTS
- VALUE OF HERRING PRODUCT EXPORTS
IN MILLIONS OF KRÓNUR
1000
900
800
700
600
500
400
300
200
100
1920
1925
1930
1935
1940
1945
1950
1955

before closing. After some days a concentrated brine is added through the bunghole to ensure that the barrel is full and then the bung is hammered in. After some weeks (or months, depending on the process) the herring is ready. During this period the brine is homogenized by occasionally rolling the barrels, which must have a temperature preferably not exceeding 10° C. If the temperature is much cooler than this, the herring cures too slowly. The barrels must be kept out of the direct sun, for if the temperature is too warm they are cured quickly enough but at the same time other processes occur which spoil the quality of the finished product. The herring now has a softer consistency and it acquires a certain flavor.

In the 1930's, after repeated attempts, the Icelanders worked out the matjes method; herring for this product should be young and not sexually mature. This method of preparation was modeled after the Scotch plan but it was later modified according to Icelandic conditions. The matjes method is very promising, since the product is of extremely high quality, but the treatment as well as subsequent storage requires the skill of experienced workmen. After some of the difficulties were ironed out the Icelandic matjes herring soon became well-known on the market. The preparation is basically similar as that of hard salted herring, except that the fish are cleaned. They are laid down in the barrel in brine with the belly open. Only very fine salt is used for this type. The quantity of salt used is only one-half as much as is used with hard salting but it varies with the size and fat content of the fish. The salt concentration in the brine is a little under 20 per

cent, and therefore does not give the protection as does the hard salting with its high concentration. It is a more delicate product and its storage offers great difficulties. The storage temperature must preferably be -1° C. to -2° C.; the barrels must be made of prime material and perfectly tight. Although the processing and storage requirements are most exacting, this type of herring has many fine qualities. It has just enough salt that it can be eaten directly and it has a tasty aroma and very high nutritive value. Because of its higher quality, matjes herring has been sold at a 50 per cent higher price than the common hard salted herring, but because it finds sale in different markets than the other salted types it has little effect on the production of these kinds.

Spiced herring is prepared with salt, sugar and 1-1 1/2 kg. of spice for every ton of fish. Between ten and twenty different spice types may be used. This herring is sold mainly to Sweden and Denmark where it is prepared into gaffelbitar or herring tidbits.

Sugar-salted herring, like the spiced is also used in Denmark and Sweden to make herring snacks. It is durable and gets a delicate flavor from the mixture of 15 kg. of fine salt to 6.5 kg. of sugar.

Since World War II only cut and cleaned herring has been produced in Iceland. This method not only increases the durability but the contents suitable as food are cheaper and more herring can be packed in a barrel. The freighting costs and eventual customs are the same per weight ton though. The disadvantage of this type is that the herring has a different taste when it is cleaned. The advantage of durability, however, makes up for this.

Since the beginning of herring salting, Sweden has been the largest and best market country for the Icelandic herring. Sweden has steadily bought more than one-half of the entire production. Other good market countries have been Denmark and Finland. But in the last few years there has been a shift of markets and Finland, Russia, and East Germany are buying a great portion of the production.

The shortage of wood in Iceland means that barrels and barrel-making material must be imported. In recent years an essential part of the Icelandic barrel needs has been supplied through the import of loose barrel material and the final constructing of the barrels has been done in the binderies in Iceland. This precludes payment of freight costs for whole barrels which are of relatively low value and very bulky. Since huge piles of barrels must be stored at the salting places before the beginning of the salting season in order to be prepared for whatever amount of catch is made, it is difficult to get freight for the return trip at this time. The salting season is very short (one month) and if a huge catch is taken there would be no time for the ordering and shipment of additional barrels. The vessels delivering salted herring to Sweden and Denmark at the close of the season used to get whole barrels as return freight from Norway. The freight costs could be brought down even further by filling some of the barrels with salt, sugar or spices.

Although the Iceland herring is of the Atlantic-Scandinavian stock, it differs from the Norwegian herring in that in Norway it is caught during the spawning season in the winter, when it is very lean. In Iceland it is caught in summer during its feeding migration when it is

very fat. Herring caught in the early part of the summer is often not more than 9 or 10 per cent fat, but they fatten very quickly and by August have often as much as 20-22 per cent fat. Early in the summer, most of the herring caught are taken to the factories, and salting begins in July. The Icelandic herring is fatter and larger than any other herring species, averaging about one pound. It is very tasty and is so fat that its caloric value exceeds that of most other kinds of food. In one kilogram of cod there are about 770 calories, in the same quantity of lean meat just over 1,000 calories, in salted North Sea herring with about 15 per cent fat, 2,200 calories, and in salted Icelandic herring with about 25 per cent fat, 3,100 calories, or three times more than in lean meat.[10] The Icelandic herring is always in great demand. Since herring treated for human consumption always brings higher prices than that made into oil and meal, great opportunities await Iceland through increasing the value of the herring catch by curing a larger proportion of it as food for human consumption, especially during present times when the nations of the world suffer from an ever increasing food shortage.

For a great number of years the capital of the herring fisheries on the north coast was Siglufjordur. Indeed, this town was one of the most important herring fishing towns in the world. Up to World War II more than one-half of all the curing stations in Iceland were there and over 5/8 of all meal and oil plants were located there. This town

---

[10]Eydal, "Some Aspects of the Herring Fishery", p. 615.

is favorably situated in a fjord on a large cuspate foreland, with an excellent, well-protected harbor and was centrally located before the recent eastward shift of the herring.

Since 1945 when the pattern of herring migration began to change, the salting center has moved further east. Rauferhofn is now the largest salting center, and more than 25 per cent of all the curing stations are on the northeast and east coast, where no herring was salted before the end of World War II (Map D).[11]

The third method of processing the herring after freezing-icing, and salting is the production of meal and oil. Much of the herring caught cannot be used for human food either because deterioration has begun or it is not fat enough and of suitable quality. Previously the capacity of the processing works was so small that herring had to be stored in a basin while waiting for processing. There was alot of decay and the herring was hard to work, many valuable materials were lost through some ingredients becoming soluble and washing away. If the herring is not processed in a fresh state, vitamins, as well as fat, are broken down and harmful materials appear which at high temperatures decrease the quality of the oil and meal. Now, however, Icelandic herring meal is of excellent quality. All the herring factories are new or have been recently modernized and the increased capacity means that the herring is quite fresh at the beginning of the processing. Unloading of the herring from the ships has been speeded up. Previously the fish were shoveled by hand into a big barrel which was mechanically lifted and dumped into trucks which are driven to the factory. By this method

---

[11] Ibid., p. 614.

100-150 hectoliters an hour could be unloaded. Now the largest factories have installed automatic unloading devices which are capable of handling 500-600 hectoliters an hour. Thus a trawler of 3,000 hectoliter capacity will save 18-20 hours in unloading. This is especially important when the catch is good and time is essential. The herring is boiled for about two hours after which the oil is pressed out; the mass which remains is dried and packed into bags as meal. It must be pressed right away after cooking otherwise it sours and 1/3 of the vitamin content can be lost. If the herring is rotten, the meal content can go down by one-half. The best yield of meal is 17 per cent of the weight of fresh herring. On the average, just as much weight in oil as meal is gotten from the herring. The quality of the oil depends on the content of free fat; when this goes over 5 per cent the herring oil is used only for technical purposes. The oil is used in various ways. It is still exported in the crude state, but refined oil is used in Iceland for the manufacture of margarine and soap. The development of refineries will become possible only when sufficient electric power is available at the herring stations. The price for oil is subject to great fluctuations. The price was set at its peak near the end of World War II. It was particularly high in 1951, but much lower in 1952. It is exported to a number of countries but chiefly to Great Britain and Norway where it is hydrogenized.

Herring meal is rich in nutritive values, albumen fats and phosphorus and very suitable for domestic animal fodder. Home consumption is increasing but over 80 per cent is usually exported to Germany, Holland and Belgium for a good and constant price.

In the past the herring fisheries were considered a gamble, which could easily give high profits; and there was no widespread recognition of the need for extensive research and planning. Being not only a highly variable but also a seasonal type of fishing, interest seemed to slacken in the autumn, only to awaken again in the spring after government budgets and plans for development had been decided. The result was a stagnation in the herring industry compared with other activities. Much research was given over to agriculture but, until recently, little to the herring. Perhaps the recent low catches spurred on more effort to solve the enigmatic problems caused by a fluctuating herring catch. In 1949 Eydal wrote that "the high standard of living in Iceland would be unthinkable without herring".[12] In the 1930's it was seen that the herring saved the country from bankruptcy many times. In 1947 and 1948 herring oil, which was much sought after at the time, was sold at below world market price with an agreement with the purchasing country to buy with the oil a certain amount of frozen fillet of cod, which was having difficulties on the market.

With the more favorable catches during the three years after 1955, Iceland has some hopes that the herring will be able to contribute more effectively to the export trade. The processing capacity is available as well as trained personnel to take care of the landings. The herring industry is affected by the shortage of labor although alot of the salting

---

[12] A. Eydal, "Naagra Drag i Islands Näringsliv av i Dag", Ymer, No. 1, 1949, p. 1.

can be done by women and children who have traditionally taken care of this form of preparation. During the first nine months of 1958 USSR and Sweden were the chief markets for cured herring, each purchasing about one-third of the total export. Finland and East Germany accounted for the other one-third. The export of salt herring during this period of 1958 represented about 8 per cent of Iceland's total export and was much more significant than either herring meal and oil or frozen bait export. The latter export was bought up entirely by Czechoslovakia, East Germany and Poland.

The cured herring bought by Sweden is in turn processed into a valuable canned product of varied forms, usually in different sauces. Iceland might well consider the feasibility of such forms of processing herself. Before going ahead with bold plans of capital outlay in this field, however, extensive market analysis programs would have to be carried out to determine product acceptability on the part of potential consumers. Fish canning never has progressed to any great extent in Iceland, but with the experience of modern methods this scheme should at least be considered.

VII

POPULATION AND OCCUPATIONS, THE KRONA, AND FOREIGN TRADE

Population and Occupations

Population movement in Iceland conforms largely to the characteristic and general trend in Europe during the past century, i.e., the movement from rural to urban areas with concomitant industrialization and mechanization. In Iceland there has been a marked shift in the regional distribution of population and, since 1900 each area has experienced a relative decline except the southwest. Most of the population shift has been towards Reykjavik and surrounding area (Kopavogur and Hafnarfjordur) with some growth also in Akureyri in the north.

In the beginning of the 19th century Reykjavik was the only town and its population of 307 inhabitants comprised 0.6 per cent of the island's population. In 1955, Reykjavik's population of 63,666 made up 40 per cent of the island's inhabitants; 40,000 people lived in 13 other towns representing an additional 25 per cent of the total population (Fig. 11). In addition, it should be noted that there are many villages with larger populations than some of the smaller incorporated towns. Present-day Iceland, as a result, shows less than 25 per cent of its people scattered through the rural districts.

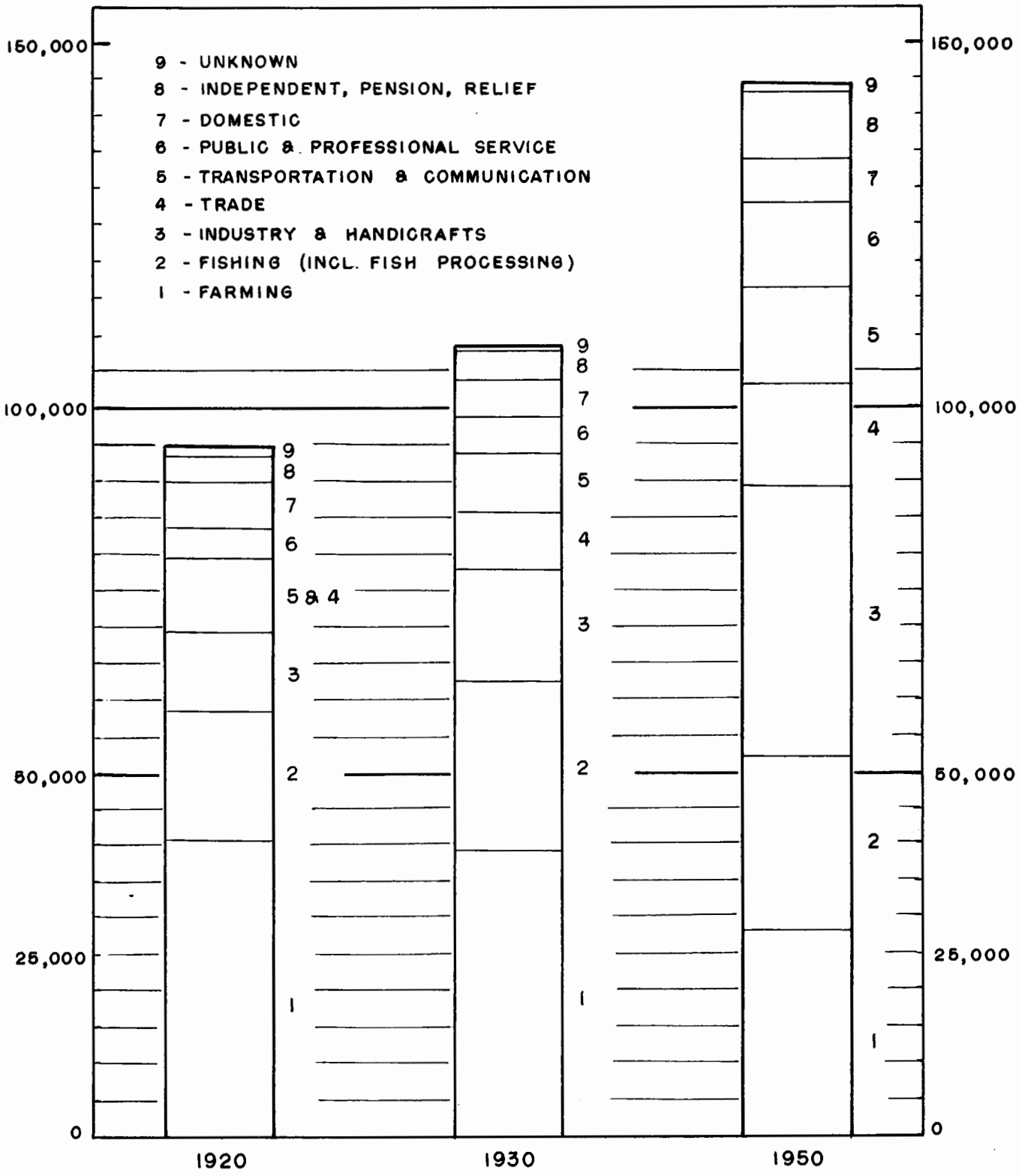
Other than the movement toward Reykjavik and other urban settlements there is a seasonal migration of people finding work in the fishing industry, both in actual fishing and also in fish processing. It is difficult to get an accurate picture of this seasonal movement, for

little statistical material is found describing it. It is reasonable to assume that because of the time involved in coastwise shipping and the condition of the roads, most people coming into the southwest at the beginning of the cod season in January will use the airlines. This is, in fact, substantiated by an upswing in air traffic. After the cod season is over, many workers go north for the summer herring fishing; this is at the same time that the University closes, and many students find occupation in the summer herring fisheries of the north.

As regards total numbers of participants, fishing has never been a leading occupation in Iceland. For many years agriculture was the first occupation, but it was topped by industry in 1950. Fishing is, of course, more important than agriculture in the towns and villages. To give an idea of the present-day decline of the fisher-farmer relationship, in rural areas the agricultural income is supplemented by only 1.6 per cent by fishing today. This is the chief source for supplementary farm income but it includes fresh-water salmon and trout as well as the lumpsucker, a salt water fish.

Figure 24 shows the distribution of population according to occupation and its trends since 1920. The distinct decline of farming as an occupation is noticeable, as well as of fishing. Farming, as an occupation, has not only suffered a relative decline with the increasing population, but it has also suffered an absolute decline in numbers. With the continued labor shortage in Iceland, the fisheries have been hard hit. Because an average of 2,500 workers are employed in construction work at the NATO air base at Keflavik, people from Germany and the

ICELAND – OCCUPATION STRUCTURE OF THE POPULATION



Faroe Islands have had to be called in to man the trawlers. The higher wages paid at Keflavik puts the fisheries at a disadvantage, although the pay on trawlers and small boats is relatively high. Manning of the trawlers was made even more difficult in 1953 when wages for seamen on motor boats was raised 20 per cent. Men from the trawlers went over to the smaller boats and could make as much money in the four-month spring small boat season as they could in one year with a trawler. Trawler captains can make up to 200,000 kronur per year ($13,000). In Norway the proceeds of the catch are distributed roughly 1/3 for equipment, 1/3 to the men, and 1/3 to the trawler owner. In Iceland approximately 60 per cent of the proceeds of the catch go to the men, in addition to a special bonus for the weight of cod-liver oil rendered aboard. The high wages which must be paid in the fisheries to keep up the exports put Iceland at a distinct disadvantage in competing on the world market, and the wages are kept still higher by competition from the construction firms at Keflavik.

The fishing life is not an easy one in the northern oceans. Voyages last upwards of three weeks and time spent on shore between unloading and re-supplying is three or four days, or even shorter if the season has been a good one. Aboard the trawlers, men work around the clock, six-hour shifts on deck alternated with six hours of leisure and sleep. The work is usually heavy and, in the winter and spring fishing, very cold. Because of severe icing and high seas in the winter months many ships have been lost throughout the years and this is true to this day.

On land, the increasing mechanization and diversification of fish processing has meant an increase in the number of persons employed in manufacturing. In the villages, one-quarter of the people are occupied in industry, and half of these are employed in manufacturing associated with fish production. Only in Reykjavik, where industrial employment is most diversified, do so few people engaged in manufacturing actually work in the processing of fish products.

It can be seen that in Iceland today, with the declining rural population, fishing is mainly an occupation of towns and villages. In 1950 nearly 65 per cent of those people supported by fishing lived in towns and villages and a further 21.3 per cent lived in villages of 300 or more inhabitants. Thus fishing is an "urban" economy, and the reason for the location of almost every coastal town or village is fishing. With its warm springs and greenhouses Hveragerdi in the southwest is the only town in Iceland which is not located on or very near to the coast and has nothing to do with the fishing industry.

The Value of the Krona

In order that some of the charts and tables showing production and export in terms of value of Icelandic kronur shall not be misleading, it is necessary to keep in mind the changing value of the krona. In discussing foreign trade using monetary value of exports and imports a slightly erroneous impression is likely to result. Figures seemingly indicating increase of exports may actually reflect a rise of price level rather than any real increase in the amount of goods traded. For example, the Icelandic exports of 1954 totalled 845,912,000 kronur ($137,500,000) which was an increase of 637 per cent over the value of

exports in 1935, but only an increase of 284 per cent in quantity.[1] To avoid confusion and to remain officially accurate, the figures used in the composition of charts and tables is that value quoted by the Statistical Bureau of Iceland. In doing this, it is true that at times the real value of goods is obscured by the krona being pegged at too high a value on the world market. There have been several devaluations (1949, 1950) in recent years and it is generally conceded that the krona is presently pegged too high in value of gold exchange. It is often difficult, therefore, to get a truly comparative picture of Iceland's growth. The tonnage of the various export products is perhaps the only accurate indicator--although to show the relative importance of each product in the total export, krona values and their percentage of total export value give a clear picture in the analysis.

