5-1978

An Input-Output Analysis of the Soviet Fleet In ICNAF Areas 5 and 6, 1961-1973

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AN INPUT - OUTPUT
ANALYSIS OF THE SOVIET FLEET
IN ICNAF AREAS 5 AND 6, 1961-1973

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For Completion of Degree Requirement
for Master of Marine Affairs Program
University of Rhode Island, May, 1978

On March 1, 1977, a former great maritime power began to once again assert itself on the waters of the earth. On that date, the United States erected an invisible, but hopefully invincible wall 200 miles from its coastline. This wall was deemed necessary by the people and the Congress as the only means available to ensure the survival of (1) the living resources in the waters off our coast, and (2) those who make their living by harvesting those resources.

It had become apparent to the U.S. fisherman and the government that the many international regulations and agreements were not an efficient means of protecting the fishery resource in the waters off the U.S. coast. Many species that were once a significant portion of the American fisherman's catch were being threatened with extinction by the tremendous fishing effort of the modern fleets of the Soviet Union, Japan, Poland, and Germany.

The case of the haddock illustrates quite well exactly what had happened off the coast of the United States during the past 20 years. In 1960, New England fishermen brought back 46 thousand tons of haddock, worth over 11 million dollars, to their respective ports. It was during 1960 that those same American fishermen began to share the

the waters off New England with the modern fleets of Japan, Poland, and the Soviet Union. By 1965, the haddock catch for New England fishermen had increased to 155 thousand metric tons.[1] However, the decline in the following years was dramatic, to say the least. In only five years, the catch had declined to a mere 13,000 metric tons, a decrease of 92% from the high in 1965. By 1974, the catch had declined to 5,000 metric tons, or 3% of the 1965 catch. Since haddock was and still is an important segment of the fresh-fish market in the U.S., this decline in catch meant a significant decline in the earnings of the American fisherman.

One of the goals of the Fishery Conservation and Management Act of 1976 was the rebuilding of the American fishing industry. However, the Act does not give the U.S. fisherman exclusive rights to the fishery resource. The American fisherman will still be competing with the foreign fleets. Section 204 (b) (1) of the Fishery Conservation and Management Act of 1976 states:

> "Each foreign nation with which the United States has entered into a governing international agreement shall submit an application to the Secretary of State each year for a permit for each of its fishing vessels to engage in fishing described in subsection (A)."

It appears, therefore, that there will be a few gates in this wall. Who comes through these gates will be determined by the State Department, the Regional Councils, and the Secretary of Commerce. However, the size of the gates will be determined by the Regional Councils as provided under the provisions of Section 303 subsection 4 (B):

> "Any fishery management plan which is prepared by any council, or by the Secretary, with respect to any fishery shall assess and specify the capacity and the extent to which fishing vessels of the United States, on an annual basis, will harvest the optimum yield specified under paragraph 3 and the portion of such optimum yield which, on an annual basis, will not be harvested by fishing vessels of the United States and can be made available for foreign fishing."

For the first year of this Act, the Department of Commerce, with the help of its National Marine Fisheries Branch, will establish the optimum yield and whether or not there will be surpluses available to the foreign fleets. Therefore, for the first year the government will decide the size of the gate and to whom to sell tickets.

We, therefore, come to the process of establishing a ticket price at the gate. The Fishery Act states in Section 204, subsection 10:

> "Reasonable fees shall be paid to the Secretary by the owner or operator of any foreign fishing vessel for which a permit is issued..... In determining the level of such fees, the Secretary may take into account the cost of carrying out the provisions of this Act with respect to foreign fishing, including but not limited to, the cost of fishery conservation and management, fisheries research, administration and enforcement."

In attempting to ascertain what is "reasonable" the Secretary must consider many factors, one of which should be: How much profit do the nations fishing off the coast of the United States derive from the sale of those fish caught in the coastal waters of the United States? Without the economic facts reflecting the performance of a foreign nation fishing off our coasts, the Secretary, in assessing the fees, is making a subjective decision at best. This decision will also be influenced by the petitions of the foreign governments applying for permits. Given, therefore, that these fees are applied nondiscriminately, they should be based on a model of economic efficiency. To do otherwise would be rather un-American as it would be rewarding permits to operations which might be wasteful and inefficient. If it is found that a high profit can be derived by the catching and selling of U.S. fish by foreign nations, then what is determined to be a reasonable fee at present might be adjusted in the future to reflect the net earnings of those foreign fleets.

Unfortunately, the United States is one of the few nations in the world today which does not directly subsidize its fishing fleet through price supports, ship building grants, import quotas, and fuel subsidies. Because of the massive subsidies provided by their governments, foreign fishermen can operate off our coasts often, regardless of cost and degree of economic efficiency. It is, therefore, difficult to determine how much profit a foreign fisherman can make in the catching of fish[2] within 200 miles off the coast of the United States. The question may be raised, why bother to determine the level of profitability when the Act states that the fees shall be applied nondiscriminately.

The answer lies in the complex goals of the Fishery Act. The first reason is to determine if present fines for violations of the Act are high enough to encourage compliance with the law.

Violations of the Fishery Conservation and Management Act committed by foreign vessels go through a long procedural and bureaucratic process before legal action is taken against the violator. Recent history has shown that the State Department has much to say in the matter of the size of fines, and whether or not to seize a vessel which is violating the Act.[3] Fines for violations can range from $500 to $25,000 depending on the nature of the offense, who committed it, and the relationship between the United States government and the government of the offender. It, therefore, becomes quite obvious that the incentive to obey the law is lacking, and that the payment of fines may become another fixed cost operation. Indeed, it may be more profitable to break the law and pay the fine than to comply with the law. Without a measure of profitability, it would be difficult to determine whether or not a country could sustain a number of fines in order to continue fishing within our 200-mile zone. If a country can indeed absorb a certain level of fines and still be profitable, then it may be necessary to legislate a higher and more rigid structure of fines. At present, the Act gives the offending country and the Secretary of Commerce a great deal of negotiating room in the assessment and payment of fines. Section 308 subsection (d) states:

> "Compromise or other action by the Secretary - The Secretary may compromise, modify, or remit, with or without conditions, any civil penalty which is subject to imposition or which has been imposed under this section."

Without an understanding of revenues received for their fish, it would appear difficult to attain the goal of one of NOAA's counsels, Richard Solomon. He stated in a telephone interview that it was his feeling that violations, and especially resource violations, should be treated in such a way as to make sure that those violations will be unprofitable for the violator.[4]

One of the many goals of the Fishery Act is the rebuilding and revitalization of the domestic fishing fleet. It is hoped that those underutilized species, formerly caught off our coasts by other nations, might become a new source of revenue for the fishermen of the United States. However, for this goal to be realized, it will require that new means of fishing be accepted by an industry which is slow to accept new techniques, and the potential change in lifestyles required by these new techniques. One of the incentives to accept a new technique and its potential required lifestyle change is the measure of profitability the new techniques will deliver. The question, therefore, must be raised: Can the present U.S. fleet, which is mostly comprised of vessels of less than 200 gross tons, successfully harvest those underutilized species such as hake, herring, squid, and mackerel in sufficient enough quantity to support the economic growth which was a hoped for goal of the Fishery Conservation and Management Act of 1976? If not, should the United States seek to ensure the benefits of a 200-mile limit by encouraging the building of a fleet of larger vessels which could economically harvest those underutilized species? The answer to this question depends on the phrase "economically harvest," and thus another reason for this study of the Soviet fleet. Kaczynski, (1977) states that Russian, Polish, East German, and Bulgarian fleets are and have been built and operated at a heavy financial loss. The purpose of this study will be to examine the micro economic workings of the Soviet fleet off the waters of New England from 1960-1974 to see if indeed this conclusion is true.

We will not, however, attempt to analyze the actual economic process of the Soviet fleet. This would be practically impossible due to many reasons. First, there is very little reliable information regarding the profitability of the Soviet fleet and indeed anything to do with the Soviet fishing fleet. There are estimates as to its size and its influence on the economy, but these are only estimates and until an objective economist from the west is permitted access to the now classified information regarding Soviet fishing fleet operation, we will have to rely on estimates and whatever news the Soviets do release. Second, a distinction must be made between western free market economies and eastern controlled economies. In other words, what is profitable in the Soviet Union may be the road to bankruptcy in a western free market economy. Syseov in his book "Economics of the Soviet Fishing Industry" illustrates this point well in his financial plan or scheme of a typical industrial ministry within the Soviet Union. Nowhere under the section marked "Expenditures and Deduction" can any expenditure for interest be found. This is because money is given from the state to the ministry interest free. He states:

> "Capital investments are financed by the state budget, taxes from cooperative and social organizations, and taxes on profits of industry, and some special enterprise funds."

Another interesting problem with Soviet enterprise is the concept of depreciation. In the west, depreciation is mostly an economic term. It describes the process of economic obsolescence that all equipment must go through. Depreciation is also very important when ascertaining the total value of an industry for tax and other monetary purposes. However, in the Soviet Union, depreciation is mostly a concept to describe the physical inability of an asset to perform its economic function. In fact, Syseov uses the word obsolescence instead of depreciation. He states that the value of a typical fishing vessel drops approximately 3% a year.[5] This would give it an economic life of 33 years. Syseov states:

> "Under socialism, the replacement of old physically useful machinery by more perfect machinery is carried out in the interest of raising productivity of labor and increasing the social product. The socialist state determines in a planned manner the trends and rates of renewal of fixed assets."

Notice that nowhere is profit used as a motive for increasing production or other investment decisions, yet, this fleet is operating in the waters of a nation whose fundamental goals are often expressed in terms of economic profit.

It, therefore, seems clear that the United States must attempt to analyze the economics of the fleets which will operate within its newly created 200-mile fisheries zone. In establishing an "optimum yield" of a certain stock or species of fish, the economic efficiency of all fleets should be considered. To do this, all fleets must be examined within a western economic format. Free market prices should be the basis of output figures, and have been used in this study. The determination of standards of operation should be examined and formulated so that studies will be consistent and able to withstand the challenges of both the domestic industry and those governments whose fleets desire to fish off our coasts. Without such information, management decisions concerning either the resource or the economics of harvesting the resource will be highly subjective, open to challenge, and contrary to the goals and spirit of the Fisheries and Conservation Management Act of 1976.

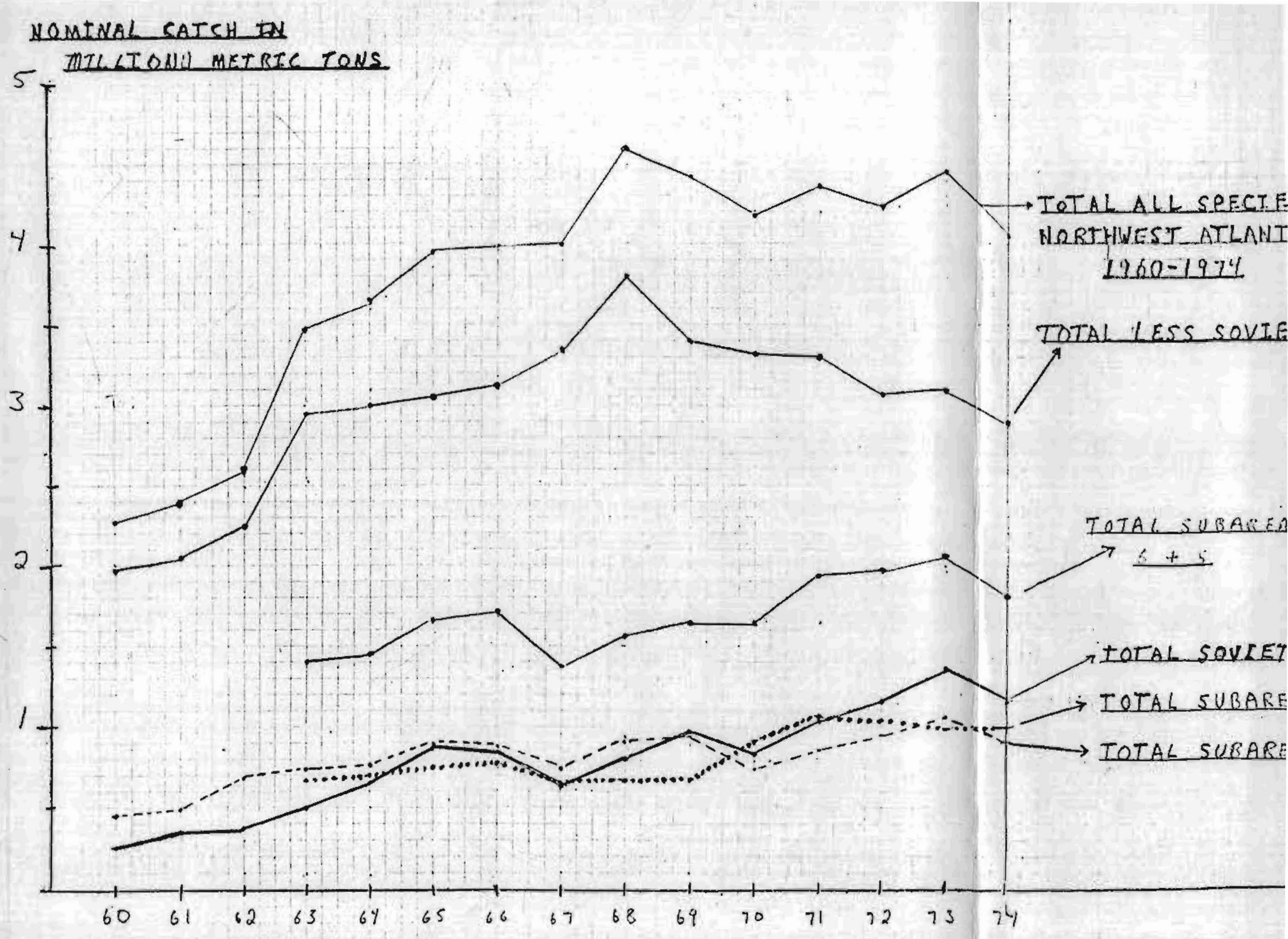
OUTPUT

The coastal waters of the Northwest Atlantic have for centuries provided the fishermen of Canada, Greenland, and the United States with a seemingly inexhaustible supply of fish. It was the bountiful harvest from these waters that attracted many of the initial residents of this part of the world. However, the coming of technology soon made it possible for other nations to share in the harvesting of this vast resource. This technology had its earliest manifestation in the form of well-designed schooners from Portugal which uses fleets of individually manned dories to catch cod. The latest manifestations of this technology are the sleek, efficient supertrawlers from the Soviet Union which are capable of staying at sea for 90 days at a time, and can process almost 70 tons of fish a day.[6]

During the late 1940's, the pressure exerted by the many fleets on the stocks of fish in the Northwest Atlantic area was so great that it became apparent that catch limits would have to be instituted if the fish stocks of this area were to be saved from extinction. Therefore, on July 3, 1950, the International Convention for the Northwest Atlantic Fisheries (ICNAF) was convened and started the difficult task of managing the many species of fish in this area.

