

Aerial Survey of  
Muskoxen (*Ovibos moschatus*)  
in the Mainland of the  
Inuvialuit Settlement Region,  
March 2009

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## ABSTRACT

In March 2009, the mainland portion of the Inuvialuit Settlement Region (ISR), east of the Mackenzie Delta, was surveyed by a small fixed-wing aircraft using a strip transect method. The population estimate for non-calf muskox (*Ovibos moschatus*) was  $2,855 \pm 1,356$ , a significant increase from the 2002 survey. There has been a shift in March distribution of muskox from past surveys.

## TABLE OF CONTENTS

ABSTRACT .....	iii
LIST OF FIGURES.....	iv
LIST OF TABLES.....	iv
INTRODUCTION.....	1
METHODS .....	2
RESULTS.....	4
DISCUSSION.....	7
ACKNOWLEDGEMENTS .....	9
LITERATURE CITED .....	10

## LIST OF FIGURES

<b>Figure 1.</b> Survey blocks and flight lines .....	2
<b>Figure 2.</b> Observations of muskoxen on transect and off transect.....	4
<b>Figure 3.</b> Other wildlife observations.....	6
<b>Figure 4.</b> Historical surveys and muskoxen observed by survey (adapted from Nagy et al. 2013).....	8

## LIST OF TABLES

<b>Table 1.</b> Results of the 2009 survey by block.....	5
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## INTRODUCTION

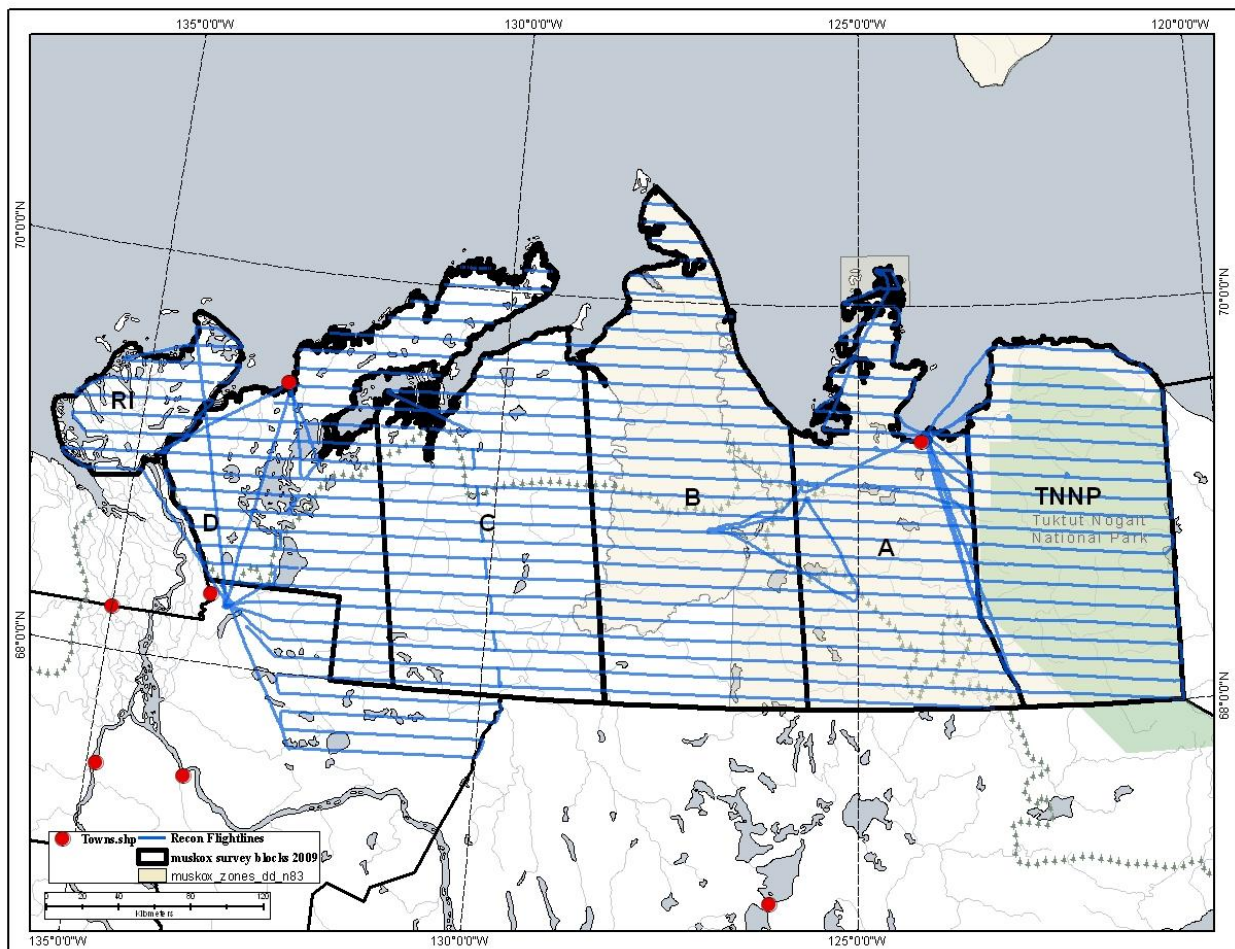
Muskoxen in the NWT (*Ovibos moschatus*) drastically declined in the late 19<sup>th</sup> century leading to legislative protection in 1917. Muskoxen numbers later increased and recolonized their historical range (Barr 1991). The study area for this survey was the mainland portion of the Inuvialuit Settlement Region (ISR) east of the Mackenzie Delta. The previous population estimate of the main portion of our survey area was conducted in 2002. The results of that survey showed a decline of muskoxen in the area since 1980 (Nagy et al 2013).

