



መጋቢት ፳፻፲፱ ዓ.ም. ለግብርና ሚኒስቴር ስራ ሰዓት ሰንጠረዥ
ግብርና ሚኒስቴር ስራ ሰዓት ሰንጠረዥ
ግብርና ሚኒስቴር ስራ ሰዓት ሰንጠረዥ



ጊዜ	ቁጥር	ስራ ስም	ደረጃ	ጊዜ	ሰዓት	
09:00 AM - 09:05 AM	1	ግብርና ሚኒስቴር			5 ሰዓት	
09:05 AM - 09:10 AM	2	ግብርና ሚኒስቴር ስራ ሰዓት ሰንጠረዥ	1		5 ሰዓት	
ግብርና ሚኒስቴር ስራ ሰዓት ሰንጠረዥ						
09:10 AM - 10:10 AM	3	ግብርና ሚኒስቴር ስራ ሰዓት ሰንጠረዥ	2		1 ሰዓት	
10:10 AM - 10:25 AM	ግብርና ሚኒስቴር					15 ሰዓት
10:25 AM - 11:10 AM	4	ግብርና ሚኒስቴር ስራ ሰዓት ሰንጠረዥ	3		45 ሰዓት	
11:10 AM - 11:40 AM	5	ግብርና ሚኒስቴር ስራ ሰዓት ሰንጠረዥ	4		30 ሰዓት	
ግብርና ሚኒስቴር ስራ ሰዓት ሰንጠረዥ						
11:40 AM - 12:10 PM	6	ግብርና ሚኒስቴር ስራ ሰዓት ሰንጠረዥ	5		30 ሰዓት	
12:10 PM - 1:25 PM	ግብርና ሚኒስቴር					1 ሰዓት 15 ሰዓት
1:25 PM - 2:10 PM	7	ግብርና ሚኒስቴር ስራ ሰዓት ሰንጠረዥ	6		45 ሰዓት	
2:10 PM - 2:40 PM	8	ግብርና ሚኒስቴር ስራ ሰዓት ሰንጠረዥ	7		30 ሰዓት	
2:40 PM - 3:10 PM	9	ግብርና ሚኒስቴር ስራ ሰዓት ሰንጠረዥ	8		30 ሰዓት	
3:10 PM - 3:15 PM	10	ግብርና ሚኒስቴር ስራ ሰዓት ሰንጠረዥ			5 ሰዓት	

Չհսկողականություն

Հյուսիսային Եվրոպայում համայնաբանական պայմաններում, համարյա
ամբողջությամբ հանրապետական շահույթ չկա.



ᐃᑕᑦᑯᐃᑦ

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5.0 ᐃᐃᐅᐱᐅᑦᑕ 1

ᓁᐅᐅᑦᑕᓗᓐᓚ ᐅᑎᐅᐱᓐ ᓚᑦᑲᓐ ᐅᓐᓚᓚᑦᑎᑦᓇᓇᑦᑕ ᐃᓐᓚᓚᑦᓇᓇᑦᑕ ᓚᐅᐅᑦᓇᓇᓇᓇᑦᑕ ᑎᐅᓐᓚᓚᑦᑎᑦᓇᓇᑦᑕ (HTO)

ᓇᓚ ᓇᓚᓇᓇᓇᓇᓇᓇ
ᓁᐅᐅᑦᓇᓇᓇᓇᓇᓇᓇ ᐃᓚᑦᑎᓇᓇ ᐃᓚᓇᓇᓇᓇ
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ᐃᓐᓚᓚᑦᑎᑦᓇᓇᓇᓇᓇᓇᓇ

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ᐃᓚᑦᑎᓇᓇᓇᓇᓇᓇᓇᓇᓇ
2015-2018 ᓁᐅᐅᑦᓇᓇᓇᓇᓇᓇᓇᓇ
2019 ᐃᓚᑦᑎᓇᓇᓇᓇᓇᓇᓇᓇᓇᓇᓇ
ᐃᓚᑦᑎᓇᓇᓇᓇᓇᓇᓇᓇᓇᓇ
ᐅᑎᐅᐱᓐ ᓁᐅᐅᑦᓇᓇᓇᓇᓇᓇ
ᐅᓚᓚᓚᓚᓚᓚᓚᓚᓚᓚᓚᓚᓚᓚᓚᓚᓚᓚᓚᓚ
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ᐃᓚᑦᑎᓇᓇᓇᓇᓇᓇᓇᓇᓇᓇᓇᓇ



ᓇᓗᓇᐃᐱᐱᐱᐱᐱᐱ



ᓂᓇ ᓇᓗᓂᓐ

John Ringrose

ᐱᓇᓂᓐᓂᓐᓂᓐ ᐱᓇᓂᓐᓂᓐ
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Regional Wildlife Biologist
Baffin Region
Department of Environment
Government of Nunavut

Aviktarviani Huradjanut Qauyihaiyi
Qiqiktaaluk
Avatliqiyitkut
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ᐱᓇᓂᓐᓂᓐ ᐱᓇᓂᓐᓂᓐ ᐱᓇᓂᓐᓂᓐ 2014-ᐱᓇᓂᓐᓂᓐ
ᐱᓇᓂᓐᓂᓐ ᐱᓇᓂᓐᓂᓐ ᐱᓇᓂᓐᓂᓐ

ᐱᓇᓂᓐᓂᓐ ᐱᓇᓂᓐᓂᓐ ᐱᓇᓂᓐᓂᓐ 2015-2018.

ᐱᓇᓂᓐᓂᓐ ᐱᓇᓂᓐᓂᓐ ᐱᓇᓂᓐᓂᓐ ᐱᓇᓂᓐᓂᓐ
ᐱᓇᓂᓐᓂᓐ ᐱᓇᓂᓐᓂᓐ ᐱᓇᓂᓐᓂᓐ

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1) ሕገቶ ሕገቶ ሕገቶ ሕገቶ ሕገቶ ሕገቶ ሕገቶ ሕገቶ ሕገቶ


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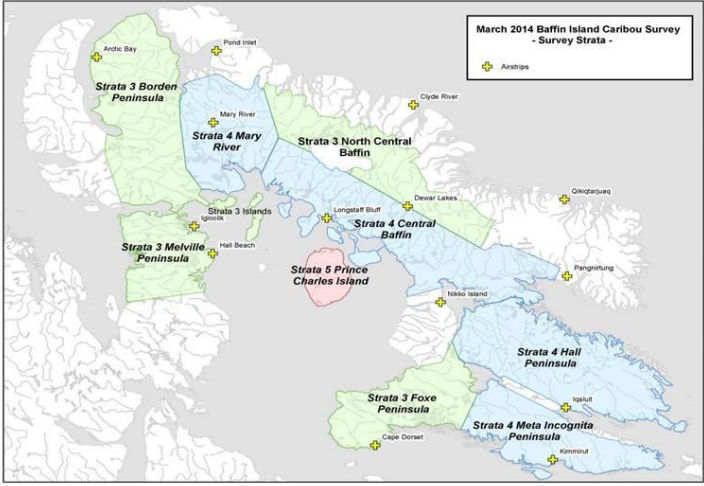
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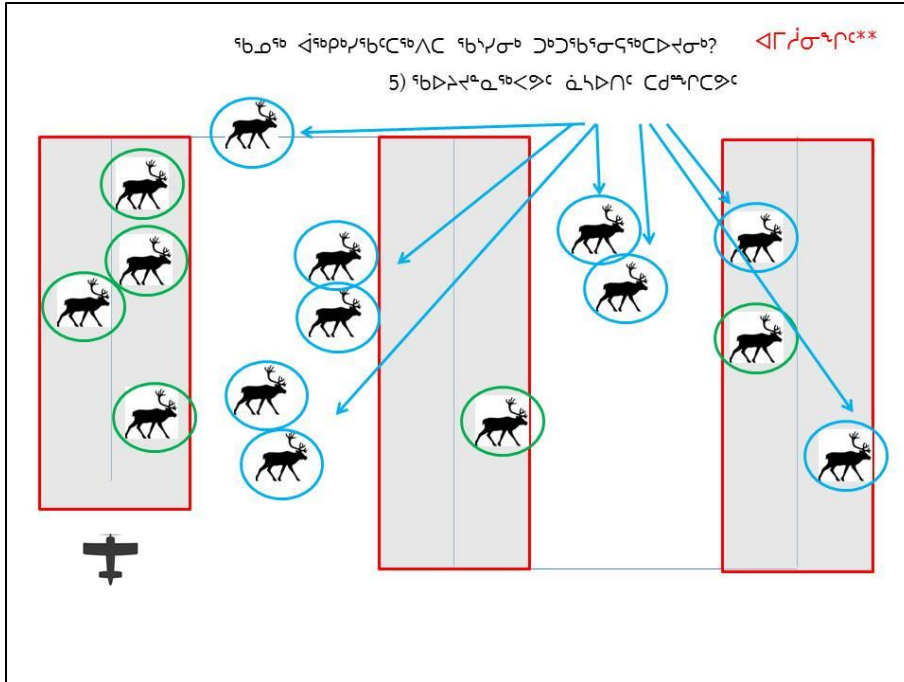


ኑኔ ሕገቶ/ኑኔ ሕገቶ ሕገቶ ሕገቶ ሕገቶ?

2) ሕገቶ ሕገቶ ሕገቶ ሕገቶ ሕገቶ ሕገቶ ሕገቶ ሕገቶ

⬆



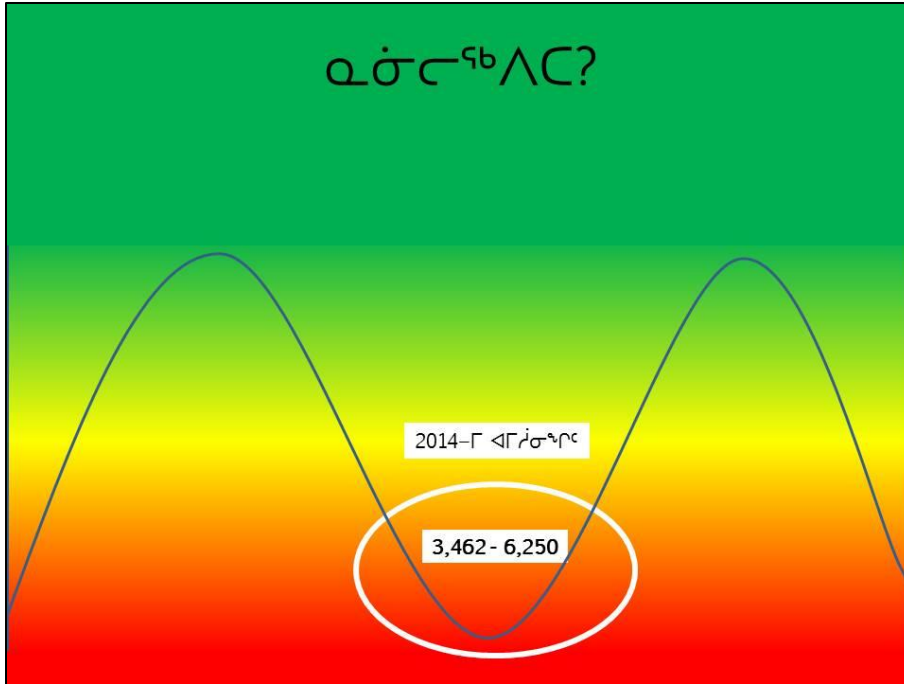


2014-ገ ክፍለ-ክፍለ ግንባታ ጋንጋኖናፍርጋሪዎች

We are 95% certain the actual number of Caribou lay between these two values ለገጽ-ጽሑፍ**

Subpopulation	Individuals Observed	We are 95% certain the actual number of Caribou lay between these two values
North Baffin		
Borden Peninsula	1	1 -30
Mary River	49	96 - 521
North Central Baffin	13	31 - 230
Total	63	159 - 622
South Baffin		
Central Baffin	197	662 - 1,798
Foxe Peninsula	20	48 - 972
Hall Peninsula	176	467 - 1,686
ፖሊናር ኮሎን	91	256 - 1,138
Prince Charles Island	557	1,158 - 2,220
Total	824	3,169 - 5,935
Total (-Prince Charles Island)	267	1,777 - 4,207
Other areas		
Melville Peninsula	26	88 - 551
Baffin Island + Melville P.	1,130	3,661 - 6,484
Baffin Island Total	1,104	3,462 - 6,250

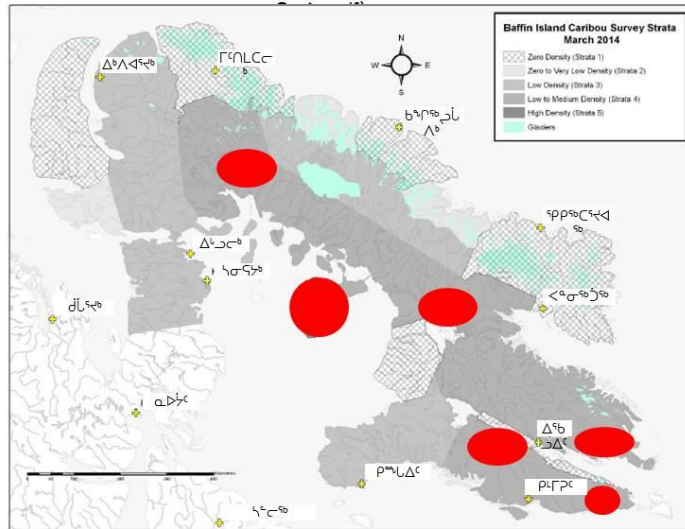
ዲታርኬሊር?



ጋንጋል ነጠላታዎች ለጋንጋል ነጠላታዎች (ፍጥነት) ነጠላታዎች ለጋንጋል (ደንበኞች, ለጋንጋል, ለጋንጋል ለጋንጋል?)

ክፍለ-ደረጃዎች**

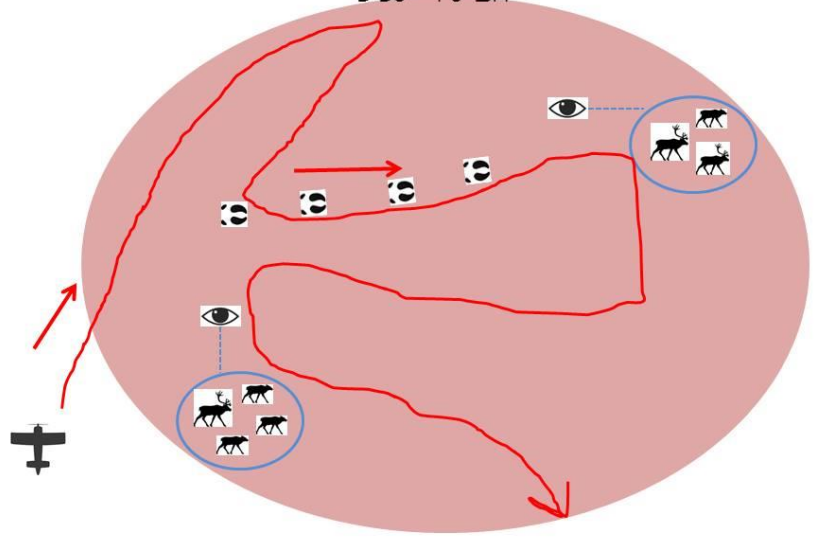
1) የጋንጋል ጋንጋል ክፍለ-ደረጃዎች (ፍጥነት ለጋንጋል)



ኅኑሃጋጅ ርኅጅ (ጃኅጋጅጋጅ, ርኅጅ), ጃኅጋጅ, ጃኅጋጅ ለሃኅጋጅ?

ኅኑጋጅጋጅጋጅ**

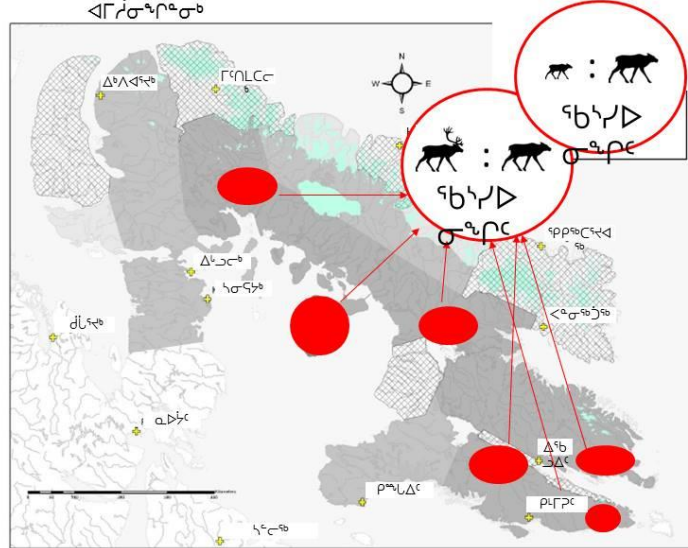
2) ርኅጋጅ ኅኑኑጋጅጋጅጋጅ ጋጅጋጅ ጋጅጋጅ ጋጅጋጅ ጋጅጋጅ ጋጅጋጅ



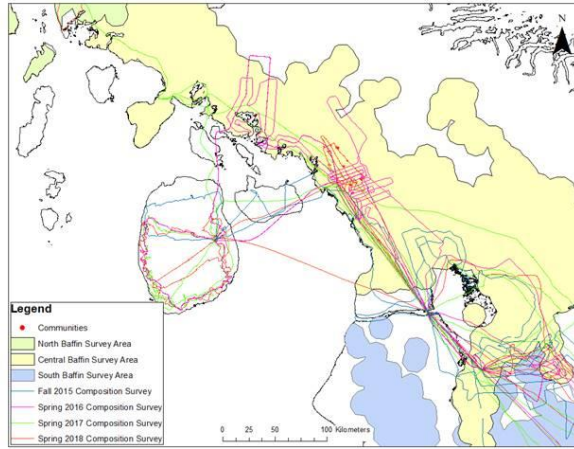
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ኅኑጋጅጋጅጋጅ**

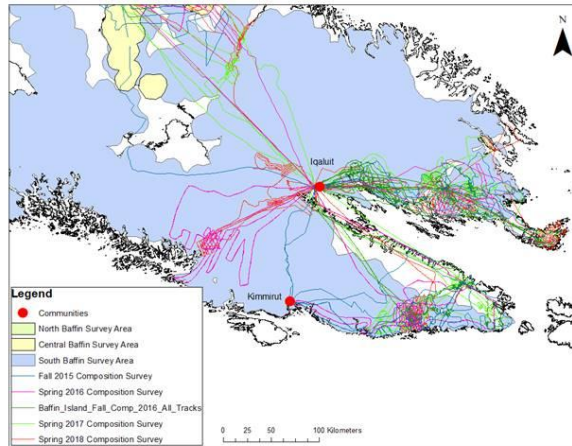
3) ኅኑሃጋጅጋጅ ለርኅጋጅጋጅ ጋጅጋጅጋጅ ርኅጋጅጋጅ ለርኅጋጅጋጅ ጋጅጋጅጋጅ



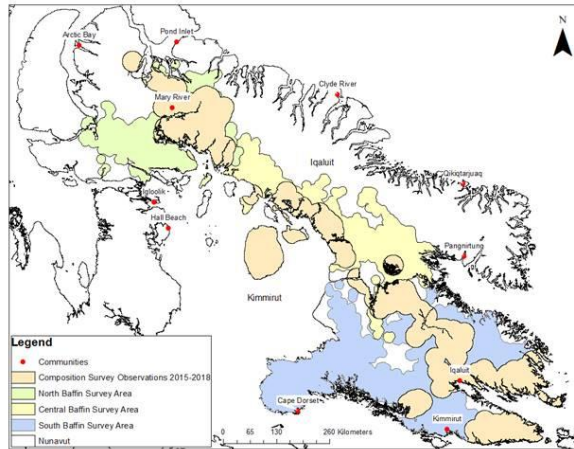
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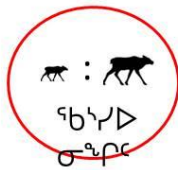


ኅይወተሥነሥና ኅይወተሥነሥ ስርዓት 2015-2018



ግራፊክስ ለምሳሌ
ለምሳሌ

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• 70-90 ስርዓት
• 50-70 ስርዓት ስርዓት
• 30-50 ስርዓት ስርዓት

40 ስርዓት:100 ስርዓት
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ጥናት ስርዓት ስርዓት ስርዓት (ጥ/አ 2001).

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ጥናት?

የኔዮታሽያን ግራም ጠቅላይ ጥናት ላይ የኔዮታሽያን ግራም ጠቅላይ ጥናት ውጤት - የጠቅላይ ጥናት

ጠቅላይ ጥናት

Table 4 Number of observed caribou by demographic group during Baffin Island composition surveys 2015-2018.

Year Season	2015 Fall				2016 Spring				2016 Fall				2017 Spring				2017 Fall				2018 Spring						
	North Baffin Island	Central Baffin Island	Prince Charles Island	South Baffin Island	North Baffin Island	Central Baffin Island	Prince Charles Island	South Baffin Island	North Baffin Island	Central Baffin Island	Prince Charles Island	South Baffin Island	North Baffin Island	Central Baffin Island	Prince Charles Island	South Baffin Island	North Baffin Island	Central Baffin Island	Prince Charles Island	South Baffin Island	North Baffin Island	Central Baffin Island	Prince Charles Island	South Baffin Island			
Calves Observed	55	28	133	49	23	82	49	54	81	47	1	114	92	86	21	18	31	155	21	18	31	155	21	18	31	155	
Cows Observed	77	39	189	64	67	328	222	94	196	120	1	351	249	139	36	33	161	401	36	33	161	401	36	33	161	401	
Calves/100 Cows	71	72	70	77	34	25	22	57	41	39	100	32	37	62	58	55	19	39	58	55	19	39	58	55	19	39	
Yearlings Observed	N/A	N/A	N/A	N/A	10	76	29	N/A	42	23	0	57	75	17	5	7	37	100	5	7	37	100	5	7	37	100	
Bulls Observed	76	29	126	46	25	204	151	54	126	64	6	133	181	74	38	40	73	277	38	40	73	277	38	40	73	277	
Bulls/100 Cows	99	74	67	72	37	62	68	57	53	600	38	73	53	53	106	121	45	69	106	121	45	69	106	121	45	69	
Bull + Cows	153	68	315	110	Not completed	52	532	373	148	322	184	7	484	430	213	74	73	234	678	74	73	234	678	74	73	234	678
Adults + Yearlings Observed	153	68	315	110	Not completed	102	608	402	148	Not completed	364	207	7	541	505	230	Not completed	Not completed	Not completed	79	80	271	778	79	80	271	778
Total Observed (Calves, Yearlings and Adults)	208	96	448	159	125	690	451	202	445	254	8	655	597	316	100	98	302	933	100	98	302	933	100	98	302	933	



40 ልዩ ልዩ ጥናት : 100 ልዩ ልዩ ጥናት ? ልዩ ልዩ ጥናት : 100 ልዩ ልዩ ጥናት ? ልዩ ልዩ ጥናት : 100 ልዩ ልዩ ጥናት

2015-ገ በሮታሊዮስ ልዩ ልዩ ጥናት ይደረግበት ልዩ ልዩ ጥናት ሙሉ ለሙሉ ይኖራል

የኔዮታሽያን ግራም ጠቅላይ ጥናት ላይ የኔዮታሽያን ግራም ጠቅላይ ጥናት ውጤት - የጠቅላይ ጥናት

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Table 4 Number of observed caribou by demographic group during Baffin Island composition surveys 2015-2018.

Year Season	2015 Fall				2016 Spring				2016 Fall				2017 Spring				2017 Fall				2018 Spring						
	North Baffin Island	Central Baffin Island	Prince Charles Island	South Baffin Island	North Baffin Island	Central Baffin Island	Prince Charles Island	South Baffin Island	North Baffin Island	Central Baffin Island	Prince Charles Island	South Baffin Island	North Baffin Island	Central Baffin Island	Prince Charles Island	South Baffin Island	North Baffin Island	Central Baffin Island	Prince Charles Island	South Baffin Island	North Baffin Island	Central Baffin Island	Prince Charles Island	South Baffin Island			
Calves Observed	55	28	133	49	23	82	49	54	81	47	1	114	92	86	21	18	31	155	21	18	31	155	21	18	31	155	
Cows Observed	77	39	189	64	67	328	222	94	196	120	1	351	249	139	36	33	161	401	36	33	161	401	36	33	161	401	
Calves/100 Cows	71	72	70	77	34	25	22	57	41	39	100	32	37	62	58	55	19	39	58	55	19	39	58	55	19	39	
Yearlings Observed	N/A	N/A	N/A	N/A	10	76	29	N/A	42	23	0	57	75	17	5	7	37	100	5	7	37	100	5	7	37	100	
Bulls Observed	76	29	126	46	25	204	151	54	126	64	6	133	181	74	38	40	73	277	38	40	73	277	38	40	73	277	
Bulls/100 Cows	99	74	67	72	37	62	68	57	53	600	38	73	53	53	106	121	45	69	106	121	45	69	106	121	45	69	
Bull + Cows	153	68	315	110	Not completed	52	532	373	148	322	184	7	484	430	213	74	73	234	678	74	73	234	678	74	73	234	678
Adults + Yearlings Observed	153	68	315	110	Not completed	102	608	402	148	Not completed	364	207	7	541	505	230	Not completed	Not completed	Not completed	79	80	271	778	79	80	271	778
Total Observed (Calves, Yearlings and Adults)	208	96	448	159	125	690	451	202	445	254	8	655	597	316	100	98	302	933	100	98	302	933	100	98	302	933	



30-ገ 50-ገ ልዩ ልዩ ጥናት : 100 ልዩ ልዩ ጥናት 30-ገ 50-ገ ልዩ ልዩ ጥናት : 100 ልዩ ልዩ ጥናት 30-ገ 50-ገ ልዩ ልዩ ጥናት : 100 ልዩ ልዩ ጥናት

በሮታሊዮስ ሙሉ ለሙሉ ልዩ ልዩ ጥናት ይኖራል

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Table 4 Number of observed caribou by demographic group during Baffin Island composition surveys 2015-2018.

Year Season	2015				2016				2016				2017				2017				2018															
	Fall				Spring				Fall				Spring				Fall				Spring															
Location	North Baffin Island	Central Baffin Island	Prince Charles Island	South Baffin Island	North Baffin Island	Central Baffin Island	Prince Charles Island	South Baffin Island	North Baffin Island	Central Baffin Island	Prince Charles Island	South Baffin Island	North Baffin Island	Central Baffin Island	Prince Charles Island	South Baffin Island	North Baffin Island	Central Baffin Island	Prince Charles Island	South Baffin Island	North Baffin Island	Central Baffin Island	Prince Charles Island	South Baffin Island												
Calves Observed	55	28	133	49	23	82	49	54	81	47	1	114	92	86	21	18	31	155	77	39	189	64	67	328	222	94	196	120	1	351	249	139	36	33	161	401
Cows Observed	71	72	70	77	34	25	22	57	41	39	100	32	37	62	58	55	19	39	71	72	70	77	34	25	22	57	41	39	100	32	37	62	58	55	19	39
Yearlings Observed	N/A	N/A	N/A	N/A	10	76	29	N/A	42	23	0	57	75	17	5	7	37	100	N/A	N/A	N/A	N/A	10	76	29	N/A	42	23	0	57	75	17	5	7	37	100
Bulls Observed	76	29	126	46	25	204	151	54	126	64	6	133	181	74	38	40	73	277	76	29	126	46	25	204	151	54	126	64	6	133	181	74	38	40	73	277
Bulls/100 Cows	99	74	67	72	37	62	68	57	6	6	600	38	73	53	108	121	45	69	99	74	67	72	37	62	68	57	6	6	600	38	73	53	108	121	45	69
Bull + Cows	153	68	315	110	92	532	373	148	322	184	7	484	430	213	146	173	234	678	153	68	315	110	92	532	373	148	322	184	7	484	430	213	146	173	234	678
Adults + Yearlings Observed	153	68	315	110	102	608	402	148	364	207	7	541	505	230	79	80	271	778	153	68	315	110	102	608	402	148	364	207	7	541	505	230	79	80	271	778
Total Observed (Calves, Yearlings and Adults)	208	96	448	159	125	690	451	202	445	254	8	655	597	316	100	98	302	933	208	96	448	159	125	690	451	202	445	254	8	655	597	316	100	98	302	933

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Table 4 Number of observed caribou by demographic group during Baffin Island composition surveys 2015-2018.

Year Season	2015				2016				2016				2017				2017				2018															
	Fall				Spring				Fall				Spring				Fall				Spring															
Location	North Baffin Island	Central Baffin Island	Prince Charles Island	South Baffin Island	North Baffin Island	Central Baffin Island	Prince Charles Island	South Baffin Island	North Baffin Island	Central Baffin Island	Prince Charles Island	South Baffin Island	North Baffin Island	Central Baffin Island	Prince Charles Island	South Baffin Island	North Baffin Island	Central Baffin Island	Prince Charles Island	South Baffin Island	North Baffin Island	Central Baffin Island	Prince Charles Island	South Baffin Island												
Calves Observed	55	28	133	49	23	82	49	54	81	47	1	114	92	86	21	18	31	155	77	39	189	64	67	328	222	94	196	120	1	351	249	139	36	33	161	401
Cows Observed	71	72	70	77	34	25	22	57	41	39	100	32	37	62	58	55	19	39	71	72	70	77	34	25	22	57	41	39	100	32	37	62	58	55	19	39
Yearlings Observed	N/A	N/A	N/A	N/A	10	76	29	N/A	42	23	0	57	75	17	5	7	37	100	N/A	N/A	N/A	N/A	10	76	29	N/A	42	23	0	57	75	17	5	7	37	100
Bulls Observed	76	29	126	46	25	204	151	54	126	64	6	133	181	74	38	40	73	277	76	29	126	46	25	204	151	54	126	64	6	133	181	74	38	40	73	277
Bulls/100 Cows	99	74	67	72	37	62	68	57	6	6	600	38	73	53	108	121	45	69	99	74	67	72	37	62	68	57	6	6	600	38	73	53	108	121	45	69
Bull + Cows	153	68	315	110	92	532	373	148	322	184	7	484	430	213	146	173	234	678	153	68	315	110	92	532	373	148	322	184	7	484	430	213	146	173	234	678
Adults + Yearlings Observed	153	68	315	110	102	608	402	148	364	207	7	541	505	230	79	80	271	778	153	68	315	110	102	608	402	148	364	207	7	541	505	230	79	80	271	778
Total Observed (Calves, Yearlings and Adults)	208	96	448	159	125	690	451	202	445	254	8	655	597	316	100	98	302	933	208	96	448	159	125	690	451	202	445	254	8	655	597	316	100	98	302	933

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ፍንዳታውጥራ ፍጠራዎችን ለፍንዳታውጥራ ፍጠራዎች - ለጥምረት

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Table 4 Number of observed caribou by demographic group during Baffin Island composition surveys 2015-2018.

