HISTORY, STATUS, AND HUNTER HARVEST OF MOOSE IN WASHINGTON STATE

Dana L. Base[1], Steve Zender[1], and Donny Martorello[2]

[1]Washington Department of Fish and Wildlife, 2315 North Discovery Place, Spokane, WA 99216, USA; [2]Washington Department of Fish and Wildlife, 600 Capitol Way North, Olympia, WA 98501, USA

ABSTRACT: Since the middle 20th century, moose have expanded their range and population in Washington, especially within the northeastern part of the state. The Washington Department of Fish and Wildlife opened a limited-entry hunting season on moose in 1977. Permit numbers gradually increased from 3 in 1977 to 98 permits offered in the 2005 hunting season. Hunter harvest is believed to be well within the reproductive capacity of Washington's moose population. Moose abundance and range are expected to at least remain at current levels into the future.

ALCES VOL. 42: 111-114 (2006)

Key words: *Alces alces*, antler widths, bull / cow / calf ratio, limited-entry hunting, management goals and guidelines, population status, range, tooth cementum aging, Washington

Until the early 1970s there were few records for moose (*Alces alces*) within the State of Washington. The first published account included a photograph of an adult bull taken by hunter Pete Lemery on November 16, 1929 near Twin Lakes in Ferry County, Washington on the Colville Indian Reservation (Scheffer and Dalquest 1944). In 1954, Washington Department of Game (later renamed Washington Department of Fish and Wildlife, WDFW) personnel found a shed moose antler in the Selkirk Mountains of Pend Oreille County in the northeastern corner of the state. The following year, 1955, two agency biologists found the carcass of a calf moose in the same general vicinity (S. Guenther, WDFW, unpublished data). By 1972 a well-established resident population of moose was documented in Pend Oreille County that consisted of an estimated 60 animals (Poelker 1972). This population grew to 850-1,000 animals over the next 30 years and greatly expanded in range (WDFW 2003).

The assumed subspecies of moose in Washington is Shira's, *Alces alces shirasi*, as this subspecies comprises the closest moose population to Washington in both Idaho and British Columbia (Poelker 1972, Compton and Oldenburg 1994). Figure 1 illustrates the estimated range of moose as of 1997 based upon modeling accomplished by Johnson and Cassidy (1997). Moose are still expanding in distribution within Washington as numerous confirmed observations outside their core range in northeastern Washington have been made since 1997.

In 1977, the Washington State Wildlife Commission opened the first limited-entry hunt of moose within the state. Three tags

Fig. 1. Range of moose in Washington State, USA, as of 1997 (indicated by shaded area: from Johnson and Cassidy 1997).

Table 1. Guidelines for managing the hunter harvest of moose in Washington State, USA.

Guideline	Liberalize harvest level	Acceptable harvest level	Restrict harvest access
Average bull : 100 cow ratio	> 75 bulls	60 – 75 bulls	< 60 bulls
Average calf : 100 cow ratio	> 50 calves	30 – 50 calves	< 30 calves
Median age of harvested bulls	> 6.5 years	4.5 – 5.5 years	< 4.5 years

issued by lottery-type drawing were awarded that year. As both the population and range of moose have expanded since 1977, the number of special hunt permits has gradually increased to a high of 98 permits in 2005 (Fig. 2).

On a statewide basis the WDFW has the following goals for managing moose:

1. Preserve, protect, perpetuate, and manage moose and their habitats to ensure healthy, productive populations.
2. Manage moose for a variety of recreational, educational, and aesthetic purposes including hunting, scientific study, cultural and ceremonial uses by Native Americans, wildlife viewing, and photography.
3. Manage statewide moose populations for a sustained yield (WDFW 2003).

In 2003, the WDFW developed guidelines for managing the hunter harvest of moose in Washington (Table 1). These guidelines are generally averaged over a 3-year period as modified from Courtois and Lamontagne (1997). Management philosophy is directed at providing a high-quality hunting experience with good opportunity for harvesting a mature bull. Field observations, aerial surveys, hunter success rates, antler widths, and moose ages are used to develop specific harvest regulations (Compton and Oldenburg 1994).

As the range of moose has expanded, the number of Game Management Units (GMUs) with allocated moose permits has increased from 1 in 1977 to 10 in 2004. Likewise, of the 39 counties within Washington State, the number in which moose can be hunted has increased from 1 in 1977 to 6 in 2005.

The annual hunter harvest success rate on both bull and cow moose has been consistently high, ranging from 67% to 100% with an average of 92% and a mode of 100%. A total of 748 moose were legally harvested between 1977 and 2005, including 556 bulls and 192 antlerless moose (cows and calves). The annual average age of harvested bull moose as determined by tooth cementum analysis was 5.2 years (range 3.9 - 6.9) from 1990 through 2004 (n = 373) (Fig. 3). The oldest bull moose taken by hunters in Washington was aged at 15.4 years. This bull was harvested in 2003. The average antler spread of harvested bulls from 1990 through 2005 was 94 cm (37 inches)

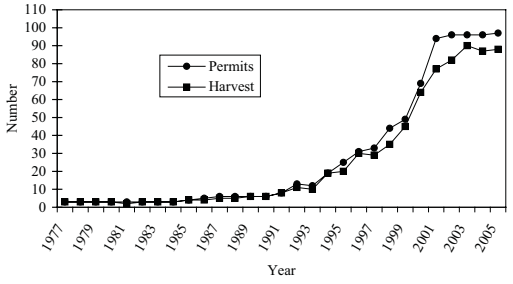

Fig. 2. Allocation of permits and hunter harvest of moose in Washington State, USA, 1977 – 2005.

