

# WHOLE WEIGHTS OF MOOSE FROM ALGONQUIN PARK, ONTARIO CANADA

Norman W.S. Quinn<sup>1</sup>, Robert W. Aho<sup>2</sup>

<sup>1</sup>Ontario Ministry of Natural Resources, Box 219, Whitney, Ontario, Canada, K0J 2M0

<sup>2</sup>Michigan Department of Natural Resources, U.S. - 41 N., Box 440, Baraga, MI, U.S.A. 49908

**ABSTRACT:** Whole weights of 89 moose (*Alces alces americana*) captured live in winter or road-killed in summer in Algonquin Park, Ontario are presented. Average weight was 410 kg (904 lb) and weights ranged from 160-542 kg. Mean weight of adult females was 435 kg and that of adult males 453 kg. Whole weights of moose from Algonquin Park are similar to moose from western North America. Linear regressions of whole weight versus total length and hind foot length showed poor correlation.

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There is little information on whole weights of *Alces alces americana*. Blood *et al.* (1967), Haigh *et al.* (1980) and Franzmann *et al.* (1978) described whole weights of moose but their data are for the *A. a. andersoni* and *A. a. gigas* subspecies. Peterson (1974) and Crête (1983) report estimated weights of Quebec moose but, apart from a few isolated cases, (Peterson 1955, Peterson 1974) whole weights of *A. a. americana* are not published. This paper describes weights of moose from Algonquin Park, Ontario, Canada.

## METHODS

Data were obtained from the Ontario-Michigan moose relocation projects of winter 1985 and 1987 (Schmitt and Aho 1988) and from road-killed moose collected during spring through summer of 1985-88. During January and February of 1985 and 1987, 67 moose were captured with the intent of establishing a population in the Upper Peninsula of Michigan. Moose were weighed to the nearest 5 kg with a spring scale suspended from a hydraulic hoist. Standard measurements, (Peterson 1974), including total length (minus tail) and hind foot length were obtained. Antlers, if present, were removed before weighing. The same data were obtained from moose killed in vehicle accidents during April-August of 1985-88. These specimens are referred to as "summer" moose. The intact

carcass of a female calf killed by wolves on 9 December 1987 was also weighed.

Age of moose was estimated by wear class (Passmore *et al.* 1955). Only the first 2 premolars of the winter moose were observable and wear class estimates were therefore crude. Adults of this group were classed as "young adult" (estimated WC of II-V) or "mature adult" (WC  $\geq$  VI), (Passmore *et al.* 1955). Several adult moose could not be assigned to either category. The summer moose were wear classed accurately but, because of limited samples, all adult weights were analyzed in the 2 broad categories of age described above. Yearling moose are defined here as 12-24 mo. old with birthdate standardized at 1 May. Only one calf, mentioned above, was handled.

## RESULTS

The average weight of 89 moose in Algonquin Park was 410 kg (904 lb) and weights ranged from 160-542 kg (Table 1). Mean weight of adult females was 435 kg (range 310-530) and adult males 453 kg (260-542 kg), (Table 1). The largest moose, a 542 kg (1195 lb) bull, could have weighed over 567 kg (1250 lb) assuming an antler weight of 25 kg.

Mean weights of Table 1 are not accurate overall norms for each age-sex class because body weight of moose increases until about WC VI (Peterson 1974) and weight varies

Table 1. Whole weights of moose from Algonquin Park, Ontario 1985-88.

Age Class <sup>1</sup>	Males				Females				All			
	Mean Weight (kg)	<i>n</i>	S.E.	Range	Mean Weight (kg)	<i>n</i>	S.E.	Range	Mean Wt. (kg)	<i>n</i>	S.E.	Range
Yearling	289	4	30.85	230-360	246	8	18.93	200-330	260	12	16.61	200-360
Young Adult	418	16	20.87	260-520	411	21	8.69	310-480	414	37	10.13	260-520
Mature Adult	496	9	8.22	455-525	461	17	10.20	350-530	473	26	7.88	350-530
All Adults <sup>2</sup>	453	29	14.08	260-542	435	45	6.72	310-530	442	74	6.68	260-542
All Moose <sup>2,3</sup>	428	34	16.15	230-542	400	55	11.97	200-530	410	88	9.68	200-542

<sup>1</sup>See text for definition of age classes.