Year Season	2015 Fall				2016 Spring				2016 Fall				2017 Spring				2017 Fall				2018 Spring										
	North Baffin Island		Central Baffin Island		Prince Charles Island		South Baffin Island		North Baffin Island		Central Baffin Island		Prince Charles Island		South Baffin Island		North Baffin Island		Central Baffin Island		Prince Charles Island		South Baffin Island		North Baffin Island		Central Baffin Island		Prince Charles Island		South Baffin Island
Calves Observed	55	28	133	49	23	82	49	54	81	47	1	114	92	86			21	18	31	155											
Cows Observed	77	39	189	64	67	328	222	94	196	120	1	351	249	139			36	33	161	401											
Calves/100 Cows	71	72	70	77	34	25	22	57	41	39	100	32	37	62			58	55	19	39											
Yearlings Observed	N/A	N/A	N/A	N/A	10	76	29	N/A	42	23	0	57	75	17			5	7	37	100											
Bulls Observed	76	29	126	46	25	204	151	54	126	64	6	133	181	74			38	40	73	277											
Bulls/100 Cows	99	74	67	72	37	62	68	57	64	64	7	484	430	53			74	73	234	678											
Bull + Cows	153	68	315	110	Not completed	92	532	373	148	322	184	7	484	213			Not completed	74	73	234											
Adults + Yearlings Observed	153	68	315	110	Not completed	102	608	402	148	Not completed	364	207	7	541	505	230	Not completed	Not completed	Not completed	79	80	271	778								
Total Observed (Calves, Yearlings and Adults)	208	96	448	159	125	690	451	202	445	254	8	655	597	316			100	98	302	933											

↑ 40 ፍንዳታውጥራ : 100 ፍጠራዎች
↑ 40 ፍንዳታውጥራ : 100 ፍጠራዎች
? ፍንዳታውጥራ : 100 ፍጠራዎች

2015-ፎ በርከራዎች ፍንዳታውጥራ ለፍጠራዎች ለፍጠራዎች ለፍጠራዎች ለፍጠራዎች

ፍንዳታውጥራ ፍጠራዎችን ለፍንዳታውጥራ ፍጠራዎች - ለጥምረት

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Table 4 Number of observed caribou by demographic group during Baffin Island composition surveys 2015-2018.

Year Season	2015 Fall				2016 Spring				2016 Fall				2017 Spring				2017 Fall				2018 Spring										
	North Baffin Island		Central Baffin Island		Prince Charles Island		South Baffin Island		North Baffin Island		Central Baffin Island		Prince Charles Island		South Baffin Island		North Baffin Island		Central Baffin Island		Prince Charles Island		South Baffin Island		North Baffin Island		Central Baffin Island		Prince Charles Island		South Baffin Island
Calves Observed	55	28	133	49	23	82	49	54	81	47	1	114	92	86			21	18	31	155											
Cows Observed	77	39	189	64	67	328	222	94	196	120	1	351	249	139			36	33	161	401											
Calves/100 Cows	71	72	70	77	34	25	22	57	41	39	100	32	37	62			58	55	19	39											
Yearlings Observed	N/A	N/A	N/A	N/A	10	76	29	N/A	42	23	0	57	75	17			5	7	37	100											
Bulls Observed	76	29	126	46	25	204	151	54	126	64	6	133	181	74			38	40	73	277											
Bulls/100 Cows	99	74	67	72	37	62	68	57	64	64	7	484	430	53			74	73	234	678											
Bull + Cows	153	68	315	110	Not completed	92	532	373	148	322	184	7	484	213			Not completed	74	73	234											
Adults + Yearlings Observed	153	68	315	110	Not completed	102	608	402	148	Not completed	364	207	7	541	505	230	Not completed	Not completed	Not completed	79	80	271	778								
Total Observed (Calves, Yearlings and Adults)	208	96	448	159	125	690	451	202	445	254	8	655	597	316			100	98	302	933											

↓ 30-ፎ 50-ፎ ፍጠራዎች : 100 ፍጠራዎች
↑ 30-ፎ 50-ፎ ፍጠራዎች : 100 ፍጠራዎች
↑ 30-ፎ 50-ፎ ፍጠራዎች : 100 ፍጠራዎች

በርከራዎች ፍጠራዎች ለፍጠራዎች ለፍጠራዎች ለፍጠራዎች

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2019-፲ ልማት ፎንድ

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ፍጹም ልማት ፎንድ ፲፱፻፲፱ ልማት ፎንድ

ፍጹም ልማት ፎንድ ፍጹም ልማት ፎንድ ፍጹም ልማት ፎንድ

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ፍጹም ልማት ፎንድ ፍጹም ልማት ፎንድ ፍጹም ልማት ፎንድ

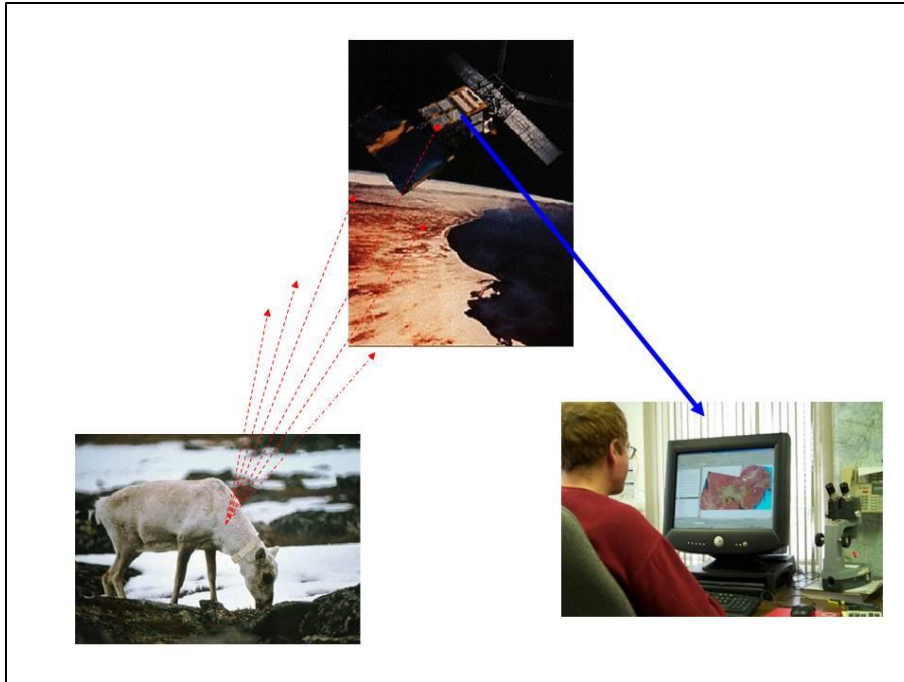
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ፍጹም ልማት ፎንድ

- ፍጹም ልማት ፎንድ ፍጹም ልማት ፎንድ

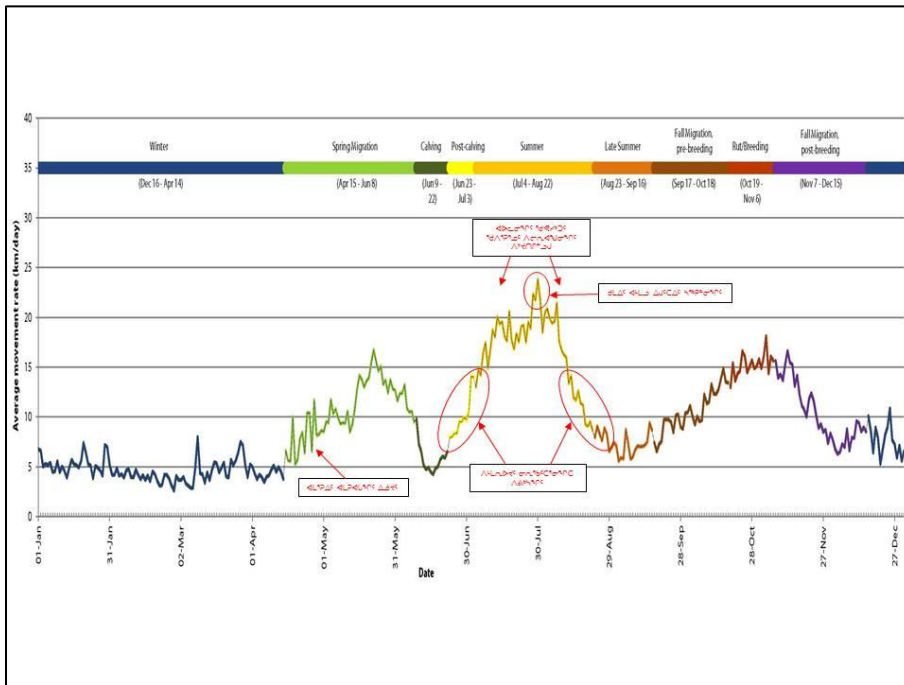
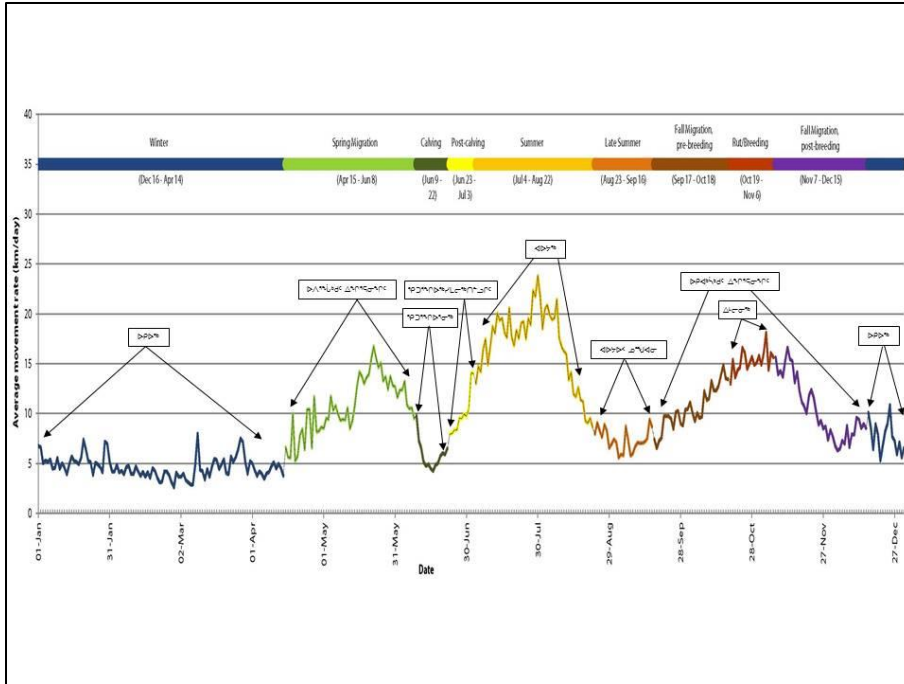
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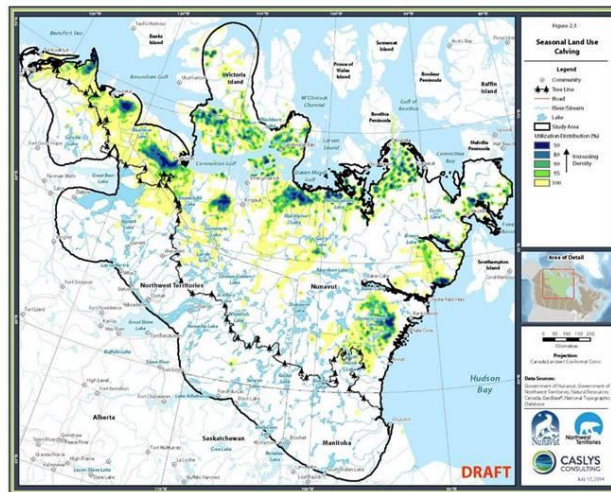




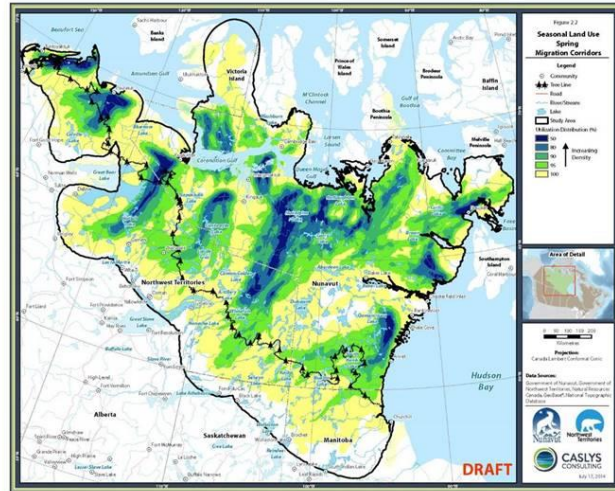
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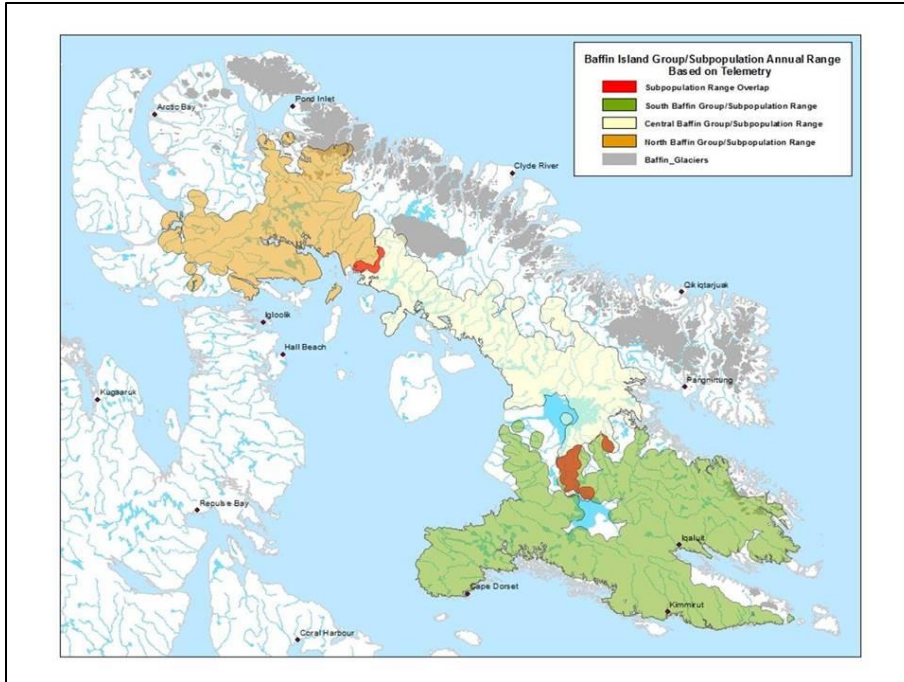


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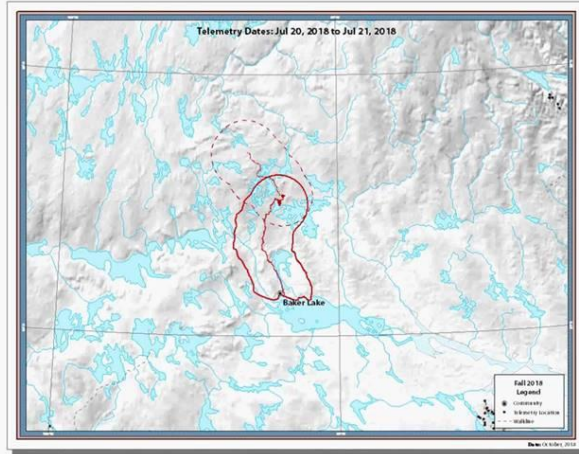
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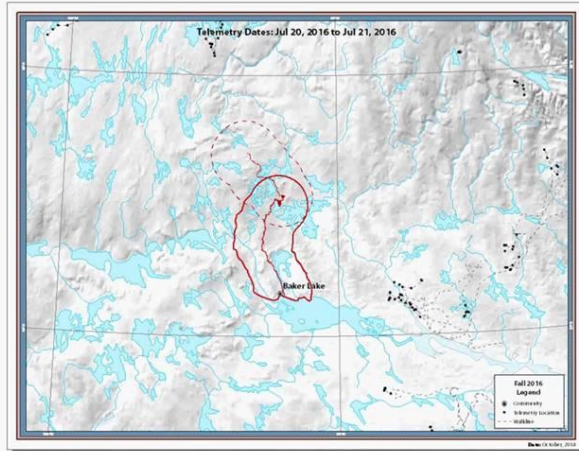


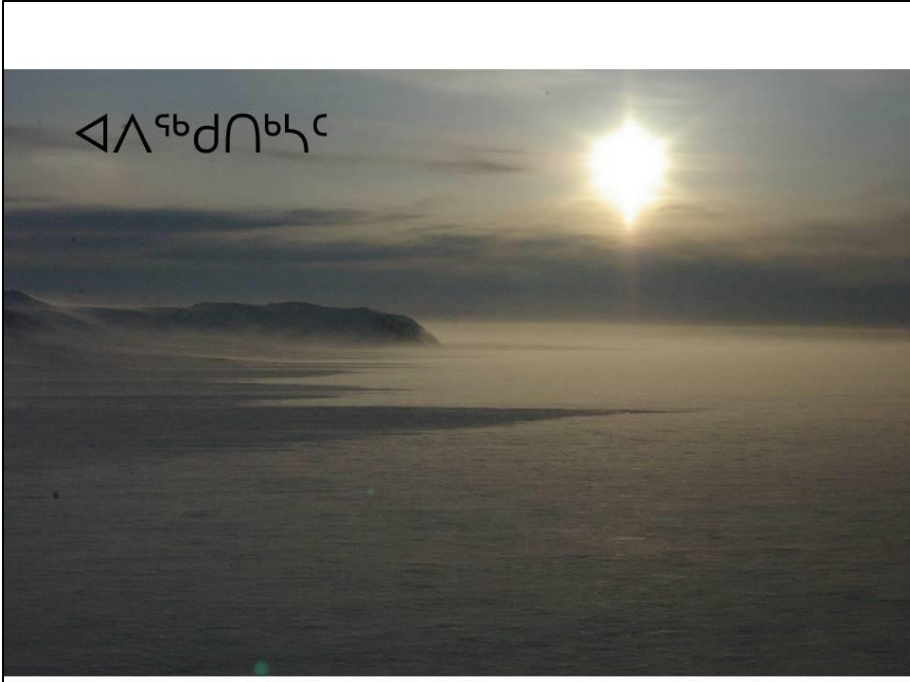
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2018



2016





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GOVERNMENT OF NUNAVUT: DEPARTMENT OF ENVIRONMENT

Baffin Island Caribou Management Plan

Working together to ensure Baffin Island caribou harvest is sustainable

EN DOE
July 2018

ᑲᑲᐴᕐᑲᑲᓯ ᐃᐱᕐᑦᑲᑲᓯ

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EN DOE
JUL 2018

የሥራ ልማት ጥቅም ላይ ላይ የሚውል?

- የግብርና ማህበረሰብ ልማት ጥቅም ላይ ላይ የሚውል
 - ግብርና ማህበረሰብ
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 - የግብርና ማህበረሰብ ልማት ጥቅም ላይ ላይ የሚውል (2028)–ግብር

የግብርና ማህበረሰብ



ጋራ ሥራ: ለሰላምና ለሰላም

የጋራ ሥራ ለሰላምና ለሰላም ጋራ ሥራ

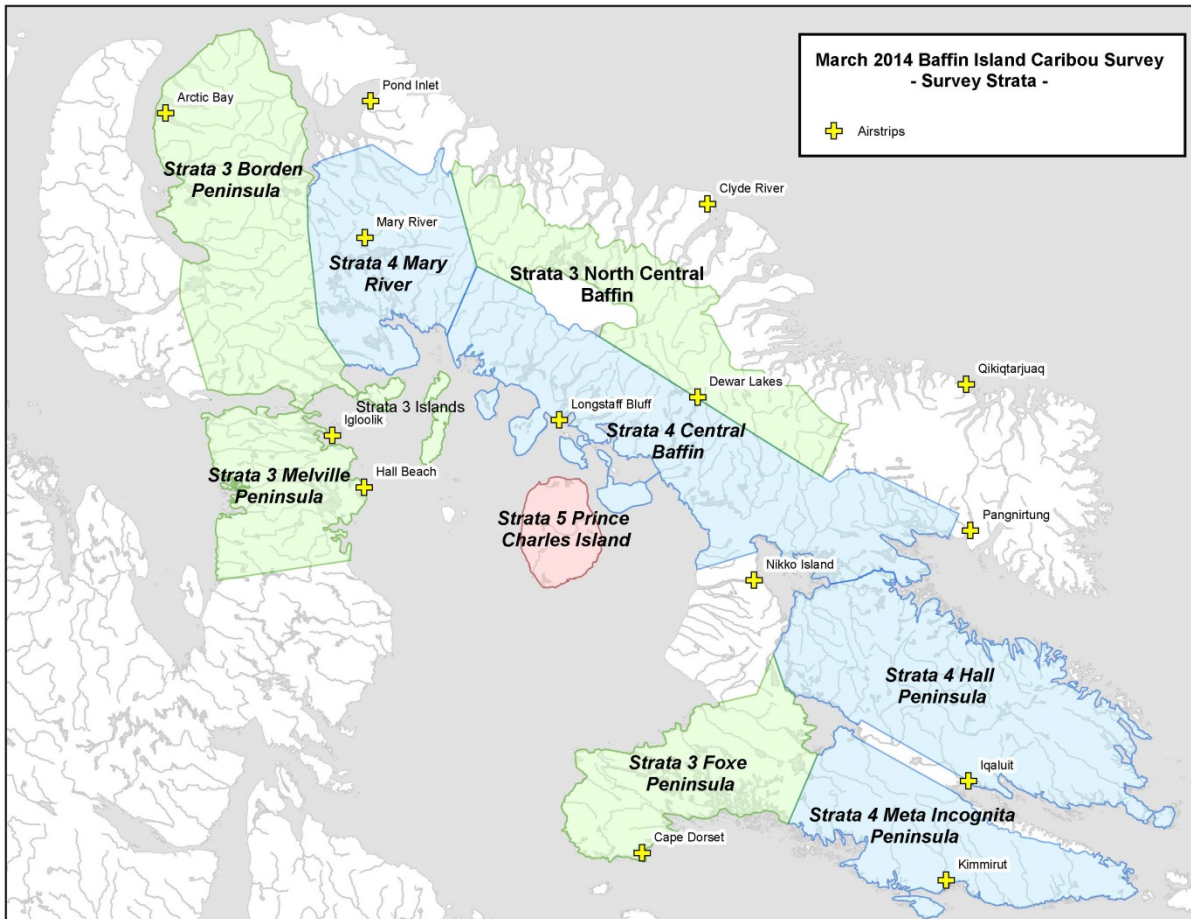
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ጋራ ሥራ ለሰላምና ለሰላም

GN DOE

ጋራ 2018

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Kotierk, M. 2015a. Public and Inuit Interests, Baffin Island Caribou and Wildlife Management: Results of a Public Opinion Poll in Baffin Island Communities. Government of Nunavut, Department of Environment, Igloolik, NU, 76pp. ᐏᕐᐱᕐᐏᕐ, ᐏᕐ. 2015a.

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TEXT of the polar bear harvest *Flexible Quota System* as proposed by the Government of Nunavut

II. 1 to 1 Harvest Option

Rationale and administration of the 1:1 harvest system

1. Rationale

During the public hearing process regarding the implementation of Nunavut's Polar Bear Co-Management Plan by the Nunavut Wildlife Management Board, many comments by Inuit organizations were brought forward that favoured a new harvest approach. For years, communities have expressed a desire to adopt a harvest regimen that does not penalize communities as sharply as the flexible quota system when females are overharvested, and that allows harvesting at an equal sex ratio. In response, the **one male for every one female harvest option (or 1:1)** was discussed and recommended by the Department of Environment.

Each polar bear subpopulation within Nunavut has a set Total Allowable Harvest (TAH), which is divided among the communities that harvest from the subpopulation, by the appropriate Regional Wildlife Organization(s), as a base allocation. Each harvest season, communities are assigned a harvest quota based on the TAH allocation and any overharvests from previous seasons. Overharvests in one season result in a reduced community quota the following season, unless the community has accumulated sufficient credits to compensate for the overharvest. When a community harvests below their harvest quota they can accumulate sex specific credits to be used in future harvest seasons or shared with other communities.

The updated harvest sex ratio, allowing one female bear harvested for every male bear harvested (1:1 sex ratio) does not constrain communities to adhere to the exact 1:1 sex ratio. Rather, it refers to the maximum proportion of female polar bears in the harvest that is allowed under this system. Specifically, a harvest sex ratio of up to 50% females, per community per harvest season, is allowed without entering into an overharvest situation. Males can be harvested up to the limit of the annual recommended quota. Recommended quota allocations can never exceed a 50% female proportion, even when a reduction in quotas occur.

2. Overharvest Situation

2.1. An overharvest situation occurs when:

2.1.1. The female proportion in the annual harvest is greater than 50% of the recommended quota,

- 2.1.2. The male proportion in the annual harvest is in excess of the total recommended quota, or
 - 2.1.3 A combination of the male and female harvest exceeds the total recommended quota.
- 2.2. An overharvest (males and females combined) over the TAH, or when the number of females taken is over 50%, results in a reduction of the quota the following year either by the number of bears over the TAH or by the number of females that exceed 50% of the recommended quota, whichever is more.

3. Implementation

- 3.1. The implementation of the 1:1 harvest system is retroactive and begins with the 2018/2019 harvest season (July 1, 2018). The existing total community annual base allocation (TAH) was divided by two, in order to determine the 1:1 sex ratio for each community, representing the 1:1 base allocation for each community for 2018/2019. This process increases the allowable female proportion of the harvest. The annual base allocation will only change when there is a new subpopulation estimate and/or a new determination of the TAH.
- 3.2. If the base allocation is an odd number then the TAH will always have one more male than females in order to implement a protective measure for females.
- 3.3. Annual recommended quotas are calculated using the previous year's harvest data.
- 3.4. Recommended quotas will be calculated based on the sections below.

4. Mortality Accounting

- 4.1. All human-caused mortality to polar bears will count towards the annual recommended quota of the nearest community, except Section 4.3.
- 4.2. A naturally abandoned cub will be counted as a natural death and not counted against the TAH.
- 4.3. Any bear that is found near death caused by starvation or injury, provided that the injury is not a result of human activity such as hunting or trapping, can be killed as a humane action where the Conservation Officer (CO) will certify that the bear was near death. After certification by the CO, the humane kill (euthanization) will not be counted against the TAH.

- 4.4. If a Nunavut Inuit kills a bear, the tag will come from that person's home community if that community has a TAH in the population from which the bear was harvested. Otherwise, closest community to the harvest location must provide the tag.
- 4.5. Harvesting of a family group or members of a family group is illegal in Nunavut; however, there are circumstances where a family group or members of a family group may be destroyed in Defence of Life and Property Kill (DLPK) circumstances.
 - 4.5.1. When a female with cubs-of-the-year (COYs), yearlings, or juveniles (2-year old offspring) are killed, then
 - 4.5.1.1. For TAH determination purposes, the COYS and yearlings are counted as males and only $\frac{1}{2}$ tag each.
 - 4.5.1.2. The juveniles (2-year old offspring) are counted as whole tags of whatever sex they are.
 - 4.5.2. If the mother is killed but the COYS, yearlings and juveniles run away after the female is killed, then
 - 4.5.2.1. The COYS and yearlings are counted as $\frac{1}{2}$ tag and all male.
 - 4.5.2.2. The juveniles (2-year olds) are each counted as whole tags and the sex is counted as $\frac{1}{2}$ male and $\frac{1}{2}$ female.
- 4.6. In a case where a community overharvests by 1 COY or yearling, credits will be used to cover the harvest. In the event there are not enough credits to cover the overharvest of 0.5 male, the TAH will not be reduced by 0.5 tag at that time, and a record is kept with the Polar Bear Harvest Lab of these fractional reductions. The deduction will occur when there is another COY or yearling harvested to equal a full male bear reduction or if the following year's harvest results in credit accumulation, the 0.5 credit deduction will be taken from the accumulated credits.

5. Credits

- 5.1. Available credits may be used to address all types of kills, including accidental, illegal, and DLPKs.
- 5.2. If a community is in an overharvest situation, all available community credits will be applied automatically by the Polar Bear Harvest

Laboratory in order to maximize the community's harvest opportunities the following year.

- 5.3. Credits are specific to a given subpopulation and cannot be used for other subpopulations.
- 5.4. Subpopulation credits accumulate until a new TAH is determined. This may include a subpopulation inventory that has been conducted and a final abundance estimate result is produced. In some circumstances, a completed and finalized harvest risk analysis may also be conducted, or the Nunavut Wildlife Management Board recommends a change in TAH for other management purposes. Under these circumstances, all credits are set back to zero.

Credits are accumulated as described in the following sections after the new TAH is implemented, and during any harvest season:

- 5.5. Credits can accumulate for males and females.
- 5.6. Credits accumulate for unused portions of the recommended quota or TAH.
 - 5.6.1. In the case where a community has a recommended quota of zero, and a total harvest of zero, credits will accumulate according to the community's TAH (if the TAH is different to zero).
 - 5.6.2. No positive credits accumulate when a community's TAH, or recommended quota, is met or exceeded by the harvest of bears, irrespective of the sex composition of the community's total harvest.
 - 5.6.3. No positive credits accumulate when the female proportion of the harvest exceeds 50% of the recommended quota.
 - 5.6.4. Female positive credits can accumulate up to 50% of the total proportion of the TAH or the recommended quota, whichever is less.
- 5.7. Negative credits are possible and represent the number of bears that have been removed from the subpopulation in excess of a community's recommended quota or TAH, whichever is more in excess.
- 5.8. Credits can be exchanged between communities within the same subpopulation.
 - 5.8.1. Communities that harvest from the same subpopulation can exchange credits, where needed, in order to restore their full

recommended quota rather than facing a reduction when no community credits are available to cover an overharvest. The existing process for credit exchange between communities will be maintained.

5.8.2. Requests by communities to use credits to increase their annual recommended quota shall be made to, and approved by, the responsible RWO. The GN will verify and confirm the number of available credits.

6. Recommended Quota Adjustments

- 6.1. Reductions caused by an overharvest occur where no credits are available to cover the overharvest.
- 6.2. In order to protect communities from years of reduced or no harvest opportunities, resulting from persistent overharvest, the 1:1 system adapts to allow restoration of the full TAH. The recommended quota will be set to zero in situations in which no credits are available and a quota reduction cannot restore the TAH.
- 6.3. Depending on the number of negative credits, there may be continued reductions in the recommended quota in order to restore credits to zero and reinstate the full TAH.

Reductions in the recommended quota and credit administration occur as follows:

- 6.4. Adjustments in Cases of Female Overharvest:
 - 6.4.1. When a community harvests greater than 50% females of the recommended quota, a reduction of next year's recommended quota will occur if there are not sufficient female credits to cover the overharvest. The following year's quota will be reduced by the number of females that were overharvested and not covered by credits. The reduction will affect the female proportion of next year's quota.
- 6.5. Adjustments in Cases of Male Overharvest:
 - 6.5.1. When the harvest exceeds the total recommended quota or the TAH, and the female proportion of the harvest is less than 50%, then an overharvest of males occurred. Where application of credits does not cover this overharvest, a reduction equalling the number of overharvested males will be applied to the male proportion of the next year's recommended quota.

6.6. Adjustments in Cases of Combination Male and Female Overharvest:

6.6.1. When females are harvested in excess of 50% of the recommended quota and the sum of the total harvest (males and females together) exceeds the recommended quota, a reduction in next year's recommended quota will occur for each gender based on the number of bears overharvested.

7. Floating Tags

"Floating tags" are additional tags allocated by RWOs. These floating tags can be administered up to a 1:1 sex ratio, at the discretion of the RWO. Once allocated by the RWO, they are added to the total annual base allocation for the recipient community for that year.

- 7.1. Unused floating tags are accumulated as credits in the gender they were allocated.
- 7.2. The floating tags, when allocated by the RWO, should not create a situation where the female proportion exceeds 50%.



