World status of wild *Rangifer tarandus* populations

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Abstract: We recognized 184 herds of wild *Rangifer tarandus*, 102 in North America, 55 in Europe, 24 in Asia and 3 on South Georgia. Seventy-five percent of the world population of 3.3 to 3.9 million animals occurred in nine herds. All seven herds larger than 120 000 animals were censused by some means of aerial photography and all were increasing. Herds between 20 000 and 120 000 were most often censused using aerial strip transect methods, while total counts were usually employed to census smaller herds. The most pronounced changes in *Rangifer* herd status between 1979 and 1985 occurred in North America where population estimates for five herds increased by a total of about one million animals. Part of this increase is attributable to a change from visual to photographic surveys. Eighty-three percent of North American, 88% of European, and 68% of Asian herds were stable or increasing.

Key words: *Rangifer tarandus*, caribou, reindeer, North America, Europe, Asia, census.

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Introduction

This paper summarizes the most recent estimates of the size of the world's wild *Rangifer tarandus* herds and the trend in number since 1979 (Reimers *et. al.*, 1980).

Methods

Most of the data for this paper were supplied to us upon request by biologists from around the world. Addresses of those providing unpublished data are listed in the Acknowledgments. The data should be considered the most current available as of 1985.

Because many census techniques were employed, we lumped most methods into either total counts or sample counts and either direct visual counts or counts of animals on photographs. Total counts were attempts to enumerate all caribou in a herd, but they were usually increased, based on additional information, to account for missed animals. Strip and block sampling techniques may have covered a herd's entire range or may have been restricted to only part of it (e.g., the calving ground) and then extrapolated, usually on the basis of additional information, to a total population estimate. Except where noted, surveys were conducted by aircraft.

The ranges of many herds overlap. For the sake of clarity of the figures, areas of range overlap were not delineated. Also, where ranges overlapped jurisdictional boundaries, herds were arbitrarily allocated to one jurisdiction.

Trend refers to change in herd size since 1979. Date refers to the year when the survey was completed or when observations were collated to derive an estimate.

Results

There were 2.3 to 2.8 million wild *Rangifer* in 102 herds in North America (Table 1). The seven largest herds (George River, Bathurst, Beverly, Western Arctic, Kaminuriak, Porcupine and Northeastern Mainland) comprised 2 million animals or 80% of the North American population. Of the 71 herds for which a trend was known 49% were increasing, 34% were stable and 17% were declining. There were 2 135 000, 225 600 and 13 100 animals in increasing, stable and declining herds respectively.

Census techniques in North America have changed in recent years with the increased use of aerial photography to census calving or post-calving aggregations of caribou (Table 1).

There were 106 700 to 124 100 wild *Rangifer* in 58 herds in Europe and on South Georgia (Table 2). The largest herd (Hardangervidda) contained 20 000 animals or 17% of the European population. Of the 51 herds for which a trend was known 16% were increasing, 72% were stable and 12% were declining. There were 10 800, 86 800 and 15 600 animals in increasing, stable and declining herds respectively. The predominance of relatively small, stable populations reflects intensive management techniques.

There were 930 500 to 944 300 wild *Rangifer* in 24 herds in Asia (Table 2). The two largest herds (Taimyr and Yana-Indigir rivers) contained a total of 630 000 animals or 56% of the Asian population. Of the 22 herds for which a trend was known 18% were increasing, 50% were stable and 32% were declining. There were 575 900, 231 500 and 125 000 animals in increasing, stable and declining herds respectively.

Census techniques in Europe and Asia have also changed in recent years with the increased use of aerial photography in Norway and the Soviet Union. In Norway, censuses were total photo counts on winter or summer ranges. The Soviets used a total photo count method for the Taimyr population, and reported an increase in the use of aircraft to census, usually by strip samples, the remaining herds. Most other estimates of *Rangifer* herds in Europe were based on total counts.

No information has been collected on the three South Georgia herds (Table 2) since 1979 (Walton, pers. comm.).