The economy of Iceland was in great difficulty from 1930 until the Second World War, difficulty caused by low prices brought by Icelandic exports in foreign markets and a loss of certain markets (clipfish) in some of the Mediterranean countries. As a result of the Spanish civil war the market there for clipfish was closed entirely (Spain had, in certain years, accounted for 40 per cent of Iceland's total export value). Finally in April 1939 a devaluation of the Icelandic krona toward pound Sterling was resorted to, from 22.15 kronur to 27 kronur to the pound, and a corresponding amount in other countries. When the pound Sterling began to depreciate in the autumn of 1939 and fall below a certain amount, the krona, by law, began to follow the dollar value. In 1949

---

[1] Statistical Bulletin (Hagtidindi), 1936 and 1955.

when the pound was devalued towards the dollar by 30.5 per cent the Icelandic krona followed suit. After the war, as local prices and costs of production continued to rise, the export industries were unable to pay their way at the prices obtained for the products in foreign markets. It was then necessary to prevent shut down in production by the payment of subsidies out of the Treasury, and it soon became evident that the Treasury could not face these expenditures. A further devaluation of the krona was necessary in March 1950 so that the rate of exchange then equalled 47.70 kronur to the pound Sterling, and that towards other currencies amended accordingly. These devaluations account for apparent discrepancies in the table showing price indices (Table 10). The cost of living index on this table was based on 100 again from March 1950. By May 1956 the index stood 81 per cent above the 1950 base and 877 per cent higher than the 1939 level. Early in 1960 it was announced that the krona had been devaluated again but, as the latest statistics are not available, it is not discussed in this paper.

Foreign Trade

The growth of Iceland's foreign trade was, as in all other countries, adversely effected by two wars and the world-wide depression of the early thirties. In addition, Iceland suffered from the lack of diversity in her foreign export, as well as great fluctuations in the fishing. During 1915 and 1916 the fishing industry was able to expand its fleet due to the rise in the price of fish on the world market. The number of motorboats increased greatly from its number of 23 in 1914. In 1917, however, Iceland was not able to import enough fuel oil for its fishing

Table 10

PRICE AND COST INDICES*

	Price Indices					Wage Rates	
Year	Gold Value of kronur in Dec	(1) Imports	(2) Exports	Average of (1) & (2)	Cost of Living Index	Building Index	Kr/hr in Dec	Index
1939	33.82	100	100	100	111	100	1.45	100
1941	33.96	166	233	200	177	133	2.54	175
1942	33.96	205	247	226	272	286	5.46	377
1943	33.96	236	212	224	259	340	5.44	375
1944	33.96	231	217	224	273	356	6.64	458
1945	33.96	214	221	218	285	357	6.96	480
1946	33.96	217	250	234	306	388	8.03	554
1947	33.96	244	272	258	328	434	9.13	630
1948	33.96	275	278	277	326	455	8.40	579
1949	23.59	274	259	267	340	478	9.24	637
1950	13.53	456	384	420	127	527	10.70	738
1951	13.53	588	472	515	151	674	13.31	918
1952	13.53	602	485	543	162	790	14.60	1007
1953	13.53	553	480	516	158	801	14.60	1007
1954	13.53	532	479	505	160	835	14.69	1221
1955	13.53	528	488	508	174	904	17.56	1239
1956	13.53				186	904	17.96	

*Bjornsson, "Iceland, A Geog., Pol., and Econ. Survey", 1952, p. 32 and 1957, p. 1004.

fleet or enough salt for curing the catch. The prices for other fishing equipment had risen greatly and, because the fish catch in 1917 was a poor one, Iceland sold ten of her trawlers (which comprised one-half of her fleet) to France in 1918. After the First World War, economic conditions in Iceland were very difficult. The trawler fleet, halved to 13 by the sale to France, was increased to 28 ships in 1920. Iceland had quite alot of trouble paying for these trawlers, and some orders had to be cancelled before delivery causing great losses.[2] But the fishing fleet had to be expanded at all costs.

Figure 12 shows the overwhelming importance of fish products in the Icelandic export. In 1957 the total exports were valued at 986,618,000 Icelandic kronur, of which 901,441,000 Icelandic kronur (or 91.3 per cent) represented fish or fish products.[3] This has been true ever since the beginning of the modern Icelandic fishing industry, and it is obvious that this great lack of variety in the exports makes the country vulnerable to the great fluctuations which characterize the fish markets of the world. For many decades the traditional markets for the main products of the Icelandic fisheries have been in Southern Europe and South America for salted fish, and in the United Kingdom and Germany for fresh fish. Frozen fish, which has risen to importance only recently, and stockfish, which has regained some of the status it had held for centuries, have gained footholds in many different markets. Herring products have traditionally been shipped to the Scandinavian countries.

---

[2]Chamberlin, "Economic Development of Iceland", p. 68

[3]Statistical Bulletin (Hagtidindi), 1957.

Iceland's realization of her vulnerability in the fluctuating fish market resulted in an attempt to increase the number of areas in which she traded and to be as adaptable as possible not only to meet current demands but to assess the future market trends. Table 11 shows the changes which have taken part in her trade from the 1930's to present day. In 1930 58 per cent of the total value of fish products exported went to Spain, Italy, and Portugal, and, as Hanson wrote in 1927:[4] "Iceland's prosperity varies with the price Spain pays for fish". At this time the export was predominantly uncured and cured salt fish to these Mediterranean countries, but by 1938 only 18 per cent went to these countries. In the 1930's Iceland began to feel the effects of adverse bi-lateral trade agreements with nations who were the chief customers of her goods, but who could not supply any of the basic items for which Iceland had vital need. In 1933 Italy, Spain, and Portugal were the best markets for clipfish (Iceland's leading export at the time), but they ranked fifth, sixth, and ninth respectively among the nations supplying Iceland's imports.[5]

At this time Iceland was beginning to lose Spain, her best market, who was in the midst of civil war and having great monetary difficulties and trying to restrict her imports. Iceland was unable to make any great trade concessions in order to save this market as most of Spain's products were considered luxury items: wine, fruit, etc. Unable to

---

[4] Hanson, "The Renaissance of Iceland", p. 57.

[5] Chamberlin, "Economic Development of Iceland", p. 74.

Table 11

ICELANDIC FOREIGN TRADE BY COUNTRIES (1936 and 1956)

Country	1936 Imports (C.I.F.) In Thousands of Kronur	1936 Exports (F.O.B.) In Thousands of Kronur
Austria	-	10
Belgium	305	791
Czechoslovakia	47	42
Danzig	73	-
Denmark	6,699	3,578
Faeroe Islands	1	8
Finland	63	-
France	189	885
Germany	9,488	7,432
Great Britian	10,019	6,971
Greece	7	61
Irish Free State	7	9
Italy	2,291	2,786
Netherlands	813	1,575
Norway	2,871	4,807
Poland	660	539
Portugal	305	6,038
Russia	1	345
Spain	1,710	1,362
Sweden	4,469	4,092
Switzerland	30	24
Argentina	43	245
Brazil	336	483
Canada	68	2
Cuba	107	375
Curacao	414	-
United States	536	5,311
West Africa	-	92
Philippines	56	-
Japan	16	-
Other Countries	7	5
Not Specified	-	371
TOTAL	41,631	48,239

Country	1956 Imports (C.I.F.) In Thousands of Kronur	1956 Exports (F.O.B.) In Thousands of Kronur
Austria	911	100
Belgium	21,330	2,970
Czechoslovakia	7 ,340	60,156
Denmark	8 ,862	23,045
Faeroe Islands	3	508
Finland	58,493	47,224
France	11,161	14,583
Germany (East)	39,716	30,086
Germany (West)	142,039	96,137
Greece	1,795	15,317
Hungary	2,641	1,336
Ireland	233	5,250
Italy	28,041	53,022
Luxembourg	559	-
Netherlands	64,615	29,033
Norway	33,795	4,234
Poland	25,324	14,261
Portugal	450	51,202
Rumania	1	-
Spain	43,008	31,055
Sweden	50,842	35,696
Switzerland	8,585	732
Trieste	-	13
United Kingdom	134,803	96,391
U.S.S.R.	240,751	203,026
Yugoslavia	-	434
Argentina	151	-
Brazil	41,136	30,552
Canada	3,864	64
Cuba	12,273	8,545
Curacao & Aruba	19,390	-
Puerto Rico	-	42
United States	246,601	127,645
Uruguay	919	18
Venezuela	79	287
Brit. poss. in Africa	85	37,439
Egypt	33	1,917
French poss. in Africa	1	3,139
Liberia	46,836	7
Spanish poss. in Africa	1,221	-
Brit. poss. in Asia	637	299
Ceylon	127	-
India	1,760	-
Indonesia	35	49
Israel	14,186	5,533
Japan	1,608	-
Philippines	2,353	-
Thailand	325	-
Other Countries (15)	150	169
TOTAL	1,468,068	1,031,516

Table 11

import a greater volume from Spain and Italy, Iceland saw her exports of salt fish decrease to these two countries. In 1933 she exported 21 million kronur worth of salt fish, but by 1937 this volume had fallen to less than three million, with little increase of sales of this product to other countries. After this, in the mid-1930's, Iceland turned to a development of her herring fisheries with large sums of money being invested in this branch.

At the same time trade agreements were concluded with Germany and Great Britain which were not actually to her advantage, with Iceland being "forced to buy inferior goods which were more expensive in markets which she otherwise would not have cultivated".[6] In 1938 the most important market, therefore, was Great Britain for iced and frozen fish and salt fish. Other countries buying exports at this time were the United States (cod-liver oil and salted herring), Norway (herring meal and oil), Sweden (salted herring only), Germany (herring oil, salted herring, and iced fish), Holland (herring meal), and salt fish only to Spain, Portugal, Italy, and Brazil. The Spanish civil war was not the only factor in the eventual change of market pattern. The Mediterranean countries lacked the foreign exchange and had to barter directly, which was unsatisfactory to Iceland because the basic needs of the island were not able to be supplied by these countries. Even before World War II there had been a marked decrease in the salt fish export, and the war, shutting off all the markets but one, cut off salt fish export entirely.

---

[6] Ibid., p. 78.

During the war a large proportion of the exports went to Great Britain. Icelandic fish and fish oil were desperately needed and high prices were brought for them. Under a special agreement between Great Britain and the United States, it was decided to include Iceland in the lend-lease agreement, so that Great Britain could re-export lend-lease goods to Iceland.[7] Later on, when it became evident that in the long run Great Britain could not cope with the demand from Iceland, the United States agreed to buy the whole of the Icelandic fish catch for a year on behalf of Britain, and pay for it in dollar credits. In addition, the United States bought for herself the entire herring oil production and about 25,000 tons of herring and other meal in 1942. As a result of this increasing intensity of trade with high prices during the war years, Iceland was able to build up large credits of foreign currency abroad. In 1944, 90 per cent of the export value went to Great Britain, which bought all the catch of iced fish, herring meal and oil, almost all the frozen fish and salt fish, and one-quarter of the cod-liver oil. In that same year a majority of the cod-liver oil, most of the salt herring and all the stockfish went to the United States.

This was the beginning of a most prosperous period in Iceland's history, which saw living costs soar and many novel economic difficulties set in. The change in importance of product from cured to fresh fish had a serious effect on the fish-drying industry. By the country being "occupied" by allied troops during the war, Iceland ". . . soon found

---

[7] "Iceland's Problems", The Economist, Vol. 143, August 22, 1942, p. 236.

the expenditures of the forces comparing not unfavorably with the value of her exports and providing a very substantial portion of her total National Income".[8]

After peace was restored, export to the other European countries began again, most to Sweden and France, the exports consisting mostly of herring, cod-liver oil, and frozen fish. In the post-war period most European countries concentrated on the reconstruction and development of their fishing fleets and only little attention was given to the need for corresponding outlets for the increased supply. This expansion of the fleets took place at a time when there was still a scarcity of food but, very soon, the threat of surplus appeared. This, of course, led to severe marketing difficulties especially for Iceland, whose total export, comprising only a moderate share of European production, and whose home market for import goods being minute, had little effect in the determination of prices on the world market. During the postwar expansion Iceland benefitted from her large foreign reserves in being able to increase her fishing fleet and import capital goods to her advantage. This prosperity gained during the war, however, resulted in a severe monetary inflation which was made even worse by this extensive postwar investment program. The war and the military expenditures on the island (an amount estimated to have been 600 million kronur, accounting to a large degree for the foreign reserve accumulation[9]) increased the real standard of living which was not matched by an equivalent rise in productivity and this particular situation was a prime factor in

---

[8] Chamberlin, "Economic Development of Iceland", p. 99.

[9] The Northern Countries, Uppsala: Almqvist & Wiksells Boktryc., 1952, p. 74.

Iceland's difficulties, and still is to this day (Table 10). This condition was coupled with the aforementioned disruption in the pattern of trade by which her exports were formerly marketed. It is well here to re-summarize these two major changes effected during World War II. Before the war, as has been made clear, the cost of essential imports was met by the sale of fish products which constituted, as they do now, more than 90 per cent of Iceland's exports. The general standard of living was relatively low as compared with other European nations, and was rather more in proportion to the country's producing power than is true today. Iceland had a surplus in the dollar area, but the effects of the world depression had been more prolonged in Iceland because of the civil war in Spain, which interrupted her main market. During the Second World War two major changes took place: first, a real improvement in the standard of living took place because of expenditures of the allied garrison in Iceland and because of an unlimited demand for fish at increasingly high prices. Even with the increased imports, however, the supply of goods lagged behind receipts from abroad, resulting both in an increase in foreign exchange reserves and an intense inflation. Foreign exchange reserves in all currencies reached an all-time high of about 89 million dollars in November 1944.[10] The cost of living advanced about 300 per cent and increases of wages and purchasing power were even greater.[11] This inflation, which was largely unchecked by the government until 1947, lifted production costs to such a degree that

---

[10] Statistical Bulletin (Hagtidindi), 1945.

[11] Ibid.

some Icelandic products had to be subsidized to be sold abroad. Out of a total budget of 214 million kronur in 1949, 60 million kronur in subsidies was listed under expenditures, and 21 million of this was directed to fish production.[12]

The second change effected was the gross disruption of the normal pattern of Iceland's trade during the war. European markets, excepting only the United Kingdom, were virtually cut off; almost all imports had to be obtained from the United States or Canada. Immediately after the war the European countries were unable, for the most part, to provide Iceland with its necessary imports and the need for dollars to pay for exports from the United States therefore continued, but the end of the war and the withdrawal of the allied garrison abruptly terminated Iceland's extraordinary sources of dollar revenues.

During the postwar years, imports on a large scale were continued through the use of accumulated reserves which fell resultingly (Table 12) from their peak of 89 million dollars in 1944 to less than one million dollars in 1947.[13] A substantial portion of these imports was used to modernize the fisheries with the hope of offsetting higher labor costs by more efficient production. This program was not fully realized, but it did generally benefit the country's economy without, however, succeeding in counteracting all the effects of the inflation.

In 1947, with foreign exchange reserves almost exhausted, plus the postwar marketing difficulties accentuated by the high cost of production

---

[12] Iceland - Country Study, United States Economic Cooperation Administration, Washington, D. C.: Superintendent of Documents, 1949, p. 18.

[13] Ibid.

Table 12

ICELAND: DIFFERENCE IN EXPORTS AND IMPORTS IN THOUSANDS OF KRONUR*

Period	Imports	Exports	Difference
1896-1900	5,966	7,014	1,048
1901-1905	8,497	10,424	1,927
1906-1910	11,531	13,707	2,176
1911-1915	18,112	22,368	4,256
1916-1920	53,709	48,453	- 5,256
1921-1925	56,562	64,212	7,650
1926-1930	64,853	66,104	1,251
1931-1935	46,406	48,651	2,245
1936-1940	57,043	74,161	17,118
1941-1945	239,493	228,855	- 10,638
1946-1950	478,924	337,951	-140,973
1951	923,964	726,631	-197,333
1952	909,813	641,322	-268,491
1953	1,110,436	706,414	-404,022
1954	1,130,488	845,912	-284,576
1955	1,264,294	847,853	-416,441
1956	1,468,068	1,030,957	-437,111
1957	1,358,446	986,618	-371,828
1958 (Jan-Nov)	1,193,354	966,216	-227,138

*Statistical Bulletin (Hagtidindi)

caused by inflation, Iceland requested assistance from the United States under the European Recovery Program (Marshall Aid). In the years 1948-49 she received over 8 million dollars, used mainly for the maintenance of dollar imports of vital necessities, grain, and fuel, as well as the development of an ambitious program of building up the fisheries by the purchase of fishing vessels, construction of fish-processing plants, quick-freezing plants, and the modernization of existing plant facilities and equipment. This program increased the productive capacity of the fisheries by an estimated 50-75 per cent above prewar. Due to a fluctuating fish catch, however, full utilization of this potential was not realized. Some of the money was invested in herring-processing plants and a cannery in the southwest after the unusual catches of 1947-48 and 1948-49, but the herring did not return after those years. The freezing of fillets increased considerably, but the sale of this and some of the other fish products was, and still is, adversely effected by high prices as compared with those of other producing countries. By steady government control, the import of consumer goods was held in check while the exports showed a considerable rise.

In 1948 the total landings of fish increased to 409,208 metric tons which was 22,000 tons less than in 1947. The decrease was due mainly to smaller landings of herring also slightly less cod. There were, however, notably larger landings of saithe, redfish, and catfish. During 1948 substantial changes took place in marketing. The transport of iced fish by fishing vessels themselves to foreign countries was 143,000 tons compared with 72,000 tons in 1947; the export of fresh

fish on ice by freighters was 11,000 tons as opposed to 2,000 tons in 1947. In 1948 76,000 tons were frozen, 42,000 salted (75,000 in 1947), and 130,000 tons used for oil and meal (200,000 in 1947).[14]

In 1949 there was a notable recession in international fisheries products and marked signs of declining prices. The herring oil price dropped noticeably in 1949 and, as a result of declining prices and in the absence of a corresponding decline in operating costs, there were great difficulties in sustaining profits and maintaining wages.

The increased postwar production was already a matter of concern in July 1949 when the OEEC (Organization for European Economic Cooperation) Fisheries Sub-Committee convened. One of the main topics discussed was the surplus threat--meaning by surplus the quantities which could not be sold at prices acceptable to the producer. In its report the Sub-Committee stated that the only solution to this problem was "to produce as much salted and dried fish as markets can absorb and, at the same time, to make all efforts to market as much as possible in other forms".[15] The Committee's fears concerning fresh fish were confirmed, for the plans to expand fishing in many cases were often based on an optimistic view of the market possibilities. In 1950 there was a general drop in prices, in spite of which there was a considerable reduction in the fresh fish trade between countries.

It was felt that frozen fish should play a more important role in the European market. OEEC experts found it was impossible to draw

---

[14] Statistical Bulletin (Hagtidindi), 1947 and 1948.

[15] Fish Marketing in OEEC Countries, Paris: Organisation for European Economic Co-Operation, 1951, p. 22.

general conclusions concerning the species preferred by European consumers, because this varied by country and by regions within each country. They did find that there was a "general and growing desire to buy fish in a form which is easy to prepare",[16] therefore more and more fish was being sold filletted. The development of frozen fish, although considerable since World War II was hampered by unfortunate experiences regarding quality, and with few exceptions (Switzerland) frozen fish was not generally well accepted.

On March 20, 1950 Iceland devalued the krona to stimulate her fish export. At this same time there was an important tendency in European fisheries, that of declining imports into Germany. As a result, Iceland, which had exported most landings as fresh or frozen fish to Great Britain and Germany for several years before 1950, made plans for the production of large quantities of salted cod, and production of both wet and dried salted cod increased by 180 per cent.[17] As the world production of this commodity had already reached pre-war level, there were great marketing difficulties for this form of export. At the same time there was a noticeable decline of catches in the North Sea, and growing emphasis placed upon European participation in the fisheries of the northwest Atlantic. There continued a substantial mechanization of fishing vessels with the new craft emerging from postwar reconstruction with greater efficiency than the old units. In 1950, Iceland suffered a prolonged

---

[16] FAO Bulletin, Vol. 5, No. 1, 1952, p. 14.

[17] FAO Bulletin, Vol. 4, No. 4, 1951, p. 11.

trawler strike which, although fish imports to Germany were decreasing, made it impossible for Iceland to complete its contract for delivering fresh fish to Germany.