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Building Nunavut Together
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Bâtir le Nunavut ensemble

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Minister of Environment
Ministaat Avatiliqiyitkut
Ministre de l'Environnement

August 26, 2019

Mr. Daniel Shewchuk
Acting Chairperson
Nunavut Wildlife Management Board
P.O Box 1379
Iqaluit, NU X0A 0H0

Translation
to follow

Re: Reconsideration of Proposed Changes to the Nunavut Polar Bear Sex-Selective Harvest Ratio and the Flexible Quota System

Dear Mr. Shewchuk,

Thank you very much for your decision concerning proposed changes to the Nunavut polar bear sex-selective harvest ratio and the flexible quota system.

To reiterate the decision of the NWMB:

- *“RESOLVED that the NWMB establish, per sections 5.3.3(c) and 5.6.48 of the Nunavut Agreement, a sex-selective harvest ratio of one female bear harvested for every male bear (1:1), applicable to all polar bear subpopulations in the Nunavut Settlement Area, until new science or Inuit Qaujimaqatuqangit information becomes available.*
- *FURTHER, recommends that the Government of Nunavut revise the ‘Flexible Quota System’, used in Nunavut to administer community polar bear allocations, to reflect the 1:1 harvest sex ratio and provide the revised document to the NWMB for consideration.*

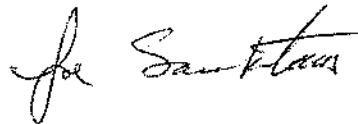
I hereby accept your decision to change the Nunavut polar bear harvest sex ratio to allow one female bear to be harvested for every male bear (1:1); applicable to all polar bear subpopulations in the Nunavut Settlement Area. This decision is an important step in addressing valuable feedback and concerns expressed during the public hearing process for the Nunavut Polar Bear Co-Management Plan.

My officials have made the necessary revisions to the current flexible quota system and the revised information is appended to this letter. The revisions to the quota system will ensure that the management and tracking of the harvest can best function with the adjustment to the harvest sex ratio and be clear and understandable for wildlife managers and users alike. I request that the Board and Board staff review the revised credit calculation system and provide any necessary feedback to the relevant staff in my department. The revised system will also be shared with co-management for their review and feedback.

I will implement the harvest ratio decision forthwith along with the functional credit calculation system.

I would like to thank the Board for their consideration on how to best move forward with this harvest management decision. We are encouraged by the collaborative efforts on this matter, which is of great importance to Nunavummiut.

Sincerely,



Joe Savikataaq,
Minister of Environment

Cc. Jimmy Noble Jr., Deputy Minister
Steve Pinksen, A/Deputy Minister
Drikus Gissing, Director of Wildlife

SEE TAB3A for a revised version of Appendix C

Appendix C

II. 1 to 1 Harvest Option

Rationale and administration of the 1:1 harvest system

Rationale:

During the public hearing process regarding the implementation of Nunavut's Polar Bear Co-Management Plan by the Nunavut Wildlife Management Board, many comments by Inuit organizations were brought forward that favoured a new harvest approach. For years, communities have expressed a desire to adopt a harvest regimen that does not penalize communities as sharply as the flexible quota system when females are overharvested, and that allows harvesting at an equal sex ratio. In response, the **1 male for every 1 female harvest option (or 1:1)** was discussed and recommended by the Department of Environment.

Each polar bear subpopulation within Nunavut has a set Total Allowable Harvest (TAH), which is divided among the communities that harvest from the subpopulation, by the appropriate Regional Wildlife Organization(s), as a base allocation. Each harvest season, communities are assigned a harvest quota based on the TAH allocation and any overharvests from previous seasons. Overharvests in one season result in a reduced community quota the following season, unless the community has accumulated sufficient credits to compensate for the overharvest. When a community harvests below their harvest quota they can accumulate sex specific credits to be used in future harvest seasons or shared with other communities.

The updated harvest sex ratio, allowing one female bear harvested for every male bear harvested (1:1 sex ratio) does not constrain communities to adhere to the exact 1:1 sex ratio. Rather, it refers to the maximum proportion of female polar bears in the harvest that is allowed under this system. Specifically, a harvest sex ratio of up to 50% females, per community per harvest season, is allowed without entering into an overharvest situation. Males can be harvested up to the limit of the annual recommended quota. Recommended quota allocations can never exceed a 50% female proportion, even when reductions in quotas occur.

An overharvest situation occurs when:

- 1) the female proportion in the annual harvest is greater than 50% of the recommended quota;
- 2) the male proportion in the annual harvest is in excess of the total recommended quota; or

- 3) a combination of the male and female harvest exceeds the total recommended quota.

An overharvest (males and females combined) over the TAH, or when the number of females taken is over 50%, results in a reduction of the quota the following year either by the number of bears over the TAH or by the number of females that exceed 50% of the recommended quota, whichever is more.

The implementation of the 1:1 harvest system is retroactive and begins with the 2018/2019 harvest season (July 1, 2018). The existing total community annual base allocation (TAH) was divided by two in order to determine the 1:1 sex ratio for each community, representing the 1:1 base allocation for each community for 2018/2019. This process increases the female proportion of the harvest and reduces the male proportion. The annual base allocation will only change when there is a new subpopulation estimate and/or a new determination of the TAH.

If the base allocation is an odd number then the TAH will always have one more male than females in order to implement a protective measure for females.

Annual recommended quotas are calculated using the previous year's harvest data.

Recommended quotas will be calculated based on the sections below.

HARVESTING MORTALITY

1. All human-caused mortality to polar bears will count towards the annual recommended quota of the nearest community.
2. A naturally abandoned cub will be counted as a natural death and not counted against the TAH.
3. Any bear that is found near death, caused by starvation or injury, provided that the injury is not a result of human activity such as hunting or trapping, can be killed as a humane action where the Conservation Officer (CO) will certify that the bear was near death. After certification by the CO the humane kill (euthanization) will not be counted against the TAH.
4. When a Nunavut beneficiary kills a bear, the tag will come from that person's home community if that community has a TAH allocation for the population from which the bear was harvested. Otherwise, the nearest community must provide the tag.
5. Harvesting of a family group, or members of a family group, is illegal in Nunavut; however, there are circumstances where a family group or

members of a family group may be destroyed in defense of life and property kill (DLPK) circumstances.

- (a) When a female with cubs-of the-year (COYs), yearlings, or juveniles (2-year old offspring) are killed, then
 - (i) For TAH determination purposes, the COYS and yearlings are counted as males and only $\frac{1}{2}$ tag each.
 - (ii) The juveniles are counted as whole tags of whatever sex they are.
 - (b) If the mother is killed but the COYS, yearlings and juveniles run away after the female is killed, then
 - (i) the COYS and yearlings are counted as $\frac{1}{2}$ tag and all male.
 - (ii) the juveniles (2yr olds) are each counted as whole tags and the sex is counted as $\frac{1}{2}$ male and $\frac{1}{2}$ female.
6. In a case where a community overharvests by one COY or yearling, credits will be used to cover the harvest. In the event there are not enough credits to cover the overharvest of 0.5 male, the TAH will not be reduced by 0.5 tag at that time, and a record is kept with the Polar Bear Harvest Lab of these fractional reductions. The deduction will occur when there is another COY or yearling harvested to equal a full male bear reduction or if the following year's harvest results in credit accumulation, the 0.5 credit deduction will be taken from the accumulated credits.

CREDITS

1. Available credits may be used to address all types of kills, including accidental, illegal, and DLPKs.
2. If a community is in an overharvest situation, all available community credits will be applied automatically by the Polar Bear Harvest Laboratory in order to maximize the community's harvest opportunities the following year.
3. Credits are specific to a given subpopulation and cannot be used for other subpopulations.

4. Subpopulation credits accumulate until a new subpopulation inventory with final abundance estimate results, and in some circumstances, a completed and finalized harvest risk analysis. In those circumstances, all credits are set back to zero because the new TAH is based on the total new population estimate, which incorporates the unrealized credits as living bears that have added to the population, and the entire sustainable take is allocated to the new TAH. Credits are accumulated as described in section 8 after the new TAH is implemented, and during any harvest season.
5. Credits can accumulate for males and females.
6. Credits accumulate for unused portions of the recommended quota or TAH (e.g. a total harvest of 0 for communities with a recommended quota of 0 results in the accumulation of male and female credits respective of the community TAH).
7. Negative credits are possible and represent the number of bears that have been removed from the subpopulation in excess of a community's recommended quota.
8. Credits can be exchanged between communities within the same subpopulation.
 - a) Communities that harvest from the same subpopulation can exchange credits where needed in order to restore their full recommended quota rather than facing a reduction when no community credits are available to cover an overharvest. The existing process for credit exchange between communities will be maintained.
 - b) Requests by communities to use credits to increase their annual recommended quota shall be made to and approved by the responsible RWO. The GN will verify and confirm the number of available credits.

RECOMMENDED QUOTA ADJUSTMENTS

Reductions caused by an overharvest occur where no credits are available to cover the overharvest. Reductions in the recommended quota and credit administration occur as follows:

1. When a community harvests greater than 50% females of the recommended quota, a reduction of next year's recommended quota will occur if there are not sufficient female credits to cover the overharvest. The following year's quota will be reduced by the number of females that were overharvested and not covered by credits. The reduction will affect the female proportion of next year's quota.

2. In order to protect communities from years of reduced or no harvest opportunities resulting from persistent overharvest, the 1:1 system adapts to allow restoration of the full TAH. The recommended quota will be set to zero in situations in which no credits are available and a quota reduction cannot restore the TAH.
 - a. Depending on the number of negative credits, there may be continued reductions in the recommended quota in order to restore credits to zero and reinstate the full TAH.

FLOATING TAGS

“Floating tags” are additional tags allocated by RWOs. These floating tags can be administered up to a 1:1 sex ratio, at the discretion of the RWO. Once allocated by the RWO, they are added to the total annual base allocation for the recipient community for that year.

- a) Unused floating tags are accumulated as credits in the gender they were allocated.

- b) The floating tags, when allocated by the RWO, should not create a situation where the female proportion exceeds 50%.



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Nunavunmi Anngutighatigut Aulapkaijitkut Katimajiat
Nunavut Wildlife Management Board

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Tammaqtailinahuarniriit anngutighat atuqhugit Inuit qaujimajatuqangillu ilihimaniillu ilitquhiannin
Conserving wildlife through the application of Inuit Qaujimajatuqangit and scientific knowledge

August 12, 2019

Honourable Joe Savikataaq
Minister of Environment
Government of Nunavut

Dear Minister Savikataaq:

Re: Reconsideration of Proposed Changes to the Nunavut Polar Bear Sex-Selective Harvest Ratio and the Flexible Quota System

At the Nunavut Wildlife Management Board (NWMB or Board) March 2019 Regular Meeting, your Department asked the Board to adjust the polar bear harvest sex ratio from two males for every female (2:1) to one male for every female (1:1), applicable to all Nunavut sub-populations. The proposal also asked for a revision to the provisions of the “Flexible Quota System”¹ to accommodate these changes. The Board considered this proposal during its In-Camera meeting (IC001-2019) on March 8, 2019, and postponed decision making until the *Nunavut Polar Bear Co-Management Plan* decision-making process is complete.

During its internal In-Camera meeting (INT009-2019) on July 24, 2019, the Board reconsidered this proposal, and reached the following resolution and recommendation:

Resolved that the NWMB establish, per sections 5.3.3(c) and 5.6.48 of the Nunavut Agreement, a sex-selective harvest ratio of one female bear harvested for every male bear (1:1), applicable to all polar bear subpopulations in the Nunavut Settlement Area, until new science or Inuit Qaujimajatuqangit information becomes available.

Further, recommends that the Government of Nunavut revise the ‘Flexible Quota System,’ used in Nunavut to administer community polar bear

¹ The flexible quota system is used in Nunavut to administer the portion of the Total Allowable Harvest allocated to a given community. The system allows for credits to be accumulated when the annual allocation is under-harvested and for over-harvested bears to be subtracted from the next year’s base allocation.



allocations, to reflect the 1:1 harvest sex ratio and provide the revised document to the NWMB for consideration.

In reaching these decisions, the NWMB considered the following:

1. The NWMB decision paves the way for the completion of the *Nunavut Polar Bear Co-Management Plan*.

On March 20, 2019, the NWMB sent its decision package concerning the management plan to you, per section 5.3.8 of the Nunavut Agreement. In it, the NWMB changed the polar bear harvest sex ratio from the current 2:1 system to a 1:1 system, whereby the overharvest of males or females is penalized by removing the same number of males or females from the following year's allocation. This NWMB's decision took into consideration the views of parties to the management plan public hearing, who expressed frustrations about the difficulties in the administration of the sex-selective harvesting and the excessive penalizations that occur when females are over-harvested.

On May 17, 2019, you disallowed the NWMB decision partially because of your Department's perceived legislative challenge in making changes to polar bear sex-selective harvest through a management plan.

The NWMB has considered your position and is now providing you with a separate *Nunavut Agreement* s. 5.6.48 decision for consideration. In reaching this decision, the Board considered and applauded your willingness to listen to Nunavummiut who have expressed concerns about the 2:1 harvesting system. Even though the 2:1 system has been instrumental to the recovery of several polar bear subpopulations in Nunavut while maximizing harvesting opportunities for Inuit, the NWMB agrees with what we heard from Inuit at the hearing: that changes to the current harvest management system are required to address today's challenges—especially threats to human safety. The NWMB hopes that this decision will pave the way for prompt completion of the management plan decision-making process so that together with our co-management partners, we can deliver on the much-anticipated *Nunavut Polar Bear Co-Management Plan*.



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Nunavunmi Anngutighatigut Aulapkaijitkut Katimajiat
Nunavut Wildlife Management Board

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Tammaqtailinahuarniriit anngutighat atuqhugit Inuit qaujimajatuqangillu ilihimaniillu ilitquhiannin
Conserving wildlife through the application of Inuit Qaujimajatuqangit and scientific knowledge

2. There is a need for a comprehensive review of the Flexible Quota System to accommodate changes to the sex-selective harvest ratio.

In your proposal to the NWMB, you asked the Board also to approve changes to the Flexible Quota System, so that (1) harvesting of females over 50% of a community's allocation in one year will reduce the allocation the following year, and (2) communities will be allowed to harvest males up to the limit of their allocation. The NWMB is open to considering such changes but would like to do so within the context of a comprehensive review of the entire Flexible Quota System (Appendix C of the *Nunavut Polar Bear Co-Management Plan*), because some of these proposals might represent a deviation from the 1:1 sex-selective harvesting approach. For example, it is not clear if communities will be able to carry over female credits if males are overharvested within or above the community quota. The Board welcomes an opportunity to consider revisions to the Flexible Quota System at the earliest time possible.

The NWMB looks forward to your reply and prompt completion of the *Nunavut Agreement* Article 5 decision-making process.

Should you or your officials have any questions or concerns about the content of this letter, please contact the NWMB

Yours sincerely,

Daniel Shewchuk
Chairperson of the
Nunavut Wildlife Management Board

cc - Drikus Gissing, Director of Wildlife Management, Nunavut Department of Environment

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**DISTRIBUTION AND ABUNDANCE OF PEARY CARIBOU (*Rangifer tarandus pearyi*)
AND MUSKOX (*Ovibos moschatus*) ON CENTRAL ELLESMERE ISLAND, MARCH 2017**

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January 2019

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IGLOOLIK, NU

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Summary

We flew a survey of central Ellesmere Island (Fosheim Peninsula, Raanes Peninsula, and Svendsen Peninsula), Nunavut, between March 8th and 20th, 2017 to update the regional abundance estimate for Peary caribou (*Rangifer tarandus pearyi*) and muskox (*Ovibos moschatus*). This survey was intended to be the second portion of three consecutive surveys that together would cover the entirety of Ellesmere Island. The southern portion was surveyed in 2015 and the northern portion was planned to be surveyed in 2018, however the survey did not occur due to logistical and financial constraints. Before 2017 the most recent survey of central Ellesmere Island was in May 2006 (which included northern Ellesmere Island).

Muskoxen were most abundant north of the Sawtooth Range on the Fosheim Peninsula with moderate densities of muskoxen found on the northern portion of Raanes Peninsula and the southern portion of Svendsen Peninsula. A total of 2,153 muskoxen were observed, and we estimated $6,902 \pm \text{SE } 1,036$ (95% confidence interval [CI] = 5,134-9,278, coefficient of variation [CV] = 15%) across central Ellesmere Island. The previous estimate for the area (from 2006) was 8,115 (95% CI 6,632 – 9,930) but also included northern Ellesmere Island. A separate population estimate for central Ellesmere Island was not calculated from the 2006 survey.

Fourteen Peary caribou were seen on transect during the survey, and we estimated a population of $32 \pm \text{SE } 25$ (95% CI = 8-127, CV = 79%). The few observations provided for a very imprecise estimate. Peary caribou were observed on the north portion of Raanes and Svendsen Peninsulas, and one group was seen at the south end of Fosheim Peninsula.

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Introduction

Caribou (*Rangifer tarandus*) and muskoxen (*Ovibos moschatus*) are the largest herbivores that inhabit the Canadian Arctic Archipelago. Peary caribou (*R. t. pearyi*) is the most northern subspecies of caribou and occurs almost entirely within the islands of the Canadian Arctic Archipelago, including the unglaciated portions of Ellesmere Island. They are smaller, lighter in colour, and have a shorter face than barren-ground caribou (*R. t. groenlandicus*). In February 2011, Peary caribou was listed as Endangered under the federal *Species at Risk Act* (SARA). In November 2015, the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) re-assessed Peary caribou as Threatened (COSEWIC 2015). As mandated under SARA, a Recovery Strategy is currently under development, and the lack of up-to-date population information has been consistently identified as a knowledge gap, particularly for the northern part of Peary caribou range including Ellesmere Island. Since 2015, the Government of Nunavut has undertaken aerial surveys of Ellesmere Island to help address this knowledge gap and inform designation of critical habitat.

Surveys of Peary caribou on Ellesmere Island have been performed occasionally over the past 50 years. The first complete survey occurred from July 30 – August 11, 1961, and the survey estimated 200 animals on the island (Tener 1963). Even at the time, Tener (1963) considered this estimate a 'best guess' and an extrapolation based on relatively few observations and incomplete coverage of the survey area due to weather. A few other surveys have been conducted since then with varying degrees of coverage. During the period from May 8 – 15, and July 4 – 7 of 1973, Riewe flew an unsystematic survey primarily north of Sydkap Ice Cap, along Baumann and Vendom Fiords and on Svendsen, Raanes, and Bjerne peninsulas. This survey reported a minimum count of 150 Peary caribou (Riewe 1976). Following a request from the Ivik (Grise Fiord) Hunters and Trappers Association (HTA), the southern portion of Ellesmere Island (including the Svendsen Peninsula) was surveyed from July 17 – 23, 1989. This survey provided an estimate of $89 \pm SE 31$ caribou (Case and Ellsworth 1991). Unsystematic surveys of central Ellesmere in June 1995 returned a minimum count of 38 caribou (Gauthier 1996). Between May 4 – 30, 2005, the Government of Nunavut (GN) systematically surveyed southern Ellesmere Island and Graham Island, and estimated 219 caribou (95% CI=109-244) in the area. The GN survey continued the next year from April 6 to May 22, 2006, over the central and northern part of Ellesmere Island, providing an estimate of 803 caribou (95%CI = 531-2,107; Jenkins *et al.* 2011). From March 19 – 26, 2015 the GN again systematically surveyed the southern Ellesmere Island study area and estimated $183 \pm SE 128$ caribou (Anderson and Kingsley 2017).

Peary caribou and muskoxen are sympatric across most of their range and they are often surveyed together to maximize limited monitoring resources. When Tener (1963) surveyed Ellesmere Island in 1961, he estimated 4,000 muskoxen on the island, although again, this was considered a best guess and likely an underestimate. The unsystematic survey in 1973 conducted by Riewe (1973) estimated 1,060 muskoxen in the area north of Sydkap Ice Cap and on the Bjerne Peninsula, Raanes Peninsula, Svendsen Peninsula, Graham Island, and Buckingham Island. The July 1989 survey of southern Ellesmere, including Svendsen Peninsula, by Case and Ellsworth (1991) estimated $2,020 \pm SE 285$ muskoxen. During the May 2005 survey of southern Ellesmere Island, the GN estimated 456 muskoxen (95% CI = 312-670, Jenkins *et al.* 2011). Along with the low numbers, 40 muskox carcasses were also observed (Jenkins *et al.* 2011) and residents of Grise Fiord recalled freezing rain and ground-fast ice in

the fall/winter of 2005 (Anderson and Kingsley 2017). In April and May 2006, the central and northern portions of Ellesmere Island were surveyed by the GN, and estimated 8,115 muskoxen (95%CI=6,632-9,930; Jenkins *et al.* 2011). The survey of southern Ellesmere Island in March 2015 by the GN estimated $3200 \pm \text{SE } 602$ (CV=19%) muskoxen (Anderson and Kingsley 2017), indicating strong recovery from the low numbers observed in 2005.

Peary caribou and muskoxen are very important to the community of Grise Fiord, the sole community that harvests on Ellesmere Island (Anderson 2015). Community members have relied on muskoxen and caribou on the island for sustenance and cultural persistence since the community was established in 1953. Monitoring caribou and muskox population trends (using both scientific approaches and Inuit Qaujimaqatugangit) around the community is therefore especially important (Anderson and Kingsley 2015).

Logistics and cost have prevented a survey of all of Ellesmere Island since 1961, and even in 1961 parts of the island could not be flown due to weather. Adverse weather still prevents survey completion some years - the 2015 GN survey of southern Ellesmere took three attempts before the survey was successfully completed (Anderson and Kingsley 2015). Costs and logistic constraints meant that rather than flying the entire 2006 study area in one year, central and northern Ellesmere Island were split into two study areas.

Study Area

The March 2017 aerial survey was flown to correspond with the west – east orientation of the transect lines from the 2006 survey of central and northern Ellesmere Island (Jenkins *et al.* 2011). The study area included the Raanes Peninsula, Svendsen Peninsula, Fosheim Peninsula, as well as the Bache and Knud Peninsulas (area north of Prince of Wales Mountains and south of the Agassiz Ice Cap). However, due to weather and logistic constraints, the Bache and Knud Peninsula transects were not able to be surveyed.

Central Ellesmere Island has a natural division with southern Ellesmere where Svendsen Peninsula and the head of Vendom Fiord meet the extensive ice fields of the Prince of Wales Mountains. Another constriction in unglaciated habitat lies along Canon Fiord at the Agassiz Ice Cap, which marked the northern boundary of our study area (Figure 1). Much of the area is very mountainous with valleys and a few plateaus. The Fosheim Peninsula is divided by the southwest-northeast trending Sawtooth Mountains, and the Raanes and Svendsen peninsulas are mostly rugged with some wide river valleys.

During March 2017 the average daily temperatures were between -37.1°C and -32.0°C with 5-7 cm of snow on the ground at Eureka. The historical (1981-2010) March daily average temperature is -36.8°C with 15 cm average snow depth at the Eureka Weather Station.

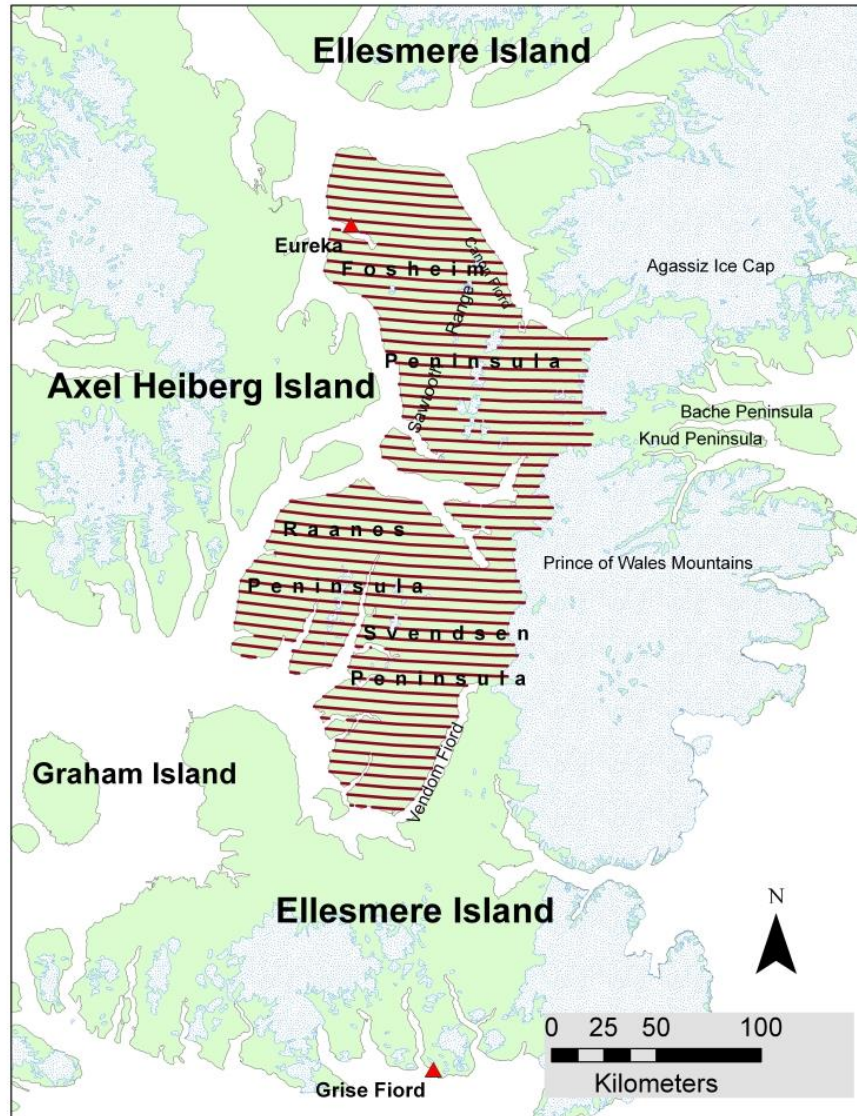


Figure 1. Central Ellesmere Island study area and survey transects.

Methods

Aerial Survey

Fixed-width transect aerial surveys are a standard way to monitor ungulate populations and have been used in the High Arctic since 1961. For this survey, we marked distance bins on the wing struts to allow for both distance sampling (Buckland *et al.* 2001, Thomas *et al.* 2009) as well as standard fixed-width strip transect sampling methods (Jolly 1969, Caughley 1977, Cochran 1977, Kingsley and Smith 1981). The central Ellesmere survey transects ($n = 62$) were flown using a fixed-wing de Havilland Twin Otter aircraft parallel to lines of latitude 5 km apart, at 180km/h. Surveys were flown at 400 feet above ground

level, set with a radar altimeter. In rugged terrain this was adhered to as closely as crew safety and aircraft capabilities allowed. Surveys were flown only on days that provided good visibility and sufficient daylight due to the latitude and time of year of the survey.

The survey crew consisted of a pilot, co-pilot, navigator/recorder, and two observers on each side of the aircraft (four total) to enable a double dependent observer platform. Occasionally the recorder also functioned as an observer. The double observer platform has been effective on other caribou surveys in Nunavut and the Canadian Arctic Archipelago (e.g., Campbell *et al.* 2012, Anderson 2014). As with the most recent southern Ellesmere survey (Anderson and Kingsley 2015), all observers could communicate and the front and rear observations for each side were combined. Using this approach, a primary observer, seated in the first seat, called out all caribou or muskox groups observed to the secondary observer (seated in the back seat). The secondary observer then identified whether they observed those groups and any additional groups not sighted by the primary observer. Compared to a single observer, this method provides more accurate estimates of group size. Ideally, the observers switched seats over the course of the survey (Cook and Jacobsen 1979) and this method allows for the estimation of detection probabilities for observers.

Five distance bins were established on each side of the aircraft: 0-200 m, 201-400 m, 401-600 m, 601-1,000 m, and 1,001-1,500 m. The bin intervals were derived from guidelines for bin intervals for aerial surveys (Buckland *et al.* 1993) which had been successfully implemented in similar survey conditions on the Baffin Island caribou survey (Campbell *et al.* 2015). The bins were marked on the struts of the aircraft following methods described by Norton-Griffiths (1978) and Buckland *et al.* (1998). Strut markings were positioned using:

$$w = W(h/H)$$

where W is the strip width, H is the flight height, h is the observers eye level when the plane is on level ground and w is the measured distance on the ground to position the wing strut marks (Figure 2).

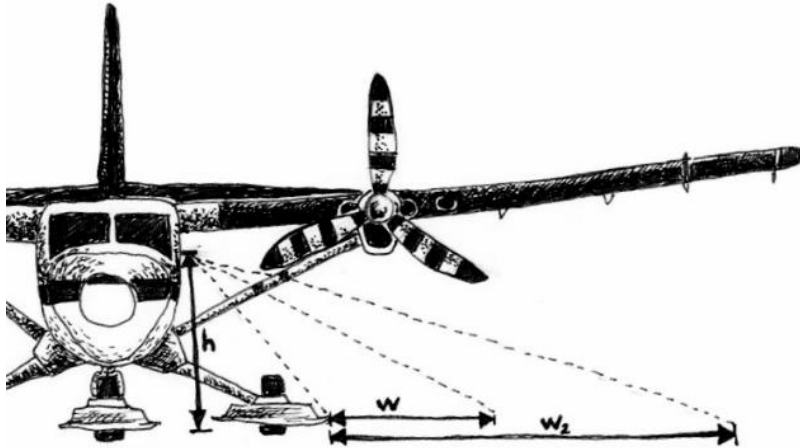


Figure 2: Derivation of wing strut marks for strip boundaries, where w and w_2 are calculated as described in the text, h is measured, and dotted lines indicate observer sightlines as modified from Norton-Griffiths (1978), drawing from Anderson (2016).

Observation of wildlife and tracks were recorded on a handheld Garmin global positioning system (GPS) (Garmin Montana 650) which also recorded the flight path. To reduce disturbance to animals we did not make multiple passes with the aircraft. During the single pass made it was not always possible to determine the sex and age of all animals in a group, and so we did not determine age or sex classes for Peary caribou, and only differentiated between adult and short-yearling (10-month old calves) muskoxen. If the group of muskoxen huddled quickly it was also difficult to determine group size and underestimates were likely in some cases. We downloaded GPS tracks and waypoints using DNR Garmin and saved them as ESRI shapefiles. Observation data were entered and manipulated in Microsoft Excel and ArcMAP (ESRI, Redlands, CA).

The Fosheim, Raanes, and Svendsen peninsulas of Ellesmere Island were surveyed from March 8 to March 20, 2017 with 62 transect lines (Figure 1). Although small ice caps in the middle of transects were flown, no tracks or animals were seen and the ice cap area was excluded from the analysis. We did not stratify the area based on predicted densities of caribou and muskoxen, but did divide the study area into discrete areas based on geographic features (i.e. large peninsulas) to identify differences in distribution and abundance for Peary caribou and muskoxen (Table 1).

Table 1. Survey strata used in central Ellesmere Island caribou survey

Location	Strata ID	Strata Area (km ²)	Base-line (km)	Mean Transect Length (km)	Total Transect Length (km)	Transect spacing (km)	Number of Transects
Fosheim Peninsula	CEI-1	11543	132	85	2624	5	31
Raanes and Svendsen Peninsulas	CEI-3	13244	319	74	2282	5	31

Abundance estimation

We used a combined distance sampling and mark-recapture approach to estimate abundance for survey strata on Ellesmere Island. The approach involved using mark-recapture to estimate the probability of detection of caribou at zero distance from the blindspot marker (the plane's wheel), and distance sampling methods to estimate the decrease in probability of detection at greater distances from the plane under the assumption of point independence (Buckland *et al.* 2010). This approach ensured a more robust estimate than using distance sampling methods alone, which assume that the probability of detection of groups at zero distance from the plane is 1 (Borchers *et al.* 1998, Buckland *et al.* 2004, Laake *et al.* 2008a, Laake *et al.* 2008b, Buckland *et al.* 2010, Laake *et al.* 2012).

