

YA HA TINDA ELK AVERSIVE CONDITIONING PROJECT SUMMER ELK RANGE SURVEYS 27, 28, 29 July 2007



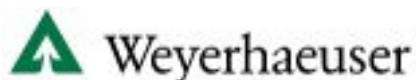
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Prepared for Project Partners



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1.0 INTRODUCTION

In this final year of the Ya Ha Tinda Aversive conditioning project aerial summer range surveys were conducted in cooperation with Dr. Hebblewhite by repeating surveys that were completed in the summers 1977, 1978 and 1979 (Morgantini 1982) and 2003 and 2004 (Hebblewhite 2006). This comparison will help to determine the larger-scale changes in elk distribution associated with this project. These surveys were intended to provide us with several benefits, first they enable us to directly compare and evaluate elk distribution in the summer ranges between the early state when migration occurred with the complete herd (1970's), the stage where the loss of migratory behavior was discovered (2003/04) and after 2-3 years of applying aversive conditioning. Secondly they allow us to monitor elk calf productivity in the summer ranges especially of elk that are exploring new habitat following aversive conditioning treatments. Comparing these early, intermediate and late datasets will be a major tool to assess the effect of aversive conditioning on the complete elk herd after three years of implementing this management tool. Continuing these aerial surveys every 2-3 years were one of the long-term management recommendations stated in Dr. Hebblewhite's PhD Thesis as a tool to monitor long-term population trends.

2.0 METHODS

Aerial survey methods followed closely those described in Morgantini and Hudson (1988), and are described briefly as follows: Elk surveys were flown from 06:00h to 12:00h on days of calm, clear, sunny conditions based out of Ya Ha Tinda Ranch. All major summer ranges identified by radiotelemetry on 78 radiocollared elk were flown in a Bell Jet Ranger 206 at an average ground speed of ~80 - 100 km/hour. Major low elevation summer ranges were systematically searched at an average height above ground level of 100-200m, including Scotch Camp, Tyrell Flats, Scalp Creek Natural Area, the Ya Ha Tinda Ranch, Panther-Dormer Corners, Windy Meadow, Mid Panther Valley, and Hector Lake Meadows. All higher elevation grasslands and meadows were searched by flying at 100- 200m above treeline to afford views of subalpine and alpine areas. Ridge tops were searched in addition to flying treeline. Flight paths were recorded with a Garmin GPS III at sampling intervals of 1 location per 00:30 – 2:00 minutes. Once an elk herd was sighted, one observer scanned for radiocollared animals, while the other observers and pilot circled the elk herd at ~100m AGL obtaining a total and classified count, where possible, following criteria described by Anderson et al. (1998).

2.1 Personnel

On July 27th and 28th Holger Spaedtke , Dr. Mark Hebblewhite and Jesse Whittington participated in the surveys. On July 29th, Dr. Mark Hebblewhite and Jesse Whittington conducted the surveys. Two observers were very experienced (> 500 hours) in conducting aerial surveys

2.2 Data Recording

Once an elk herd was sighted, one observer (MH) scanned for radiocollared animals, while the other observers and pilot circled the elk herd at ~100m AGL obtaining a total and classified count, where possible, following criteria described by (Anderson et al. 1998); note, no efforts to distinguish female yearlings were made. The following ancillary data were recorded for each elk herd sighted:

- 1) Primary and secondary activity (feeding, resting, moving)
- 2) Relative canopy cover class following Hebblewhite (2000), namely 0 – 33% cover, class 0, 33-66% cover, class 1, 66-100% cover, class 2. Cover types were later confirmed using GIS cover layers and Satellite Photos.
- 3) Count confidence was recorded – i.e. if observers were unsure whether all elk were seen or observed, especially calves, then note was made as a class 2 count confidence ('all elk seen' count confidence =1).
- 4) Summer Range area, divided into 3 strata: 1) the areas around the Ya Ha Tinda Ranch including the Ranch, Dogrib ridges, and ridges North and NW of the Ranch, called the Ranch strata, 2) the Front Ranges including Divide, Peters, Condor, Forbidden, Red Deer, Panther, Snow creek areas, and 3) the Main Ranges, including Pipestone, Molar, and Upper Bow River areas.

All other wildlife observations were recorded by identifying species and conducting an overall count (ignoring sex distribution). No locations (or only rough estimates of the location) were recorded, only giving a total estimate of species in the survey area.

