HISTORIC AND CURRENT DISTRIBUTION OF MOOSE IN THE NORTHEAST USSR

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ABSTRACT: I reviewed the historic and current distribution of moose in the northeast portion of Siberia. Moose distribution in this area has changed considerably during the past two centuries due largely to fire and plant succession. Moose currently are expanding into tundra shrub areas along the Bering Sea and Arctic Ocean. I believe moose will continue to persist in these areas if given protection and human uses are controlled.

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Moose occur within the entire northeast region of Siberia of the former USSR. However, distribution of moose within this area is discontinuous and varies by season. Three forest types occur within northeast Siberia; boreal, forest tundra, and tundra (Kozhevnikov 1978). Each type has unique vegetation and these types are interspersed both laterally and altitudinally.

Moose distribution, seasonal distribution by biotope and spatial structure of populations are distinctly distinguished in outlying areas (Geptner 1936). Therefore, determination of moose distribution, examination of specific sites, their distribution by biotope as well as spatial structure are of great interest for wildlife managers in light of potential human development activities within this portion of Siberia.

Geptner *et al.* (1961) suggested that until recently, reliable data concerning subspecies status and distribution of moose within northeast Siberia was poorly understood. Currently three subspecies of moose are recognized in the eastern USSR (Fig. 1): *Alces alces pfizenmayeri*, *Alces alces buturlini*, and *Alces alces cameloides*. There is considerable overlap in the distribution of each subspecies (Fig. 2). Portenko (1941) delineated moose distribution along the upper reaches of the Bolshoi and Malyi anjuev river systems. On occasion moose have been observed in the upper Anadyer river basin. This boundary was identical to that described by Kischinski (1967). However, their reported distribution boundaries differed from those reported by by Kulik (1972) and Krivosheeva (1978). Moose distribution information in the eastern area of Chukotka (Omolon-Anjuev area) has been described by Vershinen (1972), Krivosheeva (1973), Egorova (1973), Chernayvski (1974), Chernyavski *et al.* (1978), Chernyavski (1981), Domnich (1981), and Chernayvski (1984).

HISTORIC DISTRIBUTION

Over the last two centuries moose distribution in eastern Siberia as well as in other portions of the USSR has changed greatly (Geptner 1960, 1965; Geptner *et al.* 1961). This change provides a unique opportunity to examine the changes and attempt to identify possible causative factors (Sarichev 1802, Pallas 1811, Vrangel 1941, Neiman 1872).

In the 2nd half of the 18th century moose were distributed along the upper Anadyr and the lower Omolon river systems and in the central portion of the Penzhin basin in the south (Bazhanov 1946). At that time moose were also observed in Kamchatka, along the

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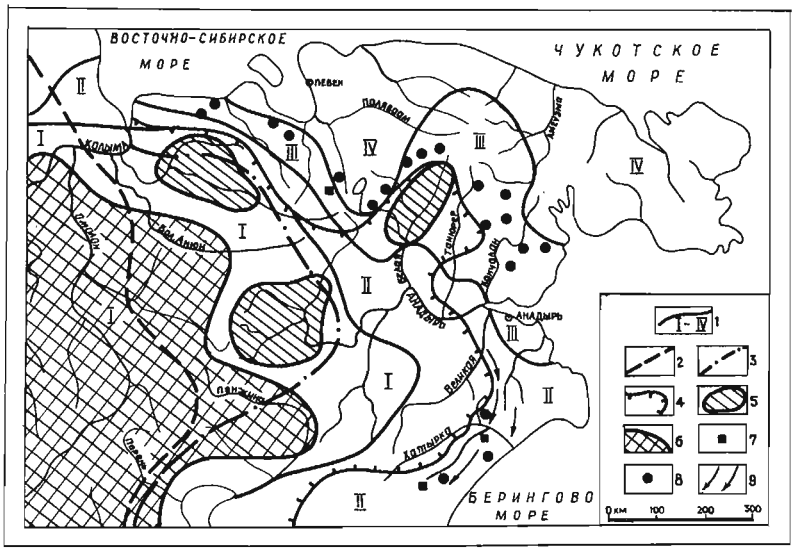

Fig. 1. Moose distribution within extreme northeast Siberia, USSR.