At first, the only nations involved in the convention were those with a traditional interest in the area, such as Canada, the United States, Great Britain, Iceland, France, and Portugal. But as Germany, Poland, and the Soviet Union started to finish the task of rebuilding their homelands destroyed by World War II, they aggressively began building a distant-water fishing fleet that would help meet the protein demands of their fast growing populations. In 1959, the Soviet fleet in particular made a rather impressive arrival in the Northwest Atlantic. In that year, their newly arrived fleet numbered 111 vessels, with an average size of 1,140 tons.[7] The only other nation to come close to this average size vessel was Portugal, with an average size of 995 tons. All of these Soviet vessels were efficient fishing platforms, and their effort resulted in a dramatic increase in the catch statistics for the Northwest Atlantic.

By the use of the graph in Figure 1, it can be seen that the arrival of the Soviet fleet had a dramatic effect on the total landings for the ICNAF area. In 1968, the landings peaked with a total of 4,599,000 metric tons of fish. This peak was more or less sustained up until 1974, but only because of the amount of fish being caught by the Soviet fleet. If one subtracts the Soviet share of



NOMINAL CATCH IN
MILLION METRIC TONS
5
4
3
2
1
60
61
62
63
64
65
66
67
68
69
70
71
72
73
74
TOTAL ALL SPECIE
NORTHWEST ATLANTI
1960-1974
TOTAL LESS SOVIE
TOTAL SUBAREA
TOTAL SOVIET
TOTAL SUBARE
TOTAL SUBARE

FIG 1

the total catch, it becomes quite evident just how fast the stocks were declining in the ICNAF area. The Soviet fleet managed to steadily increase its catch during the years from 1960-1973. It went from 258,000 metric tons to 1,357,000 metric tons, an increase of 525%. If one examines Figure 1 even closer, it becomes apparent that the increasing catch of the Soviet fleet was due in part to their fishing activity in areas 5 and 6, or off the coast of New England. Indeed, the waters off the coast of New England have consistently provided about 30-40% of the total catch in ICNAF waters.

The importance of Georges Bank and the rest of the waters off the New England coast to the Soviet fleet can be more accurately assessed in Figure 3. At first, in 1961, the Soviets experienced little return in this area when compared to what they were catching in other areas of the Northwest Atlantic. But then, in 1962, a trend started that was to continue for eight years until 1969. That trend was an increased effort in this area to the point where, over that period, 52% of the total Soviet catch in ICNAF waters was caught off the shores of New England. During this same period, the Soviet fleet accounted for 25% of all the fish caught in areas 5 and 6. At this

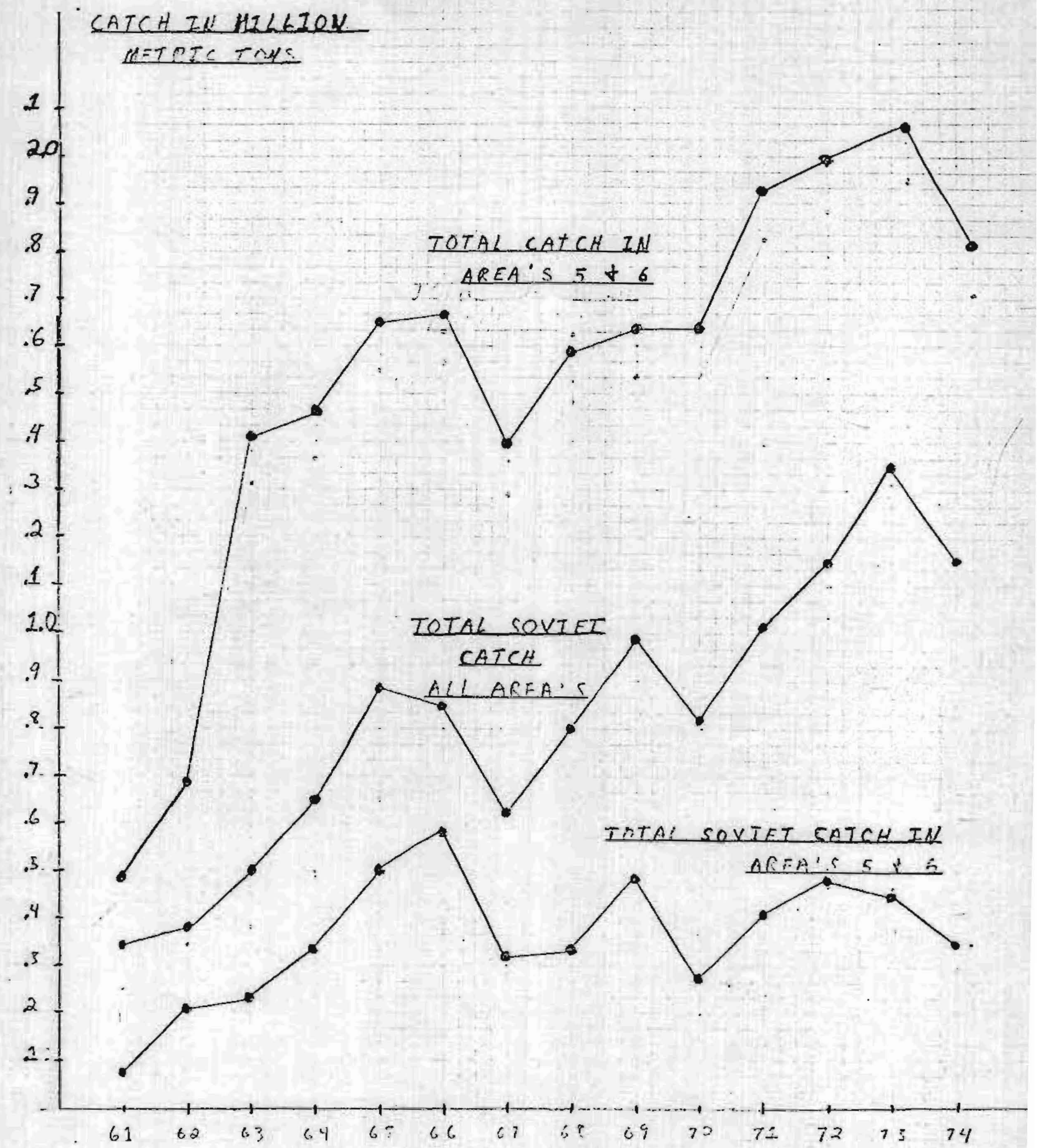
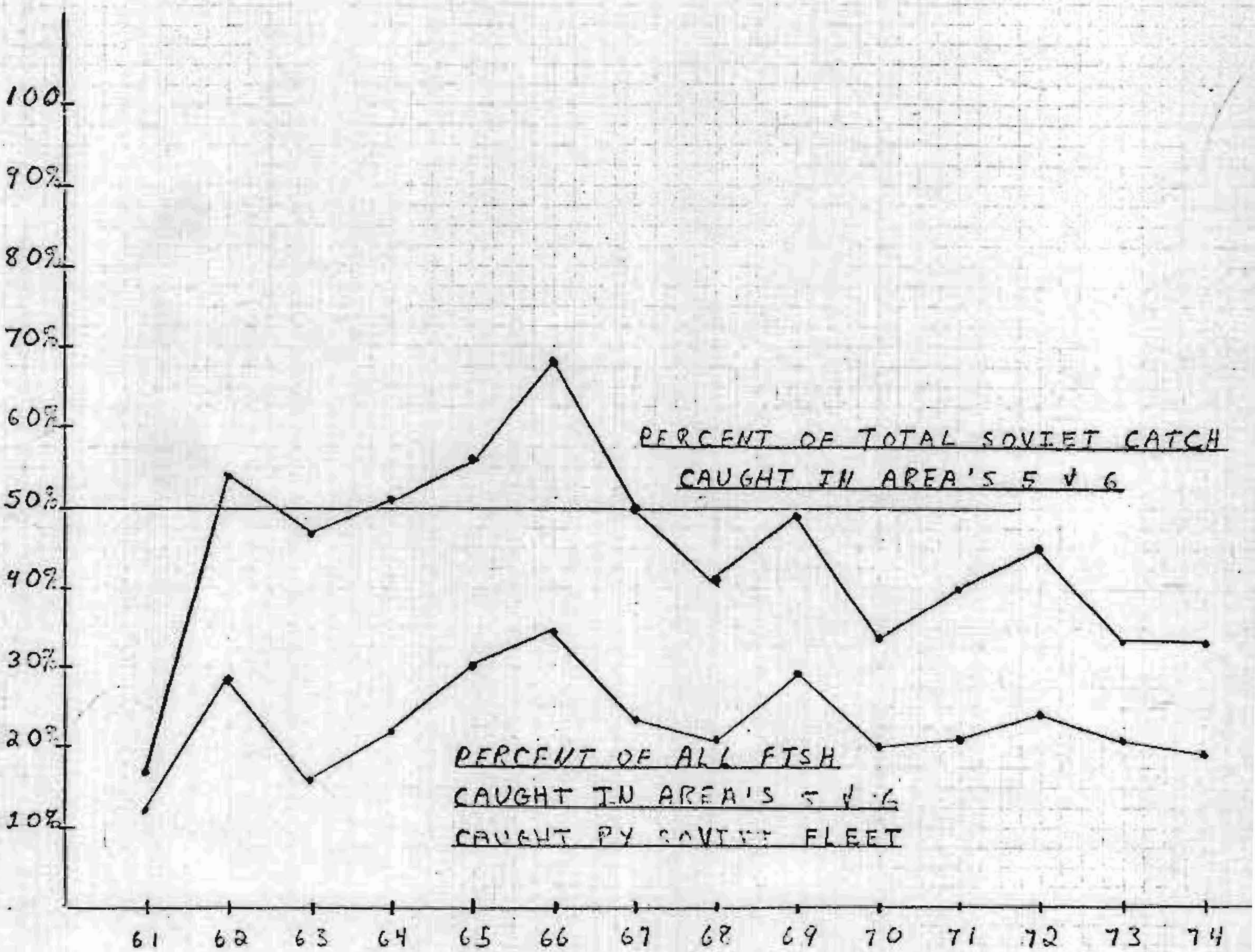

CATCH IN MILLION
METRIC TONS
TOTAL CATCH IN
AREA'S 5 + 6
TOTAL SOVIET
CATCH
ALL AREA'S
TOTAL SOVIET CATCH IN
AREA'S 5 + 6

FIG 2



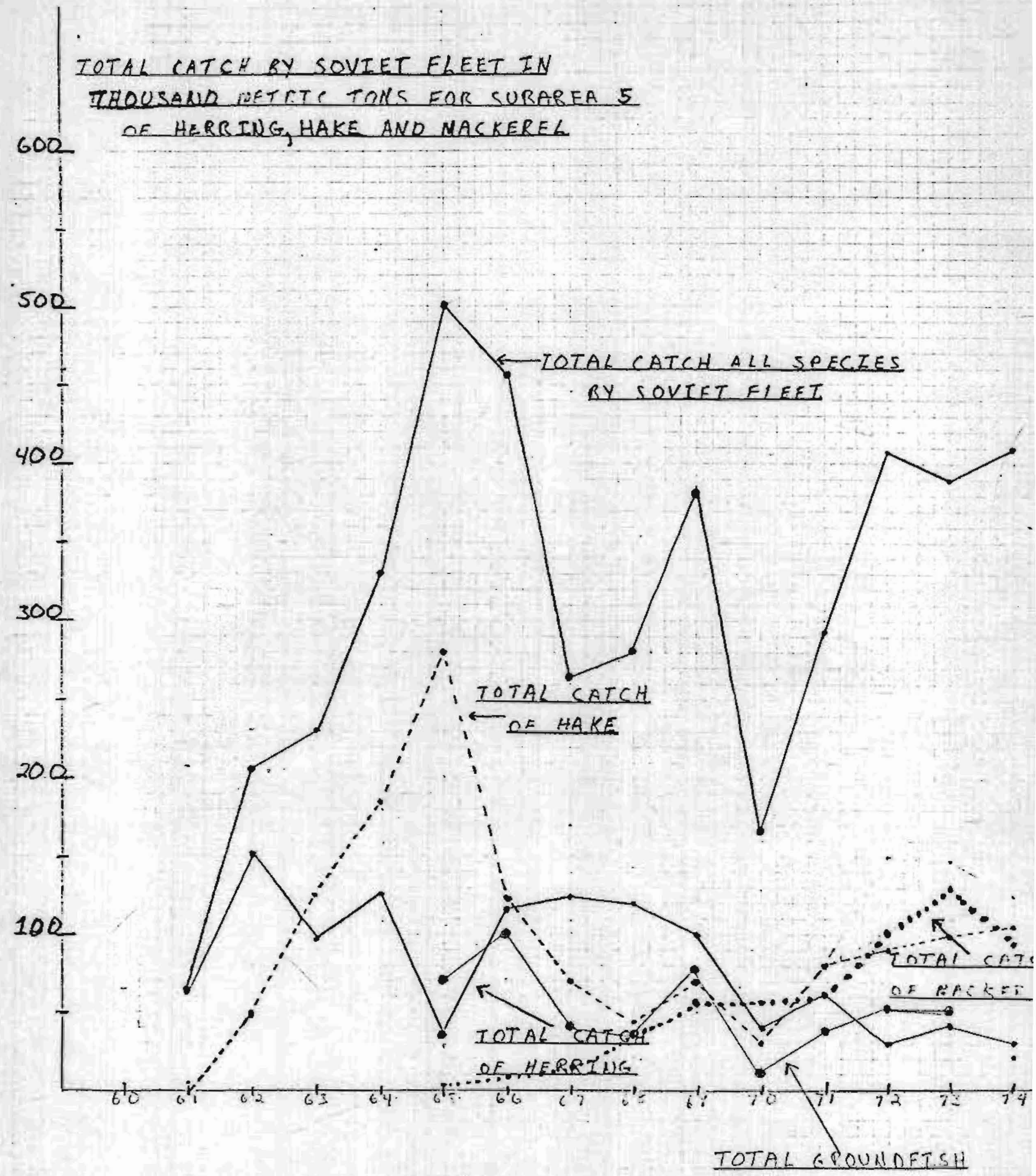
100
90%
80%
70%
60%
50%
40%
30%
20%
10%
PERCENT OF TOTAL SOVIET CATCH
CAUGHT IN AREA'S 5 & 6
PERCENT OF ALL FISH
CAUGHT IN AREA'S
61
62
63
64
65
66
67
68
69
70
71
72
73
74

FIG 3

time, there were at least five other nations actively fishing this area.

It beomes apparent, therefore, that along with the fishermen of New England, the Soviet fishermen knew a good thing when they saw it. Their effort off our coastline resulted in over 50% of their total catch in the Northwest Atlantic, and required substantial investment and direction. In attempting to determine the final potential gain to them, one must proceed on a species-by-species analysis of their catch.

