THE HUNTING PATTERN OF THE IGLULIGMIUT: WITH EMPHASIS ON THE MARINE ENVIRONMENT.

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P. H. Beaubier. The Hunting Pattern of the Igluligmiut: With Emphasis on the Marine Environment. Department of Geography. Master of Arts.

Abstract.

The thesis is an investigation of the hunting system as practiced by the Eskimos of Igloolik in northern Foxe Basin. It focuses on interrelationships between physical, biological and cultural factors in the eco-system and their influence on the hunting pattern. There are three basic parts to the study. The first examines the use of space by the hunters both in terms of area and the amount of time that the hunting territory is available for exploitation. The second section deals with the processes, or the phases, which comprise a single hunt. The hunt has been divided into travel, spotting, shooting and retrieving ranges and the spatial dimensions of each range is discussed. The final section looks at the changes in the hunting pattern over a period of time and attempts to isolate the factors which have contributed significantly to the present pattern.

THE HUNTING PATTERN OF THE IGLULIGMIUT: WITH EMPHASIS ON THE MARINE MAMMALS.

A THESIS

BY

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Support was also given by Dr. A. W. Mansfield of the Arctic Biological Station at Ste. Anne de Bellevue, Que.

Particular mention should be made of the late Dr. D. C. Foote without whose assistance this thesis would not have been possible.

To the people of Igloolik, particularly Kamanik, Erkaksa, Akatiak, Enuki and Anguilianuk who showed understanding, kindness and co-operation, my very special thanks.

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I would also like to thank Mrs. H. S. Collis for her careful typing of this thesis.

CONVENTIONS.

1. Orthography.

Eskimo place names used in the text are based on the pronunciations introduced in Thibert's (1958) English-Eskimo dictionary.

Most letters are pronounced as in Latin, however, there are certain exceptions which are listed below.

K - The K has two different pronunciations:

a. K as in king

b. K pronounced kr deep in the throat with the r choked, never being distinctly pronounced or rolled.

J-Y - These letters are interchangeable and are pronounced Y as in you.

S - Generally pronounced as SH.

I - Pronounced as EE.

U - Pronounced OO as in shoot.

Ng - Pronounced as a single sound as in singing.

2. Place Names.

Whenever possible the system of Eskimo place names are used. Eskimo place names not appearing on official maps have been underlined in the text. The main changes from the official maps are as follows:

Igloolik becomes Ikpiadjuk in the text.

Hall Beach becomes Seneria " " "

Tern Island becomes Seowa " " "

Official names are used when Eskimo place names are not available.

CONVENTIONS contd.

3. Abbreviations.

Att.	-	attitude
Avg.	-	average
Cal.	-	calibre
Cm.	-	centimeters
Contd.	-	continued
D.E.W.	-	Distant Early Warning
D.I.A.N.D.	-	Department of Indian Affairs and Northern Development
Eng.	-	engine
Est.	-	estimate
Ft.	-	feet
Gal.	-	gallons
In.	-	inches
I.B.P. - H.A.	-	International Biological Program-Human Adaptability
Lbs.	-	pounds
Mi.	-	miles
Min.	-	minutes
Mod.	-	model
M.P.H.	-	miles per hour
N.D.	-	no data
No.	-	number
Qt.	-	quarts
R.C.M.P.	-	Royal Canadian Mounted Police
Sec.	-	seconds
Spec.	-	species
Unk.	-	unknown
0/00	-	per thousand

4. Calculations.

All numerical values given in the text have been rounded to whole numbers.

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CHAPTER I

INTRODUCTION.

1. 1 Background to Research Problem.

In the spring of 1968 the author was asked to join the McGill Ecology Project which was being co-ordinated by the late Dr. Foote through the Department of Geography. The project, which was completed in May of 1970, was working under the auspices of the International Biological Program; Canadian Human Adaptability Project, an on going five year study. The overall aim of the Human Adaptability section of the international study is to assess human adaptability as displayed by circumpolar populations. This is to be accomplished by the comparison between Eskimo populations of Wainwright, Alaska, Iglulik, Canada and Upernivik and Amassalik in Greenland. Additional comparisons will be made between Eskimos and other Polar peoples such as the northern Scandinavian population, the Ainu and Siberians also studied under I.B.P. research projects on human adaptability. The studies are intended to describe the population and its environment in sufficient detail to determine quantitatively the dynamic relationship between man and his eco-system. This broad goal is comprised of three major areas of scientific study. These are:

1. the description and analysis of the human population for its physical, genetic, physiological and health characteristics;

2. the social organization, structure and linguistic boundaries of the study group in relation to other Eskimo populations and Eskimo society in general;

3. the resource base provided by the environment and the extent and methods by which the Eskimo population exploits his environment for food, for fabrication of materials and for export.

Within the Canadian section of the program it was Dr. Foote's intention to provide data for the third, or environmental section. He proposed to develop a simulation model whereby factors determining the utilzation of resources and the productivity of an Eskimo community could be combined into a single conceptual framework. The design of the research program undertaken by Dr. Foote was to describe the probable outcome of an Eskimo hunt. Dr. Foote outlined three major areas of investigation to be integrated into the simulation model. These were:

1. the collection of data related to the physical geography, oceanography and climatology of the study area;

2. biological studies to include animal behaviour and the pattern distribution and demographic characteristics of the animal population;

3. an analysis of the decision making process whereby the Eskimo moves through the environment in search of his prey and the probability of his success.

The present thesis was to have contributed to the hunting or third section of the research proposal.

1. 2 Study Area. [1.]

The site chosen for the study of Eskimo hunting was the settlement of Iglulik located in northern Foxe Basin in the eastern Canadian arctic. In its present state, the village is in transition from the traditional way of life to the concept of community dwelling as conceived of in southern Canada. In such a settlement one can study both the traditional hunting and the modern systems of adaption and their influence on the Eskimo population, The western institutional

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1. For a complete discussion of the physical geography of the study area, see Anders (1965).

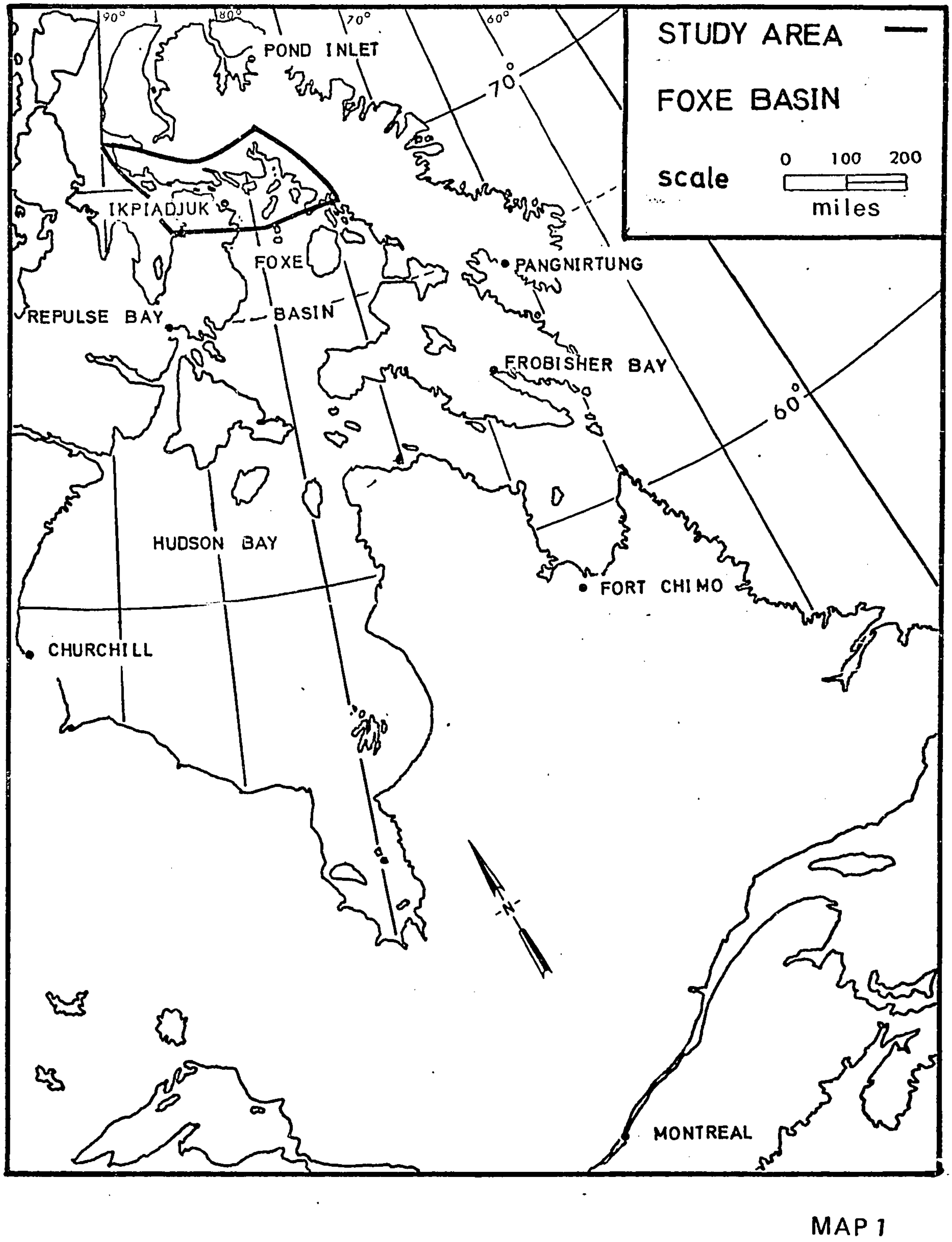
organization of the community is leading more and more Eskimos, particularly the young, away from the traditional way of life. Hunting, however, is still the dominant way of life in Iglulik and the Eskimos are in possession of the skills, knowledge and cultural attitudes which enable them to successfully exploit their environment. The survival of traditional skills and attitudes for such a long period of time into the modern, highly technological world is explained, in part, by the relative isolation of northern Foxe Basin.

The relationship, geographically, of the study area to eastern Canada is given in Map 1. Map 2 illustrates the relationship of the study area within northern Foxe Basin.

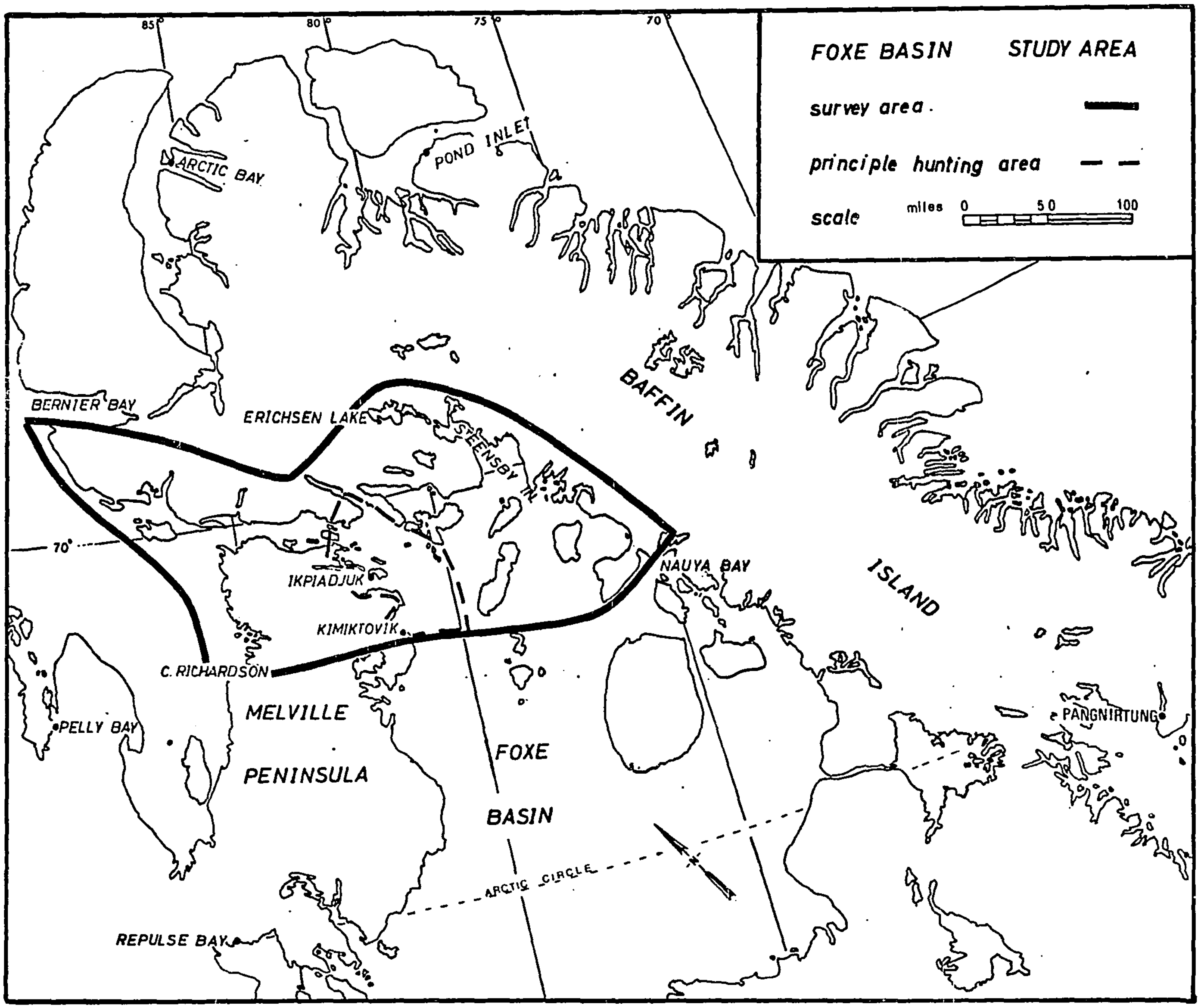
The boundaries of the study area chosen by the author are based on the territory utilized by the present day hunters now residing in the settlement of Ikpiadjuk. The area examined in this thesis and shown in Map 2 in no way delineates that being studied by other I.B.P.-H.A. personnel. The locations of place names used in the text are given in Map 3.

1. 3 Problem.

The problem under consideration in the thesis is an attempt to analyze, in as accurate terms as possible, the hunting pattern of the Igluligmiut (limited to the people of northern Foxe Basin). The hunting pattern is understood to refer to the action of the hunters within the local ecological system in the pursuit of game in any given phase of the hunting cycle. The hunting pattern applies to the area actually exploited not potentially exploitable. To properly refine this concept it is necessary to assess the relationships that exist between the physical and biological sub-systems within the eco-system,

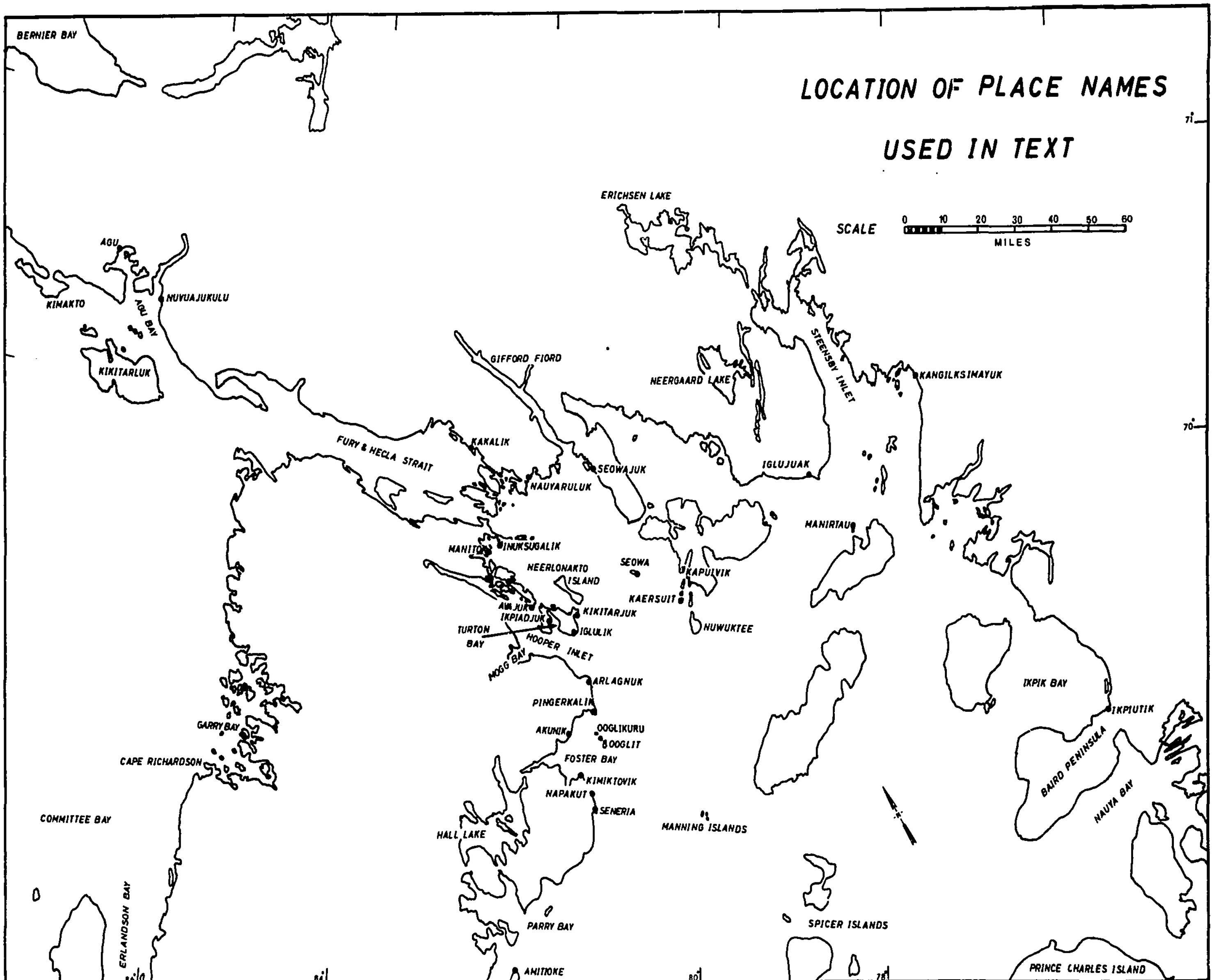

STUDY AREA
FOXE BASIN
scale
0 100 200
miles
POND INLET
70°
IKPIADJUK
FOXE
BASIN
REPULSE BAY
PANGNIRTUNG
FROBISHER BAY
60°
HUDSON BAY
FORT CHIMO
CHURCHILL
N
MONTREAL
90°
80°
70°
60°

MAP 1



FOXE BASIN STUDY AREA
survey area
principle hunting area
scale miles 0 50 100
85°
80°
75°
70°
70°
POND INLET
ARCTIC BAY
BERNIER BAY
ERICHSEN LAKE
STEENSBY
BAFFIN
ISLAND
NAUYA BAY
IKPIADJUK
KIMIKTOVIK
C. RICHARDSON
MELVILLE
PENINSULA
PELLY BAY
FOXE
BASIN
ARCTIC CIRCLE
REPULSE BAY
PANGNIRTUNG

MAP 2


LOCATION OF PLACE NAMES
USED IN TEXT
SCALE
0 10 20 30 40 50 60
MILES
BERNIER BAY
AGU
AGU BAY
KIMAKTO
NUVUAJUKULU
KIKITARLUK
GIFFORD FIORD
ERICHSEN LAKE
NEERGAARD LAKE
STEENSBY INLET
KANGILKSIMAYUK
FURY & HECLA STRAIT
KAKALIK
SEOWAJUK
NAUYARULUK
IGLUJUAK
MANIRTAU
INUKSUGALIK
MANITOK
NEERLONAKTO ISLAND
SEOWA
KAPUIVIK
KAERSUIT
AVAJUK
IKPIADJUK
KIKITARJUK
IGLULIK
NUWUKTEE
TURTON BAY
HOOPER INLET
HOGG BAY
ARLAGNUK
PINGERKALIK
AKUNIK
OOGLIKURU
OOGLIT
FOSTER BAY
KIMIKTOVIK
NAPAKUT
SENERIA
MANNING ISLANDS
HALL LAKE
GARRY BAY
CAPE RICHARDSON
COMMITTEE BAY
ERLANDSON BAY
PARRY BAY
AMITIOKE
SPICER ISLANDS
PRINCE CHARLES ISLAND
IKPIK BAY
IKPIUTIK
BAIRD PENINSULA
NAUYA BAY
71°
70°
84
82
80
78

MAP 3

and the cultural skills, both material and non-material, utilized by the hunter as a part of his adaptive strategy, and apply these variables to the hunting pattern of the Igluligmiut. [1]

The hunting pattern of the Eskimos can be conceived of as a system made up of three interrelated segments. These are: 1.) the hunt, 2.) the seasonal cycle and 3.) the annual pattern. The first segment, the hunt, consists of travel to and the spotting, shooting and retrieving of game. Travel is the process of movement through the hunting territory. Spotting represents visual contact between the hunter and the animal pursued. Shooting involves an attempt to dispatch the animal and retrieving is the attainment or possession of the game.

These component units or operational ranges of travel, spotting, shooting and retrieving, form the core of all hunting systems. The operation ranges deal with the process of hunting as it exists at a given point in time and assumes that programming has

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1. As used in the context of this thesis the physical subsystem refers to elements of the physical geography, oceanography and climatology of the study area. The biological system refers to characteristics of the mammals of northern Foxe Basin, both marine and terrestial; in particular, patterns of distribution, demographic characteristics and animal behaviour. The cultural subsystem refers to the social, intellectual, and technological characteristics of the Eskimos which contribute to the hunting systems.

already been completed.[1] The hunt is conceived of as a unit of analysis for hunting systems. That is, one may define hunting as being made up of very specific processes. When investigating the hunting process in relation to the physical, biological and cultural subsystems the four processes of the hunt evolve as a series of operational ranges with very specific properties. These properties can be measured and described in quantitative terms. The decision to hunt will involve a rational assessment on the part of the hunter of conditions in the biological and physical subsystems at that period in time and of the cultural resources at his command which will aid

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1. Laughlin (1968) for instance, outlines essentially the same steps, which he terms behavioural complexities, as forming the basic processes of all hunting societies. He lists five behavioural complexities related to hunting; 1. programming the child, 2. scanning or collecting information, 3. stalking or pursuit of the game, 4. immobilization of the game including the kill or capture of the game and 5. the retrieval of the game. The basic difference between the two systems of analysis is that Laughlin is concerned with hunting as an integrated system of behavioural activities which begins in early childhood and continues throughout the life of the individual. That is, he introduces a major temporal dimension into his conceptual framework. By contrast, the organization of the hunt into operational ranges, as conceived of by this author, is concerned more specifically with the factors which influence hunting systems.

him in the hunt. [1] These factors allow him to arrive at an index of probable success; thus the decision to hunt or not. With the decision to hunt, interaction with the eco-system begins which introduces a spatial dimension to the hunting process.

The second segment of the hunting pattern, the seasonal cycle, expands on the concept of operational ranges in an attempt to assess the variations in the location and availability of the resources utilized by the Igluligmiut hunters. In this context, the hunting pattern is analyzed in terms of the seasonal distribution of the hunting effort and available hunting hours. Seasonal variations in the geographic location of hunting are controlled mainly by the normal yearly cycle of spring, summer, fall and winter and the response of the biological subsystem to these changes. This results in different animals and areas being exploited by the hunters during the seasonal cycle. The analysis of seasonal variations in the hunting pattern in terms of available hunting hours is related to

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1. There are many other factors that will influence the decision to hunt besides elements in the biological and physical subsystems. As hunting is only a component of the total system there are a variety of activities which take up the Eskimo's time. However, for the purpose of this thesis the desire to hunt is assumed and the author will ignore the activities which compete with hunting.

factors in the physical subsystem. These factors determine whether conditions are favorable for hunting or not. If conditions are unfavorable there is no hunting. The decision not to hunt effectively limits the hunting activity in terms of time. In other words, there are limits on the amount of time or the number of days a hunting territory is available to the hunter for productive exploitation. The two factors of resource location and availability of resources are the focus of investigation in the second segment of the hunting pattern.

The third and final segment of the hunting framework, the annual pattern, deals with change in the hunting system through time. The first two segments within the context of the thesis, are discussed as they were observed at a particular point of time. The annual pattern attempts to explain the various factors which go beyond the confines of the single hunt or the seasonal cycle and which influence the evolutionary process of the hunting pattern. Annual variations are caused by many different factors. The presence of a new animal passing through the area, which is then hunted, will cause a change in the annual pattern. A further factor is the introduction of economic incentives to harvest a previously unwanted resource. The introduction of commercial fox trapping and its influence on the hunting pattern of the Eskimos is an example (Damas,1963). The introduction of a new technology in terms of hunting equipment may also cause a variation in the hunting pattern as will cultural changes influencing attitudes toward hunting or which present the opportunity for a different means of support besides hunting. The emphasis of the thesis, when dealing with the annual pattern, is placed on the technological and cultural influences. It is felt by the author that these two factors are by far the most important and are seen as having had the greatest impact on the hunting pattern of the Igluligmiut.

A diagramatic representation of the hunting pattern of the Igluligmiut is given in Figure 1. The figure illustrates how the hunter weighs factors in the physical, biological and cultural subsystems to arrive at a decision whether to hunt or not. The decision to hunt feeds into the hunting unit to give it a spatial dimension which is represented by the varying circle sizes. The hunt, as a core unit, forms the basis of the seasonal cycle and the annual pattern. However, the hunt is too small a unit to yield data related to the total hunting pattern. Therefore, in both segments analysis is made beyond the hunt to give a holistic view of hunting as practiced by the Igluligmiut. The seasonal cycle is concerned with the seasonal activities of the hunters and is conceived of as closed circle within any one year. The annual pattern which is viewed as an on going progress; one evolving through time. This segment of the pattern can handle data which will not fit into the framework provided by the seasonal cycle and gives an understanding of the processes of change in a hunting system.

1. 4 Organization and Applications.

The thesis is divided into three parts. The first part deals with the seasonal cycle, the second with the operational ranges and the annual pattern is presented in the last part. The understanding of the complexities of the various operational ranges is dependent on a solid knowledge of the methods of exploitation,

HUNTING PATTERN OF THE IGLULIGMIUT

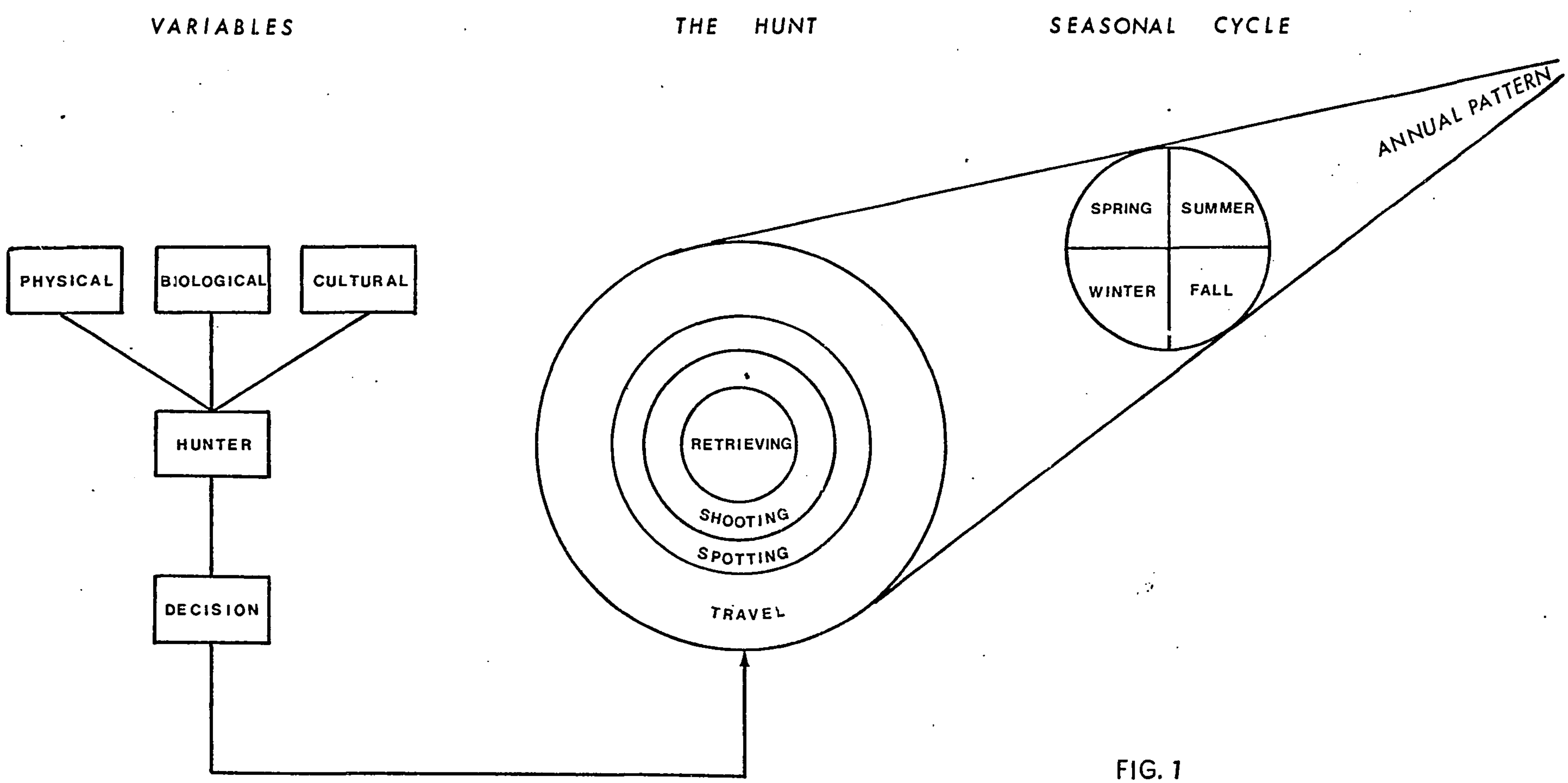

FIG. 1

equipment used and animals hunted in northern Foxe Basin. This necessary background detail is best presented within the framework provided by the seasonal cycle and is therefore given first.

It is felt that the hunting pattern, used as a framework for the organization of data, is of particular value both in practical and theoretical terms. First of all, it leads to an understanding of hunting as an adaptive mechanism. Man's interaction with and dependence on a balanced eco-system is clearly brought out through the study of the hunting pattern. Ecological influences on hunting styles are effective at two levels. Adaption to the micro-environment can be studied through the analysis of two widely divergent hunting cultures. An example would be a comparison between the arctic and tropical rain forest hunters. Here one might investigate how the differences in spotting ranges influenced hunting patterns. The Eskimos, in many cases, are dealing with a flat surface. The hunters of the rain forest by comparison, have severe limitations on spotting ranges due to the dense foliage. Micro-environmental factors are reflected in the adaptive techniques and can be brought out through the study of particular ecological niches of two different groups within the same broad hunting culture. A comparison between the Netsilik and the Igluligmiut Eskimos would illustrate such an approach. Although basically having the same cultural background variations in ice conditions around Pelly Bay and Iglulik contribute to different perceptions and therefore to different hunting patterns. The study of hunting as an adaptation, and the modification of hunting techniques by the eco-system, is facilitated by the use of a framework common to all hunting groups.

In practical terms, the framework of the hunting pattern is a very useful approach to gathering meaningful information about hunting. The system is amenable to analysis in quantitative terms rather than descriptive writing. This allows accurate assessment of values regarding efficiencies, input-output studies, probability of success, spatial ranges and economics. Furthermore, analysis can be made of the individual, the camp or the total hunting society. The framework also allows prediction for the future to be made with some degree of accuracy. For example, if under present conditions a hunter is operating his canoe with a six horsepower motor he is limited to a retrieving range of X yards. However, if his engine is increased to eighteen horsepower, his retrieving range will also be substantially increased. There is, of course, an optimum value for horsepower beyond which there is no effective increase in retrieving range. To maximize efficiency, spatial ranges, and the economics of hunting, the aim should be to make available to the hunter the motor that best does the job of retrieving seals. This can be determined for each of the ranges thereby allowing more rational discussion regarding economic policies for northern communities.

It is clear that the scheme offered is not the only means of organization available to researchers. Furthermore, in its present form, much refinement and added information is needed both in theory and field research. Data collection needs to be more precise in terms of technique and instrumentation. Under hunting conditions it is very hard to evaluate ranges without interrupting the hunting process and detailed instrumentation is impossible. On a theoretical basis, the framework could be expanded to include other aspects of hunting systems. The present study deals in detail with the physical and biological subsystems. The analysis of the cultural variables is limited mainly to an assessment of technological factors and generally ignores the influence of important features such as perception, value systems, other activities besides hunting, etc. Nevertheless, the framework is felt to be a valid approach to the collection and presentation of data both for comparative and analytic purposes.

1. 5 Literature.

Most studies of the Eskimo, dealing with hunting, yield little in quantitative terms. This is not to say that they are completely devoid of good information for these works contribute to the basic understanding of Eskimo hunting in terms of technology, culture, hunting techniques and animals hunted. Lacking, however, are two important aspects which permit a more intimate and accurate understanding of Eskimo hunting patterns. The literature fails to deal fully with the functional interrelationships existing in the eco-system and how these combine to determine hunting systems. At best, factors in the eco-system are dealt with as separate entities and the connections are only implied. Secondly, the literature does not provide the basis for quantitative analyses. Quantification permits a more precise statement to be made about hunting. For example, it is more meaningful to state that a hunter hits a seal thirty-one per cent of the time when shooting from ice but only twelve per cent of the time when shooting from a moving boat than to say it is more difficult to kill a seal when shooting from a canoe. As quantification permits more detail, accurate comparisons between different hunting cultures can be made. The investigator can give a figure and state accurately to what degree hunting societies differ. Although most of the present material does not deal in analytic terms it does often provide an excellent basis for more detailed studies of hunting.

The studies done by Nelson (1966a, 1966b) working at the Aeromedical Laboratory in Fort Wainwright, Alaska, and incorporated into his book "Hunters of the Northern Ice" (1969), are a case in point. It is a remarkable collection of material which contains very accurate and detailed information on modern hunting technique, equipment and the influence of physical and biological environment on hunting. However, it is basically an ethnography of hunting. It does contain some quantitative ranges but no attempt is made to draw these into a conclusive statement. Other studies are similar. Most literature dealing with hunting contains some information about shooting ranges, travel ranges, etc., but these are generally approached as merely contributing to the description and do not form the central focus of the work.

The first research done which enables detailed elaboration on some of the variables that influence operational ranges was done by Fisheries Research Board and comes out of their works on the biology of the eastern Canadian arctic. Of particular importance in this regard is the research done by McLaren (1958a, 1958b, 1961a) on the biology of the seal. These works contain valuable information about the interrelationship of the physical and biological subsystems in determining the resource potential of an area. The studies attempt to explain why seals, particularly ringed seals, vary in numbers in different locations throughout the arctic. McLaren goes into considerable detail of how ice type and its distribution influences the factor of seal distribution and behaviour. Some mention is made of hunter productivity per unit effort for the various seasons of the year.

Although McLaren's primary interest is not in an analysis of hunting, the works contribute to a better understanding of the relationship between the physical and biological subsystems and a more accurate estimation of some of the variables involved in the operational ranges of the Eskimo.

The study that comes closest to outlining the processes or stages of hunting is a thesis by Haller (1967) on the hunting economy of Cumberland Sound. Haller's approach was to analyze the economics of hunting by studying the hunting cycle season by season in terms of material input, probability of success, and product return of seal hunting. In doing this he has outlined many of the factors that influence operational ranges of hunting, particularly shooting and spotting. However, economics, not hunting systems, are his chief concern. Although his work is of great value, more detailed studies on Eskimo hunting patterns are needed. The present thesis is an attempt to meet this need.

1. 6 Methodology.

The program of field studies investigating the hunting pattern of the Igluligmiut took place over a two year period. The 1968 field season extended from May 25 to September 10 involving 108 days in the field. In 1969 field studies resumed on May 6 and continued until November 6 giving a total of 183 days. The study can be conveniently divided into the following sections.

1.6.1 Hunting Data. [1]

The method of research during this phase was to accompany Eskimo men on their hunting trips and to record pertinent information about hunting conditions. In particular physical, biological, technological, economic and hunter performance data was noted.

During the 1968 and 1969 seasons detailed material was collected on sixty-four individual Eskimo hunts which involved travelling some 3,380 miles by dog team, ski-doo, canoe and whale boat. To these hunts can be added information gathered through questionnaires given to twenty hunters.

All the main types of hunting in the Iglulik area were covered. Emphasis lay on the marine mammals, particularly ringed seals, bearded seals and walrus. The hunts have been divided into six categories on the basis of ice type and distribution and the seasonal behaviour of the animals involved and are listed in Table 1.

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1. For a more detailed breakdown of methods of data collection during the hunts see Appendix 4.

Table 1

Recorded Data Hunt Types, Ikpiadjuk, 1968-1969.

Category	1968 Observed	1969 Observed	Questionnaire	Total
Breathing Hole	0	1	0	1
Floe Edge	12	6	8	26
Basking	3	5	3	11
Drift Pan Ice	11	8	5	24
Open Water	8	6	4	18
Freeze-up	0	4	0	4
	34	30	20	84

During the hunts observations were made on well over 1,648 marine mammals noting both unter and animal reaction.

Detailed information was also gathered on summer caribou hunting. Two extended caribou hunts, each a week's duration were covered during the 1968 and 1969 field seasons. During this time the stalking and dispatching of thirty-five caribou was observed. The caribou hunts of fall, winter and spring were covered by interview rather than direct participation. The basic aim of the interviews was to determine seasonal variations in areal concentration of caribou hunting.

1.6.2 Biological Sampling.

With the co-operation of the Fisheries Research Board Arctic Station at Ste. Anne de Bellevue, Quebec, a marine mammal sampling program was carried out during the 1968 and 1969 field seasons. Samples were taken during the hunts by the author and by J. M. Bradley, who was also connected with I.B.P.-H.A. Further samples were collected from hunters who had returned from the village with game and had sufficient data to make the sample meaningful.

A total of 508 animals, comprising 325 ringed seals, 150 bearded seals and thirty-three walrus, were examined for biological date to include in whole or in part the following: location and date of kill, hunter, hunting method, animal weight, length, girth, blubber thickness, sex and samples of reproductive organs and lower jaw or claw for age determination. Additional data was recorded on animal behaviour, distribution, diet, component weights, losses due to sinking and hunter reaction to the game.

1.6.3. Climatic Observations. [1]

A. Macro-Climate.

During both field seasons a Stevenson screen and recording instruments were installed to assess general climatic conditions. Climatic parameters were usually recorded four times daily at 0800, 1200, 1600 and 2400 hours.

Information was collected on wind direction, wind speed, wind gusts, minimum temperature, maximum temperature, snow temperature, air temperature, precipitation, precipitation duration, sea ice cover, sea ice type, cloud cover and visibility.

Recordings were obtained complete for the 1968 field season. However, during 1969, due to a reduction in personnel, the recording of data was interrupted by hunting trips and movement out to and from camp.

B. Micro-climate.

Micro-climatic data was recorded for each hunt where such information was felt to relate to hunting. Pertinent data includes: snow temperature, which affects travel; salinity of the water, which seems to influence the floating time of seals; wind speed and direction

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1. For an analysis of climatic data see Appendix 2.

and wave height, which affects shooting and retrieving success; and the general atmospheric conditions such as available light, color of the water surface and cloud cover, which influence spotting ranges. Detailed information was also gathered on ice type and its distribution in the hunting area.

1.6.4 Interviews.

The interviews conducted during the 1969 field season were carried out at three different levels.

A. The first series of interviews were carried out among the white agencies, mainly the school and church officials in an attempt to evaluate, in their opinion, how centralization of population, wage employment, welfare, housing, education and extensive cultural contact were influencing the hunting pattern of the Eskimo.

B. The second set of interviews were designed to evaluate the present day hunting territory and hunting intensity of every adult male in Ikpiadjuk. A total of eighty-three adult male household heads representing each hunting household in Ikpiadjuk were covered. Furthermore, the interviews were extended to include thirty-one unmarried sons over the age of sixteen.

C. In the last series, eight hunters were interviewed in an attempt to assess the seasonal population movements in regard to hunting and the biological resource of the area before Ikpiadjuk became the focal point. The interviews also assessed the influence of the town on hunting movement and biological resource since it has become virtually the only settlement (besides Seneria) in the area.

1.6.5. Records.

During this phase, records pertinent to hunting and economic conditions in the village were gathered. The records concerned were the R.C.M.P. Annual Game Reports from 1965 to 1969, R.C.M.P. population figures for 1961, 1965, 1966, 1967, 1968 and 1969, D.I.A.N.D. social welfare records from 1967 to 1969, the Eskimo Co-operative fur records for 1968 and 1969 and individual hunter game records.

1.6.6. Experimentation.[1]

The observation of hunting technique was carried out in such a way as to influence the hunters' actions as little as possible. For this reason, it was impossible to record some of the hunting phenomena very accurately, particularly spotting ranges. As a result, controlled experiments were conducted simulating hunting conditions to better arrive at an empirical value for spotting ranges and to determine the influencing variables.

1.7 Characteristics of Study Area.

1.7.1. Historical Background.[2]

Northern Foxe Basin has been inhabited by Eskimos for thousands of years. Meldgaard (1960a, 1960b) traces three cultural sequences in the development of the modern Eskimo of this area. These are: pre-Dorset or Sarqaq, extending from 1800 B.C. to 800 B.C; Dorset, from 800 B.C. to 1300 A.D.; and Thule, from 1300 A.D. to approximately the 1700's and evolving into the modern Eskimo.

First contact with white man by the Igluligmiut came in

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1. For a more detailed explanation of the experiment conducted see Chapter V , Section 5.2.1. part A.

2. See Chapter VIII for an historical outline of the hunting pattern.

1822-23 when Parry wintered his ships in Turton Bay after an unsuccessful attempt to pass through Fury and Hecla Strait (Parry,1824). The Eskimo had knowledge of whalers at Pond Inlet but had, to the time of Parry, no direct contact with them. Subsequent journeys into the area by whites were infrequent and had little impact on the Eskimo way of life. Hall travelled from Wagner Inlet to Iglulik in 1867 and again in 1868 in search of the lost Franklin Expedition (Anders,1965). However, both his visits to the area were extremely brief. During the latter half of the nineteenth century a few whaling vessels did manage to penetrate Foxe Basin but little is known of the extent of their exploration and it is doubtful if many got up into the northern portion. It is known, however, that at least one ship got as far north as the Spicer Islands (Anders, 1965). The next significant journey into the area was made by members of the Fifth Thule Expedition. Matthiasen and Freuchen made several trips to Iglulik in the course of the years 1922, 1923 and 1924. Both men travelled extensively throughout the area.

Although none of the above expeditions had a lasting impact on the Eskimo of Iglulik, their culture was beginning to change by the 1920's. Change came through Pond Inlet and across Baffin Island. The Protestant religion was introduced to the Igluligmiut in 1920 by an Eskimo from Pond Inlet and began to replace the traditional religion. In 1931 a Catholic mission was established at Avajuk and moved to Ikpiadjuk in 1937. Along with introduction of the new religions came a change in the material culture. Trade goods were available, first from the whalers at Pond Inlet, and later from trading posts at Repulse Bay and Pond Inlet. In 1939 a Hudson Bay post was established at Ikpiadjuk. However, the annual supply ships failed to reach Iglulik Island between 1940 and 1943 due to poor ice conditions and the post was abandoned. The Eskimos were forced to resume trading with Pond Inlet and Repulse Bay. In 1947 the Hudson Bay post was reestablished at Ikpiadjuk and continues operation there to this date.

With the establishment of the Catholic mission and a trading post, a small group of Eskimos also settled for the first time at Ikpiadjuk. However, the Eskimos connected with the store and mission were few and the settlement did not grow appreciably. By the late 1950's the situation had changed considerably and Ikpiadjuk was beginning to emerge as a growing community. The availability of wood from the D.E.W. Line base, which was built in 1955-56 at Hall Beach, for the construction of houses encouraged a few more families to settle in the village. By 1955 several children from the area were being flown to Chesterfield Inlet for schooling. The process of concentration was strengthened in 1959 when an Eskimo ecclesiastic came down from Pond Inlet and built an Anglican Church. In the same year a number of permanent buildings, including a school, were erected by the Department of Indian Affairs and Northern Development. This resulted in more families moving into the settlement to earn wages by maintaining the buildings and to send their children to school. In 1961-62, hostels were built in the community to house the school children coming in from the outlying camps. The process of concentration of the Eskimos at Ikpiadjuk drew rapidly to a conclusion when the government committed itself fully to a housing, administrative, health and educational program designed to concentrate all the camp families at a central location. The housing program began in 1964 and was effectively completed in the winter of 1969. With the development of housing there was also an expansion of administrative, health and educational facilities. There now remains only one family unit still established at a camp in the Iglulik region. Even this family is dependent on the settlement and spends a great deal of time during the winter months in the village staying with relatives. All but one of their children regularly attend school.

A similar process of centralization has been operational at Seneria, fifty miles to the south of Ikpiadjuk. Although much smaller, Seneria has both Anglican and Catholic churches, a school, nursing station and a Hudson Bay post.

