

2017 Field Report for Ivittuut Greenland to NUNAVIS



Four bull muskoxen (below two 3-years, above left adult ≥ 5 -years, to right a 4-year old) Ivittuut Region. Photo C. Cuyler

Ivittuut muskoxen minimum count & demographics 8-13 June 2017

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**2017 Field Report for Ivittuut Greenland for NUNAVIS
Muskox Minimum Count & Demographic
Ivittuut Region, 8-13 June 2017**

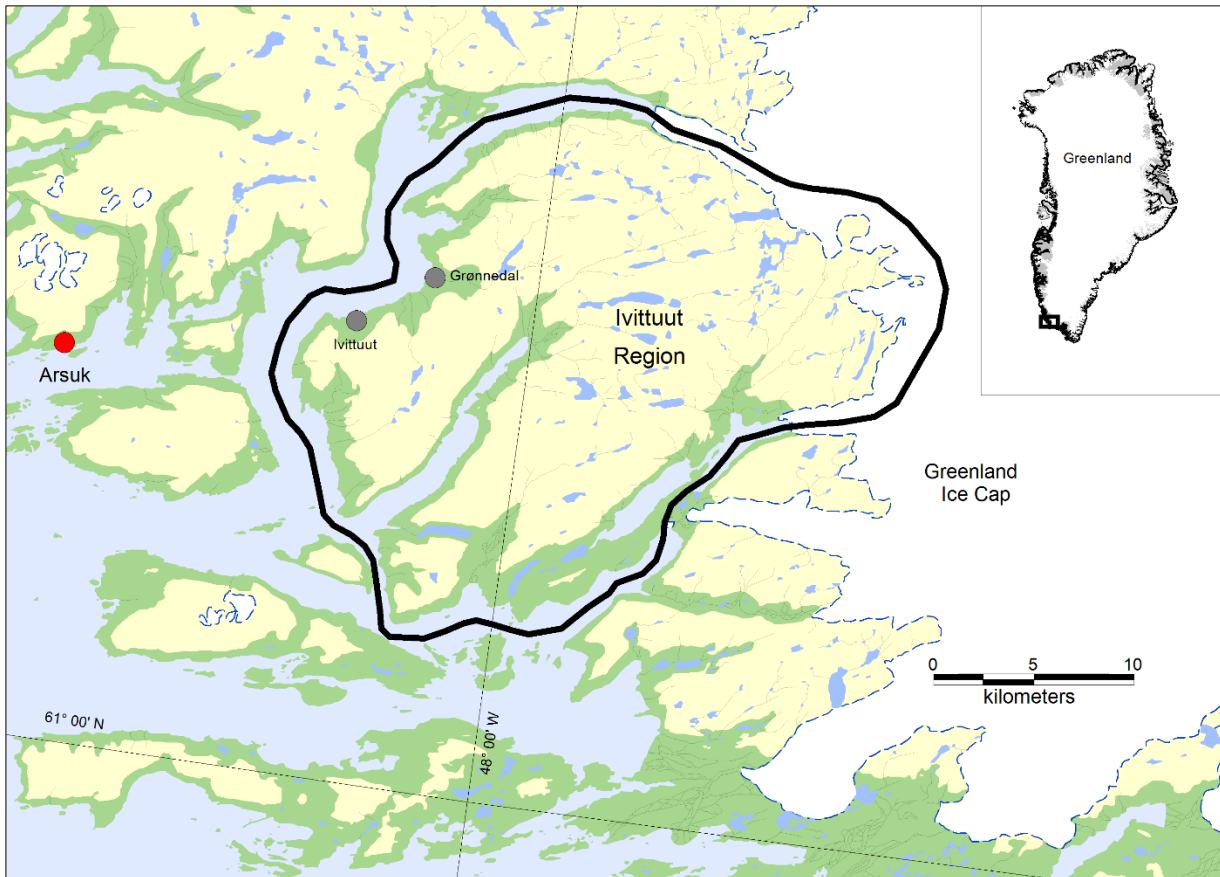


Figure 1. Ivittuut regions borders and communities.

A minimum count of the Ivittuut muskoxen (*Ovibos moschatus*) population was completed for NUNAVIS by the Greenland Institute of Natural Resources (GN) in cooperation with two persons from the Greenland Fisheries and Licensing Control (GFLK) and two local commercial hunters from the Arsuk community. This count included detailed demographics for a portion of the total number of muskoxen observed.

The Ivittuut region is a 'round' peninsula bounded to the west and north by the Arsuk fjord, which ends at the Greenland Ice Cap's Sermeq Arsuk glacial tongue (Figure 1). To the south and east is the Qoornoq fjord, which after the 'narrows' becomes Qinngerlersivaq and also ends at the Greenland Ice Cap with the Nordre Qoornoq glacial tongue (Figure 2).

Muskoxen were located sailing open outboard boats along the coastline and by hiking up into the principal valleys and using points of high elevation as look-outs. Muskoxen typically did not react to our sailing past them, however, if we sailed close to shore, or remained for several minutes, the animals generally moved up and away from their initial positions. In 2015 and 2016, we often experienced that the muskoxen fled from our approach as we hiked into the terrain. They ran further into the valleys, where they mixed with other groups, which made both counting and demographics difficult. To avoid double-counting, and due to time constraints, this year we often went up to a vantage point located only a short distance into the

valleys and counted all animals seen from that point. Similarly, to avoid double-counting a coastal or fjord area was only begun if we could finish its entire length within a few hours on the same day. We did not count observed muskoxen if doubt existed whether counted before. Given the stationary nature of the muskoxen and our method, double counting (i.e., counting the same animal(s) twice) did not occur.



Figure 2. Ivittuut place names.

