

## WMU221 Aerial Ungulate Survey (2015)

### Background

Although relatively small portions of Wildlife Management Unit (WMU) 221 were surveyed in a combined effort with WMU 224 in 1985, those results are difficult to assess by WMU. No other ungulate surveys have been conducted in WMU 221, nor have there been population estimates based on survey data.

In WMU 221 there is an archery season (Sept 1–Oct 31) with General Licence for white-tailed deer, antlerless mule deer (Special Licence required for moose and antlered mule deer), antlered elk (3-point or larger), and antlerless elk. Special Licences can currently be used during archery or general seasons. General season occurs Nov 1–Nov 30. While there is a General Licence for antlered elk (3-point or larger) during the general season, antlerless elk are on Special Licence and are in a zone combined with WMU 322 that has three seasons (Nov 1-25; Nov 26-Dec 20; Jan 1-20). Moose, antlered mule deer, and antlerless mule deer are on Special Licence during general season, General Licences for white-tailed deer licences are available during general season but Supplemental Licences for antlerless white-tailed deer are not available. Hunter harvest data for Special Licences indicate four year average success as follows: antlered moose 65%, antlerless moose 60%; antlered mule deer 82%, antlerless mule deer 30%; antlerless elk 12% (average of three seasons). The objectives of this survey were to assess the status of the deer, moose, and elk populations in WMU 221, and to determine a population estimate for moose, mule deer and white-tailed deer based on density estimates, and a population split for sex and age classes of all three species.

### Survey Method

The transect survey was conducted flying east-west lines at 3.2 km (2 mile) intervals, with 25% coverage (800 m survey strip). At each observation point animals were counted by species, and sex and age determined, where possible. Antler size was classified for deer as 'small' (spike or two points on one or both antlers), 'medium' (antlers with 3 or more points; antlers inside ears) or large (antlers with  $\geq 4$  points, antlers outside of ears). Because transects varied in length (see Krebs 2014, Jolly 1969), the average density ( $R$ ; #/km<sup>2</sup>) of mule deer, white-tailed deer, and moose was calculated by summing the total animals counted per transect ( $\sum x$ ) by total area searched (length of transects multiplied by 800 m survey strip [ $\sum z$ ]). For a population estimate (unequal sized units, sampling without replacement), the average density ( $R$ ) was multiplied by the overall area of the WMU ( $Z$ ). The width of the 90% confidence interval was calculated by multiplying the t statistic for the left-tailed inverse of the Student's t-distribution, ( $t_{0.05, df=n-1}$ ) by standard error (SE; without replacement) of the abundance estimate where  $SE = \text{sq root variance}$ , and  $\text{variance} = N*(N-n)/(n*(n-1)) * (\sum x^2 + R^2 * \sum z^2 - 2*R*\sum xz)$  with  $N$  as the total number of possible transects given 100% coverage, and  $n$  as the number of transects sampled. Elk are considered a minimum count.

### Results

Fifteen transects were surveyed December 21-22, 2015 for a total survey effort of 492 km. Sixty-two moose were observed from 26 groups. Of the 60 moose that were classified to age and sex, 13 (22%) were bulls, 22 (37%) were cows, and 25 (42%) were calves. The bull:cow and calf:cow ratios were 0.59 and 1.13, respectively. The final density estimate was 0.16/km<sup>2</sup> with a 90% confidence

interval of (0.13, 0.19). This corresponds to a 90% confidence interval that is +/- 17% of the density estimate. The estimated moose abundance is 259 (90% CI 214, 303). The population split is estimated to be 96 cow, 57 bull, and 109 calf.

In total, 105 mule deer were observed from 19 groups. Of the 105 mule deer that were classified to age and sex, 9 (9%) were bucks, 53 (50%) were does, and 43 (41%) were fawns. Of the nine mule deer bucks classified, three (33%) were classified 'small', four (44%) 'medium', and two (22%) 'large'. The buck:doe and fawn:doe ratios were 0.17 and 0.81, respectively. The final density estimate was 0.27/km<sup>2</sup> with a 90% confidence interval of (0.23, 0.31). This corresponds to a 90% confidence interval that is +/- 15% of the density estimate. The estimated mule deer abundance is 438 (90% CI 371, 506). The population split is estimated to be 219 doe, 39 buck, and 179 fawn.

One hundred seventy-one white-tailed deer were observed from 49 groups. Of the 171 white-tailed deer that were classified, 11 (6%) were bucks, 88 (51%) were does, and 68 (40%) were fawns. Of the 11 bucks classified, four (36%) were 'small', seven (64%) 'medium'; no 'large' bucks were observed. The buck:doe and fawn:doe ratios were 0.13 and 0.77, respectively. The final density estimate was 0.43/km<sup>2</sup> with a 90% confidence interval of (0.37, 0.49). This corresponds to a 90% confidence interval that is +/- 15% of the density estimate. The estimated white-tailed deer abundance is 714 (90% CI 711, 969). The population split is estimated to be 364 doe, 43 buck, and 286 fawn.

Ten elk were observed in one group; one bull, six cow, three calf.

**Table 1.** Density, and age/sex composition ratios for moose, mule deer and white-tailed deer in WMU 221. Ranges in parentheses represent 90% confidence limits where available.

Species	Population Estimate	Density/km <sup>2</sup>	Male:Female	Offspring:Female
Moose	259 (214,303)	0.16 (0.13,0.19)	0.59	1.13
Mule Deer	438 (371,506)	0.27 (0.23,0.31)	0.17	0.81
White-tailed Deer	713 (604,824)	0.43 (0.37,0.49)	0.13	0.77

#### Literature

Krebs, C.J. 2014 Ecological Methodology, 3<sup>rd</sup> Edition. Chapter 4, Estimating Abundance: Quadrat Counts [online] [http://www.zoology.ubc.ca/~krebs/downloads/krebs\\_chapter\\_04\\_2013.pdf](http://www.zoology.ubc.ca/~krebs/downloads/krebs_chapter_04_2013.pdf) .

Jolly, G.M. 1969. Sampling methods for aerial census of wildlife populations. E. Afr. Agric. For. J. 34:46-49.