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JUNEAU, ALASKA

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WILDLIFE RESEARCH UNIT STUDIES

by
David R. Klein, Leader

Volume XI
Annual Project Segment Report
Federal Aid in Wildlife Restoration
Project W-17-2, Jobs 19.2R, 19.3R, 19.4R and 19.5R

(Printed August, 1970)

JOB PROGRESS REPORT (RESEARCH)

State: Alaska

Cooperators: Spencer Linderman and David R. Klein

Project No: W-17-2 — Project Title: Research Unit Studies

Job No: 19.2R — Job Title: The Role of Mineral Licks in the Ecology of Dall Sheep

Period Covered: July 1, 1969 to June 30, 1970

SUMMARY

Mineral lick sites were examined from the air and on the ground in the Talkeetna, Chugach and Kenai Mountains. Samples of water and substrate were collected from six sites. Sixty selected samples from collections made at mineral licks during May - August 1969 were analysed by International Agricultural Services for Na, Mg, Ca, K, Fl, Cl, SO_4, PO_4, bicarbonate and total soluble salts. The results have been entered on IBM cards and computer analysis of the data will be completed in the fall. Preliminary inspection of the results showed high concentrations of Na, Mg, K and SO_4 ions in a large proportion of the lick samples.

OBJECTIVES

To determine the mineral content of natural mineral licks used by Dall sheep in central and southcentral Alaska and establish what minerals specifically attract sheep to them.

To characterize the daily and seasonal patterns of usage by population, as well as by sex and age groups within populations.

PROCEDURES

Field efforts continued in the Talkeetna, Chugach, and Kenai Mountains, attempting to locate and sample mineral licks.

July 1, Mr. Robert Langlotz and I reached the lick at Twin Peaks in the Chugach Mountains near Eklutna Lake, A minimum of 75 sheep were eating soil material at the rock-soil interface and in the clefts of rock outcrops. Six samples were collected.

July 2, we hiked south of Eklutna Lake into Thunderbird Creek, and reached the main lick at Peter's Creek on July 3. Two ewes and a yearling were resting near the wet seep. Seven soil and two water samples were taken.

July 5-7, bad weather prohibited aerial reconnaissance of possible lick sites in the Talkeetna Mountains. Checking local guides during this time yielded one additional lick site to be checked.

July 8, Mr. Lyman Nichols and I flew Sheep Creek, Chickaloon River, and Boulder River drainages checking four sites without finding enough evidence of licks to warrant investigation on foot.

July 10, Mr. Robert Richie, Assistant Manager of the Kenai National Moose Range, flew Langlotz and me to Emma Lake after an aerial reconnnaissance of North and South Forks Indian Creek, at the head of Tustumena Lake on the Kenai Peninsula. July 12 we reached a lick on the North Fork and collected seven samples.

Low clouds and continuing rain prevented more than a glimpse of several rams in the lick and nearly all sign had been washed out. Bad weather made it impossible to check another location at the head of the North Fork and Mr. Richie brought us out July 14.

August 8, Dr. Donald Theophilus and I reached a lick in the Chugach Mountains near Raven Glacier. Thirty-one sheep were at the lick and a smaller mud hole 100 yards away. August 10 and 11 we took 14 samples from a major lick and two smaller ones on Camp Creek.

August 12, we found 15 ewes and yearlings using a large wet lick on a tributary of North Fork Ship Creek.

The winter was spent on course work and thesis preparation. Analysis of 60 selected samples was completed in June 1970 by International Agricultural Services and the results put on IBM cards. Samples were analysed for Na, Mg, Ca, K, Fl, Cl, SO_4, PO_4, pH, total soluble salts and bicarbonate. Preliminary inspection of the results showed high concentrations of at least Na, Mg, K, and SO_4 ions in many of the samples. A detailed statistical analysis will be formulated.

PREPARED BY: SUBMITTED BY:

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JOB PROGRESS REPORT (RESEARCH)

State: Alaska

Cooperators: Ronald Modafferi and David R. Klein

Project No.: W-17-2 Project Title: Research Unit Studies

Job No.: 19.3R Job Title: Effects of Nutritive Condition on Clutch Size of Female Rock Ptarmigan

Period Covered: July 1, 1969 to June 30, 1970

SUMMARY

In 1969, from April 19 to May 22, 103 female rock ptarmigan were collected from a 20 square mile area. One hundred and five female rock ptarmigan were collected from this same area during April 19 to May 22 of 1970. Autopsies yielded weights, measurements, organs and gut contents which will be analyzed in relation to the nutritional status of the birds in various reproductive stages within years and be compared along with the respective clutch size over three years.

OBJECTIVES

This study is proposed to test the following hypothesis on female rock ptarmigan: nutritive condition of the female during a short period preceding egg laying effects clutch size.

An attempt will be made to quantify nutritive condition within years which will be compared over three years.

PROCEDURES

The first part of the study was devoted to searching the literature for methods of quantifying nutritive condition of a bird or simply quantitatively characterizing a bird in as many meaningful ways as possible.

Additional time was utilized searching the literature for chemical analysis methods which were satisfactory for tests to be made in and determining if required equipment was available to the investigator.

Many methods of quantifying condition were selected; laboratory time and expense would eventually delete those methods of seemingly less importance.

Several trips afield were made to become familiar with rock ptarmigan and their habitat.

A study area was selected in which data on nutritive condition as well as clutch size could be gathered from birds of the same population as that being studied by Alaska Department of Fish and Game biologists at Eagle Creek, but not near enough to interfere with adjacent ptarmigan studies.

The study area selected was located approximately three miles NW of the Alaska Department of Fish and Game Eagle Creek Study Area.

In addition to population level data, clutch size data would be supplemented by that gathered by Alaska Department of Fish and Game on Weeden's Eagle Creek Study Area.

Prior to April 15, 1969, most of the field supplies (including a gas generator and freezer) were transported by airplane to a point 12 miles east of the field campsite. On April 15 the investigator, field assistant Bruce P. Oberg, and volunteer helpers, Dr. R. B. Weeden and Bud Burris of the Alaska Department of Fish and Game departed for this same location.

It required this crew with some additional man-power five days to transport the supplies (including two 50-gallon barrels of gas) the remaining 12 miles to the field campsite. Snow machines were used to transport light loads but a "Ranger" snow vehicle had to be used for heavy articles.

From April 20 to May 22, 103 (57 adult; 46 juveniles) female rock ptarmigan were collected from a 20 square mile area surrounding the field campsite. An attempt was made to collect four females a day. Data collected from each bird were the following: total wt.; crop wt.; thoracic esophagus length; proventriculus wt., length, diameter; ventriculus muscle wt.; contents wt.; small intestine wt. and len.; caeca wt. and len.; large intenstine wt. and len.; thyroids len. and greatest diameter; adrenals gre. diam.; kidney wt.; heart wt.; liver wt.; spleen len. and gre. diam.; ovary wt. and gre. diam. of ten largest follicles; oviduct wt.; Pectoralis major wts.; P. minor wts.; superficial fat deposits around crop base of sternum wt. estimated; stage of molt recorded and age of bird determined.

Articles saved for chemical analysis were either put in plastic bags or small vials, labeled and stored in the freezer.

Additional data recorded in the field were temp., relative humidity and notes taken on flowering dates of plants and arrival of passerine birds.

