



# Survey of Dall's Sheep in the Northern Richardson Mountains: June, 2017

---

Tracy Davison,<sup>1</sup> Kyle Russell<sup>2</sup> and Édouard Bélanger<sup>3</sup>

<sup>1</sup> Department of Environment and Natural Resources

<sup>2</sup> Yukon Government, Department of Environment

<sup>3</sup> Gwich'in Renewable Resources Board

2018

Manuscript Report No. 274

The contents of this paper are the sole responsibility of the authors



## ABSTRACT

An aerial survey of the northern Richardson Mountains' Dall's sheep (*Ovis dalli dalli*) population was conducted between 19 and 22 June, 2017. The survey was conducted by helicopter on high mountain ridges keying in on post lambing habitat. The survey area blocks were established in 1984 and spans the border between the Northwest Territories and Yukon Territory.

A total of 647 sheep were observed, of which 506 were adult sheep and 141 were lambs. Of the adult sheep, 323 were nursery sheep and 183 were rams. This is an increase in the size of the population compared to the last survey in 2014 (496 total sheep).

The average lamb to nursery sheep and ram to nursery sheep ratios for this population were both healthy at 44:100 and 57:100, respectively. It is worth noting however that these ratios varied among survey blocks.

## TABLE OF CONTENTS

ABSTRACT .....	iii
INTRODUCTION.....	1
METHODS.....	3
RESULTS AND DISCUSSION .....	4
ACKNOWLEDGEMENT.....	12
REFERENCES .....	13

## LIST OF FIGURES

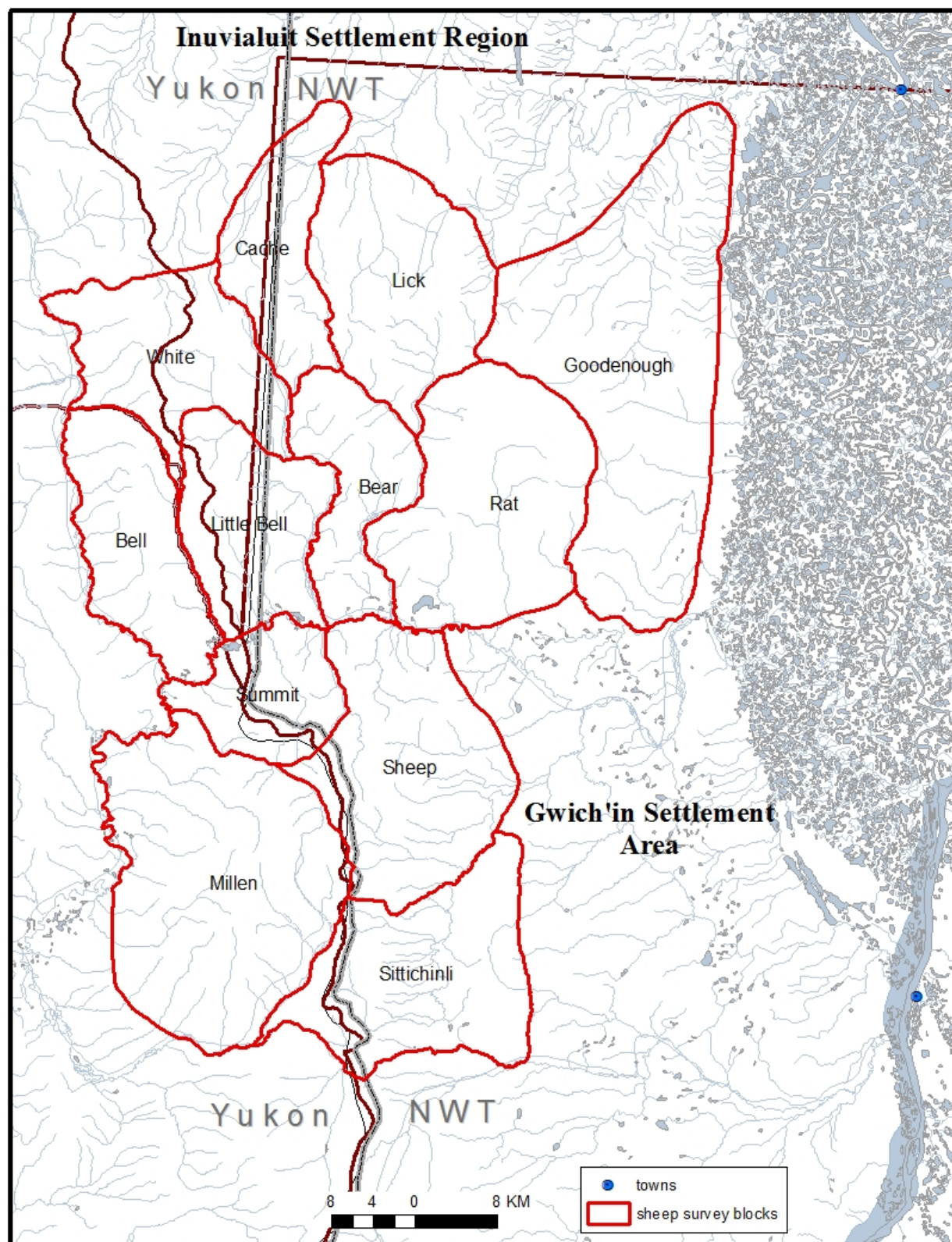
<b>Figure 1.</b> Study area and survey blocks in the northern Richardson Mountains.....	2
<b>Figure 2.</b> Flight lines recorded by GPS during the June 2017 northern Richardson Mountains sheep survey. ....	4
<b>Figure 3.</b> Sheep locations recorded by GPS during the June 2017 northern Richardson Mountain sheep survey.....	5
<b>Figure 4.</b> Sheep population size in the Northern Richardson Mountains Study Area, 1984 to 2017.. ....	7
<b>Figure 5.</b> Total Ram, Nursery Sheep, Lamb and Estimated abundance from surveys between 1984 to 2017.....	8
<b>Figure 6.</b> Lamb to 100 nursery sheep ratio in the northern Richardson Mountains Study Area from 1984 to 2017.....	9
<b>Figure 7.</b> Ram to 100 nursery sheep ratio in the northern Richardson Mountains Study Area from 1984 to 2017.....	10
<b>Figure 8.</b> Observations of non-sheep large mammals during the June 2017 survey. ....	11