Figure 4 begins this analysis in subarea 5 or that area which is immediately adjacent to the coast of New England. From this area, the Soviets harvested mostly underutilized fish, such as herring and silver hake. What is done with this catch is not entirely known. Syseov (1970) states that in 1968,429,000 tons of herring was salted in the Soviet Union. The herring catch in area 5 would, therefore, have provided about 28% of the total output of salted herring for that year. It is known that most of the silver hake is dressed and frozen right on board the trawlers themselves.[8] Therefore, it can be assumed that most of this catch is going to the Soviet consumer in the round, and not being turned into fishmeal. It is interesting to note that



TOTAL CATCH BY SOVIET FLEET IN
THOUSAND METRIC TONS FOR SUBAREA 5
OF HERRING, HAKE AND MACKEREL
600
500
400
300
200
100
TOTAL CATCH ALL SPECIES
BY SOVIET FLEET
TOTAL CATCH
OF HAKE
TOTAL CATCH
OF HERRING
TOTAL GROUNDFISH
60
61
62
63
64
65
66
67
68
69
70
71
72
73
74

FIG 4

after 1969 species which are easier to dress, such as silver hake and mackerel, were harvested in greater numbers than herring. This may in part be due to the Soviet consumer's reluctance to buy salted herring when frozen hake or mackerel can be purchased instead.

Figure 5 gives a picture of those species considered as valuable, i.e., cod, haddock, and flounder. The most striking aspect of this graph is the tremendous pressure the Soviet fleet exerted on the haddock stock for three years, from 1964-1967, the result being that the stock was almost wiped out, and is still in very poor shape because of this intensive pressure. All of these fish are either filleted and then frozen, or dressed and frozen. They represent the "cream of the crop" and command premium prices from the Soviets or any other consumer. Some of the cod is frozen into blocks for export to other communist countries.

Soviet fishing activity in area 6 during this period was much less than that in area 5. Its most productive year was 1966, the first year that statistics were recorded for this area. In that year, 130,000 metric tons were caught, 92,000 tons of which were silver hake. However, mackerel soon became the primary species being caught in this area with 247,000 metric tons being harvested during the

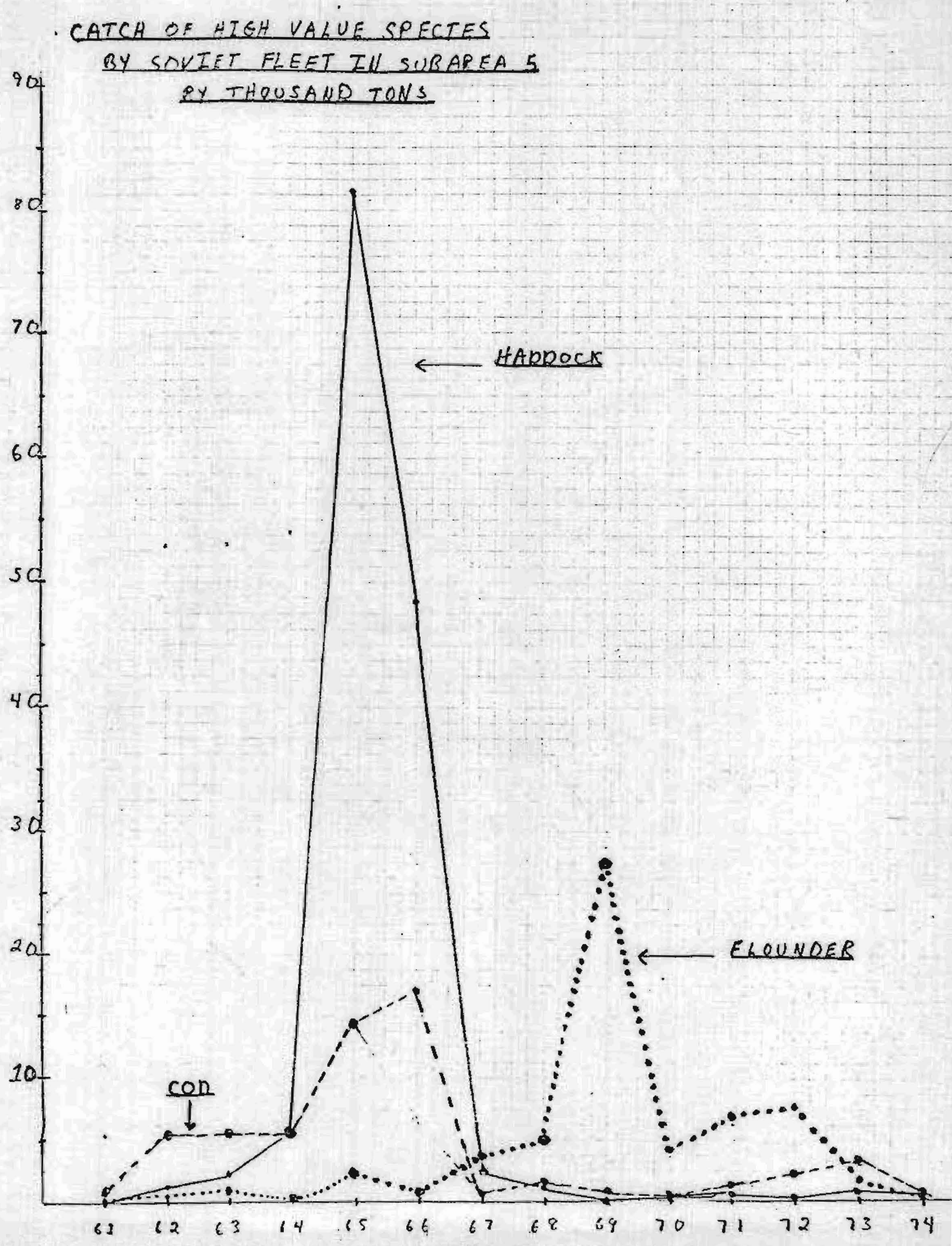
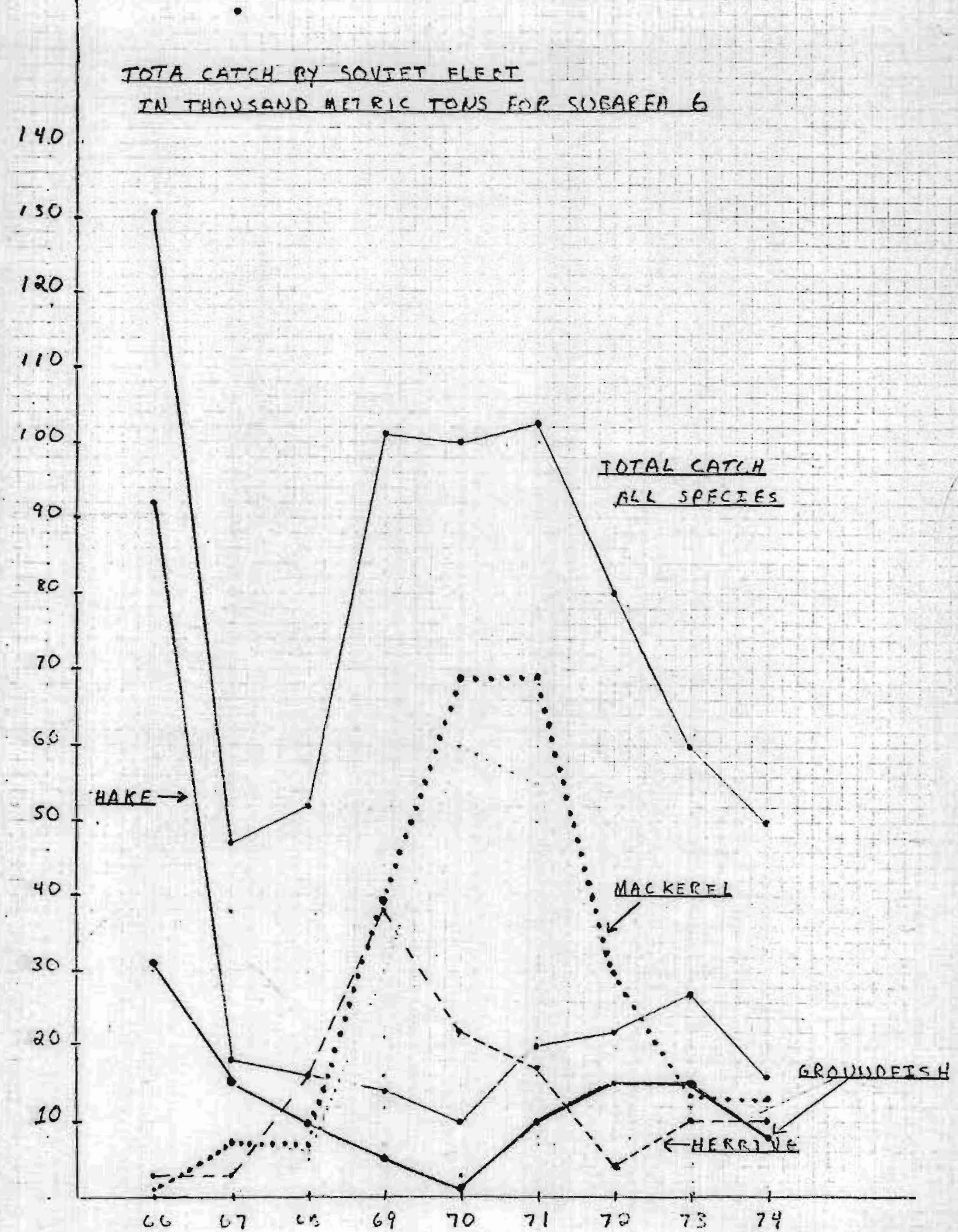

CATCH OF HIGH VALUE SPECIES
BY SOVIET FLEET IN SUBAREA 5
BY THOUSAND TONS
90
80
70
60
50
40
30
20
10
HADDOCK
FLOUNDER
COD
61
62
63
64
65
66
67
68
69
70
71
72
73
74

FIG 5



TOTA CATCH BY SOVIET FLEET
IN THOUSAND METRIC TONS FOR SUBAREA 6
140
130
120
110
100
90
80
70
60
50
40
30
20
10
TOTAL CATCH
ALL SPECIES
HAKE →
MACKEREL
GROUNDFISH
← HERRING
66
67
68
69
70
71
72
73
74

FIG 6

years 1966-1974. By returning to Figure 1, one can see that at no time did the Soviet catch in area 6 ever become more than 19%, and most of the time it represented only 10-14% of the total catch in this area.

In area 6, species with a high value were caught in fairly limited quantities. Flounder was the only species caught in any significant amount with a total of 3,187 tons being harvested during 1968-1974. Figure 7 is proof again of the importance of the Georges Bank area as a producer of high value groundfish. Area 6 corresponds to the mid-Atlantic coast of our eastern seaboard, and has historically never had a productive offshore fishery. Most of its volume comes from the inshore fishery for shrimp, menhaden, and oysters in and around Chesapeake Bay.

PRICE

Because of the nature of the Soviet economy, it is difficult for a westerner to attempt to produce a balance sheet for the fishing fleet that will have meaning in a demand type economic system, such as that in the United States. Syseov states:

> "All the prices of similar goods are fixed in Soviet industry as single prices, proceeding from the mean branch expenditures on production... Thus, the prices express all aspects of the complex process of reproduction of the gross social product, and social and other aspects."

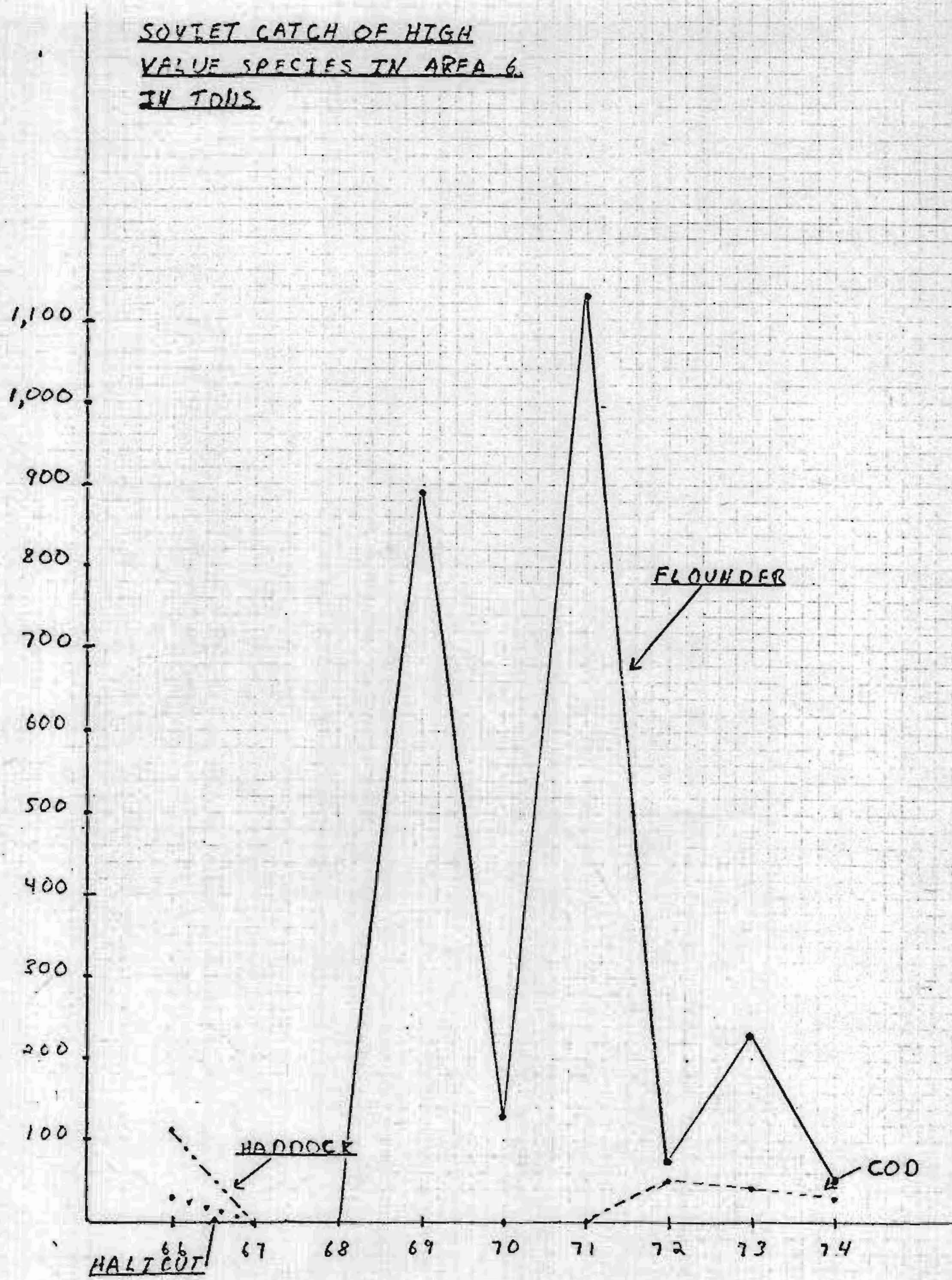

SOVIET CATCH OF HIGH
VALUE SPECIES IN AREA 6.
IN TONS
1,100
1,000
900
800
700
600
500
400
300
200
100
FLOUNDER
HADDOCK
COD
HALIBUT
66
67
68
69
70
71
72
73
74

FIG 7

However, the fish being harvested within our 200-mile conservation zone are entering many types of economic systems, most of which are similar to the demand system of the United States. Therefore, it beomes necessary, in the preservation of fairness, to apply a common price to the fish being harvested off our coasts, if we are to come up with a potential profit-loss estimate for the many fleets off our coasts. Of further interest is that by using a western economic system and free world prices, it can be determined if fishing on a scale as large as the Soviets might be profitable and, therefore, feasible for the fishermen of the United States.

