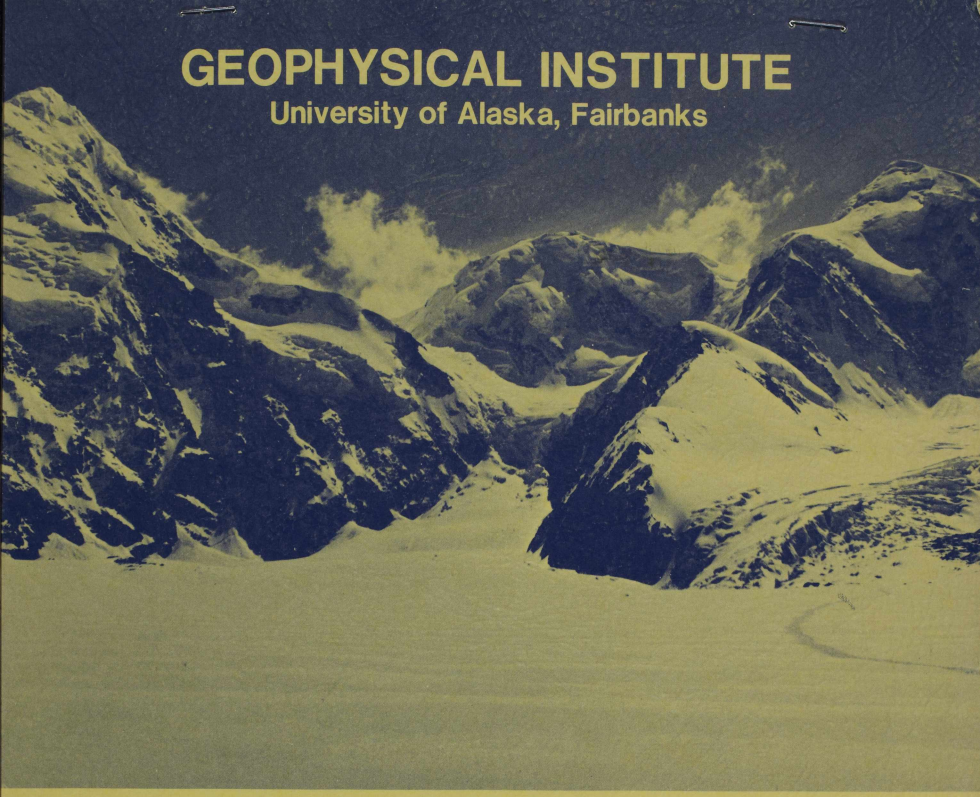

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HISTORICAL REFERENCES TO ICE CONDITIONS ALONG THE BEAUFORT SEA COAST OF ALASKA

by

Lewis H. Shapiro and Ronald C. Metzner

Assisted by

Kenneth Toovak
Barrow, Alaska

SCIENTIFIC REPORT

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Approved:

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ABSTRACT

The objective of this program was to extend the data base on ice hazards along the Beaufort Sea coast of Alaska backward in time by using the knowledge and understanding of ice and weather conditions of the local residents. Information for this pilot project was obtained through direct interviews with residents, or from narratives supplied by them. The results of these procedures were evaluated to provide a basis for improving similar efforts in future. Observations of particular interest obtained from these interviews and narratives include (1) a description of a major motion of the landfast ice off Harrison Bay in late February, (2) a description of the formation of ice push ridges and ride-up at Cape Halkett during break up, (3) reports of whales traveling inshore of Cross Island during the fall migration and of whales being taken by crews from the Prudhoe Bay area at that time of year, and 4) descriptions of conditions in the nearshore area during summer. In addition information of historical and cultural interest was obtained.

ACKNOWLEDGEMENTS

This study was supported by the Bureau of Land Management through interagency agreement with the National Oceanic and Atmospheric Administration under which a multi-year program responding to need of petroleum development of the Alaskan continental shelf is managed by the Outer Continental Shelf Environmental Assessment Program (OCSEAP) Office. Drawings were done by Debbie Coccia and Jim Burton. The idea of this project arose during a conversation between George Edwardson, Jr., and one of the Principal Investigators. Rachael Craig and Edna MacLean helped in initiating the project and Mrs. Molly Pederson of the North Slope Borough Inupiaq Language Commission obtained some of the narratives and interviews and provided translations. Teri McClung assisted with transcription of interviews and editing. Finally, the hospitality of the family of Kenneth Toovak during the translation process is gratefully acknowledged.

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I. INTRODUCTION

The existing data base regarding average and extreme ice conditions along the northern coast of Alaska is based primarily on observations made within the last several years. This naturally followed from the interest in the area resulting from the discovery of oil at Prudhoe Bay, and the subsequent recognition that similar deposits may occur in the adjacent continental shelf. Since that time, observations of ice conditions in the region have been intensified, and an understanding of ice motions in the nearshore area has begun to emerge. In the near future, decisions will be made regarding the procedures for exploration and development of these offshore areas. These will be based, in part, upon the available information regarding the potential for major ice motion in the lease areas at different times of the year.

It may be true that the most severe conditions likely to be encountered during the exploration, development and production of oil from the continental shelf along the Beaufort Sea Coast of Alaska have occurred during the years since the observations noted above were begun. However, this cannot be known until the data base of observations is extended in time.

The objective of this project is to attempt to extend the data base backward in time through interviews with local residents of the North Slope who have lived along the coast during past years. These people were primarily engaged in traditional hunting and trapping activities and thus they had both the opportunity and the incentive to carefully observe ice conditions in the area. It may therefore be possible to obtain information regarding extreme or unusual events affecting the ice cover through interviews and discussions with them.

This report covers the initial phase of the study, summarizes the results to date and evaluates the procedures used.

II. PROCEDURES

This project was proposed after we (the Principal Investigators) learned of a planned 'Conference of Elders' to be held at Barrow in May, 1978, under the sponsorship of the North Slope Borough. The purpose of the conference was to bring together some of the older members of the Eskimo community for discussions of local history and culture, so that these could be recorded and saved for the future. Through meetings with some of the conference organizers we arranged for a session to be held regarding ice and weather phenomena, which would involve several members of the various North Slope communities with experience as hunters and trappers on the ice. In addition, we were to name one of the participants of the session who would help guide the discussions to insure that topics of interest to the objectives of this project were included. Translation of the proceedings was to be arranged by the conference organizers. It was anticipated that through the conference we would obtain a sample of the type of information which could be developed through a program of interviews and, in addition, learn of individuals who could be interviewed.

We contacted Mr. Kenneth Toovak of Barrow to act as our representative at the conference. Mr. Toovak was an employee of the Naval Arctic Research laboratory at Barrow for many years. He is well known to many members of the scientific community who have operated through the laboratory and is respected for this expertise on various aspects of sea ice. He is fluent in English, including much of the technical terminology needed. In addition, as a lifetime resident of the Barrow area he is

acquainted with many of the people who would be likely candidates for interview. We held meetings with Mr. Toovak, explaining the problem and the type of information which we hoped to obtain. In addition, a list of topics for discussion was developed.

Two thirds of the budget of the project was intended to be spent to support the ice and weather session, and approval of the proposal was granted prior to finalization of plans for the conference organization. Subsequently, it became necessary for the conference organizers to restrict active participation to members of the local community so that, while we were present at the conference as observers, we did not take part in the proceedings, nor contribute toward financing the session.

As a result, we decided to move directly to what had previously been considered as the second stage of the project. That is, direct interviews with residents of the area who might be able to supply useful information. With the assistance of Edna MacLean (Head of Iñupiaq Eskimo Research, Alaska Native Language Center, University of Alaska, Fairbanks) we arranged for Mrs. M. Pedersen of the Iñupiaq Language Commission of the North Slope Borough to work with Mr. Toovak in arranging and conducting interviews, and to provide translations.

Without the experience which the Conference of Elders was to provide, there was no means of anticipating what type of information could be obtained. Accordingly, we provided a list of suggested topics for the interviews to Mr. Toovak.

The people interviewed were selected by Mr. Toovak and Mrs. Pederson. Their names and other information are given in Appendix 1. A total of eight interviews were conducted of which four (including Mr. Toovak's)

were narratives into the tape recorder without the presence of an interviewer. The other four interviews were conducted by Mr. Toovak. In one case, one of the Principal Investigators was present during the interview. Most of the translations were done by Mrs. Pederson who provided texts generally paraphrasing or describing what was said. Subsequently, Mr. Toovak listened to the tapes, verbally translating and elaborating on the text material. In one case, the translation was done entirely by Mr. Toovak speaking into a tape recorder while listening to the tape of the interview. The tape of the translation was later transcribed by us.

The resulting transcriptions of the interviews are given in Appendix 2. We emphasize that these are not literal translations but instead include paraphrasings and descriptions by the translators. In addition, some comments by the translators are also included, and in some cases, these could not be clearly identified. If necessary, this can be done in future by going over the tapes again with Mr. Toovak.