Although there was some resistance to the product, Iceland continued developing the quick-freezing industry. In 1949 56 per cent of the groundfish catch (total 268,000 metric tons) had been landed in Europe as iced fish, 29 per cent was landed at the freezing plants for processing, and 15 per cent used for salting. The frozen fish and fillets were marketed in America, but mostly in Europe. The amount going to European markets was 91 per cent of the frozen fillet production, equivalent to 26 per cent of the total catch. To America went only 9 per cent of the frozen fillet production, which represented 3 per cent of the catch. At this time, because of expanding production on the continent and rising costs of production at home, Iceland realized that she faced the loss of European markets for both iced and frozen fish. The development of Iceland's frozen fillet industry occurred during a period of great need for its products. There was no difficulty in disposing of all that could be produced. But the conditions were changing in 1949-1950, and a competitive situation arose on the world markets which prevented profitable operation. The necessity for the payment of subsidies continued at an increasing rate, so that Icelandic products would be able to compete favorably with those of other countries, and this placed a heavy burden on the government which had to levy higher and higher import duties in order to subsidize the fisheries.

In the years 1950 and 1951, when prices of fish oils were favorable on the world market, the trawlers had caught big quantities of fish for reduction in the oil and meal factories. A large proportion of this catch was redfish, which is fat and yields considerable oil. The great price reduction in fish oils since 1952, however, forced the trawlers out of this fishery, with an increasing amount of redfish going to the filletting and freezing plants. This was based on the fact that the frozen redfish fillets found a ready market in the United States where "fish-sticks" were becoming a popular food. The market situation for salted and dried fish was favorable in 1952. The main markets for stockfish were West Africa (Nigeria), and despite the big increase in production, no difficulties were encountered in marketing. The clipfish markets in Spain and Brazil were being built up after long interruption, but difficulties were still caused by the fact that trade between Iceland and these countries had still to be carried out on a bi-lateral clearing basis. The comparatively small variety of products these countries have to offer as payment for fish and the limited market for these products in Iceland set a rather narrow limit to the trade in this case. Italy was by far the most important market for wet-salted fish in 1952 with an export to that country of 33,000 tons. This was such an unusually big export for one year that some reluctance in this market to accept more fish the following year was noted.[18] In 1952 the export of salt herring was about 12,000 tons with Finland and Sweden being the main importers followed by Poland and Denmark.

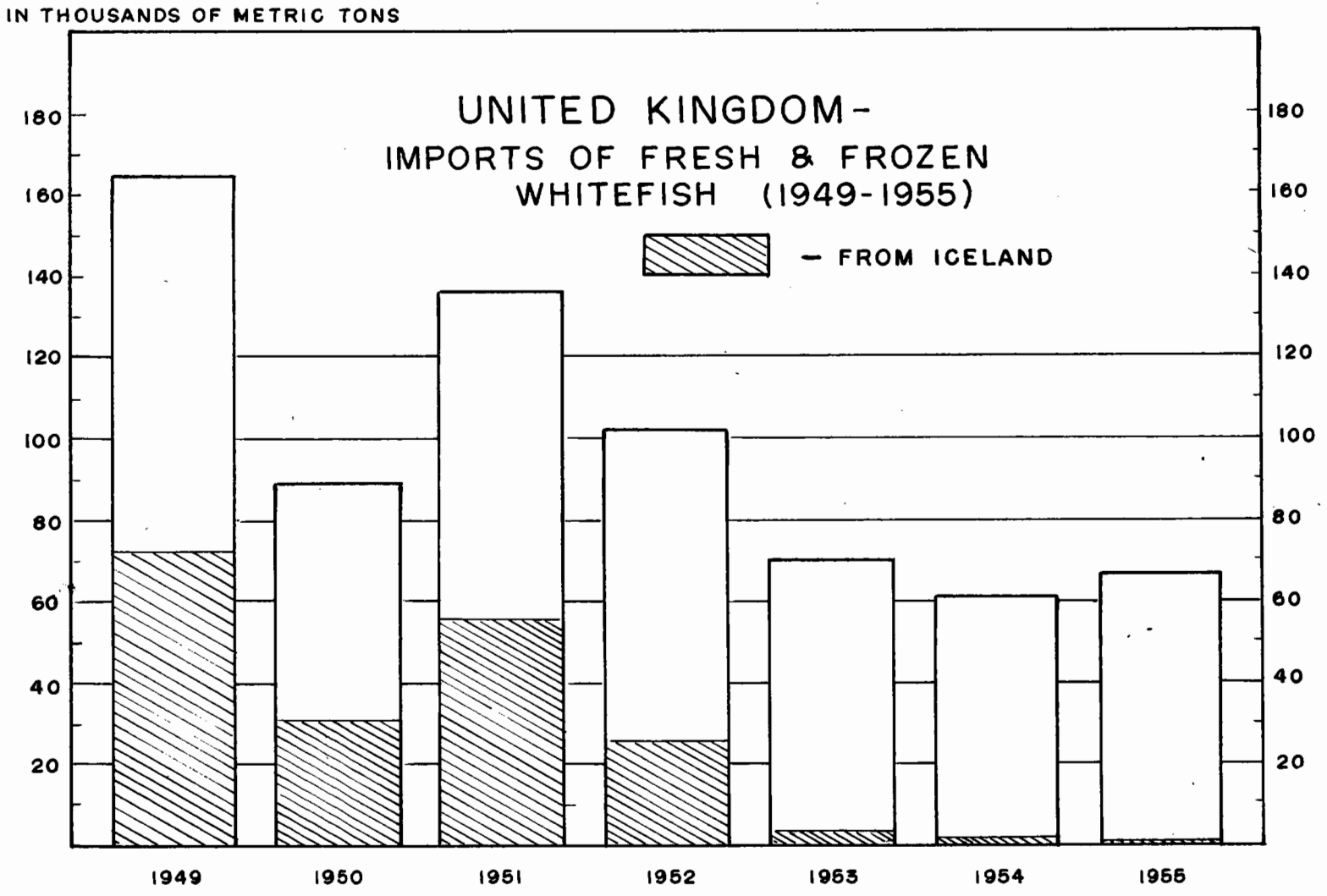
---

[18] D. Olafsson, "Icelandic Fisheries and Exports", in Fisheries Yearbook and Directory 1953-54, London: British-Continental Trade Press Ltd., 1954.

One characteristic of the catch in 1952 and still more in 1953 was a decrease in the catch of flat fish. This was due to new fishing limits which went into effect in May 1952 and prohibited all fishing with trawl and Danish seine nets within a four-mile limit determined by straight lines drawn across all bays and fjords. Despite the fact that the catch of flat fish is small, it remains a valuable one especially for the small fishing boats. The new fishery limits of 1952 (discussed more fully in Chapter 8) seemed necessary to avert a serious development of overfishing. This new limit had its effect in marketing, as the Trawler-Owners Association of Great Britain, in retaliation, instigated a ban on the landing of fresh fish from Icelandic vessels in British ports. At this time about 1/4 of the groundfish caught by Icelandic trawlers was being landed and sold in the United Kingdom (Fig. 25). This landing ban only tended to accelerate the trend in Iceland towards more freezing, salting, and drying, which had been going on since the war. The suddenness of the developments in Great Britain required immediate action. The increased salting and sale to Italy was mentioned above as was the sale of dried fish to Africa. Despite the partially successful search for alternate outlets, Icelandic storehouses continued to bulge through the winter of 1952 and into the next spring. In April 1953 the USSR offered to buy 21,000 tons of frozen fillets, and at that moment Iceland's entire production was 25,000 tons.

At the end of World War II there was a period of short duration when the government was composed of the Conservative and Communist parties of Iceland in coalition. At this time the Soviet Union negotiated for the purchase of some frozen fish but soon afterward purchases stopped

FIG. 25



SOURCE: OEEC, 1957

and notes from Iceland requesting this market be opened up again were not acknowledged. Five months after the British boycott, the trade was again opened by the above-mentioned sale, with Iceland selling 14,000 tons of frozen fillets over an 18-month period to Russia.

In 1955 Iceland's exports to the Soviet bloc totalled $4,400,000 and the production of frozen fish doubled from 1953 to 1956. Sales of this product to the United States had been declining, repeal of the protective tariff notwithstanding. Although Iceland had set up some marketing outlets in the USA, the difference in package demands between the US and Russia resulted in market profit differentials for producers. The United States wanted a uniform product individually wrapped in cellophane, while Russia accepted inferior grades wrapped in cardboard boxes. The puzzling situation is, as Malmstrom says, that "the high cost of Icelandic labor results in a net loss on sales to the United States market which is only offset by profits earned behind the Iron Curtain".[19]

In September 1956 a trade agreement was signed with the Soviet Union covering a period of three years and providing for a significant extension of trade between the two countries. Under the agreement Iceland exports mainly frozen fish and salt herring. In 1956 Iceland exported 28,000 metric tons of fish to the USSR. The new agreements made provision for 32,000 tons or 12,000 tons over the old agreement. Iceland in turn receives fuel oil, petrol, coal, and coke, iron and steel, cereals, cement, timber, and automobiles.[20]

---

[19] Malmstrom, A Regional Geography of Iceland, p. 28.

[20] Economic Conditions in Denmark, Iceland, Norway, and Sweden, Paris: Organisation for European Economic Co-Operation, 1957, p. 20.

In 1956 there was a better balance between supply and demand on the labor market. This was mainly the result of a decline in defense construction at Keflavik. Although the shortage of labor was less pronounced than before, large numbers (over 1,000) of Faroese fishermen were still working in the Icelandic fishing fleet during the winter season.

Prices and wages which had been rising steadily were frozen by the government in mid-1956 but rose by 2 per cent after a year. This increasing inflation tended further to broaden the gap between domestic and foreign prices and made the marketing of fish even more difficult (Table 10). In December 1956, an Act was passed to improve the profitability of the fishing industry and try to arrest the inflation. As a result of this Act, export subsidies were increased by 40 to 50 per cent, among other measures of price control and wage freezes. The system of export subsidies and import taxes is not, in itself, conducive to economic stability. Such measures may, in certain circumstances, prove useful as a temporary expedient to overcome short-term difficulties. But export subsidies in Iceland amount at present to 40 to 50 per cent of the total merchandise export value and have become a major factor in the profitable operation of the export industries. The disadvantages of such a system are many, but the obvious one is that the money to finance subsidies is raised by imposing import taxes on certain classes of consumer goods. In order to gain anything at all from this, import licenses must be granted and the necessary foreign exchange for the imports on which taxes are to be paid must be freed. The consequence is interesting, for Icelandic reserves of foreign exchange diminished

rapidly to finance such imports as automobiles etc., which were in one of the main groups to be taxed. By and large this system has left Iceland as badly off as it had been before. Iceland's particular geographic liabilities force her to import most of her necessities (and all of her luxuries). To do this she must export, and with the spiralling inflation she is not able to get along without government aid in bringing the prices down to a competitive level. The presence of the NATO air base has certainly created unnatural economic conditions in Iceland and is one of the main factors in the present situation. It is equally true that Iceland has gained close to 40 per cent of her national income from military expenditures in the past ten years, and when these decline at all, Iceland's deficit in the difference between the value of exports and imports rises considerably. The deficit on the current account of the balance of payments rose from $8.7 million in 1955 to$9.6 million in 1956, as military receipts declined from $13.8 million to $11.6 million. Both exports and imports rose rapidly from 1955 to 1956. The exports rose by 22 per cent in 1956 but fell in 1957.

The growth of exports in 1956 was largely made possible by the better herring catch, and the countries accounting for this growth of export trade were Finland, Spain, Brazil, and some in Eastern Europe i.e., those with whom Iceland had bi-lateral trade agreements. In the early months of 1957, however, when the fish catch fell, exports were only able to expand as a result of a reduction of stocks. In 1957 there was another substantial decline in military receipts (approx. $3.5 million as well as a fall in the total export product value.

In 1958, the latest available statistics on individual markets include only the months from January to November. The total export value during this period was 966,216,000 kronur as opposed to 901,376,000 in the similar period of 1957. The most important market country was Russia which, up until December 1958 had imported 166,316,000 kronur worth of fish--mostly frozen fillets and salt herring. The second most important country was the United States, purchasing 122,070,000 kronur worth of products, mostly frozen fillets and cod-liver oil, but also some quantities of uncured salt fish, salt herring, and fish meal. The Federal Republic (West) of Germany purchased 100,740,000 kronur worth of products including 1/3 of the fresh fish on ice shipped from Iceland, and significant amounts of fish meal, cod and other fish oils, and smaller quantities of uncured salt fish and stock fish. These three countries together comprised over 40 per cent of Iceland's trade in the period 1 January - 1 December 1958. Other market countries in order of their importance are the United Kingdom (73,398,000 kronur), East Germany (67,433,000 kronur), Czechoslovakia (63,087,000 kronur), Sweden (49,345,000 kronur), Portugal (43,989,000 kronur), Italy (32,556,000 kronur), and Poland (32,544,000 kronur). Trade with these countries represented an additional 37 per cent of Iceland's export value, with another 53 countries accounting for the remaining 23 per cent of trade.

The production of <u>fresh fish on ice</u> declined during 1958 to a value of 15,048,000 million kronur (from 23,851,000 kronur in 1957) and the whole production was divided between West Germany (1/3) and the

United Kingdom (2/3) (Figs. 25 and 27). On the other hand frozen fish production increased by 50,000,000 kronur to 351,865,000 kronur with a little under one-half of this going to USSR and 1/3 to the USA (Table 13). Significant amounts of this product went also to East Germany and Czechoslovakia, with smaller quantities to Poland, Israel, the United Kingdom, Netherlands and France.

The export of clipfish also increased during 1958 with most of the production going to Brazil, Jamaica, Spain and Cuba, with insignificant quantities to Venezuela and Panama.

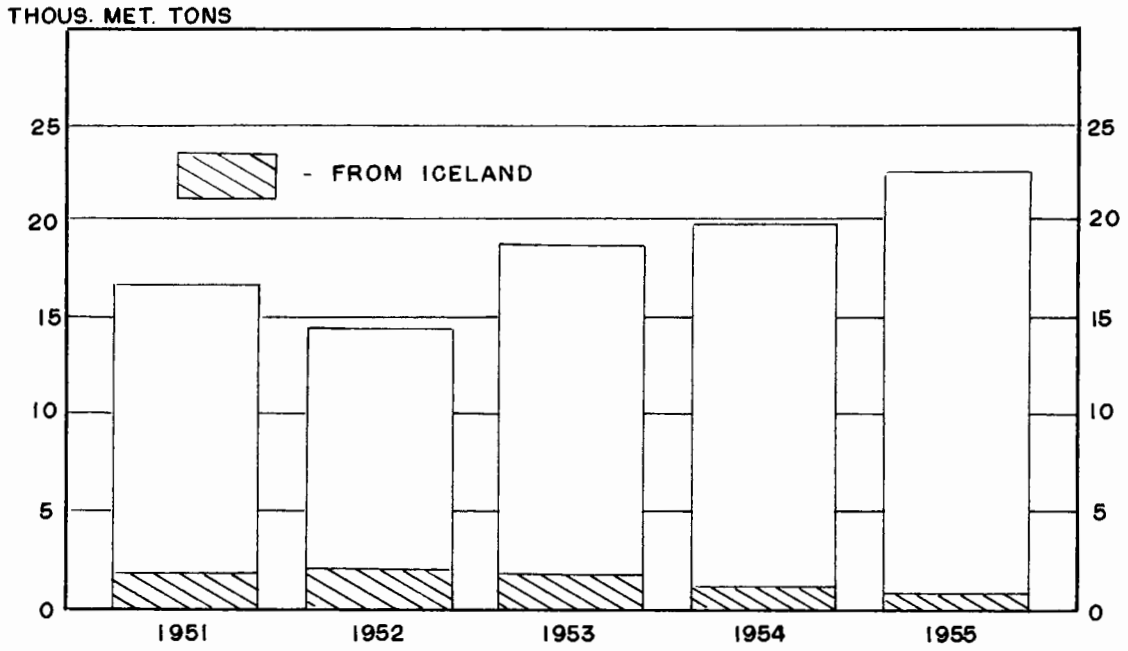
The value of uncured salt fish was lower, with 60 per cent bought by Portugal with important amounts going also to Italy, the United Kingdom, Greece and Egypt.

The stockfish export was also down considerably (from 85,063,000 kronur to 49,205,000 kronur) from 1957, with almost 70 per cent going to Nigeria, most of the remainder to the United Kingdom and smaller quantities to West Germany, Italy, and Finland.

The production of herring was about the same as the previous year, having shown a marked increase since 1955. Czechoslovakia, East Germany, and Poland bought almost the entire production of frozen herring. Two-thirds of the cured herring went equally to Russia and Sweden, with smaller quantities to East Germany, Finland and Poland.

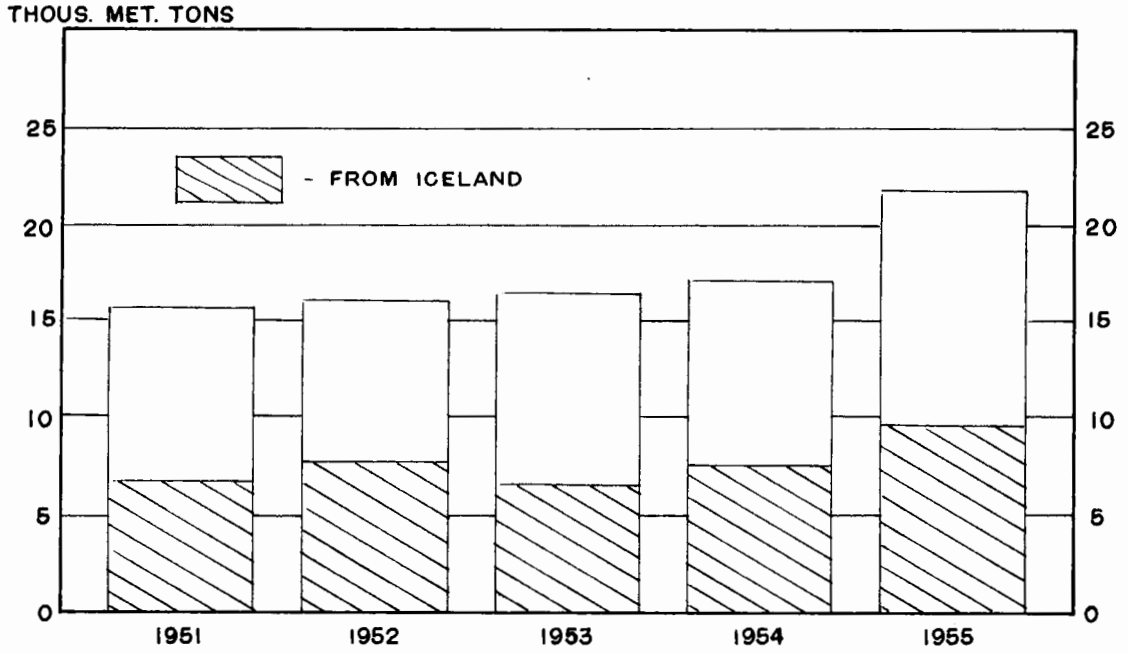
West Germany imported over one-third of the fish meal production and the United Kingdom one-sixth. Smaller quantities went to the Netherlands, Denmark, Sweden, Czechoslovakia, East Germany and Poland. There was a noteworthy increase in the production of fish meal over 1957

FIG. 26.



FRANCE: IMPORTS OF FRESH & FROZEN FISH

FIG. 27.