Where, therefore, does one find a consistent source of the price of fish? The answer to that question lies in another question, and also depends on how consistent you feel your source must be. The other question is, what price do you mean, the ex-vessel, the wholesale, or the retail? This researcher felt that to accurately reflect the worth of some commodity to a country, one must examine the price that country receives for its goods, from the country or consumer to whom it is selling. However, this technique runs afoul of the standard of consistency. An example of this is the statistics from the U.S. Census Bureau on values and amounts of imported fish.

During the early 1960's, there were seven categories of species which could be used as the basis of an average price for the purposes of this report. By 1973, there were only four categories. For some of the years, imports were recorded from Sino-Soviet Bloc countries, but that was only from 1965-1974 and only for frozen cod. Therefore, the use of these statistics would fail the consistency requirement.

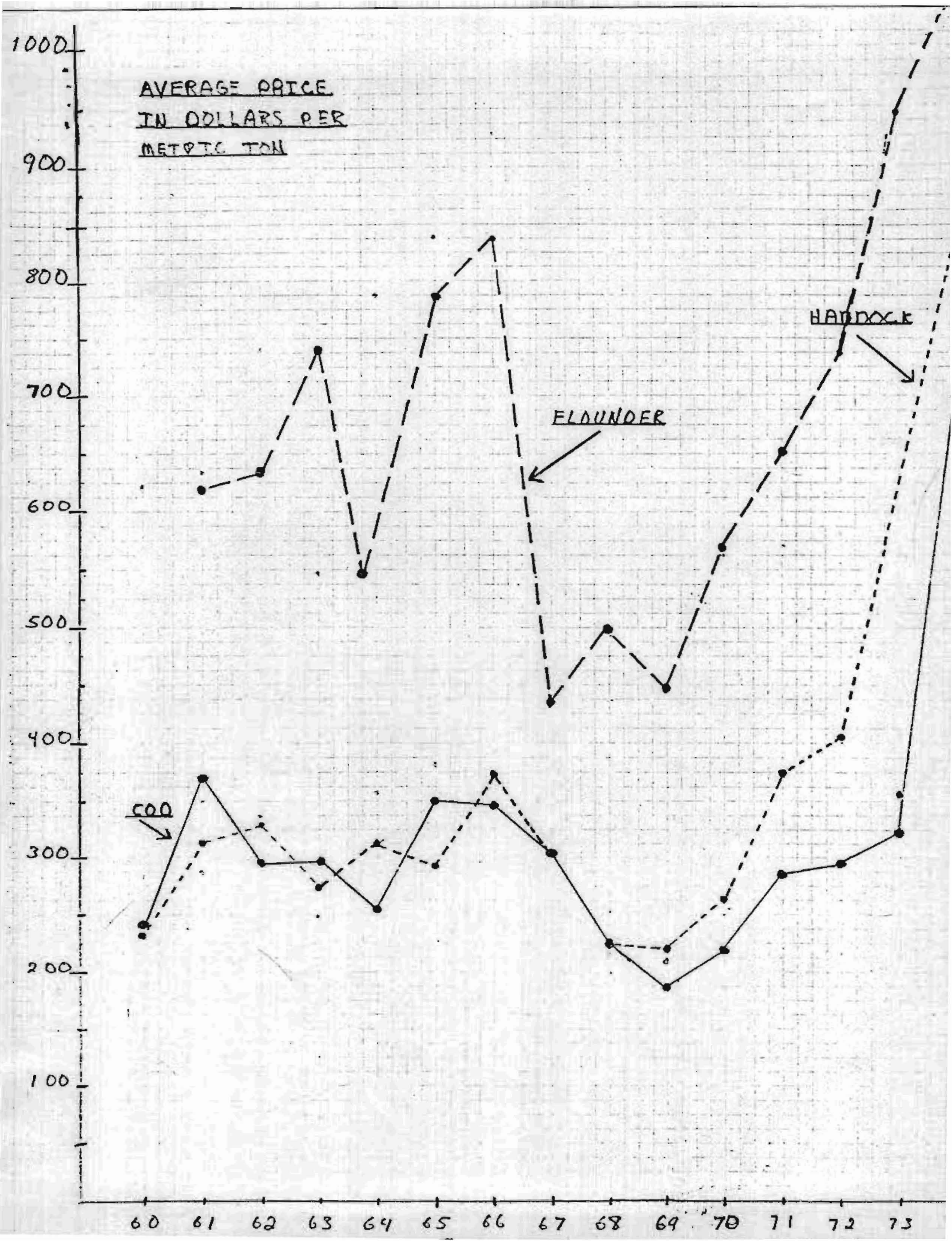
The lack of consistency can also be used for a reason to not use the FAO export prices. The FAO, while commendable in its desire to expand on types and categories, fails the researcher when after a six-year period, a particularly useful category is suddenly deleted.

The final source which was used to provide a basis for research was found at the ex-vessel level of prices, due to the fact that during the study period all species of fish being recorded remained in the same category. This, however, meant that all prices be converted to dollars, as ex-vessel prices are historically recorded in the native currency.

Another problem to be overcome was that the relevancy of the species of fish being used must be substantiated. It would clearly be inaccurate to include English whiting in the average international price of silver hake, simply because silver hake is often called whiting in the United States. It would also be inaccurate to include Pacific mackerel into the average price of Atlantic mackerel.

The technique which was devised is as follows. It was determined where else in the world the six species being used for this report were landed. The five most productive countries were then grouped together to form the data base from which the total average value, <u>not</u> average price, was culled. For example, herring is caught by many countries, but for this study we used the landings and values of Canada, the United States, Denmark, West Germany, and Great Britain. These five countries catch a great deal of sea herring and are heavily involved in the import and export of this product. The species being studied in this report were chosen partially because of their use by many different countries, and have a historical pattern that has been fairly well recorded.

The results of their technique can be found in Figure 8, which is fairly self-explanatory. By combining the prices from Figure 8 and the output of the Soviet fleet, we are able to come up with the following information. We now have a fairly good estimate of what the Soviet Union



AVERAGE PRICE IN DOLLARS PER METRIC TON
1000
900
800
700
600
500
400
300
200
100
FLOUNDER
HADDOCK
COD
60
61
62
63
64
65
66
67
68
69
70
71
72
73

would have paid American fishermen for the fish landed by the Soviet fleet. To clarify further, if the Soviet Union had a free market demand type economy, and it participated in world trade, its fleet would have had the following gross income for the years from 1961-1973. It would have earned $47,260,000 for high value species, such as cod, haddock, and flounder. It would have earned $241,300,000 for the low value or underutilized species, such as hake, herring, and mackerel. Therefore, for these six species, it would have earned $288,560,000. The total earnings figure for the Soviet fleet is probably a great deal higher than this last figure due to the catching of many other important high value species, such as halibut or squid. However, it was impossible to collect data on these species as the landings were recorded in an inconsistent manner. There is a smaller data base from which to figure an average price, so that the total worth of the species to the Soviet fleet might be dominated by the price generated by one country. It would, for instance, be inconsistent to determine an average price of squid because of the fluctuations of the landings and the sometimes dominance of the market price by a country such as Spain or Japan. However, it is possible to establish a world-wide

Average International Ex-Vessel Price of Fish by Species per Metric Ton in Dollars

	1961	'62	'63	'64	'65	'66	'67	'68	'69	'70	'71	'72	'73
Cod	132.49	125.79	134.84	153.47	170.21	171.41	167.29	147.21	159.74	191.25	268.07	306.82	451.96
Haddock	154.56	158.08	168.14	178.75	192.92	178.44	200.16	191.33	246.08	260.11	300.00	337.30	412.10
Herring	57.25	47.95	50.74	53.64	56.81	56.14	49.28	45.56	51.29	58.97	62.19	74.60	125.43
Mackerel	97.44	111.71	109.10	111.11	123.13	105.02	100.17	106.84	90.84	105.01	114.14	108.10	129.09
Hake	53.99	51.44	49.01	54.73	50.97	52.97	42.03	47.50	61.35	78.41	92.79	94.66	144.33
Flounder	131.58	72.15	69.81	71.72	72.38	73.85	108.07	104.76	117.15	101.76	103.13	123.53	154.40
All Species	137.31	140.57	148.57	151.14	165.71	181.00	200.14	191.08	206.85	227.85	274.0	307.33	377.25

Fig 9

average value of all fishery products at the ex-vessel level. This figure has been determined and is reflected in Figure 9 under the category of "all species." Using this world-wide average value, we are able to establish the estimated total worth of all the species landed by the Soviet fleet from 1961-1973 in the waters off the New England coast. It is estimated, therefore, that had this fish been caught by a western free market economy fleet, such as the West German fleet, the fleet would have received $1,143,600,000 for its catch.

EST. TOTAL VALUE IN MILLIONS OF DOLLARS, OF FISH CAUGHT OFF NEW ENGLAND BY THE SOVIET FISHING FLEET 1961-1973

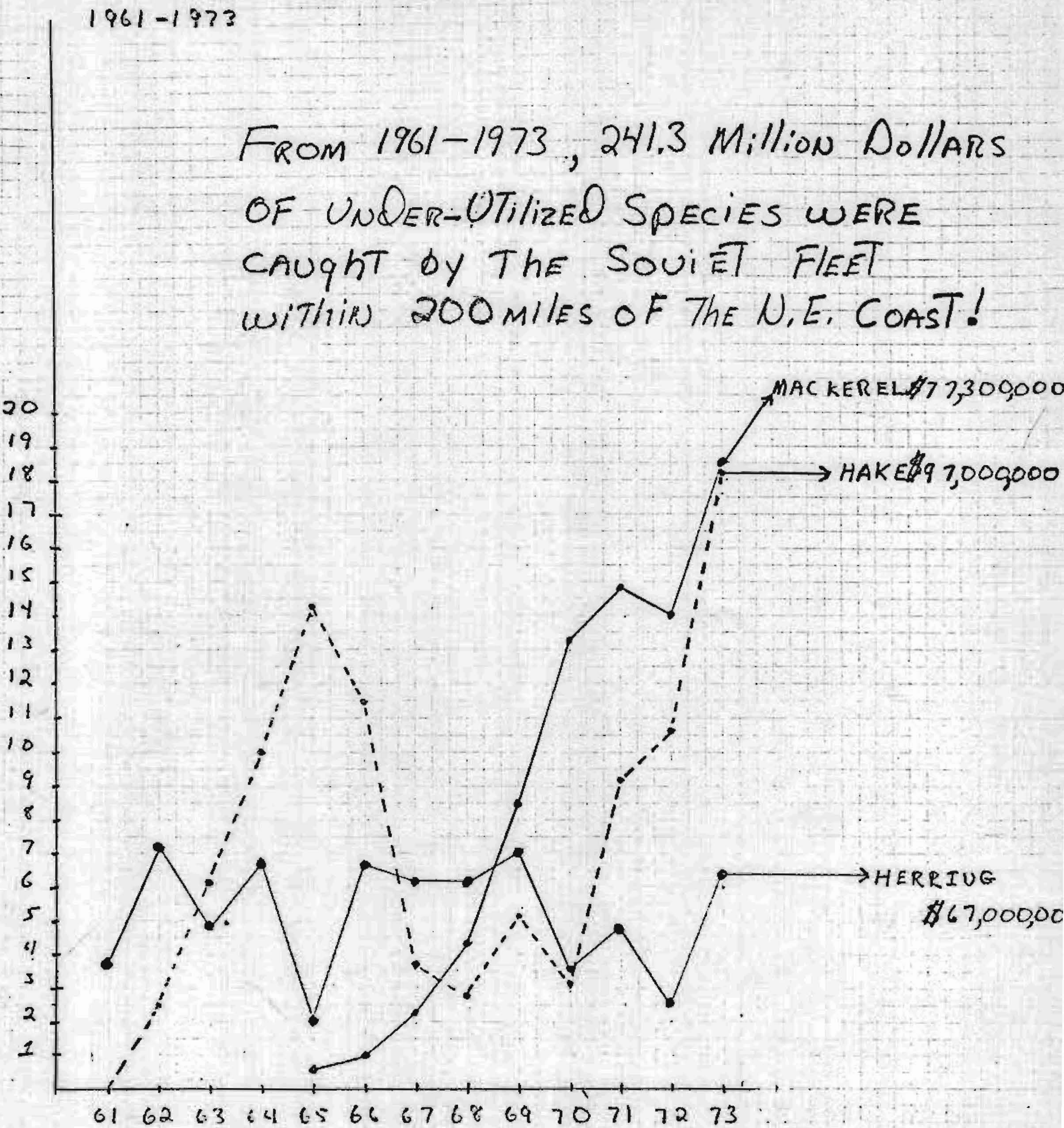


FIG 10

EST. TOTAL VALUE IN MILLIONS OF DOLLARS
OF HIGH-VALUE FISH CAUGHT BY
SOVIET FLEET OFF NEW ENGLAND
WATERS FROM 1961-1973

From 1961-1973 AN ESTIMATED 48 million Dollars of TRADITIONAL U.S. Fish WAS CAUGHT by The Soviet Fleet within 200 miles of The N.E. Coast

