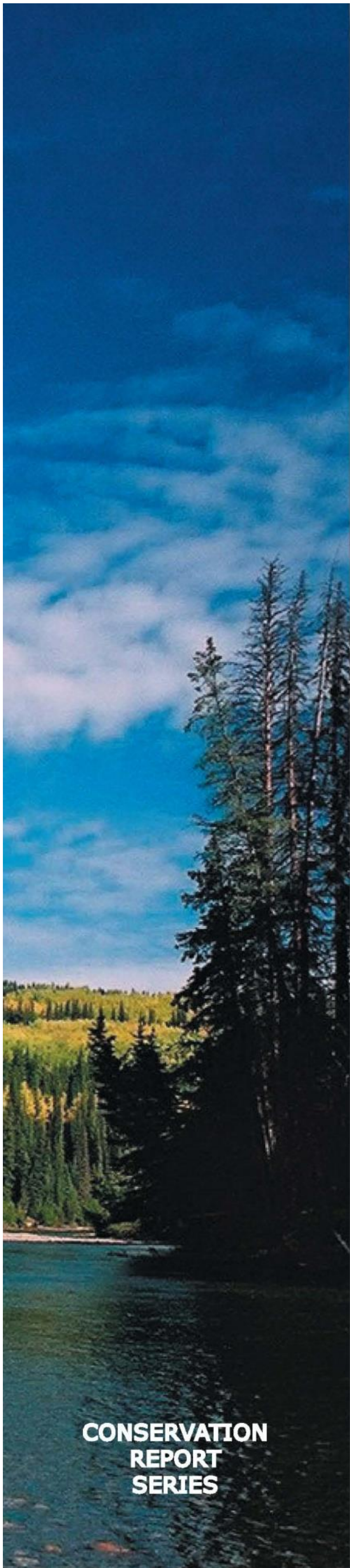

Delegated Big Game Surveys
2011/2012 Survey Season

Alberta Conservation Association
Conserving Alberta's Wild Side

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Delegated Big Game Surveys, 2011/2012 Survey Season

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Conserving Alberta's Wild Side

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EXECUTIVE SUMMARY

Alberta Conservation Association (ACA) uses levies on hunting and fishing licenses to collect and analyze population inventory data that can be used by Alberta Sustainable Resource Development (ASRD) in setting hunting and fishing seasons and regulations. Big game surveys (BGS) are currently used to determine the population status and trends for ungulates in select areas of Alberta, and provide information for setting hunting guidelines. Beginning in 2007, ACA became an active partner in delivering big game surveys, and now works collaboratively with ASRD to plan and conduct surveys and to summarize survey data. A portion of the overall survey plan is delegated to ACA for delivery (D-BGS) in collaboration with ASRD. During the 2011/2012 fiscal year, ACA funded and delivered 13[1] surveys across Alberta. These surveys included summer range trend surveys for pronghorn antelope (*Antilocapra americana*) and mountain goats (*Oreamnos americanus*), winter range trend surveys for bison (*Bison bison*), and random stratified block surveys for moose (*Alces alces*), white-tailed deer (*Odocoileus virginianus*) and mule deer (*Odocoileus hemionus*). This document summarizes the methods used to conduct these surveys, as well as the survey results.

Key words: Alberta, aerial survey, big game, ungulates, pronghorn antelope, mountain goats, bison, moose, white-tailed deer, mule deer, population estimates.

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[1] All Antelope Management Areas (AMAs) are counted as individual surveys.

ACKNOWLEDGEMENTS

The Alberta Conservation Association – Alberta Sustainable Resource Development Wildlife Program Agreement clarifies that ACA is delegated the responsibility to deliver a significant portion of the big game survey program in Alberta. Toward this end, we work collaboratively to plan surveys, collect and analyze data, and complete written summaries for the surveys conducted. We thank the following ACA and ASRD staff and volunteers who were involved in the planning and delivery of surveys in 2011/2012:

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1.0 INTRODUCTION

Alberta Conservation Association (ACA) is a non-profit, non-governmental organization that has been designated as a Delegated Administrative Organization by Alberta Sustainable Resource Development (ASRD) to assist with the responsibilities of conserving Alberta's fish and wildlife resources. A component of this partnership is the use of hunting and fishing levies to collect and analyze inventory data to better understand population trends, composition and status, which can then be used by ASRD to set hunting and fishing regulations. Big Game Surveys (BGS) are an important method for estimating population data that is used both to set hunting allocations, and to keep the general public, and hunters in particular, informed of population trends.

Prior to 2007, ACA's role in the BGS program was limited primarily to funding survey flights, while ASRD determined the species and areas to be surveyed, conducted the surveys, and analyzed data to estimate populations, trends and demographic parameters. In 2007, ACA became an active partner in the BGS program, and now works collaboratively with ASRD to plan and conduct surveys and to analyze and report on survey results. ASRD continues to set provincial priorities for survey locations and rotations, and uses these data to manage big game populations. A portion of the overall survey plan is delegated to ACA for delivery (D-BGS).

ACA is committed to providing detailed annual reports that describe the outcome of these surveys. Annual reports condense and combine all delegated survey information into one document, streamlining access to big game population indices for the general public, hunters, ASRD, and ACA staff. The following annual report summarizes the surveys conducted from 1 April 2011 to 31 March 2012.

During the 2011/2012 survey cycle, the Wildlife Management Branch of ASRD delegated 23 big game surveys to ACA. Unfortunately, due to lack of favourable survey conditions, including insufficient snow cover and a milder than normal winter, only 13 surveys were completed. Specifically, we conducted at least one survey for moose (*Alces alces*), white-tailed deer (*Odocoileus virginianus*), mule deer (*Odocoileus hemionus*), mountain goats (*Oreamnos americanus*), pronghorn antelope (*Antilocapra americana*), and bison (*Bison bison*). Details for each individual survey[2] are described in the following sections. Additional surveys were conducted by ASRD as part of their internal survey activities. In some cases, ACA staff participated in the delivery of these additional surveys; however, the ASRD led surveys are not included in this report.

2.0 SELECTING SURVEY PRIORITIES

As the government agency responsible for managing big game within Alberta, ASRD sets the long-term BGS priorities for big game. In many cases, wildlife management units (WMUs) are surveyed on a three to five year rotational basis to enhance management decisions. Surveys may also be prioritized in order to assess the effectiveness of specific management actions, determine the effects of harsh winters, or in response to unique information requirements for a specific species or area of the province. ACA works collaboratively with ASRD to develop short-term (three year) plans for the implementation of surveys to ensure that they fall within budget constraints. In addition, because of the rarity of good survey conditions (complete snow cover coupled with low winds and high visibility) in some areas of the province, several condition-dependent surveys are identified each year that are given priority if weather conditions are favourable.

3.0 SURVEY METHODS

The techniques used to survey Alberta's big game herds vary across the province according to the habits and habitats of the species of interest, weather conditions that may affect animal movement or sightability, and the safety features of various aircraft. In general, three main approaches are used, each with its own advantages and limitations.

[2] Some related surveys have been grouped into a single report section to facilitate comparison (e.g., all antelope management area surveys are in Section 4.1).

3.1 Summer range trend surveys

For some species, including mountain goats and pronghorn antelope, the contrast between their coat colour and vegetation, coupled with the openness of their habitats, allows population surveys to be conducted during summer months. Summer surveys are ideal from a harvest management perspective because they allow the population status to be assessed immediately prior to the hunting season and inherently incorporate over-winter mortality, unlike traditional winter surveys. While useful for monitoring long-term changes in big game populations, summer range trend surveys do not necessarily allow the complete enumeration of population numbers, and therefore are most useful when compared to counts from previous years to estimate trend. However, trend surveys do not provide a measure of precision around the estimate and therefore do not enable a robust comparison of population estimates among years or regions.

Mountain goat summer ranges are intensively searched by rotary-winged aircraft (helicopter) during the cool parts of the day when goats are most active and visible. In addition to recording the total number of goats seen on each mountain range complex, surveyors enumerate the number of adults, yearlings, and kids, whenever possible.

Pronghorn antelope surveys are conducted by surveying 1-mi wide transects within long-term census blocks that have been established across pronghorn range. Counts of pronghorn observed in these blocks are extrapolated across the antelope management area (AMA) to estimate the total population within the AMA. In addition, classification by sex and age allows for estimation of buck/doe/kid ratios for each herd.

