Ivory Gull population status in Greenland 2019

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(Med et dansk resumé: Ismågens bestandsstatus i Grønland 2019)

Abstract In July 2019, a survey of the breeding population of Ivory Gull *Pagophila eburnea* was conducted in North and East Greenland. In total, 36 known sites were visited, 16 of these were occupied, nine new colonies were identified and 2028 birds were observed. Compared to the results of a survey in 2009, no change in population status could be detected. The population was estimated at 2000-2500 pairs.

Introduction

The Ivory Gull *Pagophila eburnea* is associated with Arctic ice-covered seas throughout its life cycle. The breeding range of this species includes Arctic Canada, Greenland, Svalbard and Arctic Russia. Many breeding colonies are found on coasts close to polynyas or shore leads, but many are also present on nunataks up to 130 km from the coast (Robertson *et al.* 2007, Gilg *et al.* 2009). The gulls forage along ice edges, at glacier fronts and in the drift ice, and it was recently shown that they can move up to 500 km away from the colony to find food (Frederiksen *et al*. 2020).

In Greenland, the main breeding distribution includes two areas: a northern distribution at the northeast corner of Greenland bordering the Northeast Water Polynya and its associated shore leads, and a southern distribution between Scoresby Sund and Tasiilaq. Between these two areas, only few breeding sites have been recorded. There are, moreover, some historical records (before 1936) which indicate breeding in Inglefield Land, Washington Land, Hall Land and Warming Land, all in the western part of North Greenland. These old records have not been confirmed since (cf. Salomonsen 1950, Gilg *et al*. 2009). A historic record, not noted before, is an observation of many 'terns' (obviously Ivory Gulls) during the descent from an ice sheet crossing towards Tasiilaq (west of Sermilik Fjord at about 66° N, 39° W) in late June 1936 (Knuth 1937) in an area where