Discussion

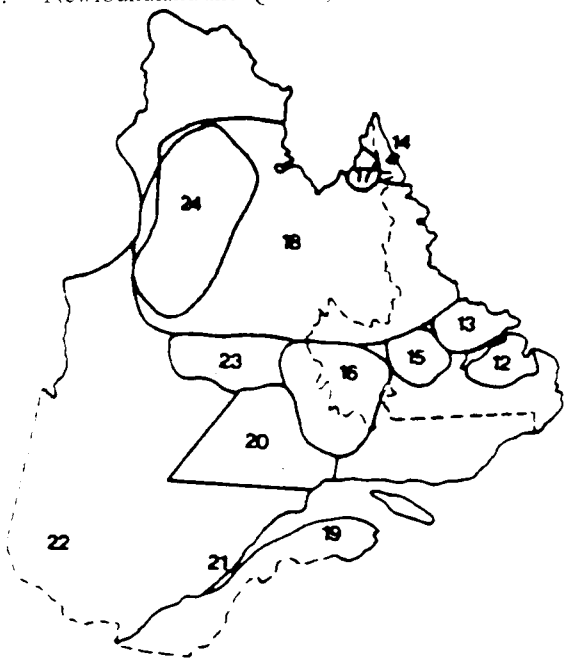
Nine herds made up 75% of the world population of 3.3 to 3.9 million animals. All seven herds larger than 120 000 were increasing and were censused by some means of aerial photography. The most pronounced changes in *Rangifer* numbers between 1979 and 1985 occurred in North America where the population estimates for five herds, the George River, Bathurst, Beverly, Kaminuriak and Western Arctic increased by a total of over one million animals. For the Bathurst, Beverly and Kaminuriak herds, part of the increase reflects greater accuracy in census results, attributable to a change from visual to photographic surveys, and part represents real population growth. This may also apply to the George River herd and to herds in Norway and the Soviet Union.

Large increases in the world's major caribou herds lead us to agree with Bergerud (Arctic 38:156, 1985) «...the great days of the caribou on the barren lands are here, at last». However, many animals in a few large herds would not compensate for loss of small herds that exist as isolated gene pools, i.e. the Gaspesie Park and Slate Islands herds (numbers 19 and 28, Table 1). With almost 20% of all herds declining, we must not become complacent with management of the world's wild *Rangifer* populations.

1a. Insular Newfoundland, Canada.

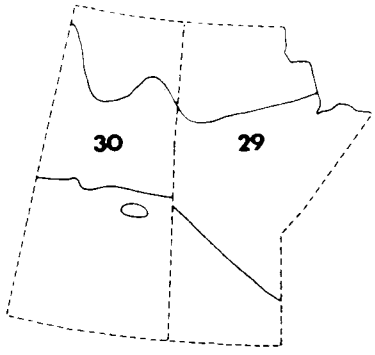
Fig. 1. Wild *Rangifer* herd ranges in North America. Numbers correspond to Table 1.

1b. Newfoundland and Quebec, Canada.



1c. Ontario, Canada.

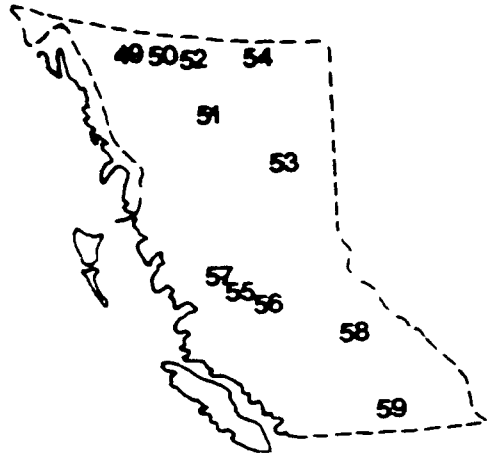
1d. Saskatchewan and Manitoba, Canada.



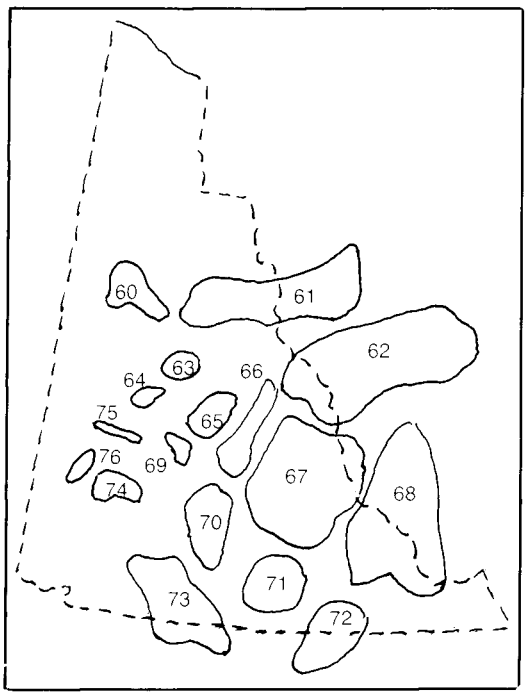
1e. Alberta, Canada.

