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PROGRESS REPORT  
HUMAN ECOLOGY INVESTIGATIONS, KIVALINA, ALASKA  
December, 1959

INTRODUCTION

MASTER

The objectives of this study are as follows:

1. to determine the nature of the human ecological balance in the region.
2. to investigate the extent of local dependence upon specific types of available food resources.
3. to determine the nature of use of specific localities in terms of seasonal use, species used and the manner and intensity with which the species are utilized.
4. to study the composition of populations as to numbers, fluctuations, and local movements.
5. to arrive at some degree of prediction as to the future course of the native economies.

Residence was established in Kivalina on August 4, 1959. Information has been obtained through observation, interviews and participation. Due to the relatively short time field investigation has been in progress, much of the information related in this report has been obtained by interviews with the residents of Kivalina. Actual observation throughout the year will be needed in order to verify this information.

THE VILLAGE OF KIVALINA

The Eskimo village of Kivalina is situated on the northwestern coast of Alaska approximately 40 miles southeast of Cape Thompson and 115 miles northwest of Kotzebue.

Cape Seppings lies to the northwest, surrounded by low foothills of the DeLong Mountains which extend to the sea along the Kivalina River. To the south can be seen the Mulgrave Hills which form the southern boundary of general Kivalina activity. The coastal plain between the Kivalina and Wulik rivers is interrupted by several hills, the highest of which is Mt. Jarvis, 1630 feet.

The village site is located on the southeastern portion of a barrier bar which encloses a lagoon approximately 5 miles in length. The Wulik and Kivalina rivers flow into the lagoon from their headwaters in the DeLong Mountains of the Brooks Range to the northeast. The original names of these rivers, Aulik and Kivalik, respectively, have been retained as the names of the channels which

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the rivers form through the barrier bar. The Aulik channel is located on the southeast border of the village, while the Kivalik channel is approximately 3.5 miles to the northwest. Thus, Kivalina is actually situated on an island and in the summer water transportation is required to reach the mainland.

The permanent settlement of Kivalina occurred about the turn of the century and seems to have been motivated to a large degree by the establishment of the school in 1904-05. Previously, although a few people lived on the coast, the majority of the population lived inland for most of the year where they fished on the rivers in the fall and then moved on to hunt caribou, establishing semi-permanent camps near large herds of caribou. In the spring the general movement was toward the coast for sealing, with a few people going on to Point Hope to take part in the whaling activities.

Today the permanent village itself is arranged roughly in two rows along the lagoon and the Chukchi Sea; it consists of 24 dwellings: the school, the Episcopal and Friends churches, the native store, and two new prefabricated steel buildings--the Alaska National Guard building and the Caribou Hoof Jewelry Workshop.

Half of the 24 dwellings are sod-covered houses which tend to be clustered about the northwestern portion of the village. In the construction of these houses, a wooden framework of lumber or split driftwood logs is surrounded by layers of sod blocks, after a thin layer of dry sod has been placed next to the wooden frame. The sod layers extend completely up the walls and frequently onto the roof, so that the entire house is covered with sod with the exception of windows and a skylight in the roof. As the sod has a tendency to fall away from the house, a second layer of sod is sometimes placed against the first to prevent it from slipping and to increase insulation. This insulating quality is often impaired by the burrowing of mice.

Some sod houses utilize only a skylight for illumination while others use both windows and a skylight. The more recent sod houses, built by young married couples, tend to eliminate the skylight entirely.

As sod houses tend to become damp in the summer, the people move out into large, white wall tents as soon as the ground becomes dry.

Many of the frame houses are fairly old, dating back to the 1920's. Three frame houses were originally constructed as stores; two belong to men who are union carpenters; two were built recently by families who have just moved into Kivalina, and the most recent was constructed this summer by a young married couple

with the aid of money the husband earned by working in Fairbanks during the summer.

All houses have storm sheds about the entrance to decrease the amount of cold air that enters when the door is opened. Double doors or pieces of canvas hung over the door are also frequently used at the entrance into the house proper.

Fuel is a major problem for Kivalina in the winter. Driftwood logs are collected from the beaches up and down the coast during the summer and are saved for winter use or sold to the store. The value of a log depends upon its size and condition. A log in good condition, 11 feet long with a diameter of 8 inches is worth about \$9.00. This wood is purchased by the people in the winter, with the sale being a means of obtaining cash for the moment. Collection of driftwood generally extends from the Mulgrave Hills or Rabbit Creek on the south to a point about 15 miles south of Ogotoruk Creek on the north. The area between Cape Seppings and Ogotoruk Creek appears to be a particularly favorable location for the collection of driftwood.

During the winter most driftwood is obtained from the Wulik and Kivalina rivers. When this is scarce, live willows are also used. Willow driftwood burns much more rapidly than driftwood logs, a sledload ordinarily lasting about two or three days. Wood is supplemented by blubber in the winter, especially after intensive sealing activities begin in February. Blubber is also burned alone if no wood is on hand. A chunk of blubber is placed on an inverted can, generally a two pound coffee can, which has holes punched in the sides and top. When a piece of paper is ignited beneath the can, the blubber melts; the oil drips into the can and burns. A five gallon can of blubber, about 40 pounds, will last for about one day if burned alone. When this amount of blubber is burned with wood, it lasts two or three days.