FED. REPUBLIC OF GERMANY (WEST): IMPORTS OF FRESH & FROZEN WHITEFISH

Table 13

ICELANDIC EXPORTS OF FROZEN FISH 1947-1956 (METRIC TONS)*

	1947	1949	1951	1952	1953	1954	1955	1956
United States	1,100	2,500	15,000	17,100	13,700	19,200	10,900	15,000
USSR	7,900	-	-	-	11,500	19,400	23,800	28,000
United Kingdom	9,300	18,600	8,800	4,600	700	300	100	800
Federal Republic of Germany	-	6,900	-	700	500	-	-	-
Soviet Zone of Germany	-	-	-	1,300	4,700	2,100	3,100	4,100
Czechoslovakia	1,300	3,000	3,000	2,500	1,800	7,700	5,500	7,400
Austria	-	1,000	500	-	-	-	-	-
France	3,600	1,100	1,900	1,800	1,700	1,100	900	800
Netherlands	900	2,500	1,100	100	100	-	100	-
Others	1,400	800	5,500	1,000	2,300	1,900	2,000	1,400
Total	25,500	36,400	35,800	29,100	37,000	51,700	46,400	57,500

*Statistical Bulletin (Hagtidindi).

with most of the increase being attributable to the good herring catch and to increasing quantities of redfish which are being processed into meal and oil.

Most of the cod-liver oil production went to Norway and West Germany, but Poland, USA, and the Netherlands also imported this product. Large quantities of other fish oils were imported by West Germany, Czechoslovakia, Spain, Norway, Sweden, and Poland.

Most of Iceland's imports come from countries with whom she has bi-lateral trade agreements. The countries responsible for most of Iceland's imports are, in order of importance: USSR, USA, UK, West Germany and Czechoslovakia. Smaller, but important amounts come from Denmark, Finland, East Germany, Netherlands, Poland, Sweden, Norway, Brazil, Spain and Italy.

VIII

THE MAIN PROBLEMS AND CONCLUSIONS

The purpose of this concluding chapter is to consider some of the longer-term problems which Iceland faces. They are three in number, and their basic causes are in each case geographical. Stated briefly, the problems are:

(1) Lack of diversity in the country's economic growth arising directly from the natural conditions existing on the island; (2) marketing problems due partly to high costs of production in Iceland and to the increased competition in Western Europe following postwar reconstruction; and (3) international conflict over territorial fishing limits around Iceland, and its relation to the overfishing problem.

Lack of Diversity

It has been said that Nature dealt harshly with the island by covering it with barren lava plains and glaciers, and then compensated for this by surrounding it with rich fishing grounds. The poverty of the land means that the Icelanders must import to live; these necessities are paid for by fish, which in one form or another constitutes over 90 per cent of the exports in every year. This reliance on a single resource is precarious at best, and it is even more so in the characteristically fluctuating fish market of the world. It is impossible to see how Iceland in the near future could vary the type of export to any appreciable extent. It remains to search out other possibilities of income and also ways to decrease the dependence on imports.

In the past ten years there has been a noticeable growth of industry,[1] which produces goods having otherwise to be imported in manufactured form. High protective tariffs have been placed on some items in order to give the growing domestic companies a chance to compete on the home market. This protection, although expensive at first, enables the country to attain a bit more self-reliance than would otherwise be possible. Cheap, abundant hydroelectric power is one of Iceland's chief assets, and this has seen a remarkable growth of installed capacity, especially since 1954. Through Marshall Aid and large loans in Europe several power stations have been constructed, one of which supplies power to a synthetic fertilizer factory extracting nitrogen from the air. The production has been enough to cover domestic needs and has even entered into the export. Iceland's continued industrial growth hinges a great deal on continued development of hydroelectric potential, of which less than 2 per cent is utilized at present.

In looking for other sources of foreign revenue, one of the best possibilities seems to be the development of tourism. It is difficult to get an accurate idea of just how much money is gained by Iceland each year in this way, but it is likely to be in the neighborhood of between one-half and three-quarters of a million dollars annually. Iceland has a severe shortage of hotel space and suitable accommodations are even more difficult to find outside of Reykjavik. The variety of natural wonders on the island and the superb fresh-water fishing will be

---

[1] Bjornsson, "Iceland, a Geog., Pol., and Econ. Survey", p. 995.

the base upon which any expansion occurs. There are several bus and tour companies operating around the island, but lack of accommodation has seriously hampered tourist development.

Spending by foreign military personnel on the island is an important factor about which no accurate figures are available. Receipts of military expenditures on construction etc., are so important that without them there would have to be either a reduction in the standard of living or a tremendous expansion in export or other sources of revenue.

Although the increase in exports would be more favorable in the form of development of new export industries, it seems that any significant increase in exports will necessarily depend on the fishing industry. It should be feasible for Iceland to increase her fish catch to the extent necessary to permit an adequate expansion of exports. Size of the catch in Icelandic waters has been increasing in recent years, as has the use of neighboring waters off Greenland and also as far as Newfoundland. This increase in fish catch will require investment effort and would be negated to some extent should the inflation continue its present trend.

The main problem will be in the marketing of fish abroad, since Iceland will have difficulty in meeting world competitive prices because of high wages and prices at home.

Marketing Problems

The rising inflation in recent years up to the present has seen several characteristic trends. First, the growth of the economy has been very rapid ever since the beginning of the war. Second, demand

at home has usually exceeded the expansion of production and that has resulted in serious inflation and large foreign deficits. And, third, Iceland's trade has been increasingly with countries with whom she has bi-lateral trade agreements, and this has prevented her from choosing the best of the available choices of imports (Table 11). The extent of the growth of the economy may be seen from the fact that the real gross national product per head of population has more than doubled since 1938.[2]

In the early postwar period, with shortage of meat and low fish production in most countries, demand for Icelandic fish was great. Exports of fresh fish on ice to the United Kingdom were held at a high level, salted fish exports to Mediterranean and Latin American countries were resumed and sales of frozen fish became an important item. Exports of herring products fell because of poor catches. The frozen fish was to a great extent sold under bulk-buying arrangements with Western European countries, mainly the United Kingdom and West Germany. A market for this product was developed in the United States; Czechoslovakia imported some and, in 1946 and 1947, USSR bought important amounts but discontinued in 1948. With the growth and change in nature of product the Icelandic freezing industry was greatly expanded with the number of freezing plants rising from 21 in 1938 to 83 in 1953, when the capacity of the industry was more than six times that of prewar.

---

[2]Economic Conditions in Denmark, Iceland, Norway, and Sweden, OEEC, 1957, p. 21.

When the meat shortage started to ease and other countries rebuilt their fishing fleets, the marketing problems became more difficult. The lower prices for fish and the landing ban in the United Kingdom imposed in 1952 greatly increased the difficulties. This was offset largely by sales of other types of fish, mainly salted and dried. It remains though that the total volume of exports to Western Europe has increased but little since 1951, while the Communist bloc countries, who are prepared to pay prices for Icelandic fish which are higher than the world level, have taken an increasing share of Icelandic exports and likewise have supplied a growing proportion of the imports.[3] Selling to these markets involves a minimum of marketing and distribution problems, as well as a standard of product quality and uniformity which is not as high as required in markets elsewhere. One factor which is not in Iceland's favor is the slow rise of fish consumption in Western Europe, especially the acceptability of a product (frozen fish) which has become Iceland's leading export. Frozen fish came into disrepute in these countries during and immediately after the war because of lack of distributive facilities, and some prejudice against this product may still remain although surveys have shown that consumers in Western Europe would like a product in a more ready-to-eat form.[4] Fish consumption has been rising very slowly, but it has only been roughly in proportion to the population growth, and less than production. It seems inevitable

---

[3] "Iceland and its Allies - Part II, The Market for Fish", Manchester Guardian Weekly, August 9, 1956, p. 7.

[4] Fish Marketing in Western Europe since 1950, Paris: European Productivity Agency of the Organisation for European Economic Co-Operation, 1957, p. 55.

that, as a matter of economic necessity, the fresh fish trade will gradually give way to deep frozen products in Europe and that consumption may respond to a wider range of easily prepared fish products. This seems almost inevitable because of the seasonal fluctuations and variability of catch, as well as the perishability of the raw material. In this respect Iceland may well be at an advantage in that a larger proportion of her catch is processed into a frozen product than in other competing nations.

The main obstacles to increasing Icelandic frozen fish exports in Western Europe are a lack of a distribution system and knowledge of the product. Although there should be a large potential market for this product, if Iceland's prices were not too high, a pre-requisite in most European countries will be the development of modern distribution systems for frozen food. It will take time for adequate wholesale and retail storage facilities to be developed, and this will require large capital outlays. Iceland can take only limited effort to this end as her means are small, but a good publicity campaign is entirely feasible. Since she has the product, she should take the initiative in convincing various countries of the possibilities of frozen food distributive systems, which will undoubtedly be built up eventually.

With the lifting of the landing ban in the United Kingdom (November 1956), there is once again a good possibility to increase the exports of fresh fish. Even though an agreement has been made allowing sales up to a maximum of 450,000 pounds each quarter, exports of fish on ice have not resumed on anything like the former scale (Fig. 25). There

is also a growing consumption of frozen fish by the United Kingdom, from 11,000 tons in 1953 to 33,000 tons in 1956, but very little of this has been supplied by Iceland.[5] The possibility of increasing this type of export would be much in Iceland's favor, since it is a more valuable product than fresh fish on ice.

West Germany is the second largest fish consumer in Western Europe. About 19 per cent of the domestic consumption is met by imports and of that amount imported only 15-18 per cent is whitefish, since the domestic fishing fleet is normally able to satisfy demand for most of the year (Fig. 27).[6] There is a 10 per cent duty on whitefish except in the autumn months, and the same amount of duty on salted herring with fresh and frozen herring being duty free.[7] Imports of herring are mainly from the Scandinavian countries and Holland, while imports from Iceland are negligible. There is, therefore, great possibility for Iceland to expand her exports in this scope. German imports of white fish seem to be growing steadily, with Iceland contributing 40-50 per cent of this type. Most of the Icelandic export is fresh fish on ice shipped during the autumn months.

Although the German market for frozen fish is expanding, transport, storage, and distribution facilities for frozen foods are still inadequate. Domestic production of frozen fish was 2,500 tons in 1951, 7,000 tons in 1954, and 15,000 tons in 1955, much of which was exported.[8]

---

[5] Fish Marketing in OEEC Countries, p. 31.

[6] Economic Conditions in Denmark, Iceland, Norway, and Sweden, p. 31.

[7] Ibid., p. 31.

[8] Ibid., p. 32.

It is reasonable to assume that Germany will be among the first of European countries to improve her distributive system and will be an important consumer of frozen fish.

France has greatest demand for shell fish, canned goods, and smoked herring, but Iceland's exports to France are mostly of frozen fish as she does not produce these other types of goods in anything but insignificant quantities. French orders for frozen fish are usually of extremely small quantity which can be supplied by greater advantage by Germany and the United Kingdom by overland transportation in refrigerated railway cars.[9]

Italy imports mostly salted cod, fresh and frozen fish, and canned herring--with smaller quantities of dried fish. Iceland is the largest single supplier of salted cod, accounting in recent years for 1/4 - 1/3 of the imports. Norway supplies most of the stockfish, but Iceland has entered into this market since 1954. Both Portuguese imports of wet salted cod and Swedish imports of salted and spiced herring from Iceland have been very significant and there does not seem to be too much room for expansion at least with the uncertainty of the herring catch from year to year.

In the United States fish consumption seems to have been falling in recent years. There has been a change towards the preference for quick frozen filletted fish, with Iceland supplying 1/3 of the imports of

---

[9] FAO Yearbook of Fishery Statistics, Rome: Food and Agriculture Organisation of the United Nations, Vol. 7, 1956-57.

fresh and frozen ground fish fillets in 1954. Two years later, however, this amount fell to 1/5 of the total or $5 million worth. The tariff quota for 1957 was up to 9.3 million pounds at a tariff of 1 7/8¢ per pound and above that 2 1/2¢ per pound.[10] It does not seem that Icelandic imports are impeded too much by the tariff quota, and there is scope for an increase in Icelandic sales.

The inception of Icelandic trade with certain tropical areas is quite new, especially export of stockfish to Nigeria. There seems to be a possibility of marketing dried herring in the tropics which would be similar to dried bonga which is popular in the Guineas and the Congo. The processing of such a dried and smoked product and production costs involved have still to be satisfactorily clarified and need further investigation. Acceptability tests must be carried out, since the product will not have the same taste and flavor as local products to which the market is accustomed. Dried fish in the form of fish meals seems to be the most acceptable commodity. In these countries dried fish is usually cut up into small pieces and powdered before being incorporated into cereal dishes, so that fish in the form of flour would not be difficult to use in the traditional dishes.[11]

One of the main problems in marketing cured fish products in tropical areas will be to find a sufficiently cheap and efficient packing material. Temperature, humidity, and insects have to be considered.

---

[10] "President Decides against Increase in Tariff on Groundfish Fillets", Department of State Bulletin, Vol. 36, No. 916, 1957, p. 56.

[11] C. L. Cutting, "Fisheries Products for Tropical Consumption", FAO Fisheries Bulletin, Vol. 10, No. 3, 1957, pp. 113-128.

Dried fish products may possibly be protected against the harmful effects of humidity and oxidation by packing in polythene containers, but these wrappers do not usually prevent the penetration of insects.

Of fundamental difficulty in marketing in some of the tropical areas is the low purchasing power as compared with other areas in the world. This is further accentuated by great distances involved and the lack of any vital cargo for the return voyage to Iceland. Because of technical aid and work done in many of the underdeveloped countries which are underfished at present, it is inevitable that Iceland, among other major exporters, will find increasing resistance in world markets, especially in the cheaper forms of fish.

The stability of the Iceland fishery continues to depend heavily on export markets, and the regularity of the catch. The government has done much to promote the former and keep in close touch with the present and potential market requirements abroad. On this basis the government and industry are making continual efforts to adjust and diversify their products to meet all foreseeable changes in demand (Tables 15, 16, and 17). However, any major and substantial recession in the export markets for fish meals and frozen and cured products would have very serious consequences, which, coupled with Iceland's high cost of production might well put her in a very vulnerable position in an industry which is her life-blood.

Territorial Fishing Limits

The development of fisheries biology since World War II has been very remarkable. From the beginning of the present century many nations

have been gathering facts about fish of economic importance and the nature of the waters in which they live. Certain important biological phenomena were recognized, particularly that the fluctuations that appeared in the catches were in large part due to variations in the real abundance of stocks of fish. It had not been fully established before World War II, however, that the abundance of a stock of fish could be affected by the nature of fishing operations carried out on it. Even though North Sea stocks increased during the First World War, it was only upon a repetition of this experience during the Second World War, which coincided with successful development of parts of the theory of fishing, that brought definite proof of the effects of human activities influencing the natural stocks of fish. The spread of conviction resulting from this proof has had two important consequences: (1) governments are now persuaded to have better information on resources accessible to their fishing fleets and (2) it is accepted that there must be positive international collaboration in both the investigation of resources and the implementation of controls of fishing activities.

The problems involved in the study of overfishing and its prevention are complex. One important consideration is that the aims of fisheries regulation as well as commercial fishing itself is to attain a maximum sustained output. This, however, is not the same as maximum stock maintenance, for fishing depletes the stock below their natural maximum; but at the same time it decreases the ratio of older, larger, and slower growing fish (which are more wasteful of food) in favor of a younger stock which, although smaller, are growing more quickly and turning more

of their food into flesh. In a well-fished area the total yearly production of fish will be greater than if the stock is older, as in an area of little fishing. This is true, of course, up to a certain limit after which the stock will become so thin and made up of small fish that fishing is no longer commercially feasible. It is true under these circumstances of overfishing that an increase of fishing effort will not only result in decreased catch per unit of effort but in decreased yearly total production as well. Fisheries regulation, therefore, should work toward the ideal of high production per unit of effort, high yearly catch, replenishment by fresh growth, and maintenance of the stock at its highest possible limit. As can be seen this is not only a long-range biological necessity but it decides the commercial feasibility of any fishery by allowing for a stock maintenance whose yield per unit of effort is such that it will or will not be able to compete on the world market. If longer hours and more days are required to catch a certain amount of fish, the immediate factor is cost of operation, but eventually overfishing will lead to a decreased yearly total catch irrespective of the total hours expended.

After a rough balance has been set up between intensity of fishing activity on the one hand, and the natural productivity of the stocks of fish on the other, it is often at a level unfavorable to man and many fishing industries have been forced to operate at an undesirably low level.

The basic problem is to gain an understanding of the mechanism which enables a fishery to reach a steady state and of the factors contributing to it, especially those factors which are potentially within

man's power to control, i.e., the amount and kind of fishing activity. The final objective is to determine the balance which is most advantageous to man, and to define the regulative measures which are required to achieve it.

It is clear that attempting to obtain the greatest possible yield is not desirable since this would require an intensity of operations whose cost would be prohibitive. If the intensity of fishing is too small the yield would be comparatively little in proportion to the expense involved.

Beverton offers a method which incorporates what might theoretically happen at various stages of intensity of fishing:

> It is necessary to convert the scales of yield and fishing intensity into the economic equivalents of the total value of the animal yield and the total running costs of generating any given fishing intensity. This is perhaps the central problem of fishery economics and it is not a simple one . . . the value of the yield will increase continuously as its weight increases, and running costs will similarly increase as the fishing intensity increases.
>
> The annual profit to the industry at any given fishing intensity can be assessed as the difference between the total value of the yield and the total running costs at that intensity . . . This will always reach a maximum at a certain level or fishing intensity, and become zero where the running costs are equal to the value of the catch.[12]

Beverton points out that the study of the biological properties of a fish population can lead only as far as the yield curve per effort or time in that fishery. The point on the yield curve at which it is

---

[12]R. J. H. Beverton, "Some Observations on the Principle of Fishery Regulation", Journal du Conseil, Cons. Perm. Internat. Explor. Mer, Vol. 19, No. 1, 1953, pp. 65-66.

best for the fishery to operate--the optimum fishing intensity--does not correspond to a maximum yield nor is it determined by any particular biological criterion, but must be decided purely with reference to economic factors and administrative policy.

Huntsman writes that an increase or decrease in yield should not always necessarily lead to obvious conclusions of too much or too little fishing. He cautions to analyse the situation by attempting to separate the various possible effects of different factors. He stresses in particular that the natural fluctuations in the abundance of fish, which have been definitely demonstrated, should be clearly distinguished from any effects of fishing. He claims "the saving of small fish and the protection of spawning fish may not have substantial basis".[13]

It is universally agreed that one of the most critical of the new problems concerns maintaining maximum productivity of stocks of fish around various coasts in the face of the threat imposed by the modern and far-ranging fishing fleets of many nations. These fisheries, of which Iceland is a good example, have been built up and maintained at a high productive level only as a result of much money and effort expended and by the imposition of controls upon fishermen. "The problem now facing governments throughout the world is how to reconcile the legitimate interests of the coastal state in desiring to maintain the productivity of fishery resources off its coast with the established right of all states to fish freely upon the high seas."[14]

---

[13] A. G. Huntsman, "Fishery Management and Research", Journal du Conseil, Cons. Perm. Internat. Explor. Mer, Vol. 19, No. 1, 1953, p. 53.

[14] "U.S. Position on Conservation of Fisheries Resources", Department of State Bulletin, Vol. 32, No. 826, 1955, p. 697.

The present problems in Iceland, therefore, are twofold: to determine in biologic-economic terms whether the stocks of fish in the surrounding waters, upon which the country is vitally dependent, are being subjected to overfishing; and, if this is so, exactly what justifiable procedures should be taken in order to protect and improve this resource. In 1952 and again in 1958 Iceland, claiming that the stocks of fish in the waters immediately surrounding her coasts had been subjected to overfishing and the economy of the country seriously threatened, extended the fishing limits of her waters. This writer is not prepared to attempt to analyze the biologic evidence of such a claim or to decide whether or not Iceland's actions were justified in both cases. It will be sufficient in this concluding chapter of Iceland's problems to discuss some of the evidence which Iceland has cited in this problem of conservation, and also some of the friction which has grown out of both extensions of her territorial waters, which have been unilateral actions.