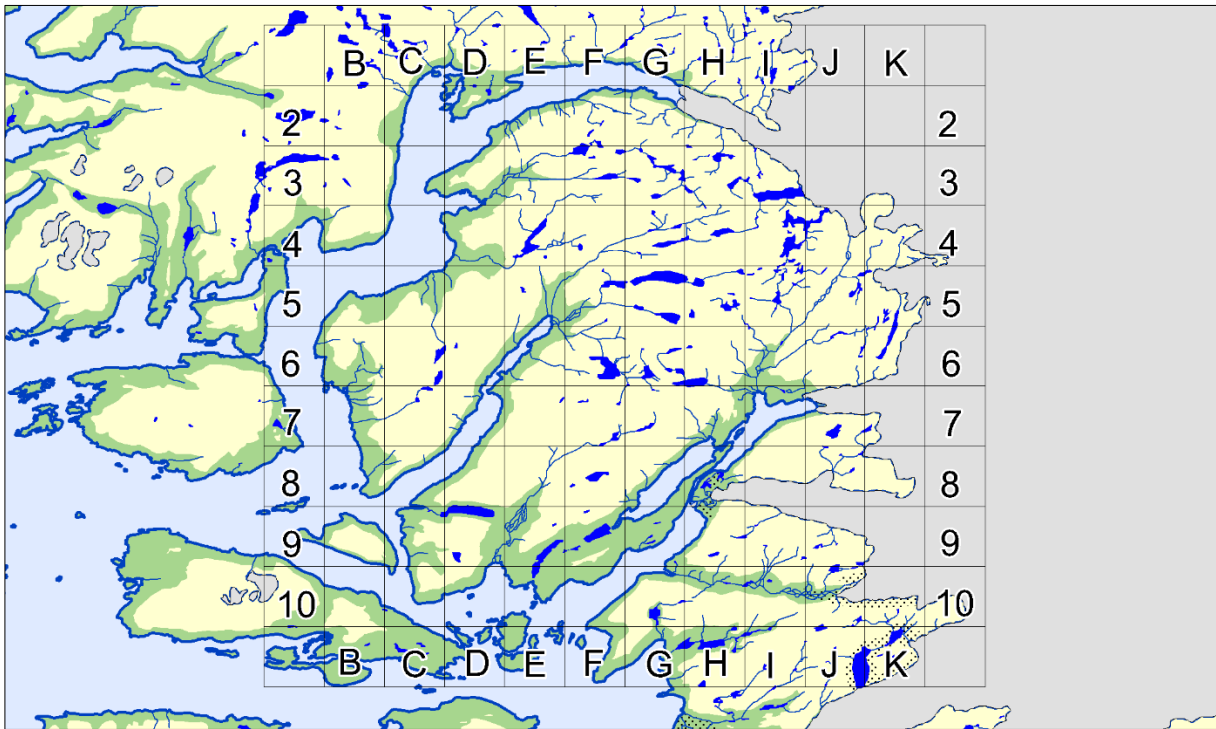


Figure 3. Ivittuut region grid cells, 3 x 3 km, generated using MapInfo software.

We assigned observations of muskoxen a grid-cell location (Figure 3). Using a 32-x magnification Leica telescope, C. Cuyler recorded the number of muskoxen groups seen, the total number of animals in each group, and when possible the sex and age of the individuals within groups (Appendix 1, 2). All other participants used binoculars, either of 8-x or 10-x magnification. When observed, we noted arctic fox, arctic hare, feral reindeer and eagles. Per N. Hansen took photos occasionally with a small camera.

Participants included the author, Per Nukaaraq Hansen (GFLK Hunting Officer from Nuuk), Morten Lyberth (GFLK Hunting Officer Assistant from Maniitsoq), and two local commercial hunters / trophy hunter outfitters from the town of Arsuk, Frank Feldmann and Jørgen (Anni) Christensen. Jørgen's wife Jakobine joined us for the muskox observations in the bottom of Ikka Bund and Oksedalen.

This year's total field season period, trip-return from Nuuk, extended from 6 to 16 June (from Maniitsoq 5-17 June). Meanwhile, the actual muskox count took place over just 5 days (8, 9, 11, 12, 13 June). There was a hiatus in counting on 10 June due to gale force winds the entire day.



Figure 4. Mature adult cow (age ≥ 4 years) with her calf-at-heel. Photo C. Cuyler

Although the West Greenland winter 2016-2017 received copious snow, little snow remained when we arrived in Arsuk on 7 June. Lowland areas were almost completely snow-free. Winter sea ice on the inner fjords was completely absent. Air temperatures were cool but comfortable. Biting insects were absent (much appreciated) until the 13-14 June when temperatures warmed. Weather conditions were favourable (sunshine, light winds) the entire period, except for the storm on 10 June. The full moon on 9 June provided maximal high tides. These facilitated sailing the shallow narrows from Qoornaq Fjord into the Paradiset Valley area, and gave us access to Blindtarm and Paradiset.

Generally, willows and birch had not yet begun to bud, or minimally, which left their branches bare. This lack of new green leaves aided sighting muskoxen, specifically the small calves. Dense willows thickets, of ca. 2 m height, can completely hide adult muskoxen. We observed this first-hand behind the abandoned town of Ivittuut. Tall dense willows are abundant in the Ivittuut valley bottom. The willows hid the adults and we could detect them only occasionally. Owing to their small body size, calves can effectively disappear when in dense thickets, even when these are not tall enough to hide adult muskoxen. Calves are missed when they lie down in the pocketed terrain or behind another larger muskox. Observing calves requires patience to wait +30-minutes until calves stand up and move about (Figure 4). As with 2015 and 2016, most muskoxen were grazing at elevations under 100 m.

PRELIMINARY RESULTS: Minimum Count & Demographics Ivittuut Muskoxen

West Greenland, 8-13 June 2017

TOTAL muskoxen observed:	812
TOTAL muskoxen observed in just Ivittuut:	806
TOTAL muskoxen seen outside of Ivittuut:	7 (Qoororsuaq Vally, Qoornaq fjord)
[DEAD muskoxen:	2 (illegal winter harvest of the 1-year old)]
Number of observations:	192
Maximum muskoxen group size:	16
Median group size:	3
AVERAGE muskoxen group size:	3.8 ± 3.1 SD
Total number muskoxen sexed & aged:	603 (out of 812)
Total number both sex & age unknown:	139
Total number adults sex unknown:	49
Total number 1-2 year olds sex unknown:	21

Table 1. Summary of the 2017 Ivittuut muskoxen minimum count and demographics

Muskox sex & age	Observed Sexed & Aged	Only of Sexed & Aged	Estimated observed	Estimated %
calf	139	23.05 %	139	17.12 %
Cow ≥ 3-years	237	39.30 %	348	42.86 %
Cow 2-years	23	3.81 %	35	4.31 %
Cow 1-year	31	5.14 %	46	5.67 %
Bull ≥ 5-years (Trophy)	57	9.45%	83	10.22 %
Bull 4-years	28	4.64 %	36	4.43 %
Bull 3-years	36	5.97 %	47	5.79 %
Bull 2-years	42	6.97 %	63	7.76 %
Bull 1-years	10	1.66 %	15	1.85 %
TOTAL	603	100 %	812	100 %
Recruitment (calves / 100 cows)	-	58.6	-	39.9
Bull (≥ 5-yrs) / cow (≥ 3-yrs)	-	0.24	-	0.24

Miscellaneous observations: 2 arctic hare, 4 arctic fox, 3 sea eagle, 2 ring seals, 51 reindeer (including 14 calves), many eider ducks.

