# ALASKA DEPARTMENT OF FISH AND GAME
## JUNEAU, ALASKA

STATE OF ALASKA
Walter J. Hickel, Governor

DEPARTMENT OF FISH AND GAME
Augie Reetz, Commissioner

DIVISION OF GAME
Joseph C. Greenley, Director

# MOOSE REPORT

by

Richard Bishop

Volume X
Annual Project Segment Report
Federal Aid in Wildlife Restoration
Project W-15-R-3, Work Plan K



(Printed January, 1969)

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PROJECT NO.: W-15-R-3 TITLE: Big Game Investigations

WORK PLAN: K TITLE: Moose

JOB NO.: 1,2,3,4,5,6,7

PERIOD COVERED: January 1, 1968 to June 30, 1968


ABSTRACT

Publications

Compilation and data analysis continued with the assistance of Mr. Sam Harbo, biometrician.

Harvest

The reported moose harvest in 1967 was 4856 males, 993 females and 73 sex unknown moose for a total of 5,922, about 1,100 fewer than in 1966. Of nearly 32,000 harvest tickets issued, 27 percent did not hunt. Of about 20,000 who reported hunting, 29 percent were successful. The lower harvest is probably due to the cancallation of antlerless seasons in southcentral Alaska in response to public opinion and to a major flood in Interior Alaska.

Highway vehicles were shown to be the most widely used conveyance in reaching hunting areas. Tracked vehicles, boats and airplanes were of varying importance depending upon access in a particular game management unit, its proximity to a major population center, and probably upon the economic welfare of residents in an area.

The success of hunters using specialized equipment was consistently higher than that of those without specialized equipment. The reported use of snow machines contributed little to the harvest. Data on residence of hunter: transportation used suggests a strong relationship to the most common means of transport available in the area, but Anchorage hunters seem to use airplanes and off-road vehicles proportionately more than Fairbanks hunters while the reverse is suggested for boats. Reports from Homer indicate that off-road vehicles are the major transportation while in the Kenai-Soldotna area highway vehicles are the major means of transportation. Continued data collection is expected to reveal trends in the relationships between success, transportation,

residence, and chronology. Comparison of voluntarily returned harvest ticket reports with those returned after a reminder letter was received showed that "reminder reports" exceeded voluntary returns in number by over 16 percent, but only 8 percent were successful, compared with 42 percent of those reporting voluntarily.

## Range Inventories

Canopy-coverage analysis of vegetation in exclosures and on control plots in the Matanuska Valley was completed.

## Sex and Age Composition

Slightly lower but good production was found in the Haines area of Unit 1. Slightly improved production was indicated in Unit 5. In Unit 6 the moose population east of the Copper River appears to be expanding rapidly. Although variations exist within Unit 13, the production appears to be generally fair and stable. Production in Unit 14 has remained fair to good. In Unit 15 production is fair on the northern part of the Kenai, and good on the lower portion. Production appears to be improving in central Unit 20 but remains fair.

## Production

Early spring counts in the Matanuska and lower Susitna Valley indicate excellent survival of calves to one year of age. In Unit 20A initial production of calves appeared to be very good.

## Tagging and Movements

Adult tagging in the Matanuska Valley was curtailed due to poor weather and snow conditions. In Unit 20A, 358 calves were tagged on the Tanana Flats in the second year of tagging operations there. Visual and physical recoveries of calves tagged in 1966 have come from the Chena River drainage, the Alaska Range, and the Flats themselves.

## Range - Productivity Relationships

Type mapping, canopy-coverage analysis and the first estimates of browse production and utilization in the Kenai Moose Research Station were completed.

Moose were stocked in two of the enclosures.

# RECOMMENDATIONS

Although the harvest ticket system is very valuable and is providing good harvest data in many Units, it is apparent that

the efficiency and reliability of the system would be enhanced by a vigorous effort to inform the public of the need for and value of the data, which can only be obtained through their co-operation. Such a program would be especially helpful in outlying areas where the harvest ticket is largely ineffective now.

A minimal fee for harvest tickets should reduce the cost of the overall program and increase its efficiency by eliminating casual users of harvest tickets who have no serious intention of hunting, and who contribute considerably to the need for reminder letters and other extra work presently expended with little benefit derived in terms of data obtained. Holders of subsistence licenses could be excepted from the fee to avoid discrimination against people of low income groups.

Harvest tickets are only a part of the greater problem of conveying the concepts involved in moose management to the public effectively. This is a continuing problem, because we are dealing with few absolute data, and it is difficult for people to grasp the connection between several types of population data which are expressed only in relative terms.

The Department, as an agency of State government, should remain responsive to the needs and wishes of the citizenry but at the same time resource management in general needs to be protected from the influences of political considerations and vested interests. The State Constitution and laws relating to the Department of Fish and Game presently do not provide the needed protection. The only good alternative at present is an intensified effort in public education.

WORK PLAN SEGMENT REPORT

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## OBJECTIVES

To obtain and evaluate data on the status of Alaska's moose populations in terms of productivity, trends of abundance, fertility, movements, sex and age compositions, and harvest to guide annual management decisions.

To obtain information on basic relationships of climatology and range, and the physiological response of moose to these environmental components in order to provide a broader base of knowledge for management of the species.

## TECHNIQUES

### Publications

Compilation and analysis of data from specimen collections and aerial count work done in past years was continued.

### Harvest Statistics

The form of the mandatory harvest ticket was revised to provide information on areas hunted unsuccessfully, and means of transportation used by moose hunters. Computer programs were designed and written to provide information on magnitude, sex, and chronology of the harvest as in past years. In addition, programs were written to extract data on success rates, means of transportation used by moose hunters, relationships of residence to Unit hunted, to transportation used, and to success, and the relationship between means of transportation and success.

Age composition of the hunter harvest in several important areas was based on cementum layers in the incisors of moose collected from successful hunters through check stations, field collections, and hunter cooperation.

## Range Inventories

A field crew established plant exclosures in representative vegetative types in two study areas in the Matanuska Valley, Alaska. The first exclosure was erected between the Knik and Matanuska Rivers at T.16N., R.1E., Section 10. The second exclosure was erected near the northwest end of the Willow airstrip at T.19N., R.4W., Section 6. The exclosure near the Knik and Matanuska Rivers was erected during the summer of 1966 and the Willow exclosure was constructed during the fall of 1966. Corner-marked sites lying adjacent to one side of the exclosures are used as controls. A canopy-coverage method of vegetation analysis (Daubenmire, 1959) was used to describe the plant taxons. The only deviation from the method described is found in mosses, where a "strike" method of determining coverage was applied. Legs welded to each corner of the microplot frame were used to determine moss coverage. If one leg struck moss, coverage was determined to be 25%. This technique was repeated adding 25% for each leg striking moss, until a point was reached where all four legs struck moss indicating 100% coverage.

Within the 66' square, one-tenth acre exclosures were placed four fifty-foot north-south lines in a random manner. A similar procedure was followed in the corner-marked sites outside the exclosures, except for the Knik-Matanuska area, where the outside lines are not random, but systematic. Figures 2 and 3 describe the locations of the permanent steel stakes installed at each end of the fifty-foot lines inside and outside each exclosure.

Using the 20x50 cm. frame described in Appendix A, 25 microplots were examined along each line at two-foot intervals, beginning at 0 feet and running to 48 feet. All microplots face the center in both the exclosures and the control plots when read along the 50 foot tape stretched between two posts, except for line 3 in the exclosure at Willow, which had to face away from the center of the exclosure because vegetation analysis crews would have damaged the plants in line 2 by trampling. All microplots were read beginning at the south end of the tape line in the southwest corner of the exclosure of control plot and proceeding northerly. The taxons were assigned a coverage class and recorded. Reading the microplots at five year intervals should evaluate trends in quantity and type of plant taxons available. Examples of plant species found in the two areas were collected, identified, pressed, and placed on file in the Palmer office of the Alaska Department of Fish and Game.

Phillip D. Havens, Game Biologist, assisted by Doug Jones of the Palmer office of the A.D.F.&G. took slides of the exclosures which are presently on file in the Palmer office. A description

of the slides and information regarding camera positioning within the exclosure is found in Table 20. The slides were taken on July 7, 1967.

At each point except those taken from the top of the fence, a stake was driven in the ground and painted orange, to mark it for several years. The camera was placed on a tripod over the stake and adjusted so that the lens would be 24" from the ground. Those pictures taken from the top and 75 feet outside the fence were hand held. The camera was aimed from one corner to the opposite corner, or from the middle of one side to the middle of the opposite side of the exclosure, depending upon the circumstances. No slides were taken of the control area.

Jack Didrickson, Ron Somerville, Jay Bergstrand, Phillip Havens, Doug Jones, Ed Bellringer Jr., Sterling Eide, Greg Bos, Lou Bottcher, Angus Robertson, and John Bury, all A.D.F.&G. employees, were responsible for and participated in the construction of the exclosures and recording and evaluation of the information contained in this report. The assistance rendered by Dr. William Mitchell of the U.S.D.A. in Palmer for help in identifying many of the plant species is gratefully acknowledged.

Method of Vegetation Analysis (abridged from Daubenmire, R.F., 1959. A canopy coverage method of vegetation analysis. Northwest Science 33:43-64).

Objective: To obtain a 2-dimensional evaluation of the influence each plant taxon exerts over the other components of its ecosystem.

Equipment: (1) A frame of 3/16" steel with inside dimensions 20x50 cm, legs about 2 cm long at each corner, and painted to indicate quarters (as in figure) with 2 sides of a square 71x71 mm indicated in one corner; (2) tape, or cord with knots at half meter intervals; (3) stakes for ends of tape; (4) paper ruled to facilitate recording coverage of several dozen taxa in no more than 50 plots.

Method of recording data: Consider all individuals of one taxon in the plot as a unit, ignoring for the moment all other kinds of plants. Imagine a line drawn about the leaf tips of the undisturbed canopies (ignoring inflorescences) and project these polygonal images onto the ground. This projection is considered "canopy-coverage." Decide which of the classes (see table) the canopy coverage of the taxon falls into, and record this value. Then consider the remaining taxa in turn. (see example in figure) The painted design of the frame provides visual reference areas equal to 5, 25, 50, 75, and 95% of the plot area. Note that a plant does not have to be rooted in the plot to have coverage over it,

and accidents of foliage dispersal within the projected canopy outline are ignored.

| COVERAGE-CLASS | RANGE OF COVERAGE | MIDPOINT OF RANGE |
|---|---|---|
| 1 | 0-5% | 2.5% |
| 2 | 5-25 | 15 |
| 3 | 25-50 | 37.5 |
| 4 | 50-75 | 62.5 |
| 5 | 75-95 | 85 |
| 6 | 95-100 | 97.5 |

Method of calculation: If 50 plots have been examined in one stand and Poa ampla was found in 5 of them, the classes recorded in the field being: 1, 6, 6, 3, and 4, then in the laboratory: Add together 2.5 + 97.5 + 37.5 + 62.5 + 297.5 +97.5 and divide by the number of plots examined (50) to get average coverage (5.9) for the total area sampled (50 x 1/10m = $5m^2$), which may be considered an estimate of average coverage for the stand as a whole.

Miscellaneous notes: The series of plots should fall in an area of maximum vegetation homogeneity, and should trend along the contour rather than cross it so as to stay within one soil type. Closely reproducible results are usually obtained with 40-50 plots. Single plots or groups of plots may be randomized as desired, or a completely systematic system of sampling may be used. Some competent statisticians have stated that biometric tests for adequacy of sampling are valid for either of these sampling procedures. Each plant should be evaluated at a time approximating its period of maximum annual leaf spread, and if the phenologies of the plants are staggered over the season, the series of plots must be tallied twice or more each time recording only those plants that are near their prime. The method is applicable to most vegetation not exceeding about 1m in height. The tiny annuals it sometimes helps to estimate the numbers of individuals that would be required to fill 5% of the frame (the 71 x 71 mm area), then a quick estimate of the numbers of individuals in each frame provides an answer as to whether the aggregate coverage falls in Class 1 or 2.

## Sex and Age Composition

The aerial sex and age composition count techniques presently used have been described in detail in past annual segment reports (Rausch, 1966, 1967, 1968). Counts were made in most of the established count areas, and some new areas of increasing importance were added.

The square-mile census of the Matanuska Valley (Rausch 1966, 1967) was attempted but was unsuccessful due to foul weather and loss of snow cover.

A stratified random block census similar in design to that used in the Matanuska Valley and on the Kenai Peninsula was planned for the Yakutat area in March, 1968 but lack of snow precluded doing the work. A strip or transect count analogous to that done in 1964 was substituted in an effort to obtain some indication of population size. The U.S. Forest Service provided most of the aircraft charter, personnel, and reported on the survey. Loyal Johnson and Wayne Fleek, A.D.F.&G., assisted. The techniques and findings presented here were abstracted from the report written by M. M. Perensovich, Wildlife Biologist, North Tongass Forest, U.S. Forest Service, Juneau, with discussion added by Loyal Johnson and R. H. Bishop, A.D.F.&G.

Parallel transects about 0.5 miles wide and lying between the ocean beach and the foothills were examined using a Cessna 180 aircraft with two observers and a PA18-150 with a pilot observer and one observer. U.S.F.S. observers were M. M. Perensovich Jr., Jim Page and Okla Duffle. Johnson and Fleek from the A.D.F.&G. assisted. The area was divided into eight counting units. Moose were counted but not classified with respect to sex and age. Snow cover was less than 1 foot in depth and was not continuous. Foul weather delayed completion of the count; from April 10 to April 23 was required to complete it.

## Production

Aerial composition counts were made between mid-May and mid-June in the Matanuska and Susitna Valleys and on the Tanana Flats. The counting technique is similar to that used for sex and age composition, but cows must be examined more closely to detect newborn calves, and because animals one year old can be confused with older animals at times.

No attempt was made to re-examine the progression of calving by daily counts over an extended period in either area this year.

Areas where calves had been tagged on the Tanana Flats in 1968 were re-counted after tagging to obtain estimates of calf production.

## Tagging and Movements

Adult moose were marked with ear tags and streamers and collars in the Matanuska Valley. The immobilization and marking techniques were described in past annual segment reports (Rausch 1967, 1968). Poor snow conditions hampered the operation during the current period.

Calves were marked with ear tags and streamers on the Tanana Flats from May 26, 1968 through May 31, 1968, using commercial Helicopters, and military helicopters through the cooperation of the U.S. Army, Fort Wainwright.

The first calf tagging program in Alaska was begun in 1960 in the Matanuska-Susitna Valley. Because it has been several years since the techniques have been described in detail, they will be included here.

General: A PA18-150 Supercub with pilot and observer is used to spot cows with calves. The location of the moose is radioed to the helicopter carrying the tagging crew. The Supercub then goes on to find another calf. The helicopter finds the cow and calf and hazes the cow away, then lets the tagging crew off to catch the calf. While the taggers are on the ground the helicopter keeps the militant cow away.

A numbered monel metal cattle ear tag is placed on the anterior edge of, and midway from the base to the tip of the ear of the calf. The metal tag is used to hold a brightly colored streamer in place and in addition to provide a numerical identification for the individual calf. Streamers are color-coded to area, and sex of the calf is indicated by which ear has a streamer (left=♂, right=♀). In the case of twins a second streamer of another color designating twins is attached to the second ear. Tag numbers, sex, streamer color and ear (left or right), approximate age, and other observations are recorded on a 4" x 6" card form by one of the taggers. The calf is then released. Streamer size is 9"x3".

Crews consist of two to three men; one tags the calves, the other carries a rifle for protection if the cow should get past the helicopter and charge; he also records if a third man is not present.

Aircraft: Helicopters carrying the tagging crews in the past have included H-21 and HU1A through military cooperation, Hiller 12E-4, and Hiller 12E. Spotting aircraft are generally PA-18 150 Supercubs, but L-19 fixed wing military aircraft and a light military helicopter have been used. Radio communication between spotter and tagging aircraft must be working for the spotter to be effective.

Tagging equipment: The metal ear tags used are #49 Hasco monel metal cattle ear tags made by National Band and Tag Co., Newport, Kentucky. Tagging pliers are available from the same company. The streamer material is 3" wide, plastic-impregnated nylon called Saflag, available from Safety Flag Co. of America, P.O. Box 1005, Pawtucket, Rhode Island, in a variety of colors.

Tennis shoes seem to be the most suitable footwear. Fluorescent vests or similar outfits help the helicopter pilot keep track of the taggers' position with respect to the cow.

Success of the operation depends upon the ability of the helicopter pilots to quickly learn how to maneuver the cow away from the calf and place the tagging crew on the ground.

## Range Productivity Relationships

Aside from the major continuing work of fence construction, two technical aspects of the work at the enclosures of the Kenai Moose Research Station were continued during this period; vegetation studies and stocking of enclosures No. 1 and 2 with moose.

Procedures for data collection and analysis, vegetation studies:

1. Successional and Plant Ecological Studies

Permanent successional study plots are to be established in each vegetation type that supports a winter food source for moose. The objective is to measure changes which may occur in the plant communities and to obtain an array of internal stand variations within and between major types.

A. Methods and Measurements

For successional studies it is desireable to use a method of sampling the vegetation which is applicable to all types and all stages of plant succession.

Generally a larger plot is required to measure mature trees than is required to measure tree reproduction or shrubs and herbs. It was found by experimentation in the field that plots 66' x 99' (3/20 acre) are an adequate size for determining the density of mature trees. This is an area at which a further increase in size does not add significantly to the accuracy and precision of the data to be gathered. In long term successional studies of this nature it is necessary to measure changes that may take place in the stands which are presently mature and also to be prepared to measure the regrowth stands as they become mature.

Efficient sampling of the smaller forms of vegetation is normally accomplished on smaller plots. Cover and density are the two parameters with the greatest significance. Lindsey (1956) found that canopy coverage "is the most important single parameter of a species in its community relations."

The literature also revealed "A Canopy-Coverage Method of Vegetational Analysis" by Daubenmire (1959) which was evaluated and modified for this study (see Range Inventories).

Microplots 20 x 50 centimeters are used to measure the cover value of each species of plant and the density of tree reproduction within the larger macroplot.

It was determined that fifty microplots would provide data with consistent reliability. This figure was doubled to one hundred in order to insure that different types or different stages of succession than those in the original design would be sampled with the same reliability.

Cover is defined as the percentage of the total area covered by the vertical projection of a polygon drawn about the extremities of the canopy of each plant. The overlapping portions of canopies of plants of the same species with the same stature in the stand are not additive. In the case where plants of the same species have different stature in the stand such as an overstory of mature trees (browse not available to moose) with an understory of reproduction (available browse) they are recorded separately.

Density is simply the number of stems per unit area. When reading the plots a stem is recorded if it occurs on the plot at the surface of the ground cover. No further attempt should be made to determine if a particular stem is only a part of multi-stemmed plant such as willow.

B. Field Procedure

1. Reconnaissance

Each stand should be examined and a species list made. An estimate of the canopy coverage should be recorded for each species. Notes should be taken on surface features, topography, and soils.

2. Location of Plots

Plots within each specific type should be located subjectively after a reconnaissance of the various stands within each type has been made. Within the plot boundaries the vegetation, topography, soil and other surface features should be relatively homogenous.

3. Plot layout and marking

Lay out the plots with a staff compass and metalic tape. The macroplots are 99 x 66 feet.

Mark the four corners of the plot and both ends of the two microplot lines with iron stakes (1/2" x 33" reinforcing rod driven halfway into the ground).

The above ground portion of the stakes should be painted bright orange or a piece of orange plastic flagging should be tied around the stake near the top.

Bright orange flagging tied high on a spruce stem near each permanent stake will increase the speed at which the plots can be found in the future.

Mark the "zero" end of the two microplot lines with a metal tag with the plot number and line number on it.

The plots are numbered consecutively as they are established and read. Line numbers are one and two for each plot and recorded as such on the data sheets.

Record the plot location and number on the type map. Plots which are not true north-south or east-west should have their true bearings recorded on the map.

4. Reading the Plots and Recording the Data

When the microplots are to be read a metalic tape is stretched between the two stakes on the line. The tape should be straight and close to the ground.

The first time each microplot line is laid out small iron stakes 1/4" x 12" should be driven 2/3 of the way into the ground at the 33 and 66 foot marks along the tape. This will help to speed up the tape layout when the plots are read again.

The fifty microplots are spaced at two foot intervals along the tape. The corner of the first microplot is at zero on the tape (the line stake with a numbered tag on it). The microplots are placed along the tape and toward the center of the macroplot.

For each microplot the cover value of each species of plant, dead material, rocks and exposed soil is recorded. The number of stems of spruce, birch, aspen, and willow is also recorded.

One digit numbers 1 through 6 are used in recording the corresponding cover values of 0-5%, 5-25%, 25-50%, 50-75%, 75-95%, and 95-100% respectively.

A separate cover value will be read for trees which are so tall that their crowns cannot be reached by moose (at the present time this means mature trees).

One form will be used for each line of 50 microplots.

The back of the form should be used to record a sketch of the plot indicating its direction, the zero end, and number of each line.

Record the number of mature stems by species, percent slope and aspect, information on soils and other pertinent data.

5. Number of Plots

Establish at least five plots in each major type in each pen. More plots should be established if there is a great variation within a particular type. Establish at least one reference plot in each type in exclosures (protected from moose at all times).

Establish at least one reference plot in each of the same types outside the pens (subject to "normal" moose use).

C. Data Analysis

The data will be summarized for each plot and tabulated by type. A list of species present, percent cover, frequency, and density are easily obtainable from the data sheets. Comparison can be made between stands, types, and years.

Whenever these data are analyzed statistically and written up or published it must be noted that the plots were located subjectively rather than randomly.

D. Time of Data Collection

The plants should be at same stage of annual growth each time the plots are read. The month of July is probably the best time to read them.

## II. Available Browse, Production, and Utilization Studies

The objectives of this portion of the study are to determine the total amount of winter browse available each fall; the annual production of winter browse, and the utilization of browse during the winter.

### A. Methods and Measurements

Generally browse sampling methods involve clipping and weighing or ocular estimating or a combination of both. In this study clipping the entire number of plots necessary for a reliable sample in each of the seven browse types would be time consuming and expensive; destructive to the habitat; and increase the difficulty of obtaining a representative sample over a period of years. Ocular estimating or a combination of clipping and ocular estimating would be open to serious question in a long-term detailed study of this type where there will no doubt be changes in personnel.

The following is a method which insures consistently reliable data to be readily taken on permanently established plots by personnel with a minimum of training. Stems are categorized by diameter and height; each type is randomly sampled to determine the number of stems in each category; a second separate and much smaller random sample is made to determine the average weight of the stems in each particular category. These average weight values are then applied to the plot data to determine the pounds of browse for each type.

Stem diameters are measured in quarter inch increments (0 - 1/4 = 1/4"; 1/4 - 1/2 = 1/2"; 1/2 - 3/4 = 3/4"; etc. at one foot above ground, and heights are measured in increments of one foot (1 - 2 = 2'; 2 - 3 = 3', etc.). Stems shorter than one foot are not measured. Examples of the categories are: 2' x 1/2"; 3' x 1/4"; 2' x 1/2"; 3' x 1/2"; 4' x 1/2"; 3' x 3/4", etc.

Preliminary study indicated a plot eight by twenty-four feet (192 sq. ft. or 1/227 acre) would be the proper size and shape for adequate and efficient sampling. The exact size of the plot is directly related to the method of obtaining weight values for the browse species. More precise measurements can be taken in the field when a gram scale is used. In this case one-half the weight in grams of browse on a plot equals the pounds per acre of browse on that plot.

In order to determine the average weight (and the standard error) of available browse and annual growth for each category, plants are randomly selected in each category for measuring. The stems and branches one-half inch and smaller in each plant are removed (clipped) and weighed. The linear annual growth is then removed (clipped) and weighed. These are the values used in determining total available browse and browse production. The one-half inch diameter criterion was determined by observations of weedy plants in areas where moose have been hard pressed for food.

B. Random Sampling Procedure

Grid lines two-tenths of an inch apart are drawn on the type maps which have a scale of 1" = 310 feet. The grid lines are then numbered on both the x and the y axes.

The random location of plots is accomplished by drawing two numbers (one from x and one for y) for each plot from a random numbers table.

Thirty-five points are drawn for each of the seven important browse types.

The coordinate point for the first pair of numbers is located on the map and the plot is drawn in from that point south (true bearing) 24 feet. The second pair of coordinates is drawn from the table and located on the map. This second plot runs east 24 feet from the point. The plots are alternately located north-south and east-west as they are drawn from the table.

Every seventh point drawn for each type is marked with an x on the map. These points will be used to obtain samples for clipping. When 35 points have been located in a specific type any additional points falling in that type are ignored and the drawing continues until all the types have 35 points.

The plot locations are then transferred to aerial photographs and maps for field use.

C. Field Procedure - Permanent Plots

1. Establishing and Marking the Plots

To establish a plot for the first reading the point on the photograph is located on the ground. From this point the tape is run 24 feet by compass bearing

south or east, whichever the case may be, for 24 feet. At that point an iron stake (1/2" x 33" reinforcing rod) is driven into the ground and the tape is run another 24 feet and the second stake is driven into the ground. This procedure should eliminate personal bias in establishing the plots.

Blue plastic flagging is placed on mature trees or on spruce reproduction near the stakes in order to speed locating the plots the next time they are read.

2. Reading the Plots and Recording the Data

The tape stretched straight between the two stakes serves as the center line of the 8' x 24' plot.

The 4 foot measuring sticks are placed perpendicular to and on one side of the tape. These are used to indicate the edge of the plot and to keep track of the area as the plants are measured.

On each plant the height is measured with a 6 foot pole marked in feet. Plants shorter than 1 foot are not included in the sample. Plants 1 foot to 2 feet are called 2 feet; plants 2 feet to 3 feet are called 3 feet, etc.

The diameter of each plant is measured at 1 foot above ground in increments of 1/4 inch. Zero to 1/4 inch is called 1/4; 1/4 to 1/2 inch is called 1/2; etc. A go and no-go gage is used.

Birch is the most common species; therefore, it is not specifically identified on the form. Other browse species are tallied in the same space and marked with an identifying letter so that the various species can be analyzed separately. Aspen will be marked with an A, willow with a W, viburnum with a V, dwarf birch with an N, cottonwood with a C, and alder with an AL.

First one-half of the plot is read by moving the 4 foot sticks then the other half is read. Care must be used not to damage the plants in the plot.

The plots are numbered in sequence as they are established. A metal plot number tag is wired to one of the permanent stakes. The plot number is recorded on the map.

3. Number of Plots

Thirty plots will be established in each type initially. This number may be increased or decreased after fall and spring measurements have been made and the data has been analyzed.

One reference plot should be established in each type in exclosures and outside the pens.

D. Field Procedure - Clipping Data

The points are located in the field from aerial photographs. When a point is located three plants in each category are cut in the ground line. The diameter and height are marked on their bases and the three plants are tied together.

When samples have been obtained for all the categories represented at the particular location the plants are taken to a laboratory.

E. Laboratory Procedure - Clipping Data

Each plant is handled individually in the laboratory. First the dead material is removed. Then all the living material 1/2 inch in diameter and smaller is removed and weighed to the nearest gram.

The material from one stem in each category from each area is placed in paper bags marked with the location and green weight (the annual growth is kept separate from the other portion of the total). These samples will be used to determine oven dry weight.

F. Data Analysis

The clipping data will be analyzed statistically to determine the mean and the standard error of the mean for each category.

These mean values will then be applied to the plot data in order to determine the mean of the browse per acre in each type.

Utilization will be determined by subtracting the weight of the remaining browse on each plot in the spring from the available browse measured on each plot the previous fall.

The minimum requirement for the final analysis is 75 percent of the mean. These criteria will be used only for birch reproduction. The other browse species are so sparse that it is neither necessary nor worthwhile to obtain a valid statistical sample of them.

G. Time of Data Collection

Fall measurements to determine available browse and production (annual growth) should be made during the first 2 weeks of October.

Spring measurements to determine utilization should be made the last 2 weeks of April.

III. Supporting Procedures

a) Permanent photographic points will be established at each of the successional study plots. These will help evaluate the studies. Plot line stakes will be used as photographic points. Initially one black and white photograph and one color transparency should be made of each line. These should be taken in July, October, and April in order to record the greatest degree of plant growth and browsing. This should be done in an orderly and efficient manner under proper conditions. It would not be efficient to have two crews reading the plots try to take the photographs at the same time.

b) Weather Data

Weather recording instruments will be set up in the pen area by the Alaska Department of Fish and Game as part of the overall project. Snow depth, percipitation, daily maximum temperatures, and wind velocity will be recorded and analyzed.

c) Soil Surveys and Compaction Tests

A soil survey was conducted prior to stocking of the pens and a soil map prepared. This will help interpret vegetative changes occurring during the study. Soil compaction tests will be taken at yearly intervals.

d) Voucher Collections

Collections will be made of each species found in the area (even for common items such as blue huckleberry and ground dogwood; these two for example, commonly include two species and hybrids in South Coastal Alaska).

Specimens should be in flower and preferably possess some relatively mature fruit, and be accompanied by notation of date of collection, location, and type found in.

### Stocking of Moose Enclosures

Through the natural movements of moose in the area both enclosures 1 and 2 contained moose by January and February when stocking was planned. The gates, which had been open, were closed when aerial counts indicated about the desired number were in the enclosures. The enclosed moose were shot with a dart syringe from a helicopter to capture them for marking, removing a tooth, collecting a blood sample, and in some cases, palpating. Palmer 32 ga. shotguns with an insert designed for 22 cal. blank charges were used to fire the Palmer Cap-chur darts. For adults, 23.5mg of succinylcholine chloride was used; for calves 16mg was used. Ear tags and streamers and numbered, color coded collars similar to those used in the Matanuska Valley (see Tagging and Movements) were placed on the captured moose to provide individual identification. Excess moose in enclosure 2 were herded out or collected to obtain specimens reflecting age, parasite load, body condition and reproductive condition.

## Winter Browse Preference

This job is being reported upon by the Alaska Cooperative Wildlife Research Unit.

# FINDINGS

## Publications

Analysis of the volume of past data for inclusion in a comprehensive review of moose research and management is continuing with the assistance of Mr. Sam Harbo, University of Alaska Biometrician. Results are not yet available.

## Harvest

### Issuance and Return

The general statistics on moose harvest ticket distribution and recovery for 1967 and 1966 are summarized in Table 1. The number of tickets issued in 1967 was essentially the same as in 1966. The percentage recovered declined slightly although the number recovered remained essentially the same. During the period 1963 through 1965, 90 percent of the tickets or more were recovered annually. The current decline is related to the elimination of a second reminder letter after 1965 when it was decided that the second letter was too expensive considering the data it secured.

The overall analysis of ticket returns is shown in the second part of Table 1. The decline in the harvest and the success rate is readily accounted for by the closure of antlerless seasons in Units 14, 15 and 16 in response to public sentiment. Lesser contributing factors were the preoccupation of Fairbanks hunters with rehabilitating their property after the August 14th flood, the distribution of moose in parts of the Interior and access to the moose, which were also adversely affected by the flood, and apathy toward the use of harvest tickets in outlying areas.

The summary shows that 27 percent of those who returned reports did not hunt. Although this proportion varies from year to year, generally one-fifth or better of those who obtain the free moose harvest tickets do not use them. Most of that group probably have no serious intentions of hunting, but obtain a harvest ticket just in case they happen upon a moose. The cost of issuing and processing these reports are the same as for the reports turned in by hunters who do hunt.

The harvest ticket report offers the hunter the choice of indicating that he "did hunt" or "did not hunt". The term "hunt" is used in the very broadest sense, and an individual who drove along the highway one evening during the moose season hoping to see a moose is perhaps as likely to reply that he hunted as an individual who spent several days hunting in the bush. It seems likely that the "unsuccessful" group contains a substantial number of the former type of hunter, who actually does little or no hunting. There may also be some bias for hunters indicating they hunted when they actually did not (McDonald & Dillman, 1968), perhaps for reasons of personal prestige. The total of "did not hunt", "unsuccessful" (who hunted little or none), and "no information" reports may represent 35 to 50 percent of the total issuance. A corresponding proportion of the cost of the harvest ticket program is expended for data which at best is of neutral value, and at worst misleading, as in the example where the individual out for an evening drive on the highway indicated he hunted moose. It may be that a study to determine the nature of the hunting done by those who reported hunting unsuccessfully should be devised in order to evaluate their responses. On the other hand a simple expedient to reduce the number of "incidental" reports of little value which are issued, returned and compiled would be to charge one or two dollars for the moose harvest ticket, except to those people holding 25-cent licenses. The subsequent decline in issuance and return would presumably be due to fewer people obtaining harvest tickets simply because they were free. The efficiency of reporting would surely be aided also, since most of the late returns are "unsuccessful", "did not hunt", and "no information" reports, which probably are obtained by the casual or incidental hunter. The fee would not be large enough to discourage any hunter entertaining any serious idea of hunting moose.

Table 1. Summary of moose harvest ticket program, 1966 and 1967.

| | 1966 | | 1967 | |
|---|---|---|---|---|
| ISSUANCE & RETURN | NO. | %* | NO. | %* |
| Tickets issued | 31,549 | 100 | 31,941 | 100 |
| Ticket reports returned | 28,210 | 89.4 | 27,921 | 87 |
| Ticket reports outstanding | 3,339 | 10.6 | 3,841 | 12 |
| Could not contact | 637 | 2.0 | --- | --- |
| No response to reminder letter | 2,702 | 8.5 | --- | --- |

* Percentages for issuance and return based on tickets issued.

| ANALYSIS OF RETURNS | NO. | %** | NO. | %** |
|---|---|---|---|---|
| Successful hunters | 7,048 | 32.2 | 5,922 | 29 |
| Antlered kill | 5,450 | --- | 4,856 | --- |
| Antlerless kill | 1,444 | --- | 993 | --- |
| Sex unknown kill | 154 | --- | 73 | --- |
| Unsuccessful hunters | 14,791 | 67.8 | 14,160 | 71 |
| Did not hunt | 6,371 | 20.1 | 7,539 | 27 |
| Total, unsuccessful and did not hunt | 21,162 | 75.0 | 21,699 | 78 |
| No information | --- | --- | 300 | 1 |

** Percentages: For successful and unsuccessful based on number who hunted; for did not hunt and total of unsuccessful and did not hunt, based on reports returned.

## Harvest Ticket Report Data

The harvest ticket program was initiated primarily to provide accurate measure of the harvest. The potential for obtaining additional data about the harvest was apparent. The harvest ticket report design has been modified and refined to provide data on chronology of the harvest, success and means of transportation used (Fig. 1). These data when related to the hunter's residence recorded on the overlay (Fig. 1) provide the means of answering many growing questions about the characteristics of moose hunting in Alaska. The information sought through the harvest ticket reports included: harvest, chronology of the harvest, successfulness of hunters, relationships of residence and transportation used, relationship of residence and Unit hunted, and successfulness of those hunters reporting voluntarily versus those reporting after receiving a reminder letter.

## Harvest

The harvest is recorded for the State, for each Unit, and in many Units for sub-units and smaller divisions referred to as areas or drainages. Table 2 shows the 1967 harvest in all sub-units and Units corrently recognized. "Unit 27" is an accumulation of kills for which no Unit was designated by the hunters. Table 3 summarizes the harvest by Unit for each year since the inception of the harvest ticket system in 1963. In most Units the harvest has remained essentially stable although fluctuations of minor magnitude have occurred. In Units 14 and 15 where the harvest dropped considerably in 1966 and 1967, the major cause was the timing of antlerless seasons, which were held in late September before moose had moved to the lowland wintering grounds in 1966, and the cancellation of antlerless seasons in all of Southcentral Alaska in response to public pressure in 1967. In Unit 7 residents have demanded successively more restrictive regulations for several years although the winter browse in much of the area is very heavily utilized, which suggest a maximal population. The harvest in Unit 16 reflects the influence of seasons in adjacent Units. With the restriction of antlerless seasons in Units 14 and 15 in 1966, the Unit 16 harvest increased considerably, although not dangerously. In 1967 the antlerless season was cancelled in Unit 16 and the harvest fell.

In outlying Units (17, 19, 21 to 26) some Unit harvests have remained stable, but more show a decline. From aerial survey work and casual observation the moose populations in most of these Units are known to be at least sufficient to sustain a much higher harvest, and in some cases the populations are high. It is also known that the harvest ticket reports are not widely used in many of the outlying areas nor has their use been encouraged actively enough by the Department. For this reason the reported kill has dwindled as

# MOOSE HARVEST TICKET 1968 No. A 48106

**NON-TRANSFERABLE**

**Name** _____
PLEASE PRINT CLEARLY

**Mailing Address** _____

**City** _____ **State** _____

**Resident** ☐ **Non-Resident** ☐ **Zip** _____

**Date Issued:** _____, 1968 **License No.** _____

## VENDOR:

**WRITE NUMBER OF THIS TICKET ON BACK OF APPLICANT'S LICENSE.**

**Detach and Mail to Alaska Dept. of Fish and Game**
**(1018 International Airport Road, Anchorage, Alaska 99502)**

**1968 No. A 48106**

**NON-TRANSFERABLE**

## MOOSE HUNTING REPORT

- _____
HUNTER'S NAME (PRINT)
- **HUNTED MOOSE** ☐ **YES** ☐ **NO**
- **SPECIFY LOCALITY** _____
- **MOOSE KILLED** ☐ **YES** ☐ **NO**
- **SEX OF KILL** ☐ **MALE** ☐ **FEMALE**
- **KILLED IN GAME MGMT UNIT** _____
- **DATE KILLED** ___/___/1968
MO. DAY
- **METHOD OF TRANSPORT**

| | |
|---|---|
| 1 ☐ HIGHWAY VEHICLE | 5 ☐ AIRPLANE |
| 2 ☐ BOAT | 6 ☐ SNOW MACHINE |
| 3 ☐ TOTE GOAT | 7 ☐ OFF ROAD VEHICLE |
| 4 ☐ HORSE | 8 ☐ AFOOT |

**THIS REPORT MUST BE FILLED OUT AND MAILED WITHIN 15 DAYS IF YOU KILL A MOOSE, OR WITHIN 30 DAYS AFTER CLOSE OF SEASON IF YOU DID NOT HUNT, OR HUNTED BUT WERE UNSUCCESSFUL.**

Fig 1. Moose harvest ticket, overlay (top) and report (below). 1967 and 1968 format are the same.

