WMU158 Aerial Ungulate Survey (2016)

Background

A survey for mule deer was last conducted in 2003 using the random stratified block (stratified for mule deer) methodology. The 2003 population estimate was 1445 mule deer (90% C.I. = 19.1%) with a density of $0.82/km^2$. While an estimate of 600 white-tailed deer was provided, the author cautioned interpretation of that result since pre-flight stratification was for mule deer. Two moose were observed during the entire 2003 survey.

Sunday hunting for big game remains prohibited in WMU 158. There is currently an archery season (Sept 1–Oct 31) with General Licence for antlered and antlerless white-tailed deer and mule deer. Special Licences can currently be used during archery or general seasons. General season for moose occurs Nov 1–Nov 30, while deer seasons in 2015 were Wed-Sat from Nov 4-28. There was no elk season in WMU 158, although a season is proposed to combine WMU 156, 158, and 160 into an elk zone for 2016. Moose, antlered and antlerless mule deer, and antlerless white-tailed deer are on Special Licence during general season. General Licences for white-tailed deer are available during general season. Hunter harvest data for Special Licences indicate four year average success as follows: antlered moose 76%, antlerless moose 79%; antlered mule deer 97%, antlerless mule deer 54%; antlerless white-tailed deer 31%.

The objectives of this survey were to assess the status of the deer and moose populations in WMU 158, and to determine a population estimate for mule deer, white-tailed deer, and moose 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 1.6 km (1 mile) intervals, with 50% coverage (800 m wide 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 ≥ 4 points, antlers outside of ears). Because transects varied in length (see Krebs 2014, Jolly 1969), the average density (R; $\#/km^2$) 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=sq root variance, and 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.

Results

Thirty-two transects were surveyed Jan 11-13, 2016 for a total survey effort of 1092 km. In total, 1143 mule deer were observed from 193 groups. Of the 1141 mule deer that were classified to age and sex, 341 (30%) were bucks, 468 (41%) were does, and 332 (29%) were fawns. Of the 341 mule deer bucks classified, 117 (34%) were classified 'small', 127 (37%) 'medium', and 97 (28%) 'large'. The buck:doe and fawn:doe ratios were 0.73 and 0.71, respectively. The final density estimate was

1.30/km^2 with a 90% confidence interval of (1.07, 1.53). This corresponds to a 90% confidence interval that is +/- 18% of the density estimate. The estimated mule deer abundance is 2308 (1888, 2728). The winter 2016 population split is estimated to be 946 doe, 692 buck, and 669 fawn.

Two hundred forty-one white-tailed deer were observed from 50 groups. Of the 241 white-tailed deer that were classified, 16 (7%) were bucks, 117 (49%) were does, and 105 (44%) were fawns. Of the 16 bucks classified, nine (56%) were 'small', eight (50%) 'medium'; and two 'large' (13%). The buck:doe and fawn:doe ratios were 0.16 and 0.90, respectively. The final density estimate was 0.27/km^2 with a 90% confidence interval of (0.19, 0.35). This corresponds to a 90% confidence interval that is +/- 30% of the density estimate. The estimated white-tailed deer abundance is 487 (342, 631). The winter 2016 population split is estimated to be 239 doe, 34 buck, and 214 fawn.

Twenty moose were observed from 12 groups. Of the 20 moose that were classified to age and sex, eight (40%) were bulls, nine (45%) were cows, and 3 (15%) were calves. The bull:cow and calf:cow ratios were 0.89 and 0.33, respectively. The final density estimate was 0.023/km^2 with a 90% confidence interval of (0.016, 0.030). This corresponds to a 90% confidence interval that is +/- 32% of the density estimate. The estimated moose abundance is 40 (27, 53). The winter 2016 population split is estimated to be 18 cow, 16 bull, and 13 calf.

No elk were observed during the survey.

Table 1. Previous density, and age/sex composition ratios for mule deer and white-tailed deer in WMU 151. Survey types have included quadrat or block surveys, random stratified block (RSB), and transect sampling methods. Ranges in parentheses represent 90% confidence limits where available.

Year	Survey Type	Population Estimate MuDE	Density MuDe/km^2	Buck:Doe	Fawn:Doe
1989	Block	982	0.55	NA	NA
1991	Block	1280	0.72	0.25	0.35
1995	Block	1363	0.77	NA	NA
2003	RSB	1445 (1170, 1720)	0.82 (0.68, 0.97)	0.31	0.44
2016	Transect	2308 (1888, 2728)	1.30 (1.07,1.53)	0.73	0.71

Year	Survey Type	Population Estimate WtDe	Density WtDe /km^2	Buck:Doe	Fawn:Doe
1989	Block	2		NA	NA
1991	Block	93	0.05	NA	NA
1995	Block	154	0.09	NA	NA
2003	RSB	600	0.34	0.03	0.31
2016	Transect	487 (342, 631)	0.27 (0.19, 0.35)	0.16	0.90

Year	Survey Type	Population Estimate Moose	Density Moose/km^2	Bull:Cow	Calf:Cow
1989	Block	0	0	NA	NA
1991	Block	0	0	NA	NA
1995	Block	NA-3 observed	NA	NA	NA
2003	RSB	NA-2 observed	NA	NA	NA
2016	Transect	40 (27,53)	0.023 (0.016,0.030)	0.89	0.33

Literature
Krebs, C.J. 2014 Ecological Methodology, 3rd Edition. Chapter 4, Estimating Abundance: Quadrat Counts [online] 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.