Legend:

1-nature zone and subzone boundaries.
I-boreal taiga subzone.
II-forest tundra zone.
III-shrub tundra zone.
2-moose area boundaries in the 19th century.
3-the area boundaries before the author's research.
4-modern area boundaries, based on the author's information.
5-the average density of moose population zone.
6-the boundaries of moose high density population.
7-the sites of individual and group hibernation.
8-encounters during the period of 1972-1988.
9-the trend of modern area widening.

Kirginika and Vorovskoi rivers (Ditmar 1901).

At the beginning of the 19th century moose numbers declined and distributions changed in northeast Siberia apparently due to plant succession and fire which resulted in disruption of natural biocoenosis. In a relatively short time period the distributions of moose shifted to the west (Fig. 1) as populations declined. In the latter part of the 19th century and at the beginning of the 20th, moose began to occupy areas to the east and south, and their distribution increased to the intrazonal forest landscape between mountain depressions. Here the distribution coincides with intrazonal forest boundaries (Fig. 1). Few boundary fluctuations of moose have been observed in North America (Peterson 1955, Kelsall 1974, Telfer 1974, Le Resche *et al.* 1974).

CURRENT DISTRIBUTION

During the past 5 years I observed moose along the coastline of the Arctic Ocean (the mouth of the Palyaavam river - the Chauni Bay in the latitude of 40 S) (Zhelezmov 1984). They were observed in shrublands and in mountain tundra zones during the summer. Based on numerous observations of moose in shrub tundra during both summer and winter I believe moose could establish viable populations in these areas if they were protected from hunting.

In western Siberia moose are primarily distributed in the Omolon and the Anjuek river basins. In the northeast, moose were displaced to the forest tundra zone, especially along the Poginden river and its tributaries namely the Attikveem and Lelveergin rivers to the Pyrkanai ridge which is at a latitude of 69° N. The distribution spreads to Illirneiski lakes (the Upper lake - at approximately latitude 67°30'N and the Lower lake -latitude 67° 20'N). From this location moose move to