Table 2. Moose Harvest in Sub-units of Game Management Units 1-26, 1967.

| Unit | Sub-unit | Code | Description | Harvest ♂ | ♂* | Total ♂ | ♀ | ♀* | Total ♀ | No Sex | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | A | 01 | Unuk, Stikine, Muddy | 36 | | | 1 | | | 1 | 38 |
| 1 | B | 02 | Taku-Berner's Bay | 47 | | | 0 | | | 1 | 48 |
| 1 | C | 03 | Haines Drainages | 90 | | | 47 | | | 0 | 137 |
| 1 | | (Total) | | 174 | | | 48 | | | 2 | 224 |
| 5 | A | 01 | (See Fig. 9) Yakutat, Situk | 76 | | | 46 | | | 1 | 123 |
| 5 | B | 02 | Ahrnklin, Seal, Antlen | 3 | | | 2 | | | 0 | 5 |
| 5 | C | 03 | Dangerous R.Area | 14 | | | 18 | | | 0 | 32 |
| 5 | D | 04 | Harlequin L. | 5 | | | 5 | | | 0 | 10 |
| 5 | E | 05 | Italio R. | 5 | | | 12 | | | 0 | 17 |
| 5 | F | 06 | Akwe R. | 10 | | | 3 | | | 0 | 13 |
| 5 | G | 07 | Ustay R. - Square L. | 5 | | | 3 | | | 0 | 8 |

* Indicates second moose, legal in Units 9, 19, 21, 24, and 25.

Table 2. Moose Harvest in Sub-units of Game Management Units 1-26, 1967 (cont.).

| Unit | Sub-unit | Code | Description | Harvest ♂ | ♂* | Total ♂ | ♀ | ♀* | Total ♀ | No Sex | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 5 | H | 08 | Tanis Mesa | 9 | | | 3 | | | 0 | 12 |
| 5 | I | 09 | Dry Bay-Alsek R. | 20 | | | 14 | | | 0 | 34 |
| 5 | Unknown | 10 | Exact Location Unknown | 4 | | | 2 | | | 0 | 6 |
| 5 | Unknown | 11 | Exact Location Unknown | 3 | | | 0 | | | 0 | 3 |
| 5 | | (Total) | | 154 | | | 108 | | | 1 | 263 |
| 6 | | (Total) | | 37 | | | 0 | | | 0 | 37 |
| 7 | | 01 | (See Fig. 10) Portage, 20 Mi.R. Ingram Cr. | 13 | | | 0 | | | 0 | 13 |
| 7 | | 02 | Hope, Silvertip, Quartz Cr. | 27 | | | 0 | | | 0 | 27 |
| 7 | | 03 | Resurrection Cr. Kenai L. Western U. 7 | 40 | | | 0 | | | 1 | 41 |
| 7 | | 04 | Seward-Kenai L. | 21 | | | 1 | | | 0 | 22 |

Table 2. Moose Harvest in Sub-units of Game Management Units 1-26, 1967 (cont.)

| Unit | Sub-unit | Code | Description | Harvest | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | ♂ | ♂* | Total ♂ | ♀ | ♀* | Total ♀ | No Sex | Total |
| 7 | | 05 | Eastern Unit 7 | 9 | | | 0 | | | 0 | 9 |
| 7 | | 10 | Area Unknown | 13 | | | 0 | | | 0 | 13 |
| 7 | | (Total) | | 123 | | | 1 | | | 1 | 124 |
| 9 | | 01 | L. Clark-Chulitna R. | 9 | 1 | 10 | 2 | 0 | 2 | 0 | 12 |
| 9 | | 02 | Iliamna L.-Kvichak R. | 18 | 1 | 19 | 2 | 1 | 3 | 0 | 22 |
| 9 | | 03 | Open | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| 9 | | 04 | Tuxedni Bay-Crescent R. | 4 | 0 | 4 | 2 | 0 | 2 | 1 | 7 |
| 9 | | 05 | Chinitna Bay-Point | 3 | 1 | 4 | 1 | 0 | 1 | 0 | 5 |
| 9 | | 06 | Kamishak Bay | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 |
| 9 | | 07 | Alagnak-Kakakluk | 3 | 0 | 3 | 0 | 0 | 0 | 0 | 3 |
| 9 | | 09 | Naknek Area | 24 | 0 | 24 | 16 | 0 | 16 | 0 | 40 |
| 9 | | 10 | Unknown Area | 30 | 0 | 30 | 9 | 0 | 9 | 1 | 40 |

Table 2. Moose Harvest in Sub-units of Game Management Units 1-26, 1967 (cont.).

| Unit | Sub-unit | Code | Description | Harvest ♂ | ♂* | Total ♂ | ♀ | ♀* | Total ♀ | No Sex | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 9 | | 14 | King Salmon R. | 19 | 2 | 21 | 1 | 0 | 1 | 1 | 23 |
| 9 | | 15 | Becharof L. | 11 | 0 | 11 | 1 | 0 | 1 | 0 | 12 |
| 9 | | 16 | Ugashik L.-R. | 41 | 5 | 46 | 5 | 0 | 5 | 1 | 52 |
| 9 | | 21 | Dog Salmon R. | 14 | 1 | 15 | 0 | 0 | 0 | 3 | 18 |
| 9 | | 22 | Wide Bay | 3 | 1 | 4 | 0 | 0 | 0 | 0 | 4 |
| 9 | | 23 | Mother Goose | 29 | 5 | 34 | 10 | 1 | 11 | 0 | 45 |
| 9 | | 24 | Cinder | 9 | 5 | 14 | 2 | 1 | 3 | 2 | 19 |
| 9 | | 25 | Meshik | 16 | 1 | 17 | 9 | 3 | 12 | 0 | 29 |
| 9 | | 31 | Black L.-Chignik | 19 | 1 | 20 | 1 | 0 | 1 | 0 | 21 |
| 9 | | 32 | Bear L. | 10 | 3 | 13 | 0 | 0 | 0 | 0 | 13 |
| 9 | | 33 | Blueberry Cr. | 1 | 1 | 2 | 0 | 0 | 0 | 0 | 2 |
| 9 | | 34 | Port Moller | 4 | 1 | 5 | 0 | 0 | 0 | 0 | 5 |
| 9 | | 35 | Stepovak Bay | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| 9 | | 36 | Dakavak Bay | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |

Table 2. Moose Harvest in Sub-units of Game Management Units 1-26, 1967 (cont.).

| Unit | Sub-unit | Code | Description | Harvest ♂ | ♂* | Total ♂ | ♀ | ♀* | Total ♀ | No Sex | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 9 | | 40 | Bristol Bay | 2 | 0 | 2 | 0 | 0 | 0 | 0 | 2 |
| 9 | | (Total) | | 272 | 29 | 301 | 62 | 6 | 68 | 9 | 378 |
| 11 | Unknown | | Area Unknown | 97 | | 97 | 65 | | 65 | 2 | 164 |
| 11 | Unknown | 0 | Area Unknown | 1 | | 1 | 0 | | 0 | 0 | 1 |
| 11 | | 01 | Nabesna Rd. | 7 | | 7 | 4 | | 4 | 0 | 11 |
| 11 | | 02 | Slana R. | 3 | | 3 | 1 | | 1 | 0 | 4 |
| 11 | | (Total) | | 108 | | 108 | 70 | | 70 | 2 | 180 |
| 12 | | 01 | North Half General | 41 | | 41 | 4 | | 4 | 1 | 46 |
| 12 | | 02 | South Half General | 76 | | 76 | 34 | | 34 | 3 | 113 |
| 12 | | 03 | Unknown | 1 | | 1 | 0 | | 0 | 0 | 1 |
| 12 | Unknown | 10 | Unknown | 18 | | 18 | 4 | | 4 | 0 | 22 |
| 12 | | (Total) | | 136 | | 136 | 42 | | 42 | 4 | 182 |

Table 2. Moose Harvest in Sub-units of Game Management Units 1-26, 1967 (cont.).

| Unit | Sub-unit | Code | Description | Harvest ♂ | ♂* | Total ♂ | ♀ | ♀* | Total ♀ | No Sex | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 13 | | 01 | Glenn Hwy | 74 | | 74 | 48 | | 48 | 1 | 123 |
| 13 | | 02 | Rich. Hwy | 85 | | 85 | 24 | | 24 | 1 | 110 |
| 13 | | 03 | Denali Hwy | 144 | | 144 | 63 | | 63 | 3 | 210 |
| 13 | | 04 | Tok-Slana | 14 | | 14 | 2 | | 2 | 0 | 16 |
| 13 | | 05 | Edgerton Hwy | 1 | | 1 | 0 | | 0 | 0 | 1 |
| 13 | | 06 | Central U. 13 | 423 | | 423 | 83 | | 83 | 5 | 511 |
| 13 | | 07 | S. of Glenn Hwy | 63 | | 63 | 12 | | 12 | 0 | 75 |
| 13 | | 08 | N. of Denali Hwy | 38 | | 38 | 8 | | 8 | 0 | 46 |
| 13 | | 09 | E. of Rich. Hwy | 221 | | 221 | 57 | | 57 | 3 | 281 |
| 13 | | 10 | Area Unknown | 154 | | 154 | 22 | | 22 | 3 | 179 |
| 13 | | (Total) | | 1217 | | 1217 | 319 | | 319 | 16 | 1552 |
| 14 | A | 01 | Matanuska Valley | 159 | | 159 | 1 | | 1 | 1 | 161 |
| 14 | B | 02 | Anchorage-Knik | 61 | | 61 | 2 | | 2 | 1 | 64 |

Table 2. Moose Harvest in Sub-units of Game Management Units 1-26, 1967 (cont.).

| Unit | Sub-unit | Code | Description | Harvest ♂ | ♂* | Total ♂ | ♀ | ♀* | Total ♀ | No Sex | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 14 | B | 03 | | 55 | | 55 | 0 | | 0 | 1 | 56 |
| 14 | C | 04 | Lower Susitna | 41 | | 41 | 1 | | 1 | 1 | 43 |
| 14 | C | 05 | Lower Susitna | 67 | | 67 | 0 | | 0 | 1 | 68 |
| 14 | C | 06 | Lower Susitna | 53 | | 53 | 0 | | 0 | 3 | 56 |
| 14 | | 10 | Sub-unit Unknown | 46 | | 46 | 0 | | 0 | 1 | 47 |
| 14 | | (Total) | | 482 | | 482 | 4 | | 4 | 9 | 495 |
| 15 | A | 01 | No. of Sterling Hwy | 247 | 0 | 247 | 0 | | 0 | 0 | 247 |
| 15 | B | 02 | Skilak L.-Tustumena L | 69 | 0 | 69 | 0 | | 0 | 1 | 70 |
| 15 | C | 03 | S. of Tustumena L. | 268 | | 268 | 0 | | 0 | 5 | 273 |
| 15 | | 10 | Unknown | 57 | | 57 | 0 | | 0 | 0 | 57 |
| 15 | | (Total) | | 641 | | 641 | 0 | | 0 | 6 | 647 |

Table 2. Moose Harvest in Sub-units of Game Management Units 1-26, 1967 (cont.).

| Unit | Sub-unit | Code | Description | Harvest ♂ | ♂* | Total ♂ | ♀ | ♀* | Total ♀ | No Sex | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 16 | | 01 | Petersville | 50 | | 50 | 0 | | 0 | 0 | 50 |
| 16 | | 02 | Fairview Mt. | 3 | | 3 | 0 | | 0 | 0 | 3 |
| 16 | | 03 | Susitna-Alexander Cr.-Talkeetna | 36 | | 36 | 0 | | 0 | | 36 |
| 16 | | 04 | Yenta-Kichatna | 67 | | 67 | 1 | | 1 | 0 | 68 |
| 16 | | 05 | Rainy Pass Area | 21 | | 21 | 0 | | 0 | 0 | 21 |
| 16 | | 06 | Tlikakila R. | 1 | | 1 | 0 | | 0 | 0 | 1 |
| 16 | | 07 | Chakachatna R.-L. | 5 | | 5 | 0 | | 0 | 0 | 5 |
| 16 | | 08 | Redoubt Bay-Drift R. | 16 | | 16 | 0 | | 0 | 0 | 16 |
| 16 | | 09 | Trading Bay-McArthur R. | 12 | | 12 | 0 | | 0 | 0 | 12 |
| 16 | | 10 | Unknown | 16 | | 16 | 0 | | 0 | 0 | 16 |
| 16 | | 12 | Beluga R.-Beluga L. | 23 | | 23 | 0 | | 0 | 0 | 23 |

Table 2. Moose Harvest in Sub-units of Game Management Units 1-26, 1967 (cont.).

| Unit | Sub-unit | Code | Description | Harvest ♂ | ♂* | Total ♂ | ♀ | ♀* | Total ♀ | No Sex | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 16 | | 13 | Tyonek | 2 | | 2 | 0 | | 0 | 0 | 2 |
| 16 | | 14 | Kahiltna-Chelatna | 29 | | 29 | 0 | | 0 | 0 | 29 |
| 16 | | (Total) | | 281 | | 281 | 1 | | 1 | 0 | 282 |
| 17 | | (Total) | | 37 | | 37 | 0 | | 0 | 1 | 38 |
| 18 | | (Total) | | 18 | 1 | 19 | 3 | 1 | 4 | 1 | 24 |
| 19 | | (Total) | | 88 | 5 | 93 | 36 | 4 | 40 | 5 | 138 |
| | | | (Fig. 16) | | | | | | | | |
| 20 | A | 01 | | 125 | | 125 | 82 | | 82 | 3 | 210 |
| 20 | B | 02 | | 85 | | 85 | 9 | | 9 | 0 | 94 |
| 20 | C | 03 | | 434 | | 434 | 92 | | 92 | 7 | 533 |
| 20 | Unknown | 04 & 10 | | 14 | | 14 | 4 | | 4 | 1 | 19 |
| 20 | | (Total) | | 658 | | 658 | 187 | | 187 | 11 | 856 |
| 21 | | (Total) | | 100 | 11 | 111 | 32 | 10 | 42 | 2 | 155 |

Table 2. Moose Harvest in Sub-units of Game Management Units 1-26, 1967 (cont.).

| Unit | Sub-unit | Code | Description | Harvest ♂ | ♂* | Total ♂ | ♀ | ♀* | Total ♀ | No Sex | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 22 | | (Total) | | 56 | | 56 | 0 | | 0 | 1 | 57 |
| 23 | | (Total) | | 65 | | 65 | 10 | | 10 | 1 | 76 |
| 24 | | (Total) | | 58 | 3 | 61 | 16 | 5 | 21 | 0 | 82 |
| 25 | | (Total) | | 35 | 3 | 38 | 10 | 5 | 15 | 1 | 54 |
| 26 | | (Total) | | 5 | | 5 | 0 | | 0 | 0 | 5 |
| 27 | | (Total) | Unit of Kill Unknown | 59 | | 59 | 12 | 1 | 13 | 0 | 72 |
| Statewide | | (Total) | | 4801 | 55 | 4856 | 960 | 33 | 993 | 73 | 5922 |

Table 3. Moose Harvest by Game Management Unit, 1963-1967, Alaska.

| Unit | Year | ♂ | ♂* | ♀ | ♀* | Sex Unknown | Total |
|---|---|---|---|---|---|---|---|
| 1 | 1963 | 149 | | 1 | | 0 | 150 |
| | 1964 | 158 | | 65 | | 0 | 223 |
| | 1965 | 128 | | 35 | | 4 | 167 |
| | 1966 | 168 | | 60 | | 2 | 230 |
| | 1967 | 174 | | 48 | | 2 | 224 |
| 5 | 1963 | 189 | | 111 | | 2 | 302 |
| | 1964 | 154 | | 111 | | 0 | 265 |
| | 1965 | 153 | | 125 | | 4 | 282 |
| | 1966 | 116 | | 90 | | 6 | 212 |
| | 1967 | 154 | | 108 | | 1 | 263 |
| 6 | 1963 | 15 | | 2 | | 0 | 17 |
| | 1964 | 15 | | 0 | | 0 | 15 |
| | 1965 | 24 | | 0 | | 0 | 24 |
| | 1966 | 23 | | 1 | | 0 | 24 |
| | 1967 | 37 | | 0 | | 0 | 37 |
| 7 | 1963 | 251 | | 174 | | 2 | 427 |
| | 1964 | 163 | | 206 | | 0 | 369 |
| | 1965 | 60 | | 1 | | 0 | 61 |
| | 1966 | 112 | | 1 | | 0 | 113 |
| | 1967 | 123 | | 1 | | 1 | 125 |
| 9 | 1963 | 179 | 0 | 46 | 0 | 2 | 227 |
| | 1964 | 184 | 1 | 64 | 0 | 0 | 249 |
| | 1965 | 200 | 13 | 63 | 5 | 4 | 285 |
| | 1966 | 240 | 0 | 75 | 0 | 8 | 323 |
| | 1967 | 272 | 29 | 62 | 6 | 9 | 378 |
| 11 | 1963 | 86 | | 37 | | 0 | 123 |
| | 1964 | 89 | | 38 | | 0 | 127 |
| | 1965 | 116 | | 70 | | 2 | 188 |
| | 1966 | 89 | | 69 | | 5 | 163 |
| | 1967 | 108 | | 70 | | 2 | 180 |
| 12 | 1963 | 138 | | 22 | | 1 | 161 |
| | 1964 | 145 | | 16 | | 0 | 161 |
| | 1965 | 151 | | 33 | | 6 | 190 |
| | 1966 | 156 | | 19 | | 7 | 182 |
| | 1967 | 136 | | 42 | | 4 | 182 |

* These columns indicate second moose taken in units 9, 19, 21, 24, 25, where the bag limit is two moose.

Table 3. Moose Harvest by Game Management Unit, 1963-1967, Alaska.(cont.)

| Unit | Year | ♂ | ♂* | ♀ | ♀* | Sex Unknown | Total |
|---|---|---|---|---|---|---|---|
| 13 | 1963 | 1,385 | | 343 | | 7 | 1,735 |
| | 1964 | 1,213 | | 394 | | 0 | 1,607 |
| | 1965 | 1,318 | | 3 | | 10 | 1,331 |
| | 1966 | 1,336 | | 181 | | 36 | 1,553 |
| | 1967 | 1,217 | | 319 | | 16 | 1,552 |
| 14 | 1963 | 925 | | 557 | | 4 | 1,486 |
| | 1964 | 795 | | 525 | | 0 | 1,320 |
| | 1965 | 1,127 | | 1,125 | | 10 | 2,262 |
| | 1966 | 565 | | 202 | | 9 | 776 |
| | 1967 | 482 | | 4 | | 9 | 495 |
| 15 | 1963 | 1,021 | | 417 | | 2 | 1,440 |
| | 1964 | 1,212 | | 858 | | 0 | 2,070 |
| | 1965 | 841 | | 731 | | 12 | 1,584 |
| | 1966 | 819 | | 307 | | 18 | 1,144 |
| | 1967 | 641 | | 0 | | 6 | 647 |
| 16 | 1963 | 344 | | 27 | | 2 | 373 |
| | 1964 | 262 | | 61 | | 0 | 323 |
| | 1965 | 333 | | 52 | | 7 | 392 |
| | 1966 | 393 | | 144 | | 18 | 555 |
| | 1967 | 281 | | 0 | | 1 | 282 |
| 17 | 1963 | 61 | | 0 | | 0 | 61 |
| | 1964 | 31 | | 1 | | 0 | 32 |
| | 1965 | 41 | | 1 | | 0 | 42 |
| | 1966 | 25 | | 1 | | 0 | 26 |
| | 1967 | 37 | | 0 | | 1 | 38 |
| 18 | 1963 | 75 | | 3 | | 0 | 78 |
| | 1964 | 39 | | 0 | | 0 | 39 |
| | 1965 | 28 | | 0 | | 2 | 30 |
| | 1966 | 31 | | 1 | | 1 | 33 |
| | 1967 | 19 | | 4 | | 1 | 24 |
| 19 | 1963 | 144 | 0 | 24 | 0 | 0 | 168 |
| | 1964 | 93 | 3 | 31 | 2 | 0 | 129 |
| | 1965 | 114 | 7 | 27 | 1 | 1 | 150 |
| | 1966 | 130 | 6 | 39 | 4 | 4 | 183 |
| | 1967 | 88 | 5 | 36 | 4 | 5 | 138 |
| 20 | 1963 | 1,324 | | 131 | | 2 | 1,457 |
| | 1964 | 1,034 | | 242 | | 0 | 1,276 |
| | 1965 | 1,050 | | 140 | | 33 | 1,223 |
| | 1966 | 814 | | 157 | | 28 | 999 |
| | 1967 | 648 | | 187 | | 11 | 856 |

Table 3. Moose Harvest by Game Management Unit, 1963-1967, Alaska.(cont.)

| Unit | Year | ♂ | ♂* | ♀ | ♀* | Sex Unknown | Total |
|---|---|---|---|---|---|---|---|
| 21 | 1963 | 168 | 0 | 72 | 0 | 7 | 247 |
| | 1964 | 125 | 12 | 43 | 6 | 0 | 186 |
| | 1965 | 87 | 9 | 30 | 1 | 1 | 128 |
| | 1966 | 106 | 8 | 46 | 4 | 2 | 166 |
| | 1967 | 100 | 11 | 32 | 10 | 2 | 155 |
| 22 | 1963 | 68 | | 1 | | 0 | 69 |
| | 1964 | 57 | | 0 | | 0 | 57 |
| | 1965 | 55 | | 3 | | 2 | 60 |
| | 1966 | 52 | | 1 | | 1 | 54 |
| | 1967 | 56 | | 0 | | 1 | 57 |
| 23 | 1963 | 76 | | 1 | | 0 | 77 |
| | 1964 | 73 | | 0 | | 0 | 73 |
| | 1965 | 44 | | 0 | | 1 | 45 |
| | 1966 | 68 | | 0 | | 1 | 69 |
| | 1967 | 65 | | 10 | | 0 | 75 |
| 24 | 1963 | 92 | 0 | 4 | 0 | 0 | 96 |
| | 1964 | 81 | 3 | 18 | 0 | 0 | 102 |
| | 1965 | 58 | 8 | 14 | 0 | 4 | 84 |
| | 1966 | 50 | 2 | 17 | 0 | 3 | 72 |
| | 1967 | 58 | 3 | 16 | 5 | 0 | 82 |
| 25 | 1963 | 77 | 0 | 2 | 0 | 0 | 79 |
| | 1964 | 55 | 0 | 2 | 0 | 0 | 57 |
| | 1965 | 51 | 1 | 1 | 0 | 0 | 53 |
| | 1966 | 69 | 1 | 12 | 7 | 2 | 91 |
| | 1967 | 35 | 3 | 10 | 5 | 1 | 54 |
| 26 | 1963 | 13 | | 0 | | 0 | 13 |
| | 1964 | 13 | | 0 | | 0 | 13 |
| | 1965 | 0 | | 0 | | 1 | 1 |
| | 1966 | 12 | | 0 | | 0 | 12 |
| | 1967 | 5 | | 0 | | 0 | 5 |
| Unknown Unit | 1963 | 59 | | 4 | | 1 | 64 |
| | 1964 | 6 | | 1 | | 70 | 77 |
| | 1965 | 32 | | 9 | | 0 | 41 |
| | 1966 | 57 | | 13 | | 9 | 79 |
| | 1967 | 59 | | 12 | | 0 | 72 |
| TOTALS | 1963 | 6,839 | 0 | 1,979 | 0 | 32 | 8,850 |
| | 1964 | 5,997 | 19 | 2,676 | 8 | 70 | 8,770 |
| | 1965 | 6,011 | 38 | 2,463 | 7 | 104 | 8,623 |
| | 1966 | 5,431 | 17 | 1,436 | 15 | 155 | 7,054 |
| | 1967 | 4,801 | 55 | 960 | 33 | 73 | 5,922 |

time passed and the novelty of the reports faded. The situation demands effective public relations work.

A number of factors have affected the harvest in Unit 20. A hard winter with record snowfall in 1965-66 caused heavy mortality in the central part of Unit 20. Calves born in 1965 were hit very hard, as were calves born in the spring of 1966. The loss of the yearlings was probably especially significant to hunting success along the roads and rivers, where much of the early season hunting is done. The very dry summer caused extremely low water in most of the streams, essentially cutting river access off over much of central Unit 20. Fifteen to twenty percent of hunters in Unit 20 use boats. In 1967, weather patterns were reversed, and in spite of relatively good winter survival, hunters in central Unit 20 (especially 20B) had difficulty because of too much water. The August 14 flood kept hunters from flooded areas at home cleaning up before freeze-up, and the flood had pushed moose out of many river- and road-side areas. Given a normal year the harvest in Unit 20 should show a decided rise, although it may be that in Sub-unit 20B where antlerless seasons have never been held the unbalanced sex ratio favoring cows will perpetuate low harvests of males if bulls-only seasons persist.

Chronology of Harvest

The chronology of the male moose harvest in selected units is shown in Figs. 2 through 5. Chronology of the harvest for the respective units illustrated has been rather consistent annually since the data became available starting in 1963. In all the Units illustrated the opening week of the season contributes a substantial percentage of the harvest. The next period which contributes heavily is the first active week of the rut, September 16-24. There is some variation; in Unit 14 the rut period is seemingly not as important. Accessible portions of the population contain relatively few bulls, and they are harvested heavily early in the season. The moose inhabiting the higher, inaccessible country only become accessible when they move to lowland wintering areas. The fall and winter of 1967-1968 were quite mild and moose did not move to the wintering areas such as the Matanuska Valley in numbers until December and January, yet the November season produced over 30 percent of the harvest in Unit 14. A similar situation exists in Unit 15, where early season hunting is briefly effective, but a substantial harvest is dependent upon weather forcing the moose out of the high country. In Units 13, 20A and 20C the situation is different in that much of the country is usually inaccessible in November except by air or snow vehicle. However, the movements of the moose during the rut make them accessible and therefore the rutting period is the most productive period in these units. In Sub-Unit 20B the opening week kill is generally the highest, apparently due to the relatively high proportion of yearling bulls

Figure 2. Chronology of 1967 Moose Harvest, Expressed in Percent by Period, Males, Unit 13.

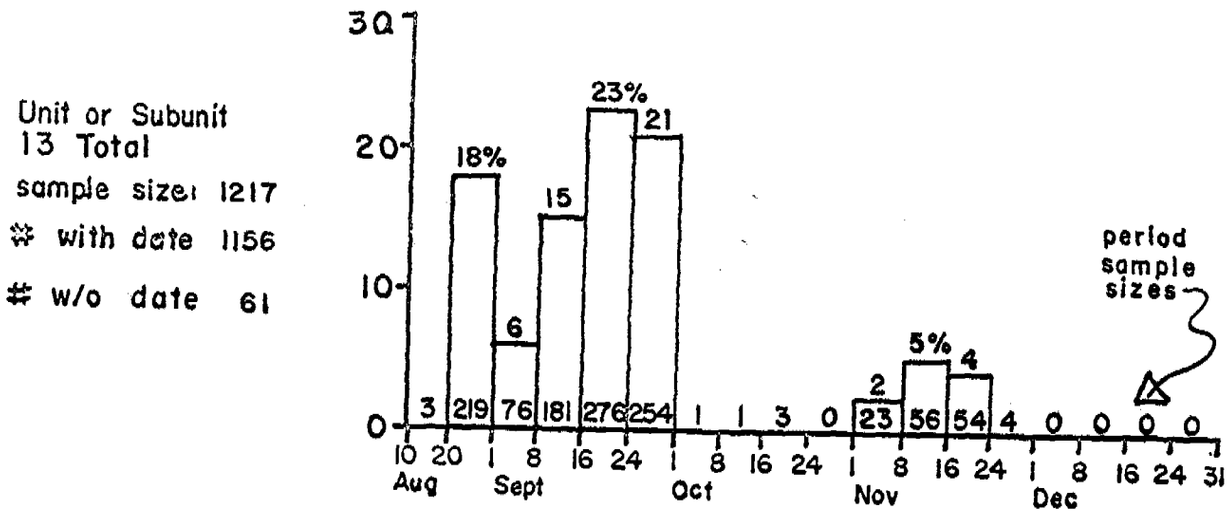
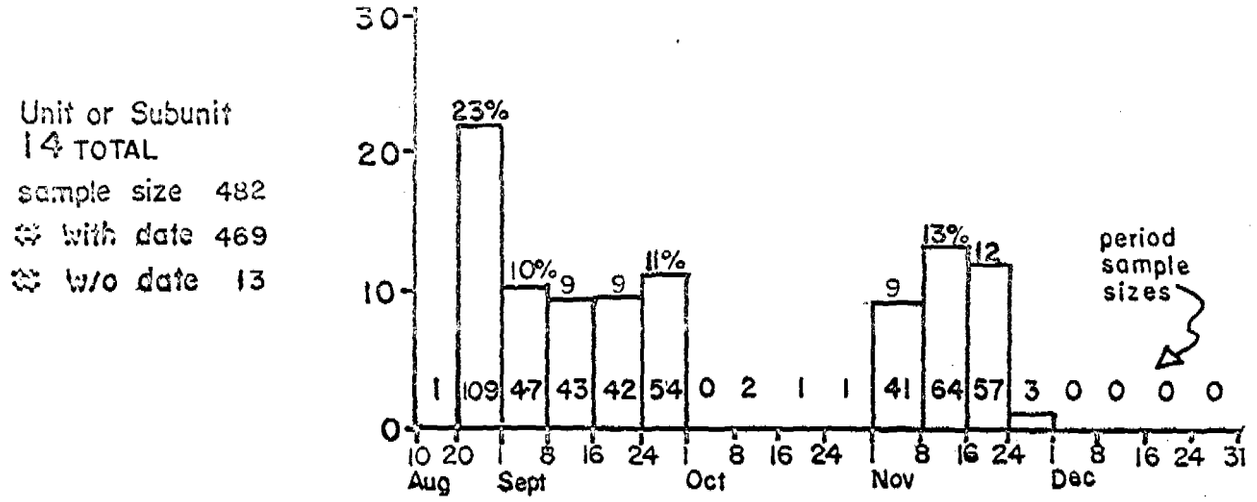
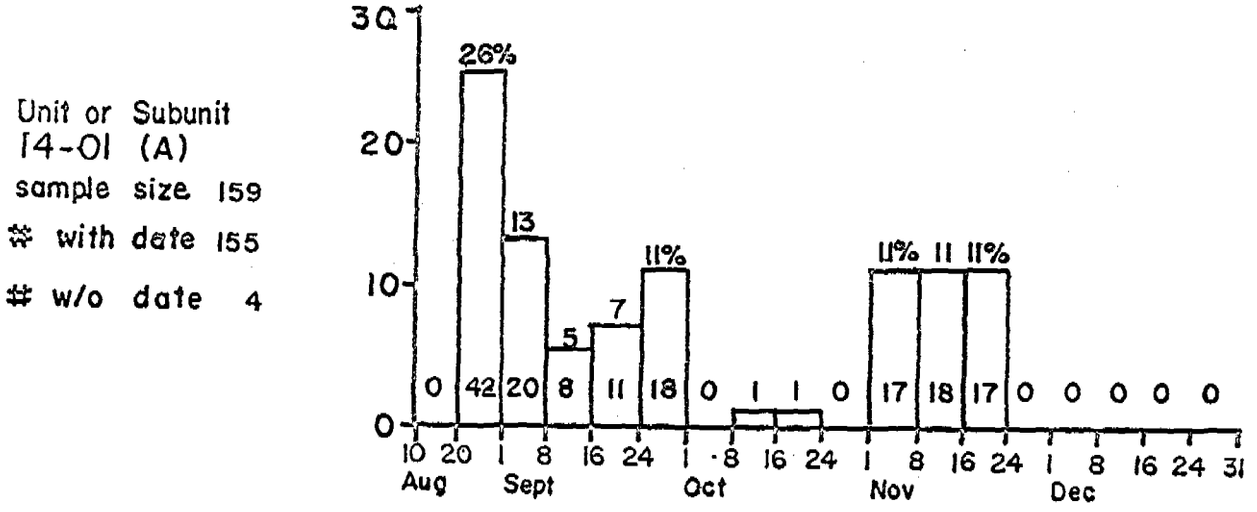


Figure 3. Chronology of 1967 Moose Harvest, Expressed in Percent by Period, Males, Unit 14.



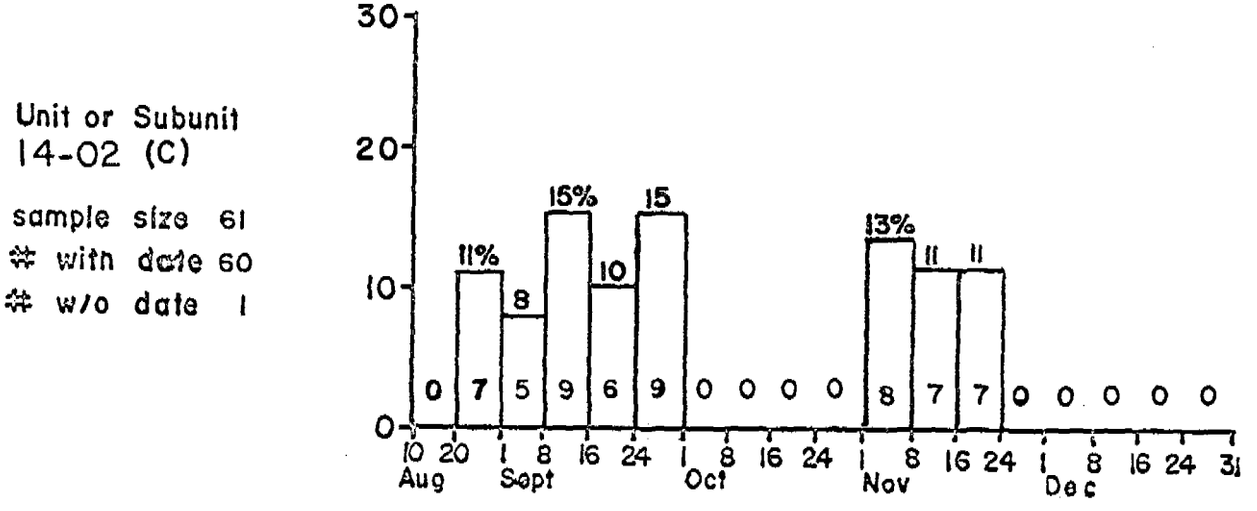
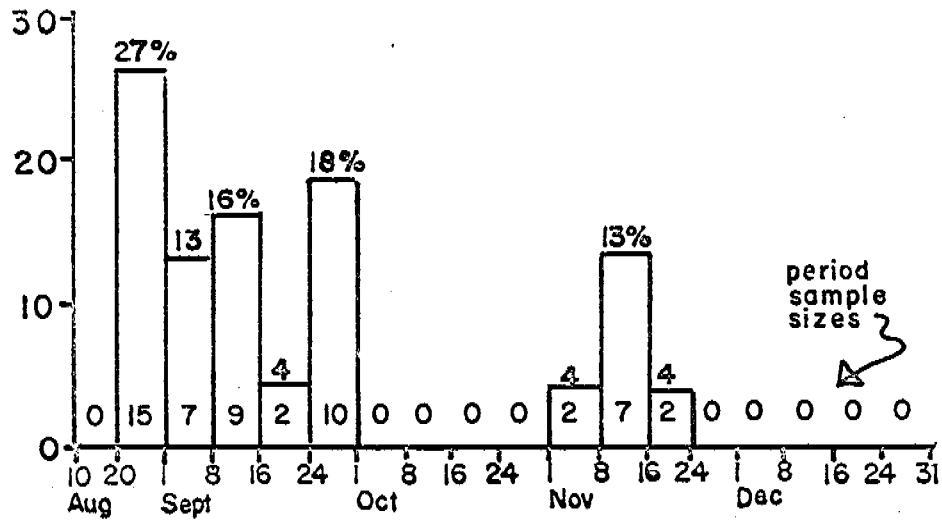
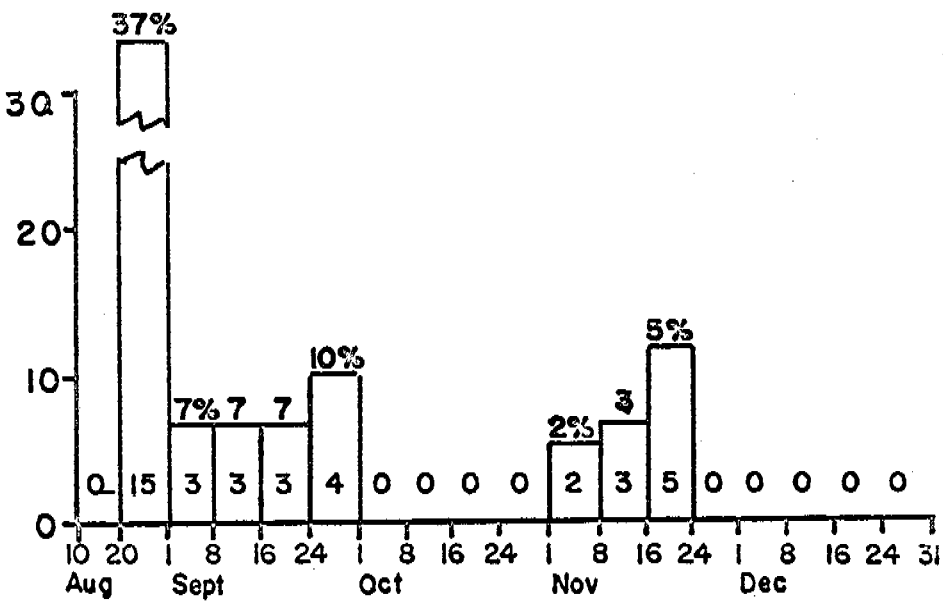



Figure 3. Chronology of 1967 Moose Harvest, Expressed in Percent by Period, Males, Unit 14.