From May 22 to June 15, with the aid of a dog, five nests were located in the area. Two nests produced six and seven chicks, respectively; one nest of five eggs was deserted and two nests of one and six eggs were unsuccessful because of predation. In addition to two nesting females four other birds were banded.

Data recorded in the field were transferred to permanent record sheets and stratified by age and reproductive condition (diameter of largest follicle). Means, standard deviations and range were computed for all parameters taken.

The Pectoralis major and P. minor muscles of each bird were lypholized (24 hours), extracted with petroleum ether (30°-60°B.P.) for eight hours in a Soxhlet extractor, and dried at 100° to constant weight. This yielded (in addition to fresh wt.) moisture content, total lipids and fat free dry wt. of each muscle. The synsacharum, tibiotarsi and femurs from each collected bird were cleaned of flesh, weighed, oven dried at 100°, weighed, warmed in parafin for 24 hours, extracted in alcohol-benzene (75-25;v-v) for 24 hours, then ashed in a muffle furnace at 550° for 24 hours. This yielded the following: fresh wt., moisture content, fat content, fat-free dry weight, organic content and ash weight.

The ash was then brought into solution with 4 ml of conc. HNO_3 and diluted to 250 ml with distilled water for P, Ca and Mg determinations.

Phosphorus was determined spectrophotometrically by the Molybdovanado-phosphoric acid method on aliquots of the above solution. Computation of weight and % Phosphorus in each bone have been completed.

Magnesium was determined on a aliquot of the above solution by atomic absorption as described in the Perkin-Elmer 303 methods manual. Computation of weight and % Mg in each bone have been completed.

Aliquots are all prepared for Calcium determinations by atomic absorption; determinations will be made next quarter.

The grit was separated from ventriculus contents. Contents were air dried, weighed and stored; organic particles on grit were oven dried at

100°, weighed, passed through various size soil screens to determine size of particles and pulverized. Plans for next quarter include determination of Ca and Mg in these samples.

Crop contents were separated into components and dried at room temperature with forced air to constant weight. Samples were very small and analyses might only be made for Ca, N and P next quarter.

Parasites from small intestines were separated from components, dried at 100° and weighed to determine parasite "load" on a per bird basis.

Although not completed this year, plans still include total iodine determinations on thyroid glands, non haem and total Iron on spleens and total lipids, moisture, Vitamin A, Copper and Manganese on at least a subsample of livers.

It is hoped that experience gained last year will enable more efficient use of time and permit completion of these analyses in the forthcoming year.

Several trips were made to field camp transporting gas, propane, food and replenishing other field supplies for the spring of 1970.

Made preparations to go into field on April 16, 1970.

On April 16 departed for field camp. The investigator and accompanying researcher, Dr. Robert Moss, skied cross country into field camp. Field assistant Charles Simmons and 2,000 lbs. of fresh supplies were transported to the camp by helicopter.

From April 19 to May 22, 105 (53 adults, 51 juvenile, 1 undetermined) female rock ptarmigan were collected in the same area as 1969. Despite problems with freezer and generator, collections were very successful. Approximately four birds were taken per day.

In the spring of 1969 both Pectoralis majors, P. minors and kidneys were dissected out of each bird. Since most of the weights were the same or exhibited little variation, only one of each was dissected out this spring. This change plus experience cut dissection time from 1 1/2 - 2 hrs. to 3/4 - 1 hr. per bird.

An unsuccessful attempt was made to mark males that accompanied collected females. However experience gained might solve the problem next spring.

The same parameters were taken on these birds as on those of 1969.

On May 23 returned to College to bring specimens to University, replenish supplies, pick up a dog and allow females to complete clutches.

On June 1 returned to field camp. In the period up to June 13, with the aid of a dog, seven nests were located (2-7 eggs, 3-8 eggs, 2-0 eggs).

In addition to all females on nests five other birds were banded.

On June 14 returned to College and currently starting to record data in same format as spring 1969 to enable comparisons between these two years.

At present investigator is proceeding to start laboratory work on breast muscles and since balance in the field was not sensitive enough to weigh spleens, these are being lypholized and weighed on a Mettler balance.

Plans for next year will be the same as those outlined here and including additions noted in text.

PREPARED BY:	SUBMITTED BY:
Ronald Modafferi	David R. Klein
Graduate Student	Wildlife Unit Leader

JOB PROGRESS REPORT (RESEARCH)

State: Alaska

Cooperators: Dennis Knutson

Project No.: W-17-2   Project Title: Research Unit Studies

Job No.: 19.4R   Job Title: Winter Ecology of Musk-oxen

Period Covered: July 1, 1969 to June 30, 1970

SUMMARY

From February 20 to May 3, the snow characteristics at 141 different snow stations were measured with the Rammsonde penetrometer. The snow-cover in vast areas of the interior of the island had depths up to 100 cm with integrated ram hardness values as much as 5,000 kg-f cm. These areas were not utilized by muskoxen or reindeer. On Cape Mohican and in the Nunathloogagamiutbingoi sand dunes, muskoxen were feeding primarily on snow-free areas. Nowhere on the island were muskoxen observed feeding in snow with a depth greater than 30 cm, or in snow with an integrated ram hardness greater than 500 kg-f cm. Reindeer were observed feeding in snow as deep as 50 cm, and with integrated ram hardness values as much as 1,500 kf-f cm.

OBJECTIVES

To obtain basic information on the winter environment of muskoxen on Nunivak Island and Nelson Island, Alaska and in the Arctic National Wildlife Range, with particular reference to snow cover and its affects on muskox feeding habits and food availability.

PROCEDURES

Preliminary work by Lent (Alaska Coop Wildlife Research Unit Quart. Report 21(2):11-19) on Nunivak Island in March of 1969 demonstrated the value of precise snowcover measurements in determining the availability of forage. Lent used snow instruments developed by the National Research Council of Canada to obtain quantitative data on snow characteristics (depth, morphology, density, and hardness). Use of these instruments, however, involves a cumbersome and time consuming task of digging a snow pit at each station. It also results in considerable disturbance of the snowcover, a distinct disadvantage where repeated measurements along a permanent transect are made.

A different instrument, the Rammsonde penetrometer, was tried during the winter of 1970, and proved to be much more effective. It gave fast and accurate hardness measurements with little disturbance to the snow cover.

The Rammsonde penetrometer consists of a 100 cm shaft with a 60° conical tip, a guide rod, and a drop hammer. The hammer is raised to a height, $\underline{h}$, which is read in cm on the guide rod, and then dropped freely. The depth of penetration, $\underline{X}$, is read from the cm scale on the shaft. The resistance to penetration (hardness) of the snow can be determined by observing the number of hammer drops to obtain a certain penetration. Knowing the weight of the drop hammer, the height of the drop, the number of hammer blows, the penetration after a certain number of blows, and the total weight of the penetrometer, the ram hardness number, $\underline{R}$, can be computed from the expression shown in Fig. 1. This expression equates the work done on the snow as the cone moves through it, to the energy given up by the falling hammer and the descending penetrometer.

The ram hardness number, $\underline{R}$, is an arbitrary index which indicates the resistance in kilograms to penetration which a given snow layer offers to the cone of the penetrometer as it moves through that layer. The mechanism of this penetration is complex, and involves both compressional and shearing stresses. These details are ignored and $\underline{R}$ is regarded simply as resisting force (Benson, 1962).