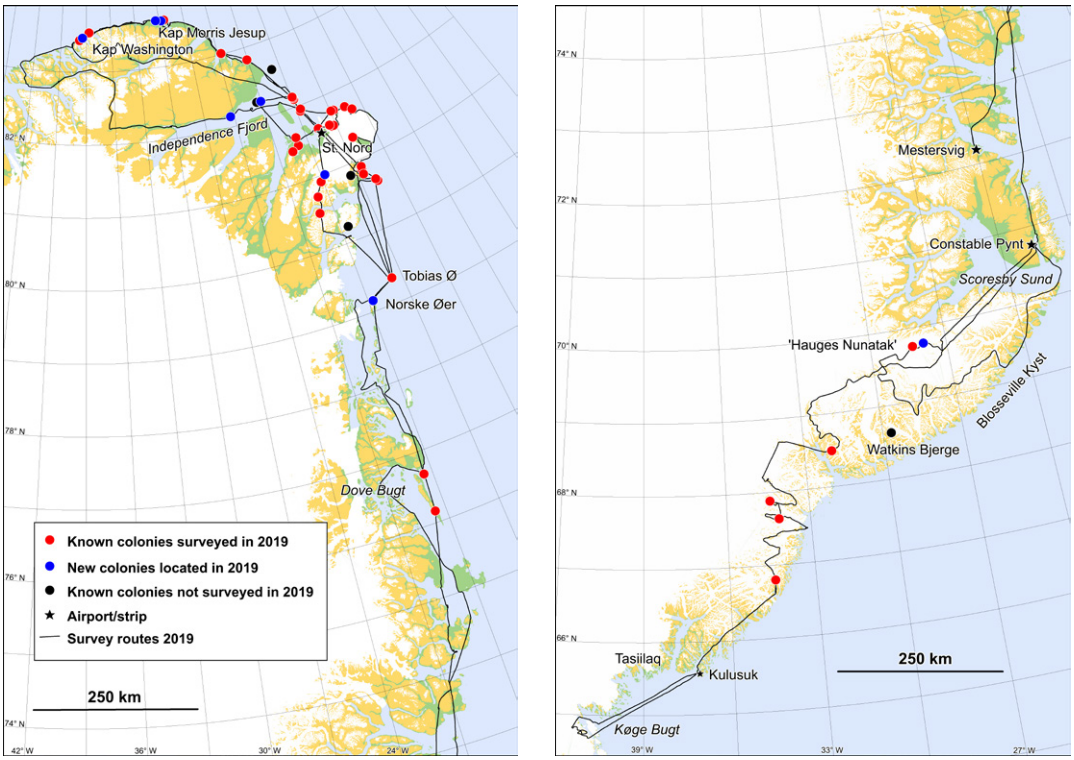

Fig. 1. Map of the survey area, with the survey routes (black line) flown in 2019 in search of Ivory Gulls. Left, northern areas. Right, southern areas.
Kort over undersøgelsesområdet med den rute der blev fløjet i 2019 indtegnet (sort streg). Det nordlige område til venstre, det sydlige til højre.

breeding never has been reported. Other recent summer records may indicate breeding in the Melville Bay area and northern Upernavik District (Boertmann & Huffeldt 2012, P. Lyngs *pers. comm.*).

The Ivory Gull is considered a species at risk: the global assessment according to the IUCN system is 'Near Threatened (NT)' (Birdlife International 2018), and 'Vulnerable (VU)' at national level in Greenland and Svalbard (Henriksen & Hilmo 2015, Boertmann & Bay 2018). Canada and Russia, using their own threat classifications, consider it as 'Endangered' (COSEWIC 2006) and 'Rare' (Iliashenko & Iliashenko 2000), respectively. Furthermore, the OSPAR-convention (covering the Northeast Atlantic Ocean) includes Ivory Gull in its list of seven bird species for which action is needed to better understand and protect them.

The justification for these assessments is that the species has declined rapidly in Canada (Gilchrist & Mallory 2005) and the extent of its primary habitat – the drift ice – is diminishing due to climate change, and will continue to do so in the future (Overland & Wang 2013). Moreover, the breeding status of the species is generally poorly known. A number of other factors are likely to be contributing to declines, such as long-range transport of pollutants, because some of the highest mercury (Hg) and persistent organic pollutants (POP) contents among Arctic seabirds have been measured in Ivory Gulls and their eggs (Strøm *et al*. 2019). Human intrusion and hunting within the breeding areas has also been mentioned as a threat (BirdLife International 2018).

In 2008, a working group under the Arctic Council, the Conservation of Arctic Flora and Fauna (CAFF), recommended a suite of research and monitoring actions, one of which was to estimate population size for each major Ivory Gull breeding population (Gilchrist *et al*. 2008). Plans for estimating the population size of the major populations were developed during 2017 and

the work was conducted in 2019 with surveys in Canada, Greenland, Svalbard and Russia. In Greenland, the survey was conducted in July 2019 and covered the northern and southern breeding areas mentioned above.

The survey was financed partly by the Strategic Environmental Study Program for the Northeast Greenland area (Government of Greenland) and the Danish Environmental Protection Agency (DANCEA-programme, grant MST-113-00086).

Methods

The survey took place between 22 July and 2 August 2019 at a time when chicks in nests usually are two to three weeks old (DB *pers. obs*.) and was airborne in order to cover the vast Greenlandic breeding range. The observation platform was a Twin Otter DHC-6 from the Icelandic company Nordlandair.

The aircraft was equipped with four bubble windows, a ferry tank for long duration flights (up to seven hours) and tundra wheels for short gravel air strip landing. In total, 52 hours were spent airborne, including surveying Ivory Gulls, conducting other surveys and for ferry flights between Iceland and Greenland. Three observers and a camera operator participated. Flight level above the ground was down to 250 feet, but many vertical cliffs were searched from flights below their tops, and survey speed was as slow as possible i.e. 100-150 knots. Details of the survey can be found in Boertmann *et al*. (2019).

Known Ivory Gull colonies were surveyed and new colonies were searched for along the coasts and in the nunatak areas both in the southern and in the northern range and along the routes between the two areas (Fig. 1). Moreover, offshore gravel covered ice floes and icebergs were surveyed in the northern range because such places are known to be nesting sites (Boertmann *et al*. 2010, Nachtsheim *et al*. 2016). At all colonies, the numbers of individual birds were recorded and colonies were identified by their unique id-number in the Greenland Seabird Colony Register (Boertmann *et al*. 2020).