The population of northern Foxe Basin is now concentrated at the two settlements of Seneria and Ikpiadjuk which have become the focal points of the area. Although the two villages are connected administratively and through kin ties of the residents, the present study concerns itself only with those hunters living in Ikpiadjuk. The concentration of population in these two locations has had the effect of creating fairly distinct boundaries between the two groups. Although the boundaries are not hard and fast, and certainly no boundary exists either historically or in the minds of the people, the tendency is for each group to hunt within a certain distance or radius of the settlement. The reason for the emergence of distinct territories for each village appears to be related to economics, in terms of gas prices, and the new permanence of family residence. The location of the family in a permanent housing unit, the daily attendance of school by the children and new duties of the women concerned with family care has greatly reduced the mobility of the Eskimo. The hunters now have a permanent point of reference to which they return after each hunt. In terms of economics, the increased use of gas driven motors has served to tie the Eskimos closer than ever before to the community, particularly the Hudson Bay post. Very few, if any, hunters can amass the capital to stock up on gasoline and free themselves momentarily from the village for usually they are dependent upon the returns of one hunt to pay for the material input of the next. For these reasons, the settlements of Seneria and Ikpiadjuk, although only fifty miles apart, and once connected by a series of camps along the coast, are developing distinctive territories of operation.

1.7.2 Population and Activity.

The present Eskimo population of Ikpiadjuk consists (figures as of July, 1969), of eighty-eight families totalling 509 persons. Figure 2 shows the age and sex profile of the Eskimo population of Ikpiadjuk and is derived from values listed in Appendix 3. Of the total population eighty-six are men between the ages of twenty-one and sixty. It is with this group, those who are mature enough to have developed the proper skills and mental attitudes to be successful hunters, that the thesis is concerned. Not all the

ESKIMO POPULATION PROFILE IKPIADJUK - 1969

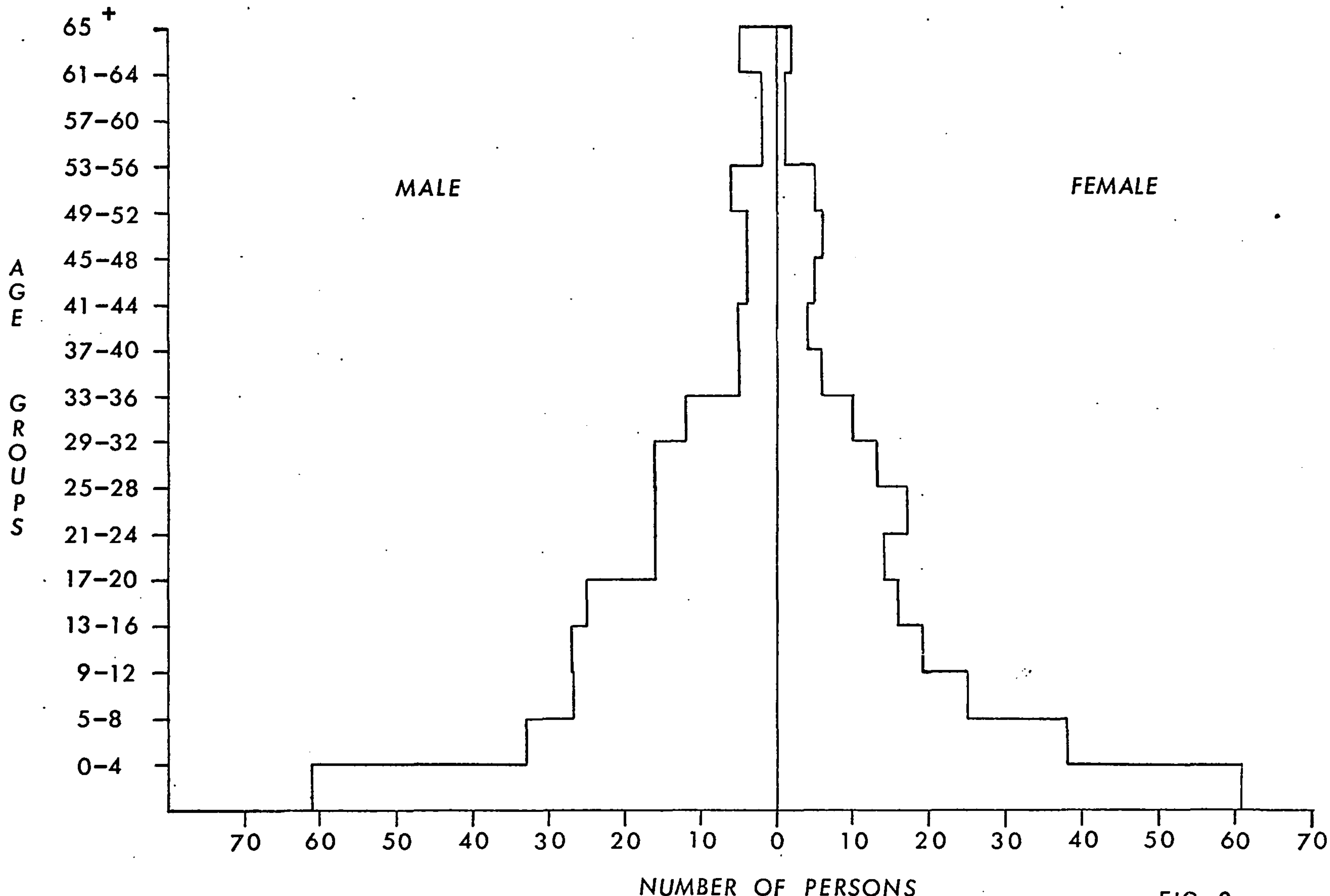

FIG. 2

men in this age group are hunters. Reference to Table 2 gives the approximate numbers of male household heads by different occupational groups. Many are employees of the government, education, health and commercial institutions located at Ikpiadjuk. Others find employment as part time construction workers during the erection of new housing units. Some of these men are carvers, some are disabled, still others are on welfare. It is clear that the influence of the village in terms of education, welfare, and the opportunity for wage employment has had a profound influence on the hunting pattern of the Eskimo. However, it is significant to note from the table that by far the largest group still rely on hunting for their livelihood. Furthermore, many of those who are not classed as hunters by occupation still hunt on weekends or during their holidays and in fact form a significant part of the hunting group.

Table 2

Eskimo Males, Occupation, Ikpiadjuk, 1968. [1]

Hunters	48	Clerk	3	Ecclesiast	1
Welfare	4	Pension	6	Administration	1
Labor	13	Carvers	2	Constable	1

[1] Vestey, 1968.

1.7.3 Hunting Activity.

Most hunting done by the Eskimos of Iglulik Island radiates out from the settlement of Ikpiadjuk. A variety of animals are hunted by the Eskimos, the most common of which are listed in Table 3.

The emphasis of hunting is, as it always has been, on the marine environment, particularly ringed seals, bearded seals and walrus, and it is with these animals that the thesis mainly deals. A list of equipment used by the hunters is given in Table 4. Not all animals are hunted throughout the year nor is all of the equipment suitable for year round use. The biological resource responds to changes in the physical subsystem. The hunters react to these changes by developing a seasonal hunting cycle which best allows them to exploit the environment by utilizing the hunting methods and equipment which suit the conditions facing them. The different hunting systems and their characteristics are summarized in Table 5.[1]

A. Products of the Hunt.

The ringed seals which remain in the area all year, form the economic basis of marine mammal hunting. They are hunted year round but the majority are taken in the summer and fall months. Bearded seals yield both a large quantity of meat and a valuable skin. However, usually only the skins of immature bearded seals are traded. The skins of adult seals are often scarred and coarse and the Eskimo value them for the manufacture of hunting equipment such as sealskin lines for harpoons, traces and harnesses. Walrus, while contributing little in economic returns to hunting besides the tusks and the baculum, constitutes the main source of meat for the winter caches and great effort is directed toward their harvest. Polar bears, although not intensely hunted, when taken contribute economically to the hunt and the meat offers a welcome change of diet.

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1. For a more detailed description of the hunt types see Chapter II, Section 2.2.

Table 3

SELECTED ANIMALS NORTHWESTERN FOXE BASIN.

Common Name	Scientific Name	Eskimo Name	Weight (lb.)	Season Hunted
Arctic Char	Salvelinus malma spectabilis	-	-	Summer/Fall
Bearded Seal	Erignathus barbatus	Udjuk	600	Summer/Fall
Bowhead Whale	Balaena mysticetus	Arverk	60,000	-
Canada Goose	Branta canadensis	Nerglek	-	Spring
Caribou	Rangifer acticus stonei	Tuktu	150	Year Round
Common Eider	Somateria mollissima	Mitierk	-	Spring
Fox	Alopex lagopus	Tireganierk	-	Winter
King Eider	Somateria Spectabilis	Mitilak	-	Spring
Narwhal	Monodon monoceros	Kelaluga	-	Summer
Polar Bear	Thalarctos maritimus	Nanuk	800	Spring/Fall
Ringed Seal	Pusa hispida	Netserk	100	Year Round
Walrus	Odobenus rosmarus	Aiverk	1,500	Summer/Fall/Winter
White Whale	Delphinaterus lecuas	Kelaluga	1,000	Summer
Wolf	Canis occidentalis	Amarok	-	-
Wolverine	Calo luscus	Kapvik	-	-

Table 4

Hunting Equipment Owned By A Sample Of

Sixty-eight *Ikpiadjuk* Households, Summer 1968, [1]

Partial Revision, Fall 1969. [2]

Item		Total Number 1968		Total Number 1969
Tents		32		36
Gasoline camp stoves		49		
Gasoline lanterns		19		
Sleds		39		
Pulling dogs		238		
Puppies		40		
Snowmobiles		19		31
Canoes		14		18
Flat bottom boats		5		
Whale boats		6		
Outboard motors (horsepower)				
(a) 5-8 hp.	4		5	
(b) 9-10 hp.	4		5	
(c) 18-20 hp.	9		9	
(d) 28 hp.	1		1	
(e) 33 hp.	2		2	
(f) unknown	6		6	
		26		28
Weapons (rifles)		81		84
Telescopic sights		unk.		
Binoculars and telescopes		34		
Stalking shield		unk.		
Gill nets (fish)		24		
Sealing knives		unk.		
Sealing nets		7		
Harpoons		unk.		
Floats		unk.		

1. Vestey (1968).

2. Beaubier (1969).

Table 5

SUMMATION OF OBSERVED HUNT TYPES.

Season	Hunt Type	No. of Hunters in Party	Primary Transport	Secondary Transport	Other Equipment	Calibre Rifle	Principal Animal Hunted	Secondary Animal Hunted	Material
Spring	Floe-edge	1-2	Dog Team	-	Recovery Punt	30-30, .222, .243	Ringed Seal	-	-
		1-2	Ski-doo	-	Recovery Punt	30-30, .222, .243	Ringed Seal	-	Gas/ Oil
		2-3	Canoe	Dog Team Ski-doo	-	30-30, .222, .243	Ringed Seal	-	Gas/ Oil
	Basking	1-2	Dog Team	-	Stalking Shield	30-30, .222, .243	Ringed Seal	-	-
			Ski-doo	-	Stalking Shield	30-30, .222, .243	Ringed Seal	-	Gas/ Oil
	Breathe Hole	2-3	Dog Team	-	Harpoon	30-30, .222, .243	Ringed Seal	-	-
		2-3	Ski-doo	-	Harpoon	30-30, .222, .243	Ringed Seal	-	Gas/ Oil
Late Spring	Break-up	2-3	Canoe	Dog Team Ski-doo	-	30-30, .222, .243	Ringed Seal	Bearded Seal, Walrus	Gas/ Oil
Early Summer	Drifting Pan Ice	2-3	Canoe	-	Harpoon & Float	30-30, .222, .243, .22	Bearded Seal	Ringed Seal	Gas/ Oil

Table 5 cont'd.

SUMMATION OF OBSERVED HUNT TYPES.

Season	Hunt Type	No. of Hunters in Party	Primary Transport	Secondary Transport	Other Equipment	Calibre Rifle	Principal Animal Hunted	Secondary Animal Hunted	Material
Summer	Drifting Pan Ice	2-3	Canoe	-	Harpoon & Float	30-30, .222, .243, .22	Bearded Seal, Walrus	Ringed Seal	Gas/ Oil
		2-5	Canoe	Whale Boat	Harpoon & Float	30-30, .243, .306	Walrus, Bearded Seal	Ringed Seal	Gas/ Oil
Fall	Open Water	2-3	Canoe	-	Harpoon & Float	30-30, .222, .243, .306, .22	Mixed Ringed, Bearded, Walrus	-	Gas/ Oil
Late Fall	Early Freeze-up	2-3	Canoe	-	Harpoon	30-30, .222, .243	Mixed Ringed, Bearded, Walrus	-	Gas/ Oil
Winter	Late Freeze-up	1-2	Dog Team	-	Recovery Punt	30-30, .222, .243	Ringed Seal	Walrus, Bearded Seal	-
		1-2	Ski-doo	-	Recovery Punt	30-30, .222, .243	Ringed Seal	Walrus, Bearded Seal	Gas/ Oil

A few whale, mainly white whale and narwhale, are taken each year, The meat is cached for dog food whereas the outer skin, the muktuk, is highly prized and considered a delicacy.

The principal terrestial animals hunted in the Iglulik area are caribou and arctic fox. Caribou are a very important source of food for the Eskimos. However, like the walrus, there is little cash return derived from a caribou hunt. Caribou are hunted in all seasons of the year but the most intense period comes in late summer, toward the end of August or early September, to take advantage of the prime conditions of the skins. Such animals as the wolf and wolverine are of economic value but do not contribute substantially to the total hunting pattern because of the rarity of their capture. By far the most important of all land animals, in economic terms, are the arctic fox. Fox trapping is limited to the winter months and has many problems connected with it. The availability of fox is highly cyclical and as such is unreliable as a steady income. Furthermore, the concentration of people at Ikpiadjuk has made it even harder for the hunter to harvest the resource due to overutilization in the area around the settlement.

The relative monetary importance of the different animals in the hunting cycle is outlined in Table 6. It should be borne in mind that the figures of the fox and seal totals are compiled by the R.C.M.P. from the records of skins passing through the commercial outlets of either the Hudson's Bay Company or the Co-operative and do not indicate the total catch for the area. Many skins, especially seal, are not traded due to damage, molting or use for material products. [1] The polar bear figures are probably quite accurate as the bears must be tagged and a new annual quota of twenty-three for the area is carefully controlled. The figures of caribou and walrus totals are not actual counts of animals taken but are based on estimates and verbal reports given to the police by the hunters and personnel from the Co-operative.

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1. For an estimate of total landed catch for ringed seal in the <u>Iglulik</u> area see Appendix 13.

Table 6

Number And Value Of Wildlife Reported Taken
In Iglulik Region
1964-1969. [1]

Year 1/7 to 30/6	1968-69	1967-68	1966-67	1965-66	1964-65
Polar Bear.					
Number	16	17	38	26	25
Value (dollars)	1,770	2,665	4,050	2,442	1,500
Ringed Seal.					
Number	1,824	670	3,178	2,228	3,914
Value (dollars)	14,082	2,075	18,941	13,157	46,283
Bearded Seal.					
Number	11	32	76	80	74
Value (dollars)	116	286	1,183	978	1,480
Total Seals.					
Number	1,835	702	3,254	2,308	3,988
Value (dollars)	14,198	2,361	20,124	14,135	47,763
Walrus.					
Number	100-150	unk.	100	180	104
White Fox.					
Number	417	974	3,929	460	2,369
Value (dollars)	5,337	8,378	58,435	7,328	19,615
Caribou.					
Number	700-800	unk.	900 plus	900	460
Wolves.					
Number	4	4	8	9	5
Total Fur.					
Value (dollars)	21,305	13,404	82,609	23,905	68,878

1. R.C.M.P. Annual Game Reports.

PART I

THE SEASONAL HUNTING CYCLE.

CHAPTER II

THE SPATIAL DISTRIBUTION OF THE RESOURCE BASE AND HUNTING EFFORT.

The Igluligmiut are a hunting people and much of their productive time is directed toward exploiting the animal resources of the area, particularly the marine mammals. The availability of these resources to the hunters in terms of their distribution within the hunting territory is affected by factors in the physical, biological and cultural subsystems. The biological base influences the general species content of the total hunting area, the physical subsystem influences the specific factors of densities, distribution and some aspects of animal behaviour and the cultural content defines the modes of hunting. The systems are interdependent and inseperable. The resource base, as determined by these systems, is a dynamic entity and varies on a seasonal basis. Although the biological content of northern Foxe Basin is remarkably constant, the physical, biological and cultural factors in the eco-system interact to create a hunting cycle which varies seasonally in content, locational emphasis and methods of exploitation.

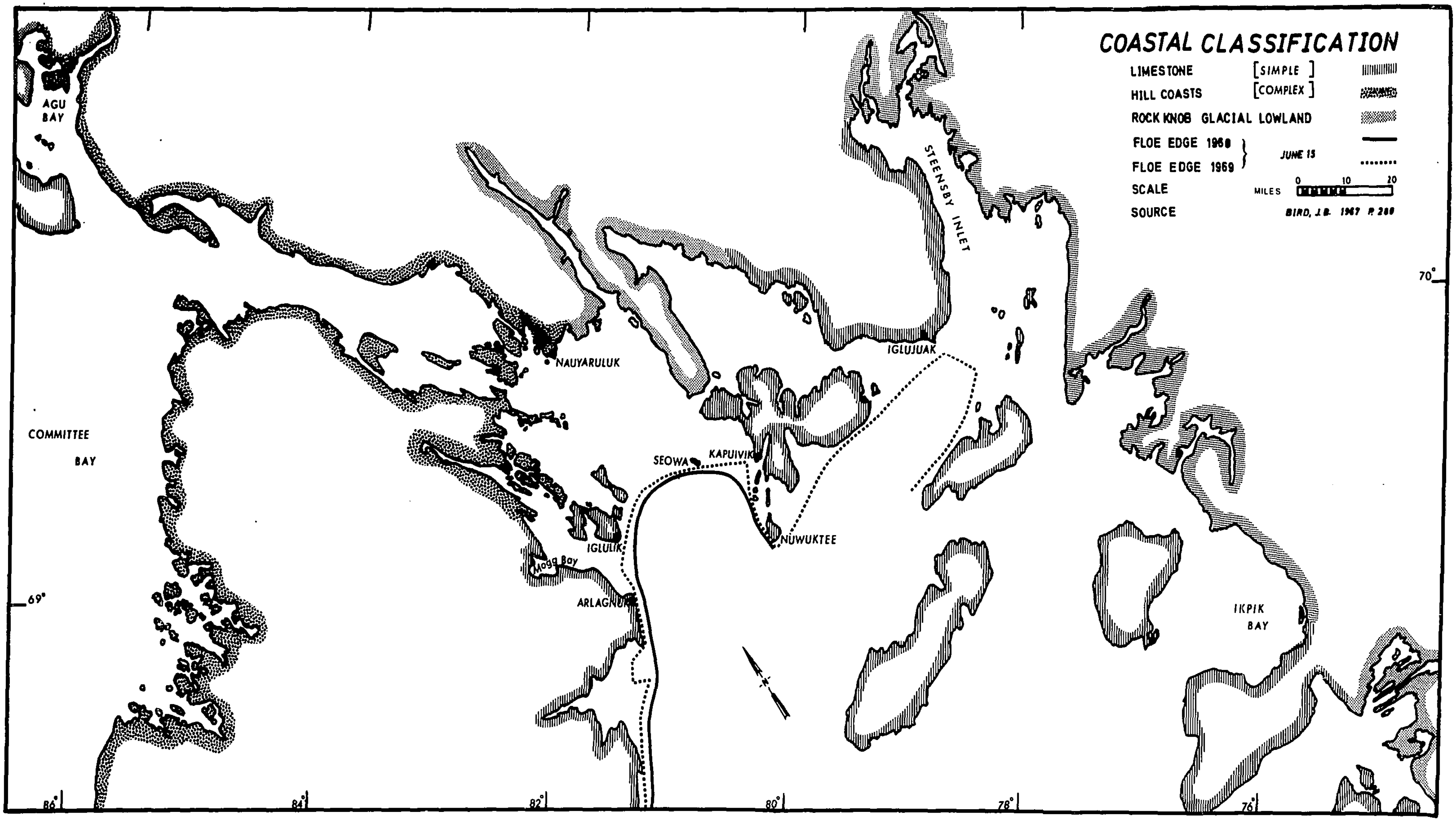
2.1 Marine Environment.

Both marine and terrestial animals are harvested by the Igluligmiut. However, the greatest emphasis is directed toward the hunting of ringed seals, bearded seals and walrus.

2.1.1 The Habitat of the Ringed Seal.

The location of ringed seals along the arctic coasts is determined mainly by the availability of ice suitable to pupping and breeding (McLaren, 1958b). The availability of good quality fast ice for pupping dens is determined by the nature of the coast-lines. Complex coasts, those with numerous bays, inlets and off-shore islands, produce ice which is excellent for pupping purposes because they hold their ice well into the summer months. Simple coasts, those with straight coastlines, have early break-ups causing high pup mortality and are therefore unsuitable. The importance of ice stability is pointed out when it is realized that the pups are born between the middle of March and the middle of April and may be dependent on their mothers for up to two months. This means that if a pup was born at the outside date of mid-April it is conceivable that it would need stable fast ice until mid-June. It is very un-likely that simple coasts would keep their ice that long.

Ice conditions in northern Foxe Basin are excellent for breeding and pupping in spite of the fact that much of the coastline in the area could be classified as simple. The coastal classification and the position of the floe edge for June 15, 1968 and 1969 are given in Map 4. The map shows that extensive areas of landfast ice exist well into June. The presence of such large amounts of good ice results not only from the coastal configurations but also from the relatively cool climatic conditions prevailing in northern Foxe Basin and the general absence of strong currents or extreme tides (McLaren, 1958b). The area most favourable for the production of


COASTAL CLASSIFICATION
LIMESTONE
HILL COASTS
[SIMPLE]
[COMPLEX]
ROCK KNOB GLACIAL LOWLAND
FLOE EDGE 1968
FLOE EDGE 1969
JUNE 15
SCALE
MILES
0
10
20
SOURCE
BIRD, J.B. 1967 P. 280
AGU BAY
COMMITTEE BAY
NAUYARULUK
STEENSBY INLET
IGLUJUAK
SEOWA
KAPUIVIK
IGLULIK
Hogg Bay
NUWUKTEE
ARLAGNUK
IKPIK BAY
70°
69°
86°
84°
82°
80°
78°
76°

MAP 4

seals is the complex coastal region to the west of Iglulik Island (McLaren, 1958b). This area has by far the most stable ice and the greatest length of coastline due to its many bays, inlets and islands. Therefore, along this coast one finds many more areas suitable for pupping dens than along simple coasts. Seals are found on all types of coasts but their density increases markedly in the complex coastal regions.

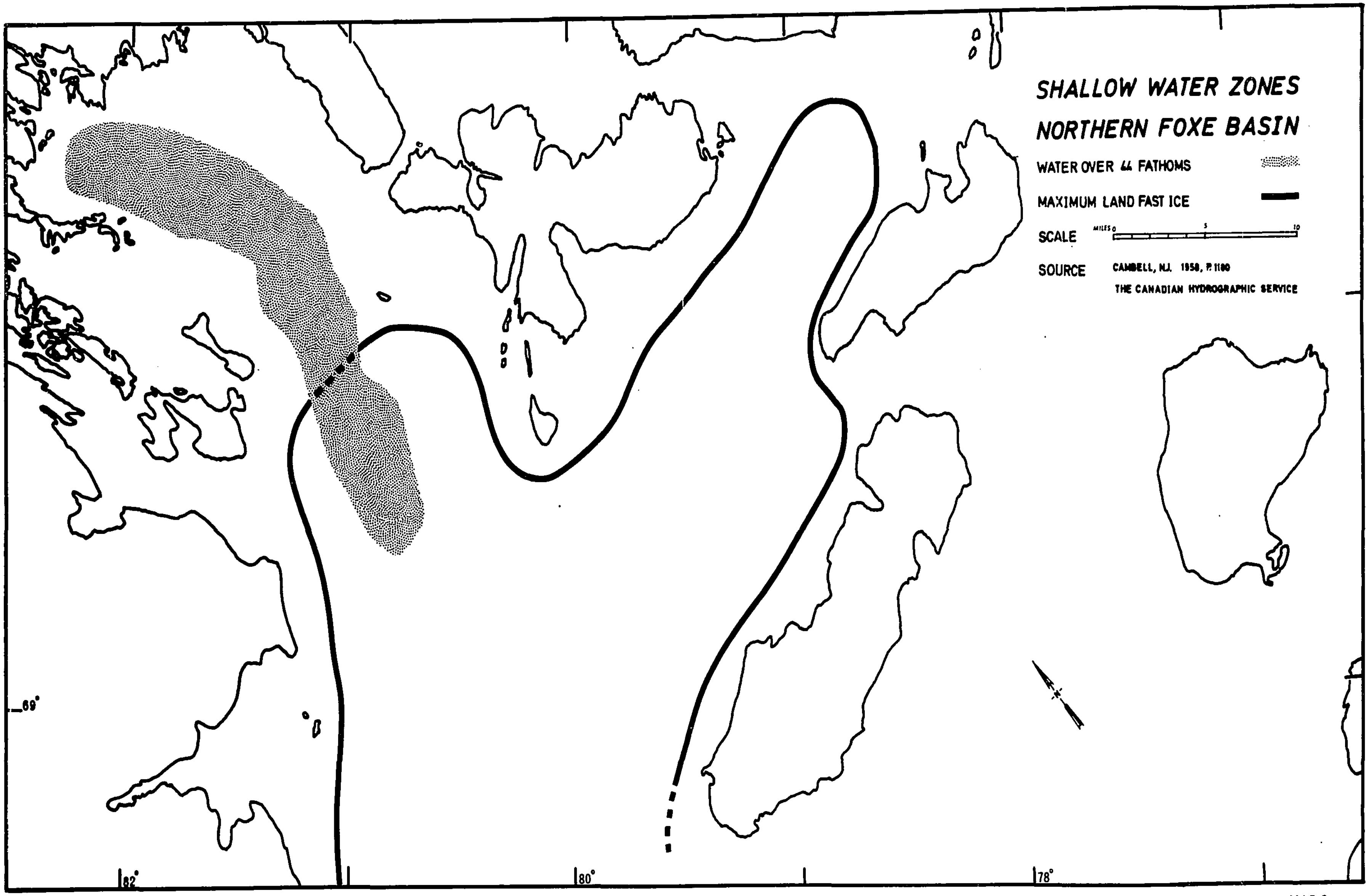
As shown in Map 4, the coasts of northern Foxe Basin are comprised of three basic types (Bird, 1967). Of the three coastal types, only the hill coast could be classified as suitably complex to provide prime conditions for the production of seals. However, due to the coastal configuration of northern Foxe Basin, the area of favorable ice conditions can be considerably increased beyond that provided by the complex coast. Between Kapuivik and Arlagnuk the islands of Seowa, Neerlonakto and Iglulik hold the ice into July. It is not until late July or August that the ice leaves Hooper Inlet and the area behind Iglulik Island. Foster Bay and Steensby Inlet, due to deep recessions and the central location of islands at their mouths, also hold the ice well into the summer. However, the simple coasts give up most of their ice sometime in May or early June. A narrow strip of ice clings to these coasts until late June or July. However, these areas, especially the coast between Nuwuktee and Iglujuak, are unsuited for pupping because of the extreme shallowness of the water. As a result most of the ice in the area is grounded blocking the entrances and exits of the seals at low tide. The ice along the simple coasts of eastern Melville Peninsula are unattractive to ringed seals because of the substantial currents which cause the ice to raft and form hummock ice. Movement of unstable, hummock ice can easily crush a baby seal. Furthermore, high winds along with currents and tide can cause the ice to be swept out into Foxe Basin any time during the year.

Ice conditions not only play a significant role in the distribution of ringed seals but also influence their seasonal behaviour pattern. Ringed seals are associated with the landfast ice and are rarely found in open water far out from land. During the winter months the adults, and a few immature seals remain under the ice in bays and fiords by maintaining a number of breathing holes. Most of the younger ringed seals, those under seven years of age, remain at the edge of the fast ice through the winter. With spring break-up seals haul out on to the ice near their breathing holes to bask in the sun and to molt their hair coat. At this time, many of the immature seals at the floe edge move a little way into the fast ice to haul out and bask. They are, however, still closely associated with the floe edge. In open water season most seals move in to concentrate in the in-shore waters. Even in this phase there is a segregation between mature and immature seals. The mature ringed seals are concentrated deep in the bays and fiords while the immatures prevail offshore or in wide bays and inlets. The movement in toward the land is intensified in late summer and early fall when most of the ice has left the area. Although seals are marine mammals they are still dependent on ice or land as a place to rest. With fall and freeze-up the immature ringed seals follow the ice edge as it grows out from the shore. The mature seals stay in the inshore waters under the ice by maintaining a network of breathing holes. Thus the winter pattern is re-established (McLaren, 1958a).

2.1.2 The Habitat of the Bearded Seal.

Bearded seal are also found in considerable numbers in northern Foxe Basin. Like ringed seals, bearded seals stay in the same general area year round but undergo local movement in response to ice conditions. Their general distribution is controlled by feeding habits. The bearded seals are almost entirely bethnic feeders utilizing primarily the smaller, more sedentary invertebrates and fish. Stomach samples taken in 1968 and 1969 in the Iglulik area yielded snails, shrimp and the inshore polar cod. McLaren (1958a) states that bearded seals will not dive below forty-four fathoms (eighty meters) in search of food. As they are not found in overly deep waters and as a general rule do not maintain breathing holes under the fast ice they are most abundant where reasonably shallow waters extend out beyond the limit of the winter fast ice. In terms of shallow water free of landfast ice, northern Foxe Basin provides an excellent area of habitation. Foxe Basin is a shallow sea and most of the basin is less than twenty-five fathoms, (forty-six meters), (Cambell and Collins, 1958a).

The depths of the northern section of Foxe Basin are given in Map 5. It can be seen from the map that the greatest part of the basin comes within the forty-four fathom contour. The maximum position of the winter landfast ice is also shown. The area out from the winter floe within the forty-four fathom range is available to


SHALLOW WATER ZONES
NORTHERN FOXE BASIN
WATER OVER 44 FATHOMS
MAXIMUM LAND FAST ICE
SCALE
MILES 0 5 10
SOURCE
CAMBELL, N.J. 1958, P. 1100
THE CANADIAN HYDROGRAPHIC SERVICE
69°
82°
80°
78°

MAP 5

bearded seals for winter feeding. It is seen that there are substantial areas of shallow water which remain free of solid ice all winter.

Bearded seal are associated with the moving, unconsolidated, pack ice. They pup and breed on the pack ice. Through the winter bearded seals remain in the drifting pack ice moving with it. Pups are born in April or May and after a short, intense suckling period, are abandoned by their mothers to fend for themselves. With spring break-up they move in toward the floe edge first appearing off Seowa. They feed in the shallow waters around the island and rest on the pans breaking off from the ice edge. July is the period when intense basking begins. Bearded seals are not associated with basking on the fast ice but are generally found on small drifting ice pans. With the reduction of ice pans in northwestern Foxe Basin, either through melting or transport, the seals move in toward land inhabiting the waters very close to shore where they sometimes haul out on bars or rocks. With fall and winter freeze-up, the bearded seals move out from land with the growing ice edge and re-establish themselves in the winter pack ice.

2.1.3 The Habitat of the Walrus.

The needs and habits of walrus are similar in many ways to those of the bearded seals. Their distribution and movement is closely associated with feeding habits and the formation and location of sea ice. Walrus are bottom feeders living almost exclusively on bivalve molluscs (Loughery, 1959). They forage in depths ranging from eight fathoms (fifteen meters) to a maximum of forty-four fathoms (eighty meters), in search of food. They cannot maintain breathing holes in the landfast ice and, therefore, during the winter months are restricted to shallow offshore waters which remain free of solid ice. The extent of such waters is shown in Map 5.

Walrus are basically sedentary animals but certain local movements do occur. Such movements are responses to the changing ice conditions rather than migrations. They prefer to feed in an area where either ice or land suitable for hauling out is readily available. At all times, between April and December, they haul out in fine weather to rest between periods of feeding. During the winter, they remain in the pack ice feeding in the shallow, ice free waters. Often herds appear off the floe edge around Iglulik and particularly at Foster Bay. The walrus seem to drift with the pack ice during this season but always staying in easy distance of suitable feeding grounds. During break-up there is a movement to the north but the animals remain well out from the floe edge. In early July a few are taken just to the south of Nuwuktee. In the summer the walrus remain a considerable distance out from Melville Peninsula. They are located in the shallow waters around the Spicer and Manning Islands or on the ice pans which stretch in lines running to the northwest of these islands. Pan ice exists in this area all through the summer. However, by mid-September much of the ice has been swept from the area and the walrus are forced to go to land to haul out. Some move in toward the Spicer Islands and up around Koch Island. Others move to the northwest into the shore along Melville Peninsula concentrating in the area of Foster Bay. The walrus that move into the Iglulik and Foster Bay areas feed in the shallow onshore waters, and haul out on ice drifting down from Fury and Hecla Strait. They are able to exist in these areas well into November foraging under the ice and keeping breathing holes by smashing through the young ice with their tough skulls. When the ice becomes too thick to break through they are forced to move out into the winter pack ice as the floe edge expands.

It should be pointed out here that walrus have very different social habits than either ringed seals or bearded seals. Both types of seals are essentially solitary animals dispersed widely over their habitat. Walrus, on the other hand, are highly social and sightings of large herds are not uncommon. They particularly like to bask in great numbers both on the sea ice and on land. Even when swimming they tend to stick in groups keeping very close contact with one another. The herds of northern Foxe Basin are concentrated to the northeast of Amitioke and around and to the north of the Spicer and Manning Island groups. There seems to be a dispersion of the herds during the fall and winter months when basking is less frequent.

2.2 Seasonal Hunting Cycle.

2.2.1 Spring Hunts.

The hunting cycle of the Eskimos follows very closely the behavioural responses of the animals to their changing environment.[1] The most accessible animal from early spring to break-up is the ringed seal as is seen by reference to Table 7 which shows records of landed catch for individual hunters.

The spring hunting of ringed seals is directed both at the basking and floe edge seals. However, the greatest emphasis is placed

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1. For a brief summation of different hunt types see Table 5.

Table 7

Landed Catch

Hunter Records.[1]

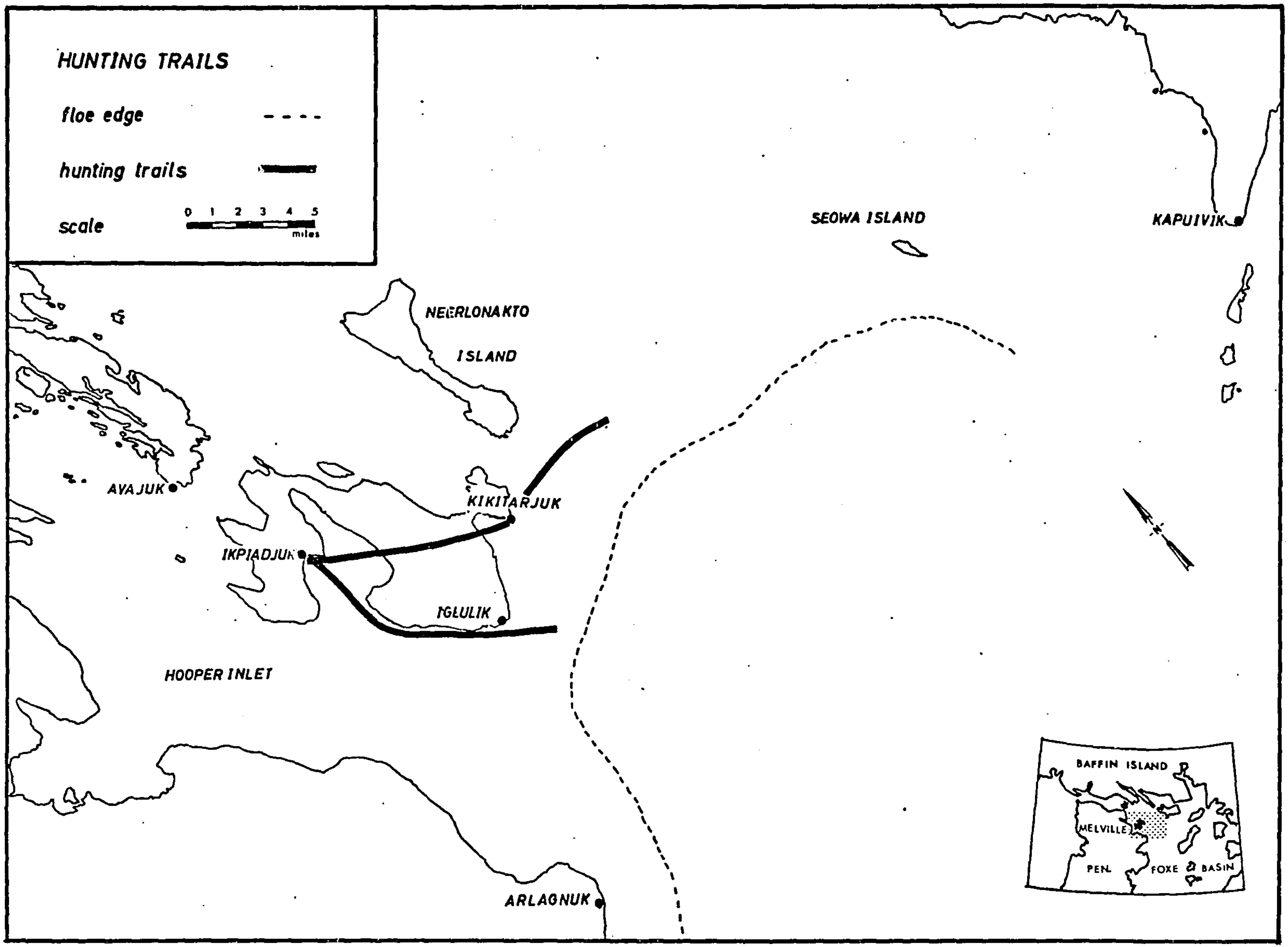
Hunter	Date	Season	Ringed Seals	Bearded Seals	Walrus
	Apr.1 - June 30	Spring	37	1	-
	Jul.1 - Aug.31	Summer	13	17	7
Hunter I	Sep.1 - Oct.24	Fall	13	-	2
	Oct.25- Nov.30	Freeze-up	14	2	1
	Dec.1 - Mar.31	Winter	10	-	1
Total			87	20	11
	Apr.1 - Jun.31	Spring	33	-	-
	Jul.1 - Aug.31	Summer	11	-	-
Hunter II	Sep.1 - Oct.24	Fall	14	-	-
	Oct.25- Nov.30	Freeze-up	31	-	-
	Dec.1 - Mar.31	Winter	8	2	2
Total			97	2	2
	Apr.1 - Jun.31	Spring	25	-	-
	Jul.1 - Aug.31	Summer	Records unavailable		
Hunter III	Sep.1 - Oct.24	Fall	8	-	-
	Oct.25- Nov.30	Freeze-up	34	-	-
	Dec.1 - Mar.31	Winter	25	-	2
Total			92	-	2

1. Personal Communication

on the floe edge. Travel is by dog team, usually with between nine and twelve dogs per team, or by ski-doo. Both pull the Eskimo sledge or komatik. Due to the problems of travelling in deep snow the hunters follow permanent trails which have been formed by continuous travel. The snow on the trails is hard packed allowing the dogs to get a good grip and supports the weight of the sledge giving a good sliding surface. The trails which are shown in Map 6 are followed until the hunters disperse along the floe edge or head off in some other direction. The trails were noted both in 1968 and 1969 and represent the main routes to the floe edge from Ikpiadjuk.

The hunting party is made up of one or two men. The hunters stop along the route to pick up a small plywood punt which is used as a recovery boat for seals shot out from the floe. The boats are left out on the sea ice by returning hunters and seem to be communal property. The hunters travel slowly along the floe edge often stopping for extended periods to hunt. High velocity rifles are the preferred hunting weapon. The .222 is the most popular, followed by the .30-30 and the .243. Very few of the rifles are equipped with telescopic sites.

Although the main emphasis is placed on hunting the floe edge seals a great deal of attention is also directed toward basking animals. They are hunted en route to the floe edge and when sealing at the ice edge is poor. Of twenty-five observed hunts between the dates of May 21 and June 30, twenty can be classed as floe edge hunts. Only five of the twenty-five hunts were directed primarily towards basking



HUNTING TRAILS
floe edge
hunting trails
scale
0 1 2 3 4 5
miles
NEERLONAKTO
ISLAND
SEOWA ISLAND
KAPUIVIK
KIKITARJUK
IKPIADJUK
IGLULIK
AVAJUK
HOOPER INLET
ARLAGNUK
BAFFIN ISLAND
MELVILLE
PEN.
FOXE
BASIN

MAP 6

seals and all five were within four miles of the floe edge. In spite of this emphasis a substantial portion of the animals taken during the spring hunts were basking seals, many of which were taken during the floe edge hunts. One hundred and sixteen seals were sampled for both 1968 and 1969 between May 21 and June 30. Of these, forty-two, or thirty-four per cent, were basking animals. The balance of seventy-four, or sixty-six per cent were shot at the floe edge.

The tendency to concentrate hunting at the floe edge is strengthened in early June when canoes are launched and travel along the landfast ice is by boat. The canoes are the "Freighter" and "Voyageur" model boats retailed by the Hudson's Bay Company. They are twenty and twenty-two feet long respectively with five foot beams. Hunting parties of two or three men travel from Ikpiadjuk to the floe edge by dog team or ski-doo. At least two men are neededto handle the canoe when loading it onto the sledge and when putting it in and taking it out of the water. Early in the year the canoes are kept on the sea ice and are picked up on the way out. Unlike the plywood punts, the canoes are not treated as communal property.

The hunting of the floe edge by canoe is essentially the same as from the landfast ice. The hunters travel out about 100 to 200 yards from the ice edge. Frequent stops are made at favorable hunting spots, and the hunters often walk into the fast ice when basking seals have been spotted from the canoe. However, although the hunters have increased their mobility along the floe and out from it, they have limited the areal extent to which they can go into the landfast ice after basking seals.

Spring Hunting Area.

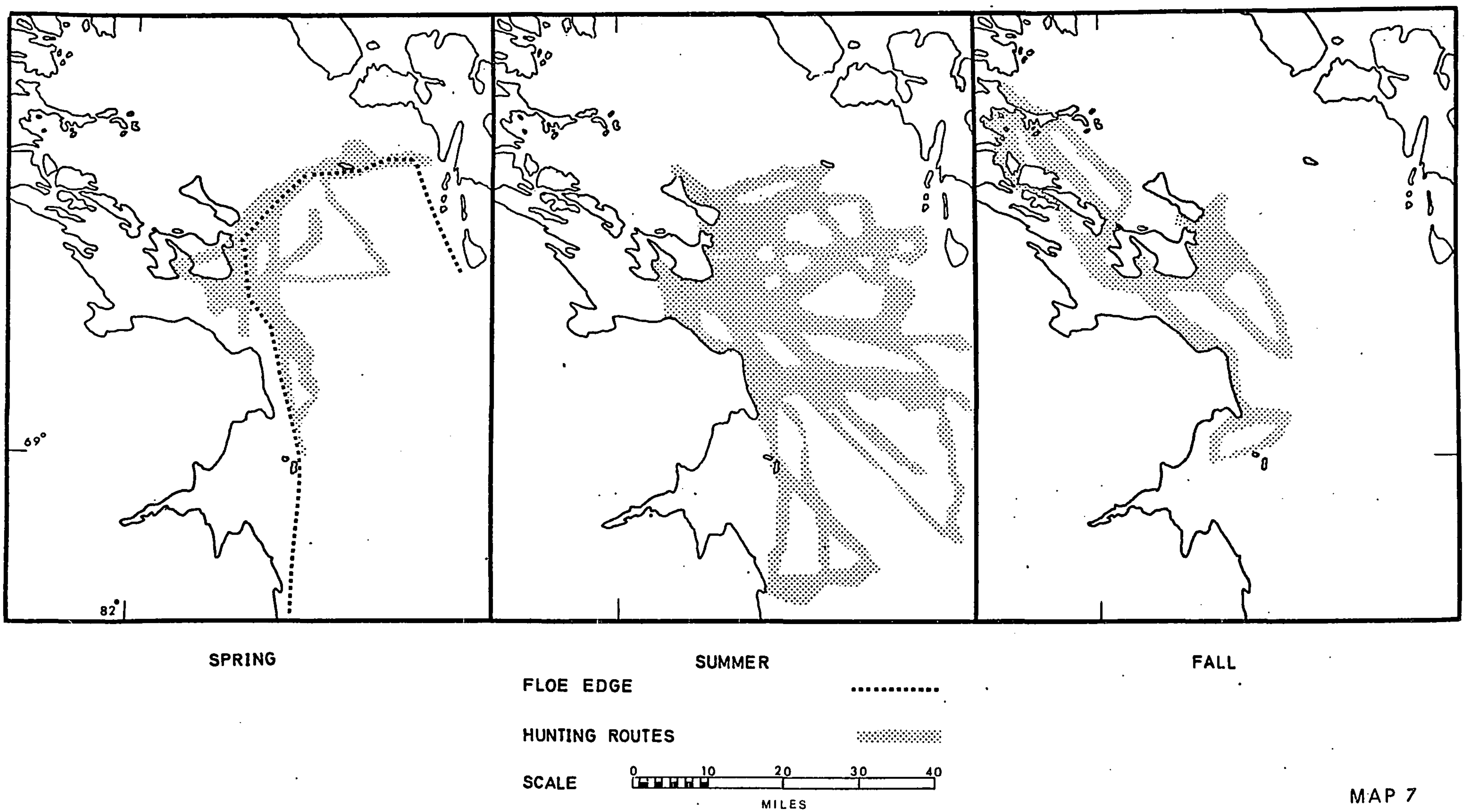
The hunting of basking and floe edge ringed seals is extremely concentrated spatially. The main hunting area is along the floe edge between Seowa and Arlagnuk. The concentration of hunting effort along the floe edge is clearly brought out in Map 7.