E. S. Russell was one of the first scientists to outline a suitable definition of overfishing, and to show some of the results of the increased intensity of fishing with larger-sized vessels of greater efficiency and modern innovations of gear.[15] He based some of his conclusions upon observations of the Icelandic fishery. In the cases of the haddock and plaice he believed there was considerable evidence of

---

[15]E. S. Russell, "The Overfishing Problem", Series of four lectures delivered at School of Hygiene, Johns Hopkins University, Cambridge University Press, 1942.

a dimunition of stocks, especially as these were seen to rise considerably during the slack fishing years of the First World War and fall off again after the increase of fishing intensity following the war. As for the cod, Russell cites here the increasing exploitation of a very abundant stock with increasingly high yields; the stock seemed to be getting more dense in spite of the rising intensity of fishing activity. Actually it is known from other evidence that the cod stocks, in the northern waters generally, have greatly increased during this period, owing to large-scale hydrographical changes, which have resulted in the warming of these waters. Russell, then, in the 1930's dealt with three fish in Icelandic waters haddock, plaice and cod and found definite signs of overfishing in the first two but with little evidence for this in the case of the cod.

The present problem, because of the climatic changes which have been observed particularly since the mid-1920's, is to attempt to determine just what the influence of these changes on the fluctuations of certain very important fish stocks has been, as distinguished from any effect of the increased intensity of fishing in the area.

When considered historically, protection of fish stocks in Icelandic waters was paradoxically quite adequate; the fishing methods were quite primitive, the stocks of fish high, but protection was greater in the past than it has been in the last few decades. Although the fishing methods became more advanced and the stocks of fish were being more seriously threatened, the fishing limits were reduced concomitantly. Briefly this paradox may be traced as follows:

(1) From 1631 to 1662, foreign nationals were prohibited from fishing in Icelandic waters to a distance of 24 miles from the coast, and this shut off all bays to fishing also. During the period of 200 years from 1662 this distance of 24 miles was reduced to 16 miles, but there was no real danger of overfishing during this time, the main consideration being that the island's economy should be respected by other nations. In 1859 the limits were reduced to cover the bays plus four miles from straight base lines.

(2) Drastic reduction was made in 1901 with Denmark and the United Kingdom concluding a Convention which adopted the traditional British views as the basis for the fishing limits around Iceland.

As a result of this Convention subjects of Denmark would enjoy the exclusive right of fishing within the distance of 3 miles from low water mark. In bays the three-mile limit was drawn across the mouth where the breadth equalled 10 nautical miles. Thus many of the larger bays and fjords were opened up for fishing, as the map of the old territorial limit in Figure 28 makes clear.

At the time these provisions were enacted, the more advanced fishing techniques of present day were just coming in and no one could foresee the consequences and ultimate threat to the fish stocks that these would represent. It was noticed that the fish stocks increased during the lull of fishing in the First World War, after which, when many nations were building trawlers to be used specifically in Icelandic waters, a gradual decline of stocks was noticed. Various laws were enacted from time to time concerning fishing around Iceland. Under Act No. 5, 1920

fishing by means of trawl is prohibited with the penalty of a high fine and forfeiture of catch and gear. Act No. 45, 1937 forbids the use of seines in territorial waters from December 1 to June 1. These laws referred to activities of Danes and Icelanders, as all other nations were prohibited from operating within the three-mile limit. During the Second World War cessation of foreign activity around the island took place, and the fish stocks showed an increase. With the rapid reconstruction of foreign and Icelandic fleets spurred on by the postwar food shortage, a noticeable decrease in the stocks of some of the more valuable (although not the most important) fish like haddock, plaice, and halibut were observed.

The Icelandic Government had made earlier attempts at conservation upon cognizance of the problem, having participated in Conventions in 1943, 1946, and 1949 on the Regulation of Meshes of Fishing Nets and Size Limits of Fish. Iceland also played an active role in the work of the International Council for the Exploration of the Sea which resulted in 1946 in the recommendation by the Council concerning the closure of Faxafloi, one of the most important nursery grounds for young fish in Iceland, if not the world. Iceland attempted to implement the Council's recommendations by convening a meeting of all the interested States, but this was reluctantly canceled when full participation by important fishing nations was found to be lacking. Although the problem was recognized internationally, very little was done which was adequate.

Iceland, therefore, took matters into her own hands by first passing a law in 1948 authorizing the Ministry of Fisheries, upon consultation

with the Fisheries Society and the Fisheries Research Institute, to issue the necessary conservation measures, within the limits of the continental shelf of Iceland. Next, in 1949, the Convention of 1901 was denounced and in 1950 regulations concerning the Conservation of Fisheries off the northern coast of Iceland were issued. In these regulations, all trawling and seine netting was prohibited to Icelandic, as well as foreign nationals in all bays of the north coast in addition to within four miles from straight base lines drawn across the bays. These provisions did not affect British trawlers until the expiry of the 1901 Convention which, by agreement, had to be two years after the announced (1949) intention.

When the Convention expired in 1951, it was further considered that additional steps should be taken. The Anglo-Norwegian Fisheries case was then pending at the Hague and it was decided best to wait until the decision of this court; when the 1901 Convention expired, British vessels were still exempted from the 1950 Regulations until opportunity was taken to discuss the whole problem in the light of the Hague judgment. Basically, the Hague decision in the Anglo-Norwegian case had to do with Norway's right to close off her fjords for fishing and to choose certain base points in so doing. Norway was upheld but in the majority comments on the case (p. 20 par. 5) it was stated: "The delineation of sea areas has always an international aspect; it cannot be dependent merely upon the will of the coastal state as expressed in municipal law."[16]

---

[16] W. C. Herrington, "U.S. Policy on Fisheries and Territorial Waters", Department of State Bulletin, Vol. 26, No. 679, 1952, p. 1021.

After study of the Hague decision, the Government of Iceland reached the conclusion that it was entitled to the same system as Norway and decided to extend its 1950 north coast Regulations to the entire coast. These regulations, issued on March 19, 1952 and taking effect on May 15, 1952, prohibited all trawling and Danish seine netting off the Icelandic coasts inside a line drawn four nautical miles from the outermost points of the coasts, islands, rocks and across the opening of z all bays (Fig. 29).

The primary purpose of the Regulations, of course, was the protection of the nursery grounds in the shallow waters of some of the bays near shore. Repeated scientific investigations have shown that the bays and other sheltered areas, as valuable nursery grounds, really provide the basis for large scale offshore fisheries by maintaining the productive yield for the fisheries of a larger number of fish with improved quality. These factors formed the basis for the 1952 Regulations by prohibiting foreign as well as Icelandic vessels in exclusive interests of conservation. There was strong opposition to this Icelandic action and with numerous exchanges of diplomatic notes with the United Kingdom especially, but also with France, Belgium, and the Netherlands. Most of the questions raised were concerned with Iceland's right according to International Law, which seems to be a rather nebulous thing at best, difficult not only to interpret but to enforce. Many cases have no precedence (it was thought by many at the time that the Anglo-Norwegian case had no basis of precedence for the subsequent Icelandic action which rested on the decision), and many different widths

of territorial waters are considered the best and according to "International Law" or custom in various parts of the world.

The apparent decline of fish stocks since the end of the Second World War has been mentioned, and after the inception of the new limits there seemed to be an increase in fish stocks as indicated by yield per unit of effort. In 1952 the total British catch in Icelandic waters increased by 67 per cent over the 1952 total, and the catch of cod was 85 per cent greater in 1953.[17]

As a protest against the 1952 Regulations, however, the British trawler owners in 1952 imposed a landing ban on Icelandic trawlers in British ports regardless of the fact that the Icelandic vessels were equally excluded from the same areas as British. It seemed to be the opinion in Iceland that, from all indications, the British trawler owners were not protesting the new fishery limits but taking it as an opportunity to eliminate some competition when a fish surplus was beginning to be shown in Europe. This ban continued until November 1956, during which time Iceland's type of product and eventual market underwent considerable change.

The effort to have Iceland rescind the new limit was unsuccessful. Most of the opposition was concerning certain base points used, as well as the overall right to unilateral action. The move, on the whole, seems an honest attempt at alleviating the depletion of fish stocks, and if it

---

[17] "The Icelandic Efforts for Fisheries Conservation, p. 19.

met with some opposition, it was little in comparison with the events leading up to and following a newer limit of September 1958 when Iceland extended to 12 miles the limit of marine fisheries around her coasts.

Iceland noticed marked improvement after the 1952 limit was enforced. In June of 1958, however, new regulations were issued extending the limit to 12 miles in order to "ensure necessary conservation and safeguard vital fishing interests", and these became effective on September 1, 1958 (Fig. 30). It seems that the purpose of these new limits was more to "safeguard vital fishing interests" than any consideration of conservation. Concrete evidence of overfishing was not offered, and Icelandic fishermen, who catch more than any other country were not completely barred from fishing within the 12-mile limit as were the vessels of other nationalities. The new limits can be seen from Figure 30 which, in comparison with Figure 31, shows exactly how much of the prime fishing banks were cut off by the new regulations.

The Icelandic trawlers were not given freedom within the 12-mile limit. They were subject to the 1952 Regulations which forbade fishing within the 4-mile line, and also were not permitted to fish in other areas of the coast during certain seasons. This was an attempt at conservation, and also at protecting the motorboat fleet, which is entirely dependent on the fisheries in the coastal areas. As shown by Figure 13, total catch of fish around Iceland by other nations is approximately equal to the Icelandic catch. Exclusion of these nations could be biologically significant.

FIG. 28.


ICELAND
OLD FISHING LIMIT
(3 NAUT. MILES)

FIG. 29.

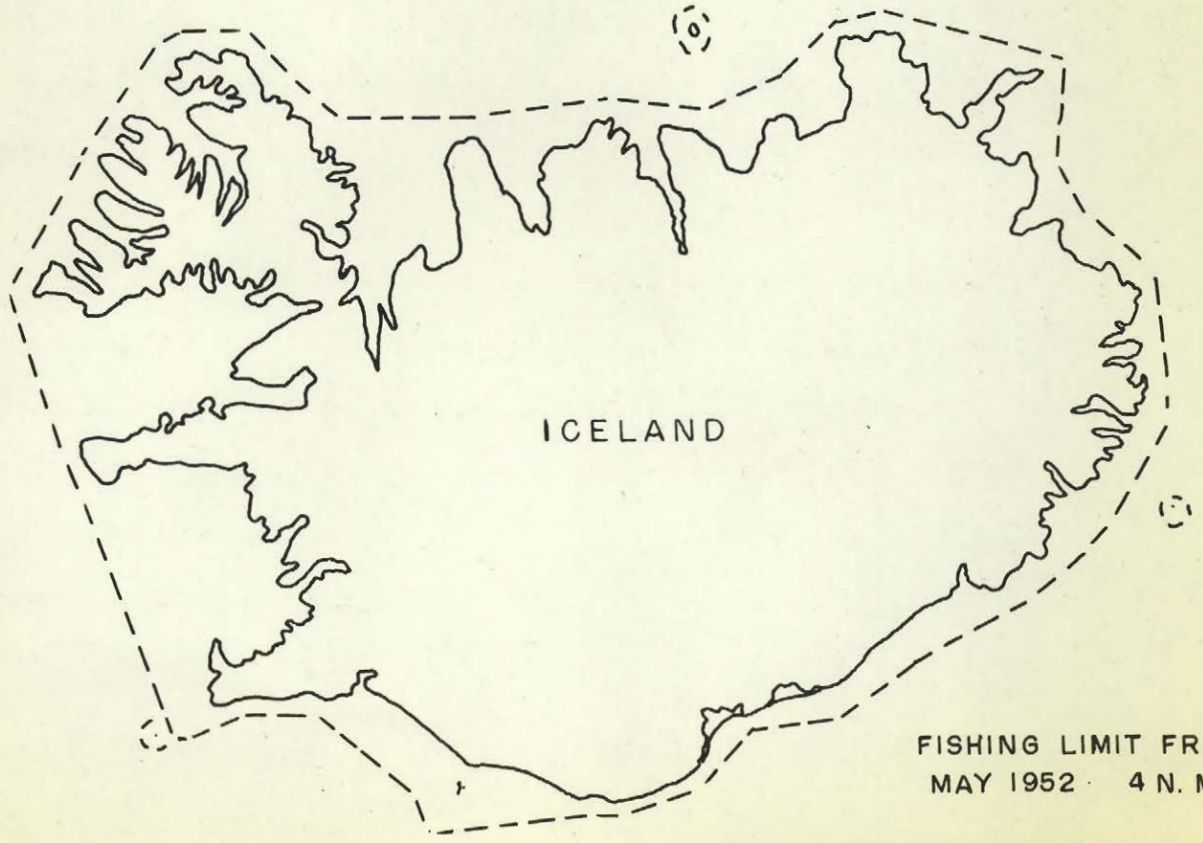
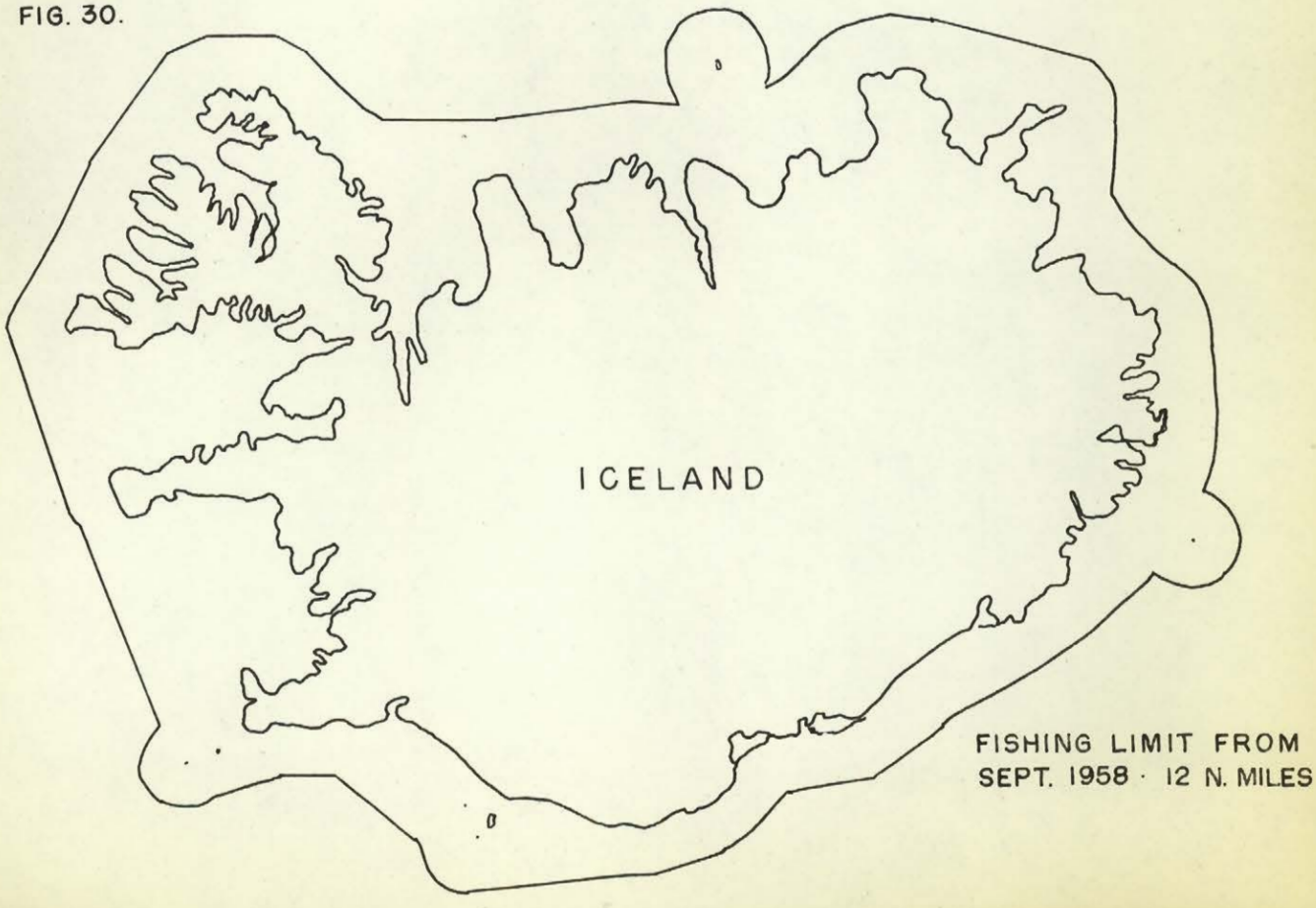

ICELAND
FISHING LIMIT FROM
MAY 1952 · 4 N. MILES

FIG. 29.


ICELAND
FISHING LIMIT FROM
MAY 1952 · 4 N. MILES

FIG. 30.


ICELAND
FISHING LIMIT FROM
SEPT. 1958 · 12 N. MILES

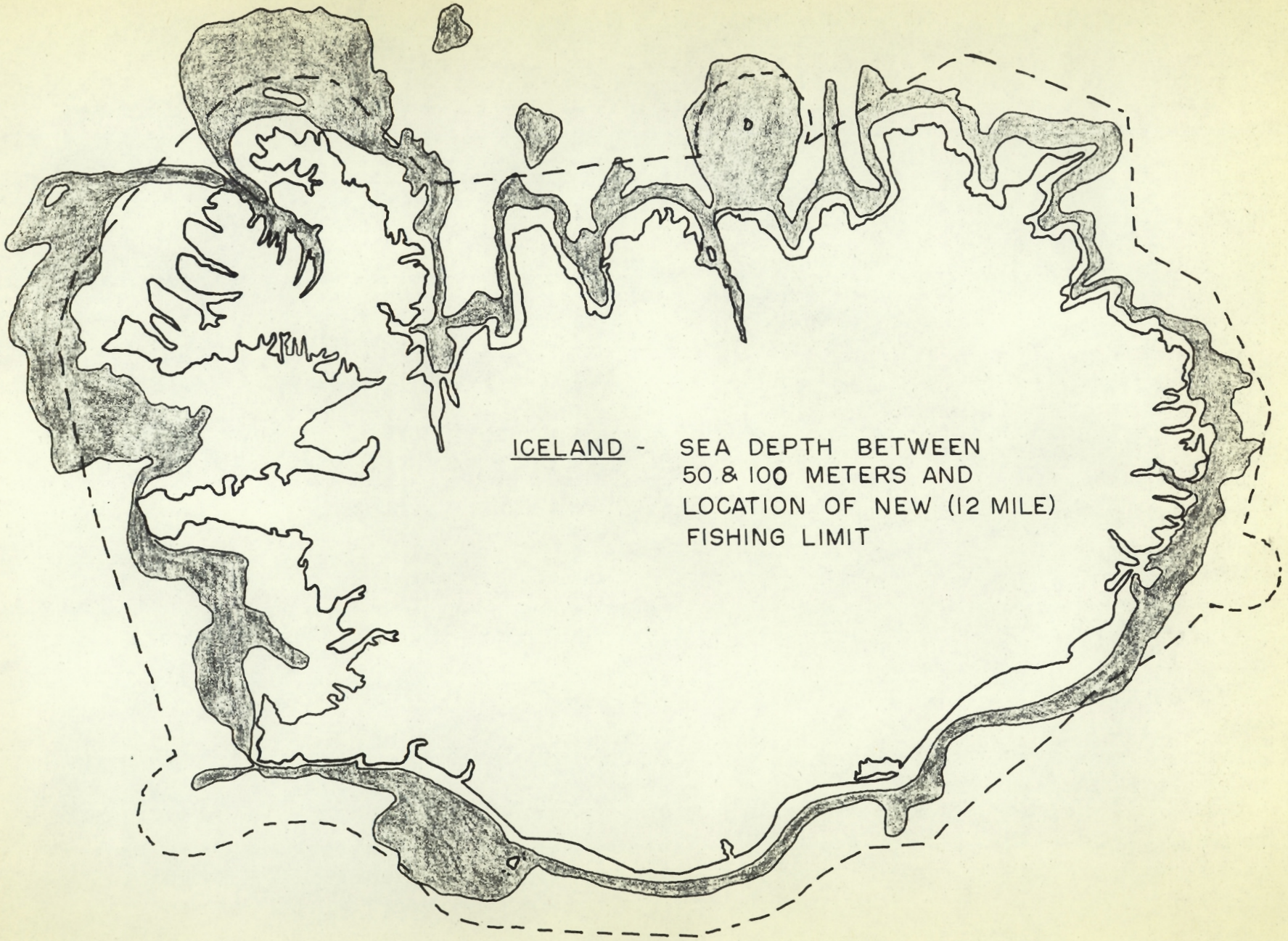

ICELAND - SEA DEPTH BETWEEN
50 & 100 METERS AND
LOCATION OF NEW (12 MILE)
FISHING LIMIT

FIG. 31.