<sup>2</sup>Eleven adult moose (>WC 1) could not be accurately wear classed and ages of two moose were unknown.

<sup>3</sup>One female calf killed by wolves on 8/7/12/09 weighed 160 kg.

widely among seasons (Franzmann *et al.* 1978, Schwartz *et al.* 1987). Our data were inadequate for rigorous statistical comparison of seasonal weights but the data are presented as information. Mean weight of male yearlings was 237 kg in summer (N=2) and 340 kg in winter (N=2); that of female yearlings was 220 kg in summer (N=6) and 325 kg in winter (N=2); male young adults were 315 kg in summer (N=4) and 452 in winter (N=12), and female young adults were 393 kg in summer (N=7) and 419 kg in winter (N=14). Only one mature adult was weighed in summer, a 480 kg male. Mean weight of 8 mature adult males in winter was 498 kg and that of 17 mature adult females was 461 kg.

Note that male moose were larger than females within seasons in all cases above but one.

We calculated linear regression of weight vs hind foot length and weight vs total length. Our purpose was to establish a simple estimator of weight for use in the field. The regression equations were  $Y$  (WEIGHT IN KG) =  $-490 + 11.66 X$  (HIND FOOT LENGTH IN CM) and  $Y = -300 + 2.75 X$  (TOTAL LENGTH IN CM). The correlations of these relationships were, however, very poor ( $r^2 = 0.19$  and  $0.42$  respectively) and not improved

by log transformation and/or analysis separately by sex.

## DISCUSSION

Part of this data set was tabulated previously in Schmitt and Dalton (1987) and Schmitt and Aho (1988) but this report is, to our knowledge, the only significant published sample for this subspecies. Previous reports of weights of *A. a. americana* are of dressed weights (Simkin 1962), or very small samples of whole weights. Timmerman (1972) cautioned against use of dressed weight to estimate whole weight, pointing out that relative weight loss of evisceration is highly variable. P.J. Nunan (O.M.N.R. unpublished 1965) weighed 6 whole moose in northcentral Ontario. His weights were comparable to ours; a WCVII bull, for example, weighed 544 kg (1200 pounds). However, Nunan speculated from dressed weight data that moose in northcentral Ontario weighed up to 1500 pounds. Moose in northcentral Ontario are in the interface between the *A. a. andersoni* and *A. a. americana* subspecies proposed by Peterson (1955).

Whole weight of moose from Algonquin Park is not strikingly different from that reported for western North America. Our adult

moose were heavier than a small sample (N=9) from Alberta (Blood *et al.* 1967) and males lighter but females heavier than 18 adults from Saskatchewan (Haigh *et al.* 1980). Franzmann *et al.* (1978) reported by far the largest sample of whole weights of moose, their data being from Alaska (*A. a. gigas*). Their adult mean weights are considerably smaller than ours. This is surprising considering that *A. a. gigas* is thought to be the largest subspecies. However, their main sample came from a semi-confined and nutritionally stressed population. Whole weights of 66 females and 5 males from a separate study area were similar to ours (Franzmann *et al.* 1978).

Haigh *et al.* (1980) and Franzmann *et al.* (1978) also calculated linear regression of weight versus total length of moose. Their equations are similar to ours but both authors reported good ( $r^2 > 0.50$ ) correlation. We believe our poor correlations are due to observer variability. At least 12 people made the measurements and, despite careful instruction, there was undoubtedly variation in placement and application of the tape to body contours. Our results question the accuracy of weights estimated in this manner.

Algonquin Park is rather atypical moose habitat. The Park is in the Great Lakes St. Lawrence Forest Region and the area specific to this study is quite distinct, being dominated by extensive mature and old-growth stands of maple (*Acer saccharum*) - beech (*Fagus grandifolia*) forest. Much of the area is not logged and the selection or shelterwood system is used where logging is permitted. Fires are virtually nonexistent. This forest habitat is very different from typically boreal Ontario moose habitats. It is thus possible that weights reported here are not Ontario norms.

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