Field Journal 5-17 June 2017 – Ivittuut Muskox

Monday 5 June:

Departure Maniitsoq

22:30 Morten Lyberth departed Maniitsoq bound for Nuuk.

Tuesday 6 June: Clear skies, light breeze

Departure Nuuk

Departure from Nuuk 14:00 with Sarfaq Ittuk coast boat. The one-way ticket, from Nuuk to Arsuk, cost was kr. 1700,-. The weather is clear with light breeze this afternoon. I caught a taxi down to the harbor at 13:10 and checked in. There was absolutely no queue for the check-in this year, likely because it's early June and kids are still in school. Come the 21 June week, the boat will probably be full and sleeping berths hard to come by. Anni (Jørgen) Christensen (who had been visiting Nuuk with his wife) helped me get all my gear on board and stowed in the luggage bay below deck (same luggage bay as we disembark from when we reach Arsuk). Just as we were bringing the last of the gear down, we met Per Nukaaraq Hansen. The lady steward helped me find my berth, no. 332, which is on the same deck as the restaurant and steward's office/shop. Settled in (mattress cover put on) and I went up top for the departure. Completely aft on the top deck I found Morten Lyberth sitting enjoying the quiet. I sat with him as Sarfaq Ittuk left the harbor at 14:00 as planned and headed south.

Wednesday 7 June: Clear skies, light breeze

Arrival Arsuk – Sail to Taylershavn cabin

Sarfaq Ittuk arrival to Arsuk at 13:00. Per, Morten and I left our gear on the dock. Although we had intended to sail immediately for Per's cabin in Taylershavn, this was not possible because Frank and the boat he was to lend us were still in Qaqortoq. Per arranged for his brother Verner Hansen to sail us over to Taylershavn after Verner finished work. Meanwhile, Per went to the Town Office and obtained the keys to the Heksested and Paradiset cabins. We all bought groceries. The store, Pilersuisoq, had few products on the shelves or in the freezers. It was good that I brought most of my grocery supplies with me from Nuuk in a cooler. While we waited, Ejnar Jakobsen came to the dock and we spoke about the muskox count. Ejnar will not participate in the count this year. Ejnar's knees hurt badly and cannot handle walking in the terrain. I also visited the Arsuk Town office and said hello to Jakobine Christensen (Jørgen's wife) and the 'mayor' Ingeborg Sørensen (Kaaleeraq's wife).

At 15:30, Verner Hansen sailed us and our gear over to Per's cabin in Taylershavn (Utoqqaat). We arrived before 16:00. We settled into the cabin. Two muskoxen grazed around the far shores of the cove. Per and Morten worked on the small yellow outboard boat that Per owns. I went for a walk in the hills behind but within sight of the cabin. An arctic fox was 'barking' at me for the better part of 20 minutes. It came to within 20 meters, and ran away far and fast when I finally looked at it. Its coloration was mainly brown, but there were spots of white winter fur on the brown body trunk, while white fur still covered its tail. I told Per about the fox, so he prepared his .22 rifle and set it by the cabin door. There has been at least one rabid fox taken around the town of Arsuk this spring. Per said all foxes should be shot-on-sight, owing to the danger from rabies. Although I went to bed ca. 23:00, Per and Morten stayed up talking together until 00:30.

Thursday 8 June: Mostly clear skies, light breeze morning & evening, winds strong in afternoon.

Taylershavn – Today's Total 34 muskoxen (including 9 calves)

Awoke and up at 06:30. By 8:30 we were hiking up into the valley area NE of Taylershavn. In that valley, we observed 33 muskoxen (which included 9 calves). Most of the 'valley' muskoxen were down in the green grass by the winding river in the bottom of the valley. All were grazing at elevations <50 m. One group of four was a cow with three calves about her. The third calf seemed unsteady on its feet sometimes. It also was calling for its mother at regular intervals, which suggested it had lost its mother [possibly died]. The sound was similar to a lamb "baahing". We watched for about 1 hour and the situation did not change.

Once we finished counting and were back at Per Nukaaraq's cabin, I went walking over into the next small bay. I noted that the vegetation in the immediate vicinity of Per's cabin appears completely unchanged since I first observed it in June 2015. The willows have not had the bark stripped off or their tops eaten. Caribou lichens (*Cladina rangiferina* and *Cladina Stellaris*) remain plentiful amongst the usual ground cover (grasses/sedges, dwarf birch, dwarf willow and crow berry) (Fig. 5). A sea eagle flew over me repeatedly.



Figure 5. Lichens *Cladina* spp. and *Cetraria* spp., remain common in the terrain and appear relatively untouched by herbivore grazing. Photo C. Cuyler.

While out walking, an arctic fox (still carrying much of its white winter fur on head, body trunk and tail) approached and shadowed me constantly from about 10 meters, although I chased it away while shouting at it several times. If I turned from it, then it ran directly towards me, stopping abruptly only when I turned

to face it. When it was only a few meters from me, I hit the fox's hip with a sharp rock, which knocked the fox over. When it regained its feet, it ran away. I returned immediately to the cabin and told Per about a possibly rabid arctic fox in the vicinity. In less than 5 minutes, the same whitish fox appeared in front of the cabin. It looked sick. Per took his .22 rifle and shot at the arctic fox, however, it ran away wounded. Per followed it into the next bay and into the hills but did not make a fatal shot. The fox got away.

While out after the fox, Per spotted a lone adult bull in the hills behind his cabin. Later this evening Jørgen (Anni) Jørgensen arrived with his wife, Jakobine (Jaku) by outboard boat. They visited for about one hour discussing the minimum count and telling stories. Frank will come tomorrow morning with the boat we are borrowing for this minimum count.

Tonight, I set up the excel database and keyed-in today's data.

Friday 9 June: Mostly clear skies, light breeze morning.