#### POPULATION

The population of Kivalina currently numbers 145, including seven students away at high school and four persons, two children and two adults, in hospitals. Since there are 24 household residences in Kivalina the average occupancy is 6 individuals. Three of these households include married couples living with their in-laws.

Tables 1 and 2 indicate the population composition of Kivalina and table 1 shows the fluctuations over the past five years. Table 3 tabulates the births and deaths of the last five years.

The shift shown in Table 1 in number of individuals in the 6-18 age bracket between 1958 and 1959 is inherent in the census dates, the 1958 census having been taken in March while that of 1959 was taken in November. Thus, the infants indicated in 1959 were all born this year; most of the infants of 1958 have moved into the 1-6 bracket but perhaps six of them moved into the 6-18 bracket.

Table 2 shows that out of a total population of 145 there are 79 individuals who are younger than 21, compared to 66 individuals who are 21 or older. As may perhaps be surmised from the age distribution, there are 35 males who may be considered hunters. The sharp decrease in the number of males between the 30 and 40 age groups may indicate a movement of unattached males away from the village. This may be influenced by the unbalanced male-female ratio which exists in the 11 to 30 age span. At present, no reason for this imbalance is evident.

Table 3 indicates a fairly high infant mortality rate. All of the infants died of pneumonia or upper respiratory infections. The adult female died of pulmonary tuberculosis. The adult male was drowned in a hunting accident. There has been a natural increase of 22 individuals in the population within the last five years.

Table 1. Kivalina Census, 1955-59.

<u>Date</u>	<u>Total Population</u>	<u>Adult Males</u>	<u>Adult Females</u>	<u>6-18 Years</u>	<u>1-6 Years</u>	<u>Infants</u>
Mar. 1955	129	39	29	35	16	10
Mar. 1956	117	36	26	30	20	5
Mar. 1957	133	45	26	34	24	4
Nov. 1957*	150	48	30	39	24	9
Mar. 1958	146	49	30	33	26	8
Nov. 1959	145	41	29	41	28	6

\*Census figures, with the exception of 1959, were obtained from the Bureau of Indian Affairs Annual Census taken by the school teacher each March. A second census was taken in November, 1957, and this is included. The 1959 figures also represent a November census.

Table 2. Age and Sex Distribution, 1959.

<u>Age in Years</u>	<u>Males</u>	<u>Females</u>
Infants	1	5
1-10	22	23
11-20	19	9
21-30	14	6
31-40	9	10
41-50	7	2
51-60	3	4
61-70	3	4
71-80	0	0
81-90	0	1
90+	1	0

Table 3. Births and Deaths, 1955-59.

<u>Year</u>	<u>Births</u>			<u>Deaths</u>				
	<u>Male</u>	<u>Female</u>	<u>Total</u>	<u>Adult</u>		<u>Infant</u>		
				<u>Male</u>	<u>Female</u>	<u>Male</u>	<u>Female</u>	<u>Total</u>
1955	3	3	6	0	0	0	0	0
1956	1	1	2		1	1	1	3
1957	4	7	11			1		1
1958		2	2	1				1
1959(Nov.1)	<u>3</u>	<u>5</u>	<u>8</u>	<u>—</u>	<u>—</u>	<u>1</u>	<u>1</u>	<u>2</u>
	11	18	29	1	1	3	2	7

Incomplete census records hinder attempts to account for all population fluctuations. Major fluctuations are most likely caused by movements of entire families to and from Kivalina. Part of the great increase in population in 1957 can be accounted for by the movement into Kivalina of two families totaling 15 people. The decrease in 1958 was caused in part by a family of six moving to Kotzebue; this family returned to Kivalina in 1959.

The main factors which appear to motivate movement away from Kivalina are the hope of better job opportunities and the difficulty of obtaining fuel in this area during the winter.

Recurrent fluctuations in population often result when a Kivalina resident marries someone from a neighboring village such as Noatak, Kotzebue or Point Hope. In such cases the residence of these married couples appears to alternate between the two villages.

Although considerable movement occurs, much of the population is quite stable, with 18 of the present 24 households having maintained permanent residence in Kivalina for at least twenty years, if not longer. (Movement of some of the individuals within these households, however, has occurred.)

Local movements of people to other villages in the surrounding area temporarily affects the size of the population and appears to take place most often in the spring and fall when dog team travel is not hampered by severe cold and wind. In fall, travel seems most likely in November or the early part of December. In spring, March and April appear to be favorable months for travel. Last spring four teams went to Point Hope in March to participate in whaling activities there. One trip was made to Point Hope to sell fish and another was made to visit friends. Other trips may have been made.

Trips to Kotzebue seem to be motivated by the desire to sell fish or to acquire supplies not available locally. At least six trips were made to Kotzebue last year.

Trips to Noatak do not appear to be as frequent, although people from Noatak and Kotzebue travel into the Kivalina area to hunt caribou in the fall and seal in the months of February and March.

Temporary shifts of local population also occurs when men go out to work in Fairbanks and Kotzebue in the summer. Last summer three men went to Fairbanks and four worked in Kotzebue. Additional shifts are occasioned by trips to the hospitals in Kotzebue and Anchorage but these have no seasonal basis.