Benson (1962), computed the total work done by the penetrometer in moving from the snow surface to a stated depth $\underline{X_i}$ by integrating the ram hardness number, $\underline{R}$, over a depth interval. In practice, this integration is performed by multiplying each depth increment, $\underline{dX}$, by its hardness number, $\underline{R}$, and adding these values from X=0, at the snow surface, to any desired depth. The intervals $\underline{dX}$ do not approach zero, nor does the number of intervals increase indefinitely, but it is still convenient to regard the summation as an integral and to examine ${}_0{}^X RdX$ as a function of $\underline{X}$.

The integrated Rammsonde profile is expressed in units of kg-f cm. A ram profile of a snowcover can be drawn as shown in Fig. 2. The ram hardness number (in kg) of each snow layer is plotted on the abscissa, and the snow depth (in cm) is plotted on the ordinate.

In Fig. 2, profile #1, for example, the first snow layer has a depth of 2 cm., with a ram hardness number, R, of 2.6 kg. Integrating R over a depth interval of 2 cm. yields 5.2 kg-f cm (2 cm X 2.6 kg.) of work done by the penetrometer in moving through the first two centimeters of snow. Likewise, the second, third, and fourth snow layers have ram hardness numbers of 15.1 kg, 4.6 kg, and 11.5 kg; with integrated values of 120.8 kg-f cm, 23.0 kg-f cm, and 103.5 kg-f cm, respectively. The total amount of work done by the penetrometer in moving through the entire snow layer is found by summing the work needed to go through each layer. It is equal to 252.5 kg-f cm in this example.

It is hoped that the integrated ram hardness values can be related to the energetics of animals digging through snow. The total amount of work done by the penetrometer in moving from the snow surface to the ground, $_0{}^x$iR dX, provides a relative index as to how much work it will take an animal to dig through the same snow layer. Some caution, however, has to be exercised in assuming that an animal will exert the same type of force as a conical penetrometer in moving through a snow layer. An animal may be morphologically or behaviorally adapted so that it exerts a different type of force or a force in such a manner that it expends less energy in digging through a snow layer.

In July of 1969, six permanent transects were established in the Nunathloogagamiutabingoi sand dunes on the south coast of the island, an area which receives intensive winter use by muskoxen. Profiles of the transects were made and the vegetation along the transects was sampled according to the double point method as described by Nicholson and Hughes (1963). *Elymus mollis* plants along the edges of blowouts were tagged to determine the extent and pattern of erosion of the sand dunes. During the winter of 1970, snowcover measurements were made along the transects with the Rammsonde penetrometer to correlate snow conditions with the areas utilized. This area will be visited again during July, 1970 to determine any changes in the vegetation.

Snow measurements were made on Cape Mohican, another area that receives heavy use by muskoxen during the winter. This area will be visited during July of 1970 to analyze the vegetation, especially to look for vegetational differences between the areas receiving heavy use and the areas receiving little or no use.

Snow measurements were made in other areas of Nunivak Island whenever possible. The snowcover was measured in the interior of the island, an area that receives no use by muskoxen or reindeer. The snowcover was also measured in areas heavily utilized by reindeer.

Findings:

Between the period of February 20 and May 3, a total of 141 snow stations were examined with the Rammsonde penetrometer. All of the data has not yet been processed, however examples of the snow conditions found at different locations on Nunivak Island are described below.

Nunathloogagamiutbingoi Sand Dunes:

Because of adverse weather and continual problems with broken-down snowmobiles, I was able to complete only one series of snow measurements along the transects in the sand dunes. These measurements were made February 19 and 20. Transects 1 and 2 could not be relocated. Evidently the stakes blew over and became covered with snow.

Generally, the foraging conditions were excellent, as there was little snow accumulation and no icing. The prevailing winds are from the northeast, so the slopes with a northeastern exposure had little or no snow accumulation (less than 10 cm). Likewise, the snow depth was greater on the southwest exposure (up to 30 cm). In some of the blowouts, snow accumulated to depths of over 300 cm.

Fig. 6, a profile of transect 5, illustrates the pattern of snow accumulation in the sand dunes, giving the snow depth and the integrated ram hardness values of the different snow stations. The ram hardness numbers of the various snow layers in the sand dunes varied from 2.6 kg to 124.6 kg, with a mean of 24.4 kg. This compares to an average of 53.8 kg. for two interior snow stations (Fig. 4). Except for stations 1, 4, and 12, I would consider the forage along transect 5 available to muskoxen.

There was no evidence of utilization in the area where the transects were located. The only muskoxen utilizing the sand dunes at this time was a herd of approximately 30 which were feeding on the bare, windswept slopes at the far eastern end of the dunes. They were feeding primarily on *Elymus mollis*, along with some *Empetrum nigrum*.

Cape Mohican:

Cape Mohican, at the extreme western end of the island, is another area heavily utilized by muskoxen. This area was visited three times during the winter.

On February 22, during the muskox census, 57 muskoxen were observed on Cape Mohican. They were found on the bare, windswept ground near the cliff edges and near the lighthouse at the very point of Cape Mohican. Snow conditions at this time were not measured with the penetrometer, but I considered them to be moderate. The snow cover in most areas was less than 10 cm., and consisted of a crusted surface layer which was underlain by a loose matrix of vegetation and snow. The snow would have presented little hindrance to feeding by muskoxen as a person could break through just by walking upon it. A lush growth of *Carex* occurs on the inland portion of the Cape, but the muskoxen still seem to prefer the cliff edges where the vegetation is much more scanty, but completely exposed.

Cape Mohican was visited again on March 27. The snow cover consisted of about 3 cm. of loose, powdery snow. This cover was insignificant and presented absolutely no hindrance to feeding, but still the muskoxen were utilizing the areas along the cliff edges.

A third trip to Cape Mohican was made during the first week of May. The snow conditions were very similar to the conditions found on February 22. The snowcover was measured with the penetrometer along five transects. Fig. 5 shows the ram profiles of eight stations on one of the transects. The snow depth varied from 0 to 26 cm., and the integrated ram hardness values ranged from 0 to 420.2 kg-f cm, with a mean of 133.4 kg-f cm. These figures are quite low when compared to the integrated ram hardness values found at other areas on the island.

The muskoxen were still utilizing the cliff edges. One group of four adult females was found feeding on the bare ground of a rocky 45° slope near the point. The vegetation was very sparse and consisted mainly of Luzula nivalis, which the muskoxen were feeding upon.

At this time it is unclear why the muskoxen are feeding primarily along the cliff edges when such a lush growth of Carex occurs just a few hundred feet inland. The snowcover does not appear to be the primary factor. This summer, vegetational differences will be examined as a possible factor.

The Interior:

Vast regions in the interior of Nunivak Island are unavailable to both muskoxen and reindeer because of the depth and extreme hardness of the snow cover. Fig. 4 shows the ram profiles of two interior stations near Kimijooksuk Butte. The integrated ram hardness values are considerably greater than the values obtained in areas utilized by muskoxen or reindeer.

Muskox Feeding Craters on Muskox Mt:

On April 1,12 muskoxen (11 adult bulls and 1 two-year-old bull) were observed on Muskox Mt. Recent feeding craters were located and the snow was measured with the penetrometer, approximately one foot to the side of each crater. Fig. 2 shows the ram profiles of three of the feeding craters. The depths varied from 21 to 27 cm. and the integrated ram hardness values varies from 252.2 to 370.3 kg-f cm. Twenty-seven cm. is the deepest snow that I found muskoxen digging in during the winter of 1970, and the integrated ram hardness values rarely exceeded 400 kg-f cm.