Today's Total 177 muskoxen (including 39 calves)

Awoke and up by 07:15. We all slept well. Frank arrived at 08:45 and took Per and Morten with him to Arsuk. Per bought fuel for the boat, diesel, propane gas etc. Meanwhile I stayed at the cabin and prepared two scenarios of the Demographics Simulator, for use later when meeting with the Arsuk Resource Council. Per and Morten returned by 10:45. We ate lunch and by 12:00 noon we were leaving Taylershavn. Just then, an arctic fox appeared beside the cabin. We were not 50 m away from the cabin. Per was half a mind to return and shoot it, however, the need to begin the muskox count decided things. We sailed the coastline to Ivittuut scanning the shore and hillsides for muskoxen. Saw 17 along the shore. There were 10 in Webershavn. Another 3, (plus 2 seen by Knud Albrechtsen) were behind the abandoned Ivittuut town. Jørgen (Anni) caught up with us when we arrived in Grønnedal. So we anchored together and walked up into the valley. In Grønnedal, there were 73. In Laksebund, there were 61, and these we added to the 11 Jørgen observed inside Arsuk Fjord. He had gone there first looking for us and so counted what he saw along the way. He did not go ashore and climb the steep mountainside, as we did last year.

There was a tourist sailing vessel moored in behind the big wharf at Grønnedal. The two men onboard were German/Austrian. Currently, tourists are forbidden entrance into Grønnedal military station. The military now has some staff stationed there and the area is off-limits to all but accepted visitors (e.g., us). When we walked up through town, two military personnel came out to speak with us. One of them recognized Per. When they realized who we were and our intentions (muskox minimum count & demographics), they waved us on our way.

In Ivittuut our effort was similar to past years. We walked about the buildings and scanned the mountain sides and the valley behind the town.

In Grønnedal, our effort was much less than last year. We only walked up the valley road to about 100 m beyond the 2nd bunker. There we sat on the hillside and counted all muskoxen we could see in the valley. Similar to past years, we observed several muskoxen nearby the Grønnedal wharf, either in the willows at the shore or on the mountainsides above. There were others among the buildings.

In Laksebund Valley, similar to Grønnedal our effort was much less than last year. In 2016 we penetrated to far up into the Lakseelv arm. This year we walked only 400-500 m into the valley on the north side of the river. We sat on a rocky vantage point, and counted all we could see.

All except one group of muskoxen were at elevations under 50 m. That one group was under 100 m.

After slowly sailing the north shore of Laksebund Fjord, our counting was done for today. It was then 19:00. Jørgen sailed back to Arsuk and we headed to the cabin in Taylershavn. Jørgen gave Per and Morten a generous portion of *ammassetter* (succulent fish that comes to shallows to spawn in June).

In anticipation of the storm winds forecast for tomorrow, Per and Morten fixed up the mooring ropes arrangement in Taylershavn. They firmly attached Frank's boat to these ropes.

Per did up the *ammassetter* for supper. He showed me his trick technique for quickly and effectively removing heads + innards in one move (cut only dorsal portion of head leaving ventral bit attached, then using knife to pull on head to detach it...the entire innards will be pulled out with it), then cut off tail. No one eats the tail, head, bones or innards. Per sucks the juicy bits off the bones, which are discarded.

The sick arctic fox from yesterday showed up at the cabin again this evening. It looked ill and had a hangdog posture. It may have rabies. Per shot and finally killed it, throwing the carcass into the bay, so that if it had rabies other foxes would not become ill from scavenging the body.



Figure 6. One of several adult bull caribou that we observed in the Ivittuut region.

Saturday 10 June: Storm winds began at ca. 06:30, gained strength by 07:30 and remained entire day.

Storm

Arose at 07:16. The full storm strength winds kept us at the cabin all day. Two muskoxen grazed around the shores of the cove.

Per and Morten removed the old rotten wood bow board from Frank's boat. They made and attached a new heavy plywood (5-ply) bow board. The compression oil from the steering column is leaking, however, this was not fixable. We have notified Frank, so that he can have it looked at later.

After supper this evening, Per, Morten and I went over our total numbers of muskoxen to date. Morten and my numbers agreed, however, Per's differed substantially. After a stressful hour of discussion and Per rechecking his notes, we were different by only one animal. Morten and Per had 210 (including 38 calves) and I had 211 (including 39 calves). We do not consider this a difference.

Sunday 11 June: Brilliant sunshine all day, sometimes heavy winds, gusty and then total quiet.

Today's Total 361 muskoxen (including 50 calves)

Awoke after 05:00 and were sailing along the coast south of Taylershavn by 07:10. We saw six bull caribou near Lille Lakseelv, before Narsaq (Fig. 6). By Narsaq there were plenty of muskoxen. As we sailed the north side shore of Ikka Fjord, Frank Feldmann joined us for the counting (within grid cell C8). When we reached the bottom of Ikka Bund and were setting anchor, Jørgen (Anni) Christensen and his wife Jakobine (Jaku) joined us as well.

We anchored up the three boats together on the south side of the bay at the bottom of Ikka Bund and went ashore to hike. Our effort this year was much less than in 2015 and 2016. We walked only 400-500 m to a rocky ledge vantage point above a riverbed full of boulders and rocks. From there we counted the entire area. Our elevation was under 50 m. Jørgen climbed a bit further and looked for muskoxen in the small valley immediately behind us.

We sailed the south side of Ikka Bund and Ikka Fjord. There were eight reindeer high on the mountainside on a snow patch. We anchored in Blæseren. Ate our lunch up on shore and then hiked to the same Blæseren vantage spot we have used every year (2015, 2016). It is a rocky spot on the north side, from which we can see to the bottom of the Blæseren Lake.

We sailed the Kangaarsuk Løb and saw two sea eagles there, as well as a few muskoxen.

We then anchored up by the Heksested cabin (*Mosk-It Hytten*), went ashore checked out the cabin, and hiked up into the valley. There were absolutely no muskoxen in the first valley, and there was almost no qiviut (wool) hanging from the willows. This suggests that the muskoxen have not been using this 1st valley yet this year. However, there were three juvenile male reindeer lying on a snow patch in the creek bottom behind the Heksested cabin. They left when we arrived. We walked through the 1st valley using the east side and climbed the 'saddle' that lies between the 1st and 2nd valleys of Oksedalen. From a vantage point on the north side of this 'saddle' we sat and counted the muskoxen in the bottom of Oksedalens 2nd valley. Most of the muskoxen were in the valley bottom grazing in the river flats. Some were higher up where snow patches remained. Most were cow-calf groups.

