
Aerial-based Inventory Methods for Selected Ungulates: Mule Deer

Standards for Components of British Columbia's Biodiversity No. 32
(Version 2.0, March, 2002)¹

Addendum June, 2013

This document is an addendum to the *Aerial-based Inventory Methods for Selected Ungulates: Bison, Mountain Goat, Mountain Sheep, Moose, Elk, Deer and Caribou (Version 2.0, March 2002)*² and provides an additional survey method for **post-hunt composition surveys for Mule Deer** (*Odocoileus hemionus*).

Field data must be collected and submitted following the Wildlife Species Inventory (WSI) Survey Data Template standardized structure.

- More information about WSI data format and submission standards is available from the following document: http://archive.ilmb.gov.bc.ca/risc/pubs/tebiodiv/sif/assets/spif_errata.pdf.
- The Mule Deer Composition Count Survey Data Template is available for download at http://www.env.gov.bc.ca/wildlife/wsi/data_templates/index.htm

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² This document is located on the Resources Information Standards Committee (RISC) website at <http://archive.ilmb.gov.bc.ca/risc/pubs/tebiodiv/index.htm>.

4.6.3 Mule Deer

Recommended method(s): Mule Deer post-hunt composition surveys. Stratified random block surveys are reliable only in the Peace Region.

4.6.3.1 Survey methods

Stratified Random Block

Standard stratified random block surveys using helicopters are routinely used in many of the western United States, and have successfully been used to estimate Mule Deer population size in the Peace Region of British Columbia. In the Peace Region, sightability was nearly 100%, based on re-sightings of collared animals and statistical analysis was completed to estimate population size without a sightability correction factor (Rob Woods, *pers. comm.*). In this area, Mule Deer concentrate on south aspect river breaks in mid-winter, where there is no coniferous cover and limited deciduous cover. Mule Deer show strong fidelity to small ranges in winter (Armleder et al. 1994), so movements are limited and replicate counts of blocks have produced virtually identical results. The applicability of this method in other areas of the province has not been tested and thus stratified random block surveys for Mule Deer are not recommended. However, stratified random block surveys for Mule Deer may be possible once a sufficiently accurate/precise sightability model is developed.

Post-Hunt Composition Surveys

Post-hunt composition surveys for Mule Deer provide buck:doe ratios which are the only performance measure in the Mule Deer Harvest Procedure (Ministry of Environment 2010). For a background of Mule Deer survey method descriptions and options, refer to the *Age and Sex Composition* section (pages 60-68) in Keegan et al. (2011) and those outlined in regional Mule Deer survey reports (Reid 2013, Stent and Szkorupa 2013). Information on the amount of hunting effort, access and seasonal movements of deer should be used to direct survey effort. These factors can also be used to understand spatial differences in composition estimates.

Surveys should be conducted after the hunting season and during the rut to ensure bucks are with doe/fawn groups and all sex and age classes have a higher probability of equal detection. Surveys should be terminated when bachelor groups are observed because bucks will have lower probability of detection. Bucks begin forming bachelor groups around December 10 in the Cariboo Region and after the first week in December in the Kootenay-Boundary (Stent and Szkorupa 2012) and Okanagan Regions (Reid 2012). In the Peace Region, surveys should follow the same methods as other regions and normally focus on the natural winter ranges where sightability is highest. However, during low snow years, numbers of deer on natural winter ranges will be lower, and during these years surveys should be expanded beyond natural winter ranges.

