



December 19, 2022



Muskox distribution and abundance of Central Kitikmeot Group, MX11

Background

- Established in 2015, MX11 is a new muskox management unit that need to be survey.
- 2013 Survey western section of the management units, 6,746 muskoxen
- Muskox are currently used as an alternative species to promote food security in Western Kitikmeot.
- Current TAH of 225 based on an approximation of 7,500 muskoxen in MX11.

Objectives

The main goal of this study is to foremost determine the muskox population Estimate in the muskox management unit, MX-11.

In addition, the survey will allow to identify area of high and low muskox density.





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Method, Aerial Survey

Line-transect sampling survey, random systematic sampling which implied a *random distribution*

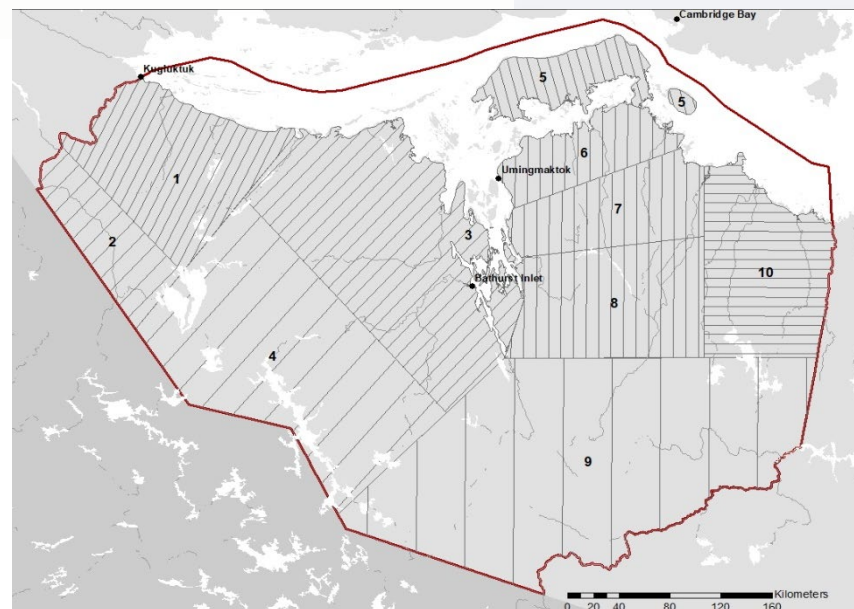
Double-observer platform, independent set up (no auditory/visual clue)

Distances binned at 200; 400; 600; 1,000; and 1,500 m

2 Twin-Otters: 400 feet, 160 km/hr

Table1: Summary of the muskox management unit MX-11 survey design, number of transects allocated in each stratum, and respective planned survey effort.

Stratum	Name	Area (km ²)	Samplers	Distance Between Transect (km)	Transect Length (km)	On Effort Track length(km)
1	HD_West	15,045	21	8	2,333	1,890
2	LD_West	7,080	11	13	798	534
3	MD_Central	28,257	25	10	3,527	2,843
4	LD_Central	29,945	10	23	1,700	1,278
5	HD_East_N	5,555	20	8	1,143	709
6	LD_East	6,530	15	10	964	656
7	MD_East_N	9,275	16	10	1,241	935
8	MD_East_S	14,136	16	10	1,775	1,446
9	LD_East_2	48,232	10	39	2,016	1,250
10	HD_East	14,012	22	8	2,127	1,749
---	-----	178,058	166	----	17,164	13,801