Muskoxen to the east of our survey area between Bluenose Lake and the Coppermine River, in Nunavut, had declined between 1987 and 1994 but the estimate for the area in 2007 was similar to 1994 (Dumond 2007). Dumond (2007) suggested there was a continued decline after the 1994 survey with a subsequent increase in population by 2007 survey, making the population appear stable between 1994 and 2007.

A population survey of muskoxen was conducted over the mainland portion of the ISR east of the delta in March 2009. The survey was done in conjunction with a distribution survey for barren ground caribou (Davison et al. 2014). The 2009 survey was conducted to determine trend in the population of muskoxen in the area, and document muskoxen distribution during late winter.

## METHODS

The survey area (Figure 1) was divided into six blocks adapted from the 2002 survey. Survey lines were spaced ten km apart, for 10% coverage of the survey area. Flight lines were flown with a Helio Courier or Cesena 206 fixed-wing aircraft. Survey crews were made up of a pilot, recorder and two observers. Observers were seated on each side of the aircraft and muskoxen within a 500 m strip on each side of the aircraft were considered on transect. The strip width was marked by flying at survey altitude over a measured 500 m distant on the ground and marking the aircraft windows. Survey was flown at an altitude of 110 m and average speed of 160 kph.



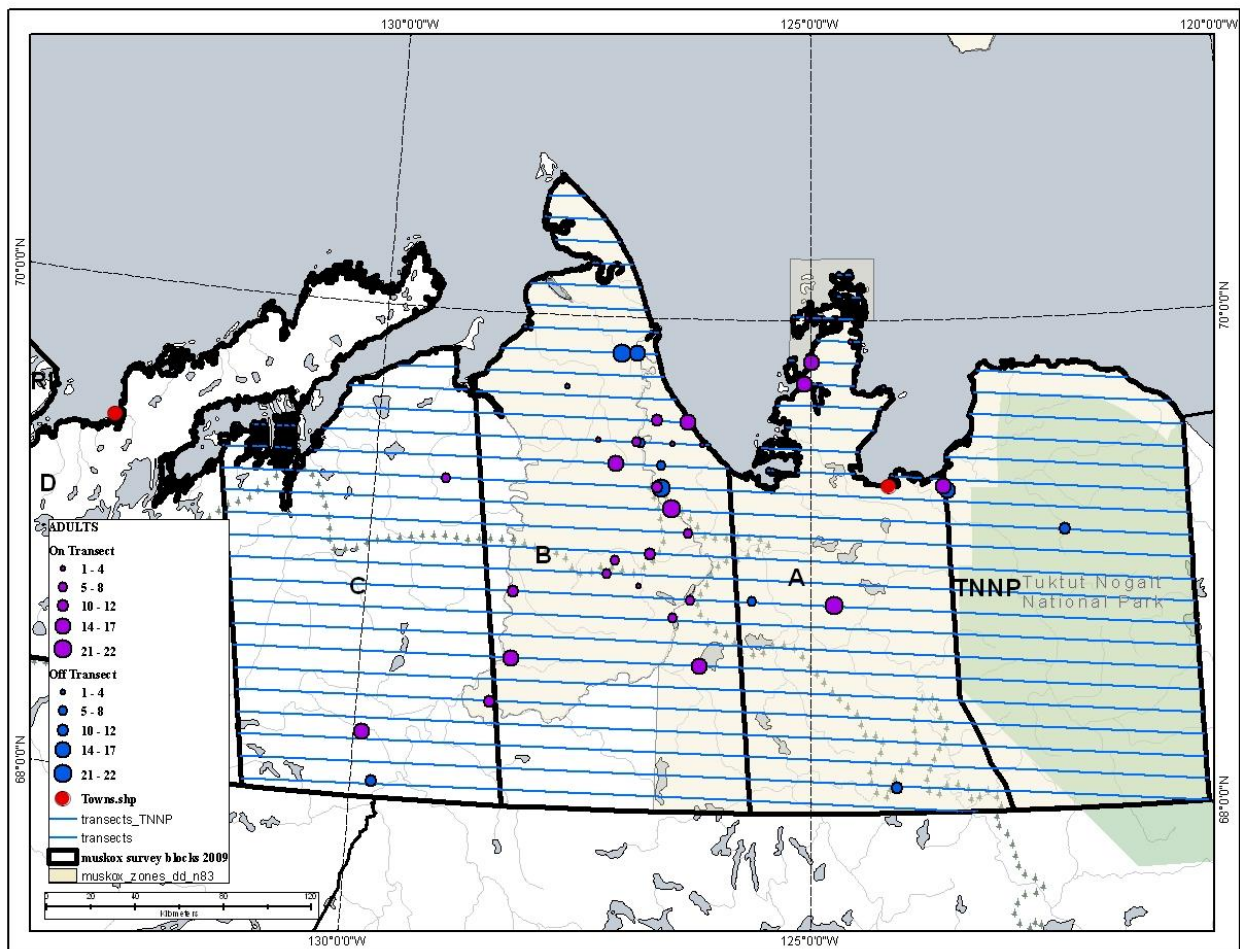
**Figure 1.** Survey blocks and flight lines.