Reindeer Feeding Craters:

Reindeer and muskox winter ranges were found to be separate in 1967 (Bos, 1967). During the winter of 1970, I also found very little overlap. The muskoxen are restricted mostly to the coastal fringe of the island, while reindeer utilize ranges farther inland. Reindeer seem to have the ability or motivation to dig through much deeper snow than can muskoxen. Frequently I have found reindeer feeding craters as deep as 50 cm, but I have found none that has exceeded 60 cm in depth. Several times I found where reindeer had dug down to a depth of 60 cm, but then stopped before they reached the vegetation.

Fig. 3 shows ram profiles of three reindeer feeding craters. The integrated ram hardness values of these craters have a mean of 1431.3 kg-f cm, three times greater than the values found for muskox feeding craters. Preliminary evidence indicates that reindeer will dig through a snow layer that has three times the integrated ram hardness value of a snow layer which muskoxen will dig through.

Muskox Census and Distribution-February 1970

In February of 1970, the muskox population on Nunivak Island was censused by snowmobile with the Nunivak Island Refuge Manager, Calvin Lensink. One-, two- and three-year-old muskoxen could be distinguished. All muskoxen over four years old were considered adults. Sex could be determined in all age classes except for the yearlings.

The distribution of the population is shown in Fig. 7. About 75% of the population occurs along the coast from Nash Harbor, around Cape Mohican, and down the coast to the end of the Nunathloogagamiutbingoi Sand Dunes. This is a reflection of better winter foraging conditions in these areas. It is also noted that the ratio of adult bulls to adult cows in the Cape Mohican area is approximately 1:3; whereas in the sand dune region along the south coast, the ratio is over 2:1 in favor of bulls. The reason for this difference is unknown at present, but it could have some important implications concerning the range quality.

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Bos, G. 1967. Range Types and Their Utilization by Muskox on Nunivak Island, Alaska. Unpubl. M.Sc. Thesis, Univ. of Alaska.

Nicholson, A. & R. Hughs. 1963. A method for the characterization of range-type vegetation. J. Range Mgmt., 16:293-299.

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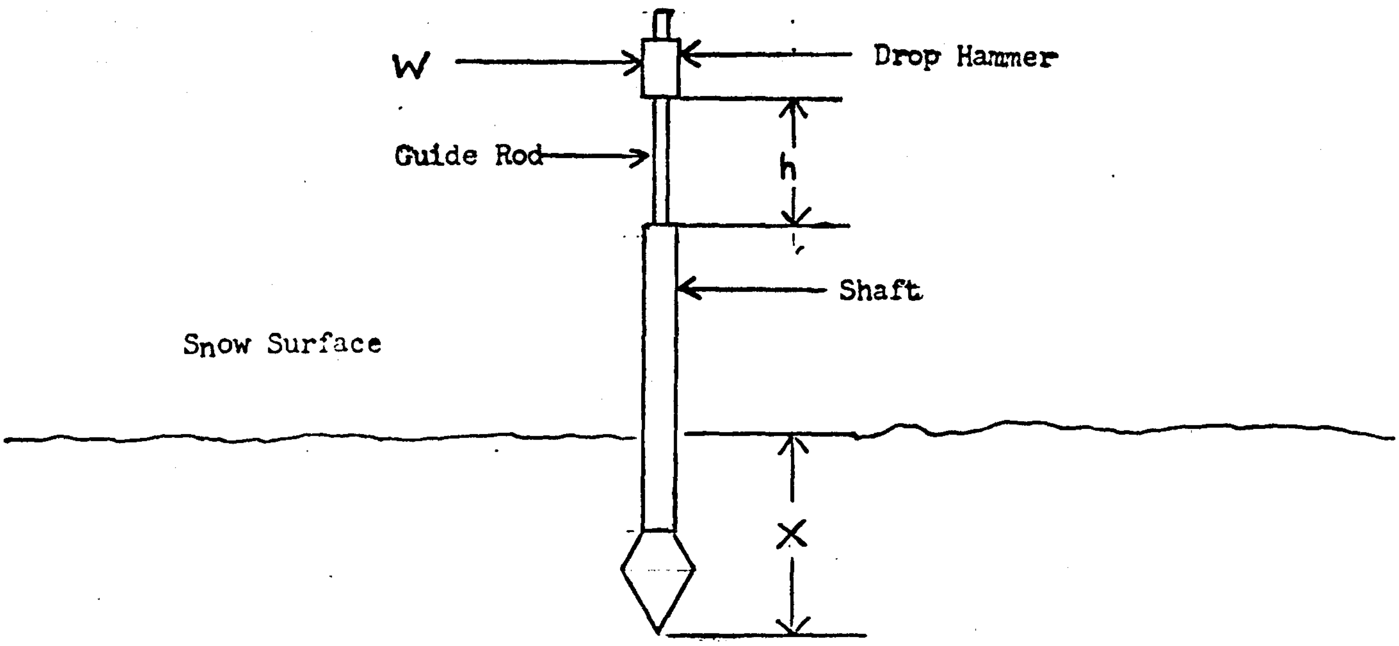


<u>The Rammsonde Penetrometer</u>

The ram hardness is computed from the following expression:

$$R = \frac{Whn}{X} + W + Q \quad \text{kg - force}$$

R = ram hardness number

W = weight of drop hammer(kg)

h = height of drop(cm)

n = number of hammer blows

X = penetration after n blows(cm)

Q = weight of penetrometer(kg)

The total work done by the penetrometer in moving from the snow surface to a stated depth x_i may be written as

$$R_i = \int_0^{x_i} R \, dX$$

The integrated Rammsonde profile is expressed in units of kg-f cm.

Figure 1.