Travel is both by canoe and by dog team which accounts for the column-like distribution of hunting on either side of the ice edge. Basking seals are hunted in areas very close to the floe edge and may be hunted anywhere along the fast ice as the hunter travels the floe. Canoes are launched in early June. For the first few weeks they are used strictly as a mode of travel along the floe edge. By the end of June the landfast ice has begun to break up and the hunters start to utilize the area out from the ice edge. The hunts are conducted among the pans which have broken off from the solid ice but the Eskimos generally confine themselves to the water fairly close into the landfast ice. These hunts show up on the map as the routes extending out from the fast ice.

2.2.2 Summer Hunts.

In the months of July and August the focus of hunting shifts to include bearded seals and walrus as is shown in Table 7. Travel by dog team and ski-doo ceases as the fast ice starts to deteriorate and becomes impassable. Hunting during this phase is done almost exclusively by motorized canoe and whale boat. Two to four members is the usual number in a hunting party.

SEASONAL VARIATION IN HUNTING TERRITORY



MAP 7

During early break-up hunting is directed mainly towards bearded and ringed seals. When the floe edge starts to deteriorate bearded seals move close into the landfast ice. Bearded seals are first reported in the Seowa area in June. However, their occurrence is not frequent until break-up is fairly well advanced. The harpoon is an essential piece of equipment during these hunts as bearded seals sink very rapidly when killed.[1] The ringed seals remain associated with the floe edge but are also found among the free floating ice pans. Both ringed seals and bearded seals bask intensely during July and early August and are often lying in the sun on the drifting pans. Ringed seals prefer large floes whereas bearded seals are associated with the smaller pans. Of the two species, the greatest hunting emphasis is placed on bearded seals. They are priced highly for the large quantities of meat yeilded and for their valuable skins. A little walrus hunting is done during early break-up but is much less intense than the bearded seal hunts. By July a few walrus have moved in the area just to the south of Nuwuktee. However, the main herd remains well to the south around the Manning and Spicer Islands.

With advanced break-up the landfast ice deteriorates into a vast area of broken, disjointed pans drifting under the influence of currents and wind. In northern Foxe Basin the dominant wind is from the northwest (see climatic data Appendix 2). The current also flows to the southeast from Fury and Hecla Strait at about four knots (Crowe, 1969). These two forces combine to disperse the ice, However,

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1. The harpoon is not often used to recover the ringed seal due to the fact that the hole in the skin lowers its value at the Hudson's Bay Company.

it is a slow process and continues through July and August. The hunting of ringed seals and bearded seals among the drifting pans continues. Less and less attention is paid to ringed seals as this is the period when they start to sink almost as soon as killed and losses are high.[1] The hunters begin using .22 rifles to hunt ringed seals instead of the high powered .222's, .243's and .30-30's. This way there is less economic loss if the seal should sink and there is a chance that the .22 will not kill instantaneously thereby increasing the probability of recovery. Bearded seals continue to be very important and the hunting of walrus claims a significant portion of the activity.

Walrus have not become significantly more accessible in terms of distance and location than they were in spring or early break-up but have become more available in terms of weather. The walrus generally inhabit the area around the Spicer and Manning Islands. With advanced break-up they move among the pan ice swept down from the Iglulik area. They often move quite far to the north along these lines of drifting pans. To hunt them the Eskimos must cross twenty to thirty miles of open water. The trip back to land, with the canoe low in the water loaded with walrus, can take over six hours. Under these circumstances the Eskimos need calm climatic conditions. These are most likely to occur in July and August (see Figure 4).

The canoe is still the main means of transport. However, the whale boat is also used because of its increased carrying capacity. The canoes are limited to harvesting one or two walrus due to problems

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1. For causes and rates of sinking see Chapter VII, Section 7.1.

of transport whereas the whale boat can carry up to two or three. The hunting party working from a canoe usually consists of two or three men. The whale boat carries a larger crew of between three and five hunters. Most hunts are conducted with at least two parties working together.

Bearded seals and walrus are hunted by essentially the same methods. Both are hunted when in the water and when basking. The preferred hunting technique is to shoot the animals when they are resting on the ice. This way the animals are approached in the boat and killed instantly by a head shot. With this method the probability of loss due to sinking is greatly reduced. When in the water, both animals are first mortally wounded by several shots placed in their exposed mid-sections as they dive, trying to get away from the hunter (See Chapter VI, Section 6.3). When sufficiently weakened they are secured by a harpoon and dispatched by a head shot.

During the summer season the hunters cache large supplies of meat for the winter months which are low in productivity. The emphasis is placed on hunting bearded seals and walrus because of the large amounts of meat yielded.

The importance of bearded seals and walrus is dramatically brought out with a comparision of total weights and meat yielded per animal. [1] Between July 1 and August 31, 109 ringed seals sampled yielded, at an average weight of seventy pounds, 7,680 pounds total weight. The 108 bearded seals sampled, at an average weight of 474

1. The average weights are based on a sample of 146 ringed seals, forty-eight bearded seals and eight walrus. The factor of blood is not accounted for in the weights of the bearded seals and walrus.

pounds, yielded 51,152 pounds. The twenty-five walrus yielded a total of 48,547 pounds, with an average weight per animal of 1,942 pounds. [1] As the main objective of the summer hunts is to harvest meat for the winter caches, clearly bearded seals and walrus are most important. The twenty-five walrus yielded almost seven times the total weight return as from the 109 ringed seals. Given the very high meat yields derived from bearded seal and walrus the hunters try and maximize the return from the hunting effort by concentrating on these animals.

A further significant indicator of the hunting emphasis on bearded seals and walrus during the summer season is an analysis of the hunts themselves. Of twenty-three hunts observed during the period under discussion, thirteen are classed as bearded seal hunts, eight as walrus hunts and only two as ringed seal hunts. The classification of hunts into these different categories is based on hunting routes and by the expressed intention of the hunters at the beginning of the hunt.

Summer Hunting Area.

As is seen from a reference to Map 7 hunting during the summer months is much more dispersed than in the spring. In spring, hunting is carried out in a narrow zone running along the floe edge whereas the summer hunts utilize waters out from the landfast ice. The resources harvested are much more dispersed than the floe edge seals. Both bearded seals and walrus are found at considerable distance out from

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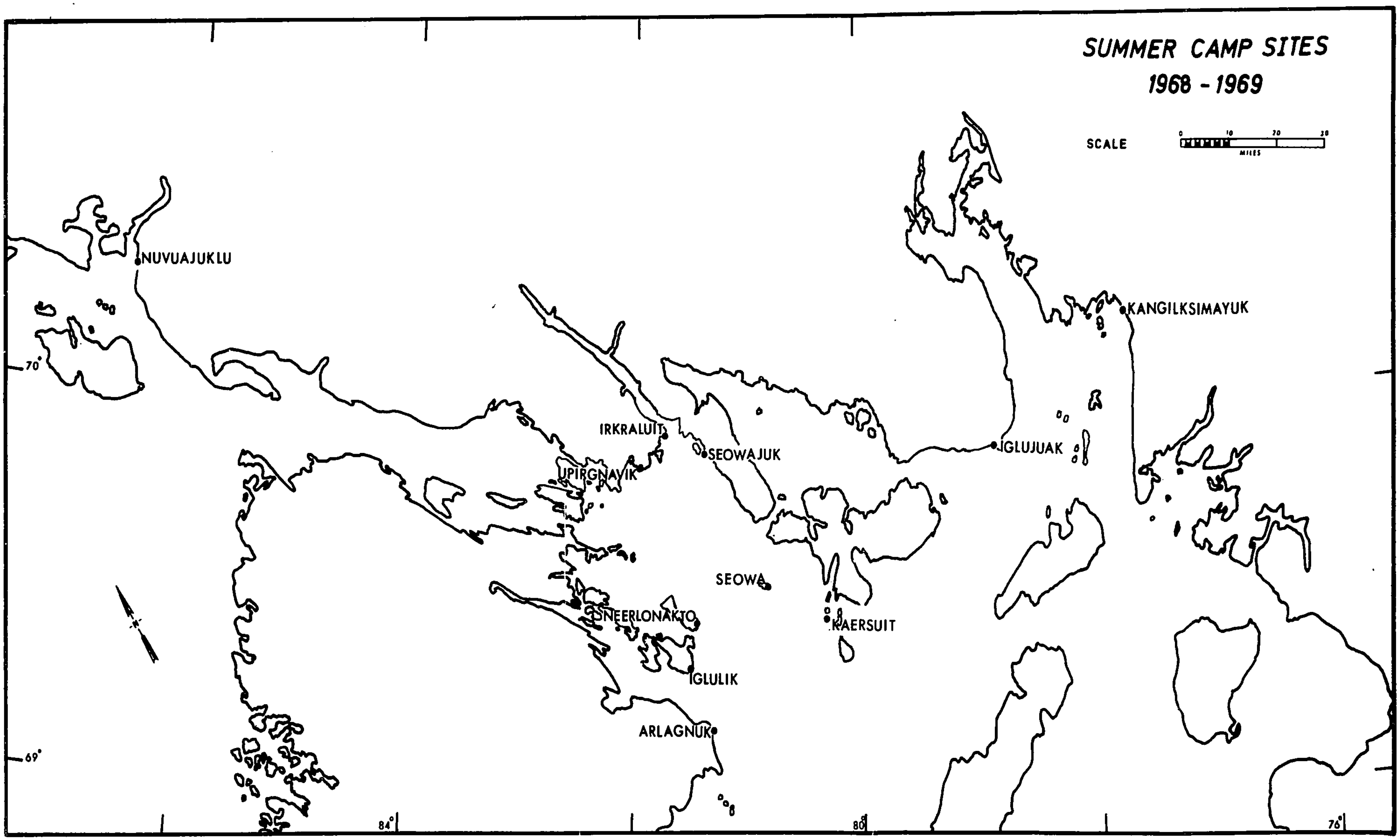
1. The average weights given in the above figures do not distinguish between adult and immature specimens thus the low weight value for the ringed seals and bearded seals. See Burns (1967) for average weights of adult animals.

the landfast ice (See Sections 2.1.2 and 2.1.3). Furthermore, the increased suitability of hunting weather and the rapid transport provided by the canoe allows hunting to be carried out over a greater area.

The expansion of hunting territory during the summer months is strengthened by the practice of many Eskimo hunting families dispersing to summer camps. The duration of the stay at the camps is anywhere from one week to two months. Most, however, are occupied for approximately one month. The composition and number of family units at any one location is constantly changing as there is a tremendous amount of movement from camp to camp, but most contain, as a nucleus, approximately one to three family units. There are many camp sites throughout northern Foxe Basin. However, the present day Eskimos from Ikpiadjuk, utilizing the marine environment, concentrate at the camps in the northwestern portion of the basin. Map 8 shows the location of the summer camp sites occupied during 1968 and 1969. It must be pointed out that these comprise only those camps directed primarily to the utilization of the marine environment.

The dispersion of hunters to the summer camps is counteracted to some extent by the fact that the main activity of camping is centered in the Iglulik area. These camps are erected at Iglulik and Arlagnuk. They are not primarily set up to get into new hunting areas but their function is related to ice conditions in Turton Bay and Hooper Inlet. With break-up, the ice in the bay and inlet deteriorates to such an extent that travel across it becomes impossible.


SUMMER CAMP SITES
1968 - 1969
SCALE
0
10
20
30
MILES
NUVUAJUKLU
KANGILKSIMAYUK
IRKRALUIT
SEOWAJUK
IGLUJUAK
UPIRGNAVIK
SEOWA
SNEERLONAKTO
KAERSUIT
IGLULIK
ARLAGNUK
70°
69°
84°
80°
76°

MAP 8

However, due to the nature of the coastal configuration and its relative protection from the prevailing winds, the ice does not go out for quite some time after becoming impassable. This means that if a hunter was in Ikpiadjuk he would be unable to hunt. To avoid this, many camp at Iglulik until the ice goes out. Once passage is unrestricted between the settlement and the hunting territories camp dissolves and there is a general movement back into the village. The camp at Arlagnuk has a dual function. It too avoids the unfavorable ice conditions around Ikpiadjuk but it is also set up to reduce gas expenditures on walrus hunts by moving closer to the area where walrus are to be found.

There are approximately thirty family units (about one third of the total families located at Ikpiadjuk) involved in the move to summer camps. Of these, seventeen were located at Iglulik in 1968. When this camp broke up six went to Arlagnuk, ten went back to Ikpiadjuk and one remained at Iglulik. During the summer of 1969 eleven tents were pitched at Iglulik and four at Arlagnuk. When the ice left the inlet all but the Arlagnuk group went back to the settlement. These figures show that approximately fifty per cent of the people who camp locate at Iglulik or Arlagnuk. The balance are dispersed at some eleven other sites in the area.

2.2.3 Fall Hunts.

Hunting of ringed seals, bearded seals and walrus continues through the open water season of September and into part of October. Bearded seals and walrus begin moving in close to the shore as there are fewer and fewer pans on which to rest (See Sections 2.1.2. and 2.1.3).

Bearded seals are spotted less frequently during open water season due to the fact that they are dispersed along the shore. The main herd of walrus probably remains in the area of the Manning Islands hauling out there. However, substantial numbers do move into the Iglulik area during this season and are significant in the hunting activity. The landed catch of individual hunters for the fall period are given in Table 7.

Hunting during open water is by boat and differs little from that of the summer season except that there is very little stalking of basking animals. The canoe, with a crew of two or three is the main means of transport. The harpoon is carried as bearded seals are still taken. The Eskimos travel along the coasts hunting from the moving boats. Often long lines of drifting pans running to the southeast form off the coast. The hunters move out along these lines looking for seals. When seals are sighted they are stalked by canoe or if they are close to land or a drifting pan the hunters will leave the canoe to shoot from the steadier platform provided by the land or ice (See Chapter VI, Section 6.5). Ringed seals become more important during this phase of the hunting cycle than they were in the late summer. By the end of August they are starting to float when shot and a higher proportion of seals are recovered.

Fall Hunting Area.

During open water season there is a distinct shift in hunting area which is shown in Map 7. The change is from the offshore hunts of summer to hunting the coastal waters. This follows closely the behavioural responses of the marine mammals to their changing environment. The hunting of the offshore waters is also restricted by the increased unsettledness of the weather (See Figure 4). Hunting trips for ringed reals and bearded seals are usually conducted along the coasts. These areas are fairly well protected from winds and hunting occurs in the lee of the islands. When pack ice builds up in the area during open water season the hunters may switch the hunting effort to utilize the ice floating off Iglulik Island. The main concentrations of walrus are in Foster Bay and most are taken in this area. The remainder are usually taken between Arlagnuk and Neerlonakto. Walrus also move up into the waters around Kaersuit and Seowa in the fall season and a few are shot in this area.

2.2.4 Freeze-up.

The early part of freeze-up brings little change to the hunting pattern of open water season. On calm days, bays and inlets are covered with a layer of unconsolidated slush ice. However, canoes can still pass through the slush and hunting continues in much the same manner as open water. The slush ice is broken, scattered and reformed several times with alternating conditions of storm and calm. Following an extended period of calm, cold weather, the slush ice solidifies and passage through the ice becomes impossible.

With the solidification of the slush ice into young, landfast ice the seasonal hunting cycle changes. Both the Eskimos and the marine mammals respond to change in ice conditions. The immature ringed seals and the bearded seals move out with the expanding ice sheet. Walrus remain foraging under the ice as long as they can smash breathing holes through the young ice. These animals are hunted by canoe as long as passage through the slush ice is possible. Once solid ice has formed, hunting begins at the floe edge using a small recovery boat in the same manner as the spring hunts. Records of individual hunters listed in Table 7 show the landed catches for the last week in October and for the month of November. It was reported that most of the animals taken during this period were caught at the floe edge which was expanding out from Iglulik Island across Hooper Inlet. Walrus are taken either at the floe edge or as they smash through the ice to breathe.

Hunting Area During Freeze-up.

The hunting of marine mammals during freeze-up is spatially very restricted. Basically hunting is limited to the floe edge which, during the early part of the season, covers a very small part of the area. During freeze-up in 1969 both Turton Bay and Hooper Inlet froze at the same time due to an extended period of calm, cold weather. The floe edge was established by October 26 at a position some four miles to the east of Ikpiadjuk running completely across Hooper Inlet to Melville Peninsula. However, the exact formation and expansion of the landfast ice varies from year to year. Usually the ice expands out from Turton Bay and Iglulik Island to gradually close off Hooper Inlet and establish by mid-November, a floe edge running north-south between Iglulik Island and Melville Peninsula. At the same time, the water to the west and to the north of Iglulik Island, between the mainland and Neerlonakto, freezes. Off the east coast of the island a narrow band of ice runs parallel to the shore between Neerlonakto and Iglulik. All other bays and protected areas of Foxe Basin are frozen by this time and the ice begins to expand seaward.

The spatial distribution of the parties hunting marine mammals is restricted by the slow growth of the ice. On October 30, 1969 the author observed twelve independent parties hunting the new floe edge between Iglulik Island and the main land. This very high density of hunters occurred as there was no other available area to hunt. Hunting territory expands as the ice grows out from the shore to establish the winter floe edge of northern Foxe Basin which reaches its maximum distance from shore toward the end of December or early January.

2.2.5 Winter Hunting.

Through winter, hunting continues along the floe edge mainly concentrated between Seowa and Arlagnuk. The main animal hunted is the ringed seal due to its availability until break-up. Bearded seals and walrus are also taken during the winter months. If the wind shifts to the east or southeast and continues from that direction for a couple of days the Foxe Basin pack closes into the floe edge along the eastern coast of Melville Peninsula. Under these special conditions walrus and bearded seals are taken. The Eskimos travel to the floe edge and hunt out on the moving pack looking for walrus in the leads of open water. Bearded seals are taken under similar conditions but the Eskimos do not go on to the pack ice but generally hunt them at the ice edge.

The months of December, January, February and March are months of low productivity. The weather is often unsuitable for hunting and there is little available light. Furthermore, the hunter has a tendency to relax the hunting effort and utilize his caches. This is emphasized by the fact that December through March is the period during which the fewest number of sealskins are traded through the Hudson's Bay Company.

Hunting records for game taken during the winter period are listed in Table 7. From the table it can be seen that for a four month period productivity is low. The hunters report that during the winter much time is spent in Ikpiadjuk living off caches. Fox trapping and caribou hunts account for the balance of time spent during these months. By April both climatic and light conditions are considerably improved and the productive hunts of spring and summer resume.

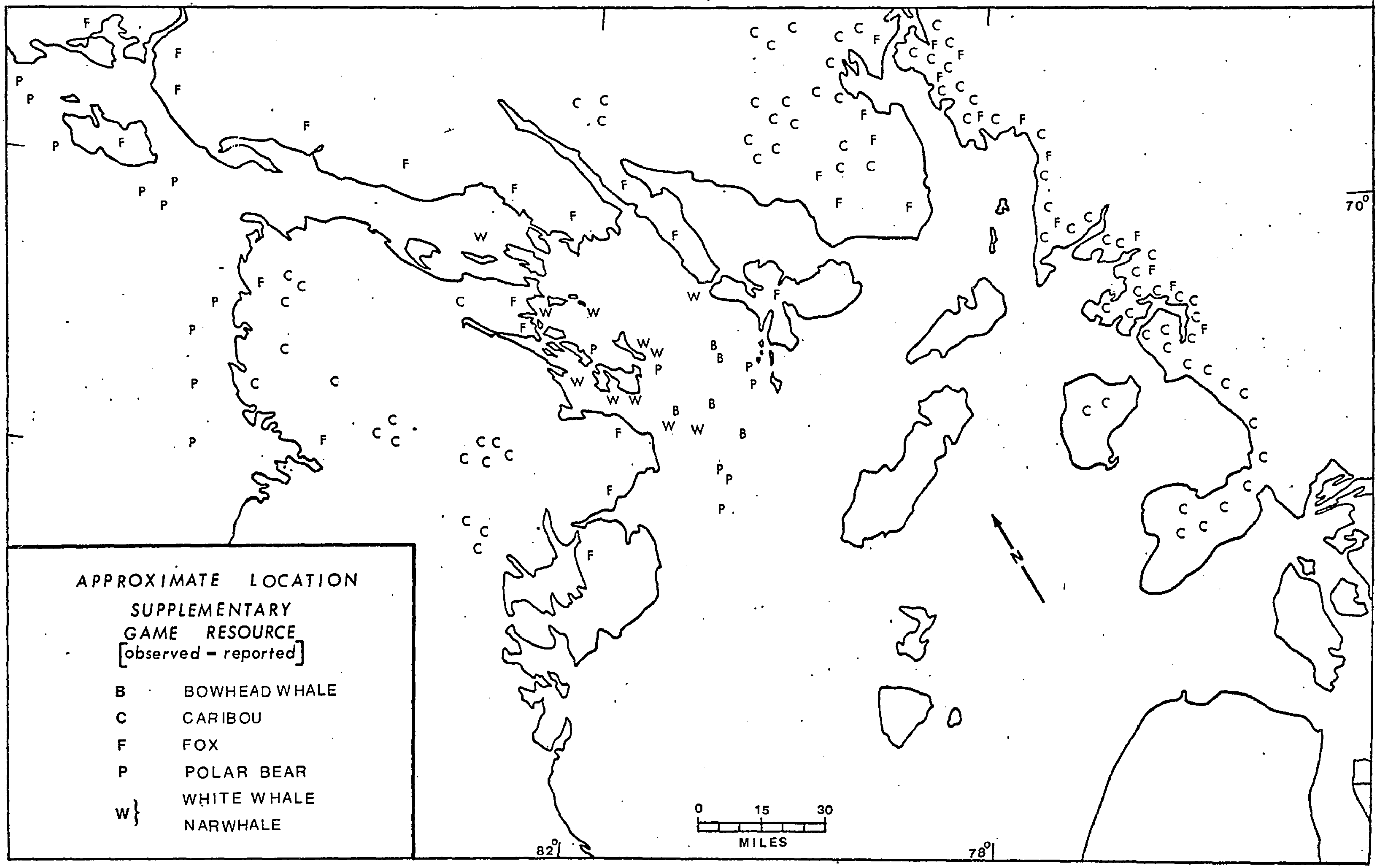
2.3 Other Animals Hunted During The Seasonal Cycle.

Other animals are exploited by the Igluligmiut and play a significant role in the seasonal cycle. The only months that are limited almost exclusively to the marine environment are those of May, June and July. Even during these months some effort is directed toward other sectors of the hunting economy. There are, however, preferred patterns of hunting and during the phases of the cycle it is possible to observe that the major hunting activity is directed toward a specific resource. The analysis of the seasonal hunting cycles represents the normal or major activity. Within the hunting cycle, polar bear, caribou, fox and whale are utilized by the Igluligmiut. The observed and reported distribution of these animals is given on Map 9.

2.3.1 Polar Bear.

Polar bears are not usually found in northwestern Foxe Basin. They are located to the west, in the area of Committee Bay and along the northwest coast of Baffin Island and to the southeast in the area of Prince Charles Island (Anders, 1965). Formerly the bears were hunted mainly by the Eskimos from Nuvuajuklu in the Agu Bay region where most of the bears are taken. Now with most of the hunters centered in Ikpiadjuk, extended trips are made across Melville Peninsula to Committee Bay. The main hunting area is from Gary Bay north to Agu Bay. Some hunts are extended beyond this area south to Erlandson Bay and north past Bernier Bay. The hunts range from two weeks to over a month in duration and usually take place either in early spring, sometime in April, or in the fall around October. The spring hunts are conducted along the floe between Gary Bay and Kikitarluk. The hunts of October are mainly in the area around Kimakto where bears are reported to concentrate in the fall.

A few bears are taken in northern Foxe Basin both at the floe edge and on drifting pans during the summer. These bears are thought to have wandered into the area either from Committee Bay via Fury and Hecla Strait or up from Prince Charles Island. During the summer months the few bears that are seen in the Iglulik area are probably carried on pans drifting in from Committee Bay. No bear hunts per se take place in the area immediately around Iglulik.


APPROXIMATE LOCATION
SUPPLEMENTARY
GAME RESOURCE
[observed - reported]
B BOWHEAD WHALE
C CARIBOU
F FOX
P POLAR BEAR
W } WHITE WHALE
NARWHALE
0 15 30
MILES
70°
82°
78°

MAP 9

Any bear shot in this region has usually been spotted during a seal or walrus hunt. A total annual quota of twenty-three bears is set for the region and is enforced through a tagging procedure. This certainly limits the significance of bear hunting in relation to the total hunting cycle. However, the skins are extremely valuable to the hunter as a source of cash. The 1968-1969 Annual R.C.M.P. Game Report gives an average price of $177.22 paid for bearskins traded through the Co-operative which is the agency handling most of the purchases. Several sales were made to local white residents of Ikpiadjuk in which case the skins sold for approximately $200.00.

2.3.2 Caribou.

Caribou are much more important to the Eskimos in terms of food, material products and availability than polar bear but are much less significant as a source of monetary return. There is no annual quota on caribou for the Eskimos and large numbers are taken each year. The skins of the animal are still an important source of clothing material as the superior insulating qualities of caribou fur makes it desirable as a winter garment. The skins are also used as a cover for sledges to insulate the hunter from cold when travelling and as a sleeping mattress when camping or on extended trips. The meat of the animal is highly valued and contributes significantly to the diet of the Eskimos. There is little cash return from caribou hunting and the hunters are forced to finance their trips by some other means.

Caribou hunting takes place virtually year round. However, caribou are most often hunted in fall, winter and spring. Of these, the fall period between mid-August and mid-October is the most productive often accounting for well over fifty per cent of the total catch for the year. During this season the caribou on Baffin Island begin to mass for their northward migration. Furthermore, the skins are in prime condition for clothing material.

Caribou are hunted in several different areas around Ikpiadjuk. Spring hunts are concentrated both on Melville Peninsula and on Baffin Island. On Melville Peninsula they take place to the south of Ikpiadjuk and just to the west of Seneria. The Baffin Island hunts are concentrated on the west coast around Kangilksimayuk and northern Steensby Inlet. The fall hunts, which begin in late August, are also conducted along the west coast. They are spread over a much greater area than those of spring and the area utilized stretches between northern Steensby Inlet and Ikpiutik. In late fall, when ice conditions limit the accessibility of the west coast of Baffin Island, caribou hunting switches to Melville Peninsula. These hunts are located more to the north than those of spring taking place immediately to the west of Ikpiadjuk from the middle to the western side of the peninsula. Few, if any, caribou are found on the east coast. In winter, with the establishment of solid, landfast ice between Iglulik Island and Baffin Island, caribou hunting changes from Melville Peninsula to the more productive areas on Baffin Island. The winter hunts are mainly around Neergaard Lake and northern Steensby Inlet south to Kangilksimayuk. In all seasons the hunters must travel considerable distances for caribou.

2.3.3 Fox.

Fox trapping starts in November and continues through to April.

The peak period of trading comes in December. Unlike caribou hunting, fox trapping can play a fairly important part in the monetary return from hunting although contributing nothing in the way of food. However, the cyclical availability of fox to the hunter makes it a very unstable resource.(see Table 6.) [1] A stable economy cannot be built on wide fluctuations. Seal prices also show some very noticeable declines but it must be remembered that seals are also a source of food and are hunted regardless of skin values. In years of low sealskin prices, hunting continues though fewer skins are traded through the Hudson's Bay.

Fox trapping cannot emerge as a constantly reliable source of income. Furthermore, the tradition of the Igluligmiut has been and continues to be, directed primarily toward the marine environment and secondly toward caribou. Fox trapping, on a commercial basis was introduced by white traders. Given its cyclical instability and its position outside the traditional hunting activity, fox trapping remains subordinate in the hunting pattern (Damas, 1963).

The position of fox trapping within the hunting cycle has been weakened by the recent movement of camp people into the settlement of Ikpiadjuk. Formerly each camp would utilize the fox in the surrounding area thus dispersing the trapping activity throughout the total hunting territory. With the movement into the village the area around Ikpiadjuk is being over-trapped resulting in a very low return per hunter. Those who set their traps at a considerable distance from the village lose more and more foxes to wolves and wolverines because

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1. For a discussion of the magnitude and causes of the cycles in fox numbers see Macpherson (1969).

of the difficulties of regularly patrolling the trap lines. Furthermore, with most of the winter caches located near Ikpiadjuk where the summer hunting is done, hunters with distant lines have a hard time feeding their dogs.

2.3.4 Bowhead Whale.

Bowhead whales are not common in Foxe Basin having been nearly hunted to extinction during the last century by the whalers. There is evidence however, which indicates that these mammals may be once again frequenting northern Foxe Basin in increasing numbers. During the field seasons there were three definite recorded sightings by field party personnel as well as two other reported sightings by hunters.

Bowhead whales are not important in the hunting cycle although a few have been taken. The last reported killing was a small animal which was driven onto the shore of Kaersuit in the early 1960's. During 1968 field personnel observed the hunting of one of these whales which was unsuccessful. The opinion was formed that the hunters are not prepared technologically to successfully exploit this resource and should be discouraged from doing so.

2.3.5 Narwhale and White Whale.

More significant in the hunting economy are narwhales and white whales. Several animals of both species are taken each year. The most important of the two is the white whale. The animals migrate through the area on a yearly basis and the largest numbers are taken in late July and August. Iglulik Island seems to be located on the migration route as many of the whales are taken all around the island

and a few in Turton Bay.

During 1968 when ice conditions were unfavorable (fast ice existing behind Iglulik Island well into August) only a few animals were landed; (approximately ten). In 1969 about thirty animals both white whale and narwhale were landed most being taken in Hooper Inlet, a few by Jens Munk Island and some in Turton Bay.

2.4 Summation.

The use of a hunting territory may be analyzed in terms of both location and availability of resources. Within this section seasonal variations in the use of hunting areas are investigated. In northern Foxe Basin the physical, biological and cultural subsystems greatly influence the hunting pattern of the Igluligmiut in terms of the distribution of hunting effort.

The physical environment is particularly favorable for habitation by ringed seals, bearded seals and walrus. Complex coasts, giving large areas of suitable landfast ice for pupping and breeding supports a large ringed seal population. Extensive areas of shallow water which remain ice free throughout the winter are suitable for bearded seals and walrus.

Although basically sedentary, there are considerable seasonal variations in behavioural and distributional patterns for each of the species discussed. These variations result from the animals' response to changing conditions in the physical subsystem. Of particular importance in this regard is the role of ice type and its influence on the animal resources of the area.

To successfully exploit the marine environment the Eskimo hunters have developed a seasonal hunting cycle, modified by cultural factors within their society, which responds to changes in animal behaviour and distribution. It is this response of the hunter to differing conditions in the physical and biological subsystems which results in the seasonal variations in hunting area outlined in the spring, summer, fall, freeze-up and winter hunts.

Other animals besides ringed seals, bearded seals and walrus are important in the hunting pattern of the Igluligmiut. The hunting of polar bears involves an extended trip to Committee Bay in fall or spring or may result from chance sightings in northern Foxe Basin. Caribou are hunted on Melville Peninsula and on Baffin Island. Most are taken along the west coast of Baffin Island during the fall hunts. Fox trapping, formerly widely dispersed, is becoming concentrated in the northwestern portion of the basin. Fox are an important contributor to the monetary returns from hunting. However, as a basically unstable resource, they cannot become too important in the total hunting pattern. Whales are also hunted; the most important species being white whale and narwhale. They are generally taken around Iglulik Island in the late summer.

CHAPTER III

THE AVAILABILITY OF HUNTING AREA.

The discussion of the distribution of the biological resource and the seasonal variations in hunting territory has been in reference to a particular point; that of Iglulik Island. A hunting territory may also be examined in terms of its availability to the hunters for exploitation through time. The physical and biological subsystems influence the spatial distribution of the resource but the ability of the hunters to utilize that resource in any given phase of the seasonal cycle is determined by other factors. The term availability applying to the use of hunting areas must be modified in the context of the physical subsystem and the hunting practices of the Eskimos. Because a resource is located spatially within the hunting territory of the Igluligmiut it does not necessarily mean that it is always available to the hunters. Availability is a function of the probability of success in any given phase of the hunting cycle. Before each hunt, the hunters weigh relevant factors operational in the eco-system against hunting methods used in that phase of the seasonal cycle thereby allowing them to arrive at an estimated probability of success. If the probability of success drops below a certain threshold the decision not to hunt will be made. This decision not to hunt effectively restricts the use of the hunting territory in terms of the number of times an area is productively availabile to the hunters.

The decision to hunt or not is governed by elements of the physical subsytems.[1] More specifically, climatic parameters

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1. See footnote page 9.

determine the degree of success a hunter may have. Certain days are considered as non-hunting days. On these days, due to unfavorable conditions, the hunters know that it is very unlikely they will be successful. Of twenty full time hunters who were asked the determining factor allowing them to decide to hunt or not, all stated "weather" as the main consideration. Observations of hunting from Ikpiadjuk revealed that the factors of wind and visibility were the two most important climatic parameters influencing hunting. These variables were also isolated by McLaren (1961b) in his study of weather suitable for hunting seals from boats. The significance of wind is determined by its velocity. Visibility is discussed here in terms of available light and conditions of fog, both of which influence hunter success. McLaren unfortunately limits his discussion of visibility to light as measured by periods of solar light available between dusk and dawn. He does not include the influence of fog, a factor which the present author found to be important.

3. 1 Wind Velocity.

Wind velocity is a major factor in limiting hunting activity. Very rarely were hunters observed preparing to leave on a trip with winds registering over fifteen miles per hour. On occasions when hunters did go out with winds over this speed hunting was always restricted to the lee side of either ice pans or of an island which effectively reduced wind velocity. Figure 3 represents the number of hunting starts plotted against the recorded wind velocity at the time of departure. The figure shows that if wind velocities were

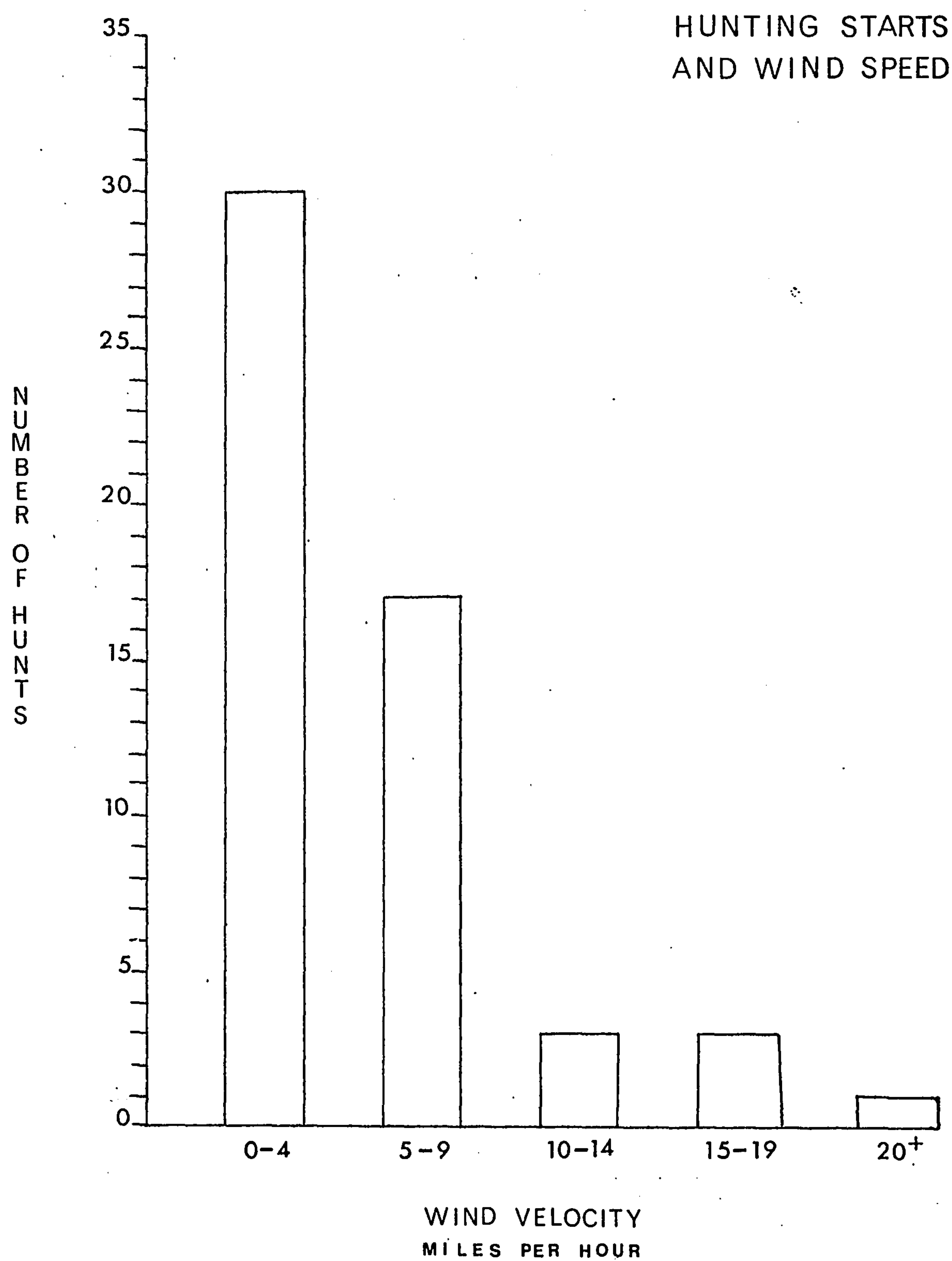
HUNTING STARTS
AND WIND SPEED
35
30
25
20
15
10
5
0
NUMBER OF HUNTS
0-4
5-9
10-14
15-19
20+
WIND VELOCITY
MILES PER HOUR

FIG. 3

over ten miles per hour the hunters generally classed it as a non-hunting day. Inspite of this, hunters were often known to be out in high winds. In these cases the hunters usually had left Ikpiadjuk before the velocity had risen to this value. The hunters, once committed to a hunt, are very reluctant to return home without game and may choose to wait out the high winds at a temporary camp site in the hopes that conditions improve the following day.

3.1.1 Seasonal Tolerances.

Wind velocity is an important factor in the consideration of probable success in all phases of the seasonal cycle. Each of the phases, however, have different threshold values for wind speed beyond which hunting becomes unprofitable. The different seasonal thresholds are shown in Table 8. The hunting of floe edge and basking seals has a fairly high wind tolerance. Hunting at the floe edge will continue in winds up to ten miles per hour. The wind blowing off the landfast ice does not build up chop until a fair distance out from the ice edge and a narrow band of relatively calm water extends out from landfast ice within which hunting can continue. With winds between eleven and fifteen miles an hour the band narrows considerably and hunting ceases as the waves build up and shooting, spotting and retrieving becomes very difficult.

Table 8

Seasonal Variations in Wind Tolerance.

Hunt Type	Maximum Wind Tolerance (m.p.h.)
1. Floe edge	10 - 15
2. Basking	10 - 15
3. Pan ice	10
4. Open water	6 - 8
5. Lee	20
6. Freeze-up	15 - 20

The influence of wind on basking seals is less clear. Seals come out to bask on sunny days. On windy days few seals are seen on the ice. How wind affects basking is not really understood. Perhaps with winds of high velocity the snow starts to drift, blowing against the basking seal. This may irritate the seal causing it to slip down its hole into the water. The Eskimos report that rain affects the seals this way. The velocity of wind needed to cause drifting depends, of course, on the composition of the snow. Snow was generally observed to start drifting with winds registering from ten to fifteen miles per hour. With winds of twenty miles per hour there was substantial movement.

During break-up, much hunting is done among loose, drifting pan ice from an open boat. Although winds of fairly low velocity may cause open water to become too rough for hunting, pan ice serves to break the motion of choppy water giving a level of wind tolerance of approximately ten miles an hour. Winds above this speed cause conditions, even among the pans, to become too rough.

Hunting in open water season has the lowest wind tolerance of all the hunting phases. The canoe becomes a very unstable shooting platform even when the water surface is slightly ruffled. McLaren (1961b) gives a wind speed of five miles an hour as the upper limit of weather suitable for successful hunting from open boats. Observations in the Iglulik area indicate that hunting as practiced by the Igluligmiut tolerates a slightly higher velocity. Hunting in open water continued in winds registering six and even seven miles per hour. Such velocities seemed very close to the maximum threshold and hunting generally ceased when winds rose to eight miles per hour.

Fall hunting is concentrated more in the inshore waters in bays, inlets and around islands. Hunting also takes place along the lines of heavy, tightly packed pans drifting in the waters close to shore. Off Neerlonakto, Kikitarjuk and Iglulik many of these pans are grounded in the shallow waters and form a solid extension of the land. In these circumstances the wind tolerance is fairly high. Hunting takes place in the lee of both the ice pans and land thereby effectively reducing the influence of high wind velocities and hunting can continue in winds up to a maximum of twenty miles per hour.

A fairly high wind speed can be tolerated for hunting during freeze-up as well. During freeze-up much of the water surface is covered with a thick slush ice which allows the passage of a canoe but effectively reduced the influence of wind on the water surface.

Winds of a substantial force are needed to cause turbulence of the slush. Under these circumstances hunting can continue with winds up to fifteen miles per hour. With winds between fifteen and twenty miles per hour hunting ceases as the slush ice begins to be broken up and dispersed creating essentially open water conditions.

3.2 Visibility.

Visibility is also an important consideration in the probability of hunting success. On days of low visibility few seals will be taken due to restricted spotting ranges. Visibility is influenced by two factors; fog and available light. Fog limits hunting mainly during break-up in the summer months. Available light refers to daylight hours suitable for hunting and is an important consideration with the short days of fall and winter when hunting is greatly restricted by lack of light.

3.2.1 Fog. [1]

Conditions of fog are certainly significant in the decision whether to hunt or not. Of thirteen days that fog prevailed at the time the hunters were in the process of decision, only once did they choose to go out.

Hunting is restricted by poor visibility even though other climatic conditions are almost perfect. During twelve of the thirteen days that fog restricted hunting, the average wind speed was in the zero to four miles per hour range which is ideal for hunting.

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1. A condition of fog exists when the visibility in the horizontal direction is less than 3,300 feet (1000 meters). If the visibility is between 3,300 feet and 6,600 feet the atmospheric condition is referred to as light fog. (Haurwitz and Austin, 1944).

Fog, however, is an unstable condition and often will dissipate either due to the motion of the air or burning off by the sun. If the fog clears early in the day or before the hunters have committed themselves to another course of action, a further decision may be made in light of the new circumstances. Of the twelve days that the decision was made not to hunt six eventually cleared. On all six days hunting parties re-evaluated the situation and started to hunt. On the remaining days the fog persisted and there was no hunting.

As on windy days, it is not unusual to find Eskimos out hunting during a fog. This generally means that the departure was made before fog set in. As fog is very often intermittent, brief and local in its distribution, the Eskimos may continue hunting in hopes that it will clear or that they will move out of it. If the fog persists the hunter will either return to the village or wait it out in a temporary camp. Only once out of the many instances of fog recorded during the hunts was the party forced to return to camp. The fog on this occasion was very heavy and lasted all day.

3.2.2 Light.

Unlike fog, light conditions do not restrict hunting during May, June, July and part of August, for there is sufficient daylight to permit hunting twenty-four hours a day even though the sun does not remain completely above the horizon throughout this period. By mid-August hunting is effectively limited by the factor of low available light. The time available to the Eskimos for hunting becomes less and less as the sun sinks lower in the horizon. When the author arrived in the field in May hunting was being conducted on a twenty-four hour basis. By the end of October, at the time field studies were discontinued, light conditions had altered such that hunting was restricted to the hours between 0800 and 1630 hours. Hunting in terms of light, is restricted most between the end of November and mid-January when the sun remains completely below the horizon.

Light conditions are discussed in terms of the number of light hours available which are suitable for successful hunting.[1] Data are derived from actual hunting conditions and do not consider periods between dusk and dawn as hunting often continues beyond these two points.[2] Table 9 lists the dates with the corresponding daylight hours and the per cent of time out of twenty-four hours an area is available for exploitation as determined by suitable light conditions. As the year advances toward fall and winter less and less time is available for hunting.

Table 9

Variation in Daylight Hours Suitable for Hunting.

Date	Hours of Daylight	% Time Area Available
May 1 - Aug. 15	24	100
Aug. 16 - Sept. 20	16	66
Sept. 21 - Oct. 10	12	50
Oct. 11 - Oct. 31	8	33

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1. See McLaren (1961b) for a more general breakdown of light conditions and their influence on hunting.

2. See Chapter V, Section 5.1.1 part C for actual light values and their influence on hunting activities.

Analysis beyond the dates listed in Table 9 cannot be made in the present study due to the lack of detailed data in regard to daylight hours and the influence of darkness on hunting during the winter season. It can be seen however, that light has a significant influence on hunting. The exact interrelationship between light, hunting and the utilization of space is developed more fully in the following section.

3.3 Computation of Available Space.

The availability of space for exploitation is determined basically by variables in the physical subsystem. More specifically the climatic parameters of wind velocity and visibility influence how often a hunter can successfully utilize the biological resources of an area. However, since adopting Christianity the Igluligmiut no longer hunt on Sunday and this practice must therefore be included in the analysis of the utilization of space.

The number of times the hunting territory of the Igluligmiut is available for exploitation can easily be computed. The base line is found by totalling the number of calendar days in the period being discussed. From this, the number of Sundays within the period are subtracted giving the number of potential days under consideration. From this total, the number of days unsuited for hunting as determined by conditions of wind and fog are subtracted thus giving the actual number of days on which hunting can take place. This is then multiplied by the number of daylight hours within which hunting can be conducted. The final answer is the number of hours the hunting territory is available for utilization in any given period. The accuracy of such an analysis is dependent upon detailed information regarding wind speeds, fog conditions and available light.

Such an analysis of available hunting hours is given in Appendix 5. The appendix uses data derived from the Department of Transport weather station at Hall Beach and from climatic data and notes collected during the 1968 and 1969 field seasons.[1.] The breakdown is by semi-monthly periods based on a thirty day month rather than by the seasons outlined in Chapter II, Section 2.2. The smaller units of half months and the even time periods give a more accurate analysis than the seasonal groupings. The table is limited to the period between May 1 and October 31, which was covered by the field seasons.