1f. Northwest Territories, Canada.

1g. British Columbia, Canada.



1h. Yukon, Canada.



1i. Alaska, U.S.A.

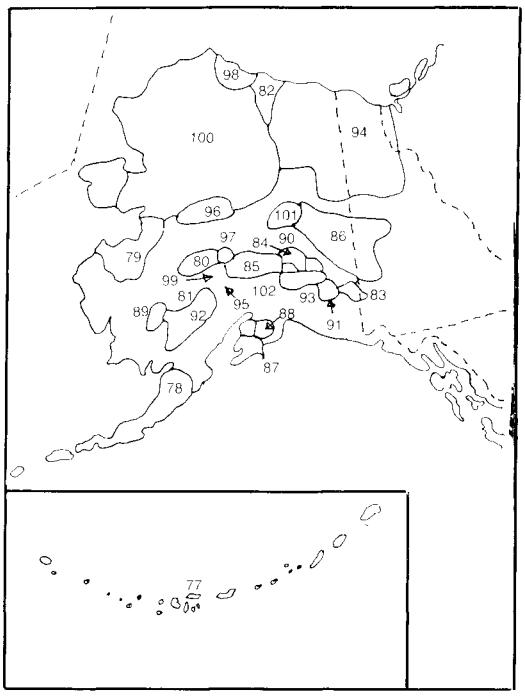


Table 1. Wild *Rangifer tarandus* herds in North America.

No.	Name	Estimate	Year	Method*	Trend**	Hunter Kill	Comment	Source***
1	Avalon	3300-6900	1982	BS	I			1
2	Middle Ridge, Mt. Peyton, Tolt	4600-9600	1982	BS	I			1
3	Pot Hill	450	1982	TC	I			1
4	Sandy Lake	200	1982	TC	I			1
5	Grey River	2500-8300	1982	BS	I			1
6	Gaff Topsails	1000-2100	1982	BS	I			1
7	Buchans	2000	1982	TC	I			1
8	LaPoile	6700-12100	1982	BS	I			1
9	Hampden Downs	400	1982	TC	I			1
10	Humber	450	1982	TC	I			1
11	Northern Peninsula	1500	1982	TC	I			1
12	Mealy Mtn.	660-740	1981	TC	I	Unknown		2
13	White Bear Lake	<100	1977	TC	D,TH	Unknown	May be viably extinct	2
14	Torngat Mtn.	5000-10000		G	I	500-1000		2
15	Red Wine Mtn.	720-780	1981	TC	S,V	Unknown	Range shared with inc.moose pop.	2
16	Lac Joseph	<600	1978	TC	D,TH	Unknown	Interprovincial, unprotected	2