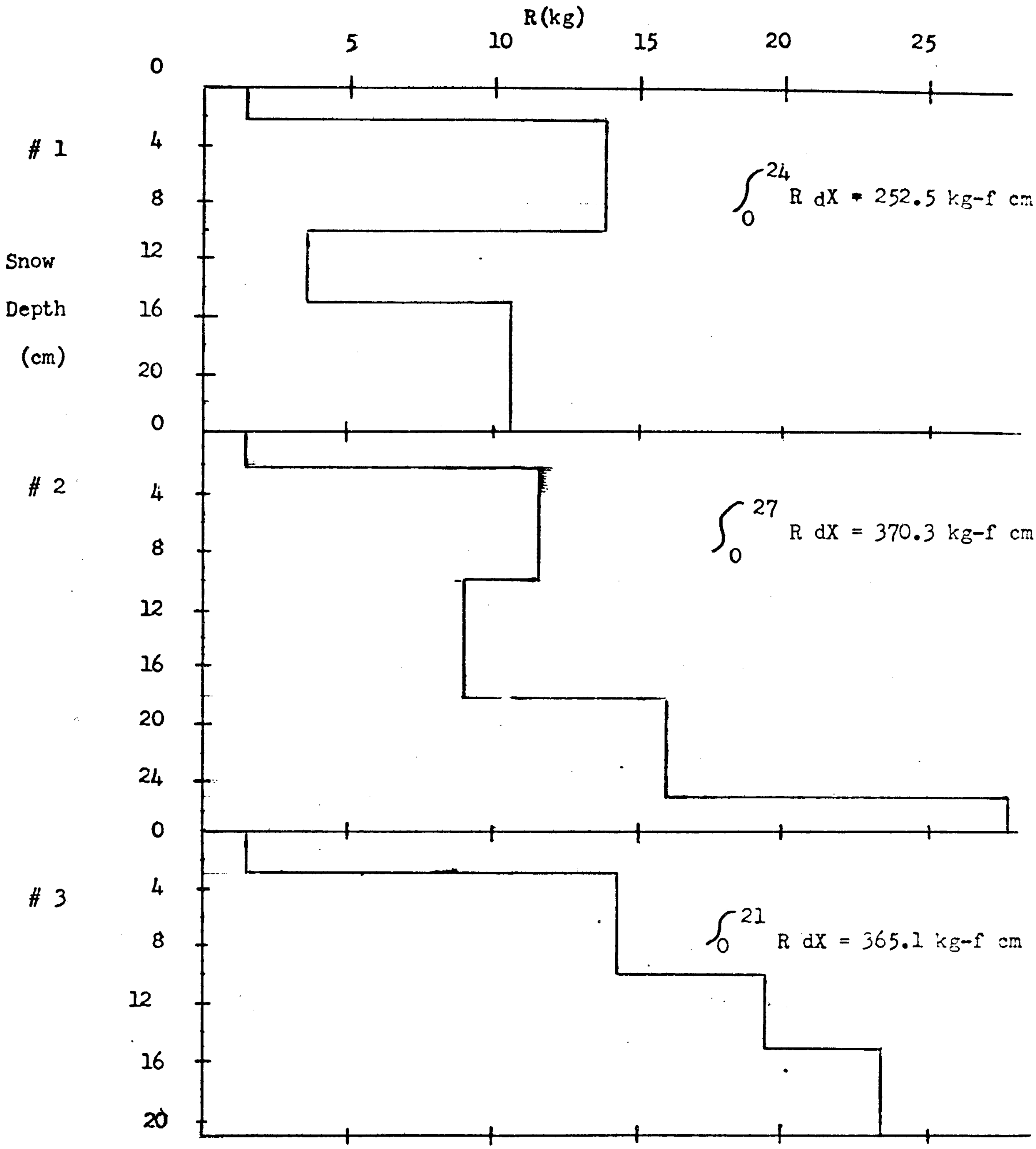


Figure 2. Ram profiles of three muskox feeding craters.

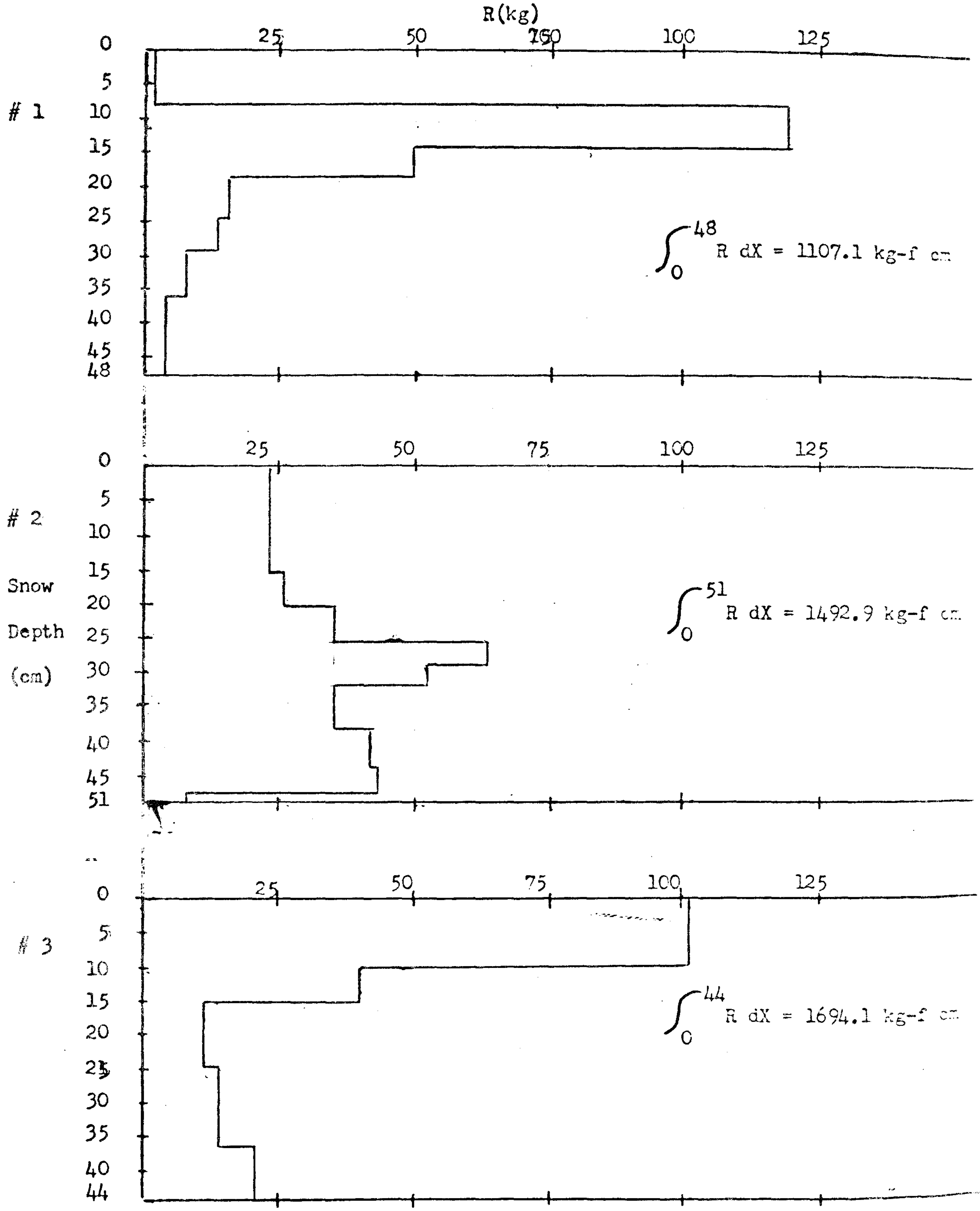


Figure 3. Ram profiles of three reindeer feeding craters.