2.3 Preliminary Sightability Estimates

Furthermore, in an attempt to understand how sightability affects summer elk counts (Unsworth 1994; Samuel et al. 1987), we collected data on whether we missed radiocollared elk in the survey area following methods in Hebblewhite (2000). One observer (HS) had a general knowledge of where to expect collared elk to be during the surveys, but this knowledge was not passed on to other data recorders. If, after surveying an area where radiocollared elk were previously located no elk were found MH used the aerial telemetry equipment to locate the 'missed' elk. While not as rigorous as methods described by Unsworth (1994) and Samuel et al. (1987), this approach may allow tests of a summer elk sightability model developed elsewhere (Anderson et al. 1998) for BNP.

3.0 RESULTS

A total of 15.3 hours and 1294 km (incl. circling over found groups for identification) were surveyed on July 27th, 28th and 29th during excellent sighting conditions. A total of 238 elk (in 39 different groups) were counted on summer ranges in the survey area, composed of 187 female elk, 27 young of the year and 24 bull elk. Furthermore in 23 (59%) of the 39 different elk groups sighted 1-3 collars were present

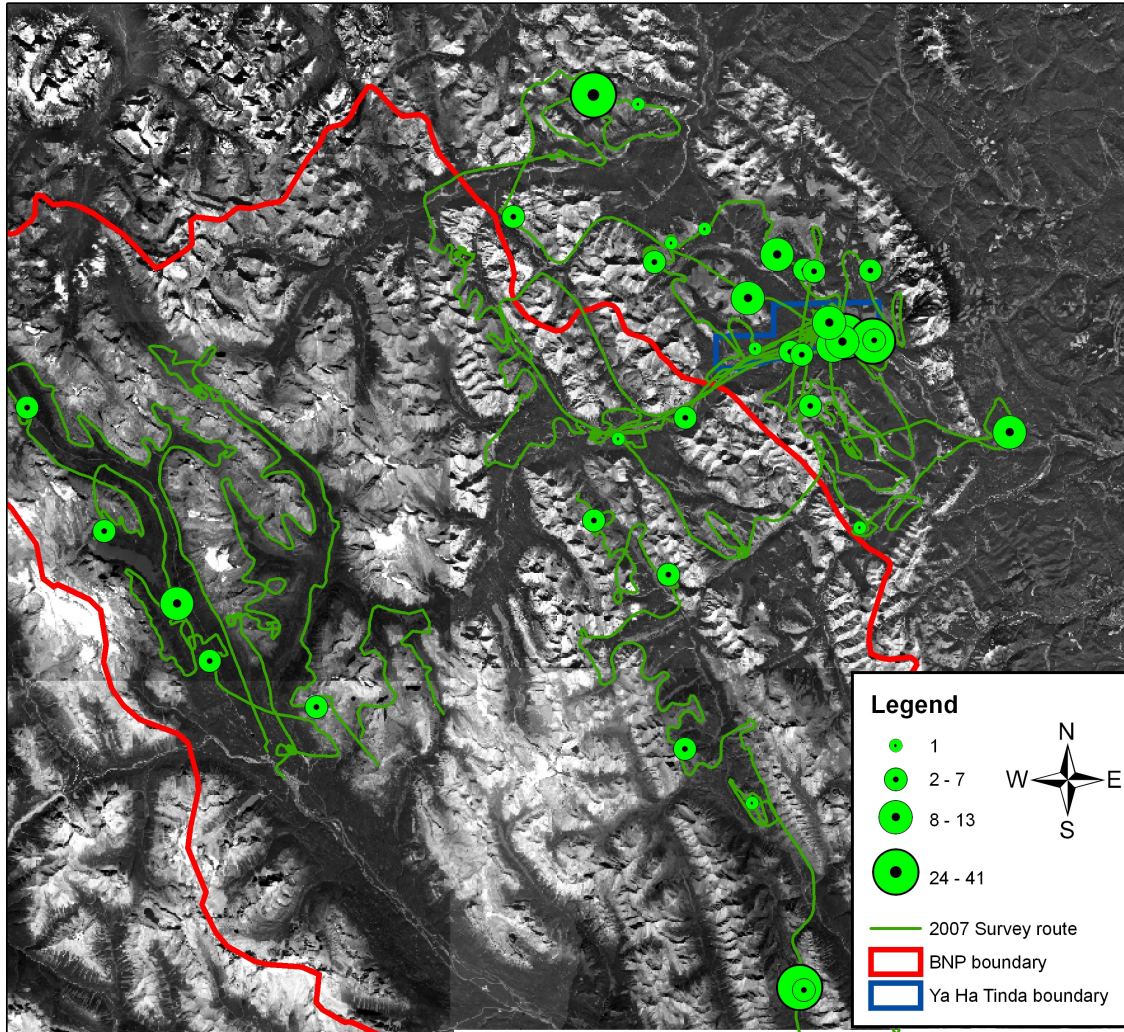


Figure 1: Summary of elk summer range surveys conducted in July 2007. Green dots represent elk groups seen and green line represents the survey route flown.