All observations were recorded on tape recorder, and each observation was associated with its observation time. A GPS (Nomad Rugged PDA IP67) recorded the survey track lines. Each observation of birds and other wildlife was geo-referenced by combining the observation time and GPS time. All clocks were synchronized with the GPS clock (UTC-time).

The northern range was surveyed from the airstrip at Station Nord, while the southern range was surveyed from the airports at Constable Pynt, Mestersvig and Kulusuk. Only two Ivory Gull sites have been reported between the northern and the southern area, namely at Dove Bugt, and both these sites were surveyed on the flights between the northern and southern area. Compared to previous surveys in 2008 and 2009, much larger areas were covered, especially along the coast between 77° and 79° N, in the mountainous areas north of 82° N, and in the southern range.

The weather conditions during the survey flights were generally very good, with clear skies and calm winds. However, on 24 July fog covered the coast and the islands between 75° and 81° N, and on 25 July fog also prevented observations along parts of the north coast of Greenland. However, most of these fog covered areas (except to the west of 45° W) were surveyed again under better conditions. Tobias Ø was visited three times but it was only possible to make observations through the fog during the third visit.

The results were compared with the results of a survey in 2009 which covered more or less the same areas in the northern part of the range and one colony in the southern part (Boertmann *et al*. 2009, Boertmann & Nielsen 2010). A General linear model (GLM) was applied to test whether the numbers had changed. Preliminary analyses using a Poisson-distributed error structure and log link function showed over-dispersion, meaning that the variance was larger than the mean of the dependent variable. Therefore a quasi-Poisson model was applied, which fits an extra parameter to account for the extra variance. The statistical test was performed using R (R Core Team 2018).

Results

The northern area was surveyed during two flights between Constable Pynt and Station Nord and during three flights from Station Nord, in total c. 5000 km (Fig. 1). Thirty one of the 35 sites known to have had Ivory Gulls breeding in earlier years were observed from the air, and 15 of these sites were occupied, whereas no signs of nesting were detected at the remaining 16 sites (Fig. 1). Seven new sites with breeding Ivory Gulls were discovered, and three of these were on gravel covered ice floes and icebergs (Tab. 1). This means that 22 occupied sites in total were located and at these sites a total of 1968 individuals were counted (Tab. 1), with the greatest numbers (820) at the newly discovered colony on Norske Øer making this colony the largest colony surveyed in Greenland so far.

The southern area was surveyed by a flight out from Constable Pynt, from a flight between Constable Pynt and Kulusuk and from a flight out from Kulusuk, which

Tab. 1. Results of the Ivory Gull survey in Greenland 2019.
Resultatet af optællingen af Ismåger i Grønland i 2019.

Category *Kategori*	**Number of birds** *Antal individer*	**Comments** *Bemærkninger*
Northern area *Nordlige område*		
Known sites *Kendte kolonier*	37	2 of these on ice floes *2 af disse på isflager*
Visited 2019 *Besøgt i 2019*	31	
Occupied 2019 *Med fugle i 2019*	15	
New sites 2019 *Nye kolonier i 2019*	7	3 of these on ice floes/icebergs *3 af disse på isflager eller -bjerge*
No. of birds at known sites *Antal fugle i kendte kolonier*	1031	
No. of birds at new sites *Antal fugle i nye kolonier*	937	
Total no. of individuals *Antal individer i alt*	1968	
Southern area *Sydlige område*		
Known sites *Kendte kolonier*	6	
Visited 2019 *Besøgt i 2019*	5	with reservations, see discussion *med forbehold, se diskussionen*
Occupied 2019 *Med fugle i 2019*	1	
New sites *Nye kolonier i 2019*	2	
No. of birds at known sites *Antal fugle i kendte kolonier*	12	
No. of birds at new sites *Antal fugle i nye kolonier*	48	
Total no. of individuals *Antal individer i alt*	60	
Grand total *Antal individer i alt i hele området*	2028	
Average number at surveyed sites *Gennemsnitlige antal i undersøgte kolonier*	45.0	

in total amounted to a survey flight of c. 2500 km (Fig. 1). Five (of six known) previous breeding sites were investigated, and birds were observed at only one of these. In addition, two new sites with breeders were located, which gave a total of three occupied sites and 60 individuals (Tab. 1).