By the new regulations, which Iceland enacted on a unilateral basis, it seems that the rights of other nations established by historical tradition had been ignored. Furthermore, Iceland chose not to attempt to place the problem before the nations concerned, with whom an amicable agreement could possibly have been reached.

It seems generally recognized that the existing law on the subject, including existing international agreements, provides no adequate protection of marine fauna against extermination, and that the resulting condition constitutes a danger to the food supply of the world. A statement in a report by the International Law Commission after four years of study on the present situation of territorial water disputes says in part:

> . . . also insofar as it (present position) renders the coastal state or the States directly interested helpless against wasteful and predatory exploitation of fisheries by foreign nationals, it is productive of friction and constitutes an inducement to States to take unilateral action, which at present is probably illegal, of self-protection.[18]

That it is productive of friction is well borne out by recent clashes between Icelandic and British fishermen off Iceland. One of the best solutions to not only the Icelandic problem but also that in other areas might, as Arthur H. Dean wrote, be " . . . that the limits of the territorial sea be extended to 6 miles and that recognition be given to the right of coastal states to regulate fishing for another 6 miles,

---

[18] Department of State Bulletin, Vol. 32, No. 811, 1955, p. 65.

subject to certain historical fishing rights."[19] Means must be found, within the framework of international law, to insure the continued effective operation of these conservation problems. At the same time the inadequacy of present scientific knowledge regarding many aspects of the problem of conservation has aroused a renewal of interest in promoting further scientific investigations. Iceland, as shown by Table 14, is the major participant in the fishing around her coasts and must, therefore, continue her leadership in these investigations.

The possibility exists that political motives lay behind recent Icelandic actions, but this is difficult to discern. Government policy, of course, should be of interest to the geographer as a determinant of various trends and cannot be overlooked if an observer wishes to consider all factors in a given problem. Present day socio-economic characteristics, however, have their roots in the past, and Iceland's entire course of development can be seen to have been the result of various delimiting geographic factors which, if their direct influence be questioned, have at least conditioned the progressive paths of development which the country might take.

The history and present-day character of the Icelandic fishing industry has been considered as well as a few of the more obvious problems facing the country today. Iceland can well be considered a one-crop country fallen on hard times. The signs, at least, have been observed: a mounting inflation, perilously rising annual trade

---

[19] A. H. Dean, "Freedom of the Seas", Foreign Affairs, Vol. 37, No. 1, 1958, p. 89.

Table 14

AVERAGE YIELDS OF ALL SPECIES FROM ICELANDIC WATERS

1952-1956*

Country	Average Annual Yield (Tons)	Population (Millions)	Annual Yield Per Capita in kg.
Belgium	21,926	8.8	2.5
Denmark	145	4.4	less than 50 gms.
England	195,902	44.6	4.4
Finland	512	4.2	0.1
Germany	185,474	52.0	3.6
Holland	142	10.8	less than 50 gms.
Iceland	430,517	0.16	2691.1
Norway	22,275	3.4	6.6
Scotland	5,352	5.2	1.0
Sweden	3,743	7.3	0.5

*The Icelandic Fishery Question, 1958, p. 7.

deficit, dwindling dollar earnings, a new taste for comfortable living which is anything but supported by the gross national product; the one product upon which it depends is of a highly fluctuating nature and is competing in a very changeable market. Iceland should continue to strive for more diversity of earning possibilities, improve the uniformity, quality, and value of her fisheries products, and attempt to utilize the limited resources at her disposal to the utmost.

While the physical advantages vary somewhat from place to place, the island as a whole, with the possible exception of the southern coast, benefits from an unusually favorable set of natural conditions for fishing. Among these are sufficiently deep fjords and protected anchorages, proximity to a series of banks covered by shallow water, and the island's location at the mixing region of cold arctic water and warm, more saline Atlantic water.

With a population of 166,831 in 1957 when 436,357 tons of fish were landed (2.6 tons per inhabitant), 220,309 tons of fish were exported in various forms giving Iceland the highest production rate of any independent country in the world. But fishing is the country's only crutch, one weakened by the innate variability and fluctuation as a biological resource, and by man in his attempt to fill the world's larger. Upon a return to "normalcy" the military sources of income will be cut off. Iceland will have done well to find the means whereby her mounting inflation is slowed down, her industry and export trade diversified,

and her one big resource, the fish which swim her coasts, managed in a sensible manner insuring the country's well-being and appreciating the rights of other nations who also live by fishing--albeit not by fishing alone.

BIBLIOGRAPHY

Aegir. (Monthly Review of Fisheries and Trade). Fiskifelags Islands. Reykjavik, monthly.

Andersson, K. A. Fiskar och Fiske i Norden. Stockholm: 1942.

Annual Proceedings. International Commission for the Northwest Atlantic Fisheries. Vol. 2, 1951-1952, 38-66.

"Bait for Big Fish", Newsweek, September 1, 1958, pp. 25-26.

Basic Data on the Economy of Iceland. Economic Report No. 57-67, United States Bureau of Foreign Commerce, World Trade Information Service, Pt. 1, July 1957, pp. 1-12.

Bertram, G. C. L. "Population Trends and the World's Resources", Geographical Journal, Vol. 107, 1946, 191-210.

Beverton, R. J. H. "Some Observations on the Principle of Fishery Regulation". Journal du Conseil, Conseil Permanent International pour l'Exploration de la Mer, Vol. 19, No. 1, 1953, 56-68.

_____. and S. J. Holt. "On the Dynamics, Exploitation, and Conservation of Fish Populations". Fisheries Investigations, Series II (Ministry of Agriculture and Fisheries), 1953.

Bjornsson, B. "Iceland, a Geographic, Political, and Economic Survey". Vidskiptaskrain (Commercial and Industrial Directory for Iceland), 1957.

Bowman, A. "The Effect upon the Stock of Fish of the Capture of Undersized Fish". Rapports et Proces Verbaux des Reunions, Conseil Permanent International pour l'Exploration de la Mer, Vol. 80, 1932.

_____. "The Qualitative Effect of Different Fishing Gears on the Stock of the Marketable Species". Rapports et Proces Verbaux des Reunions, Conseil Permanent International pour l'Exploration de la Mer, Vol. 52, 1904, 227-238.

Burkenroad, M. D. "Theory and Practice of Marine Fishery Management", Journal du Conseil, Conseil Permanent International pour l'Exploration de la Mer, Vol. 18, No. 3, 1952, 300-310.

Butler, C. "The Fish Liver Oil Industry". Fishery Leaflet 233. United States Department of the Interior, Fish and Wildlife Service, March 1948, pp. 1-104.

"Captains Contentious". The Economist, August 30, 1958, pp. 650-652.

Chamberlin, W. C. "Economic Development of Iceland through World War II". Columbia University Studies in History, Economics and Public Law, No. 531, 1947.

"Chart for all the Oceans". United Nations Revue, Vol. 2, March 1956, 29-35.

"Codfish War". Time, (New York), September 15, 1958, pp. 23-24.

Corlett, J. "Arctic and Sub-arctic Marine Resources". FAO Fisheries Bulletin, Vol. 9, No. 2, April - June 1956, 62-79.

Cutting, C. L. "Fisheries Products for Tropical Consumption". FAO Fisheries Bulletin, Vol. 10, No. 3, July - September 1957, 113-128.

Dean, A. H. "The Law of the Sea". United States Department of State Bulletin, Vol. 38, No. 980, April 7, 1958, 574.

_____. "Freedom of the Seas". Foreign Affairs, Vol. 37, No. 1, October 1958, 83-94.

Dugan, J. "Behind the Global Fish War". New York Times Magazine, September 21, 1958, pp. 22-24.

Dunbar, M. J. "Greenland - An Experiment in Human Ecology". Commerce Journal, March 1947, pp. 69-109.

Economic Conditions in Denmark, Iceland, Norway, and Sweden. Organisation for European Economic Cooperation, Paris, 1957, pp. 15-29.

Einarsson, H. "Sunnlenzka Sildin Arid 1951". (The Southern Icelandic Herring during 1951). Fjolrit Fiskideildar, No. 2, Atvinnudeild Haskolans Fiskideild (The University Research Institute - Department of Fisheries), Reykjavik, 1952, pp. 1-14.

_____. "Skarkolinn (Pleuronectes platessa L.) i Hamarsfirthi". (The Plaice in Hamarsfjord), Rit Fiskideildar, Vol. 2, No. 3, Atvinnudeild Haskolans Fiskideild (The University Research Institute - Department of Fisheries), Reykjavik, 1956.

_____. "Frequency and Distribution of Post-Larval Stages of Herring (Clupea harengus L.) in Icelandic Waters". Rit Fiskideildar, Vol. 2, No. 4, 1956, 1-35.

_____. and J. Jonsson. "Investigations at Sea during the Years 1947 and 1948 with a List of Stations (Station 1 - 1012)". Fjolrit Fiskideildar, No. 1, 1952, pp. 1-69.

Einarsson, H. and U. Steffansson. "Rannsoknir a Firvinnihaldi Sunnansildar". Fjolrit Fiskideildar, No. 3, 1953, pp. 1-16.

Eydal, A. Havets Silver, En Bok om Sillen. Uppsala, Sweden: Almqvist & Wiksells Boktryckeri Aktiebolag, 1945.

_____. "Nagra Drag i Islands Näringsliv av i Dag". Ymer, No. 1, 1949, pp. 1-10.

_____. "Some Aspects of the Herring Fishery and Herring Industry of Iceland". Proceedings, 8th General Association and 17th International Geographical Congress, Washington, D. C., 1952, pp. 612-615.

Eythorsson, J. "Temperature Variations in Iceland". Geografiska Annaler, Vol. 31, No. 1-4, 1949, 36-55.

_____. "Hafis vid Island". Jökull (Arsrit Jöklarannsoknafelags Islands), 2 Ar, 1952, pp. 31-32.

FAO Fisheries Bulletin. Vol. 1, No. 2, 1948, 27-45.

_____. Vol. 1, No. 3, 1948, 71.

_____. Vol. 2, No. 2, 1949, 22-45.

_____. Vol. 4, No. 4, 1951, 4-20.

_____. Vol. 5, No. 1, 1952, 14.

FAO Yearbook of Fishery Statistics. Food and Agriculture Organization of the United Nations, Rome, Italy, Vol. 4, Pt. 2, 1952-1953, Vol. 5, 1954-1955, Vol. 6, 1955-1956, Vol. 7, 1956-1957.

"Fish and Free Trade". New Republic, December 24, 1956.

Fish Marketing in OEEC Countries. Paris: Organization for European Economic Cooperation (OEEC), 1951.

Fish Marketing in Western Europe Since 1950. Paris: European Productivity Agency of the Organization for European Economic Cooperation (OEEC), 1957.

Fiskiskyrslur of Hlunninda. Hagskyrslur Islands, Reykjavik: Rikisprentsmidjan Gutenberg, annually.

Fleming, R. H. "The Influence of Hydrographic Conditions on the Behavior of Fish". FAO Fisheries Bulletin, Vol. 9, No. 4, 1956, 181-196.

"Food from the Sea". Newsweek, Vol. 45, June 20, 1955, 60.

Fridriksson, A. "The Icelandic Fisheries". Le Nord, Vol. 1, 1938, 305-313.

_____. "Rannsoknir Fiskideildar 1937-39". (Investigations of the Fisheries Department of the University Research Institute 1937-39), Rit Fiskideildar, No. 1, 1940, pp. 3-56.

_____. "Nordurlands Sildin" (The Herring of the North Coast of Iceland), Rit Fiskideildar, No. 1, 1944, pp. 1-340.

_____. "Boreo-tended Changes in the Marine Vertebrate Fauna of Iceland During the Last 25 Years". Rapports et Proces Verbaux des Reunions, Conseil Permanent International pour l'Exploration de la Mer, Vol. 125, 1948, 30-32.

_____. and O. Aasen. "The Norwegian-Icelandic Herring Tagging Experiments". Rit Fiskideildar, No. 1, 1952.

_____. and O. Aasen. "The Norwegian-Icelandic Herring Tagging Experiments". Report on Norwegian Fish and Marine Investigations, Vol. 9, No. 11, Bergen, 1950.

_____. and P. Hannesson. "Fisk og Fiskeri ved Island". Dansk-Islandsk Samfunds Smaaskrifter, No. 14, Copenhagen, 1925.

_____. and G. Timmermann. "Rannsoknir a Hrygningarstodvum Vorgots-sildar Vorid 1950". (Herring Spawning Grounds of the South Coast of Iceland during Spring 1950), Rit Fiskideildar, No. 1. 1950.

"From Trafalgar to Reykjavik". Nation. Vol. 187, No. 7, 1958, 122-123.

Gerhard, I. "Cost and Profit in Swedish Fishing Vessels". FAO Fisheries Bulletin, Vol. 10, No. 3, 1957, 131-141.

Girard, M. "Fish Marketing in Western Europe". FAO Fisheries Bulletin, Vol. 5, No. 1, 1952, 3-15.

Gisalason, G. "Economic Development of Iceland". Socialist World, December 1948, pp. 31-37.

Gjerset, K. History of Iceland. New York: Macmillan, 1924.

Glanville, A. "Danish Seining". FAO Fisheries Bulletin, Vol. 6, No. 3, 1953, 63-87.

_____. "The Larsen Mid-water Trawl". FAO Fisheries Bulletin, Vol. 9, No. 3, 1956, 113-129.

Graham, M. "Modern Theory of Exploiting a Fishery, and Application to North Sea Trawling". Journal du Conseil, Conseil Permanent International pour l'Exploration de la Mer, Vol. 10, 1935.

_____. "How Much is Left in the Sea Larder?". Research for Plenty No. 7, Agriculture, (Ministry of Agriculture and Fisheries, London), Vol. 60, No. 2, 51-55.

_____. and G. L. Kesteven. "Biological Possibilities in World Fisheries". FAO Fisheries Bulletin, Vol. 7, No. 1, 1954, 1-13.

Handbok Utanrikisraduneytisins (Manual of the Ministry for Foreign Affairs of Iceland), part of which is: "Samningar Islands vid Onnur Riki" (Treaties between Iceland and other Countries). Reykjavik: Rikisprentsmidjan Gutenberg, 1955.

Hanson, E. P. "The Renaissance of Iceland". Geographical Review, Vol. 18, 1928, 41-61.

Hansson, O. Facts About Iceland. Translated by Peter G. Foote, Reykjavik: Bokautgafa Menninggarsjods, 1952, pp. 51-54.

Henderson, E. Iceland, or the Journal of a Residence in that Island during the Years 1814 and 1815. 2 Volumes, Edinburgh: Oliphant, Waugh, & Innes, 1818.

Hermansson, H. "Sir Joseph Banks and Iceland". Islandica, Vol. 18, Cornell University Library, 1928, 76-82.

Herrington, W. C. "US Policy on Fisheries and Territorial Waters". United States Department of State Bulletin, Vol. 26, No. 679, 1952, 1021-1023.

Hjort, J. "Fluctuations in the Great Fisheries of Northern Europe". Rapports et Proces Verbaux des Reunions, Conseil Permanent International pour l'Exploration de la Mer, Vol. 20, Copenhagen, 1914.

Hjulstrom, F. and Others. "The Hoffelsandur, Part II, A Glacial Outwash Plain". Meddelanden fran Uppsala Universitets Geografiska Institutionen, Series A, No. 108-112, 1955, 108-112.

Holt, S. J. "Exploratory and Experimental Fishing". FAO Fisheries Bulletin, Vol. 9, No. 1, 1956, 1-22.

Huntsman, A. G. "Fishery Management and Research". Journal du Conseil, Conseil Permanent International pour l'Exploration de la Mer, Vol. 19, No. 1, 1953, 44-55.

"Iceland and its Allies - Part II, The Market for Fish". Manchester Guardian Weekly, August 9, 1956, p. 7.

"Iceland Base". US News and World Report, April 13, 1956, pp. 43-44.

"Iceland - 1947". FAO Fisheries Bulletin, Vol. 1, No. 1, 1948, 7-8.

"Iceland - Country Study". US Economic Cooperation Administration, Washington, D. C.: Superintendent of Documents, 1949, pp. 1-34.

"Iceland - Summary of Current Economic Information". United States Office of International Trade, International Reference Service, Washington, D. C.: Superintendent of Documents, 1948, pp. 1-4.

The Icelandic Efforts for Fisheries Conservation. Memorandum Submitted to the Council of Europe by the Government of Iceland, Reykjavik, 1954, pp. 5-55.

The Icelandic Fishery Question. Memorandum submitted by the Government of Iceland to the General Assembly of the United Nations, September 1958.

"Iceland's Fishing Grounds". Commonwealth, September 15, 1958, pp. 605-6.

"Iceland's Problems". Economist (London), Vol. 143, August 22, 1942, 236-7.

"In Iceland's Choppy Wake". Economist (London), Vol. 188, No. 6003, September 13, 1958, 823.

"Island". Norraen Jol, Vol. 11, 1951, 36-43.

Islenzkt Sjomanna-Almanak. Reykjavik, annually.

Jakobsson, J. "A Study of the Plankton-Herring Relationship off the SW-coast of Iceland". Rit Fiskideildar, Vol. 2, No. 5, 1958, 23-25.

Jensen, Ad. S. and P. M. Hansen. "Investigation of the Greenland Cod". Rapports et Proces Verbaux des Reunions, Conseil Permanent International pour l'Exploration de la Mer, Vol. 72, 1931.

Johansen, A. C. "Investigations on Icelandic Herring in 1924-25". Rapports et Proces Verbaux des Reunions, Conseil Permanent International pour l'Exploration de la Mer, Vol. 39, 1926, 114-138.

_____. "On the Migrations of the Herring". Journal du Conseil, Conseil Permanent International pour l'Exploration de la Mer, Vol. 2, 1927, 3-27.

Jonsson, J. "Icelandic Researches, Analysis of Trawler-caught Cod in Greenland Waters in 1952". Annual Proceedings, International Commission for the Northwest Atlantic Fisheries, Vol. 3, 1952-1953, 38-40.

_____. "Icelandic Researches on Trawl-Caught Cod on the West Greenland Banks in 1953". Annual Proceedings, International Commission for the Northwest Atlantic Fisheries, Vol. 4, 1953-1954, 38-39.

_____. "Icelandic Research Report 1956 (Cod)". Annual Proceedings, International Commission for the Northwest Atlantic Fisheries, Vol. 7, 1956-1957, 39-40.

_____. and U. Stefansson. "Sildarrannsoknir 'Aegis' Sumarid 1954". (Herring Investigations with the Research vessel "Aegir" in the Summer of 1954). Fjolrit Fiskideildar, Atvinnudeild Haskolans Fiskideild, No. 5, 1955.

"Judgement by Court in the Anglo-Norwegian Case". United Nations Bulletin, Vol. 12, January 1, 1952, 19.

Kamban, G. "Modern Iceland". Geographical Review, Vol. 5, 1918, 195-207.

Kesteven, G. L. "Fisheries and Weather". FAO Fisheries Bulletin, Vol. 6, No. 4, 1953, 109-118.

Koch, L. "Two Summer Expeditions to Northeast Greenland". Arctic, Vol. 2, No. 3, 1949, 196.