## TRANSPORTATION

Transportation in the summer is by boats, and everyone in the village owns or has access to a wooden rowboat. The rowboats are fitted with 50-gallon oil barrels which are used to haul water from the Wulik River.

Large, open, skin boats, called "umiaks" or "umaypaks," are used for sea hunting in the spring, for seine fishing, for the collection of driftwood, and for general transportation purposes.

The size of the boats is determined by the number of "ugruk" (bearded seal, Erignathus barbatus) skins required to cover the wooden frame. There are two boats requiring six skins and three requiring eight skins in the village. An eight skin umiak is capable of carrying 2.5 to 3 ton loads.

Outboard motors are now used, although it has been less than ten years since the first one was acquired. There are eight outboard motors in the village with the 14 and 18 horsepower sizes being preferred.

Kayaks are used during the winter to retrieve seals and ugruk shot in open water. They are usually carried on the dog sleds when sea hunting.

Dog teams are essential for winter transportation and hunting. There are 174 work dogs in Kivalina, used with an average of eight dogs to a team. They are used for hunting caribou and seal, for collecting driftwood and for general transportation. As a definite relationship exists between dog team efficiency and hunting success, it is necessary that a sufficient amount of dog food be on hand in order that both dogs and humans may benefit.

During the winter months, dogs are fed about two or three pounds of food a day. Frozen fish is sometimes used. During the winter seal blubber is used as fuel and the remainder of the seal is used for dog food. Male caribou obtained in the fall are also frequently used as dog food. When food is short, cooked rolled oats or blubber is used. Seal oil is frequently added to dog food if it is available in sufficient quantity.

## FOOD

Although permanent residence is now maintained by the people of Kivalina along the coast, their basic subsistence pattern remains similar to that of the past. The basic elements of the daily diet are provided by fish, caribou, and ugruk. These major food resources are supplemented by berries, roots, birds, eggs, and greens. Quantities of flour, corn meal, pilot bread, crackers, jam,

tea, coffee, canned milk, and sugar are also used.

### Fish

Fish play a vital part in the subsistence economy of the Kivalina people. The major portion of the fish catch consists of the Dolly Varden char (Salvelinus malma), which is called the Kivalina trout. It is renowned in the region for its large size and good eating.

These fish leave the streams in June and some fishing takes place at that time. However, major fishing activities occur in the fall when the fish return to the streams. The fish begin to arrive in mid-August and are reported to return in distinct waves. The first wave is said to consist of medium-sized and small fish; the second group of small fish; the third of fairly large fish; and the last of the very largest fish accompanied by small fish and found in association with whitefish. The last wave appears to arrive toward the end of September.

Early arrivals are caught with rod and reel and by means of gill nets set near the Aulik channel. The amount of fish obtained in this manner probably does not exceed 1,000 pounds. Large scale fishing begins when the fish arrive in sufficient numbers to warrant seining activities. This year seining operations began on September 1, with boats fishing on the lower portions of the Wulik River.

The most intensive seining takes place at fish camps established on the Wulik River. Departure for these fish camps is largely determined by the arrival of the North Star, a Bureau of Indian Affairs vessel which brings supplies in once a year to BIA schools and native stores. Departure is delayed until after the North Star is unloaded. This delay is motivated in part by the fact that the people earn \$1.05 an hour for longshoring and also by the fact that the store must pay \$55.00 an hour for the use of the <sup>LCM</sup> ~~LST~~ landing craft which brings the supplies from the ship to the shore. Therefore, the store and ultimately the people save money by having the unloading proceed as rapidly as possible. The North Star was unloaded on September 13, 1959; credits for longshoring were established by September 15th and departure for fish camps took place on the 16th.

Only two of the three large umiaks went up the river this year. The owner of the third boat appeared to be remaining in the village in hopes of obtaining a job on the landing field construction which was going on at that time. As the owner did not secure regular employment, this boat engaged in fishing activities from the village.

Make-up of the crews, which include both men and women, appears to be largely determined by family relationships. However, there is always room for anyone who wishes to fish. One crew consisted of four men, four women and one eleven-year-old boy. The other crew consisted of seven men, two women and a twelve-year-old boy.

The catch is divided equally among the crew members, with the owner of the boat receiving an additional share for the use of the boat. The person owning the seine net is also entitled to a share for its use. However, when the same person owns the boat and net, the second share is usually not claimed. Frequently, the net of some individual unable to participate actively in the fishing is used and this person receives a share of the fish. One woman on each crew serves as the cook. She also receives a full share of the fish, as did the boys if they engaged in fishing.

Permanent fishing sites are not maintained. Movement is occasioned by the availability of fish. However, certain locations on the river have natural advantages which cause them to be utilized frequently as fishing sites. In the past, fishing sites have extended up the river as far as the base of Mt. Jarvis. This year the shallowness of the river prevented the establishment of sites beyond Sevoo, a point on the Wulik River about 14 miles from Kivalina. Sites were established this year at a point between Sevoo and Egarrack, at Ahgaviknak, at Omeyak and at Talak. The first three locations were within four miles of Sevoo. The last site was about four miles from Kivalina.