## LIST OF TABLES

<b>Table 1.</b> Sheep population composition of the 2017 northern Richardson Mountains survey area by survey block and date surveyed.....	11
---	----

## INTRODUCTION

Dall's sheep in the northern Richardson Mountains are at the northern range of the species. This small, isolated population has high cultural and subsistence value for the Gwich'in and Inuvialuit of the Northwest Territories and the Vuntut Gwitchin of the Yukon. The Yukon Government (YG), the Gwich'in Renewable Resources Board (GRRB), and the Government of the Northwest Territories (GNWT) have surveyed this population since the late 1980s. Surveys using the same survey method have been conducted in June 1984, June 1985, June 1986, August 1991, August 1997, June 2001, August 2003, June 2006, June/July 2010 (summarized in Lambert Koizumi et al. 2011), and June 2014 (Davison and Callaghan 2018). The current study area is shown in Figure 1. The Sittichinli survey block was added in 1997, but no sheep have been observed in this block during surveys conducted since then. During the August 1997 survey, a number of blocks on the west side of the study area, primarily the blocks that are outside the NWT, could not be surveyed because of bad weather. Based on historic distributions, the total population was estimated to be 1573; this is the highest recorded population size (Nagy and Carey 2013). The Dall's sheep population increased from 543 animals in 1984 to 1573 in 1997, a 3-fold increase. Since 1997, the population declined to 496 in 2014 (Davison and Callaghan 2018). This was below the threshold of 500 total sheep set in the draft management plan that calls for voluntary harvest reductions (Working Group for Northern Richardson Mountains Dall's Sheep 2008).



**Figure 1.** Study area and survey blocks in the northern Richardson Mountains.

## METHODS

The survey was conducted post-lambing using an A-star helicopter based out of Inuvik, NWT. The survey blocks (Figure 1) were flown with focus on areas of sheep habitat, especially high ridges. Block names are used for ease of description only. An area outside of the survey blocks, to the north of cache and lick blocks, was surveyed at the request of the Aklavik Hunters and Trappers Committee. Mountains were flown in a counter-clockwise direction. Survey crew consisted of a pilot, an observer/recorder beside the pilot and two observers in the back.

All observations and locations were marked using a hand-held Garmin GPS by the recorder. Sheep were classified as lambs, rams or nursery sheep by the recorder. Nursery sheep include ewes, yearling and young males that usually cannot be distinguished from ewes by air. Rams were classified as  $\frac{1}{4}$ ,  $\frac{1}{2}$ ,  $\frac{3}{4}$ , or full curl based on horn size.

Population total was considered all sheep observed. The number of lambs per 100 nursery sheep and rams per 100 nursery sheep were also calculated. Data were summarized by blocks to compare the distribution of sheep between surveys, and to explore localized changes in the population. Growth rate ( $\lambda$ ) was calculated using the same formula as Lambert Koizumi et al (2011):