17	Koroc River	5000	1980	SS,TC				3
18	George River	600 000	1984	PS	I	15000	Calving ground survey	4
19	Gaspesie Park	250	1980	TC	D	Unknown	Range made into park in 1981	3
20	North Shore	2000	1977		D	Unknown		3
21	Grands Jardins	67	1982	TC	I	None Legal	Range made into park in 1982	3
22	Val d'Or	50		TC	S,TH		Logging threatens habitat	3
23	James Bay	4000-5000	1982		S	Unknown		3
24	Leaf River	65 000-70 000	1983		I	Unknown	Calving ground survey	5
25	NE Ontario	4500	1985	IO	S	Unk.native	No complete survey	6
26	N. Lake Superior	<200	1985	IO	S	None legal	Scattered remnant herds	6
27	NW Ontario	3100	1984	SS	U	2.4-3.6%		7
28	Slate Islands	600	1984	TC	I	None	Die-off expected	8
29	Manitoba herds	5000	1985	IO	S	2-300	Logging, Habitat loss	9
30	Saskatchewan herds	2500	1985	IO	D,TH	<100 legal	Logging, Roads	10
31	Alberta herds	1500-3000	1985	V	D,TH	<25 native	Logging, Poaching, Predation	11
32	Northeast Baffin	10000		G	U	1000	Never surveyed	12
33	North Baffin	>30 000		G	U	7000	Range expansion, not surveyed	12
34	South Baffin	>60 000	1984	SS	U	8000	Range expansion	12
35	Belcher Islands	287	1982	TC	I	32	Feral, introduced 1978	12
36	Coats Island	2100	1984	SS	S	300	Icing causes die-offs	13
37	Southampton Island	1100	1978	SS	I	70	Introduced in 1967	14
38	Northeastern Mainland	110 000-130 000	1983	SS	S	3900		15
39	Kaminuriak	180 -280 000	1983	PSS	I	10000	Calving ground survey	16
40	Beverly	250 000-420 000	1984	PSS	I	6000	Calving ground survey	17
41	Bathurst	320 000-450 000	1984	PSS	I	14300	Calving ground survey	13
42	Bluenose	50 000-80 000	1983	PSS	S	4000	Calving ground survey	18
43	Mackenzie Woodland	2000-5000		G	U	>150	No survey data	19
44	Boothia Peninsula	8900	1985	SS	U			20
45	Banks Island	5000	1985	SS	S	>500		21
46	Victoria Island	7000-9000	1980	SS	U	1100-1500		22
47	Somerset, Pr. of Wales	4400-5800	1983	SS	U	150-250		23
48	Queen Eliz. Islands	4200						
	eastern	1500	1961	SS	U	Unknown		24
	western	2700	1974	SS	U	Unknown		25
49	Atlin	500	1979		S			8
50	Kaudy-Level	800	1983	TC	D	11 males	Minimum count	8
51	Spatsizi-Lawyers Pass	1260	1982	TC	D	33 males	Minimum count	8
52	Horse Ranch	300	1982	TC	I	3 males	Wolf control	26
53	Pink Mountain	300	1978		S			26
54	Liard Plateau	125	1978	TC	S		Ground based	26
55	Telkwa	40	1977	TC	S		Radio-tracking	26
56	Tweedsmuir	200	1978	TC	I		Ground based	26
57	Itcha-Ilgachuz	700	1982	TC	I	59 males		8
58	Cariboo Mountains	1500	1984	MR	D		Predation, logging	27
59	Selkirk	25-30	1980	TC	S		Ground based	8
60	Hart River	1200	1978	TC	S	10		28
61	Bonnet Plume	5000	1982	TC	I	15-20		28
62	Redstone	5000-10000		G	U	45-50		28
63	Mayo				U	None		28

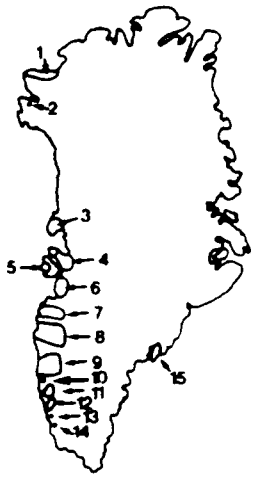
64	Ethel Lake	200	1977	TC	U,V	5		28
65	Anvil Range	300		G	U,V	15		28
66	Tay Lake	300		G	U,V	5-10		28
67	Finlayson	2500	1984	TC	I	250	Harvest reduction, Wolf control	28
68	Nahanni	2000		G	U,V	25-70		28
69	Glenlyon Range	350	1977	TC	U	5		28
70	Pelly Herds	1000		G	U	10-15		28
71	Wolf Lake	500		G	U	5-10		28
72	Little Rancheria	450		G	D,TH	20-25		28
73	Carcross Herds	600	1980	TC	S,V	10-15		28
74	Aishihik	1500	1981	TC	S	35-45		28
75	Dawson Range	250		G	U	5-10		28
76	Burwash	400	1982	TC	S,V	15-20		28
77	Adak	300	1982	TC	S	None	Preharvest count	29
78	Alaska Peninsula	>30 000	1984	TC	I	1454	Photo and visual	29
79	Andreafsky	400		IO	U	10-50	Not adequately censused	29
80	Beaver Mountains	1600	1983	TPC	U	25	Based on radio-collars	29
81	Big River	750	1982	TC	D	42-47	Based on radio-collars	29
82	Central Arctic	>12 500	1983	TPC	I	170		29
83	Chisana	1000	1981	TC	U	28	Ground based	29
84	Delta	8000	1984	TPC	S	694	Photo and visual	29
85	Denali(McKinley)	2100	1984	TC	S	None		29
86	Fortymile	16000	1984	TC,SS	I	250-300	Photo and visual	29
87	Kenai Lowlands	80-85	1983	TC	S	None	Based on radio-collars	29
88	Kenai Mountains	300	1982	TC	S	29	Based on radio-collars	29
89	Kuskokwim Mts.	600	1983	IO	U			29
90	Macomb	700	1981	TC	U	11	Based on 475 seen	29
91	Mentasta	3000	1983	TC	S	90	Photo and visual	29
92	Mulchatna	30 000-33 000	1984	TPC	I	1000-1500		29
93	Nelchina	25000	1984	TPC	I	969	Based on 22100 seen	29
94	Porcupine	150 000	1983	TC,SS	I	400	Photo and visual	29
95	Rainy Pass	1500	1984	IO	U	45-50		29
96	Ray Mts., Kokrines Hills	1000	1983	IO	U	25		29
97	Sunshine Mountains	525-750	1983	TC	D	None	Based on radio-collars	29
98	Teshekpuk	10 8000	1984	PSa		Unknown	Calving ground survey	29
99	Tonzona	<1000	1983	IO	U	10-15		29
100	Western Arctic	>200 000	1984	TC,SS	I	5000-12000	Photo and visual	29
101	White Mountains	800	1983	IO	U	6		29
102	Yanert	>500	1984	PSa	U	54	Yanert - Delta herd mixing	29