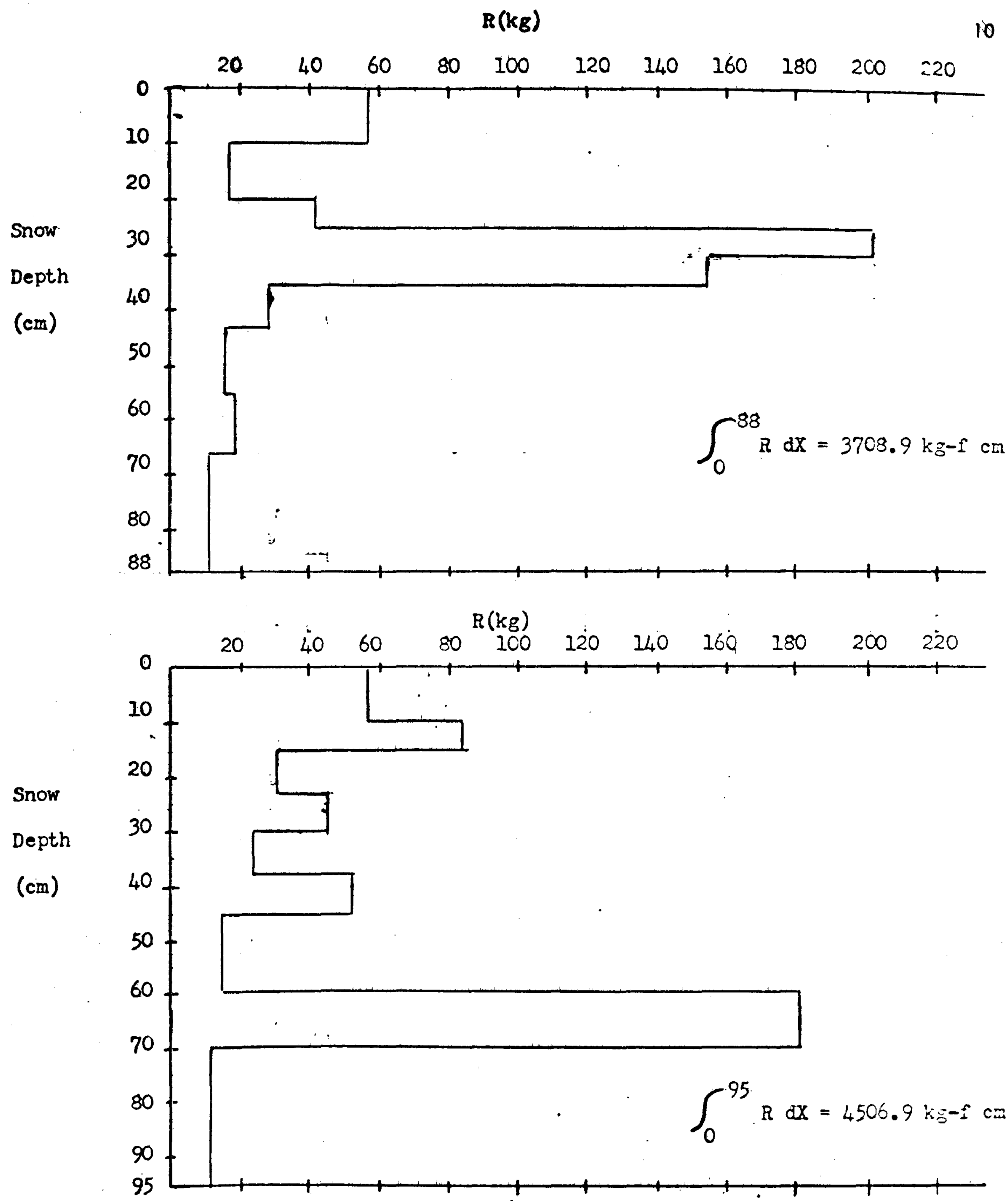


Figure 4. Ram profiles of two interior stations near Kimijooksuk Butte.

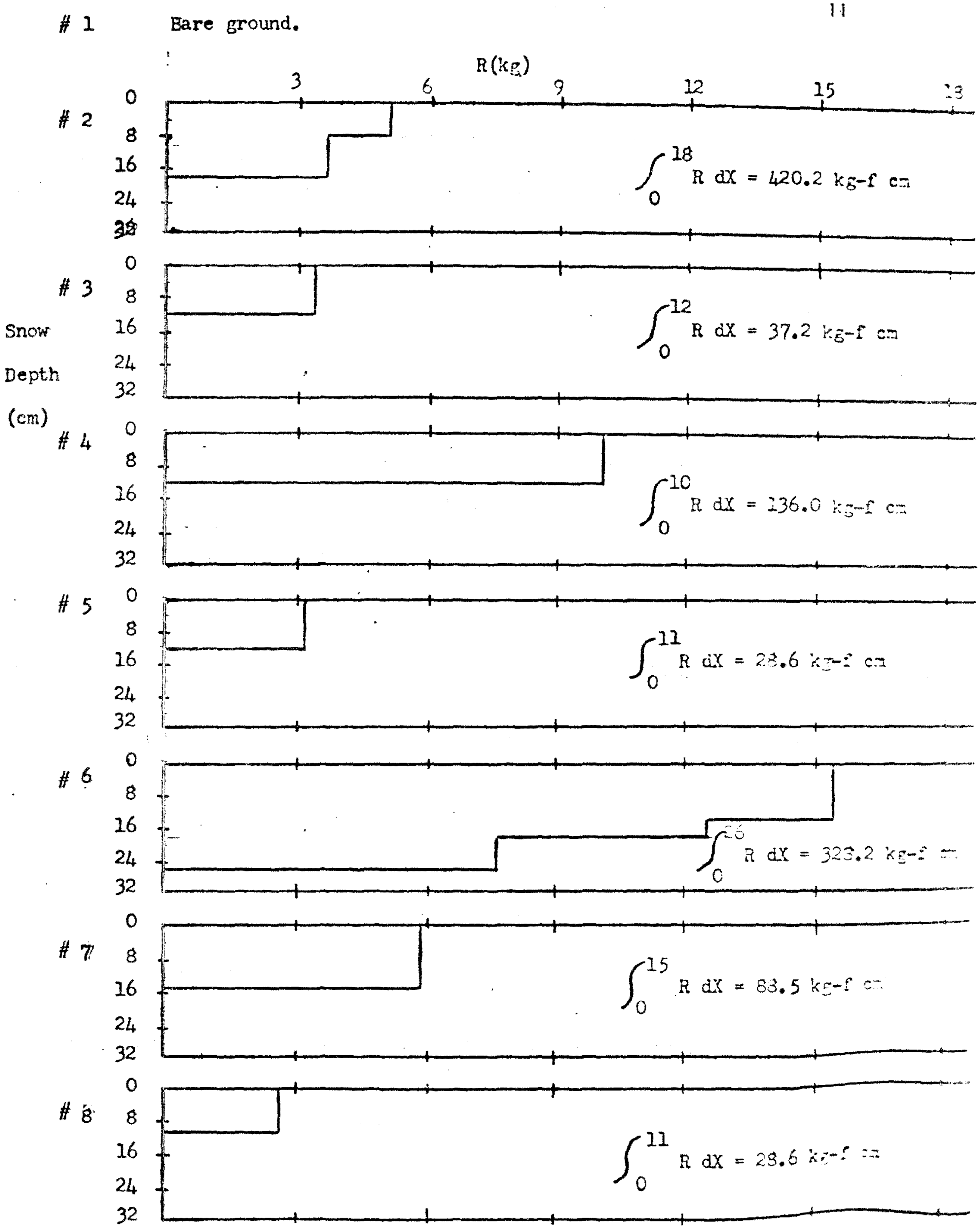
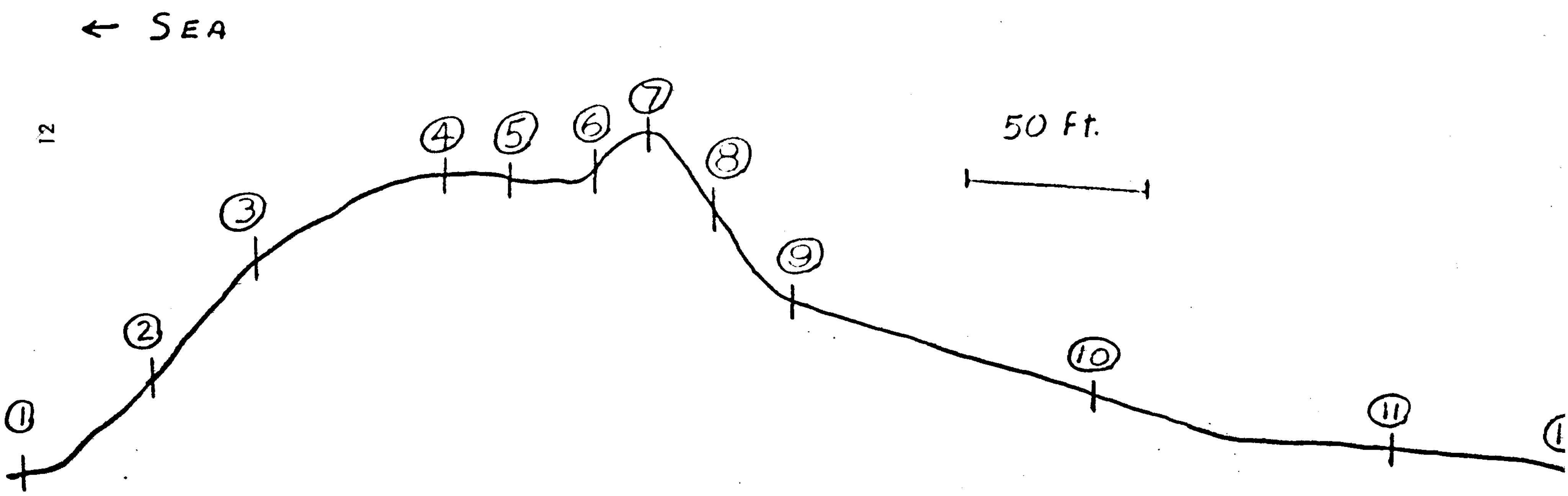