The recorder marked every observation using a GPS and flight lines were also collected using the GPS. Muskoxen on transect were classified as adult and calves. All other wildlife sightings were also recorded.

Population estimates for adult muskoxen were calculated using a ratio method for unequal-sized units sampled without replacement (Krebs 1999, Ecological Methodology, Version 7.0). Population estimates are only calculated for the adults because of the high variability of yearly productivity and higher mortality rate of animals in their first year. This is consistent with historic population estimates allowing trend determinations. A two-tailed t-test was used to determine if the population estimates of adult muskoxen were significantly different than the 2002 estimates (Gasaway 1986).

## RESULTS

The survey was conducted between March 9<sup>th</sup> and 23<sup>rd</sup>, 2009. Flight time for the survey, including ferrying, totalled 125.6 hours (Figure 1). There were no muskoxen observed in the survey areas of Richard Island (RI) or Tuktoyaktuk Peninsula-Husky Lake (D), so these are not included in the total population results (Figure 2). Total population estimate for areas Tuktut Nogait National Park (TNNP), A, B and C was  $2,855 \pm 1356$  (Table 1).



**Figure 2.** Observations of muskoxen on transect and off transect.



**Table 1.** Results of the 2009 survey by block.

<b>Block</b>	<b>TNNP</b>	<b>A</b>	<b>B</b>	<b>C</b>	<b>Total</b>
<b>Description</b>	<b>Tuktut Nogait National Park</b>	<b>Paulatuk</b>	<b>Cape Bathurst</b>	<b>South of Husky Lakes</b>	
Area (km <sup>2</sup> )	17,892.36	25,180.40	20,812.13	20,495.70	84,380.60
Number of transects	25	28	20	20	93
Number of possible transects	243	287	200	200	930
% transects sampled	10.29	9.76	10.00	10.00	10
% total area	10.03	9.91	9.93	10.07	9.98
Number on	61	173	32	15	281
Number off	15	80	11	27	133
<b>Population Total</b>	<b>647</b>	<b>1,746</b>	<b>322</b>	<b>149</b>	<b>2,855</b>
SE	295.94	539.94	268.44	141.84	683.88
95% CI	610.62	1,107.97	561.85	296.87	1,356.83
2002 estimate $\pm$ 95% CI (Nagy et al 2013)	150 $\pm$ 183	264 $\pm$ 193	801 $\pm$ 454	Not applicable	1,215 $\pm$ 526

All other animal observations, not including caribou which was reported separately (Davison et al. 2014), are shown in Figure 3. There were no wolves seen during this survey and no wolves seen during the 2002 survey (Nagy et al. 2013).

The total population in the study area has significantly increased since the 2002 population estimate of 1,215 $\pm$ 526 ( $t^2=2.243$ ,  $DF=42$ ,  $p>0.05$ ), which was the lowest population estimate for the area (Nagy et al. 2013).