3.1 1 Elk sex class distribution

Considering only ‘confidence = 1’ observations (98% of all sightings) we calculated calf:cow ratio’s by the three ecological zones, and for the entire study area. Calf:cow %’s ranged from a low of 7% in the areas surrounding the Ranch to 18% in Front Ranges to a high of 44% in the Main Ranges (Table 1).

Table 1: Cow:calf ratios and sex class distributions from reliable sightings where all cows and calves were counted during aerial summer range surveys in July 2003 and July 2007. Numbers in brackets indicate standard errors.

<u>REGION</u>	<u>AGE CLASS</u>	<u>COUNT 2003</u>	<u>COUNT 2007</u>
<u>Ranch</u>	Female	206	91
	Calf	91	6
	Male	3	14
	Yearling male	N/A	4
	Total	300	115
	calf:cow %	0.44 (0.13)	0.07 (0.06)
<u>Main Ranges</u>	Female	77	16
	Calf	15	7
	Male	6	2
	Yearling male	N/A	0
	Total	98	21
	calf:cow %	0.19 (0.10)	0.44 (0.22)
<u>Front Ranges</u>	Female	95	78
	Calf	14	14
	Male	6	3
	Yearling male	N/A	1
	Total	115	96
	calf:cow %	0.14 (0.07)	0.18 (0.10)
<u>Total</u>	Female	378	185
	Calf	120	27
	Male	15	19
	Yearling male	N/A	5
	Total	513	232
	calf:cow %	0.32 (0.06)	0.15 (0.05)

3.2 Preliminary Sightability Application

Clear differences in sightability existed between the three ecological strata areas of the survey. In the Ranch area, 95% of all radiocollared elk were sighted on aerial surveys, compared to 33% of all radiocollared elk in the Front Ranges, and 21% of all elk in the Main Ranges sightability percentages had shown a similar pattern during Hebblewhite's surveys (Ranch = 93%; Front Ranges = 76% and Main Ranges = 31%) (Table 2).

Table 2: Rough sightability estimate based on radiocollared elk missed during summer range surveys in July 2007 and sightability estimates from surveys in 2003

Region	Collared elk seen 2007	Collared elk missed 2007	2007 sightability %	2003 sightability %
Ranch	19	1	95	93
Main ranges	4	3	21	31
Front ranges	6	3	33	76

Using the sightability percentages total elk numbers were adjusted accordingly to achieve a rough estimate of the total elk population (Table 3).

Table 3: Elk numbers observed during 2007 summer range surveys and adjusted elk numbers using both 2003 and 2007 estimates for comparison.

Region	Elk observed 2007	Adjusted using 2003 sightability	Adjusted using 2007 sightability
Ranch	118	127	124
Front Ranges	96	126	291
Main ranges	25	81	119
Total	239	334	534

3.3 Comparison to 2003 survey

Overall elk numbers have decreased by 27% (using sightability corrected data). This trend was most pronounced in the Ranch (63%) and the Main Ranges (53%). The Front Ranges showed the opposite trend with a population increase of 93%. Using actual counts (not corrected) the general trend persists, however a slight decrease (17%) shows in the Front ranges. (Figure 2A/B and Table 4)

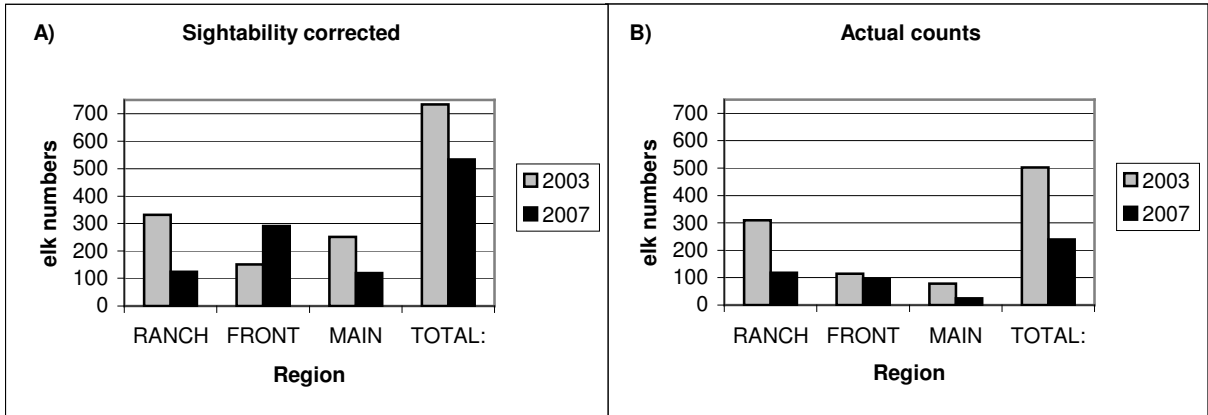


Figure 2A/B: Sightability corrected and actual count data for elk seen during 2003 and 2007 surveys, organized by region.