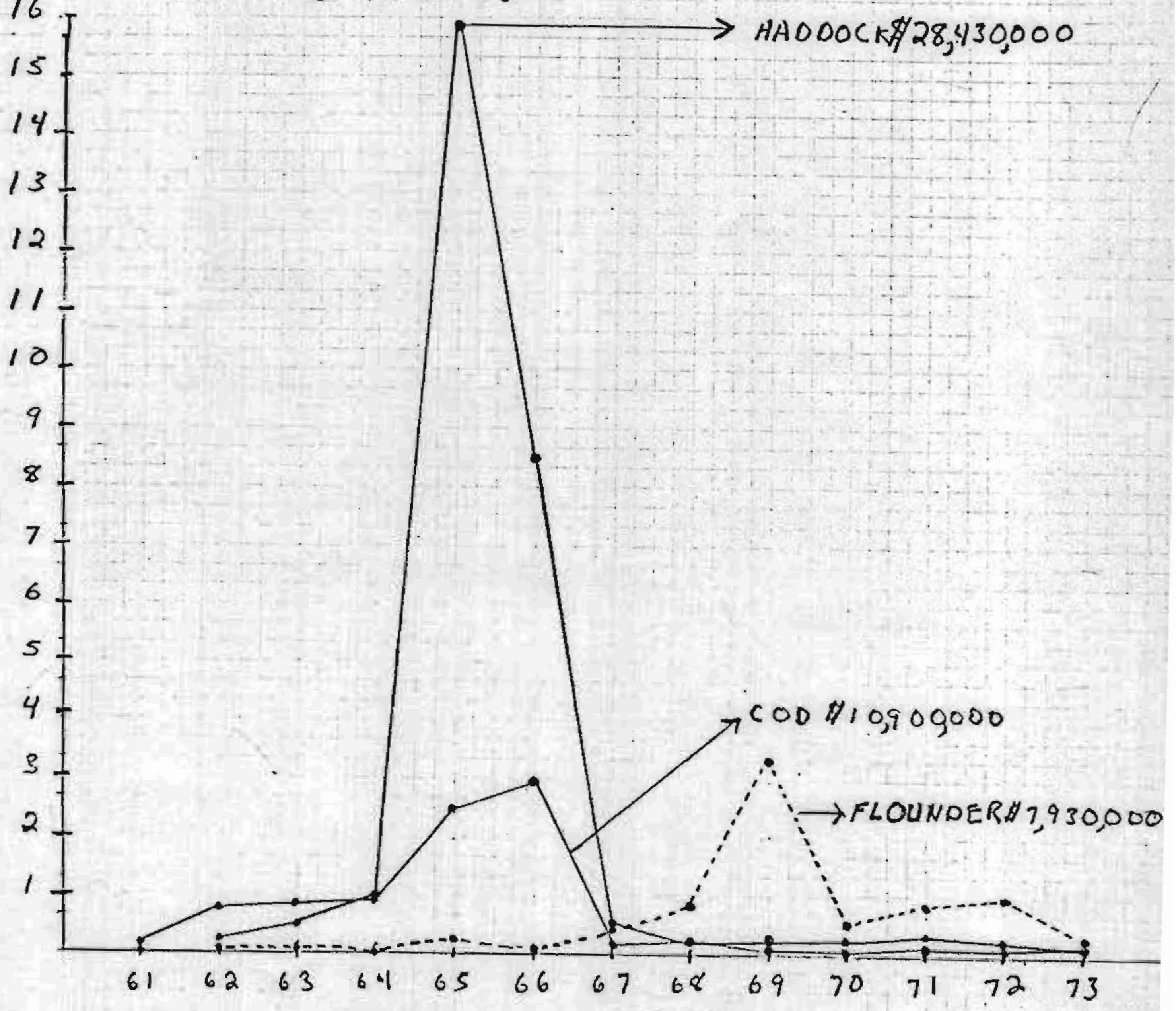


FIG 11

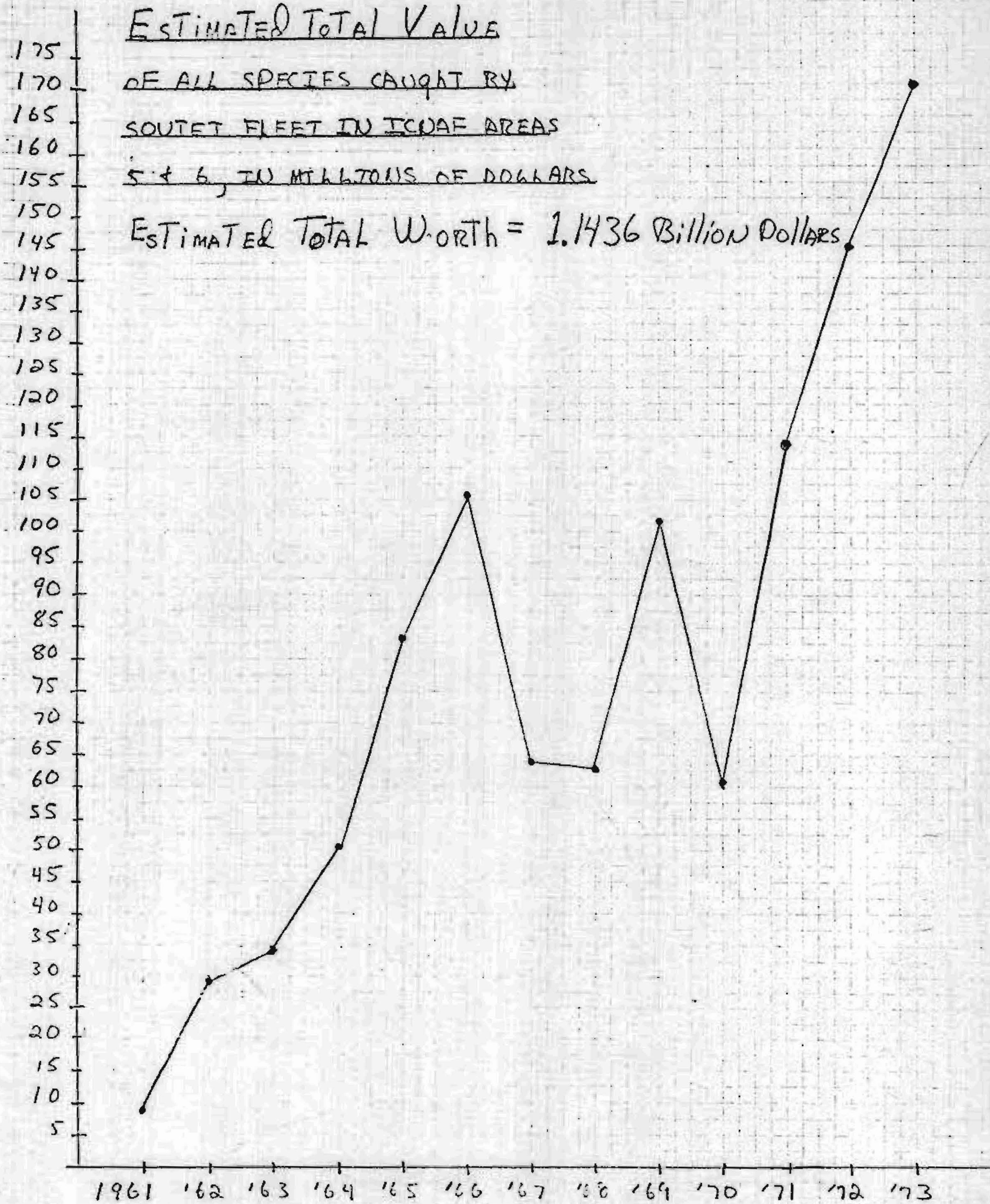

ESTIMATED TOTAL VALUE
OF ALL SPECIES CAUGHT BY
SOVIET FLEET IN ICNAF AREAS
5 & 6, IN MILLIONS OF DOLLARS
EsTimaTed ToTaL Worth = 1.1436 Billion Dollars
175
170
165
160
155
150
145
140
135
130
125
120
115
110
105
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
1961
'62
'63
'64
'65
'66
'67
'68
'69
'70
'71
'72
'73

FIG 12

INPUT

The development of data to determine the Soviet level of input for the area and time being considered is a task of estimation, extrapolation, and determination. The reasons for this are many but, as stated in the introduction, center around the lack of hard facts and information with which to deal. On a subjective level, it is common knowledge that the Soviet fishing fleet is composed of large, modern, and efficient trawlers of all designs and purposes.

It has been estimated that from 1946-1965, the Soviet Union invested over 4 billion dollars in the reconstruction, modernization, and development of its fishing industry.[9] We do not have figures on how many new shoreside facilities were constructed during this period. We do, however, have information concerning the size, number, and cost of the offshore fleet and, therefore, can estimate a level of costs for the fleet in the waters off the New England coast from 1961-1973. We can combine these estimated cost figures with the estimated production figures to arrive at an estimated net figure for the time period. The word "estimate" cannot be used enough in this study, due to the lack of consistent statistics compiled by ICNAF and lack of operational procedures which migh affect the economic, not harvesting, efficiency of the Soviet offshore fleet.

The Soviet fleet that first arrived in the waters of the Northwest Atlantic was not an especially impressive sight. There were a few of the larger new BMRT class, but the majority of the fleet was comprised of older side trawlers having a gross tonnage of 704 or less, and a horsepower of less than 800. An anology that might be useful is found in the airline industry during this same period. There were still many DC-3's flying and carrying passengers, and the new 707's were yet to be the standard.

The first of the Soviet's offshore vessels came under the designation of RT or large side trawlers. They were built in Finland and Sweden, but many were built in the late 1950's by Great Britain.[10] The RT207, Sever of the Murmansk fleet is a good example of this early offshore vessel. Built by Great Britain in 1956, it fished off the New England coast from 1959-1965,[11] was 57 meter or 142 feet long, and weighed 685 gross tons. The boat was fairly modern in that it had two refrigerated cargo holds kept cool by a Freon-12 cooling system. It was powered by an 1100 horsepower diesel, which gave it a top speed of almost 13 knots. The cost of construction of this vessel has been estimated to be 2 million dollars[12] The Gydnia Shipyard of

Soviet Fleet Days on Grounds and Estimated Number of Shi

Tonnage Class	'61	'62	'63	'64	'65	'66	'67	'68	'69	'70	'71	'72	'73	'74
2000 & over Class 7	2391 10	3317 13	4297 17	7972 31	10,630 42	12,889 51	5,247 20	4,843 19	9,476 37	2,972 12	7,767 31	10,986 43	10,134 40	7,225 29
1000-1999 Class 6					21 1	144 1	94 1							
500-999 Class 5				217	2575 11	3248 14	1,522 6		3,767 16	7,002 29	7,216 30	11,265 47	12,883 54	9,266 39
150-499 Class 4	7744 35	22,603 103	13,102 60	13,920 63	13555 62	7415 34	19,665 90	26,907 122	32,148 146	14,673 67	11,690 53	17,380 79	6,774 31	5,710 26
Total	10,135	25,920	17,399	22,109	26,781	23,696	26,528	31,750	45,391	24,647	26,673	39,631	29,791	22,161

Max-Min Fuel Consumption by Vessel in ICNAF Area's 5 + 6, in Tons

	'61	'62	'63	'64	'65	'66	'67	'68	'69	'70	'71	'72	'73	'74
BMRT	14,000 → 20,000	19,000 → 28,000	25,000 → 37,000	46,000 → 68000	61,000 → 90,000	75,000 → 110,000	30,000 → 45000	28,000 → 41000	55,000 → 81,000	17,000 → 25000	45,000 → 66000	64,000 → 93,000	59,000 → 86000	42000 → 81,000
SRTR				3,350 → 520	4,100 6,200	5,200 3800	2,400 3,600		6,000 9,000	11,000 16,800	11,500 17,300	18,000 27,000	20,600 → 31,000	15,000 → 22,000
SRT	9,300 → 15,000	27,000 → 45,000	16,000 → 26,000	17,000 → 28,000	16,000 → 27,000	9,000 → 15000	24,000 → 39000	32,000 → 54,000	39,000 → 64,000	18,000 → 29,000	14,000 → 23,000	21,000 → 35,000	8,000 → 14,000	7,000 → 11,000
Total	23300 → 35,000	46,000 → 73,000	41,000 → 63,000	63,350 → 96,520	81,100 123,200	89,200 132,800	56,400 87,600	60,000 95,000	100,000 154,000	46,000 70,800	70500 106,300	103,000 155,000	87,600 131,000	64,000 94,000

Fig 1

Poland has indicated that a vessel of similar size and weight could be built today for about 3.5-4 million dollars.[13]

It soon became evident through operational comparisons that the large stern trawlers were much more efficient than the RT or side trawlers. A stern trawler could fish in much heavier weather, due to its ability to face the seas during the hauling and setting of the net, instead of having to lie side to the sea while hauling back. The statistics for the Northwest Atlantic bear this out. In 1960, there were 33 BMRT stern trawlers fishing all of the ICNAF waters. By 1965, there were 98, or an increase of almost 200%. In 1971, there were 186 BMRT's in the ICNAF convention area or an increase of 600% in ten years.[14] The Soviet fleet had certainly gone through a drastic change in just ten years. Yet, despite this tremendous growth in the number of larger vessels, the effort off the New England coast was being pursued by the boats of the RT size as is borne out in the days on the grounds graph on Figure 2. Only during two years, 1966 and 1973, were more days put into the total fishing effort by the large BMRT's than by the smaller RT's.

Yet, despite this higher effort by the smaller RT's, the new BMRT's contributed significantly to the overall harvesting capability on the Soviet fleet. Comonly known as factory trawlers, these BMRT's have many things in common despite their being built in many different countries and having many different sizes. The Majakovskij class, an early class of BMRT, was started in 1957. This class was similar to the later Atlantik class which was built in Poland and East Germany during the 1960's. These vessels were different from the earlier RT's in many ways. First, they were capable of processing the fish while underway or fishing. The RT class could merely hold the fish until it offloaded, either on a factory ship or a plant on shore. This processing capability meant that a BMRT was an entity unto itself, and did not need to worry about returning to offload fish and renew supplies. They had a range of 16,000-17,000 nautical miles and could stay at sea for up to 90 days. It had a crew of 104 people or enough to guarantee 24-hour round the clock fishing, navigating, and processing. The stern trawler itself is a more efficient and versatile fishing platform. (This concept is proven in the growing numbers of new U.S. stern trawlers, which have been recently built to take advantage of the Fishery Conservation and Management Act; almost 100% of all the new U.S. vessels built for finfishing are stern trawlers). The size of these BMRT's was and is another contributing factor to their success as a fishing platform. Having an average of 3,000 gross registered tons, they only stop fishing in winds in excess of 60 knots, and, therefore, can fish more days as opposed to their counterpart RT's, which must heave-to because of rough seas.[15]

In analyzing that portion of the Soviet fleet which fished in ICNAF areas 5 and 6, we must use what data is available. In this respect, the only commonly recorded indication of effort was the days on the grounds spent by a certain tonnage class. We can analyze what vessels make up the tonnage class, but we cannot estimate the number of vessels it took to harvest a certain number of tons of fish. This is because the vessels in the Soviet fleet fished in all of the ICNAF areas, not just 5 and 6. We can, however, come up with a figure which can be translated into a cost figure. This figure is based upon the number of days on the grounds. An example is as follows. In 1966, there were 12,889 days spent on the grounds by vessels which registered over 2,000 gross tons. By finding what the typical vessel of this ICNAF class might be for the Soviet fleet, we can arrive at one of the primary levels of investment for that particular year. The result would be a figure that could be arrived at in any number of ways, such as 100 ships of 2,200 tons each working 100 days. By figuring the cost per ton for construction