3.2 Winter range trend surveys

For some species, including elk, bighorn sheep, and bison, the presence of distinct winter ranges that are predictably occupied year-after-year provides the opportunity to conduct annual minimum population counts. These counts are used to estimate the population trend (increasing, decreasing or stable) and key demographic information, including male/female/young ratios and the percent of males in various size categories. As with summer range surveys, winter range surveys are useful for monitoring long-term changes in big game populations, but inevitably do not provide a complete enumeration of the population, and therefore are most useful when compared to counts from previous years to estimate trend. Trend surveys also do not provide a measure of precision around the estimate and therefore do not enable a robust comparison of population estimates among years or regions.

Trend surveys are typically conducted by helicopter during ideal weather conditions, such as after a recent snowfall when winds are low. In some cases, fixed-wing aircraft may be used to locate groups of animals for subsequent counting by helicopter. The navigator directs the pilot to known traditional winter ranges, where the area is searched intensively to determine if animals or tracks are present. When animals are seen, the pilot maneuvers the aircraft so that surveyors can estimate a total count and enumerate the numbers of males, females and offspring. These classifications may not be possible for all species, especially during late winter when many male ungulates have dropped their antlers. On ranges with large herds, the survey team may take photographs to allow for more accurate counts.

3.3 Random stratified block surveys

When possible, ACA strives to implement aerial survey approaches that provide statistically rigorous estimates of big game population numbers and densities within each WMU. In most cases, this is facilitated by using the 'Gasaway Method' (Gasaway et al. 1986) to design and implement counts in a random selection of survey blocks. This approach has widespread application for moose and deer in areas where the forest cover is sparse enough to allow good sightability. In addition to providing accurate population estimates, this approach often allows estimates of male/female/young ratios, as well as the relative number of small, medium, and large-antlered males, if surveys are conducted prior to antler drop.

The Gasaway Method divides a WMU or group of adjacent WMUs into smaller survey blocks that are approximately equal in size, and then classifies each block into a stratum that describes the relative number of animals that are expected to be present within that block. Stratification can be based on counts from fixed-wing aircraft immediately prior to the intensive portion of the survey, previous knowledge of big game distribution within the WMU, or habitat features within each survey block. Following stratification, a portion of the blocks within each stratum are randomly selected for intensive searching via helicopter. During surveys, each block is thoroughly searched and surveyors classify each animal observed as an adult male, adult female or young, whenever possible. A series of calculations allow the number of animals observed in the survey blocks to be converted to a population estimate for the entire WMU, and the error associated with the estimate is determined. Additional blocks are surveyed until the error is deemed acceptable (typically error is below 20% for a 90% confidence interval).

3.4 Population recruitment surveys

Total population estimates are used in conjunction with estimates of reproduction and mortality to model how a big game population may be changing throughout the year or during intervening periods between population surveys. These models can be used to track the population's rate of change, to identify appropriate harvest levels, or to predict how changes in harvest level might influence the overall population in the short and long-term. The D-BGS program contributes information to these modeling exercises by providing information on the number of offspring recruited into a population in a given year. These data may be collected by three general means. The first method involves intensively searching areas of known big game distribution and good sightability to find females. The number of offspring observed with these females is used to calculate a reproductive rate. The second method involves locating radio-collared females and recording the number of offspring observed with the associated group. This method provides more reliable data, but is less common as it is generally only associated with larger studies that have deployed radio collars for other purposes. The third method records the number of offspring observed during random stratified block or trend surveys. Although this method provides an efficient use of resources, it is usually only a secondary objective of the survey and may not provide an adequate level of data collection in all cases.

3.5 Classification by antler size

Beginning in 2008/2009, survey crews across the province began using a standardized classification system for adult male big game species (Table 1). This system allows comparisons among WMUs of the relative number of small, medium, and large-antlered big game of various species. However, because of variability in the timing of antler drop by age class across years, comparisons of the percentage of small, medium, and large males may not be possible for surveys that are conducted during mid to late winter.

Table 1. Standardized classification system used to determine antler size classes of male big game species in Alberta.

Size Class	Moose	Deer	Elk
Small	Antler pole type, usually a spike or fork; if palmated, does not extend beyond ear tip.	Spike or 2 points on one or both antlers.	Spike antlers or with light 1 to 2 point antlers.
Medium	Antlers palmated, with spread < ½ of body length.	Small to medium size antlers with 3 or more points/antler; antlers inside ears.	Small antlers with 3 to 5 points/antler.
Large	Antlers palmated, with spread > ½ of body length.	Large antlers with 4 or more points/antler; antlers outside of ears.	Large antlers with 6 to 7 points/antler, massive.

4.0 SUMMER RANGE TREND SURVEYS

4.1 Pronghorn antelope

Section Authors: Blair Seward, Mike Grue, Kim Morton and Ed Hofman

Aerial surveys for pronghorn antelope are conducted annually to provide information on population density, distribution and composition within a series of long-term trend survey blocks. This information is used by ASRD to extrapolate an estimate of population size for each antelope management area (AMA), which in turn influences harvest objectives for the upcoming fall hunting seasons. Recreational hunting opportunities for pronghorn antelope in Alberta are highly sought after, making the information collected during the annual aerial survey an important component of provincial pronghorn management. This summary describes data collected during the 2011 survey conducted in AMAs A to H (Figure 1).

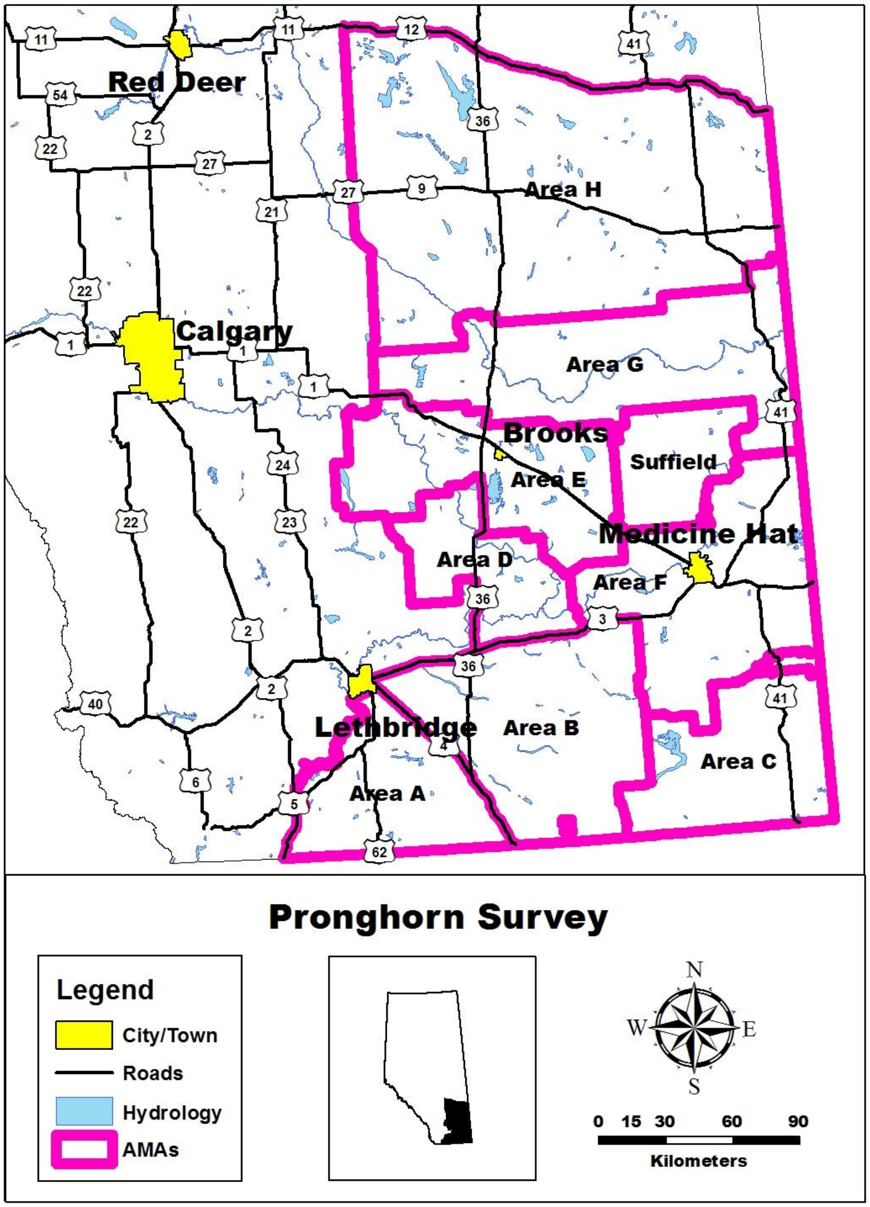

Figure 1. Location of pronghorn antelope management areas (AMA) in Alberta.