III. RESULTS

The points made in the interviews which are considered to be most relevant to the problems of OCS development are summarized below. In this context, it is important to emphasize that the absence of mention of a particular type of event should not be considered as evidence that the event never occurs. As an example, none of the people interviewed mentioned any specific episode of a major winter storm resulting in large ice motions in the landfast ice along the Beaufort Sea coast. However, Samuel Kunaknana, who has lived in the Colville River area for many years, said that a strong wind from the west can cause the ice to break up and go out even in winter, which would clearly constitute an event of this type. Thus, the absence of references to a specific event

may not be significant, and the statement of Mr. Kunaknana may instead be representative of the accumulated experience of the local residents.

The only specific mention of major ice motion in the near shore area during winter came in the interview with Mr. Harold Itta. He described a lead which opened across Harrison Bay from the vicinity of Cape Halkett, extending eastward toward Thetis Island. The event occurred in February, 1928, with the lead opening to a reported width of one mile. From the position of the lead which Mr. Itta indicated on a map of the area, the motion apparently involved a translation about one mile seaward of all of the landfast ice sheet off Harrison Bay outside of the approximately 10 meter depth contour. In this context, it is of interest to note that in the summary of motion of the landfast ice sheet in the Beaufort Sea Synthesis report it was concluded that ice motion of up to a few tens of meters might be anticipated in the floating landfast ice sheet after freeze up was completed. This was based upon observations in the relatively narrow landfast ice area offshore from Narwhal Island. The speculation was offered that significantly greater motions might be possible in areas such as off Harrison Bay, where the landfast ice sheet is wide and the barrier islands are absent. The report also notes that there were no data available to substantiate this, but the results of the interview with Mr. Itta would appear to provide the necessary support.

In the interview with Mr. Elija Kakinya the question of motion in the landfast ice between the barrier islands and the shore after freeze

up, was specifically asked. The response was negative; Mr. Kakinya had no knowledge of any examples of winter ice motion behind the barrier islands in the area around Flaxman Island. In addition, he also noted that he had never seen the ice come over the barrier islands, although it is not certain that he was speaking of islands other than Flaxman Island or seasons other than winter. The question of the ice coming over the barrier islands after freeze up was also asked of Mr. Henry Nashanik who had trapped extensively in the area around the McClure Islands and Stockton and Cross Islands. He reported that he had never seen the ice pushed on top of these islands, but that ice commonly piled all around the islands, including on the inshore side during early winter. The presence of such piles indicates motions of the ice inshore from the barrier islands during freeze up.

In neither of the above interviews was the question of override of the barrier islands during break-up explored. This is a time of year when trappers are not likely to be moving over the ice, but it is still too early for boat travel. However, Mr. Samuel Kunakana mentioned that, during the summer, old ice is occasionally driven or washed up onto the barrier islands by north winds. Specific examples of this, along with the frequency of occurrance would be of interest. In addition Mr. Elija Kakinya notes that west winds tend to keep the ice near shore during the summer, while northeast winds can drive the pack ice out of sight to the north. In addition he noted that times when the ice is near shore during the summer are considered to be good for seal hunting, suggesting an association between the position of the pack ice edge and seal densities. These questions need to be pursued in future interviews.

One episode of spring ice override was described in the interview with Mr. Harold Itta, (note that the same event was described in an informal and untaped discussion with Mr. Herbert Leavitt of Barrow). The event occurred in July of 1928 at Esook on the coast near Cape Halkett. The ice was about 4 feet thick at the time, and the movement formed piles estimated at 20 feet high along the beach. Over part of the movement front, the ice did not pile, but advanced up the beach as a continuous sheet for a distance of up to 200 feet.

Mr. Kenneth Toovak described an episode of overriding of the beach on the Chukchi Sea coast at Barrow, which occurred in late-February or early March of 1935 or 1936. At that time, the ice advanced about 250 feet up the beach, terminating in a pile about 20 feet high (this may be the same event described by C. Brower in his book "Fifty Years Below Zero", p. 312. Brower noted that a southwest gale drove the ice onshore, forming piles up to 75 feet high. He gives the year as 1937). While not directly related to the Beaufort Sea coast, this episode is of interest for two reasons. First, it indicates that the end of freeze up does not signal the beginning of a period of inherent stability of the ice. Given the appropriate driving conditions, motion of the ice up a beach could conceivably occur at any time of year. Second, this is illustrative of many examples of ice push which have occurred at Barrow during the winter months, suggesting that the ice in nearshore waters of the Chukchi Sea coast is likely to be less stable than that encountered along the Beaufort Sea coast. This is a point which will require study prior to leasing in the Chukchi Sea.

No attempt has been made to summarize the comments made during the interviews regarding summer conditions. These tend to relate primarily

to problems of moving through coastal waters in small boats and are directed towards describing local currents and the effects of weather on travel. However, some information on the relationship between the position of the pack ice edge and local winds was given. It is possible that such observations would provide useful data for studies leading to predictive models of pack ice incursions during the summer months. A series of questions directed toward this should be included in future interviews.

The interviews produced little information regarding synoptic features of the ice cover. This is entirely expected however, because such information requires aircraft or satellite observation platforms. However, one point was raised by several people. That is, that a wind from the west at any time the ice is present, will usually cause a lead to form extending from Cross Island eastward across Camden Bay and towards Barter Island. Apparently this lead forms quite rapidly, and two stories of hunters being trapped on the ice when it moved offshore are included in the transcripts. It was also noted that west winds in summer can cause heavy, polar ice to drift into Prudhoe Bay behind Cross Island and between the Return and Midway Islands. However, the size of floes moved in this way will be limited by the depth, state of the tide, and presence and absence of storm surges.

Finally, Mrs. Sarah Kunaknana, who lived on Cross Island and at Prudhoe Bay reported two instances of bowhead whales being taken by crews operating in that area, during the fall migration. Others noted that whales have been sighted between Cross Island and the mainland at that time of year.

IV. DISCUSSION AND EVALUATION

The problem of obtaining data through interviews, as described above, is likely to be new to most physical scientists as it was to us. Further, the fact that the interviews could not be conducted in English compounded the problem. As a result, difficulties arose which limited the amount of information obtained. These resulted both from lack of experience in planning such a program, and from operational problems. However, we believe that these can be overcome and a successful series of interviews conducted.

In general, it proved useful to have the translations done verbally by Mr. Toovak with one of the Principal Investigators present. In this manner it was possible to clarify discrepancies in times and places in the interviews and get the benefits of Mr. Toovak's comments and interpretations. In addition, this type of translation can be obtained rapidly, which would provide opportunities to return to the person interviewed within a short time with additional questions.

Mr. Toovak has also proved to be an effective interviewer and colleague. In the short time available for this project he made significant progress toward understanding the problems which OCSEAP is trying to solve. Continued improvement can be anticipated, and this should enhance the quantity of useful information obtained in future interviews. In addition, in order to make the interviews more uniform and prevent inadvertant oversights an expanded list of topics for discussion, as well as a list of specific questions to be asked, will be used as a guide. Finally, we would arrange for second interviews with some of the people, in order to have them elaborate on some of the points raised. This was not possible under the present project because of limitations in time and funding.

The procedure of supplying a tape recorder to an individual and suggesting that they supply a narrative on their knowledge of the area is not generally effective, because, while the information gained is useful and interesting, it cannot be expected to address OCSEAP problems unless the person making the tape is familiar with these. However, this method might be acceptable for cases in which an interview in person cannot be arranged.

To date it has not been practical to have one of the Principal Investigators present at the interviews because these have occurred at irregular times in the Barrow area, and the funding level was not sufficient to provide for travel there specifically for the interview. This is likely to be true of future interviews as well unless one of the Principal Investigators is in the area in conjunction with other studies. Thus future work should be planned with this limitation in mind.

The interviews produced useful information regarding specific events. The verification of the occurrence of large motion of the landfast ice sheet during late winter is particularly important, because events of this magnitude have not previously been reported for that time of year. In addition, the description of the ice override at Cape Halkett during break-up is the first report of a break-up override along that part of the coast. However, a reading of the interviews suggests that in general, such information is more likely to be offered in response to specific questions, rather than in a general discussion.

Finally, it should be emphasized again that there is no assurance that an event cannot occur even if the people who happen to be interviewed have

never seen such an event. As an example, in these interviews there was no mention of ice overrides of the barrier islands occurring during winter. However, in January of 1978, complete overrides occurred on Tapkaluk and Igalik Islands, two relatively low and narrow barrier islands located 22 and 64 km east of Point Barrow (Shapiro, et. at., Annual Report, NOAA contract 03-5-022-55, Task 11, May 1979). Thus, only positive references to a type of event can be considered as useful information. The absence of such references may not be significant.

APPENDIX I

List of Persons Interviewed

Itta, Harold; age, 71, Born in Barrow, later lived near Teshepuk Lake and at Esook near Cape Halkett. Interview by Kenneth Toovak; translated by K. Toovak and M. Pederson.

Kakinya, Elija; age 85, presently lives in Anaktuvak Pass. Lived and traveled along much of the coast between Herschell Island and Barrow, but mainly near Flaxman Island, Beechey Point, Gordon Point. Interview by Kenneth Toovak; verbal translation by K. Toovak, transcribed by Teri McClung.

Kunaknana, Samuel; age 64 or 65, Born in Barrow, lived in the Colville River area. Presently resides in Nuiqsit in the Colville Delta. Narrative without interview; translation by M. Pederson and K. Toovak.