Figure 4 is a graph plot of the values of Appendix 5. From the graph and appendix it can be seen how wind, fog and light hours combine to determine the total number of hours an area is available for hunting.

During May conditions are fairly constant although in the last two weeks there is an increase in the number of days suitable for hunting as determined by wind velocities. There is a sudden decrease in available hunting hours in June which is explained by the fact that there are three Sundays in the first part of the month whereas all other subdivisions have only two and by the sharp increase in the occurrence

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1. Based on the D.O.T. grouping of wind velocities (1. calm 2. one to twelve 3. thirteen to thirty-eight and thirty-nine miles and over) the following analysis considers all days with winds over twelve miles per hour as unsuitable for hunting.

AVAILABLE HUNTING HOURS

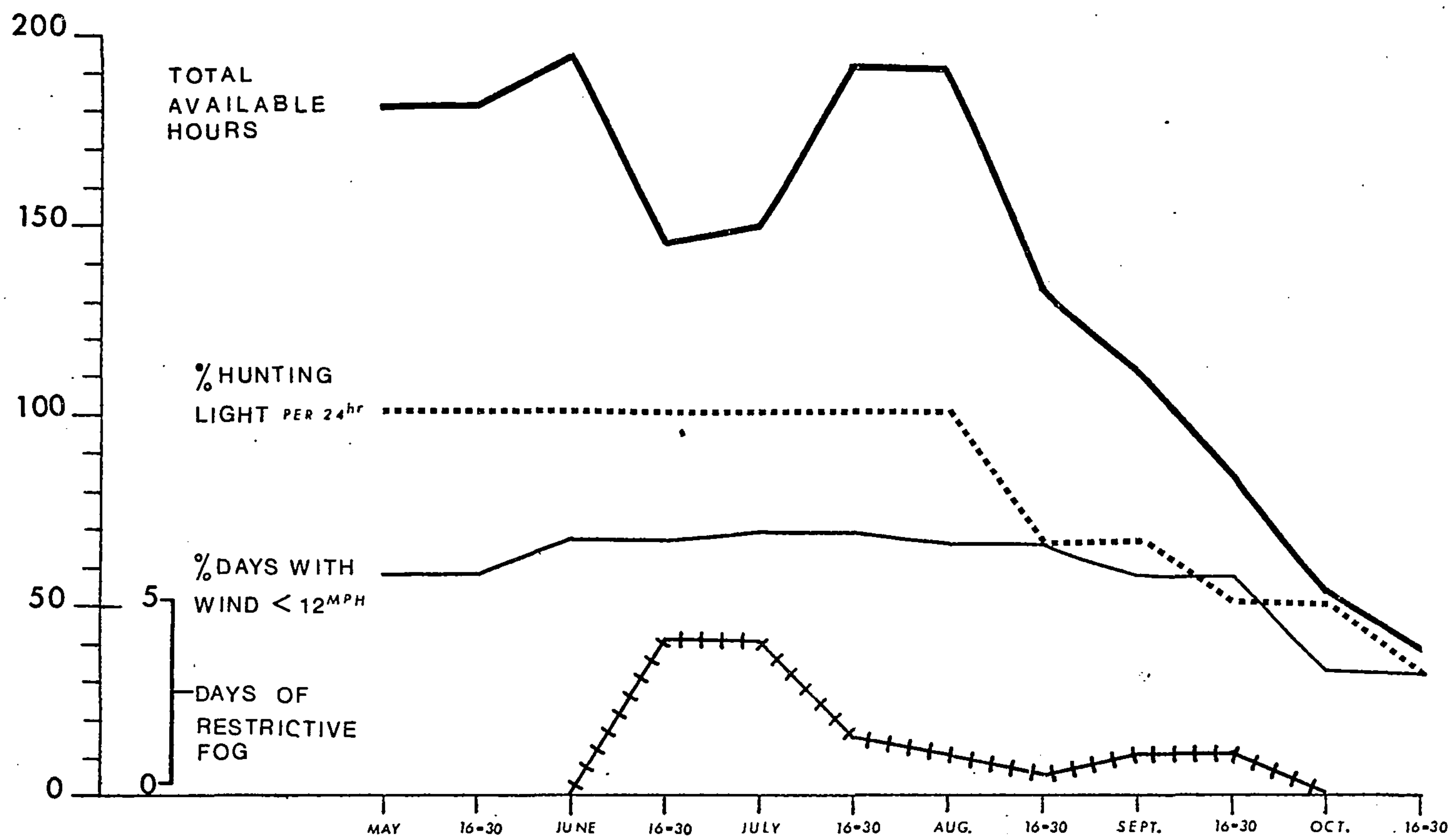


FIG. 4

of days of fog. Through the first half of July conditions improve markedly. Hunting is most favorable throughout the last two weeks of July and into the first part of August. Toward mid-August conditions begin to worsen and there is a sharp decrease in suitable hunting conditions determined largely by low light values and the high occurrence of windy days. This deterioration is shown on the graph by the steady decline in the total available hours from August through to November.

The direct significance of the variations of available hunting hours on the seasonal hunting pattern is quite difficult to assess and requires much more data than has been gathered by the author. On the surface it seems that the general pattern of the Igluligmiut is to take advantage of good hunting conditions and utilize the marine environment as much as possible when conditions are favorable. However, when trying to develop this pattern by an analysis of the hunts themselves the relationship is not so clear. In other words there is a discrepancy between the actual time spent hunting and the number of hours a territory is available for exploitation. A detailed breakdown of the hunters' actions both on the hunt and when in the camp or village is needed to accurately assess hunting intensity. There are many times when hunting conditions are favorable and yet not every hunter in the village is out hunting, although the majority will be. Obviously then, there are often other factors which keep the hunters from the hunt besides weather (see footnote on page 9). Further data directed toward a time and motion study of an individual over a long period may reveal some of these factors.

3.4 Summation.

The availability of a hunting territory for exploitation by the Eskimo hunters is dependent upon favorable climatic conditions. Analysis of hunting systems at Ikpiadjuk revealed that wind and visibility were the two most important variables influencing hunter success.

Generally winds over ten miles an hour were considered to be unfavorable for hunting. However, the different seasons within the hunting cycle had varying wind tolerances, influenced mainly by the hunting technology and changes in the physical subsystems.

Visibility restricting the use of a hunting area is influenced by conditions of fog and daylight hours. Fog limited hunting during the summer months whereas periods of low available light were important in fall and winter.

The computation of the total amount of time an area is available for exploitation is easily done with accurate data relating to wind velocities, visibility and cultural activities which restrict the hunting activity.

PART II

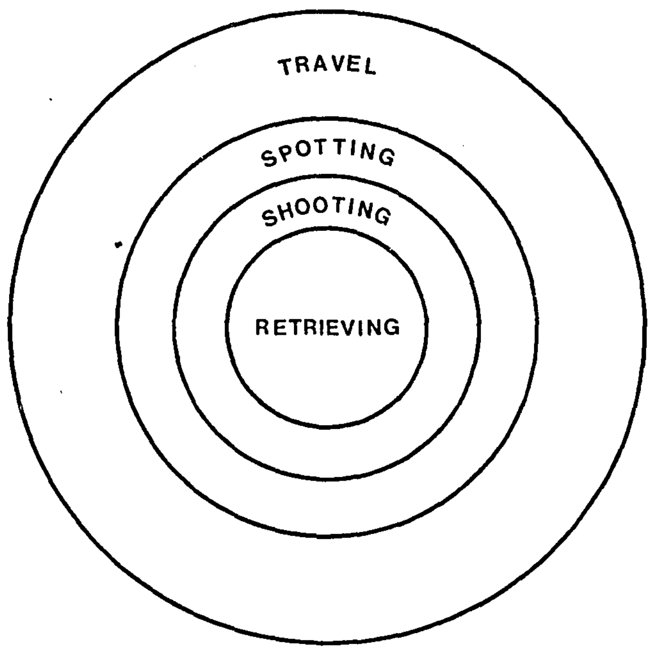
OPERATIONAL RANGES.

Introduction.

The actions of the hunter within the eco-system in the pursuit of game are regulated by the processes of hunting. In the successful hunt the hunter moves through several different processes or operational ranges which, when combined, form the hunt. The operational ranges are presented diagrammatically in Figure 5. The first of the operational ranges is the travel range. Travel range refers to the time and distance covered in a single hunt. The second range is the spotting range; that distance at which game can be seen. Third, is the shooting range which represents the distance at which game is killed. Finally, to land the catch it is necessary for the hunter to be within retrieving range of the killed animal.

The dimensions of the operational ranges decrease in size as the hunter passes from one operation to the other in the process of the hunt. The largest range is the travel range. The hunter must cover a specific amount of territory to assure an adequate return for the effort invested. As the hunter travels through the environment he constantly scans the total area for game. However, the travel range will extend far beyond his field of vision. Once game has been spotted the hunter's focus of attention is generally directed toward the animal. The hunter moves into a position from which he can dispatch the game. He is, in effect, focusing his attention on a specific task. Having shot, his interaction with the environment is further

OPERATIONAL RANGES OF THE HUNTER



AFTER FOOTE 1967, P. 108

FIG. 5

narrowed as all his attention is directed toward securing the animal. The relative dimensions of each stage of the hunt are influenced by the hunter regulating his behaviour as he focuses on a particular goal.

The absolute values for each of the operational ranges results from a combination of many different factors. Physical, biological and cultural variables all influence operational ranges. The ranges are not constant but are continually changing as the content of the eco-system varies. The greatest variations in the operational ranges come on a seasonal basis as certain specific conditions become dominant within the eco-system. Basic changes result from conditions in the physical subsystem and the hunter and animal reaction to these changes.

The following chapters deal with each of the operational ranges in the sequence of their occurrence in the hunt. That is, travel, spotting, shooting and retrieving ranges.

CHAPTER IV

TRAVEL RANGES.

Travel range is the movement of the hunter through the environment in the pursuit of game. Involved is not only a consideration of the actual distance covered but also the time spent under hunting conditions. Prior to the hunt, decisions are made on the part of the hunter which primarily directs his course of action throughout the hunt. These decisions are made taking into account factors in the eco-system which the hunter feels will influence his success. Two of the most basic decisions are the choice of hunting locations and the time to be spent hunting. The Eskimos of Iglulik feel that any man who starts out without a basic plan of travel covering these two points is not a very wise hunter.

Differences in travel ranges exist within the hunting cycle of the Igluligmiut. These differences result from changing conditions in the eco-system and the hunter's reaction to them. The variations in time and distance expended in the different hunt types are illustrated in Figure 6. This figure is plotted from the values listed in Table 10 which gives a breakdown of the different hunts in regard to time and distance and some of the factors that influence travel ranges. Data given in the table is derived from a selection of forty-one observed hunts. Those which involve several different operations in a single hunt were omitted. For example, if the Eskimo switched from primarily hunting basking seals to floe edge hunting, then this hunt was excluded. Furthermore, only those hunts

TRAVEL RANGES
TIME AND DISTANCE

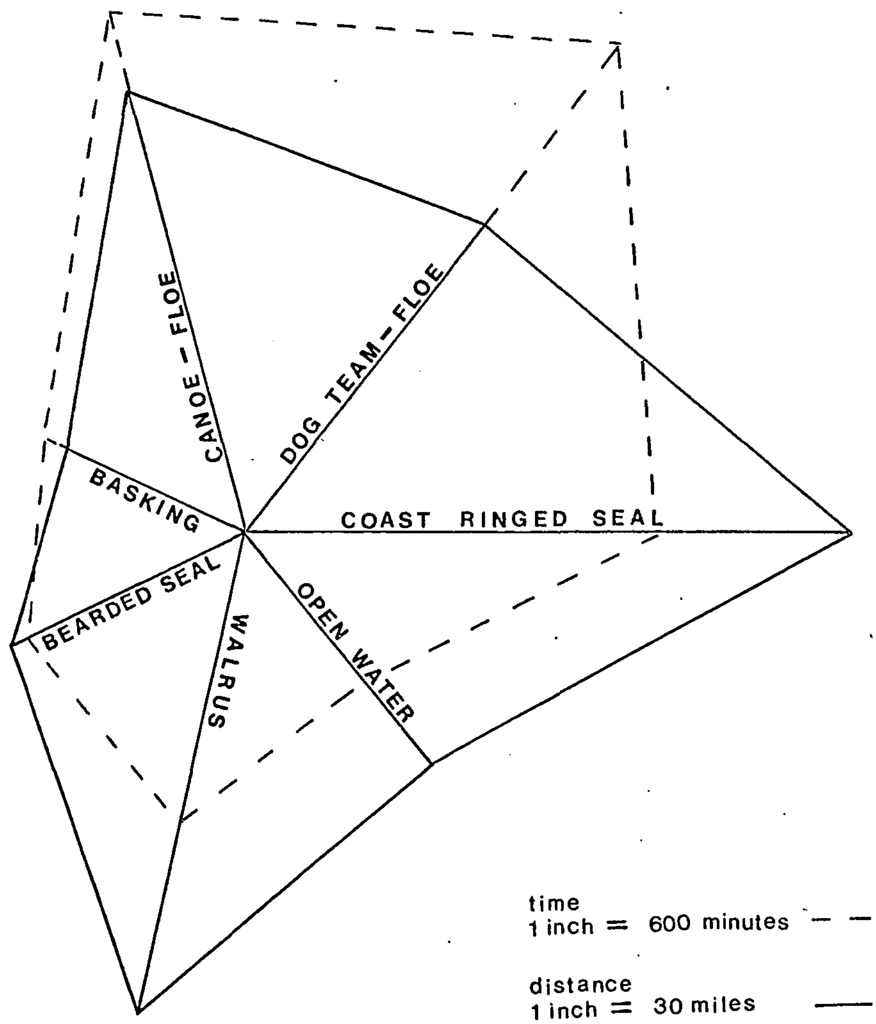


FIG. 6

Table 10

VARIATIONS IN TRAVEL RANGES.

Hunt Type	Miles	Time [1.]	Engine Efficiency: Gal. Gas	Engine Efficiency: Mi./ Gal.	Engine Efficiency: Min.Eng.	Engine Efficiency: % Used	Hunted Animals	Productivity Landed Catch/Min.	No. of Observations.
Dog/Floe	59.28	1,898	-	-	-	-	Ringed Seal	1/1268 min.	4
Dog/Bask.	30.33	719	-	-	-	-	Ringed Seal	1/399 min.	5
Canoe/Floe	68.27	1,608	7	6.9	267	24% adjusted	Ringed Seal	1/428 min.	8
Canoe/ Bearded	39.45	734	9	4.3	365	50%	Bearded Seal	-	8
Canoe/ Walrus	75.89	890	21	3.5	564	63%	Walrus	-	7
Canoe/ Open Water	45.13	634	8	5.6	327	51%	Ringed Seal, Bearded Seal, Walrus	-	8
Canoe/ Coast	92.16	1,287	17	5.4	618	48%	Ringed Seal, Bearded Seal	-	3

1. Time in minutes.

that were terminated by the free choice of the hunter were counted. If a hunt was ended due to unfavorable weather conditions it was not included for under such circumstances the time - distance inputs are distorted.

From Figure 6 it can be seen that there are considerable differences in travel ranges. An examination of the different hunting types will attempt to explain these differences.

4.1 Hunt Types and Travel Range.[1]

4.1.1 Floe Edge by Dog Team.

Reference to Table 10 shows that hunting the floe edge by dog team involves an average round trip from Ikpiadjuk of some fifty-nine miles. This distance seems unreasonably long in light of the fact that floe edge hunting is available as close as between eight and twelve miles to the east of Ikpiadjuk. The long distance can be explained by the concentration of population at Ikpiadjuk. The travel range is the result of an attempt to disperse the hunting effort away from the centralized village. The location of large numbers of hunters at the one settlement has resulted in very high competition for seals at the nearby floe edge and the over use of these close areas has made the seals extremely wary and hard to catch. The need to disperse is reflected in the distances travelled.

The Eskimos report that before Ikpiadjuk became the focus of the area and was no larger than the other camps in northern Foxe Basin, hunting at the Iglulik floe edge was very successful. There were few

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1. For a description of the hunt types, see Chapter II, Section 2.2. and Table 5.

hunters in the area and sealing was good close to the village. Under these conditions total distances travelled during the hunts were probably little more than twenty-four miles.

It is interesting to compare this distance with the present camp situation. During the spring of 1969, two family units were camped at Seowa. Their hunts along the floe edge by dog team only covered a distance of some ten miles to the east giving a total distance travelled for the hunt of approximately twenty miles. These hunters were able to travel such short distances because their camp was located in an area beyond which few hunters from Ikpiadjuk go. This results in little competition for seals in the area.

Similar data from another camp is provided by Bradley (1969). He recorded that hunters from Iglujuak, on two individual trips along the floe edge by dog team, registered twenty and twenty-two miles travelled in total. These values from the camp situations are approximately one third less than those recorded for hunts out of Ikpiadjuk and closely resemble the values noted for the settlement before it became the size it is today.

The Eskimos of Ikpiadjuk certainly hunt the floe edge just to the east of Iglulik Island and in these cases the hunting trips cover about twenty-four miles. However, many of the people who hunt in this area are the "weekend" hunters or are those who, due to other obligations back in the village, do not have the time to go further. Most of the men who depend on hunting for their livelihood travel to more distant places where competition is less severe and the seals are not as wary.

As the distance travelled is influenced by an attempt to disperse hunting effort, the duration of the hunt reflects a similar trend. Figure 6 shows floe edge hunting as having the longest duration of all the observed hunts. During the hunts the Eskimo travel along the floe edge stopping for extended periods to hunt certain areas, and then move further along to another spot. When tired, the hunters make a temporary camp to sleep for a few hours before resuming hunting which increases the total time invested in the hunt. The long duration of the hunts results from an attempt to maximize efficiencies. The travel effort involved in dispersing demands that the hunters compensate for such an input. The Eskimos therefore, extend the hunting activity while at the floe edge.

This is well brought out by a comparison with the camp situation. Data from Bradley (1969) concerning the aforementioned hunts from Iglujuak showed that the durations of these hunts were 660 and 708 minutes in total. The pattern was not to rest on the landfast ice but to return to the camp. The hunters from Iglujuak were able to operate in this way because of the low investment in distances travelled which in turn is controlled by hunter density.

4.1.2 Floe Edge by Canoe.

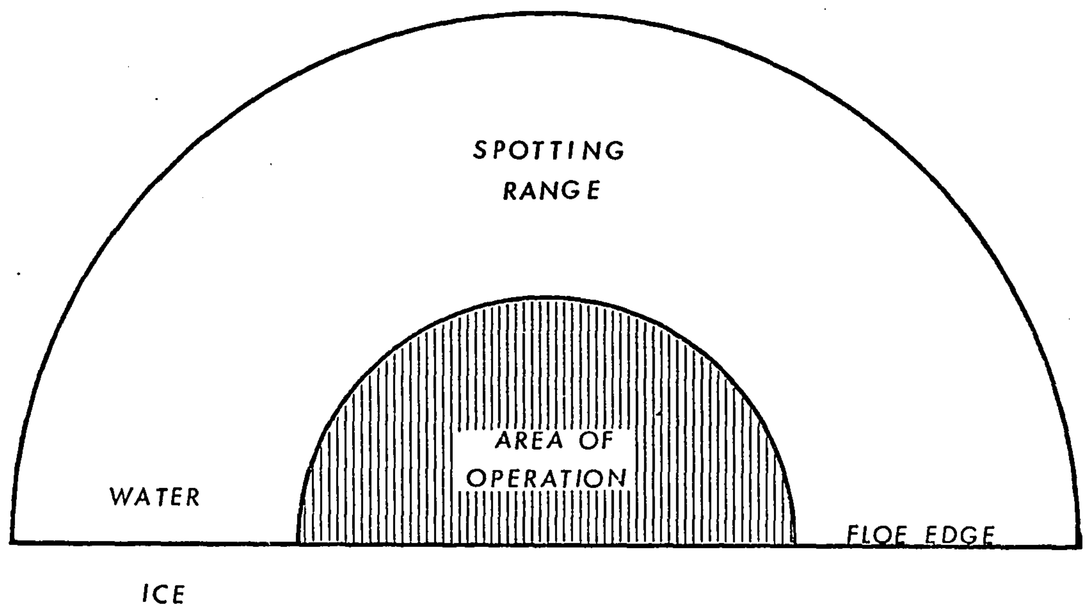
The hunters switch to utilizing canoes as a mode of transportation as soon as possible in the year and canoes are launched by early June. The hunters prefer the canoe because of the increased mobility. When hunting the floe edge by dog team the Eskimos are spatially very restricted and are limited to operating within shooting range. If a seal comes up outside this area of operation they can do little but hope that it will move in closer. It is beyond their means to pursue a seal that remains out of shooting range. Thus, only those seals that come up in front of a hunter can be considered as potential catches even though the hunter can see far beyond this area. This situation is illustrated in Figure 7.

Canoes allow the hunters to expand the area of operation considerably. They are now, through increased mobility both along the floe edge and out from it, able to utilize the total observed area. That is, the area of operation has expanded to the limit of spotting range. Hunters can change positions along the ice more quickly than by dog team and they can also use the marine environment to a greater extent than before. Reference to Table 10 shows that productivity is increased markedly.

The increase in productivity is a result of two factors. The main reason has already been explained by the increase in operational area due to the mobility provided by the canoe. The second is the increased availability of basking seals found just in from the floe edge. Basking seals are not readily available to the hunter utilizing the floe edge by dog team, as seals in northern Foxe Basin are not common on the ice until mid-June. By this date most travel is by canoe.

Reference to Figure 6 and Table 10 shows that there is an increase in total distance travelled but a decrease in hunt duration when hunting the floe edge by canoe. There is still the strong need to disperse which in part explains the long distances travelled. A further factor is the mobility provided by the canoe which gives the

AREA OF OPERATION
DOG TEAM — FLOE EDGE



NOT TO SCALE

FIG. 7

hunters a better means of getting further away from areas of heavy competition. This ability to disperse more easily may also contribute to the increased productivity noted for these hunts by giving a more even distribution of hunters along the floe edge.

The duration of the hunts are somewhat shorter inspite of the increase in mileage. However, the hunts are still fairly long and, once again, reflect the hunter's need to stay out for a long time to compensate for the great distances travelled. The relative decrease in time is explained by two factors. First, due to the increased speeds provided by the canoe, the amount of time consumed by straight movement from point to point is greatly reduced. Secondly, as Table 10 shows, the hunters are now limited by an input of gasoline. When using a canoe they can only stay out as long as the gas lasts. As gasoline is expended in increased mobility the duration of the hunt must decrease.

4.1.3 Basking Seal by Dog Team.

The basking seals appear to be a curiously under utilized resource in the Iglulik area. Reference to Figure 6 and Table 10 indicates that travel ranges are greatly reduced in this hunt type. Travel ranges are quite small when one considers that the Eskimos have the opportunity to rest on the ice. Furthermore, there are no restrictions due to material inputs such as gasoline expenditures and Table 10 shows productivity to be very favorable when compared with other hunts. Inspite of this situation there are few actual hunts conducted strictly for basking seals (see Chapter II, Section 2.2.) and such hunts that do take place do not utilize the full potential of travel ranges. Basking seals are by and large ignored if hunting at the floe edge is at all good. On many occasions the author has observed the Eskimos by-passing basking seals not even bothering to hunt them. When questioned, the hunters would indicate that they thought hunting at the floe edge would be better. These animals are ignored by the Eskimos, when, according to the figures given in Table 10, they have a far better chance of higher productivity when hunting basking seals (see Chapter VI, Section 6.5.1 for a statement of shooting success on basking seals).

The author was unable to explain this seemingly contradictory situation within the framework of the hunting pattern. It is felt therefore, that there are sociological explanations in terms of perception of resources involved in the under utilization of basking ringed seals. Certainly much more research needs to be done on this problem.

4.1.4 Bearded Seal Hunts.

During the bearded seal hunts both the time expended hunting and the miles travelled during the trip drop by over fifty per cent of the travel range when hunting the floe edge by canoe. The reduction in travel ranges is explained by several factors. All the observed bearded seal hunts for both 1968 and 1969 took place from the camp at Iglulik. The movement out to camp reduced travel by some sixteen miles from the floe edge hunts as the hunters no longer have to cover long distances from Ikpiadjuk. A further factor re-

reducing travel ranges is the fact that long rests during the hunts are impossible due to the nature of the broken disjointed pans. As the hunters cannot sleep on the ice they must return to the camp which will obviously reduce time expenditures for the hunt. The nature of the resource being utilized also helps to reduce travel ranges. The bearded seals are dispersed over a fairly wide area in the waters off Iglulik. The hunters when utilizing this resource disperse automatically and therefore, there is not the great need to go so far to get away from the areas of high competition.

The greatest restricting factor on travel ranges during the bearded seal hunts is the material input of gasoline. The consumption of gasoline during these hunts is fairly heavy. In explanation of the great variations in miles yielded per gallon of gasoline between the hunt types an examination of the different hunting techniques needs to be made. During the floe edge hunts the hunters move along the ice edge at a constant speed and travel is approximately from point to point. There is some departure from this when seals are hunted out from the fast ice but on the average only nine minutes are spent stalking a single animal. Basically the motor is run fairly efficiently. Hunting bearded seals is a different matter. Reference to Table 10 shows that the engine is kept running for a greater per cent of the time even though there are fewer miles travelled, indicating a less efficient engine use.

Travel rates when spotting for the bearded seal are at a fairly constant speed but when an animal is located speeds become quite variable.

The motor is kept running constantly during the stalking which takes an average of thirty-two minutes. When the animal dives the canoe travels slowly on the surface in the direction that the hunter expects the seal to go. When the seal surfaces the motor is opened full as the hunter speeds to where the seal has been spotted. This pattern is continued until the seal is landed or gets away.

4.1.5 Summer Walrus.

The travel ranges of walrus hunts are influenced basically by the nature of the resource being harvested. Walrus, during the summer morths, are located in the waters well offshore. Hunters travel an average of seventy-five miles usually straight out to where the animals are to be found and straight back again. Little hunting is done en route as the hunters are concerned with walrus and as gas consumption is very high, variations from a direct route are greatly restricted. The very low return per gallon of gasoline results from the fact that in some cases over two tons of meat are being transported long distances back to camp putting a heavy work load on the motor.

The duration of a walrus hunt is controlled mainly by the social habits of the walrus and problems of transport. The walrus are social animals and are usually found in large groups. Because of this habit the hunters can take all the walrus they can transport from one location. This cuts down on the amount of time that would otherwise be spent searching for individual animals. The time consumptive activity during the hunts is the trip back to camp. On the return trip boats are loaded to capacity and travel is very slow. Speeds are approximately five to six miles an hour compared to twelve miles an hour averaged on the way out. During the trip back to land no hunting is done as the boats usually cannot take any more meat. Hunting stops when all the walrus have been butchered but the long trip back extends travel ranges considerably beyond this point.

4.1.6 Open Water.

Hunting during open water season has the lowest travel ranges of all the observed hunts. Travel ranges are restricted mainly by the physical subsystem and gasoline inputs. Open water hunting begins in late August or early September when most of the drifting ice pans have been cleared out of northwestern Foxe Basin. Reference to Figure 4 shows that available light for hunting drops continuously from mid-August onward. The duration of the hunts are limited by this reduction. The time involved in the average hunt in open water season is 634 minutes. This value correlates quite closely with the mean daylight hours available for hunting through the open water season.

Distance covered during the open water hunts is controlled mainly by gasoline consumption. Travel during open water season consists of movement through the environment often from pan to pan which are drifting in the inshore waters. Speeds when spotting for game are fairly constant. However, when game is sighted, speeds are more variable as the hunters attempt to get into shooting range; moving slowly when the seal is below the surface and faster when the seal comes up. The efficiency of the motor falls between that achieved in the floe hunts and the bearded seal hunts. This in turn is reflected in distance travelled which also comes between these two hunt types.

4.1.7 Coastal Ringed Seal.

A variation of the open water hurts is the coastal ringed seal hunts. Table 10 shows travel ranges to be extensive both in terms of time and distance. The great distances travelled are an attempt on the part of the Eskimos to disperse the hunting effort. During open water season the marine mammals move into the coastal areas (see Chapter II, Sections 2.1.1, 2.1.2 and 2.1.3). The hunters, following the habits of the animals, focus on the inshore waters. The Eskimos are further restricted to the coastal waters because of the increasing occurrence of weather unsuitable for hunting along unprotected shores. This double cause of concentration results in a high density of hunters immediately around Iglulik Island which in turn created an area of high competition. The canoe trips along the coast to the productive region of Inuksugalik are an attempt to disperse the hunting effort. This is confirmed by the Eskimos themselves, who report that before Ikpiadjuk grew into a large settlement there was not the need to travel long distances to get good hunting.

The duration of the hunts is controlled mainly by the input of gasoline and the need to extend the hunting time for as long as possible to compensate for the long distances covered.

Engine efficiency is very similar to hunting open water which is to be expected as hunting methods are essentially the same. The high input of gasoline restricts both the duration and the frequency of the hunts. However, when hunting very close along the shore the Eskimos have the opportunity to stop frequently and hunt from land thereby cutting down the amount of time the engine is used during the hunt. Furthermore, the presence of an abandoned government house at Inuksugalik allows the hunters to sleep during periods of darkness. This is a very similar pattern to the floe edge hunts and results from the same cause; the need to extend the hunt to balance the miles travelled. However, the duration of the coastal hunts is not as long as either of the floe edge hunts because of the restriction imposed by the input of gasoline and relatively lower engine efficiency.

4.2 Summation.

The travel ranges noted for the different hunt types result from changing environmental conditions and the hunters' reactions to these changes. As the seasonal content of the eco-system varies the Eskimos adjust the hunting effort in terms of location, resources utilized and hunting methods which in turn effect travel ranges.

The extended travel ranges involved in the floe edge hunts by dog team and canoe and the coastal ringed seal hunts are an attempt by the hunters to disperse the hunting effort from areas of concentration around Iglulik Island. With the use of the motorized canoe travel ranges are also influenced by increased mobility, the material input of gasoline and by engine efficiency.

The low travel ranges noted for the hunting of basking ringed seals are thought to reflect an under utilization of the resource which may result from sociological factors influencing the hunting system.

The moderate travel ranges for the bearded seal hunts are controlled primarily by the input of gasoline and motor efficiency. Modifying factors are the dispersed nature of the resource hunted and the movement out to summer camp.

The nature of the resource harvested has the greatest influence on high travel ranges during walrus hunts. The walrus are located well out from Ikpiadjuk necessitating the long distances travelled. The problems of transporting large quantities of meat back to land extend the time spent on the hunts.

The moderate travel ranges for hunting in open water are restricted by unfavourable light conditions which limit hunting time and by gasoline inputs and motor efficiency which control the distances covered.

CHAPTER V

SPOTTING RANGES.

The spotting range, which is the stage following travel range in the hunting process, refers to the maximum distance between the hunter and the animal when the hunter first becomes aware of the presence of game. Spotting ranges vary tremendously depending largely on the content of the biological and physical subsystems and the equipment used during the hunt. As has been discussed, the content and form of the hunt varies tremendously from season to season. It is this variability of different climatic conditions, the changing availability of the biological resource and the hunting methods employed to meet these changes, that bring about the different values for spotting ranges. The analysis of spotting ranges must go beyond seasonal variation for spotting ranges can change between hunts in the same season and even within a single hunt.

One of the most important factors determining the value of spotting ranges is the position of the animal when sighted. This can be broken down into two basic situations, basking animals and animals in the water. The best way of dealing with the complex problem of spotting ranges is to separately examine these two positions fully discussing the variables which influence a change in spotting conditions and comparing how the two differ. There are many restraints on spotting ranges in both situations. The most important factors influencing ranges on basking animals are ice, atmospheric and light conditions and hunting technologies. Those restricting spotting for animals in the water are the color of the water, which is influenced by wave action and cloud cover, ice, atmospheric and light conditions, animal behaviour and the technology of hunting.

5.1 Basking Animals.

The body of the basking animal stands out very clearly as a black object in sharp contrast to the white background of the ice floe or pan on which it is resting. The hunters when searching for basking animals examine the environment looking for such dark objects in an otherwise white area. Determining what distances the animals are from the hunter at first sighting is a very difficult problem. In many situations the surface is almost isotropic and there are no objects of known size or distance available with which the position of the observed animal can be compared. The problem of accurately measuring spotting ranges was overcome by the computation of speed and time travelled to the sighted object. Time was recorded on a stop watch starting when the hunter first reported that he had sighted a seal. The speed of travel was determined by travel time over a known distance and checked by pacing beside the sledge. It is very important to measure the time when the Eskimo spotted the seal to account for the role of perception. It was observed that the hunter could spot a basking seal at a distance considerably greater than the investigator. This fact, of course, has an influence on the accurate recording of spotting ranges in regard to the actual hunting pattern.

Table 11 outlines the spotting ranges for the various marine mammals hunted in the Iglulik area. The table gives the average distance that a basking ringed seal can be seen on the landfast ice.[1] The table shows that there is a constant relationship between spotting range and body size of the hunted species. Data on spotting ranges for ringed seals are felt to be quite accurate. The values for bearded seals and walrus are thought to be valid estimates based on a very limited amount of data.

Although there are very few observations on maximum spotting ranges for basking animals the values given in Table 11 are based on many observations on animals that could not be grouped in the maximum range. For example, there were many sightings of bearded seals and walrus that were at a distance of approximately 2,500 to 2,800 yards and were clearly not at maximum spotting range. From this sort of observation it is obvious that the maximum range on these animals is over 2,800 yards. It is very difficult to get a large enough sample clustered around the maximum range but the numerous observations made below this value indicate that the ranges given in the table are probably quite accurate.

5.1.1 Restraints on Spotting Range.

The ranges given in Table 11 represent the maximum spotting range of the different animals. There are many variables that will come into effect to reduce the spotting values from this maximum and others that will aid the eye to extend them.

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1. See Haller (1967) for a different estimation of spotting range.

Table 11

Spotting Ranges for Basking Animals.

Species	Maximum Recorded Range (yds.)	Minimum Recorded Range (yds.)	Mean Range (yds.)	No. of Observations	Average Range (yds.) Telescope	Average Range (yds.) Binoculars	Average Animal Size	
							Length	Girth
Ringed Seal	2800	2700	2735	9	----	4360	3' 6"	2' 8"
Bearded Seal	3017	----	----	1	4693	5310	7' 0"	4' 10"
Walrus	3520	3200	3340	2	4224	----	10' 1"	8' 3"

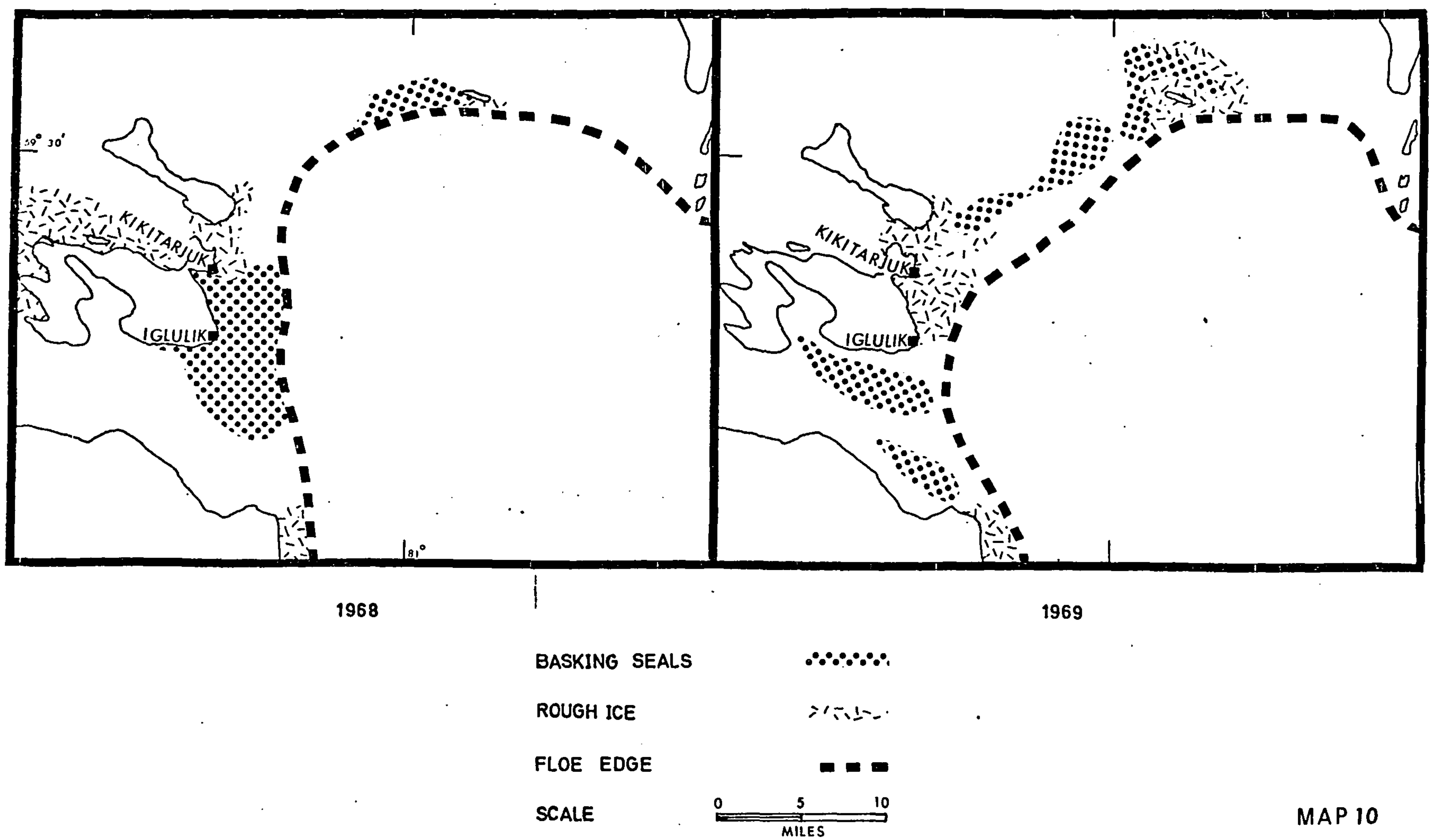
A. Ice Conditions.

Ringed seals bask out on the flat landfast ice and can generally be spotted at the maximum distance. However, the occurrence of hummock ice will cut spotting ranges. It is impossible to spot ringed seal that are basking among hummocks until the hunter has a direct line of vision to the seal. The distance of this direct line varies with the pattern of the hummocks around the seal. Rarely, however, will the spotting range drop below 200 yards for seals do not like to bask in areas where they cannot scan the horizon for predators. Of the many basking seals observed in 1968 and 1969 only four were noted to be basking in areas where there was less than 200 yards clear visibility.

The comparitive absence of hummocked ice as shown in Map 10 indicates that ice is not a very serious barrier to spotting ranges in the Iglulik area. Map 10 shows the location of rough ice and observed basking seals for 1968 and 1969. Both sections of the map also show the seals' avoidance of the ice hummocks. In 1968 the ice between Iglulik and Kikitarjuk was flat and high concentrations of seals were observed basking in the area. However, in 1969 the ice was extremely rough and not a single animal was noted basking there.

The problem of hummocked ice will sometimes also restrict spotting ranges on basking bearded seal and to a lesser extent walrus in much the same manner as when dealing with ringed seals. There does not appear to be a critical distance these animals leave

LOCATION OF BASKING RINGED SEALS



MAP 10

between themselves and the hummock but care is always kept to be next to an easy access to the water. Spotting range in this case is determined by the maximum direct line between the hunter and animal.

B. Atmospheric Conditions.

Further variables in the physical environment also restrict spotting ranges on basking animals. The conditions of blowing snow, precipitation and fog obviously interfere with spotting ranges. However, in actual hunting these factors are not too important for usually, in any of these conditions, it is quite unlikely that animals will be out on the ice as basking is closely related to periods of fine weather.

C. Light Conditions.

Conditions of light were felt to be a critical factor in determining spotting ranges by the author. Investigation into the matter however, has revealed this to be only partially correct although there appears to be a critical light value affecting hunting as an activity. The period of intense basking coincides with the period of twenty-four hour daylight and measurements of incident light, recorded in foot candles to an accuracy of plus or minus five per cent, indicate that rarely and only toward the end of the summer do values fall low enough to influence hunting. Light values apply more directly to bearded seals and walrus than ringed seals.

A great range of recordings exist for the values taken during bearded seal hunts. Light values range from 12,000 foot candles to two foot candles. Spotting remains constant through most of this range until a minimum of light finds its way into the system and hunting is restricted as illustrated in Figure 8. This minimum occurs with values below 100 foot candles and hunting as an activity is stopped altogether with a value of six foot candles.

D. Technology.

The role of technology both hinders and helps spotting ranges. Table 11 shows how the telescope and binoculars will aid the naked eye in extending spotting ranges. Binoculars and telescopes are used most frequently when hunting bearded seals as the resource is dispersed over a wide area and the aid of a telescope helps the hunter cover a greater area of spotting thereby increasing the efficiency of travel ranges. They are less important for basking ringed seals and walrus as the general location of the resource is basically already known.

The introduction of the ski-doo has had the opposite effect. It lowers spotting ranges by two different means. First of all, unlike a sledge pulled by a dog team, a ski-doo cannot steer itself but requires constant guiding. Furthermore, due to increased speed much more attention is required by the driver to avoid hummocks, bumps, deep drifts and cracks. The factor of speed and the need of the hunter to control direction at all times means that the Eskimo must direct most of his attention to steering. He has, therefore, less time to scan the horizon for seals and as a

LIGHT VALUES — SPOTTING

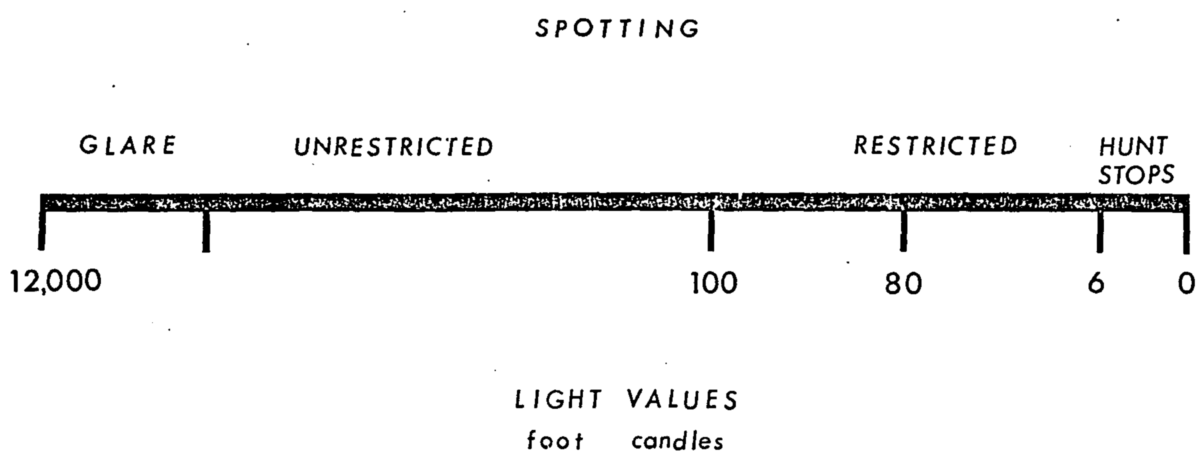


FIG. 8

basking seal at 1.5 miles appears as just a dot it is likely he will miss it. Secondly, and more important than the first, is the critical noise level produced by the ski-doo engine. Many of the machines when travelling over very rough ice have lost their mufflers and the noise level is thereby increased considerably. Basking seals can hear the approach of a ski-doo long before the seal becomes visible to the hunter. The increased noise level causes the seal to slip down its breathing hole and out of sight. Seals will generally come back up on to the ice once the ski-doo is well past and the noise has died down. This influence of noise level causing the seals to spook and the consequent reduction of spotting ranges has been observed on many different occasions by the author and confirms similar reports by Eskimo hunters.

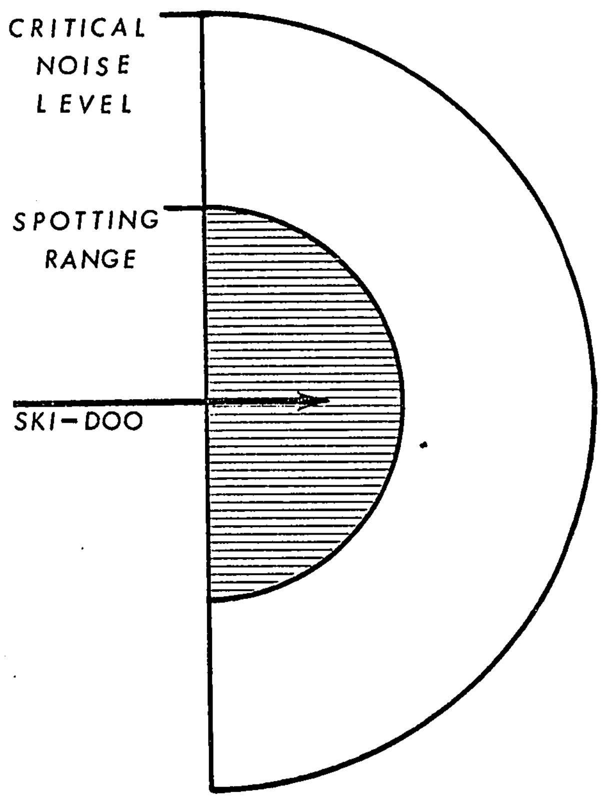
This is in direct contrast to the dog team. The hunter points the dogs in the right direction and has only minimal work after that. This means that the hunter can spend a great deal more time than the ski-doo driver scanning the horizon for basking seal. Furthermore, the noise level of a dog team is almost negligible. Figure 9 represents the relationship between spotting ranges and noise level when hunting from a ski-doo.