Figure 5. Ram profiles of eight stations on a transect at Cape Mohican. The stations are 200 ft. apart, going from northeast to southwest.



SNOW DEPTH (CM)

(1) 48 (2) <10 (3) 0 (4) 55 edge of blowout (5) 18 (6) 3 (7) 1 (8) 16 (9) 20 (10) 23 (11) 37 (12) 43

$\int_0^X R\,dX$ Kg-F cm

(1) 1005.2 (2) 0 (3) 0 (4) — (5) 166.8 (6) 0 (7) 0 (8) 62.0 (9) 191.8 (10) 435.2 (11) 590.2 (12) 1517.8

Figure 6.

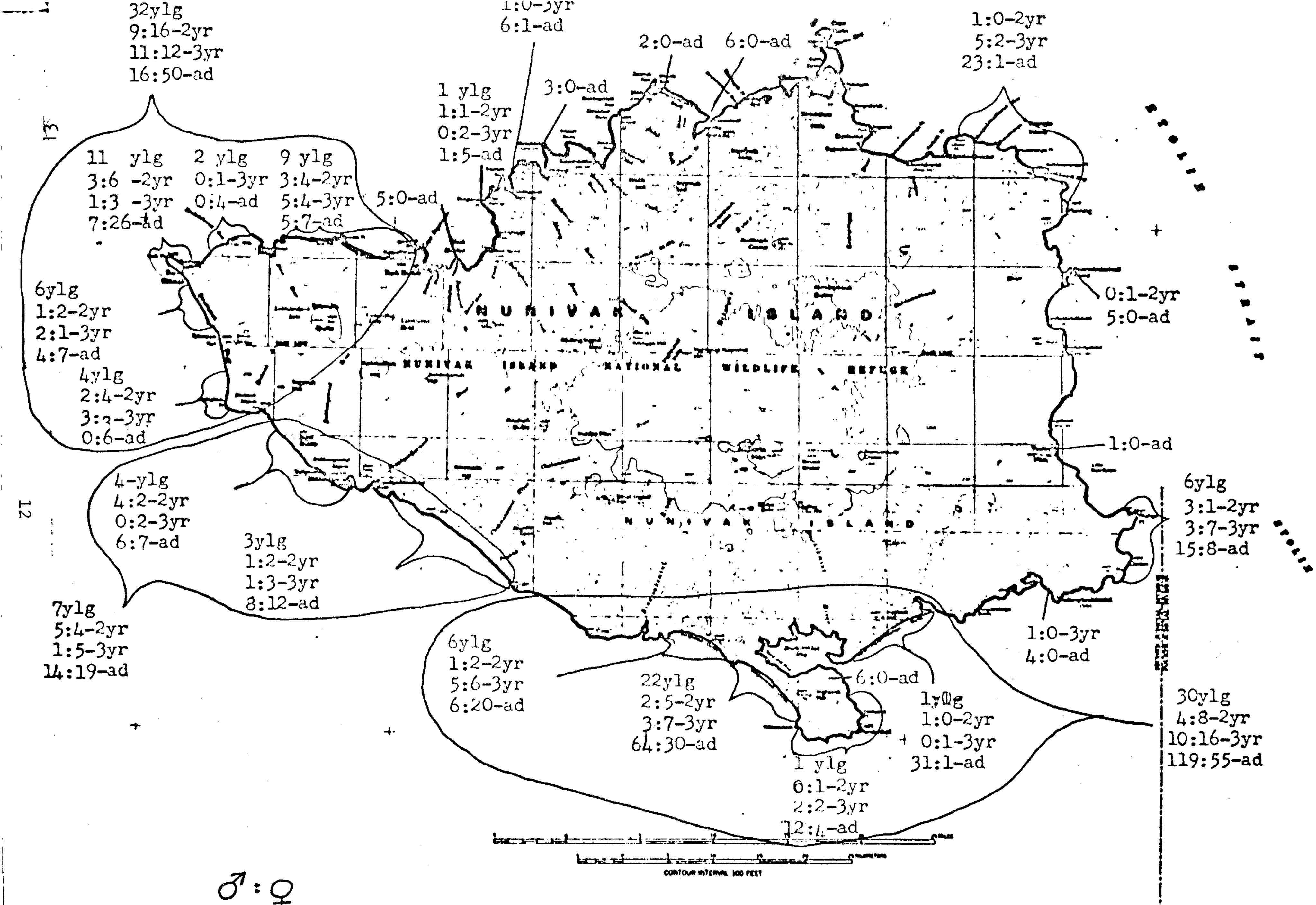


Figure 7. Muskox Distribution - February 1970.

JOB PROGRESS REPORT (RESEARCH)

State: Alaska

Cooperators: Larry Johnson and David R. Klein

Project No.: W-17-2 Project Title: Research Unit Studies

Job No.: 19.5R Job Title: Populations, Migrations and Utilization of Eider Ducks

Period Covered: July 1, 1969 to June 30, 1970

SUMMARY

From May 9 to June 21 the investigator made 154 half-hour observations at the open lead, on the pack ice and on land in the Point Barrow area to determine the number of the various species of waterfowl migrating north and east past the point and to determine the importance of these waterfowl to local subsistence hunters. The largest portion of waterfowl migrate over the lead which may be several miles from shore and several miles wide. King eiders (*Somateria spectabilis*) were observed to be the most abundant, but estimation of the relative number of each species is impractical for one observer during the spring migration. The total waterfowl counted during observation periods was 22,238. Examination of specimens of all four eider species indicated they were in good physical condition.

Spring subsistence hunting in the Barrow area is devoted primarily to whaling and sealing. A small number of waterfowl are taken during the spring hunts but they are relatively unimportant in the total subsistence economy.