Fish are deposited on a sandbar near the camp until fishing at that site is completed. Then willow nests are constructed for the storage of fish. This is accomplished by driving stakes in the ground in a circle and weaving willows between the stakes to form a nest. Willows are then placed on the bottom of the nest and the fish are stacked within. The fish are sometimes placed in burlap sacks in order to make their later removal easier. When all the fish have been put away, willows and driftwood are placed on top in order to make the fish secure from animals (this is not always successful). The fish are transported later in the winter by dog team.

Fishing sometimes proceeds until the river freezes over. The boat is then left upstream and the people walk back to the village or are returned by dog team. This year both boats were able to return to the village before the river froze completely, although it was necessary for one boat to force its way through the ice which had formed on the lagoon and the lower portion of the river. The lagoon froze over on September 24 and one boat returned home through the ice on the 26th. A thaw, which started on the 27th allowed the last boat to return through open water on the 29th. Fishing was resumed from the village on October 2 and continued until October 7 when freezing weather once more set in.

Table 3 indicates the amount of fish obtained at various phases of the fishing operations.

Table 3. Fishing Success by Residents of Kivalina, Autumn 1959.

	<u>Boat No.</u>	<u>No. Days Fished</u>	<u>Total Crew Days Fished</u>	<u>Lbs. Fish Caught</u>	<u>Total Lbs. Fish</u>	<u>Av. lbs. Per Crew Day</u>
September 1-9						
Village	1	4		5,400		
	2	1	8	2,300	13,500	1,687+
	3	3		5,800		
September 16-29						
Fish Camp	1	9		23,000		
	2	8	17	22,000	45,000	2,647+
Village	3	3	3	11,100	11,100	3,700
October 2-7						
Village	1	4		10,000		
	2	4	12	8,800	28,000	2,333+
	3	4		9,200		
			40		97,600	2,440

Galvanized tubs are used to remove fish from the boat after seining operations, therefore, estimates of total catch were obtained by counting the number of tubs removed from each boat and multiplying this by the weight of a tub, which is approximately 100 pounds.

A comparison of the number of pounds of fish caught during the first weeks of September and October indicates a steady increase in the intensity of the fish run. Boat No. 1 caught almost twice as many fish in four days of fishing during the first week of October as it did for the same number of days during the first week of September. The most successful fishing appeared to occur during the latter part of September. The one boat operating from the village during that period had the highest average of fish caught per days fished. While this figure is not an impossible one, nor even an unlikely one if the fishing was very good, it should be noted that the author had no opportunity to check the fish catch in the village, because at this time she was a crew member on one of the boats up river. It was possible to visit the fishing sites of the other crew up river

and their reported catch compares favorably with estimates made by the author at that time.

If the reported catch from the village during the latter part of September is accurate, the high degree of fishing success may have been a result of greater flexibility in the selection of fishing sites in the lower portions of the river; also, the fish run was probably heavier in that part of the river at that time. Activities based at camps up river were restricted in movement by shallowness of sections of the river, making it necessary to fish the same parts of the river several times and thus decreasing the amount of fish caught per unit effort.

Nevertheless, the fish caught up river represent almost half of the total catch. One advantage of fishing up river is that fishing can continue for quite a bit longer than fishing from the village, because the upper portions of the river do not freeze over as soon.

No fishing is conducted on the Kivalina River because it is too shallow. Some fishing is done through the ice on the Kivalina River in the winter.

Noatak people are reported to utilize the upper reaches of the Wulik River for fishing as soon as weather conditions permit travel by dog team. Their fish are reported stored along the river when fishing is completed. The extent of these fishing activities is not yet known.

The reported arrival of fish in groupings of size appears to be somewhat substantiated by the pattern of catches observed at fish camps up river. The first site, which was located about 12 miles up river, yielded a predominance of fish about 10 inches in length. At the succeeding camp, about 2 miles down river from the first, fish averaging about 15 inches in length made up the bulk of the catch. The fish obtained at the third camp, about 4 miles from Kivalina, averaged about the same size. From 10 to 12 very large fish averaging 36 inches in length were obtained at all the sites with no increase in the frequency of catch being observed. However, it was reported that in the past some catches have consisted almost entirely of the large fish.

The reported late arrival of the whitefish (Coregonus spp.) was substantiated by the fact that about half of the catch obtained on the lower reaches of the Wulik River beginning on October 2 consisted of whitefish.

The last fishing expeditions of the season proceeded farther up the Wulik River and the catch there was entirely of Dolly Varden. Of the total catch of 28,000 pounds obtained during October, an estimated 12,000 pounds consisted of whitefish. Identification of the various species of whitefish obtained has not yet been made.

Seining activities were discontinued with the arrival of freezing weather, but, fishing for tomcod and grayling was conducted through the ice.

Fishing for tomcod extends all along the lagoon near the village. Areas shift with the movement of the fish. Fishing continues until the ice becomes too thick, which is usually toward the end of November. Grayling are secured through the ice about 2 miles up the Wulik River. Some grayling are also obtained during seining activities up river.

The following is an estimate of the fish obtained this fall:

<u>Common Name</u>	<u>Scientific Name</u>	<u>Eskimo Name</u>	<u>Amount in Lbs.</u>
Dolly Varden char	<u>Salvelinus malma</u>	Ahkalukpik	85,600
Whitefish	<u>Coregonus</u> sp.	Kahlrak	12,000
Tomcod	<u>Boreogadus saida</u>	Ooack	1,400
Grayling	<u>Thymallus arcticus</u>	Sululpowak	400

Other species are caught occasionally; however, to date not in large numbers. These include lingcod (Lota lota) bullheads, sole, Arctic char (Salvelinus alpinus), and a smaller type of tomcod. (More exact identifications will be obtained as soon as possible.)