5.2 Animals in the Water.

The preceding discussion has been concerned with basking animals. Spotting ranges for animals in the water are quite different. As would be expected, ranges are considerably lower as much less of the animal's body is exposed. Neither ringed seals, bearded seals or walrus swim very far along the surface of the water

SPOTTING RANGE — SKI-DOO

NOISE LEVEL



NOT TO SCALE

FIG. 9

but stay up only a little while, take air and then go down again.

The measurement of spotting ranges for animals in the water is an extremely difficult task. A range finder was thought to be a possible solution but the light, portable range finder taken into the field proved to be very unsatisfactory as it was impossible to focus it quickly on a small object.

Lacking a more sophisticated means of measure, an estimated value for spotting ranges is used. The values are felt to be accurate to plus or minus five per cent of the actual ranges as this degree of accuracy was achieved by the author on estimating measured distances on the sea ice. Only objects which were positively identified as animals and whose position was noted in relation to other objects of known size such as ice pans were recorded. No account is taken of the role of perception for the Eskimos could identify distant objects before they became discernible to the author.

5.2.1 Restraints on Spotting Range.

The author arrived at a maximum spotting range for ringed seals in the water of approximately one third of a mile for a non-Eskimo.[1.] Maximum spotting ranges are dependent upon a very specific set of conditions in the physical subsystem which are extremely complex and very difficult to deal with. The author undertook to measure changes in light values and wave height as they affected spotting ranges. The hypothesis was that high light values and a smooth surface gave maximum spotting whereas a rough surface and lower light values served to reduce the range. It was thought that

1. This range was also noted by both McLaren (1958a) and Haller (1967).

waves blocked an object from sight whereas lower light values made the eye less effective.

The findings of 1969 do not totally support these ideas. Maximum spotting conditions were recorded with light values ranging from 9,400 foot candles to 300 foot candles whereas light values during periods of poor spotting, varied from 12,000 foot candles to 100 foot candles. Furthermore, field investigations showed that wave height below six inches is not a critical factor in blocking an object from view but is important for its influence on the color of the water. It was discovered that the most important factor influencing spotting ranges is the color of the water surface and the background it provides against which the seal's head is seen.

An analysis of the conditions under which maximum spotting ranges were achieved reveals that it is necessary to have a dead calm water surface of pearly color under a completely overcast sky. The head of the seal appears very dark as it breaks the water and by far the best contrast is provided by such a surface. The darker or lighter the water the less the contrast and therefore the lower the spotting values.

The color of the water is controlled by many different variables. Conditions of cloud, wind velocities, the angle of incoming radiation, the depth of the water and the surrounding topography all play a significant role. A change of any of the variables will bring about a change in spotting ranges. The present research has just touched on the problem of spotting ranges and much more sophisticated work needs to be done on this complex problem. The author has isolated what he feels to be the most significant variables influencing water color which are wave and cloud conditions. Table 12 attempts to show the relationship between these variables and spotting ranges.

A. Wave Height.

Waves influence spotting ranges by affecting the color of the water surface and by blocking the animals from view. Those waves below six inches influence the color of the water surface. The relationship between water color and wind conditions are partially outlined in Table 12. A calm pearly surface when ruffled even by a slight breeze quickly changes color to a grey or dark grey. Higher wind speeds, generating larger waves, will serve to deepen water color to a dark tone. Under a clear, or partially cloudy sky and calm winds the surface is often light blue resulting in excellent spotting. However, here too, waves will produce a darkening of the surface and a lowering of spotting ranges.

Waves over six inches do not appreciably influence spotting ranges by affecting the color of the water. However, beyond six inches they begin to rise to such a height so as to obscure an object from sight. With an increase in wave height beyond twelve inches there is a relative decline in the blocking effect of waves. By twelve inches the waves have developed deep troughs which by and large obscure the animal from view and any increase in wave height makes little difference to spotting range.

Table 12

Water Color And Spotting Range.

Color	Spotting	Wind(m.p.h.)	Cloud Type	Cloud Thickness	Cloud Cover (Oktas)
Pearly	Maximum	Calm (0)	Cirrus	Thin	8
			Cirrostratus	Thin	8
			Cirrocumulous	Thin	8
Steel Gray	Excellent	Calm (0)	Cirrus	Thin to Light	8
			Cirrostratus	Thin to Light	8
			Cirrocumulous	Thin to Light	8
Light Gray	Excellent	Calm (0)	Cirrostratus	Light to Moderate	8
		Light (2)	Cirrocumulous	Light to Moderate	8
			Stratus	Thin	8
Light Blue	Excellent	Calm (0)	Fractostratus	Thin	1-6
		Light (2)	Clear	----	-
Gray	Good	Light (2-4)	Stratus	Light to Moderate	8
		Calm (0)	Fractostratus	Light to Moderate	6-8
Blue	Good	Light (2-4)	Clear	----	-
			Fractostratus	Light to Moderate	1-6
Dark Blue	Poor	Moderate (4-6)	Clear	----	-
			Fractostratus	Moderate	1-6
Dark Gray	Poor	Moderate (4-6)	Stratus	Moderate to Thick	8
		Calm (0)	Stratus	Thick	8
Gray Black	Poor	Moderate (6-8)	Stratus	Thick	8
		Calm (0)	Stratocumulous	Very Thick	8
Black	Poor	High (10+)	Stratus	Thick	8
		Light (2-4)	Stratocumulous	Very Thick	8

The relationship between spotting ranges and wave height for both experimental and actual hunting conditions are given in Figure 10. To arrive at the values for the experimental plot a football was used to simulate a seal's head and spotting ranges were computed by the measurement of speeds and duration of travel. The values arrived at by this method can be compared with a plot of the estimated values achieved under hunting conditions. As is seen from Figure 10 the experimental values are considerably higher than the estimated values. There are several explanations for this. First of all, the size of a football is larger than the head of a seal. Secondly, the Eskimos knew approximately where the ball had been dropped and were concentrating on that area, whereas under hunting conditions they scan the total environment. Thirdly, Eskimo observers were used which extends the range of vision beyond those estimated by the author due to the role of perception. Finally, the ball floated higher in the water than would a seal.

In spite of the variations in distance between the two plots the curves are not radically dissimilar. Both register the trough effect for waves over twelve inches as the water begins breaking over both the ball and the seal. Although the graph plots are based upon estimated distances and controlled experimental conditions, it is felt that Figure 10 represents the general relationship of wave height to spotting range. A more accurate statement can only be made when there are further data on the factors which control the variation in color of the water surface and a method

SPOTTING RANGE — WAVE HEIGHT

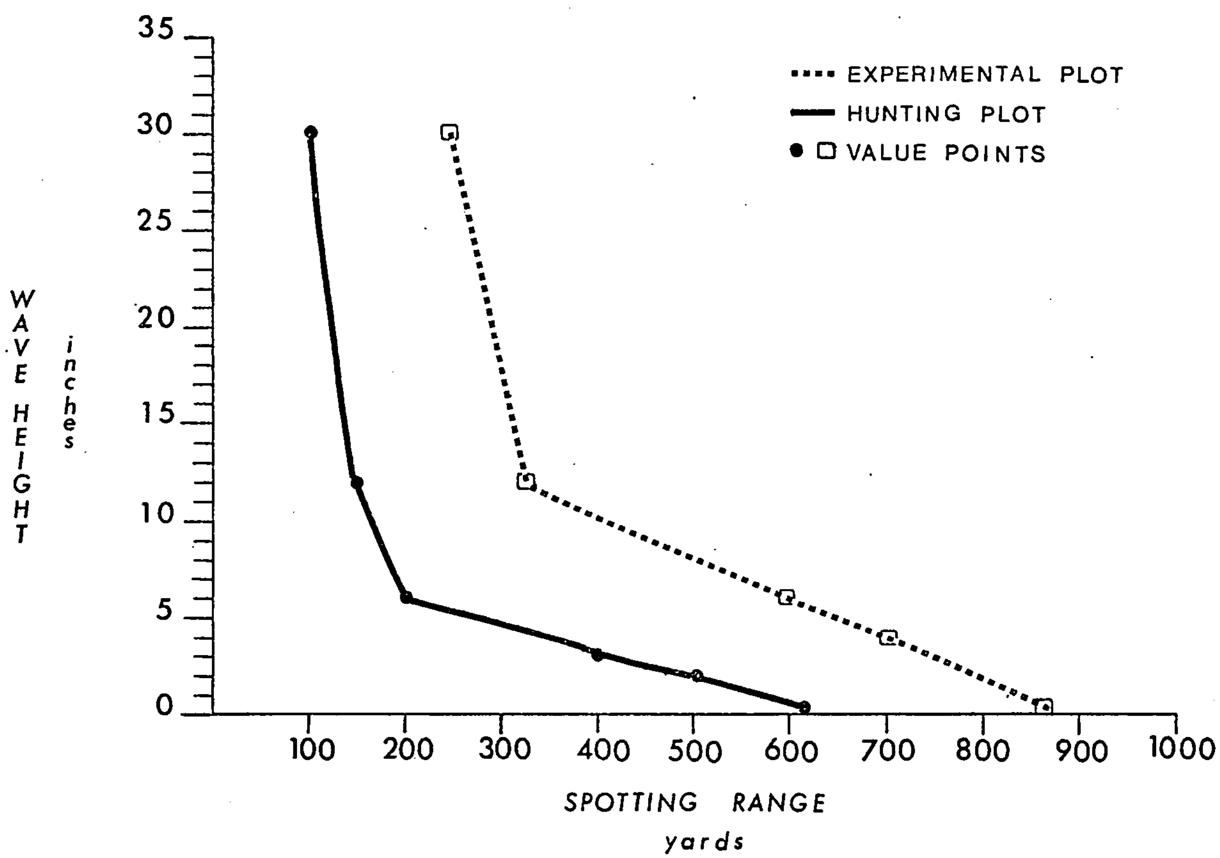


FIG. 10

which will measure actual spotting ranges accurately and quickly.

B. Cloud Conditions.

Cloud conditions are probably the most important of all the factors influencing water color. Variations in either cloud type, cloud thickness or per cent cloud cover will influence spotting ranges. Reference to Table 12 indicates that high, thin cloud cover is necessary to achieve excellent to maximum spotting values. The lower, heavier stratus and stratocumulus clouds result in poor spotting conditions even with a calm sea surface. Under conditions of partial cloud cover much depends upon the position of the sun in relation to the clouds.

Completely different sets of conditions develop when the sun is behind clouds than when it is free of cloud cover. This is due, not to reduced light values as was supposed earlier but by the color produced by the filtering or diffusing of light by the clouds.

The whole question of cloud conditions and spotting ranges and their influence on incoming light is very complicated and much more research is needed in this area. The limited data gathered by the author are best presented and summarized in Table 12.

C. Light Conditions.

Although in general, light conditions were not found to have a direct effect on spotting ranges extreme light conditions do. Light readings of over 10,000 foot candles tend to reduce spotting by creating a surface which is far too bright thereby cutting down detail in the environment. Light values registering under 100 foot candles also reduce detail but this time due to darkness rather than brightness. It is interesting to note that this was the critical value recorded for basking animals (see Figure 8). However when hunting the water environment much depends upon the angle of the incoming radiation. Even with values of below 100 foot candles if the sun's rays strike the water surface at a low angle and the light source is from behind the hunter, spotting can be excellent.

D. Atmospheric Conditions.

Other factors in the physical environment besides the color of the water influence spotting ranges. Atmospheric conditions producing snow, rain and fog will obviously restrict visibility. To what extent these lower the distances at which animals can be seen depends largely on the intensity of their occurrence. Of all the recorded hunts only one hunt was stopped due to rain and none for snow. Fog, however, does limit spotting ranges considerably, often for the entire duration of the hunt. One of the observed hunts lasted a total of some fourteen and a half hours with spotting ranges never over 300 yards and generally at a maximum of 150 yards. A very thick, persistent fog which reduces spotting to under 100 yards results in a halt of hunting until the fog clears or thins out. With ranges of 100 yards or over, the hunt continues.

E. Ice Conditions.

Ice conditions are also a barrier in the physical subsystem which can restrict spotting ranges. When travelling through open water the hunters have an unrestricted horizon to scan. However, once the canoe has moved into pan ice the spotting ranges on any seals in the water are greatly lowered by the floating ice which breaks the line of vision. This blocking effect is illustrated in Figure 11. Tightly packed fields of ice are more restrictive than loose scattered pans.

The influence of ice pans on spotting ranges varies from year to year. Foxe Basin is well known for its heavy concentrations of pack ice and ice coverage of the basin varies between twenty and seventy per cent according to the yearly climatic regime (Crowe, 1969). During the 1968 field season concentrations of ice pans were particularly heavy and covered large portions of north-western Foxe Basin from mid July to mid-August. Most of the hunt routes between these dates passed almost entirely through pan ice. Under these circumstances conditions of pan ice are far the most important factors influencing spotting ranges. By contrast, in 1969 there was very little pan ice and spotting was by and large unrestricted by ice.

F. <u>Animal Behaviour</u>.

Spotting ranges are determined not only by factors in the physical subsystem but the biological subsystem also plays an important role. In this regard spotting is influenced by what might best be described as animal swimming styles. Swimming styles resolve into a factor of movement and noise which in turn extend spotting ranges. The function of noise and movement serves to identify an object as game whereas it may have been indistinguishable as such

BLOCKING EFFECT OF ICE PANS

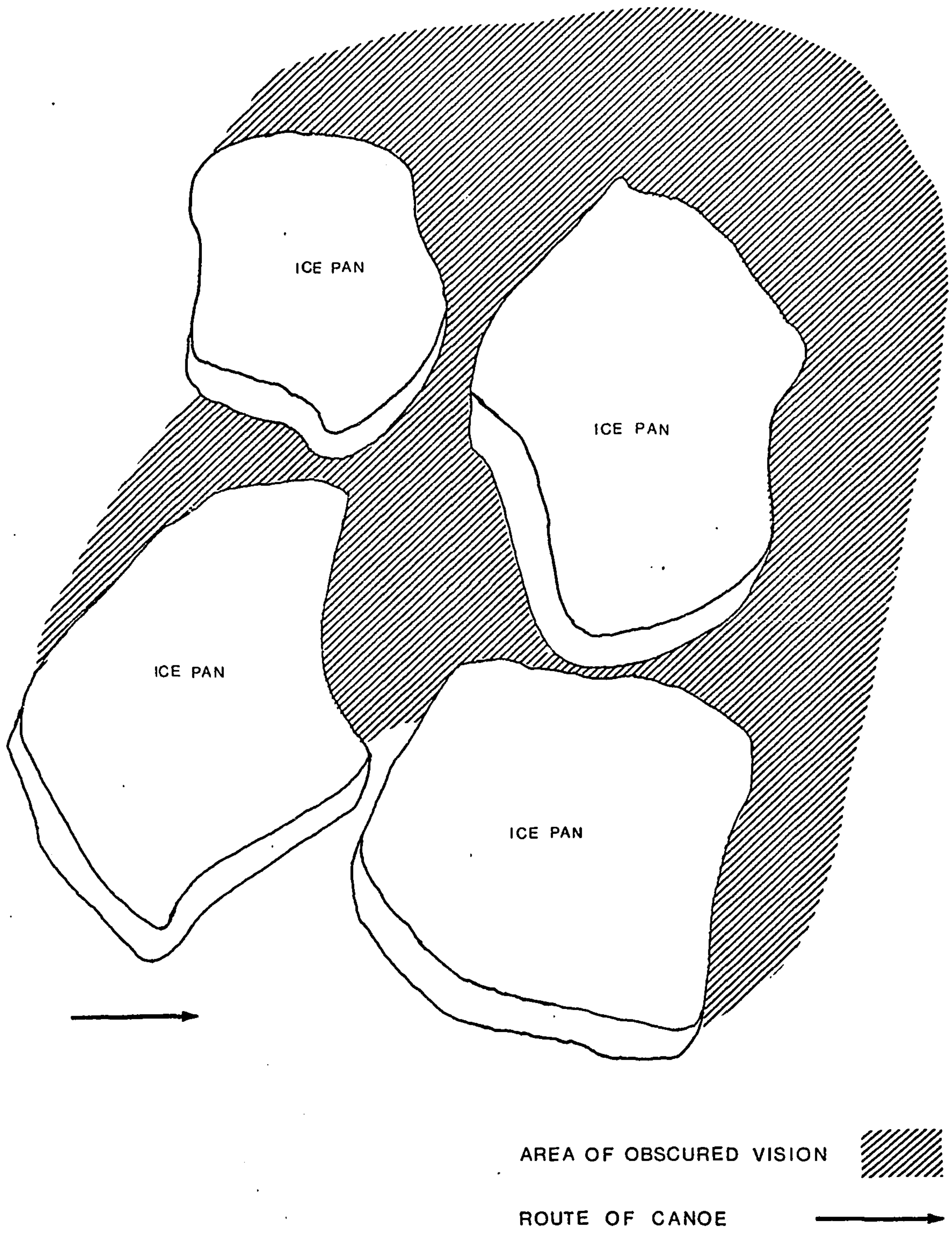


FIG. 11

before. Ringed seals surface virtually noiselessly and when diving, sink in a vertical position also making no noise.[1] It is possible then, for ringed seals to surface, stay up for awhile and submerge and not be noticed unless the hunter is continuously scanning the area of observation. Bearded seals or walrus are less likely to escape the notice of the hunter. Both cause considerable commotion when at the surface. Bearded seals usually take a series of shallow dives which consist of bobbing up and down in the water exposing the head and back. When deep diving the seals roll forward exposing the back and then kick up with the hind flippers. It is quite a noisy dive and causes some commotion of the water.

Walrus are particularly active on the surface. They will swim extended distances on the surface in a series of powerful, short, shallow dives before deep diving, blowing noisily each time they come up. As walrus are usually found in groups the commotion is considerable.

Both ringed and bearded seals have maximum spotting ranges of around 600 yards. The range that walrus can be seen in the water is extended to between 800 and 900 yards. This is a direct result of the large size of these animals and their social swimming habits. Walrus are also vociferous animals especially when feeding in herds. The loud grunts of the walrus can be heard for considerable distances often extending beyond the limit of maximum visibility for animals both in the water and on the ice.

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1. The diving habits of ringed and bearded seals have been well illustrated by Mansfield (1967).

There are certain seasonal and daily conditions during which movement and noise are very important. A season of particular note is break-up when there are literally thousands of small chunks of ice floating in the water. When the sun is very bright, tending to obliterate detail, or when the water surface is dark, there is often little difference in appearance between the floating blocks of ice and a seal's head. There is, of course, a specific range at which one can distinguish the difference. Movement, however, can be detected far beyond this distance and serves to extend spotting ranges. On absolutely calm days any movement stands out markedly in contrast to an otherwise motionless environment. The influence of noise and movement on spotting ranges is illustrated in Figure 12.

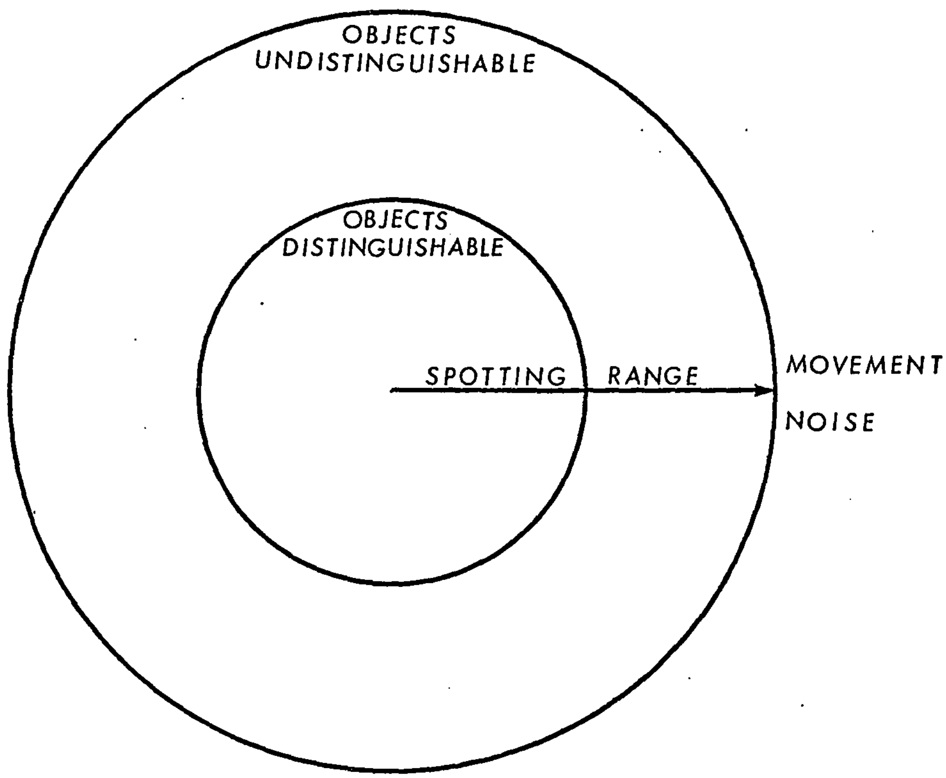
G. Technology.

Technological innovation has had little direct effect on spotting ranges for animals in the water. The hunter works within the limit of the unaided eye. However, through the introduction of the outboard motor there has been a very real but indirect influence on spotting ranges. With the almost exclusive use of the motorized canoe for hunting seals in the water the factor of speed of travel has become important.

When scanning the water for seals the hunters will see only a small per cent of the animals in the area due to the fact that many are under the water at the moment of observation. Table 13 gives the mean surface and dive times of ringed and bearded seals. From the table it can be seen that the seals spend much more time

SPOTTING RANGE

MOVEMEMENT and NOISE



NOT TO SCALE

FIG. 12

Table 13

OBSERVED DIVING AND SURFACE TIMES OF

RINGED AND BEARDED SEALS.

DIVING TIMES	BEARDED SEAL	RINGED SEAL
No. of Observations	91	82
No. of Animals Observed	17	39
Total Dive Time (sec.)	12,780	10,102
Mean Dive Times (sec.)	240.22	123.19
Mean Dive Time (min.)	2.33	2.05
Range of Dive Time (sec.)	4 to 390	2 to 366

SURFACE TIMES		
No. of Observations	16	34
No. of Animals Observed	12	6
Total Surface Time (sec.)	391	864
Mean Surface Time (sec.)	23.41	25.40
Mean Surface Time (min.)	0.39	0.42
Range of Surface Time (sec.)	3 to 81	1 to 61

below the surface than above. A single scan of an area would therefore miss a large portion of the seals. When utilizing the floe edge a hunter has no trouble keeping an area under constant surveillance because he is either stationary or moving very slowly. He is able to continuously scan the area of observation making sure that he has spotted all the seals. When in a canoe the hunters have the possibility of rapid travel and speed begins to influence the amount of time an area can be kept under observation.

The presence of a canoe clearly has an effect on the behaviour of seals. In all probability seals close to the route of the canoe will surface due to the noise factor whereas those further away will be less likely to come up (McLaren, 1961a). Beyond 200 yards the passage of a canoe seems to have very little influence on the diving behaviour of the seal (Nelson, 1969; Freuchan, 1935). This means that although the Eskimos could spot most of the seals in the observation area under 200 yards from the canoe, a large portion of those between 200 yards and the maximum range of 600 yards would be missed if travel speeds were high.

Table 13 indicates that a hunter can expect a bearded seal to be out of sight from four to 390 seconds with an average dive time of 240 seconds. Times are similar for ringed seals. This means that if a hunter is to obtain the highest probability of seeing an animal, the boat speed should allow the maximum area of observation to be under surveillance for at least 390 seconds

(6.5 minutes). If the hunters pass through an area at high speed they will have travelled beyond the maximum spotting range before all the seals in the area have had a chance to surface.

Eskimo hunters scan the whole water surface around the boat. Thus under perfect conditions, a boat travelling at 185 yards per minute (six miles per hour) should observe nearly all the seals surfacing within 600 yards. An analysis of boat speeds at Iglulik disclosed that the mean speed of a random sample of thirty-seven measurements on twenty different hunts was 233 yards per minute (seven miles per hour). The mean hunting speed of the craft represents a speed very close to the most efficient rate of travel with respect to seal diving times to maximize spotting ranges. When travelling from one point to another but not hunting, the canoe averaged fourteen miles per hour.

It is significant to note that a similar study done by Foote (1967), on which the present investigation is based, arrived at a mean hunting speed of seven miles per hour. He also noted that when not hunting the mean speed of the canoe was fifteen miles per hour. It is clear when comparing the independent figures of the author and those of Foote that hunting speeds are a very conscious adjustment on the part of the hunters to conditions in the eco-system and the technological sophistication of the hunting equipment.

Once the seal has been spotted in the area of observation to effect a kill it is necessary to keep the animal within the field of vision. This is a function of boat speed, dive time of the seal and the angle of movement through the area of observation formed by the direction of travel of the seal in relation to the canoe. Seals have the capacity to easily swim out of spotting range and therefore the hunters must compensate by moving in such a way to ensure that the seal surfaces within their spotting range.

It was observed that the successful stalking of a seal from a motorized canoe depends on how the hunters regulate the speed and direction of the canoe in light of their knowledge of animal behaviour. Figure 13 represents the stalking of a seal from a canoe. When a seal was sighted the hunters would direct the canoe over to the point where the seal was observed to have dived. They would move rapidly to this position and once in the approximate area would cut the speed to about four miles per hour so as not to speed well past the seal, and continue in the direction which they estimated the seal would be swimming. Usually the seal swims directly away from the approaching canoe and therefore resurfaces well within spotting range (position A in the figure). However, should the hunters have grossly misjudged the direction the seal swam, a large angle forms between the canoe and the seal and the animal will come up well outside the spotting range (position B in the figure).

SPOTTING RANGE AND EVASIVE DIVING OF SEALS

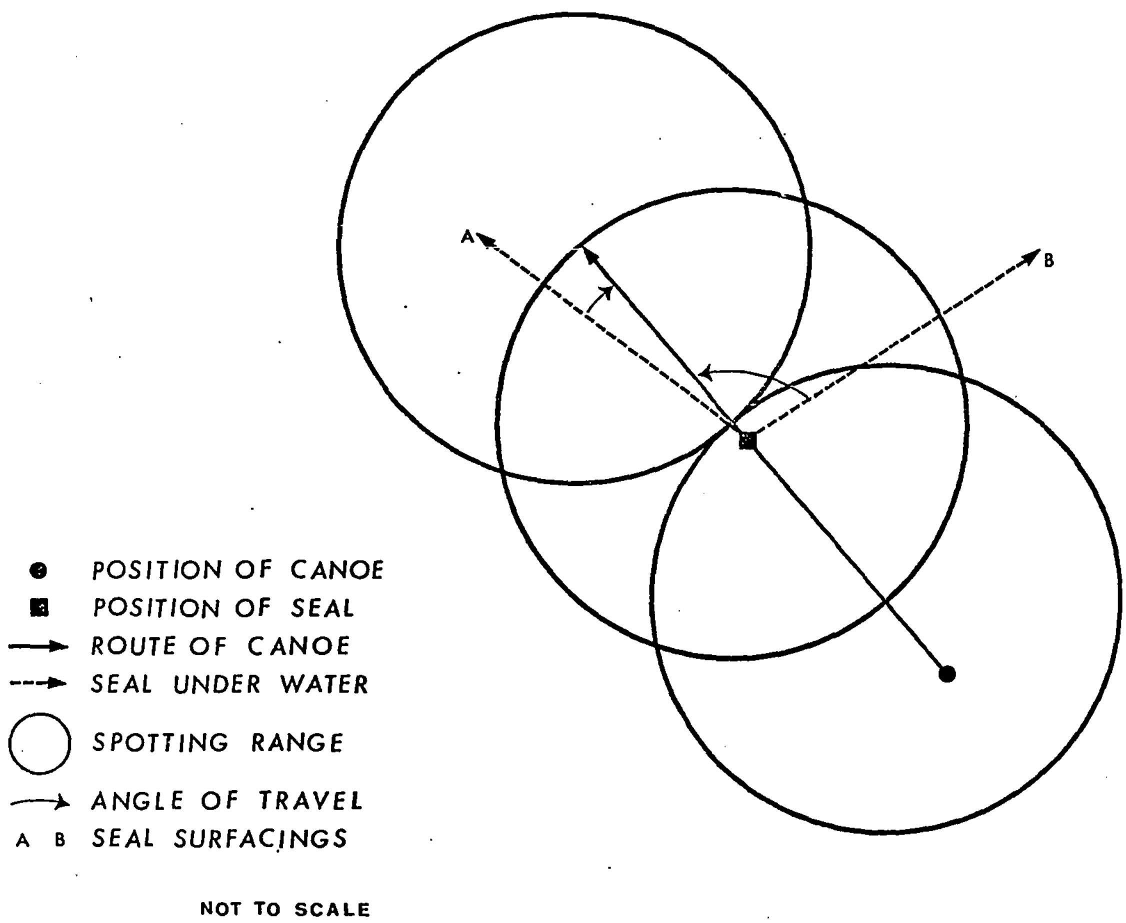


FIG. 13

5.3 Summation.

Spotting ranges are basically determined by the position of the hunted animal in relation to the hunter. This can be broken into the two categories of basking animals and animals in the water. Variations in spotting ranges between these two positions are related to the amount of the animal's body which can be observed by the hunter. Basking animals have much greater spotting ranges because their total body is exposed to view whereas only the heads and a small portion of the backs of the animals in the water are visible.

Variations in spotting ranges for basking animals are determined mainly by species. The larger the animal, the greater the spotting values.

Ice conditions also influence spotting. Hummocked and rough ice block animals from view and ranges are determined by the maximum direct line distance between the seal and the hunter. This in turn is determined by the pattern of hummocks around the basking animal.

Conditions of light and the general atmosphere were not found to be too significant in restricting spotting ranges as basking usually coincides with high light values and periods of fine weather.

Technology both hinders and helps spotting for basking animals. Telescopes and binoculars extend ranges through improved optics. Ski-doos, on the other hand, lower spotting ranges through increased attention demanded to steer the machine and the increased noise level which spooks the seals.

Conditions controlling spotting ranges for animals in the water seem to be more variable than for the basking animals. The main factor influencing spotting ranges is the color of the water surface and the contrast it provides against which the dark color of the seal's head can be seen. Maximum spotting range occurs with a pearly surface under a completely overcast sky.

Cloud conditions are very important in influencing water color. High, thin cloud produces light colored surfaces providing excellent spotting whereas lower, heavy clouds bring about a reduction of ranges due to the darkened water surface.

Waves also affect spotting conditions. Wave action under six inches reduces ranges by darkening the water surface whereas waves over six inches block the animals from view.

A blocking effect is also noted among pan ice. The heavier the pan ice the more restricted the spotting range. Conditions of concentrated pack ice extending over large areas have a greater influence on spotting values than any other factor.

Only extreme light conditions which either obliterated detail due to surface glare or which obscured animals because of darkness were noted to have a direct effect on spotting ranges. A threshold light value which is related to hunting as an activity was noted for both basking animals and animals in the water.

Of general atmospheric phenomena only fog restricts spotting ranges to a significant extent. The degree of restriction is related to fog density.

Animal behaviour also influences spotting ranges. The different swimming and diving styles of ringed seals, bearded seals and walrus reduce to a factor of noise level and movement at the surface which may alert the hunter to the presence of game beyond his normal limit of vision.

The role of technology has an indirect but very real influence on spotting values. With the increased speed and mobility provided by the motorized canoe the Eskimos must adjust rates of travel both when looking for and stalking animals to ensure all seals in the area surface and remain within spotting range.

CHAPTER VI

SHOOTING RANGES.

Shooting range refers to the distance between the hunter and the stalked animal at the moment the rifle is discharged. The statement in no way implies a consideration of the maximum range of the rifle but involves the effective range. There is a considerable difference between these two. The hunters of Iglulik are equipped with modern, high powered weapons such as the .222, .243 and .30-30. A bullet discharged from any of these rifles is dangerous for a radius of several miles. However, its effective range, when directed at a specific target is considerably less. Studies at Ikpiadjuk indicate that the maximum effective range, as utilized by the Eskimos hunting the marine environment, is approximately 150 yards. [1.] This value represents the maximum recorded distance at which game was secured and beyond which a negligible amount of shots were fired. Although 150 yards is the maximum effective range the Eskimos usually work well within this limit and many different factors combine to keep the ranges well below this value.

6.1 Species Landed.

Figure 14 gives the mean shooting range according to species hunted. The graph, based on a sample of 900 observed shots, shows that there are considerable variations between the different animals. It is also shown that the mean shooting range

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1. An effective range of 150 yards is also given by Sonnenfeld (1957) in his study on the subsistence changes among the Barrow Eskimos.

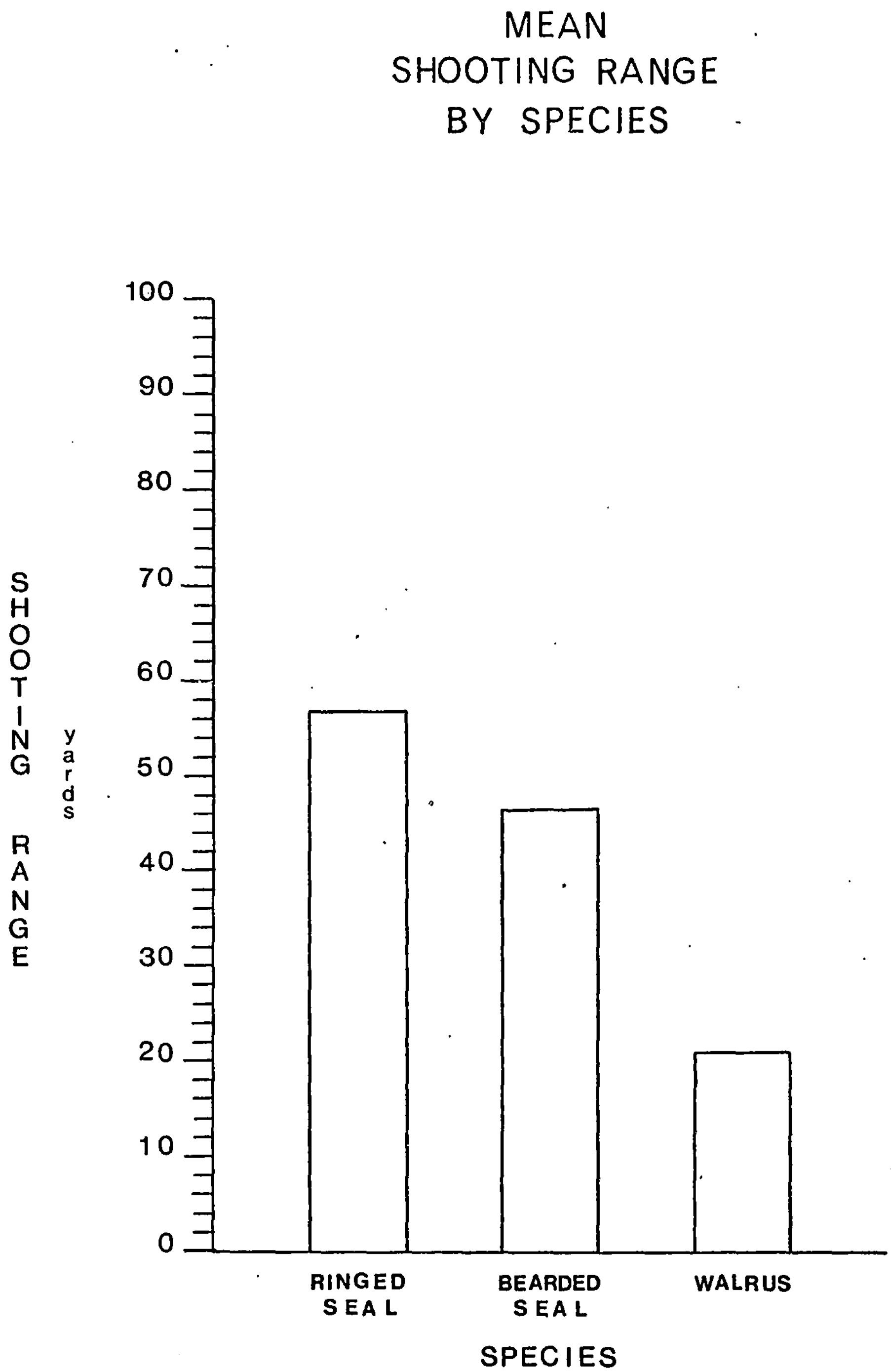
MEAN
SHOOTING RANGE
BY SPECIES
SHOOTING RANGE
yards
100
90
80
70
60
50
40
30
20
10
0
RINGED SEAL
BEARDED SEAL
WALRUS
SPECIES

FIG. 14

for all species is well below the maximum of 150 yards. The discrepancy of ranges between species can be explained by a factor of animal behaviour.

6.1.1 Ringed Seals.

Of the marine mammals hunted around Iglulik, the ringed seals are the most cautious in their response to the hunter. This caution is reflected in the comparative shooting ranges given in Figure 14 which represents a rough measure of approachability. The wariness of basking ringed seals has been well documented by other writers (Freuchen, 1935; Nelson, 1969) and the Iglulik seals are no exception. When basking on the ice ringed seals will rarely sleep soundly but will always check the surrounding area for signs of danger. Head movements taken on an undisturbed, basking ringed seal showed that the seal would raise its head for a second or two every minute. However, when once alerted to a possible source of danger the average time spent with the head down was only twenty-five seconds and its head was up for an average of seven. A great deal of skill is needed to successfully stalk a basking animal and the seal will slip down its hole at the slightest indication of danger.

When ringed seals are in the water their behaviour changes markedly. Nelson (1969) reports that when in the water ringed seals are attracted by gentle noises and even the sight of a man. Freuchen (1935) noted that inexperienced seals are attracted by the noise of a motor and will come closer for a better look.

Although the seals at Iglulik were observed to be much more curious in the water than when basking they generally did not display such marked curiosity as reported by Nelson and Freuchen. Generally, the seals were noted to be quite wary of the hunters and motor noise. Freuchen states that ringed seals are attracted by a motor boat only when they do not know what it is. However, when the boat has been in the district for some time and has scared the seals by hunting them, they soon learn to associate the motor boat with danger.

There is evidence that this has occurred at Iglulik as a result of increased boat traffic and hunting pressure. Before the Hudson's Bay post was opened in Seneria in the winter of 1967, there was a great deal of boat traffic between the two settlements as hunters came to Ikpiadjuk regularly for supplies, hunting both ways on the journey. The increase in hunting intensity due to the concentration of population at Ikpiadjuk has also caused the seals to become wary of man. Although ringed seals still might be described as curious animals more and more seals in the area are surfacing identifying the noise or object as a source of danger and leaving immediately.

6.1.2 Bearded Seals.

Such marked behavioural changes in bearded seals and walrus have not yet been observed. Bearded seals will allow themselves to be approached much more closely than ringed seals both when on the ice and in the water which is reflected in the shooting ranges given in Figure 14. Bearded seals are hunted intensely for only about three months of the year. This less intense hunting pressure does not develop the same fear of the hunter as is found in ringed seals which are hunted year round. The relative ease with which bearded seals may be approached has been documented by many writers (Freuchen, 1935; Nelson, 1969; Burns, 1967; King, 1964). When hunting it was not uncommon to have observed bearded seals approaching the boat to see what the object was and even after repeated shots the animals stayed in the area surfacing frequently. When wounded however, bearded seals will make every effort to get away and are hard to catch.

Basking bearded seals are also easy to approach. Freuchen (1935) noted that it was very easy to paddle up to bearded seals because they slept soundly and felt secure on the drifting ice pans. The Eskimos of Iglulik do not paddle up to the sleeping animals but move in with motors at low speed and fire from about forty yards. The animals are well aware of the boat but show little sign of alarm.

Burns (1967) feels that such a low level of concern is typical of bearded seals only in certain seasons of the year. He reports that during the winter months the seals are much more wary and will spook at the slightest provocation. The author is unable to corroborate this due to a lack of information on winter conditions.

6.1.3. Walrus.

Figure 14 indicates that walrus are even easier to approach than bearded seals. This is explained in part, by the fact that, like the latter, they are not hunted intensely year round. Nelson (1969) reports on the ease of approaching basking walrus, His observations are readily supported by the behaviour of the walrus in Foxe Basin.

The pattern of hunting walrus is to move slowly up to the ice pans with engines running. The walrus notice the hunters' presence at about 200 to 250 feet but make little effort to escape into the water. Many merely raise their heads for a few seconds and then go back to sleep. It is not until the shooting actually starts, at about twenty yards, that the walrus dive into the water. On one occasion, while stalking a single basking male, the hunter approached to ten yards and shot the animal which never once looked up. It seems from this that walrus are very sound sleepers and feel quite secure when basking. Certainly, there are no head movements on undisturbed, basking walrus which indicate they are keeping watch.

6.2 Animal Age.

A further biological factor influencing shooting range is the age of the animals being hunted. The curiosity of all young animals is well known and seals are no exception. Young ringed seals are easily recognizable not only by their size and coloring but also by their behavioural patterns. They can be drawn in to the hunter by low scraping noises on the boat or ice. At the surface they are often observed swimming along toward the boat stopping in once place to wriggle higher in the water to get a better view of the object. They often remain in an area bobbing on the surface in one to five second dives moving gradually closer and closer.

The behaviour of young seals is in marked contrast with the older seals which were not so easily drawn in by scraping or gentle noises. The older seals were often observed to take one look, dive and not be seen again. This is especially true of the seals that inhabit the complex coastal regions west of Iglulik Island. Here, when a seal was spotted it was noted as a mature animal by its large size, dark color and wary behaviour. These seals were usually sighted only once and the Eskimos spent little time hunting them but preferred the wide inlets and bays which contained the immature animals.

Figure 15, which is based on a sample of seventy-two shots, shows the mean shooting range plotted against the age of ringed seals. There is insufficient data to plot a similar graph for either bearded seals or walrus due to the low number of immature animals taken from both species. As can be seen from the graph there is a marked increase in shooting range with the age of the animal which reflects an increasing wariness. McLaren (1958a) also noted the curiosity of young seals and recorded that they became much more wary as they grew older. He points out that the older seals and the recently matured seals probably do not differ in catchability. This assumption is supported by the graph which begins to level off around six years old which is near the age when ringed seals mature.

MEAN SHOOTING RANGES
AND RINGED SEAL AGES

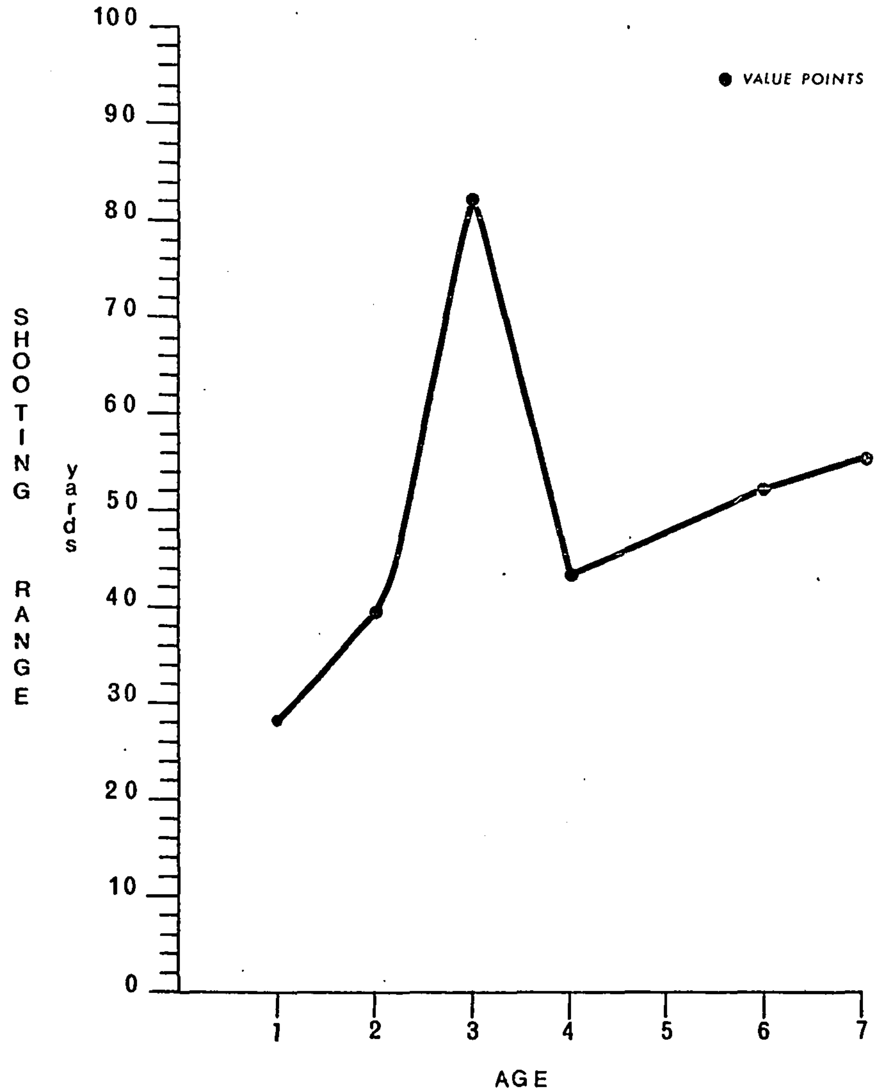

FIG. 15

The three year old seals show up as an anomalie on the graph. This is explained by the fact that there is a low sample for this age group. All three year olds for which data are available were shot at the floe edge on the first surfacing which influences the results. It is felt that if a wider sample were available which included seals shot in open water as well as at the floe edge the shooting ranges would be considerably lower for the three year olds and more in line with the slope of the plot.