$$\lambda = \left( \frac{N_{t+T}}{N_t} \right)^{\frac{1}{T}}$$

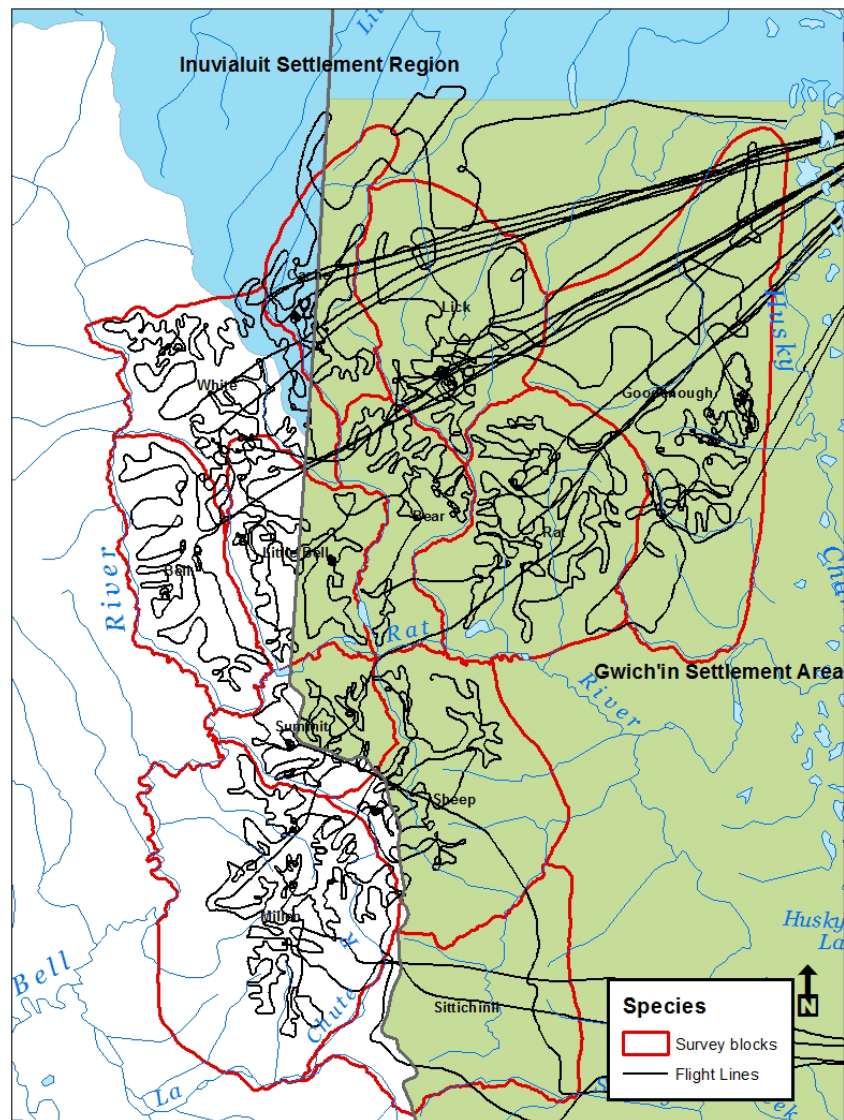
A value of 1 for  $\lambda$  indicates a stable population, where above 1 indicates a growing population and below 1 a declining population.

Sightings of other wildlife including grizzly bears (*Ursus arctos*), wolves (*Canis lupus*), caribou (*Rangier tarandus*), moose (*Alces americanus*), and muskoxen (*Ovibos moschatus*) were also recorded.