Fishing activities also take place in June but the extent of the catch at that time is not known.

If the total catch obtained was distributed evenly among the 24 households, each would receive more than 4,000 pounds of fish. The catch was not so distributed, however, although most families obtained more than 2,000 pounds of fish.

The Dolly Varden are a staple of diet for both humans and dogs. Frozen fish are sometimes fed to the dogs, however, if cooked into a stew with other leftover scraps, the same amount will last twice as long. Most of the catch obtained during the early part of September was utilized as dog food because freezing temperatures had not been attained at that time. This is also true of the early catches up river.

Fish are prepared for human consumption in a variety of ways: in soups, boiled, fried or eaten raw when frozen. The whitefish is preferred as Koch, frozen meat or fish. Grayling are also saved for human consumption. Eggs of the female grayling are eaten when fresh. Tomcod is usually not fed to the dogs and when it is it is usually cooked. Fish obtained in the summer is dried and stored in seal oil.

Dolly Varden are often sold and provide a convenient source of income. The local native store bought 2174 pounds of fish for 15 cents a pound. They are re-sold to the local people for 18 cents a pound. If the fish are taken to another village, it is possible to obtain from 25 to 30 cents a pound for the fish.

Caribou (Rangifer arcticus). "Tutu."

Caribou were first sighted from the village this fall on October 14. However, the first kill was not made until October 20. A record of the kill between October 20 and November 8 is included in Table 4.

Table 4. Summary of Caribou Hunting, October 20 - November 7, 1959.

<u>Date Party</u> <u>Left Village</u>	<u>Days</u> <u>Hunting</u>	<u>No.</u> <u>Hunters</u>	<u>No. Caribou</u> <u>Killed</u>	<u>Area</u> <u>Killed</u>
Oct. 20	2	2	2	Cape Seppings
Oct. 23	1	1	1	"
Oct. 23	1	1	1	"
Oct. 23	2	2	2	"
Oct. 26	3	2	0	"
Oct. 27	3	5	9	"
Oct. 28	4	3	14	Kivalina River
Oct. 30	2	3	4	"
Oct. 31	1	1	3	"
Nov. 2	4	2	7	"
Nov. 3	3	2	12	"
Nov. 3	1	1	5	"
Nov. 3	6	3	23	Wulik River
Nov. 3	1	1	2	Cape Seppings
Nov. 4	2	1	5	Kivalina River
Nov. 7	2	3	6	Kivalina River
	<u>37</u>	<u>33</u>	<u>96</u>	

The shift in hunting areas outlined above gives an indication of the movement of the caribou in the vicinity of the village. The first kills were made in the Cape Seppings area, however not many caribou were seen. The caribou in the region were moving across the hills and along the coast toward the Kivalina River. Last year the movement of caribou continued along the coast and passed, very close to the village on the other side of the lagoon. This year the caribou moved up the Kivalina River and then apparently shifted to the southeast, crossing the Wulik

River in the vicinity of Mt. Jarvis. Some caribou apparently continue on and winter in the Mulgrave Hills, but the main herd probably moves back to the northwest because the largest concentration of caribou have been reported along the upper reaches of the Kivalina River. Many caribou apparently winter in the DeLong Mountains and the Brooks Range as this was reported to be the best hunting area last winter. The eastward movement of the caribou may be deflected in part by the activity of Noatak and Kotzebue hunters in the area about Mt. Jarvis. The extent of these hunting activities is not yet known, however it is reported that several Kotzebue hunters passed through Kivalina last year to hunt in this region.

Selection of hunting partners appears to be a function of the closely related factors of age, experience and friendship ties. The most experienced hunter in the group tends to direct hunting activities. If caribou are to be used for human consumption, the tendency is to kill young females, for after the end of August the males are considered good only as dog food. If dog food is also needed, there does not appear to be any discrimination in the kill. Some attempt may be made to kill fat caribou.

Division of the kill is made equally among the hunters. When many caribou have been killed, the meat is frequently cached beneath caribou skins. Occasionally the lower edge of the skins are singed in an attempt to discourage animals which might molest the meat. At other times a 5-gallon can is hung by the meat with a stick attached inside to serve as a clapper.

Caribou hunting continues until the rivers break up in the spring and traveling becomes difficult. The greatest portion of the kill, however, appears to occur in the fall. Some caribou hunting is done in the summer, especially in conjunction with wood gathering along the coast between Cape Seppings and Ogotoruk Creek. Hunting is also conducted during egg gathering operations at Cape Thompson in July. Approximately nine caribou were reported killed during egg collecting in 1959, with 10 to 15 more reported killed along the coast during the summer.

Caribou, with the exception of males in the fall, are used mainly for human consumption, although when dog food is short they are also used for dogs. Almost all of the caribou is utilized; bone and meat are generally boiled to make stew and soups. The entire head is boiled and the meat and brains eaten. The brains are sometimes fried. The marrow of the leg bones is eaten either fresh or boiled.