6.3 Animal Behaviour and Hunting Methods.

The hunting technique used when stalking bearded seals and walrus in the water involves the necessity of close range firing. Both animals are first severely wounded to weaken them for harpooning without danger to the hunter. To do this the hunter must be in such a position as to shoot into the diving animal's back and mid-section. The angle of shooting should be such that the bullets will go into the organs of the seals or walrus and not just penetrate the layer of fat. This means that the hunter should be relatively close to eliminate a flat trajectory. Generally, when hunting walrus in the water the hunter will shoot from a standing position to increase the angle of entry into the body. He must, however, sit down when shooting at bearded seals due to the increased accuracy needed to hit the animal's back. The hunter must also be sufficiently close to the animals to harpoon them once they are in a weakened condition. Maximum harpooning range is approximately twenty-five yards.

Eskimo hunters use their knowledge of animal behaviour to keep shooting ranges low. With the walrus there is not too much trouble keeping track of the animals when they dive. Although powerful swimmers, they cannot swim too fast. [1] Furthermore, walrus are not deep divers and on a calm day, especially if swimming in a group, they create a wake on the surface which indicates exactly where they are going and the hunter can be right on top of them when they surface.

Such is not the case with bearded seals. They are deep divers and fast swimmers leaving no indication on the surface of which way they are going to go. The hunters must judge the direction of swimming from the dive of the seals (see Figure 13). Bearded seals have the capacity to swim beyond spotting range and therefore the Eskimos shorten their diving times by forcing them to submerge before they have had time to draw a proper breath of air. As soon as bearded seals surface they are shot at with a .22 rifle, forcing them to dive again. By denying adequate breathing space the length of time they can stay under the water is considerably shortened. The hunters are able to get closer and closer for good body shots with a high velocity rifle as the seals become more weary. Finally, when the seals have been mortally wounded and are too weak and exhausted to dive, the canoe closes with the animals and they are secured by a harpoon.

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1. Loughery (1959) gives a maximum swimming speed of about six miles per hour.

Freuchen (1935) reported that bearded seals can stay below the surface for up to fifteen minutes even when hit, though not in a vital spot, if the animals have had time to draw a proper breath before diving. The maximum dive time recorded for an undisturbed bearded seal in the Iglulik area was eight minutes. However, there were some which were timed but never reappeared and therefore, are assumed to have been down much longer than eight minutes swimming beyond spotting range. The mean dive time taken on an undisturbed bearded seal is six minutes fifteen seconds. In sharp contrast is the mean dive time taken on seals forced down. In this case the time is two minutes five seconds. It is clear that the practice of forcing the animals down before they can draw a proper breath helps to keep the animals within the operational ranges of the hunters.

6.4 Light and Atmospheric Conditions.

The shooting ranges of Eskimo hunters are not severely limited by general atmospheric conditions. If the weather had deteriorated to such an extent so as to influence shooting, hunting as an activity would have ceased long ago. For example, rain, snow and fog, if of the intensity so as to hinder the maximum effective range of 150 yards, would be near the intensity to stop hunting. This is also true when considering light conditions. Once light values have decreased to such an extent to hinder shooting then spotting ranges have been reduced so as to stop hunting.

6.5 Shooting Position.

One of the most important influences on shooting ranges is hunter shooting success. Shooting success is controlled by the relationship between the animal and the hunter at the time of firing. This involves much more than merely the straight line distance between two objects. Much has to do with the stability of both the shooting platform and the target. The hunters attempt to reduce shooting ranges in order to adjust to unstable shooting conditions. In the hunting cycle of the Igluligmiut there are many different firing relationships that result from seasonal changes in the physical and biological subsystems.

During the spring the Eskimos hunt both floe edge and basking seals. In the first case the hunters are firing from a very stable platform on the landfast ice at seals in the water which present a small, moving target. When hunting basking seals both the hunters and the seals are on solid ice and are both in a stable position in regard to shooting. With break-up the hunters begin utilizing canoes as the main form of transportation. Under these conditions the hunters shoot at ringed seals, bearded seals and walrus from the canoe whether stationary or moving. In both these situations the hunters are on a very unstable platform and the animals in the water present a difficult target. Of the two situations, the moving canoe is by far the most unstable. Basking bearded seals and walrus are also hunted by both stationary and moving canoes. Special effort is made to keep the canoe stable and, as the target is also stable, shooting success is high. Basking ringed seals are not hunted by canoe as they are usually only found in the middle of very large floes and must be stalked by foot. Similarly bearded seals and walrus are generally not shot at from ice as during the period of observation they were hunted almost exclusively among small pans or in the open water.

All of these situations vary in hunter shooting success as is shown by reference to Figures 16 and 17.

6.5.1 Ringed Seal.

A. Breathing Hole.

When examining shooting ranges and hunter success for ringed seals, Figure 16 shows that the highest probability of a hit comes when hunting the breathing hole. Although no shots were observed during this hunt type the author was present when such a hunt took place. The hunt was conducted on June 23, 1969. At this time the breathing hole was completely exposed and about one and a half feet across. Seals coming to breathe would fully expose their heads making an excellent target for the hunters who sit only three feet away. Under these conditions the probability of a hit is very high and is estimated at about ninety per cent.[1] Although shooting success is very high the hunters rarely utilize the breathing holes because of the very long wait involved and the uncertainty that a seal will even show.

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1. The Eskimos reported that hunters on occasion do miss due to the sudden movements of the seal.

SHOOTING POSITION —— SHOOTING SUCCESS

RINGED SEAL

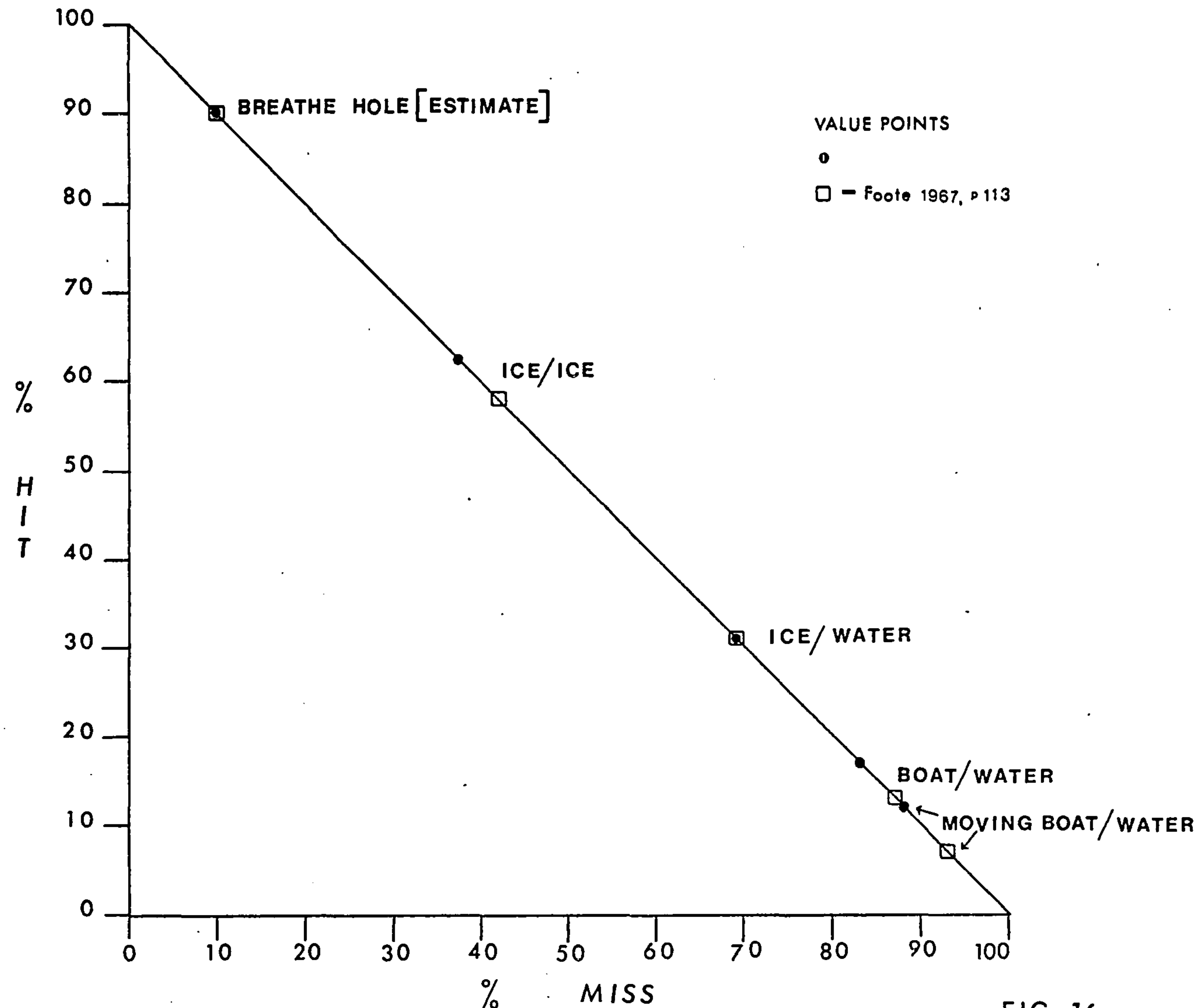

FIG. 16

B. Ice to Ice.

Shooting conditions with both the hunters and the seals on the ice are also quite successful. Under these conditions both the shooting platform and the basking ringed seal as a target are extremely stable. The mean shooting range on basking ringed seals is eighty-five yards and the hunters achieve a sixty-three per cent shooting success.

C. Ice to Water.

Shooting success drops from the above position with increasing instability of the shooting platform or target. With the hunters on the ice and the seals in the water there are fewer hits although reference to Appendix 6 shows that the mean shooting range to be less than for basking animals. The hunters are on a stable platform but the target is unsteady. Ringed seals present a small moving target and are on the surface only for a very shory time. The mean surface time of a hunted ringed seal was recorded at eighteen seconds. Many bob up and down in the water diving and re-surfacing quite rapidly increasing the instability of the target.

When hunting seal in the water from ice the hunters have little opportunity to adjust shooting ranges to achieve a greater success. The position at which the seals surface is controlled by the floe edge. In a normal situation, surfacing out from the floe edge would probably be random. However, Bradley (1970) has indicated, due to intense hunting pressure in the Iglulik area, that surfacings are no longer random but that the seals will be wary of coming up close to the floe edge. Therefore, the hunters have little control over shooting ranges in this situation.

D. Boat to Water.

When hunting ringed seals from a canoe Figure 16 shows that hunter success drops further even though the shooting ranges given in Appendix 6 are considerably lower. Under these conditions both the shooting platform and the target are very unstable. When using a canoe hunters can control shooting ranges by pursuing the seals but the motion of the boat lowers shooting success. Even in the stopped canoe the slightest movement will cause rocking and create difficulties for the shooter. Generally, two to three Eskimos hunt from a single canoe and the movement is considerable.

One of the most serious causes of instability results from the fact that each hunter is competing with the others. [1.] When a seal is spotted within range all hunters in the boat raise their rifles and swing to where the seal has been sighted. Each hunter knows that he must not only fire within eighteen seconds before the seal goes down but also before the others shoot. The instability of the canoe plus the sharp competition results in only seventeen per cent of the shots hitting the target in spite of the fact the range when measured in straight distance to the target is quite low.

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1. When hunting ringed seals the skin is claimed by the person who killed the animal and there is little sharing of skins.

E. Moving Boat to Water.

A canoe under power is even more unstable. Not only is the canoe affected by the motion of its occupants but also by the steady rising and falling caused by the displacement of water by the hull. Even though shooting ranges remain essentially the same as the stopped canoe, hunter success drops as a result of the motion. Shooting from a moving canoe is further complicated by the fact that both the hunters and the target are moving. The hunters try to cut down on this double movement as much as possible by heading toward the seal so that the hunter can shoot straight ahead and not be forced to compensate for any forward movement of the canoe.

Hunting ringed seals from a canoe is one of the least successful of all hunting positions in terms of shooting (with no consideration made of landed catch). The Eskimos are well aware of this and make every effort to reduce shooting ranges to compensate for the instability. Comparison of the mean shooting range by species given in Figure 14, which is a rough measure of approachability, and the mean shooting range for hunting from a boat listed in Appendix 6, indicates that the hunters have adjusted shooting ranges to their maximum in an attempt to compensate for shooting success. Furthermore, whenever they can the hunters land to shoot from the floe edge, a drifting ice pan or from the shore in order to increase the probability of a hit.

6.5.2 Bearded Seal.

A. Boat to Ice.

Figure 17 shows a similar relationship between shooting success and hunter-target stability for bearded seals. Here too, as is shown in Appendix 6 hunters make every attempt to adjust ranges in order to compensate

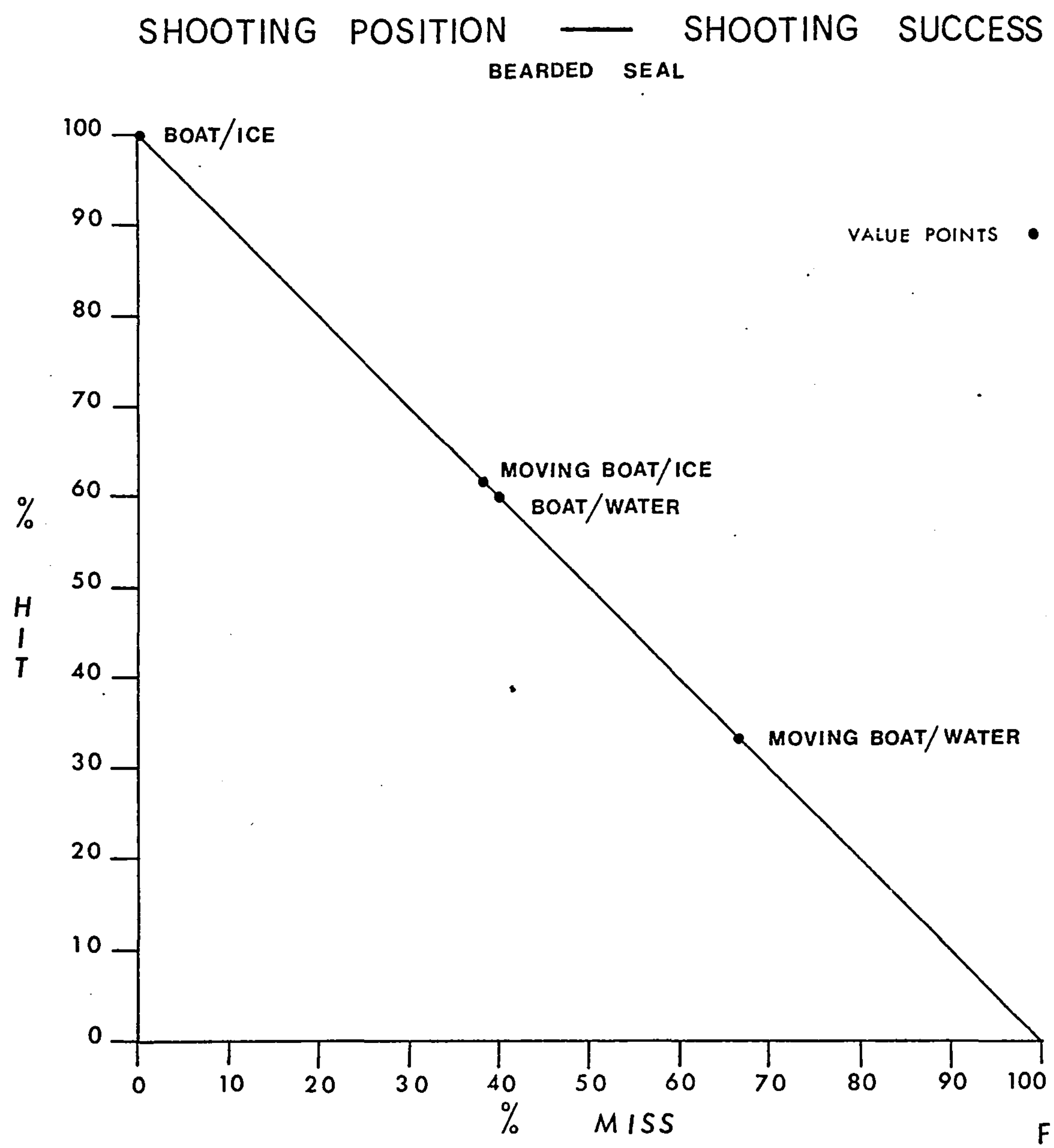
SHOOTING POSITION —— SHOOTING SUCCESS
BEARDED SEAL
BOAT/ICE
VALUE POINTS
MOVING BOAT/ICE
BOAT/WATER
MOVING BOAT/WATER
% HIT
% MISS
0
10
20
30
40
50
60
70
80
90
100

FIG. 17

for low shooting success. Shooting from a stationary boat to basking bearded seals shows up as a very successful way to hunt. The animals present a stable target, moving only slightly to observe the approaching canoe. Furthermore, because of the equal division of the catch including the skin, there is not the competition for bearded seals.[1.] The hunters, under these conditions wait until all motion in the boat has stopped. One man is chosen to do the shooting with a second ready to quickly fire should the first shot miss. Both kneel in the front of the canoe resting their rifles on the side of the boat to get a steady aim. As the animals are basking and are fairly unconcerned there is not the need for quick shooting as when hunting ringed seals. With a steady shooting platform and a fairly low shooting range of fifty yards, success is very high. The data shows a sample of ten shots and it is felt by the author that if the sample were larger the per cent of hits to misses would probably drop to about eighty per cent. However, even this is high and results from shooting stability and the approachability of basking bearded seals.

B. Moving Boat to Ice.

The influence of the unsteady shooting platform comes out clearly when one takes a further case in the analysis. When shooting from a moving boat to ice hunter success drops very markedly even though shooting ranges are less. The hunters still co-operate in steadying the boat. The shooter kneels, resting his rifle on the gunnels but the aim is not

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1. Unlike ringed sealskins bearded sealskins are not generally traded but are used for the manufacture of material products and are therefore easily divisible.

so steady due to the movement of the canoe underway.

C. Boat to Water and Moving Boat to Water.

Hunting bearded seals in the water from a canoe runs into the same considerations of movement of both shooting platform and target as with ringed seals. A comparison between Figures 16 and 17 shows that although problems are similar there is a much greater shooting success for bearded seals. There are several reasons for this. First of all, shooting ranges on bearded seals are lower, resulting from approachability and from the practice of forcing the animal to dive. Secondly, there is much less competition and therefore more co-operation between the hunters when hunting bearded seals. The hunters co-operate in an effort to keep the canoe as steady as possible which results in a fairly satisfactory ratio of hits to misses. Finally, the behaviour of bearded seals makes them an easier target than ringed seals. Bearded seals give more warning when they are going to dive. The dive itself is often relatively slow. Furthermore, a large area of the back and mid-section is exposed when the animal dives giving a fairly large target at which to shoot.

6.6 Summation.

Shooting ranges are controlled primarily by the behavioural responses of the different animals to the hunter. This resolves into a consideration of the approachability of the different animals. Bearded seals and walrus are easier to approach than ringed seals and as a result shooting ranges are lower on these two animals.

Age of the hunted animal will influence shooting ranges. The younger animals are more curious and easier to catch whereas the older, mature animals are more wary of the hunter. This difference results in variations in shooting ranges by animal age.

The diving habits of bearded seals and walrus and the hunting methods employed by the Eskimos also help to determine shooting range. The method of hunting these two animals involves close range firing to eliminate a flat trajectory. The Eskimos force the animals to dive before they have had time to draw sufficient air. This way the animals are both weakened and kept within operational ranges.

One of the most important influences on shooting ranges is hunter shooting success. This resolves into a consideration of the stability of the shooting platform and the target. The more stable shooting conditions tolerate greater ranges whereas when firing from an unstable position the hunters will attempt to compensate by reducing ranges.

General atmospheric conditions of rain, snow, fog and light have little direct influence on shooting values.

CHAPTER VII

RETRIEVING RANGES.

Retrieving range refers to the maximum distance between a hunter and a killed animal over which recovery is possible. Involved is a consideration of time and distance. The distance is the straight line measure between the hunter and the game at the time the animal was killed. This, of course, is controlled by the shooting range. Recovery time is a function of the relative position between the hunter and game and the hunting equipment used in the recovery process.

When considering retrieving ranges there must be a differentiation between marine and terrestial animals. Retrieving ranges do not, in practice, apply to animals shot on land. For animals shot on land there is not the consideration of time as there is no danger of losing the game once it has been killed. Under these conditions retrieving range equals shooting range. However, when hunting the marine environment retrieving ranges become crutial for successful hunting. Both time and distance become important as there is a possibility that the game will be lost due to sinking.

7.1 Causes of Sinking.

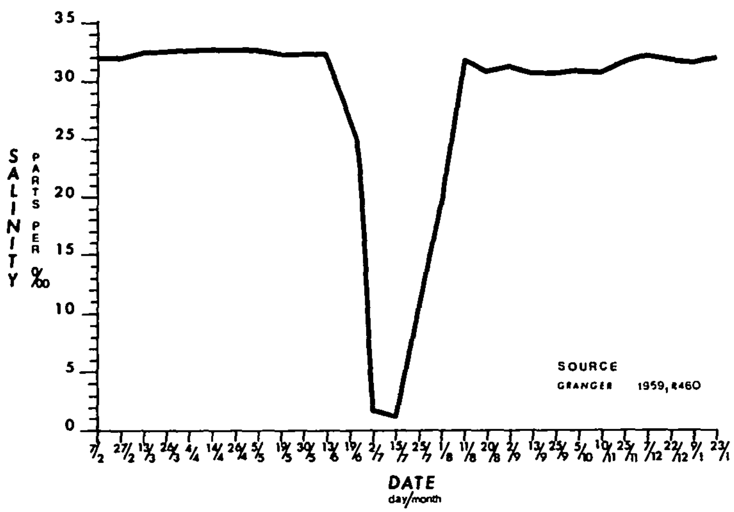
Losses occur on a seasonal basis with the highest number of sinkings coming during the summer months. The causes, which have only been partially investigated, are summarized in Figure 18.

7.1.1 Variation in Body Density.

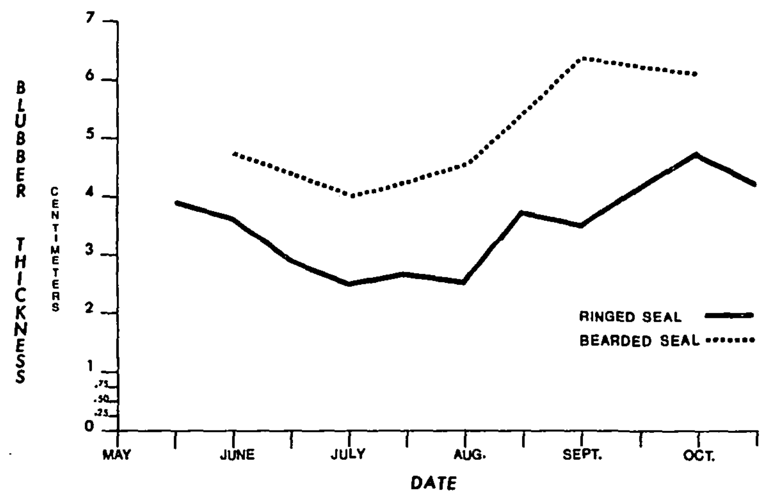
Figure 18 indicates that the seasonal reduction in blubber thickness is one of the most important factors influencing the sinking of seals. Blubber thickness of ringed seals varies markedly on a seasonal bases. There is a general decline of blubber in early spring which reaches its

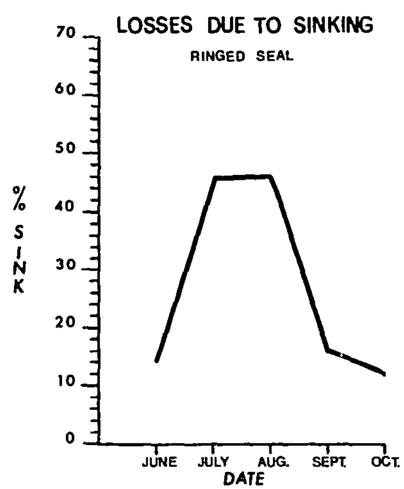
SEASONAL LOSSES DUE TO SINKING

SEASONAL VARIATIONS IN SURFACE SALINITY



SEASONAL VARIATIONS IN BLUBBER THICKNESS





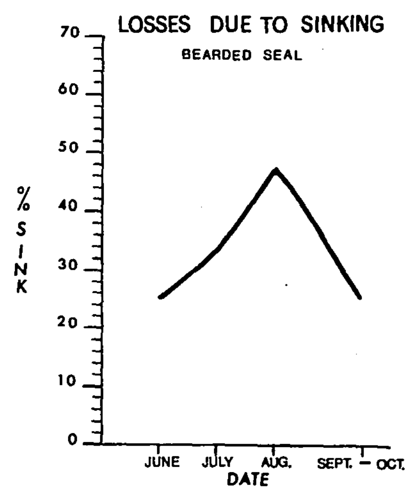


FIG. 18

lowest point by late July. The decrease in blubber thickness coincides with the period of fast which lasts during the season of intense basking. Since blubber has a low specific gravity, the overall density of the seals increases with the reduction of the blubber layer which results in many of the seals sinking (McLaren, 1958b). However, by the end of July much of the fast ice has been broken up and basking becomes less intense. With the decrease in basking the seals start to feed once more and blubber thickness increases sharply through August to reach prime condition around freeze-up (McLaren, 1958b).

Bearded seals follow a similar trend though less exact knowledge is known about the cycle. By the time bearded seals appear in large numbers off Iglulik Island their blubber thickness is already below peak condition. It continues to decline reaching a low point in July, at which time the blubber slowly begins to build up again. From August on the blubber thickness of bearded seals rapidly increases and reaches a peak condition sometime just before freeze-up.

For both animals specific gravity is lowest when the blubber is thickest. Hence one would expect losses due to sinking to be greatest when blubber layers are thin due to increased body density of the animals. This is confirmed both by field observations and an experiment carried out by Bradley (1969). Bradley, using a seal which had been recently recovered, removed slices of blubber from the ventral area of the body of the animal to lower the proportion of fat on the animal. With each piece of blubber removed, the seal was put back into the water to determine the effect. The seal continued floating until 925 grams (1.93 pounds) of blubber had been removed at which time the seal sank. This experiment stands in marked contrast to another carried out by the author. In this case seals that had just recently been recovered were put immediately back into the water untouched to see how long they would float if left. The seals gave every indication of floating indefinitely. A comparison of the two experiments clearly brings out the importance of the blubber layer as a factor influencing floating.

7.1.2 Variation of Water Density.

A second factor outlined in Figure 18 effecting the sinking of seals is the density of the water in which the animals were shot. The more dense the water the more buoyant the seals. With water of low density one would expect to find high losses due to sinking. As can be seen from the figure there are considerable seasonal variations in salinity which influences water density. The variations are caused by the flow of fresh water into the sea during break-up. Granger (1959) noted that the decrease in salinity coincided with the first signs of spring melting. The fresh water comes as runoff from the snow and ice on surrounding land, the release of water from melting rivers and the deterioration of vast areas of ice which cover large parts of the sea. Salinity begins to increase toward the end of July as by then most of the heavy inflow of melt water has already run off from the land and snow packs. As more and more of the pack ice is blown out of the area and is eliminated as a source of fresh water salinity increases steadily. Toward the end of August salinity builds back to a fairly constant level as most of the pack ice has gone and extensive melting ceases as temperatures drop below freezing.

The importance of salinity effecting water density is quite significant in influencing floating and was well brought out by an observation made during the 1968 field season. The author was hunting with two Eskimos at a location some five miles to the west of the Rowley River in eastern Steensby Inlet. A ringed seal was shot and immediately sank. When the party went over to the area where the seal was shot it was observed to be floating some five feet below the surface at the fresh-salt water interface. The seal had sunk rapidly through the water of low density to be stopped by the saline water below. The Eskimos reported that this was not an unknown occurence to them.

7.1.3 Air Buoyancy.

One of the most difficult features to assess, and yet one which is felt by the author to have an effect on the floating ability of seals, is the amount of air in the respiratory and digestive tracts of the animals at the time they are killed. If the lúngs and intestines of the seals are full of air this tends to make the animals more buoyant. It is not uncommon for a seal, particularly a bearded seal, once having sunk to rise to the surface several hours later due to the gas trapped in the intestines and stomach. Such a feature of air in an animal's system is very difficult to evaluate, especially under hunting conditions. Certainly more research needs to be done to arrive at a more meaningful statement about its effect on the ability of seals to float.

7.2 Seasonal Variation in Sinking.

The factors of changing body and water density have perhaps the greatest influence on the seals' ability to float. Reference to Figure 18 shows that both undergo considerable seasonal variations. However, the important feature of the figure is that the two follow similar patterns with values dropping off in the summer months and the low points occurring through July. Both increase steadily from August on. With the parallel cycles one would assume that the greatest losses due to sinking would come from mid-June through toward the end of August. The graphs in Figure 18, giving the seasonal variations in sinking of ringed seals and bearded seals, support the above assumption. The figure shows that high losses fall exactly where expected and correlate very well with reductions in blubber thickness and salinity.

7.3 The Concept of Retrieving Ranges in the Marine Environment.

As has been stated, retrieving ranges apply strictly to the marine environment. However, even here a distinction must be made between basking animals and animals in the water. In actual practice retrieving ranges refer only to animals which have been shot in the water. When basking animals are killed, and barring such accidents which may cause the animals to slip off the ice into the water, the animals have at the same time also been secured. Under these conditions retrieving range is equal to shooting range. The time element has been removed and retrieving range is strictly a measure of the distance at which the animals were shot. This applies to all basking animals; ringed seals, bearded seals and walrus.

A similar situation exists when hunting walrus and to a lesser extent bearded seal in the water. The practice utilized when hunting these two animals is to chase them down by canoe, shooting them several times in the back and mid-section to greatly weaken them (see Chapter VI, Section 6.3). Once they are sufficiently weak and of no great danger to the hunters they are secured by a harpoon and float. Once harpooned, the Eskimos can shoot the animals in the head which will kill them instantaneously. Here too, like the basking seals, there is no element of time involved in retrieving ranges. The hunters can dispatch the animals at whatever range they like and have little worry that they will lose the animals due to sinking. In this situation retrieving range is the same as shooting range.

It might be argued that in this case it is not the shooting range which is important but the harpooning range. This, in fact, is quite a valid point for it is when the animal is secured that is significant rather than when it is killed. There are variations in harpooning ranges when dealing with bearded seals and walrus. There is very little danger from wounded seals and once the animals are in a sufficiently weakened state the harpoon is thrust into their backs from a range of about three feet. There is, however, considerable danger when dealing with walrus. Even though the walrus are left in a very weak state from repeated shots they remain extremely dangerous due to their immense size. The tusks of a walrus can easily demolish a canoe and the Eskimos are extremely wary of them. For this reason the walrus are given a wide berth and the harpoon is thrown from its maximum effective range of approximately twenty-five feet.

When hunting ringed seals in the water and bearded seals which are killed before being harpooned retrieving ranges become extremely complex. A large number of seals are lost by the Eskimo hunters due to sinking during the summer months. The sinking of seals has a very real influence on the whole concept of retrieving ranges. It is not merely a matter of seals floating for awhile and then sinking. Some sink instantaneously while others seem to float indefinitely. A very small number of the animals shot, four per cent and nine per cent for ringed and bearded seals respectively, float for awhile and then sink. However, it is impossible to predict what any single animal will do when killed.

A partial assessment of retrieving ranges can be made on seals that float for awhile before sinking and the unknown factor of whether the seal will float or not. During the summer months the Eskimos recover floating seals as quickly as possible because the seals give no indication of whether they are going to float or sink. This results in lost information to the investigator of what proportion of the seals shot will eventually sink. Instead, data must be gathered on the reaction of the hunters.

The maximum recorded time that a ringed seal floated before sinking was fifty seconds. For the bearded seal this was reduced to thirty seconds. This means that as far as the Eskimos are concerned, for all those seals recovered within fifty seconds and thirty seconds or less depending upon species, there was a very real possibility of the seals sinking. Field data show that thirty per cent of the ringed seals and thirty-eight per cent of the bearded seals were recovered in under fifty and thirty seconds respectively. This means that the consideration of retrieving ranges for ringed seals involves the thirty per cent recovered under fifty seconds plus the four per cent which float before sinking giving a total of thirty-four per cent of all animals shot. For the bearded seals this is increased to include the thirty-eight per cent recovered in under thirty seconds plus the nine per cent which floated before sinking giving a total of forty-seven per cent of all animals shot. For the balance, seventy-six per cent for the ringed seal and fifty-three per cent for the bearded seal, retrieving ranges do not apply as these animals either float or sink.

7.4 Hunter Adjustment of Retrieving Ranges.

7.4.1 Shooting Position.

Although the hunters have little control over the actual retrieving ranges they do attempt to adjust hunting methods and technology to maximize retrieving efficiency. Shooting position represents one of the most important adjustments made by the hunters.

For the seals that floated a while before sinking, the mean float time for the ringed seals was thirty-five seconds and for the bearded seals, twelve seconds. This means that for ringed seals that floated the hunters had to be in a position to cover the shooting range within thirty-five seconds to affect a recovery. When hunting seals from a moving boat this should be no problem for the mean shooting distance for open water can easily be covered by a canoe in motion. However, if the canoe is stationary with the motor off or if the hunter is shooting from ice to water and has to launch his canoe for recovery then it is unlikely he will get to the seal before it sinks.

An examination of hunting data revealed that of those ringed seals that floated an average of thirty-five seconds and yet finally sank all were shot when the hunter was in an unsatisfactory position in regard to recovery. Three were shot when the hunter was on the ice, one was shot from a stationary canoe and two were lost due to equipment failure. When compared to ringed seals that were recovered in thirty-five seconds or less the importance of shooting position is clearly brought out. Most of those recovered were shot from a moving boat and the hunters were able to easily cover the shooting distance to the seal. The remainder were killed at such close range that the hunters were able to get to them in under thirty five-seconds even though they were not in a moving canoe at the time. For those seals not shot from a moving canoe and yet were recovered, the mean shooting range was recorded at twenty-one yards. This is well below the average range for summer seal hunting (see Appendix 6). The maximum recorded distance a seal was recovered under such conditions was thirty yards. This distance is felt to be fairly representative of the maximum retrieving range for a hunter shooting from a non-moving boat.

The hunters are well aware of this recovery relationship and attempt to place themselves in the most favorable position to the floating seal. During the period when seals are sinking over seventy per cent of the shots taken at ringed seals are from a moving canoe. In this position the hunters have the highest probability of affecting a recovery and are operating within the open water shooting ranges.

Bearded seals, for those animals that float before sinking, have a mean floating time of twelve seconds. As bearded seals are almost always shot from a moving boat when killed the hunters are operating well within retrieving range. Data reveal that losses of those bearded seals that floated awhile before sinking were due to mechanical problems with the engine or hunter error, and not the inability of the canoe to cover the distance to the animals within twelve seconds.

7.4.2 Retrieving Time.

Although retrieving ranges are difficult to deal with in terms of absolute distances there are seasonal variations in time expended on retrieving seals. This may serve to give an indication of the intensity of recovery activity. Data given here applies only to ringed seals as there is insufficient information regarding bearded seals. The variations in recovery times are given in Figure 19. It is important to realize that

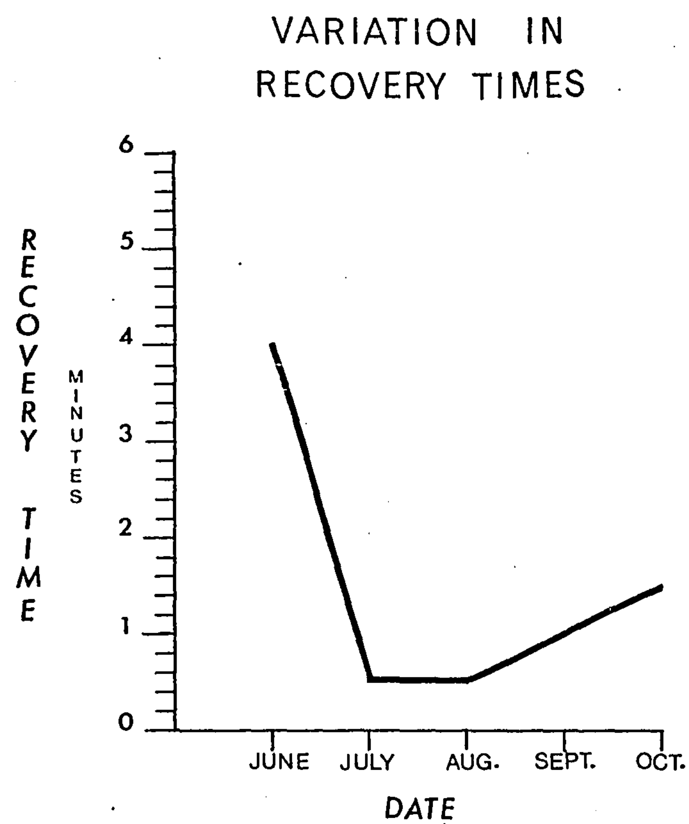

VARIATION IN
RECOVERY TIMES
RECOVERY TIME
MINUTES
6
5
4
3
2
1
0
JUNE
JULY
AUG.
SEPT.
OCT.
DATE

FIG. 19

it is the profile of the plot which is the significant feature rather than the values themselves. The value points represent the median recovery times on eighty-two observations taken by monthly groupings.

Many other factors influence time values for June, September and October besides the process of recovering the seals. During June much hunting is still conducted from the floe edge. When seals are shot the hunters first look to see if they are going to float before starting out after them. Once they have decided the seals will float they are in no hurry to recover them and may leave them floating for up to thirty minutes. Through July and August when seals are sinking in larger numbers a greater effort is put into reaching them. Realizing that a very high proportion of the seals will sink the hunters do not wait to see if they will float or not but start right out after them. As a result, many seals that would have otherwise undoubtedly sunk are recovered. It is interesting to note that although the Eskimos are still hunting in an open water situation in September and October, recovery times have gone up from those of July and August. The hunters are in the same position in regard to the ease of getting the animals but take longer to retrieve them. In September and October the Eskimos know that a high proportion of the seals float when shot and therefore there is not the same urgency to recover them. The hunters take between two and three times as long to recover seals as they did during the summer.

7.4.3 Hunting Equipment.

The hunters, in attempting to meet the problems of retrieving, also utilize different hunting implements to reduce losses as much as possible. The harpoon is extensively used to reduce losses when hunting bearded seals and walrus. As has been discussed, the diving habits of these two animals make the use of the harpoon quite practical.

The canoe represents another implement adjustment to the summer hunts. Although the canoe has been adopted by the hunter for many other reasons than retrieving, it is far superior to the whale boat in this task. McLaren (1958a) reports that the canoe is not only the most productive boat during the summer months but is the best craft to use when the seals are sinking due to its speed and maneuverability. The author observed only four hunts that were conducted by whale boat but the impressions gathered during these hunts completely agree with those expressed by McLaren in regard to the performance for retrieving purposes.

Much of the success of the canoe as a superior retrieving craft depends upon the engine which powers it. The Eskimos of Iglulik prefer engines between eighteen to twenty horsepower (see Table 4). For maximum efficiency the hunters need an engine that will generate a high rate of speed over a fairly short distance. Shooting is done from a speed of between three and four miles an hour. When the animal is hit the hunter needs lots of power to quickly bring the boat up to a high rate of speed. This is even more crucial when the canoe is completely stopped.

Motors of low horsepower do not have the power reserve to give this performance. Those motors of six horsepower and less do not have enough speed even at top capacity to reach a sinking seal over the mean summer shooting ranges. Although the author did not observe many hunts when the canoe was driven by a low powered motor, Bradley (1968) reported that the six horsepower was not sufficiently powerful to cover retrieving ranges adequately. This is especially the case when hunting bearded seals. The nine and one half horsepower engines are probably operating just near the point of efficiency required. However, should the canoe be carrying a heavy load then the efficiency of the motor drops below a satisfactory level. The eighteen to twenty horsepower motors are felt, by the author, to be the most efficient engine. They have the capacity to produce the power and speed when needed even with a fairly heavy load. Engines over twenty horsepower do not add anything as they are overpowered for the job required. The exception might be when the canoe has a very heavy load.

7.5 Summation.

Retrieving ranges, which are a consideration of the time and distance involved in securing game, refer only to the marine environment. There is no danger of loss for animals shot on land whereas marine mammals may be lost due to sinking.

The causes of sinking are related mainly to blubber thicknesses and water salinity. Both these factors undergo considerable seasonal variations. During the summer there is a reduction in the blubber layer of the marine animals which results in an increase in body density. Following a similar seasonal cycle there is a decrease in salinity causing lowering of water density. These two factors combine to cause high losses of marine mammals due to sinking during the summer months. An unknown factor influencing the animals' ability to float is the amount of air in their systems at the time they were shot.

Within the marine environment retrieving ranges apply to those animals shot in the water and, in particular, ringed seals. Basking animals are usually secured at the same time they are killed due to their position on the ice. Walrus and most bearded seals are secured by a harpoon and float before being dispatched.

When considering retrieving ranges a further division must be made even for animals in the water. The concept does not apply to animals that sink instantaneously or which float indefinitely. Retrieving ranges involve only those animals which float before sinking and those that are recovered before it is known whether they will sink or float. This accounts for thirty-four per cent of ringed seals and forty-seven of bearded seals shot in the water.

For these animals recovery ranges are controlled primarily by the shooting position of the hunters. If the hunters are in a position to reach the animal quickly there is a good chance of securing the game. The hunters attempt to work within operational ranges by getting into the most favorable position and most shots are taken from a moving boat which has the highest probability of recovering a floating animal.

The hunters also intensify recovery activity during the season seals are sinking in an attempt to try and minimize losses. This is reflected in a reduction of the time invested in the recovery activity.

The Eskimos use different hunting methods and equipment during the summer to try and reduce losses. The harpoon is used extensively for bearded seals and walrus.and high powered canoes provide speed and maneuverability needed for effective recovery.

PART III

THE ANNUAL PATTERN.

Introduction.

The analysis of the annual pattern attempts to outline those factors that create changes of the seasonal cycle and operational ranges through time. The seasonal cycle dealt with factors in the physical and biological subsystems which varied from season to season and the hunters' response to these changes in a single year. Operational ranges were discussed as they existed at a point in time. Within the framework of the study both are viewed as being consistent. However, through an analysis of the annual pattern basic factors of change which influence the total hunting system can also be seen to bring about changes of the seasonal cycle and the operational ranges.

Although basically stable from year to year, the annual pattern is conveived of as a continuously evolving entity whose rate of change varies through time. Each of the cultural sequences through which the Igluligmiut have passed to the present has had its own distinctive hunting pattern. Changes from one cultural type to the next took hundreds of years. The present hunting pattern, which reflects the most profound changes in the entire history of the Igluligmiut, has evolved in the last thirty years.

There are many different factors that cause change in a hunting society and it is not the aim of this thesis to trace all these factors through the various cultural sequences to the present. The focus of this section is to outline the formation of the annual pattern as it exists today.

The major factors influencing the hunting system of the Igluligmiut have been the profound technological changes in hunting equipment, the interaction with and the dependence on a monetary economy, the increase in population over the last forty years and the acceptance of new life styles based on southern Canadian standards. These elements have led to the development of a new hunting pattern which for the first time is sensitive to conditions beyond the confines of northern Foxe Basin and the traditional Eskimo culture. Although during early contact the new technologies introduced by the white man were beneficial to the hunters, the overall effect of changes in the hunting pattern brought about by external influences has been a decline in the availability of game. The decline has resulted from either the over-killing of existing stocks, the movement of animals out of the hunting area or their increased wariness.

CHAPTER VIII

DEVELOPMENT OF THE PRESENT HUNTING PATTERN.

8.1 Hunting Pattern at Contact.

As mentioned in Chapter I the first direct contact of the Igluligmiut with the white man came in 1822-23 when Captain Parry wintered his ships in the mouth of Turton Bay. Both Parry (1824) and his second in command, Lyon (1824), recorded the hunting cycle of the Eskimos in their journals.

In September large groups of people would gather at Iglulik and Pingerkalik to hunt walrus which moved into the area at this time. Parry reported a total of from fifty to sixty individuals camped at Iglulik in fifteen to sixteen tents. Through autumn to mid-December the Eskimos lived mainly off stores cached from summer and fall hunts. Around the new year they split up and formed two seperate villages on the sea ice. One group located to the northeast situated a few miles to the west of Seowa Island while the others camped about a mile to the east of Iglulik. The snow house villages lived off ringed seals taken at their breathing holes and by hunting walrus at the floe edge when winds were favorable. In March a few families from Iglulik went south to the camp at Pingerkalik where walrus were more plentiful at the floe edge. By the end of April the camps began to break up as people dispersed during the spring. There was generally very wide dispersion and a variety of activities were carried out. Some went inland on Melville Peninsula caribou hunting. Others remained on the coast hunting seal and walrus by kayak. Fishing, although in total of minor importance, was also a summer activity. By fall the people had once more concentrated at Iglulik and Pingerkalik for the walrus hunts and re-established the yearly pattern.

The hunting pattern remained basically unchanged over the next 100 years. Few whites came through the area and those that did, stayed for a very short time. Matthiasen and Freuchen working with the Fifth Thule Expedition, travelled extensively through the area in 1923-24 and noted essentially the same hunting pattern as recorded by Parry. They reported two permanent winter settlements, one at Iglulik and the other at Pingerkalik (Matthiassen, 1945).

8.2 The Hunting Pattern During the 1930's.

After the Fifth Thule Expedition the hunting pattern of the Igluligmiut began to change. The changes, which were to have a profound effect on the seasonal cycle and operational ranges, were primarily a response to the increasing availability of trade goods in the form of new hunting equipment which the Eskimos brought into the area from Pond Inlet and Repulse Bay.