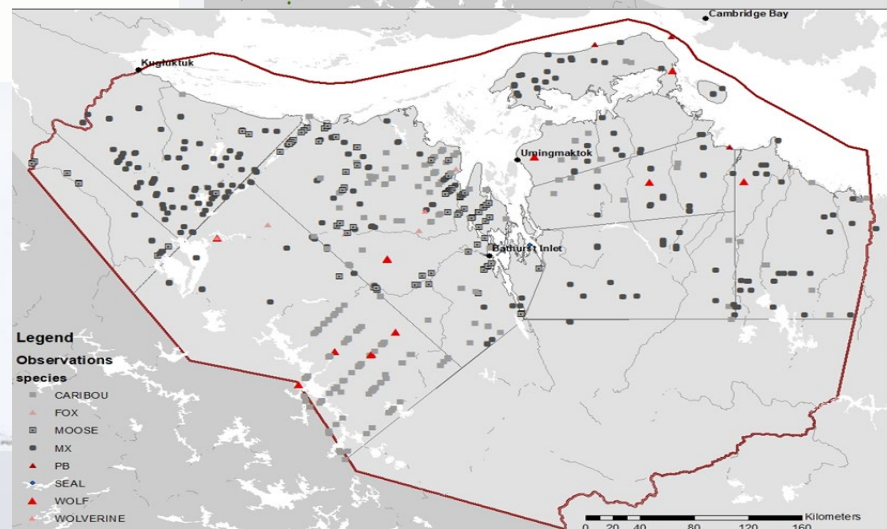
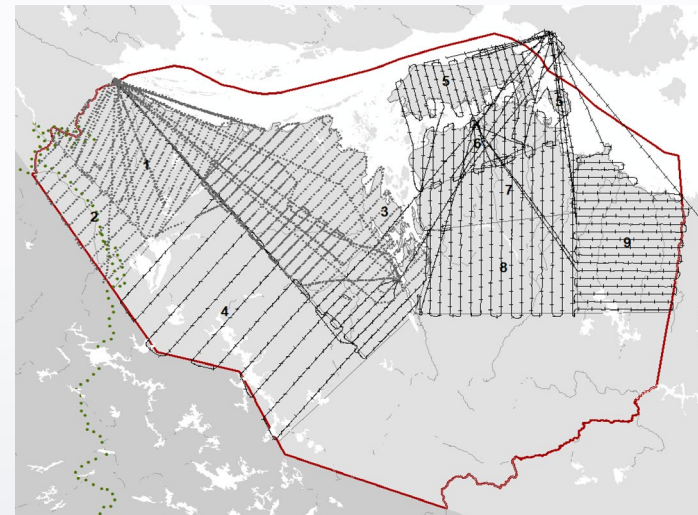


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Results

Completed between March 14 and March 27, 2022

Couldn't complete strata 9 (low priority); Covid-19, weather, Budget





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Observer bias

15 observers (data recorders excluded)-
preclude to model observers as covariates

Many observer focused on the last
bin/horizon

Most observers missed on average 30% of
the groups by the other observer.

Many of the large groups where detected by
only one observer

Average group size ~17 animals

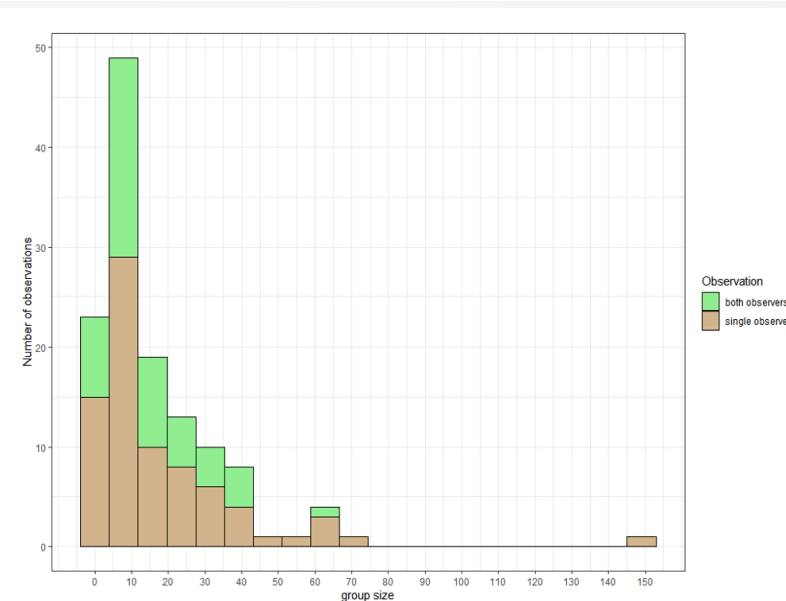
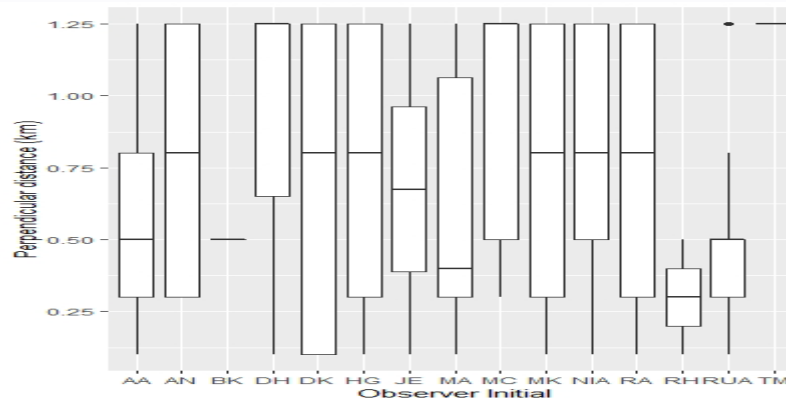


Figure 3: Distribution of group sizes.