4.1.1 Survey methods

We conducted pronghorn antelope surveys from 11 – 18 July 2011 following an established trend survey protocol developed within Alberta. Each AMA contains designated survey blocks with fixed strip transects, which we surveyed from a rotary-winged aircraft. To reduce survey costs, we conducted non-stop, 3 hour flights with the support of a mobile fuelling trailer. We divided each survey day into two periods, with the first flight commencing at approximately 0800 h and the second flight beginning toward evening, after the heat of the day. The survey crew consisted of the pilot, navigator, and two rear seat observers in a Bell 206L helicopter. Primary observers maintained constant observation of the ground out to a distance of 0.8 km perpendicular to the flight line on each side of the aircraft. The navigator kept the aircraft on course, recorded observations, and assisted with ground observation and herd classification, whenever possible. Observers counted all pronghorn observed on the transect, and classified the number of bucks, does and kids, whenever possible. Counts also include individuals seen while off the center of the flight line but still within the 1.6 km strip width. This likely biased our result by placing more effort in areas with higher pronghorn density. The GPS location of all observed individuals and groups was recorded.

4.1.2 Observed pronghorn density

We calculated a minimum estimate of pronghorn density (# animals/km^2) for the survey blocks in each AMA by dividing the number of animals observed by the total area (km^2) of the strip transects that were flown. We did not correct for sightability; therefore, overall counts should be considered as minimum estimates. Direct comparison of trend survey results among years should be interpreted as an indication of a trend rather than a robust comparison of the actual population number.

4.1.3 Results

During the 2011 survey, we counted 440 bucks, 1,184 does and 392 kids. Observed pronghorn density (pronghorn/km^2), buck to doe ratios and kid to doe ratios, calculated by AMA, are presented in Table 2. This year's survey results show the average density of pronghorn in all AMAs is lower than in previous years (2007 – 2010).

Table 2. Comparison of pronghorn antelope survey results from 2007 – 2011.

	Antelope Management Area								
	A	B	C	D	E	F	G	H	S
2011 Survey									
Observed pronghorn density (pronghorn/km^2)	0.21	0.32	0.47	0.30	0.35	0.34	0.31	0.17	--
Bucks/100 Does	64	40	34	39	31	42	28	36	--
Kids/100 Does	26	40	15	8	43	34	53	53	--
2010 Survey									
Observed pronghorn density (pronghorn/km^2)	0.39	0.54	0.68	0.36	0.63	0.42	0.43	0.19	1.12
Bucks/100 Does	47	45	48	45	48	53	50	43	54
Kids/100 Does	20	33	15	17	12	26	29	37	20
2009 Survey									
Observed pronghorn density (pronghorn/km^2)	0.63	0.39	0.93	0.62	0.89	0.50	0.44	0.27	0.95
Bucks/100 Does	38	66	43	60	39	35	62	35	66
Kids/100 Does	39	58	22	42	42	35	34	29	47
2008 Survey									
Observed pronghorn density (pronghorn/km^2)	0.50	0.43	0.98	0.95	0.90	0.38	0.50	0.25	--
Bucks/100 Does	40	47	59	44	50	32	52	65	--
Kids/100 Does	21	42	28	30	27	43	47	31	--
2007 Survey									
Observed pronghorn density (pronghorn/km^2)	0.48	0.44	0.96	0.93	0.65	0.53	0.37	0.19	--
Bucks/100 Does	24	46	42	24	48	30	45	68	--
Kids/100 Does	30	67	30	52	37	37	50	39	--

"--" Area S (Suffield) not surveyed.

4.2 Wildlife Management Unit 400 mountain goats

Section Authors: Mike Jokinen and Greg Hale

Counts to estimate the trends for mountain goat populations in WMU 400 have been carried out on 23 occasions since 1979. In the initial survey year, only the Alberta portion of the continental divide was flown; however, from 1980 until the present, the survey area has included both the Alberta and British Columbia sides of the continental divide. In 2011, the WMU 400 goat survey area was further sub-divided into survey units based on mountain ranges/complexes, mountain passes, river drainages and natural breaks on the landscape (Figure 2). This aides in simplifying navigation among mountain complexes, and ensures full coverage of the survey area while avoiding duplication. Additionally, this improvement will provide greater consistency among survey years.

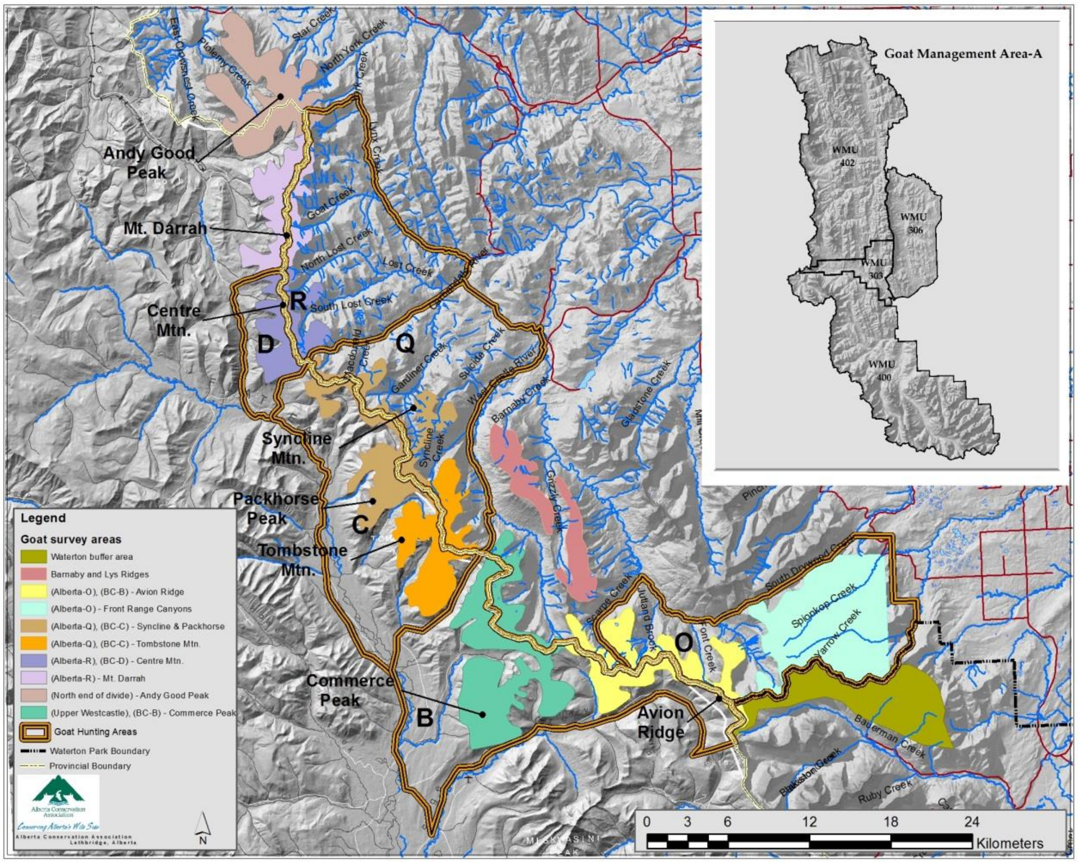

Figure 2. Location of the Wildlife Management Unit 400 mountain goat survey area in Alberta and British Columbia.

The 2011 survey provides count data that may be used to refine Goat Population Areas within Goat Management Area A of WMU 400. Our survey objectives were to obtain a minimum count of goats to determine population status and trend, to classify goats by age to assess herd structure and recruitment, and to map sightings that describe regional distribution. Additionally, these data will be compared to the ASRD goat management plan to assess the viability for a continued mountain goat harvest in this WMU.

4.2.1 *Survey methods*

We searched mountain complexes in WMU 400 on 25, 27, 28, 30 July 2011 and 3 August 2011. All surveys occurred during the morning hours to take advantage of peak animal activity, using a Bell 206L helicopter flown at air speeds ranging from 80 – 100 km/h. In some instances, coverage of the goat range was accomplished by conducting a single flight above timberline, but portions of the survey area required a second and sometimes third flight line at higher elevations to provide more complete coverage of mountain faces, particularly in high goat density areas.