Kunaknana, Sarah; age 57, Born in Barrow but grew up on Cross Island and at Prudhoe Bay. Presently resides at Nuiqsit. Narrative without interview; translation by M. Pederson and K. Toovak.

Nageak, Vincent; age 76, Resident of Barrow, but traveled extensively along the coast and mentioned having lived at Barter Island, and at Oliktok. Narrative without interview; translation by M. Pederson.

Nashanknik, Henry; age 73, Resident of Barrow, but has lived at numerous locations along the coast and trapped on many of the larger barrier islands. Interviewed by K. Toovak, translation by M. Pederson and K. Toovak.

Nekapigak, Bruce; age 78, Born in Barrow, later lived at Oliktok, Barter Island, Pt. McIntyre and Beechy Pt. Interview by K. Toovak, translation by M. Pederson and K. Toovak.

Toovak, Kenneth; age 55, Born in Barrow and has always lived in that area. Narrative transcribed by M. Pederson.

APPENDIX II

Transcriptions of Interviews

The following transcriptions include some direct translation which we believe to be verbatum. Parts which are clearly summaries or which represent comments by Mr. Toovak or the Principal Investigators are set off in square brackets.

An alphabetical place name index and the associated maps are given in Appendix III.

Harold Itta:

I turned 71 on May 5. I was born in Barrow. In 1914, we moved to Sikulik just 1 mile east of Teshepuk Lake and wintered there 2 years. In 1916 we went to Esook trading post which is along the coast just west of Cape Halkett [before they went inland to trap].*

[The main reason they went to Esook was to hunt seal. That fall he remembers that the ice was extremely flat except for a really flat (?) hunk of ice grounded east of Esook. His father went out hunting when the ice was fairly thin. He was tracking a polar bear and he climbed on top of that big grounded block east of Esook to get a better view. While he was sitting on top of it it split in two right underneath him. He fell down and lost all his gear and his "unaaqpauraq" (ice testing pole) and he was knocked unconscious. He was in the water when he woke up feeling very cold and he couldn't move. He prayed that the Lord would help him move and after praying he finally managed to climb out of the water. Harold Itta worried about him and set the lantern up high over the house so it could be seen from a distance. Finally as Harold was getting the dog team ready to go to look for him his father came home. He took him to Barrow to see Dr. ~~Christ~~ Greist (the minister and doctor in the area at the time). Harold's father stayed in Barrow for a long time (until after Christmas) recovering].

I remember in November of 1927, there at Esook, the ice piled up really badly. It was crumpled up from 1 mile out all the way in to the mainland. This was November and there was a strong wind from the northeast.

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*See the introduction to Appendix II for the meaning of the square brackets.

Ice ridges were there all winter and lasted into the summer months. When Captain Pederson came they had to stop steaming east because of the ridges. So he dynamited those ridges to make a pass to go through. It took him at least a week. [There also was another ship the "Bay Chimo", that picked up natives from Barrow as guides and helpers and went all the way to Canada. Kenneth Toovak remembers that when he was a boy they used to take 45 men from Barrow with them. He then told a story about how that ship was coming back from the east and got jammed up by polar ice just in front of Duck Camp. The floating ice opened about 1 mile out from the coast and this ship dynamited a path out and got free. Later that year his father was out driving his dog sled to hunt seals and found a good piece of thick rope out on the ice that was from the ship. He unravelled it and made thinner ropes out of it.]

[Mr. Itta says that after Pederson went through the path he blasted, the "Bay Chimo" came through and followed the same path. Pederson cut a path through those real high ridges and ran east behind the ridges. They were at least a mile out. In July of 1928, it did the same, (referring to the ice being piled up along the shore) but the wind came from the west. (This was at Esook). The ice was approximately 4 feet thick. It piled higher than Mr. Itta's present house in Barrow (which is 2 stories high or about 20 ft) in places, but at Oliver Morris' boat it moved as a flat sheet and pushed the boat 100 ft to 200 ft up the beach. Harold Itta's father put driftwood under the boat and between the boat and the ice so it wouldn't be damaged. This trick worked and the boat slid sideways up the beach. Oliver Morris' wife started crying when she saw the boat way up the beach. Mr. Itta says Oliver Morris was really lucky because the ice was piling on either side but it just came up as a sheet where Oliver Morris' boat was].

The summer after that the ice was all crumpled up in beach ridges and a large number of "qiliġi" nested on the ridges. They were brown birds that look a bit like owls. (This was the first time he ever saw them. He doesn't know the English word). The ice there is controlled by the winds, not the currents. The west wind also opens leads to take the ice out.

I remember there was quite a lot of huge grounded polar ice in the summer of 1930 in front of Esook, about 3 miles out. It never did melt all summer. It was still there when the ocean froze again. There was also large, grounded polar ice out in the ocean northeast of Cape Halkett. Pieces there never left all summer either. The open leads are usually very far out. In 1932, when I was going out, it would take me all day to get there. The lead is always about 20 to 25 miles out from Esook. This is in winter months where the ice usually opens and closes a little. Sometimes in fall the ice piles up on the shallows east of Cape Halkett. There was an island there in his father's time which is gone now. (He remembered this after the interview). In 1928, (February) there was a 1 mile wide open lead in Harrison Bay, almost in a line from Cape Halkett to Thetis Island, but seaward of the ice pile on that shoal. The wind was from the west. I never traveled on ice very much after that, but this is what I remember seeing.

[At Barrow in the early 50's Harold had a whaling crew out on the ice in spring. During the day Harold would come in to Barrow for supplies. He knew the current was running north but the wind was calm. His son-in-law and another man borrowed Harold's dog team to go to the whaling camp. Then late in the evening on May 1 (it was the time of year when ducks start arriving) the lead opened between the crews and shore. The wind picked up and came from the southwest. When the drifting

started, the hunters headed for shore. They tried pulling a dog team and gear and umiaq.* They teamed up with another crew that way trying to get back and went with only the one umiaq. The ice was shearing and piling at the same time. They had to watch themselves and try to get back. (All the crews were doing that). All they saved was a couple of darting guns. They broke the stocks off and just carried the barrels. All crews got back safely but they lost most of their gear. After a day or so, Harold's dogs got loose from the sleds and made it home on their own. They came in one at a time over several days. A day or two later the missionary flew around in his light plane and spotted Harold's umiaq 6 or 7 miles east of Point Barrow on top of a pile of ridges. Something similar happened in 1929 when all the whaling crews were out but it was not as bad as the story above.]

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*15 to 30 foot open boat covered with bearded seal or walrus hide used for spring waling.

Elija Kakinya - (Verbal translation by K. Toovak)

I've lived around Herschell, some around Flaxman Island and I do know that the ice opened up from westerly winds in winter months and when the wind shift over to east after it's opened up from westerly wind the ice always start to crumble up out on the edge of the open lead.

The people that live up around east of Barrow in winter months, they always go out to the open lead to see if they could catch some seals to live on but evidently, the people never had any kayak to retrieve their seal whenever they, when they had a chance to shoot a seal but they use a line with a hook with a floater on the end of it, on the hook.

[There was a good size family, ah, his dad and brothers and sisters and uncles and whatever. They used to live around Flaxman Island back in 1918.]

When my family were living on the coastal area they have to go out to open leads to hunt seals. Some of the families usually move up to the mountains to live. They just go back and forth between the two, ocean and inland searching for the food to live on. I stated in the early part of my talking that westerly wind usually opened the lead and there's a break before it gets real frozen in. When the wind shifts over to northeasterly wind it moves on the shore ice. The ice usually crumbled up and formed some pressure ridges way out on edge of the lead.

In the winter months when the ice is still for quite a number of days or weeks even though the wind is blowing and windy from northeasterly, the ice never opened up. But when the wind is blowing from west the lead opened and that's the time people always go out to seal hunt.

In some years when the ice goes out in spring it isn't visible in summer, and some years the ice goes out and comes back and is visible, and hangs around all summer months.

Sometimes when the ice hangs around in summer months when it gets towards fall some of the polar ice is grounded off shore and that's the time when people are happy to be out hunting for seals; when the polar ice is grounded in fall that means the ice freezes earlier and when there is no ice it freezes little later than usual.

I lived at Flaxman Island till I was just about 20 years old, and my father used to keep us moving -- one year there, another year in different places and finally we got on up to Marchesi (Demarcation Point) and lived there for a while when Tom Gordon had a store there as a trading post. Sometimes in the fall, when the wind cames after the ice formed, the westerly wind opened up and then it closes and it piled up ridges close to the barrier islands all the way up to Herschell Island that I could recall.

Right around Flaxman Island, on the lagoon side, that is behind the barrier islands, inward to the inland, after the ice formed and freezes it never moved or any disturbance that I could recall in that area.

Before the ice gets any much thicker in fall, the ice usually crumbled up and built kind of bit of ridges along the barrier islands in some places, but not often some years it's flat but some years it's always some piles of ice but I never noticed any ice slide over the barrier islands.

Again when the ice crumbled up right along the ocean side of the barrier islands the highest points that I can figure is approximate 12 to 15 feet high.

That ice crumbled up in the fall, that is before the ice gets thick.

Later part of the years I lived around Beechey Point where Jack Smith had his trading post. I lived in that area and in summer months I used to go with Jack Smith on the way to Barrow to pick up supplies and also return to Beechey Point after we picked up the supplies.