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Results (Mark-recapture and distance analysis)

Plot of detection function predictions (red dots) and histograms of detections functions for the two levels of visibility. Observations from the outer-most bin were reduced when visibility from this further bin was obscured.

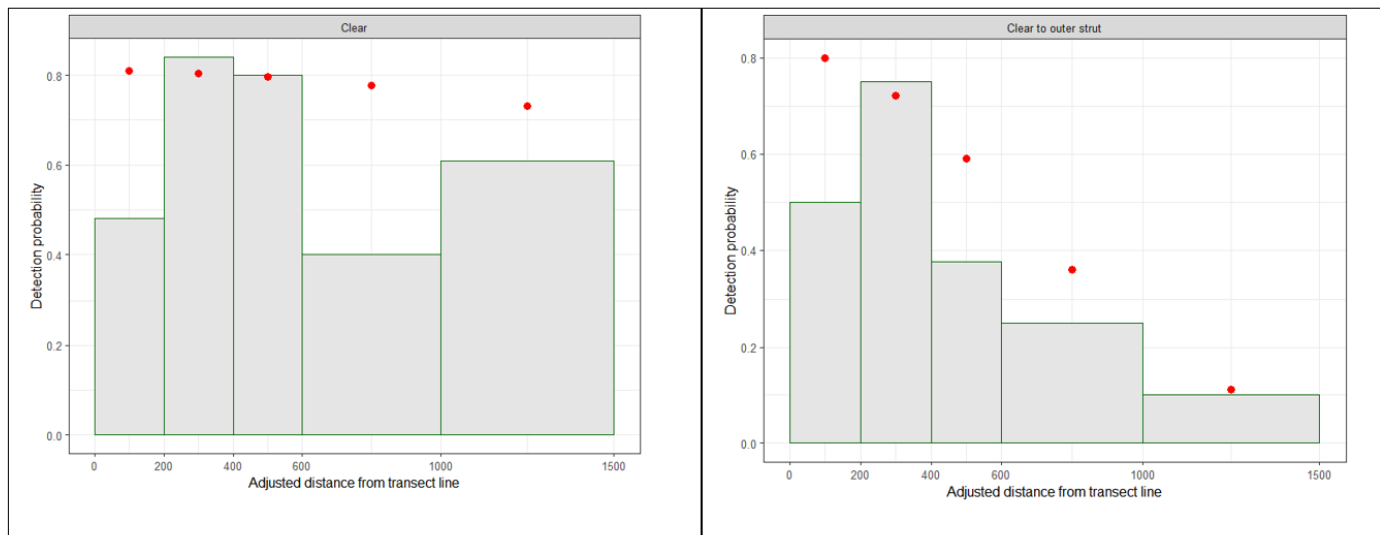


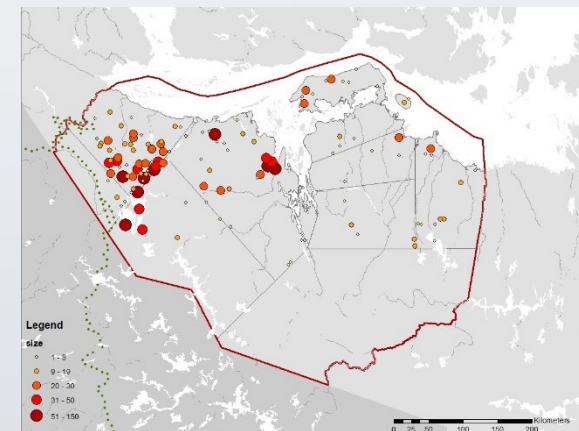
Figure 10: MRDS detection probability estimates (red dots) and observed detection histograms for 2 levels of visibility from model 1



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Table 4: Sensitivity of estimates to left truncation (LT), right truncation (RT) and DS only analyses. Percent change is in comparison to the first model/estimate listed (Table 3, model 1). Goodness of fit test p-values are also given