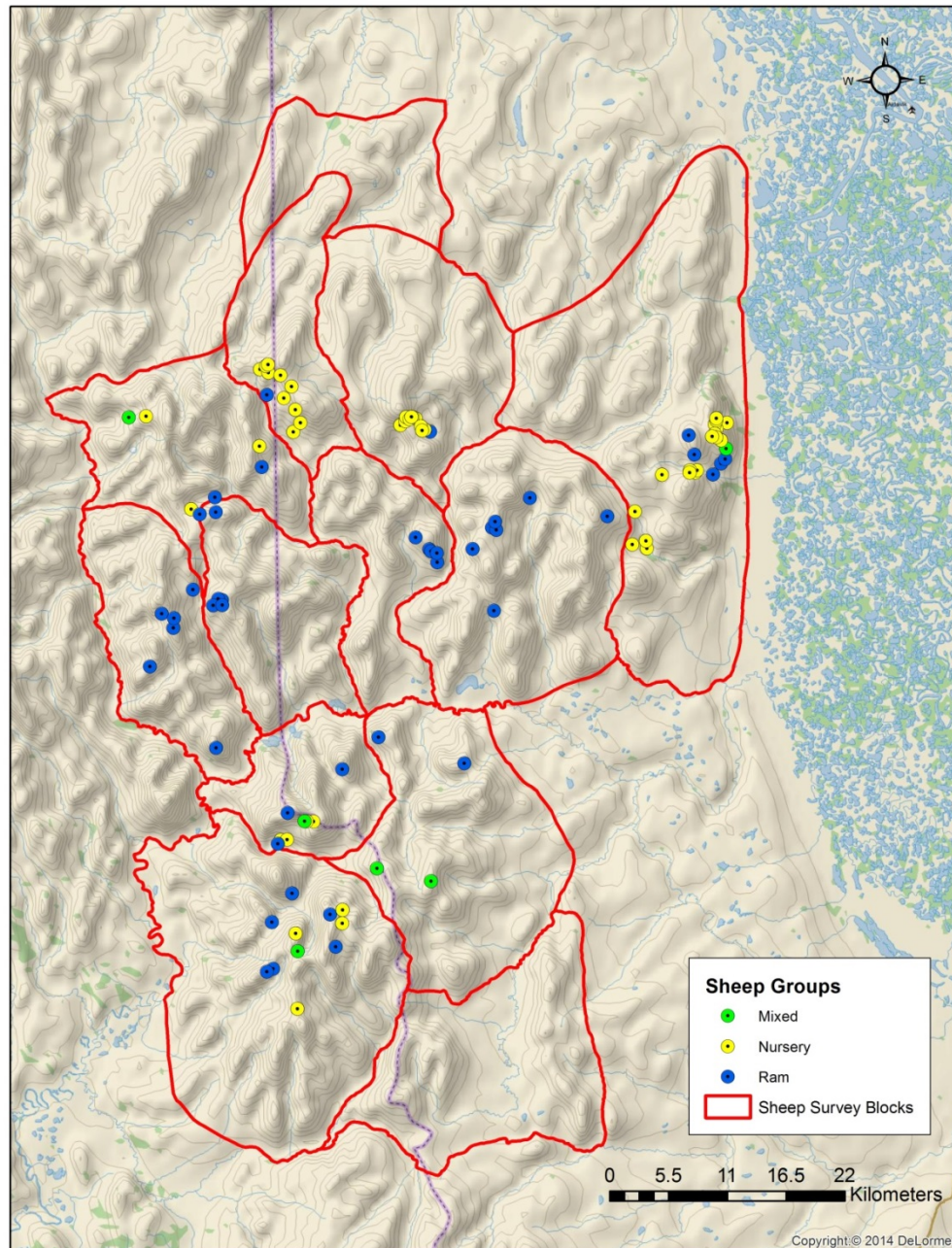
## RESULTS AND DISCUSSION

The survey was flown between June 19<sup>th</sup> to 22<sup>nd</sup>, 2017. There were no survey delays due to weather, although some adjustments in daily flights were made to account localized weather patterns and ensure blocks were surveyed with good visibility. Total flight time was 29.9 hours including ferry time, and flight lines are shown in Figure 2.



**Figure 2.** Flight lines recorded by global positioning system (GPS) during the June 2017 northern Richardson Mountains sheep survey.

A total of 647 sheep were observed: 323 nursery sheep (ewes, yearlings, young rams), 141 lambs, and 183 rams. The location of sheep observations is shown in Figure 3 and a breakdown of the number of sheep per block is reported in Table 1.