Unit or Subunit
14-03 (C)
sample size 55
* with date 54
* w/o date 1




Unit or Subunit
14-04 (B)
sample size 41
* with date 38
* w/o date 3




Unit or Subunit
14-05 (B)
sample size 67
* with date 65
* w/o date 2

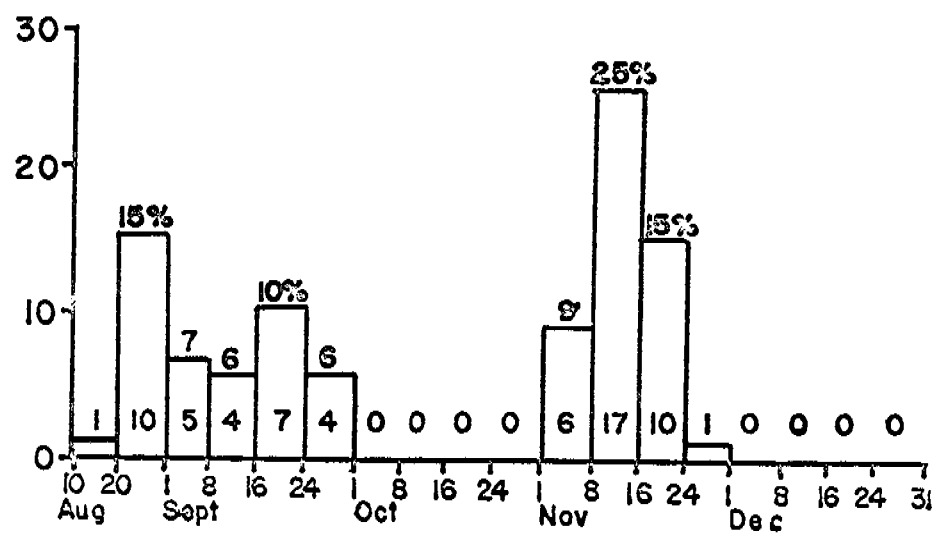
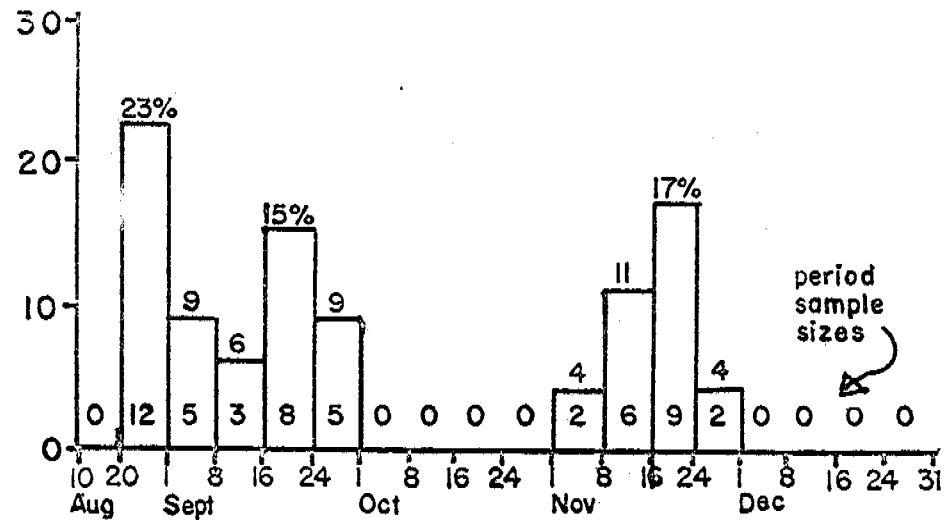


Figure 3 Chronology of 1967 Moose Harvest, Expressed in Percent by Period, Males, Unit 14.

Unit or Subunit
14-06 (B)
sample size 53
# with date 52
# w/o date 1




Unit or Subunit
14 Unknown
sample size 46
# with date 45
# w/o date 1

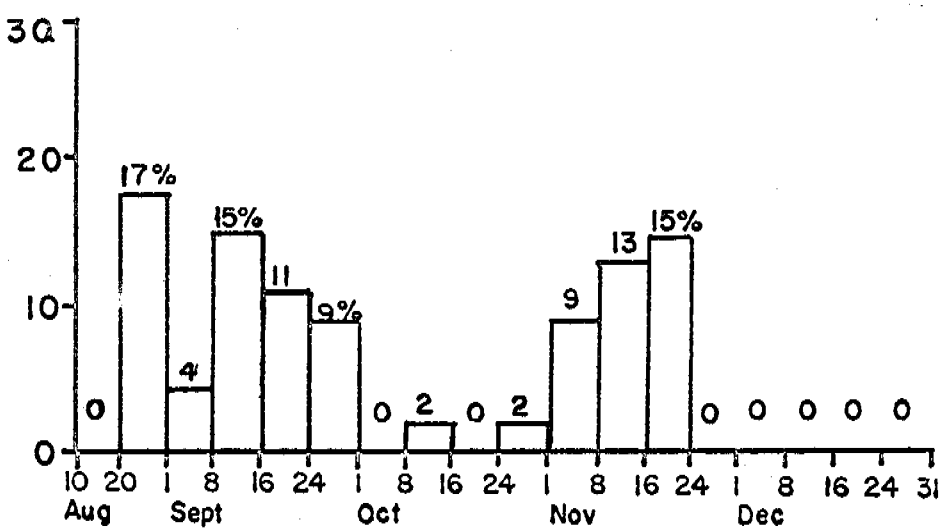


Figure 4. Chronology of 1967 Moose Harvest, Expressed in Percent by Period, Males, Unit 15.

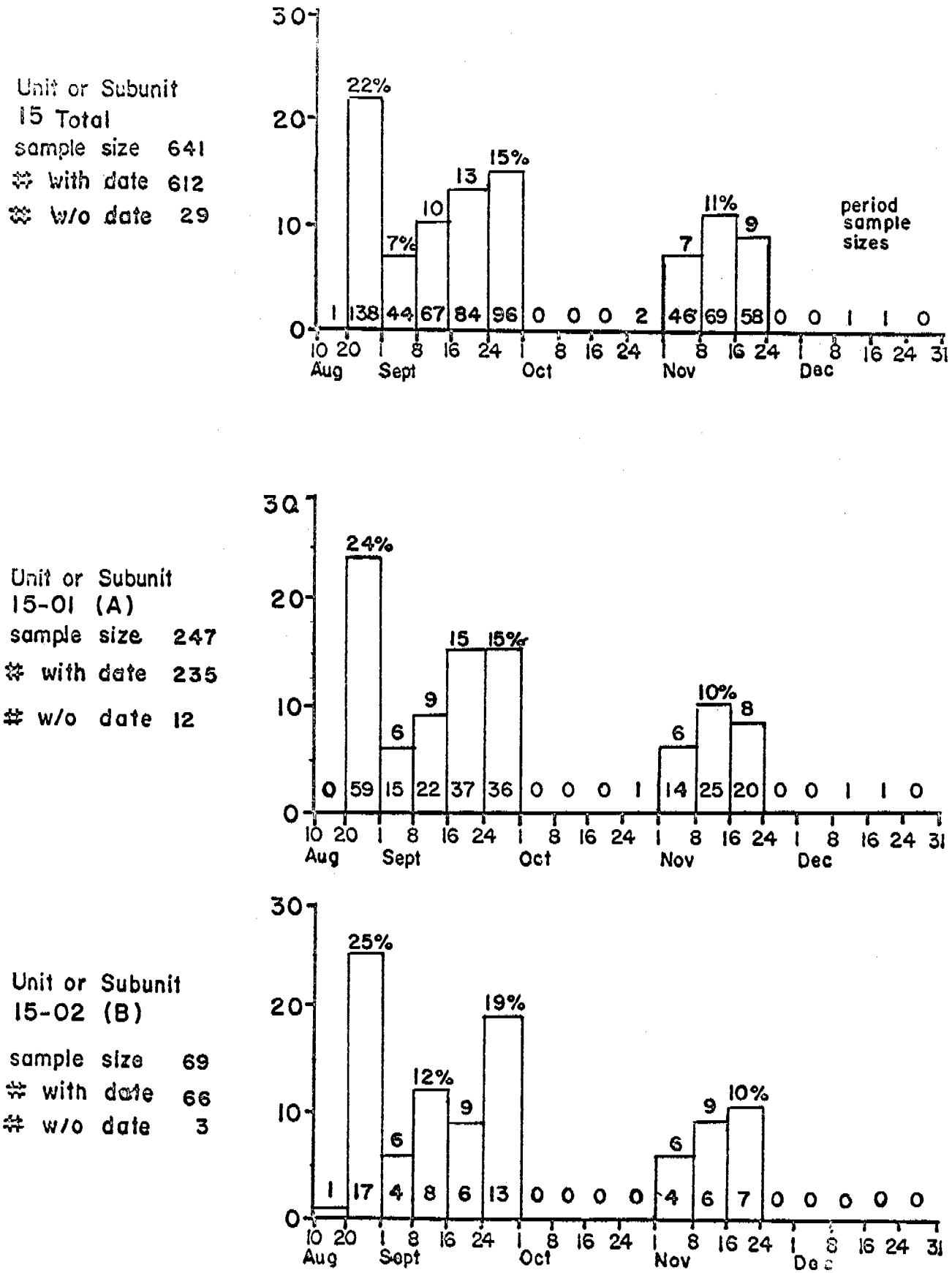


Figure 4. Chronology of 1967 Moose Harvest, Expressed in Percent by Period, Males, Unit 15.

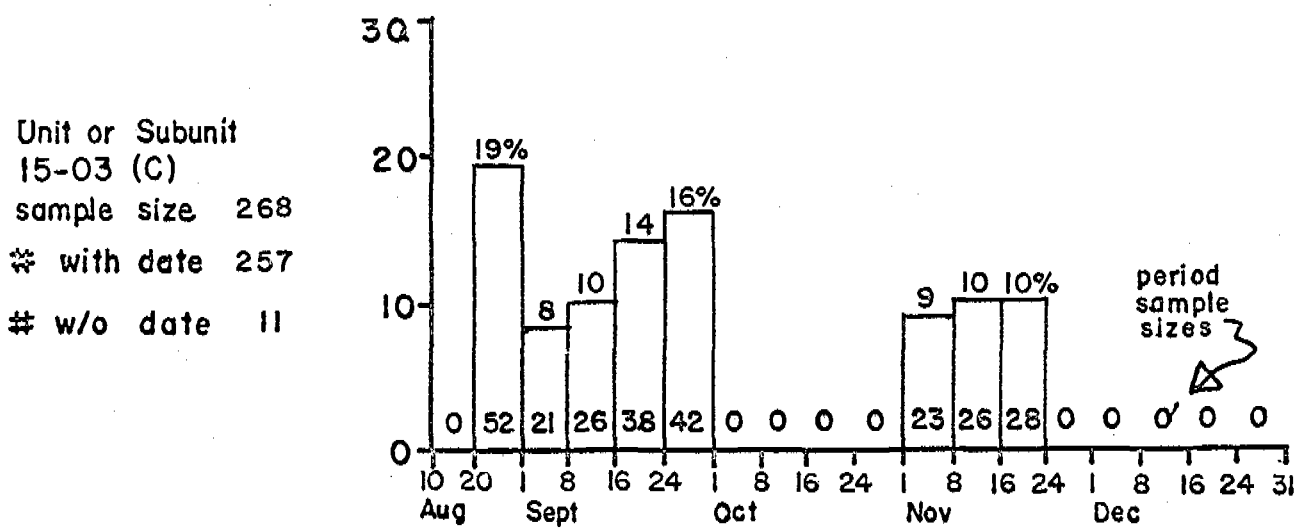


Figure 5. Chronology of 1967 Moose Harvest, Expressed in Percent by Period, Males, Unit 20.

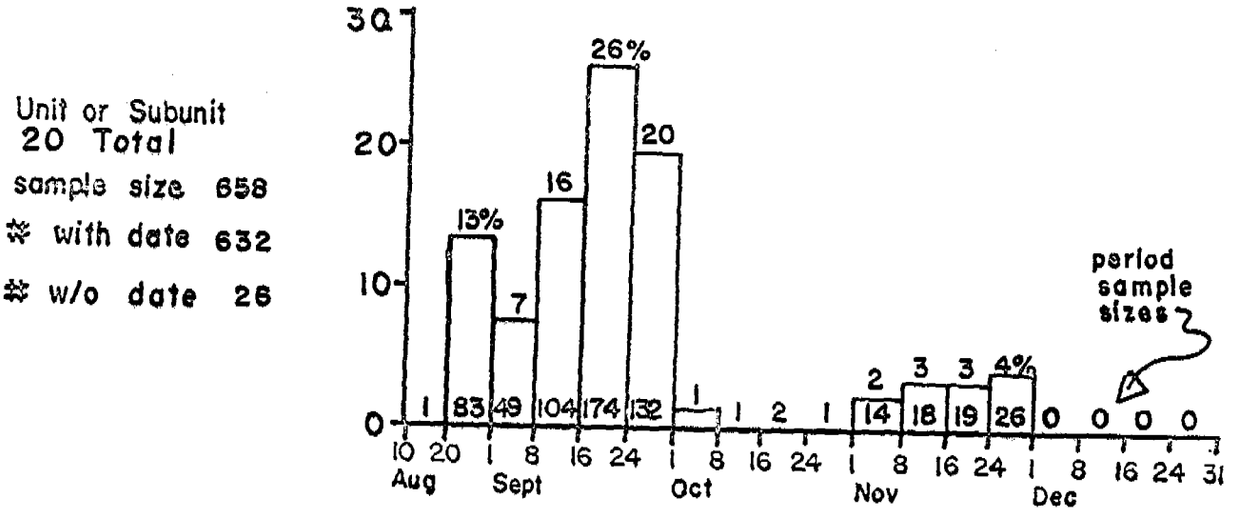
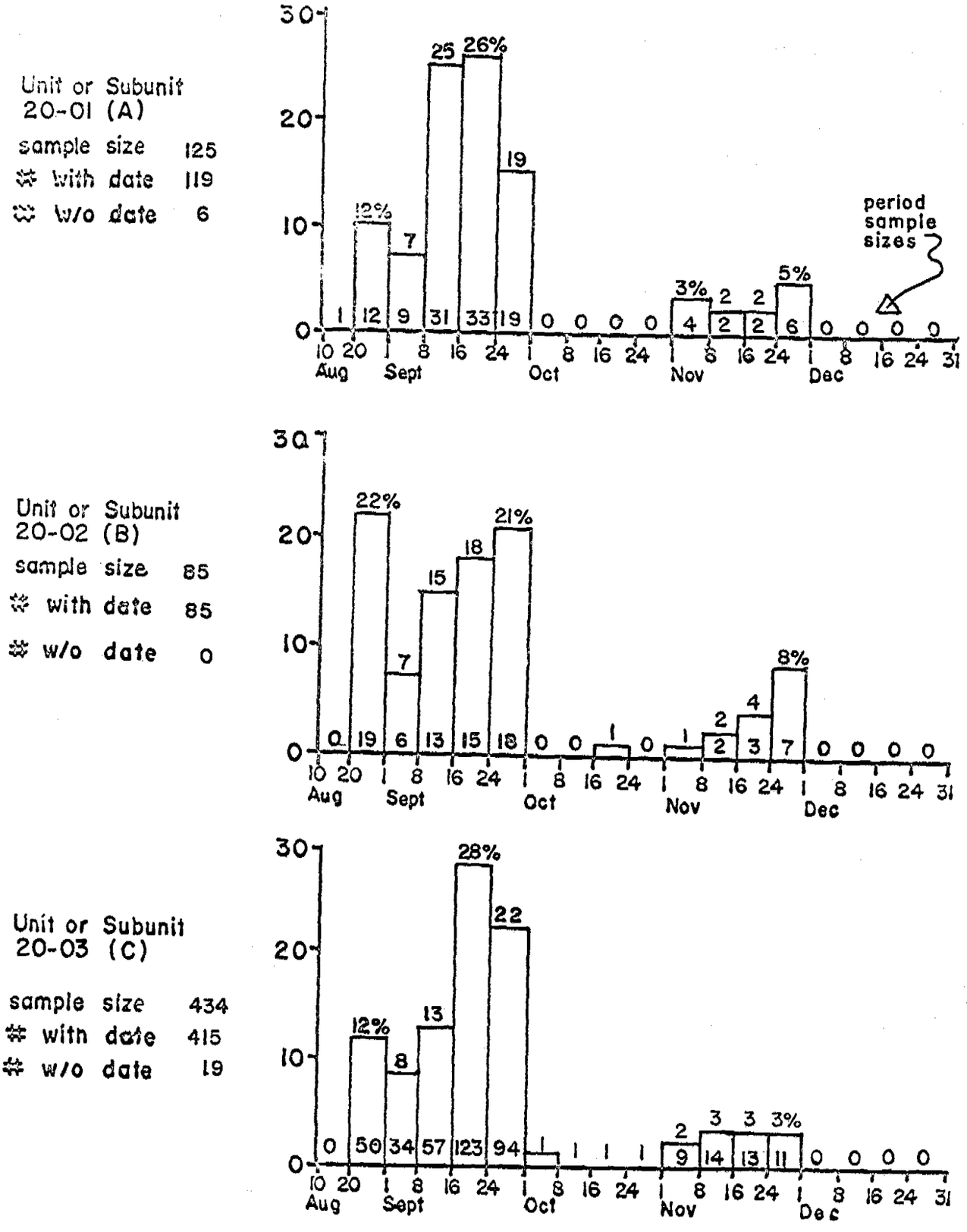


Figure 5. Chronology of 1967 Moose Harvest, Expressed in Percent by Period, Males, Unit 20.



which frequent the more easily hunted areas. In this respect Unit 14 (especially 14A) and Sub-Unit 20B are similar. The hypothesis remains to be verified by checking the age distribution of an adequate sample of the early harvest from 20B. In most of the other units the small sample sizes and long seasons make interpretation of the chronologies difficult. Some interesting variations do occur. In Unit 5 the major hunting effort seems to be in late September and October. In Units 11 and 12, interest in November hunting increased in 1967, probably due to cancellation of antlerless seasons in southcentral Alaska. It is also interesting that the November season in Unit 13 has never been of major importance from the standpoint of the harvest.

Hunter Success

In 1966 the number of hunters hunting in each unit and their success were estimated on the basis of replies to a special reminder letter. In 1967 these data were obtained directly from the harvest tickets. The results are compared in Table 4. The two years' estimates are not consistently comparable, yet in most units the estimates from 1966 are close enough to the known value from the 1967 data to allow some confidence in the 1966 estimates. In certain units other information available supports some of the differences found between 1966 and 1967. In Unit 5, the weather during the 1966 season was consistently bad for even getting out hunting, much less being successful; the harvest was lower than it had been since the inception of the harvest ticket report. In 1967 with better weather the harvest went up along with the success rate. In Unit 13 with a similar harvest in both years, the number of hunters and their success are remarkably similar. In Unit 14 the decline in the number of hunters in 1967 may be an artifact of sampling but it could be related to the confusion surrounding the antlerless moose seasons in that unit in 1967. Without a flexible season providing for the harvest of moose after the fall downward movement, the moose harvest will continue to be uncertain in Unit 14.

In Unit 20, cleaning up after the August 14 flood kept much of the population busy until freeze-up. The decline in numbers of hunters in Unit 20 shown in the hunter success data is probably close to the true decline, and may even be conservative.

Variation in hunting success may be expected in geographical areas as large as the game management units. Table 5 shows the hunter success in sub-units of Units 13, 14, 15 and 20. Factors affecting success are means of access, distribution and movements of moose, and weather, as discussed previously. The poor success shown in unknown sub-units is the result of hunter attitude; many unsuccessful hunters do not indicate where they hunted with any precision. Unsuccessful hunters are not alone in their inaccurate

Table 4. Index of moose hunter success, 1966 & 1967.*

| Unit | 1966 Total Est. Hunters | 1966 Est% Successful | 1967 Reporting | 1967 Est % Successful |
|---|---|---|---|---|
| 1 | 1275 | 18.0 | 749 | 30 |
| 5 | 579 | 36.6 | 426 | 62 |
| 6 | 174 | 13.8 | 132 | 28 |
| 7 | 445 | 25.4 | 414 | 30 |
| 9 | 519 | 62.2 | 509 | 67 |
| 11 | 263 | 62.0 | 317 | 57 |
| 12 | 571 | 31.9 | 464 | 39 |
| 13 | 4163 | 37.3 | 4027 | 39 |
| 14 | 4206 | 18.4 | 2968 | 17 |
| 15 | 2980 | 39.4 | 2548 | 25 |
| 16 | 826 | 67.2 | 503 | 56 |
| 17 | 90 | 28.9 | 77 | 49 |
| 18 | 136 | 24.3 | 59 | 37 |
| 19 | 347 | 52.7 | 208 | 62 |
| 20 | 4185 | 23.8 | 3345 | 26 |
| 21 | 302 | 55.0 | 171 | 78 |
| 22 | 279 | 19.4 | 153 | 37 |
| 23 | 151 | 45.7 | 117 | 65 |
| 24 | 93 | 77.4 | 88 | 84 |
| 25 | 151 | 55.0 | 69 | 67 |
| 26 | 26 | 46.2 | 7 | 71 |
| Totals | 21,761 | 32.0 | 19,921 | 29 |

* 1966 estimates based on replies to harvest ticket follow-up letters and reported moose harvest. 1967 figures based on final IBM tabulation.

Table 5. Moose hunter success, subunits of Units 13,14,15,20, 1967.

| Subunit* | Hunters Reporting | % Successful |
|---|---|---|
| **Unit 13** | | |
| 13-? | 656 | 27 |
| 13-00 | 6 | 0 |
| 13-01 | 477 | 26 |
| 13-02 | 307 | 36 |
| 13-03 | 433 | 48 |
| 13-04 | 458 | 3 |
| 13-05 | 59 | 2 |
| 13-06 | 959 | 53 |
| 13-07 | 202 | 37 |
| 13-08 | 58 | 79 |
| 13-09 | 412 | 68 |
| 13 TOTAL | 4,027 | 39 |
| **Unit 14** | | |
| 14-? | 3 | 0 |
| 14-01 | 998 | 16 |
| 14-02 | 241 | 27 |
| 14-03 | 160 | 35 |
| 14-04 | 115 | 37 |
| 14-05 | 382 | 18 |
| 14-06 | 346 | 16 |
| 14-10 | 732 | 6 |
| 14-14 | 1 | 0 |
| 14 TOTAL | 2,968 | 17 |
| **Unit 15** | | |
| 15-? | 4 | 0 |
| 15-01 | 1,036 | 24 |
| 15-02 | 233 | 30 |
| 15-03 | 643 | 42 |
| 15-05 | 1 | 0 |
| 15-07 | 1 | 0 |
| 15-10 | 630 | 9 |
| 15 TOTAL | 2,548 | 25 |
| **Unit 20** | | |
| 20-? | 8 | 0 |
| 20-01 | 568 | 37 |
| 20-02 | 808 | 12 |
| 20-03 | 1,597 | 33 |
| 20-04 | 348 | 5 |
| 20-10 | 16 | 6 |
| 20 TOTAL | 3,345 | 26 |

* Unknown sub-unit areas as designations: 13-?, 14-?, 14-10, 14-14; 15-?, 15-05, 15-07, 15-10; 20-?, 20-04, 20-10.

reporting. Some successful hunters do not wish to disclose their favored hunting area, and give misleading broad or erroneous locations on their harvest ticket reports. Considering the probable number of people who indicate they hunted but do very little actual hunting, and last-minute regulation changes which eliminated the 1967 antlerless seasons in southcentral Alaska, the overall success of 29 percent is reasonably good.

Means of Transport and Their Relationship to Success

The major means of transport reported by hunters and their success are summarized for each Unit in Table 6.

Considering the entire state, highway vehicles were the most used means of transportation. However, variations did occur which were related to the physiography of the Unit, the extent of roads available, and the financial circumstances of the hunters. Such variations were generally predictable from a general knowledge of the Unit and hunting activities within it. The high use of highway vehicles is related to socio-economic factors. The greatest number of hunters live in the population centers located on the road system and most have a highway vehicle as a normal component of their everyday life. The number of people who can or want to support specialized equipment for hunting is limited, and the automobile is adequate to get them to a hunting area. The relatively low success of this group of hunters is probably related to the loose definition of "hunting", their minimal mobility off the road, and the likelihood of this group containing a greater proportion of unskilled hunters. The other widely used conveyances are off-road vehicles, boats, and airplanes.

The use of off-road vehicles is also related to Units with road systems. The road system provides the means of transporting the equipment to a hunting area or taking the hunter to where the equipment can be rented. Thus in Units 11, 12, 13, 14, 15 and 20 the use of off-road vehicles is of major importance. In Unit 7 it apparently cannot compete with the horse. The success rate of off-road vehicle users is consistently high. The Units where boats are of major importance are those where their use corresponds to that of highway vehicles. In Units 1, 6, and 17 through 25 boats are used extensively. Their use in Unit 20 is interesting because they have persisted as a popular and effective means of hunting even though an extensive road system exists. As the road system continues to expand it will be interesting to see how the use of boats will be affected.

Airplanes are used in moose hunting throughout the state, but it is in Units or parts of Units which are inaccessible by other means yet are relatively close to population centers containing affluent hunters that they are used most extensively. Units 5, 9,

16 and 19 are good examples. The lack of other access as well as the airplane's efficiency are also important factors in the extent of their use. In Unit 5 the limited access by other means and the development of airstrips and cabins has made the airplane almost a necessity. In Unit 9 natural tundra landing areas provide great mobility for the airborne hunter. The interest in guide trophy hunting in Unit 9 must stimulate the use of aircraft also. Unit 16 is an example of an area close to a major population center but with practically no roads. As a result the airplane is the major means of getting to the moose. Both Unit 13 and 15 are Units with large central areas lacking good access except by air. Unit 14 is almost literally in Anchorage's backyard from the standpoint of the aircraft user, and in the lowland portion many lakes are available for landing sites. Unit 13 is close enough to Anchorage to be attractive to Anchorage hunters and in addition numerous aircraft equipped guides operate in this Unit. Aircraft will likely continue to be of major importance in these Units. Proposed highway development to and on the Kenai Peninsula may alter the pattern in Unit 15 in the future. The northern and western portion of Unit 11 is physiographically similar to adjacent parts of Unit 13, and the use of aircraft in the two areas is similar.

The use of aircraft in Unit 14 is much less significant than in adjacent Units, probably due to the much better road access in much of the Unit, and to the relative lack of good landing sites in the rugged country comprising the remainder of the Unit.

In Units 17 through 21 the airplane continues to be of major importance, although in Unit 20 the alternatives available limit its importance somewhat. The importance of boats in the outlying Units has been mentioned. As one might expect, the importance of airplanes in these Units declines, probably due to the generally lower incomes of the residents. It seems likely that the importance of the airplane in these outlying Units may be overemphasized in the data because the harvest tickets are little used by the majority of the residents, who are not as well informed in the details of regulations.

The data listed for "Unit 27" includes returns for which no Unit was indicated. It is interesting that success indicated in these data is much lower than that found in data for which Units were indicated.

The positive and negative values of snow machines as a means of hunter transportation have been speculated upon as their popularity has grown. The extent and efficiency of their use in moose hunting as shown by harvest ticket reports are amoung the first documented data on their merits. In Table 6 where they are represented they appear to be quite successfully used, but this may be a result of the type of complition. In Table 7 where all reported

Table 6. Relationship of Means of Transport and Success of Moose Hunters, 1967.

| Means of Transport* | | No. | No. | % | % Successful Hunters Using |
|---|---|---|---|---|---|
| Code | Description | Hunters | Successful | Success | This Means |
| UNIT 1 | | | | | |
| 1 | Hi.veh. | 47 | 17 | 36.2 | 7.8 |
| 1,8 | Hi.veh.,Afoot | 40 | 6 | 15.0 | 2.7 |
| 1,2 | Hi.veh.,Boat | 22 | 9 | 40.9 | 4.1 |
| 1,2,8 | Hi.veh.,Boat Afoot | 26 | 10 | 38.5 | 4.6 |
| 2 | Boat | 249 | 96 | 38.6 | 43.8 |
| 2,8 | Boat,Afoot | 34 | 10 | 29.4 | 4.6 |
| 5 | Airplane | 35 | 20 | 57.1 | 9.1 |
| 7 | Off Road Veh. | 12 | 8 | 66.7 | 3.7 |
| 8 | Afoot | 54 | 27 | 50.0 | 12.3 |
| | TOTAL | 519 | 203 | | |
| Total Hunters Reporting Transportation | | 563 | 219 | 38.9 | |

*Method of Transport

1. Highway vehicle
2. Boat
3. Tote Gote
4. Horse
5. Airplane
6. Snow Machine
7. Off Road Vehicle
8. Afoot

Table 6. Relationship of Means of Transport and Success of Moose Hunters, 1967 (con't.).

| Means of Transport* Code | Description | No. Hunters | No. Successful | % Success | % Successful Hunters Using This Means |
|---|---|---|---|---|---|
| UNIT 5 | | | | | |
| 1 | Hi.veh. | 29 | 19 | 65.5 | 7.3 |
| 2 | Boat | 29 | 26 | 89.7 | 10.0 |
| 5 | Airplane | 163 | 121 | 74.2 | 46.5 |
| 5,8 | Airplane,Afoot | 50 | 34 | 68.0 | 13.1 |
| 8 | Afoot | 33 | 25 | 75.8 | 9.6 |
| | TOTAL | 304 | 225 | | |
| Total Hunters Reporting Transportation | | 367 | 260 | 70.8 | |
| UNIT 6 | | | | | |
| 1 | Hi.veh. | 21 | 2 | 9.5 | 5.4 |
| 1,2 | Hi.veh.,Boat | 3 | 2 | 66.7 | 5.4 |
| 2 | Boat | 10 | 8 | 80.0 | 21.6 |
| 5 | Airplane | 12 | 9 | 75.0 | 24.3 |
| 5,8 | Airplane,Afoot | 3 | 2 | 66.7 | 5.4 |
| 8 | Afoot | 17 | 8 | 47.1 | 21.6 |
| | TOTAL | 66 | 31 | | |
| Total Hunters Reporting Transportation | | 99 | 37 | 47.0 | |

Table 6. Relationship of Means of Transport and Success of Moose Hunters, 1967 (con't.).

| Means of Transport* | | No. Hunters | No. Successful | % Success | % Successful Hunters Using This Means |
|---|---|---|---|---|---|
| Code | Description | | | | |
| UNIT 7 | | | | | |
| 1 | Hi.veh. | 49 | 18 | 36.7 | 14.5 |
| 1,2 | Hi.veh.,Boat | 4 | 2 | 50.0 | 1.6 |
| 1,2,8 | Hi.veh.,Boat Afoot | 10 | 1 | 10.0 | .8 |
| 1,8 | Hi.veh.,Afoot | 51 | 10 | 19.6 | 8.1 |
| 2 | Boat | 14 | 9 | 64.3 | 7.3 |
| 2,3 | Boat,Tote Gote | 2 | 2 | 100.0 | 1.6 |
| 4 | Horse | 16 | 15 | 93.8 | 12.6 |
| 4,5 | Horse,Airplane | 1 | 1 | 100.0 | .8 |
| 4,8 | Horse,Afoot | 2 | 1 | 50.0 | .8 |
| 1,5,8 | Horse,Airplane, Afoot | 4 | 2 | 50.0 | 1.6 |
| 5 | Airplane | 30 | 20 | 66.7 | 16.1 |
| 5,8 | Airplane,Afoot | 11 | 8 | 72.7 | 6.5 |
| 8 | Afoot | 78 | 26 | 33.3 | 21.0 |
| | TOTAL | 272 | 115 | | |
| Total Hunters Reporting Transportation | | 305 | 124 | 40.7 | |

Table 6. Relationship of Means of Transport and Success of Moose Hunters, 1967 (con't.).

| Means of Transport* | | No. Hunters | No. Successful | % Success | % Successful Hunters Using This Means |
|---|---|---|---|---|---|
| Code | Description | | | | |
| UNIT 9 | | | | | |
| 1 | Hi.veh. | 14 | 8 | 57.1 | 2.2 |
| 2 | Boat | 69 | 48 | 69.6 | 12.9 |
| 2,5 | Boat,Airplane | 6 | 5 | 83.3 | 1.3 |
| 2,5,8 | Boat,Airplane Afoot | 5 | 2 | 40.0 | .5 |
| 2,8 | Boat,Afoot | 27 | 21 | 77.8 | 5.7 |
| 1,5 | Hi.veh.,Airplane | 4 | 2 | 50.0 | .5 |
| 5 | Airplane | 229 | 174 | 76.0 | 46.9 |
| 5,8 | Airplane,Afoot | 41 | 36 | 87.8 | 9.7 |
| 7 | Off Road Veh. | 20 | 18 | 90.0 | 4.9 |
| 7,8 | Off Road Veh., Afoot | 6 | 5 | 83.3 | 1.3 |
| 8 | Afoot | 55 | 47 | 85.5 | 12.7 |
| | TOTAL | 476 | 366 | | |
| Total Hunters Reporting Transportation | | 500 | 371 | 74.2 | |

Table 6. Relationship of Means of Transport and Success of Moose Hunters, 1967 (con't.).

| Means of Transport* Code | Description | No. Hunters | No. Successful | % Success | % Successful Hunters Using This Means |
|---|---|---|---|---|---|
| UNIT 11 | | | | | |
| 1 | Hi.veh. | 51 | 26 | 51.0 | 14.5 |
| 1,8 | Hi.veh.,Afoot | 34 | 10 | 29.4 | 5.6 |
| 4 | Horse | 6 | 6 | 100.0 | 3.4 |
| 4,5 | Horse,Airplane | 1 | 1 | 100.0 | .6 |
| 4,7 | Horse,Off Road Veh. | 2 | 1 | 50.0 | .6 |
| 5 | Airplane | 36 | 35 | 97.2 | 19.6 |
| 5,7 | Airplane,Off Road Veh. | 1 | 1 | 100.0 | .6 |
| 5,8 | Airplane,Affot | 5 | 5 | 100.0 | 2.8 |
| 1,5 | Hi.veh., Airplane | 3 | 2 | 66.7 | 1.1 |
| 6 | Snow Mach. | 13 | 13 | 100.0 | 7.3 |
| 7 | Off Road Veh. | 51 | 39 | 76.5 | 21.8 |
| 8 | Afoot | 21 | 13 | 61.9 | 7.3 |
| | TOTAL | 224 | 152 | | |
| Total Hunters Reporting Transportation | | 276 | 179 | 65.0 | |

Table 6. Relationship of Means of Transport and Success of Moose Hunters, 1967 (con't.).

| Means of Transport* Code | Description | No. Hunters | No. Successful | % Success | % Successful Hunters Using This Means |
|---|---|---|---|---|---|
| UNIT 12 | | | | | |
| 1 | Hi.veh. | 135 | 51 | 37.8 | 28.3 |
| 1,2,8 | Hi.veh.,Boat Afoot | 11 | 5 | 45.5 | 2.8 |
| 1,8 | Hi.veh.,Afoot | 36 | 6 | 16.7 | 3.3 |
| 2 | Boat | 12 | 7 | 58.3 | 3.9 |
| 4 | Horse | 15 | 13 | 86.7 | 7.2 |
| 5 | Airplane | 8 | 8 | 100.0 | 4.4 |
| 6 | Snow Mach. | 9 | 8 | 88.9 | 4.4 |
| 7 | Off Road Veh. | 45 | 33 | 73.3 | 18.3 |
| 8 | Afoot | 41 | 24 | 58.5 | 13.3 |
| | TOTAL | 312 | 109 | | |
| Total Hunters Reporting Transportation | | 379 | 180 | 47.5 | |

Table 6. Relationship of Means of Transport and Success of Moose Hunters, 1967 (con't.).

| Means of Transport* Code | Description | No. Hunters | No. Successful | % Success | % Successful Hunters Using This Means |
|---|---|---|---|---|---|
| UNIT 13 | | | | | |
| 1 | Hi.veh. | 705 | 263 | 37.3 | 17.1 |
| 1,5 | Hi.veh., Airplane | 20 | 18 | 90.0 | 1.2 |
| 1,8 | Hi.veh.,Afoot | 396 | 77 | 19.4 | 5.0 |
| 2 | Boat | 115 | 57 | 49.6 | 3.7 |
| 4 | Horse | 37 | 26 | 70.3 | 1.7 |
| 5 | Airplane | 305 | 245 | 80.3 | 16.0 |
| 5,7 | Airplane, Off Road Veh. | 29 | 26 | 89.7 | 1.7 |
| 5,8 | Airplane,Afoot | 54 | 47 | 87.0 | 3.1 |
| 6 | Snow Mach. | 60 | 21 | 35.0 | 1.4 |
| 7 | Off Road Veh. | 654 | 426 | 65.1 | 27.7 |
| 7,8 | Off Road Veh. Afoot | 68 | 23 | 33.8 | 1.5 |
| 8 | Afoot | 332 | 185 | 55.7 | 12.0 |
| | TOTAL | 2,775 | 1,414 | | |
| Total Hunters Reporting Transportation | | 3,233 | 1,536 | 47.5 | |

Table 6. Relationship of Means of Transport and Success of Moose Hunters, 1967 (con't.).

| Means of Transport* Code | Description | No. Hunters | No. Successful | % Success | % Successful Hunters Using This Means |
|---|---|---|---|---|---|
| UNIT 14 | | | | | |
| 1 | Hi.veh. | 529 | 115 | 21.7 | 23.6 |
| 1,7,8 | Hi.veh., Off Road Veh.,Afoot | 49 | 6 | 12.2 | 1.2 |
| 1,8 | Hi.veh.,Afoot | 477 | 43 | 9.0 | 8.8 |
| 2 | Boat | 17 | 8 | 47.1 | 1.6 |
| 4 | Horse | 29 | 24 | 82.8 | 4.9 |
| 5 | Airplane | 72 | 39 | 54.2 | 8.0 |
| 6 | Snow Mach. | 33 | 10 | 30.3 | 2.1 |
| 7 | Off Road Veh. | 196 | 89 | 45.4 | 18.3 |
| 7,8 | Off Road Veh. Afoot | 52 | 7 | 13.5 | 1.4 |
| 8 | Afoot | 449 | 119 | 26.5 | 24.4 |
| | TOTAL | 1,903 | 460 | | |
| Total Hunters Reporting Transportation | | 2,136 | 487 | 22.8 | |

Table 6. Relationship of Means of Transport and Success of Moose Hunters, 1967 (con't.).

| Means of Transport* Code | Description | No. Hunters | No. Successful | % Success | % Successful Hunters Using This Means |
|---|---|---|---|---|---|
| UNIT 15 | | | | | |
| 1 | Hi.veh. | 477 | 142 | 29.8 | 22.3 |
| 1,7 | Hi.veh.,Off Road Veh. | 20 | 10 | 50.0 | 1.6 |
| 1,8 | Hi.veh.,Afoot | 293 | 34 | 11.6 | 5.3 |
| 2 | Boat | 52 | 25 | 48.1 | 3.9 |
| 4 | Horse | 27 | 19 | 70.4 | 3.0 |
| 5 | Airplane | 165 | 117 | 70.9 | 18.3 |
| 5,8 | Airplane,Afoot | 27 | 11 | 40.7 | 1.7 |
| 6 | Snow Mach. | 32 | 21 | 65.6 | 3.3 |
| 7 | Off Road Veh. | 161 | 110 | 68.3 | 17.2 |
| 7,8 | Off Road Veh. Afoot | 38 | 9 | 23.7 | 1.4 |
| 8 | Afoot | 336 | 106 | 31.5 | 16.6 |
| | TOTAL | 1,628 | 604 | | |
| Total Hunters Reporting Transportation | | 1,839 | 638 | 34.7 | |