In the 1st valley, just before we climbed the 'saddle' we found the bone carcass remains of a muskox that had been shot in autumn 2016. The entire skeleton remained, except for the head and three legs. There was no skin/hair about either. Raven and fox scavengers had cleaned the bones. Frank and Jørgen (Anni) picked up the large intact skeleton and took turns carrying it on their shoulders and down to the sea. They threw it into the deep water off the rocks in front of Heksested cabin.

Once back at the Heksested cabin we ate another brunch out on the porch in the sunshine. I suggested that we complete the Nuuk Point area today. It is nearby and only ca. 1 hour required. This was vetoed by Per.

16:44 everyone sailed their separate ways to 'home'.

17:18 we were back at Taylershavn cabin.

Monday 12 June: Bright blue skies, sunshine 'warm' and calm this morning.

Today's Total 36 muskoxen (including 6 calves)

Awoke around 06:00 as usual. Per saw a group of four muskoxen right outside the cabin early this morning around 05:00 (three cows and one 1-year old). These do not go into the count because they may have come from the valley behind Taylershavn. We have already counted that valley.

08:45 Per and Morten sailed for Arsuk to tank up boat fuel and get diesel for the generator. I stayed at the cabin and packed. We intend to overnight in Paradiset cabin tonight. Also finished typing in the previous days' data into the computer and washed up the dishes & kitchen area.

10:45 Per and Morten returned from Arsuk.

11:15 we sailed from Taylershavn.

11:47 we were ashore and from a rock hilltop we looked out over the Nuuk Point area (just east of Heksested cabin where there is a long lake). There were 6 (3 cows + 3 calves), 1 male adult and a further 6 unknown sex/age animals that were far away and at ca. 100 m up on mountainside lying on a snow patch.

While overlooking the Nuuk Point area, we observed first a group of 23 reindeer (included at least 10 calves). They moved about avoiding insect harassment in the rugged rock lowlands between the Heksested cabin and us. A further group of 8 reindeer (included 4 calves) showed up minutes later in the same area.

We left Nuuk Point and sailed towards Qoornaq Fjord. Almost at the entrance of the fjord, we met dozens of eider ducks (mixed sexes) on the sea surface. They all attempted to get airborne as we approached, however, many could not get off the sea surface. These flapped their wings energetically, and ran their feet crazily over the sea surface, but they could not get airborne. They finally sank to the water to rest again. Per said their bellies were too full of food, making them too overweight for take-off.

We observed the north side of the Qoornaq Fjord and saw several bulls there. There was only one group with cow and calf.

Now we must wait for high tide so that we can sail up the narrows into the Paradiset area.

13:00 we were by a tiny waterfall on the south side of Qoornaq Fjord gathering wild angelica plants for eating. Per spots angelica from the boat because of their emerald green colour among the lesser green/brown vegetation. Per showed me how to cut them off below the soil surface, the difference

between the male (hollow core) and female plants (solid core), and how to peel and eat the male plants. They have a mild nutty taste with a water-chestnut texture.

13:45 we were anchoring at Frank Feldmann's cabin on the small island outside the mouth of Qoornaq Fjord. Frank, his wife Mette and 3-year old son Ole, were there and served up coffee/tea and cake. We were there for about

16:10 we sailed into Qoornaq Fjord again.

17:00 we were in the river mouth of the Qoororsuaq River/Valley. This is an east-west running river valley on the east side of the Qoornaq Fjord. We anchored on the north side, and walked into the valley about 400-500 m. From a small rise, we looked into the valley but could not see far owing to a bend in terrain. A group of 7 (including 1 calf) muskoxen lay on the south side of the river from us.

17:55 we were out on the Qoornaq Fjord again

18:10 saw some muskoxen on the north side of Qoornaq Fjord, in a little 'pass' just before narrows. We anchored and went ashore. There were 5 muskoxen. They were shedding qiviut wool profusely. On the way back to the boat, I found the remains of a juvenile muskox shot the previous winter. The skin remained, so there was wool scattered all about. All else was gone except one small broken off horn, which I took.

19:00 we were back aboard and sailing through the narrows. The trout jump for insects in the turbulent waters of the narrows. There are also many terns fishing here.

20:25 was the approximate time of maximal high tide at coast (DMI 2017), and may be delayed at narrows because inland. Per did not have tide charts.

19:30, about 1-hour before maximum high tide, we were completely through the narrows and into the Paradiset bay area. 2 ring seals popped their heads up. 2 bull reindeer were grazing on the glacial till flats in front of the glacial tongue.

We sailed directly to the cabin and got settled in. We did not count any Paradiset animals this evening. Per wants to sail out of the narrows on next morning's high tide, which is around 9:00. Therefore, tomorrow Per intends to get up early and be hiking for the muskox count by 05:00.

While waiting for my potatoes to boil, I walked about in the immediate vicinity of the Paradiset cabin collecting shed qiviut (muskox wool) from the bare willow branches. Willow buds, although green, have not sprung yet here. Large (8-12 individuals) groups of muskoxen, of mixed sexes, were plentiful just on the other side of the Hoveddal river. Unlike Heksested / Oksedalen, in the Paradiset valley and bay area, the muskoxen appear undisturbed, e.g., they were numerous and right down on the rocky beaches. As I walked in the calm evening, I could hear the muskox bulls' vocalizations. They kept up a regular 'lowing' or grumbly/rumbly sound that reminded me of a small rock-slide. Adult bulls seem to be more numerous here than elsewhere in Ivittuut this year. This is the first time I have heard so much vocalization from the muskox bulls.

21:30 Per was in his sleeping bag and snoring. Morten was only 5 minutes later.

22:00 I was also in my sleeping bag.

Tuesday 13 June: Mostly clear skies, light breeze.

Today's Total 204 muskoxen (including 35 calves)

We awoke early. 05:00 Per left to hike the short east-running valley, which ends with the tongue of the Nordre Qoornoq Glacier. Per observed 51 muskoxen (including 9 calves).

05:10 Morten and I were away to do the large Hoveddal, which is the main valley running north-northeast from Paradiset. We observed 153 muskoxen (including 26 calves).

08:45 was the approximate time of maximal high tide at coast (DMI 2017), and may be later at narrows.