* BS=Block samples, TC=Total count, G=Guess, SS=Strip samples, PS=Photo strips, IO=Incidental observations, V=Various methods, PSS=Photo strip samples, MR=Mark resighting, TPC=Total photo count, PSa=Photo sample.

** I=Increasing, D=Decreasing, S=Stable, TH=Threatened, V=Vulnerable, U=Unknown

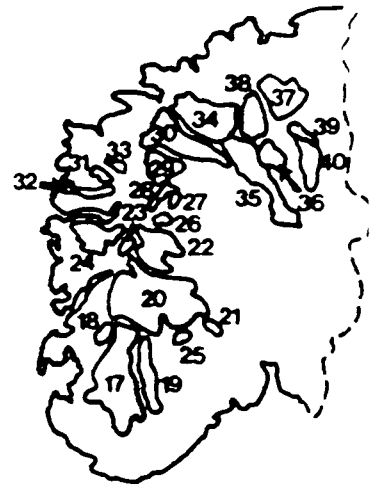
*** All sources are pers.comm. except those with a year citation.
1=Mercer, 2=Luttich, 3=Belanger and Le Henaff, 4=Anon. 1985, 5=Le Henaff and Messier, 6=Stefanski, 7=Darby, 8=Bergerud, 9=Kearney, 10=Trottier, 11=Edmonds and Rippen, 12=Ferguson, 13=Heard, 14=Kraft, 15=Heard et. al. 1986, 16=Heard and Calef 1986, 17=Gates, 18=Williams and Heard, 19=Decker, 20=Gunn, 21=Jingfors, 22=Jakimchuk and Carruthers 1980, 23=Gunn and Decker, 24=Tener 1963, 25=Miller et al. 1977, 26=Bergerud 1980, 27=Seip, 28=Farnell, 29=Davis.

2a. Greenland.

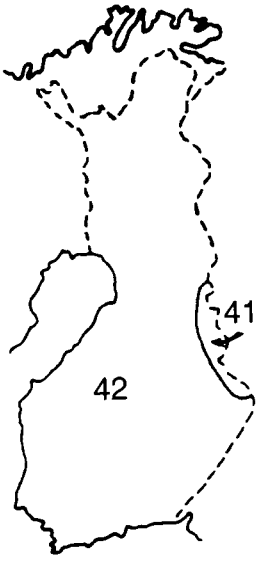


2b. Iceland.

2c. Norway.

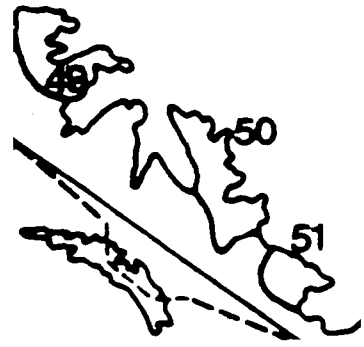


2d. Finland.