Table 4: Sightability corrected and actual count data and population decrease percentages between 2003 and 2007 surveys for elk seen during 2003 and 2007 surveys.

	Sightability corrected counts			Actual counts			
	2003	2007	Population decrease %	2003	2007	Population decrease %	
RANCH	332	124.2	62.6	RANCH	309	118	61.8
FRONT	151	290.9	-92.7	FRONT	115	96	16.5
MAIN	251	119.0	52.6	MAIN	78	25	67.9
TOTAL	734	534.2	27.2	TOTAL	502	239	52.4

3.4 Other ungulate observations

Sheep was the most often seen ungulate (second to elk only) followed by deer and horses. Goats and caribou were only seen on 3 occasions and were the least seen ungulate with 5 individuals each. (Table 5)

Table 5: Other ungulate observations made during 2007 elk surveys

Species	# Observed
Sheep	214
Deer	83
Horses	10
Goats	5
Caribou	5

4.0 DISCUSSION

Aerial surveys closely followed 1970's and 2000's surveys, and counted 239 elk across the survey area, representing 38% of the winter elk population (637 elk) counted on January 27 2007 by two independent observers at Ya Ha Tinda. Furthermore, at least 1 collared elk was found in over half of all observed elk groups. The high proportion of sampled groups with collared elk suggests that our survey design adequately sampled the distribution of elk in the survey area. The relatively low sampling proportion of the overall population suggests that in a large area with low population of elk this sampling tool maybe reaching the borderline.

4.1 Calf:cow ratios

Calf:cow ratios differed extremely from previous aerial surveys as well as from ground counts in the two previous years. This may be due to the relatively low counts in combination with bad sightability. This could however indicate a low calf crop in general. Winter calf:cow estimates can be used to evaluate if the trend shown here is correct or due to sampling mistake.

4.2 Sightability correction

The Sightability estimates, calculated based on missed collared animals, have only changed slightly at the Ranch (93% in 2003; 95% in 2007) and in the Main Ranges (31% in 2003; 21% in 2007) but has dropped dramatically in the Front Ranges (76% in 2003; 33% in 2007). The low sightability percentage in the Front Ranges combination with a larger number of smaller elk groups observed suggests that elk may be distributed in smaller subgroups and are thus easier to miss than in previous years. Sightability could also have been influenced by changes in biomass (especially shrubland and tree stand density) or a difference in elk behavior given the slightly later survey date (July 27 – 29 2007 as opposed to July 15-16 2003).

4.3 Comparison to Hebblewhite survey 2003

The general trend of a declining elk population indicated by Hebblewhite's survey from 2003 has continued. The total population decline was, with a decline of 27%, lower than anticipated.

The Ranch grasslands show, with 62%, a decline much larger than the total, which might be connected to the successful application of aversive conditioning treatments in the past three years. More data to support this hypothesis are analyzed to date and will be published soon. Given that sightability was very high in both years at the Ranch we can conclude that sightability issues are not a factor in determining population trends at the ranch. Elk seen at the Ranch behaved differently compared to the years of Hebblewhite's project. Less elk were found in the grasslands, more elk in areas just adjacent to the Ranch.

The Front Ranges show a reverse trend, a population increase compared to 2003 data, using sightability corrected numbers and only a very little decrease (compared to the total decrease) using actual count numbers. These numbers could be based on the fact that conditioned elk have moved away from ranch grasslands into the nearby Front Ranges. Future work with elk movement datasets can help evaluate this hypothesis.

The trend of declining populations has moved west to the Main Ranges where instead of ~250 elk (adjusted for sightability), there are ~120. This is a great difference to previous surveys as Hebblewhite had found the population in the Main Ranges relatively stable compared to Morgantini's surveys in the 1980s. This trend however might be an advantage for caribou survival if the recently discussed elk-wolf-caribou predation hypothesis (Hebblewhite et al. 2007) was true.

4.4 Other wildlife observations

Sheep populations appear to be stable; they were the most seen ungulate after elk. Surprising was the number of deer seen (mostly white tailed deer). The population seems to have increased drastically in the survey area, which follows the trend of the deer populations in the surrounding areas (Jim Mitchell, Sunde Fish and Wildlife, pers. communication)

5.0 LITERATURE CITED

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