The left front passenger (navigator) maintained the proper flight course and assisted with classification of goats to age categories. Two observers occupying the rear seat provided continuous side observation, with the right passenger recording wildlife numbers and GPS locations. We classified all goats observed into standard age categories of adult, yearling, or kid. We did not correct for sightability; therefore, overall counts should be considered as minimum estimates. These counts do not have estimates of precision, and therefore direct comparison of survey results among years or regions is difficult.

Weather conditions in WMU 400 are commonly unstable, with high winds often grounding surveys for a day or more at a time. However, we were able to survey within limited windows when weather conditions were good to excellent. Over the 5 survey days, average temperatures were +16 degrees Celsius, cloud cover ranged from 0 – 100% and wind speeds averaged 19 km/h.

4.2.2 *Results*

We observed 146 mountain goats during the 2011 survey, including 120 adults, 15 yearlings, 11 kids, and 0 unclassified goats (Table 3). Classification of age classes resulted in reproduction and recruitment rate indices of 9 kids/100 adults and 13 yearlings/100 adults.

The 2011 survey count (146 goats) was 33% lower than the 2008 survey (218 goats) (Table 4). The 2011 reproduction estimate of 9 kids/100 adults was down significantly from 2008, when 31 kids/100 adults were observed, and it is the lowest recruitment rate encountered over the 32 year span that this area has been surveyed. The number of yearlings per adults (13 yearlings/100 adults) was also one of the lowest yearling rates on record.

Early July is the typical survey period, since mountain goats are highly observable at this time due to larger group sizes (nursery groups), and their use of open alpine habitats. There is also an increased potential to accurately classify goats to age class. Heavy snowpack and late snow melt delayed the 2011 survey, which occurred approximately 3 weeks later than usual. The delay of this survey to late July could have resulted in fewer goats being seen due to seasonal range changes in most of the survey area. Additionally, the winter of 2010/2011 had the highest snowpack on record in this survey region; therefore, a harsh winter may have impacted yearling survival and nanny energy reserves. It is interesting to note that overall goat counts were also lower in surveys conducted in both southern and west-central Alberta (next section).

Table 3. Mountain goat population trend counts for all goat hunting areas in Wildlife Management Unit 400 in 2011.

Goat hunting area	Adult	Yearling	Kid	Unclassified	Total
Alberta – Area O[a]	12	1	0	0	13
B.C. – Area B	21	6	2	0	29
Upper West Castle[b]	9	0	1	0	10
Alberta – Area Q	21	3	2	0	26
B.C. – Area C	10	1	0	0	11
Alberta – Area R	29	3	5	0	37
B.C. – Area D	10	1	0	0	11
North end of Divide	8	0	1	0	9
Total	**120**	**15**	**11**	**0**	**146**

[a] Does not include Waterton buffer area counts.

[b] Does not include Barnaby or Lys Ridge counts.

Table 4. Total mountain goat population trend counts for all goat hunting areas in Wildlife Management Unit 400 from 1980 – 2011.

	Number of mountain goats				
Year	Adults	Yearling	Kid	Unclassified	Total
2011[a]	120	15	11	0	146
2008	147	25	46	0	218
2007	110	30	41	12	193
2005	143	31	70	4	248
2004	147	15	34	0	196
2003	115	13	46	0	174
2002	95	28	27	0	150
2001	143	34	44	0	221
2000	157	21	46	0	224
1999	115	29	37	0	181
1997	106	28	31	0	165
1995	103	24	28	0	155
1993	92	17	22	0	131
1991	82	16	17	0	115
1990	86	18	24	0	128
1989	79	22	18	0	119
1988[b]	26	3	9	0	38
1987[b]	30	8	4	0	42
1986	116	18	33	0	167
1983	121	--	7	0	128
1982	132	--	32	0	164
1980	128	--	55	0	183

[a] Survey was flown 3 weeks later than normal.

[b] Incomplete survey, thus trend counts are not comparable.

"--" Yearlings are included in adult count.

4.3 Wildlife Management Units 438 – 446 mountain goats

Section authors: Jeff Kneteman and Mike Ranger

Extensive annual surveys for mountain goats have been conducted in Willmore Wilderness Park and adjacent areas since 1974. With permission from the Superintendent of Jasper National Park, the survey area was expanded (beginning in 1979) to include mountain complexes straddling the Jasper Park boundary. The objectives of annual goat surveys in WMUs 438 – 446 (Figure 3) are to collect data on population trends, distribution, and herd composition, and to monitor the status of these mountain goat herds.

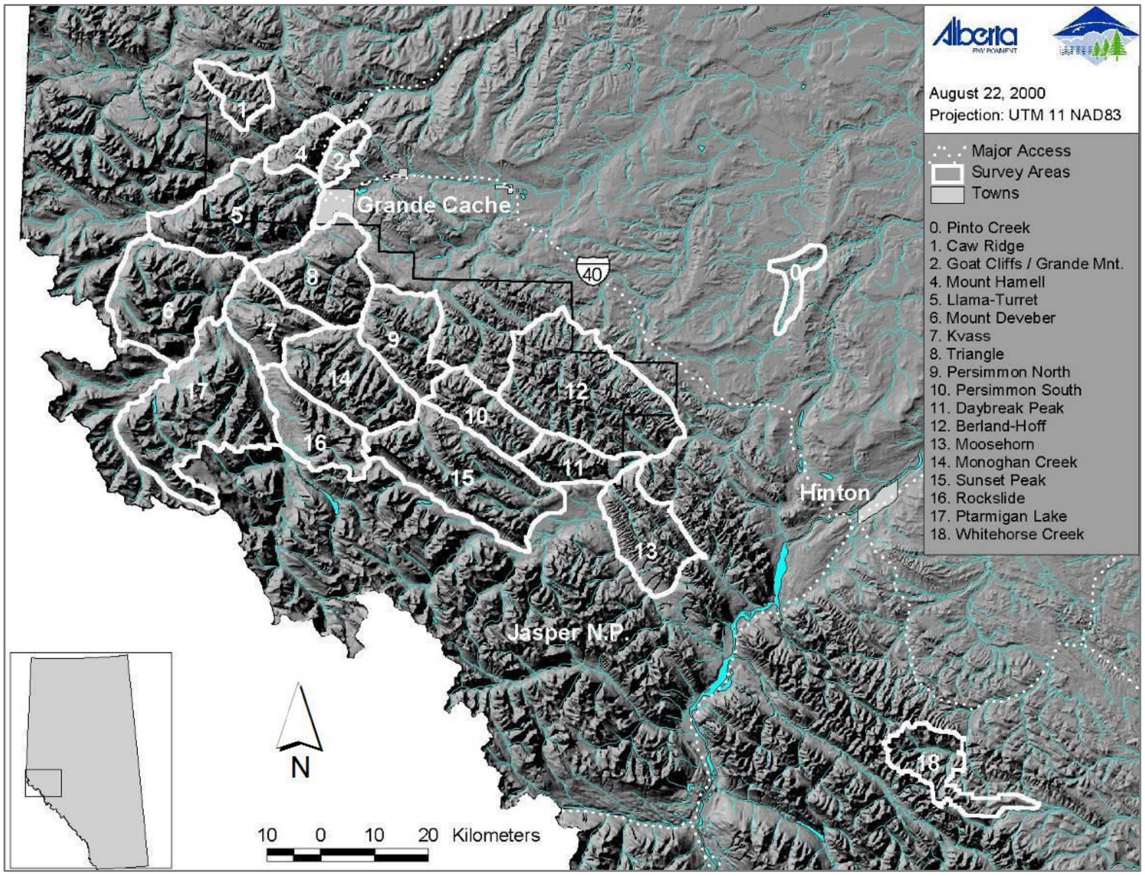

Figure 3. Location of the Wildlife Management Units 438 – 446 mountain goat survey area in Alberta.