DAYS ON THE GROUNDS BY TONNAGE CLASS

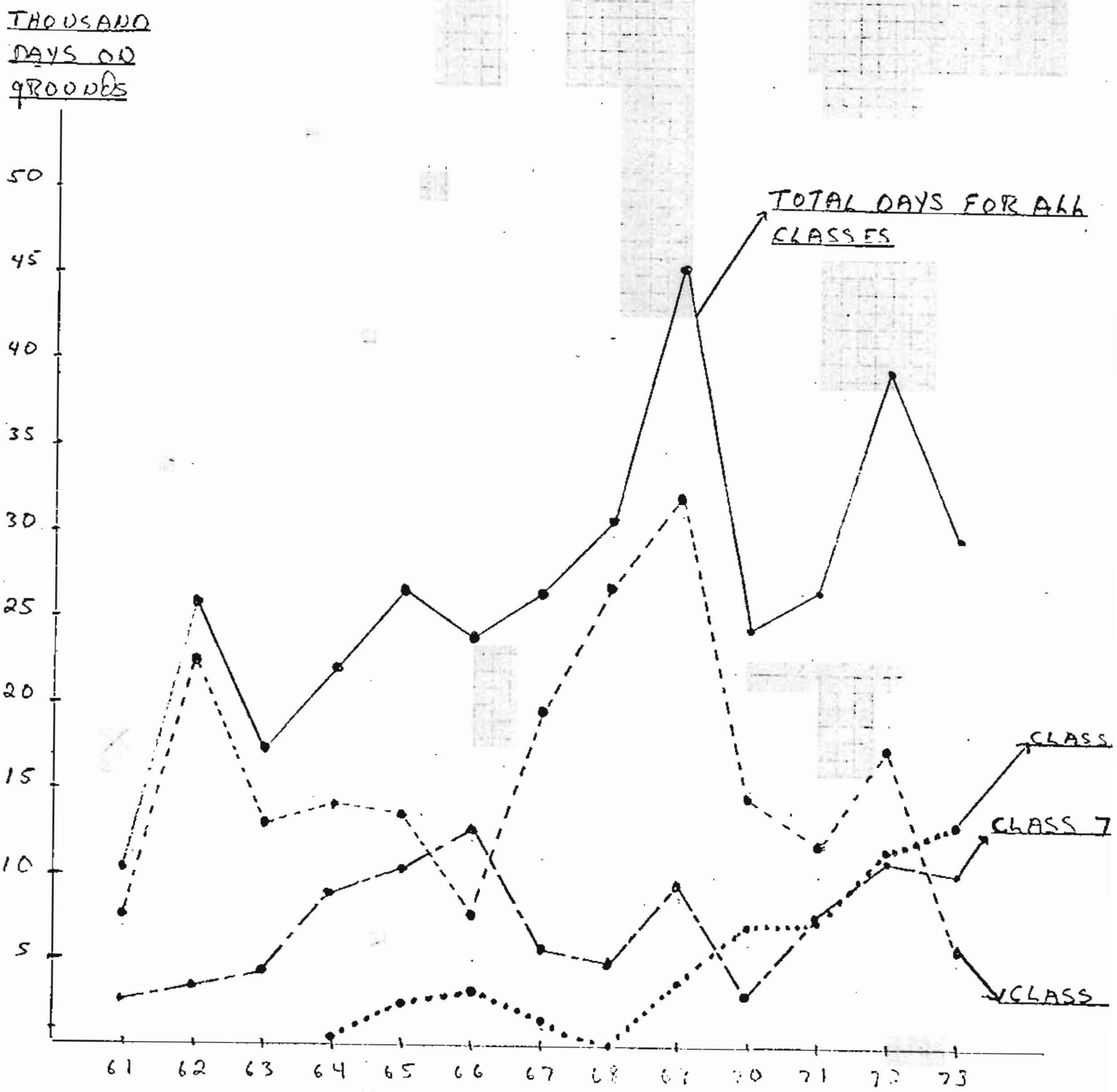


FIG A

and operation of that class, one can arrive at a total economic input for the vessels themselves. For 1966, there were 12,889 days on the grounds by vessels over 2,000 tons, which could have been produced by 37 ships working 350 days a year, or 85 ships working 150 days of the year. To clarify further, what is needed is not necessarily the total number of vessels, but the class of vessels and the days that class spent on the grounds. How then can one arrive at a daily cost of operations for the various classes of vessels?

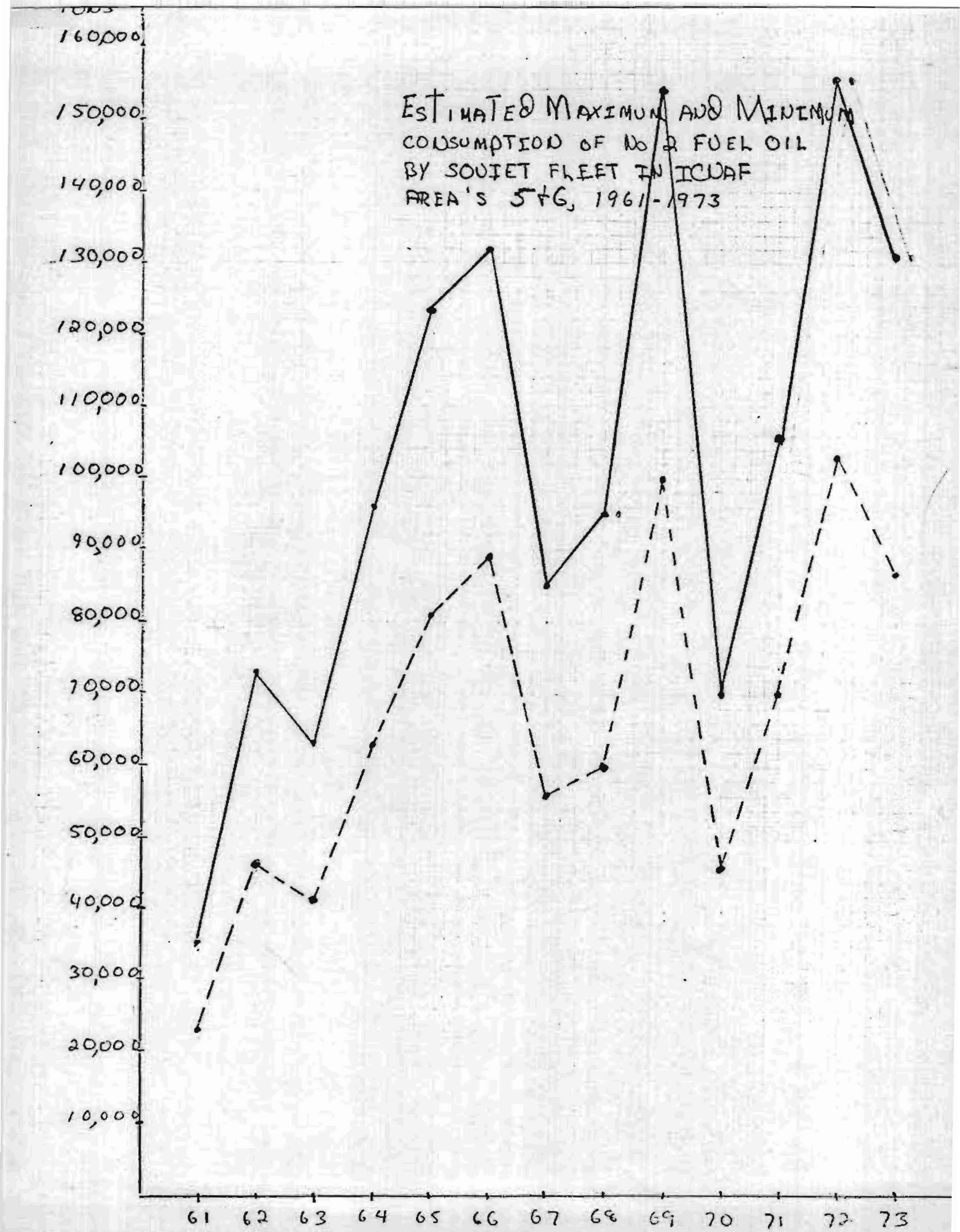
For the purpose of this report, the cost of daily operations are based on the consumption of consumable and expendable items such as fuel and supplies. The daily consumption of twine, food, wire, and other similar items are difficult to estimate due to a lack of information concerning these items. However, one can make a fair estimate of the total consumption of fuel based on an average day. For this report, days on ground and days fishing will be considered the same. The reasons for this are that consumption of fuel on board a vessel occurs regardless of what it is doing. Most of the time the main and auxiliary engines are at maximum use due to the normal demands of just operating vessels of this size. Another reason for the statistical grouping together of these two categories is that the days on the grounds is the larger of the two categories and, therefore, the more accurate as to the total amount of fuel consumed for a specific catch.

There were three main classes of vessels which fished off the New England coast as can be seen in Figure 1. For the purposes of simplicity, these classes will be represented by what is considered to be the vessel which is most representive of that class. In class 7, or over 2,000 tons, that vessel is the BMRT of the Majakovskij class having 2,000 horsepower. The SRTR or M having a horsepower of 540 represents the vessels for class 5, and the small SRT having 400 horsepower are representive of class 4. To determine fuel use, therefore, we simply establish a fuel rate based on engine demand and horsepower, and multiply it by the total number of days for that particular class of vessel.

The horsepower statistics for these vessels represent peak demand, such as would occur on a vessel while at its highest cruising velocity. However, these vessels have varying power demand and one must, therefore, arrive at what seems to be a reasonable average demand for horsepower on a ship of this nature. Sysoev (1970) uses a BMRT to demonstrate the hourly expenditures for an average vessel. However, he does not indicate where this average BMRT is fishing. But, based on his figures, a typical BMRT uses 5.65 tons of diesel per day while at sea. This figure includes time fishing, in transit, and remaining in the area but not fishing.[16] If we were to use peak horsepower as a basis of demand, a BMRT of 2,000 horsepower would burn 9.8 tons of diesel per day. Using Syseov's example, we can estimate that on an average the Soviet vessels use 60% of available horsepower while at sea. Therefore, a typical BMRT will consume an average 1,727 gallons per day while on the grounds. This figure represents an average, and would increase should it be shown that the vessel is fishing more than would be typical for its class. In Syseov's example, the vessel is at sea for 280 days, 207 of which it is fishing. If the vessel uses 90% of available power while fishing, and the percentage of fishing days were increased, fuel consumption would obviously increase. It, therefore, would seem valid to have two figures for fuel consumption, a minimum and a maximum, based on horsepower demand. In Syseov's example, fishing time comprises 74% of the time at sea. This figure would appear to be a reasonable minimum due to the BMRT's ability to fish in almost any weather condition. Therefore, if a vessel were to fish 90% of its time at sea, its fuel consumption would be an estimated 8.5 tons, or 2,514 gallons per day, or an increase of almost 70%.

To conclude, it would appear that for the purposes of this report, two fuel consumption models will be utilized. The first, based on Syseov's model, will be a minimum based on a 60% demand for horsepower, and the second based on a model of increased fishing time, which would result in an average 87% horsepower demand. The results of these two figures are given in Figure 3.

During this period, the price of Number 2 fuel oil remained at a fairly consistent rate if bought in bulk quantities. Figure 4 illustrates the price of Number 2 fuel purchased on the free market from 1961-1973 in dollars per ton. It must be remembered that this was before the drastic price increase of 1973-1974. However, in analyzing present Soviet activities, one must realize that the Soviet Union is self-sufficient when it comes to oil demand, and could possibly maintain a comparably low fuel cost, even today. However, in attempting to ascertain the profitability of the Soviet fleet in a western economic system, the price of fuel oil is perhaps the most critical expenditure in the total operation. In analyzing Figure 5, therefore, we begin to see that due to low world-wide fuel prices during this time period, that the total fuel expenditure for the Soviet fleet in ICNAF areas 5 and 6 is estimated at between eight and fourteen million dollars. Not much considering



TONS
ESTIMATED MAXIMUM AND MINIMUM
CONSUMPTION OF No 2 FUEL OIL
BY SOVIET FLEET IN ICNAF
AREA'S 5+6, 1961-1973
160,000
150,000
140,000
130,000
120,000
110,000
100,000
90,000
80,000
70,000
60,000
50,000
40,000
30,000
20,000
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70
71
72
73

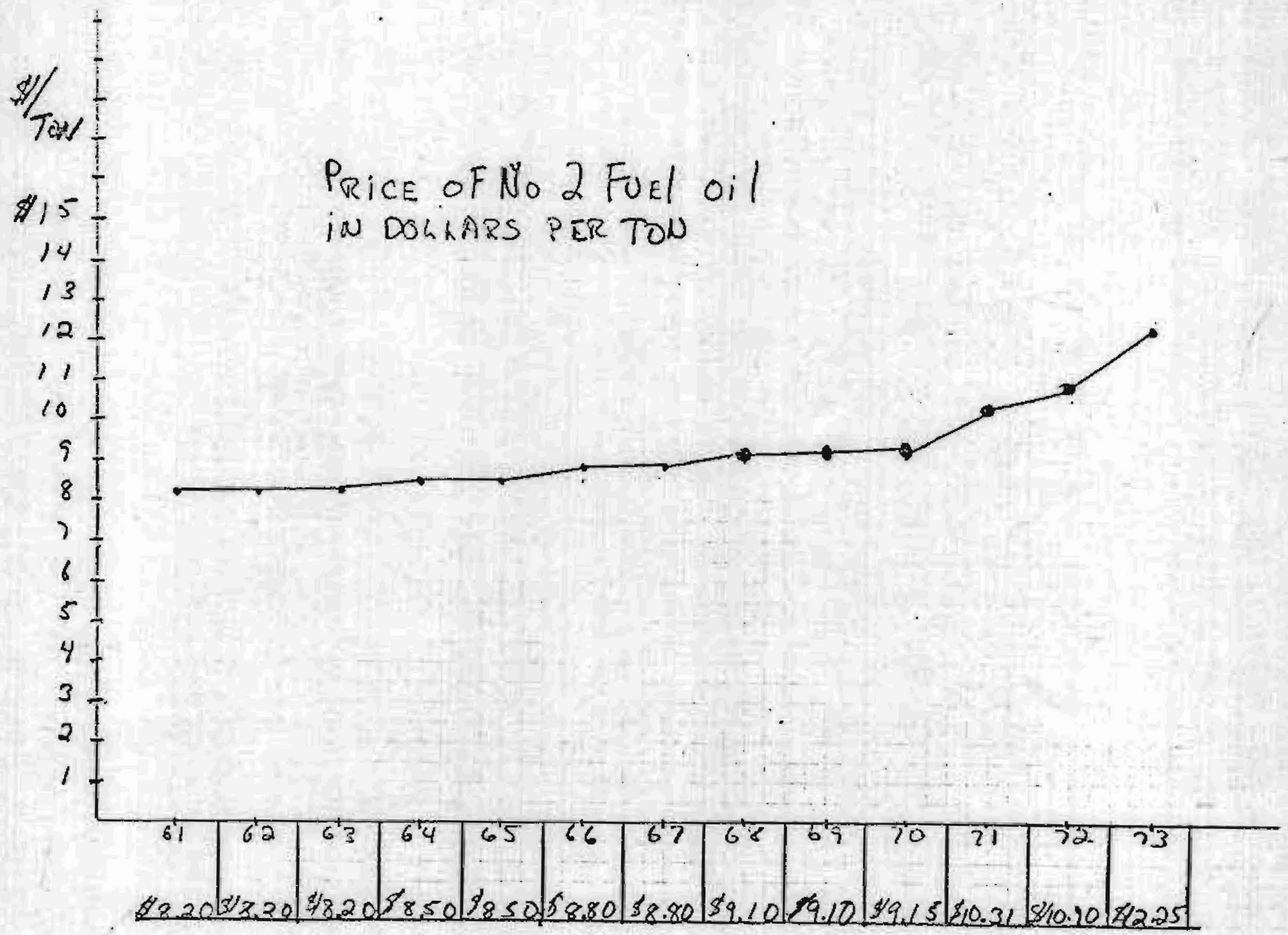


FIG 4

PRICES BASED ON FIGURES SUPPLIED BY
OFFICE OF ENERGY DATA INTERPRETATION
DIVISION: FUEL STATISTICS
DEPT OF ENERGY 241 · E ST. NW WASHINGTON D.C.