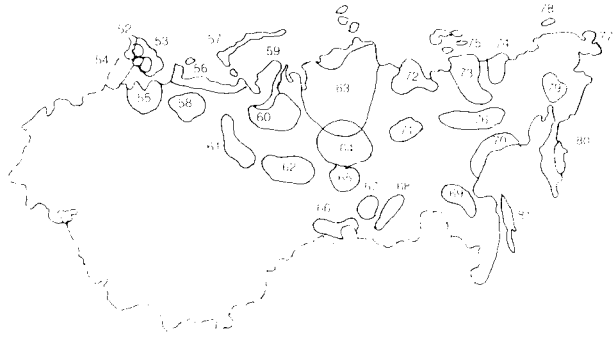


2e. Svalbard.

2f. South Georgia.



2g. Soviet Union.



2h. China.

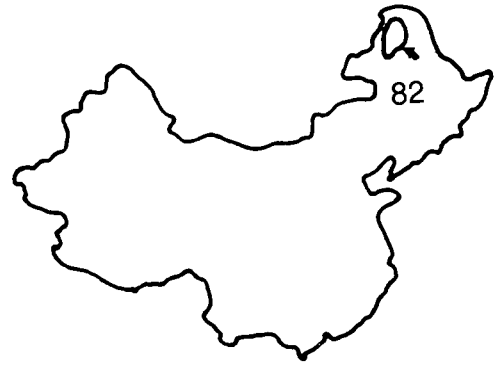


Fig. 2. Wild *Rangifer* herd ranges in Europe, Asia and South Georgia. Numbers correspond to Table 2.

Table 2. Wild *Rangifer tarandus* herds in Europe, Asia and South Georgia.

No.	Name	Estimate	Year	Method*	Trend**	Hunter Kill	Comment	Source***
1	Inglefield Land	<100	1984		I,V	<10	Isolated, wild	1
2	Orlik Fjord	100-300	1978	TC	I,V	<10	Isolated, feral	1
3	Nunavik	<100	1980		D,TH		Isolated, wild	1
4	Nuussuaq	200-300	1980	IO	I	50	Wild, feral	1
5	Qeqertassuaq	150-250	1980	TC	I	35	Feral	1
6	Nassuttooq	400-600	1978	TC		100	Wild	1
7	Nassuttuup	1300-3300	1982	TC	D	700	Wild	1
8	Sisimut	2500-5500	1982	TC	D	2000	Wild	1
9	Nuuk	5200-10200	1982	TC	D	4000	Wild	1
10	Qoornoq	50-150	1982	TC	S,V		Feral	1
11	Ameralik	1000-2000	1983	TC	S	200	Wild	1
12	Sermilik	200-400	1982	TC	S	<50	Wild	1
13	Qassit	100-300	1982	TC	S	50	Wild	1
14	Neria	300-500	1980	IO	S	100	Wild	1
15	Tasiilaq	80-120	1980	IO	S.V	<10	Feral	1
16	Iceland	3000	1984	TPC	S,V	390	Aerial and ground; proposed hydro project	2
17	Setesdal Vesthei	2700	1978	TPC	S	352	Summer count	3
18	Saudafjella	75	1979	TPC	S	10		3
19	Setesdal Austhei	2000	1979	TPC	S	600	Summer count	3
20	Hardangervidda	20 000	1984	TPC	S	9200	Summer count	3
21	Blefjell	130	1979	TPC	S	50	Winter count	3
22	Hallingskarvet	2500	1984	TPC	S	1000	Winter count	3
23	Raudafjell	30	1978	TPC	S	0		3
24	Fjellheimen	850	1979	TPC	S	185	Summer count	3
25	Brattfjell-Vindeggen	600	1983	TPC	S	250	Winter count	3
26	Lærdal-Årdal	300	1979	TPC	L			3
27	Årdal-Tyin	100	1979	TPC	L			3
28	Vest-Jotunheimen	720	1977	TPC	S	88	Winter count	3
29	Ottadalen Sør	460	1980	TPC	S	81	Winter count	3
30	Ottadalen Nord	3100	1980	TPC	S	725	Winter count	3
31	Førdefjella	100	1978	TPC	S	14	Winter count	3
32	Sunnfjord	600	1978	TPC	S	20	Winter count	3
33	Svartebotnen	130	1979	TPC	S	25	Winter count	3
34	Snøhetta	2800	1984	TPC	S	1100	Winter count	3
35	Rondane	1200	1982	TPC	S	350	Winter count	3
36	Sølnkletten	530	1979	TPC	S	29	Winter count	3
37	Forelhogna	1800	1984	TPC	S	1000	Winter count	3
38	Knutshø	914	1984	TPC	S	350	Winter count	3
39	Tolga Østfjell	200	1979	TPC	S	9	Winter count	3
40	Rendalen	700	1984	TPC	S	125	Ground based	3
41	Finnish forest reindeer	600	1984	TC	I	0		4
42	Finnish	30-40	1984	TC	U	0	Introduced	4
43	Nordenskiöldland	4500	1985	TC	S	0		5
44	Reinsdyrflya	1000	1985	G	U	0		5
45	Nordaustlandet	500	1985	G	S	0		5
46	Edgeøya-Barentsøya	2500	1985	TC	S	0		5
47	Wedel-Jarlsbergland	300	1980	G	U	0		5
48	Brøggerhalvøya	50	1980	TC	U	0	Introduced; experimental	5
49	Busen	450	1976	TPC	D		Introduced	6

