MUSKOX: LIFE HISTORY AND CURRENT STATUS OF MUSKOXEN IN THE N.W.T. By D.R. URQUHART. Yellowknife: N.W.T. Department of Renewable Resources, Wildlife Service, 1982. 40 p. incl. maps, illus. Softcover. Cdn$5.00. (Order from Supervisor, Conservation Education, Department of Renewable Resources, Government of the N.W.T., Box 2668, Yellowknife, N.W.T., Canada X1A 2R1.)

Muskox (*Ovibos moschatus*) populations were exterminated or greatly depleted throughout much of the circumpolar range of the species during the 19th century. Through legal protection and reintroductions to historical ranges the species has made a remarkable recovery worldwide and populations are in most cases experiencing high productivity. Range extensions into habitats unoccupied since before 1900 are occurring in mainland areas of Alaska and Canada. This publication on the muskox in the N.W.T provides the first updating on the status of the species in Canada since Tener's monograph in 1965. The entire Canadian population of muskoxen is contained in the N.W.T., with the exception of a few individuals recently released from a captive herd at Old Fort Chimo in northern Québec and occasional animals moving into northern Yukon from adjacent herds in Alaska.

The report will be a useful reference on muskox populations and their distribution for wildlife managers and others interested in Canada's north. It is well illustrated with maps and notes on muskox population status. Coverage of muskox life history is disappointing. Very little is added beyond what is available in Tener (1965) and this is surprising in view of several recent references cited but rather sketchily summarized. The effort to include a review of industrial activity, past, present, and planned, for each area reported on is well intended, but appears too superficial to be of much value.

I found a few points of contention throughout the text which appear to stem from an incomplete review of literature. In the introduction, Sweden should be included in the list of countries where muskox populations occur. A group of Norwegian muskoxen crossed into Sweden and established themselves there several years ago. In the section on taxonomy the author states that "Recent serological tests indicate that this animal is most closely aligned with goats", and goes on to conclude: "Consequently, it is classified as a separate tribe Ovibosini [*sic* Ovibovini] in the subfamily Caprinae of the family Bovidae (Tener 1965)". It is not clear whether reference to "recent serological tests" is from Tener where Moody (1959) is cited as a reference on serological studies. The classification indicated in Tener is that of Simpson (1945), made without reference to serological studies. Investigation of chromosome number in muskoxen (Tietz and Teal, 1967) has failed to substantiate a close relationship to goats and the question of evolutionary relationships to other Bovidae remains unanswered.

The statement under population dynamics and densities, that "Large parts of the Canadian tundra are devoid of suitable forage and could never support this species" calls to mind the words "never say never" accompanying a recently popular musical score. In view of the wide diversity of plant species present in the diet of muskoxen throughout their distribution and evidence from winter observations, it appears that characteristics of the snow cover, rather than forage types *per se*, are more important in limiting distribution.

The author states that "experiments with muskox domestication began in Vermont in 1954", failing to note that during 1930-1935 muskox domestication experiments were carried out at the U.S. Biological Survey Experiment Station at College, Alaska (Palmer and Rouse, 1946). He goes on to state that a "domesticated herd has also been maintained since 1964 by the University of Alaska" whereas the herd in question was maintained by the Institute of Northern Agricultural Research *at* the University of Alaska during 1964-1976, and from 1976 at Unalakleet, quite independent of the University of Alaska.

In discussion of the population status of muskoxen on Banks Island the author states: "Historical evidence indicates that the Thomsen River area could be a refugium for muskoxen on Banks Island", but no reference is cited. The reader is left wondering whether this is based on the extensive archaeological literature on muskox-hunting cultures that were present there or stems from reports of early explorers in the area.

The art work and quality of paper in the publication is impressive, but one is also struck by the inefficient use of paper with large blank spaces on most pages, and maps with virtually no detail blown up to full-page size. The result is a publication of 40 numbered pages when it could readily have been shortened by nearly half that number with no reduction in content.

In spite of its shortcomings, the publication will serve as a valuable reference source on muskox populations in Canada's Arctic, providing baseline information against which future population changes can be compared.

REFERENCES

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DIE SEETAUCHER. By E.O. HÖHN. Die Neue Brehm Buecherei, A. Ziemsen Verlag, Wittenberg Lutherstadt, German Democratic Republic, 1982. 96 p. + 9 tables, 17 illus., 32 photos. Softcover. M8.20. (In German.)

In this first edition the author describes the morphology, distribution, natural history, and ecology of the four species of loon which inhabit northern environments of the Old and New Worlds. The aim of this work was to provide an updated alternative to earlier discussions by other authors of the biology of the four members of the Order Gaviiformes, Family Gaviidae. The author did not attempt to review exhaustively the literature of the Soviet Union and refers to other authors for a complete discussion of plumage variation and molt.

After diverging from an ancestral type, already identifiable in the 130-million-year-old deposits of the Cretaceous, the modern-day loons have become highly specialized divers. Their normal diving bouts may last as long as two minutes and take them to a depth of 11 m. Loons have especially long uncinate processes which extend laterally from one rib over several others, affording extra strength and preventing the rib cage from collapsing during a dive. Their heavy bones, unlike those of most other birds, lack hollows for air sacs (the cervical and interclavicular air sacs are missing altogether) and facilitate diving by reducing buoyancy. Muscles acting on the feather shafts press the contour feathers closely against the body, reducing air spaces between feathers and causing the bird to submerge. The thigh bones are rigidly connected to the rump, and muscles which allow other birds to walk erect are used by loons to increase their propelling force in water. The cost for this specialization for an aquatic existence is paid for by a poor ability to walk on land. As a result, loon nests are rarely more than a few metres from water.

Loons are carnivorous, feeding on fish and aquatic invertebrates. They pursue their prey under water, made possible by excellent eyesight both in air and in water. A specially adapted "window", situated in the center of the nictitating membrane, acts as an additional structure for refracting light rays when this third eyelid covers the eye during a dive. It is not clear whether the wings are used by loons during a dive. Their wings are small in comparison to their body weight and loons therefore need to run on water to take flight. They gain height only slowly and for this reason avoid landing on small lakes, particularly in forested regions.

The eerie calls of loons carry up to 8 km in their northern habitats. The Yellow-billed, Arctic, and Red-throated loons are circumpolar in their distribution but the Common Loon breeds in North America, Greenland, and Iceland only. The Yellow-billed Loon characteristically breeds north of the treeline whereas the others also inhabit lakes in forested regions. The Red-throated Loon is the smallest of the four species and the only one able to take flight from land. Because of their greater maneuverability in flight, Red-throated Loons are able to feed and nest on small ponds, and if these are surrounded by trees, they fly in circles to gain height.

Fish comprise approximately 80% of the loons' diet, invertebrate animals are second in importance, and ducklings are killed occasionally. Since marine fish, as opposed to marine invertebrates, have a low salt content, and since loons obtain most of their water from their fish diet when at sea, they rely less on their salt glands for salt excretion than do other birds feeding on marine invertebrates. Parent loons feed their one to two young for approximately 70 days.

The book is well written and well organized, treating the general biology of the four species in the first chapter, discussing each species separately in the following four chapters, and including a summary. It is unfortunate that the