4.3.1 Survey methods

The survey area is comprised of seventeen mountain complexes and one canyon complex in the forested foothills of WMUs 438 – 446 (Figure 3). We surveyed 12 complexes beginning on 28 June 2011, followed by flights on 4 – 7, 11 July 2011, using a Bell 206B helicopter flown counter-clockwise around each mountain complex between timberline and ridge top. Air speed ranged from 120 – 150 km/h. The left front passenger navigated, observed and plotted checkpoints on a 1:250,000 scale topographic map. GPS locations were recorded for each group of goats. The two rear passengers observed and recorded species classifications and counts onto field data sheets. When herd size and/or location made classification difficult for observers or dangerous for mountain goats, the helicopter landed at a distance of approximately 0.8 km and we classified goats using a 20 – 45X variable spotting scope. Flights typically occurred between 0600 – 1100 h and

1600 – 2200 h during the goats' most active periods. Exact survey flight paths vary from year to year; thus, comparison of overall counts between years is cautioned and should only be considered as a long term trend. We did not correct for sightability; therefore, overall counts should be considered as minimum estimates. These counts do not have estimates of precision, and therefore direct comparison of survey results among years or regions is difficult.

Weather conditions in this region are variable with high winds or low cloud cover often grounding surveys for a day or more at a time. However, we were able to work within limited windows when weather conditions were considered acceptable. During the 6 survey days, average temperatures were +12 degrees Celsius, cloud cover ranged from 0 – 100%, and wind speeds varied from 0 – 40 km/h.

4.3.2 Results

In 2011, we observed a total of 368 goats (284 adults, 31 yearlings, 53 kids, and 0 unclassified) with ratios of 19 kids/100 adults and 11 yearlings/100 adults (Table 5). Kid to adult ratios were lower than the average and yearling to adult ratios were equal to the average, for the six mountain complexes surveyed most frequently between 1979 and 2011 (Table 6). Total counts of goats on individual complexes in 2011 were lower than the long-term averages for all 12 complexes surveyed.

In 2011, total counts were less than the 2010 survey on six complexes (Caw Ridge, Daybreak, Goat Cliffs, Llama-Turret, Monaghan and North Persimmon), and comparable on four complexes (Deveber, Moosehorn, Mt. Hamel and Rockslide). One complex (Whitehorse Creek) had comparable counts to the previous survey in 2007, and one complex (Triangle) exceeded total goats counted during the previous survey in 2008.

Table 5. Mountain goat population counts within each mountain complex of Wildlife Management Units 438 – 446 in 2011.

Complex	Adult	Yearling	Kid	Unclassified	Total
Caw Ridge	64	7	6	0	77
Daybreak	5	1	2	0	8
Deveber	39	4	11	0	54
Goat Cliffs	27	1	1	0	29
Llama-Turret	47	5	6	0	58
Monaghan	13	5	1	0	19
Moosehorn	5	1	3	0	9
Mt. Hamel	35	0	7	0	42
North Persimmon	22	3	6	0	31
Rockslide	11	3	8	0	22
Triangle	16	1	2	0	19
Whitehorse Creek	0	0	0	0	0
Total	**284**	**31**	**53**	**0**	**368**

Table 6. Total mountain goat population counts for six mountain complexes (Caw Ridge, Daybreak, Goat Cliffs, Llama-Turret, Moosehorn and Mt. Hamel) flown on a consistent basis in Wildlife Management Units 438 – 446 from 1979 – 2011.

	Number of mountain goats				
Year	Adults	Yearling	Kid	Unclassified	Total
Jul. 2011	183	15	25	0	223
Jul. 2010	260	18	25	0	303
Jul. 2009	192	13	36	81	322
Jul. 2008	221	11	51	0	283
Jul. 2007	236	21	40	9	306
Jul. 2005	269	31	63	5	368
Jul. 2004	299	17	63	5	384
Jul. 2002	302	15	75	9	401
Jul. 2001	223	20	70	43	356
Jul. 1999	230	27	79	34	362
Jul. 1998	245	21	79	11	375
Jul. 1997	227	14	56	8	305
Jul. 1996	260	32	75	0	367
Jul. 1995	248	26	76	0	350
Jul. 1994	205	19	76	0	300
Jul. 1993	214	11	66	10	301
Jul. 1990	194	20	67	40	321
Jul. 1989	160	31	64	0	255
Jul. 1986	219	19	45	3	286
Jul. 1984	214	25	75	0	314
Jul. 1983	245	38	80	12	375
Jul. 1980	160	28	66	0	254
Jul. 1979	219	72	91	3	385

5.0 WINTER RANGE TREND SURVEYS

5.1 Hay-Zama bison

Section Author: Ryan Hermanutz and Lyle Fullerton

The Hay-Zama wood bison population was established in 1983 and has been reported on in three previous survey reports (Morton 2003; Moyles 2007, 2008). In 2008, a seven month hunting season was initiated for bison in the Hay-Zama complex from 1 September 2008 to 31 March 2009 for Aboriginal hunters and a two month season from 1 January to 28 February for recreational hunters. The Resident Wood Bison season in this area has continued annually with the goal to maintain bison numbers at 400 – 600 animals. The objectives of the introduction of a hunting season were to reduce bison numbers and their range, due to growing concerns over disease transmission among herds, with bison moving west from Wood Buffalo National Park; concern for public safety with conflicts in communities and risks associated with road collisions in the region. We monitored the Hay-Zama bison population in March 2012 using aerial surveys.

5.1.1 Study area

The Hay-Zama wood bison herd established itself in the area west of High Level, east of Rainbow Lake and north to Zama City (Moyles 2008). The limits of this distribution are roughly North 58 degrees 30 minutes in the south, North 59 degrees 30 minutes in the north, West 117 degrees 30 minutes to the east, and West 119 degrees 30 minutes to the west (Figure 4). The herd distribution has changed in recent years, expanding to the south along Highway 58 and easterly along the Zama Highway. Expansion to northerly and westerly areas appears to be seasonal, occurring during the summer. Six townships (Township 112, 113, and 114, Range 2, and 3) have been established as a "No Hunting Area" to provide a refuge of important winter habitat for the bison.

5.1.2 Survey methods

From 6 – 8 March 2012, a two-person crew in a Cessna 206 airplane performed pre-flight surveys for bison in the Hay-Zama area. The pre-flight surveys consisted of transect lines flown in an east-west direction along lines of latitude spaced 1 minute apart, covering an area of approximately 6,900 km^2. Included in this area were flight lines not previously flown to locate bison in the northern and eastern areas of their range. Bison sightings and areas of bison tracks were recorded, and a GPS waypoint was taken using a handheld unit. Poor visibility due to falling snow interrupted surveys on 7 March; however, conditions improved again on 8 March and the pre-flight was successfully completed.

On 9 – 10 March 2012, the same two-person crew flew intensive surveys in a Bell 206B helicopter to locate and count the bison observed during the pre-flight surveys. All observed bison were counted and classified as calves or adults. Photos were taken of herds to confirm the number of calves, which were identified by their smaller body size and absence of horns. Yearlings were included in the adult age class because of the difficulty in distinguishing between these two age categories in an aerial survey. We did not correct for sightability; therefore, overall counts should be considered as minimum population estimates and direct comparisons of survey results among years may be difficult.