The author has not yet seen heart, liver and a portion of the stomach eaten. In some instances the contents of the stomach are eaten. In summer the meat is dried and stored in seal oil. The sinews are dried and used for sewing, the



leg sinews being preferred for use with mukluks. The meat which encloses the back sinew makes good "kock," frozen meat eaten raw.

Fawn skins and skins of caribou killed in August are preferred for making parkas as the hair does not fall out as readily as that of the winter skins. The winter skins are used for sleeping robes. Caribou legs are frequently used to make knee length mukluks.

### Sea Mammals

The ringed seal (Phoca hispida) the bearded seal, (Erignathus barbatus) and the white whale or beluga (Delphinapterus leucas) are the species which play the most important role in the sea hunting economy of the Kivalina people. The harbor seal, (Phoca vitulina) is also obtained but not in great numbers.

The general area which sea hunting encompasses extends from the Mulgrave Hills on the south to Cape Seppings on the north. The distance to which hunting extends out to sea depends on wind and ice conditions. Because Kivalina's position on the coast causes it to face the sea in a southeasterly direction, winds from the south tend to push the ice in toward shore. This is considered a good hunting wind since it is possible to go quite far out on the ice with little danger of drifting out to sea. A northwest wind tends to blow the ice out to sea and can therefore prove dangerous. If a strong northwest wind is blowing, hunting usually ceases until the ice has gone out leaving only the firmly anchored shore ice. An east wind has a tendency to cut several leads in the ice parallel to the shore and may thus cause open water between a hunter on the ice and the shore. Hunting is reported to be very bad with a west wind as very few seals are seen.

Seals are usually sighted off the coast in late October and early November. This fall the first seals were sighted on November 2. Two ringed seals and one harbor seal were reported shot and lost near the Kivalik channel on November 4. On the same day a second hunter shot and lost two harbor seals in the same area. These seals were lost because the hunters did not have kayaks with them to retrieve the seals. The men returned to the area the next day and one obtained two harbor seals and the other got two ringed seals and lost two others.

Other seals will be taken this fall; the most intensive seal hunting is said to occur in February. Cold weather and wind is said to limit winter hunting prior to this time. Seals are usually obtained in open leads during February. As the weather begins to warm up the seals and some ugruk begin to appear on the

ice. In the early winter the seals are reported on the ice during cloudy days rather than clear, sunny days which tend to be cold. When rains come, usually in April, the seals do not appear at all.

Unborn seals are obtained in February and early March. The females then retreat to lairs in the ice to have their pups and usually only males are taken during the remainder of March.

Ugruk are reported to appear in March or April and are hunted in leads and on the ice until the ice breaks up in late May or early June. They are then hunted by crews of men in umiaks. Ugruk obtained are divided equally among the crew members. Hunting continues from the umiaks until the last of the pan ice has blown out to sea. This usually occurs by the early part of July.

Beluga are reported to appear in March or April just before the large whales. They tend to stay out in open water, although occasionally they occur in leads. When shot they are hauled up on the ice by means of lines attached to dog teams and are then cut up and divided among the hunters.

An estimate as to the intensity of kill may be derived from Table 5. The figures for 1958-59 were obtained by interviewing hunters. Information concerning the years 1954-58 was obtained from the Bureau of Indian Affairs Combined Game and Fur Take Report which is compiled by the village teacher. (The report for 1955-56 was missing from the files.) While the figures for 1958-59 appear to be fairly consistent with those of the previous years, it should be emphasized that all the figures are only estimates.

Table 5. Estimated Sea Hunting Kill, Kivalina.

<u>Species</u>	<u>1959</u>	<u>1958</u>	<u>1957</u>	<u>1955</u>	<u>1954</u>
Ringed seal	545	500	600	425	265
Bearded seal	104	135	120	35	0
White whale	11	14	16	6	6

Blubber from the ringed seal provides an important source of fuel in the winter. The meat is sometimes used for human consumption but is more frequently used as dog food. Seal liver and intestines are often saved for human use. Seal skins are used to make parkas, mukluks and winter hunting pants. Seal skin which is bleached white in the sun after the fur has been scraped from it is used for such things as mukluk ties and a border between the mukluk ugruk bottom and fur

top. Scraped seal skin is cut into rope and is also used to cover kayaks. Seal skin pokes are used as storage containers. Some seal oil is made from the blubber in summer, although ugruk blubber seems to be preferred. Blubber used to make seal oil is put into barrels or seal pokes. The poke or barrel is then stored in some shaded area as direct sunlight causes the oil to become too strong and rancid. Five gallons of blubber generally yields a somewhat less amount of oil.

Fresh ugruk meat is boiled and eaten with salt. In summer, much of the meat is dried and made into "panniktuk." Meat which is to be dried is left hanging for about two weeks; if it rains, the meat is covered. Some meat is left to hang until the surface is dried, then taken down and cooked before placing it into seal oil. Ugruk flippers are sometimes wrapped in a cloth and placed in a shallow hole in the ground which has been lined with grass. The ground is replaced over the meat and it is allowed to remain there until such time as the fur can be pulled away from the meat. It is then removed, washed and is ready to eat. Meat prepared in this manner is called "Unack." Much of the ugruk blubber is used to make seal oil. Skins from young ugruk are cut into rope. The skins from older animals is used to cover umiaks and as mukluk bottoms.