We used the program *Distance* (Buckland *et al.* 1993, Buckland *et al.* 2004, Thomas *et al.* 2009) to format the data which was then ported into the MRDS package (Laake *et al.* 2012) in program *R* (R Development Core Team 2009). The mark-recapture/distance sampling analysis had two phases. In the first phase, we fit competing distance sampling models with mark-recapture covariates held constant. We used information-theoretic model selection methods to determine which model had the most support (Burnham and Anderson 1992). Once a distance sampling model was selected, we used it to compare removal double observer mark-recapture models under the point independence assumption. Using this approach provided a seamless way to model both sources of variation. We produced abundance estimates for the entire study area for each model formulation to assess the sensitivity of estimates to model specification.

The main covariates we used in the analysis are listed in Table 2. The observer covariate corresponds to each primary observer in the survey. The distance covariate was mainly used in the mark-recapture analysis given that it is explicitly considered in the distance analysis. Covariate predictions were assessed graphically to evaluate biological validity and model fit.

Table 2. Distance and mark-recapture model covariates

Covariate	Acronym	Type
Observer	ob1-3	binary
Distance bin from plane	distance	ordinal
Group size	size	continuous
Log(group size)	logsize	continuous
Snow cover	snow	ordinal
Cloud cover	cloud	continuous
Snow patchiness	patch	ordinal
Observer pairs	Ob1, Ob2	categorical

We compared estimates from the MRDS analysis to estimates from distance sampling and strip-transect methods only. Strip transect estimates were generated in program *Distance* using observations of 400 meters or less from the survey plane. We used a uniform detection function to emulate the strip transect assumption of perfect sightability within 400 meters of the survey plane. Variance was estimated in program MRDS which considered the distance sampling, mark-recapture,

and encounter rate variation (Innes *et al.* 2002). We applied the “O2” approach in MRDS, which accounted for the systematic sampling design with sequential transect lines between strata and likely correlation of adjacent transects, to estimate encounter rate variance (Fewster *et al.* 2009).

Results

Muskox

Across the survey region we observed 254 groups of muskoxen and 2,153 muskoxen in total. Each group was assigned to a distance bin. The mean group size was 8.5 muskoxen (range = 1-38, standard deviation [SD] = 6.9). We used the total number of adults and 10-month-old calves for our analysis.

Muskoxen were most numerous on the central part of the Fosheim Peninsula north of the Sawtooth Range, and on northern Raanes Peninsula (Figure 3).

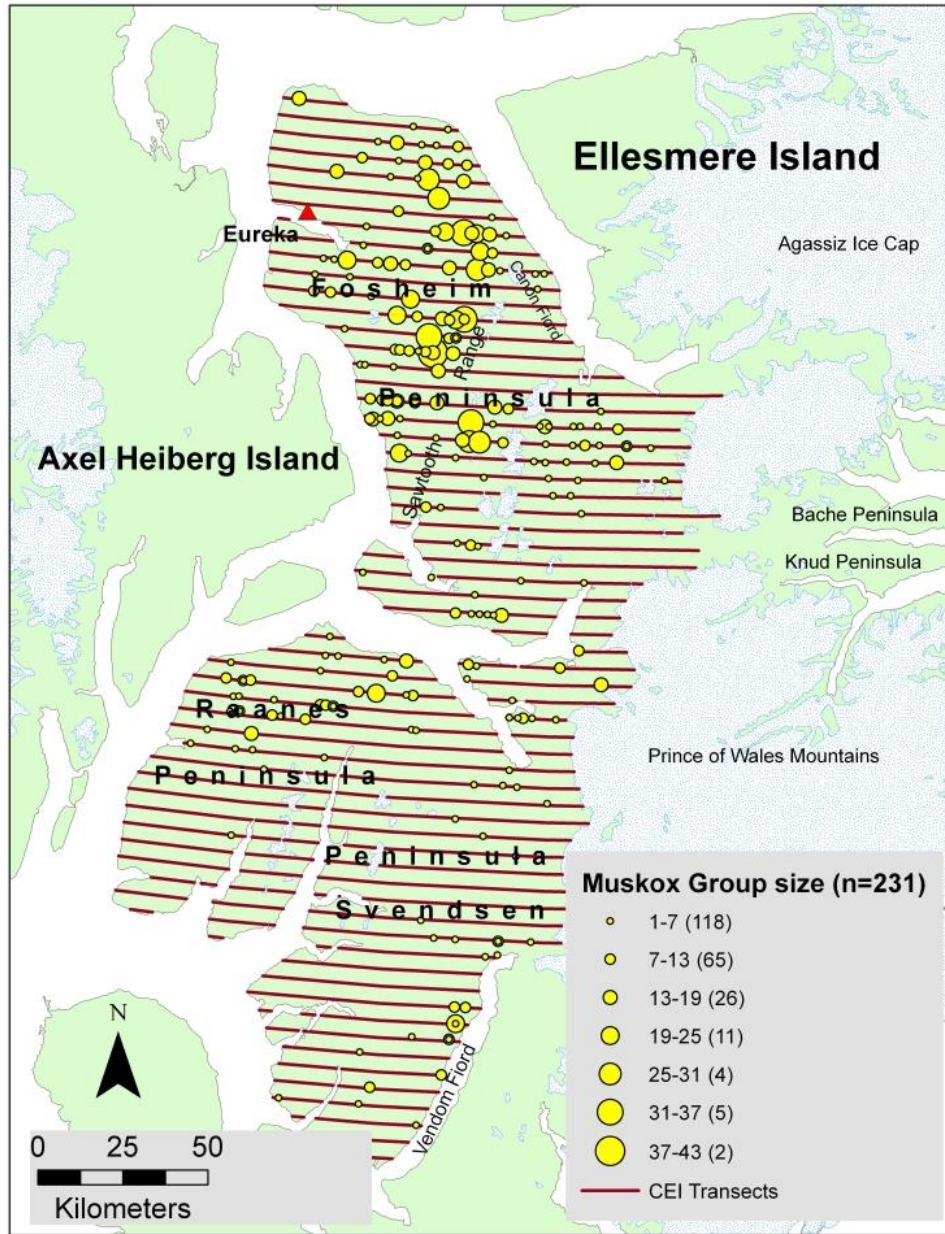


Figure 3. Distribution and group sizes of muskox observations during the 2017 Central Ellesmere Island survey. Frequencies of each group size are given next to each bin interval.

As expected, most groups were observed in the distance bins closest to the transect line. There were a similar number of observations in the first two distance bins (i.e. within 400 m of the aircraft), with fewer groups detected in distance bins further from the transect line, even after adjusting for unequal sized distance bins (200 m versus 500 m; Figure 4).

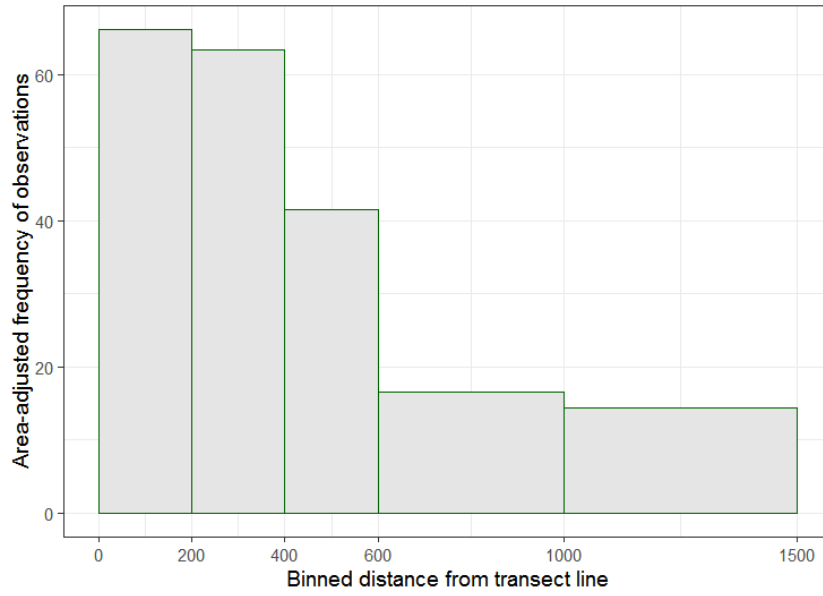


Figure 4. Bin-width adjusted frequencies of muskox observations on Central Ellesmere Island.

Muskoxen were usually seen in groups of ten or fewer, but we detected group sizes up to 38 muskoxen (Figure 5).

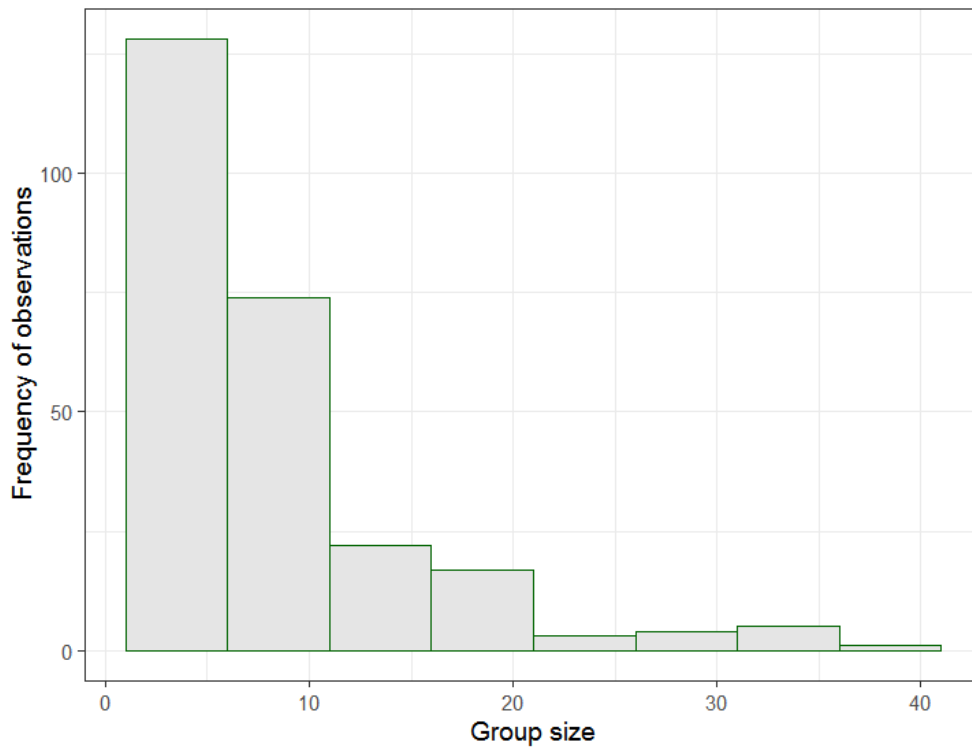


Figure 5. Frequency of muskox group sizes observed on Central Ellesmere Island, March 2017.

Influence of covariates on detection

Group size can influence detection, so the potential effect of group size on the distribution of detections was also examined (Figure 6). Proportionally more large groups were observed further from the transect line. Densities were used to compare among distance bins to account for bins covering different distance intervals (200-m or 500-m).

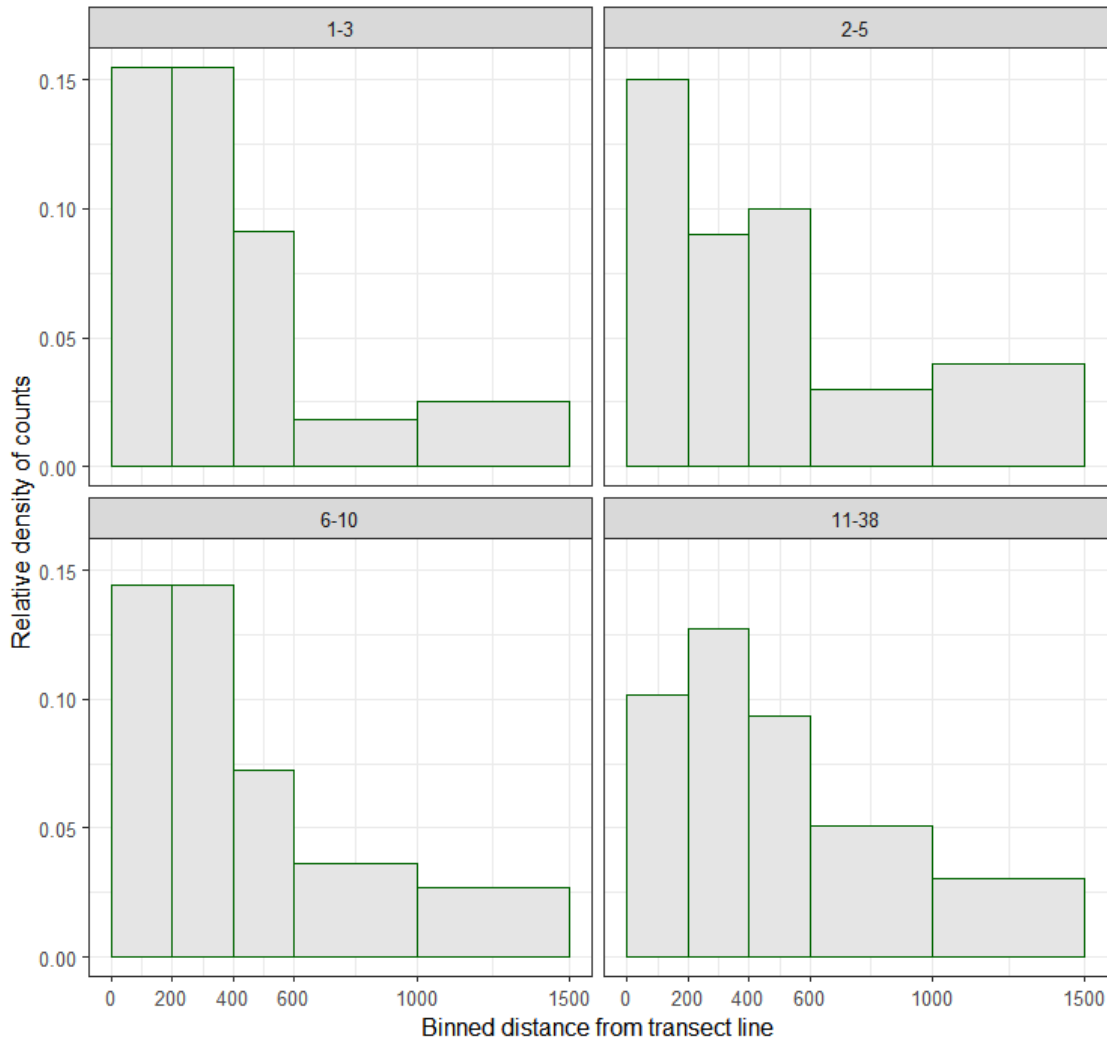


Figure 6. Density of muskox observations in each distance bin for group sizes of 1-3, 2-5, 6-10, and 11-38 muskoxen.

The observer pairings on either side of the aircraft might also have influenced the detection of groups and the shape of the detection function. There were two main observer pairings during the survey (Pair 1 and Pair 2) with a third pairing (Pair 3) accounting for relatively few observations (Table 3). The Pair 1 observers were in the same order for the majority of observations, whereas Pair 2 observers had similar observation frequencies in both positions. The overall pooled detection probabilities were similar for Pair 1 and Pair 2 based on naïve detection probabilities (Table 3). Our analysis largely uses observations from Pair 1 and Pair 2 given the low sample sizes for Pair 3.

Table 3. Frequencies of muskox observations by observer pairing and order. Observations are binned by whether front (F), rear (R), or both (B) observers reported a muskox group. The naïve probability of the front observer seeing a group, P(F), is estimated as 1 minus the proportion of observations only observed by the rear observer for any given pairing.

Pair	Observer		Obs. Order 1-2				Obs. Order 2-1				Pooled			
	Observer 1	Observer 2	F	R	B	P(F)	F	R	B	P(F)	F	R	B	P(F)
1	F. Noah	J. Pijamini	5	15	45	0.77	3	3	24	0.90	8	18	69	0.81
2	J. Kiguktak	M. Fredlund	1	8	60	0.88	0	1	54	0.98	1	9	114	0.93
3	M. Campbell	J. Pijamini	3	2	6	0.82	0	0	1	1.00	3	2	7	0.83

The distribution of sightings was slightly different by observer pairings with Pair 1 having relatively greater observations closer to the plane in comparison to Pair 2 (Figure 7).

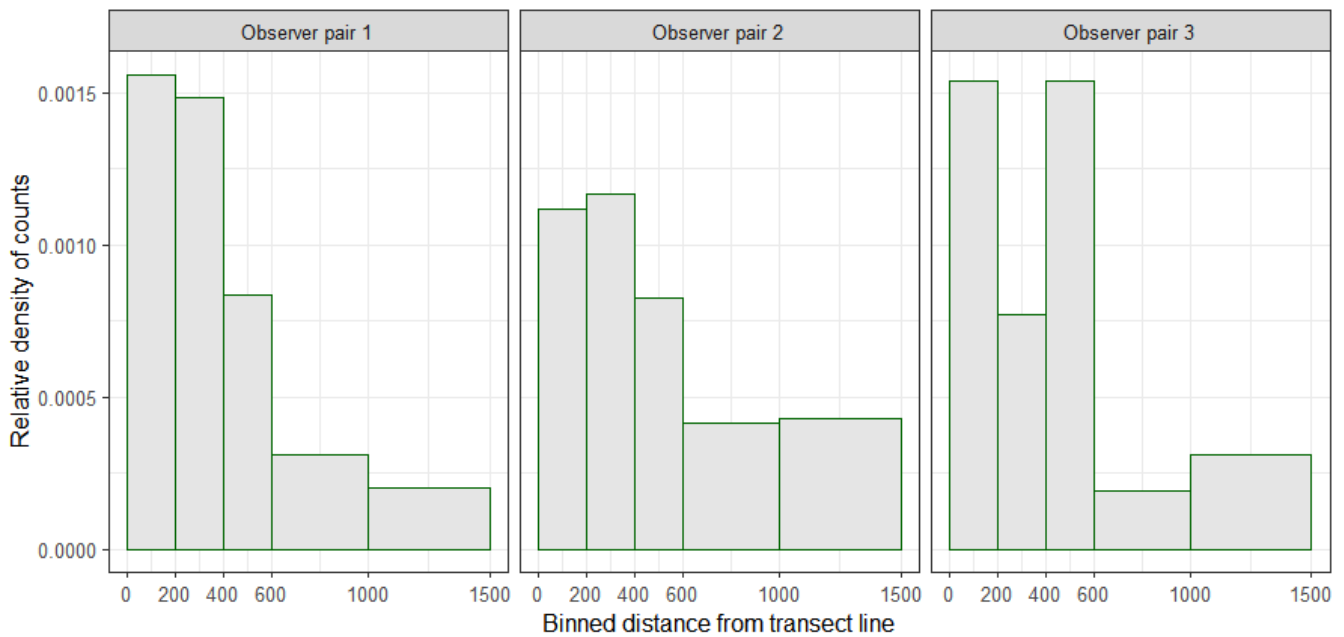


Figure 7. Muskox observation densities in each distance bin by observer pairing.

Abundance estimation

Our two-phase abundance estimate incorporated both mark-recapture and distance sampling analysis. In the first phase, distance models were fit while mark-recapture covariates were held constant. Once a distance sampling model was fit, mark-recapture models were considered under the point independence assumption. For the distance phase (Table 4, models 10-20) a model with log of group size and observer Pair 1 influencing a hazard rate detection function had the lowest AIC_c score (model

10), although models 11 and 12 were tied for support with model 10 ($\Delta AIC_c < 2$). Due to the similar support for models 10-12, further analyses with mark-recapture covariates used model 10 as a base model. Models with covariates stratum and cloud cover had less support than the null model (model 16). Snow cover and snow patchiness covariates showed minimal variation and therefore were not considered in any models.

Using model 10 as a base model, we compared additional models that included mark-recapture covariates (models 1-10). Of these, model 1, with covariates log of group size and observer pair 1, had the lowest AIC value, although models 2 and 3 received equivalent support ($\Delta AIC_c < 2$). Estimates of abundance from these three models were very close (within 2 animals), suggesting minimal influence of the covariates on the final abundance estimate. Abundance estimates were similar for most models, ranging from 6,900-7,194. Model 16, the null model, produced the highest abundance estimate. Most models used a hazard rate detection function, although in two cases a half normal function was used, with poor results.

Table 4. Mark-recapture/distance sampling model selection results. Models are defined by distance detection function (DF: HR = Hazard rate, HN = half normal), distance sampling and mark-recapture covariates (as defined in Table 2). A “1” indicates that the parameter was held constant. Akaike Information Criteria corrected for small sample sizes (AIC_c), the difference in AIC_c values between the i th model and the model with the lowest AIC_c value (ΔAIC_c), Akaike weights (w_i), number of parameters (K), and log-likelihood of the model are presented. Baseline models are shaded for reference.

No	DF	Model covariates		Model fit				Abundance		
		Distance	Mark-recapture	AIC	ΔAIC_c	w_i	K	LL	N	CV
1	HR	logsize + ob1	ob1 + logsize	981.10	0.00	0.39	7	-483.6	6,902	15.0%
2	HR	logsize + ob1	ob2 + logsize	981.38	0.28	0.33	7	-483.7	6,903	15.0%
3	HR	logsize + ob1	ob1+ob2 + logsize	982.45	1.35	0.20	8	-483.2	6,904	15.0%
4	HR	logsize + ob1	ob1	986.10	5.00	0.03	6	-487.1	6,938	15.1%
5	HR	logsize + ob1	ob2	987.00	5.90	0.02	6	-487.5	6,941	15.1%
6	HR	logsize + ob1	cloud	987.65	6.55	0.01	6	-487.8	6,927	15.0%
7	HR	logsize + ob1	ob1 + ob2	987.93	6.83	0.01	7	-487.0	6,941	15.1%
8	HR	logsize + ob1	logsize	991.85	10.75	0.00	6	-489.9	6,889	15.0%
9	HR	logsize + ob1	size	993.26	12.16	0.00	6	-490.6	6,894	15.0%
10	HR	logsize + ob1	1	993.99	12.89	0.00	5	-492.0	6,916	15.0%
11	HR	logsize + ob2	1	994.14	13.04	0.00	5	-492.1	6,875	14.9%
12	HR	logsize + ob1 + ob2	1	995.66	14.56	0.00	6	-491.8	6,871	14.9%
13	HR	size + ob1 + ob2	1	997.38	16.28	0.00	6	-492.7	7,010	14.9%
14	HR	logsize	1	997.66	16.55	0.00	4	-494.8	7,107	15.7%
15	HR	size	1	999.57	18.46	0.00	4	-495.8	7,194	15.6%
16	HR	1	1	1000.9	19.86	0.00	3	-497.5	8,026	15.7%
17	HR	stratumcov	1	1001.7	20.61	0.00	4	-496.9	7,642	14.8%
18	HR	cloud	1	1001.7	20.64	0.00	4	-496.9	7,736	14.7%
19	HN	logsize	1	1009.4	28.37	0.00	3	-501.7	6,299	12.5%
20	HN	1	1	1012.5	31.49	0.00	2	-504.3	6,881	12.8%

Goodness of fit tests suggested adequate fit for the mark-recapture part of the model ($\chi^2 = 5.0$, $df = 7$, $p = 0.65$) but marginal fit to the 600-1,000-m bin for the distance sampling component, which caused the overall fit of the model to be marginal ($\chi^2 = 12.6$, $df = 2$, $p = 0.001$). Inspection of the individual fit of each bin suggested the only area of low fit was the 600-1,000-m bin ($\chi^2 = 6.9$), with other component χ^2 scores being less than 1. It is likely that lack of fit of this bin, which is far from the shoulder of the detection function, did not greatly influence abundance estimates. Inspection of detection probabilities relative to densities of observations (Figure 8) also suggested reasonable fit for detections by the

primary observer only and pooled detections from both observers. Group size and observer pairings also influenced the predicted detection of model1 (Figure 9).

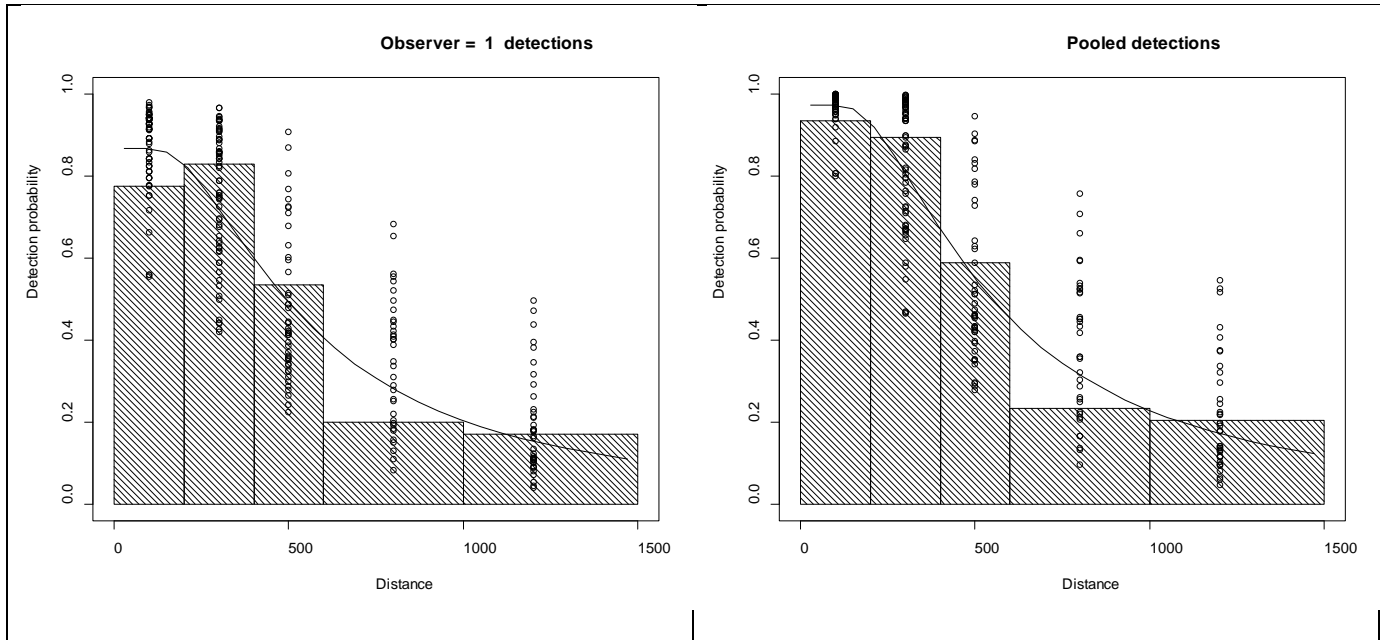


Figure 8. Predicted and observed detection probabilities for the primary observer (left) and pooled observers (right) from model 1 (Table 4). The histograms denote the relative frequency of observations whereas the points and line display the predicted detection probabilities and fitted detection function.

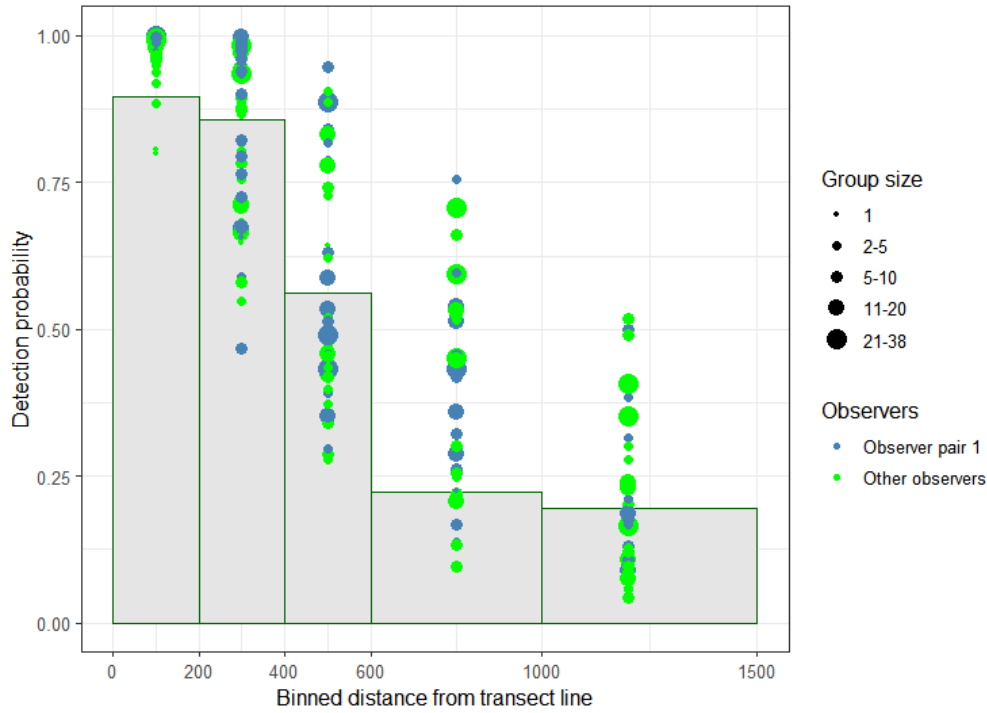


Figure 9. Predicted and observed detection probabilities for pooled detections of muskox groups as a function of observer pairs and muskox group size from model 1 (Table 4). The histograms denote the relative frequency of observations whereas the points and line display the predicted detection probabilities and fitted detection function. Covariate values associated with points (group size and observer) are also indicated by size and color of each point.

Muskox abundance was estimated for the study area using the most supported MRDS model, model 1 (Table 4). To investigate the sensitivity of our abundance estimate to different analysis methods, we also estimated muskox abundance using mark-recapture strip transect, distance sampling without mark recapture, and strip-transect only methods (Table 5). The highest estimate was from the MRDS model, which accounts for heterogeneity in detections. Precision was reasonably similar between approaches (Table 5). Estimates from MRDS model 1 were also computed for individual stratum (Table 6).

Table 5. Estimates of muskox abundance for Ellesmere Island derived by mark-recapture distance sampling (MRDS), mark-recapture strip transect (MR), distance sampling without mark recapture (DS), and strip transect methods.

Method	Muskoxen observed	Muskoxen estimated	SE	Confidence Limits (95%)		CV (%)
MRDS (Model 1, Table 4)	2,153	6,902	1,036	5,134	9,278	15.0
MR only (400 m strip)	1,067	6,857	887	5,286	8,896	12.9
DS only	2,153	6,807	1,001	5,092	9,098	14.7
Strip (400m)	1,067	6,741	998	5,029	9,037	14.8

Table 6. Estimates of muskox abundance by survey stratum on central Ellesmere Island March 2017 using mark-recapture distance sampling model 1.

Stratum	Muskoxen observed	Muskoxen estimated	SE	Confidence Limits (95%)		CV (%)
Raanen and Svendsen Peninsulas	562	1,948	280	1,467	2,585	14.4
Fosheim Peninsula	1591	4,954	897	3,461	7,091	18.1
Total	2153	6,902	1,036	5,134	9,278	15.0

Peary caribou

The Peary caribou analysis was constrained by a very small number of observations, with only nine individuals in five groups seen by the dedicated observers. Five additional individuals were seen by a recorder only. Peary caribou were seen on the northern Raanes and Svendsen peninsulas, and on the Fosheim Peninsula east of Bay Fiord (Figure 10).