Table 6. Relationship of Means of Transport and Success of Moose Hunters, 1967 (con't.).

| Means of Transport* | | No. Hunters | No. Successful | % Success | % Successful Hunters Using This Means |
|---|---|---|---|---|---|
| Code | Description | | | | |
| UNIT 16 | | | | | |
| 1 | Hi.veh. | 43 | 24 | 55.8 | 8.6 |
| 1,5 | Hi.veh.,Airplane | 5 | 4 | 80.0 | 1.4 |
| 1,8 | Hi.veh.,Afoot | 19 | 6 | 31.6 | 2.2 |
| 2 | Boat | 18 | 10 | 55.6 | 3.6 |
| 5 | Airplane | 188 | 132 | 70.2 | 47.5 |
| 5,8 | Airplane, Afoot | 37 | 27 | 73.0 | 9.7 |
| 6 | Snow Mach. | 12 | 5 | 41.7 | 1.8 |
| 7 | Off Road Veh. | 10 | 6 | 60.0 | 2.2 |
| 8 | Afoot | 56 | 47 | 83.9 | 16.9 |
| | TOTAL | 388 | 261 | | |
| Total Hunters Reporting Transportation | | 439 | 278 | 67.3 | |

Table 6. Relationship of Means of Transport and Success of Moose Hunters, 1967 (con't.).

| Means of Transport* Code | Description | No. Hunters | No. Successful | % Success | % Successful Hunters Using This Means |
|---|---|---|---|---|---|
| UNIT 17 | | | | | |
| 1 | Hi.veh. | 4 | 2 | 50.0 | 5.3 |
| 2 | Boat | 29 | 12 | 41.4 | 31.6 |
| 2,8 | Boat,Afoot | 5 | 2 | 40.0 | 5.3 |
| 5 | Airplane | 16 | 15 | 93.8 | 39.5 |
| 5,8 | Airplane,Afoot | 1 | 1 | 100.0 | 2.6 |
| 6 | Snow Mach. | 2 | 2 | 100.0 | 5.3 |
| 8 | Afoot | 5 | 4 | 80.0 | 10.5 |
| | TOTAL | 62 | 38 | | |
| Total Hunters Reporting Transportation | | 66 | 38 | 57.6 | |
| UNIT 18 | | | | | |
| 2 | Boat | 41 | 16 | 39.0 | 66.7 |
| 2,5 | Boat,Airplane | 2 | 1 | 50.0 | 4.2 |
| 2,8 | Boat,Afoot | 3 | 1 | 33.3 | 4.2 |
| 5 | Airplane | 7 | 6 | 85.7 | 25.0 |
| | TOTAL | 53 | 24 | | |
| Total Hunters Reporting Transportation | | 57 | 24 | 42.1 | |

Table 6. Relationship of Means of Transport and Success of Moose Hunters, 1967 (con't.).

| Means of Transport* | | No. Hunters | No. Successful | % Success | % Successful Hunters Using This Means |
|---|---|---|---|---|---|
| Code | Description | | | | |
| UNIT 19 | | | | | |
| 1,5 | Hi.veh., Airplane | 2 | 2 | 100.0 | 1.5 |
| 2 | Boat | 97 | 58 | 59.8 | 43.6 |
| 5 | Airplane | 33 | 31 | 93.9 | 23.3 |
| 5,8 | Airplane,Afoot | 9 | 9 | 100.0 | 6.8 |
| 6 | Snow Mach. | 5 | 3 | 60.0 | 2.3 |
| 7 | Off Road Veh. | 6 | 6 | 100.0 | 4.5 |
| 8 | Afoot | 30 | 19 | 63.3 | 14.3 |
| | TOTAL | 182 | 128 | | |
| Total Hunters Reporting Transportation | | 200 | 133 | 66.5 | |

Table 6. Relationship of Means of Transport and Success of Moose Hunters, 1967 (con't.).

| Means of Transport* | | | | | |
|---|---|---|---|---|---|
| Code | Description | No. Hunters | No. Successful | % Success | % Successful Hunters Using This Means |
| UNIT 20 | | | | | |
| 1 | Hi.veh. | 724 | 223 | 30.8 | 26.2 |
| 1,2 | Hi.veh.,Boat | 82 | 15 | 18.3 | 1.8 |
| 1,7 | Hi.veh., Off Road Veh. | 55 | 13 | 23.6 | 1.5 |
| 1,8 | Hi.veh.,Afoot | 371 | 36 | 9.7 | 4.2 |
| 2 | Boat | 178 | 138 | 49.6 | 16.2 |
| 2,8 | Boat,Afoot | 41 | 11 | 26.8 | 1.3 |
| 5 | Airplane | 131 | 89 | 67.9 | 10.4 |
| 5,8 | Airplane,Afoot | 32 | 24 | 75.0 | 2.8 |
| 6 | Snow Mach. | 41 | 29 | 70.7 | 3.4 |
| 7 | Off Road Veh. | 179 | 112 | 62.6 | 13.1 |
| 7,8 | Off Road Veh. Afoot | 38 | 10 | 26.3 | 1.2 |
| 8 | Afoot | 254 | 94 | 37.0 | 11.0 |
| | TOTAL | 2,126 | 794 | | |
| Total Hunters Reporting Transportation | | 2,536 | 852 | 33.6 | |

Table 6. Relationship of Means of Transport and Success of Moose Hunters, 1967 (con't.).

| Means of Transport* | | | | | % Successful |
|---|---|---|---|---|---|
| Code | Description | No. Hunters | No. Successful | % Success | Hunters Using This Means |
| UNIT 21 | | | | | |
| 1 | Hi.veh. | 12 | 8 | 66.7 | 5.2 |
| 1,2 | Hi.veh.,Boat | 2 | 2 | 100.0 | 1.3 |
| 2 | Boat | 64 | 58 | 90.6 | 37.9 |
| 2,5 | Boat,Airplane | 10 | 10 | 100.0 | 6.5 |
| 5 | Airplane | 54 | 50 | 92.6 | 32.7 |
| 6 | Snow Mach. | 7 | 7 | 100.0 | 4.6 |
| 8 | Afoot | 15 | 14 | 93.3 | 9.2 |
| | TOTAL | 164 | 149 | | |
| Total Hunters Reporting Transportation | | 175 | 153 | 87.5 | |

Table 6. Relationship of Means of Transport and Success of Moose Hunters, 1967 (con't.).

| Means of Transport* | | | | | |
|---|---|---|---|---|---|
| Code | Description | No. Hunters | No. Successful | % Success | % Successful Hunters Using This Means |
| UNIT 22 | | | | | |
| 1 | Hi.veh. | 14 | 8 | 57.1 | 14.3 |
| 1,2 | Hi.veh.,Boat | 7 | 2 | 28.6 | 3.6 |
| 1,8 | Hi.veh.,Afoot | 9 | 5 | 55.6 | 8.9 |
| 2 | Boat | 67 | 26 | 38.8 | 46.4 |
| 2,8 | Boat, Afoot | 7 | 5 | 71.4 | 8.9 |
| 5 | Airplane | 3 | 3 | 100.0 | 5.4 |
| 6 | Snow Mach. | 2 | 2 | 100.0 | 3.6 |
| | TOTAL | 109 | 51 | | |
| Total Hunters Reporting Transportation | | 123 | 56 | 45.5 | |

Table 6. Relationship of Means of Transport and Success of Moose Hunters, 1967 (con't.).

| Means of Transport* Code | Description | No. Hunters | No. Successful | % Success | % Successful Hunters Using This Means |
|---|---|---|---|---|---|
| UNIT 23 | | | | | |
| 2 | Boat | 58 | 46 | 79.3 | 60.5 |
| 2,8 | Boat,Afoot | 9 | 6 | 66.7 | 7.9 |
| 5 | Airplane | 14 | 12 | 85.7 | 15.8 |
| 5,8 | Airplane,Afoot | 2 | 2 | 100.0 | 2.6 |
| 6 | Snow Mach. | 4 | 3 | 75.0 | 3.9 |
| 8 | Afoot | 4 | 4 | 100.0 | 5.3 |
| | TOTAL | 91 | 73 | | |
| Total Hunters Reporting Transportation | | 101 | 76 | 75.2 | |
| UNIT 24 | | | | | |
| 2 | Boat | 27 | 26 | 96.3 | 44.8 |
| 2,8 | Boat,Afoot | 6 | 4 | 66.7 | 6.9 |
| 5 | Airplane | 16 | 13 | 81.3 | 22.4 |
| 5,8 | Airplane,Afoot | 6 | 3 | 50.0 | 5.2 |
| 7 | Off Road Veh. | 4 | 3 | 75.0 | 5.2 |
| 8 | Afoot | 12 | 9 | 75.0 | 15.5 |
| | TOTAL | 71 | 58 | | |
| Total Hunters Reporting Transportation | | 71 | 58 | 81.8 | |

Table 6. Relationship of Means of Transport and Success of Moose Hunters, 1967 (con't.).

| Means of Transport* | | No. Hunters | No. Successful | % Success | % Successful Hunters Using This Means |
|---|---|---|---|---|---|
| Code | Description | | | | |
| UNIT 25 | | | | | |
| 1 | Hi.veh. | 3 | 3 | 100.0 | 5.9 |
| 1,2 | Hi.veh.,Boat | 4 | 2 | 50.0 | 3.9 |
| 1,5 | Hi.veh.,Airplane | 2 | 2 | 100.0 | 3.9 |
| 2 | Boat | 38 | 27 | 71.1 | 52.9 |
| 2,8 | Boat,Afoot | 5 | 4 | 80.0 | 7.8 |
| 5 | Airplane | 6 | 6 | 100.0 | 11.8 |
| 8 | Afoot | 6 | 3 | 50.0 | 5.9 |
| | TOTAL | 64 | 47 | | |
| Total Hunters Reporting Transportation | | 70 | 51 | 72.8 | |
| UNIT 26 | | | | | |
| 5 | Airplane | 5 | 5 | 100.0 | 100.0 |
| | TOTAL | 5 | 5 | | |
| Total Hunters Reporting Transportation | | 7 | 5 | 71.4 | |

Table 6. Relationship of Means of Transport and Success of Moose Hunters, 1967 (con't.).

| Means of Transport* | | | | | |
|---|---|---|---|---|---|
| Code | Description | No. Hunters | No. Successful | % Success | % Successful Hunters Using This Means |
| UNIT 27 (Unit Unknown) | | | | | |
| 1 | Hi.veh. | 340 | 8 | 2.4 | 11.3 |
| 2 | Boat | 123 | 17 | 13.8 | 23.9 |
| 5 | Airplane | 66 | 16 | 24.2 | 22.5 |
| 7 | Off Road Veh. | 64 | 6 | 9.4 | 8.5 |
| 8 | Afoot | 196 | 14 | 7.1 | 19.7 |
| | TOTAL | 789 | 61 | | |
| Total Hunters Reporting Transportation | | 1,439 | 71 | 4.9 | |

Table 7. Hunting Success with the aid of Snow Machine, 1967.

| Unit | Number Hunters Reporting | Number Hunters Using Snow Machine | % Using Snow Machine | % Success of Snow Machine Users | Number Moose Taken W/aid of Snow Machine |
|---|---|---|---|---|---|
| Composite of All Units | 14,983 | 746 | 4.9 | 24.3 | 182 |
| 1 | 563 | 0 | 0 | 0 | 0 |
| 3 | 4 | 0 | 0 | 0 | 0 |
| 5 | 367 | 3 | .8 | 33.3 | 1 |
| 6 | 99 | 1 | 1.01 | 0 | 0 |
| 7 | 305 | 4 | 1.31 | 0 | 0 |
| 9 | 500 | 9 | 1.8 | 44.4 | 4 |
| 11 | 276 | 31 | 11.2 | 58.0 | 18 |
| 12 | 379 | 25 | 6.5 | 40.0 | 10 |
| 13 | 3,230 | 164 | 5.07 | 25.0 | 41 |
| 14 | 2,136 | 134 | 6.27 | 12.6 | 17 |
| 15 | 1,839 | 59 | 3.2 | 35.5 | 21 |
| 16 | 439 | 35 | 7.9 | 28.5 | 10 |
| 17 | 66 | 3 | 4.5 | 66.6 | 2 |
| 18 | 57 | 2 | 3.5 | 0 | 0 |
| 19 | 200 | 10 | 5.0 | 30.0 | 3 |
| 20 | 2,536 | 114 | 4.5 | 32.4 | 37 |
| 21 | 175 | 7 | 4.0 | 100.0 | 7 |
| 22 | 123 | 6 | 4.8 | 50.0 | 3 |
| 23 | 101 | 10 | 9.9 | 40.0 | 4 |

Table 7. Hunting Success with the aid of Snow Machine, 1967 (cont.).

| Unit | Number Hunters Reporting | Number Hunters Using Snow Machine | % Using Snow Machine | % Success of Snow Machine Users | Number Moose Taken W/aid of Snow Machine |
|---|---|---|---|---|---|
| Composite of All Units | 14,983 | 746 | 4.9 | 24.3 | 182 |
| 24 | 71 | 0 | 0 | 0 | 0 |
| 25 | 70 | 3 | 4.2 | 66.6 | 2 |
| 26 | 7 | 0 | 0 | 0 | 0 |
| Unit Unknown | 1,439 | 126 | 8.7 | 1.5 | 2 |

combinations involving snow machines for each Unit are compiled it is clear that in the State as a whole snow machines were used by only about 5 percent of the hunters reporting, and their overall success was similar to the average found among all hunters reporting in the State. Two factors probably depress the figures; (1) The inclusion of Southeast Alaska data where snow machines are probably of little value, and (2), the poor reporting from northern and western bush areas where snow machines are known to be more widely used. The exclusion of the data from Units 1 through 6 raises the percentage of hunters using snow machines to 5.3 percent, and depresses the success rate slightly, to 23.3 percent.

A similar summary of aircraft use in hunting indicates the overall importance of the airplane. The number of moose reported taken using aircraft is 26.7 percent of the reported total harvest.

Relationships of Residence and Unit Hunted

In order to formulate practical management plans for moose, particularly in intensively hunted areas, the amount of hunting pressure, how it relates to access available, and its source should be understood. With sufficient background data some prediction of hunting pressure, patterns of access use, and harvest may be possible. The data in Table 9 relates the number of hunters in each Unit to the major population centers of the State. From the data it is apparent that in Southcentral Alaska the number of hunters in a given Unit will be strongly affected by the distribution of Anchorage hunters alone. The regulations in a given year as they affect the opportunities of Anchorage hunters to hunt with some hope of success will probably be a prominent factor in the distribution of those hunters. However, it is clear that a large proportion of them will continue to hunt in Unit 14, presumably due to the convenient access.

Few hunters from other parts of the State go to Southeast Alaska to hunt according to the data at hand. However, a substantial number of Juneau and Ketchikan hunters hunt elsewhere, mainly in Units 13 and 20. From the standpoint of Unit totals, their percentage is small, but they may contribute considerably to hunting activity in a smaller area such as the Taylor Highway; which is popular with Southeastern hunters.

With the exception of Fairbanks, communities in the Interior-Arctic tend to be small and their hunting is largely restricted to the Unit in which they are located. Fairbanks hunters hunt largely in Unit 20, but some travel to Unit 13, while others through the uses of aircraft and boats reach the more remote Units north and west of Unit 20.

Table 8. Hunting Success with the aid of Aircraft, 1967.

| Unit | Number Hunters Reporting | Number Hunters Using Airplanes | % Using Air-planes | % Success of Airplane Users | Number Moose Taken W/aid of Aircraft |
|---|---|---|---|---|---|
| Composite All Units | 14,983 | 2,423 | 16.1 | 65.3 | 1,584 |
| 1 | 563 | 69 | 12.2 | 15.9 | 11 |
| 3 | 4 | 0 | 0 | 0 | 0 |
| 5 | 367 | 246 | 67.0 | 72.3 | 178 |
| 6 | 99 | 18 | 18.1 | 72.2 | 13 |
| 7 | 305 | 54 | 17.7 | 57.4 | 31 |
| 8 | 1 | 0 | 0 | 0 | 0 |
| 9 | 500 | 293 | 58.6 | 74.7 | 219 |
| 10 | 0 | 0 | 0 | 0 | 0 |
| 11 | 276 | 55 | 19.9 | 85.4 | 47 |
| 12 | 379 | 15 | 3.9 | 80.0 | 12 |
| 13 | 3,230 | 483 | 14.9 | 77.6 | 375 |
| 14 | 2,136 | 119 | 5.6 | 40.3 | 48 |
| 15 | 1,839 | 231 | 12.5 | 61.4 | 142 |
| 16 | 439 | 243 | 55.3 | 68.7 | 167 |
| 17 | 66 | 18 | 27.2 | 88.8 | 16 |
| 18 | 57 | 9 | 15.7 | 77.7 | 7 |
| 19 | 200 | 51 | 25.5 | 86.2 | 44 |
| 20 | 2,536 | 227 | 8.9 | 62.5 | 142 |
| 21 | 175 | 68 | 38.8 | 91.1 | 62 |
| 22 | 123 | 6 | 4.8 | 66.6 | 4 |

Table 8. Hunting Success with the aid of Aircraft, 1967 (cont.).

| Unit | Number Hunters Reporting | Number Hunters Using Airplanes | % Using Air planes | % Success of Airplane Users | Number Moose Taken W/aid of Aircraft |
|---|---|---|---|---|---|
| Composite All Units | 14,983 | 2,423 | 16.1 | 65.3 | 1,584 |
| 23 | 101 | 16 | 15.8 | 93.75 | 15 |
| 24 | 71 | 22 | 30.9 | 72.7 | 16 |
| 25 | 70 | 8 | 11.4 | 100 | 8 |
| 26 | 7 | 5 | 71.4 | 100 | 5 |
| 27 Unknown | 1,439 | 167 | 11.6 | 13.1 | 22 |

Table 9. Relationships of residence of moose hunters and game Management Unit hunted, 1967. The number of hunters from a given community hunting in a particular unit and their number as a proportion of the total hunters reporting that unit are listed under unit headings thus: #/%.

| | | UNIT | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Residence | Code | 1 | 5 | 6 | 7 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| Anchorage | 11 | 2/0 | 17/4 | 8/6 | 207/50 | 89/16 | 1/1 | 154/48 | 190/41 | 1725/43 | 1682/56 | 792/31 | 324/64 |
| Anchor Pt. | 12 | 0/0 | 0/0 | 0/0 | 1/0 | 0 | 0 | 0 | 0 | 3/0 | 1/0 | 75/3 | 0 |
| Auke Bay | 18 | 17/2 | 11/3 | 0 | 0 | 0 | 0 | 0 | 0 | 4/0 | 0 | 1/0 | 0 |
| Bethel | 22 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| College | 48 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2/0 | 31/1 | 0 | 1/0 | 1/0 |
| Delta Jct. | 55 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9/2 | 16/0 | 0 | 1/0 | 0 |
| Eagle Riv. | 60 | 0 | 0 | 1/1 | 2/0 | 2/0 | 0 | 6/2 | 5/1 | 124/3 | 132/4 | 9/0 | 15/3 |
| Fairbanks | 69 | 0 | 0 | 0 | 0 | 2/0 | 0 | 8/2 | 15/3 | 215/5 | 1/0 | 4/0 | 3/1 |
| Glennallen | 79 | 0 | 0 | 0 | 0 | 0 | 0 | 9/3 | 9/2 | 108/3 | 2/0 | 2/0 | 0 |
| Haines | 84 | 225/30 | 3/1 | 0 | 0 | 0 | 0 | 0 | 0 | 6/0 | 0 | 0 | 0 |
| Homer | 90 | 0 | 0 | 0 | 1/0 | 2/0 | 0 | 0 | 0 | 2/0 | 1/0 | 259/10 | 0 |
| Juneau | 100 | 198/26 | 127/30 | 0 | 0 | 0 | 0 | 1/0 | 8/2 | 37/1 | 4/0 | 9/0 | 1/0 |
| Kenai | 109 | 0 | 2/0 | 0 | 6/1 | 12/2 | 0 | 0 | 0 | 14/0 | 228/8 | 418/16 | 14/3 |
| Ketchikan | 110 | 33/4 | 19/4 | 0 | 1/0 | 1/0 | 0 | 0 | 4/1 | 13/0 | 0 | 0 | 0 |
| Nenana | 147 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2/0 | 0 | 0 | 0 |

Table 9. Cont'd

| | | UNIT | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Residence | Code | 1 | 5 | 6 | 7 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| No. Pole | 156 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9/0 | 1/0 | 0 | 0 |
| Palmer | 163 | 0 | 1/0 | 0 | 2/0 | 2/0 | 0 | 5/2 | 4/1 | 181/4 | 330/11 | 4/0 | 10/2 |
| Seward | 193 | 1/0 | 0 | 0 | 74/18 | 4/1 | 0 | 1/0 | 0 | 9/0 | 3/0 | 98/4 | 2/0 |
| Soldotna | 203 | 0 | 0 | 0 | 4/1 | 8/1 | 0 | 1/0 | 0 | 2/0 | 3/0 | 359/15 | 3/1 |
| Tok | 221 | 0 | 0 | 0 | 0 | 0 | 0 | 2/1 | 46/10 | 24/1 | 0 | 0 | 0 |
| Valdez | 231 | 0 | 0 | 5/4 | 0 | 0 | 0 | 5/2 | 3/1 | 73/2 | 1/0 | 0 | 0 |
| Wasilla | 236 | 1/0 | 2/0 | 0 | 0 | 1/0 | 0 | 0 | 0 | 28/1 | 164/5 | 4/0 | 4/1 |
| Wrangell | 241 | 114/19 | 6/1 | 0 | 0 | 0 | 0 | 1/0 | 0 | 2/0 | 0 | 0 | 0 |
| Eielson | 243 | 0 | 0 | 2/2 | 0 | 0 | 0 | 0 | 6/1 | 61/2 | 2/0 | 0 | 0 |
| Elmendorf | 244 | 0 | 0 | 0 | 18/4 | 8/1 | 0 | 18/6 | 13/3 | 156/4 | 203/7 | 66/3 | 17/3 |
| Ft. Rich. | 246 | 0 | 0 | 0 | 4/1 | 2/0 | 0 | 5/2 | 8/2 | 70/2 | 113/4 | 15/1 | 6/1 |
| Ft. Wain. | 247 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2/1 | 2/0 | 19/0 | 0 | 0 |
| Tot. # Hunters in Units. | | 750 | 428 | 132 | 416 | 548 | 1 | 321 | 466 | 4052 | 2986 | 2562 | 505 |

Table 9. Cont'd.

| Residence | UNIT 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | Total hunters from residence indicating unit. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Anchorage | 5/6 | 0/0 | 20/9 | 106/3 | 8/4 | 2/1 | 0/0 | 2/2 | 2/3 | 0 | 961/37 | 6297 |
| Anchor Pt. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 13/1 | 93 |
| Auke Bay | 0 | 0 | 0 | 6/0 | 0 | 0 | 0 | 0 | 0 | 0 | 3/0 | 42 |
| Bethel | 3/4 | 21/34 | 23/11 | 3/0 | 36/19 | 0 | 0 | 0 | 0 | 0 | 11/0 | 97 |
| College | 0 | 0 | 0 | 180/5 | 5/3 | 3/2 | 1/1 | 0 | 2/3 | 0 | 23/1 | 249 |
| Delta Jct. | 0 | 0 | 0 | 194/6 | 2/1 | 0 | 0 | 0 | 0 | 0 | 29/1 | 251 |
| Eagle Riv. | 0 | 0 | 4/2 | 3/0 | 0 | 0 | 0 | 0 | 0 | 0 | 42/2 | 345 |
| Fairbanks | 0 | 0 | 0 | 1213/36 | 15/8 | 1/1 | 0 | 11/11 | 11/14 | 0 | 183/7 | 1682 |
| Glennallen | 0 | 0 | 0 | 2/0 | 0 | 0 | 0 | 0 | 0 | 0 | 16/1 | 148 |
| Haines | 0 | 0 | 0 | 8/0 | 0 | 0 | 0 | 0 | 0 | 0 | 45/2 | 287 |
| Homer | 2/3 | 0 | 0 | 3/0 | 0 | 0 | 0 | 0 | 0 | 0 | 36/1 | 306 |
| Juneau | 0 | 0 | 2/1 | 69/2 | 2/1 | 0 | 0 | 0 | 2/3 | 0 | 6/0 | 466 |
| Kenai | 3/4 | 0 | 0 | 1/0 | 0 | 1/1 | 0 | 0 | 0 | 0 | 88/3 | 787 |
| Ketchikan | 0 | 0 | 0 | 13/.4 | 0 | 0 | 0 | 0 | 0 | 0 | 3/0 | 87 |
| Nenana | 0 | 0 | 0 | 63/2 | 1/1 | 0 | 0 | 0 | 0 | 0 | 19/1 | 85 |
| No. Pole | 0 | 0 | 0 | 34/1 | 1/1 | 0 | 0 | 0 | 0 | 0 | 14/1 | 59 |
| Palmer | 1/1 | 0 | 0 | 2/0 | 0 | 0 | 0 | 1/1 | 0 | 0 | 88/3 | 631 |
| Seward | 0 | 0 | 0 | 1/0 | 0 | 0 | 0 | 0 | 0 | 0 | 44/2 | 237 |

Table 9. Cont'd.

| Residence | UNIT 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | Total hunters from residence indicating unit. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Soldotna | 0 | 0 | 0 | 3/0 | 0 | 0 | 0 | 0 | 0 | 0 | 59/2 | 442 |
| Tok | 0 | 0 | 0 | 50/2 | 1/1 | 0 | 0 | 0 | 0 | 0 | 26/1 | 149 |
| Valdez | 0 | 0 | 0 | 1/0 | 0 | 0 | 0 | 0 | 0 | 0 | 15/1 | 103 |
| Wasilla | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 24/1 | 228 |
| Wrangell | 0 | 0 | 0 | 5/0 | 0 | 0 | 0 | 0 | 0 | 0 | 17/1 | 145 |
| Eielson | 0 | 0 | 1/0 | 387/12 | 0 | 0 | 0 | 0 | 2/3 | 0 | 82/3 | 543 |
| Elmendorf | 0 | 0 | 0 | 8/0 | 7/4 | 0 | 0 | 0 | 0 | 0 | 125/5 | 639 |
| Ft. Rich. | 0 | 0 | 0 | 4/0 | 0 | 0 | 0 | 0 | 0 | 0 | 57/1 | 284 |
| Ft. Wain. | 0 | 0 | 0 | 297/9 | 0 | 0 | 0 | 0 | 0 | 0 | 35/1 | 355 |
| | | | | | | | | | | | Total hunters from selected residences | 15,037 |
| Total hunters in units | 77 | 61 | 217 | 3356 | 192 | 153 | 117 | 97 | 78 | | 2568 | |
| | | | | | | | | | | | (Total hunters, State | 20,082) |

These residence - Unit hunted data provide a valuable basis for understanding the movements of hunters within the State, but at this point it is necessary to remember that one year's data can not be considered conclusive.

Residence: Transportation Relationships

The most used means of transport used by hunters from selected major communities are shown in Table 10. Some differences in the distribution of means of transport used are apparent, although highway vehicles alone or in combination with afoot constitute 20 percent or more of the means used in all cases. Airplanes are clearly used more by Anchorage hunters than by Fairbanks hunters. The same is true of off-road vehicles. The reverse situation is true of boat use. An interesting difference in the reporting by Anchorage and Fairbanks hunters is where highway vehicles are used alone or in combination with "afoot", the Anchorage hunters reported mainly "highway vehicles plus afoot" while Fairbanks hunters reported mainly "highway vehicle alone".

The category "afoot" introduces problems of interpretation. Technically all hunters must be afoot to legally take a moose, and most probably are. Some undoubtedly report "afoot" which strictly speaking is correct, even though they used some vehicle to reach their hunting area. The intent of the question assumes the hunter is afoot when hunting or shooting, and is intended to find out how he got to the hunting area. The majority of hunters probably understand the intent of the question and answer accordingly. There is no way to determine what proportion of hunters used only foot transportation. The whole problem could be eliminated by replacing "afoot" with "other".

An interesting contrast also exists between Homer, where off-road vehicles are the major means used, and Kenai and Soldotna, where highway vehicles are by far the most popular transportation. Highway vehicles are the major means of transportation of Seward hunters also.

The strong showing of highway vehicle use by Ketchikan hunters is partly attributable to their interest in hunting the northern part of Unit 1 and the Taylor Highway country in Unit 20C.

The large proportion of hunters who did not indicate what transportation they used presents a problem in interpretation of the data. Distributing these returns proportionately among the reported means may be done if the number not reporting remains high in the future.

Table 10. Major Means of Transportation Used by Moose Hunters from Selected Urban Areas, 1967. Means with less than 10 users are not listed separately.

| Means of Trans.* | # of Hunters using Means | % of Total Hunters using Means |
|---|---|---|
| ANCHORAGE | | |
| None reported | 534 | 11.9 |
| 1 | 124 | 2.8 |
| 1,2 | 76 | 1.7 |
| 1,2,5,8 | 10 | .2 |
| 1,2,6 | 10 | .2 |
| 1,2,6,8 | 12 | .3 |
| 1,2,7,8 | 12 | .3 |
| 1,2,8 | 103 | 2.3 |
| 1,5 | 28 | .6 |
| 1,5,8 | 45 | 1.0 |
| 1,6 | 59 | 1.3 |
| 1,6,7,8 | 21 | .5 |
| 1,6,8 | 46 | 1.0 |
| 1,7 | 73 | 1.6 |
| 1,7,8 | 72 | 1.6 |
| 1,8 | 805 | 18.0 |

* 1. Highway Vehicle
2. Boat
3. Tote, Gote
4. Horse
5. Airplane
6. Snow Machine
7. Off Road Vehicle
8. Afoot

Table 10. Major Means of Transportation Used by Moose Hunters from Selected Urban Areas, 1967 (con't.). Means with less than 10 users are not listed separately.

| Means of Trans.* | # of Hunters using Means | % of Total Hunters using Means |
|---|---|---|
| ANCHORAGE (cont.) | | |
| 2 | 175 | 3.9 |
| 2,5 | 18 | .4 |
| 2,8 | 50 | 1.1 |
| 4 | 31 | .7 |
| 5 | 511 | 11.4 |
| 5,7 | 10 | .2 |
| 5,8 | 69 | 1.3 |
| 6 | 102 | 2.3 |
| 6,8 | 17 | .4 |
| 7 | 586 | 13.1 |
| 7,8 | 90 | 2.0 |
| 8 | 613 | 13.7 |
| Other | 176 | 3.9 |
| Total Hunters: | 4478 | |
| FAIRBANKS | | |
| None reported | 343 | 20.4 |
| 1 | 374 | 22.3 |
| 1,2 | 45 | 2.7 |
| 1,2,8 | 31 | 1.8 |

Table 10. Major Means of Transportation Used by Moose Hunters from Selected Urban Areas, 1967 (con't.). Means with less than 10 users are not listed separately.

| Means of Trans.* | # of Hunters using Means | % of Total Hunters using Means |
|---|---|---|
| FAIRBANKS (cont.) | | |
| 1,6,8 | 12 | .7 |
| 1,7 | 30 | 1.8 |
| 1,7,8 | 29 | 1.7 |
| 1,8 | 159 | 9.5 |
| 2 | 174 | 10.4 |
| 2,8 | 12 | .7 |
| 5 | 88 | 5.2 |
| 5,8 | 17 | 1.0 |
| 6 | 29 | 1.7 |
| 7 | 108 | 6.4 |
| 7,8 | 10 | .6 |
| 8 | 106 | 6.3 |
| Other | 112 | 6.7 |
| Total Hunters: | 1679 | |
| HOMER | | |
| None reported | 76 | 24.8 |
| 1 | 41 | 13.4 |
| 1,8 | 23 | 7.5 |

Table 10. Major Means of Transportation Used by Moose Hunters from Selected Urban Areas, 1967 (con't.). Means with less than 10 users are not listed separately.

| Means of Trans.* | # of Hunters using Means | % of Total Hunters using Means |
|---|---|---|
| HOMER (cont.) | | |
| 7 | 66 | 21.6 |
| 7,8 | 19 | 6.2 |
| 8 | 37 | 12.1 |
| Other | 44 | 14.4 |
| Total Hunters: | 306 | |
| KENAI | | |
| None reported | 195 | 34.6 |
| 1 | 125 | 22.2 |
| 1,8 | 62 | 11.0 |
| 2 | 14 | 2.5 |
| 5 | 33 | 5.9 |
| 7 | 15 | 2.7 |
| 8 | 65 | 11.5 |
| Other | 55 | 9.8 |
| Total Hunters: | 564 | |
| KETCHIKAN | | |
| None reported | 14 | 15.6 |
| 1 | 18 | 20.0 |
| 2 | 12 | 13.3 |

Table 10. Major Means of Transportation Used by Moose Hunters from Selected Urban Areas, 1967 (con't.). Means with less than 10 users are not listed separately.

| Means of Trans.* | # of Hunters using Means | % of Total Hunters using Means |
|---|---|---|
| KETCHIKAN (cont.) | | |
| 5 | 17 | 18.9 |
| Other | 29 | 32.1 |
| Total Hunters: | 90 | |
| SEWARD | | |
| None reported | 95 | 36.6 |
| 1 | 44 | 16.9 |
| 1,8 | 53 | 20.4 |
| 5 | 13 | 5.0 |
| 8 | 32 | 12.6 |
| Other | 23 | 8.8 |
| Total Hunters: | 260 | |
| SOLDOTNA | | |
| None reported | 159 | 35.6 |
| 1 | 89 | 19.9 |
| 1,8 | 53 | 11.9 |
| 5 | 21 | 4.7 |
| 8 | 43 | 9.6 |
| Other | 82 | 18.4 |
| Total Hunters: | 447 | |

## Hunter Success, Voluntary and Reminder Letter Returns

Table 11 gives a comparison of the success rates of hunters who returned their moose harvest tickets voluntarily and those who responded only after a reminder letter advising them to return the card or the information. The data shows that the group which voluntarily returned their tickets had a much higher success rate in most Units. These data document a fact previously known in a general way. The data also point our the need for more effective communication with the public regarding the harvest ticket program. The total responding to reminder letters was greater than the total voluntary returns. In some of the outlying Units practically no returns were obtained without reminder letters, while in supposedly conservation-conscious Units like 7, 13, 14 and 15, voluntary returns were not far ahead of reminder returns. In Unit 20 reminder returns were the largest. It seems clear that the Department needs to "sell" this valuable data gathering technique to obtain better quality results more promptly.

Check Stations: Check stations were operated on the Denali Highway and the Taylor Highway to obtain data on the number of people hunting in each area, their results, and to collect biological specimens and data.

The Denali station was open for an extended period (Table 12) in order to contact as many moose and caribou hunters as possible. The Taylor check station was operated only during the height of the moose hunting activity (Table 13). Traffic before and after this period is sporadic unless caribou are available.

The data from these stations provide knowledge of hunting activities in local areas, including details of hunting pressure which are not obtained through harvest ticket reports. Data on residence of a sample of hunters at the Taylor station suggest the relative importance of the area to residents of the three major areas of the State.

Both stations have been operated for several years and a more detailed examination of the data acquired is planned.

## Range Inventories

Range inventory work was carried out by Jack Didrickson and his assistants in the Matanuska Valley as described under "Techniques". The data obtained are given in Tables 14 through 17, and Figs. 6 and 7.

Table 11. Comparison of moose hunter success data of voluntarily returned harvest reports and reminder letter reports, 1967.

| | Voluntary Reports | | | Reminder Reports | | |
|---|---|---|---|---|---|---|
| Unit | Total Reporting | No. Successful | % Successful | Total Reporting | No. Successful | % Successful |
| 1 | 551 | 204 | 37 | 198 | 20 | 10 |
| 5 | 326 | 239 | 73 | 100 | 24 | 24 |
| 6 | 73 | 33 | 45 | 59 | 4 | 7 |
| 7 | 251 | 106 | 42 | 163 | 19 | 12 |
| 9 | 344 | 298 | 87 | 202 | 80 | 40 |
| 11 | 245 | 157 | 64 | 72 | 23 | 32 |
| 12 | 307 | 158 | 51 | 157 | 24 | 15 |
| 13 | 2,531 | 1,338 | 53 | 1,496 | 214 | 14 |
| 14 | 1,653 | 396 | 24 | 1,315 | 99 | 8 |
| 15 | 1,459 | 529 | 36 | 1,090 | 118 | 11 |
| 16 | 347 | 236 | 68 | 156 | 46 | 29 |
| 17 | 31 | 24 | 77 | 46 | 14 | 30 |
| 18 | 7 | 4 | 57 | 54 | 20 | 37 |
| 19 | 90 | 81 | 90 | 127 | 57 | 45 |

Table 11. Comparison of moose hunter success data of voluntarily returned harvest reports and reminder letter reports, 1967.

| | Voluntary Reports | | | Reminder Reports | | |
|---|---|---|---|---|---|---|
| Unit | Total Reporting | No. Successful | % Successful | Total Reporting | No. Successful | % Successful |
| 20 | 1,643 | 676 | 41 | 1,705 | 180 | 11 |
| 21 | 103 | 90 | 87 | 89 | 65 | 73 |
| 22 | 55 | 45 | 82 | 99 | 13 | 13 |
| 23 | 59 | 53 | 90 | 58 | 23 | 40 |
| 24 | 76 | 72 | 95 | 20 | 10 | 50 |
| 25 | 45 | 34 | 76 | 33 | 20 | 61 |
| 26 | 5 | 5 | 100 | 2 | 0 | 0 |
| 27 (Unk) | 1,353 | 59 | 4 | 1,279 | 13 | 1 |
| TOTAL | 11,554 | 4,837 | 42 | 13,357 | 1,086 | 8 |

Table 12. Denali Check Station Summary, 1966 and 1967.

| | 1967 | 1966 |
|---|---|---|
| Period of Operation..... | 14 Aug. - 9 Oct. | 15 Aug. - 10 Oct. |
| Individual Hunters..... | 2977 | 2799 |
| Hunting Parties..... | 1306 | 1202 |
| Average Party Size..... | 2.38 | 2.33 |
| Range in Party Size..... | 1 - 9 | 1 - 11 |
| Number of Successful Hunters..... | 864 | 907 |
| Percent Hunter Success..... | 29.02 | 32.40 |
| Caribou Harvest..... | 740 (65% males) | 857 (71% males) |
| Moose Harvest..... | 312 (78% males) | 290 |
| Sheep Harvest..... | 10 | 9 |
| Grizzly Harvest..... | 2 | 9 |
| Black Bear Harvest..... | 2 | 2 |

Table 13. Taylor Highway Moose Harvest Data, 1967.