Muktuk, skin and blubber, from the white whales is cut into square chunks. The blubber is slashed and the chunks hung outside for a few days. Care is taken to remove them before the skin separates from the blubber. The muktuk is then cooked and stored in oil.

The blubber is occasionally used to make oil. The meat is sometimes eaten or dried as panniktuk. Often the meat is used as dog food.

## Berries

Berry picking begins when the berries ripen about the second week of August. Although blackberries and cranberries are available on the tundra to the northwest of the village, most berries are picked at locations up and down the coast and up the rivers. Groups of women proceed to these sites in umiaks, leaving the village in the morning and usually returning in the evening. The species listed below are utilized.

Blackberries (Empetrum nigrum). "Pohnrock."

There appear to be three areas other than near the village in which the picking of blackberries is concentrated. One area, Pingo, is located on the coast at the northwestern end of the lagoon. The other sites, Singnikroak and Ahtahnak are on the coast approximately 10 and 15 miles, respectively, southeast of the village. The areas north and south of the village are reported to alternate in productivity from year to year. Most berry picking occurred at Pingo this year, with one group of women camping in the area overnight. About 200 gallons of blackberries were picked this fall.

Blackberries are used as dessert and eaten with seal oil. They are stored in wooden barrels or seal pokes with a small amount of seal oil. The berries are sometimes mixed with blueberries or with wild spinach, Rumex arcticus.

Blueberries (Vaccinium uliginosum). "Ahsayvik."

Most blueberries are picked at locations on rivers northeast of the village. While some berries are picked on the Kyacktoruk River, a small stream between the Wulik and Kivalina rivers, this is often very shallow and difficult to navigate. Most activity is therefore concentrated on the Wulik River. This year Wahngahnik, about five miles up the river, was the area most utilized. Blueberries were not very plentiful this year and few attempts were made to acquire them; only about 15 gallons were harvested.

Berries are stored in wooden barrels or seal pokes. They are sometimes mixed with blackberries. Some are made into pies, though they are often eaten with seal oil and sugar.

Salmonberries (Rubus chamaemorus). "Ahpik."

These berries are most often found in association with "niggerheads" in slightly swampy areas. Most are picked along the lower reaches of the Wulik and Kyacktoruk rivers, although they also occur in other suitable habitats along the coast. No salmonberries were picked this year, although last year considerable quantities were obtained. The poor season was attributed by some to the unseasonable snow which occurred in July. Others report that the berries

often alternate between good and bad years.

These berries are also stored in barrel and pokes and are eaten with seal oil and sometimes sugar.

Cranberries (Vaccinium vitis-idaea). "Kimingnak."

Cranberries occur along the coast on the tundra in association with blackberries. They do not become ripe until about the second week of September. Very few berries were picked this year (about 10 gallons), and these were acquired in the vicinity of the village.

Cranberries are usually made into jam by cooking them, adding sugar, sometimes a small amount of flour and occasionally a teaspoon of vanilla. The jam is stored in jars.

### Roots

Only one root appears to be collected extensively. This is the Eskimo potato, Hedysarum alpinum, which is called "masue." The root of this plant is collected and stored by mice in the fall, and much of the masue is gathered by Eskimos by discovering the storage places of the mice. Hummocks in the tundra which exhibit evidence of digging and many holes are likely places to look for masue. Eskimos test the hummocks with the heel of their foot until a soft portion is found. The soft area is dug into and turned over with the aid of a masue pick which is frequently a long, thin piece of iron attached to a wooden handle about 2 feet long. If masue is discovered, the best roots are taken and something is left for the mouse in return. This may be a willow leaf or a part of a cracker. Twigs are then placed across the hole to support the sod which is replaced. Roots are also collected by digging up the plants themselves.

Some masue is collected by women when at fish camp up the Wulik River in the fall. It is also collected on the lower reaches of the Wulik River.

Masue roots may be boiled and eaten with seal oil or eaten raw. Approximately three large burlap sacks were collected this fall. The roots are generally eaten immediately.

### Edible plants, or Greens

Edible plants, or greens, are collected in the spring, generally in late June or early July. Most greens are used immediately with only wild spinach, Rumex arcticus being stored in quantity. The following species are known to be utilized, and there are probably more. Additional information will be

gathered in the spring.

Wild Spinach (Rumex arcticus). "Koach."

This plant appears to be the only green collected in quantity, and is also the only green stored in quantity. About 130 gallons were harvested this fall. Wild spinach occurs in slightly swampy regions all along the coast. Some is picked across the lagoon from the village site and in areas immediately to the north and south of the lagoon.

The leaves are cooked, then mixed well. It may be stored alone in barrels and pokes, but is more frequently mixed with blackberries. This mixture is used as dessert and eaten with seal oil and sugar.

Willow Leaves (Salix pulchra?). "Surah."

Edible willow leaves occur in many places along the coast. The most convenient place to pick them appears to be at the southeastern end of the lagoon. About 2 gallons were picked this fall.

They may be eaten immediately, often with meat, or may be stored with seal oil for later use.

Wild Celery (Angelica lucida). "Eegoosik."

Wild celery occurs immediately northwest of the village where most is picked. The stem is peeled and eaten raw or may be stored in seal oil. The leaves are sometimes picked and eaten soaked in seal oil.