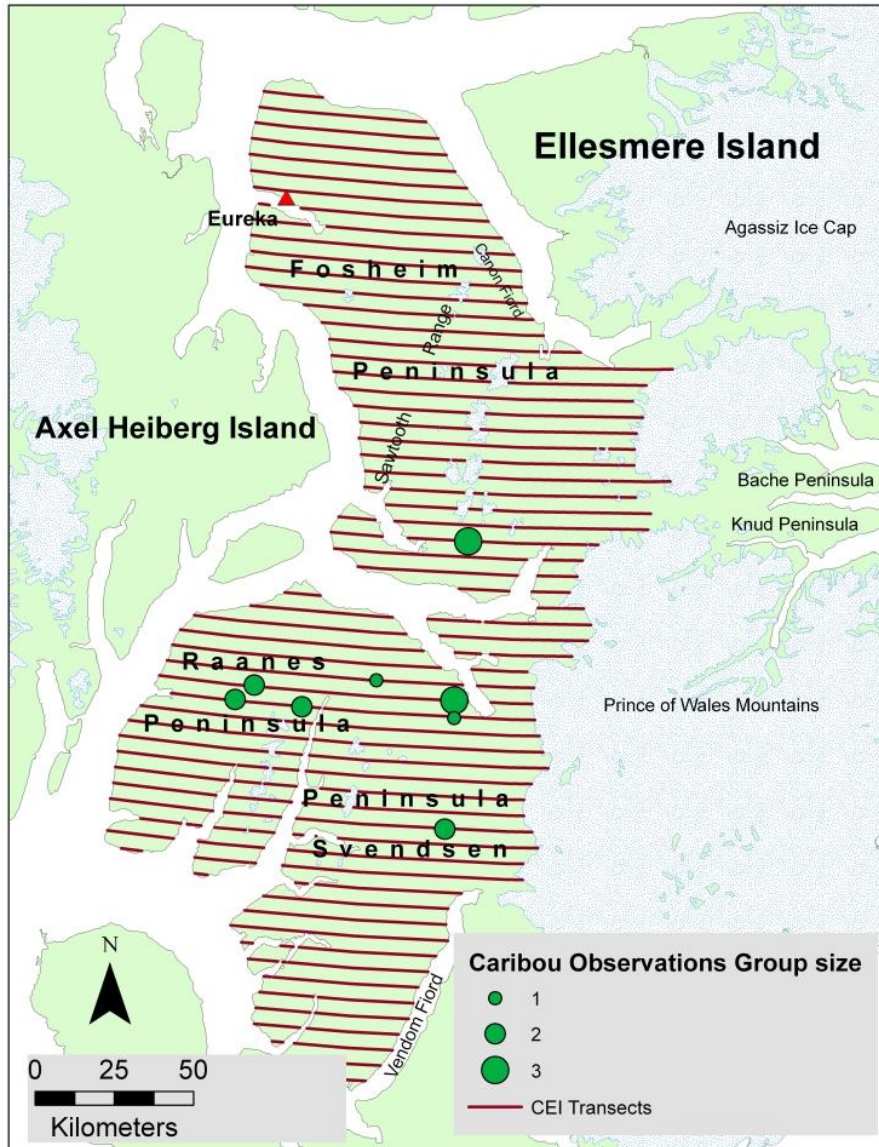


Figure 10. Observation locations and group sizes of Peary caribou during the 2017 Central Ellesmere Island survey.

The dedicated observer pairs saw Peary caribou up to the 600-1,000 m distance bin, and two groups totaling five individuals were seen by the recorder in the 600-1000-m bin. No individuals were observed in the 1,000-1,500-m distance bin (Figure 11). Statistical analysis was run with and without the recorder observations.

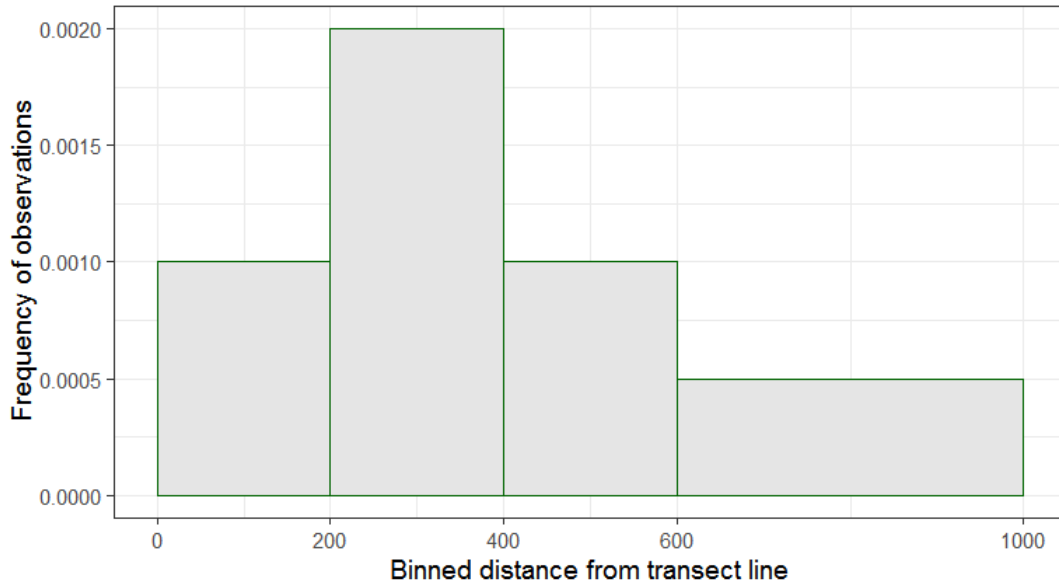


Figure 11. Bin-width adjusted frequencies of Peary caribou observations during the survey by the two dedicated observer pairs (recorder observations not included).

The low number of observations precluded more advanced modelling methods such as mark-recapture distance sampling. Half normal and hazard rate detection functions were fitted to the data on an exploratory basis. Of these, a half-normal detection function was most supported (Figure 12) with goodness of fit tests suggesting adequate fit ($\chi^2 = 0.51$, $df = 2$, $p = 0.77$). However, the reliability of this test is compromised by the small sample size. The resulting abundance estimate from this model was $32 \pm SE 25$ caribou (95% CI = 8 - 127, CV = 78.8%). A model with group size as a covariate was also considered, and was equally as likely as the half-normal model without group size. The estimate from this model was $36 \pm SE 29$ caribou (95% CI = 8-163, CV = 80.5%). A strip transect estimate assuming a 400-m strip width was also run, with an estimate of $25 \pm SE 19$ caribou (CI = 6 - 101, CV = 76.6%).

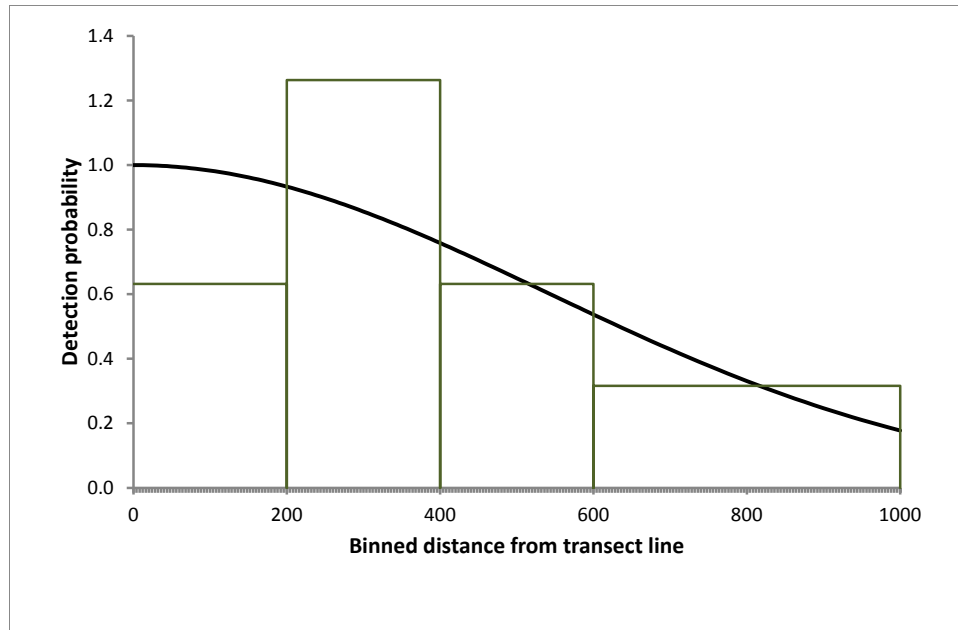


Figure 12. Fit of the half-normal detection function to the Peary caribou observation data.

Inclusion of recorder observations could be justified when the recorder was scanning the same area as observers and acting as a third observer with a similar detection function. The two additional recorder observations occurred in the 600-1000-m bin, and inclusion of these observations increased the detection function in this bin (Figure 13). Models using recorder observations that included group size as a covariate were more supported than models without group size. The half-normal detection function without group size was essentially flat, suggesting similar sightability in all distance bins. When group size was included, the detection function declined sharply up to 400 metres from the transect line, and then became uniform at 0.4 for distances up to 1000 meters (Figure 13). This detection function may be an artifact of the distribution of a small number of observations, as sightability should decline as distance increases. We estimated $49 \pm SE 30$ caribou (95% CI = 16-154, CV = 60.7%) using the model that included recorder observations and a group size covariate. If group size was not included, the estimate was $35 \pm SE 24$ caribou (95% CI = 10-127, CV = 67.8%).

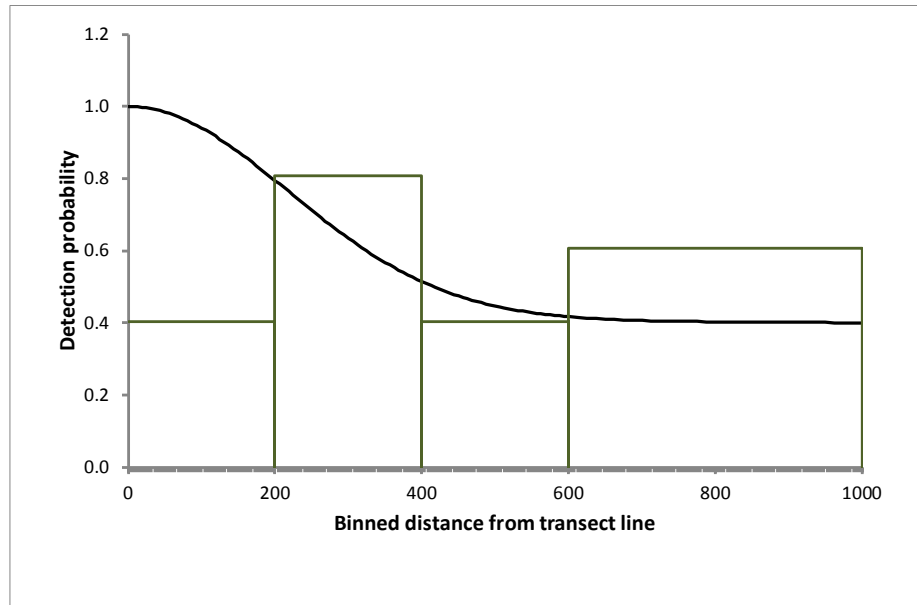


Figure 13. Fit of the half-normal detection function to the Peary caribou data including recorder observations and group size as a covariate.

Discussion

With the lack of consistency in both the frequency and method of surveys of Ellesmere Island it is challenging to confidently provide trends for either the muskoxen or Peary caribou populations (Anderson and Kingsley, 2015).

Muskoxen

In 1961, Tener (1963) flew a survey of Ellesmere Island and estimated 4,000 muskoxen on the entire island, admitting that this was a 'best guess' and more intensive surveys would be required for an accurate population estimate. Of the 605 muskoxen that he observed, 38% were on the Fosheim Peninsula, and he estimated a quarter of the island's muskox population was distributed between the Fosheim Peninsula and the Tanquary Fiord-Lake Hazen-Alert plateau (Tener 1963). In 1973, Riewe flew a series of surveys centered on the Bjorne Peninsula to investigate the distribution of wildlife during a seismic program conducted by PanArctic Oil (Riewe 1976). He estimated 425 muskoxen on the Svendsen Peninsula and 200 muskoxen on the Raanes Peninsula (Riewe 1973). In 1989, Case and Ellsworth (1991) covered southern Ellesmere Island, including the Svendsen Peninsula, and estimated $350 \pm \text{SE } 90$ muskoxen (Case and Ellsworth 1991). In 1995, Gauthier flew unsystematic surveys of Ellesmere Island and observed 1196 muskoxen (Gauthier 1996). The most recent survey of central Ellesmere Island occurred in 2006 when it was part of a systematic survey of central and northern Ellesmere Island (Campbell 2006, Jenkins *et al.* 2011). The 2006 survey estimated 8,115 muskoxen (95% CI = 6,632-9,930) on northern and central Ellesmere Island, based on 4,999 muskoxen seen on transect (Jenkins *et al.* 2011). Most of the muskoxen in 2006 were seen on the Fosheim Peninsula ($n = 3286$), with other concentrations on the Lake Hazen Plateau ($n = 1428$)

between Tanquary Fiord and Alert. The number groups seen in 2006 for the Fosheim Peninsula Strata was greater than in 2017 as shown in Figure 14. However, there were more groups observed in 2017 on the Raanes and Svendsen Peninsulas.

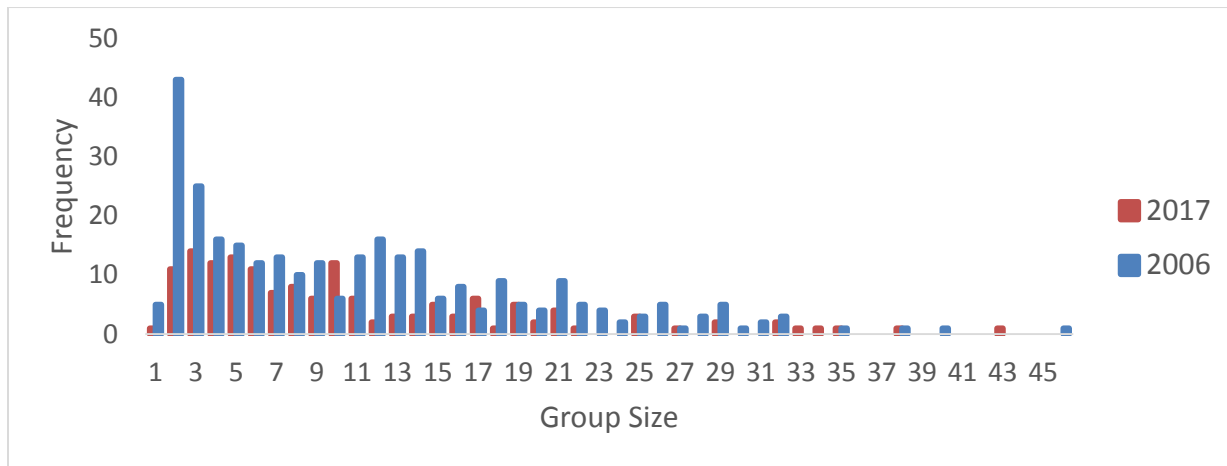


Figure 14. Frequency of observed group sizes during the 2006 and 2017 surveys for the Fosheim Peninsula stratum.

For muskox, the current analysis demonstrates the utility of the joint MRDS approach to account for multiple sources of variation in aerial survey data. The mark-recapture analysis suggested that detection was less than one near the plane, which would violate one of the assumptions of the distance sampling methodology. Use of the mark-recapture component accounted for this source of bias. The distance sampling component allowed all of the data to be used for analysis rather than only observations detected within a fixed-width strip transect.

Although the mark-recapture strip-transect estimate was the most precise (Table 5) of the methods examined, our data indicated that this estimate violates the method's assumption of equal sightability within the survey strip (i.e. detection was less than one in the 0- 400 m distance bin). However, the difference in precision between the most precise method and the MRDS estimate was small. The main loss of detection occurred for smaller groups which contributed less to the overall estimate, and the realized difference between mark-recapture strip transect and the slightly less precise MRDS abundance estimates was minimal (Table 5).

Peary caribou

Our Peary caribou analysis was compromised by the low number of observations, which limited our ability to model a distance detection function. Distance sampling data from similar studies might be able to assist in estimation of detection functions by allowing the pooling of data to estimate detection functions and associated detection probabilities. Approaches such as density surface modelling (Miller *et al.* 2013, Miller *et al.* 2016) that provide further inference on the distribution of patchy populations might improve estimates, especially if Peary caribou are associated with unique habitat characteristics within the study area.

Small sample sizes have been an issue for Peary caribou surveys on Ellesmere Island since Tener observed 74 Peary caribou (37 on transect) on the island in summer 1961 (Tener 1963). He guessed that about 200 caribou inhabited the island (Tener 1963). Riewe estimated 65 caribou on the Svendsen Peninsula and 300 caribou on the Raanes Peninsula in 1973, with a concentration of caribou at the head of Blind Fiord (Riewe 1976). In 1989, Case and Ellsworth (1991) estimated $31 \pm SE 23$ Peary caribou on the Svendsen Peninsula. In 2006, there were an estimated 802 Peary caribou (95% CI 531-1,207 caribou) on northern Ellesmere Island, including the central part of the island covered during this survey (Jenkins *et al.* 2011). Most caribou on that survey were seen on northern Ellesmere Island, on the Hvitland, Svartfjeld, and Marvin peninsulas and in the Blue and Blackwelder Mountains (Jenkins *et al.* 2011).

The small sample sizes and resulting low precision of abundance estimates make it difficult to interpret population trends, but the survey data that exist suggest that Peary caribou persist at low densities on central Ellesmere Island.

Management Recommendations

Over the past five years, muskox harvest has been managed through the Management Plan for High Arctic Muskoxen of the Qikiqtaaluk Region 2013-2018 (DOE *et al.* 2013). Ellesmere Island is encompassed completely within the Muskox Management Unit MX-01. Based on the results of the 2015 survey of southern Ellesmere Island, which found high densities of muskoxen in the most accessible part of MX-01, the total allowable harvest for muskox in MX-01 was lifted, although maintenance of a reliable reporting system for harvest was recommended to continue to collect and monitor harvest data. The results of this survey support those management actions.

Although only 14 caribou were seen on transect and a reliable population estimate was not attainable, the area surveyed is not within typical harvesting range of Grise Fiord and Peary caribou abundance on central Ellesmere Island is not limited by harvest activities. A management plan for Peary caribou in Nunavut is currently in development and regular monitoring (based on scientific methods and Inuit Qaujimagatugangit) is expected to be an important part of the plan.

Acknowledgments

Thank you to all those involved in making this project happen. Thanks to the survey observers Jopee Kiguktak, Jason Pijamini, and Frankie Noah - your sharp eyes and great attitudes even during the weather days were invaluable. Thank you to the Iviq and Resolute Bay Hunters and Trappers Associations for the knowledge that was shared and support in arranging observers, in particular Terry Noah. I would also like to thank the Eureka Weather Station staff for making us feel welcomed. Thank you Polar Continental Shelf Program for providing logistical support and letting us invade your work space on those weather days.

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Appendix 1. Previous surveys conducted on Ellesmere Island. Some of the surveys that have taken place within all or parts of the area surveyed and analysed in this report. Total Obs = Total muskoxen or caribou observed, Est = Abundance estimate, and '-' = no records taken.

Table 7. Past Muskoxen surveys that included central Ellesmere Island

Study Area	1961		1973		1989		1995		2006		2017	
	Total Obs	Est	Total Obs	Est	Total Obs	Est	Total Obs	Est	Total Obs	Est	Total Obs	Est
Fosheim Peninsula	227	1000	-	-	-	-	790	-	3745	8115 (95% CI 6,632- 9,930)	1591	4954 ±897
Sverdrup Pass	47	3000	-	-	-	-	42	-				
Raanen Peninsula	54		161	200	-	-	47	-				
Svendsen Peninsula	20		362	425	89	350 ±90	142	-				
Vendom Fiord	-		100	-	-	-	-	-				
Strathcona Bay Fiords	-		32	-	-	-	91	-				
Northern Ellesmere Island	182		-	-	-	-	-	-	1254	-	-	-
Southern Ellesmere Island	75	591	625	567	2020 ±285	-	-	-	-	-	-	
Survey Date	July 30 - Aug 11		May 8, 15, July 4, 7		July 17 - 23		June 12 - 21		April 6 - May 22		March 8 - 20	
Reference	Tener 1963 ¹		Riewe 1973 ¹		Case and Ellsworth 1991 ²		Gauthier 1996		Jenkins <i>et al.</i> 2011			

¹The surveys of 1961 and 1973 were not extensive enough to have any scale of accuracy for the estimates provided.

² The survey by Case and Ellsworth in 1989 had five strata, one of which was part of Svendsen Peninsula, and was able to be pulled out as a separate estimate. However, the full estimate for Southern Ellesmere also includes Svendsen peninsula.

Table 8. Past Peary Caribou Surveys that included central Ellesmere Island

Study Area	1961		1973		1989		1995		2006		2017	
	Total Obs	Est	Total Obs	Est	Total Obs	Est	Total Obs	Est	Total Obs	Est	Total Obs	Est
Fosheim Peninsula	1	200	-	-	-	-	11	-	36	802 (95% CI 531- 1,207)	3	-
Sverdrup Pass	-		-	-	-	0	-					
Raanen Peninsula	5		219	300	-	-	11	-				
Svendsen Peninsula	-		23	65	25	31 ±23	12	-				
Vendom Fiord	-		-	-	-	-	-					
Strathcona Bay Fiords	-		-	-	-	3	-					
Northern Ellesmere Island	45		-	-	-	-	-	298	-	-	-	-
Southern Ellesmere Island	15		58	80	25	89 ±31	-	-	-	-	-	-
Survey Date	July 30 - Aug 11		May 8, 15, July 4, 7		July 17 - 23		June 12 - 21		April 6 - May 22		March 8 - 20	
Reference	Tener 1963 ¹		Riewe 1973 ¹		Case and Ellsworth 1991 ²		Gauthier 1996		Jenkins <i>et al.</i> 2011			

¹The surveys of 1961 and 1973 were not extensive enough to have any scale of accuracy for the estimates provided.

² The survey by Case and Ellsworth in 1989 had five strata, one of which was part of Svendsen Peninsula, and was able to be pulled out as a separate estimate. However, the full estimate for Southern Ellesmere also includes Svendsen peninsula.

Appendix 2. Central Ellesmere Island survey transects

Table 9. Transect end points and strata on central Ellesmere Island flown during fixed-wing survey, March 2017

Transect	Stratum	Longitude (West terminus)	Latitude (West terminus)	Longitude (East terminus)	Latitude (East terminus)	Length (km)
1	CEI-1	-84.7780	77.5237	-83.7354	77.5228	19.1608
2	CEI-1	-84.8575	77.5690	-83.5489	77.5685	31.3538
3	CEI-1	-84.9946	77.6144	-83.4041	77.6141	34.1408
4	CEI-1	-85.2482	77.6596	-83.3364	77.6595	43.1923
5	CEI-1	-85.2462	77.7049	-83.2142	77.7050	46.2413
6	CEI-1	-85.2157	77.7503	-83.1664	77.7503	47.2176
7	CEI-1	-85.1769	77.7956	-83.1118	77.7957	49.0093
8	CEI-1	-85.4075	77.8407	-82.9872	77.8410	53.5812
9	CEI-1	-85.5188	77.8859	-82.8956	77.8863	51.6996
10	CEI-1	-85.6861	77.9308	-82.7443	77.9315	69.2458
11	CEI-1	-85.5166	77.9765	-82.7791	77.9769	63.3201
12	CEI-1	-85.2807	78.0222	-82.7615	78.0222	58.6650
13	CEI-1	-86.2412	78.0666	-82.5873	78.0673	61.5315
14	CEI-1	-87.2819	78.1128	-81.7566	78.1120	109.7099
15	CEI-1	-87.5011	78.1578	-81.7604	78.1573	116.6300
16	CEI-1	-87.0684	78.2036	-81.5613	78.2031	103.4846
17	CEI-1	-87.5185	78.2485	-81.6448	78.2482	126.1597
18	CEI-1	-87.5025	78.2938	-81.7677	78.2932	118.6898
19	CEI-1	-87.5044	78.3391	-81.7738	78.3385	119.8666
20	CEI-1	-87.4991	78.3845	-81.6719	78.3841	128.2379
21	CEI-1	-87.5032	78.4298	-81.4449	78.4299	131.8484
22	CEI-1	-87.4005	78.4753	-81.5262	78.4751	124.2423
23	CEI-1	-87.2582	78.5208	-81.5811	78.5203	123.5258
24	CEI-1	-86.8502	78.5662	-81.6516	78.5655	113.7587
25	CEI-1	-87.0480	78.6115	-81.6987	78.6107	112.5940
26	CEI-1	-86.9671	78.6568	-81.6786	78.6561	112.2479
27	CEI-1	-86.9129	78.7022	-81.7828	78.7011	103.4227
28	CEI-1	-86.8285	78.7474	-81.1386	78.7475	113.4587
29	CEI-1	-86.6517	78.7926	-80.9160	78.7928	114.6534
30	CEI-1	-85.8505	78.8369	-74.7333	78.8155	97.9495
31	CEI-1	-85.3706	78.8832	-75.0124	78.8610	25.6303
32	CEI-3	-82.8210	78.9287	-76.2201	78.9053	28.2383
33	CEI-3	-84.3314	78.9734	-75.7296	78.9508	63.4596
34	CEI-3	-84.6993	79.0193	-75.9464	78.9955	73.0550
35	CEI-3	-84.7698	79.0647	-74.4280	79.0642	75.6296
36	CEI-3	-84.6728	79.1099	-74.5175	79.1097	93.9799
37	CEI-3	-83.9752	79.1539	-80.0000	79.1538	82.7325

Transect	Stratum	Longitude (West terminus)	Latitude (West terminus)	Longitude (East terminus)	Latitude (East terminus)	Length (km)
38	CEI-3	-84.3200	79.2000	-80.0000	79.1991	89.1923
39	CEI-3	-84.3265	79.2453	-79.7043	79.2453	85.5274
40	CEI-3	-84.4059	79.2908	-80.2521	79.2905	78.1989
41	CEI-3	-84.4612	79.3362	-80.2482	79.3358	82.4700
42	CEI-3	-84.4570	79.3816	-80.2171	79.3811	83.8034
43	CEI-3	-84.5731	79.4271	-80.1208	79.4261	83.7156
44	CEI-3	-84.8181	79.4726	-80.2790	79.4719	92.3412
45	CEI-3	-84.9285	79.5180	-80.0719	79.5166	97.2458
46	CEI-3	-84.9813	79.5633	-79.6621	79.5626	105.2471
47	CEI-3	-85.0397	79.6086	-81.1001	79.6086	79.5353
48	CEI-3	-85.1830	79.6539	-81.6891	79.6532	71.0937
49	CEI-3	-85.4867	79.6989	-81.8610	79.6981	72.8418
50	CEI-3	-86.2028	79.7436	-81.9680	79.7432	76.6579
51	CEI-3	-86.4671	79.7895	-82.0603	79.7886	69.4444
52	CEI-3	-86.4077	79.8347	-82.0781	79.8340	86.0609
53	CEI-3	-86.4385	79.8801	-82.2032	79.8796	79.1084
54	CEI-3	-86.4361	79.9254	-82.4099	79.9254	73.9772
55	CEI-3	-86.3668	79.9706	-82.6389	79.9710	62.4448
56	CEI-3	-86.4800	80.0161	-82.7677	80.0165	72.2597
57	CEI-3	-86.5574	80.0616	-83.0152	80.0619	69.0022
58	CEI-3	-86.6099	80.1070	-83.2220	80.1071	64.8551
59	CEI-3	-86.6034	80.1523	-83.3805	80.1523	61.6405
60	CEI-3	-86.5741	80.1976	-83.5321	80.1974	57.5415
61	CEI-3	-86.5367	80.2429	-83.7497	80.2423	52.4790
62	CEI-3	-86.4941	80.2881	-85.5070	80.2881	18.3872

Appendix 3. Daily flight summaries**Table 10.** Daily flight summaries for central Ellesmere Island survey, with recorder and observer locations on aircraft

Date	Time Up	Time Down	Data Recorder	Left Front Observer	Left Rear Observer	Right Front Observer	Right Rear Observer
Mar-08-2017			Mitch Campbell	Matthew Fredlund	Jopee Kiguktak	Frankie Noah	Jason Pijamini
Mar-09-2017			Mitch Campbell	Jopee Kiguktak	Matthew Fredlund	Jason Pijamini	Frankie Noah
Mar-10-2017	10:05	14:10	Mitch Campbell	Matthew Fredlund	Jopee Kiguktak	Frankie Noah	Jason Pijamini
Mar-11-2017	9:55	13:12	Mitch Campbell	Jopee Kiguktak	Matthew Fredlund	Jason Pijamini	Frankie Noah
Mar-12-2017	Weather Day - Did not survey						
Mar-13-2017	9:38	13:08	Mitch Campbell	Matthew Fredlund	Jopee Kiguktak	Frankie Noah	Jason Pijamini
Mar-14-2018	Weather Day - Did not survey						
Mar-15-2019	Weather Day - Did not survey						
Mar-16-2020	Weather Day - Did not survey						
Mar-17-2017	8:50	12:30	Mitch Campbell	Jopee Kiguktak	Matthew Fredlund	Frankie Noah	Jason Pijamini
Mar-18-2017	8:50	11:00	Mitch Campbell	Jopee Kiguktak	Matthew Fredlund	Frankie Noah ¹	Jason Pijamini
						Mitch Campbell ¹	Jason Pijamini
	11:30	15:27	Mitch Campbell	Matthew Fredlund	Jopee Kiguktak	Jason Pijamini	Frankie Noah
Mar-19-2017	8:40	12:35	Mitch Campbell	Jopee Kiguktak	Matthew Fredlund	Mitch Campbell	Jason Pijamini
	13:28	16:30	Mitch Campbell	Matthew Fredlund	Jopee Kiguktak	Jason Pijamini	Frankie Noah ² Mitch Campbell ²
Mar-20-2017	8:53	11:07	Mitch Campbell	Jopee Kiguktak	Matthew Fredlund	Frankie Noah	Jason Pijamini

¹ Right front observer replaced with right data recorder/observer during flight

² Right rear observer replaced with right data recorder/observer during flight

Appendix 4. Incidental wildlife observations

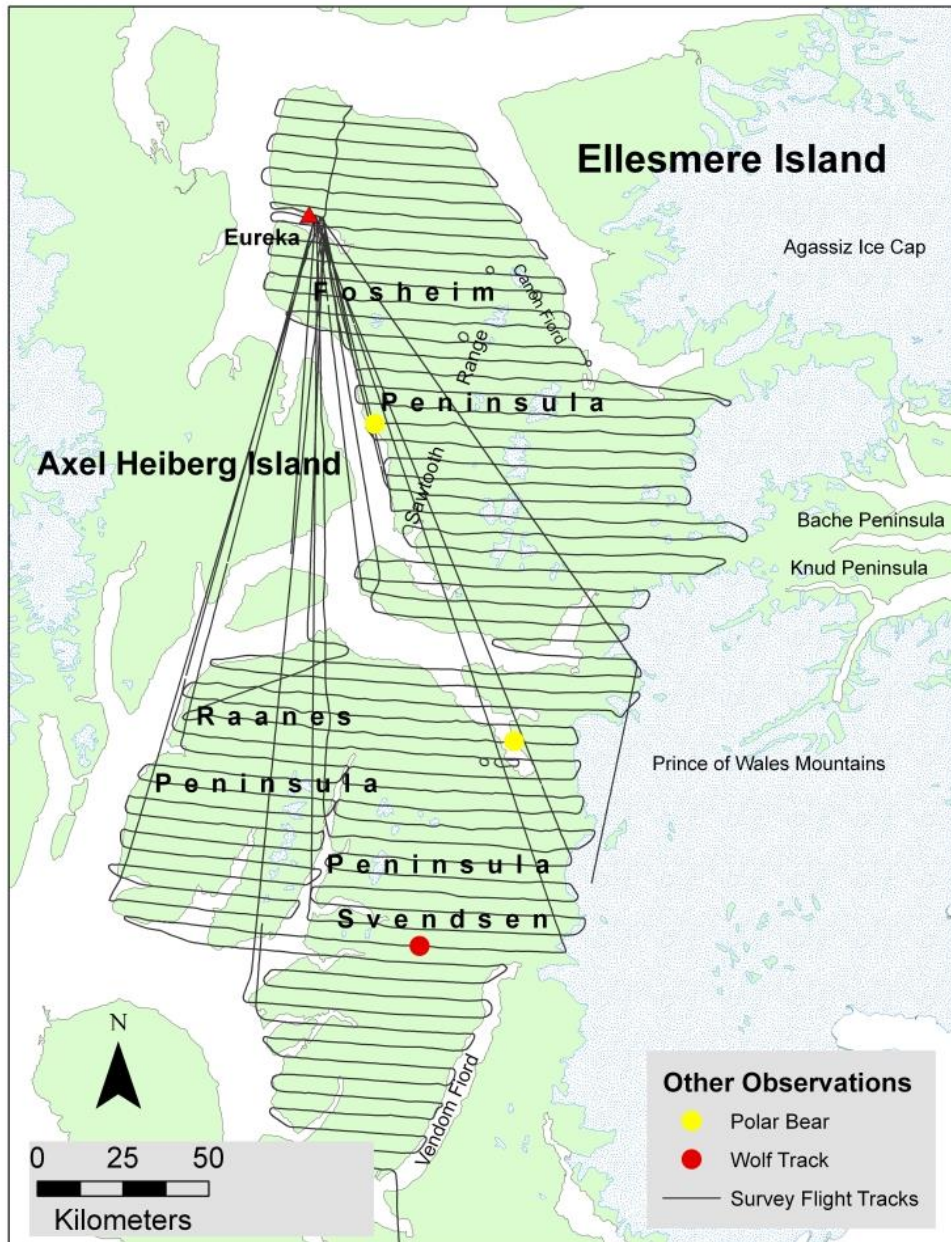


Figure 15. Incidental observations and flight lines from central Ellesmere Island aerial survey, March 8-20, 2017. A total of two polar bears were seen. Although no wolves were seen a track that appeared to be from a wolf was seen. Communication with staff from the Eureka Weather Station informed us that wolves had been seen around the station a few weeks earlier. Arctic hares were also seen but locations were not recorded.