Dates of operation: September 15 - October 1, 1967

Hours of operation: 3:00-4:00 AM. to 11:00-12:00 PM.

Total hunters: 485

No. parties: 208

Mean party size: 2.3

Range of party size: min: 1 - max: 7

Total days expended: 663

No. days hunted/hunter: 1.5 days

No. moose checked: 68 No. moose taken, harvest ticket data, 3/15/68 = 110.

% success of moose hunters: 14

Successful resident: 51; non-resident: 17

Other species harvested:

Caribou - 5
Wolf - 1
Black Bear - 1
Brown Bear - 1
Grizzly - 1
Grouse - 20 - 40

Residence of Taylor Highway hunters

| Interior Fairbanks | Tok | Delta Junction | Other Int. | | |
|---|---|---|---|---|---|
| 17 | 4 | 3 | 3 | = | 27 |
| **Southcentral Anchorage** | **Other S.C.** | | | | |
| 3 | 2 | | | = | 5 |
| **Southeastern Ketchikan** | **Juneau** | **Other S.E.** | | | |
| 3 | 10 | 4 | | = | 17 |
| | | | | Total | 49 |

Table 14. Canopy coverage by taxon, Willow Moose exclosure, 1967. Total by sampling line and average for exclosure and control plot.

| | Outside | | | | | Inside | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | Total 100 | 1 | 2 | 3 | 4 | Total 100 |
| Picea gl a. | | | | | | | | | | |
| b. | 127.5 | 135.0 | 10.0 | 152.5 | 4.2 | 5.0 | 37.5 | 2.5 | | 0.4 |
| Stem # | 4 | 3 | 1 | 2 | 10 | 1 | 1 | 0 | 0 | 2 |
| Betula r. a. | | | | | 0.0 | | | | | 0.0 |
| b. | 110.0 | 230.0 | 97.5 | 182.5 | 6.20 | 132.5 | 207.5 | 257.5 | 355.0 | 9.5 |
| Stem # | 13 | 14 | 13 | 16 | 56 | 10 | 7 | 12 | 13 | 42 |
| Populus a. | | | | | 0.0 | | | | | 0.0 |
| b. | 32.5 | | 92.5 | 30.0 | 1.6 | 282.5 | 52.5 | 300.0 | 242.5 | 8.8 |
| Stem # | 1 | 0 | 3 | 0 | 4 | 2 | 1 | 2 | 2 | 7 |
| Salix | 752.5 | 660.0 | 750.0 | 480.0 | 26.4 | 642.5 | 335.0 | 130.0 | 517.5 | 16.2 |
| Stem # | 28 | 15 | 19 | 11 | 73 | 3 | 6 | 3 | 6 | 18 |
| Vaccinium | 55.0 | 102.5 | 197.5 | 90.0 | 4.4 | 220.0 | 392.5 | 232.5 | 215.0 | 10.6 |
| Cornus | 272.5 | 155.0 | 175.0 | 177.5 | 7.8 | 247.5 | 645.0 | 252.5 | 610.0 | 17.6 |
| Epilobium | 217.5 | 112.5 | 140.0 | 160.0 | 6.3 | 280.0 | 142.5 | 192.5 | 255.0 | 8.7 |
| Dead | 475.0 | 172.5 | 285.0 | 405.0 | 13.4 | 97.5 | 260.0 | 92.5 | 427.5 | 8.8 |
| Calamagrostis | 242.5 | 665.0 | 1045.0 | 422.5 | 23.8 | 537.5 | 745.0 | 702.5 | 1455.0 | 34.4 |
| Ledum | 37.5 | 62.5 | | 87.5 | 1.9 | 15.0 | 285.0 | 70.0 | 162.5 | 5.3 |
| Polytrichum | 2040.0 | 1950.0 | 1892.5 | 1942.5 | 78.2 | 2065.0 | 2140.0 | 2127.5 | 2192.5 | 85.2 |
| Fruiticose | 15.0 | 22.5 | 10.0 | 27.5 | 0.8 | 5.0 | 15.0 | | 92.5 | 1.1 |
| Equisetum | 80.0 | 15.0 | 10.0 | 70.0 | 1.8 | | | | | 0.0 |
| Hylocomium | 15.0 | 177.5 | 25.0 | 67.5 | 2.8 | 50.0 | 30.0 | 160.0 | 167.5 | 4.1 |
| Mushroom | 12.5 | 12.5 | 5.0 | | 0.3 | 2.5 | 2.5 | 7.5 | 7.5 | 0.2 |
| Vaccinium u | 92.5 | 432.5 | 382.5 | 377.5 | 12.8 | 1172.5 | 882.5 | 1095.0 | 92.5 | 32.4 |
| Solidago | 2.5 | | | | 0.02 | | | | | 0.0 |
| Agrostis | 2.5 | 165.0 | 115.0 | 150.0 | 4.3 | 2.5 | | | 2.5 | 0.05 |
| Lupine | | 262.5 | | | 2.6 | | | | | 0.0 |
| Rosa sp | | | | 2.5 | 0.02 | | 2.5 | 80.0 | 72.5 | 1.6 |
| Luzula | | | | | 0.0 | | | 2.5 | | 0.02 |
| Peltigera | 100.0 | 100.0 | 127.5 | 37.5 | 3.6 | 2.5 | 52.5 | 37.5 | 55.0 | 1.5 |

Table 15. Canopy coverage by taxon, Knik Moose exclosure, 1967. Total by sampling line, and average for exclosure and control plot.

| | Outside | | | | | Inside | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | Total 100 | 1 | 2 | 3 | 4 | Total 100 |
| Picea gl. a | | | | | 0.0 | | | | | 0.0 |
| b | | | 2.5 | | 0.02 | | | | | 0.0 |
| Stem # | | | 1 | | 1 | | | | | 0 |
| Betula r. a | | 32.5 | | | 0.3 | | | | | 0.0 |
| b | | | 42.5 | | 0.4 | | | | | 0.0 |
| Stem # | | | | | 0 | | | | | 0 |
| Populus t. a | | | | | 0.0 | | | | | 0.0 |
| b | | | | | 0.0 | | | | | 0.0 |
| Stem # | | | | | 0 | | | | | 0 |
| Salix | 272.5 | 575.5 | 487.5 | 960.0 | 23.0 | 37.5 | 62.5 | 55.0 | 15.0 | 1.7 |
| Stem # | 2 | 14 | 3 | 32 | 51 | 1 | | 1 | | 2 |
| Vaccinium | | | | | 0.0 | | | | | 0.0 |
| Cornus | | | | | 0.0 | | | | | 0.0 |
| Epilobium | | 15.0 | | | 0.2 | | | | | 0.0 |
| Dead | 130.0 | 805.0 | 662.5 | 592.5 | 21.9 | 1150.0 | 855.0 | 1067.5 | 752.5 | 38.2 |
| Eleagnus | 600.0 | 465.0 | 460.0 | 370.0 | 19.0 | 692.5 | 355.0 | 630.0 | 722.5 | 24.0 |
| Stem # | | 1 | 8 | 4 | 13 | 3 | 10 | 15 | 15 | 43 |
| Equisetum | | 17.5 | 80.0 | 47.5 | 1.4 | 540.0 | 177.5 | 32.5 | 52.5 | 8.0 |
| Artemsia | | | | 2.5 | 0.02 | 185.0 | 162.5 | 130.0 | 92.5 | 5.7 |
| Hedysarum | | 40.0 | | 85.0 | 1.2 | 45.0 | 162.5 | 15.0 | 167.5 | 3.9 |
| Achillea | 275.0 | 270.0 | 512.5 | 367.5 | 14.2 | 902.5 | 830.0 | 705.0 | 530.0 | 29.7 |
| Aster sp | 45.0 | 445.0 | 477.5 | 25.0 | 9.9 | 122.5 | 217.5 | 825.0 | 402.5 | 15.7 |
| Elymus m | 410.0 | 707.5 | 747.5 | 852.5 | 27.2 | 1037.5 | 867.5 | 597.5 | 1220.0 | 37.2 |
| Festuca r | 1365.0 | 1602.5 | 965.0 | 435.0 | 43.7 | 1377.5 | 2267.5 | 2195.0 | 2147.5 | 79.9 |
| Rhinanthus m | | | | | 0.0 | | | 15.0 | | 0.2 |
| Agropyron | 457.5 | 265.0 | 617.5 | 552.5 | 18.9 | 1072.5 | 1165.0 | 1317.5 | 1267.5 | 48.2 |
| Smilacina | | 55.0 | | 162.5 | 2.2 | | | | | 0.0 |
| Iris setosa | 72.5 | 2.5 | | 2.5 | 0.8 | | 30.0 | | | 0.3 |
| Bromus p | | | 2.5 | 20.0 | 0.2 | 5.0 | | | 32.5 | 0.4 |
| Mertensia | 2.5 | 15.0 | 52.5 | 142.5 | 2.1 | 20.0 | 130.0 | 2.5 | 15.0 | 1.7 |
| Lathyrus m | 7.5 | | | 482.5 | 4.9 | 162.5 | | 15.0 | 132.5 | 3.1 |
| Calamagrostis | 1112.5 | 1427.5 | 932.5 | 1007.5 | 44.8 | 575.0 | 310.0 | 1085.0 | 1025.0 | 30.0 |
| Poa sp | | 5.0 | | 2.5 | 0.1 | | | | | 0.0 |
| Poa eminens | | | | | 0.0 | | | | | 0.0 |
| Parnassia | | | 2.5 | 7.5 | 0.1 | 17.5 | 17.5 | 22.5 | 20.0 | 0.8 |
| Aster sibiricus | | | 120.0 | 35.0 | 1.6 | 52.5 | 2.5 | | | 0.6 |
| Lathyrus p | 2.5 | 55.0 | 72.5 | 25.0 | 1.6 | 102.5 | 65.0 | 52.5 | 80.0 | 3.0 |
| Habenaria | | | | | 0.0 | | 2.5 | 17.5 | | 0.2 |
| Potentilla | | | | | 0.0 | | | | | 0.0 |
| Angelica | | | | | 0.0 | | | | | 0.0 |
| Conioselinum | | | | 7.5 | 0.1 | 2.5 | 5.0 | | | 0.1 |
| Sedge | | | 15.0 | | 0.2 | | | | | 0.0 |
| Moss | 1212.5 | 937.5 | 1037.5 | 475.0 | 36.6 | 1200.0 | 1650.0 | 937.5 | 887.5 | 46.8 |
| Rosa sp | | | 2.5 | | 0.02 | 2.5 | | | | 0.02 |
| Cerastium | | | 2.5 | | 0.02 | 137.5 | | | 15.0 | 1.5 |
| Agrostis | | | | | 0.0 | | | | 30.0 | 0.3 |
| Taraxacum | | | | | 0.0 | 17.5 | 2.5 | | 2.5 | 0.2 |

Table 16. Estimated percentages of Plant Coverages, Matanuska Valley Moose Exclosures, 1967.

| Species | WILLOW AREA Outside | WILLOW AREA Inside | MATANUSKA-KNIK Outside | MATANUSKA-KNIK Inside |
|---|---|---|---|---|
| Picea gl a. | | | 0.0 | 0.0 |
| b. | 4.2 | 0.4 | 0.02 | 0.0 |
| Stem # | 10 | 2 | 1 | 0 |
| Betula r. a. | 0.0 | 0.0 | 0.3 | 0.0 |
| b. | 6.20 | 9.5 | 0.4 | 0.0 |
| Stem # | 56 | 42 | 0 | 0 |
| Populus a. | 0.0 | 0.0 | 0.0 | 0.0 |
| b. | 1.6 | 8.8 | 0.0 | 0.0 |
| Stem # | 4 | 7 | 0 | 0 |
| Salix | 26.4 | 16.2 | 23.0 | 1.7 |
| Stem # | 73 | 18 | 51 | 2 |
| Vaccinium | 4.4 | 10.6 | 0.0 | 0.0 |
| Cornus | 7.8 | 17.6 | 0.0 | 0.0 |
| Epilobium | 6.3 | 8.7 | 0.2 | 0.0 |
| Dead | 13.4 | 8.8 | 21.9 | 38.2 |
| Calamagrostis | 23.8 | 34.4 | 44.8 | 30.0 |
| Ledum | 1.9 | 5.3 | | |
| Polytrichum | 78.2 | 85.2 | | |
| Fruiticose | 0.8 | 1.1 | | |
| Equisetum | 1.8 | 0.0 | 1.4 | 8.0 |
| Hylocomium | 2.8 | 4.1 | | |
| Mushroom | 0.3 | 0.2 | | |
| Vaccinium u | 12.8 | 32.4 | | |
| Solidago | 0.02 | 0.0 | | |
| Agrostis | 4.3 | 0.05 | 0.0 | 0.3 |
| Lupine | 2.6 | 0.0 | | |
| Rosa sp | 0.02 | 1.6 | 0.02 | 0.02 |
| Luzula | 0.0 | 0.02 | | |
| Peltigera | 3.6 | 1.5 | | |
| Artemisia | | | 0.02 | 5.7 |
| Hedysarum | | | 1.2 | 3.9 |
| Achillea | | | 14.2 | 29.7 |
| Aster sp | | | 9.9 | 15.7 |
| Elymus m | | | 27.2 | 37.2 |
| Festuca r | | | 43.7 | 79.9 |
| Rhinanthus | | | 0.0 | 0.2 |
| Agropyron | | | 18.9 | 48.2 |
| Smilacina | | | 2.2 | 0.0 |
| Iris setosa | | | 0.8 | 0.3 |
| Bromus p. | | | 0.2 | 0.4 |
| Mertensia | | | 2.1 | 1.7 |
| Lathyrus m. | | | 4.9 | 3.1 |
| Poa sp | | | 0.1 | 0.0 |
| Poa eminens | | | 0.0 | 0.0 |
| Parnassia | | | 0.1 | 0.8 |
| Astersibiricus | | | 1.6 | 0.6 |
| Lathyrus p | | | 1.6 | 3.0 |
| Habenaria | | | 0.0 | 0.2 |
| Potentilla | | | 0.0 | 0.0 |
| Angelica | | | 0.0 | 0.0 |
| Conioselinum | | | 0.1 | 0.1 |
| Sedge | | | 0.2 | 0.0 |
| Moss | | | 36.4 | 46.8 |
| Cerastium | | | 0.02 | 1.5 |
| Taraxacum | | | 0.0 | 0.2 |

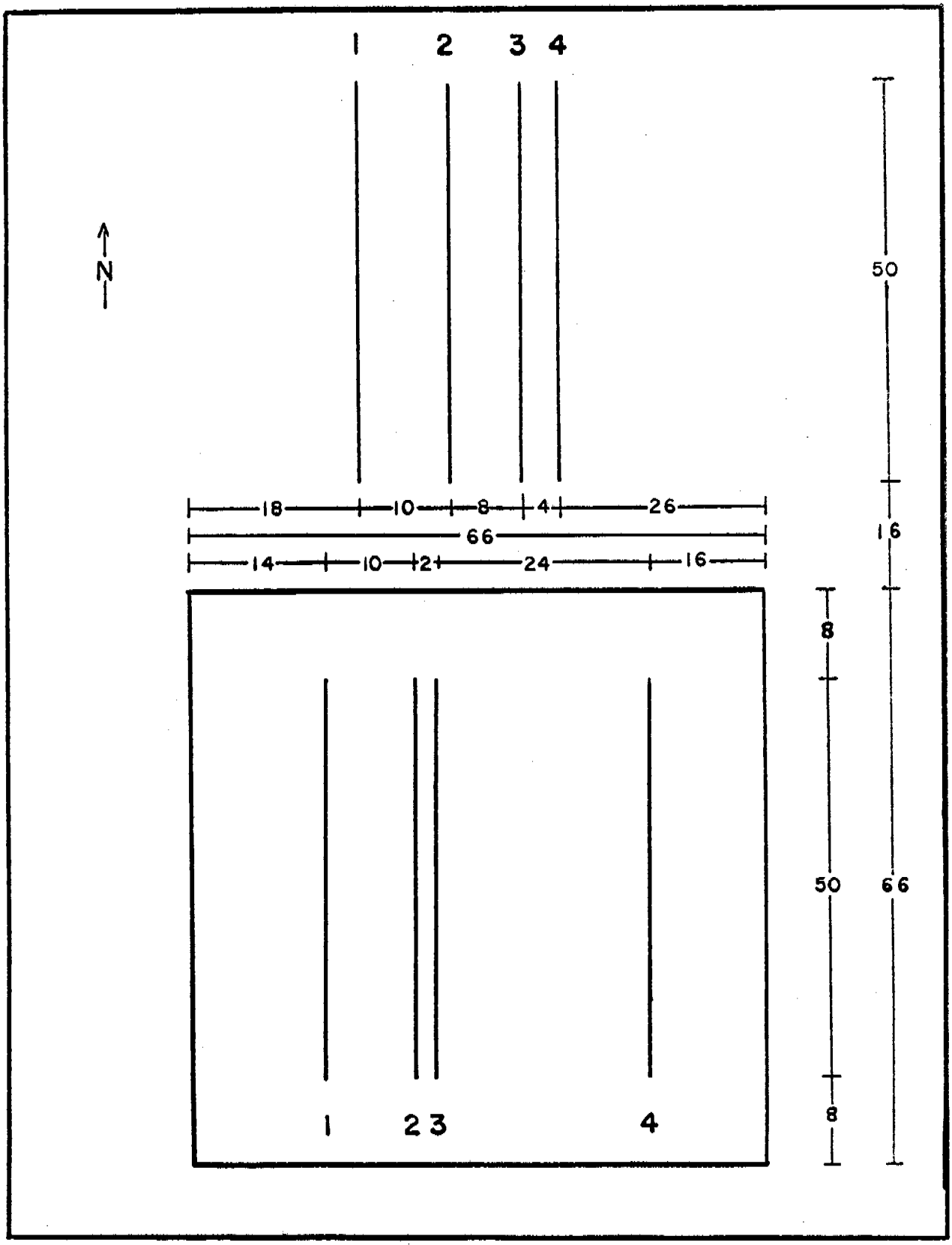



Fig. 6. Location of Lines along which microplots were examined inside and outside the Willow Moose Exclosure, 1967.

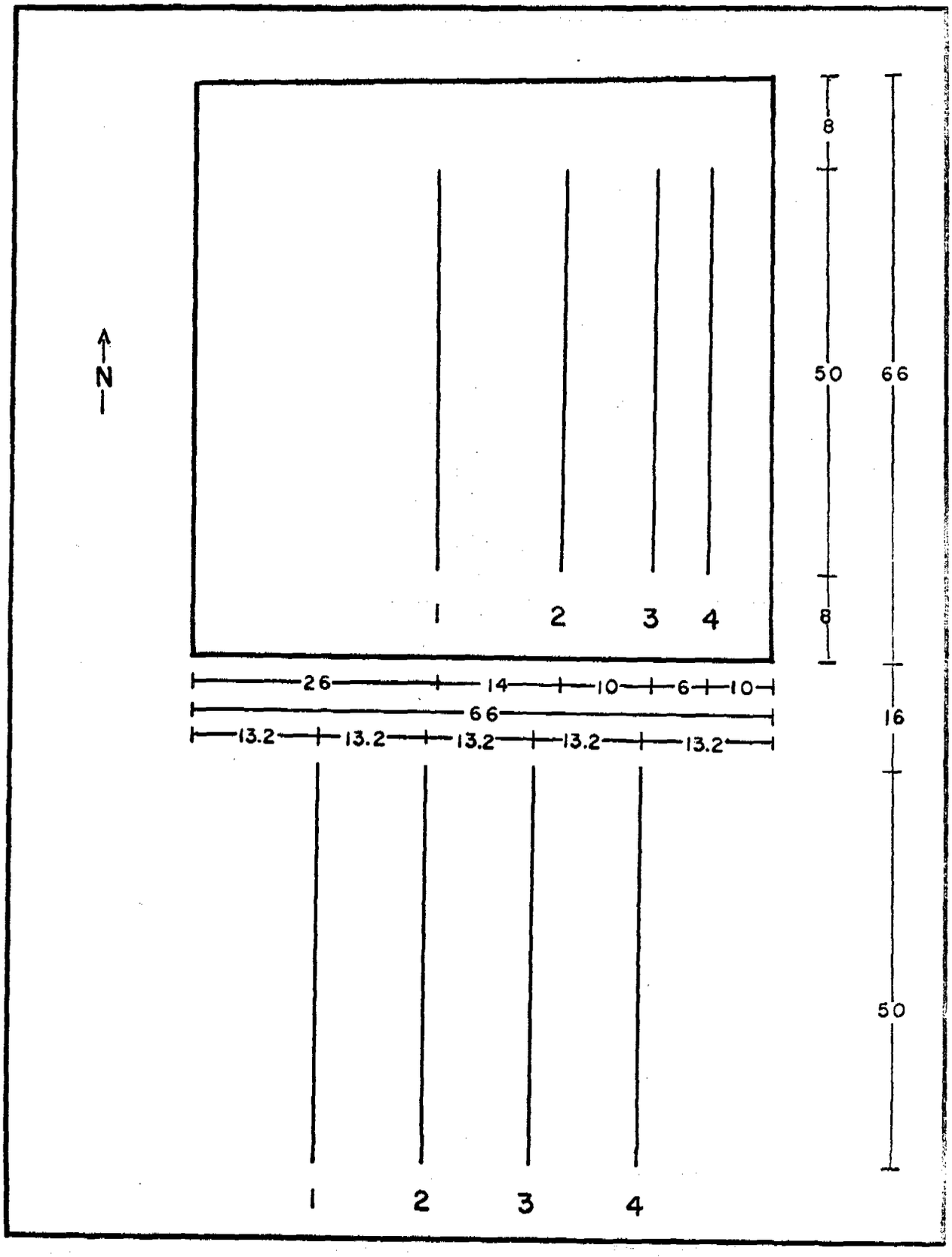



Fig. 7. Location of lines along which microplots were examined inside and outside of the Knik Moose Exclosure, 1967.

Table 17. Information Relating to Transparancies Taken of the Exclosures at Willow and Matanuska-Knik Area, 1967.

## W I L L O W  E N C L O S U R E

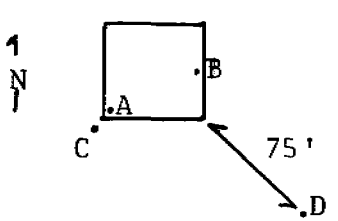
| Camera Point | Location | Camera Height | Camera | Film | Shutter Opening | Shutter Speed | Time of Day |
|---|---|---|---|---|---|---|---|
| A - 1 | SW Corner | 24" | Rollicord | Hi-Speed Ektachrome | F 16 | 125 | 0945 |
| - 2 | " | " | " | " | " | 60 | " |
| - 3 | " | " | " | " | " | 250 | " |
| B - 4 | Middle E side | " | " | " | F 11 | 125 | " |
| - 5 | " | " | " | " | " | 250 | " |
| - 6 | " | " | " | " | " | 60 | " |
| C - 7 | SW Corner | Top of fence | " | " | " | 125 | " |
| - 8 | " | " | " | " | " | 250 | " |
| - 9 | " | " | " | " | " | 60 | " |
| D - 10 | 75' out from SE corner | 50" | " | " | F 16 | 125 | " |
| - 11 | " | " | " | " | " | 250 | " |
| - 12 | " | " | " | " | " | 60 | " |

## M A T A N U S K A - K N I K  E N C L O S U R E

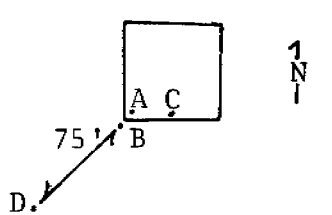
| | | | | | | | |
|---|---|---|---|---|---|---|---|
| A - 1 | SW Corner | 24" | " | " | F 16 | 125 | 1200 |
| - 2 | " | " | " | " | " | 250 | " |
| - 3 | " | " | " | " | " | 60 | " |
| B - 4 | " | Top of fence | " | " | F 22 | 125 | " |
| - 5 | " | " | " | " | " | 250 | " |
| - 6 | " | " | " | " | " | 60 | " |
| C - 7 | Middle S Side | 24" | " | " | F 16 | 125 | " |
| - 8 | " | " | " | " | " | 250 | " |
| - 9 | " | " | " | " | " | 60 | " |
| D - 10 | 75' from SW corner | 50" | " | " | " | 250 | " |
| - 11 | " | " | " | " | " | 500 | " |
| - 12 | " | " | " | " | " | 125 | " |



WILLOW ENCLOSURE




MATANUSKA-KNIK ENCLOSURE



## Sex and Age Composition

Aerial counts of moose in the fall provide indices to the general status of, and are used to assess trends in the welfare of, moose populations in important hunting areas. These counts are not intended to provide an estimate of the number of moose in any given area, but are simply a means of sampling the sex and age composition in a particular population or portion thereof. The data suggest that in most populations sampled changes in sex and age ratios from 1966 to 1967 were slight.

In the Haines area a decline in the proportion of calves and twin calves between 1966 and 1967 may represent a decline in production or it may be an artifact of sampling. However, production in 1967 was still very good. The 1968 counts should help to identify any trend which may be developing.

In Unit 5 slightly improved yearling and calf survival and production are indicated. Conception rates have generally been high in the Yakutat area, but in the last 2 to 3 years production has been low for unknown reasons. The most likely cause seems to have been a very high population on a limited quantity of range.

In Unit 13 where harvests have been rather stable over the past several years production has also been rather stable in each area. As might be expected portions of Unit 13 exhibit better productivity than others. The variations are probably related to general range conditions (which are not well known at this time) and population composition, which has been monitored closely for a number of years.

Moose in the Matanuska Valley where hunting pressure on bulls is high continue to have good production and survival. In the lower Susitna Valley counts made in late winter indicate good survival of calves. Subsequent yearling proportions should be examined carefully since deep snows in the upper portions of this region in early 1968 may have had some affect of survival after the counts. However, in a population subject to so little hunting pressure there is little danger to the general welfare of the population.

In Unit 15 on the Kenai National Moose Range composition counts from 1967 are not strictly comparable to earlier counts. Those data from the "lowland" area indicate a low male:female ratio, similar to the Matanuska Valley. Calf production appears to be fair. In the Funny River Benchland the data show a different herd composition with a higher proportion of bulls and lower proportion of calves. Studies to determine whether these two population segments are distinct or only seasonally separate are being planned. On the lower Kenai production is generally good, especially in the Homer - Anchor Point areas.

Aerial counts in Unit 20A and B suggest that in these areas production of calves and survival of yearlings has improved over the last 2 years. Production however is still only fair. In the Taylor Highway area of 20C, the counts suggest extremely low calf production, so low in fact that it seems very likely that the distribution of moose when the counts were done produced a strongly biased sample in which calves were grossly under-estimated.

Composition counts were made in several new areas (Units 9, 19, 13, 14 and 16) in an effort to obtain data on areas where increases in hunting activity are anticipated.

Censuses

Bad weather precluded completing the square mile-random sample census of the Matanuska Valley moose herd and prevented the use of a similar system at Yakutat.

A transect "total" count was substituted at Yakutat. Results of the 1967 transect "total" count are compared with the results of an analogous survey made in 1964 at Yakutat in Table 18.

Discussion: The total number of moose seen in 1968 is in the same order of magnitude as the total seen in 1964. Considering this and the poor snow cover and therefore visibility prevailing in 1968, moose are at least as numerous as they were in 1964, and probably are more numerous. The counting technique used does not lend itself to statistical determination of confidence limits on the population estimate. Experience in Alaska and other areas indicates that this technique tends to underestimate the number of moose present from 20 to 50 percent.

## Production

Counts were made in several Units during the calving period to obtain data on parturition rates. In the Matanuska and lower Susitna Valleys where considerable data on magnitude and timing of parturition are available, counts were made earlier, when cows and "short yearlings" were still together, to see if better data might be obtained on survival of calves of the previous year.

At Yakutat (Unit 5) foul weather all but eliminated counting, and the limited data can not be interpreted meaningfully.

In Unit 14, Susitna and Matanuska Valleys, the data suggest excellent survival of moose to about 1 year old. The earlier counts appear to have merit in more accurately assessing survival of calves over the winter.

Table 18. Comparison of numbers of moose counted on the Yakutat foreland in 1964 and 1968, using a transect system of aerial counting (Data from U.S.F.S., M.M. Perensovich, Jr.).

| Area | 1964 | 1968 | Moose/hr. 1964 | 1968 |
|---|---|---|---|---|
| 1. Yakutat Bay-Situk R. | 11 | 13 | 8.5 | 6.2 |
| 2. Situk R.-Ahrnklin R. | 185 | 179 | 105.7 | 89.5 |
| 3. Ahrnklin R.-Dangerous R. | 227 | 213 | 174.6 | 236.6 |
| 4. Dangerous R. Italio R. | 259 | 223 | 196.2 | 101.4 |
| 5. Italio R.-Akwe R. | 36 | 29 | 32.2 | 22.2 |
| 6. Akwe R.-Tanis R. | 168 | 97 | 104.9 | 80.8 |
| 7. Tanis R.-Alsek R. | 345 | 258 | 269.5 | 143.3 |
| 8. Alsek R.-Doame R. | 158 | 114 | 121.5 | 114.0 |
| TOTAL | 1,389 | 1,126 | 120.8 | 93.1 |

TABLE 19. Summary of moose population composition counts, Haines Area, Unit 1, 1967. (See Fig. 8, map of count areas.)

| Area | Date | large ♂ | small ♂ | total ♂ | ♀ W/0 | ♀ W/1 | ♀ W/2 | total ♀ | total adults | lone calves | total calves | unid. sex & age | total moose | count time (hr.) | moose per hr. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Portions of Chilkat, Takhin Big Salmon, Klehini Rivers | 11/30, 12/1 | 28 | 22 | 50 | 106 | 61 | 6 | 173 | 223 | 2 | 75 | 0 | 298 | 2.8 | 91 |

TABLE 20. Moose sex and age ratios, Haines Area, Unit 1, 1967. (See Fig. 8, map of count areas.)

| Area | Date | Total ♂ per 100 ♀ | small ♂ per 100 ♀ | small ♂ per 100 large ♂ | small ♂ % in herd | small per 100 ♂ calves | calves per 100 ♀ | Incidence of twins per 100 cows w/calf | Calf % in herd | moose per hr | Total moose |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Chilkat Takhin Big Salmon Klehini Rivers | 11/30 12/1 | 28.9 | 12.7 | 78.6 | 7.4 | 58.7 | 43.4 | 8.9 | 25.2 | 91 | 298 |

TABLE 21. Summary of moose population composition counts, Yakutat, Unit 5, 1967. (See Fig. 8, map of count area.)

| area | date | large ♂ | small ♂ | total ♂ | ♀ W/0 | ♀ W/1 | ♀ W/2 | total ♀ | total adults | lone calves | total calves | unid. sex & age | total moose | count time (hrs) | moose per hour |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Yakutat-Dangerous River (area-1) | 11/29 | 29 | 19 | 48 | 97 | 14 | 1 | 112 | 160 | 0 | 16 | 0 | 176 | 2.8 | 64 |
| Dangerous River Italio River (area-2) | 11/29 | 10 | 4 | 14 | 95 | 24 | 3 | 122 | 136 | 1 | 31 | 0 | 167 | 1.3 | 134 |
| Italio River Alsek River (area-3) | 12/1 | 61 | 12 | 73 | 160 | 39 | 4 | 203 | 276 | 1 | 48 | 0 | 324 | 2.3 | 144 |
| Total | | 100 | 35 | 135 | 352 | 77 | 8 | 437 | 572 | 2 | 95 | 0 | 667 | 6.3 | 107 |

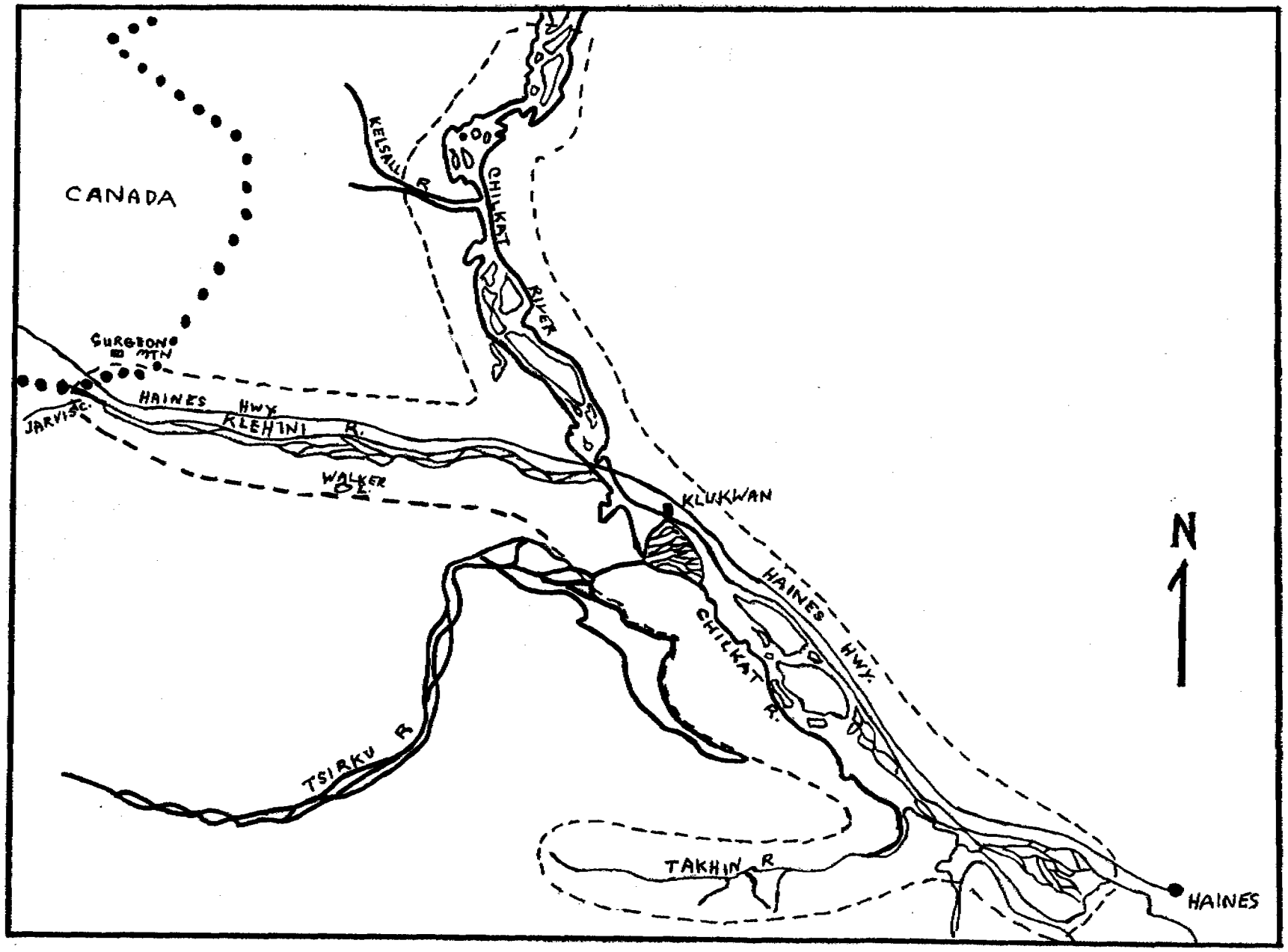



Fig. 8 Moose population composition count areas. Unit 1, Haines.

Table 22. Moose sex and age ratios, Yakutat, Unit 5, 1967.*

| Area | total ♂ per 100 ♀ | small ♂ per 100 ♀ | small ♂ per 100 large ♂ | small ♂ % in herd | small ♂ per 100 ♂ calves | calves per 100 ♀ | incidence of twins per 100 cows w/calf | Calf % in herd | moose per hr | Total moose |
|---|---|---|---|---|---|---|---|---|---|---|
| Yakutat-Dangerour River (area-1) 11/29 | 42.8 | 17.0 | 65.6 | 10.8 | 118.8 | 14.3 | 6.7 | 9.1 | 64.0 | 176 |
| Dangerous River Italio River (area-2) 11/29 | 11.5 | 3.2 | 40. | 2.4 | 26.7 | 25.5 | 11.1 | 18.6 | 134.0 | 167 |
| Italio River Alsek River (area-3) 12/1 | 36.0 | 5.9 | 19.7 | 3.7 | 50.0 | 23.6 | 9.3 | 14.8 | 144.0 | 324 |
| Total | 30.9 | 8.0 | 35. | 5.2 | 74.5 | 21.7 | 9.4 | 14.2 | 107.0 | 667 |

* See Fig. 9, map of count areas.