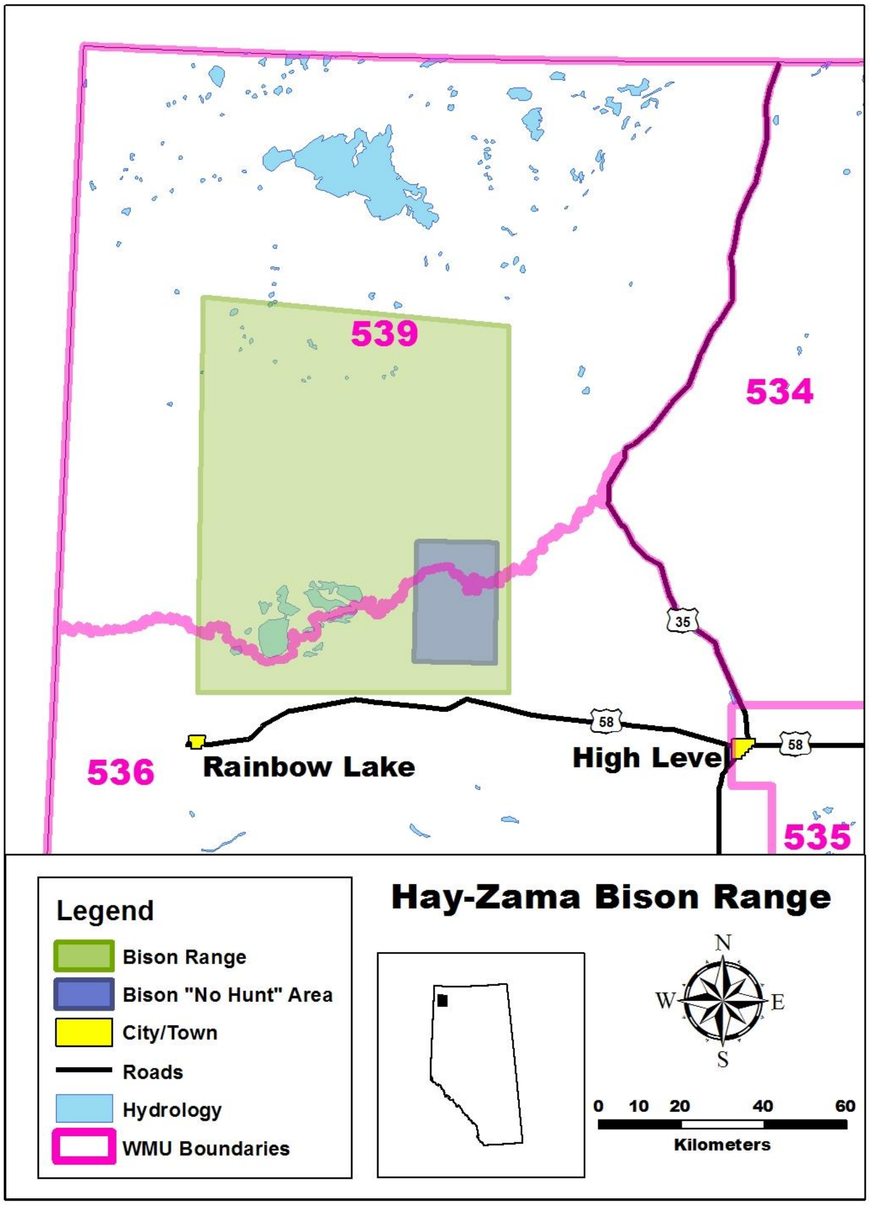

Figure 4. Location of the Hay-Zama bison herd range in Alberta.

Although light conditions for the survey varied from flat to bright, overall weather and sightability conditions were acceptable for the survey. Snow conditions were fair to marginal with accumulations in the area being far below normal values. Through visual and ground observations, there was an estimated 40 to 60 cm of snow cover; however, the amount of fresh snow to cover old tracks was minimal.

5.1.3 Results

A total of 587 bison (512 adults and 75 calves) were counted at 30 sites throughout the survey area (Table 7). A significant number of bison were located within the Hay-Zama Wildland Provincial Park. Four bison were located northeast of Zama City (Township 119 Range 3), while only 2 bison were located southeast of Zama City (Township 115 Range 5). The remaining bison were observed in traditional wintering areas throughout their range. No bison were located near the Zama Highway or Highway 58, in the southern portion of their traditional winter range. The number of bison counted during the 2012 survey is consistent with the previous three years. The Hay-Zama bison population appears to be stabilized at the higher end of the desired population goal (400 – 600 animals).

Table 7. Comparison of aerial survey results for bison in the Hay-Zama area from 1994 – 2012.

Year	# of Groups	Number of bison			% Calves[b]
		Adults[a]	Calves	Total	
Mar. 2012	30	512	75	587	13
Mar. 2011	31	500	61	561	11
Mar. 2010	39	452	75	527	14
Feb. 2009	59	547	50	597	8
Mar. 2008	63	593	59	652	9
Mar. 2007	41	499	66	565	12
Feb. 2006	41	499	23[c]	522	4
Mar. 2005	33	365	59	424	14
Mar. 2004	30	267	53	320	17
Feb. 2003	23	236	26	262	10
Feb. 2002	21	200	33	233	14
Mar. 2001	12	158	27	185	15
Mar. 2000	12	132	21	153	14
Mar. 1999	14	81	16	97	17
Feb. 1998	12	106	6[d]	112	5
Mar. 1997	7	75	14	89	16
Mar. 1996	7	61	15	76	20
Nov. 1995	4	62	12	74	16
Mar. 1995	4	48	15	63	24
Dec. 1994	3	41	17	58	29

[a] Adults includes yearlings.
[b] % Calves = calves/total population x 100.
[c] This is a minimum count due to difficulties in distinguishing calves from yearlings.
[d] This is a minimum count.

6.0 RANDOM STRATIFIED BLOCK SURVEYS

6.1 Wildlife Management Unit 320 and 322 moose

Section Author: Anne Hubbs and Corey Rasmussen

Wildlife management units 320 and 322 are desirable units for moose hunters and receive high pressure from recreational hunting. To improve moose management, ASRD replaced the general hunting season in these WMUs in the late 1990s, with a special license draw system for both antlered and antlerless moose, during both the archery and general seasons. The harvest goal for antlered and antlerless moose is presently 4% and 1%, respectively, of the estimated pre-season populations. Moose hunter success according to hunter harvest questionnaires has averaged 45% for antlered moose and 60% for antlerless moose over the last five years in WMU 320, and 78% and 71%, respectively, in WMU 322. WMU 320 and 322 were last surveyed for moose in 2008. The objectives of the 2012 survey were to estimate the total population and herd composition for moose in these WMUs.

6.1.1 Study area

Wildlife management units 320 and 322 are located southeast of Rocky Mountain House, extending down towards Sundre (Figure 5). Highway 22 forms part of the western perimeter; Highway 766 and the Red Deer River the eastern perimeter; Highway 12 the northern extent (WMU 322); Highway 584 and the Red Deer River the southern extent (WMU 320); while Highway 54 divides the two units. Combined, these two WMUs cover an area of approximately 2,313 km^2. Both WMUs straddle the Lower Foothills, Central Mixedwood and Dry Mixedwood Natural Subregions of Alberta (Natural Regions Committee 2006).

6.1.2 Survey methods

We stratified WMU 320 and 322 for moose using a Cessna 185 airplane on 23 – 24 January 2012 (Gasaway et al. 1986). The aircraft flew at approximately 100 – 130 km/h, approximately 240 m above the ground, depending on vegetation cover and topography (higher elevation in dense forest and greater topography). We flew stratification flight transects in an east – west direction at 1 minute longitude intervals (1800 m apart) (Lynch and Shumaker 1995; Lynch 1997). Observers scanned approximately 400 m out from each side of the aircraft and recorded moose locations found along each transect. Temperatures were -13 to +2 degrees Celsius and snow conditions were good.

After the stratification survey flight, moose counts and GPS locations were uploaded into a GIS and intersected with a fishnet grid overlaid onto a map of WMU 320 and 322. The grid divided WMU 320 into 59 survey blocks and WMU 322 into 103 survey blocks (3 min latitude x 3 min longitude). We classified survey blocks into strata according to the density of moose counted during the stratification flight. Low blocks had 0 moose/km^2, medium blocks had 0.01 – 0.15 moose/km^2 and high blocks had $\geq$ 0.16 moose/km^2. In WMU 320, 27 blocks (46%) were classified as low, 19 (32%) as medium, and 13 (22%) as high density blocks. In WMU 322, 56 blocks (54%) were classified as low, 29 (28%) as medium, and 18 (18%) as high density blocks. We then randomly selected survey blocks for inclusion in the intensive rotary-wing survey flight, using the Excel Seed file methods (Shumaker 2001).