By the 1930's the Eskimos had relatively easy access to firearms, ammunition and to a lesser extent, because of the high cost, whale boats. Fox trapping on a commercial basis influenced the seasonal cycle by creating a new winter activity, which took place from November to late April. It also provided the cash source needed by the hunters for the purchase of the new hunting equipment. The new technology brought about new hunting methods. With the increased supply of rifles and ammunition hunting the ringed seal at the floe edge became much more important and replaced hunting at the breathing holes (Damas, 1963). The rifle increased the operational range and the hunters were able to utilize a greater territory along the floe edge whereas before the harpoon restricted them to the breathing hole.

The new technology also resulted in increased meat yields. The whale boat provided a much more efficient craft for hunting walrus and bearded seals than did the kayak or umiak.[1] Parry (1824) reported that it often took several kayaks up to half a day to kill a single walrus. With the whale boat and rifles it was possible to kill, butcher and transport back to land several walrus in that period of time.

The increase in meat yields brought about the concentration of population at the two semi-permanent residences of Akunik and Avajuk. The camps of Iglulik and Pingerkalik noted by Parry (1824) dispersed in early winter to hunt seals at their breathing holes when the supplies of meat were gone and the concentrations of population at these sites were fairly temporary. However, by the 1930's the seasonal cycle had changed. The whale boat and rifle allowed the hunters to efficiently exploit the large herds of walrus found in the waters around Akunik and Avajuk. By depending heavily on these animals the hunters were able to cache sufficient supplies to provide the basis for these camps and fox trapping replaced breathing hole and floe edge sealing as the main winter activity.

The hunting pattern of the 1930's, reconstructed through interviews carried out in Ikpiadjuk in 1969, gives the following cycle. The informants stated that the camp at Akunik was a permanent, year round location for many families in the area. The early fall months

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1. Although Parry (1824) noted an absence of umiaks at Iglulik during his visit they were in use in the area in the 1930's. Their occurence at this time is probably connected with increased availability of wood for the construction of frames.

were spent hunting walrus which came into Foster Bay in large herds during open water season. Hunting was by whale boat driven by sails. During freeze-up walrus were hunted from the young ice until the floe edge extended past Ooglit Island and the animals moved out into the Foxe Basin pack. Late fall through winter to early spring was spent living off the summer and fall caches. Fox trapping was carried out on Melville Peninsula to the west of the camp. In the winter large numbers of walrus were reported at the floe edge but were usually not hunted as there were sufficient supplies in the caches. However, if supplies were low in any year walrus were hunted and ringed seals were taken both at the floe edge and at their breathing holes. In late March or early April when travel conditions were good, trading trips, which became more and more an essential part of the total hunting system, were made to Repulse Bay. With the return of the hunters spring hunting of basking ringed seals and walrus and ringed seals at the floe edge continued. The summer months were spent hunting ringed seals, bearded seals and walrus from whale boats. Walrus were reported to be plentiful right in Foster Bay and hunting was concentrated in this area. Extended caribou trips were also made during the summer. Families would travel inland on Melville Peninsula and up to the northern shore of Fury and Hecla Strait. By fall most families were re-established at Akunik for the walrus hunts.

A similar pattern was followed at Avajuk. Winter was spent at the camp living off summer and fall caches. Fox trapping took place during the winter as did dog team trips out to the floe edge to hunt ringed seals and some walrus when the wind was right. Spring trading trips were taken to Repulse Bay, Arctic Bay or Pond Inlet, for supplies. On returning, spring hunts concentrated on hunting floe edge and basking seals around Iglulik Island. During the summer the people moved out to camp at Iglulik, Arlagnuk or Pingerkalik where they hunted ringed seals, bearded seals and walrus from whale boats. The movement out to these camps reflects an attempt to gain easy access to the large herds of walrus found along the deteriorating floe edge during summer. The main emphasis of hunting walrus was around Ooglit Island where they were plentiful. Some caribou trips were made to the interior and to the western side of Melville Peninsula. In the fall the people returned to Avajuk to hunt the large numbers of walrus which moved into the area all around Iglulik Island. Hunting continued until freeze-up at which time the walrus moved out of the area and the people established themselves at Avajuk until early spring.

This pattern, as reported by an Eskimo informant, is confirmed by Rowley (1940) who, when excavating a pre-Dorset site at Avajuk in 1939, noted that the people of this camp were attracted to the area by the large numbers of walrus that came into the area in fall.

8.3 The Hunting Pattern During the 1940's - 1950's.

By the 1940's the pattern began to change once more as the population spread out to a number of new, smaller sites. The dispersion of the population resulted from a number of factors. During the late 1930's through to the 1940's the population of the Iglulik area began to increase due mainly to an immigration into the district from other regions. Many of the immigrants came from the area around Repulse Bay. This once rich and profitable area was hunted out by the 1930's. Aivalik, (the place of the walrus), an old camp at the head of Repulse

Bay which formed the focus of the area, was abandoned as walrus grew more and more scarce. The people moved either to Southampton Island or to Iglulik (Manning, 1943).

Damas (1963) feels that the increase of population was absorbed by the establishment of new camp sites in northern Foxe Basin accounting for the dispersion found in the 1940's. This is partly confirmed by Manning's (1943) observations that many of the people that came up from Repulse Bay settled along the northern coast around Fury and Hecla Strait and on the northwest coast of Baffin Island. However, interviews with some of the informants in Ikpiadjuk indicate that many of the people at Akunik and Avajuk also moved at this time to establish a more dispersed camp pattern. The dispersion of people to scattered camps may reflect an attempt to balance the hunting pressure in the total area in response to the increase in population.

Other factors are also quite important. Manning (1943) feels that dispersion of settlements reflects an increase in the fox trapping activity and that the scattering of people may have been encouraged by the presence of the local trader working at the new Hudson's Bay post established at Ikpiadjuk in 1937. Damas (1963) reports that although the great increase in population was the main factor in the dispersion, the process was greatly facilitated by an increased availability of whale boats which allowed some family units to achieve independence from the larger settlements and establish new camp sites. He states that in the early 1950's more whale boats, some now equipped with motors, entered the region and supported the trend of dispersion.

The pattern of dispersed camps existed through to the mid 1960's. Many were small camps that were occupied during some years, often several in a row, and then were abandoned as the former occupants established themselves elsewhere. There was a great fluidity of camp membership and location. The larger, more stable camps were those adjacent to the walrus and productive seal areas which provided adequate supplies of meat for the residents and their dogs.

The new seasonal cycle of hunting varied with the different camps. The cycles of the camps responded to the new patterns of residence and the resource base of their local area within the Foxe Basin system. Generally, those camps that were dependent upon walrus adjusted their pattern to the habits of the animal. Fall was spent hunting the waters around Iglulik Island, in Foster Bay, to the south of Kaersuit and to the southwest of Manirtau. Winter was spent at the main camps living off summer and fall walrus caches. Fox trapping was carried out in the area around each of the camps. Spring hunts continued at the floe edge and the basking seal became quite important as temperatures increased. With advanced break-up summer camps were established. The people at Kapuivik moved down to Kaersuit. The people at Ikpiadjuk moved to Iglulik, Kikitarjuk, Pingerkalik or Napakut. The summer hunts were by whale boat, some with sails, some with motors, for bearded seal and walrus. Caribou hunts were made by some of the men usually along the west coast of Baffin Island often as far south as Baird Peninsula. Walrus hunting continued through fall concentrating on the coastal regions. With freeze-up the walrus moved out into Foxe Basin and the people re-established in their winter camps.

The hunting pattern of the smaller camps in the area differed considerably from that of the larger camps. Generally, the hunting activity throughout the year was limited to a relatively small area immediately around the camp. These camps were based on ringed seals and supplimented by fishing, summer bearded seal and caribou hunts. During the winter the hunters would hunt ringed seals in open water pools in the fast ice. Several of these pools are found at the eastern entrance of Fury and Hecla Strait between the islands and another is found to the west of Seowajuk. The pools are kept open all winter by the strong eastward flow of water. The camp at Nuvuajuklu lacking open water pools hunted ringed seals at their breathing holes or established a camp on the ice just off Kikitarluk near the floe edge. Fox were trapped in the areas around each of the camps. Spring was spent at the open holes and stalking basking seals. The summer activity was directed toward hunting seals in the water right around the camp from the shore. Fall was also spent in the same area hunting as ice grew out from the shore. Hunting switched back to the open holes when ice covered the bays and was strong enough for travel. At least three different camps, Manitok, Kakalik and Nauyaruluk followed this pattern. There were usually minor shifts of the camp sites especially in spring and summer but hunting was conducted in the same general area year round.

One of the most significant changes in the seasonal cycle and operational ranges of the Igluligmiut began to show up from the late 1940's on. The change is reflected in a shift in the walrus hunting territory. In the 1930's to 1940's informants reported that in the summer months walrus were taken mainly in Foster Bay or near the mouth of the bay. Walrus were especially plentiful when there was lots of pan ice on which to bask and were also found from Neerlonakto to the south well past Foster Bay. In mid-July of 1822 Parry (1824) reported seeing many large herds of walrus which were found basking on the drifting pans in groups from twelve to thirty animals. Between Hall Beach and Pingerkalik he noted that the ships passed thousands of walrus which were basking on almost every loose piece of ice in the area. Large numbers of walrus were also noted basking on ice off the east coast of Iglulik Island.

By the 1950's this was no longer the case. Reports of large summer herds in the area of Foster Bay and walrus hauled out on Ooglit Island are not recorded for this period. The walrus had moved out of the region and established themselves around the Manning Islands and Spicer Islands. In response to the movement of the walrus there developed a very significant change of the seasonal cycle and operational ranges in terms of territory utilized. The Eskimos were now having to sail considerable distances out into Foxe Basin to search for walrus.

There are no references in the literature to explain why the walrus left the area. The hunters themselves feel that it resulted from an increase in the hunting and travel activity in the area of Foster Bay and along the whole coast. The increase in activity associated with this area seems to have resulted directly from the introduction of new technologies from outside the hunting system and the new patterns of residence based on the higher yields provided by these technologies. Much of the hunting was concentrated in the bay and it was extensively used by people from both Akunik and Avajuk. Some of the Eskimos were permanent residents of Akunik which served to increase the overall activity level of the area. The increase in population through immigration from Repulse Bay put even greater pressure on the herds.

The activity level increased with the establishment of the Hudson's Bay post at Ikpiadjuk in 1937. The settlement became a focal point for all the Igluligmiut and the people living to the south made regular trips for supplies year round. The travel route was generally right through Foster Bay and undoubtedly had an effect on the walrus. Furthermore, by the 1950's engines were being used on the whale boats and many of the hunters feel that the walrus reacted unfavorably to the noise of the motor. Although most of the informants do not feel that the herd was declining markedly they noted that the walrus were begining to become wary, associating the area with danger.

The increased activity did not seem to have such a marked effect on the fall movement of walrus. Large herds continued to come into Foster Bay and the waters around Iglulik and up past Kaersuit as the ice moved out of the basin. However, even the fall movement was greatly reduced by the late 1950's. Traffic had increased noticeably. More boats were available to the hunters and engines were common. Travel between Ikpiadjuk and the outlying camps increased as the settlement developed as the main center of the region. In the mid 1950's heavy construction was underway twenty miles to the south of Foster Bay. The din of construction work and the ceasless coming and going of airplanes bringing in men and material to the D.E.W. Line site at Hall Beach is thought to have had a disturbing effect on the walrus. Furthermore, the construction site attracted many Eskimos and this served to double the movement through the Foster Bay area. Construction of government buildings at Ikpiadjuk also began in the late 1950's and any permanent settlement producing a constant high noise level and foreign smells is bound to effect game in the area.

The overall effect of the increased activity was finally to reduce the large fall migrations of walrus in the areas of Foster Bay and Iglulik. A large herd was reported behind Iglulik as recently as 1959 but over the last ten years no more have moved into the area. One informant stated that walrus stopped coming because of the increased use of motor boats. He also claimed that walrus stopped moving up around Seowa Island when the hunters at Kapuivik got a motor for their boat. However, inspite of the decreases sufficient walrus did move into Foster Bay and along the eastern shore of Iglulik Island and to a lesser extent into Hooper Inlet during the 1950's to provide successful hunting. At least for the fall hunts there was no real need to shift hunting territories or to place the emphasis on some other marine mammal.

8.4 The Present Pattern.

The hunting pattern observed in 1968 - 1969 and outlined in Chapter II is very different from the preceding cycles. Most of the changes of the seasonal and operational ranges have been brought about by new technology, the new pattern of residence and extensive contact with peoples and institutions connected with the society and economics of southern Canada. The effects of the concentration of population at a central location and the introduction of new ideas and life styles have influenced the annual pattern more profoundly than any other factor. The changes brought about by these developments have not only had an effect on the biological resources but have also greatly modified the attitudes of many Eskimos toward hunting as a way of life.

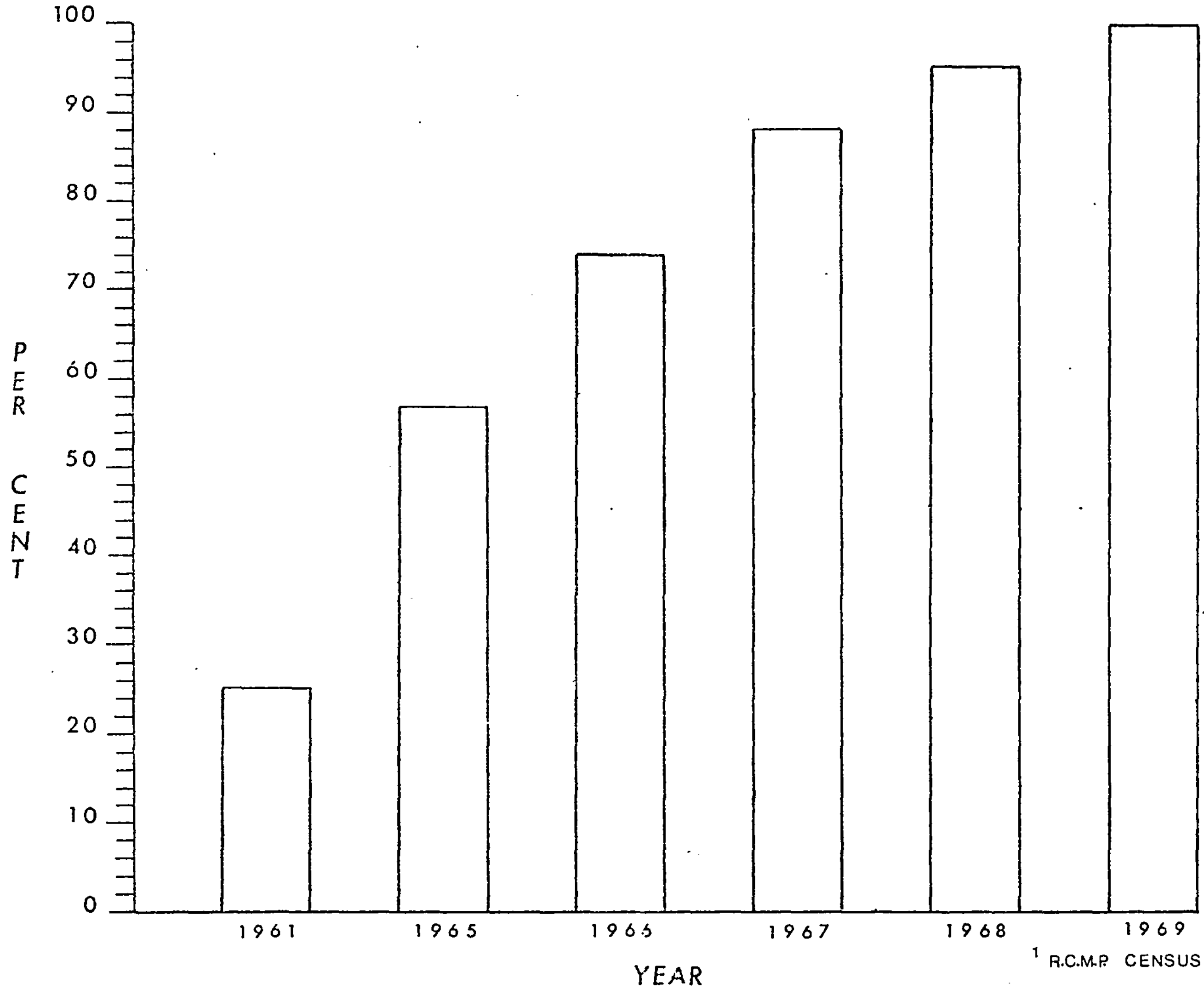
The Eskimos were drawn into the central settlement of Ikpiadjuk by new social amenities such as health facilities, educational programs, churches, wage employment, welfare and housing programs. The growth of the settlement was remarkably fast and coincided mainly with the housing program which began in 1964. The per cent of people living in either Seneria or Ikpiadjuk is plotted by year in Figure 20 and shows the rapid growth of the two centralized settlements and the virtual disappearance of the camps over a very short period of time.

8.4.1 Impact on the Biological Resource.

The concentration of population at Ikpiadjuk has had a marked effect on the marine mammals associated with the area, which has influenced the hunting system. Noticeable changes in behavioural patterns have been recorded. Most obvious of all has been the movement of the walrus from the Foster Bay and Iglulik areas. The processes which started in the 1930's has been strengthened with the concentration of all the people at Ikpiadjuk or Seneria and the heavy traffic between these two points. Walrus are no longer associated with the area during the summer months but stay out among the pan ice to the north of the Manning and Spicer Islands. The movement of walrus into the waters around Iglulik and Foster Bay in open water season has also decreased. Now only relatively small herds move in and hunters report that they no longer stay very long but soon move back out because of all the activity in the area. No herds

ESKIMO POPULATION AT SENERIA OR IKPIADJUK

1961–1969[1]



[1] R.C.M.P CENSUS

FIG. 20

appear around Iglulik but a few animals are taken each year usually along the east coast of Iglulik Island. In 1968 one animal was taken in Hooper Inlet but this is insignificant when compared with the vast herds that supported the fall-winter settlement of Avajuk (Rowley, 1940; Iytok, personal communication).

The effect on the hunting pattern of this shift in the area associated with walrus has resulted in greatly extended areas of operation in terms of travel ranges. The hunters, during the summer months, have to travel long distances out into Foxe Basin to harvest walrus. As a result they must wait for periods of extended fine weather before hunting the animals. This results in a change in the seasonal cycle as a greater emphasis is placed on ringed seals and bearded seals during the early summer. The large gasoline inputs further restrict the frequency of walrus hunts, thereby also causing greater emphasis to be placed on seals.

A similar shift in the seasonal cycle and operational ranges has been noted for the fall hunts as well. As there are few walrus in the area the emphasis is placed on seals and walrus are hunted usually only when sighted. Some trips may be made to Foster Bay but walrus are not always to be found there. During the entire open water season the author saw only four walrus along the coast between Neerlonakto and Coglit Island. This is in marked contrast to the vast herds reported by the hunters in earlier years. During 1969 herds of thirty to forty animals were reported to be in Foster Bay on several different occasions but few were taken because they did not stay long in the area. The Eskimos however, still hunt walrus at the floe edge during winter when wind conditions are right and walrus move into the ice edge with the drifting pack.

The concentration of activity has also had a marked effect on the other marine mammals in the area, which in turn influences operational ranges. Most hunters feel, rather than an absolute decline in the seal population, that the animals have withdrawn somewhat and are much more wary of the hunters and therefore harder to catch. Informants report that ringed seals used to bask in Turton Bay before Ikpiadjuk became the focal point of the area. In the present situation seals avoid basking in the bay and have moved out of the area and now lie on the ice to the southeast in Hooper Inlet. Some hunters, however, feel that there has also been a decline in population due to too much hunting. Insufficient data exist to accurately say which view is correct. The one thing all agree upon is that there has been a behavioural change in the seals due to hunting pressures and the increase of motorized traffic in the area.[1.] The hunters report that due to the high competition in the immediate area of Ikpiadjuk, they are forced to expand their area of operation for successful hunting (see Chapter IV).

The effect of concentration on bearded seals is less clear as they follow a different cycle. There is remarkably little mention in hunting or biological literature of their activities, numbers or behaviour in this area. However, the Eskimos themselves report that

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1. For an analysis of behavioural changes in the ringed seal see Bradley (1970).

the bearded seals are becoming more wary and harder to catch and attribute this to increased hunting pressure.

8.4.2 Social Impact.

The total experience of living in a settlement controlled and operated by foreign agencies, has also had an influence on the hunting pattern. Most hunters emphasize that it is impossible to save money in the village due to added expenses such as rent on housing, the increased standard of living, the convenience of retail stores, medical supplies and treatment and store bought food supplies. Furthermore, with the move into the village, the monetary returns from fox trapping have been greatly reduced. The hunters are usually short of money to invest in hunting equipment such as canoes, motors, rifles, ammunition and gasoline which are extremely costly (see Appendix 14). Part of the hunting expense is met by family allowance cheques which were first issued in the Iglulik area in 1945. The availability of part time wage employment also serves as a supplementary source of income and is becoming a new, but very necessary, part of the hunting pattern to meet the rising costs of hunting equipment. However, there are not nearly sufficient jobs to fill the needs of all the hunters. Furthermore, the time when most of the work is available is during the summer months which is the best time for hunting (see Figure 4). Many are reluctant to work for wages when they know that they will need large supplies of meat to feed their families and dogs through the winter.

The prospect of permanent wage employment, welfare payments and a market for carvings has prompted some to cease hunting as a full time activity and these people look inside the community structure for their livelihood. The absolute numbers are small. There are only about fifteen steady jobs available to the Eskimos which are held by men who would otherwise be hunters (see Table 2). Most of these jobs require mechanical or clerical skills or a knowledge of English and are therefore not open to the majority of hunters. There are several casual jobs filled by unskilled labor which are available through the Co-operative or the D.I.A.N.D. These, especially those with the D.I.A.N.D. such as house painting and clean-up, are of short duration and often come in the summer. During 1969 there was heavy construction at Ikpiadjuk and many hunters found work with the construction crews but such work is temporary and most return to hunting when construction is finished. Very few men, one or two at the most, rely on carving as their chief source of income. Many supplement incomes by carving but few depend heavily on it. Although the community structure removes some men from the hunting pattern most remain dependent on hunting for their livelihood.

The need to hunt is still very much in evidence. Most of the village depends primarily on products of the hunt as their main source of protein (S. Beaubier, personal communication) and the food demands of the population has grown appreciably in the last few years. Figure 2 in Chapter I shows the population profile for the village of Ikpiadjuk. The broad base stands out very clearly. In terms of hunting this means that there is a large increase in population to be provided for and the members of the older generation, the hunters, must meet this demand. More and more of the burden of hunting falls on the upper half of the pyramid which constitutes a relatively small portion of the population.

The problem is complicated further when it is realized that many of the adolescents, who would normally be active helpers in the hunting activity, are taken out of the cycle by the educational institutions thus placing an even greater share of the work on the hunters. Furthermore, even though some people have dropped out of hunting as a way of life they still desire a lot of meat. Most of these men are occasional hunters but cannot meet all of their demands this way. As a result they too are dependent on the hunters for much of their food.

This heavy demand on the hunters results in the need for intense hunting. This feeds back into the system and results in over hunting which causes a decline in animals landed due either to over-kill, movement out of the area or increased animal wariness. This in turn effects the hunting pattern in terms of the seasonal use of different territories and operational ranges in the increasing effort to disperse.

8.5 Summation.

The annual pattern is conceived of as a framework by which changes in the total hunting pattern of the Eskimos can be investigated.

The present day hunting pattern as practised by the Igluligmiut has developed directly from extensive contact with the white man. Prior to contact the Eskimos had achieved a hunting pattern which was in tune with the physical and biological subsystems and their hunting technology. Contact with the white man altered this balance.

Two basic changes resulted from contact with the white man. New hunting technology was introduced and changes in patterns of residence developed. These two factors served to create areas of intense activity in northern Foxe Basin. The animal resources reacted to the areas of intense activity by withdrawing and becoming more wary and harder to catch. This in turn influences the present day hunting pattern in terms of the seasonal use of different hunting territories and the increasing effort to disperse the hunting activity.

CHAPTER IX

CONCLUSIONS

The study of the hunting pattern of the Iglulígmiut is in essence an analysis of one set of processes which contributes to the adaption of the Eskimos to the resources of northern Foxe Basin. The hunting system, one mode of survival, can be defined as being comprised of physical, biological and cultural components. The physical and biological subsystems interact to form the natural environment the structure of which can be recognized by man as a source for exploitation. The interaction between man and the environment is based upon man's need for energy and the material resources that must be met if the culture is to maintain itself. The specific ways in which these needs are met are based upon the technological, intellectual and sociological behaviours associated with adaption.

Part of the needs of a society are met by direct interaction between man and the natural environment. The definition and understanding of a society's needs and the realization of the restraints which must be overcome to achieve these needs create a set of conditions to which man applies strategies to achieve his goals. The exploitation of the environment by the Iglulígmiut evolves around hunting, and this study has attempted to outline the specific methods of exploitation which characterizes this system. Not only is the total hunting system seen as an adaption to the natural environment but the specific hunting skills are also viewed as a part of the strategy designed to overcome the environmental barriers which separate man and his needs.

The hunters have come to understand and incorporate into the hunting system a whole range of predictive relationships which exist between the various components of the eco-system. The interpretation of these relationships is based on a clear understanding and ordering of facts. From this order the hunters are able to operate at a level of predictability which will aid them in overcoming points of stress and thereby maintaining the cultural system. However, hunting strategies are restricted by local conditions and therefore success is not 100 per cent predictable; although needs must be met often enough to ensure survival.

The specific factors in the eco-system, which outline the restraints and the resulting adaptive strategies affecting the Igluligmiut, have been presented in the various sections of the thesis; the seasonal cycle, the operational ranges and the annual pattern. These factors are given diagramatically in Figure 21.

The thesis points out the sensitivity of the hunting system to specific sets of conditions in the eco-system. In the section on the seasonal cycle it was seen how conditions in northern Foxe Basin favored certain species and influenced their behavioural, demographic and distributional patterns. This in turn influenced the distribution of the hunting activity. The times a hunting territory was available for exploitation were noted to be influenced by the specific climatic conditions of wind velocity and visibility. In the section dealing with the operational ranges each of the ranges was noted to have been influenced by exact sets of conditions upon which hunting success was dependent. For example, spotting

INTERACTION OF THE PHYSICAL, BIOLOGICAL AND CULTURAL SUBSYSTEMS

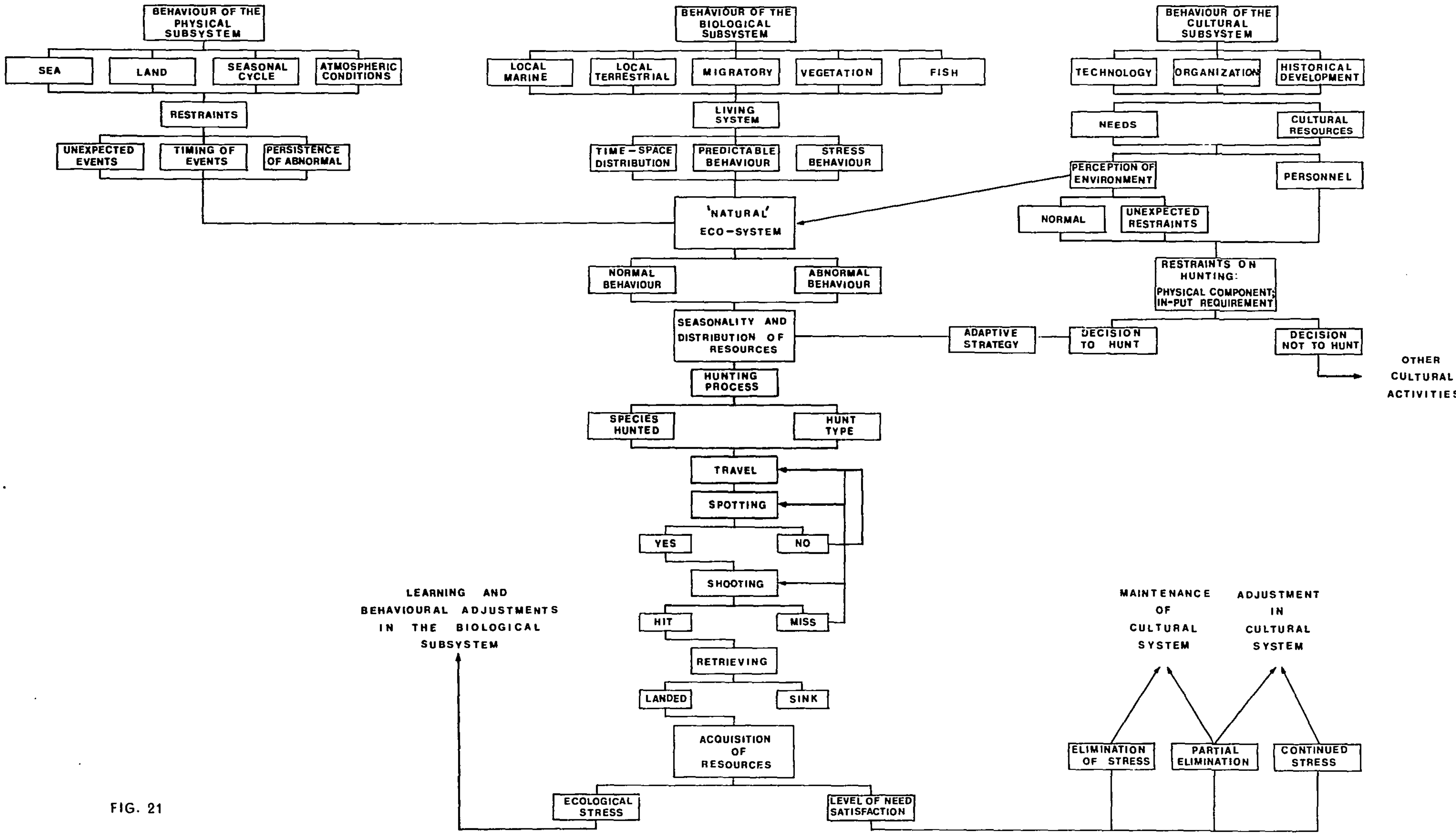

FIG. 21

ranges for animals in the water were shown to have been influenced mainly by the color of the water surface and the background it provided against which the seal's head was seen. Water color, it was noted, was controlled mainly by cloud conditions and wind velocities. An examination of the annual pattern emphasized the evolutionary nature of the hunting system. By studying hunting from an historical perspective the total system was viewed as being in a state of constant change. Changes were directed by responses of the hunting system to variations within the components of the eco-system.

The processes of adjustment to conditions within the eco-system are by no means limited to the adaptive strategies of man. The impact of man on the physical and biological subsystems is no less important than the impact of these components on man. Each element within the system is very sensitive and reacts to changes in the total system. As man is an intricate part of the eco-system his presence and adaptive strategies will bring about a reaction in those elements with which his interaction is most intense. In the consideration of hunting systems this will be the biological component. For example, the impact of man on the biological resources of northern Foxe Basin has resulted in very definite behavioural changes in the marine mammals around Ikpiadjuk. Such changes in behaviour are viewed as being a direct response to recent increases in the hunting pressure by the Eskimos.

Through an examination of the historical development of the hunting pattern the variations of man's impact on the different components of the eco-system are identifiable. The physical subsystem was noted to have remained relatively constant whereas there have been profound and highly significant changes within the cultural and biological subsystems.[1] The changes have been a direct response to the introduction of new technologies of exploitation and patterns of residence introduced by southern cultures. As the total system is sensitive to change the biological subsystem has responded to the new adaptive methods and settlement patterns. Presently a situation exists that requires further adjustment on the part of the hunters to new conditions in the biological component, if hunting as a method of meeting the society's needs is to survive.

The continuation of hunting demands a factor of flexibility within the social structure of the Igluligmiut. Over the last several decades changes in the eco-system of northern Foxe Basin have been very rapid and the effects of these changes far reaching. The hunters must recognize and adjust to the crutial areas of change. Failure to properly identify evolving points of stress will result in maladaption and may bring about the decline of hunting. With the identification of areas of change solutions in the form of new adjustments can be put forward thereby maintaining hunting.

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1. Given a broad enough period of investigation changes in climatic conditions and resulting influences on hunting are also discernible. For example, Meldgaard (1960a) notes that the Dorset and Thule Eskimos had to adapt their cultural structure to increasing coldness of the climate. His investigations revealed that there have been several changes in the climate of northern Foxe Basin with resulting cultural adjustments.

The most significant area of stress in the present day hunting pattern of the Igluligmiut has been brought about by extensive contact with the white man and results directly from the introduction of new technologies and patterns of residence. These changes have completely altered the economics of hunting. They have also created areas of intense activity in northern Foxe Basin which the animals have learned to associate with danger and avoid. It is the increased wariness and avoidance of the area around the settlement of Ikpiadjuk and the new economic structure of hunting which are the main problems facing the hunters.

The most practical adaption to the point of stress created by the areas of intense activity is the dispersion of the hunting effort to where activity levels are fairly low and the establishment of temporary hunting camps in these areas. Since the movement of the Eskimos into the settlement of Ikpiadjuk outlying areas have probably been increasing in animal population due to the decrease in predation by hunters. Furthermore, the animals in these areas will become less wary of man as Eskimos now appear only occasionally and the presence of hunters may arouse the curiosity of the animals rather than fear (see Chapter VI, Section 6.1.1). These two factors have the possibility of increasing the landed catch and may justify high travel ranges involved in dispersion.

9.1 Technology of Dispersion.

Two relatively recent changes in the hunting equipment of the Eskimos may be able to provide the needed link between dispersed hunting areas and the settlement and may lead to a more equitable balance in terms of hunting territory utilized. These are the canoe and the ski-doo.

Until the late 1950's the main hunting craft was the whale boat (Damas, 1963). Beginning in the 1960's the whale boat was rapidly replaced by the light, speedy, maneuverable canoe. Anders (1965) who studied the Iglulik area in 1965, stands in sharp contrast to Damas (1963) who worked in the area in 1960-61. Anders noted that the canoe was the most widely used craft for seal and walrus hunting. It is very hard to find a mention of the canoe in Damas and yet only five years later the whale boat had almost completely been replaced by this craft. During 1968-1969 the canoe was certainly the preferred boat. Whale boats were sometimes used for walrus hunts and extended caribou hunts; in situations where a large load was to be transported.

The canoe is a fast travelling craft, highly mobile and semiportable. The cost is much less than the whale boat (see Appendix 14) and is therefore more readily available to a wider range of hunters. The availability of the canoe has greatly increased the number of boats for hunting which, plus the factor of speed and maneuverability and the small number of men per boat, allows more hunters to disperse over a wider area more readily than would be permitted by whale boat. Furthermore, as Crowe (1969) points out, the canoe can be easily transported to the floe edge on a sledge which greatly extends the amount of time it is available for use. The whale boat can be transported only with great difficulty and it is not usually launched until break-up is well advanced.

The ski-doo, which has been introduced much more recently than the canoe as a hunting implement, also has the possibility of dispersing the hunting effort. The ski-doo is a very fast motorized sledge able to cross a wide variety of snow covered terrains and yet pull substantial weights as well. The speed allows the hunters to travel great ranges in relatively short periods of time thus dispersing the hunting effort. The ski-doo can be used from November through to mid-June.

Many problems still exist with the ski-doo. One has already been pointed out; that is the factor of noise and its effect on game (see Chapter V, Section 5.1.1). This is a very serious problem and perhaps a better muffling system needs to be introduced. However, this is presently beyond the control of the hunters. Certainly any ski-doos which have lost their mufflers, which many have, should not travel into the hunting area without getting a new one. The second factor is the fact that the ski-doo was designed as a southern play toy and not to meet the rugged demands of the hunter. As a result, depreciation is fairly high and the Eskimos are leery of its reliability when travelling long distances. Finally, there also exists the problem of the hunters getting used to the ski-doo as a hunting implement. As with any new innovation time is needed to work out its place in the hunting cycle and to achieve maximum operational efficiency. Part of the problem lies in how Eskimos perceive the ski-doo. Anders (1965) reported that ski-doos were approached as a status symbol rather than a hunting impliment. There was some evidence noted by the author in 1969 that status was still a contributing factor in the purchase of a ski-doo. However, it is beginning to emerge more as a hunting implement. Time is still needed to maximize its use.

The hunters as yet are using it as a means of getting into essentially the same hunting area as those utilizing a dog team. Hopefully the hunters travelling by ski-doo will use it to cover greater distances from Ikpiadjuk to get into areas not available to the dog team; steering well away from the floe edge en route to reduce the influence of noise on the seal population. The Eskimos are not yet getting this full hunting potential from the ski-doo but with modifications both in design and use, it could be a very valuable implament of dispersion.

9.2 The Limitations of Technologies of Dispersion.

Although the canoe and ski-doo are seen as potential modes of adaption to the problem of concentration certain features in both need to be changed before they are completely acceptable. As has been pointed out, the noise factor from both these modes of transportation can scare animals which will lower hunting returns. Therefore, until a system has been introduced to greatly reduce noise level, modification needs to be practised in the use of these technologies. It is suggested that the most practical use of the equipment would be strictly as a means of dispersion. The canoe and the ski-doo can be used to quickly cover the distance to the outlying camps situated in the areas of low activity. The hunters utilizing these camps would then switch to traditional equipment such as dog teams and sailing and paddling the canoes (using motors only when essential) which would greatly reduce the noise levels.

Travel routes to the outlying camps should be well away from concentrations of animal resources or should be varied with each journey to the camp.

The greatest problem with the canoe and the ski-doo is a question of economics. It is only possible to get the full potential from these implements by introducing a readily available supplementary source of income or by greatly modifying the hunting economy. Both are expensive and require high cash outlays by the hunters which few can readily meet. With increasing demands on his money resulting from community living, the hunter finds it almost impossible to save for either. Most must take casual work to acquire the equipment (see Chapter VIII, Section 8.4.2). Most of the ski-doos in 1968 were owned by non-hunters. The great increase in ski-doos in 1969 is explained by the availability of high incomes derived from construction projects carried out during the summer. Without this source of income few could have afforded the machines.

Depreciation on the equipment is fairly high. Haller (1967) estimates the annual depreciation on a ski-doo to be approximately 200 dollars. The combined depreciation on a canoe and motor is between eighty and 100 dollars a year. The outboard motor has a maximum life expectancy under hunting conditions of under ten years while the canoe will probably last a few years longer without major repairs.

Although both the ski-doo and the canoe have the potential of overcoming the problem of dispersing the hunting activity, under the present economic structure of hunting, the input of gas and oil limits their actual effective range. Gasoline costs 1.50 dollars a gallon and the price of oil is 0.65 dollars at the Co-operative and 0.79 dollars at the Hudson's Bay. Mileage is very low for the outboard, the average return for a gallon of gasoline being somewhere between five and six miles. Returns from the ski-doo are better being around ten miles to the gallon. The high cost of gasoline and oil has a reversing influence on the mobility of these two vehicles.

With the low cash returns from the hunt and high costs of hunting material the Eskimos are restricted to operating fairly closely to the village. There is a very real need for the hunters to disperse to the more distant hunting areas on a regular basis. However, in terms of initial investment, depreciation and operating costs, this is impossible even though the technology is available.

The problems restricting the use of the new modes of transportation as a means of overcoming a serious area of stress within the hunting system go beyond a question of economics. Adaptive strategies have been limited in their effectiveness by the fact that both the design of the equipment and the economics of hunting have been imposed from outside the hunting system and are presently beyond the control of the hunters. The canoe and ski-doo have been developed for use in southern Canada and the sales market to the Eskimos is not large enough to warrant radical changes in design to meet the very specific demands of the hunter. Therefore, the hunter is operating with equipment that, unlike the traditional technology, was not designed for very specific tasks.

The problems resulting from a market based economy are more serious. The hunters have experienced wide fluctuations in the prices paid for seal and fox skins. As the economy is based on the single commodity of skins the hunters are seriously affected by each change in the market. They have no control over the price structure but must take what is paid by the commercial agents of southern furriers. To ensure an adequate annual return from hunting a minimum price paid for skins should be fixed at a value in line with the hunting economy. This would allow the hunters to plan around a steady market. However, there is no evidence that this will ever be done.

The cost structure of the hunting material is also beyond the control of the hunters. The price of canoes, ski-doos, rifles etc. is controlled by the southern markets and has no bearing on the economics of hunting. Similarly, costs of gasoline and oil are set by southern agencies. A reduction in gasoline prices to a fair cost to the hunter would necessitate the federal government lifting the high road tax charged to the Eskimo hunters, the buying of gasoline in bulk which in turn would call for large scale storage facilities and the marketing of gasoline by a non-profit organization. Many of these steps to reduce gasoline costs are presently far beyond the influence of the hunters and therefore cannot play a significant part in any adaptive strategy introduced by the hunters.

9.3 Institutional Adjustment.

The hunters have identified and are well aware of the present areas of stress within the hunting system however, unless they can develop a more direct influence on the technology and economics of hunting they will continue to be in a state of maladaption to conditions within the hunting cycle. Although there are no simple solutions, some steps are being taken in the form of new institutional organizations in an attempt to overcome some of the most serious problems facing the hunter. Direction comes mainly through the Co-operative which is directly involved in the problems of adaption to rapidly changing conditions affecting hunting as a system of adaption. The Co-operative was formed in 1963 by people from the camps and Ikpiadjuk in order to buy two Peterhead boats to aid in hunting.

With the new patterns of residency there has been a growing demand for meat. The Co-operative has organized large scale communal hunts directed from the Peterhead boats to insure that there is enough meat for the people and dogs through the winter. The hunts are organized along traditional lines with food being available to any member of the Co-operative whether he was on the hunts or not. This practice is not understood by some whites who operate in a different value system. However, it is similar to the traditional practice where the best hunters were expected to and not mind providing a large portion of the meat.

Besides attempting to meet the high demands for food in the village the Co-operative is also trying to give the hunters the opportunity to supplement their hunting incomes by working for wages. The Co-operative contracts out its large supply of heavy duty equipment to the government for road building, airstrip construction and maintenance, garbage collection and other jobs around the village. In 1969 the Co-operative received the contract for the construction of ten new housing units in Ikpiadjuk. The jobs through the Co-operative provided the cash needed and yet were arranged so that the men had time off for hunting. Besides this activity, the Co-operative also runs a retail store employing several men and a handicraft store which retails most of its carvings at the D.E.W. Line base at Hall Beach. Both these activities, particularly the handicraft store, give the hunters a source of cash by selling their products to the Co-operative.

Until the summer of 1969 the Co-operative used to buy fish and caribou from the hunters for re-sale in the village. The very sound and practical philosophy behind this was that in this way the hunters could gain a higher cash return from their hunting activities and at the same time the supply of meat could partially fulfill the demands of the non-hunting wage earners in the village. It was a very good balance and a sensible answer to many of the problems facing the people of Ikpiadjuk. Unfortunately the practice of selling caribou was stopped by the R.C.M.P. who noted that under law it was illegal for the Co-operative, as a non-licensed hunter, to sell caribou meat.

The government industrial officer at Ikpiadjuk is also concerned with the problems of adaption facing the hunters. Fishing on a commercial basis was introduced in the fall of 1969 in an attempt to provide the hunters with further sources of income besides the sale of seal and fox skins. A small caribou clothing industry was also started. The hunters can sell their caribou skins to the manufacturers who sew them into winter parkas for local and sales outside Ikpiadjuk. A new organization, The Hunters' and Trappers' Association, has been formed to deal with the problems of hunting. Trapping is being encouraged and the Association is dealing with the problem of dispersing the hunting effort by organizing itself to handle the transportation of dog food to those who are trapping distant lines. To what success the efforts of the Industrial Division of D.I.A.N.D. and the Hunters' and Trappers' Association will have in these ventures is impossible to tell for they are as yet far too young. However, they should be given every encouragement as they are dealing with the real problems created by the concentration of population, the loss of control over the technology and economics of the hunting system.

Although the Igluligmiut have recognized and responded to emerging points of stress within the hunting system the ultimate continuation of hunting as a method of exploitation is presently beyond their immediate control. With extensive contact with the white man the Igluligmiut have become a part of a system which is global in nature. Although they have little control over this system it has had a tremendous influence on them. The result has been the very rapid infusion of new ideas, technologies and life styles which have yet to be fitted into the hunting pattern. This impact has been felt not only by man but also by the total system of Foxe Basin. Thus adaption by the hunters is not only to factors in the global structure but also to the local reaction of the Foxe Basin system to this sudden expanded linkage.

APPENDIX 1

Recording of Hunting Data.

Prior to each hunt data were gathered on climatic conditions noting wind speed and direction, visibility, cloud cover, cloud type, air temperature, light intensity and ice and/or water conditions. These formed the base line and any changes during the hunts were noted. It was almost impossible to take readings at regular intervals because of the difficulties imposed by the hunting conditions.

When the hunt began the starting time was noted using the twenty-four hour clock system as many of the hunts lasted well over a day. All notes or observations were entered with the time of their occurence. Note was also made of the number and names of the men in the hunting party, the mode of transport and the hunting technology.

During the hunt detailed notes were kept on the following.

1. The presence of other Eskimos were noted recording direction and mode of travel, hunting equipment, landed catch and number and structure of the hunting party.

2. Duration of stopped and travelling times were recorded noting the activities of the hunters during each of the periods.

3. Biological data were recorded which included the time, species, attitude (basking or in the water) and the distance sighted for all marine mammals observed on the trips. Notes were also kept of the reactions of both the animal and the hunter.

4. All shots were recorded noting calibre, target range, shooting position and results.

5. Material in-puts and landed catch were recorded for each hunt.

A sample page from a field note book is given in Figure I.