ESTIMATED FUEL EXPINDITURES FOR THE SOVIET FLEET IN ICNAF AREA'S 5 & 6, 1961-1973.

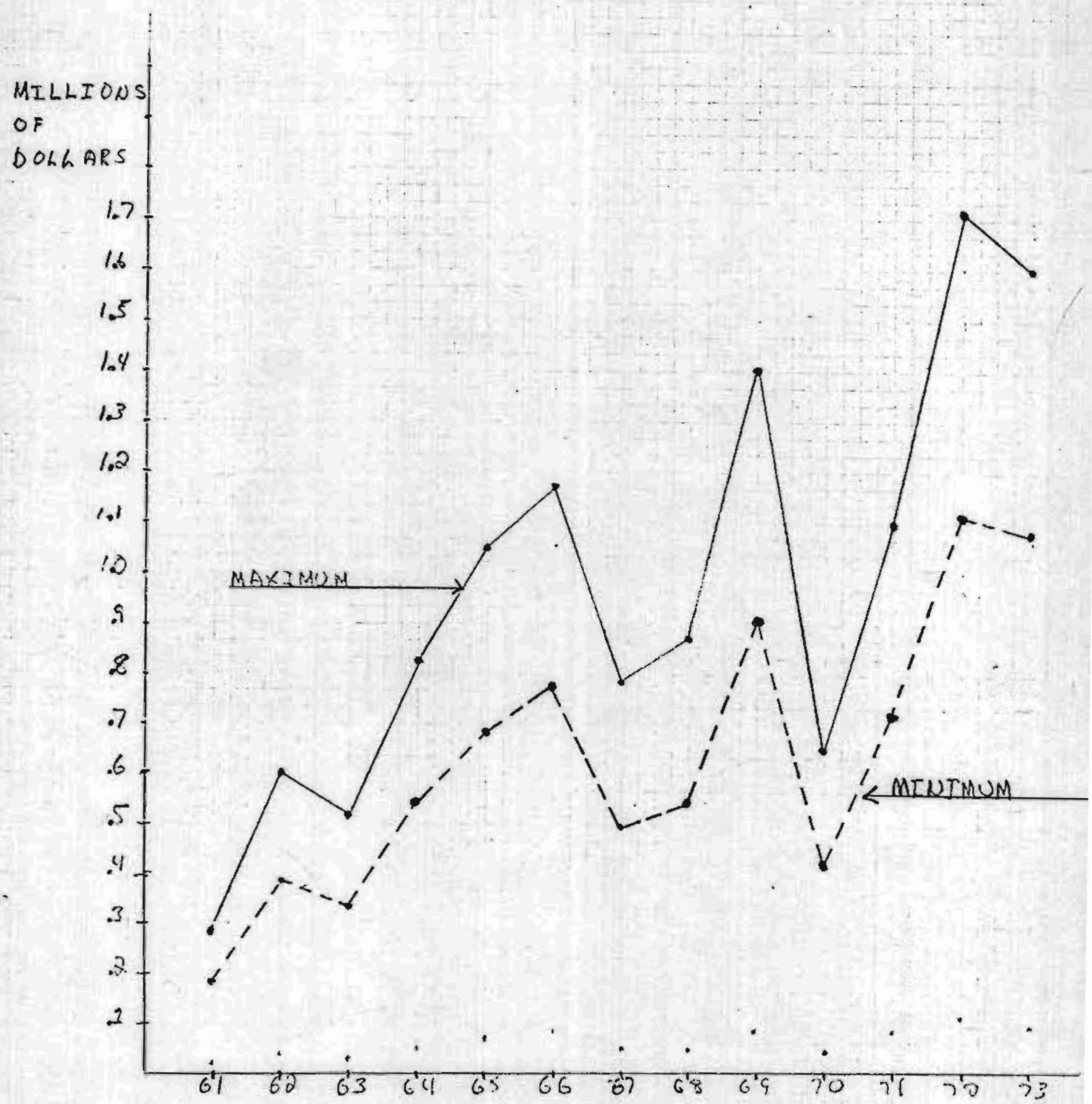


FIG 5

the total returns for catch is estimated to be $1,146,000,000. Fuel costs would have accounted, therefore, for between a half to 1.2% of the total return to the Soviet fleet, had it in fact been operating with free world prices.

While fuel costs can be estimated based on engineering principles, construction costs are altogether another problem. Most of the BMRT's and SRTR's were built in either the Soviet Union or a satelite country of the Soviet Union. The fixed economies of these countries can place the construction cost of such vessels at an artificially low level compared to what they might cost in another country. As Mr. Zdzislav Pienkawa of Centromor-North America indicated in an interview concerning the building of Soviet fishery vessels by Poland, the Soviet Union pays for its ships by old fashioned trading methods. A Soviet Central Committee decides that one BMRT is worth one thousand Soviet built tractors or perhaps ten thousand barrls of oil. The only indication of currency being passed from one country to another is hidden somewhere in the central budget. Poland and East Germany must accept the fact that the Soviet Union feels that this BMRT is worth so many tractors or barrels of oil.[17]

Fortunately, there have been a few instances when the Soviet Union did business in non-communist countries. We also have figures which show what the Polish shipyards expect in dollars for the various fishing vessels it now build. In 1963, Japan and France both signed contracts with the Soviet Union to build a number of types of vessels.[18] The figures given for the vessels built by the French indicate an average of $1,500 per gross ton for a large factory stern trawler, or $38,000 per meter. The Japanese were in that same year building a similar vessel for an estimated $35,000 per meter, or estimated $1,200 per gross ton. Due to world-wide inflation, the price of a new large factory type trawler has risen dramatically. The various yards in Poland now command an average of well over 100% from the prices of 1963. The construction cost for a large tuna seiner in the United States in 1977 was about $4,700 per ton, not much more than the yards in Poland.[19] Given these and other figures not discussed here, we can construct an estimated construction cost graph based on dollars per gross ton as shown in Figure 6.

Given this figure, it now is necessary to decide how the Soviet Union might best have fished ICNAF areas 5 and 6, if those had been the only two areas where their fleet had fished. We have, as stated earlier, the total number of days on the grounds by tonnage class, but due to

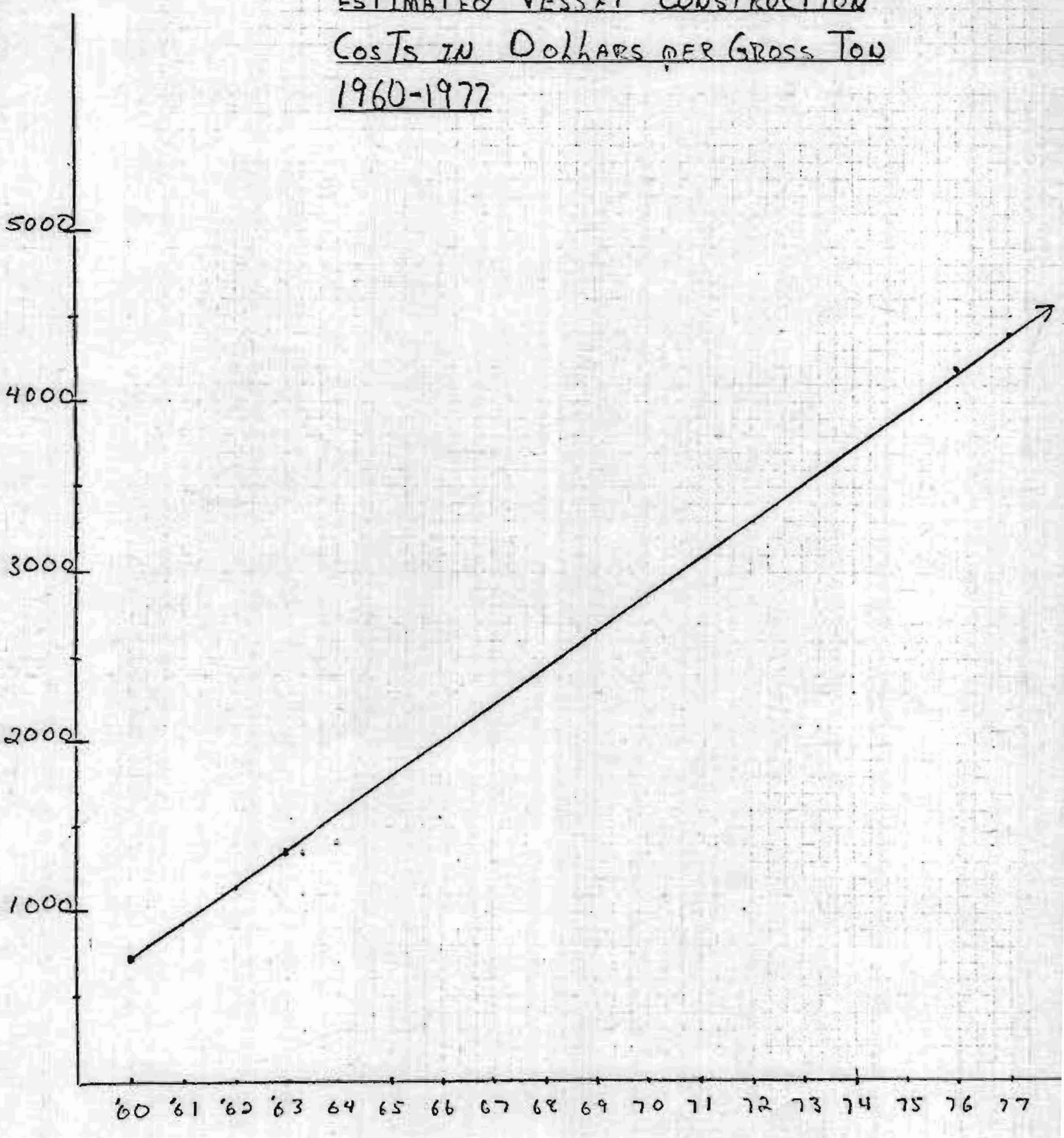
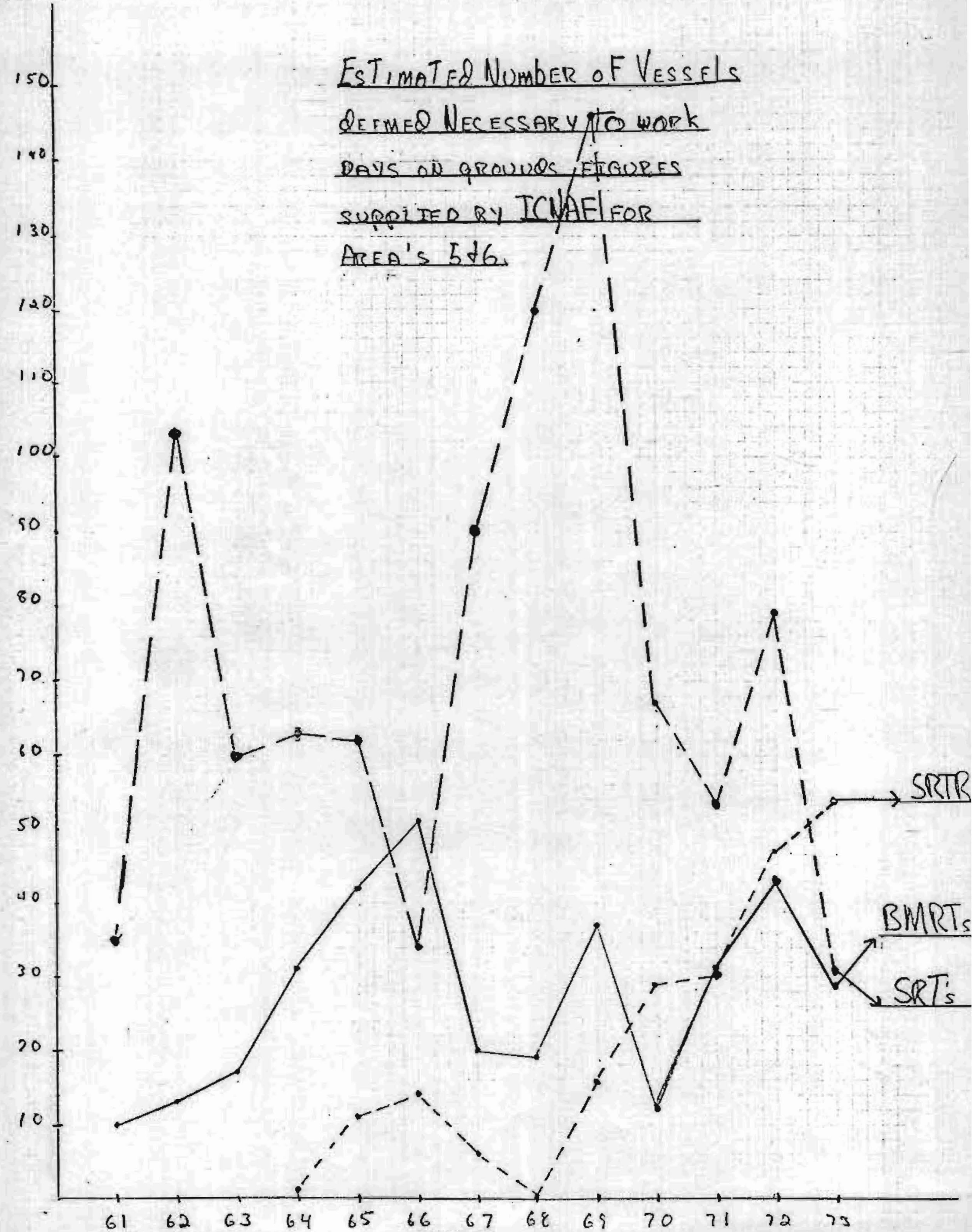

ESTIMATED VESSEL CONSTRUCTION
COSTS IN DOLLARS PER GROSS TON
1960-1977
5000
4000
3000
2000
1000
'60 '61 '62 '63 64 65 66 67 68 69 70 71 72 73 74 75 76 77

Fig 6

the movement back and forth between areas, we can only theorize and extrapolate as to the actual numbers of vessels that were necessary to harvest the catch and accummulate the days on the grounds. Using Syseov's BMRT as an example for time on grounds spent by class 7, where a BMRT is on the grounds for 253 days of the calendar year, it would take at least ten BMRT's to fish and be on the grounds for the number of days given for class 7 in 1961. The figures given by ICNAF for 1962, for example, show that there were 21 BMRT's in areas 5 and 6; 18 of which were there exclusively. Unfortunately, we only have this information every three years, and even it is not totally accurate. So, it appears that combining the extrapolation and the ICNAF data, we can estimate the total number of ships that were necessary to catch the fish in the given time period that has been recorded. This estimation is recorded by the graph on Figure 7. These figures are based on the percentage of calendar days spent at sea supplied by Syseov in his analysis of the Soviet fishing industry.[20]

In analyzing the graph on Figure 7, one sees that what is needed to determine construction costs is the number of new vessels that are needed each year until the maximum number is reached. In the case of the larger BMRT's, new



Estimated Number of Vessels
Deemed Necessary to work
Days on grounds, figures
supplied by ICNAF for
Area's 5 & 6.
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
61
62
63
64
65
66
67
68
69
70
71
72
73
SRTR
BMRTs
SRT's

FIG 7

vessels were added up to 1966, after which the existing fleet was adequate. For the SRTR's, there were new additions up until 1973 and for the smaller SRT's, 1969 was the last year for new additions.