Kristjonsson, H. and Others. "Fish Detection". FAO Fisheries Bulletin, Vol. 5, Nos. 3-4, 1952, 95-119.

Lee, A. J. "Forecasting Climatic Fluctuations and its Importance to the Arctic Fishery". Rapports et Proces Verbaux des Reunions, Conseil Permanent International pour l'Exploration de la Mer, Vol. 125, 1948, 40-41.

Leistikow, G. "Iceland Between East and West". Am-Scandinavian Review, Vol. 43, Winter 1955, 19-55.

Lemon, J. M. and C. B. Carlson. "Freezing Fish at Sea". Fishery Leaflet 278, United States Department of the Interior, Fish and Wildlife Service, Washington, D. C., 1948, pp. 1-11.

Lloyd, T. and J. B. Snell. The Fishing Industry of North Norway. Technical Report ONR 438-03-05, January 1956, pp. 1-20.

Lund, E. E. "Fisheries Developments in Iceland". United States Office of International Trade, Superintendent of Documents, Washington, D. C., Vol. 4, Pt. 5, No. 14, 1946, 1-7.

Magnusson, J. "Icelandic Research Report, 1956". Annual Proceedings, International Commission for the Northwest Atlantic Fisheries, Vol. 7, 1956-1957, 40-41.

Magnusson, M. K. "The Organization and Scope of Iceland's Fish-Inspection Service". Commerical Fisheries Review, May 1950, pp. 1-10.

Malmstrom, V. H. A Regional Geography of Iceland. National Academy of Sciences, National Research Council, Publication 584, Division of Earth Sciences, Foreign Field Research Program Report No. 1, 1957.

Mead, W. R. "Renaissance of Iceland". Economic Geography, Vol. 21, 1945, 135-144.

Merriman, D. "Food Shortages and the Sea". Smithsonian Report, 1950, pp. 373-384.

_____. "Food Shortages and the Sea". The Question of the Size of the Contribution of Fisheries Products to World Food Supply, Yale Review, Vol. 39, March 1950, 430-444.

Morgan, R. World Sea Fisheries. London: Methuen & Co. Ltd., 1956.

The Northern Countries. Published by the Foreign Ministries of Denmark, Finland, Iceland, Norway, and Sweden, Uppsala: Almqvist & Wiksells Boktryckeri, AB., 1952.

The Northern Countries in World Economy. Helsinki: Octava Printing Office, 1939.

Olafsen and Povelsen. Travels in Iceland. London: Richard Phillips, 1805.

Olafsson, D. "Icelandic Fisheries and Exports". Fisheries Yearbook and Directory 1953-54, London: British-Continental Trade Press Ltd., 1954.

"President Decides against Increase in Tariff on Groundfish Fillets". United States Department of State Bulletin, Vol. 36, No. 916, 1957, 55-57.

The Problem of the Fisheries around Iceland. Memorandum Submitted to the General Assembly of the United Nations by the Government of the United Kingdom, November 1958.

Reynolds, J. H. "Iceland in 1872 and 1926". Geographical Journal, Vol. 70, 1929, 44-49.

Rollefsen, G. (ed.). "Climatic Changes in the Arctic in Relation to Plants and Animals". Rapports et Proces Verbaux des Reunions, Conseil Permanent International pour l'Exploration de la Mer, Vol. 125, 1948.

Russell, E. S. "Some Theoretical Considerations on the Overfishing Problem". Journal du Conseil, Conseil Permanent International pour l'Exploration de la Mer, Vol. 6, 1931.

_____. "The Overfishing Problem". Series of four lectures delivered at School of Hygiene, Johns Hopkins University, Cambridge University Press, 1942.

Saemundsson, B. "Um Fiskirannsoknir 1896". Andvari, Vol. 22, Reykjavik, 1897, 96-172.

_____. "Sild og Sildveidar". Andvari, Vol. 26, Reykjavik, 1901, 124-127.

_____. "Fiskirannsoknir 1905". Andvari, Vol. 31, Reykjavik, 1906, 117-124.

_____. "Um Hrygningu Sildarinnar og Nokkra Fleiri Fiska". Andvari, Vol. 33, Reykjavik, 1908, 117-122.

_____. "Oversigt over Islands Fiske". Skrifter, Kommissionen for Havundersøgelse, No. 5, Copenhagen, 1909, pp. 101-104.

_____. "Rannsoknir a Breidafirdi of Faxafloa 1909". Andvari, Vol. 36, Reykjavik, 1911, 51-103.

_____. "Islenzk Dyr I". Fiskarnir, Reykjavik, 1926, pp. 404-407.

_____. "Synopsis of the Fishes of Iceland". Visindafelag Islendinga, Reykjavik, 1927, pp. 56-63.

_____. "Probable Influence of Changes in Temperature on the Marine Fauna of Iceland". Rapports et Proces Verbaux des Reunions, Conseil Permanent International pour l'Exploration de la Mer, Vol. 86, 1934.

_____. "Marine Pisces". The Zoology of Iceland, Vol. 4, Pt. 72, 1949.

Schmidt, J. "Re Migrations of Cod, Iceland-Greenland". Rapports et Proces Verbaux des Reunions, Conseil Permanent International pour l'Exploration de la Mer, Vol. 72, Pt. 3, 1931.

Statistical Bulletin. International Commission for the Northwest Atlantic Fisheries.

Statistical Bulletin. Statistical Bureau of Iceland (Hagstofa Islands).

Stefansson, U. "Temperature Variations in the North Atlantic Coastal Area". Rit Fiskideildar, Vol. 2, No. 2, 1954.

_____. "Yfirbordshiti Sjavar vid Strendur Islands Arin 1949 - 1953". Fjolrit Fiskideildar, No. 4, 1954, pp. 1-23.

Stefansson, V. Iceland. New York: Doubleday, Doran & Co., 1939.

Sverdrup, H. U. "Some Aspects of the Primary Productivity of the Sea". FAO Fisheries Bulletin, Vol. 5, No. 6, 1952, 215-223.

Taaning, A. V. "Long-Term Changes in Hydrography and Fluctuations in Fish Stocks". Annual Proceedings, International Commission for the Northwest Atlantic Fisheries, Vol. 3, 1952-1953, 69-77.

The Technology of Herring Utilization. Report of the FAO Meeting on Herring Technology in Bergen, Norway, September 1950, Published by the Director of Fisheries, Bergen, 1953.

Thorarinsson, S. "The Thousand Years Struggle against Ice and Fire". Miscellaneous Papers, No. 14, Museum of Natural History, Reykjavik, 1956.

Thorsteinsson, T. (ed.). Iceland - 1946. A Handbook published on the sixtieth anniversary of Landsbanki Islands (The National Bank of Iceland), 4th edition, 1946, Reykjavik: Rikisprentsmidjan Gutenberg, pp. 107-127.

Trade News. Department of Fisheries of Canada, Vol. 11, No. 5 and No. 6, 1958.

Traung, J. O. (ed.). Fishing Boats of the World. London: Ludgate House, 1955.

United States Department of State Bulletin. Vol. 32, No. 811, 1955, 64-66.

"US Position on Conservation of Fisheries Resources". United States Department of State Bulletin, Vol. 32, No. 826, 1955, 696-698.

von Brandt, A. "Net Materials of Synthetic Fibers". FAO Fisheries Bulletin, Vol. 10, No. 4, 1957, 187-210.

Whiteleather, R. T. "Kite Rigs for Otter Trawl Gear". Fishery Leaflet No. 302, United States Department of the Interior, Fish and Wildlife Service, Washington, D. C., May 1948, pp. 1-7.

"World Fisheries: General Trends and Outlook with Examples from Selected Countries". FAO Fisheries Paper, No. 12, July 1958.

Yershova, T. "Iceland Today - Political and Economic Aspects". New Times (Moscow), October 3, 1957, pp. 22-25.

FISH EXPORT PRODUCT	1931 Tons	1931 Th. Kr.	1931 %	1932 Tons	1932 Th. Kr.	1932 %	1933 Tons	1933 Th. Kr.	1933 %	1934 Tons	1934 Th. Kr.	1934 %	1935 Tons	1935 Th. Kr.	1935 %
Salted fish, dried (clipfish)	58,907	20,908	46.4	59,103	21,890	50.9	60,727	24,262	52.7	46,675	18,939	43.0	38,861	16,010	37.2
Salted fish, uncured	15,840	3,822	8.4	17,763	3,802	8.8	16,364	3,881	8.4	17,832	4,219	9.5	14,884	3,465	8.0
Fresh fish, iced (incl frozen to '48)	?	5,442	12.1	?	4,400	10.2	12,843	3,171	6.8	15,032	5,206	11.8	16,007	4,638	10.7
Herring, cured	15,896	4,387	9.7	24,004	4,485	10.4	21,450	4,298	9.3	20,456	4,801	10.9	13,731	5,665	12.8
Cod-liver oil	3,111	1,834	4.0	3,941	1,819	4.1	4,542	2,492	5.3	4,399	2,840	6.4	4,828	3,625	8.2
Herring oil	7,855	1,192	2.6	9,930	1,577	3.6	9,619	1,642	3.5	7,718	1,351	3.0	7,420	1,613	3.7
Fish meal (all types until 1950)	12,357	2,908	6.4	13,262	2,611	5.9	14,524	2,835	6.0	12,170	2,647	6.0	10,079	1,971	4.5
Roes, salted	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Stockfish (dried, unsalted)	-	-	-	-	-	-	-	-	-	-	-	-	152	117	.27
Redfish oil	-	-	-	-	-	-	-	-	-	-	-	-	295	118	.27
Canned fish	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Herring frozen	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Whale oil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fresh fish, frozen (in iced to '48)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Whale meal	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Herring meal (in fish meal to '50)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Redfish meal (" " " " ")	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Roes, frozen	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Whale meat	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Shrimps & Lobster, frozen	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Wings, salted	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTALS :	113,766	40,493	89.1	128,003	40,584	92.3	140,070	42,581	90.9	124,282	40,003	89.3	106,257	37,225	84.8
TOTAL EXPORT:		45,424	100.0		43,960	100.0		46,843	100.0		44,761	100.0		43,881	100.0

FISH EXPORT PRODUCT	1936 Tons	1936 Th. Kr.	1936 %	1937 Tons	1937 Th. Kr.	1937 %	1938 Tons	1938 Th. Kr.	1938 %	1939 Tons	1939 Th. Kr.	1939 %	1940 Tons	1940 Th. Kr.	1940 %
Salted fish, dried (clipfish)	26,995	15,555	32.4	25,210	12,339	21.2	20,170	10,246	17.9	19,204	10,551	15.2	17,541	15,161	11.4
Salted fish, uncured	12,136	2,888	6.0	13,564	3,667	6.3	24,241	6,973	12.2	10,879	6,546	9.4	9,322	4,828	3.6
Fresh fish, iced (incl frozen to '48)	17,282	4,603	9.5	15,155	4,795	8.2	17,530	5,732	10.0	21,337	8,425	12.7	99,926	67,741	51.3
Herring, cured	24,654	6,890	14.3	20,056	5,833	9.9	32,867	9,514	16.6	26,533	11,661	16.6	3,660	2,759	2.0
Cod-liver oil	4,692	3,590	7.5	4,611	4,145	7.1	4,895	4,039	7.0	6,577	5,729	8.0	5,549	13,188	9.9
Herring oil	15,219	5,157	10.7	21,419	8,678	14.9	21,540	5,234	9.1	17,373	6,297	9.1	22,435	12,653	9.5
Fish meal (all types until 1950)	21,559	3,649	7.6	30,372	6,585	11.1	22,317	4,722	8.3	25,567	7,195	10.4	23,100	9,320	7.0
Roes, salted	-	-	-	-	-	-	2,576	745	1.3	2,220	761	1.1	575	277	.2
Stockfish (dried, unsalted)	561	316	.66	855	455	.8	466	283	.5	650	483	.7	393	494	.3
Redfish oil	1,329	598	1.2	564	330	.5	329	161	.2	-	-	-	-	-	-
Canned fish	-	-	-	-	-	-	--	-	-	-	-	-	-	-	-
Herring, frozen	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Whale oil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fresh fish, frozen (in iced to '48)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Whale meal	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Herring meal (in fish meal to '50)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Redfish meal (" " " " ")	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Roes, frozen	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Whale meat	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Shrimps & Lobster, frozen	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Wings, salted	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTALS	124,427	43,246	89.6	131,806	46,827	75.4	146,931	47,649	82.5	139,340	58,148	83.4	182,546	126,421	95.1
TOTAL EXPORT		48,238	100.0		58,867	100.0		57,752	100.0		69,654	100.0		132,908	100.0

FISH PRODUCT EXPORTS	1941 Tons	1941 Th. Kr.	1941 %	1942 Tons	1942 Th. Kr.	1942 %	1943 Tons	1943 Th. Kr.	1943 %	1944 Tons	1944 Th. Kr.	1944 %	1945 Tons	1945 Th. Kr.	1945 %
Salted fish, dried (clipfish)	4,387	6,031	3.1	2,401	3,930	1.9	706	1,534	.6	39	163	.05	167	370	.14
Salted fish, uncured	18,503	16,481	8.7	6,521	7,283	3.6	1,542	2,008	.8	1,253	1,409	.6	610	755	.2
Fresh fish, iced (also frozen to 48)	117,491	106,279	56.5	137,685	123,670	61.8	149,496	131,069	60.5	165,429	166,713	65.6	151,392	167,208	62.6
Herring, cured	7,295	6,267	3.3	4,552	5,621	2.3	3,047	4,824	2.0	1,969	3,651	1.4	11,454	17,078	6.4
Cod-liver oil	5,430	20,125	11.8	5,469	21,760	11.8	5,562	20,198	8.6	6,377	21,988	8.7	8,380	32,671	14.5
Herring oil	27,762	14,247	7.5	26,526	20,979	10.4	29,961	27,153	11.6	26,429	26,052	10.2	13,888	13,542	5.0
Fish meal (all types to 1950)	19,495	7,295	3.8	17,881	8,364	4.1	13,575	6,549	2.8	28,157	13,655	5.3	7,778	3,759	1.4
Roes, salted	613	501	.26	617	50	.02	4,807	649	.28	693	1,127	.44	1,510	2,882	.8
Stockfish (dried, unsalted)	496	1,180	.57	253	805	.4	198	906	.4	296	1,133	.4	296	1,556	.6
Redfish,oil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Canned fish	547	1,024	.54	126	386	.19	123	480	.2	206	789	.31	254	983	.37
Herring, frozen	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Whale oil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fresh fish, frozen	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Whale meal	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Herring meal (with fish meal to '50)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Redfish meal (" " " " ")	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Roes, iced or frozen	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Whale meat	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Shrimps & Lobster, frozen	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Wings, salted	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTALS	202,119	179,430	95.1	202,031	192,848	96.1	209,017	205,370	88.0	230,848	236,910	93.1	183,229	240,804	90.1
TOTAL EXPORT		188,504	100.0		200,572	100.0		233,246	100.0		254,286	100.0		267,261	100.0

FISH PRODUCT EXPORTS	1946 Tons	1946 Th. Kr.	1946 %	1947 Tons	1947 Th. Kr.	1947 %	1948 Tons	1948 Th. Kr.	1948 %	1949 Tons	1949 Th. Kr.	1949 %	1950 Tons	1950 Th. Kr.	1950 %	FISH PRODUCT EXPORTS
Salted fish, dried (clipfish)	16	65	.02	300	793	.27	1,439	1,129	1.0	296	952	.33	4,023	22,508	5.3	Salted fish, dried (clipfish)
Salted fish, uncured	11,533	18,889	6.4	26,622	46,364	15.9	14,752	26,681	6.7	17,882	36,252	12.5	28,035	66,463	15.7	Salted fish, uncured
Fresh fish, iced (also frozen to 48)	96,696	122,990	42.2	86,627	111,758	38.5	128,901	90,347	22.8	119,775	75,676	26.2	28,280	24,188	5.7	Fresh fish, iced (also frozen to 48)
Herring, cured	15,284	27,971	9.6	6,361	13,221	4.5	10,580	21,794	5.5	9,471	20,758	7.0	18,100	54,665	12.9	Herring, cured
Cod-liver oil	7,745	28,482	9.7	5,406	22,864	7.8	8,035	33,666	8.5	5,818	18,782	6.5	11,901	43,968	10.4	Cod-liver oil
Herring oil	17,534	26,788	9.2	20,527	51,799	17.8	28,336	74,313	18.8	7,099	16,962	5.8	5,808	21,505	5.1	Herring oil
Fish meal (all types to 1950)	16,363	12,051	4.1	16,619	16,423	5.6	39,184	40,671	10.2	6,950	7,809	2.7	8,614	19,556	4.6	Fish meal (all types to 1950)
Roes, salted	1,899	2,694	.9	2,091	1,914	.66	1,337	1,348	.34	2,245	2,552	.88	2,452	5,292	1.2	Roes, salted
Stockfish (dried, unsalted)	107	198	.1	3	4	.001	6	14	.003	4	22	.008	94	482	.1	Stockfish (dried, unsalted)
Redfish oil	-	-	-	-	-	-	-	-	-	-	-	-	1,504	6,895	1.6	Redfish oil
Canned fish	513	2,875	.98	340	1,446	.49	959	4,206	1.0	421	1,541	.53	382	2,001	.47	Canned fish
Herring, frozen	48	55	.02	866	466	.16	4,033	2,178	.55	307	255	.09	1,463	2,720	.64	Herring, frozen
Whale oil	-	-	-	-	-	-	773	2,144	.54	2,498	5,894	2.0	2,334	10,196	2.4	Whale oil
Fresh fish, frozen	-	-	-	-	-	-	22,464	64,009	16.0	36,358	95,423	33.0	18,833	80,540	19.0	Fresh fish, frozen
Whale meal	-	-	-	-	-	-	-	-	-	497	597	.2	465	992	.2	Whale meal
Herring meal (with fish meal to '50)	-	-	-	-	-	-	-	-	-	-	-	-	2,146	4,107	.9	Herring meal (with fish meal to '50)
Redfish meal (" " " " ")	-	-	-	-	-	-	-	-	-	-	-	-	6,005	13,528	3.2	Redfish meal (" " " " ")
Roes, iced or frozen	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Roes, iced or frozen
Whale meat	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Whale meat
Shrimps & Lobster, frozen	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Shrimps & Lobster, frozen
Wings, salted	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Wings, salted
TOTALS	167,738	243,358	83.5	165,758	267,052	91.9	256,799	365,500	92.3	209,621	283,475	98.0	140,569	379,606	89.9	TOTALS
TOTAL EXPORT		291,446	100.0		290,482	100.0		395,678	100.0		289,224	100.0		421,870	100.0	TOTAL EXPORT