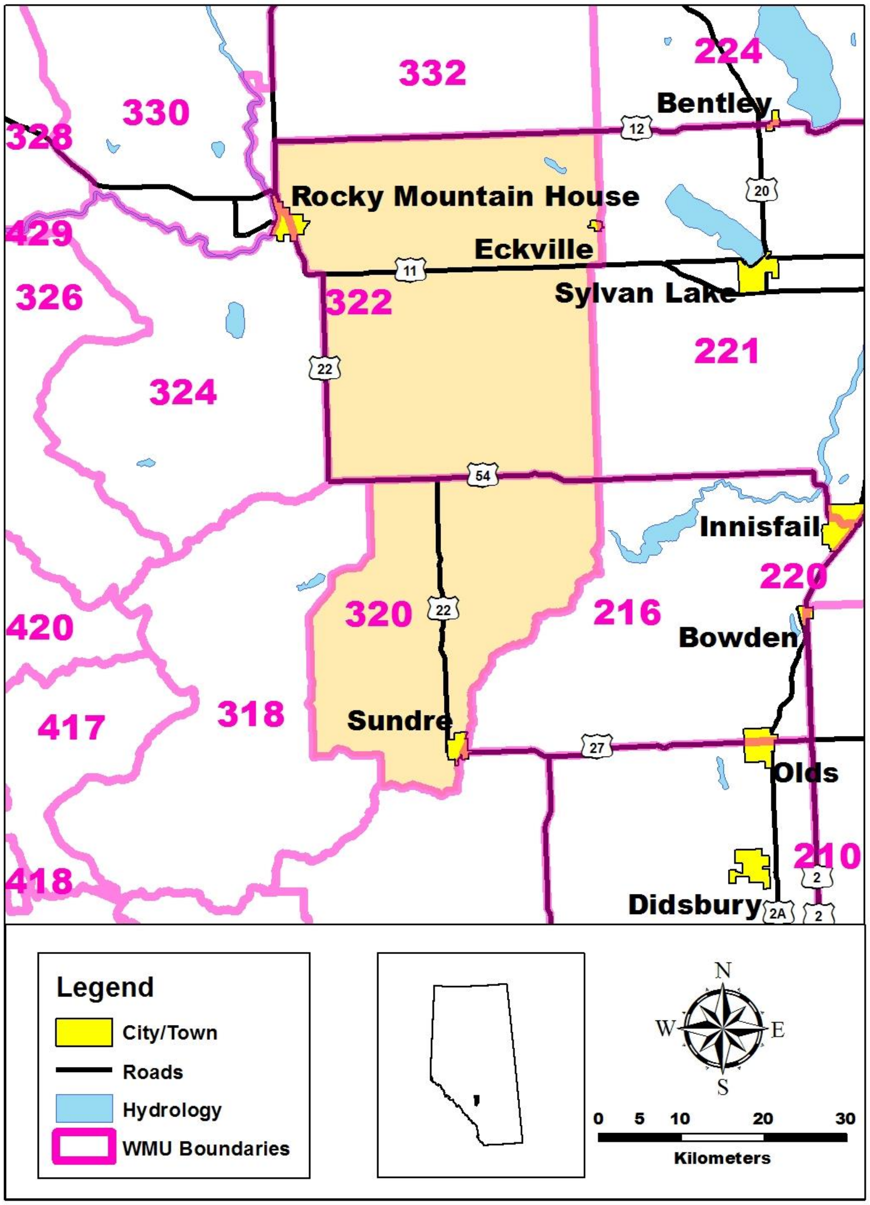

Figure 5. Location of Wildlife Management Units 320 and 322 in Alberta.

We searched survey blocks with a Bell 206B helicopter from 25 – 27 January 2012. We surveyed 17 blocks in WMU 320; 6 low, 6 medium, and 5 high, and 20 blocks in WMU 322; 8 low, 10 medium, and 2 high. We flew approximately 120 km/h, 60 – 90 m above the ground, at 400 m flight line spacing to ensure full coverage of each survey block. A navigator sat next to the pilot and observed and recorded animal locations, while 2 observers sat in the back of the aircraft. Each observer was responsible for observing approximately 200 m from each side of the aircraft.

We counted and recorded locations of moose, deer (white-tailed and mule deer were combined), elk, coyotes, and eagles. We determined age, sex, and total counts of moose; circling the animals if necessary. Most bulls at this time had shed their antlers, but cows were easily distinguishable by the white vulva patch below their tails. Light brown or grey patches, typically occurring on the shoulders and back, indicated winter tick (*Dermacentor albipictus*) infestation and were noted.

Moose counts per survey block were summed and entered into separate Excel Quad files to determine population estimates (Lynch 1999). We did not correct for sightability; therefore, overall counts should be considered as minimum population estimates and direct comparisons of survey results among years may be difficult.

The intensive survey flights were flown during partially cloudy, calm days with average temperatures ranging from -13 to +2 degrees Celsius. Snow conditions were good throughout the survey area.

6.1.3 Results

During the intensive survey flights of WMU 320, a total of 98 moose were counted (27 bulls, 39 cows, 25 calves and 7 unclassified). In WMU 322, a total of 136 moose were counted (35 bulls, 58 cows, 37 calves and 6 unclassified). From this, we estimated the total moose population to be between 227 and 315 for WMU 320, and between 401 and 607 for WMU 322 (Table 8). Population estimates for moose in WMU 320 and 322 declined moderately between 1999 and 2008, but seem to have rebounded in 2012. During the 2012 survey, 5 cows were observed with twins and 30 moose were observed with varying degrees of tick related hair loss.

Table 8. Comparison of aerial survey results for moose in Wildlife Management Units 320 and 322 from 1999 – 2012.

WMU/Year	Population estimate (90% confidence limits)	Moose/km^2	Ratio to 100 Females	
			Males	Juveniles
WMU 320				
2012	271 (±16.2%)	0.31	69	64
2008	175 (±29.5%)	0.20	8	76
2002	395 (±22.6%)	0.44	--	--
1999	293 (±21.7%)	0.33	26	53
WMU 322				
2012	504 (±20.4%)	0.35	60	64
2008	426 (±29.9%)	0.30	28	55
2002	548 (±26.6%)	0.38	--	--
1999	724 (±21.7%)	0.54	43	59

"--" Demographic ratios were not available from ASRD.

6.2 Wildlife Management Unit 336 moose, mule deer, and white-tailed deer

Section Authors: Curtis Stambaugh and Mike Ranger

Wildlife Management Unit 336 is a medium sized unit, located approximately 50 km west of Edmonton. Several communities including the towns of Drayton Valley, Sangudo and Onoway border this WMU. This WMU has been surveyed once using the modified Gasaway method for moose in 2003 (Gasaway et al. 1986; Lynch 1997; ASRD 2010). This WMU has also been surveyed for moose, mule deer and white-tailed deer in 1982, 1988, and 1993 using the line transect methodology, which is inherently biased towards river valley habitats, and thus, cannot be directly compared to Gasaway surveys. In 2012, we surveyed this WMU for moose, mule deer, and white-tailed deer using the modified Gasaway method.

6.2.1 *Study area*

WMU 336 is located northeast of Drayton Valley and is bounded by Highway 22 and the Pembina River to the west, Highway 43 to the north, Highway 770 to the east, and the North Saskatchewan River to the south (Figure 6). This 2,616 km^2 area has extensive open pit coal mines concentrated around Wabamun Lake, along with moderate levels of oil and gas development (roads, well sites, gas plants, and pipelines). The majority of the WMU consists of mixed farming with a high rural residential population, located primarily to the east of Lac Ste. Anne and Wabamun Lake. Alexis and Wabamun First Nations are located in the north and central portions of this WMU, respectively. Crown grazing lease lands are interspersed throughout the WMU, with the largest area being Jack Pine Provincial Grazing Reserve, located southwest of Wabamun Lake. Forested habitat consisting largely of pure deciduous forest with small fragments of mixed wood forest is found throughout the area. An extensive network of high-density all-weather roads exist, allowing industry and hunters ease of access throughout the majority of the WMU.

6.2.2 *Survey methods*

Survey methodology followed the modified Gasaway technique (Gasaway et al. 1986; Lynch 1997; ASRD 2010). The WMU was divided into 3 minute latitude x 5 minute longitude grids (excluding First Nations reservations, Wabamun, St. Anne, and Isle Lakes), resulting in 83 survey blocks. Survey block stratification flights were conducted using a Cessna 185 and a Cessna 210 airplane on 29 February 2012. Both crews consisted of a pilot, a navigator/observer and 2 full time observers. Stratification transects were flown every 1 minute of latitude, with the exception of survey block boundaries (every 3rd minute), and all observations of moose, mule deer, and white-tailed deer on either side of the aircraft were recorded. All animal locations were recorded with a Garmin GPS. The pilot attempted to maintain an altitude of approximately 100 m above ground level and a speed of 150 km/h.