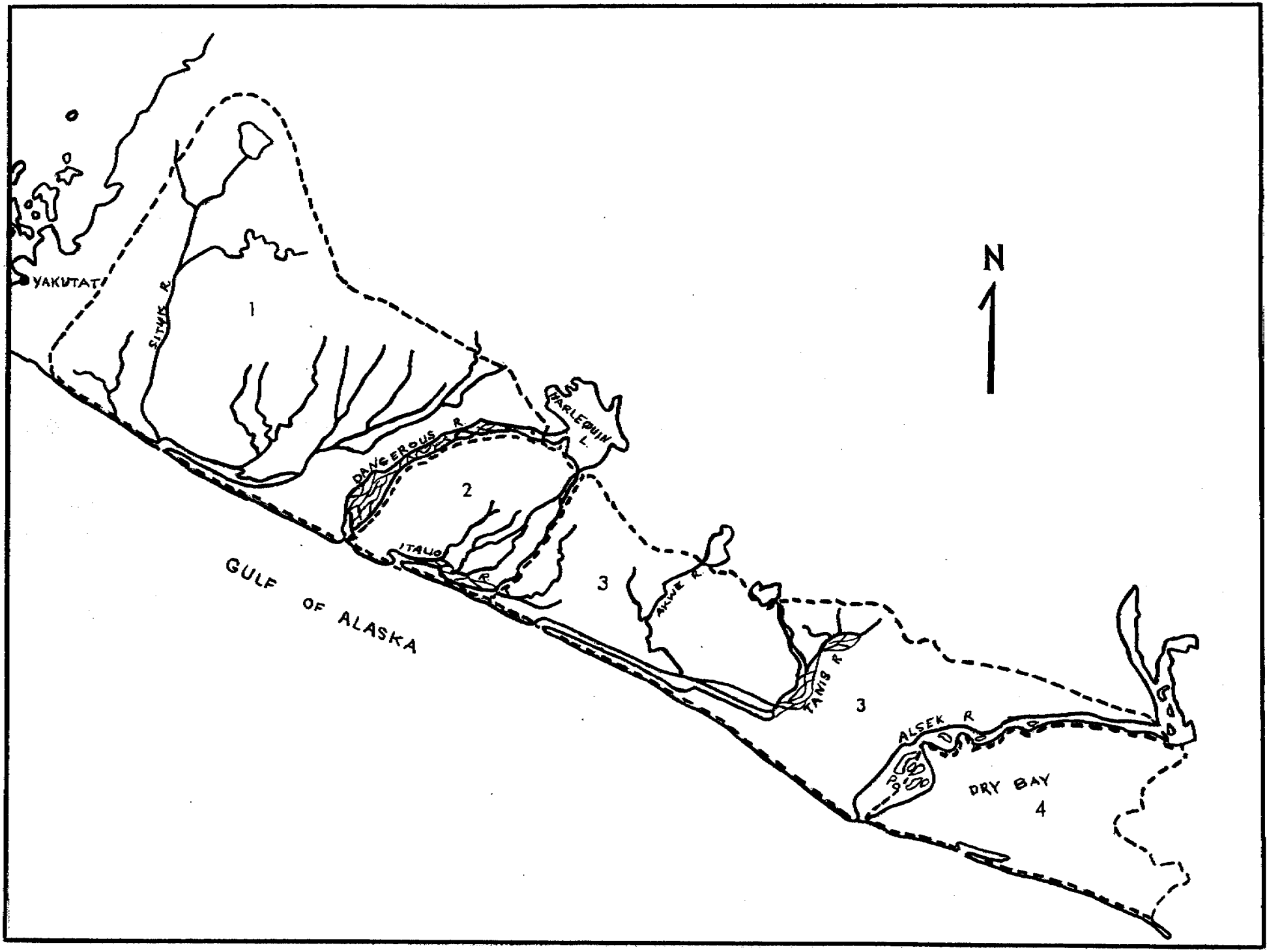



Fig. 9 Moose composition count areas, Unit 5, Yakutat.

Table 23. Summary of moose population composition counts, Copper River Delta, Unit 6, 1967.*

| area | date | large ♂ | small ♂ | total ♂ | ♀ w/0 | ♀ W/1 | ♀ W/2 | total ♀ | total adults | lone calves | total calves | unid. sex & age | total moose | count time (hrs) | moose per hour |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mile 24 to Smith Lake South of Road (area-1) | 11/24 | 2 | 4 | 6 | 29 | 19 | 1 | 49 | 55 | 0 | 21 | 0 | 76 | .3 | 31.9 |
| Smith Lake to Eyak River - South of Road (area-2) | 12/7 | 0 | 0 | 0 | 3 | 3 | 0 | 6 | 6 | 0 | 3 | 0 | 9 | 0.8 | 10.8 |
| Mile 13 to Mile 7-North of Road (area-3) | 12/7 | 3 | 1 | 4 | 17 | 2 | 0 | 19 | 23 | 0 | 2 | 0 | 25 | 1.4 | 16.7 |
| Mile 24-27 (area-4) | 12/11 | 0 | 0 | 0 | 0 | 2 | 1 | 3 | 3 | 0 | 4 | 0 | 7 | 0.1 | 46.7 |
| Total West of Copper River | | 5 | 5 | 10 | 49 | 26 | 2 | 77 | 87 | 0 | 30 | 0 | 117 | 4.8 | 24.4 |
| East of Copper River | 12/11 | 33 | 31 | 64 | 37 | 35 | 12 | 84 | 148 | 0 | 59 | 0 | 207 | 3.1 | 67.4 |
| Total | | 38 | 36 | 74 | 86 | 60 | 14 | 161 | 235 | 0 | 89 | 0 | 314 | 7.8 | 40.0 |

* Not illustrated.

Table 24. Moose sex and age ratios, Copper River Delta, Unit 6, 1967.

| Area | total ♂ per 100 ♀ | small ♂ per 100 ♀ | small ♂ per 100 large ♂ | small ♂ % in herd | small ♂ per 100 ♂ calves | calves per 100 ♀ | incidence of twins per 100 cows w/calf | Calf % in herd | moose per hr | Total moose |
|---|---|---|---|---|---|---|---|---|---|---|
| Copper River Delta West of Copper River | 13.5 | 6.8 | 100 | 4.5 | 33.3 | 39.0 | 7.1 | 25.6 | 24.4 | 117 |
| East of Copper River | 76.1 | 37.0 | 93.9 | 15.0 | 103.3 | 70.2 | 25.5 | 28.5 | 67.4 | 207 |
| Total | 46.0 | 22.4 | 94.7 | 11.5 | 80.0 | 55.3 | 18.9 | 28.3 | 40.0 | 314 |



Table 25. Summary of moose population composition counts, Unit 7, 1967*

| Area | Date | large ♂ | small ♂ | total ♂ | ♀ W/0 | ♀ W/1 | ♀ W/2 | total ♀ | total adults | lone calves | total calves | unid. sex & age | total moose | count time (hr.) | moose per hr. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Resurrection Cr. (10) | 11/28 | 30 | 15 | 45 | 69 | 35 | 4 | 108 | 153 | 0 | 43 | 3 | 199 | 2.2 | 90 |
| Twentymile R. (6) | 11/28 | 2 | 4 | 6 | 53 | 15 | 3 | 71 | 77 | 0 | 21 | 0 | 98 | 1.2 | 82 |
| Total | | 32 | 19 | 51 | 122 | 50 | 7 | 179 | 230 | 0 | 64 | 3 | 297 | 3.4 | 87 |

*See Figure 10, map of count areas.

Table 26. Moose sex and age ratios, Unit 7, 1967.*

| Area | Date | total ♂ per 100 ♀ | small ♂ per 100 ♀ | small ♂ per 100 large ♂ | small ♂ % in herd | small ♂ per 100 ♂ calves | calves per 100 ♀ | incidence of twins per 100 cows w/calf | Calf % in herd | moose per hr | Total moose |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Resurrection Cr. (10) | 11/28 | 41.7 | 13.9 | 50.0 | 7.5 | 69.8 | 39.8 | 10.3 | 21.6 | 90 | 199 |
| Twentymile R. (6) | 11/28 | 8.5 | 5.6 | 200.0 | 4.1 | 38.1 | 29.6 | 16.7 | 25.6 | 82 | 98 |
| Total | | 28.5 | 10.6 | 59.4 | 6.4 | 59.4 | 35.8 | 12.3 | 21.5 | 87 | 297 |

* See Fig. 10, map of count areas.

Table 27. Summary of moose population composition counts, Alaska Peninsula, Unit 9, 1967*

| Area | Date | large ♂ | small ♂ | total ♂ | ♀ W/0 | ♀ W/1 | ♀ W/2 | total ♀ | total adults | lone calves | total calves | unid. sex & age | total moose | count time (hr.) | moose per hr. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| King Salmon R. (North of Becharof) | 10/9 | 125 | 22 | 147 | 96 | 29 | 7 | 132 | 279 | 1 | 44 | 0 | 323 | 3.1 | 104 |
| Becharof | 10/10 | 68 | 14 | 82 | 60 | 15 | 2 | 77 | 159 | 1 | 20 | 0 | 179 | 3.2 | 56 |
| Ugashik | 10/10 | 11 | 1 | 12 | 4 | 1 | 0 | 5 | 17 | 0 | 1 | 0 | 18 | 0.5 | 36 |
| Dog Salmon | 10/12 | 14 | 6 | 20 | 38 | 7 | 0 | 45 | 65 | 0 | 7 | 0 | 72 | 0.9 | 80 |
| Mother Goose | 10/13 | 220 | 61 | 281 | 380 | 71 | 13 | 464 | 745 | 2 | 99 | 0 | 844 | 8.4 | 100 |
| Cinder R. | 10/13 | 7 | 0 | 7 | 2 | 1 | 0 | 3 | 10 | 0 | 1 | 0 | 11 | 0.1 | 110 |
| Totals | | 445 | 104 | 549 | 580 | 124 | 22 | 726 | 1275 | 4 | 172 | 0 | 1447 | 16.2 | 89 |

*See Figure 11, map of count areas. King Salmon R. to Becharof areas not illustrated.

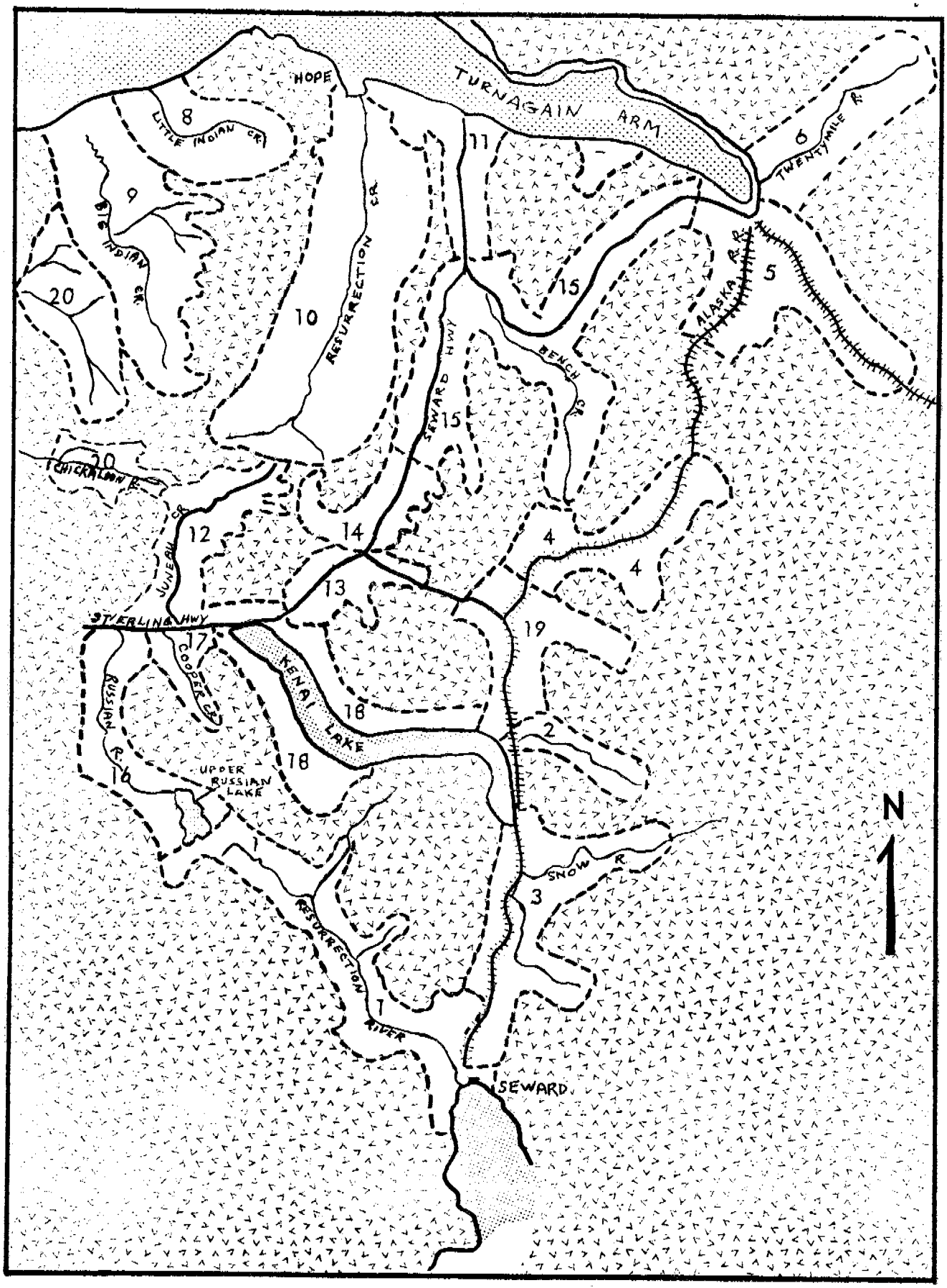



Fig. 10 Moose composition count areas, Unit 7

Table 28. **Moose sex and age ratios,** Alaska Peninsula, Unit 9, 1967.*

| Area | | total ♂ per 100 ♀ | small ♂ per 100 ♀ | small ♂ per 100 large ♂ | small ♂ % in herd | small ♂ per 100 ♂ calves | calves per 100 ♀ | incidence of twins per 100 cows w/calf | Calf % in herd | moose per hr | Total moose |
|---|---|---|---|---|---|---|---|---|---|---|---|
| King Salmon R. (North of Becharof | 10/9 | 111 | 17 | 18 | 7 | 100 | 33 | 39 | 14 | 104 | 323 |
| Becharof | 10/10 | 106 | 18 | 21 | 8 | 70 | 26 | 24 | 11 | 56 | 179 |
| Ugashik | 10/10 | 140 | 20 | 9 | 6 | 100 | 20 | 0 | 6 | 36 | 18 |
| Dog Salmon | 10/12 | 44 | 13 | 43 | 8 | 171 | 16 | 0 | 10 | 80 | 72 |
| Mother Goose | 10/13 | 61 | 13 | 28 | 7 | 123 | 21 | 31 | 12 | 100 | 844 |
| Cinder River | 10/13 | 233 | 0 | 0 | 0 | 0 | 33 | 0 | 9 | 110 | 11 |
| Total | | 73 | 14 | 23 | 7 | 121 | 24 | 30 | 12 | 89 | 1447 |

*See Figure 11, map of count areas. King Salmon R. and Becharof areas not illustrated.

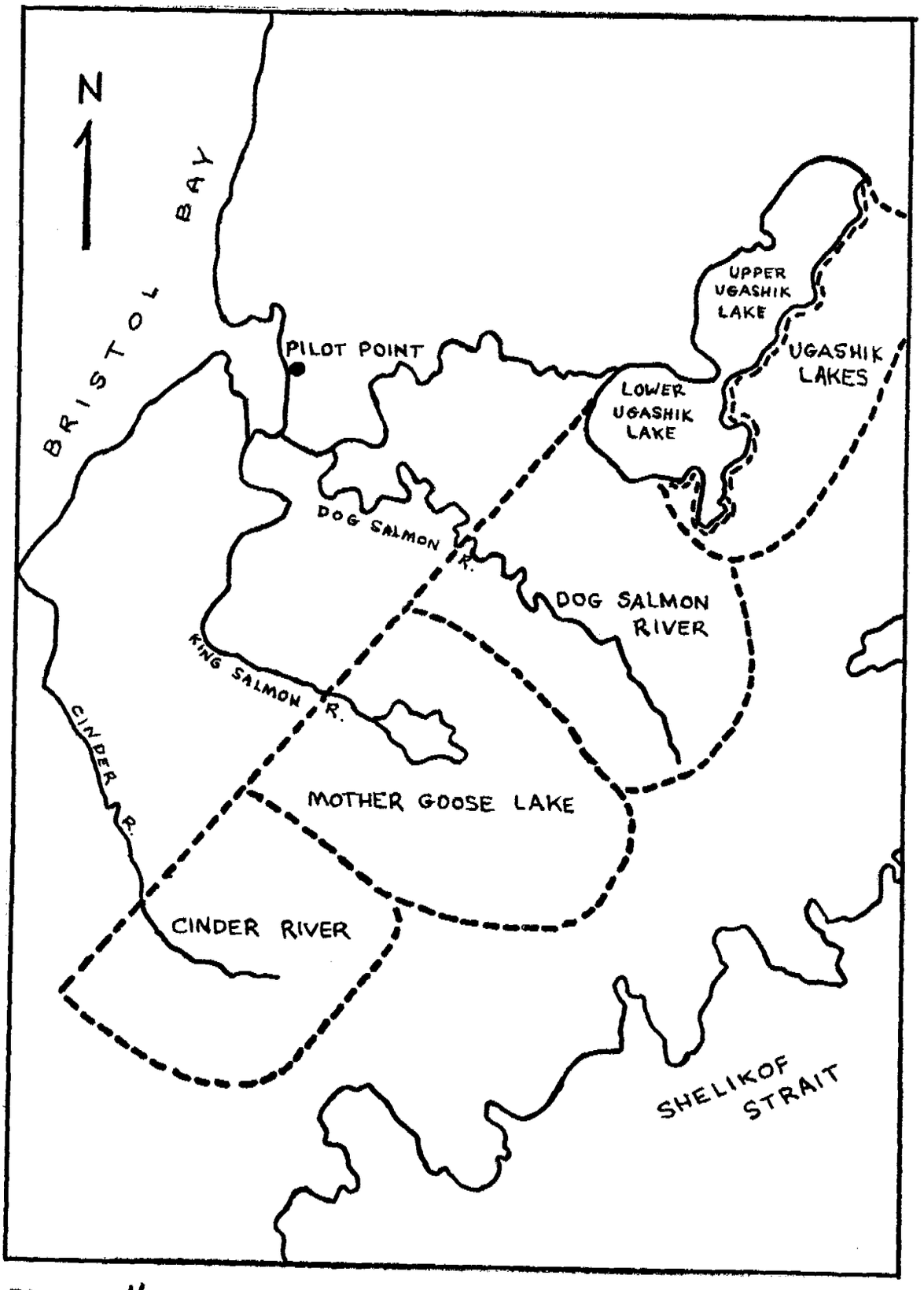



Fig. 11 Moose composition count areas. Unit 9, Alaska Peninsula.

Table 29. Summary of moose population composition counts. Nelchina Basin, Units 13 and 11, 1967.*

| Area | Date | large ♂ | small ♂ | total ♂ | ♀ W/0 | ♀ W/1 | ♀ W/2 | total ♀ | total adults | lone calves | total calves | unid. sex & age | total moose | count time (hr.) | moose per hr. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 11/10/67 | 23 | 15 | 38 | 105 | 57 | 7 | 169 | 207 | 0 | 71 | 0 | 278 | 2.9 | 96 |
| 2 | 11/10, 11 | 43 | 4 | 47 | 63 | 49 | 3 | 115 | 162 | 1 | 56 | 5 | 224 | 4.7 | 47 |
| 3 | 11/11, 28 | 56 | 31 | 87 | 129 | 53 | 3 | 185 | 272 | 0 | 59 | 0 | 331 | 3.4 | 97 |
| 5 | 11/8, 10, 28, 29, 30 | 206 | 52 | 258 | 493 | 134 | 4 | 631 | 889 | 0 | 142 | 0 | 1031 | 20.0 | 52 |
| 6 | 11/11, 28, 29 | 104 | 23 | 127 | 305 | 121 | 1 | 427 | 554 | 0 | 123 | 4 | 681 | 7.9 | 86 |
| 7 | 11/10 | 135 | 28 | 163 | 318 | 77 | 2 | 397 | 560 | 1 | 82 | 0 | 642 | 8.3 | 68 |
| 8 | 11/8 | 11 | 10 | 21 | 35 | 32 | 0 | 67 | 88 | 0 | 32 | 0 | 120 | 1.9 | 63 |
| 9 | 11/8 | 9 | 7 | 16 | 18 | 11 | 0 | 29 | 45 | 0 | 11 | 0 | 56 | 1.0 | 56 |
| 10 | 11/9, 10 | 88 | 21 | 109 | 149 | 84 | 1 | 234 | 343 | 0 | 86 | 0 | 429 | 4.4 | 98 |
| 11 | 11/10 | 140 | 23 | 163 | 163 | 62 | 2 | 227 | 390 | 0 | 66 | 0 | 455 | 3.9 | 117 |
| 12 | 12/12 | 30 | 8 | 38 | 138 | 52 | 0 | 190 | 228 | 0 | 52 | 2 | 282 | 7.3 | 39 |
| 13 | 11/8, 9, 10 | 25 | 33 | 58 | 238 | 45 | 2 | 285 | 343 | 1 | 50 | 0 | 394 | 7.9 | 50 |
| 14 | 11/8, 9 | 66 | 14 | 80 | 137 | 66 | 2 | 205 | 285 | 0 | 70 | 0 | 355 | 3.0 | 118 |
| 15 | 11/9 | 77 | 17 | 94 | 159 | 17 | 1 | 177 | 271 | 0 | 19 | 0 | 290 | 3.5 | 83 |
| 16 | 11/8 | 66 | 11 | 77 | 70 | 40 | 0 | 110 | 187 | 0 | 40 | 0 | 227 | 2.6 | 87 |
| Totals | | 1079 | 297 | 1376 | 2520 | 900 | 28 | 3448 | 4824 | 3 | 959 | 11 | 5794 | 82.7 | 71 |

*See Figure 12, map of count areas. Count area #11 is in Unit 11.

Table 30. Moose sex and age ratios, Nelchina Basin, Units 13 and 11, 1967.*

| Area | Date | total ♂ per 100 ♀ | small ♂ per 100 ♀ | small ♂ per 100 large ♂ | small ♂ % in herd | small ♂ per 100 ♂ calves | calves per 100 ♀ | incidence of twins per 100 cows w/calf | Calf % moose in herd | moose per hr | Total moose |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 11/10 | 22.5 | 8.9 | 65.2 | 5.4 | 42.3 | 42.0 | 10.9 | 25.5 | 96 | 278 |
| 2 | 11/10, 11 | 40.9 | 3.5 | 9.3 | 1.8 | 14.3 | 48.7 | 5.8 | 25.0 | 47 | 224 |
| 3 | 11/11, 28 | 47.0 | 16.8 | 55.4 | 9.4 | 114.8 | 31.9 | 5.4 | 17.8 | 97 | 331 |
| 5 | 11/8,10, 28-30 | 40.9 | 8.2 | 25.2 | 5.0 | 73.2 | 22.5 | 2.9 | 13.8 | 52 | 1031 |
| 6 | 11/11,28, 29 | 29.7 | 5.4 | 22.1 | 3.4 | 37.4 | 28.8 | 0.8 | 18.1 | 86 | 681 |
| 7 | 11/10 | 41.1 | 7.1 | 20.7 | 5.0 | 68.3 | 20.7 | 2.5 | 14.6 | 68 | 561 |
| 8 | 11/8 | 31.3 | 14.9 | 90.9 | 8.3 | 62.5 | 47.8 | 0.0 | 26.7 | 63 | 120 |
| 9 | 11/8 | 55.2 | 24.1 | 77.7 | 12.5 | 127.3 | 37.9 | 0.0 | 19.6 | 56 | 56 |
| 10 | 11/9, 10 | 46.5 | 9.0 | 23.9 | 4.9 | 48.8 | 36.8 | 1.2 | 20.0 | 98 | 429 |
| 11 | 11/10 | 71.8 | 10.1 | 16.4 | 5.0 | 69.7 | 29.1 | 3.1 | 14.5 | 117 | 456 |
| 12 | 12/12 | 20.0 | 4.2 | 26.7 | 2.8 | 30.8 | 27.4 | 0.0 | 18.4 | 39 | 282 |
| 13 | 11/8-10 | 20.4 | 11.6 | 132.0 | 8.4 | 132.0 | 17.5 | 4.3 | 12.7 | 50 | 394 |
| 14 | 11/8, 9 | 39.0 | 6.8 | 21.2 | 3.9 | 40.0 | 34.1 | 2.9 | 19.7 | 118 | 355 |

*See Figure 12, map of count areas. Count area #11 is in Unit 11.

Table 30. Moose sex and age ratios, Nelchina Basin, Units 13 and 11, 1967.* (Continued)

| Area | Date | total ♂ per 100 ♀ | small ♂ per 100 ♀ | small ♂ per 100 large ♂ | small ♂ % in herd | small ♂ per 100 ♂ calves | calves per 100 ♀ | incidence of twins per 100 cows w/calf | Calf % moose in herd | moose per hr | Total moose |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 15 | 11/9 | 53.1 | 9.6 | 22.1 | 5.9 | 178.9 | 10.7 | 5.6 | 6.6 | 83 | 290 |
| 16 | 11/8 | 70.0 | 10.0 | 16.7 | 4.8 | 55.0 | 36.4 | 0.0 | 17.6 | 87 | 227 |
| Totals | | 39.9 | 8.6 | 27.5 | 5.1 | 62.1 | 27.8 | 3.0 | 16.6 | 71 | 5794 |

Table 31. **Summary of moose population composition counts,** Eagle River, Unit 14, 1967*

| Area | Date | large ♂ | small ♂ | total ♂ | ♀ W/0 | ♀ W/1 | ♀ W/2 | total ♀ | total adults | lone calves | total calves | unid. sex & age | total moose | count time (hr.) | moose per hr. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Eagle River | 12/20-21 | 5 | 10 | 15 | 36 | 31 | 1 | 68 | 83 | 2 | 35 | 10 | 128 | 5.2 | 24 |

Table 32. **Moose sex and age ratios,** Eagle River, Unit 14.*

| Area | total ♂ per 100 ♀ | small ♂ per 100 ♀ | small ♂ per 100 large ♂ | small ♂ % in herd | small ♂ per 100 ♂ calves | calves per 100 ♀ | incidence of twins per 100 cows w/calf | Calf % moose in herd | moose per hr | Total moose |
|---|---|---|---|---|---|---|---|---|---|---|
| Eagle River | 22.1 | 14.7 | 200 | 7.8 | 57.1 | 51.5 | 3.1 | 27.3 | 24.4 | 123 |

*Not illustrated.

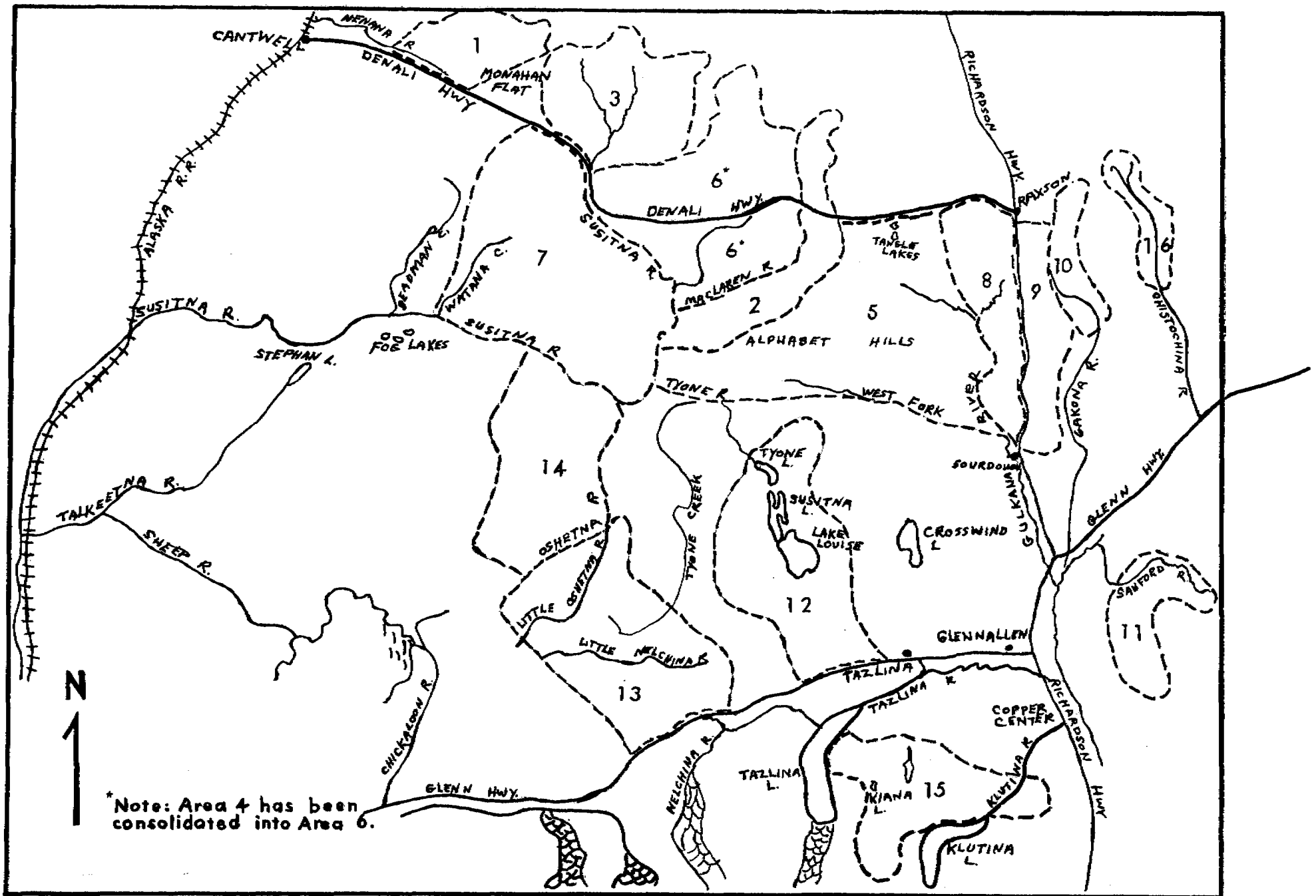



Fig. 12 Moose composition count areas, Unit 13 Nelchina Basin.

**Table 33.** Summary of moose population composition counts, Matanuska Valley, Unit 14, 1967.*

| Area | Date | large ♂ | small ♂ | total ♂ | ♀ W/0 | ♀ W/1 | ♀ W/2 | total ♀ | total adults | lone calves | total calves | unid. sex & age | total moose | count time (hr.) | moose per hr. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. | 12/19,20 | 3 | 23 | 26 | 161 | 118 | 6 | 285 | 311 | 1 | 131 | 3 | 445 | 9.2 | 48.5 |
| 2. | 12/12,19 | 14 | 39 | 53 | 63 | 78 | 5 | 146 | 199 | 3 | 91 | 0 | 290 | 6.0 | 48.4 |
| 3. | 12/10 | 3 | 5 | 8 | 51 | 58 | 6 | 115 | 123 | 2 | 72 | 5 | 200 | 4.0 | 49.4 |
| 4. | 12/9,11 | 3 | 9 | 12 | 32 | 23 | 1 | 56 | 68 | 2 | 27 | 0 | 95 | 2.6 | 36.8 |
| 5. | 12/18 | 6 | 18 | 24 | 126 | 92 | 6 | 224 | 248 | 2 | 106 | 1 | 355 | 5.3 | 66.0 |
| 6. | 12/9,18 | 0 | 0 | 0 | 9 | 13 | 0 | 22 | 22 | 0 | 13 | 0 | 35 | 3.6 | 9.8 |
| 7. | 12/6,8,9 | 22 | 15 | 37 | 156 | 87 | 12 | 255 | 292 | 0 | 111 | 0 | 403 | 6.4 | 62.7 |
| 8. | 12/4,6,8 | 22 | 22 | 44 | 263 | 139 | 4 | 406 | 450 | 3 | 150 | 1 | 601 | 9.2 | 65.0 |
| 9. | 12/11 | 7 | 5 | 12 | 70 | 34 | 1 | 105 | 117 | 0 | 36 | 0 | 153 | 2.6 | 59.0 |
| TOTAL | | 80 | 136 | 216 | 931 | 642 | 41 | 1614 | 1830 | 13 | 737 | 10 | 2577 | 48.9 | 52.7 |

*See Figure 13, map of count area.

**Table 34.** Moose sex and age ratios, Matanuska Valley, Unit 14, 1967.*

| Area | Date | total ♂ per 100 ♀ | small ♂ per 100 ♀ | small ♂ per 100 large ♂ | small ♂ % in herd | small ♂ per 100 ♂ calves | calves per 100 ♀ | incidence of twins per 100 cows w/calf | Calf % in herd | moose per hr | Total moose |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. | 12/19, 20 | 9.1 | 8.1 | 766.7 | 5.2 | 35.1 | 46.0 | 4.8 | 29.4 | 48 | 445 |
| 2. | 12/12, 19 | 36.3 | 26.7 | 278.6 | 13.4 | 85.7 | 62.3 | 6.0 | 31.4 | 48 | 290 |
| 3. | 12/10 | 7.0 | 4.3 | 166.7 | 2.5 | 13.9 | 62.6 | 9.4 | 36.0 | 49 | 200 |
| 4. | 12/9, 11 | 21.4 | 16.1 | 75.0 | 9.5 | 66.7 | 48.2 | 4.2 | 28.4 | 37 | 95 |
| 5. | 12/18 | 10.8 | 8.0 | 300.0 | 5.1 | 34.0 | 47.3 | 6.1 | 29.8 | 66 | 355 |
| 6. | 12/9, 18 | 0 | 0 | 0 | 0 | 0 | 59.1 | 0 | 37.1 | 10 | 35 |
| 7. | 12/6, 8,9 | 14.5 | 5.9 | 68.2 | 3.7 | 27.0 | 44.5 | 12.1 | 27.5 | 63 | 403 |
| 8. | 12/4, 6,8 | 10.8 | 5.4 | 100.0 | 3.7 | 29.3 | 36.9 | 2.8 | 25.0 | 65 | 601 |
| 9. | 12/11 | 11.4 | 4.8 | 71.4 | 3.3 | 27.8 | 34.3 | 2.9 | 23.5 | 59 | 153 |
| TOTALS | | 13.4 | 8.4 | 170.0 | 5.3 | 36.9 | 45.7 | 6.0 | 28.6 | 53 | 2577 |

*See Figure 13, map of count area.

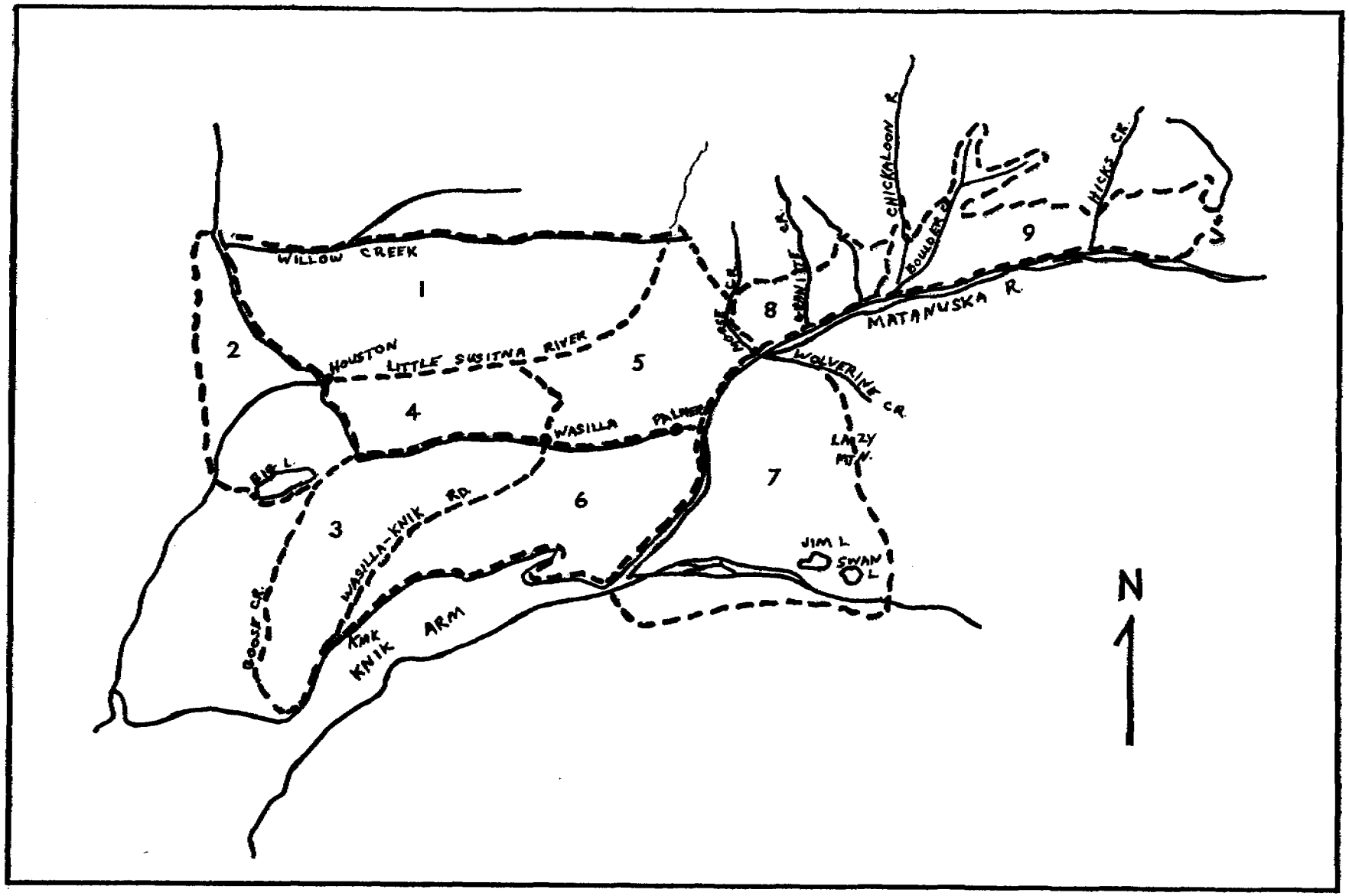



Fig. 13 Moose composition count areas, Unit 14, Matanuska Valley.

Table 35. **Summary of moose population composition counts,** Lower Susitna River, Unit 14, 1967.*

| Area | Date | large ♂ | small ♂ | total ♂ | ♀* W/0 | ♀ W/1 | ♀ W/2 | total ♀ | total adults | lone calves | total calves | unid. sex & age | total moose | count time (hr.) | moose per hr. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Willow to Little Willow | 1/25/68 | -- | -- | -- | 101 | 46 | 0 | -- | 147 | 0 | 46 | 0 | 193 | 2:03 | 94.1 |
| L. Willow to Kash-witna | 1/25/68 | -- | -- | -- | 61 | 55 | 8 | -- | 124 | 1 | 72 | 0 | 29 | 3:13 | 60.9 |
| Kashwitna** to Montana Creek | 1/27/68 | -- | -- | -- | 15 | 7 | 0 | -- | 22 | 0 | 7 | 0 | 29 | :35 | 49.7 |
| Talkeetna*** to Montana Creek | 1/25/68 | -- | -- | -- | 105 | 82 | 1 | -- | 188 | 4 | 88 | 1 | 277 | 3:21 | 63.7 |
| Talkeetna to Sheep River | 1/26/68 | -- | -- | -- | 64 | 33 | 1 | -- | 98 | 1 | 36 | 0 | 134 | 1:19 | 101:8 |
| Total | | -- | -- | -- | 346 | 223 | 10 | -- | 579 | 6 | 249 | 1 | 829 | 10:31 | 78.8 |

* Includes all adults without calves.
** Not completed.
*** West of Alaska Railroad only.

* See Fig. 14, map of count areas.