50	Barff	1000	1976	TPC	D		Introduced	6
51	Royal Bay	550	1976	TPC	S		Introduced	6
52	W. Kola Peninsula	230	1984	TC	I,TH	0	No contact with domestic reindeer	7
53	E. Kola Peninsula	2700	1984	TC	I,TH	0	Little contact with domestic reindeer	7
54	Karelia	7000-11000	1983	SS	S	0.7%		7
55	Archangel Forest	14000	1983	SS	S	<1.7%		7
56	Archangel Tundra	4000	1983	SS	S,TH	1%		7
57	Novaya Zemlya Isl.	6000-7000	1981	SS	I	3.3%	Recovered	7
58	Komi Forest	4000	1983	SS	S	1.3%		7
59	Yamal Tundra	2000	1983	SS	S,TH	<1.5%		7
60	Nadym-Pur Rivers	5000	1983	SS	D,TH	<1.5%	Close contact with domestic reindeer	7
61	Konda-Sosva Rivers	7000	1983	SS	D	<1.5%		7
62	W.Siberian Forest	5000	1983	SS	S,TH	<50	No contact with domestic reindeer	7
63	Taimyr	530 000	1984	TPC	I	13.8%		7
64	Evenkiysk	50 000	1982	SS	D	<2.0%		7
65	Upper Angara R.	10 000	1983	SS	D	<2.0%		7
66	Altai-Sayan Mntns.	10 000	1982	SS	S	<1.0%		7
67	Irkutsk	20 000	1983	SS	S	1.6%		7
68	E. Baikal	8000	1983	SS	S	<1.0%		7
69	Amur	3000	1983	SS	D	1.2%		7
70	W. Okhotsk	15 000-17 000	1983	SS	S	2.0%		7
71	Lena-Vilyui Rivers	20 000	1983	SS	D	<1.0%		7
72	Bulun	60 000	1983	SS	S	<11%	Interaction with reindeer husbandry	7
73	Yana-Indigir Rivers	100 000	1983	SS	S	<15%	Interaction with reindeer husbandry	7
74	Sundrun	30 000	1983	SS	I	<15%	Interaction with reindeer husbandry	7
75	Novosibirsk Isls.	7500-16 300	1980	SS	I	<1.0%	Two independent counts	7
76	Yukutsk Mntn. Taiga	30 000	1983	IO	D	<1.0%		7
77	Chukotsk Tundra	5000-6000	1981	SS	S	<10%		7
78	Wrangel Island	2000	1982	TC			Harvested to control population size	7
79	Chukotsk Forest	3000-5000	1981	SS	I			7
80	Kamchatka	4000	1983	SS	S,TH	1.8%		7
81	Sakhalin	3000	1983	IO	TH			7
82	Taxinganling	980	1982	TC	S,V	0	Wolves and disease	8

* TC=Total count, IO=Incidental observations, TPC=Total photo count, G=Guess, SS=Strip samples

** I=Increasing, D=Decreasing, S=Stable, L=Lost, V=Vulnerable, TH=Threatened, U=Unknown

*** All sources are pers.comm. except those with a year citation.
1=Thing, 2=Thórisson, 3=Skogland, 4=Tunkkari, 5=Øritsland and Alendal 1985, 6=Leader-Williams 1980, 7=Kuzyakin, 8=Ma.

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