Action Plan for the Blue Whale (*Balaenoptera musculus*), Northwest Atlantic Population, in Canada

Blue Whale, Northwest Atlantic Population



2019

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For copies of the Action Plan, or for additional information on species at risk, including COSEWIC Status Reports, residence descriptions, recovery strategies, and other related recovery documents, please visit the [Species at Risk Public Registry](#).

Cover illustration: Y. Morin, DFO

Également disponible en français sous le titre
«Plan d'action pour le rorqual bleu (*Balaenoptera musculus*), population de l'Atlantique Nord-Ouest, au Canada. »

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Preface

The federal, provincial, and territorial government signatories under the [Accord for the Protection of Species at Risk \(1996\)](#) agreed to establish complementary legislation and programs that provide for the effective protection of species at risk throughout Canada. Under the *Species at Risk Act* (S.C. 2002, c.29) (SARA), the federal competent ministers are responsible for preparing action plans for species listed as extirpated, endangered, and threatened, and for which recovery has been deemed feasible. They are also required to report on progress five years after the publication of the final document on the Species at Risk Public Registry.

The Minister of Fisheries and Oceans is the competent minister under SARA for the Northwest Atlantic Blue Whale and has prepared this Action Plan to implement the Recovery Strategy, as per Section 47 of SARA. The minister responsible for the Parks Canada Agency is the competent minister for individuals in the waters of Forillon National Park. In preparing this Action Plan, the competent ministers have considered, as per Section 38 of SARA, the commitment of the Government of Canada to conserving biological diversity and to adhering to the principle that, if there are threats of serious or irreversible damage to the listed species, cost-effective measures to prevent the reduction or loss of the species should not be postponed for a lack of full scientific certainty. To the extent possible, this Action Plan has been prepared in cooperation with Parks Canada Agency and the Mingan Island Cetacean Study, as per Section 48(1) of SARA.

As stated in the preamble to SARA, success in the recovery of this population depends on the commitment and cooperation of many different constituencies that will be involved in implementing the directions and actions set out in this Action Plan and will not be achieved by Fisheries and Oceans Canada or any other jurisdiction alone. The cost of conserving species at risk is shared between different constituencies. All Canadians are invited to join in supporting and implementing this Action Plan for the benefit of the Northwest Atlantic Blue Whale and Canadian society as a whole.

Under SARA, an action plan provides the detailed recovery planning that supports the strategic direction set out in the recovery strategy for the species. The plan outlines recovery measures to be taken by Fisheries and Oceans Canada, Environment and Climate Change Canada and other jurisdictions or organizations to help achieve the population and distribution objectives identified in the Recovery Strategy. Implementation of this Action Plan is subject to the appropriations, priorities, and budgetary constraints of the participating jurisdictions and organizations.

Acknowledgments

Fisheries and Oceans Canada would like to thank Andréanne Demers, Hugues Bouchard, Sarah Larochelle and Charline Le Mer, who drafted this Action Plan, as well as all those in the Department who supported its development. The Department also wishes to acknowledge the contributions of Parks Canada, as well as Richard Sears and Christian Ramp of the Mingan Island Cetacean Study.

Executive summary

The Northwest Atlantic Blue Whale was listed as Endangered under the *Species at Risk Act* in 2005. The main threats to its recovery are anthropogenic noise, lack of food availability, contaminants, collisions, disturbances and entanglements. Published in 2009, the Recovery Strategy proposed three recovery objectives intended to increase knowledge of the population, its habitat, and threats, and implement measures to mitigate threats.

The Action Plan for the Northwest Atlantic Blue Whale presents measures that will be implemented in the short and medium term to assist in meeting the recovery objectives. The first set of measures will be taken by Fisheries and Oceans Canada. They consist primarily of research aimed at estimating the size of the Northwest Atlantic Blue Whale population and its use of Canadian waters. The measures also include adopting or enforcing legislation or policies to protect Blue Whale habitat and mitigate threats. The second set of measures will be implemented by the Department in partnership with the various stakeholders involved in the Blue Whale's recovery. They include research on krill and the use of hydroacoustics to document the presence of these whales. The third set of measures consists of actions that concerned stakeholders will be able to take voluntarily. They include observations and photo-identification of Blue Whales and outreach and awareness initiatives.

The measures set out in the Action Plan could affect some stakeholders such as non-governmental organizations or the shipping industry. However, their implementation would not necessarily result in incremental costs to these stakeholders. Canadian society as a whole would benefit from the implementation of the Action Plan, given the economic value that Canadians attach to the recovery of the species and the protection of its habitat.

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1. Recovery actions

1.1 Context and scope of the Action Plan

The Blue Whale (*Balaenoptera musculus*) is a baleen whale that uses coastal and offshore Atlantic Canadian waters mainly in the summer (Figure 1), to feed primarily on euphausiids, commonly known as krill. The Blue Whale population in the Northwest Atlantic was designated as Endangered by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) in May 2002. This population was reassessed by COSEWIC in 2012 and its status confirmed. It was listed as Endangered under the *Species at Risk Act* (SARA) in January 2005. Commercial whaling historically carried out in the Atlantic Ocean reduced the population by about 70%; at least 11,000 Blue Whales were killed before the 1960s including at least 1,500 animals in eastern Canadian waters. The size of the Northwest Atlantic population is currently unknown, but experts estimate that the number of mature animals is unlikely to exceed 250 individuals.

The [Recovery Strategy for the Northwest Atlantic Blue Whale](#) (Beauchamp et al. 2009) presents the various threats facing the population. In addition to historical whaling and natural sources of mortality such as ice entrapment and predation, several threats have been identified and their general level of concern assessed. This level of concern depends on the potential impact of the threat on the population, knowledge on the threat, and its extent within the distribution range. The main threats to the recovery of the Northwest Atlantic Blue Whale population were determined by experts to be anthropogenic noise, which causes a degraded underwater acoustic environment and alters behaviour, and the lack of food resources, which could result from ecosystem changes caused in particular by climate change.

Contaminants, vessel collisions, disturbances caused by whale watching activities, entanglements in fishing gear, epizootics, toxic algal blooms and toxic spills also pose a threat to the Blue Whale. Based on the best available information when the recovery strategy was published in 2009, these threats were assessed as presenting a low level of concern, either because their impact was considered low, very localized or difficult to quantify or because the threats were considered potential. Based on new data from photo-identification (Gaspard et al. 2017), the impact of the threat of entanglement in fishing gear needs to be reassessed, as it may be more significant than previously thought. Given the small size of the Blue Whale population, even activities that affect a small number of individuals can have a significant impact on the species' survival in the Atlantic Ocean.

The long-term goal of this Recovery Strategy is to reach a total of 1,000 mature individuals. To reach this recovery goal, three objectives were set for the Canadian range:

Objective 1: Define and conduct a long-term assessment of the size, structure and trends of the Northwest Atlantic Blue Whale population, and determine their range and critical habitat within Canadian waters;

Objective 2: Implement control and monitoring measures for activities that could hinder the recovery of the Blue Whale in its Canadian range;

Objective 3: Increase knowledge of the main threats to the recovery of the Blue Whale in Canadian waters both to determine their true impact and to identify effective measures to mitigate the negative consequences for the population's recovery.

The Recovery Strategy is proposing recovery approaches based on three broad strategies: research and monitoring, conservation, awareness and education. The purpose of this Action Plan is to outline priority actions to meet the above recovery objectives, following the same broad strategies. These actions are related to all the threats described in the Recovery Strategy and the full range of the population in Atlantic Canada's waters. The Recovery Strategy provides more details on the strategies and approaches for recovering Northwest Atlantic Blue Whales, on studies to identify their critical habitat, and on their biology (Beauchamp et al. 2009).

Under Section 47 of SARA, the competent minister must prepare one or more action plans based on the Recovery Strategy. Action planning for species at risk recovery is therefore an iterative process. The Implementation Schedule in this Action Plan may be modified in the future depending on the level of progress made towards recovery.

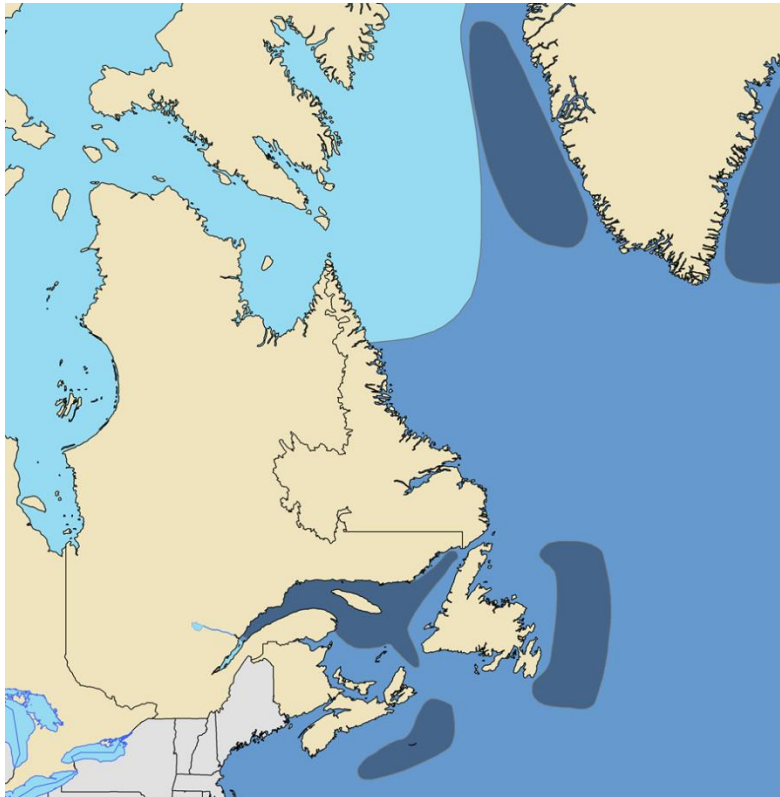


Figure 1. Geographic range and concentration areas (darker blue) of the Blue Whale in the Northwest Atlantic Ocean.

1.2 Measures to be taken and Implementation Schedule

Success in the recovery of this population is not dependent on the actions of any single jurisdiction; rather, it requires the commitment and cooperation of the many different constituencies involved in implementing the directions and actions set out in this Action Plan.

This Action Plan outlines measures that maximize the likelihood of achieving the population and distribution objectives for the Northwest Atlantic Blue Whale. It also includes measures to address threats to the population and monitor its recovery, in order to guide not only activities to be undertaken by Fisheries and Oceans Canada (DFO), but also those in which other jurisdictions, organizations and individuals have a role to play. DFO strongly encourages all Canadians to participate in the conservation of the Blue Whale by supporting and implementing the priority recovery measures outlined in this Action Plan. DFO recognizes the important role of key players in the field in the implementation of recovery measures for this population.

The following three tables are not intended to present all the measures that could be taken to foster the Blue Whale's recovery; instead, they target measures likely to be taken

in the medium term (within the next 5 to 10 years). These measures are technically and financially feasible and will help identify measures that could be implemented in the longer term based on the knowledge that will be acquired. Given that the Northwest Atlantic Blue Whale has a vast range, the proposed research focuses on targeted areas to optimize results and efficiency. Much of this research could help support future critical habitat identification.

Table 1. Implementation Schedule: Measures to be undertaken by Fisheries and Oceans Canada

Table 1 identifies measures to be taken by DFO to support the recovery of the Blue Whale. This table primarily presents research and monitoring measures that will have to be led by DFO, particularly because of the complex logistics involved in monitoring a Blue Whale population with such a vast range. This research is a continuation or logical extension of studies already performed by DFO as part of the Recovery Strategy and as part of its mandate for marine mammal conservation. For an overview of the research activities and conservation and awareness measures carried out from 2009 to 2014, see the [Report on the Progress of Recovery Strategy Implementation for the Blue Whale, Northwest Atlantic Population](#) (Fisheries and Oceans Canada 2016). The measures listed in Table 1 as well as Tables 2 and 3 address the three recovery objectives:

Objective 1: Increase knowledge of the population and its size (Measures 1 to 3): A better understanding of the high-concentration areas of Blue Whales will make it possible to carry out targeted surveys to assess the population size more effectively; this research will also make it possible to understand the reasons why Blue Whales are attracted to certain locations. It is being conducted to meet both Objective 1 of the Recovery Strategy and the Schedule of Studies to identify critical habitat included in the Recovery Strategy. The studies on high-concentration areas and their characteristics, such as high concentrations of krill, could lead to the identification of Blue Whale critical habitat, at least partially, in an update of the Recovery Strategy.

Objective 2: Mitigate threats (Measures 7 to 10): Fisheries and Oceans Canada will also implement conservation measures to protect the Blue Whale's food resources, mitigate the risk of collisions and protect the Blue Whale from disturbances through policies and regulations.

Objective 3: Develop a better understanding of threats (Measures 4 to 6): The impact of threats, such as noise, disturbance or entanglement, which can alter the behaviour of Blue Whales and thereby adversely affect their recovery, are still poorly understood. Studies on noise sources and the impact of disturbance and entanglement on the recovery of the population will make it possible to implement suitable mitigation measures and improve on existing mitigation measures.

The measures presented in Table 1 are in addition to the implementation of DFO's mandate and enforcement of laws in effect. The Blue Whale is protected under SARA, which prohibits anyone from harming or harassing an endangered species. The Blue Whale's needs must also be taken into account in the environmental assessments of various projects under the *Fisheries Act*, the *Canadian Environmental Assessment Act*,

2012 or the *National Energy Board Act*. Mitigation measures can also be included in authorization conditions issued under various types of legislation enforced by the Department. Environmental assessments of projects submitted to federal-provincial offshore petroleum boards are also reviewed by DFO to ensure that species at risk are taken into account. Moreover, scientific research protocols on the Blue Whale are reviewed to minimize disturbances. By enforcing legislation, other government departments and agencies also contribute to Blue Whale recovery. For example, Parks Canada is implementing the *Marine Activities in the Saguenay–St. Lawrence Marine Park Regulations*.

Table 1. Measures to be undertaken by Fisheries and Oceans Canada

#	Recovery Measures	Priority ¹	Threats or Objectives Addressed ²	Timeline
Broad Strategy: <i>Research and monitoring</i>				
1	Continue delineating high-density seasonal areas in Canadian waters using satellite transmitters, especially in southwestern Newfoundland and on the Scotian Shelf. Transmitters have been put on several Blue Whales since 2010 and data have been used to define feeding areas and migratory routes. This research will identify locations where the Blue Whale is found in order to assess their numbers through targeted surveys.	High	Objective 1	5 years
2	Conduct targeted surveys in high-density areas to assess the population size. Once high-density areas have been identified, aerial or vessel-based surveys can focus on these areas and thereby be more effective in estimating the number of Blue Whales.	High	Objective 1	5 years
3	Assess the extent to which the biological processes (krill aggregations) and physical processes (currents, tides) affect the distribution, behaviour, and migrations of the Blue Whale.	High	Objective 1	5 years

¹ **Priority:** Reflects the degree to which the measure contributes directly to the recovery of the population or is an essential precursor to a measure that contributes to the recovery of the population.

- “High” priority measures are considered those most likely to have an immediate or direct impact on the achievement of the recovery objective for the population.
- “Medium” priority measures may have a less immediate or direct impact on the achievement of the population and distribution recovery objectives, but are still important for the recovery of the population.
- “Low” priority recovery measures will likely have an indirect or gradual impact on the achievement of the recovery objectives. They are nonetheless considered important contributions to the knowledge base or public involvement and to the value the public ascribes to the species.

² **Threats or objectives addressed:** Indicates which recovery objective the measure addresses or which threat it mitigates. Summary of the objectives: Objective 1: Increase knowledge of the population and its size; Objective 2: Mitigate threats; Objective 3: Develop a better understanding of threats.

#	Recovery Measures	Priority ¹	Threats or Objectives Addressed ²	Timeline
4	Study the Blue Whale's behavioural responses to various noise sources in various contexts. The Blue Whale's tolerance to noise must be better understood in order to develop appropriate mitigation measures for noise-generating human activities.	Medium	Objective 3 Noise	10 years
5	Study the behavioural response of Blue Whales to various approach distances of boats (whale watching, research, and recreational boats). This knowledge will help to establish acceptable approach distances for the Blue Whale.	Medium	Objective 3 Disturbance	2 years
6	Assess the fishing effort and characterize the fishing gear used in areas occupied by the Blue Whale to determine the potential impact of the threat of gear entanglement on the population.	Low	Objective 3 Entanglement	10 years
Broad Strategy: Conservation				
7	Assess whether any commercial fishery of krill would affect the integrity of the ecosystem or the energy needs of a recovering or a recovered Blue Whale population, in accordance with the Policy on New Fisheries on Forage Species .	High	Objective 2 Availability of food	Ongoing
8	Adopt and implement the amendments to the <i>Marine Mammal Regulations</i> to help protect the Blue Whale from anthropogenic disturbances in all of the areas that they occupy. The amended regulations include approach distances for species at risk like the Blue Whale in order to reduce disturbance.	High	Objective 2 Disturbance Collisions	Ongoing
9	Determine the best management tools for achieving the St. Lawrence Estuary Area of Interest's conservation objectives and implement them, including the designation of a marine protected area.	High	Objective 2	5 years
10	By enacting regulations, designate a marine protected area in the American Bank area located off the Gaspé Peninsula. This site is, among other things, considered as a high-density Blue Whale area. Examples of potential conservation measures would be voluntary measures and rules of ethics to regulate marine observation activities and reduce disturbances, as well as	Medium	Objective 2 Disturbance Entanglement	2 years

#	Recovery Measures	Priority ¹	Threats or Objectives Addressed ²	Timeline
	apply fishery measures aimed at protecting forage species, such as krill, the Blue Whale’s main prey.		Collisions	
Broad Strategy: Outreach				
11	Encourage the whale watching public to report their observations. For example, the “Tell Jack” outreach campaign encourages the whale watching public in Newfoundland and Labrador to play a role in DFO marine mammal science and promote DFO’s research on marine mammals including the Blue Whale. Anecdotal reports and pictures sent to the marine mammal research group can provide useful information. The campaign uses social media, proactive media relations, and public outreach activities to solicit observation reports and pictures from the public via Twitter and email.	Medium	Objective 1	Ongoing
12	Carry out outreach and educational activities intended for whale watching operators, the whale watching public, and other mariners about best practices for observing marine mammals including the Blue Whale. For example, in Newfoundland and Labrador, school visits and public events such as Oceans Day are organized using life-size Blue Whale tails made of fabric. The tails could be used to educate people on the Blue Whale’s biology, behaviour, and lifecycle, as well as its SARA status.	Medium	Objective 2 Disturbance	Ongoing

Table 2. Measures to be undertaken collaboratively between Fisheries and Oceans Canada and its partners

Table 2 shows the actions that will be taken by Fisheries and Oceans Canada and its partners working in collaboration. The order in which partners are listed in the table is not indicative of their contribution or degree of involvement. Implementation of these measures will be dependent on a collaborative approach, in which Fisheries and Oceans Canada is a partner in recovery efforts, but cannot implement the measures alone. Table 2 presents research and monitoring measures that DFO is implementing in close partnership with universities, other government agencies, the private sector and research organizations. The purpose of these measures is to:

1. Continue the characterization of noise sources and levels and the Blue Whale's exposure to noise in the areas they use the most (measure 13).
2. Study the Blue Whale's primary food source, krill (Measures 14 to 16). DFO intends to continue its research on krill production in the Estuary and Gulf of St. Lawrence, and on krill interaction with Blue Whales, in collaboration with universities.
3. Increase knowledge of the Blue whale distribution in areas outside the Estuary and Gulf of St. Lawrence, for which few observational data are available (Measures 17 to 22). DFO and several partners intend to use hydroacoustics and photo-identification for this purpose. These measures also support the schedule of studies intended to identify critical habitat set out in the Recovery Strategy.
4. Better assess the effect of the threat of entanglement on the health and recovery of the Blue Whale (measure 23).

This table also proposes several partnerships to implement conservation measures and thereby mitigate threats to Blue Whale recovery. Certain initiatives are underway or are planned for the near future to mitigate threats, such as noise (Measure 24), toxic spills (Measure 25), vessel collisions (Measures 26 and 27) and entanglements (Measure 28). Two awareness campaigns are also underway to improve the data collected by observers (Measure 29) and to raise awareness among pleasure boaters around the Saguenay–St. Lawrence Marine Park in order to reduce disturbances in this important area for the Blue Whale (Measure 30).

Table 2. Collaborative measures between Fisheries and Oceans Canada and its partners.

Acronyms: DFO (Fisheries and Oceans Canada), NGO (Non-Governmental Organizations), NOAA (National Oceanographic and Atmospheric Administration, US).

#	Recovery Measures	Priority ³	Threats or Objectives Addressed ⁴	Timeline	Partnerships ⁵
Broad Strategy: <i>Research and monitoring</i>					
13	Continue characterizing of noise sources and levels, and analyzing the exposure of Blue Whales to noise in the areas they use most often in Canadian Atlantic waters.	Medium	Objective 3 Noise	Ten years	DFO Transport Canada Industry
14	Study krill distribution, population dynamics and production processes. Tides, currents, and krill behaviour will determine the aggregation areas essential for effective Blue Whale feeding. A better understanding of these factors could be integrated into critical habitat identification.	High	Objective 3 Availability of food	3 years	DFO Universities Research institutes
15	Study the Blue Whale's energy needs to estimate the krill biomass necessary to support the current population and eventually a recovering population.	High	Objective 3 Availability of food	3 years	DFO Universities Research institutes
16	Study the trophic interactions between the Blue Whale and krill to try to explain the high inter-annual and inter-regional variability of Blue Whale occurrences and residence time.	High	Objective 3 Availability of food	3 years	DFO Universities Research institutes

³ See footnote 1.

⁴ See footnote 2.

⁵ **Potential partners:** Université du Québec à Rimouski, Dalhousie University, Institut des sciences de la mer à Rimouski, Group for Research and Education on Marine Mammals (GREMM), Mingan Island Cetacean Study, Réseau d'observation des mammifères marins, Indigenous groups, Shipping Federation of Canada, whale watching tour operators, emergency response networks, etc.

#	Recovery Measures	Priority ³	Threats or Objectives Addressed ⁴	Timeline	Partnerships ⁵
17	Use hydroacoustic techniques to monitor the occurrence and number of Blue Whales in Atlantic Canada's waters, especially on the Scotian Shelf and south of Newfoundland. Bottom-moored recorders will make it possible to collect data on all marine mammal species that vocalize in a specific location.	High	Objective 1	2 to 5 years	DFO Universities Research institutes
18	Acquire data on Blue Whale distribution and abundance outside the Gulf of St. Lawrence (Cabot Strait and Scotian Shelf) where very little information is available, using photo-identification and the installation of satellite transmitters.	High	Objective 1	5 years	NGO DFO Universities
19	Conduct necropsy on dead Blue Whales whenever possible and follow protocols for data collection and sharing.	High	Objective 1 Objective 3	Ongoing	NGO DFO Universities
20	Continue collecting tissue samples and conducting biopsies to assess the population structure, pregnancy rates, and level of contaminants, especially in the Gulf of St. Lawrence, the Cabot Strait and the Scotian Shelf.	Medium	Objective 1 Objective 3	5 years	NGO Universities DFO
21	Better integrate all Blue Whale sightings data collected by various sources.	Low	Objective 1	5 years	NGO Universities Research institutes DFO
22	Establish international research partnerships to increase understanding of the Blue Whale's distribution and migration routes. Sharing hydroacoustic data is an example of collaboration.	Low	Objective 1	10 years	DFO NOAA Universities

#	Recovery Measures	Priority ³	Threats or Objectives Addressed ⁴	Timeline	Partnerships ⁵
23	Use photo-identification to monitor entanglement rates in Blue Whales in order to better assess the impact of this threat on the health and recovery of the population.	Medium	Objective 2 Entanglement	In progress	NGO DFO
Broad Strategy: Conservation					
24	Study and implement measures to reduce the negative impact of noise caused by human activities, such as shipping, construction, and seismic exploration.	High	Objective 2 Noise	Ongoing	DFO Transport Canada Industry Parks Canada Universities NGO
25	Develop and implement response plans to reduce impacts to Blue Whales and their habitat likely to be caused by toxic spills. The government's initiative to strengthen the tanker safety system includes improving response planning in the event of toxic spills in targeted areas such as the Gulf of St. Lawrence, a high-risk area for spill impacts.	Medium	Objective 2 Spills	5 years	Provincial and federal departments Industry NGO
26	Maintain the Marine Mammal Response Program in the various regions of Canada's Atlantic coast. This program supports organizations that maintain call centres and databases, and that intervene when a marine mammal is in distress. It also supports training for emergency responders.	Medium	Objective 2 Entanglement Collisions	Ongoing	NGO DFO Indigenous groups
27	Study how to reduce the risk of vessel collisions with Blue Whales in the St. Lawrence Estuary and Gulf of St. Lawrence beyond existing voluntary measures for speed reduction, with the goal of identifying measures to implement (e.g., moving shipping lanes, establishing no-go areas).	Medium	Objective 2 Collisions	5 years	DFO Transport Canada Industry NGO

#	Recovery Measures	Priority ³	Threats or Objectives Addressed ⁴	Timeline	Partnerships ⁵
28	Develop projects to promote the recovery of ghost or lost fishing gear in the Estuary and Gulf of St. Lawrence	Low	Objective 2 Entanglement	5 years	DFO Industry NGO
Broad Strategy: Outreach					
29	Continue training observers to improve marine mammal identification and information gathering. Training is intended for all those who have the opportunity to gather observational information (researchers, bird watchers, observers on platforms).	Medium	Objective 1	Ongoing	DFO NGO Industry
30	Educate pleasure boaters and captains of whale watching excursions on the impacts their activities have on Blue Whales near the Saguenay-St. Lawrence Marine Park. In collaboration with fisheries officers, the goal of this project is to educate users on the appropriate behaviour to adopt outside the marine park. It could be extended to other areas where there is a high incidence of disturbance by pleasure boaters and whale watchers.	Medium	Objective 2	5 years	DFO Parks Canada NGO

Table 3. Measures that represent opportunities for other jurisdictions, organizations or individuals to lead

As all Canadians are invited to join in supporting and implementing this Action Plan for the benefit of the Blue Whale and Canadian society as a whole, Table 3 identifies measures likely to support the recovery of the Northwest Atlantic Blue Whale that could be taken voluntarily by other jurisdictions, institutions, groups, and individuals interested in supporting the species' recovery. The order in which partners are listed in Table 3 is not indicative of their contribution or degree of involvement. The research and monitoring measures presented in Table 3 are activities that could be implemented by non-governmental organizations, particularly the Mingan Island Cetacean Study (MICS). These measures involve continuing Blue Whale monitoring activities through photo-identification, hydroacoustics, tissue sample collection, and biopsies (Measures 31 to 36) in Canadian and international waters. Several organizations, including Parks Canada, are already involved in efforts to raise marine user awareness of the impact their activities have on the Blue Whale, and these efforts are expected to continue (Measures 37 and 38).

If your organization is interested in participating in one of these measures, please contact the Species at Risk Management Division in Quebec at lep-sara-qc@dfo-mpo.gc.ca.

Table 3. Measures that represent opportunities for other jurisdictions, organizations or individuals to lead.

#	Recovery Measures	Priority ⁶	Threats or objectives addressed ⁷	Partnerships ⁸
Broad Strategy: <i>Research and monitoring</i>				
31	Continue photo-identification activities, especially in various areas of the Gulf of St. Lawrence, and analyze photos to continue identifying individuals. These analyses help to better understand the Blue Whale's annual use of Canadian waters and assess its abundance. The continuation of these activities implies maintaining a database of observations and photos.	High	Objective 1	NGO Indigenous groups
32	Conduct acoustic monitoring (recording vocals using moored recorders) in various sectors of the Gulf of St. Lawrence and Atlantic Canada that are difficult to access in order to better characterize their use by the Blue Whale.	High	Objective 1	NGO Universities Research institutes
33	Conduct an analysis of the Northwest and Northeast Atlantic photo-identification catalogues to verify whether there are connections between these two areas of the Atlantic Ocean.	Medium	Objective 1	NGO Universities Research institutes
34	Biopsy Blue Whales to monitor their contaminants levels. The accumulation of contaminants in the Blue Whale is barely known and biopsies could make it possible to identify contaminants found in tissues and monitor their evolution over time.	Medium	Objective 3 Contaminants	NGO Universities Research institutes
35	Conduct genetic analyses of tissues collected from individuals that died in spring 2014 in southern Newfoundland. The comparison of these analyses with biopsies carried out across the North Atlantic will allow for a better understanding of the extent of exchange among the whales in the various regions.	Low	Objective 1	NGO Universities Research institutes

⁶ See footnote 1.⁷ See footnote 2.⁸ See footnote 5.