As well as notes being kept during the hunts certain data were recorded on maps. A sample of the type of maps used and the data noted is given in Figure II. The maps were of the total area of northern Foxe Basin and had been divided into seperate, $8\frac{1}{2}$ x 11 inch sheets for ease of handling under hunting conditions. The maps were drawn at a scale of 1:250,000 and were covered by a grid system for quick and accurate reference. The hunt routes checked by travel speeds, compass bearings, consultation with the hunters and by 1969, observer familiarity with the area, were plotted for each hunt. Along each route the location of every marine mammal observed was noted. Ice conditions and distribution of different ice types were also mapped for each hunt. As well, the location, number of members and the direction of travel of all other observed hunting parties were recorded on the maps.

After each hunt much of the information was tabulated for quick reference and for a preliminary insight into the results or the direction of the findings. The organization of data into tables also helped to point out where data were weak and more information was needed. An example of data put into table form during the field season is given in Figure III.

SAMPLE PAGE FROM HUNT NOTE BOOK

HUNT 27 JULY 31 1968

To much pan ice around - restricts
travel and manuverability.
17:30 Leave ice pan. position
right off kikitarjuk.
17:33 underway - direction south-
east.
17:42 stop for very small portage.
17:43 underway again.
17:51 ringed seal in water. stop.
Drift in area to hunt. Not seen
again, lost in pans. 5 min stalk time.
17:56 Underway.
18:03 ringed seal spotted behind canoe.
not seen again - lost in pan ice!
Continue on - spotting for basking seal.
18:27 basking ringed seal spotted.
18:28 land on large floe to stalk —
spooked! spread out along pan
looking for the seal to come up
at the edge.
18:32 Bearded seal spotted just
off pan. 1 shot .30-30 Alaraluk
(E5-616) ice/water 50 yd miss.
1 shot .222 Enuki (E5-403) ice/water
50 yards miss.

FIG. I

SAMPLE HUNT MAP

HUNT 27 JULY 31 1968

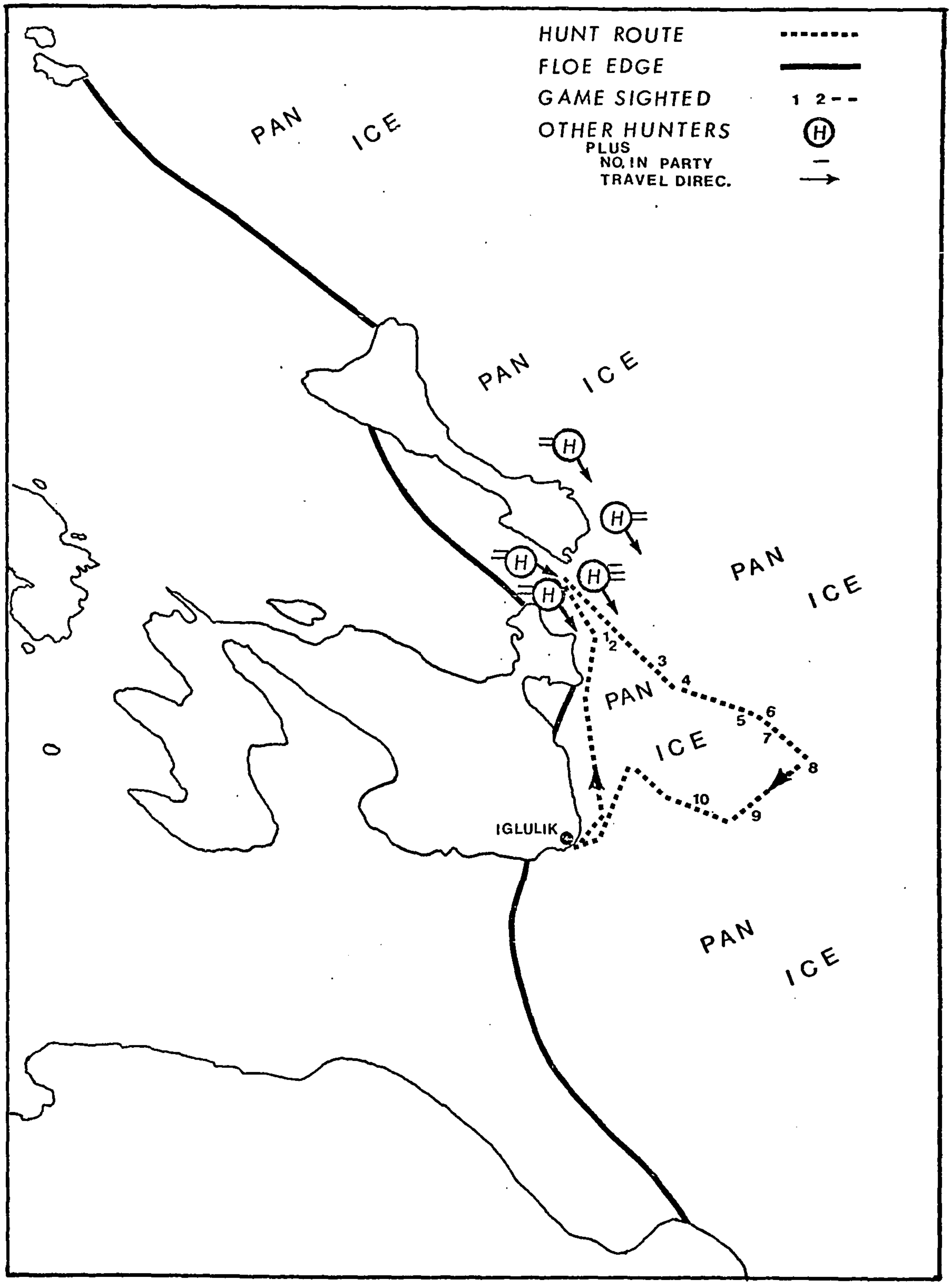

FIG. II

SAMPLE TABLE

GAME SEEN HUNT 27 JULY 31 1968.

TIME	NO.	SPEC.	ATT.	STALK	CAL.	RESULTS
14:58	1	BEARD	WATER	46M	.303	KILLED/HARPOON
16:00	1	RING	WATER	4M	.222	MISS
17:51	1	RING	WATER	5M	—	DOVE NOT SEEN AG.
18:03	1	RING	WATER	—	—	DOVE NOT SEEN AG.
18:27	1	RING	BASK.	5M	—	SPOOKED
18:32	1	BEARD.	WATER	39M	.303	WOUND GOT AWAY
19:51	1	RING	WATER	8M	—	AWAY IN PAN ICE
19:36	1	BEARD.	WATER	24M	303	KILLED REC. 5 MIN.
21:49	1	RING	WATER	—	.303	KILLED SANK <1S
22:00	1	BEARD	WATER	32M	.30-30	WOUND GOT AWAY

FIG. III

APPENDIX 2

Climate Data.[1,2]

Summary Of Precipitation.

	1968 May 26 - Sept. 1	1969 May 9 - Sept. 1
No Precipitation	52	96
Light Snow	13	10
Heavy Snow	1	1
Sleet or Hail	2	2
Condensing Mist and Fog	8	15
Rain of all types	32	11

Summary Of Mean Air Temperatures (F°).

Month	Surface.		Minimum.		Maximum.	
	1968	1969	1968	1969	1968	1969
May	21	18	20	14	24	18
June	30	29	29	24	34	35
July	37	42	34	ND	40	ND
August	41	44	37	42	45	ND

Summary Of Additional Temperatures (F°).

Month	Mean Snow Temperatures	Mean Hunting Temperatures	
		Ikpiadjuk	Iglujuak
May	16	22	ND
June	24	32	36
July	32	41	39
August	--	41	ND

1. Data collected by all members of the McGill research group.

2. Table prepared by J.M. Bradley.

APPENDIX 2 contd.

Climate Data.

Summary Of Wind Speeds And Directions.

A. Wind Speed.

Month	1968 Speed m.p.h.	1968 Observations	1969 Speed m.p.h.	1969 Observations
May	5.9	ND	9.4	66
June	3.9	ND	6.4	85
July	4.0	ND	6.0	85
August	3.1	ND	5.2	118

B. Wind Direction.

Compass Direction	1968 Observations	1968 %	1969 Observations	1969 %
0 - 90 North to East	74	22	89	21
91 - 180	66	21	75	18
181 - 270	59	18	48	11
271 - 359	126	39	206	50

Cloud Cover. Oktas.	1968 Observations	1968 %	1969 Observations	1969 %
0	35	11	46	13
1	40	14	68	19
2	11	3	29	8
3	10	3	34	9
4	11	3	15	4
5	12	4	6	2
6	23	7	11	3
7	32	10	12	3
8	151	45	142	39

APPENDIX 3

Age And Sex Composition Of Ikpiadjuk Settlement:

Eskimo Population, July 1969.

Age Range	Male	Female	Total
0-4	61	61	122
5-8	33	38	71
9-12	27	25	52
13-16	27	19	46
17-20	25	16	41
21-24	16	14	30
25-28	16	17	33
29-32	16	13	29
33-36	12	10	22
37-40	5	6	11
41-44	5	4	9
45-48	4	5	9
49-52	4	6	10
53-56	6	5	11
57-60	2	1	3
61-64	2	1	3
65 and over	5	2	7
Total	266	243	509

APPENDIX 4

Basic Hunt Data Gathered.

Hunt No.	Date 1968	Hunt Type	Total Time (min)	Hunt Time (min)	Non-Hunt (min)	Landed Catch Species	Landed Catch No.	Total Shots No.	Total Shots Cal.	Gas Gal.	Oil Qt.	Miles Travel	No. Of Hunters
1	May 28	Dog-Floe	1985	1395	590	Ringed	1	5	.243	-	-	60	1
2	May 29	" "	1985	1395	590	—	0	2	.222	-	-	60	1
3	June 1	Basking	626	236	390	Ringed	1	1	.243	-	-	30	1
5	" 3	Canoe-Floe	1781	1246	535	Ringed	10	13 21	.243 .222	10	2	75	2
6	" 8	" "	1087	607	480	Ringed	3	4	.243	5	1	72	2
7	" 8	" "	1087	607	480	Ringed	1	1	.222	ND	ND	80	2
8	" 10	" "	1828	1164	664	Ringed	6	13	.243	9	2	64	2
10	" 17	Basking	1847	1000	847	Ringed	4	7	.243	6	1	57	2
11	" 20	Basking	622	330	292	Ringed	3	3	.243	-	-	25	1
12	" 22	Canoe-Floe	852	306	546	Ringed	1	5	.243	3	1	43	2
15	" 29	Basking	796	558	238	Ringed	4	8	.243	-	-	28	1
17	July 2	Walrus	2426	1348	1078	Walrus Ringed	1 2	7	.243	25	4	127	2
18	" 9	Canoe-Floe	1362	968	394	Ringed	2	13	.243	8	2	65	2
19	" 9	" "	1362	968	394	Ringed	2	6	.222	5	1	65	2
22	" 22	Bearded Seal	774	748	26	Bearded	3	6	.243	10	2	50	2
24	" 26	" "	618	610	8	Bearded	1	4 3	.30-30 .243	9	2	42	2
26	" 29	" "	566	525	41	—	0	2	.243	2	0	9	2

APPENDIX 4 contd.

Basic Hunt Data Gathered.

Hunt No.	Date	Hunt Type	Total Time (min)	Hunt Time (min)	Non-Hunt (min)	Landed Catch Species	Landed Catch No.	Total Shots No.	Total Shots Cal.	Gas Gal.	Oil Qt.	Miles Travel	No. Of Hunters
	1968												
27	July 31	Bearded Seal	661	661	0	Bearded	2	26	.22	ND	ND	24	3
								11	.303				
								3	.30-30				
								2	.222				
28	Aug. 2	" "	653	653	0	Bearded	2	6	.243	9	2	36	2
								2	.303				
								3.	.22				
29(1)	Aug. 5	" "	1813	1090	723	Bearded	7	14	.243	20	4	84	2
								5	.22				
32	" 9	Walrus	730	730	0	Walrus	1	13	.222	12	2	61	2
						Bearded	2	12	.243				
								4	.22				
33	" 12	Walrus	1258	858	400	Walrus	4	21	.243	20	4	80	4
								21	.222				
								12	.22				
36	" 19	Open-Water	723	379	344	Ringed	4	21	.222	3	1	14	2
38	" 21	" "	321	269	52	Bearded	1	7	.222	2	-	9	2
41	" 24	" "	730	411	319	Ringed	1	5	.222	6	1	33	2
	1969												
3	May 21	Dog-Floe	2468	1532	936	Ringed	1	5	.30-30	-	-	61	1

(1) Extended Bearded Seal Hunt.

APPENDIX 4 contd.

Basic Hunt Data Gathered.

Hunt No.	Date	Hunt Type	Total Time (min)	Hunt Time (min)	Non-Hunt (min)	Landed Catch Species	Landed Catch No.	Total Shots No.	Total Shots Cal.	Gas Gal.	Oil Qt.	Miles Travel	No. Of Hunters
	1969												
5	May 28	Basking	756	504	252	Ringed	1	2	.243	-	-	31	1
7	" 30	" "	899	658	241	—	0	1	.243	-	-	39	1
9	June 3	" "	798	471	327	Ringed	1	2	.30-30	-	-	35	1
11	" 11	Dog-Floe	1819	880	939	Ringed	2	6	.30-30	-	-	55	1
13	" 13	" "	1340	333	1007	—	0	0	—	-	-	25	1
15	" 16	" "	738	490	248	Ringed	2	11	.30-30	-	-	21	1
								5	.222				
17	" 17	Canoe-Floe	3989	2543	1446	Ringed	11	9	.30-30	10	2	89	2
								21	.222				
19	" 23	" "	1949	825	1124	Ringed	1	2	.30-30	4	1	36	3
								13	.222				
								13	.22				
21	" 26	" "	8033	2036	5997	Ringed	9	14	.30-30	27	6	132	2
						Bearded	3	19	.222				
23	July 8	" "	2548	1084	1464	Bearded	2	1	.30-30	20	4	95	2
								4	.222				
								18	.22				
25	" 11	Walrus	685	470	215	Walrus	1	3	.30-30	14	3	63	2
						Bearded	2	9	.222				
								27	.22				
27	" 16	Bearded Seal	876	804	72	Bearded	2	38	.222	9	2	47	2
						Ringed	2	22	.22				

APPENDIX 4 contd.

Basic Hunt Data Gathered.

Hunt No.	Date 1969	Hunt Type	Total Time (min)	Hunt Time (min)	Non-Hunt (min)	Landed Catch Species	Landed Catch No.	Total Shots No.	Total Shots Cal.	Gas Gal.	Oil Qt.	Miles Travel	No. Of Hunters
31	July 22	Walrus	940	627	313	Walrus	3	8	.30-30	30	6	71	2
						Ringed	2	4	.303				
								35	.22				
33	" 23	Bearded	825	800	25	Bearded	1	9	.30-30	10	2	41	2
								11	.222				
								25	.22				
35	" 25	Walrus	832	648	184	Walrus	2	10	.30-30	25	5	79	2
37 (1)	" 30	Bearded	1258	1258	---	Bearded	7	36	.30-30	27	6	80	3
						Ringed	2	13	.222				
								8	.22				
39 (2)	Aug. 5	Open-Water	1969	1099	870	Ringed	3	4	.30-30	30	6	88	2
						Bearded	1	36	.222				
								32	.22				
41 (2)	Sept. 8	" "	1965	1310	655	Ringed	4	14	.222	20	4	104	3
								4	.243				
								18	.22				
43	" 19	" "	712	705	7	Ringed	5	14	.222	7	2	47	2
								4	.243				
45 (2)	" 26	" "	2145	1190	955	Ringed	5	7	.222				
						Bearded	1	5	.243				
								15	.22				

(1) Extended Bearded Seal Hunt.

(2) Coastal Ringed Seal Hunt.

APPENDIX 4 contd.

Basic Hunt Data Gathered.

Hunt No.	Date 1969		Hunt Type	Total Time (min)	Hunt Time (min)	Non-Hunt (min)	Landed Catch Species	Landed Catch No.	Total Shots No.	Total Shots Cal.	Gas Gal.	Oil Qt.	Miles Travel	No. Of Hunters
47	Oct.	4	Open-Water	749	668	81	Bearded	1	1	.222	15	3	75	2
49	"	11	" "	525	505	20	Walrus	1	5	.222	8	2	49	2
									1	.243				
51	"	13	" "	565	565	—	Ringed	1	1	.243	10	2	66	2
53	"	20	Freeze-Up Canoe	540	540	—	Ringed	2	7	.222	7	2	42	2
									2	.243				
55	"	21	" "	285	285	—	Ringed	1	1	.222	5	1	27	2
									5	.22				
57	"	25	" "	574	464	110	Ringed	3	8	.222	6	1	18	2
							Bearded	2	4	.243				
59	"	30	Freeze-Up Dog	580	405	175	Ring	2	2	.243	-	-	11	1
									1	.222				

APPENDIX 5

Computation of Available Hours.

Period	May		June		July		Aug.		Sept.		Oct.	
	1-15	16-30	1-15	16-30	1-15	16-30	1-15	16-30	1-15	16-30	1-15	16-30
Calendar Days	15	15	15	15	15	15	15	15	15	15	15	15
Sundays	-2	-2	-3	-2	-2	-2	-2	-2	-2	-2	-2	-2
Potential Days	13	13	12	13	13	13	13	13	13	13	13	13
Fog Days	-0	-0	-0	-4	-4	-1.5	-1	-0.5	-1	-1	-0	-0
Total	13	13	12	9	9	11.5	12	12.5	12	12	13	13
Wind <12 m.p.h.	58%	58%	67%	67%	69%	69%	66%	66%	58%	58%	34%	34%
Actual Days	7.54	7.54	8.04	6.03	6.21	7.93	7.92	8.25	6.96	6.96	4.42	4.42
Daylight Hours	x24	x24	x24	x24	x24	x24	x24	x16	x16	x12	x12	x8
Available Hunting Hours	181	181	193	145	149	190	190	132	111	84	53	37

APPENDIX 6

Hits and Misses - Shooting Position.

Condition	Shots Total	Shots Hit	Shots Miss	Mean Range (yards)	%Hit	Ratio Hit/Miss
Ringed Seal						
Breathing Hole	ND	ND	ND	1	90.0[1]	ND
Ice/Ice	51	32	19	85.54	62.7	1:0.53
Ice/Water	253	89	164	70.77	31.2	1:1.84
Boat/Water	100	17	83	56.66	17.0	1:4.88
Moving Boat/ Water	236	29	217	55.15	12.3	1:7.48
Bearded Seal						
Boat/Ice	10	10	0	50.62	100.0	1:0.0
Boat/Water	15	9	6	47.50	60.0	1:0.67
Moving Boat/Ice	42	26	16	43.44	61.9	1:0.61
Moving Boat/ Water	107	36	71	37.37	33.6	1:1.97

1. Estimate.

APPENDIX 7

Summary Eskimo Shooting Success, Ikpiadjuk, 1968-1969.

	Ice/Water			Ice/Ice			Boat/Ice			Moving Boat/Ice			Boat/Water			Moving Boat/Water		
Ringed Seal	Hit	Miss	Total	Hit	Miss	Total	Hit	Miss	Total	Hit	Miss	Total	Hit	Miss	Total	Hit	Miss	Total
0- 20(yd)	4	5	9	1	0	1	-	-	-	-	-	-	6	4	10	7	19	26
21- 40	28	16	44	1	0	1	1	0	1	1	0	1	8	11	19	15	110	125
41- 60	20	29	49	3	1	4	-	-	-	-	-	-	3	50	53	7	62	69
61- 80	21	50	71	7	6	13	-	-	-	-	-	-	1	17	18	0	20	20
81-100	10	19	29	10	5	15	-	-	-	-	-	-	1	1	2	0	1	1
101-120	3	12	15	6	0	6	-	-	-	-	-	-	-	-	-	-	-	-
121-over	1	20	21	3	1	4	-	-	-	-	-	-	-	-	-	0	1	1
Bearded Seal																		
0- 20(yd)	-	-	-	-	-	-	-	-	-	-	-	-	1	0	1	2	3	5
21- 40	2	0	2	-	-	-	2	0	2	14	3	17	4	0	4	26	33	59
41- 60	1	0	1	1	0	1	6	1	7	16	9	25	3	4	7	13	23	36
61- 80	1	2	3	2	0	2	1	0	1	-	-	-	1	2	3	0	3	3
81-100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	1	1
101-120	-	-	-	2	0	2	-	-	-	-	-	-	-	-	-	-	-	-
121-over	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Walrus																		
0- 20(yd)	6	0	6	-	-	-	7	0	7	14	0	14	-	-	-	42	0	42
21- 40	1	0	1	-	-	-	1	1	2	-	-	-	-	-	-	18	1	19
41- 60	-	-	-	-	-	-	-	-	-	3	0	3	-	-	-	-	-	-
61- 80	-	-	-	-	-	-	1	0	1	-	-	-	-	-	-	-	-	-
81-100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
101-120	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
121-over	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

APPENDIX 8

Summary Marine Mammals Seen At Ikpiadjuk, 1968.

Hunt No.	Date	Ringed Seal Basking	Ringed Seal In Water	Ringed Seal Total	Bearded Seal Basking	Bearded Seal In Water	Bearded Seal Total	Walrus Basking	Walrus In Water	Walrus Total	Total Animals
1-2	29 May	1	16	17	-	-	-	-	-	-	17
3	1 June	2	-	2	-	-	-	-	-	-	2
5	1 June	6	39	45	1	1	2	-	-	-	47
6-7	8 "	5	7	12	-	-	-	-	-	-	12
8	10 "	13	36	49	-	-	-	-	-	-	49
10	17 "	30	8	38	-	-	-	-	-	-	38
11	20 "	7	-	7	-	-	-	-	-	-	7
12	22 "	1	5	6	-	-	-	-	-	-	6
15	29 "	66	11	77	-	-	-	-	-	-	77
17	2 July	117	9	126	-	-	-	19	4	23	149
18	9 July	40	20	60	-	1	1	-	-	-	61
22	22 "	-	6	6	3	3	6	-	-	-	12
24	26 "	1	-	1	11	2	13	-	-	-	14
26	29 "	-	1	1	6	3	9	-	-	-	10
27	31 "	1	5	6	-	4	4	-	-	-	10
28	2 Aug.	5	2	7	3	1	4	-	-	-	11
29	5 Aug.	6	11	17	20	5	25	ND	-	-	42
32	9 "	-	11	11	1	5	6	1	-	1	18
33	12 "	-	4	4	-	4	4	5	15	20	28
36	19 "	-	5	5	-	12	12	-	-	-	17
38	21 "	-	2	2	-	3	3	-	-	-	5
41	24 "	- -	8	8	-	1	1	-	-	-	9
	Total	301	206	507	45	45	90	25	19	44	641

APPENDIX 9

Summary Marine Mammals Seen At Ikpiadjuk, 1969.

		Ringed Seal			Bearded Seal			Walrus			
Hunt No.	Date	Basking	In Water	Total	Basking	In Water	Total	Basking	In Water	Total	Total Animals
3	21 May	24	11	35	-	-	-	-	-	-	35
5	28 May	7	-	7	-	-	-	-	-	-	7
7	30 "	4	-	4	-	-	-	-	-	-	4
9	3 June	10	-	10	-	-	-	-	-	-	10
11	11 June	2	19	21	-	-	-	-	-	-	21
13	13 "	1	2	3	-	-	-	-	-	-	3
15	16 "	-	36	36	-	-	-	-	-	-	36
17	17 "	20	48	68	-	-	-	-	-	-	68
19	23 "	34	8	42	-	-	-	-	-	-	42
21	26 "	14	47	61	2	2	4	-	-	-	65
23	8 July	9	7	16	1	3	4	-	-	-	20
25	11 July	-	1	1	3	1	4	1	-	1	6
27	16 "	-	11	11	2	3	5	-	-	-	16
31	22 "	-	5	5	1	-	1	26	-	26	32
33	23 "	-	9	9	3	4	7	-	-	-	16
35	26 "	1	6	7	2	1	3	7	-	7	17
37	30 "	1	17	18	23	8	31	3	-	3	52
39	5 Aug.	-	97	97	-	7	7	-	-	-	104
41	8 Sept.	-	103	103	-	5	5	-	-	-	108
43	19 Sept.	-	18	18	-	1	1	-	-	-	19
45	26 "	-	50	50	-	2	2	-	-	-	52
47	4 Oct.	-	4	4	-	1	1	-	2	2	7
49	11 Oct.	-	-	-	-	-	-	2	-	2	2
51	13 "	-	6	6	-	1	1	-	-	-	7
53	20 "	-	12	12	-	-	-	-	-	-	12
55	21 "	-	2	2	-	-	-	-	-	-	2
57	25 "	-	19	19	-	4	4	-	-	-	23
59	30 "	-	3	3	-	-	-	-	-	-	3
	Total	127	541	668	37	43	80	39	2	41	789

APPENDIX 10

Summary Of Marine Hunting Catch, Ikpiadjuk, 1968.

		Ringed Seal			Bearded Seal			Walrus		
Hunt No.	Date	Landed	Wounded Lost	Sunk Lost	Landed	Wounded Lost	Sunk Lost	Landed	Wounded Lost	Sunk Lost
1-2	29 May	2	-	2	-	-	-	-	-	-
3	1 June	1	-	-	-	-	-	-	-	-
5	3 June	10	2	2	1	-	1	-	-	-
6-7	8 "	5	-	-	-	-	-	-	-	-
8	10 "	9	1	2	-	-	-	-	-	-
10	17 "	7	1	-	-	-	-	-	-	-
11	20 "	3	-	-	-	-	-	-	-	-
12	22 "	1	-	2	-	-	-	-	-	-
15	29 "	3	2	1	-	-	-	-	-	-
17	2 July	2	-	-	-	-	-	1	1	-
18	9 July	4	1	-	-	-	-	-	-	-
22	22 "	2	-	1	3	-	-	-	-	-
24	26 "	-	-	1	1	-	-	-	-	-
26	29 "	-	1	-	-	1	-	-	-	-
27	31 "	-	-	1	2	2	-	-	-	-
28	2 Aug.	-	-	-	2	1	1	-	-	-
29	5 Aug.	-	-	1	9	1	2	-	-	-
32	9 "	-	-	-	2	-	1	1	-	-
33	12 "	-	-	-	-	-	-	4	1	1
36	19 "	4	-	2	-	-	1	-	-	-
38	21 "	-	-	-	1	1	-	-	-	-
41	24 "	1	-	-	-	1	-	-	-	-
	Total	54	8	15	21	8	6	6	2	1

APPENDIX 11

Summary Of Marine Hunting Catch, Ikpiadjuk, 1969.

Hunt No.	Date	Ringed Seal			Bearded Seal			Walrus		
		Landed	Wounded Lost	Sunk Lost	Landed	Wounded Lost	Sunk Lost	Landed	Wounded Lost	Sunk Lost
3	21 May	1	1	-	-	-	-	-	-	-
5	28 May	1	-	-	-	-	-	-	-	-
7	30 "	-	-	-	-	-	-	-	-	-
9	3 June	1	-	-	-	-	-	-	-	-
11	11 June	2	-	-	-	-	-	-	-	-
13	13 "	-	-	-	-	-	-	-	-	-
15	16 "	2	1	-	-	-	-	-	-	-
17	17 "	11	2	2	-	-	-	-	-	-
19	23 "	1	-	-	-	-	-	-	-	-
21	26 "	9	1	1	3	1	-	-	-	-
23	8 July	-	-	1	2	-	-	-	-	-
25	11 July	-	-	-	2	1	-	1	-	-
27	16 "	2	-	1	2	-	1	-	-	-
31	22 "	2	-	-	-	-	-	3	-	-
33	23 "	-	-	2	1	1	1	-	-	-
35	26 "	-	-	1	-	-	-	2	-	1
37	30 "	2	-	1	7	-	2	-	-	-
39	5 Aug.	3	1	4	1	-	-	-	-	-
41	8 Sept.	4	-	1	-	1	1	-	-	-
43	19 Sept.	5	-	2	-	-	-	-	-	-
45	26 Sept.	5	1	-	1	-	-	-	-	-
47	4 Oct.	-	-	-	1	-	-	-	-	1
49	11 Oct.	-	-	-	-	-	-	1	1	-
51	13 "	1	-	-	-	-	-	-	-	-
53	20 "	2	-	-	-	-	-	-	-	-
55	21 "	1	-	-	-	-	-	-	-	-
57	25 "	3	-	1	2	-	-	-	-	-
59	30 "	2	-	-	-	-	-	-	-	-
	Total	60	7	17	22	4	5	7	1	2

APPENDIX 12[1].

Game Species Killed by Hunter One 1960 - 1968.

Date	Ringed Seal	Bearded Seal	Walrus	Polar Bear	Whale	Caribou	Fox	Wolf
1960								
March	-	1	3	-	-	7	21	-
April	-	-	-	-	-	-	19	-
May	1	-	-	-	-	4	-	-
June	-	1	6	-	-	-	-	-
July	-	-	1	-	-	-	1	-
August	1	2	1	-	-	15	-	-
September	2	-	5	-	-	5	-	-
October	1	1	-	-	-	6	-	-
November	-	-	2	-	-	-	6	-
December	-	-	1	-	-	5	13	-
Total	5	5	19	-	-	42	60	-
1961								
January	1	-	-	-	-	4	25	-
February	6	-	-	-	-	5	16	-
March	6	1	-	-	-	4	11	-
April	-	-	-	-	-	3	-	-
May	13	-	1	-	-	-	-	-
June	2	-	1	-	-	-	-	-
July	6	19	1	-	-	-	-	-
August	4	5	-	-	1	39	-	-
September	1	-	-	-	-	1	-	-
October	5	1	3	-	-	-	-	-
November	1	-	1	-	-	4	24	-
December	1	-	-	-	-	-	16	-
Total	46	26	7	-	1	60	92	-
1962								
January	4	1	-	-	-	-	-	-
February	2	-	-	-	-	14	2	-
March	12	3	4	-	-	9	3	-
April	1	-	-	-	-	3	2	-
May	2	-	-	-	-	6	-	-
June	18	1	-	-	-	-	-	-
July	8	13	-	-	-	-	-	-
August	16	16	-	-	-	-	-	-
September	3	1	1	-	-	25	-	1
October	-	-	-	-	-	-	-	-
November	-	-	-	-	-	-	-	-
December	-	-	-	-	-	10	-	-
Total	66	35	5	-	-	67	7	1

1. Personal Communication.

APPENDIX 12 contd.

Game Species Killed by Hunter One 1960 - 1968.

Date	Ringed Seal	Bearded Seal	Walrus	Polar Bear	Whale	Caribou	Fox	Wolf
1963								
January	-	-	-	-	-	-	-	-
February	8	-	-	-	-	-	1	-
March	3	-	-	-	-	-	-	-
April	6	-	-	-	-	1	3	-
May	20	1	-	-	-	11	-	-
June	20	1	4	-	-	-	-	-
July	13	5	-	-	-	-	-	-
August	1	1	-	-	-	32	2	-
September	1	-	2	-	-	2	-	-
October	6	-	1	-	-	-	-	-
November	-	-	-	-	-	7	-	-
December	1	-	-	-	-	2	-	-
Total	79	8	7	-	-	55	5	-
1964	No accurate records kept for 1964.							
1965								
January	4	-	-	-	-	-	-	-
February	3	-	-	-	-	-	-	-
March	4	-	-	-	-	-	-	-
April	8	1	-	-	-	23	-	-
May	5	1	-	-	-	4	-	-
June	20	-	6	-	-	-	-	-
July	17	8	-	-	-	1	-	-
August	4	-	-	-	-	2	-	-
September	5	2	-	-	-	3	-	-
October	5	-	3	-	-	-	-	-
November	3	-	-	-	-	1	-	-
December	-	-	-	-	-	5	-	-
Total	78	12	9	-	-	39	-	-
1966								
January	1	-	-	-	-	-	-	-
February	6	1	2	-	-	-	-	-
March	-	-	-	-	-	3	-	-
April	5	1	1	2	-	-	-	-
May	4	-	-	2	-	-	-	-
June	13	1	-	-	-	-	-	-
July	14	1	-	-	-	2	-	-
August	1	-	3	-	-	11	-	-
September	-	-	3	-	4	4	-	1
October	4	-	-	-	-	-	-	-
November	2	-	-	-	-	7	-	-
December	2	-	-	-	-	6	11	-
Total	52	4	9	4	4	33	11	1

APPENDIX 12 contd.

Game Species Killed by Hunter One 1960 - 1968.

Date	Ringed Seal	Bearded Seal	Walrus	Polar Bear	Whale	Caribou	Fox	Wolf
1967								
January	2	-	-	-	-	-	13	-
February	14	1	-	-	-	14	10	1
March	10	1	-	-	-	5	1	1
April	1	2	-	-	-	15	3	-
May	5	-	-	-	-	-	-	-
June	6	1	-	-	-	2	-	-
July	1	1	-	-	-	4	-	-
August	2	3	1	-	-	-	-	-
September	19	2	-	-	-	-	-	-
October	7	-	-	-	-	-	-	-
November	1	-	1	-	-	-	-	-
December	-	-	-	-	-	4	9	-
Total	68	11	2	-	-	44	36	2
1968								
January	3	-	-	-	-	7	3	-
February	2	-	1	-	-	-	-	-
March	6	-	-	-	-	-	-	-
April	1	-	-	-	-	-	-	-
May	9	-	-	-	-	10	-	-
June	27	1	-	-	-	-	-	-
July	7	3	1	-	-	-	-	-
August	6	14	6	-	-	-	-	-
September	-	-	2	-	-	21	-	-
October	13	-	3	-	-	-	-	-
November	14	2	-	-	-	-	-	-
December	1	-	-	-	-	-	-	-
Total	89	20	13	-	-	38	3	-

Game Species Killed by Hunter Two 1965 - 1968.

Date	Ringed Seal	Bearded Seal	Walrus	Polar Bear	Whale	Caribou	Fox	Wolf
1965								
January	3	-	-	-	-	7	-	-
February	4	-	-	-	-	3	-	-
March	Hospitalized at Frobisher Bay							
April	-	1	-	-	-	4	-	-
May	6	-	-	-	-	11	-	-
June	7	-	1	-	-	-	-	-
July	11	3	-	-	-	1	-	-
August	6	5	-	-	-	24	-	-
September	5	3	-	-	-	36	-	-
October	7	1	-	-	-	18	-	1
November	-	-	-	-	-	13	2	-
December	-	-	-	-	-	1	2	-
Total	43	13	1	-	-	118	4	1

APPENDIX 12 contd.

Game Species Killed by Hunter Two 1965 - 1968.

Date	Ringed Seal	Bearded Seal	Walrus	Polar Bear	Whale	Caribou	Fox	Wolf
1966								
January	1	-	-	-	-	4	-	-
February	1	-	-	-	-	15	1	1
March	2	1	-	-	-	9	-	-
April	-	-	-	-	-	7	-	-
May	2	-	-	-	-	3	-	-
June	5	-	-	-	-	2	-	-
July	14	2	-	-	-	1	-	-
August	2	10	-	-	-	8	-	-
September	8	3	-	-	-	19	-	3
October	1	2	-	-	1	16	4	-
November	-	-	-	1	-	8	2	-
December	1	-	-	-	-	-	2	1
Total	37	18	-	1	1	99	9	5
1967								
January	-	-	-	-	-	9	-	1
February	-	-	-	-	-	12	-	1
March	-	-	-	-	-	-	-	-
April	-	-	1	-	-	-	-	-
May	2	-	-	-	-	5	-	-
June	9	-	-	-	-	1	-	-
July	5	-	-	-	-	-	-	-
August	1	1	-	-	-	17	-	-
September	3	-	-	-	-	-	-	-
October	11	-	-	-	-	-	-	-
November	1	Working; a non-hunting period						
December		Working; a non-hunting period						
Total	37	1	1	-	-	39	-	2
1968								
January	-	-	-	-	-	4	-	-
February	2	2	-	-	-	-	-	-
March	6	-	2	-	-	-	-	-
April	8	-	-	-	-	-	-	-
May	4	-	-	-	-	3	-	-
June	21	-	-	-	-	-	-	-
July	4	3	1	-	-	-	-	-
August	5	2	1	-	-	11	-	-
Total	50	7	4	-	-	18	-	-

APPENDIX 12 contd.

Game Species Killed by Hunter Three 1967 - 1969.

Date	Ringed Seal	Bearded Seal	Walrus	Polar Bear	Whale	Caribou	Fox	Wolf
1967								
January	5	1	-	-	-	-	-	-
February	6	1	-	-	-	-	-	-
March	12	1	-	-	-	5	-	-
April	8	2	-	-	-	13	-	-
May	26	-	-	-	-	5	-	-
June	20	-	-	-	-	-	-	-
July	1	-	2	-	1	-	-	-
August	No accurate records kept.							
September	8	3	-	-	-	-	-	-
October	4	2	-	-	-	-	-	-
November	5	-	3	-	-	-	-	-
December	1	-	-	-	-	-	-	-
Total	96	10	5	-	1	23	-	-
1968								
January	-	-	-	-	-	6	-	-
February	6	-	-	-	-	-	-	-
March	10	-	-	-	-	-	-	-
April	4	-	-	-	-	-	-	-
May	9	-	-	-	-	-	-	-
June	12	-	-	-	-	-	-	-
July	8	1	-	-	-	-	-	-
August	1	-	-	-	-	-	-	-
September	2	-	-	-	-	7	-	-
October	6	-	-	-	-	-	-	-
November	34	-	-	-	-	-	-	-
December	No Hunting							
Total	92	1	-	-	-	13	-	-
1969								
January	3	-	-	-	-	-	-	-
February	2	-	2	-	-	-	-	-
March	No Hunting							
April	8	-	-	-	-	-	-	-
May	2	-	-	-	-	3	-	-
June	21	-	-	-	-	-	-	-
July	2	10	3	-	-	-	-	-
August	No Data Available.							
September	Hospitalized at Frobisher Bay.							
October	No Data Available.							
Total	38	10	5	-	-	3	-	-

APPENDIX 13

Product Return From Hunting.

It is very difficult to assess the returns from hunting on the individual, family or community level and much more research needs to be done in this regard. Records of individual hunters listing landed catch (see Appendix 12) must be approached with some caution for they are not kept up to date by most hunters. However, they do give an excellent indication of the type of country food utilized. Furthermore, they probably represent at least the minimum annual supply available to the hunter and his family. For hunter one the records of 1968 and for hunter three the records of 1968 and into 1969 are known to be quite accurate and perhaps can be used as a measure against the preceding years. It must be realized, however, that the three hunters have experienced a shift in hunting territory between 1967 and 1968 which will influence the emphasis on and the numbers of each species landed.

The R.C.M.P. Annual Game Reports (see Table 6) must also be approached with caution when estimating total landed catch. For seals the figures given represent only the skins traded through the Hudson's Bay or the Co-operative and as such are an underestimation of the total kill. This is particularly true for bearded seals where only a very small portion of the skins are traded.

Data are available which allowsan adjustment to be made on the figures for ringed seals and are given in Table I of the appendix. The table lists the number of ringed seals traded in the two stores at Ikpiadjuk. As well as this the table estimates the number of seals killed by the hunters on the basis of hunting experience in 1968 when eight per cent of the seals shot were not recovered by the hunters and an average of twenty per cent of the skins were not traded but were kept for use in the home (Bradley, 1970).

Table I

Estimation of Ringed Seals Harvested.
Ikpiadjuk 1964 - 1969.[1]

Year	Number Traded	Number Killed
1964-65	3914	4697
1965-66	2228	2678
1966-67	3178	3814
1967-68	670	804
1968-69	1824	2198

1. Bradley (1970).

The caribou and walrus figures given in the R.C.M.P. Annual Reports do not represent actual counts of animals taken but are based on estimates and verbal reports given to the police by the hunters and personnel from the Co-operative.

The most accurate, but limited data can be derived from an analysis of the observed hunts. From the data listed in Appendix 4 information about the number of hunts, the duration of the hunts, the material in-put and landed catch is available. This may give a measure of hunting returns and the effort needed to achieve those returns.

Assessment of landed catch is only a small step in determining the availability of food. There is a basic division in the landed catch between food for humans and food for dogs. A small amount of information was gathered on the feeding of dogs. Most hunters reported that their teams are fed the equivalent of one ringed seal every other day when the dogs were working or during the winter months. This covers the period from mid-October to mid-June. During the fall they are fed two to three times a week. The remainder of the year, in July and August, the dogs are fed very little and quite irregularly perhaps once every one or two weeks.

Table II gives a break down by weight of the component parts of the main animals hunted at Ikpaidjuk. As can be seen from the table only a relatively small portion of the total animal is suitable for consumption by humans or dogs. McLaren (1958a) estimates that only thirty per cent and thirty-nine per cent of the weight of the seals is edible by humans and dogs respectively. This must be taken into consideration when discussing availability of food as derived from the hunting activity.

One of the most difficult and probably the most important factor to consider when determining hunter yields is the flow of food through the village and the sharing of products of the hunt. One must not only be aware of the return of the hunting effort but also any other sources of food available to the hunter as well as the demands for his food beyond his immediate family. Much more research needs to be done to determine the network by which food leaves and enters a household. No data exist from the observations of the hunts which will help to elucidate the problem.

Table II

Yield of Country Food.

	% Total Weight[1]		% Total Weight[2]
Ringed Seal (Pusa hispida).			
Average weight Ikpiadjuk sample - 70.46 lbs.			
Meat and edible viscera	27	Meat	27
Internal organs	9	Viscera	9
Bone	16	Bone	16
Blood	5	Blood	5
Blubber	32	Blubber	32
		Skin	11
Average weight (lbs.)	76		100
Edible yield % total weight - human 30, dogs 39 (McLaren, 1958).			
Bearded Seal (Erignathus barbatus).			
Average weight Ikpiadjuk sample - 473.63 lbs.*			
Meat and edible viscera	25	Meat	25
Internal organs	9	Viscera	9
Bone	16	Bone	16
Blood	5	Blood	5
Blubber	27	Blubber	27
		Skin	18
Average weight (lbs.)	464		600
Edible yield % total weight - human 30, dogs 39 (McLaren, 1958).			
Walrus (Odobenus rosmarus).			
Average weight Ikpiadjuk sample - 1,941.87 lbs.**			
Meat and edible viscera	26	Meat	35
Internal organs	6	Viscera	26
Bone	12	Bone	11
Blood	7	Blood	N.D.
Blubber	30	Blubber	16
		Skin	12
Average weight (lbs.)	1,450		1,500
Caribou (Rangifer acticus stonei).			
		Meat	35
		Viscera	20
		Bone	25
		Blood	N.D.
		Fat	10
		Skin	N.D.
Average weight (lbs.)			150

* add 5% for blood loss. ** add 7% for blood loss.

1. Anders (1965).
2. Foote (1967).

APPENDIX 14

Expense of Hunting Equipment - Hudson's Bay Company.

Weapons	Cost 1968	Cost Partial Revision 1969
.22 Cooey single shot (mod. 75002)	$ 22.95	(mod. 750) $18.50
.22 Repeater bolt action (mod. 60001)	$ 35.95	
.22 Cooey semiautomatic (mod. 64)	$ 44.95	
.22 Mosberg	$ 61.95	
.22 Remington automatic (mod. 66MB)	$ 74.50	
.22 Winchester repeater (mod. 250)	$ 87.95	
.22 Winchester hornet (mod. 270)	$ 85.95	
.222 Remington (mod. 340)	$ 89.95	
.222 Remington	$169.50	
.243 ------------	$162.50	
.30-30 ----------	$ 85.95	
.303 British enfield	$ 26.95	
12 Gauge shotgun	$ 65.00	
12 Gauge shotgun	$ 31.95	

Ammunition Calibre		No. of Shots	Cost 1968	Cost 1969
.30-06	Springfield	20	$6.20	
.303	British enfield	28	$5.80	$5.95
.30-30	Winchester	20	$4.75	
.300	Savage	20	$6.00	
.250	Savage	20	$5.50	
.243	Winchester	20	$5.25	$5.90
.270	Winchester	20	$6.20	
.308	Winchester	20	$6.20	
.222	Remington	20	$4.30	$4.75
.22	Winchester hornet	50	$4.10	
.22	Long rifle	50	$1.25	
12	Gauge shot	25	$4.10	

APPENDIX 14 cntd.

Expense of Hunting Equipment - Hudson's Bay Company.

Transportation Items	Cost 1968	Cost 1969
Whale boat plus motor	$2,675.00 (Est. Crowe, 1969)	
19 foot freighter canoe	$ 345.00	
22 foot voyageur canoe	$ 500.00 (Est.)	
Ski-doo	$ 850.00	$769.00
5 horsepower Johnson	$ 265.00	
9.5 horsepower Johnson	$ 459.00	
9.5 horsepower Evinrude	$ 420.00	
20 horsepower Johnson	$ 579.00	
33 horsepower Johnson	$ 655.00	

Fuel	Amount	Cost 1968	Cost 1969
Gasoline	1 gallon	$1.22	$1.50
Naptha	1 gallon	$1.10	$1.50
Kerosene	1 gallon	$3.91	
Lubricating oil #30	1 quart	$ .70	
Outboard motor oil	1 quart	$ .79	

Miscellaneous	Cost
Fish net unfinished nylon	$ 7.25
Blue nose mounted gill nets - nylon	
4 inch mesh, 4 feet deep, 30 yards long	$11.75
4½ inch mesh, 4 feet deep, 30 yards long	$ 7.29
Rope ¼ inch	$ .02/ft.
Rope 3/8 inch	$ .04/ft.
Rope ½ inch	$ .08/ft.
Dog chains 40 inches	$ 4.98
Harness webbing	$ .35/yd.
Coleman stove - two burner	$27.95
Coleman stove - one burner	$21.95
Primus stove - one burner	$11.95
Sledge runners	$14.50/pair
Parka duffle	$ 9.50/yd.

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