In some years between Beechey and Barrow on a run going towards Barrow and returning, sometimes the ice was always invisible all summer and return in fall.

When the polar ice hang around not far from the barrier islands the people always say that there is a good chance of catching seals when ice is close to shore. In summer months when there is a westerly wind you can see ice from shore but when the wind is blowing from northeasterly, the ice always goes out. I don't know how many miles but you couldn't see any ice from shore when the wind is blowing from the northeast.

When I had family I used to go along with Jack Smith whenever he needed any help when making a run to Barrow.

These days of 1978, the older people who have lived in the general area around Beechey Point and Flaxman Island who are getting to be few, those who understand that general area. [There is a section regarding masses of multi-year ice being grounded or frozen to the bottom and serving as an anchor for the first year ice which freezes in fall. In this case, the ice is safe].

I started to work with Jack Smith in summer to assist him on the boat runs between Barrow and Beechey. In winter I used to move back inland. I lived around Colville, way back just below Umiat and up far as to Anaktuvak in winter and back down to coastline in the spring.

The people that lived at McKenzie River say that the lake ice drifts out through the river and floats out to ocean. That means that they claim the ice, what we call polar ice, is from the lakes of McKenzie. After the ice has drifted out from the river and melted in summer months and when winter comes (on my thinking whether its right or wrong) the ice freezes from the bottom and is still fresh water on top. Then in summer months part of surface melts and I think that's when it gets kind of wavy.

In my early age, when I happened to live and stay a bit around McKenzie area, I used to have dinner with the older people and listen to them tell stories. That's how I learned what the polar ice means.

Samuel Kunaknana

I'll tell what I know about the ice even though we didn't live on the coast all the time -- but I've lived here for many years. The ice in front of Colville piles up and forms pressure ridges when it freezes in the fall, like it does in Barrow. As it thickens it piles up until it completely freezes. There is always some ice on the ocean side of the islands (sandbars) although they are pretty far out, even in August. The ice never sits still and when we check the current from the ice it's always moving. In the winter time the ice goes out when the wind is from the west on the ocean side of the barrier islands. When the weather is bad, the ice piles up in pressure ridges in the ocean. The ice is never smooth. When the wind is strong from the west the ice can break up fast all over the place and go out. No matter how thick the ice is, even in the dead of winter, it will break up and there would appear big bodies of open water.

The ice starts rotting in May, there and it is hard to hunt. [In the spring his parents used to take him out hunting. That's how he knows this.] Sometimes it would be so rough from piling that it would be hard to go out and hunt. The ridges were too rough to get over. No matter how thick the ice may be it can break up and pile up fast. In the summer time, the ocean is deep on the ocean side of the islands. I know it is deep because ships used to travel right alongside the islands, and the ships never let ice stop them. [He doesn't specify which islands]. The ships were built strong so they could push through the summer ice.

[He now refers to the visit the State and OCS people made to Nuiqsit and the maps they brought with them for the Cape Thompson sale hearing.]

I've heard of people who are interested in drilling oil in the ocean and I don't go along with that because of the animals. There are many different kinds of fish down there. Also different kinds of birds. When the old squaw ducks are there there are so many birds in a group on the water they can look like a big piece of land. There are also different kinds of whales.

The first time I learned of whale hunting was when this crew from Barrow caught a whale at Cross Island in the fall. I was just a boy then. [He talks about the boat being built of wood, not a skin umiaq like now and not a big commercial whaler either. He also mentions the first whale that was caught after Nuiqsit was re-established in 1973, and the many types of whale bones from long ago he has seen along the beach there indicating whaling has gone on there before.]

We all know that the ice is especially dangerous, if they are going to drill for oil out there. When the ice starts moving, nothing can hold it. I worked for the navy when they first came up to look for oil. The only thing that worried them was to make the drill stand straight. They never tried to make it safe from moving ice. If they are going to drill it has to be fixed and safe because the moving ice is strong. I don't think a drilling rig can withstand the moving ice. After they strike oil and the ice starts moving there probably won't be any more animals either, they would either die off or they wouldn't be able to come through anymore. We have lived on those animals, and that is why we oppose any offshore

drilling. Nothing stops the ice when it starts moving. Take, for example, that big Canadian ship the ice carried around--a small drill certainly wouldn't stand it. [The reference may be to the Dome oil ship which was forced off site by threatening ice. He says compared to the size of that ship a drilling rig would look like a stick.]

No matter how thick it might be it will break and pile up. No matter how thick it might be it will break and pile up, and no matter how thick it gets it is never guaranteed stable. It just depends on the weather. The ice goes completely out after July 4, around the Colville. That's when the Patterson (Capt. Pederson's ship) used to come up here in July. There is always new ice when it freezes because none of the ocean ice floes come in; the winds blow mostly along the coast. [He is still talking about the Colville area. "Ocean ice" means thick floes of old ice that could ground. Not much of that comes in. This is also why it goes out so easily.]

I'm just talking about what I know about the ocean here. There are different kinds of fish out there, salmon, white fish, flounders, different kinds of birds, seals, polar bears, bearded seals. That is why we oppose the oil drillings around here. This spring the elders talked about how they wouldn't like to see oil rigs in the ocean. Unless that oil rig is put in safe and with strong supports, the moving ice would think nothing of it.

If we agreed to let them drill offshore we would go against the people's wishes who live along the coast, and the elders don't want to see any animals interfered with. They mentioned again and again how the ice can take anything with it, no matter how strong it might be. [There is a long discussion about the Elder's Conference and some reflections that

people live differently in different parts of Alaska].

The Colville River ice goes out the first part of June. It floods badly before it goes out. It usually goes out before June 10, but the flooding can be very bad. Last spring (1977) it flooded so much it was like an ocean there.

We don't have a lot of money like these white people and oil companies. We have to do what they want. If they drill and strike oil they won't give anything to us. They are only doing it for themselves.

[There is now a long discussion of how the people lived in the past in small family groups that were scattered up and down the coast. They would go meet Pederson's supply ship when it came in the spring and they used fox pelts as currency. He also mentions that he was a little boy just school age when his family moved from Barrow to the Colville area but he remembers it well. He says this tape is too long and he's rambling on trying to think of things to say to fill it up. He then talks about going inland to hunt carribou, about how caribou never came down to the coast then as they do now. He describes caribou hunting and what they used the skins for and using dogs with backpacks. They used back packs themselves.]

There is never any ice in between the mainland and the islands once the ice goes out in the spring, because the lagoon ice rots early on the landward side of the islands.

I've never lived near Cape Halkett and Barter Island so I don't know about the ice there. My wife has lived around Cross Island and west

so she can talk about the ice there. As I said before, the ice around here in the Colville area never has old ice coming in when it starts freezing. When it freezes first year ice is all there is because the wind is always parallel with the coast and there is no wind from the north to bring in ice from the ocean to the bays. It is all new first year ice when it freezes. When the wind is from the north, ice comes along with it and gets on the outer islands. In the summertime, this occurs only when the wind is from the north. Sometimes old ice comes in [the old ice is floating pieces surviving from before, he is not talking about new ice ridging on the islands, he's talking about ice pieces driven up or washed up in the summer], but not enough to stay long. The ice is never still when the wind is from the west anytime of the year no matter how thick the ice is it can pile up.

When the wind is from the west it can go out. When the wind is from the west the ice can also pile up [he's talking about ridging on the ocean in front of the Colville, but does not specify distance from shore]. In the spring, the ice starts rotting before June on the ocean side of the islands. It also rots early in the bays although the ice doesn't go until around July but it's too rotten to travel on between the islands and land. The ocean side of the islands is really deep. The "Patterson" used to anchor right alongside the islands.

It's taking a long time to fill up this tape. People around here know about the ice and how it moves. They trapped foxes on the ice and sometimes lost their traps when the leads opened up. [He also talks about how his family moved to the Colville area around 1920, how they traveled inland by Tesheqpuk Lake and came down the river].

Sarah Kunaknana

I am going to talk about ice conditions from Beechey Point to Flaxman Island. I was born in Barrow in 1921. My parents took us with some people to Cross Island, when I was 2 or 3 months old. [She mentions that the mother of Mrs. M. Pederson (who did the translation) was on that trip and that her mother is Mrs. Pederson's aunt. She talks about how people in those days were all related and knew it, but nowadays no one knows their relatives]. I grew up around Cross Island and around where Prudhoe Bay is now. I'm the only one left in the family who lived on that island My parents and their crew caught a whale at Cross Island that fall. My father had whaling gear, and that is why he brought the people to Cross Island, to hunt whale. He had not always lived in Barrow, but he settled us at Prudhoe Bay. My earliest memories are of Prudhoe Bay. My father traveled a lot but finally they settled in the Prudhoe area. [She doesn't remember everything she's going to say about ice herself but some of it will be what her parents said].