FISH EXPORT PRODUCTS	1951			1952			1953			1954			1955		
	Tons	Th. Kr.	%	Tons	Th. Kr.	%	Tons	Th. Kr.	%	Tons	Th. Kr.	%	Tons	Th. Kr.	%
Salted fish, dried (clipfish)	11,775	66,759	9.2	5,309	33,847	5.2	8,479	57,196	6.7	7,952	57,196	6.7	9,772	73,115	8.3
Salted fish, uncured	25,021	65,547	9.0	41,799	153,455	23.9	29,396	100,270	11.0	28,378	95,363	11.2	32,582	121,779	13.4
Fresh fish, iced	52,151	70,877	9.7	29,900	34,266	5.3	8,216	8,835	1.2	10,612	13,401	1.5	10,411	10,930	1.2
Herring, cured	17,721	60,793	8.3	11,867	44,946	7.0	18,649	73,121	10.0	15,929	55,324	6.5	23,847	88,997	10.4
Cod-liver oil	5,238	37,192	5.1	9,063	33,321	5.2	11,954	46,592	6.6	9,940	40,047	4.7	9,902	39,569	4.6
Herring oil	11,707	72,070	9.9	1,588	6,808	1.0	4,543	12,293	1.7	5,756	16,790	2.0	1,619	5,055	.6
Fish meal (excl. herring &redfish)	13,881	27,316	3.7	15,683	32,381	5.0	16,261	35,691	5.0	23,191	55,154	6.5	20,518	51,680	6.1
Roes, salted	2,099	4,930	.6	2,707	7,001	1.8	2,592	7,726	.9	3,516	10,567	1.2	3,827	11,534	1.3
Stockfish, dried, unsalted	1,041	7,665	1.0	2,355	19,649	3.0	6,500	64,708	9.1	12,935	124,744	14.7	6,553	60,458	7.1
Redfish oil	3,954	21,909	3.0	1,322	4,029	.6	1,694	4,972	.7	2,994	8,057	.9	3,463	11,262	1.3
Canned fish	392	2,632	.36	182	1,317	.2	106	901	.13	44	883	.09	155	3,457	.4
Herring, frozen	1,142	2,474	.34	1,862	3,618	.56	5,406	10,224	1.44	1,449	2,951	.34	2,768	5,953	.71
Whale oil	2,035	11,376	1.5	911	2,883	.45	2,112	6,001	.85	2,248	7,301	.84	1,016	3,718	.44
Fresh fish, frozen	35,756	179,661	24.0	26,587	171,814	26.0	36,972	210,254	29.0	51,676	295,298	35.0	46,374	264,483	31.0
Whale meal	842	1,356	.18	393	733	.11	592	1,133	.16	704	1,561	.18	374	844	.1
Herring meal	5,130	10,743	1.4	4,500	9,729	1.5	3,511	8,763	1.2	2,454	6,344	.5	327	814	.09
Redfish meal	17,430	33,720	4.6	2,875	5,748	.9	2,423	5,386	.76	5,228	11,943	1.4	5,770	13,833	1.6
Roes, iced or frozen	574	2,079	.28	600	2,568	.4	533	2,349	.33	589	2,676	.33	1,206	5,613	.66
Whale meat	318	1,488	.2	559	5,574	.87	1,437	4,758	.67	1,189	3,248	.38	1,906	4,911	.58
Shrimps & Lobster, frozen	-	-	-	-	-	-	-	-	-	-	-	-	36	1,322	.15
Wings, salted	1,054	2,308	.3	2,610	7,589	1.1	1,395	3,265	.4	2,041	5,342	.48	2,231	6,974	.8
TOTALS	208,986	682,895	93.9	163,775	581,282	90.6	162,771	668,871	94.7	188,828	814,190	96.2	184,750	786,301	92.8
TOTAL EXPORT		726,631	100.0		641,322	100.0		706,254	100.0		845,912	100.0		847,853	100.0

FISH EXPORT PRODUCTS	1956			1957			1957 (Jan-Oct)			1958 (Jan-Oct)			FISH EXPORT PRODUCTS
	Tons	Th. Kr.	%	Tons	Th. Kr.	%	Tons	Th. Kr.	%	Tons	Th. Kr.	%	
Salted fish, dried (clipfish)	8,619	65,008	6.3	5,747	41,267	4.1	5,371	38,709	5.0	6,480	44,786	5.1	Salted fish, dried (clipfish)
Salted fish, uncured	33,179	118,283	11.4	27,533	100,679	10.2	24,850	90,926	11.7	19,729	77,792	8.7	Salted fish, uncured
Fresh fish, iced	18,812	24,891	2.4	16,928	27,974	2.9	10,629	16,942	2.1	6,815	11,908	1.2	Fresh fish, iced
Herring, cured	28,351	105,189	10.2	26,049	86,938	8.8	19,147	69,715	9.0	18,851	72,151	8.1	Herring, cured
Cod-liver oil	10,888	40,707	3.9	7,657	31,756	3.2	6,199	25,637	3.0	8,851	30,557	3.5	Cod-liver oil
Herring oil	5,331	17,088	1.6	8,664	26,946	2.7	4,432	13,667	1.7	7,513	25,385	2.9	Herring oil
Fish meal (excl. herring & redfish)	20,278	49,806	4.8	24,263	59,667	6.0	21,228	52,150	6.7	25,605	64,150	7.4	Fish meal (excl. herring & redfish)
Roes, salted	3,453	10,806	1.0	3,525	11,266	1.1	3,513	11,225	1.4	3,134	11,603	1.3	Roes, salted
Stockfish (dried, unsalted)	11,505	103,271	10.0	10,154	93,354	9.5	7,160	64,725	8.3	3,918	37,805	4.3	Stockfish (dried, unsalted)
Redfish oil	3,121	10,684	1.0	2,594	8,785	.9	1,692	5,937	.7	1,813	5,645	.6	Redfish oil
Canned fish	154	3,566	.34	144	3,639	.36	109	2,355	.3	277	7,551	.84	Canned fish
Herring, frozen	4,409	9,926	.96	7,194	15,339	1.5	6,263	13,120	1.7	6,213	14,020	1.6	Herring, frozen
Whale oil	2,749	9,617	.95	3,092	11,027	1.1	3,092	11,027	1.4	3,396	10,341	1.2	Whale oil
Fresh fish, frozen	57,479	330,236	32.0	57,088	325,256	33.0	46,938	267,007	34.0	55,859	322,646	38.0	Fresh fish, frozen
-	-	-	-	-	-	-	-	-	-	-	-	-	Whale meal
1,876	4,763	.4	8,089	20,586	2.0	3,965	10,362	1.3	10,578	27,595	3.2	Herring meal
5,914	14,129	1.3	4,940	11,873	1.2	2,475	6,114	.8	10,153	24,443	2.8	Redfish meal
1,188	5,794	.56	889	4,555	.46	605	2,970	.38	626	3,704	.42	Roes, iced or frozen
3,098	9,323	.9	2,733	7,931	.81	2,368	6,819	.9	2,362	5,807	.67	Whale meat
64	2,388	.23	81	2,885	.29	42	1,512	.2	137	3,368	.38	Shrimps & Lobster, frozen
2,421	7,688	.74	2,928	9,658	.9	2,889	9,555	1.2	1,890	6,368	.7	Wings, salted
222,869	963,463	91.5	220,292	901,441	91.3	172,967	727,393	93.9	194,200	807,627	93.4	TOTALS
	1,030,957	100.0	986,618	986,618	100.0		774,226	100.0		864,123	100.0	TOTAL EXPORT

Note:

Values given in tables are in Metric Tons, Thousands of Icelandic Krónur, and per centages of total export.

Sources: Statistical Bulletin of Iceland (Hagtíðindi), FAO Fisheries Yearbooks and Bulletins.

ICELAND

MAIN FISHING GROUNDS

Stranda-grunn
KÖGURGRUNN
HORNGRUNN
Barða-grunn
KÓPANES-GRUNN
Látragrunn or Breiðafjarðar-fláki
DRITVÍKUR-GRUNN
Jökul-banki
Eldeyjar-banki
FAXA-BANKI
REYKJA-NES GRUNN
Selvogsbanki
SKAGA-GRUNN
KOLBEINSEYJARGRUNN
GRÍMS-EYJAR-SUND
RIFSBANKI
SLÉTTU-GRUNN
Þistilfjarðar-grunn
LANGANES-GRUNN
VOPNAFJARÐAR-GRUNN
DIGRANES-GRUNN
GLETTINGANES-GRUNN
GERPISGRUNN
SKRÚÐSGRUNN
HVALBAKS-GRUNN
PAPA-GRUNN
STOKKS-NES-GRUNN
MÝRA-GRUNN
ORÆFA-GRUNN
SÍÐU-GRUNN
KÖTLU-GRUNN

DEPTH IN METERS
100
200

SCALE IN MILES
0 10 50

ICELANDIC = ENGLISH
GRUNN = SHOAL, SHALLOW
BANKI = BANK
SUND = STRAIT, SOUND
FLÁKI = TRACT

SOURCES:
BJARNI SÆMUNDSSON
GUÐMUNDUR GUÐJÓNSSON
SJÓKORT ÞORKELL SIGURÐSSON

WGM 59

ICELAND

TOWNS & FISHING VILLAGES

- ⊙ CAPITAL
- • INCORPORATED TOWN
- ○ OTHER TOWNS & VILLAGES
- — MAIN ROAD

SCALE IN MILES

20 15 10 5 0 10 20 30

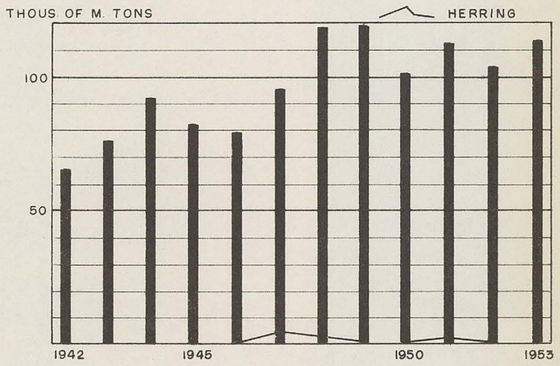
WGM '59

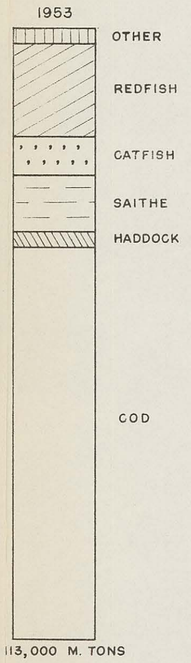
24° 22° 20° 18° 16° 14° W. LONGIT.

66° 65° 64°

ÍSAFJARÐARDJÚP
BOLUNGAVÍK
SUÐUREYRI
HNÍFSDALUR
FLATEYRI
ÍSAFJÖRÐUR
SÚÐAVÍK
ÞINGEYRI
BÍLDUDALUR
SVEINSEYRI
VATNEYRI
FLATEY
BREIÐIFJÖRÐUR
STYKKISHÓLMUR
SANDUR
KVIABRYGGJA
ÓLAFSVÍK
FAXAFLÓI
Borgarnes
AKRANES
MIÐ-SANDUR
REYKJAVÍK
KÓPAVÓGUR
GERÐAR
SANDGERÐI
YTRI-NJARÐVÍK
KEFLAVÍK
VOGAR
INNRI-NJARÐVÍK
HAFNIR
HAFNARFJÖRÐUR
REYKJANES
GRINDAVÍK
ÞORLÁKSHÖFN
EYRARBAKKI
STOKKSEYRI
Vestmannaeyjar
INGÓLFSFJÖRÐUR
ARNES
KÁLFSHAMARSVÍK
DJÚPAVÍK
KOLBEINSVÍK
DRANGSNES
HOLMAVÍK
HÚNAFLÓI
HVAMMSTANGI
SKAGASTRÖND
SIGLUFJÖRÐUR
SKAGAFJÖRÐUR
HOFSÓS
Sauðárkrókur
GRÍMSEY
SKJÁLFANDI
Ólafsfjörður
DALVÍK
HRÍSEY
GRENIVÍK
HJALTEYRI
GLÆSIBÆR
AKUREYRI
EYJAFJÖRÐUR
Húsavík
AXARFJÖRÐUR
RAUFARHÖFN
PISTILFJÖRÐUR
ÞÓRSHÖFN
BAKKAFLÓI
BAKKAFJÖRÐUR
VOPNAFJÖRÐUR
BAKKAGERÐI
SEYÐISFJÖRÐUR
NESKAUPSTAÐUR
ESKIFJÖRÐUR
Búðir
KIRKJUBÓL
BREIÐDALSVÍK
DJÚPIVOGUR
Höfn

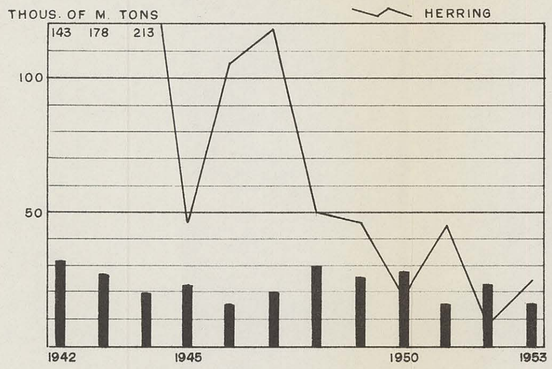
NORTH - WEST

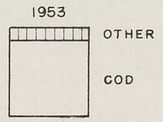




FISH	GEAR	SEASON
COD & HADDOCK	LONG-LINE	OCT. - MAY
COD	TRAWL	ALL YEAR
SAITHE	TRAWL	APRIL - JUNE
CATFISH	LONG-LINE	MARCH - JUNE
REDFISH	TRAWL	JULY - OCT.

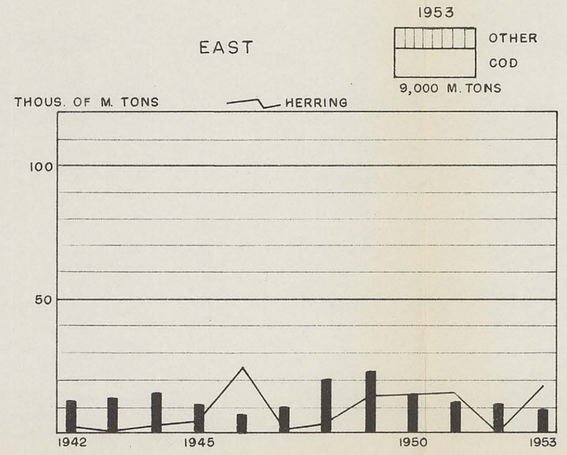
NORTH





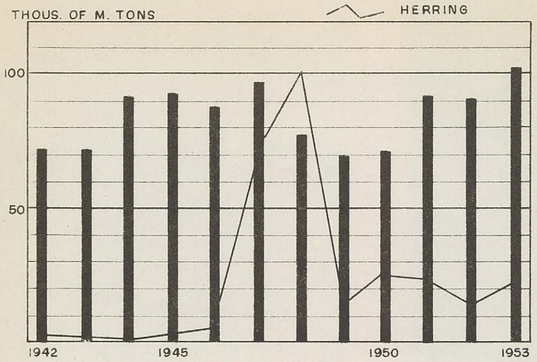
FISH	GEAR	SEASON
HERRING	PURSE SEINE	JULY - SEPT.
COD	TRAWL	APRIL - JUNE

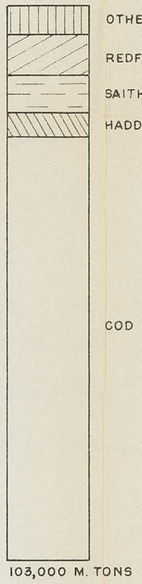
EAST



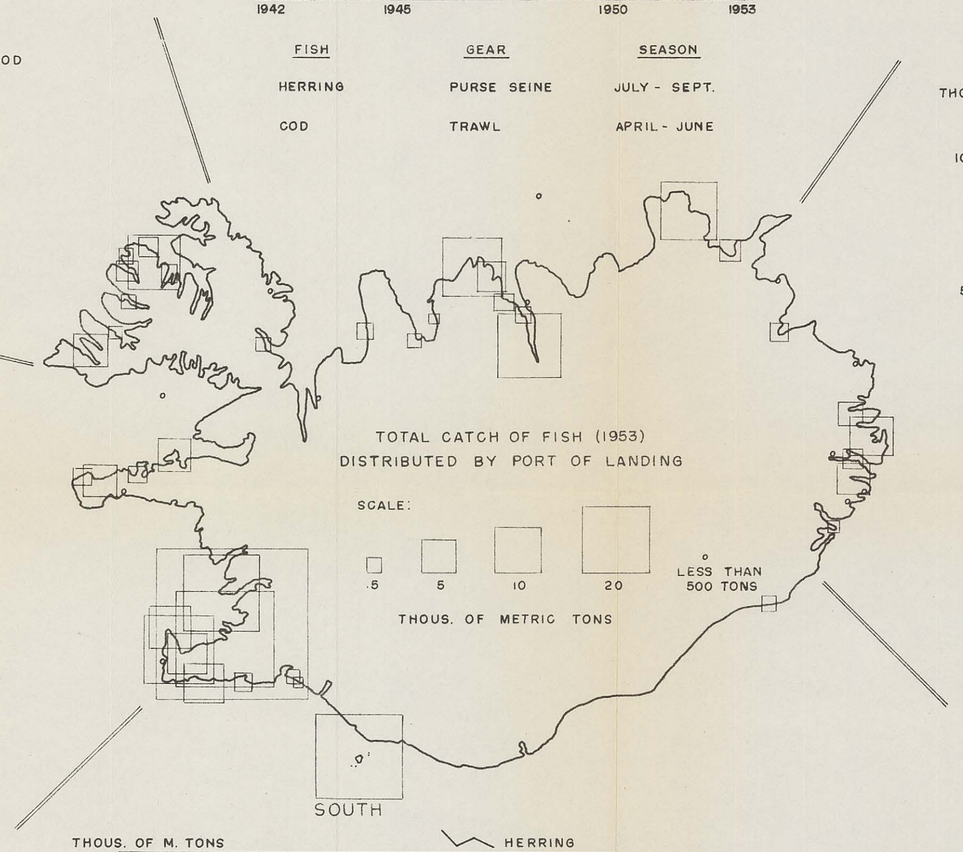
FISH	GEAR	SEASON
COD	LONG-LINE	APRIL - OCT.
CATFISH	SEINE NETS	MAY - JULY
COD	TRAWL	JUNE - OCT.
REDFISH	TRAWL	JULY - SEPT.
HERRING	PURSE SEINE	JULY - SEPT.

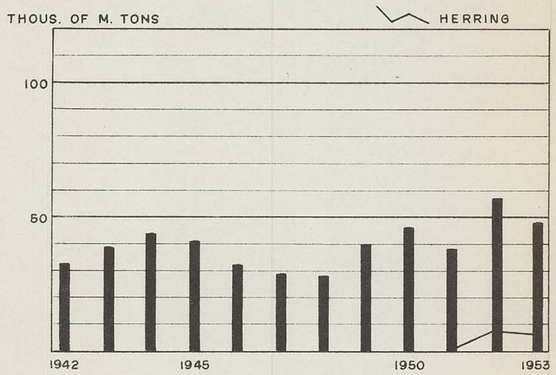
SOUTH - WEST

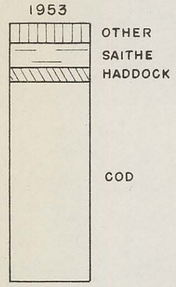




FISH	GEAR	SEASON
COD & HADDOCK	TRAWL LONG-LINE COD-NET	JAN.- MAY
FLATS	SEINE NETS	MAY- NOV.
HERRING	DRIFT NETS	AUG.- NOV.
HERRING	PURSE SEINE	OCCAS. DEC.- FEB.
HALIBUT	LONG-LINE	SPRING & SUMMER
REDFISH	TRAWL	APRIL - JUNE
SAITHE	TRAWL	FEB. - MARCH







FISH	GEAR	SEASON
COD & HADDOCK	LONG-LINE, TRAWL	JAN.- MAY
REDFISH	TRAWL	APRIL - JUNE
FLATS & HADDOCK	SEINE NETS	SUMMER & FALL

ICELAND

THE FISHING INDUSTRY

TOTAL CATCH BY REGION

COMPOSITION OF CATCH

TYPE OF FISH, GEAR, & SEASON

DISTRIBUTION OF CATCH BY PORT

SOURCES: HAGTÍÐINDI, FISKISKÝRSLUR OG HLUNNINDA

WGM 59

ICELAND

FISH PROCESSING & SHIPYARDS

- ● - FREEZING PLANT (ICELANDIC FREEZING PLANTS CORPORATION)
- ◉ - FREEZING PLANT (FEDERATION OF ICELANDIC COOPERATIVE SOCIETIES)
- ▼ - FISH OIL AND MEAL FACTORY
- • - HERRING-CURING STATION
- L - COD-LIVER OIL FACTORY
- S - SHIPYARD

WGM '59