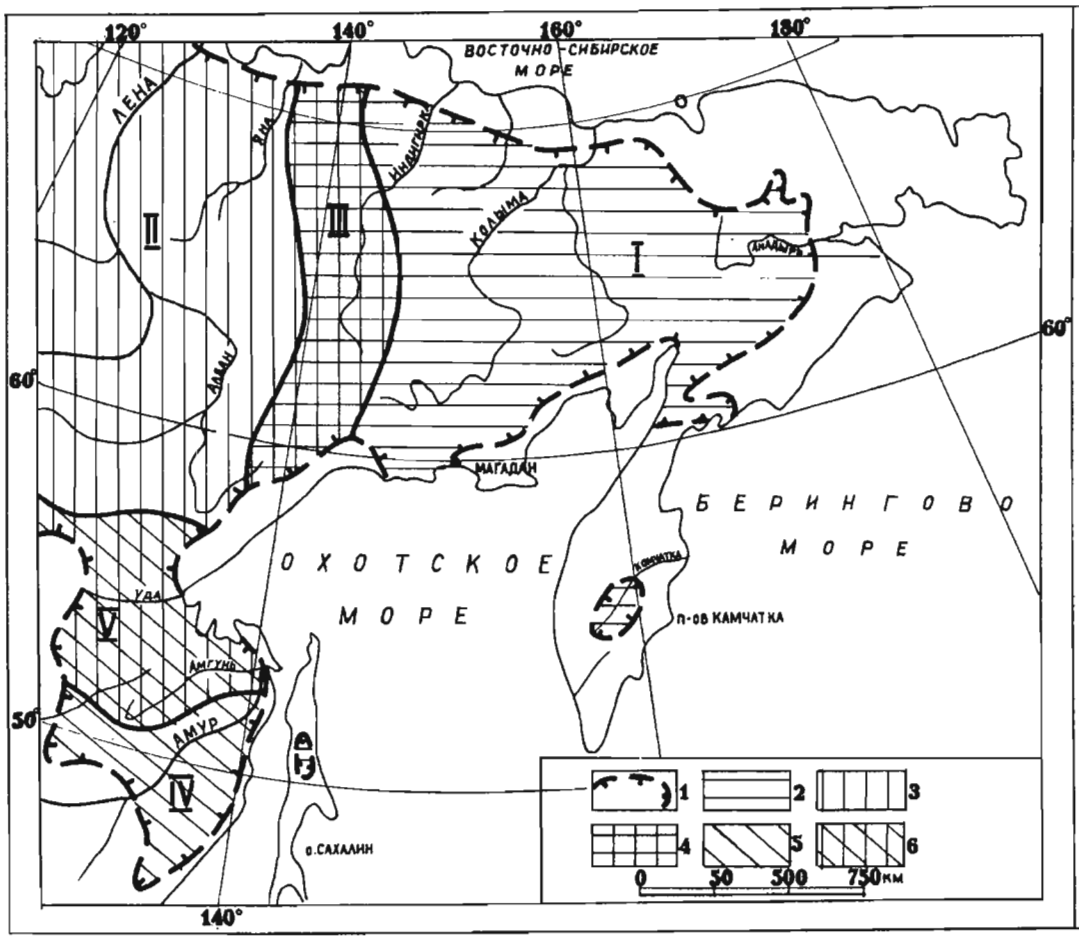

Fig. 2. Subspecies distribution of moose in the Far East, USSR.

1-moose area boundaries and separate isolated sites of its habituation.

2-the area of *Alces alces buturlini* - I.
3-The area of *A.a.pfizenmayeri*-II.
4-The area of mixed form *A.a.pfizenmayeri*+ *A.a. buturlini*-III.
5-The area of *A.a.cameloides* - IV.
6-the area of mixed form *A.a.pfizenmayeri*+ *A.a.cameloides* - V.

higher elevation in summer and move along the mountain valleys of the Leljuveem, Yarakvaam and Pucheveem rivers to the north-east of the region and into open tundra. Moose distribution boundaries in Northeastern Siberia correspond to the distribution of *Larix dehurica*.

The eastern portion of the region includes the Koiverlyansk, Ubienko and Chineiveema rivers which are tributaries of the Anadyr river. Moose occur within valleys of island forests in the middle part of the Vapanaivaam basin and cross the arctic circle at the Zateryanaya river (a tributary of the Anmyvaama River) and includes the Jurumkuveem, Bolshaya, Osinovaya and Koinchinveema river basins.

The Taniurer river is considered to be the eastern limit for moose. Animals reach this zone through the Pekulnei ridge along the Telpegergyn valley. This distribution does not include the Beloya basin. The distribution

continues south through the Tanjurer river mouth to the upper reaches of the Maichan, Lamutskaya and Berezovaya rivers where many moose over-winter.

On the south moose occur along the Velikaya and Koiverelan river valleys where they first appeared in the period 1968 to 1970, and reach the upper Belaya river and its tributaries (Palmatkina, Impenveem, Essoveem river in Kamchatka). At this point the distribution extends out to the Penzhin river and the right Oklan river tributary. It includes the Tylha, Paren, Gihiga and Nayahan rivers in the southwest. No moose have been observed in the Taiganos river basin.

Currently, in the south of Chukotka (Fig. 2) moose are extending their distribution toward the Bering Sea and along the Kamchatka coastline. Moose occupy intermountain depressions of the Koryak plateau, skirting the central part from the east. In the summer some individuals were observed in the Hatyrki mouth (1.5 years ago) and in April 1976 two adult moose were observed in the upper Lomrauthbaam which is on the other side of the Koryak plateau. Moose have only appeared in Kamchatka in recent times. In 1977 the process of moose relocation from the Belaya valley to the Kamchatka peninsula began.

In 1988 ten moose were captured and relocated from the Anadyr basin to Sakhalin, where the animals used different biotopes. Due to this relocation of A.a. buturlini the distribution of moose has become more widespread and now includes the Kamchatk and Sakhalin basins.

On the whole the distribution of moose is expanding in the extreme northeast part of Siberia. This change appears to be due in part to changes in vegetation caused by forest fires and river succession (i.e., changes in river bed allows establishment of vegetation used by moose [Vasiliev 1956]). New river banks and islands are quickly vegetated by young popular (*Populus* spp.) and willow (*Salix* spp.) shrub shoots. This vegetation attracts moose as these species are important food items.

I identified 5 biotopes within the area inhabited by moose in the north eastern USSR. Seasonal use of these biotyopes by moose was not equal. The larch biotope includes old riverside terraces and slopes in the forest tundra. The *Populus suaveolens - Chosenis arbutifolia* biotope includes flood plains and valleys of large rivers, azonal and zonal landscapes. The main forest biotope is comprised primarily of *Populus suaveolens* and *Chosenia arbutifolia*. The shrub forest biotope includes *Alnus frutićosa* and different species of willow. The low birch (*Betula* spp.) forest is comprsed mainly of *Betula exilis*, *Betula middendorfa* and Salix. Usually such biotopies are old terraces, valleys and slopes. The Lake-mire biotope includes open zones adjacent to forests and shrub tundra.