#	Recovery Measures	Priority ⁶	Threats or objectives addressed ⁷	Partnerships ⁸
36	Conduct a survey off Mauritania in the winter to determine whether the Northwest Atlantic Blue Whale uses the waters off West Africa to breed.	Low	Objective 1	NGO Universities Research institutes
Broad Strategy: Outreach				
37	Continue raising awareness among marine users of the impact their activities have on the Blue Whale (marine observation activities, commercial shipping, and pleasure boaters).	Medium	Objective 2	Parks Canada Transport Canada NGO Industry Indigenous groups
38	Continue mandatory training for all captains and kayaking guides who conduct their activities in the Saguenay-St. Lawrence Marine Park to familiarize them with the best practices for observing marine mammals (marine park regulations, biology, and ways to diversify excursions).	Medium	Objective 2	Parks Canada

1.3 Critical habitat

1.3.1 Critical habitat identification

The Act requires an action plan which or that includes an identification of critical habitat to the extent possible. When published in 2009, the Recovery Strategy for the Northwest Atlantic Blue Whale included a schedule of studies to identify critical habitat. Several such studies have been carried out since the publication of the Recovery Strategy, and others are ongoing. These studies are summarized in the [Report on the Progress of Recovery Strategy Implementation for the Blue Whale, Northwest Atlantic population](#). The results were presented and peer-reviewed at a DFO Science Advisory Meeting in winter 2016. A Science Advisory Report was published recently (Fisheries and Oceans Canada 2018) and will be used to support the identification of Blue Whale critical habitat, to the extent possible. This identification will be presented in an update of the Recovery Strategy, rather than in this Action Plan.

2. Socioeconomic assessment

The *Species at Risk Act* requires that an Action Plan include an assessment of the socioeconomic costs associated with its implementation and of the benefits to be derived from the implementation (SARA 49(1)(e), 2002). This assessment addresses only the incremental (new) socioeconomic costs associated with the implementation of this Action Plan at the national level as well as the social and environmental benefits of implementing it in its entirety, recognizing that not all aspects of its implementation are under the jurisdiction of the federal government. It is intended to inform the public and guide partners in their decision-making on the implementation of the Action Plan.

This assessment will first identify the main stakeholders that could be affected by or involved in the implementation of the recovery measures listed in Tables 1 to 3 of the Action Plan. Section 2.2 then examines whether these measures could involve incremental costs to stakeholders. Lastly, Section 2.3 presents an overview of the benefits of implementing the Action Plan.

2.1 Stakeholder profile

The Blue Whale recovery measures set out in Tables 1 to 3 are grouped into three types of broad strategies: research and monitoring, conservation, and outreach. The types of stakeholders that would take part in the implementation of the Action Plan are also identified in these tables.

Research and monitoring

DFO's main partners in carrying out the research and monitoring activities are universities (e.g., University of Quebec at Rimouski, Dalhousie University), governmental (e.g., Transport Canada) and non-governmental (e.g., Mingan Island Cetacean Study) organizations.

Conservation

The implementation of conservation measures would involve a number of stakeholders, including the federal and provincial governments, non-governmental organizations, and the private sector. Several private sector industries could be affected by the implementation of conservation measures. In particular, noise reduction measures could have repercussions for industries whose activities involve shipping, marine construction, and seismic exploration (Table 2 – Measure 24). Initiatives to enhance the security systems of tankers and reduce the risk of collision between Blue Whales and ships may also have an impact on the shipping industry (Table 2 – Measures 25 and 27).

Outreach

Outreach activities would be conducted primarily by the federal government in collaboration with non-governmental organizations and the whale watching industry.

2.2 Socioeconomic costs of implementing the Action Plan

Many of the measures identified in the Action Plan are initiatives underway within the federal government and its partners, and these measures are expected to continue even in the absence of the Action Plan. Although the measures set out in the Action Plan could affect some stakeholders identified above, their implementation would not systematically result in incremental socioeconomic costs to these stakeholders.

There is not enough information to quantify the incremental socioeconomic costs that could result from implementing the Action Plan for the Blue Whale. Therefore, the potential costs of the Action Plan are evaluated qualitatively because most of the available information is qualitative.

Research and monitoring

Of the 38 recovery measures in the action plan, 23 measures involve research and monitoring activities. Many of these research projects are an extension of projects already being carried out by DFO and its partners. Certain projects go beyond the scope of the Blue Whale Recovery Strategy and include the acquisition of knowledge that can be applied to several species. It is therefore realistic to think that many of the research activities listed in Tables 1 to 3 would be carried out by DFO and its partners, even in the absence of the Action Plan.

DFO-led research and monitoring would be funded through the Department's regular programs and would not mean incremental costs to DFO. Measures undertaken by other organizations (universities, NGOs, research institutes) could be funded in part by existing federal government programs. However, additional costs could be incurred by local and regional stakeholders who chose to become involved in Blue Whale recovery efforts.

There is not enough information at this stage to quantify these costs, but they would vary depending on the extent of the research activities undertaken.

Conservation

The Action Plan identifies eight conservation measures to implement mitigation and monitoring measures for activities that could disrupt the recovery of the Blue Whale in its Canadian range. Most of these measures fall within the framework of initiatives that are already underway within the federal government; the implementation of these measures therefore will not involve any incremental costs to the government.

One of the conservation measures aimed at reducing the risk of collisions between the Blue Whale and ships in the St. Lawrence Estuary (Table 2 – Measure 27) could lead to additional costs for the shipping industry. As details on the implementation of these measures are not known, it is not possible to estimate the incremental costs, if any, to the shipping industry.

The implementation of conservation measures is not expected to generate any additional costs to the other stakeholders.

Outreach

The awareness activities included in the Action Plan are all activities that are currently underway and are intended to protect several species of marine mammals. Therefore, realistically, these activities would be carried out even in the absence of the Action Plan for the Blue Whale. Consequently, awareness activities are not expected to generate incremental costs to the federal government or any of the stakeholders.

2.3 Benefits of implementing the Action Plan

The implementation of the measures outlined in this Action Plan will contribute positively to the achievement of the long-term goal of the Northwest Atlantic Blue Whale Recovery Strategy, which is to reach a total of 1,000 mature individuals in the population.

The benefits of the recovery of the Blue Whale are difficult to quantify. However, the Act recognizes that “wildlife, in all its forms, has value in and of itself and is valued by Canadians for aesthetic, cultural, spiritual, recreational, educational, historical, economic, medical, ecological and scientific reasons” (SARA 2002). Self-sustaining and healthy ecosystems with their various elements in place, including species at risk, contribute positively to the livelihoods and the quality of life of all Canadians. A review of the literature confirms that Canadians value the preservation and conservation of species in and of themselves. Measures taken to preserve a species, such as habitat protection and restoration, are also valued. In addition, the more measures contribute to the recovery of a species, the higher the value the public ascribes to such measures (Loomis and White 1996; Fisheries and Oceans Canada 2008).

Specifically, a study estimating the economic benefits of marine mammal recovery in the St. Lawrence Estuary reveals that Canadians would be willing to pay \$229 annually per household for a multi-species recovery strategy resulting in a measurable improvement in the status of species at risk for a number of marine mammals, including the Blue Whale (Boxall et al. 2012).

The implementation of the Action Plan should also generate benefits beyond the recovery of the Blue Whale. The acquisition of knowledge and the development of conservation measures should benefit several other marine mammal species.

2.4 Distributional impacts

Many different stakeholders will be involved in implementing the recommendations set out in this Action Plan. Given that most of the measures set out in the plan relate to existing programs and are a continuation of activities already underway, the incremental costs to DFO and its partners should be minimal.

The benefits of implementing the Blue Whale Action Plan will be enjoyed by the Canadian society as a whole, given the economic value that Canadians attach to the recovery of the species and the protection of its habitat.

3. Measuring progress

The recovery objectives presented in the Recovery Strategy propose a method for defining and measuring progress made toward achieving population and distribution objectives.

A report on the implementation of the Action Plan (under s. 55 of SARA) will be prepared to assess the progress made towards the implementation of the recovery measures.

A report on the ecological and socioeconomic impacts of the Action Plan (under s. 55 of SARA) will be prepared to provide information on the monitoring of the species' recovery and its long term viability, and on the implementation of the Action Plan.

4. References

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Appendix A: Effects on the environment and other species

A Strategic Environmental Assessment (SEA) is conducted on all SARA recovery planning documents under SARA and in accordance with the [Cabinet Directive on the Environmental Assessment of Policy, Plan and Program Proposals](#). The purpose of an SEA is to incorporate environmental considerations into the development of public policies, plans, and program proposals to support environmentally sound decision-making and to evaluate whether the outcomes of a recovery planning document could affect the environment in any way or the achievement of any of the [Federal Sustainable Development Strategy](#)'s goals or targets.

Recovery planning is intended to benefit species at risk and biodiversity in general. However, it is recognized that implementation of action plans may inadvertently have environmental impacts beyond the intended benefits. The planning process based on national guidelines directly incorporates consideration of all environmental impacts, with a particular focus on the potential impacts on non-target species or habitats. The results of the SEA are incorporated directly into the action plan itself, but are also summarized below in this statement.

The threats affecting the Blue Whale also weigh on several marine mammal species that share its range. Measures aimed at reducing the impact of threats to the Blue Whale should therefore also benefit these species. Research intended to better understand krill production and behaviour and could lead to conservation measures will also be positive for all levels of the food chain.

Appendix B: Record of cooperation and consultation

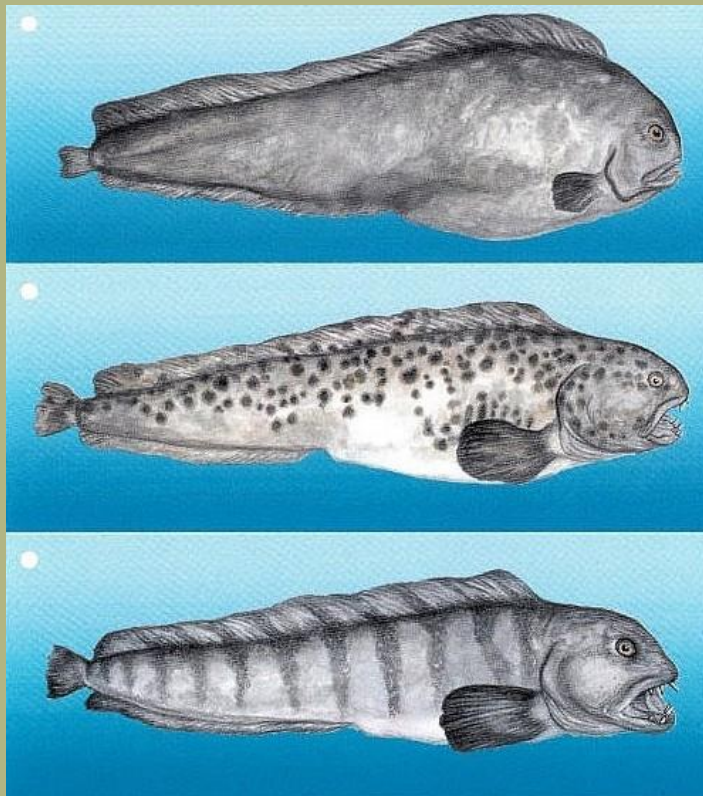
This document was prepared with the participation of DFO researchers working on the Blue Whale. Representatives of the Saguenay-St. Lawrence Marine Park also participated, because the species is often present within its boundaries. The expertise of the Mingan Island Cetacean Study, which has been collecting observational data on whales for over three decades and which acts as curator of the Blue Whale photo-identification catalogue, was also solicited.

The document has been reviewed by the different divisions in the five relevant DFO administrative regions and by national headquarters. It was also sent for comment to provincial governments and Indigenous groups present within the range of this Blue Whale population. The non-governmental organizations, the shipping and fishing industries and the commercial marine life observations activities were also consulted.

April 2, 2019

ᐃᑦᑭᑦᑭᑦ ᐃᑦᑭᑦᑭᑦ ᐃᑦᑭᑦᑭᑦ ᐃᑦᑭᑦᑭᑦ ᐃᑦᑭᑦᑭᑦ
ᐃᑦᑭᑦᑭᑦ (Anarhihas denticulatus) ᐃᑦᑭᑦᑭᑦ ᐃᑦᑭᑦᑭᑦ
ᐃᑦᑭᑦᑭᑦ (Anarhichas minor), ᐃᑦᑭᑦᑭᑦ ᐃᑦᑭᑦᑭᑦ
ᐃᑦᑭᑦᑭᑦ ᐃᑦᑭᑦᑭᑦ ᐃᑦᑭᑦᑭᑦ (Anarhichas Lupus)
ᐃᑦᑭᑦᑭᑦ

ᐃᑦᑭᑦᑭᑦ ᐃᑦᑭᑦᑭᑦ, ᐃᑦᑭᑦᑭᑦ ᐃᑦᑭᑦᑭᑦ, ᐃᑦᑭᑦᑭᑦ
ᐃᑦᑭᑦᑭᑦ ᐃᑦᑭᑦᑭᑦ



ᐃᑦᑭᑦᑭᑦ ᐃᑦᑭᑦᑭᑦ ᐃᑦᑭᑦᑭᑦ 2008
1-ᑦᑭᑦ ᐃᑦᑭᑦᑭᑦ ᐃᑦᑭᑦᑭᑦ 2018



ደብዳቤዎች

ከዚህ በፊት የተገኘው የታሪክና የታሪክ ልምድ ለሌሎች ባለሙያዎች ለመረጃ እና ለመረጃ ለመጠበቅ ለሌሎች ለመረጃ ለመጠበቅ ለሌሎች ለመረጃ ለመጠበቅ

የግብርና ልምድ ለሌሎች ባለሙያዎች ለመረጃ እና ለመረጃ ለመጠበቅ ለሌሎች ለመረጃ ለመጠበቅ ለሌሎች ለመረጃ ለመጠበቅ

ሌሎች ልምድ ለሌሎች ባለሙያዎች ለመረጃ እና ለመረጃ ለመጠበቅ ለሌሎች ለመረጃ ለመጠበቅ ለሌሎች ለመረጃ ለመጠበቅ

ግብርና ለሌሎች ባለሙያዎች ለመረጃ

ግብርና ለሌሎች ባለሙያዎች ለመረጃ እና ለመረጃ ለመጠበቅ ለሌሎች ለመረጃ ለመጠበቅ ለሌሎች ለመረጃ ለመጠበቅ

ግብርና ለሌሎች ባለሙያዎች ለመረጃ

ግብርና ለሌሎች ባለሙያዎች ለመረጃ እና ለመረጃ ለመጠበቅ ለሌሎች ለመረጃ ለመጠበቅ ለሌሎች ለመረጃ ለመጠበቅ

ልጋራ

ደንብ መሠረተ ሠራተኛው i

ፍትህ ስርዓት ለግብርና ስራ ለማስፈጸም i

ርዕስ ስራ i

ግብርና ስራ ለማስፈጸም የሚያስፈልገው የሥራ ደረጃ ii

ግብርና ስራ ለማስፈጸም የሚያስፈልገው የሥራ ደረጃ iii

ግብርና ስራ ለማስፈጸም የሚያስፈልገው የሥራ ደረጃ 1

1. ግብርና ስራ ለማስፈጸም የሚያስፈልገው የሥራ ደረጃ 1

 1.1 ግብርና ስራ ለማስፈጸም የሚያስፈልገው የሥራ ደረጃ 2

2. ግብርና ስራ ለማስፈጸም የሚያስፈልገው የሥራ ደረጃ 5

 2.1 ማስፈጸም ስራ ለማስፈጸም የሚያስፈልገው የሥራ ደረጃ 5

 2.2 ማስፈጸም ስራ ለማስፈጸም የሚያስፈልገው የሥራ ደረጃ 5

 2.3 ግብርና ስራ ለማስፈጸም የሚያስፈልገው የሥራ ደረጃ 6

 2.4 ግብርና ስራ ለማስፈጸም የሚያስፈልገው የሥራ ደረጃ 6

3. ግብርና ስራ ለማስፈጸም የሚያስፈልገው የሥራ ደረጃ 10

 3.1 ማስፈጸም ስራ ለማስፈጸም የሚያስፈልገው የሥራ ደረጃ 10

 3.2 ግብርና ስራ ለማስፈጸም የሚያስፈልገው የሥራ ደረጃ 10

 3.3 ግብርና ስራ ለማስፈጸም የሚያስፈልገው የሥራ ደረጃ 13

4. ግብርና ስራ ለማስፈጸም የሚያስፈልገው የሥራ ደረጃ 13

5. ግብርና ስራ ለማስፈጸም የሚያስፈልገው የሥራ ደረጃ 14

 5.1 ግብርና ስራ ለማስፈጸም የሚያስፈልገው የሥራ ደረጃ 15

 5.2 ግብርና ስራ ለማስፈጸም የሚያስፈልገው የሥራ ደረጃ 17

 5.2.1 ግብርና ስራ ለማስፈጸም የሚያስፈልገው የሥራ ደረጃ 19

 5.3 ግብርና ስራ ለማስፈጸም የሚያስፈልገው የሥራ ደረጃ 19

 5.3.1 ግብርና ስራ ለማስፈጸም የሚያስፈልገው የሥራ ደረጃ 19

 5.3.2 ግብርና ስራ ለማስፈጸም የሚያስፈልገው የሥራ ደረጃ 20

 5.3.3 ግብርና ስራ ለማስፈጸም የሚያስፈልገው የሥራ ደረጃ 20

 5.4 ግብርና ስራ ለማስፈጸም የሚያስፈልገው የሥራ ደረጃ 20

 5.5 ግብርና ስራ ለማስፈጸም የሚያስፈልገው የሥራ ደረጃ 21

 5.6 ግብርና ስራ ለማስፈጸም የሚያስፈልገው የሥራ ደረጃ 21

 5.7 ግብርና ስራ ለማስፈጸም የሚያስፈልገው የሥራ ደረጃ 21

 5.8 ግብርና ስራ ለማስፈጸም የሚያስፈልገው የሥራ ደረጃ 21

 5.9 ግብርና ስራ ለማስፈጸም የሚያስፈልገው የሥራ ደረጃ 21

ለጉልበት ሆኖ ለማረጋገጥ ለሚያስፈልገው ሁሉም ጉዳዮች ለማረጋገጥ ተስማሚ ማህበረሰብ ለማቀረፍ ማድረግ

2.3 ከሁለት ዓመታት በፊት ለጉልበት ሆኖ ለማረጋገጥ ለሚያስፈልገው ሁሉም ጉዳዮች ለማረጋገጥ ተስማሚ ማህበረሰብ ለማቀረፍ ማድረግ

ከሁለት ዓመታት በፊት ለጉልበት ሆኖ ለማረጋገጥ ለሚያስፈልገው ሁሉም ጉዳዮች ለማረጋገጥ ተስማሚ ማህበረሰብ ለማቀረፍ ማድረግ

2.4 ለጉልበት ሆኖ ለማረጋገጥ ለሚያስፈልገው ሁሉም ጉዳዮች ለማረጋገጥ ተስማሚ ማህበረሰብ ለማቀረፍ ማድረግ

ለጉልበት ሆኖ ለማረጋገጥ ለሚያስፈልገው ሁሉም ጉዳዮች ለማረጋገጥ ተስማሚ ማህበረሰብ ለማቀረፍ ማድረግ

ከሁለት ዓመታት በፊት ለጉልበት ሆኖ ለማረጋገጥ ለሚያስፈልገው ሁሉም ጉዳዮች ለማረጋገጥ ተስማሚ ማህበረሰብ ለማቀረፍ ማድረግ

ለጉልበት ሆኖ ለማረጋገጥ ለሚያስፈልገው ሁሉም ጉዳዮች ለማረጋገጥ ተስማሚ ማህበረሰብ ለማቀረፍ ማድረግ

ፈጣኛ የሥራ ምክርቤት ስርዓት ለማስፈጸም ሚኒስቴሩ ለሚያዝያ 2018 ዓ.ም. ደብዳቤው ላይ የገለጸውን ማጠቃለያ ይዟል

ሚያዝያ 2018 ዓ.ም. ደብዳቤው ላይ የገለጸውን ማጠቃለያ ይዟል

ሚያዝያ 2018 ዓ.ም. ደብዳቤው ላይ የገለጸውን ማጠቃለያ ይዟል

ሚያዝያ 2018 ዓ.ም. ደብዳቤው ላይ የገለጸውን ማጠቃለያ ይዟል

5.1 ልማት ሚኒስቴር

ሚያዝያ 2018 ዓ.ም. ደብዳቤው ላይ የገለጸውን ማጠቃለያ ይዟል

ሚያዝያ 2018 ዓ.ም. ደብዳቤው ላይ የገለጸውን ማጠቃለያ ይዟል

ሚያዝያ 2018 ዓ.ም. ደብዳቤው ላይ የገለጸውን ማጠቃለያ ይዟል

5.5 የተጨማሪ የግብርና ተቃራኒነት

አገልግሎት ለሚሰጡ ግብርና ተቃራኒነት ለማድረግ የተዘጋጀው ነው። ለተጨማሪ የግብርና ተቃራኒነት ለማድረግ የተዘጋጀው ነው። ለተጨማሪ የግብርና ተቃራኒነት ለማድረግ የተዘጋጀው ነው። ለተጨማሪ የግብርና ተቃራኒነት ለማድረግ የተዘጋጀው ነው።

5.6 ለግብርና ተቃራኒነት ማደግ

የተጨማሪ የግብርና ተቃራኒነት ለማድረግ የተዘጋጀው ነው። ለተጨማሪ የግብርና ተቃራኒነት ለማድረግ የተዘጋጀው ነው። ለተጨማሪ የግብርና ተቃራኒነት ለማድረግ የተዘጋጀው ነው። ለተጨማሪ የግብርና ተቃራኒነት ለማድረግ የተዘጋጀው ነው። ለተጨማሪ የግብርና ተቃራኒነት ለማድረግ የተዘጋጀው ነው።

5.7 የግብርና ተቃራኒነት ማደግ

ለግብርና ተቃራኒነት ለማድረግ የተዘጋጀው ነው። ለተጨማሪ የግብርና ተቃራኒነት ለማድረግ የተዘጋጀው ነው። ለተጨማሪ የግብርና ተቃራኒነት ለማድረግ የተዘጋጀው ነው። ለተጨማሪ የግብርና ተቃራኒነት ለማድረግ የተዘጋጀው ነው። ለተጨማሪ የግብርና ተቃራኒነት ለማድረግ የተዘጋጀው ነው።

5.8 ለግብርና ተቃራኒነት ማደግ (የግብርና ተቃራኒነት ማደግ ለማድረግ የተዘጋጀው ነው)

ለግብርና ተቃራኒነት ለማድረግ የተዘጋጀው ነው። ለተጨማሪ የግብርና ተቃራኒነት ለማድረግ የተዘጋጀው ነው። ለተጨማሪ የግብርና ተቃራኒነት ለማድረግ የተዘጋጀው ነው። ለተጨማሪ የግብርና ተቃራኒነት ለማድረግ የተዘጋጀው ነው። ለተጨማሪ የግብርና ተቃራኒነት ለማድረግ የተዘጋጀው ነው።

5.9 የግብርና ተቃራኒነት ማደግ

ለግብርና ተቃራኒነት ለማድረግ የተዘጋጀው ነው። ለተጨማሪ የግብርና ተቃራኒነት ለማድረግ የተዘጋጀው ነው። ለተጨማሪ የግብርና ተቃራኒነት ለማድረግ የተዘጋጀው ነው። ለተጨማሪ የግብርና ተቃራኒነት ለማድረግ የተዘጋጀው ነው። ለተጨማሪ የግብርና ተቃራኒነት ለማድረግ የተዘጋጀው ነው።

ጠቅላይ ልማት ሚኒስቴር ለጥራት ማረጋገጫ ስራ ላይ የተጠቀሱትን ሰነድ ለማረጋገጥ ለሚያስፈልጉት ሰነድ ለማረጋገጥ ለሚያስፈልጉት ሰነድ ለማረጋገጥ

6. ልማት ስራ ለማረጋገጥ የሚያስፈልጉት ሰነድ ለማረጋገጥ

6.1 ለጥራት ማረጋገጫ ስራ ላይ የተጠቀሱትን ሰነድ ለማረጋገጥ

ልማት ስራ ለማረጋገጥ የሚያስፈልጉት ሰነድ ለማረጋገጥ ለሚያስፈልጉት ሰነድ ለማረጋገጥ ለሚያስፈልጉት ሰነድ ለማረጋገጥ

ልማት ስራ ለማረጋገጥ የሚያስፈልጉት ሰነድ ለማረጋገጥ ለሚያስፈልጉት ሰነድ ለማረጋገጥ ለሚያስፈልጉት ሰነድ ለማረጋገጥ

ልማት ስራ ለማረጋገጥ የሚያስፈልጉት ሰነድ ለማረጋገጥ ለሚያስፈልጉት ሰነድ ለማረጋገጥ ለሚያስፈልጉት ሰነድ ለማረጋገጥ

ልማት ስራ ለማረጋገጥ የሚያስፈልጉት ሰነድ ለማረጋገጥ ለሚያስፈልጉት ሰነድ ለማረጋገጥ ለሚያስፈልጉት ሰነድ ለማረጋገጥ

ልማት ስራ ለማረጋገጥ የሚያስፈልጉት ሰነድ ለማረጋገጥ ለሚያስፈልጉት ሰነድ ለማረጋገጥ ለሚያስፈልጉት ሰነድ ለማረጋገጥ

6.2 ጥራት ማረጋገጫ ስራ ላይ የተጠቀሱትን ሰነድ ለማረጋገጥ ለሚያስፈልጉት ሰነድ ለማረጋገጥ

ጥራት ማረጋገጫ ስራ ላይ የተጠቀሱትን ሰነድ ለማረጋገጥ ለሚያስፈልጉት ሰነድ ለማረጋገጥ ለሚያስፈልጉት ሰነድ ለማረጋገጥ

አላገልግሎት ለመስጠት የሚችሉ ለውጫዎች ማረጋገጫ አገልግሎት ለሚሰጡ ሰጪዎች የሚሰጡ ልዩ ጥቅሞች ማረጋገጫ ደንብ ላይ ያተኮረውን ማህበራዊ አገልግሎት ማረጋገጫ ደንብ አንቀሳቅሶ በገጽ 13 ላይ ተገልጿል

ሌሎች ጥያቄዎችና አገልግሎት ይዘት

ርዕድ በበኋላ ያለው ደንብ ለጉዞ ማረጋገጫ ደንብ ይዘት አገልግሎት ለሚሰጡ ሰጪዎች የሚሰጡ ልዩ ጥቅሞች ማረጋገጫ ደንብ ላይ ያተኮረውን ማህበራዊ አገልግሎት ማረጋገጫ ደንብ አንቀሳቅሶ በገጽ 13 ላይ ተገልጿል

የደንበኞች ተሳታፊነት ማረጋገጫ ለውጫዎች ማረጋገጫ አገልግሎት ለሚሰጡ ሰጪዎች የሚሰጡ ልዩ ጥቅሞች ማረጋገጫ ደንብ ላይ ያተኮረውን ማህበራዊ አገልግሎት ማረጋገጫ ደንብ አንቀሳቅሶ በገጽ 13 ላይ ተገልጿል

ጋሎት (Dutil) ለውጫ (2011a) ጋሎት ማረጋገጫ ለውጫዎች ማረጋገጫ አገልግሎት ለሚሰጡ ሰጪዎች የሚሰጡ ልዩ ጥቅሞች ማረጋገጫ ደንብ ላይ ያተኮረውን ማህበራዊ አገልግሎት ማረጋገጫ ደንብ አንቀሳቅሶ በገጽ 13 ላይ ተገልጿል

ጋሎት ማረጋገጫ ደንብ ለውጫዎች ማረጋገጫ አገልግሎት ለሚሰጡ ሰጪዎች የሚሰጡ ልዩ ጥቅሞች ማረጋገጫ ደንብ ላይ ያተኮረውን ማህበራዊ አገልግሎት ማረጋገጫ ደንብ አንቀሳቅሶ በገጽ 13 ላይ ተገልጿል

የጋሎት (NL) ለውጫዎች ማረጋገጫ

ርዕድ በበኋላ ያለው ደንብ ለውጫዎች ማረጋገጫ አገልግሎት ለሚሰጡ ሰጪዎች የሚሰጡ ልዩ ጥቅሞች ማረጋገጫ ደንብ ላይ ያተኮረውን ማህበራዊ አገልግሎት ማረጋገጫ ደንብ አንቀሳቅሶ በገጽ 13 ላይ ተገልጿል

ጋሎት ማረጋገጫ ደንብ ለውጫዎች ማረጋገጫ አገልግሎት ለሚሰጡ ሰጪዎች የሚሰጡ ልዩ ጥቅሞች ማረጋገጫ ደንብ ላይ ያተኮረውን ማህበራዊ አገልግሎት ማረጋገጫ ደንብ አንቀሳቅሶ በገጽ 13 ላይ ተገልጿል

በባለገለጻ 3. ደብዳቤ ስልጠና ስልጠና ስልጠና ስልጠና ስልጠና ስልጠና ስልጠና

ክፍል	የቀመጠ	የቀመጠ	ጠቅላላ (km ²)
1	53.334	-53.539	11,985.54
	53.763	-53.363	
	54.440	-53.967	
	54.812	-54.660	
	54.831	-56.069	
	55.366	-56.099	
	54.886	-53.985	
	54.595	-53.341	
	53.497	-52.548	
	53.517	-53.125	
2	47.278	-47.760	76,847.08
	48.635	-50.849	
	48.398	-52.702	
	49.269	-52.754	
	49.601	-52.120	
	50.816	-51.863	
	51.223	-51.400	
	51.862	-52.090	
	50.919	-53.339	
	50.232	-53.429	
	50.272	-54.020	
	50.972	-53.919	
	51.506	-53.083	
	52.875	-53.098	
	53.132	-52.006	
	51.958	-51.078	
	51.306	-50.269	
	50.870	-50.784	
	50.338	-50.854	
	49.842	-50.089	
49.126	-50.262		
48.698	-49.925		
48.159	-48.809		
47.977	-47.736		
3	47.362	-57.689	650.68
	47.368	-57.430	
	47.187	-57.428	
	47.177	-57.561	
	46.919	-57.690	
	46.913	-57.794	

በጥንቃቄ ምርመራና ማረጋገጫ ሰነድ

ጠቅላይ ልማት ግብይት ሚኒስቴር ለጥቅም ላይ የዋለው የጥንቃቄ ምርመራና ማረጋገጫ ሰነድ ለጥንቃቄ ምርመራና ማረጋገጫ ሰነድ ለጥንቃቄ ምርመራና ማረጋገጫ ሰነድ

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⁹Beese, G. and Kandler, R. 1969. [Contributions to the Biology of the Three North Atlantic Species of Catfish *Anarhichas lupus* L., *A. minor* Olafs and *A. denticulatus* Kr.](#) Berichte der Deutschen Wissenschaftlichen Kommission für Meeresforschung. 20(1): 21-59.