Table 36. **Moose sex and age ratios,** Lower Susitna River, Unit 14, 1967.*

| Area | total ♂ per 100 ♀ | small ♂ per 100 ♀ | small ♂ per 100 large ♂ | small ♂ % in herd | small ♂ per 100 ♂ calves | calves per 100 ♀ | incidence of twins per 100 cows w/calf | Calf % in herd | moose per hr | Total moose |
|---|---|---|---|---|---|---|---|---|---|---|
| Willow to Talkeetna | -- | -- | -- | -- | -- | -- | 4.3 | 30.0 | 78.8 | 829 |

* See Fig. 14, map of count areas.

Table 37. **Summary of moose population composition counts,** Talkeetna-Cantwell, December 1967.*

| Area | Date | large ♂ | small ♂ | total ♂ | ♀ W/0 | ♀ W/1 | ♀ W/2 | total ♀ | total adults | lone calves | total calves | unid. sex & age | total moose | count time (hr.) | moose per hr. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| #4 Curry to Fountain R. | 12/5-6 | 8 | 2 | 10 | 28 | 7 | 0 | 35 | 45 | 2 | 9 | 0 | 54 | 1.9 | 28.4 |
| #5 Talkeetna to Curry | 12/5-6 | 46 | 27 | 73 | 124 | 73 | 9 | 206 | 279 | 1 | 92 | 0 | 371 | 6.5 | 57.1 |
| #6 Peters Hills to Kahiltna | 12/4 & 12/6 | 121 | 52 | 173 | 443 | 205 | 31 | 679 | 852 | 2 | 269 | 0 | 1121 | 8.9 | 126.0 |
| Yentna | 12/4 | 34 | 15 | 49 | 41 | 10 | 7 | 58 | 107 | 0 | 24 | 0 | 131 | 1.1 | 119.1 |
| Summary All Areas | 12/4-6 | 209 | 96 | 305 | 636 | 295 | 47 | 978 | 1283 | 5 | 394 | 0 | 1677 | 18.4 | 91.1 |

* Not illustrated.

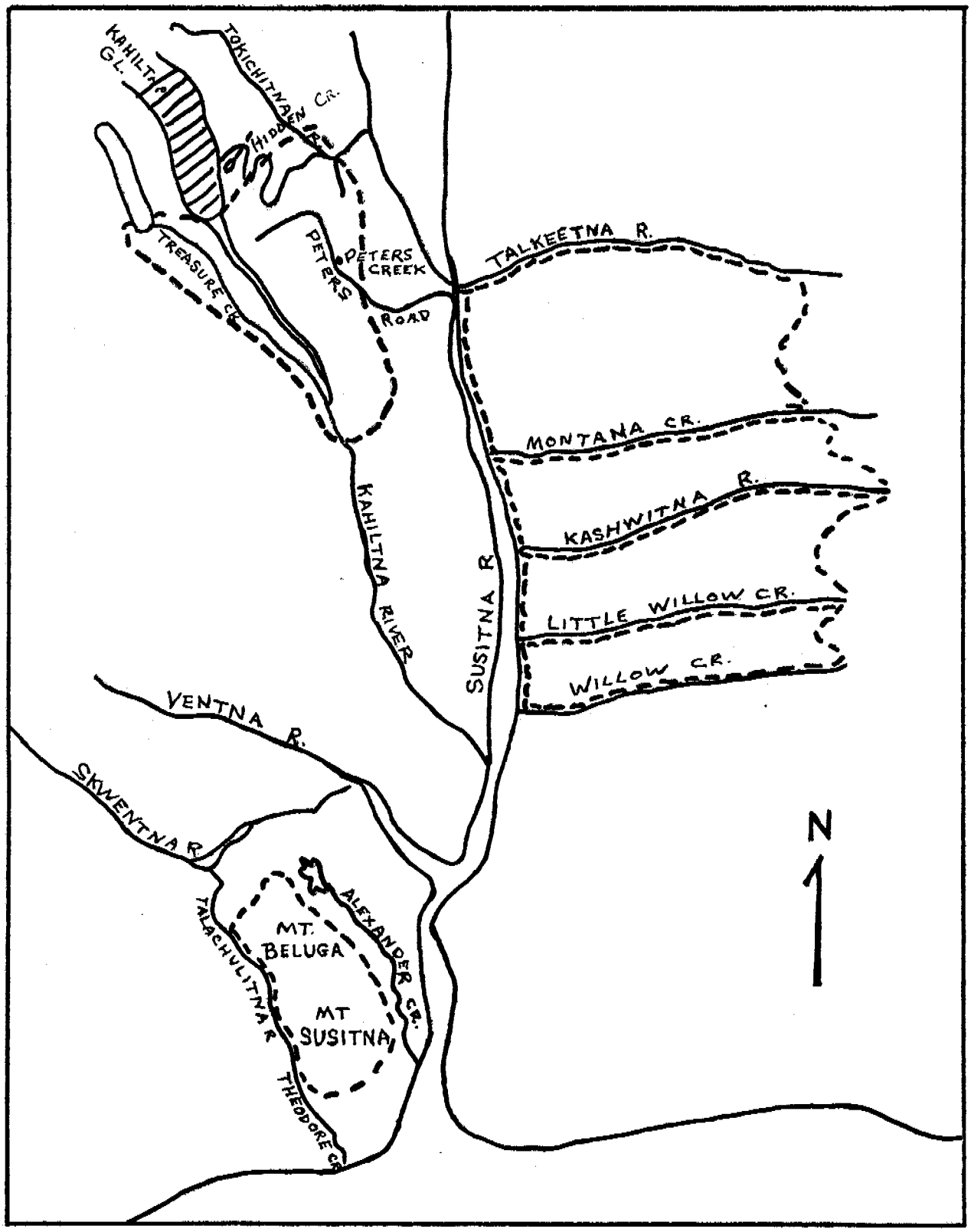



Fig. 14. Moose composition count areas, Units 14 and 16, Lower Susitna Valley.

Table 38. **Moose sex and age ratios,** Talkeetna-Cantwell, Units 14 and 16, 1967.

| Area | Date | total ♂ per 100 ♀ | small ♂ per 100 ♀ | small ♂ per 100 large ♂ | small ♂ % in herd | small ♂ per 100 ♂ calves | calves per 100 ♀ | incidence of twins per 100 cows w/calf | Calf % in herd | moose per hr | Total moose |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 4. Curry-Fountain | 12/ R. 5-6 | 28.6 | 5.7 | 25.0 | 3.7 | 44.4 | 25.7 | 0.0 | 16.7 | 28 | 54 |
| 5. Talkeetna-Curry | 12/5-6 | 35.5 | 13.1 | 58.7 | 7.3 | 58.7 | 44.7 | 11.0 | 24.8 | 371 | 57 |
| 6. Peters Hills-Kahitna | 12/4&6 | 25.5 | 7.7 | 43.0 | 4.6 | 38.7 | 39.6 | 13.1 | 24.0 | 126 | 1121 |
| Yentna | 12/4 | 84.5 | 25.9 | 44.1 | 11.5 | 125.0 | 41.4 | 41.2 | 18.3 | 119 | 131 |
| Total | | 31.2 | 9.8 | 31.5 | 5.7 | 48.7 | 40.3 | 13.7 | 23.5 | 91 | 1677 |

Table 39. Summary of moose population composition counts Kenai National Moose Range, 1967*

| area | date | large ♂ | small ♂ | total ♂ | ♀ w/0 | ♀ W/1 | ♀ W/2 | total ♀ | total adults | lone calves | total calves | unid. sex & age | total moose | count time (hrs) | moose per hour |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Swan Lake Road Area | 10/3-16 | 9 | 7 | 16 | 135 | 42 | 8 | 185 | 201 | 1 | 59 | -- | 260 | -- | -- |
| Skilak Pipeline Area | 10/3-16 | 14 | 6 | 20 | 116 | 45 | 9 | 170 | 190 | 2 | 65 | -- | 255 | -- | -- |
| Misc. Areas Sunken I, Rd. Dabbler L. | 10/3-16 | 6 | 4 | 10 | 29 | 9 | 1 | 39 | 49 | 0 | 11 | -- | 60 | -- | -- |
| Total, Lowland Area | | 29 | 17 | 46 | 280 | 96 | 18 | 394 | 440 | 3 | 135 | -- | 575 | -- | -- |
| Funny R. Bench Land | 10/3-16 | 80 | 11 | 91 | 267 | 48 | 1 | 316 | 407 | 0 | 50 | -- | 457 | -- | -- |

*Data from W. Troyer, Refuge Manager. Count areas not illustrated.

Table 40. **Moose sex and age ratios,** Kenai National Moose Range, 1967*

| Area | Date | total ♂ per 100 ♀ | small ♂ per 100 ♀ | small ♂ per 100 large ♂ | small ♂ % in herd | small ♂ per 100 ♂ calves | calves per 100 ♀ | incidence of twins per 100 cows w/calf | Calf % in herd | moose per hr | Total moose |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Swan L. Rd. area | 10/3-16 | 8.0 | 3.5 | 77.8 | 2.7 | 23.7 | 31.9 | 16.0 | 22.7 | -- | 260 |
| Skilak Pipeline area | 10/3-16 | 11.8 | 3.5 | 42.9 | 2.4 | 18.5 | 38.2 | 16.7 | 25.5 | -- | 255 |
| Misc. areas, Sunken I. Rd. Dabbler L. | 10/3-16 | 25.6 | 10.3 | 66.7 | 6.7 | 72.7 | 28.2 | 2.6 | 18.3 | -- | 60 |
| Total, Lowland area | 10/3-16 | 11.7 | 4.3 | 58.6 | 3.0 | 1133.3 | 34.3 | 15.8 | 23.5 | -- | 575 |
| Funny R. Bench Land | 10/3-16 | 28.8 | 3.5 | 13.8 | 2.4 | 44.0 | 15.8 | 2.0 | 10.9 | -- | 457 |

*Computed from data from W. Troyer, Refuge Manager. Count areas not illustrated.

Table 41. **Summary of moose population composition counts,** Lower Kenai Peninsula, Unit 15, 1967*

| Area | Date | large ♂ | small ♂ | total ♂ | ♀ W/0 | ♀ W/1 | ♀ W/2 | total ♀ | total adults | lone calves | total calves | unid. sex & age | total moose | count time (hr.) | moose per hr. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C (Below timber) | 10/24 | 4 | 5 | 9 | 24 | 28 | 1 | 53 | 62 | 1 | 31 | 0 | 93 | 2.3 | 41 |
| C (Above timber) | 10/25 | 53 | 61 | 114 | 462 | 232 | 20 | 714 | 828 | 2 | 274 | 0 | 1102 | 4.0 | 276 |
| C Total | | 57 | 66 | 123 | 486 | 260 | 21 | 767 | 890 | 3 | 305 | 0 | 1195 | 6.3 | 191 |
| I Below Timber | 10/25 | 8 | 8 | 16 | 28 | 7 | 3 | 38 | 54 | 0 | 13 | 0 | 67 | 1.0 | 67 |
| I Above Timber | 10/26 | 179 | 31 | 210 | 431 | 155 | 8 | 594 | 804 | 0 | 171 | 0 | 975 | 3.5 | 279 |
| I Total | | 187 | 39 | 226 | 459 | 162 | 11 | 632 | 858 | 0 | 184 | 0 | 1042 | 4.5 | 233 |
| Homer | 10/26-27 | 12 | 9 | 21 | 110 | 99 | 9 | 218 | 239 | 1 | 118 | 0 | 357 | 5.8 | 62 |
| Anchor Point | 10/28 | 18 | 13 | 31 | 130 | 113 | 9 | 252 | 283 | 2 | 133 | 0 | 416 | 1.9 | 219 |
| A | 10/24 | 0 | 0 | 0 | 2 | 3 | 0 | 5 | 5 | 0 | 3 | 0 | 8 | 0.3 | 27 |
| 3 | 10/24 | 3 | 0 | 3 | 9 | 4 | 0 | 13 | 16 | 0 | 4 | 0 | 20 | 0.3 | 67 |
| Total | | 277 | 127 | 404 | 1196 | 641 | 50 | 1887 | 2291 | 6 | 747 | 0 | 3038 | 19.0 | 160 |

*See Figure , map of count areas.

Table 42. **Moose sex and age ratios,** Lower Kenai Peninsula, Unit 15, 1967*

| Area | Date | total ♂ per 100 ♀ | small ♂ per 100 ♀ | small ♂ per 100 large ♂ | small ♂ % in herd | small ♂ per 100 ♂ calves | calves per 100 ♀ | incidence of twins per 100 cows w/calf | Calf % moose in herd | moose per hr | Total moose |
|---|---|---|---|---|---|---|---|---|---|---|---|
| C Below Timber | 10/24 | 17 | 9.4 | 125 | 5.4 | 32 | 58 | 3 | 33.3 | 41 | 93 |
| C Above Timber | 10/25 | 16 | 8.5 | 115 | 5.5 | 45 | 38 | 8 | 24.9 | 276 | 1102 |
| C Total | | 16 | 8.6 | 116 | 5.5 | 43 | 40 | 7 | 25.5 | 191 | 1195 |
| I Below Timber | 10/25 | 42 | 21.0 | 100 | 11.9 | 123 | 34 | 30 | 19.4 | 67 | 67 |
| I Above Timber | 10/26 | 35 | 5.2 | 17 | 3.2 | 36 | 29 | 5 | 17.5 | 279 | 975 |
| I Total | | 36 | 6.2 | 21 | 3.7 | 42 | 29 | 6 | 17.6 | 233 | 1042 |
| Homer | 10/26-10/27 | 10 | 4.1 | 75 | 2.5 | 15 | 54 | 8 | 33.0 | 62 | 357 |
| Anchor Point | 10/28 | 12 | 5.2 | 72 | 3.1 | 20 | 53 | 15 | 32.0 | 219 | 416 |
| A | 10/24 | 0 | 0 | 0 | 0 | 0 | 60 | 0 | 37.5 | 27 | 8 |
| 3 | 10/24 | 23 | 0 | 0 | 0 | 0 | 31 | 0 | 20.0 | 67 | 20 |
| Total | | 21 | 6.7 | 46 | 4.2 | 34 | 40 | 14 | 25.6 | 160 | 3038 |

*See Figure 15, Map of count areas.

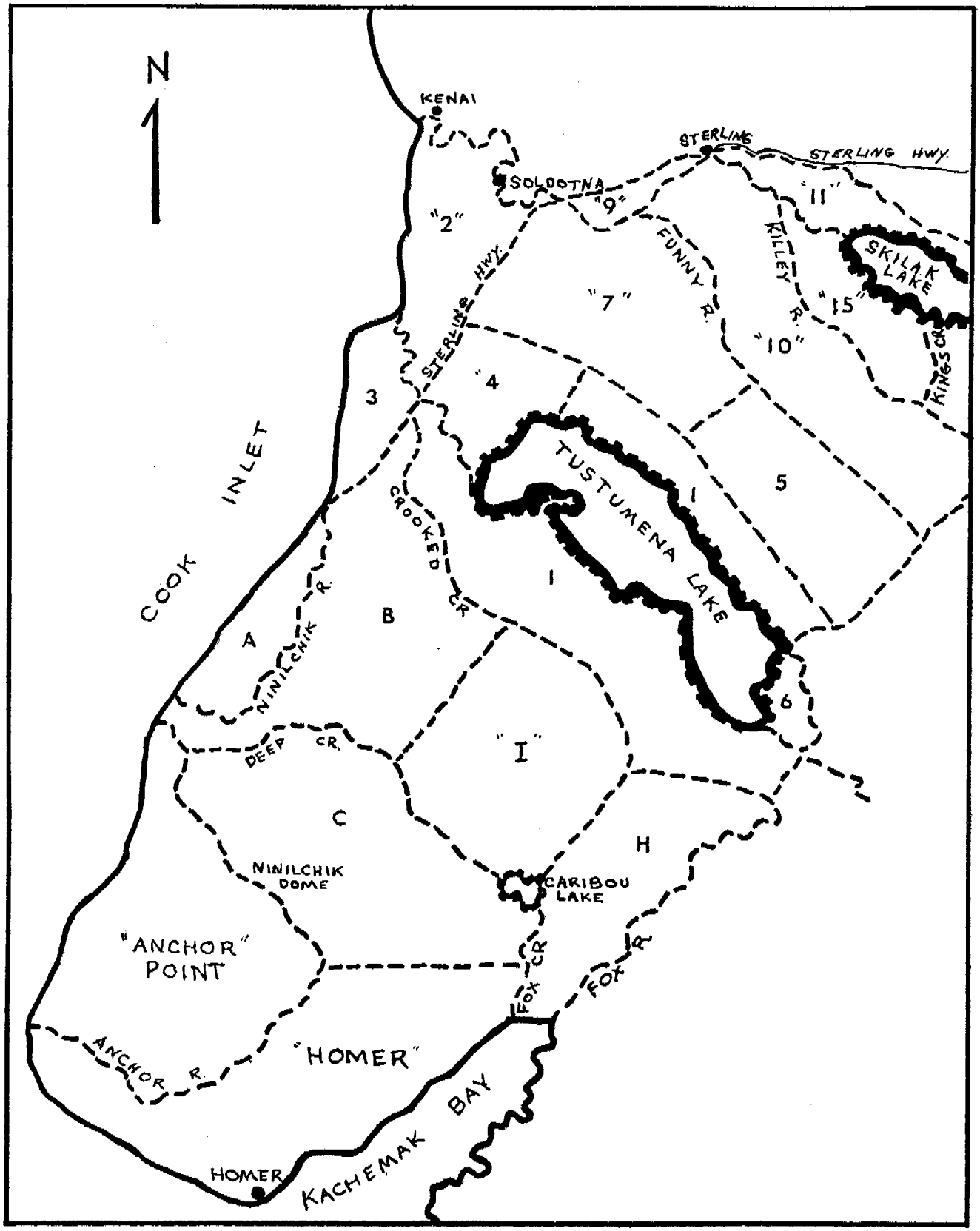



Fig. 15 Moose composition count areas, Unit 15, Lower Kenai Peninsula.

Table 43. Summary of moose population composition counts. Kuskokwim River, Unit 19, 1967-68*

| Area | Date | large ♂ | small ♂ | total ♂ | ♀ W/0 | ♀ W/1 | ♀ W/2 | total ♀ | total adults | lone calves | total calves | unid. sex & age | total moose | count time (hr.) | moose per hr. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Takotna R. | Mar. 15 1968 | - | - | - | - | 13 | 1 | - | 72 | 0 | 15 | - | 87 | 1.8 | 48 |
| Kuskokwim R. Medfra-Selatna R. | Mar. 14 1968 | - | - | - | - | 38 | 4 | - | 130 | 0 | 46 | - | 176 | 4.3 | 41 |
| Pitka, Middle Forks, Big R. | Mar. 14 1968 | No Significant Sample | | | | | | - | - | - | - | - | - | - | - |
| Kuskokwim R. Selatna R. to Sleetmute | Mar. 15 1968 | Small Sample | | | | 3 | 1 | - | 16 | 0 | 5 | - | 16 | 0.6 | 26 |
| Total, Kuskokwim River | | - | - | - | | 54 | 6 | - | 218 | 0 | 66 | - | 279 | 6.7 | 42 |

*Not illustrated.

Table 44.

Moose sex and age ratios, Kuskokwim River, Unit 19, 1967-68.*

| Area | Date | Total ♂ per 100 ♀ | small ♂ per 100 ♀ | small ♂ per 100 large ♂ | small ♂ % in herd | small ♂ per 100 ♂ calves | calves per 100 ♀ | Incidence of twins per 100 cows w/calf | Calf % in herd | moose per hr | Total moose |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Takotna R. | Mar. 15 1968 | - | - | - | - | - | - | 7.1 | 17.2 | .48 | 87 |
| Kuskokwim R. Medfra Selatna R. | Mar. 14 1968 | - | - | - | - | - | - | 9.5 | 26.1 | 41 | 176 |
| Pitka, Middle Fork, & Big River | Mar. 14 1968 | No Significant Sample | | | - | - | - | - | - | - | - |
| Kuskokwim R., Selatna R. to Sleetmute | Mar. 14 1968 | No Significant Sample | | | - | - | - | - | - | 27 | 16 |
| Total, Kuskokwim River | Mar. 14-15 1968 | - | - | - | - | - | - | 10.0 | 23.7 | 42 | 279 |

*Count areas not illustrated.

Table 45. Summary of moose population composition counts, Tanana Flats, Unit 20, 1967.*

| area | date | large ♂ | small ♂ | total ♂ | ♀ w/0 | ♀ W/1 | ♀ W/2 | total ♀ | total adults | lone calves | total calves | unid. sex & age | total moose | count time (hrs) | moose per hour |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | Oct. 26,27 | 35 | 3 | 38 | 68 | 15 | 0 | 83 | 121 | 0 | 15 | 0 | 136 | 3.1 | 44 |
| 3 | Oct 25 | 10 | 4 | 14 | 35 | 16 | 1 | 52 | 66 | 0 | 18 | 0 | 84 | 1.8 | 47 |
| 4 | Oct 27 | 22 | 0 | 22 | 19 | 5 | 0 | 24 | 46 | 0 | 5 | 0 | 51 | 3.0 | 18 |
| 5 | Oct 25 | 9 | 2 | 11 | 12 | 7 | 0 | 19 | 30 | 0 | 7 | 0 | 37 | 2.1 | 18 |
| 6 | Oct 25 | 18 | 5 | 23 | 30 | 5 | 0 | 35 | 58 | 0 | 5 | 0 | 63 | 1.7 | 37 |
| 7 | Oct 28, 30 | 14 | 0 | 14 | 14 | 3 | 0 | 17 | 31 | 0 | 3 | 1 | 35 | 2.5 | 14 |
| 8 | Oct 30 | 4 | 0 | 4 | 14 | 2 | 0 | 16 | 20 | 0 | 2 | 0 | 22 | 1.3 | 17 |
| 9 | Oct 27,28 | 20 | 6 | 26 | 33 | 20 | 0 | 53 | 79 | 1 | 21 | 0 | 100 | 3.6 | 29 |
| Totals | | 132 | 20 | 152 | 225 | 73 | 1 | 299 | 451 | 1 | 76 | 1 | 528 | 19.1 | 28 |

*See Figure 16 map of count areas.

Table 46. Moose sex and age ratios, Tanana Flats, Unit 20, 1967.*

| Area | | total ♂ per 100 ♀ | small ♂ per 100 ♀ | small ♂ per 100 large ♂ | small ♂ % in herd | small ♂ per 100 ♂ calves | calves per 100 ♀ | incidence of twins per 100 cows w/calf | Calf % in herd | moose per hr | total moose |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | Oct 26,27 | 45.8 | 3.6 | 8.6 | 2.2 | 40.0 | 18.1 | 0.0 | 11.0 | 44 | 136 |
| 3 | Oct 25 | 26.9 | 7.7 | 40.0 | 4.8 | 44.4 | 34.6 | 5.9 | 21.4 | 47 | 84 |
| 4 | Oct 27 | 91.6 | 0.0 | 0.0 | 0.0 | 0.0 | 20.8 | 0.0 | 9.8 | 18 | 51 |
| 5 | Oct 25 | 57.9 | 10.5 | 22.2 | 5.4 | 57.1 | 36.8 | 0.0 | 18.9 | 18 | 37 |
| 6 | Oct 25 | 65.7 | 14.3 | 27.8 | 7.9 | 200.0 | 14.3 | 0.0 | 7.9 | 37 | 63 |
| 7 | Oct 28,30 | 82.4 | 0.0 | 0.0 | 0.0 | 0.0 | 17.6 | 0.0 | 8.6 | 14 | 35 |
| 8 | Oct 30 | 25.0 | 0.0 | 0.0 | 0.0 | 0.0 | 12.5 | 0.0 | 9.1 | 17 | 22 |
| 9 | Oct 27,28 | 49.1 | 11.3 | 30.0 | 6.0 | 57.1 | 39.6 | 0.0 | 21.0 | 29 | 100 |
| Total | | 50.8 | 6.7 | 15.2 | 3.8 | 52.6 | 25.4 | 1.4 | 14.4 | 28 | 528 |

*See Figure 16, map of count areas.

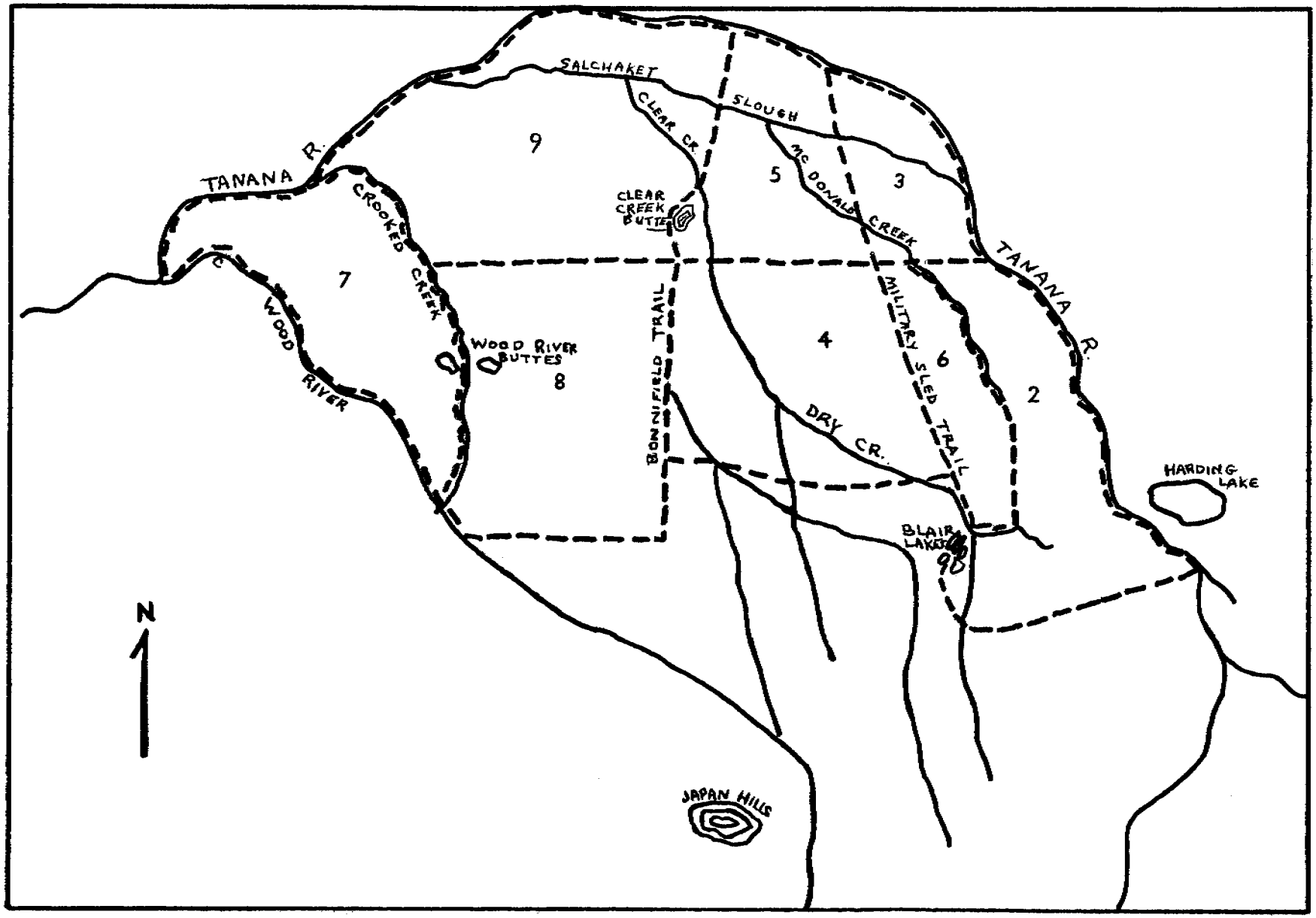



Fig. 16 Moose composition count areas, Unit 20A, Tanana Flats.

Table 47. Summary of moose population composition counts. Tanana Valley, Unit 20, 1967-68*.

| Area | Date | large ♂ | small ♂ | total ♂ | ♀ W/0 | ♀ W/1 | ♀ W/2 | total ♀ | total adults | lone calves | total calves | unid. sex & age | total moose | count time (hr.) | moose per hr. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Chena R. | 11-12 Mar. 68 | - | - | - | - | 15 | 0 | - | 75 | 1 | 16 | - | 92 | 6.8 | 14 |
| Chatanika R. | 12-13 Mar. 68 | - | - | - | - | 10 | 2 | - | 53 | 0 | 14 | - | 65 | 6.6 | 10 |
| Total, Chena, & Chatanika R. | | - | - | - | - | 25 | 2 | - | 128 | 1 | 30 | - | 157 | 13.4 | 12 |
| Shaw Cr. Goodpaster R. | 15 Mar. 68 | - | - | - | - | 3 | 0 | - | 15 | 0 | 3 | - | 18 | 1.9 | 9 |
| Salcha R. | 15 Mar. 68 | - | - | - | - | 8 | 0 | - | 38 | 0 | 8 | - | 46 | 1.2 | 38 |
| Total, Shaw Cr. Goodpaster R. & Salcha R. | | - | - | - | - | 11 | 0 | - | 53 | 0 | 11 | - | 64 | 3.1 | 21 |
| Total, Tanana Valley | | - | - | - | - | 36 | 2 | - | 181 | 1 | 41 | - | 221 | 17.5 | |

*Not illustrated.

Table 48. Moose sex and age ratios, Tanana Valley, Unit 20, 1967-68*.

| Area | Date | total ♂ per 100 ♀ | small ♂ per 100 ♀ | small ♂ per 100 large ♂ | small ♂ % in herd | small ♂ per 100 ♂ calves | calves per 100 ♀ | incidence of twins per 100 cows w/calf | | Calf % moose in herd | moose per hr | Total moose |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Chena R. | 11/12 March '68 | -- | -- | -- | -- | -- | -- | -- | -- | 17.4 | 14 | 92 |
| Chatanika R. | 12/13 March '68 | | | | | | | | | 21.6 | 10 | 65 |
| Total, Chena R. & Chatanika R. | | -- | -- | -- | -- | -- | -- | -- | -- | 19.1 | 12 | 157 |
| Shaw Cr. Goodpaster R. | | -- | -- | -- | -- | -- | -- | -- | -- | 16.7 | 9 | 18 |
| Salcha R. | | -- | -- | -- | -- | -- | -- | -- | -- | 17.4 | 38 | 46 |
| Total, Shaw Cr. Goodpaster, Salcha R. | | -- | -- | -- | -- | -- | -- | -- | -- | 17.2 | 21 | 64 |
| Total, Tanana Valley | | -- | -- | -- | -- | -- | -- | -- | -- | 18.6 | 13 | 221 |

*Not illustrated.

Table 49. **Summary of moose population composition counts.** Tok area, Units 20 and 12, 1967. *

| Area | Date | large ♂ | small ♂ | total ♂ | ♀ W/0 | ♀ W/1 | ♀ W/2 | total ♀ | total adults | lone calves | total calves | unid. sex & age | total moose | count time (hr.) | moose per hr. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1-A Ketchumstuk | 11/17 | 39 | 11 | 50 | 98 | 9 | 0 | 107 | 157 | 0 | 9 | 0 | 166 | 1.9 | 87 |
| 1-B 1966 Burn, NE of Mt. Fair-Play | 10/16 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 2 | 0 | 1 | 0 | 3 | 0.4 | 8 |
| Taylor Mt. | 10/19 | 20 | 10 | 30 | 68 | 7 | 0 | 75 | 105 | 0 | 7 | 0 | 112 | 1.1 | 102 |
| Mi. 95-105 Taylor Hwy. & Walker Fk. Bridge to head. | 11/16 | 5 | 5 | 10 | 17 | 0 | 0 | 17 | 27 | 0 | 0 | 0 | 27 | 1.1 | 25 |
| W. side Wade Cr. | 11/16 | 4 | 0 | 4 | 20 | 3 | 0 | 23 | 27 | 0 | 3 | 0 | 30 | 0.4 | 75 |
| Total, 1-B | | 30 | 15 | 45 | 105 | 11 | 0 | 116 | 161 | 0 | 11 | 0 | 172 | 3.0 | 57 |
| Total, 1 A&B | | 69 | 26 | 95 | 203 | 20 | 0 | 223 | 318 | 0 | 20 | 0 | 338 | 4.9 | 69 |
| 2-A E. side, Mt. Fairplay | 10/16 | 13 | 1 | 14 | 29 | 2 | 0 | 31 | 45 | 0 | 2 | 0 | 47 | 0.9 | 52 |
| Tanana Hills, Heads, E. & W. Fk. Dennison | 10/27 | 11 | 6 | 17 | 33 | 2 | 0 | 35 | 52 | 0 | 2 | 0 | 54 | 1.0 | 54 |
| W. Fk. Dennison, upstream from Taylor Hwy. | 10/19 | 15 | 1 | 16 | 20 | 0 | 0 | 20 | 36 | 0 | 0 | 0 | 36 | 1.3 | 28 |
| W. Fk. Dennison, W. of Mt. Fairplay | 11/16 | 4 | 5 | 9 | 14 | 0 | 0 | 14 | 23 | 0 | 0 | 0 | 23 | 0.3 | 77 |

* See Fig. 17, map of count areas.

Table 49. **Summary of moose population composition counts.** Tok area, Units 20 and 12, 1967 (continued).

| Area | Date | large ♂ | small ♂ | total ♂ | ♀ W/0 | ♀ W/1 | ♀ W/2 | total ♀ | total adults | lone calves | total calves | unid. sex & age | total moose | count time (hr.) | moose per hr. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total, 2-A | | 43 | 13 | 56 | 96 | 4 | 0 | 100 | 156 | 0 | 4 | 0 | 160 | 3.5 | 46 |
| 2-B Alaska Range, Cathedral Bluffs E. to Tok. Slana Hwy. | 10/27 | 7 | 5 | 12 | 19 | 2 | 0 | 21 | 33 | 0 | 2 | 1 | 36 | .7 | 51 |
| Tanana Hills N. of Tok-60 mi. dome. | 11/15 | 26 | 10 | 36 | 45 | 8 | 0 | 53 | 97 | 0 | 8 | 0 | 105 | 1.2 | 88 |
| Total, 2-B | | 33 | 15 | 48 | 64 | 10 | 0 | 74 | 130 | 0 | 10 | 1 | 141 | 1.9 | 74 |
| Total, 2 A&B | | 76 | 28 | 104 | 160 | 14 | 0 | 174 | 286 | 0 | 14 | 1 | 301 | 5.4 | 56 |
| Total, 1&2 | | 145 | 54 | 199 | 363 | 34 | 0 | 397 | 604 | 0 | 34 | 1 | 639 | 10.3 | |

Table 50. Moose sex and age ratios, Tok Area, Units 20 and 12, 1967.*

| Area | Date | total ♂ per 100 ♀ | small ♂ per 100 ♀ | small ♂ per 100 large ♂ | small ♂ % in herd | small ♂ per 100 ♂ calves | calves per 100 ♀ | incidence of twins per 100 cows w/calf | Calf % in herd | moose per hr | Total moose |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1-A | 11/17 | | | | | | | | | | |
| Ketchumstuk | | 46.7 | 10.3 | 28.2 | 6.6 | 244.4 | 8.4 | 0.0 | 5.4 | 87 | 166 |
| 1-B | 10/16 | | | | | | | | | | |
| 1966 Burn | | 100.0 | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 | 33.3 | 8 | 3 |
| | 10/19 | | | | | | | | | | |
| Talyor Mt. | | 40.0 | 13.3 | 50.0 | 8.9 | 285.7 | 9.3 | 0.0 | 6.2 | 102 | 112 |
| | 11/16 | | | | | | | | | | |
| Mi. 95-105, to Walker Fk. | | 58.8 | 29.4 | 100.0 | 18.5 | - | 0.0 | 0.0 | 0.0 | 25 | 27 |
| | 11/16 | | | | | | | | | | |
| Wade Cr. | | 17.4 | 0.0 | 0.0 | 0.0 | 0.0 | 13.0 | 0.0 | 10.0 | 30 | 75 |
| Total 1-B | | 38.8 | 12.9 | 50.0 | 8.7 | 272.7 | 9.5 | 0.0 | 6.4 | 57 | 172 |
| Total 1 A & B | | 42.6 | 11.7 | 37.7 | 7.7 | 260.0 | 9.0 | 0.0 | 5.9 | 69 | 338 |
| 2A | 10/16 | | | | | | | | | | |
| E. Mt. Fairplay | | 45.2 | 3.2 | 7.7 | 2.1 | 100.0 | 6.5 | 0.0 | 4.3 | 52 | 47 |
| | 10/27 | | | | | | | | | | |
| Tanana Hills E & W Dennison | | 48.6 | 17.1 | 54.5 | 11.1 | 600.0 | 5.7 | 0.0 | 3.7 | 54 | 54 |
| W. Fk. Dennison, Taylor-Up | 10/19 | 80.0 | 5.0 | 6.7 | 2.8 | - | 0.0 | 0.0 | 0.0 | 28 | 36 |

*See Figure 17, map of count areas.

Table 50. Moose sex and age ratios, Tok Area, Units 20 and 12, 1967.*

| Area | Date | total ♂ per 100 ♀ | small ♂ per 100 ♀ | small ♂ per 100 large ♂ | small ♂ % in herd | small ♂ per 100 ♂ calves | calves per 100 ♀ | incidence of twins per 100 cows w/calf | Calf % in herd | moose per hr | Total moose |
|---|---|---|---|---|---|---|---|---|---|---|---|
| W. Fk. Dennison, W. of Fairplay | 11/16 | 64.3 | 35.7 | 125.0 | 21.7 | - | 0.0 | 0.0 | 0.0 | 77 | 23 |
| Total, 2-A | | 56.0 | 13.0 | 30.2 | 8.1 | 650.0 | 4.0 | 0.0 | 2.5 | 46 | 160 |
| 2-B | | | | | | | | | | | |
| Alaska Range, Cathedral-E | | 57.1 | 23.8 | 71.4 | 13.9 | 500.0 | 10.5 | 0.0 | 5.6 | 51 | 36 |
| Tanana Hills, Tok-60 Mi. Dome | | 67.9 | 18.9 | 38.5 | 9.5 | 250.0 | 15.1 | 0.0 | 7.6 | 88 | 105 |
| Total 2 B | | 64.8 | 20.3 | 45.5 | 10.6 | 300.0 | 13.5 | 0.0 | 7.1 | 74 | 141 |
| Total, 2A & 2B | | 59.7 | 16.1 | 36.8 | 9.3 | 400.0 | 8.0 | 0.0 | 4.7 | 56 | 301 |
| Total 1 & 2 | | 50.1 | 13.6 | 37.2 | 8.5 | 317.6 | 8.6 | 0.0 | 5.3 | 62 | 639 |

*See Figure 17, map of count areas.