Moose sex-age class distribution by biotope is extremely variable on an annual basis (Fig. 3) and depends on a number of different factors. Based on 15 years of observations I concluded that food was the primary factor influencing seasonal distribution. During spring moose usually use the *Populus suaveloens - Chosenia arbutifolia* biotope. The larch biotope is rarely used during this period. In summer moose occupy the 1st and the 3rd biotopes (shrub forest biotope). These biotopes are frequented mainly primarily by males. Females with calves use yernik and lake-mire biotopes, where early meadow vegetation is their main food source. In summer when mosquitos, horse-flies and midges begin to bite moose, they move to larch biotopes. In this biotope air temperatures are higher with lower humidity and strong air currents reduce midge activity. Open birch and gramineous lake biotopes are used in autumn. Moose use aquatic-mire vegetation.

With the onset of winter moose move to the valleys and use the *Populus suaveolens - Chosenia arbutifolia* biotope. According to the behaviour of moose and the distribution of

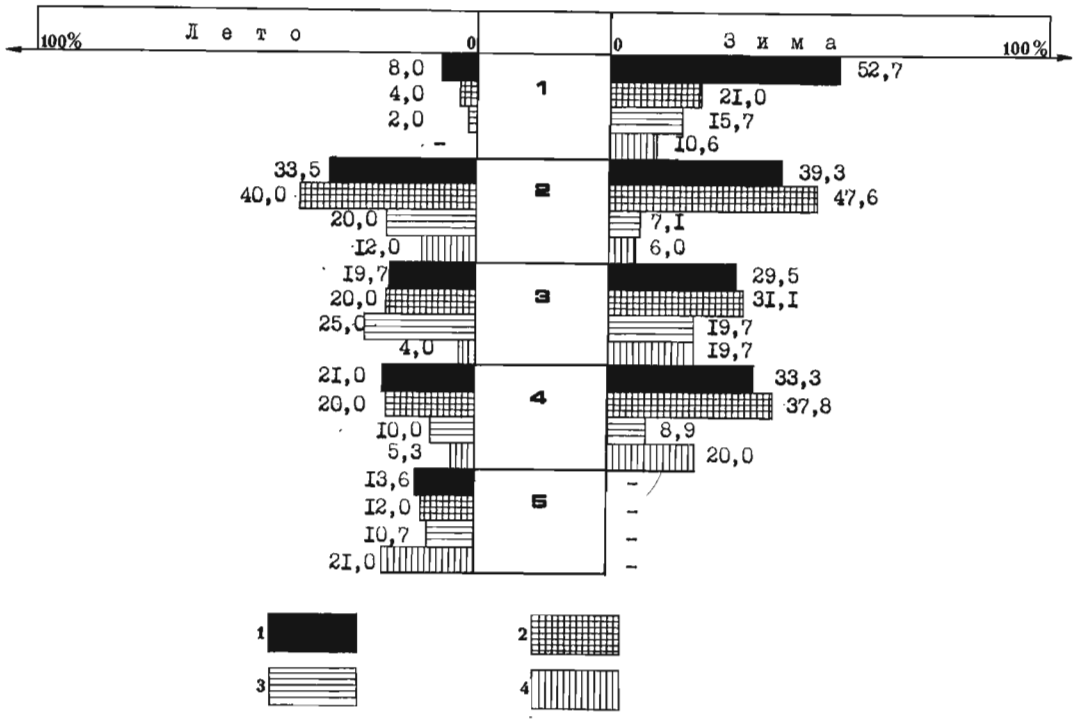

Fig. 3. Distribution of moose by sex and age classes in northeast Siberia. (n = 6000). 1 = males; 2 = females; 3 = moose aged 1.5; 4 = calves.

these biotopes in the northeast the populations can be referred to as constant (forest-tundra zone) ribbon and diffuse (boreal taiga subzone) structure. The second biotope listed is considered to represent optimal conditions for moose in the north-east.

SUMMARY

Based upon the seasonal distribution of moose by biotope in the remote parts of the area, and the rapid expansion of the moose population in the north-east (i.e., Kamchatka and Sakhalin areas) it appears that moose can exist under a wide range of ecological conditions in northeast Siberia. Whether moose continue to persist in these areas may be dependent upon protection and controlled human use.

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