The ice around here looks sturdy, but the wind doesn't think its sturdy when it blows from the west. The lead opens up right alongside Cross Island on the ocean side because it is very deep there. And when it is an east wind, the ice piles up along the coast. There is nothing to stop the ice seaward of the islands. But the water between the islands and the land is shallow, from Beechey Point to Flaxman Island. There are islands all the way from Beechey Point to Flaxman Island. I have traveled between Barrow and Prudhoe Bay many times by boat and dog team with my parents, so I know the area. There are many kinds of animals here. When we wintered at Cross Island, there were all kinds of animals there. In

the fall we fish in the ocean. In the winter and spring there are seals to hunt. [She says in the spring they hunt seals with nets and there are foxes and polar bears to hunt. Then she talks about how her father caught these animals]. In June and July when the ice is rotting in the little bays along the coast we start seining for fish (iqalukpik). After just seining 1 or 2 times there would be so many fish we would have a hard time putting them all away. And now the white people want to drill for oil out there. We lived on the animals we caught there during the winter, or we traded at the stores at Beechey Point. Besides trading at the store we traded with the ship "Patterson" (Capt. Pederson's ship). [She talks about the food they got from the ship having to last all winter. She then names all the people who had stores but gives no dates. The ship resupplied the chain of trading posts Charlie Brower maintained between Barrow and Canada].

Our houses are still standing at Cross Island and Prudhoe Bay. [She tells where there used to be old houses and how her father fixed one up for them to live in at Cross Island]. If we knew that they were going to strike oil, we would have stayed there and lived high! Our house in Prudhoe is there just standing [its only 30 minutes by plane or 5 hours by snowmachine from Nuiqsit to her house at Prudhoe, but she hasn't been back recently].

I sure hate to see them drill around Cross Island where our winter house is. Another reason I'm against it is that all the animals, fish and seals, come up to Colville River from the ocean and we use them for food. The fish never come from inland they come from the ocean. All kinds of animals do that, even seals. [She notes that "Pani(ng)ona", lived in the Flaxman Island area and his house still stands on Flaxman Island. (Note, this tape was made in July 1978, the first translation was available by the end of

August but was paraphrased and did not include this statement. The verbal translation including the name was made in October. (Unfortunately, he died in September so the opportunity to interview him was lost). They used to call Flaxman Island Qikiqtaq in Eskimo. The cost of oil isn't any cheaper even though the oil is from our land. We have a hard time paying for the heating oil to keep us warm even though the oil comes from our land. I mix my words up all right but you'll understand what I mean. We lived in Prudhoe Bay 15 years.

When she lived at Prudhoe Bay she was about 14 and they got another whale (about 1935). They used a wooden boat with an inboard motor. She talks about the whale and how their share which they brought home made two boatloads and they also got bearded seal at that time. [That was the first time she'd ever tasted fresh boiled muktuk, and she didn't like it, it tasted too rich. She just tasted it but never ate any although her parents and brothers did. Many people came that winter to get food from them (whale meat and blubber)]. We used to live on all these animals but now we can't hunt at Prudhoe Bay anymore because of oil development. Nobody can hunt there anymore.

Not much more to say, I'm just repeating what my parents said. [Her parents took them to winter just west of Flaxman Island. She doesn't know what things are like east of there]. The map they showed at the hearings (regarding the lease sale in May, 1978 at Nuiqsit) is where all the animals live that they used to live on. When she saw those maps she felt against the leasing because she grew up there and lived off the land there. She followed her brothers when they hunted seals and bearded seals.

She was the youngest and followed. When they hunted bearded seals it never took long to fill their boat. They also got lots of fish whenever they put their nets out in summer time. Because she likes eating animals from the ocean she doesn't agree with drilling in the ocean. She talks about the oil companies always coming back and asking to drill even though they keep telling them no].

[She talks about moving inland up the Shaviovik river in summer and her parents sometimes taking them all the way up to the mountains. She lists the animals they caught when they went inland. They would come back to live at Prudhoe Bay after spending sometime inland, probably in the fall].

My parents took us to winter just on this side of Flaxman Island. The map they showed us of the planned oil leases is where I have lived. One winter, in 1934, when the wind was real stormy from the west, my brother was lost out on the ice when the west wind opened the lead. The wind can change real fast and the wind controls the ice. [1934 was a bad year for ice accidents for her family. In November a group of hunters including her brother were caught offshore and drifted east but made it back. In December it happened again to a different party including a different brother who froze to death trying to get back. She skips from brother to brother as she tells the story. The details are clearer in Henry Nashanik's statement although he's not sure of the date. He thought possibly 1932. The best reconstruction is probably her date and his details.]

My brother froze to death out on the ice after the west winds had opened up the leads. He was with several people but they all came back. The ice broke up all around them except where they were. They believe

they were saved because they remembered God and prayed. My brother Joseph died in December 1934. The other people with him came towards land through the forming pressure ridges. When the ice starts moving there's nothing you can do about it. [When the wind let up they "came up" (moved landward), but when it got stormy again her brother froze to death]. Henry Nashanik knows about that. I was about 15 years old then. We didn't want to spend another winter alone there. [So in the summer they moved to Colville (1935?)].

[She then discusses going inland up the Colville hunting caribou and hunting caribou at Umiat before the Navy came. She tells how one of her brothers found an oil seep there].

Just before July 4, we went to hunt for caribou at Umiat. We stayed there and hunted caribou for several days, drying meat. There was just us, the children, up there; our folks were still at "Anaqtuuppaa" [the mouth of the Anaktuvak river, one of the tributaries of the Colville]. While we were up there was when Mark found oil. There weren't any white people at Umiat at that time. He was walking along a little creek when he found it. He put it in a can which he found and brought it home and when we smelled it, it smelled really strong like either gas or fuel oil. When we tried to light it, it burned. He'd dipped it out of a puddle. It was where they drilled and discovered oil later. Another brother, David, put a marker up on a little knoll beside it. He stood up a boulder and wrote his name on it. I don't know if its still there.

[When they left there, they moved to what is now POW 2. The next winter they went back inland. They went to Nirilik (distributary of

The Colville). They also moved to Fish Creek and spent the winter there. They traveled so they could live on the fish at that time. They lived wherever they could catch fish. They moved again (not clear where) and built a house which is still used to this day by people who go fishing in that area. Then they moved to "Putuu" (which was on the Colville, upstream from the present village of Nuiqsit) and lived there for 5 winters. They stayed there until the Colville area was empty of people (the last group of people moved away from there sometime in the '40's). They have a celler there that they still use. They fixed it up when they moved back to the Colville area in 1973 when Nuiqsit was established. When they moved back in 1973 she went to see the place where they had lived and it was like it was someone else's story. There were no houses, only growing grass and it was like people had never lived there. Their house would have still been standing but somebody had torn it apart and moved it somewhere else].

[She says she's traveled by dogsled from Nuiqsit to Anaktuvak Pass and she recognizes places when she flies over that area].

[She says she got the last of the way people lived a long time ago, before there were too many white man things. They lived by following the animals that they used for food. Now things are so easy with all these conveniences even traveling is nothing anymore. Young people just starting to make a living these days, only worry about their jobs. Her father was from Utukak (a village between Point Hope and Wainwright) and her mother was from Nuvuk (Pt. Barrow). Her mother died when she was really young. Her father used to say that the people would go inland just like wolves. That's how people lived in those days. They followed the

caribou living off them. Then they would go back to the mouth of the Utukak River to live off the ocean. They would trade caribou skins for blubber etc., with people who stayed along the coast. She says she's just repeating things her parents told her].

[When she was a girl and they were living at Prudhoe Bay, two men from Greenland came through and stopped and stayed with them. They came on dog sleds and looked like white people but they spoke Eskimo (Iñupiaq). When they found out her father was from Utukak it was like finding relatives because some of the people from Greenland are originally from Utukak].

[After taking care of their dogs they would bring out their guitars and play and sing and dance until the kids fell asleep.] "We weren't used to staying up late, unlike kids of today who stay up all hours and never go to sleep". [They stayed quite a while then left for Barrow. She hasn't heard anything more about them after they left]. Even though we don't know each other it must be true that everybody's related somehow or other. Boy, I'm taking a long time to finish this tape. You'll probably laugh at everything I've said not making any sense.

Times have changed so much and we have to move with those changes but we can't do it by ourselves. We must remember we need the help of God. The changes are so many and hard to understand and the forces behind them so powerful and beyond our control that we have to rely on God.

Vincent Nageak

Someone asked that I talk about the currents and ice from Cape Halkett to MacKenzie Bay. I know about the sea in summer around there because I have lived on Barter Island, and at Harrison Bay, a long island called Mitqutaillaqtuuq, islands are in the wrong places on the map that you gave me.*

I lived for 4 or 5 years in Ooliktuq (Oliktok). The Bodfish Islands are in front of Ooliktuq. I have traveled by dog team from Ooliktuq to Barrow many times. In some years, Harrison Bay ice rots early at the mouth of the Colville River. The shallows go out pretty far at the mouth of the river. The ice there usually moves out to sea when the wind is from the east. It's hard to pass Cape Halkett, especially when the current is strong from the east. The current is so strong it can take you out to sea even though you might think you are going straight. But when the current is not strong you can easily travel where you want, always taking the current into account. You also have to watch the waves in this area, and when the ice starts moving, it all goes, leaving just the ice on the shallow area. They don't travel on it in June because of the danger of moving ice, but I've crossed it in June. We crossed it to go to Beechey Point. It took us 5 days to cross because the way was so bad. The current at Cross Island is about the same as at Harrison Bay but in summer, huge ice chunks can pass the islands into Prudhoe Bay when the wind is from the west. The furthest island out, Cross Island, is dangerous to cross, and when we travel on it we hope that the wind won't change to westerly.