09:28 we were onboard the boat with all our gear. We sailed along the shore to Blindtarm. Per is worried with good reason that we will not be able to get through the narrows. We still must do Blindtarm and lake at the end.

Blindtarm is a deep rift lake of depth ca. 250 m.

I noticed what looked to be gouging / grazing soil erosion in a little round bay (NE side) at the south end of Blindtarm. No time for a closer look. If this is gouging/erosion, then it is the first observed in the entire region. The status of willow shrubs in much of the Ivittuut region appears similar to 2015 and 2016 (Fig. 7).

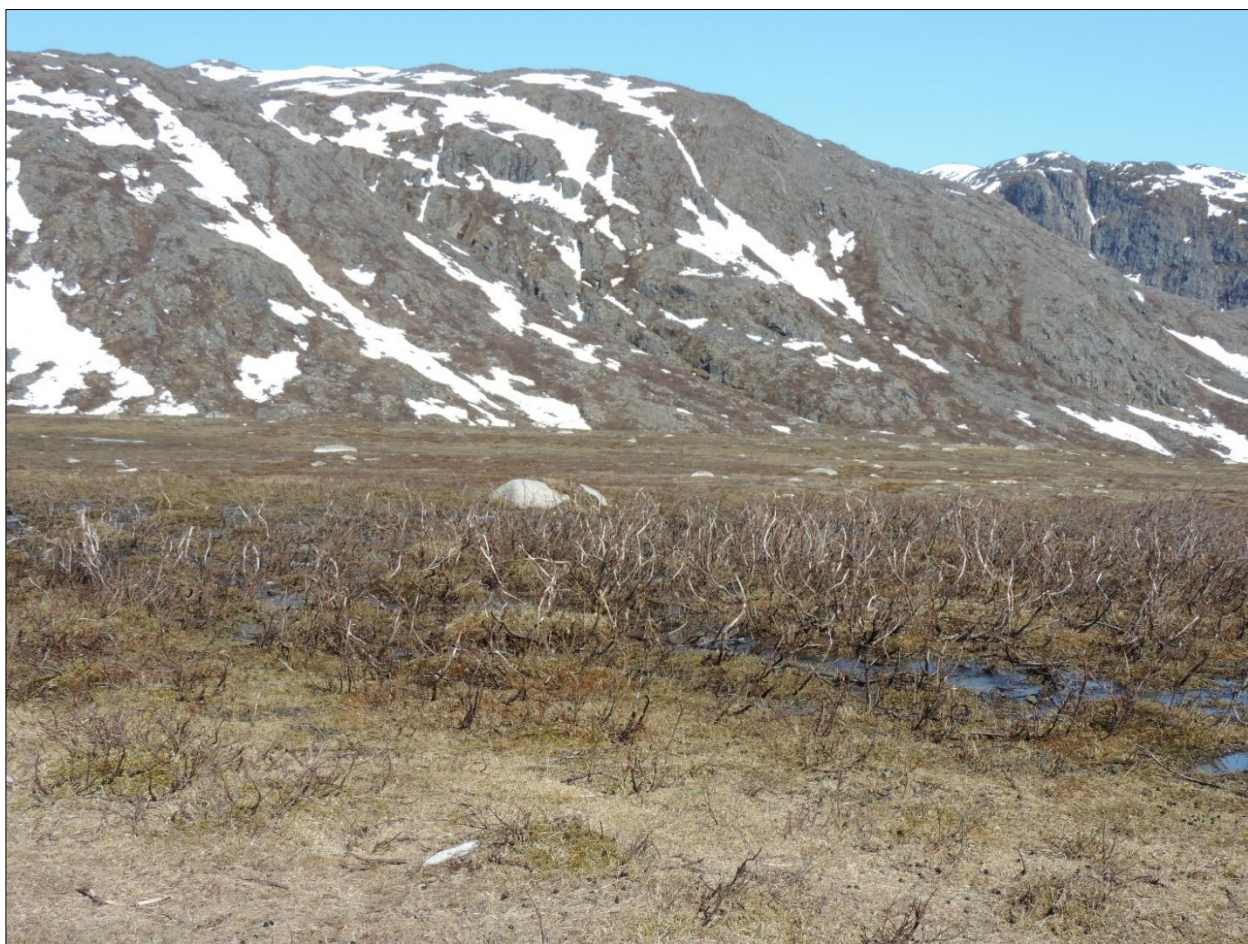


Figure 7. Willow bushes stripped of bark and their tops removed are common on valley bottoms. Photo C. Cuyler.

We counted 35 along the shore to Blindtarm, 16 in Kigut, 17 on west shore Blindtarm, 11 muskoxen at the end of Blindtarm, and 2 on the east shore of Blindtarm.

10:45 we sailed the narrows. It seemed a good meter higher than yesterday, but still lacking ca. 1 m water, as per the high water mark on shore rocks. We saw 1 bull reindeer on the glacial till at the narrows.

Per, Morten and I shared 'high-fives' for our successful completion of the Ivittuut muskox count.

11:30 we were anchor roped at Taylershavn. 11:39 all gear back up at the cabin. Checking over the day's numbers and a final tally for the entire muskox count became a heated discussion because my number of calves was greater by over 30 animals. Meanwhile, total number observed did not differ by more than six animals.

Wednesday 14 June: Sunny and calm.

In Arsuk most of today

At 06:30 we were up and about.

09:09 we sailed to Arsuk. Per has his 9.9 horsepower outboard engine onboard. There were two 3-year old males just off the point from Taylershavn as we left. Per checked out the salmon nets nearby.

09:40 we docked in Arsuk. Per brought his 9.9 horsepower engine ashore and had a local mechanic look at it. Per has tried all he knows and it still does not work. This mechanic will now take it to his shop.

The Arsuk Resource Council cannot meet with us today. It is the last day of school, with picnic and barbeque. Therefore, Jørgen Christensen (as teacher) is busy all day and the school is not yet available as a meeting location. We agreed to meet tomorrow before we leave on the coastal steamer, *Sarfak Ittuk*, for Nuuk.

Several hours went by in town. Noteworthy for the future, is that the Pilersuisoq grocery shop always closes for lunch, 12:00-13:00. The store shelves and freezers are now full of produce, unlike when we arrived. I met Frank's wife, Mette, with son, Ole, in town and chatted with her a bit. After lunch, I went up to the school and helped Jørgen and Tove Sørensen (the school principal) clean up after their school picnic. Jakubine, Jørgen's wife, would like me to send her the e-mail address to the Danish company that sells equipment for spinning muskox wool.