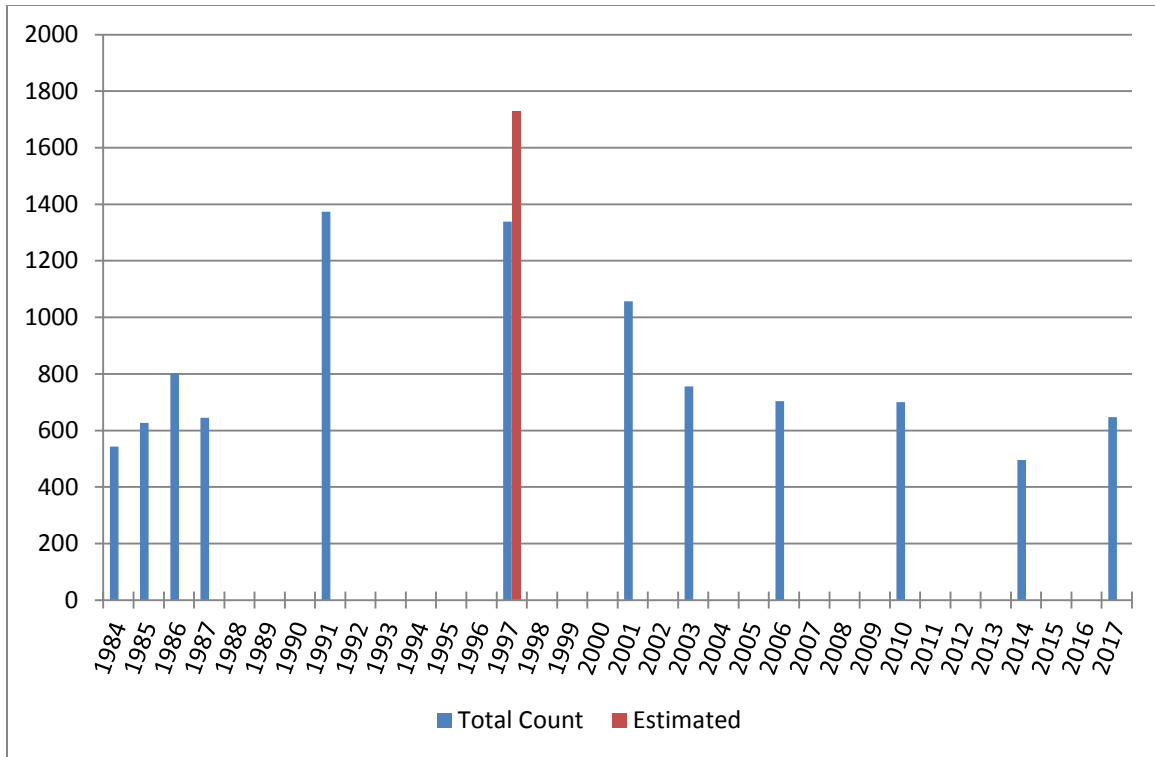


**Figure 3.** Sheep locations recorded by GPS during the June 2017 northern Richardson Mountains sheep survey. Locations have been separated into ram or nursery/mixed group. Mixed groups are groups that had both nursery sheep and mature rams intermingled.

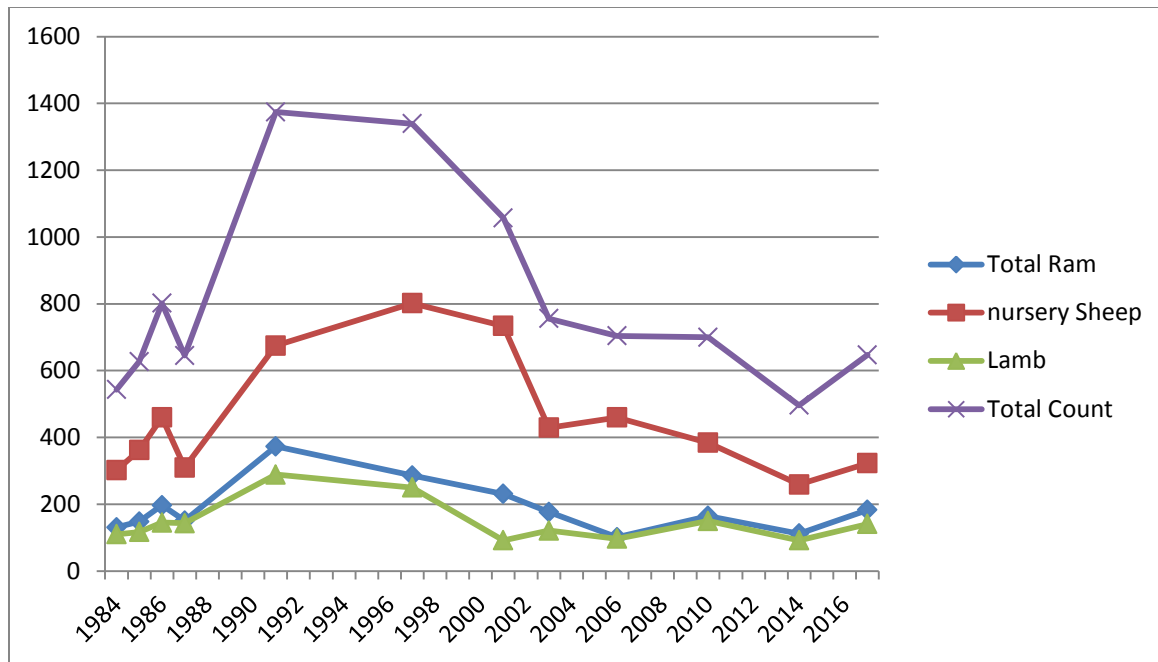
**Table 1.** Sheep population composition of the 2017 northern Richardson Mountains survey area by survey block and date surveyed.

Date Surveyed	Block	Total Ram	Nursery	Total Adult	Lamb	Total Sheep
June 19	White	5	63	68	37	<b>105</b>
June 19, 20	Bear	9	0	9	0	<b>9</b>
June 19	Cache	4	44	48	23	<b>71</b>
June 22	Lick	5	33	38	8	<b>46</b>
June 20	Little Bell	37	0	37	0	<b>37</b>
June 21	Millen	26	42	68	21	<b>89</b>
June 20	Rat	29	0	29	0	<b>29</b>
June 21	Summit	16	20	36	6	<b>42</b>
June 22	Goodenough	36	100	136	36	<b>172</b>
June 20	Bell	8	0	8	0	<b>8</b>
June 21	Sheep	8	21	29	10	<b>39</b>
June 21	Sittichinli	0	0	0	0	<b>0</b>
<b>TOTAL</b>		<b>183</b>	<b>323</b>	<b>506</b>	<b>141</b>	<b>647</b>

The 2014 population count of sheep in the northern Richardson Mountains was 496 sheep. The grown rate ( $\lambda$ ) was 1.09 between the 2014 and 2017, indicating a growing population. Between 2010 and 2014 indicated a declining population ( $\lambda = 0.92$ ) after being stable between 2006 and 2010 ( $\lambda = 1.00$ ). The growth rate for this population of sheep has varied between 0.73 and 1.28 since 1984. The population size over time is shown in Figure 4. Figure 5 shows changes in ram, nursery sheep and lambs over time.