It is very difficult to find a leeward side among any of those three groups of islands. It is difficult to camp out so we usually go to

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*This was the first tape. Later interviews involving maps utilized accurate U.S.G.S. 1:250,000 maps.

Foggy Island for protection. The ice at the mouth of MacKenzie River also rots early. Foggy Island is always the place to go when the strong winds start from the west because the water is shallow there. The current is always from the east. [He pointed to the mainland side of Cross Island on a map of the area and says there is supposed to be another island shoreward of it.] There are a lot of islands which are not on this map. There is a string of islands all the way past MacKenzie Bay. The ice all along the coast on the mainland side of these islands rots early from Cape Halkett onward. Traveling by boat you don't run out of open water like you do around Barrow, and the ice does not rush right out. The current is a little different in Brownlow Point but not too bad to travel by boat. When I travel by boat I always steer because I know the currents and can travel in a straight line from Thetis Island to Cape Halkett. I know the weather and currents between Barrow and Barter Island in spring, summer, and fall because I have traveled that way so many times. Once the water muddies the current can take you way out. The sea is dangerous in Harrison Bay because of the spill off of Colville River. The current there also takes the ice out to sea once it starts rotting but sometimes all the ice does not go when there is ice that is stuck fast to the bottom. There are always pressure ridges at Cross Island. The ice takes a little bit longer to go out by Thetis Island.

Sometimes whales travel on the inshore side of Cross Island.

Once the ice goes, you can travel easily by boat on Harrison Bay and Prudhoe Bay. The ice rots early due to the rivers and as long as the wind isn't from the west and you are traveling from the east, boat travel is easy.

When you're traveling from the west you don't want the wind from the east because the water is terrible in Harrison Bay, but once you're past there it's good all the way to Barter Island. The pressure ridges form on the ocean side of these barrier islands.

The only times I've seen ice pushed over the islands is when the flat ice gets pushed on top when it's being pushed from way down in the ocean somewhere.

Henry Nashanknik:

I am 73 years old. I was 15 years old when we first moved to the coast. We began in Canada and traveled towards Barrow, building a house and spending sometimes several years at each place we stopped. Sometimes we stopped 2 years, sometimes 5 and sometimes just 1 year. We spent about 1 year east of Barter Island at Pokok Bay. Then in the summer we traveled by boat to west of Barter Island.

I got married when I was 25 years old. We lived in different places along the coast and sometimes going inland. I've lived on the Colville River, Canning River, Sagvagniqtuuq, and Shoviovik River, and just east of the mouth of Colville at Qulvi Creek. I would trap on the McClure Islands and Stockton Island, so I traveled in that area by dog team. These Islands have always had ice piled around them. Sometimes in the fall, the ice would pile all around these islands and at times just the ocean side would have pressure ridges. I've seen ice pushed on top of other ice, but I have never seen ice pushed on top of these islands, probably because these islands are high. The same as Cross Island. The ship owned by Captain Pederson would go between Cross Island and the McClure Islands when it headed east in the spring. Seaward of these islands there are usually pressure ridges and at times really high ones. Most of the time you can travel over them. Sometimes there would be huge chunks of polar ice but none of it was grounded and in other years there would be polar ice which was grounded. When the ice opens, when the wind is constantly from the east in summer months, all the ice goes out seaward of these barrier islands. The coastal ice also goes out when

the wind is from the west. But even when the wind is strong and constant from the west the ice seaward of the barrier islands is still visible. Only when the wind changes from west to east does it finally go out completely. I don't know about east of Barter Island because the ice can go when the wind is from either direction; land comes to a point there.

Once the ice leaves the mainland coast, it stays out. Below (seaward of) McClure Islands there are often huge pressure ridges. But we can travel through them in the spring, hunting seals. There the open leads are not too far out, so we would be able to hunt for seals in them. From Cross Island it would take us about 4 or 5 hours on dogteam to get to open leads. [The actual distance traveled depends on the roughness of the ice and how many switch-backs are necessary. Straight line distance many not be the same. He estimates 4 or 5 hours corresponds to 20 to 30 miles traveled]. There are always some pressure ridges seaward of the McClure Islands but they're not bad and you can maneuver around them to hunt seals in spring. I know people from Cross Island also hunted on open leads. When the wind is from the west the leads would open.

There was a time in November, 1932, [he is uncertain of the exact time] when five people were out on ice hunting seals from Cross Island. This was when temperatures were mild and the wind direction was from the south and leads opened up. Because the weather was mild and the leads had opened they were out looking for seals. But when the temperatures are mild like that the wind usually changes to the west. This can happen very quickly. The wind started to blow very hard from the west, the ice broke up behind them and they drifted away.

They were out for about five days. They knew they were way out in the ocean because even though they were on a big high ice chunk, the moon would disappear below the horizon when they were in the trough of big waves. When they would wake up there would be water all around and each nightfall they would

look for high ice chunks to sleep on. The waves would break up ice, but when the temperature went down it would freeze up, so they would travel toward shoreline. They made it up to Flaxman Island, on the new formed ice. The ice was so thin that a person couldn't walk on it without breaking through, yet these men drove over it with their dog team and it did not break under them. It was a miracle that they survived. [Mr. Nashanknick and his brother might have been with them but luckily they decided to trap fox that day].

[It happened again that same year just before Christmas time. Pete Sovalik (he had been with the November party that drifted away and later was employed at NARL for many years), his father and four other men were out at the lead. They decided to spend the night. Pete was against it because of his recent close call. He went back and tried to convince his father and another man to go with him. They refused to leave, so Mr. Sovalik went home but his father, "Kingosak", "Kaugina" (Sarah Kanaknana's brother) and "Piilaq" plus the other man stayed out on the ice. The wind changed as Mr. Sovalik had feared and the ice broke away behind them. After they were drifting, when daylight came, Kingusak lead the men to where they knew the pack ice was shearing and crumbling against the shorefast ice. He started to walk over it onto the shorefast ice. But the ice opened and closed and caught both of his feet. After he was caught the motion stopped. The others chiseled his feet free and when he was loose they went a good long way onto the shore fast ice. They had to stop because Kingosak couldn't walk. They made a snow house for shelter. The wind shifted to west and it got very cold. They spent the night in the snowhouse. The next day when daylight came two of the younger men, Piilaq and Kaugina, decided to walk to shore for help. They walked all day until they were tired and nearly exhausted, then went to sleep on the ice. When Piilaq woke up

to the line of grounded ice where there was no rough sea. They were running from Thetis Island to Cape Halkett and it too hours and hours. When they thought that they were near Cape Halkett (in fact they had gone past it) they turned south. They got into floating ice again and the wind picked up and they found themselves in a storm. They were towing a boat behind them. The waves got high and the boat being towed smashed into their rudder control so they lost steering. Jack Smith made an emergency repair so they had some control. They made it to a sheltered spot (Cape Simpson) and waited out the storm. Then they made it to Barrow.

Bruce Nukapigak

I was born here in 1900, April 10, (I'm 78 years old), just at the head of Kuuguq ravine at the southeast corner of what is now Barrow, in a snow house. My parents lived at Ualiqpaa (near the Will Rogers and Wiley Post Monument just south of Barrow,) and they came to Barrow just before I was born. I lived at Ualiqpaa until my grandmother died. We moved to Barrow after our father died. My mother remarried Iqaluk. He had a kayak that he used for hunting and he never left it. I used to meet him after his hunt. They hunted all the time because that's all they had--not even a penny in their pockets. When I grew up I whaled in Igasak's crew in the fall. We went out in a whaling boat 20-25 ft with no motor. We used a sail but had no cabin even though the wind was cold.

I would be cold in the boat and we never really slept. When there were grounded ice chunks in the water, they would get over to them and climb up on them to look for whales. When they saw one, they got in the boat to go after it. They never used motors. Once they killed a whale, they would tow it to the Point (Point Barrow) to butcher it, unless they butchered it on the ice. Sometimes grounded ice ridges north of the point never moved in summer or fall and some of them stayed until the next year.

My mother moved to Barter Island when I married and after I had two sons, my mother sent for us to come to Barter Island. That is when I moved there. I had no one to teach me how to hunt on the ice but Uqumailaq's father (his father-in-law). He taught me all the information about ice movement and the proper use of a cod line.

["Cod line" is an English term which K. Toovak thinks approximates the Eskimo term. There are two types of these lines; one type has a float on the end and the other has a sinker. Both have multiple hooks. They are used for retrieving seals that were killed in the water (winter seals float, spring seals sink). However, they have other uses. A cod line with a sinker can be used to test for current and ice motion. It is lowered until it just touches bottom. If it drags along the bottom, the ice is moving. A current may put a bow in the line but it shouldn't drag the weight along. If it is established that the ice is not moving, there are various ways to test for current.]

I hunted on Barter Island, and he taught me about the ice. He took me on hunts as far as Cross Island and east of Barter Island to in front of the Jago River. At Barter Island the leads open up when the wind is from the west all the way to Cross and leads close when wind is from the northeast.