OBJECTIVES

To determine on a species basis the number of waterfowl migrating past Point Barrow, Alaska.

To evaluate the importance and determine the extent of utilization of these waterfowl by the Natives of Barrow Village, Alaska.

PROCEDURES

The investigator arrived at the Naval Arctic Research Laboratory at Barrow, Alaska on May 5 and made arrangements to live with a local whaling crew on the edge of the open lead approximately four miles north of Point Barrow.

Sample units of one-half hour of observation over the lead were begun immediately to identify and count waterfowl migrating north. Observations were possible at all times of day since daylight persists around the clock at Barrow at this time of year. Observations and identifications were made with 7 X 35 binoculars and a 20X spotting scope. The 7 X 35 binoculars were later replaced with 10 X 50 binoculars which proved better for identification.

A total of 154 formal half-hour observation periods was completed. Sixty-nine were made from May 9 to May 24 at the lead and 61 were made from May 27 to June 12 inland and on the pack ice between the lead and shore to determine the relative number of waterfowl migrating past the three different locations.

A full analysis of data has not been made yet. However, it was obvious that the majority of the waterfowl travel north up the open lead. A substantial number also fly over the pack ice following pressure ridges and the shore line and a small number of waterfowl pass south of Barrow village overland.

In designing a plan for sampling the migration, it was assumed that the waterfowl movements would be noticeably heavier when the wind direction favored their northeasterly movement. Observations at the open lead, however, were made only during north, northeasterly, and easterly winds. No observations were made at the lead when winds could be considered favorable.

The migration of waterfowl was comprised entirely of king eiders (Somateria spectabilis) and Pacific eiders (Somateria mollissima v. nigra) until oldsquaw (Clangula hyemalis) were first observed on May 21 flying with a flock of eiders. At the distances involved for these observations (up to one mile) it became apparent that it would be impractical to attempt to count the eider species separately. Their similarity and the fact that they often fly in mixed flocks of varying proportions would require ideal visibility at all times. Even if visibility were ideal, the large flocks of 200-300 birds would be impossible to break down on a species basis in the time available to count them. Estimating proportions of each species in a flock also seems impractical. In addition, one would have to assume an equal number of females as males of each species in each flock as the females of the two species are indistinguishable except at very close range. In observations at close range it did appear that the birds were in pairs, but there is no way of telling how many in a flock were nonbreeders and therefore unpaired. Many flocks were identifiable only as eiders by their characteristic low flight over the water, their characteristic laborious wing beat, and their long-string flock formations. Species could only be distinguished when the lighting and range were favorable. During the migration king eiders are the most numerous. Oldsquaw are the most numerous waterfowl nesting in the Barrow area.

It appeared as through the birds arrived in "flights" as Murdock (1885) described although the winds were not always favorable as he and Thompson and Person (1963) suggested when these peak flights occurred. The heaviest flight observed occurred on May 18 when the wind was unfavorably from the east at 9-10 m.p.h. On this day the following observations were made:

TIME	TOTAL EIDER COUNTED	MEAN FLOCK SIZE
3:30 - 4:00 AM	0	------
5:30 - 6:00 AM	5	5
9:30 -10:00 AM	2780	185
12:00 -12:30 PM	3075	171
2:30 - 3:00 PM	1170	146
5:30 - 6:00 PM	714	102
9:00 - 9:30 PM	336	84

A total of 22,238 eiders was counted in 154 one-half-hour observations. The mean flock size of eiders flying over the lead was 100, and the mean flock size of eiders flying over the pack ice and over land south of Barrow was 31.

Through the seven weeks of observation, it became apparent that one could expect the heaviest movements of birds between 9 AM and 2 PM.

No spectacled eiders (Lampronetta fischeri) or Steller's eiders (Polysticta stelleri) were observed migrating north, however, it is possible that small numbers of these two species could have been mixed with the more common species in large flocks and gone unnoticed. Steller's eiders were not reported to be seen until June 6 near Point Barrow. Several later observations of pairs on inland melt ponds were reported. Only one report of spectacled eiders was received in the Barrow area and that was from a small inland lake. A few spectacled eiders were being taken by Eskimo hunters several miles south of Barrow.

The spring migration past Barrow does not lend itself to a visual census by one man for many reasons. The dispersed movement of birds over a wide route possibly extending several miles inland to an unknown number of miles out over the lead and pack ice requires observations at several locations under all kinds of weather conditions to determine the proportion of birds flying along each route. Observations on the far side of the lead (at this time 4-5 miles wide) can not be made unless a boat can be hauled over the pack ice to the lead or unless one can land an aircraft on the opposite side. Attempts to reach the other side of the lead were unsuccessful. The changing condition of the open lead with changing weather conditions not affects bird movements and therefore reliable estimates, but it also determines whether observations can be made at all as the shifting wind can make the ice unsafe for an observer. When favorable winds for a northeasterly migration eventually blew from the west or southwest, many Eskimos broke camp because of their fear that the ice might break up.

Twenty-two eiders including specimens of all four species, were examined for fat deposits, weighed, measured for an emaciation index, and their reproductive organs were preserved. All appeared in good physical condition as indicated by heavy fat deposits in mesenteries, lower abdomen, and under the skin. Females appeared to have larger fat deposits, especially in the lower abdomen. A fat sample was obtained from each and will be analyzed for pesticide content later. The same data were collected from oldsquaw ducks.

It was evident that during the whaling season (beginning in April and concluding around June 1) spring duck hunting was not of major importance to the Barrow subsistence hunters. Hunting priority during April and May is given almost completely to whales. Approximately twenty whaling crews took part in the spring whaling season.

Fifteen bow-head whales (Balaena mysticetus) were taken, and according to local hunters this is a very exceptional harvest. Last year's harvest of 11 whales was considered a very good year.

The migrating ducks were nearly always out of shotgun range of the whaling camps. On only one occasion was actual waterfowl hunting observed at the whaling camps. On a calm day, when little whaling activity was going on, two boats containing two men each motored out into the lead where the eider usually passed. Several shots were heard but no birds were seen taken. On other occasions an occasional shotgun blast could be heard off in the distance. Not all whaling crews had shotguns in camps. Those that did might take an occasional shot at some close flying ducks but the instances were not common. Undoubtedly some birds were taken during the whaling season but the number would appear to be very small. Goose hunting inland in the latter part of May apparently attracted a few whalers.

After the whaling season is concluded, the hunters switch their attention to seal hunting. Again a few ducks may be taken but if sealing is good, it will receive the majority of the hunters time. Without exception all seal hunters interviewed were equipped with at least one shotgun in camp and usually more. Passing ducks are more likely to be shot at during seal hunting than during whaling as the whaling crews discourage any unnecessary noise in camp, so as not to scare whales away. Also, the migrating ducks are more accessible during seal hunting. Several sealing crews interviewed were found to have recently-shot ducks in their possession and remains of ducks already consumed were observed in the camps.

The southward migration of waterfowl past Barrow should lend itself better to censusing. The eider are reported to fly along the northern coast of Alaska hugging the shore line until reaching the sand spit that extends from the mainland toward the point. Here they cross the spit and head south along the coast and are readily counted (Thompson and Person, 1962).

The natives of Barrow village set up tents on the spit to take part in the traditional fall duck hunt. Permanent drying racks and tent sites have been established for this annual affair. Hunter interviews and bag checks are planned for this time. Observations are planned to begin July 10 and continue until September 15.

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