14:30 we sailed from Arsuk back to Taylershavn cabin. There were two arctic foxes near the shore of cove at Taylershavn. One of the foxes came around to the bait Per and Morten had put in front of the cabin. This fox was behaving strangely and seemed sick in the way it walked. Per got his .22 rifle and shot it. When the fox ran over into the hills, Per followed until he killed it.

16:30 Per and Morten sailed to Grønnedal / Ivittuut to check out Per's boathouse and homes there. They found that his two rubber dinghies had been stolen and several dining room chairs. They returned by 19:30.

Per and Morten went up to the fox den in the hills behind the cabin and tried to smoke some foxes out, using smoke signal flares. No foxes appeared, although they tried for over an hour.

Muskoxen are often observed on the far side of the cove at Per's cabin (Fig. 9).



Figure 9. Two bull muskoxen grazing near shore, willows and ridge effectively hide one. This is across the little protected cove of Taylershavn, where Per N. Hansen's cabin is situated. Photo C. Cuyler.

Thursday 15 June: Bright sunshine and calm.

Arsuk Resource Council meeting in Arsuk and departure for Nuuk

05:25 We were all up and about packing and preparing to depart today.

Per and Morten repaired his cabin roof, cleaned the cabin, screwing the doors shut on sheds and storage, covering and tying down the generator.

09:19 began sailing, however, Per had forgotten his hellefisk 'gravlaks' and so we returned to shore. 09:25 again on our way to Arsuk (Fig. 10) and arrived before 10:00. We unloaded our gear onto the dock for Sarfak Ittuk. Per then realized that he had forgotten his knapsack back at the Taylershavn cabin.

10:15 he sailed to fetch it. When he returned at 11:10, he filled the boat's fuel tanks and handed it over to Frank. I bought three sorts of cakes/cookies for the Arsuk Resource Council meeting.

13:00 - Arsuk Resource Council meeting. Per, Morten and I met with Jørgen, Ejnar, Frank and Knud in the public school cafeteria to talk about the completed muskox count and discuss the quota for this coming autumn and several other management issues. The meeting adjourned by 14:35, details in Appendix 3.

While waiting by the dock for Sarfak Ittuk's arrival, the Arsuk Town 'mayor', Ingeborg Sørensen, came and sat chatting for about 2 hours. When the Sarfak Ittuk arrived at 16:05, she bid me farewell.

16:30 we were aboard Sarfak Ittuk and sailing away from Arsuk, headed north to Nuuk. Per's sister Lisa is onboard, as is Ejnar with wife Hanny and family. Daniel Skifte is also sailing to Nuuk. Daniel, Lisa and a Færosese man named Markus, are all on the board for the fish plant in Arsuk.



Figure 10. Arsuk community with Arsuk Island Mountain in background to the south. Photo C. Cuyler.

Friday 16 June:

Arrival Nuuk

15:00 Per Nukaaraq Hansen and I arrived back to Nuuk. Morten helped carry one load of gear ashore.

Saturday 17 June:

Arrival Maniitsoq

07:00 Morten Lyberth arrived back to Maniitsoq.

Data Sheets [Greenlandic / Danish] & [Greenlandic / English]

Note: Print 20-25 pages on water resistant paper, with page numbers top right. This permits 300-375 individual group observations.

Umimmaat / Moskus IVITTUUT 61°N, Vestgrønland – JUNI 2017 Ikinnerpaamik kisitsineq + katersat sannaq / tælling + **FINE** floksstruktor

[illegible]

Demographics

[illegible]

Appendix 2

Contact information for participants

Telephone numbers (+299)

Christine Cuyler:	48 23 23 (Project leader/researcher)
Per Nukaaraq Hansen:	48 73 68 (GFLK Hunting Officer Nuuk)
Morten Lyberth:	48 76 40 (GFLK Hunting Officer Assistant Maniitsoq)
Ejnar Jakobsen:	54 86 65 (Commercial hunter & Trophy outfitter)
Jørgen 'Anni' Christensen:	53 81 57 (Commercial hunter & Trophy outfitter)
Frank Feldmann:	28 48 51 (Commercial hunter & Trophy outfitter)
Knud Mikaelson:	48 65 76 (Commercial hunter & Trophy outfitter)



Figure 11. Juvenile, 3-year old, bull at the shore observed from boat. Photo C. Cuyler.

Appendix 3

Arsuk Resource Council (ARC) Meeting

Date: 15 June 2017

Time: 13:00 – 14:35

Location: Arsuk Public Grade School Cafeteria

Participants:

From the Arsuk community - Local commercial hunters / trophy agents, Jørgen (Anni) Christensen, Ejnar Jakobsen, Frank Feldmann and Knud Mikaelson.

From the Greenland Fisheries and Licensing Control (GFLK) - Nuuk Hunting Officer Per Nukaaraq Hansen and Maniitsoq Hunting Officer Assistant Morten Lyberth.

From the Greenland Institute of Natural Resources - Senior Scientist Dr. Christine Cuyler.

Minutes of Meeting:

Nuuk Hunting Officer Per Nukaaraq Hansen spoke for the first 40 minutes. He described in detail the results from the completed minimum count for those present and introduced several points for consideration. There followed 25 minutes of back-&-forth discussion among the participants. They discussed the illegal harvesting by persons from Kujalleq Municipality (Kommune). They thought illegal harvesting first began to be excessive when Neqi AS opened for the sale of muskox meat. In addition, they suspect the hotels and restaurants in Kujalleq Municipality are buying muskox meat without checking for commercial licenses or hunter report numbers. ARC would like better control of hunters using the Ivittuut region to prevent illegal harvesting. ARC mentioned the name of the worst offender. Moving the region's southern border also received much discussion. ARC thinks that if the border was further south at the old municipal border, that hunters from Kujalleq Municipality would stop and hunt there and not come further north to Ivittuut. Further, ARC thinks that shooting the reindeer close to the old municipality border will hinder the movement of reindeer north into the Ivittuut area. Jørgen, Ejnar and Per Nukaaraq appeared to prefer reindeer were not present in Ivittuut, or at least fewer in number, while Frank and Knud think more reindeer in Ivittuut would benefit 'bonus' trophy hunting for their customers. Ejnar asked Christine about the status of the willow vegetation. She replied that her inquiries at two international meetings had yielded an interesting perspective. Vegetation scientists would not define the willow observations in Ivittuut as overgrazing. Instead, the heavily grazed willows in the valley floors were evidence that the muskox browser/grazer was likely in the process of *altering* the plant community landscape. Vegetation scientists expect alteration/change of the plant communities when a browser/grazer enters an ecosystem. This alteration is not 'overgrazing' unless, or until, soil erosion takes place. It is a matter of definition. Ejnar smiled.