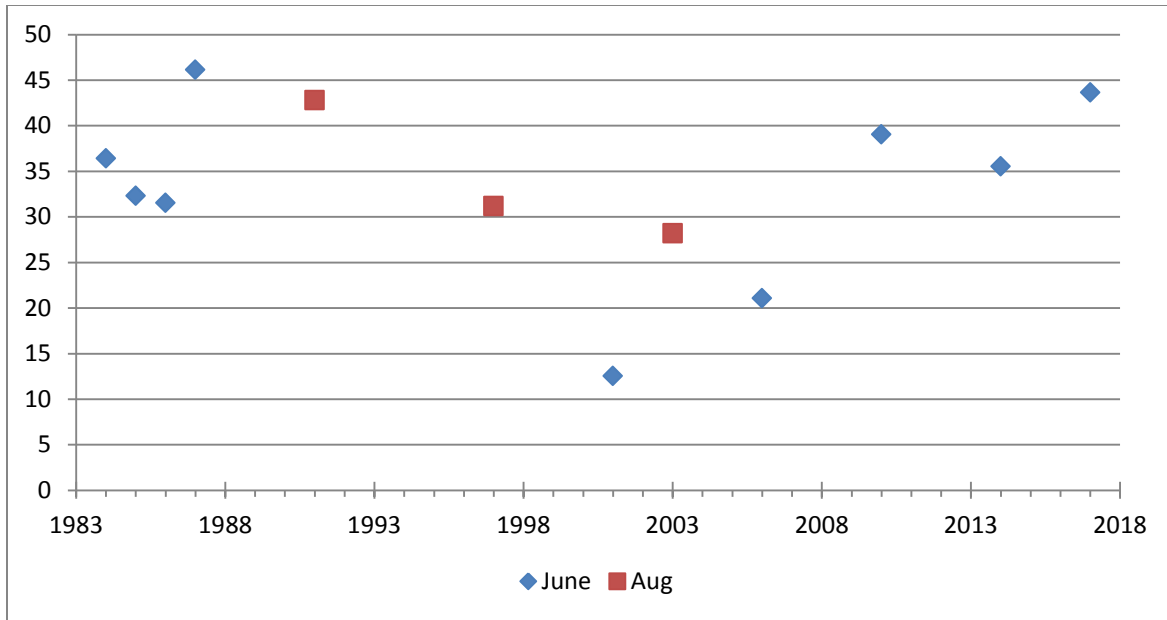


**Figure 4.** Sheep population size in the Northern Richardson Mountains Study Area, 1984 to 2017. In 1997 not all areas could be surveyed; estimated population size accounts for areas missed (Lambert Koizumi et al. 2011).



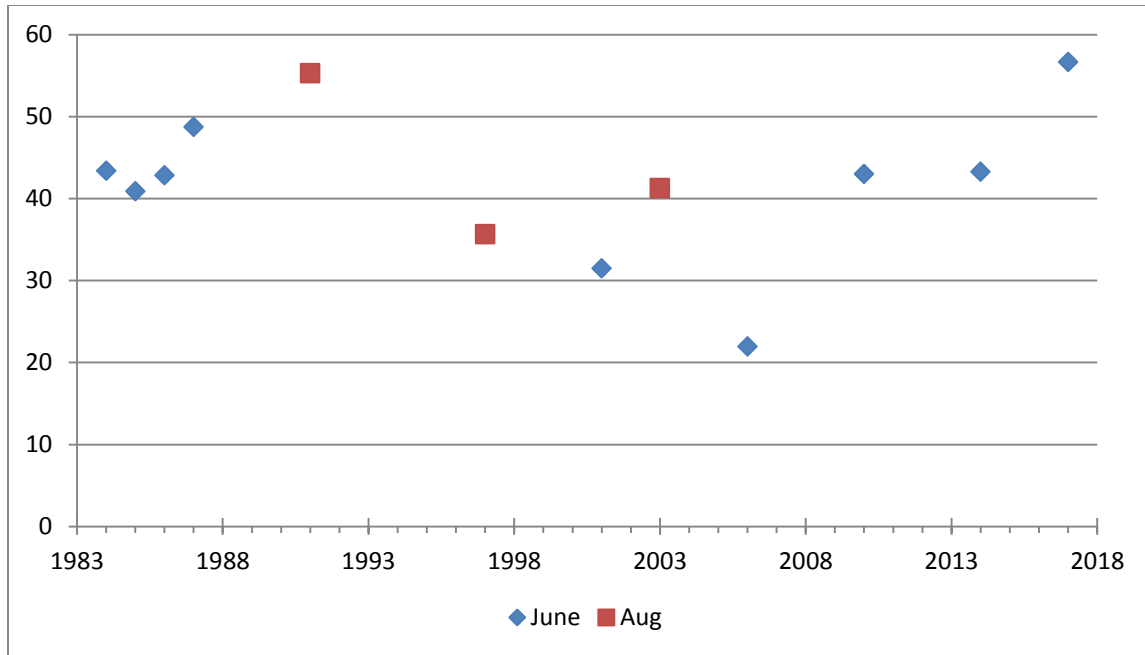
**Figure 5.** Total Ram, Nursery Sheep, Lamb and Estimated abundance from surveys between 1984 to 2017 in the northern Richardson Mountains. In 1997 not all areas could be surveyed. (1984 to 2006 summarized in Lambert Koizumi et al. 2011).

