

BOOK RECEIVED

Alces — moose ecology. International Symposium on moose ecology held in Quebec City, Canada, 26—28 March 1973. General editor J. Bédard, Co-editors E. S. Telfer, M. L. Wolfe, J. Peek, D. W. Simkin, P. C. Lent, R. W. Ritcey. Les Presses de l'Université Laval, Quebec, 1975: 1—741.

These are proceedings of an international symposium on the ecology of moose held in Quebec City, Canada, on March 26—28, 1973. From the 42 papers presented on the symposium, no less than 34 came from North America, while 8—from Europe and Asia. The content was arranged into following chapters: Habitat distribution (9 papers), Nutrition (5 papers), Behavior (6 papers), Moose coactions (6 papers), Population dynamics (7 papers), and Management (7 papers).

It is preceded by a keynote address written by R. L. Peterson, author of the first North American moose monograph from 1955, and two other chapters which did not fit into any of the chapters mentioned. Very interesting is the idea, expressed in keynote address, that the genus *Alces* is monotypic with the single species being represented by a number of geographic races. This indicates, how much is to be done in the field of moose taxonomy. Another interesting hint concerns general expansion of moose northward in both the Old and the New World in recent years.

The greatest, and perhaps most interesting, at least for me, was the first chapter on the distribution of moose habitat. It gave a broad review of habitats occupied by moose from North America, Asia, and Europe (Fennoscandia). Very relevant for the situation in Europe is the remark by D. G. Dodds (p. 51) that »the presence of aquatic vegetation improves moose habitat but is not essential«. An interesting characteristics of forest stands in winter habitats of moose is given by Brassard, Audy, Crete and Grenier (pp. 76 and following). The general conclusion is that »the carrying capacity of moose yards ... depends above all upon the availability of deciduous stems in the feeding layer. The carrying capacity of these yards is also related to cover quality«.

In his well documented paper Krefting concludes that »the most important habitats within the boreal forest are produced in the early stages of plant succession« (p. 82). The effect of logging upon food resources is illustrated by Telfer's study, which showed that »the annual growth of browse on 1.6 ha uncut stands would feed a moose for one day and in contrast five to seven year old cuts provided browse at the rate of 32 moose-days per ha« (p. 89). The mechanism of habitat occupation by moose is following: »climax-type ranges support a nucleus population from which individuals can rapidly colonize newly created transient (seral) habitat« (p. 151).

Numerous radio telemetry studies on the size of home range in moose »showed the summer range was about 1.6 by 3.2 km in size and the winter range was a series of wanderings in an area about 0.4 by 4.8 km« (p. 97). Consequently, as Berg and Phillips state »the average amount of habitat available during the winter per moose was 805 ha and represented 61.3 and 58.4% of the area available during the summer and autumn, respectively« (p. 109). Moose habit characteristics is supplemented by data on biomass production of shrubs (LeResche *et al.*, pp. 167 and following). It was found, however, that the biomass of available browse is seldom a limiting factor to moose densities.

Another aspect fully covered is the climate as the most important factor limiting the distribution of moose. Studies in both USSR and Canada suggest that moose can travel more or less freely through soft snow up to about 60 cm (Telfer, 1970). Moose are increasingly impeded and restricted by depths of soft snow up to 100 cm (about the chest height of an adult animal).

Undeniably interesting and new are data on differences in feeding habits between moose from Kolyma and Indigirka basins (*Alces a. gigas* Miller) and those from central Yakutia and Yana basin (*A. a. pfizenmayeri* Zukowski) reported by Kistchinski in his paper entitled »The moose in north-east Siberia«. Markgren reviewed the history, recent population developments and habitat preferen-

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ces of moose in Fennoscandia. Thus, the chapter covers almost entire moose range in North America, Asiatic part of USSR and Fennoscandia. It is a pity that European part of USSR and Poland were not included in this review.

The second chapter on »Nutrition« reviewed moose food habit studies, energy requirements, blood chemistry, and mineral composition of browse plants for moose in North America.

The third chapter, entitled »Behavior«, contained review of rutting behavior, mother-infant relations, changes in the behavior with age and during the process of domestication, seasonal movements in Europe and North America, and the influence of snow on moose behavior.

Chapter fourth reviewed moose coactions with other animals, but particularly with big predators and large herbivores. Predation by several large carnivores, as bear, wolverine, cougar has been described, but the wolf (*Canis lupus*) is the only effective moose predator throughout the range of its distribution. Relations with other wild herbivores, domestic livestock, beaver and other rodents, hares, tetraonids, arthropod pests, and phytophagous insects were also discussed.

Very important chapter on »Population dynamics« lined up the recent information on moose reproduction, productivity, evolution of reproductive potential, annual yield of population, sex and age structure, population fluctuations, dynamics, and a review of moose inventory techniques.

Last chapter in the book concerned management of moose populations and harvesting programs employed in different parts of the world.

Very good editorial work and a high scientific standard are general features of this book, which after all is a collection of different papers contributed from various research and administrative centers. Reviewer had a very hard time in finding mistakes or shortcomings. After a careful reading of whole book I found only one expression which seems to be not supported by research data. In »A review of the general life history of moose« R. L. Peterson wrote (p. 9): »the peak of the breeding season, in all races of moose (*Alces alces*) falls within one oestrus period; one early and perhaps, one or two late oestrus periods account for a small percentage of total pregnancies«. Where from this small percentage of total pregnancies? Moose is known as an animal with perhaps the highest reproductive potential among cervids

Owing to a broad spectrum of research and management problems discussed, this book is an invaluable tool for all studying moose, their ecology, and management.

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