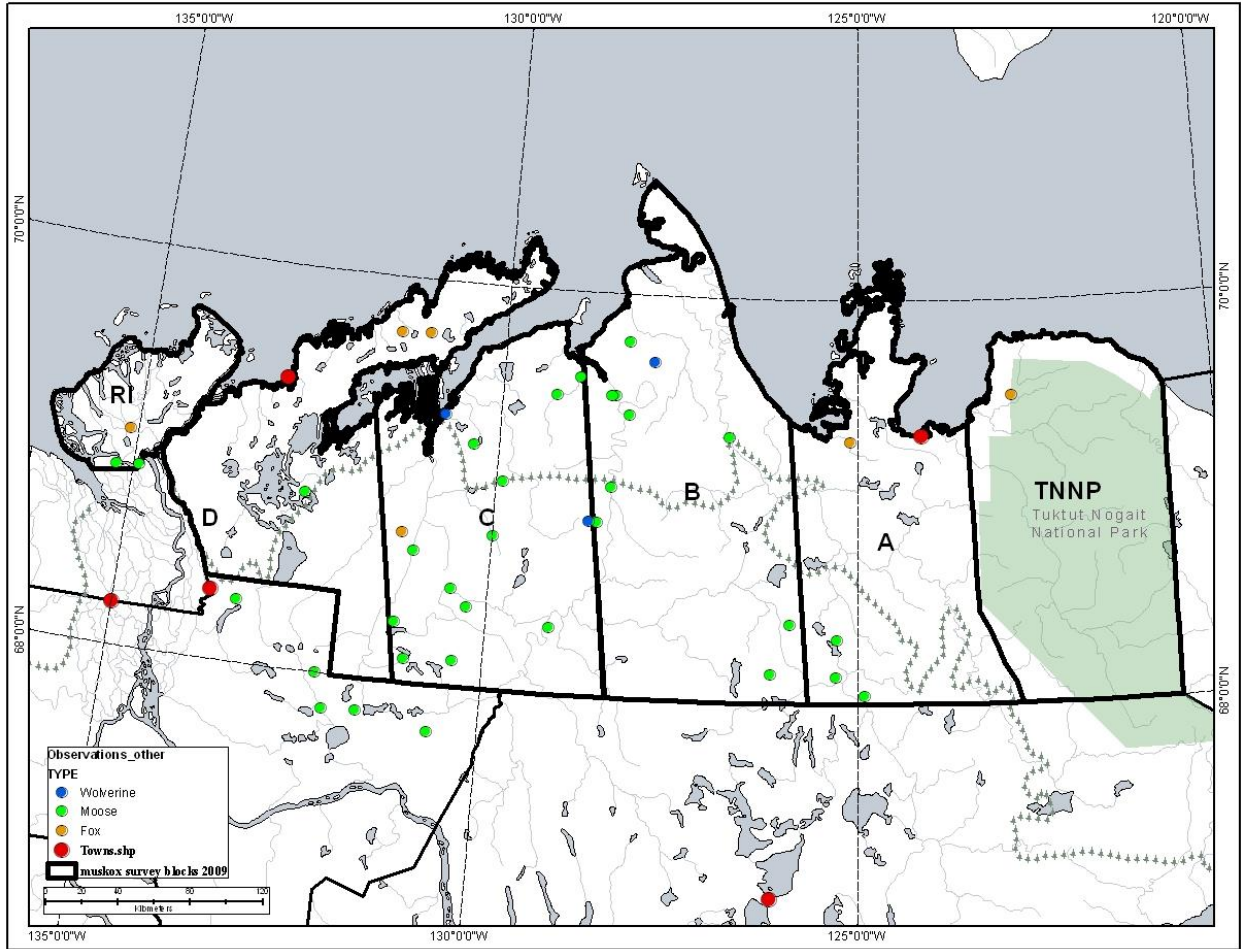
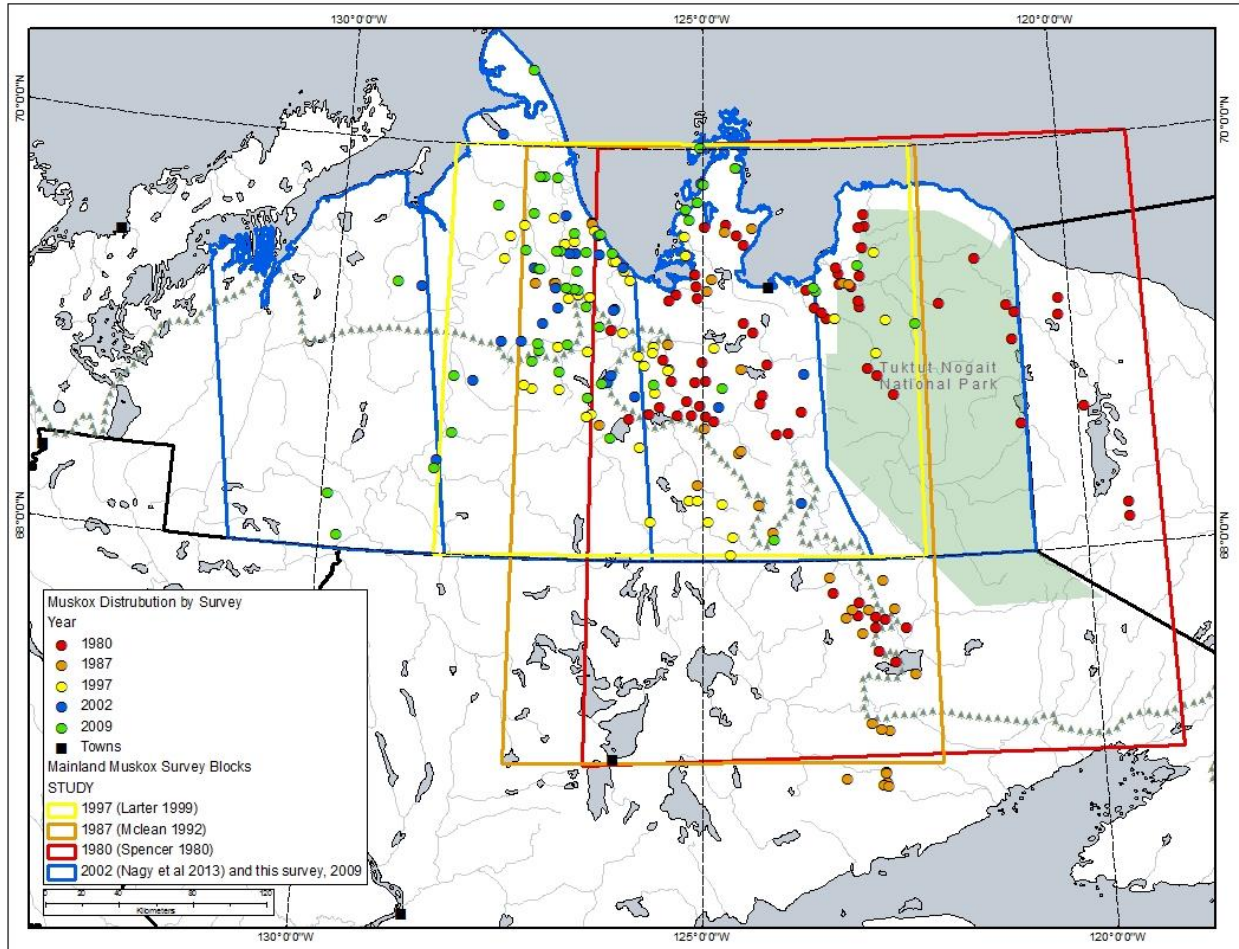