For the entire survey area, 44 lambs per 100 nursery sheep were observed. The number of lambs per 100 nursery sheep was higher in this survey than in 2010 or 2014, with 39.1 and 35.5 lambs per 100 nursery sheep found, respectively. The number of lambs per 100 nursery sheep observed during each survey between 1984 and this survey is shown in Figure 6. The lamb ratio found in this survey is among the highest recorded for this population; landing between the 46.1 ratio in 1987 and 42.8 ratio in 1991, during a period of growth for this population.



**Figure 6.** Lamb to 100 nursery sheep ratio in the northern Richardson Mountains Study Area from 1984 to 2017 (1984 to 2006 summarized in Lambert Koizumi et al. 2011).

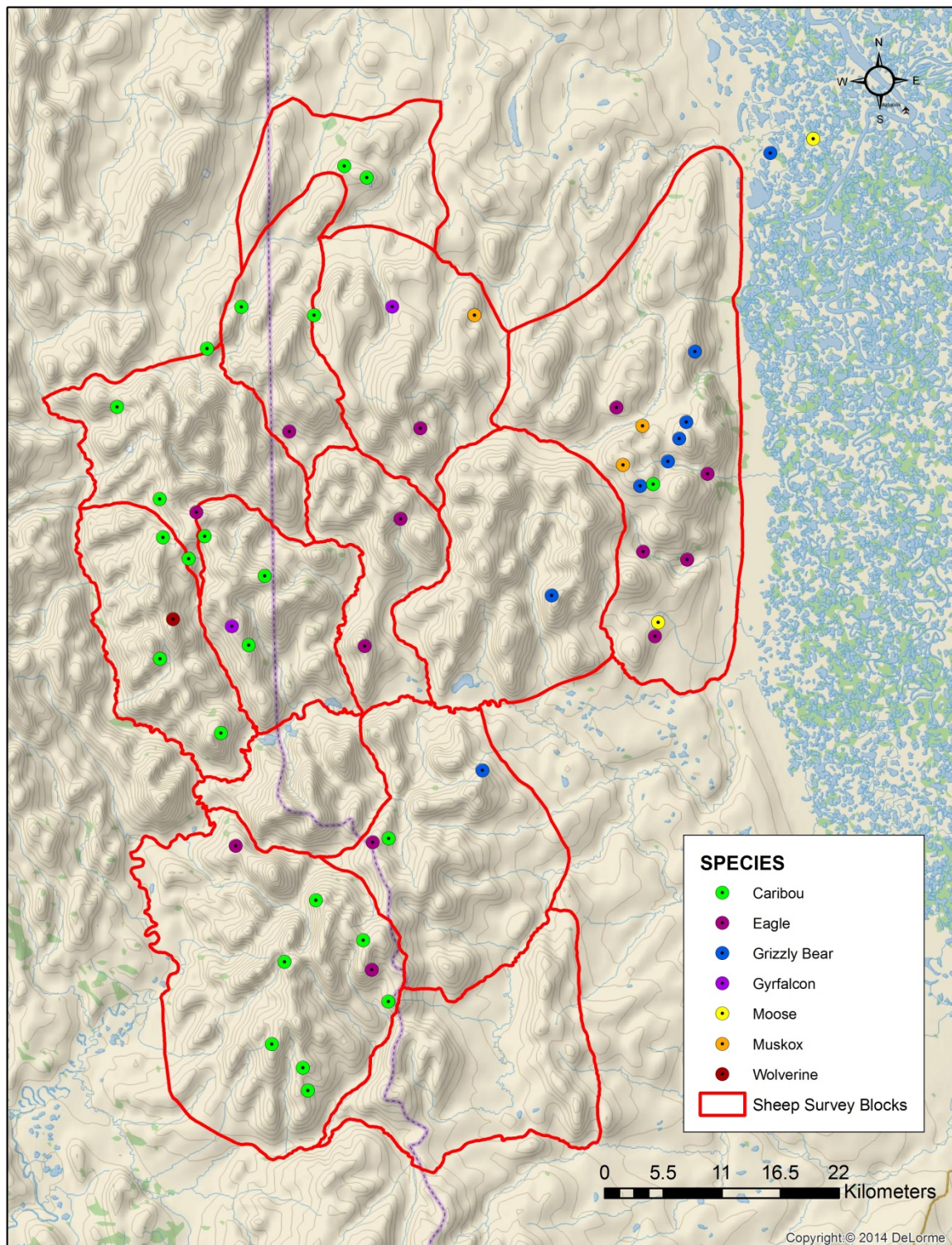
For the survey area, 57 rams per 100 nursery sheep were observed. This is higher than the ratio in 2014 when there were 43.2 rams per 100 nursery sheep. These values are within the range recorded in this population in other surveys (Lambert Koizumi et al. 2011). The number of rams per 100 nursery sheep observed during each survey between 1984 and this survey is shown in Figure 7. A ratio of 40 to 60 rams per 100 nursery sheep is considered normal and would not be considered as a management concern (Yukon Renewable Resources 1996).