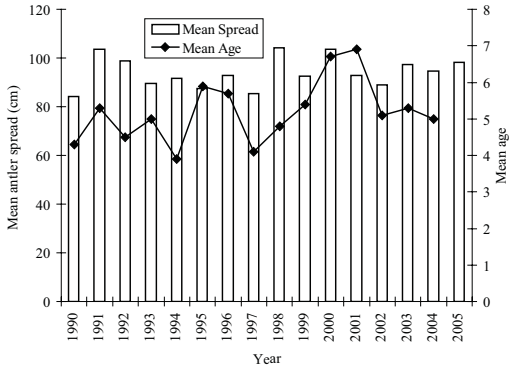

Fig. 3. Annual average antler spread (cm) and age of hunter-harvested bull moose in Washington State, USA, from 1990 to 2005.

Table 2. Bull and calf moose ratios per 100 cows as determined from early winter helicopter surveys in Washington State, USA, 1994 – 2005.

	Number Seen During Survey				
Year	Bulls	Cows	Calves	Bulls:100 cows	Calves:100 cows
1994	14	17	5	82	29
1995	17	20	6	85	30
1996	17	24	8	71	33
1997	58	65	21	89	32
1998	33	47	12	70	26
1999	27	36	22	75	61
2000	55	59	29	93	49
2001	31	49	17	63	35
2002	59	46	34	128	74
2003	62	63	35	98	56
2004	39	47	21	83	45
2005	34	48	20	71	42

with an annual mean ranging between 84 and 104 cm (33 – 41 inches; $n = 440$) (Fig. 3). The widest antler spread of any hunter-harvested moose in Washington was 147 cm (58 inches) from a bull taken in 2000.

Bull and calf moose ratios as determined from early winter helicopter surveys ranged from 63 to 128 bulls and 26 to 74 calves per 100 cows from 1994 through 2005 (Table 2). The calf ratio appears to be indicative of a stable to increasing population. Percentages of bull moose tallied by age class using criteria outlined by Timmermann (1993) and Bubenik et al. (1977) has shown fairly equal proportions of adult and sub-adult bulls since 2000 (Fig. 4). In addition there has been an increase in the proportion of yearling bulls since 2000, probably indicative of a moose population continuing to grow.

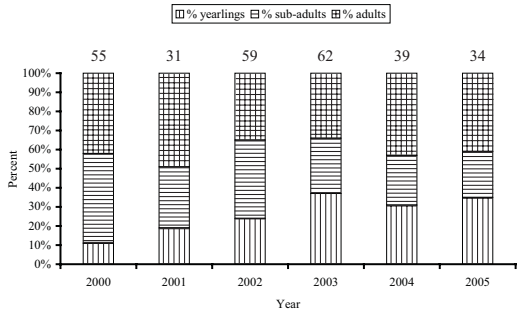

Fig. 4. Percentages of bull moose tallied by age class as identified by antler size from early winter helicopter surveys in Washington State, USA, 2000 - 2005. The sample size (n) of total bulls classified by year is indicated at the top of each bar.

REFERENCES

BUBENIK, A. B., O. WILLIAMS, and H. R. TIMMERMANN. 1977. Visual estimation of sex and social class in moose (*Alces alces*) from the ground and the plane. A preliminary study. Proceedings of the North American Moose Conference and Workshop 13: 157-176.

COMPTON, B. B., and L. E. OLDENBURG. 1994. The status and management of moose in Idaho. Alces 30: 57-62.

COURTOIS, R., and G. LAMONTAGNE. 1997. Management systems and current status of moose in Quebec. Alces 33: 97-114.

JOHNSON, R. E., and K. M. CASSIDY. 1997. Terrestrial mammals of Washington State. Location data and predicted distributions. Volume 3 *in* K. M. Cassidy, C. E. Grue, M. R. Smith, and K. M. Dvornich, editors. Washington State Gap Analysis – Final Report. Washington Cooperative Fish

and Wildlife Research Unit, University of Washington, Seattle, Washington, USA.

POELKER, R. J. 1972. The Shiras Moose in Washington. Unpublished administrative report. Washington Department of Game, Olympia, Washington, USA.

SCHEFFER, V. B., and W. W. DALQUEST. 1944. Records of mountain goat and moose from Washington State. Journal of Mammalogy 25: 412-413.

TIMMERMANN, H. R. 1993. Use of aerial surveys for estimating and monitoring moose populations – A review. Alces 29: 35-46.

(WDFW) WASHINGTON DEPARTMENT OF FISH AND WILDLIFE. 2003. Moose, Game Management Plan, Wildlife Program. Washington Department of Fish and Wildlife, Olympia, Washington, USA.