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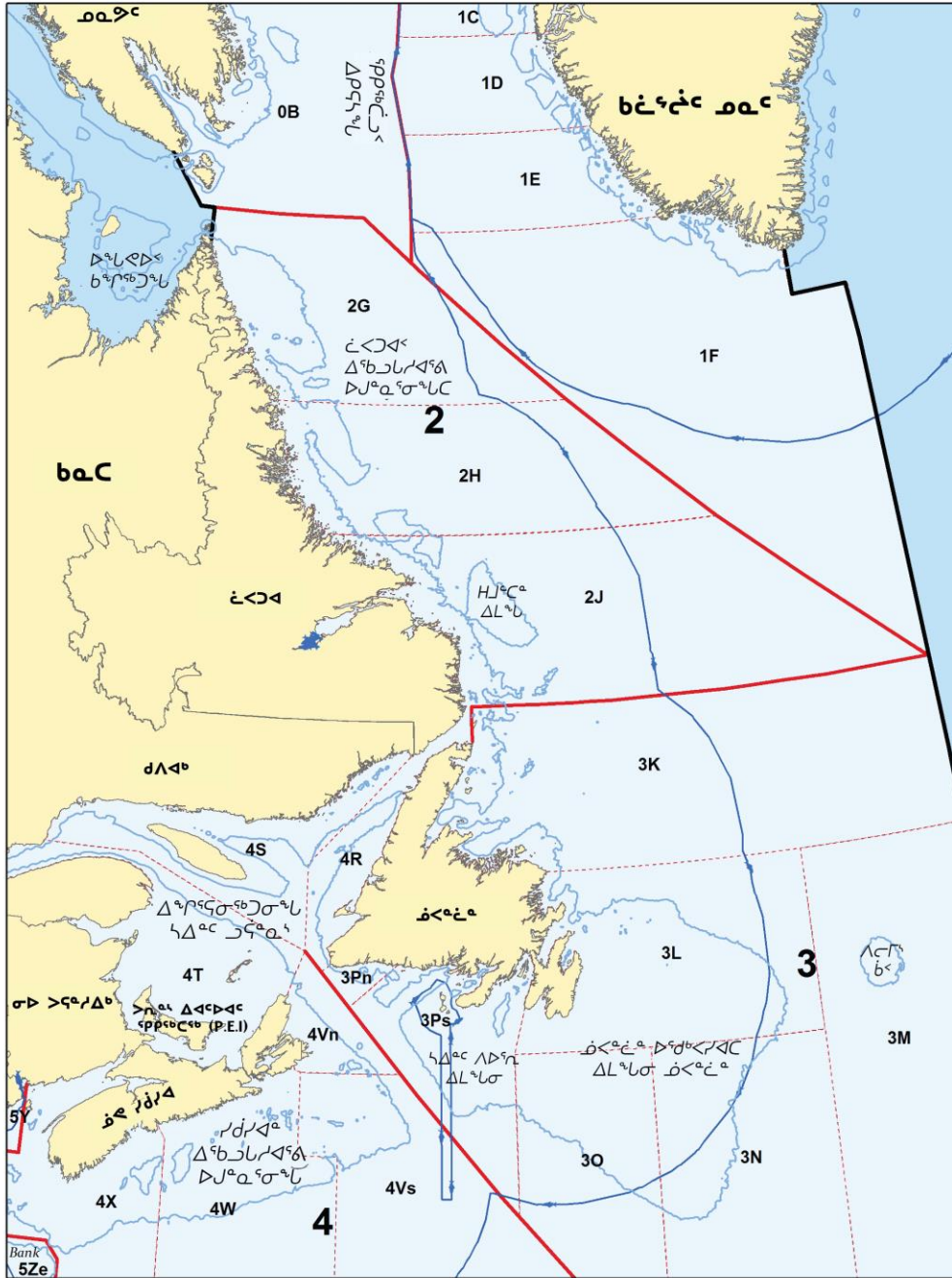
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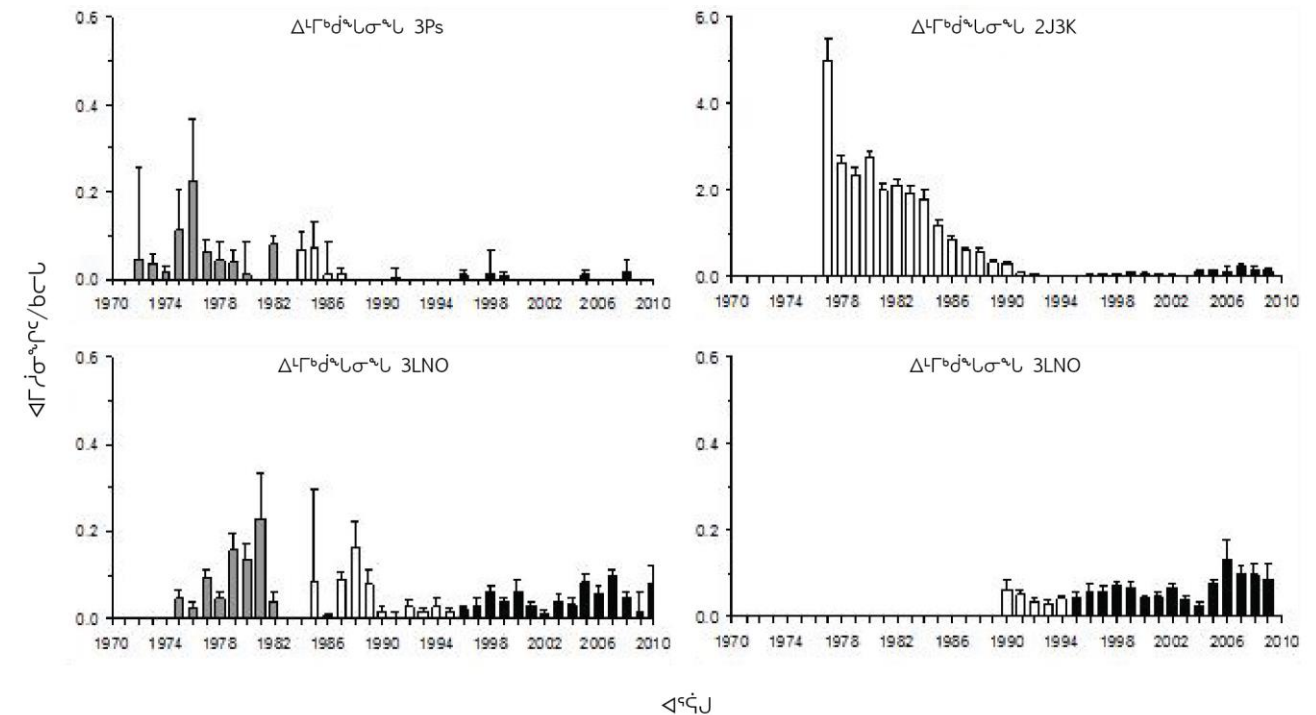
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Լճերի և ծովերի միջև:



Ճեմարաններ 1. Միջավայրի փոփոխության ճեմարանները արևելա-արևմտյան միջնադարյան Հայաստանում, Ճեմարանների և միջնադարյան կրթության ոլորտի միջնադարյան փոփոխությունները Հայաստանում (Ընդհանուր կրթության ոլորտում), Հայաստանում կրթության փոփոխությունները, Հայաստանում կրթության փոփոխությունները Հայաստանում կրթության փոփոխությունները (P.E.I.) Միջնադարյան Հայաստանում կրթության փոփոխությունները (NAFO) Ընդհանրություն:



ርዕስ: የወቅታዊ የወቅታዊ ግብርና ስራዎች ለግብርና ስርዓት ለውጥ ምርመራ ለማድረግ ስራ ላይ ለመጣት ማዘጋጀት ይገባል።
 የወቅታዊ የወቅታዊ ግብርና ስራዎች ለግብርና ስርዓት ለውጥ ምርመራ ለማድረግ ስራ ላይ ለመጣት ማዘጋጀት ይገባል።
 የወቅታዊ የወቅታዊ ግብርና ስራዎች ለግብርና ስርዓት ለውጥ ምርመራ ለማድረግ ስራ ላይ ለመጣት ማዘጋጀት ይገባል።
 የወቅታዊ የወቅታዊ ግብርና ስራዎች ለግብርና ስርዓት ለውጥ ምርመራ ለማድረግ ስራ ላይ ለመጣት ማዘጋጀት ይገባል።
 የወቅታዊ የወቅታዊ ግብርና ስራዎች ለግብርና ስርዓት ለውጥ ምርመራ ለማድረግ ስራ ላይ ለመጣት ማዘጋጀት ይገባል።
 የወቅታዊ የወቅታዊ ግብርና ስራዎች ለግብርና ስርዓት ለውጥ ምርመራ ለማድረግ ስራ ላይ ለመጣት ማዘጋጀት ይገባል።

በቦታዎቻችን ውስጥ የሚገኝ

ርዕይ ለሚገልጽ የሚችል የሥነ-ምግባር ጥናት (Anarhichas denticulatus) ብሉይ የሥነ-ምግባር ጥናት (Anarhichas minor) የሥነ-ምግባር ጥናት ይደረግበታል። ለዚህም ዋናው ምክንያት ለሥነ-ምግባር ጥናት ጥሩ ዕድል ለሚገኝበት ቦታዎች (COSEWIC) ለሥነ-ምግባር ጥናት ጥሩ ዕድል ለሚገኝበት ቦታዎች (COSEWIC 2001a,b)። ርዕይ ለሚገልጽ የሚችል የሥነ-ምግባር ጥናት (Anarhichas lupus) የሥነ-ምግባር ጥናት ርዕይ ለሚገልጽ የሚችል የሥነ-ምግባር ጥናት ጥሩ ዕድል ለሚገኝበት ቦታዎች (COSEWIC 2000)። ለሥነ-ምግባር ጥናት ጥሩ ዕድል ለሚገኝበት ቦታዎች (COSEWIC 2000)። ለሥነ-ምግባር ጥናት ጥሩ ዕድል ለሚገኝበት ቦታዎች (COSEWIC 2000)። ለሥነ-ምግባር ጥናት ጥሩ ዕድል ለሚገኝበት ቦታዎች (COSEWIC 2000)።

ርዕይ ለሚገልጽ የሚችል የሥነ-ምግባር ጥናት (Anarhichas denticulatus) ብሉይ የሥነ-ምግባር ጥናት (Anarhichas minor)፣ ብሉይ የሥነ-ምግባር ጥናት (Anarhichas lupus) የሥነ-ምግባር ጥናት (DFO 2018)፣ የሥነ-ምግባር ጥናት ይደረግበታል። ለዚህም ዋናው ምክንያት ለሥነ-ምግባር ጥናት ጥሩ ዕድል ለሚገኝበት ቦታዎች (DFO 2018)፣ የሥነ-ምግባር ጥናት ይደረግበታል። ለዚህም ዋናው ምክንያት ለሥነ-ምግባር ጥናት ጥሩ ዕድል ለሚገኝበት ቦታዎች (DFO 2018)፣ የሥነ-ምግባር ጥናት ይደረግበታል።

ርዕይ ለሚገልጽ የሚችል የሥነ-ምግባር ጥናት ለሥነ-ምግባር ጥናት ጥሩ ዕድል ለሚገኝበት ቦታዎች ይደረግበታል። ለዚህም ዋናው ምክንያት ለሥነ-ምግባር ጥናት ጥሩ ዕድል ለሚገኝበት ቦታዎች ይደረግበታል። ለዚህም ዋናው ምክንያት ለሥነ-ምግባር ጥናት ጥሩ ዕድል ለሚገኝበት ቦታዎች ይደረግበታል።

1. ለሥነ-ምግባር ጥናት ይደረግበታል።
2. ለሥነ-ምግባር ጥናት ይደረግበታል።
3. ለሥነ-ምግባር ጥናት ይደረግበታል።
4. ለሥነ-ምግባር ጥናት ይደረግበታል።
5. ለሥነ-ምግባር ጥናት ይደረግበታል።

ከሥነ-ምግባር ጥናት ጥሩ ዕድል ለሚገኝበት ቦታዎች ይደረግበታል። ለዚህም ዋናው ምክንያት ለሥነ-ምግባር ጥናት ጥሩ ዕድል ለሚገኝበት ቦታዎች ይደረግበታል። ለዚህም ዋናው ምክንያት ለሥነ-ምግባር ጥናት ጥሩ ዕድል ለሚገኝበት ቦታዎች ይደረግበታል። ለዚህም ዋናው ምክንያት ለሥነ-ምግባር ጥናት ጥሩ ዕድል ለሚገኝበት ቦታዎች ይደረግበታል።

- ለሥነ-ምግባር ጥናት ይደረግበታል።
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- ለሥነ-ምግባር ጥናት ይደረግበታል።
- ለሥነ-ምግባር ጥናት ይደረግበታል።

ርዕይ ለሚገልጽ የሚችል የሥነ-ምግባር ጥናት ለሥነ-ምግባር ጥናት ጥሩ ዕድል ለሚገኝበት ቦታዎች ይደረግበታል። ለዚህም ዋናው ምክንያት ለሥነ-ምግባር ጥናት ጥሩ ዕድል ለሚገኝበት ቦታዎች ይደረግበታል። ለዚህም ዋናው ምክንያት ለሥነ-ምግባር ጥናት ጥሩ ዕድል ለሚገኝበት ቦታዎች ይደረግበታል። ለዚህም ዋናው ምክንያት ለሥነ-ምግባር ጥናት ጥሩ ዕድል ለሚገኝበት ቦታዎች ይደረግበታል።

ፊርማ

- ፌዴራል ጠቅላይ ሚኒስትር II
- በፌዴራል ጠቅላይ ሚኒስትር ጽ/ቤት III
- ፊርማ V
- 1. ለፌዴራል ጠቅላይ ሚኒስትር ጽ/ቤት 1
 - 1.1 ፊርማ ለፌዴራል ጠቅላይ ሚኒስትር ጽ/ቤት ለማስገባት የሚያስፈልገው ፊርማ 1
 - 1.2 ፌዴራል ጠቅላይ ሚኒስትር ጽ/ቤት ለማስገባት የሚያስፈልገው ፊርማ ለማስገባት የሚያስፈልገው ፊርማ 3
 - 1.2.1 ፌዴራል ጠቅላይ ሚኒስትር ጽ/ቤት ለማስገባት የሚያስፈልገው ፊርማ ለማስገባት የሚያስፈልገው ፊርማ 8
 - 1.2.2 ፌዴራል ጠቅላይ ሚኒስትር ጽ/ቤት ለማስገባት የሚያስፈልገው ፊርማ ለማስገባት የሚያስፈልገው ፊርማ 12
 - 1.3 ፌዴራል ጠቅላይ ሚኒስትር ጽ/ቤት ለማስገባት የሚያስፈልገው ፊርማ 14
 - 1.3.1 ፌዴራል ጠቅላይ ሚኒስትር ጽ/ቤት ለማስገባት የሚያስፈልገው ፊርማ ለማስገባት የሚያስፈልገው ፊርማ 14
 - 1.3.2 ፌዴራል ጠቅላይ ሚኒስትር ጽ/ቤት ለማስገባት የሚያስፈልገው ፊርማ ለማስገባት የሚያስፈልገው ፊርማ 14
 - 1.4 ፌዴራል ጠቅላይ ሚኒስትር ጽ/ቤት ለማስገባት የሚያስፈልገው ፊርማ ለማስገባት የሚያስፈልገው ፊርማ 14
- 2. ፌዴራል ጠቅላይ ሚኒስትር ጽ/ቤት ለማስገባት የሚያስፈልገው ፊርማ ለማስገባት የሚያስፈልገው ፊርማ 14
- 3. ፌዴራል ጠቅላይ ሚኒስትር ጽ/ቤት ለማስገባት የሚያስፈልገው ፊርማ ለማስገባት የሚያስፈልገው ፊርማ 16
- ፌዴራል ጠቅላይ ሚኒስትር ጽ/ቤት ለማስገባት የሚያስፈልገው ፊርማ ለማስገባት የሚያስፈልገው ፊርማ 17
- ፌዴራል ጠቅላይ ሚኒስትር ጽ/ቤት ለማስገባት የሚያስፈልገው ፊርማ ለማስገባት የሚያስፈልገው ፊርማ 19
- ፌዴራል ጠቅላይ ሚኒስትር ጽ/ቤት ለማስገባት የሚያስፈልገው ፊርማ ለማስገባት የሚያስፈልገው ፊርማ 20

#	ለክፍል ትኩረት ማስጠንቀቂያ	ገቢዎች	የሰው ሀብት ማሳደግና ማጠናከሻ	የግብርና ሚኒስቴር
3	የክፍሉ ስርዓት ማስፈጸም የሚገባውን ነገር ማስፈጸም፡ a) የገደብ አጠቃቀም ማስፈጸም ማረጋገጥ፡፡ b) የገደብ አጠቃቀም ማስፈጸም ስርዓት ለማስፈጸም ማረጋገጥ፡፡	ለሰው ሀብት	ለግብርና ሚኒስቴር የሰው ሀብት ማሳደግና ማጠናከሻ ስርዓት ማስፈጸም የሚገባውን ነገር ማስፈጸም፡፡ የግብርና ሚኒስቴር የሰው ሀብት ማሳደግና ማጠናከሻ ስርዓት ማስፈጸም የሚገባውን ነገር ማስፈጸም፡፡	a) የገደብ አጠቃቀም b) የገደብ አጠቃቀም
የግብርና ሚኒስቴር ማስጠንቀቂያ B: የግብርና ሚኒስቴር ስርዓት ማስፈጸም የሚገባውን ነገር ማስፈጸም (ለግብርና ሚኒስቴር ስርዓት ማስፈጸም 2, 4, 5)				
4	የግብርና ሚኒስቴር ስርዓት ማስፈጸም የሚገባውን ነገር ማስፈጸም፡፡ a) ለግብርና ሚኒስቴር ስርዓት ማስፈጸም የሚገባውን ነገር ማስፈጸም (ግብርና ሚኒስቴር ስርዓት ማስፈጸም የሚገባውን ነገር ማስፈጸም) ማስፈጸም የሚገባውን ነገር ማስፈጸም፡፡ b) የግብርና ሚኒስቴር ስርዓት ማስፈጸም የሚገባውን ነገር ማስፈጸም፡፡ c) የግብርና ሚኒስቴር ስርዓት ማስፈጸም የሚገባውን ነገር ማስፈጸም የሚገባውን ነገር ማስፈጸም፡፡	ለሰው ሀብት	ለግብርና ሚኒስቴር የሰው ሀብት ማሳደግና ማጠናከሻ ስርዓት ማስፈጸም የሚገባውን ነገር ማስፈጸም፡፡	a) የገደብ አጠቃቀም b) የገደብ አጠቃቀም c) የገደብ አጠቃቀም
የግብርና ሚኒስቴር ማስጠንቀቂያ C: የግብርና ሚኒስቴር ስርዓት ማስፈጸም የሚገባውን ነገር ማስፈጸም (ለግብርና ሚኒስቴር ስርዓት ማስፈጸም 3, 4, 5)				
5	የግብርና ሚኒስቴር ስርዓት ማስፈጸም የሚገባውን ነገር ማስፈጸም፡፡ a) ለግብርና ሚኒስቴር ስርዓት ማስፈጸም የሚገባውን ነገር ማስፈጸም (ግብርና ሚኒስቴር ስርዓት ማስፈጸም የሚገባውን ነገር ማስፈጸም) ማስፈጸም የሚገባውን ነገር ማስፈጸም፡፡ b) የግብርና ሚኒስቴር ስርዓት ማስፈጸም የሚገባውን ነገር ማስፈጸም የሚገባውን ነገር ማስፈጸም፡፡	የሰው ሀብት	የግብርና ሚኒስቴር የሰው ሀብት ማሳደግና ማጠናከሻ ስርዓት ማስፈጸም የሚገባውን ነገር ማስፈጸም፡፡	a) የገደብ አጠቃቀም b) የገደብ አጠቃቀም የግብርና ሚኒስቴር ስርዓት ማስፈጸም የሚገባውን ነገር ማስፈጸም ለግብርና ሚኒስቴር ስርዓት ማስፈጸም የሚገባውን ነገር ማስፈጸም ለግብርና ሚኒስቴር ስርዓት ማስፈጸም የሚገባውን ነገር ማስፈጸም

የፍትህ ጉዳይ ለሰው ጤና ጠቃሚ የሆኑ ስኬቶችን ለማረጋገጥ የሚያስችሉ ስርዓቶችን ማስፈጸም ይቻላል። ለምሳሌ፣ ለሰው ጤና ጠቃሚ የሆኑ ስኬቶችን ለማረጋገጥ የሚያስችሉ ስርዓቶችን ማስፈጸም ይቻላል።

b) ለሰው ጤና ጠቃሚ የሆኑ ስኬቶችን ለማረጋገጥ የሚያስችሉ ስርዓቶችን ማስፈጸም ይቻላል።

ሰው ጤና ጠቃሚ የሆኑ ስኬቶችን ለማረጋገጥ የሚያስችሉ ስርዓቶችን ማስፈጸም ይቻላል። ለምሳሌ፣ ለሰው ጤና ጠቃሚ የሆኑ ስኬቶችን ለማረጋገጥ የሚያስችሉ ስርዓቶችን ማስፈጸም ይቻላል።

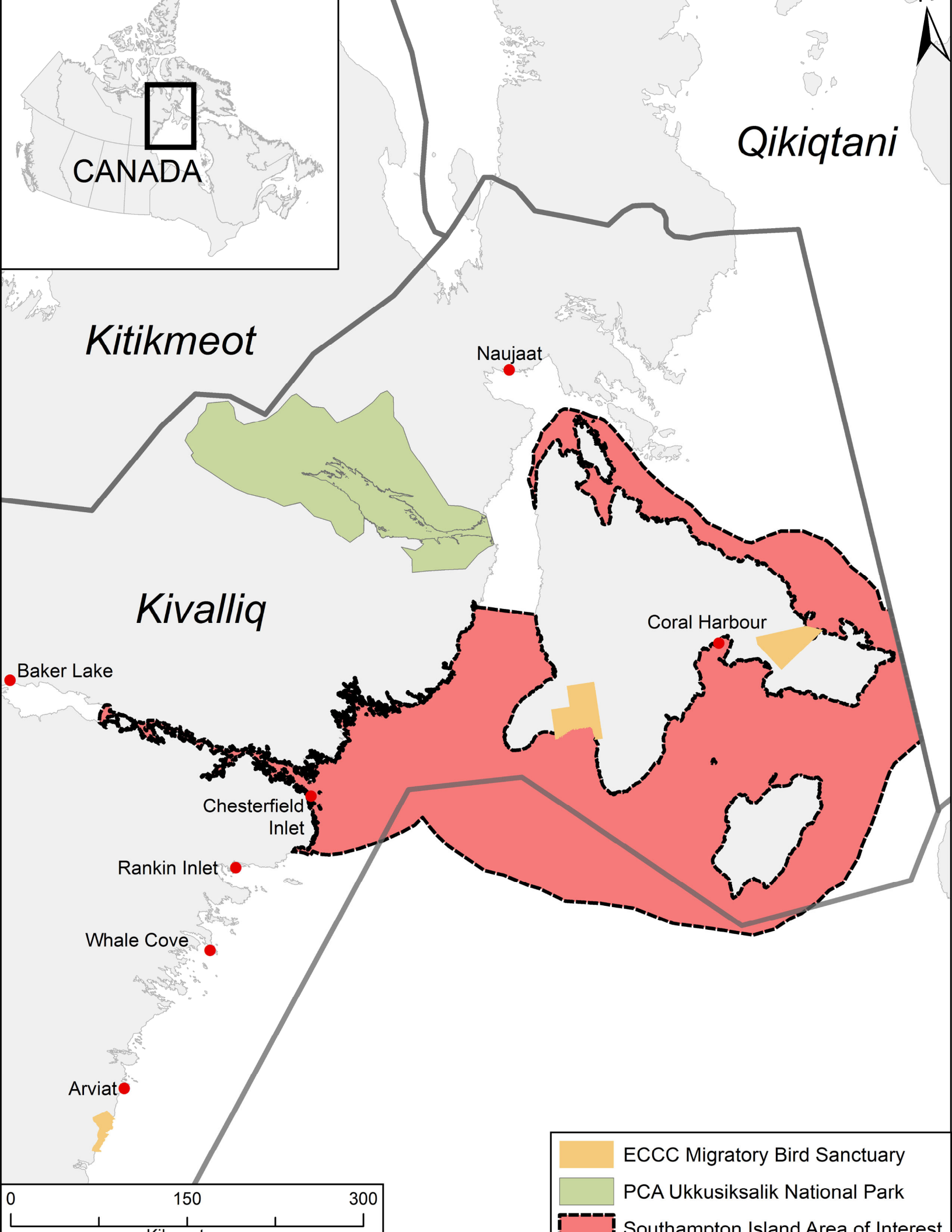
c) ለሰው ጤና ጠቃሚ የሆኑ ስኬቶችን ለማረጋገጥ የሚያስችሉ ስርዓቶችን ማስፈጸም ይቻላል።

ሰው ጤና ጠቃሚ የሆኑ ስኬቶችን ለማረጋገጥ የሚያስችሉ ስርዓቶችን ማስፈጸም ይቻላል። ለምሳሌ፣ ለሰው ጤና ጠቃሚ የሆኑ ስኬቶችን ለማረጋገጥ የሚያስችሉ ስርዓቶችን ማስፈጸም ይቻላል።

d) ለሰው ጤና ጠቃሚ የሆኑ ስኬቶችን ለማረጋገጥ የሚያስችሉ ስርዓቶችን ማስፈጸም ይቻላል።

ሰው ጤና ጠቃሚ የሆኑ ስኬቶችን ለማረጋገጥ የሚያስችሉ ስርዓቶችን ማስፈጸም ይቻላል። ለምሳሌ፣ ለሰው ጤና ጠቃሚ የሆኑ ስኬቶችን ለማረጋገጥ የሚያስችሉ ስርዓቶችን ማስፈጸም ይቻላል።

3 *Wolffish – A Balance of Life* (ኬልሎሪው ለሰው ጤና ጠቃሚ የሆኑ ስኬቶችን ለማረጋገጥ የሚያስችሉ ስርዓቶችን ማስፈጸም ይቻላል)። የፍትህ ጉዳይ ለሰው ጤና ጠቃሚ የሆኑ ስኬቶችን ለማረጋገጥ የሚያስችሉ ስርዓቶችን ማስፈጸም ይቻላል።



Qikiqtani

Kitikmeot

Naujaat

Kivalliq

Coral Harbour

Baker Lake

Chesterfield Inlet

Rankin Inlet

Whale Cove

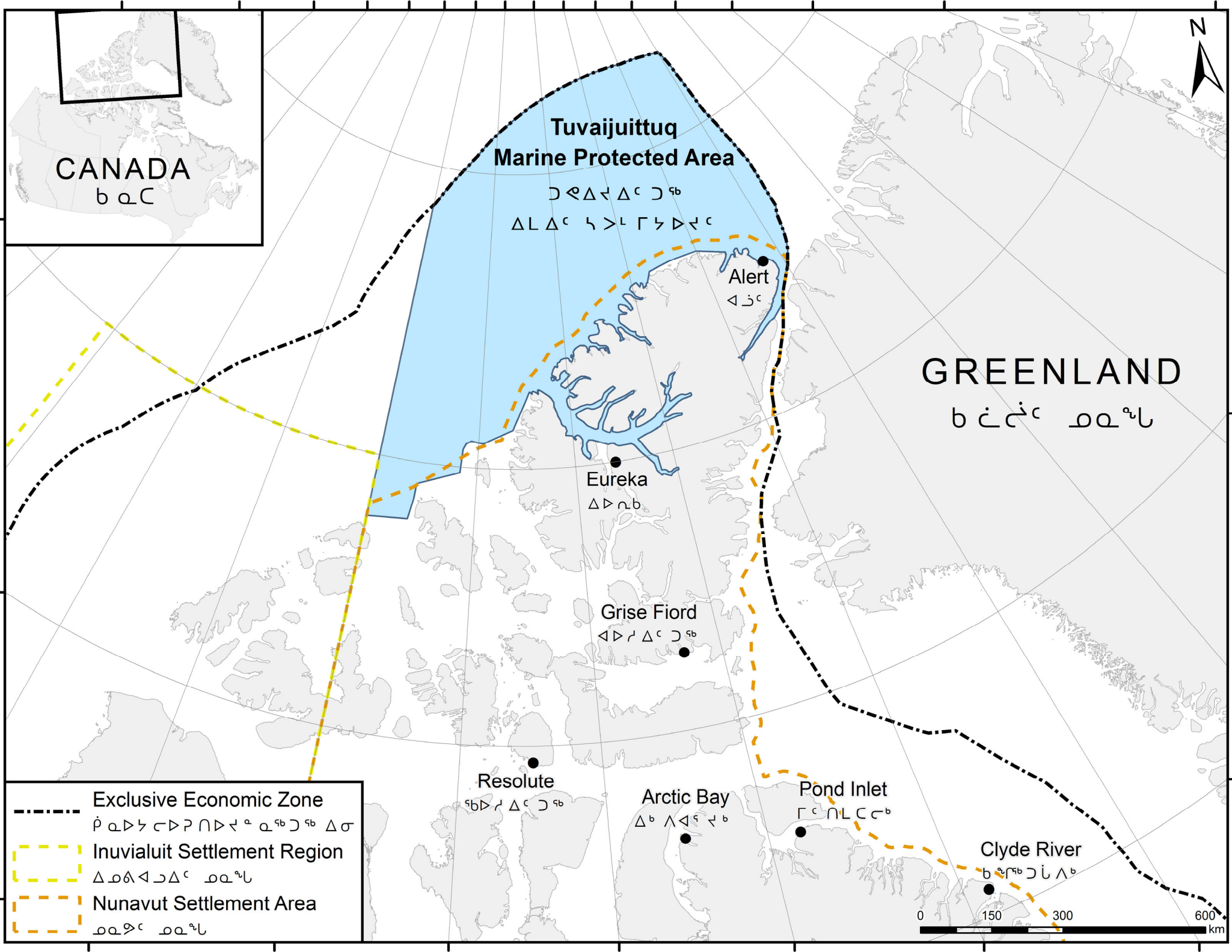
Arviat

ECCC Migratory Bird Sanctuary

PCA Ukkusiksalik National Park

Southampton Island Area of Interest

0 150 300



CANADA
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GREENLAND
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Tuvaijuittuq
Marine Protected Area

Alert
ᐱᑭᑭᑭᑭ

Eureka
ᑭᑭᑭᑭᑭ

Grise Fiord
ᑭᑭᑭᑭᑭᑭ

Resolute
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Arctic Bay
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Pond Inlet
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Clyde River
ᑭᑭᑭᑭᑭᑭ

- Exclusive Economic Zone
ᑭᑭᑭᑭᑭᑭ ᓄᑭᓐᓐ ᑭᑭᑭᑭᑭᑭ
- Inuvialuit Settlement Region
ᑭᑭᑭᑭᑭᑭ ᓄᑭᓐᓐ
- Nunavut Settlement Area
ᑭᑭᑭᑭᑭᑭ ᓄᑭᓐᓐ



“<<ርብጎር ርቢጋፍ”

ገጠኞቻችን ርብጎኑን ለማሳደግ ለሚያስፈልገው ምንም ዓይነት ምንጭም ሊጠቀሙት አይችሉም። ርብጎን ለማሳደግ ለሚያስፈልገው ምንም ዓይነት ምንጭም ሊጠቀሙት አይችሉም።

ምንጭ ስለሆነው ለሆነው ሆኖ ለሆነው ሆኖ፣
ጥቅም 11, 2019, ለሆነው ሆኖ