Ejnar Jakobsen wrote (in Greenlandic) a brief summary of several of the topics discussed. Ejnar Jakobsen had another appointment at 14:00 and left the meeting at 14:05. Thereafter for a further 30 minutes, Frank Feldmann, Jørgen Christensen and Per Nukaaraq continued the discussions, with Knud Mikaelsen pitching in occasionally. They agreed that the 2017 muskox quota could not be as suggested (i.e., 320) in the Department of Fisheries and Hunting draft hearing for hunting seasons and quotas for caribou and muskoxen, autumn 2017. The quota for 2017 should be much smaller. Per Nukaaraq Hansen suggested a cow quota of 100. ARC agreed to write immediately to the government Department of Fisheries and Hunting, listing their requests for harvest management in the Ivittuut region.

Here is a summary (not ranked in order of importance) about what ARC deemed was necessary for good wildlife management in the Arsuk / Ivittuut region. It seemed unanimous about what was required.

- 1) That there was an urgent need for a new hunting officer, living in Arsuk year round. The previous hunting office assistant (of many years under Per Nukaaraq Hansen), Johan Mikaelsen, was acceptable to ARC.
- 2) Muskox hunters only able to obtain muskox hunter reports, and return these, to the Arsuk Community Office. ARC hopes this will reduce illegally harvesting several animals using the same unfilled-out hunter report, which today ARC suspects often occurs.
- 3) The region's southern border to be the former Municipality border (kommune græsen).
- 4) Illegal harvesting punished by loss of license (e.g., commercial license).
- 5) No more new trophy agents for the Ivittuut muskox population. Maintain the four agents that are in Arsuk today and do not open for more agents.
- 6) Reduce next year's muskox trophy quota. For example, the quota might be 60 trophy bulls. This would give 15 trophy bulls to each of the four agents.
- 7) Selective harvest continues:
 - NO harvest of cows with calf-at-heel.
 - NO harvest of bulls under the age of 5-years.
- 8) The entire muskox quota reserved for only Arsuk.
- 9) The entire muskox quota reserved for only commercial hunters and trophy agents from Arsuk.
 - No portion of the Ivittuut quota given to Nuuk/Paamiut or Kujalleq Municipality.
- 10) Reduce the 2017 quota. It is too high.
- 11) Reduce the cow quota. It should not exceed a maximum of 100.
- 12) Perhaps from 2018 onwards, the harvest of trophy bulls could begin on 15 September. Alternately, there could be a pause in trophy hunting, with resumption by 15 September. Starting the trophy harvest of muskox bulls from mid-September will permit the bulls to impregnate cows before the bulls die. This will benefit reproduction. In addition, by mid-September the reindeer bulls are in full rut. This makes them an attractive 'bonus' trophy for their customers to harvest.

Appendix 3

Observation routes taken in 2017 – sailing & hiking

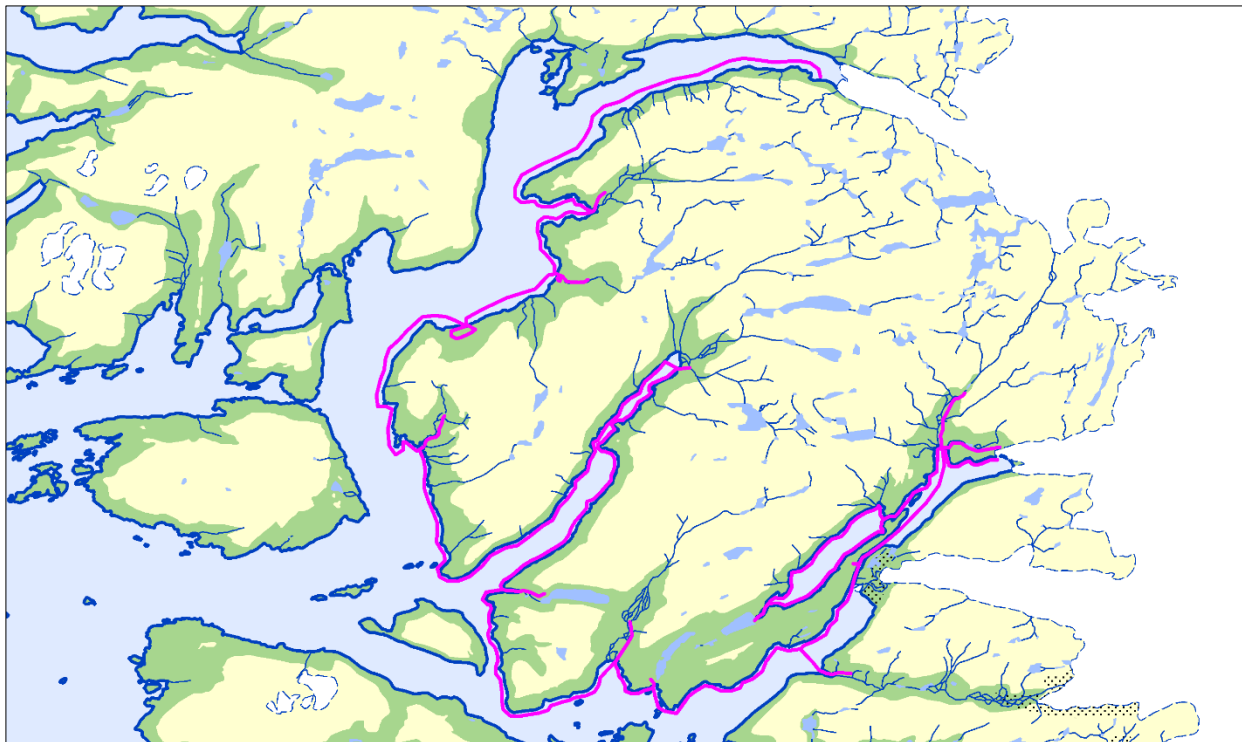


Figure 12. Observations routes taken by sea and land for the 2017 muskox minimum count of the Ivittuut region.