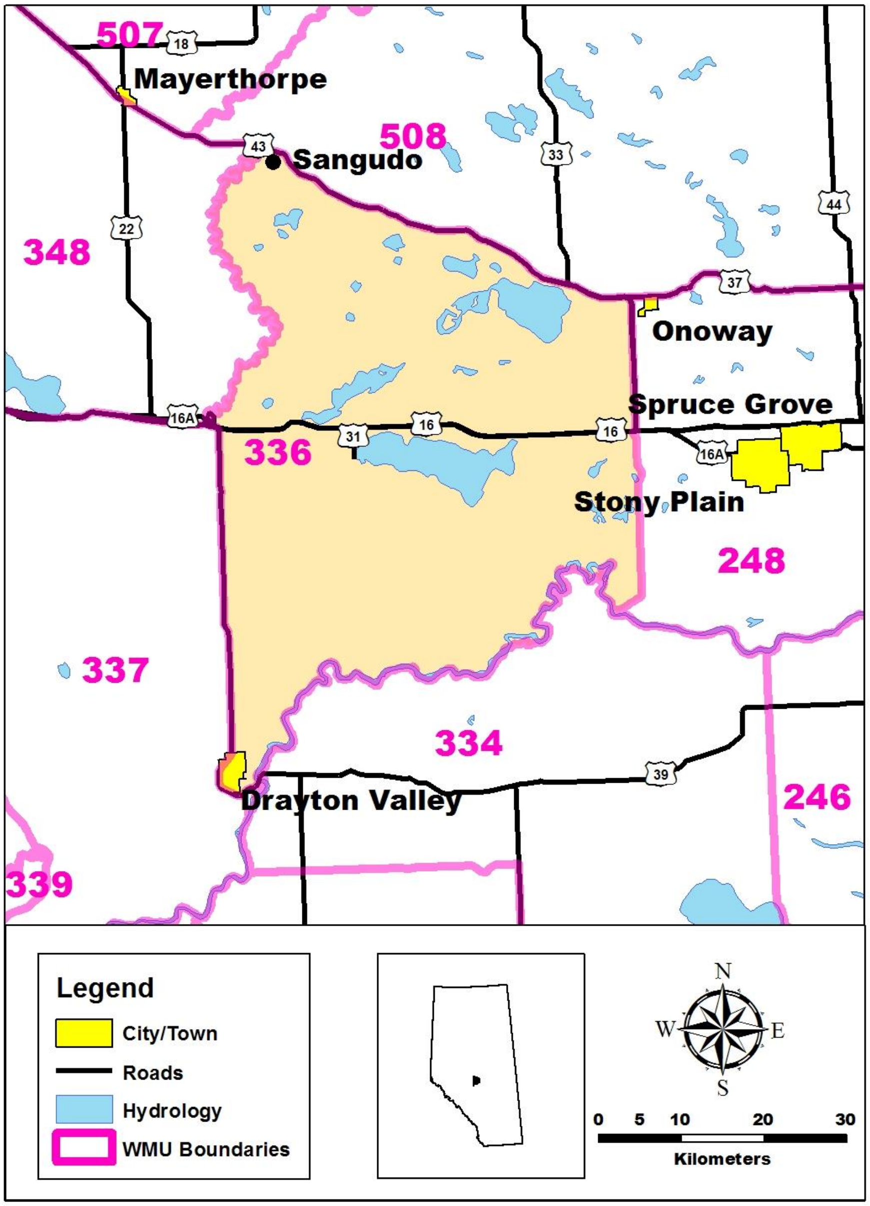

Figure 6. Location of Wildlife Management Unit 336 in Alberta.

Survey blocks for moose were then assigned to one of three strata; low, medium, or high, based on moose densities from the stratification flights. The stratification process for mule deer and white-tailed deer was based largely on habitat, topography, and local knowledge, as well as observations from the stratification flights. For the intensive survey flights, a minimum of five survey blocks were chosen randomly from each of the low, medium and high strata for moose, mule deer and white-tailed deer.

Intensive survey flights, using a Bell 206B helicopter, began on 1 March with a crew consisting of a pilot, a navigator/observer and 2 full time observers. A second crew joined the intensive survey from 2 – 3 March, also employing a Bell 206B helicopter. North/south lines were flown every 0.170, 0.500, and 0.830 minutes longitude within each survey block resulting in an approximate 400 m line separation. Pilots flew approximately 30 m above the trees and at an average speed of 100 km/h, depending on cover type. Within the settled portions of the WMU, the pilot would increase altitude and/or veer off the transect when approaching houses and domestic livestock (which ever was most appropriate to the circumstances and to adhere to Transport Canada's over flight standards).

All moose, mule deer and white-tailed deer locations were recorded with a GPS. Every attempt was made to sex and age the animals unless forest cover and/or wind prevented safe or confident identification. Animals were classified as adults or calves/fawns based on body size and length of snout; all yearlings were classified as adults. All adult moose were classified as cows if a white vulva patch was present. All adult bulls that still possessed antlers were classified as having small, medium or large antlers (ASRD 2010). Deer with antlers were classified as males and assigned to a size category of small, medium or large (ASRD 2010), while non-antlered deer not attended by a fawn(s) (i.e., does) were left unclassified. We did not correct for sightability; therefore, overall counts should be considered as minimum population estimates and direct comparison of survey results among years may be difficult.

Survey conditions were good throughout the duration of the survey with nearly 30 cm of fresh snow having blanketed the entire WMU on 26 February 2012. Temperatures gradually warmed from -12 degrees Celsius at the beginning of the survey to -2 degrees Celsius by the end of the survey. Winds were light and turbulence was negligible throughout the survey.

6.2.3 *Results*

During the intensive survey, 16 survey blocks were flown for moose (5 low, 5 medium and 6 high) resulting in an estimated moose population ranging from 887 to 1,254 (Table 9). A total of 39 bulls were observed, with 77% having already shed their antlers. Of the 9 carrying antlers, eight were yearlings and one was classified in the medium size class. Population estimates for moose in WMU 336 appear to have remained stable from 2003 to 2012.

During the intensive survey, 16 blocks were flown for mule deer (7 low, 5 medium and 4 high) resulting in an estimated mule deer population ranging from 726 to 1,145 (Table 9). Nearly half of the mule deer went unclassified (43%), as most male deer lacked antlers making sex and age classification particularly difficult. Specifically, only 16 antlered males were observed; 10 yearlings and 6 medium. From the classified portion (57%) of the sampled population, a ratio of 36 bucks per 100 does and 102 fawns per 100 does were observed. However, these demographic ratios must be interpreted cautiously, as the male cohort would be drastically under represented as males with shed antlers were recorded as unclassified. Previous surveys of WMU 336 (line transect surveys) do provide a population and density estimate for mule deer; however, no confidence limits can be derived. In addition, these surveys do not provide demographic or gender metrics and are biased towards river valley habitats. Caution must be taken when comparing these results to the 2012 Gasaway survey.

During the intensive survey, 16 blocks were flown for white-tailed deer (6 low, 6 medium and 4 high) resulting in an estimated white-tailed deer population ranging from 2,485 to 4,099 (Table 9). Nearly half of all white-tailed deer went unclassified (45%), as most male deer lacked antlers making sex and age classification particularly difficult. Specifically, only 12 antlered males were observed; 5 yearlings and 7 medium. From the classified portion (55%) of the sampled population, 7 bucks per 100 does and 118 fawns per 100 does were observed. However, these demographic ratios must be interpreted cautiously, as the male cohort would be drastically under represented as males with shed antlers were recorded as unclassified. Previous surveys of WMU 336 (line transect surveys) do provide a population and density estimate for white-tailed deer; however, no confidence limits can be derived. In addition, these surveys do not provide demographic or gender metrics and are biased towards river valley habitats. Caution must be taken when comparing these results to the 2012 Gasaway survey.

Table 9. Comparison of aerial survey results for moose, mule deer, and white-tailed deer in Wildlife Management Unit 336 from 1982 – 2012.

Species/Year	Population estimate (90% confidence limits)	Animals/km^2	Ratio to 100 Females	
			Males	Juveniles
Moose				
2012[a]	1,071 (±17.2%)	0.41	31	57
2003[a]	1,150 (±16.9%)	0.46	50	57
1993[b]		0.52	53	63
1988[b]		0.51	26	76
1982[b]		0.32	35	79
Mule deer				
2012[a]	936 (±22.4%)	0.36	36	102
1993[b]		0.42	--	--
1988[b]		0.25	--	--
1982[b]		0.15	--	--
White-tailed deer				
2012[a]	3,292 (±24.5%)	1.26	7	118
1993[b]		1.67	--	--
1988[b]		0.72	--	--
1982[b]		0.41	--	--

[a] Survey was flown using the modified Gasaway methodology.

[b] Survey was flown using line transect methodology; population estimates were not derived. Line transect survey data should not be directly compared to Gasaway survey data.

"--" Demographic ratios were not obtained.

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