Data/model	groups	Individuals counted	N	SE	Conf. Limit		CV	% change	GOF p
MRDS vis model (Table 3 model 1)	130	2167	10,246	2085.6	6,721	15,620	20.4%		0.142
MRDS vis model LT 200	114	2000	11,408	2922.3	6,594	19,734	25.6%	11.3%	0.102
MRDS vis model RT 1000	90	1385	9,820	1808.2	6,828	14,124	18.4%	-4.2%	0.274
MRDS vis model group size of 150 reduced to 75	130	2092	9,487	1580.8	6,816	13,204	16.7%	-7.4%	0.142
DS vis model	130	2167	8,294	1641.4	5,486	12,540	19.8%	-19.0%	0.021
DS vis model LT 200	114	2000	9,075	2271.6	5,280	15,595	25.0%	-11.4%	0.012





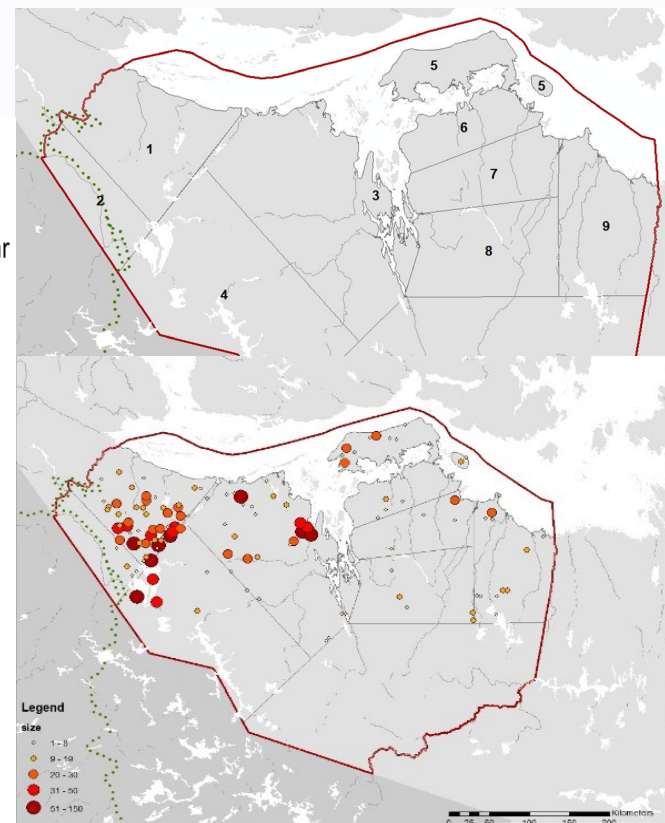
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Estimates

A model averaged estimate from Table 5 is 10,246, (SE=2309.6, CI=6,715-15,940, CV=20.4%). Estimates for strata from Model 1 are below. Strata specific estimate precision was low. The highest density of muskox was in Strata 1 with similar densities in strata 3 to 5.

Table 5 Estimates of strata from Model 1 (Table 1). Density is in muskox per 100km²

Strata	individuals	N	SE	CIL	CIU	CV	Strata area	Density
1	1041	3,578	885.4	2,143	5,972	24.7%	15,045	23.78
2	31	178	87.4	58	539	49.2%	7,080	2.51
3	479	2,598	594.3	1,628	4,147	22.9%	28,258	9.20
4	242	2,449	1500.7	591	10,145	61.3%	29,945	8.18
5	134	538	204.7	241	1,201	38.1%	5,555	9.68
6	23	99	41.1	40	243	41.5%	6,531	1.52
7	34	146	120.6	28	762	82.8%	9,275	1.57
8	19	81	46.6	24	273	57.3%	14,137	0.58
9	164	579	237.0	247	1,357	40.9%	14,013	4.13
Total	2167	10,246	2085.6	6,721	15,620	20.4%	129,838	7.89



****Last TAH of 225 was set on a population of approximatively 7,500 animals (1/3, 6,746 muskoxen)**





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Based on survey results, the current recommendation is made for managing muskoxen in Muskox Management Unit MX11:

- ENV recommends a TAH increase of 75 muskoxen up to 300 from the current 225, representing a 2.9% rate of harvest of the overall 2022 abundance estimate.
- ENV further recommends that the KRWB allocate any proposed increases across the management unit to distribute hunting pressure across the entire management unit. Due to the sedentary nature of muskox, distributing hunting pressure across the management unit should help to maintain local muskox family groups within local hunting areas.

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THANK YOU
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