Figure 3. Other wildlife observations.

## DISCUSSION

The 2002 population estimate for TNNP was  $150 \pm 183$ . Results in 2002 for blocks A, and B were  $264 \pm 193$ , and  $801 \pm 454$ , respectively. There was no population estimate of muskoxen in block C in 2002 (Figure 3). The 2002 survey only observed two muskoxen, off transect, in Block C and they were near the east edge of the block (Nagy et al. 2013).

There appears to be a continued change of distribution of muskoxen compared to previous surveys, as previously discussed by Nagy et al. (2013). This survey included areas further to the west than previous surveys, including block D and RI where no muskoxen were observed. The groups of muskoxen seen in Block C in 2009 were farther west and larger in size than 2002 and a larger proportion of animals are now seen in area B and C. We believe there seems to be a continued shift of muskox to the west (Figure 4 - adapted from Nagy et al 2013).



**Figure 4.** Historical surveys and muskoxen observed by survey (adapted from Nagy et al. 2013).

Distribution of muskoxen in the ISR is of interest because a change in distribution towards the west likely increases the likelihood of interactions with the western North Slope muskoxen population. The North Slope muskoxen were introduced from Greenland to Alaska in 1969 and 1970, and have since expanded their distribution into the Yukon and recently the NWT. These muskoxen are the Arctic island subspecies *Ovibos moschatus wardi* and not the continental sub-species *Ovibos moschatus moschatus* found in this survey area (Jingfors and Klein 1982, Gunn 1983, Lent 1999). There are serious concerns about different parasites and diseases between the two groups of muskoxen (Cooley et al. 2011).

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