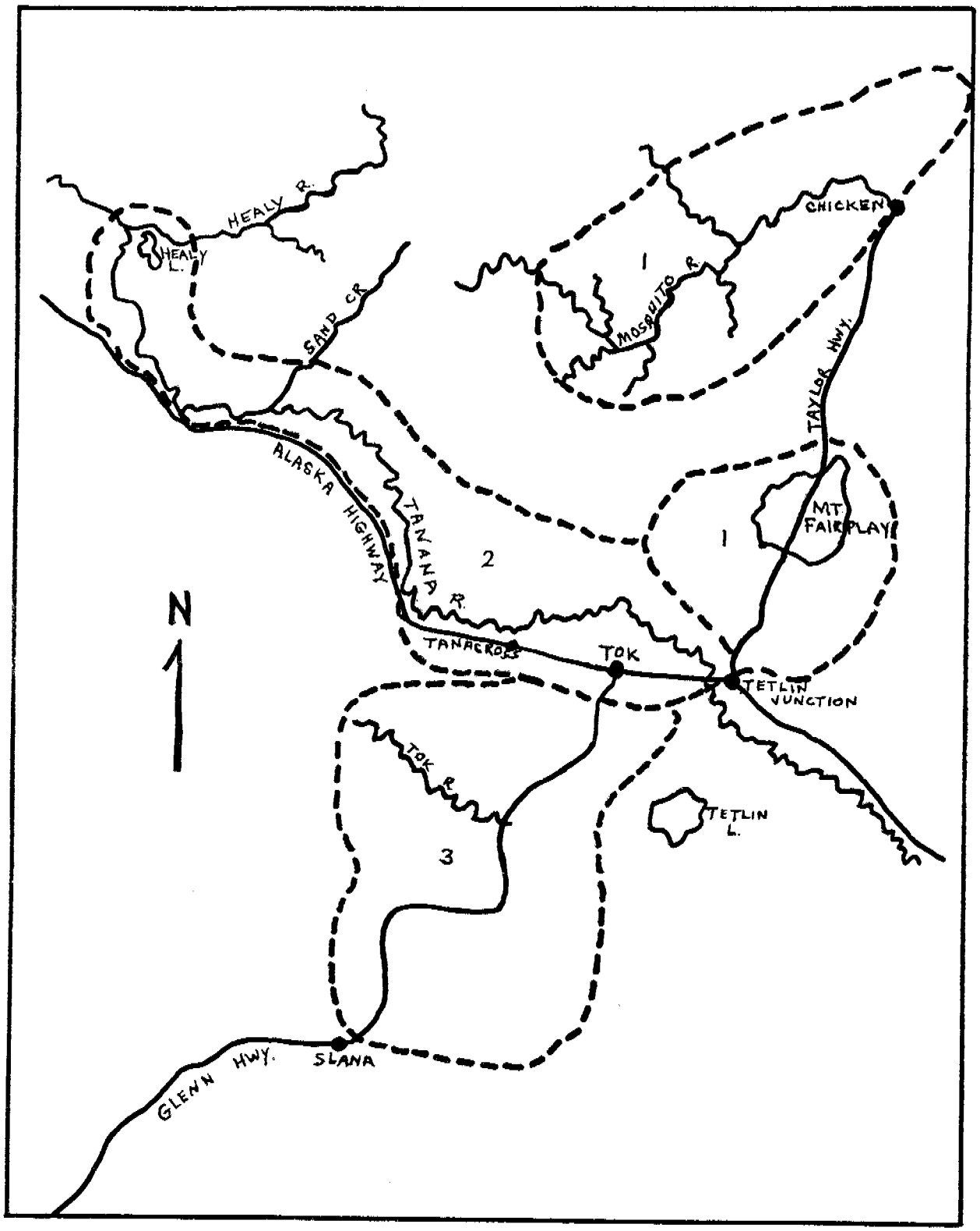



Fig. 17 Moose composition count areas, Units 20C and 12, Tok area.

Table 51. Moose sex and age ratios, Yukon River, Unit 21, 1962-1968.*

| Area | Date | total ♂ per 100 ♀ | small ♂ per 100 ♀ | small ♂ per 100 large ♂ | small ♂ % in herd | small ♂ per 100 ♂ calves | calves per 100 ♀ | incidence of twins per 100 cows w/calf | Calf % in herd | moose per hr | Total moose |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Lower Yukon | 11/62 | 45.9 | 16.3 | 57.1 | 10.1 | 222.2 | 14.6 | 20.0 | 9.1 | - | 395 |
| Middle Yukon (Kaltag-Tanana) | 3/63 | - | - | - | - | - | - | 6.3 | 15.8 | 95 | 647 |
| Middle Yukon (Tanana Holy Cross) | 3/66 | - | - | - | - | - | - | 7.8 | 18.6 | 99 | 704 |
| Middle Yukon (Tanana-Nulato) | 3/68 | - | - | - | - | - | - | - | - | - | 476 |

* Not illustrated.

Table 52. [illegible] and age ratios, Koyukuk River, Units 21 and 24, 1954-1967.*

| Area | Date | total ♂ per 100 ♀ | small ♂ per 100 ♀ | small ♂ per 100 large ♂ | small ♂ % in herd | small ♂ per 100 ♂ calves | calves per 100 ♀ | incidence of twins per 100 cows w/calf | Calf % in herd | moose per hr | Total moose |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Koyukuk | 10-12 1954 | 131.6 | 65.8 | 100.0 | 21.0 | 161.3 | 81.6 | 36.7 | 26.1 | - | 119 |
| " | 10-12 1957 | 79.5 | 15.9 | 25.0 | 6.2 | 48.3 | 65.9 | 23.9 | 25.7 | 35 | 226 |
| " | 10-12 1958 | 43.5 | 13.4 | 44.3 | 6.3 | 48.6 | 55.0 | 19.0 | 26.0 | 132 | 553 |
| " | 12/ 1959 | 99.3 | 21.6 | 27.8 | 8.1 | 77.9 | 55.4 | 20.6 | 20.8 | 51 | 370 |
| " | 1/ 1961 | - | - | - | - | - | - | 29.2 | 32.1 | - | 579 |
| " | 3/ 1963 | - | - | - | - | - | - | 4.6 | 11.4 | 133 | 1003 |
| " | 3/ 1966 | - | - | - | - | - | - | 6.0 | 21.4 | 223 | 668 |
| " | 3/ 1968 | - | - | - | - | - | - | - | - | 264 | 739 |



*Not illustrated.

Table 53. Summary of moose parturition counts, Tanana Flats, Post-Tagging, 1968.

| Area | Date | Newborn Calves ♀/0 | ♀/1 | ♀/2 | ♀/? | Yearlings W/0♀ | ♀/1 | ♀/2 | Tagged | Total Calves | Total Yrlings | Total ♀ | Calves: 100 ♀ | Yrlings: 100 ♀ | ♂ | Total Moose | Moose/ Hr |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| I | 6/4-5 | 79 | 67 | 8 | 23 | 5 | 18 | 1 | 0 | 83 | 20 | 201 | 41.2 | 9.9 | 267 | 571 | 88 |
| | | | | | | | | | | 45 tagged calves | | | | | | | |
| II | 6/13 | 31 | 22 | 1 | 0 | 0 | 3 | 0 | 0 | 24 | 3 | 57 | 42.7 | 5.2 | 70 | 154 | 42 |
| | | | | | | | | | | 7 tagged calves | | | | | | | |
| III | 6/12 | 18 | 14 | 6 | 8 | 1 | 24 | 0 | 0 | 26 | 24 | 71 | 36.6 | 33.8 | 73 | 194 | 68 |
| | | | | | | | | | | 7 tagged calves | | | | | | | |
| Tanana-Salchaket | 6/4 | 2 | 13 | 1 | 5 | 1 | 1 | 0 | 0 | 15 | 1 | 23 | 65.2 | 4.3 | 2 | 41 | 20 |
| | | | | | | | | | | 5 tagged calves | | | | | | | |
| E. of area I, S. of Salchaket | 6/4 | 2 | 7 | 1 | 0 | 0 | 2 | 0 | 0 | 9 | 2 | 12 | 75.0 | 16.7 | 1 | 24 | 26 |
| | | | | | | | | | | 1 tagged calf | | | | | | | |
| TOTALS | | 132 | 123 | 17 | 36 | 7 | 48 | 1 | 0 | 157 | 50 | 364 | 43.4 | 11.0 | 413 | 984 | |
| | | | | | | | | | | 65 tagged calves, total | | | | | | | |

Table 54. Summary of moose parturition counts, Yakutat, Unit 5, 1968.

| Area | Date | Newborn Calves ♀/0 | ♀/1 | ♀/2 | ♀/? | Yearlings W/0♀ | ♀/1 | ♀/2 | Tagged | Total Calves | Total Yrlings | Total ♀ | Calves: 100 ♀ | Yrlings: 100 ♀ | ♂ | Total Moose | Moose/ Hr |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ustay R.- Alsek R. | 5/27 | 23 | 4 | 4 | 1 | 3 | 1 | 0 | - | 12 | 1 | 36 | 33.3 | 2.7 | 19 | 68 | 29 |
| Situk R.- Dangerous R. | 5/24 | 11 | 1 | 3 | 0 | 1 | 1 | 1 | - | 7 | 3 | 18 | 38.8 | 16.7 | 11 | 39 | 34 |
| TOTAL | | 34 | 5 | 7 | 1 | 4 | 2 | 1 | - | 19 | 4 | 54 | 35.2 | 7.4 | 30 | 107 | 32 |

Table 55. Summary of Moose Yearling Counts, Matanuska and Lower Susitna, Unit 14, May 1968.

| area | date | large ♂ | small ♂ | total ♂ | ♀ W/0 | ♀ W/1 | ♀ W/2 | total ♀ | total adults | lone calves | total calves | unid. sex & age | total moose | count time (hrs) | Yrlys/ 100 ♀ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Matanuska Valley 1* | 4/30 | 0 | 2 | 2 | 86 | 24 | 2 | 112 | 114 | 2 | 30 | 0 | 114 | 3.33 | 27 |
| Palmer Hwy. Flats | 5/3 | 0 | 0 | 0 | 23 | 5 | 1 | 29 | 29 | 1 | 8 | 0 | 37 | 0.5 | 28 |
| Matanuska Valley 2* | 5/3 | 1 | 0 | 1 | 48 | 17 | 1 | 61 | 62 | 0 | 19 | 0 | 81 | 1.6 | 31 |
| Matanuska Valley 3* | 5/7 | 0 | 0 | 0 | 6 | 3 | 0 | 9 | 9 | 0 | 3 | 0 | 12 | 0.6 | 33 |
| Total Matanuska Valley | | 1 | 2 | 3 | 163 | 49 | 4 | 211 | 214 | 3 | 60 | 0 | 244 | 6.0 | 28 |
| Jim-Swan | 5/3 | 1 | 0 | 1 | 24 | 11 | 1 | 36 | 37 | 1 | 14 | 0 | 51 | 0.5 | 39 |
| Lower 4* Susitna | 5/1 | 1 | 0 | 1 | 18 | 6 | 0 | 24 | 25 | 0 | 6 | 0 | 31 | 2.30 | 25 |
| Lower 5* Susitna | 5/2 | 3 | 0 | 3 | 84 | 35 | 0 | 119 | 122 | 0 | 35 | 0 | 157 | 5.33 | 29 |
| Lower 6* Susitna | 5/7 | 0 | 1 | 1 | 38 | 10 | 0 | 48 | 49 | 1 | 11 | 0 | 60 | 4.3 | 23 |
| | | 4 | 1 | 5 | 140 | 51 | 0 | 191 | 196 | 1 | 52 | 0 | 248 | 11.9 | 27 |

1* Timberline, Premier Mine to Little Susitna
2* Timberline, Little Sue to Willow
3* Lake Nancy Flats to Willow
4* Willow Creek from Susitna River to Alpine
5* Alpine and below from Willow to Sheep Creek
6* Flats from Willow to Little Willow

Exploratory counts in the McArthur River and Susitna River flats (Unit 16) yielded small sample sizes from which conclusions should not be drawn, but also provided information about favored calving areas which will be useful in future counts.

In Unit 20A on the Tanana Flats initial production of calves seemed good, although phenologically the spring was advanced over the previous two years which made finding moose more difficult in early June especially in areas II and III.

## Tagging and Movements

### Tanana Flats

Moose calves were tagged on the Tanana Flats south of Fairbanks from May 26 through May 31. Tagging effort was concentrated in Area I, an arbitrarily described portion of the Flats lying between the Bonnifield Trail on the west, the Military Sled Trail on the east, the Tanana River on the north and the dense spruce timber on the south. Much of Area I consists of large wet marshes with shrub and tree growth of any size limited to present or former stream and pond banks. Tagging conditions are nearly ideal. In Areas II and III which lie between the Bonnifield Trail and the Wood River much of the cover consist of mature black spruce or birch and the marshes are smaller and support taller shrub growth. The few large marshes generally have deeper water than those in Area I. Thus tagging is much more difficult as are subsequent sightings of tagged moose.

The data reflecting numbers and location of calves tagged are summarized in Tables 57 and 58.

Returns from the 1966 tagging operation suggest that many of the moose tagged on the Tanana Flats are also winter residents there, but that a substantial number also move to the Alaska Range, thirty to fifty miles away, and some cross the Tanana River to winter in adjacent portions of sub-unit 20B. Returns from the 1968 tagging effort are still rather limited and will not be discussed at this time.

Department personnel assisting in moose calf tagging included Art Bratlie, John Frank, Jack Didrickson, Larry Jennings, Scott Grundy, Tom Cates, Jim Miller, Lonnie Richards, Sam Snyder, Bea Faber, Jean Ernest, and Dick Bishop. U.S. Army personnel assisting are listed in Table 59.

### Matanuska Valley

Adult tagging in the Matanuska Valley was curtailed due to poor weather and snow conditions.

Table 56. **Summary of moose parturition counts**, Cook Inlet, Unit 16, 1968.

| Area | Date | Newborn Calves ♀/0 | ♀/1 | ♀/2 | ♀/? | Yearlings W/0♀ | ♀/1 | ♀/2 | Tagged | Total Calves | Total Yrlings | Total ♀ | Calves: 100 ♀ | Yrlings: 100 ♀ | ♂ | Total Moose | Moose/ Hr |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| McArthur R. Flats | 6/13-14 | 39 | 17 | 6 | 0 | 18 | 0 | 0 | 0 | 23 | 0 | 80 | 28.8 | 0.0 | 18 | 121 | - |
| Susitna R. Flats | 6/14 | 23 | 3 | 4 | 1 | 13 | 0 | 0 | 0 | 11 | 0 | 44 | 25.0 | 0.0 | 24 | 79 | - |
| TOTAL | | 62 | 20 | 10 | 1 | 31 | 0 | 0 | 0 | 34 | 0 | 124 | 27.4 | 0.0 | 42 | 200 | - |



Table 57. Summary of Moose Calf tagging data, Tanana Flats, 1968.

| Area | Calves Tagged ♂ | ♀ | ? | Sets Twins | One of twins | Total Tagged | Time * Required | # Tagged per hour | Helicopter Used |
|---|---|---|---|---|---|---|---|---|---|
| I | 114 | 120 | 0 | 18 | 10 | 234 | 50.5 | 4.6 | 12E4 HU1A |
| II | 33 | 24 | 0 | 6 | 3 | 57 | 12.1 | 4.7 | 12E4 |
| III | 37 | 30 | 0 | 8 | 3 | 67 | 19.8 | 3.4 | 12E4 |
| TOTAL | 184 | 174 | 0 | 32 | 16 | 358 | 82.4 | 4.3 | HU1A 12E4 |

Table 58. Area Moose Tagging Results, Tanana Flats, 1968.

AREA I

| | 26 May | 27 May | 28 May | 29 May | 30 May | 31 May | | TOTAL |
|---|---|---|---|---|---|---|---|---|
| Total Moose | 35 | 53 | 72 | 51 | 1 | 22 | | 234 |
| No. Males | 18 | 30 | 32 | 25 | - | 9 | | 114 |
| No. Females | 17 | 23 | 40 | 26 | 1 | 13 | | 120 |
| Sets of Twins | 2 | 5 | 5 | 5 | - | 1 | | 18 |
| One of Set | 1 | 5 | 1 | 2 | - | 1 | | 10 |
| Color Marker ** | R W/tw | R W/tw | R W/tw | R W/tw | Red | R W/tw | | |
| Tag Series * | | | | | | | | |
| Chopper Use Hrs. | 12E4 6.6 | HUIA 10-12 | HUIA 12-13 | HUIA 10-12 | 12E4 - | 12E4 6.9 | | 50.5 |

* 6830-6847, 6864-6866, 6868-6890, 6892-6895, 6897-6898, 6899, 6926-6938, 6940-6946, 6976-6977, 6979-6983, 6985-6999, 7301-7380, 7384-7425, 7428-7430, 7432-7437, 7439-7445, 7447-7450, 7452-7454, 7459-7489, 7491-7552, 7554, 7571-7575, 7701-7732, 7734-7760, 7762-7775, 7778-7799, 7803, 7805-7821, 7823, 7831-7832, 7851-7875, 7883, 7887, 8098, 8226-8227, 8505, 8524, 8601-8607, 8609,8611-8615, 8619, 8623, 8625, 8672, 8675, 8693-8698, 8700

Duplicate Numbers:

7856 on RE, Specimen #1 and LE, Specimen #7, May 28
7415 on RE, Specimen #21 and LE, Specimen #22, May 28
7498 on LE, Specimen #15 and 16, May 29
8698 on LE, Specimen #23 and 24, May 29

** R - Red
W - White
tw - Twin

Table 58. Area Moose Tagging Results, Tanana Flats, 1968.

AREA II

| | 26 May | 27 May | 28 May | 29 May | 30 May | 31 May | TOTAL |
|---|---|---|---|---|---|---|---|
| Total Moose | -- | -- | -- | 40 | 17 | -- | 57 |
| No. Males | -- | -- | -- | 25 | 8 | -- | 33 |
| No. Females | -- | -- | -- | 15 | 9 | -- | 24 |
| Sets of Twins | -- | -- | -- | 5 | 1 | -- | 6 |
| One of Set | -- | -- | -- | 3 | -- | -- | 3 |
| Color Marker** | | | | O B/tw | O B/tw | | |
| Tag Series * | | | | | | | |
| Chopper Use Hrs | | | | 12E4 8.11 | 12E4 4.0 | | 12.1 |



* 7512, 7525, 7542-7547, 7901-7914, 7916-7924, 7926-7935, 7937-7949, 7951-7952, 7954-7956, 7985-7988, 7991, 7994-7998, 8513-8522, 8526-8539 (7987 duplicated on Specimen #1 & 3, May 30)

7987 - LE on Specimen #1 and 3, May 30

** O - Orange
B - Blue
tw - Twin

Table 58. Area Moose Tagging Results, Tanana Flats, 1968.

AREA III

| | 26 May | 27 May | 28 May | 29 May | 30 May | 31 May | TOTAL |
|---|---|---|---|---|---|---|---|
| Total Moose | -- | 21 | 33 | 1 | 11 | 1 | 67 |
| No. Males | -- | 11 | 19 | -- | 6 | 1 | 37 |
| No. Females | -- | 10 | 14 | 1 | 5 | -- | 30 |
| Sets of Twins | -- | 1 | 6 | -- | 1 | -- | 8 |
| One of Set | -- | 1 | 1 | -- | 1 | -- | 3 |
| Color Marker ** | | | Y P/tw 07539 | O | Y P/tw | Y | |
| Tag Series * | | | | | | | |
| Chopper Use Hrs | | 12E4 5.1 | 12E4 6.8 | 12E4 7.9 | 12E4 | 12E4 | 19.8 |

* 6901-6909, 6911-6912, 6916-6917, 6921-6922, 6924-6925, 6947-6948, 6951-6964, 6966-6967, 6969-6972, 6974-6975,7438, 7501-7510, 7513-7522, 7526-7529, 7532-7541, 7556,7557-7559, 7561-7568, 7576-7577, 7579-7591,7594-7595, 7598-7600, 7983-7984, 7990, 7992-7993, 7995, 7999, 8000, 8501-8506, 8509-8510, 8540-8544, 8546-8547, 8648-8649

** Y - Yellow
P - Pink
O - Orange
tw - Twin

Table 59. U.S. Army support, Tanana Flats Moose Calf Tagging, 1968.

SSG Wayne Booher, Post Conservation NCO

SFC Gail L. Burch, 171st Inf Bde CM1 - NCO

2nd Lt Roger S. Streeter, 171st Bde, CM1 OFF

CPT John C. Taylor, 47th MED Det Post Dent. CL.

CPT Arthur S. Hansen, B.A.H. Dent. CL.

MAJ. William E, Kalmus, 12th Avn Co. (FW)

CPT Mendeln S. Solomon, 171st Avn Section, 171st Inf Bde.

TRANS MDM HEL CO (N)

Cpt John G. Swan, Jr.

CW3 Billie M. Couch

CW3 Kenneth E. Estess, 18th Transportation Det.

CW2 Gordon D. Colis

CW2 Ronald H. Cone

CW2 David R. Talbot

CW2 Wayne F. Woodbury

SFC Enzie A. Stovall

SSG Jerry D. Jordan

SSG Henry A. Hamman

SP6 Maurice L. Holman

SP5 Charles G. Lampert

SP4 James A. Donaldson

## Range - Productivity Relationships

### Construction

Construction of the four, 1 $mi^2$ enclosures continued in 1967-1968. Installation of fence posts for all enclosures was completed, exclosures were completed in enclosures 1 and 2. Enclosures 1 and 2 were completed, and spruce poles were installed along the mid-line and top-line of the fence in enclosure 1 to reduce efforts of and damage by moose attempting to go over or through the fence.

### Vegetation (Data and Summary By R. Seemel, Kenai Moose Range).

Details of techniques used in the vegetation studies are included in the "Techniques" section.

During the summer of 1967 Bob Seemel, Assistant Refuge Manager, Kenai National Moose Range, and assistants located and gathered data on plant succession on over 100 plots in the various vegetation types in enclosures 1 and 2. The data are being summarized.

Thirty plots of 3/20 acre in size were established in each of the seven cover types in each of enclosures 1 and 2 for the study of browse production and utilization. Total available browse and annual growth were measured on these plots. The plots were examined again in the spring of 1968 to determine utilization of the browse by moose which were held in the two enclosures over the winter.

In enclosure 2, moose browsed on about 30 percent of the stems, from which they removed an average of 66 percent of the annual growth. Moose rarely utilized more than the annual growth in the winter of 1967-1968.

The data for enclosure 2 are given in Table 60 through 63. Data for enclosure 1 are being analyzed.

### Stocking

The gates of enclosures 1 and 2 were left open until late December - early January when aerial observation showed that at least 10 moose were in each enclosure. The moose had wandered into and out of the enclosures naturally.

In January the moose in the pens were captured by using a Cap-chur dart gun and darts (Table 65). Sixteen mg. and 23.5 mg. of succinylcholine chloride were the doses given to calves and adults respectively. An incisor and blood sample were taken from the captured animals and they were marked with ear tags and

Table 6Q. Estimated number of stems of browse species per acre in Vegetation Types and diameter classes, Enclosure #2, Kenai Moose Research Station, Fall 1967.

VEGETATION TYPE*

| Dia.Class (≤N) | Dense Birch | | | | Med. Birch | | | Thin Birch | | | | Spruce Birch | | | | Spruce | | | | M.H. Thin | | | | M.H. Dense | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Bir | A | V | W | Bir | A | W | Bir | A | W | AL | Bir | A | V | W | Bir | A | W | N | Bir | A | V | W | Bir | A | V |
| 1/4" | 7242 | 23 | 23 | 114 | 4458 | 23 | 152 | 3730 | 91 | 75 | 0 | 1113 | 27 | 9 | 36 | 667 | 23 | 104 | 1072 | 1371 | 218 | 36 | 27 | 471 | 336 | 309 |
| 1/2" | 16995 | 58 | 23 | 325 | 10161 | 31 | 227 | 6885 | 61 | 122 | 129 | 4030 | 36 | 27 | 118 | 1453 | 30 | 160 | 2341 | 1243 | 145 | 36 | 9 | 127 | 173 | 0 |
| 3/4" | 6313 | 15 | 0 | 166 | 3481 | 23 | 98 | 2569 | 52 | 68 | 0 | 1878 | 18 | 0 | 36 | 455 | 15 | 0 | 129 | 190 | 36 | 0 | 0 | 0 | 18 | 18 |
| 1" | 1189 | 0 | 0 | 52 | 682 | 0 | 7 | 562 | 15 | 15 | 0 | 426 | 0 | 0 | 0 | 123 | 0 | 0 | 8 | 9 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 1/4" | 408 | 0 | 0 | 7 | 217 | 0 | 0 | 129 | 0 | 0 | 0 | 281 | 0 | 0 | 0 | 37 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 1/2" | 173 | 0 | 0 | 0 | 26 | 0 | 0 | 30 | 0 | 0 | 0 | 63 | 0 | 0 | 0 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 3/4" | 46 | 0 | 0 | 0 | 14 | 0 | 0 | 0 | 0 | 0 | 0 | 18 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2" | 21 | 0 | 0 | 0 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 1/4" | 7 | 0 | 0 | 0 | 14 | 0 | 0 | 9 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| TOTAL & (%) | 32394(97.57) | 19110(96.86) | 13914(95.68) | 7809(96.22) | 2742(41.48) | 2813(84.73) | 616(42.16) |
| | 96(0.29) | 137(0.69) | 219(1.51) | 81(1.0) | 68(1.03) | 399(12.02) | 527(36.56) |
| | 46(0.14) | | 280(1.92) | 36(0.44) | 264(3.9) | 72(2.17) | |
| | 664(2.0) | 484(2.45) | 129(0.89) | 190(2.34) | 3550(53.59) | 36(1.08) | 309(21.28) |
| GRAND TOTAL | 33,200 | 19,731 | 14,542 | 8,116 | 6,624 | 3,320 | 1,452 |

* Species within types are abreviated thus: Bir = White Birch, A = Aspen, V = High bush cranberry, W = Willow, AL = Alder, N = Dwarf Birch, "M.H." = Mature Hardwood.

Table 61. Estimated annual production of Browse Species in enclosure #2, Kenai Moose Research Station, Fall 1967. Estimates are given for diameter class, and Vegetation Type, in LB/Acre.

| Dia.Class | VEGETATION TYPE* | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Dense Birch | | | | Med.Birch | | | Thin Birch | | | | Spruce Birch | | | |
| (≤N) | Bir | A | V | W | Bir | A | W | Bir | A | W | AL | Bir | A | V | W |
| 1/4" | 15.88 | 0.06 | 0.03 | 0.42 | 12.98 | 0.06 | 1.12 | 12.96 | 0.22 | 0.55 | 0 | 3.84 | 0.07 | 0.01 | 0.13 |
| 1/2" | 145.12 | 0.09 | 0.06 | 2.82 | 109.89 | 0.22 | 1.96 | 78.83 | 0.16 | 1.06 | 0.02 | 19.25 | 0.09 | 0.07 | 1.06 |
| 3/4" | 138.03 | 0.03 | 0 | 3.77 | 86.94 | 0.03 | 2.24 | 67.87 | 0.40 | 1.53 | 0.36 | 34.53 | 0.04 | 0 | 0.82 |
| 1" | 66.13 | 0 | 0 | 1.22 | 35.31 | 0 | 0.20 | 30.44 | 0 | 0.20 | 0.24 | 18.70 | 0 | 0 | 0 |
| 1 1/4" & over | 62.13 | 0 | 0 | 0 | 36.55 | 0 | 0 | 32.14 | 0 | 0 | 0 | 28.97 | 0 | 0 | 0 |
| TOTALS | 427.29 | 0.18 | 0.09 | 8.23 | 281.67 | 0.31 | 5.52 | 222.24 | 0.78 | 3.34 | 0.64 | 105.29 | 0.20 | 0.08 | 2.01 |

* M.H. = Mature Hardwoods. Species abbreviations: Bir = Paper Birch, A = Aspen, V = High Bush Cranberry, W = Willow, AL = Alder, N - Dwarf Birch.

Table 61. Estimated annual production of Browse Species in enclosure #2, Kenai Moose Research Station, Fall 1967. Estimates are given for diameter class, and Vegetation Type, in LB/Acre. (continued)

| | VEGETATION TYPE* | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Dia.Class | | Spruce | | | M.H. Thin | | | | M.H. Dense | | | |
| (≤N) | Bir | A | W | N | Bir | A | V | W | Bir | A | V | |
| 1/4" | 1.60 | 0.09 | 0.43 | 1.47 | 3.28 | 0.54 | 0.05 | 0.10 | 1.13 | 0.83 | 0.43 | |
| 1/2" | 8.34 | 0.08 | 1.45 | 6.20 | 7.12 | 0.36 | 0.10 | 0.20 | 7.28 | 0.43 | 0 | |
| 3/4" | 12.66 | 0.03 | 0 | 0.36 | 5.32 | 0.09 | 0 | 0 | 0.51 | 0.04 | 0 | |
| 1" | 5.91 | 0 | 0 | 0 | 0.44 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 1 1/4" & over | 2.63 | 0 | 0 | 0 | - | - | - | - | - | - | - | |
| TOTALS | 31.14 | 0.20 | 1.88 | 8.03 | 16.16 | 0.99 | 0 | 0.30 | 8.92 | 1.30 | 0.43 | |

Table 62. Utilization of Browse Species within Vegetation Types and Diameter Classes, Enclosure #2, Kenai Moose Research Station Winter 1967-1968. In LB/Acre.

| Dia.Class (≤N) | VEGETATION TYPE* | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Dense Birch | | | | Med. Birch | | | Thin Birch | | | | Spruce Birch | | | | Spruce | | | | M.H. Thin | | | | M.H. Dense | | |
| | Bir | A | V | W | Bir | A | W | Bir | A | W | AL | Bir | A | V | W | Bir | A | W | N | Bir | A | V | W | Bir | A | V |
| 1/4" | 0.32 | - | - | 0.02 | 0.18 | - | 0.08 | 0.16 | - | - | - | 0.12 | - | - | - | 0.01 | - | - | 0.30 | 0.28 | 0.07 | - | - | - | - | - |
| 1/2" | 28.12 | - | - | 0.85 | 20.35 | - | 0.34 | 17.46 | 0.05 | 0.13 | 0.01 | 2.26 | 0.03 | - | - | 0.66 | 0.02 | 0.09 | 2.03 | 1.40 | 0.12 | 0.02 | - | 0.63 | 0.03 | - |
| 3/4" | 33.72 | - | - | 0.88 | 22.51 | 0.02 | 0.47 | 21.68 | 0.05 | 0.20 | 0.24 | 7.90 | - | - | 0.21 | 5.50 | 0.02 | 0.31 | 0.13 | 2.31 | 0.02 | - | - | 0.39 | 0.07 | - |
| 1" | 23.21 | - | - | 0.34 | 10.14 | 0 | 0.20 | 8.85 | 0.02 | 0 | 0.18 | 6.73 | - | - | - | 0.71 | 0 | 0.20 | 0 | 0.61 | - | - | - | - | - | - |
| 1 1/4" & over | 11.85 | - | - | - | 1.51 | - | - | 1.79 | - | - | - | 2.49 | - | - | - | 0.20 | - | - | - | - | - | - | - | - | - | - |
| TOTALS | 97.22 | | | | 54.69 | | | 49.94 | | | | 19.50 | | | | 7.08 | | | | 4.60 | | | | 1.02 | | |
| | | 0 | | | | 0.02 | | | 0.12 | | | | 0.03 | | | | 0.04 | | | | 0.21 | | | | 0.10 | | |
| | | | 0 | | | | 0.33 | | | | 0 | | | | 0.60 | | | | 0.02 | | | | 0 | | | |
| | | | | 2.09 | | | | 1.09 | | | | 0.43 | | | | 0.21 | | | | 2.46 | | | | 0 | | |

* M.H. = Mature Hardwoods. Species Abbreviations: Bir = Paper Birch, A = Aspen, V = High bush cranberry, W = Willow, A = Alder, N = Dwarf Birch.

Table 63. Total Utilization of Browse Species within Vegetation Types and in all Types, Enclosure #2, Kenai Moose Research Station, Winter 1967-1968.

| Type | Area (Acres) | UTILIZATION BY SPECIES, IN LB/ACRE | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Birch | | Willow | | Aspen | | High-Bush C. | | Dwarf Br. | | Alder | |
| | | LB/Acre | LB | LB/Acre | LB | LB/Acre | LB | LB/Acre | LB | LB/Acre | LB | LB/Acre | LB |
| Dense Birch | 71 | 97.22 | 6903 | 2.09 | 148 | | | | | | | | |
| Med. Birch | 80 | 54.69 | 4325 | 1.09 | 87 | 0.02 | 2 | | | | | | |
| Thin Birch | 82 | 49.94 | 4095 | 0.33 | 27 | 0.12 | 10 | | | | | 0.43 | 35 |
| Spruce Birch | 35 | 19.50 | 682 | 0.21 | 7 | 0.03 | 1 | | | | | | |
| Spruce | 106 | 7.08 | 751 | 0.60 | 63 | 0.04 | 4 | | | 2.46 | 261 | | |
| Mature Hardwood Thin | 170 | 4.60 | 782 | - | - | 0.21 | 36 | 0.02 | 3 | | | | |
| Mature Hardwood Dense | 107 | 1.02 | 109 | - | - | 0.10 | 11 | | | | | | |
| TOTALS | | | 17,697 | | 332 | | 64 | | 3 | | 261 | | 35=18,392 LB. |

18,392 LB. of Browse used by 25 to 35 moose between Oct. 15 and May 1, or 92 LB. per day.

Table 64. Data on moose captured and marked at the Kenai Moose Research Station, January 1968.*

| Date | Pendant No. | Tag Nos. | Sex | Age | W/Calf | Pen No. | Anectine Dose (mg) | Hit Location | Time to* Drop | Time to* Recover | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1/24/68 | 10 | LE 4240<br>RE 4241 | F | Calf | | 1 | 16 | L. Thigh<br>R. Ribs | -- | -- | Two shots |
| 1/24/68 | 8 | LE 4239<br>RE 4238 | F | Calf | | 1 | 16 | | -- | -- | |
| 1/25/68 | Ear Tag 4250 | LE 1138<br>RE 1137 | M | Calf | | 2 | ? | R. upper ham | 9:20 | ? | |
| 1/25/68 | 17 | LE 3991<br>RE 3994 | F | Calf | | 2 | 16 | R. rump | 3:00 | 30:00 | Art. resp. used for recovery |
| 1/17/68 | 1 | LE 1119<br>RE 1120 | F | Adult 4+ | | 1 | 23 | R. ham | 6:30 | 30:45 | Pregnant |
| 1/17/68 | 2 | LE 1121<br>RE 1122 | F | Adult 4+ | | 1 | 23 | R. ham | 13:25 | 28:50 | Pregnant |
| 1/17/68 | 3 | LE 1123<br>RE 1126 | F | Adult 5+ | | 1 | 23 | R. ham | 13:30 | 23:10 | Pregnant |
| 1/18/68 | 4 | LE 1127<br>RE 1128 | F | Adult 15+ | Yes | 1 | 23.5 | L. underside | 17:35 | 36:00 | |
| 1/18/68 | 5 | LE 1129<br>RE 1130 | F | Adult 7+ | | 1 | 23.5 | L. high middle | 15:00 | ? | Old |
| 1/18/68 | 6 | LE 1131<br>RE 1132 | F | Adult 10+ | | 1 | 23.5 | L. high middle | 15:00 | 1:7:20 | Old |

* min:sec.

Table 64. Data on moose captured and marked at the Kenai Moose Research Station, January 1968. (cont.)

| Date | Pendant No. | Tag Nos. | Sex | Age | W/Calf | Pen No. | Anectine Dose (mg) | Hit Location | Time to* Drop | Time to* Recover | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1/24/68 | 9 | LE 3987<br>RE 3988 | F | Adult<br>5+ | Yes | 1 | 23.5 | L. flank | 19:45 | 35:15 | |
| 1/24/68 | 7 | LE 4244<br>RE 4245 | F | Adult<br>4+ | | 2 | 23.5 | L. rump | 5:00 | ? | Art. resp. used for recovery |
| 1/24/68 | 11 | LE 3990<br>RE 3989 | F | Adult<br>— | | 2 | 23.5 | Loin, dorsal surface | 17:00 | 26:40 | Conscious and hackles up |
| 1/24/68 | 12 | LE 4242<br>RE 4243 | F | Adult<br>6+ | | 2 | 23.5 | High L. loin | 18:00 | ? | |
| 1/24/68 | 13 | LE 3398<br>RE 3400 | F | Adult<br>— | Yes | 2 | 23.5 | L. dorsal forward of loin | 14:10 | 25:35 | |
| 1/24/68 | 14 | LE 3992<br>RE 3993 | F | Adult<br>— | Yes | 2 | 23.5 | ? | 16:35 | 24:20 | Alert, with ears back |
| 1/25/68 | 15 | LE 4248<br>RE 4249 | M | Adult<br>2+ | | 2 | 23.5 | ? | 9:00 | ? | |
| 1/25/68 | 16 | LE 4247<br>RE 4246 | F | Adult<br>9+ | | 2 | 23.5 | L. R. Spine | ? | ? | |
| 1/25/68 | Ear tag 3995 | LE 3996<br>RE 3997 | F | Adult<br>5+ | | 2 | 23.5 | L. flank high | 15:00 | ? | |

a collar of the type developed for moose in the Matanuska Valley. Results with the drug dosages were variable on adults probably due to variation in size of the moose and relatively crude method of measuring the dosage. The Palmer .22 blank charges used in a Palmer shotgun with an adapter give extremely erratic results in penetration at similar ranges. Some darts barely stuck while with others the dart body was driven into the flesh. These charges can not be recommended for this work. They are generally too powerful for use on calves. One calf (Pendant #17) later died probably as the result of injuries caused by the dart.

The presence of 13 to 15 moose beyond the needs for stocking in enclosure 2 provided a much needed opportunity to obtain reproductive, age, and blood specimens. No collections had been made in the area since the 1965 antlerless season. These moose were removed by herding out the gates or by shooting them to obtain blood, age and reproductive tract specimens. Data on these moose will be presented at a later time.

Most work on the moose enclosures was abruptly interrupted in June by the fatal airplane accident involving Art Bratlie, who had supervised the construction activities, and John Frank, who was organizing the studies on moose at that time. Active work is just being resumed at the time of writing. Al Johnson deserves considerable credit for having kept the construction and maintenance underway following the accident.

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