The lead in Barter Island is always close. There is never any grounded ice in front of Barter Island. When the wind is from the west the ice goes out at Cross Island and, no matter how big the pieces of polar ice are, the current takes them away. That is when the ice piles up (pressure ridges) along the coast from Barter Island to Jago River. When the ice moves out from Cross Island, it begins to pile up. There is not really much current at Barter Island. When the wind is from the west the ice usually breaks off along the beach all the way to Angun Lagoon.

I've also lived in McIntyre and around Beechey Point for 18 years (from 1932) but I've walked all along the coast. At Beechey Point, the ice piles along the coast outside of the barrier islands. The

pieces of polar ice come in through the bay between Return Islands and Midway Islands. This is in winter, when the strong winds are from the west. When there is little wind, the currents really play with ice along there. This is in summer months and at Pingok, Bodfish and Cottle islands the pieces of ice move in and out through the channels with the tides. The polar ice gets pushed in from the ocean just west of Cross Island to Beechey Point. There is no strong current on the ocean side of the islands, so the ice piles up because of ice movement elsewhere. But the ice in places with "singaq" are controlled by the tidal currents. [Note: singaq - channel created by either flow from a river or because of the existence of an island or along the shore of a point; isiqsqnaq - during high tide the current flowing in through a channel; anaisagnaq - during low tide the current flowing out through the channel]. [At this point K. Toovak asked the question "Did you ever see ridges off shore in the general area". He answered that off shore in front of Beechey (beyond the islands) there's crumpled ice but he's never seen big piles like you get at Barrow. He personally never saw high ridges from Cross Island to the mouth of the Colville to Cape Halkett].

When I lived in McIntyre from 1932 on there was never any ridges around there because its deep there. When the ice goes there's never any left.

The lead breaks off in somewhat of a straight line from Barter Island to Cross Island so its pretty far out in Camden Bay. That

area has flat ice between the shore and the pressure ridges but it's never the same each year. Sometimes you can run into old ice along there but not much. This old ice usually gets stuck to the bottom around Cross Island. Same thing happens in front of the mouth of Colville River because its shallow. The pressure ridges are far out there too. [When he left Cape McIntyre and he headed for Barrow to stay (in 1950) he finally started seeing some ridges out there and some polar ice grounded from Cape Simpson on towards Barrow. These were the kind which usually stay through the summer. They were high but not as high as they get at Barrow. He was traveling by dog team when he saw this].

Out where there are islands when the tide gets high the ice can get pushed up on the islands. This is when the ice first freezes and has thickened a little. I don't know of any permanent (tide) cracks on ice in front of Pt. McIntyre but I know there are always these cracks on the mainland side of Cross Island. When its high tide these cracks usually widen and close or even jam up when the tide goes down but even after pressure ridging they can open up again. There is this type of crack on both sides of McClure Islands out from the mainland to the ocean.

[When he lived at Pt. McIntyre he used to go out seal hunting in the early fall. He would go to Cross Island and all the way to the McClure Islands. He would make this trip from Pt. McIntyre to Cross to McClure by dog team. When the tide comes in ice piles up on the ocean side of the barrier islands. Sometimes it is up to a foot thick].

[When he traveled out to Cross Island and the McClure Islands

he would watch the wind carefully. For seal hunting it was good between Cross and McClure because there was usually some open water between those islands in the channel. He also usually saw pieces of polar ice grounded between Cross Island and the mainland. It was not thick but still polar ice. They would be driven in during the fall and stay for the winter.

In the early spring Pederson's ship would usually go through the channel between Cross Island and the Midway Islands and go east in the lagoon behind the islands [K. Toovak says it was a wooden boat of moderate draft. He remembers that when he was a boy it went through behind Pingok Island and out to the ocean through a channel. They stopped various places to trade for fox skins].

But it is early fall when the flat pieces of polar ice drifted in through the chanels between Cross Island and Pt. McIntyre. There were always some small ridges formed around the flat pieces of polar ice but they weren't high. Westerly winds usually brought those pieces of ice in when the tide was up. They would stay for the winter.

Then the ice comes in driven by westerly winds in the early fall along with the pieces of polar ice, the ice piles up on the oceanward side of the barrier islands. Also pieces of polar ice can be forced up against the barrier islands and gouge up the sand a bit. But the ice piles aren't high. At the same time these westerly winds cause movements in the ice between the barrier island and the mainland. But this is in the fall before it gets really thick.

But the ice behaves differently from year to year. Some years it

can be bad and some years it can be mild. Some winters it's smooth as far as you can see. (Mr. Nukapigak died in April of this year.)

Kenneth Toovak:

I'm 55 years old and was born in Barrow. I have lived here all my life, and have never lived any other place. If I was to talk about the ice, I couldn't remember the exact years. The ice here starts freezing in October, sometimes the middle of October, when the temperatures are mild. As soon as there is no wind, it starts to freeze. It has been like this for many years. Some years, when the currents bring polar ice from the east, elders say it freezes early. I'm not that knowledgeable about ice to really talk about it, from the time I can remember, but elders have said when grounded polar ice gets out there in front, the ice usually thickens faster from the shore down to the ice. This is because once the ice is there permanently the ice between it and the shore doesn't move.

I remember one time when I was young coming back from camping on the rivers inland. Even before we could see Barrow, we saw high pressure ridges towering over the hills and banks. This was during one winter -- I really couldn't say what year. Also, when I was a boy, there used to be a wide beach in front of Browers trading post. One year, the ice was piled up, just about reaching the trading post. These pile ups were up to 20 feet tall. This was about 1935 or 1936 in late February or early March. This is one time about the ice that I remember. It came about 250 feet up the beach to the pile.

After I started working out at the camp for Arctic Contractors 1949 (either in January or February) there were grounded pressure ridges on the beach all along the coast, up to 15 feet high. I can't say how

far east these ridges went. Then around March, our boss had us bulldoze the ice from the beach so it could melt faster because cargo ships were coming in with equipment for the contractors. We did this over several weeks from March through May. After we finished the wind from the west brought the ice in and it piled up again up to about the same height as before. We started again, but in late May and June the ice can't hold tractors. We had to use water pumps to hose off the ice which had dug into the sand so that it would melt away faster. I can say now the ice piles up along the coast when there isn't too much ice further out which is stuck to the bottom. Usually, this ice is about 3/4 to 1 mile off the coast. But just in front of Pigniq (shooting station) it is usually farther out because it's deeper out there. When the ice packs which come in first don't touch bottom and get stuck, the ice takes longer to freeze. When there's no stuck ice out front, the freezing ice along the coast usually doesn't thicken enough to stay until around December or January.

Once the ice was frozen thick enough to stay fast to the bottom, the people used to start leaving their hunting equipment out on the path. Only then they wouldn't worry that the ice would take them away even though it might get real windy. But they made sure the ice was stuck fast to the bottom before they started leaving their equipment out there. If we had lived then we would probably leave them and lose them, but the elders didn't do that. They made sure it was safe before they did that. The whalers did the same. When the lead closes up they leave their whaling gear where it's safe. Those two are the only instances I remember from years back.

In 1974, around November, when the wind was from the north, the

ice piled up bad about 1/2 mile out until it touched bottom. This was before the ocean completely froze up. That was the year the way was real bad for hunters to travel on. I've never lived anywhere else so I can't say how the ice behaves nearer to Barter Island. But I can probably say that once there are ice packs stuck to the bottom on the shallow shelf the coastal ice is usually pretty smooth. I have heard that the leads open pretty far out around Beechey Point. In 1963 during our cat train trip to Cape Halkett the pressure ridges were about 1 1/2 miles out. And from these ridges to the coast was smooth. I have also seen the ice smooth in front of the mouth of Kuukpik (Colville) River.

I can also say that the weather here is never the same. The ice usually goes out the middle or last part of July, but the current can bring it back again. During the spring, the current is from the west; in the winter it comes from the east, with the wind. The weather controls the currents during the winter. In the summer, when the wind is from the east for several weeks and the current is from the west, the ice goes so far out you can no longer see it.

The elders used to get together in someone's house or the community house to talk about things. They kept each other informed like this. Some of them would have lean-tos by their houses, and that was where they gathered to discuss weather and hunting. Once the ice is so far out it usually doesn't come back in again until the currents are from the east. It usually stays out until fall. Once the ice thickens and comes from the east and the current isn't strong, it usually freezes and stays.

Once, in September of 1945 or 1946 while I was whaling, we saw an ice berg which was grounded in front of the point; we used it for a marker. You couldn't see the land from it. I don't think it ever left through the summer.