**Figure 7.** Ram to 100 nursery sheep ratio in the northern Richardson Mountains Study Area from 1984 to 2017 (1984 to 2006 summarized in Lambert Koizumi et al. 2011).

Other wildlife observed during the flights included 29 muskox (including 2 calves), 11 grizzly bears (including 2 cubs), 2 bull moose, 2 wolverine, and approximately 400 caribou (Figure 8). No wolves were observed.





**Figure 8.** Observations of non-sheep large mammals during the June 2017 survey.



## **ACKNOWLEDGEMENTS**

Daniel Benlert (Canadian helicopters) safely piloted the helicopter for this survey. We would like to thank Jim Kay (Ehdiitat RRC), and Peter Archie (Aklavik HTC) for assisting in the survey locating sheep.

## LITERATURE CITED

- Barichello, N., J. Carey, K. Jingfors. 1987. Population ecology, range use and movement patterns of Dall sheep (*Ovis dalli dalli*) in the Northern Richardson Mountains. Northern Oil and Gas Action Program (NOGAP) Project G-14. Yukon Fish and Wildlife Branch Report TR-87-1. Whitehorse, Yukon, Canada.
- Davison, T. and K. Callaghan. 2018. Survey of Dall's Sheep in the Northern Richardson Mountains: June, 2014. Environment and Natural Resources, Government of the Northwest Territories. Manuscript report.
- Lambert Koizumi, C., J. Carey, M. Branigan, and K. Callaghan. 2011. Status of Dall's sheep (*Ovis dalli dalli*) in the Northern Richardson Mountains. Yukon Fish and Wildlife Branch Report TRC-11-01. Whitehorse, Yukon, Canada. [www.env.gov.yk.ca/publications-maps/documents/dalls\\_sheep\\_richardson\\_status\\_report\\_2011.pdf](http://www.env.gov.yk.ca/publications-maps/documents/dalls_sheep_richardson_status_report_2011.pdf)
- Nagy, J. A., and J. Carey. 2013 Distribution and Abundance of Dall's sheep in the Richardson Mountains, August 1997. Government of the Northwest Territories. Manuscript report 235. 31 pp.
- Working Group for Northern Richardson Mountains Dall's Sheep. 2008. Management Plan for Dall's Sheep in the Northern Richardson Mountains: 2008-2013 (Draft). Retrieved 31 October 2017 from [www.env.gov.yk.ca/publications-maps/documents/N-Richardson\\_Sheep\\_Mgmt\\_Plan\\_DRAFT\\_2008.pdf](http://www.env.gov.yk.ca/publications-maps/documents/N-Richardson_Sheep_Mgmt_Plan_DRAFT_2008.pdf)
- [www.enr.gov.yk.ca/publications-maps/documents/dalls\\_sheep\\_richardson\\_status\\_report\\_2011.pdf](http://www.enr.gov.yk.ca/publications-maps/documents/dalls_sheep_richardson_status_report_2011.pdf)
- [www.enr.gov.yk.ca/publications-maps/documents/N-Richardson\\_Sheep\\_Mgmt\\_Plan\\_DRAFT\\_2008.pdf](http://www.enr.gov.yk.ca/publications-maps/documents/N-Richardson_Sheep_Mgmt_Plan_DRAFT_2008.pdf)
- Yukon Renewable Resources. 1996. Sheep Management Guidelines: July 1996. Retrieved 3 October 2017 from [www.env.gov.yk.ca/publications-maps/documents/SheepManagementGuidelinesJuly1996.pdf](http://www.env.gov.yk.ca/publications-maps/documents/SheepManagementGuidelinesJuly1996.pdf)