To ensure accurate classification of age classes, surveys should be conducted where Mule Deer have reasonable sightability (e.g., open habitat; forest openings) as the risk of bias increases as sightability decreases. It may not be possible to accurately determine Mule Deer composition in closed forests. Ensure there is adequate snow cover (5-15 cm) to provide background contrast

and detection of small antlers on bucks. In the Cariboo Region, Mule Deer begin to retreat under higher density conifer cover when snow depth reaches or exceeds 20-25 cm (Ministry of Forests Research, Rick Dawson, *pers. comm.*). Cold temperatures, ideally -20° to -25°C (Parker and Gillingham 1990), are advantageous during the surveys as deer may be more active at these temperatures. Achieving an adequate sample size of Mule Deer (about 5-10% of the estimated deer population) is essential for completing a reliable survey (Keegan et al. 2011). In the absence of a reliable deer population estimate, surveys should strive to classify 100 female deer per Management Unit (MU) following Stent and Szkorupa (2013). Reporting of composition ratios should include the number of animals observed and estimates of uncertainty (see section 3.7, page 35 in RISC 2002).

Camera Specifications and Settings

Photographs should be used to verify buck and fawn classification recorded from the helicopter during composition surveys. Digital Single Lens Reflex (DSLR) cameras capable of taking high resolution photographs (≥ 8 megapixels) are recommended. Cameras should have a continuous shutter release mode so a string of photos can be taken in a few seconds by holding down the shutter release button. A minimum 200 mm focal length lens is needed and vibration reduction or image stabilization is recommended to capture sharp images. To maximize visibility of antler points in photographs, animals should be photographed against a background of snow with a side profile of the antlers. Identification of antler points is extremely difficult with a frontal (head-on) view of antlers. Photographs of deer groups can be used to verify classification of fawns if animals are photographed against snow with a broadside view of the rostrum. Photo numbers must be recorded with composition data for each deer group to ensure photographs refer to the correct group of animals.

Survey procedures:

- ❑ Conduct surveys after the hunting season in mid to late November or early December when bucks are with doe/fawn groups. Terminate surveys once segregation between the sexes is apparent.
- ❑ Conduct surveys with adequate snow (i.e. 5-15 cm) and weather conditions (minimal precipitation, clear, cold temperatures) to provide optimal sightability of Mule Deer.
- ❑ Begin surveys in the early morning to achieve sufficient sample sizes, especially in areas with low Mule Deer densities.
- ❑ Focus surveys on open or semi-open habitats to allow for complete and accurate classification of each Mule Deer group.
- ❑ Survey areas should represent a cross-section of hunting effort and refugia.
- ❑ Classify at least 5-10% of the estimated Mule Deer population, or at least 100 female Mule Deer per MU.
- ❑ Spatially reference Mule Deer or groups of Mule Deer with a Global Positioning System (GPS) using the Universal Transverse Mercator (UTM) coordinate system to verify classification of individuals.
- ❑ Photograph Mule Deer and cross-reference photographs to GPS locations so classification data can be verified.

4.6.3.2 Classification

The minimum classification is Level II in which bucks, does and fawns (juveniles) are classified. Survey objectives will determine if more detailed classification (i.e., Level III or Level IV) is warranted. For Level III, Mule Deer bucks should be classified as having either $<$ or \geq 4 points and $<$ or \geq 3 points (excluding the brow-tine). For Level IV, juveniles and adult females are classified, while bucks are separated into the following categories (see examples in Appendix 1):

- ❑ Class I: Small bucks; all spikes and small 2pts, very small 3pts
- ❑ Class II: Medium bucks; medium 3pts and large 2pts
- ❑ Class III: Large 3pts, small and medium 4-points (segregate 3pts and 4pts)
- ❑ Class IV: Large bucks with 4 or more points and antlers extending well beyond the ears

Only raw data should be used to determine buck:doe ratios because a sightability model to address visibility bias does not exist for Mule Deer in B.C. Visibility bias should be considered only after existing models are tested, or new models are developed.

Literature Cited

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Appendix 1. Examples of Mule Deer Buck Classes

- Class I- small bucks: All spikes and small 2-points, very small 3-points (i.e., left and middle photo).



- Class II- medium bucks; medium 3-points. May include large 2-points.



- Class III: Large 3-points (Right Photo), small and medium 4-points (left and middle photo). Segregate 3-points and 4-points.



- Class IV: Large bucks with 4 or more points and antlers extending well beyond the ears.