From this net gain in vessels each year, we can (1) establish total expenditures necessary for the building of the vessels, and (2) estimate financial depreciation, an important item in western economies. In Figure 8, the bottom set of figures provides an estimated cost of constructing a fleet of vessels similar to those of the Soviet Union, which could have harvested the same catch and done it in the same number of days on the grounds. This fleet would have cost from 1961-1973 a minimum of 334.2 million dollars to construct. This figure is based on an average BMRT having a gross weight of 3,000 tons, an average SRTR having a gross weight of 575 tons, and an average SRT having a gross weight of 265 tons.

The financial cost of depreciation is a variable expenditure depending on many things. First, there is the service life of the item being depreciated. Second, there is the financial objective of the firm or nation doing the depreciating. Third, there is the technological advancement in the general culture, which may or may not increase

Estimated Number of New Vessels Required by Soviet Fleet For ICNAF Area's 5&6, 1961–1973

	61	62	63	64	65	66	67	68	69	70	71	72	73
Class 7	10	3	4	14	11	9							
Class 5	0	0	0	1	10	3	0	0	2	13	1	17	7
Class 4	35	68	0	0	0	0	0	0	19	24	0	0	0

Estimated Tonnage Demands For Soviet Vessel Construction

	61	62	63	64	65	66	67	68	69	70	71	72	73
BMRT	30,000	9,000	12,000	42,000	33,000	27,000	0	0	0	0	0	0	0
SRTR	0	0	0	575	6325	1725	0	0	1150	7475	575	9725	4025
SRT	9275	18,020	0	0	0	0	0	0	5035	6360	0	0	0
Total	39,275	27,020	12,000	42,575	39,325	28,725	0	0	6185	13835	575	9775	4025

Estimated Vessel Construction Expenditures in Millions of Dollars

	61	62	63	64	65	66	67	68	69	70	71	72	73
BMRT	21.3	8.3	13.5	56.7	52.0	48.6	0	0	0	0	0	0	0
SRTR	0	0	0	.8	10.0	3.1	0	0	2.8	19.8	1.6	30.0	13.3
SRT	6.6	16.7	0		0	0	0	0	12.2	16.9	0	0	0
Total	27.9	25.0	13.5	57.5	62.0	51.7	0	0	15.0	36.7	1.6	30.0	13.3

Fig 8

the rate of depreciation of a piece of equipment. These are but a few of the reasons for choosing a certain rate of depreciation. Inflation and market conditions can also greatly affect this rate. The three types of vessels chosen as examples in this study are all affected differently by depreciation and the reasons for depreciation given here. Syseov feels that a service life of 33 years is feasible and expected for a BMRT. This would give a yearly depreciation rate of 3%. However, for a western economic system where taxes and resale are of importance to the overall financial picture, this would be an extremely low rate of depreciation. Therefore, a straight line depreciation will be applied to the fleet, with the BMRT's having a life of 20 years, the SRTR's 15 years, and, due to their size and traditional design, the SRT's will have a 10 year life. Figure 9 gives the amounts and portrays by graph the potential depreciation costs for the Soviet fleet. Using this graph, therefore, it is estimated that the depreciation costs for the Soviet fleet operating in ICNAF areas 5 and 6 from 1961-1973 was 142 million dollars.

Another major expenditure in any fishing operation is labor. The Soviet fleet pays its crews on a fixed rate per day, plus a bonus for catching anything over their

Estimated cost of vessel depreciation for Soviet Fleet in ICNAF area's 5 & 6 1961-1973

	61	62	63	64	65	66	67	68	69	70	71	72	73
'61		2.08	2.08	2.08	2.08	2.08	2.08	2.08	2.08	2.08	2.08	1.42	1.42
'62			2.08	2.08	2.08	2.08	2.08	2.08	2.08	2.08	2.08	2.08	.42
'63				.675	.675	.675	.625	.675	.675	.675	.675	.675	.675
'64					2.90	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9
'65						3.26	3.26	3.26	3.26	3.26	3.26	3.26	3.26
'66							2.63	2.63	2.63	2.63	2.63	2.63	2.63
'67								0	0	0	0	0	0
'68									0	0	0	0	0
'69										1.4	1.4	1.4	1.4
'70											3.0	3.0	3.0
'71												.10	.10
'72													2.0
'73													0
TOTAL	0	2.08	4.16	4.835	7.735	10.99	13.625	13.625	13.625	15.03	18.03	18.13	20.13

Fig. 9

projected quota. Western fleets, however, pay their crew a percentage of the total gross receipts. Depending on the size of the vessel and species being caught, a lay system of wages has always been a traditional form of paying the wages on a fishing vessel. A typical lay system might by 60/40, or 60% to the crew and 40% to the boat. However, as the vessel costs increase, the percent to the boat might also increase. Therefore, if the Soviet fleet were operating on a lay system, it might be a broken 55/45. In this system, fuel and food might be extracted from the gross receipts, and the net result would be divided. Fifty-five percent would go to the crew, and 45% to the vessel.

The final and perhaps most difficult cost to estimate for this fleet is the cost of repair, replacement, and general maintenance. The data supplied only gives us an idea of the number of days spent on repair. It does not supply us with actual costs. How many miles of wire are worn out, how many nets lost, and how many tons of fish boxes are consumed is a problem that can't even be estimated. However, Syseov does give us a percentage figure for these items based on what he classifies as the "prime cost of fishing." On our three types of vessels, the cost of the wear and tear on fishing gear is an average 11.6% of the total prime cost. Fishing equipment accounts for 1.7% and current repairs account for 14.6% of the total prime cost. Together, these items account for an average 25% of the prime cost of fishing.[21] In this same table, we find that fuel represents an average of 5.2% of the prime cost. Therefore, we can arrive at, using our already estimated fuel expenditures, a figure of between 40 and 70 million dollars, depending on which fuel figure one choses to use.

CONCLUSION

The Fishery Conservation and Management Act of 1976 gave the fishermen and the fishing industry of the United States an opportunity, the likes of which they will never see again. It also presented them with many regulatory and legal problems, the likes of which they will continue to see for many years. It has been the purpose of this study to provide a potential answer to some of the frequently asked questions that have arisen due to the FCMA. The first major question that can now be answered--is the Soviet fleet making enough profit to be able to ignore the potential fines for violating the FCMA? Let us take a final look at the figures and determine an answer.

As shown in the output section, the Soviet fleet could have received an estimated $1,143,600,000 for its fish if, in fact, it had sold them on the free market. Assuming a lay system, as described in the input section, one would deduct fuel costs of 8-14 million dollars, and then arrive at a figure of an estimated return to the fleet of 508 million dollars, and wages of 621 million dollars. Before we proceed, however, consideration must be given to the fact that Syseov states that wages are an average 28% of the prime cost of production. This would mean that the return to the crews of

Soviet fleet would actually be an estimated 80 million dollars, or about 13% of what they would have received if they had been working on a vessel from one of the free market nations. This would give the Soviet fleet an estimated return of $1,060,000,000, or just about twice the return to the western capitalist. Estimated expenses would be as follows: 334.2 million for vessel construction, 142 million for depreciation, and 70 million for general maintenance. Due to the fact that the Soviet Union does not not charge itself interest for money it borrows from itself, there is no figure for the cost of money.[22] Therefore, total expenses are estimated to be a minimum of 546 million dollars, leaving a net gain of an estimated 514 million dollars, or an average of 39.5 million dollars a year, enough to pay more than a few fines.

The second question, however, gives us a better indication of whether or not the Soviet fleet did, in fact, make money. That question is, with the 200-mile limit giving the fishing industry such an opportunity, are the fleets of large vessels of the Soviet Union the most economic way to harvest fish? Returning to the lay system, we find that if this fleet had been operating on a western economic system, it would have lost its investors a minimum of 38 million dollars.

In this system, there would be a cost for the lending of money, and this cost would add an estimated 15 million dollars to the major expenses of the fleet, increasing the total loss to an estimated 53 million dollars.

There are a few problems that occur when attempting to apply this overview technique to the fleets of today. The first is, of course, the fact that this study takes place before the great inflationary spiral that was brought on by the OPEC nations in 1974. Because of this, the world-wide price of fuel has risen an estimated 87%. Though the price of fish has also risen, it is not known by this researcher to what extent. One of the reasons for this study ending in 1973 is due to a lack of financial records from FAO after that date. Another problem is that there are few fleets of larger vessels that have many new vessels. Due to the shrinking of available territories, the world-wide demand for new large fishing vessels has decreased dramatically. Therefore, there would be few, if any, construction costs necessary for utilizing a new resource of fish, should the Soviet Union decide to do so.

Finally, there are a number of missing elements to this total picture. The costs and expenses of processing plants have not been included. However, this can be justified by the fact that this study used ex-vessel, not wholesale or retail prices, for the basis of its output figures. The problem of time spent between the grounds and homeport was not addressed due to the lack of information. Finally, it must be restated that this study is merely an attempt to establish costs, and should in no way be construed as being the true facts,for until we initiate or demand an exchange of economic information between ourselves and those countries desiring to fish in our 200-mile conservation zone, we can only estimate, and not determine, its ultimate worth to them.

Footnotes

1. ICNAF, Statistical Bulletin, 1961-1974

2. "Subsidies to Canadian Groundfish Industry, Background Information for Countervailing Duty Assessment," Dept. of Resource Economics, University of R.I., (June 1977)

3. Townes, Brookes, "Commerce Department actions baffling to everyone, including their own," National Fisherman, December 1977

4. Conversation with Richard Solomon, legal counsel for National Marine Fisheries Service and the New England Regional Council, October 6, 1977

5. Syseov, N.P., Economics of the Soviet Fishery Industry Israel Program for Scientific Translations, Jerusalem, 1974, P.209

6. Sealy, T.S. "Soviet Fisheries: a Review," Underwater Journal and Information Bulletin, 152-174, (August 1973), Vol. 5, No. 4, P.159, IPC America, Inc., 205 East 42nd Street, New York, N.Y. 10017

7. ICNAF, List of Vessels Over 50 Gross Tons fishing in the ICNAF convention area 1959, 1962, 1965, 1971, 1974

8. Syseov, supra note 5, P.142

9. Sealy, T.S., supra note 6, P.154

10. ibid., P.160

11. ICNAF, supra note 7

12. Commercial Fisheries Review, August 1964, Vol. 25, No. 8 P.112

13. Conversation with Zdzislau Pienkawa, Representative of Centromor North America on October 13, 1977

14. ICNAF supra note 7

15. Sealy, T.S., supra note 6, P.166

16. Syseov, N.P., supra note 5, P.248

17. Conversation, supra note 13

18. <u>Commercial Fisheries Review</u>, supra note 12, P.112

19. <u>The Fish Boat</u>, "At last, a new tuna boat,"(April 1978)

20. Syseov, supra note 5, P. 253

21. ibid., P. 362

22. ibid., P. 209

Bibliography

1. Commercial Fisheries Review (August 1963) Vol. 25, No. 8

2. FAO (1961-1974) YB. Fish Statist., Vol. 23-38, Catches & Landings, FAO, Rome, Italy

3. Gorman, Brian, Fishery Conservation and Management Act of 1976, a Synopsis, National Sea Grant Office, Washington, D.C.

4. I.C.N.A.F., Statistical Bulletin, Vol. 11-24, Issued from the Headquarters of the Commission, Dartmouth, N.S., Canada

5. I.C.N.A.F., List of Vessels Over 50 Gross Tons, 1959, 1962, 1965, 1971, 1974, issued from the Headquarters of the Commission, Halifax, N.S., Canada

6. Fish Boat, "At Last a New U.S. Tuna Boat," April, 1978 H. L. Peace Publications, Box 217, Mandeville, Louisiana, 70448

7. Kaczynski, Vladimir, "Controversies in Stretegy of Marine Fisheries Development Between Eastern and Western Countries," Institute of Marine Studies, University of Washington (January, 1977)

8. Kaczynski, Wlodzimierz, "Economic Problems of and Further Development of Polish Distant-Water Fisheries," University of Washington, Seattle, (December, 1976)

9. Mathisen, Ole A., and Donald E. Bevou, "Some International Aspects of Soviet Fisheries," (A paper issued by the College of Fisheries) - Olympia: State Univ. of Washington, 1967

10. Pienkaw, Zdzislau, American Representative of the Polish Shipbuilding Industry, Interview on October 13, 1977 concerning cost of building fishery vessels for the Soviet Union

11. Sealy, T.S., "Soviet Fisheries; a Review," Underwater Journal and Information Bulletin, (August, 1973) Vol. 5, No. 4, I.P.C. America, Inc., 205 East 42nd Street, New York, N.Y. 10017

12. Solomon, Richard, legal counsel for N.M.F.S. in Gloucester, Mass., Interview on October 6, 1977 concerning violations and past actions by N.M.F.S. concerning the F.C.M.A. of 1976

13. Stinson, Karl W., Diesel Engineering Handbook, 12 edition, Business Journals, Inc., 80 Lincoln Avenue, Stamford, Connecticut 06904 (1972)

14. "Subsidies to the Canadian Groundfish Industry," (a paper prepared by a group from the Department of Resource Economics), University of R.I., (June, 1977)

15. "U.S. Imports of Merchandise for Consumption, "Census Report No. FT.110, 1960-1974, U.S. Census Bureau, Washington, D.C.