APPENDIX III

Location Maps and Index of Place Names

LOCATION MAPS

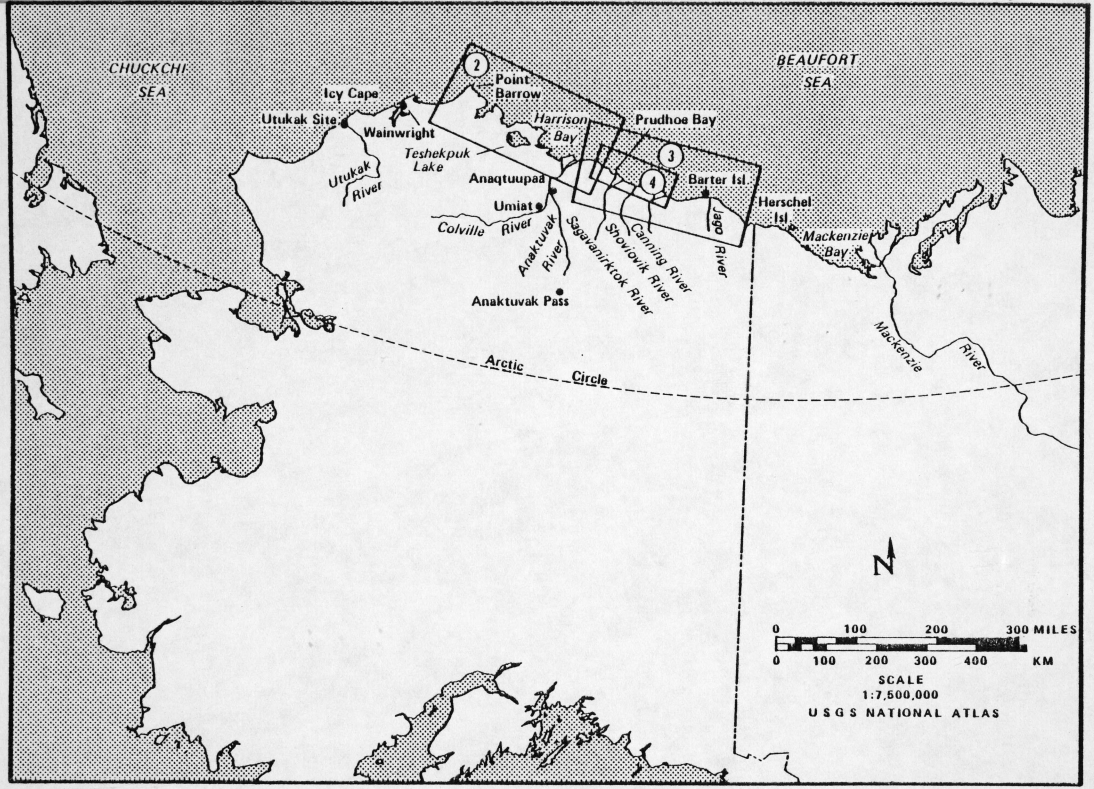
Figure Headings

Figure 1: Map #1 showing the region and the location of 3 insert maps; from the National Atlas prepared by the U.S.G.S.

Figure 2: Map #2. The arctic coast from Barrow to Oliktok; from the U.S.G.S. 1:1000000 maps.

Figure 3: Map #3. The arctic coast from Oliktok to Herschel Island; from the U.S.G.S. 1:1000000 maps.

Figure 4: Map #4. The arctic coast in the lease area; from the Alaska OCS Office Draft Environmental Impact Statement for the Beaufort Sea offshore oil and gas lease sale.



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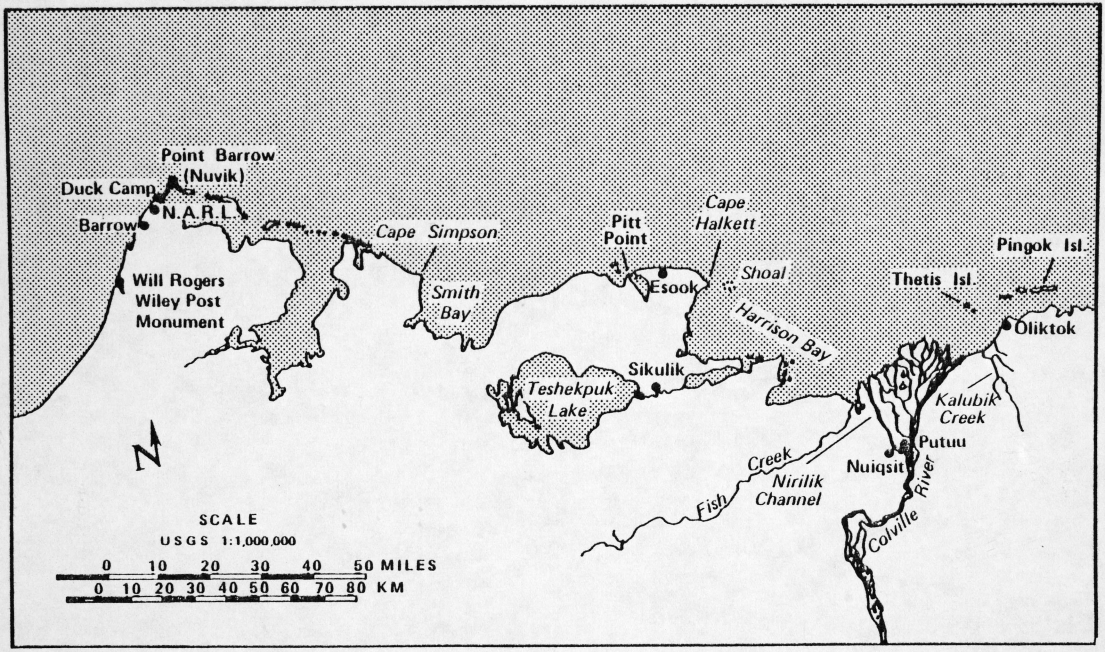

Figure 2: Map #2. The arctic coast from Barrow to Oliktok; from the U.S.G.S. 1:1000000 maps.

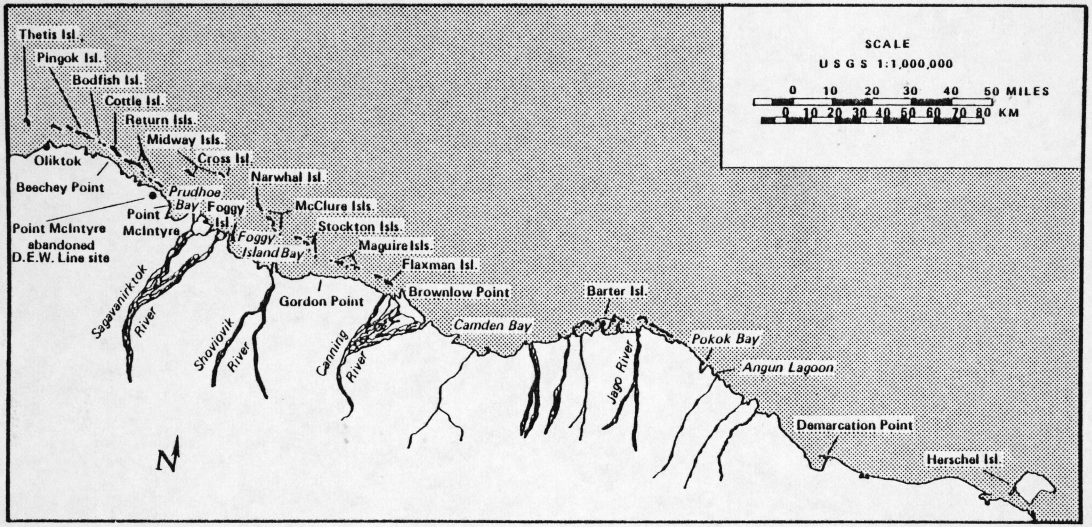

Figure 3: Map #3. The arctic coast from Oliktok to Herschel Island; from the U.S.G.S. 1:1000000 maps.

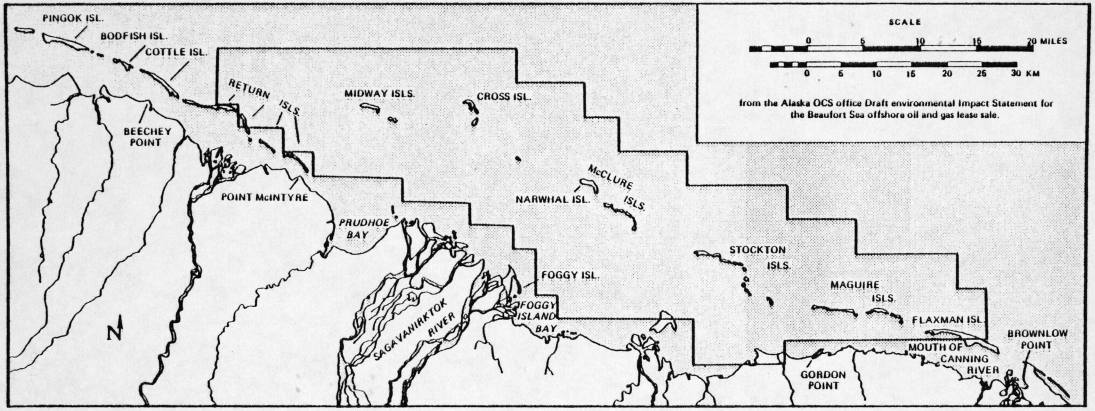

Figure 4: Map #4. The arctic coast in the lease area; from the Alaska OCS Office Draft Environmental Impact Statement for the Beaufort Sea offshore oil and gas lease sale.

INDEX OF PLACE NAMES

Iñupiaq Eskimo place names are spelled using the University of Alaska convention. These are not standardized and may differ from those given in other publications. Alternate spellings are given where known.

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