The small amount picked this spring (about 15 bunches) was used immediately.

Wild Chives (Allium schoenoprasum). "Aneak."

This plant is collected immediately northwest of the village. It is eaten raw or may be cooked with meat. Only about 10 bunches were collected and they were used immediately.

### Bird Eggs

Kivalina men travel to Cape Thompson by boat in the early part of July to gather "crowbill" or murre eggs. Eggs of both the Common murre (Uria aalge) and the Thick-billed murre (Uria lomvia) are collected.

Three boats left Kivalina about July 5, 1959, and remained at Cape Thompson for a week. The birds were reported to be late this year. Usually eggs can be collected immediately if boats go up about this date. This year the birds were not laying eggs abundantly until about the date the boats departed, which was July 11. Snow, which was reported to have occurred in this area at that time, may have been a contributing factor in this delay.

Three particular cliffs are reported to be utilized by Kovalina people. Two of these are located on either side of Emmikroak Creek. The cliffs to the north of the creek are called "Imnapat," meaning "higher than the hills to the south." The cliffs to the south of the creek are called "Taktalurat," meaning "all black rocks." These cliffs are reported to be quite low and eggs can be collected by means of ladders. To the south, just beyond the next small creek, are the "Iragaroat" cliffs. The Eskimo name indicates that the cliffs "look like hands."

In the collecting of eggs, usually a cliff is scaled to a point which affords enough room to stand in while lowering a man over the side of the cliff on a rope. The man on the rope slips the eggs he collects into the neck opening of the calico parka cover he is wearing. This cover is tied off at the waist by a belt. When sufficient eggs have been collected, he signals a man on the beach who then sends up a container attached to the other end of the rope. The eggs are transferred to the container and lowered to the beach. The eggs are usually put into empty Blazo boxes for transport back to the village.

About 11 Blazo boxes (approximately 10 gallons each) of eggs were collected this year by the crews of three boats. Two of the boats had six-man crews, while the third had a four-man crew. The first two boats collected 5.5 and 4 boxes of eggs, respectively, while the third collected 1.5 boxes.

The eggs are eaten fresh and no attempt is made to preserve them. While the eggs do not constitute a major factor in their diet, the people have a great liking for them and the men entail considerable risk in obtaining them.

Approximately 60 murrelets were reported killed by the crews during the egg collecting. They are reported to prefer them half raw.

Gull eggs, probably those of the Glaucous Gull (Larus hyperboreus) are collected along the Wulik River about 2 miles from the village. These eggs are collected around June 1. About 150 eggs were reported collected during 1959.

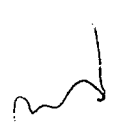
Some duck eggs are also collected around the village in the spring. The extent of this collecting and the species utilized is not yet known.

PREDICTED FUTURE ECONOMY

It is not yet possible to make any predictions as to the future course of native economies in Kivalina. However, one factor which might well influence future economic developments is the Caribou Hoof Jewelry Project. This project is an attempt on the part of the Indian Arts and Crafts Board of the Department of the Interior to help establish a craft industry in the village which would enable the people to derive a money income without hampering their normal subsistence activities.

Construction this summer of a 12 by 20 foot prefabricated steel building to serve as a workshop was made possible by the loan of \$4,500 to the village from the former Alaska Rural Development Board. This loan is payable to the state over a ten-year period with no interest being charged. In addition, a grant of \$5,000 to be used as operating capital was obtained from the Bureau of Indian Affairs. The Indian Arts and Crafts Board is furnishing tools and the services of an arts and crafts specialist.

Individuals making hoof jewelry at the workshop will receive 60 per cent of the value of the item, the remaining 40 per cent being returned to the shop as operating capital.





## CONCLUSIONS

Resources obtained by hunting and fishing are vital to the people of Kivalina. The areas in which these activities appear to be concentrated are 1) along the coast from the Mulgrave Hills to Cape Thompson; 2) the area between these points extending inland to the headwaters of the Wulik and Kivalina Rivers; and 3) the area extending several miles out to sea, especially between the Mulgrave Hills and Cape Seppings, utilized while sea hunting. The inland areas appear to be most important in fall and early winter with emphasis shifting to the coast in winter, spring and summer.

Further study will be needed to determine the extent to which these areas are utilized. Of particular importance is the possibility that these general areas of activity might be extended in the event of the failure of one of the major food resources. Should fishing be bad one year, for example, there would probably be a greater concentration upon caribou and sea hunting. Although the basic subsistence cycle holds in general for all families, there appears to be considerable variation within the population as to the extent to which each of these resources is utilized. In some cases what is thought normally to be a secondary food resource appears to play a more important role in the subsistence of certain families.

This report is only preliminary in nature. Some aspects of the subsistence cycle such as trapping and the utilization of birds in the spring have not been discussed because of lack of sufficient data at this time. The money economy also has not been discussed in this report. This is an important element in the ecology of the region, and studies are in progress to determine the extent of dependence upon sources of money income.

Accurate information as to seasonal use of areas, intensity of kill and utilization can only be obtained through census methods and observation over a full year period. Human ecology studies should be continued in this region throughout the duration of Project Chariot activities in order to achieve a better understanding of the present ecology of the region and to determine the effect that present and future activities of Project Chariot may have upon the human ecological balance of the region.