A nunatak area south of Kulusuk (as far south as 65° S) was surveyed for potential new sites because Ivory Gulls occur during summer time along the adjacent coasts (Boertmann & Rosing-Asvid 2014). However, no breeding Ivory Gulls were recorded in that area.

Finally, two previously known breeding sites in the Dove Bugt area between the northern and southern strongholds were overflown without finding Ivory Gulls.

The morphology/substrates of the colonies observed in 2019 and during surveys in 2008 and 2009 are listed in Tab. 2. Substrates include level ground on coasts, islands and inland areas, steep cliffs at the sea, inland or on nunataks, and also small gravel banks surrounded by sea ice, gravel patches on ice floes, on icebergs and on a glacier (Figs 3, 4).

A comparison of Ivory Gull numbers recorded at breeding sites in 2009 (Boertmann & Nielsen 2010) and visited again in 2019 indicated no significant difference between years (GLM, quasi-Poisson model, df = 40 (residual deviance), F test, P = 0.99) even though there was a large variation among the single colonies between the two survey years. It is also remarkable that the average colony size was almost identical between the two survey years (Tab. 3).

Discussion

The coverage of potential breeding sites of Ivory Gulls in the northern range was very good. Almost all known sites were visited. We missed a colony in Amdrup Land that was reported in 2008 by a helicopter pilot (O. Gilg *pers. comm.*). Moreover, the two breeding sites located on gravel covered ice-floes in 2008 and 2009 (Boertmann & Nielsen 2010, Boertmann *et al*. 2010) had disappeared or had shifted to a new location during an open water situation in late summer in subsequent years. However, three new colonies were found on ice at sea. Two of these were on gravel covered floes (one of which was only 6.5 km from the one found in 2008) and one colony was located on a gravel spot on a low, tabular iceberg (Fig. 2).

The southern area was extremely difficult to survey because all the known sites are located in the nunatak-areas. The topography there is characterized by numerous, steep, tall cliffs where small white birds are extremely difficult to detect from a moving observation platform. It was, however, remarkable that we observed birds at the remote 'Hauges Nunatak' just to the south of Scoresby Sund. Ivory Gulls were not observed there in 2009. Even more remarkable were two previously unknown sites located 30 km further away. No birds could be located at any of the other known sites. However, due to the topography, Ivory Gulls could easily be missed at these sites. In contrast to our experience, Robertson *et al*. (2007) found that Ivory Gulls in Canada were 'easily spotted' against the dark nunatak faces, probably because they used a helicopter during their survey and apparently flew much closer to the cliffs. Unfortunately, a colony in Watkins Bjerge (Merkel *et al*. 2010) was missed due to a navigation error.

A more effective way to locate colonies in southern nunatak areas would be to catch gulls and fit them with satellite transmitters at their coastal foraging area so they can be tracked to their breeding sites. This should then be followed up by a search from a smaller and more versatile aircraft than the Twin Otter, as was done in 2008 and 2009 near Station Nord (Gilg *et al*. 2009, Boertmann *et al*. 2010).

The nunatak areas west of Blosseville Kyst and Køge Bugt (64° 45′ N) were searched for new sites, because Ivory Gulls regularly are observed during summer along these coasts. However, no colonies were found. The nunataks west of Køge Bugt looked particularly unsuitable as nesting sites: they were capped with snow and

Tab. 2. Substrate of 45 Ivory Gull sites in Greenland surveyed in 2008, 2009 and 2019. All nunatak colonies were situated on steep cliffs. Colonies on ice were all on gravel covered areas. The gravel banks may have included completely gravel covered ice floes very close to the coast (see Fig. 3).
Underlag for 45 kolonier af Ismåge besøgt i 2008, 2009 og 2019. Alle kolonier på nunatakker var på stejle klippesider. Kolonier på isflager og isbjerge var på grusdækkede områder. Nogle af grusbankerne meget tæt på kysten kan have været isflager helt dækket med grus (se Fig. 3).

Substrate ***Underlag***	**Number of colonies** ***Antal kolonier***
Coastal cliff *Kystklippe*	4
Gravel bank *Grusbanke*	8
Inland cliff *Indlandsklippe*	2
Inland plateau *Indlandsslette*	1
Low island *Lav ø*	8
Low coast *Lav kyst*	3
Gravel bank on glacier *Grusbanker på gletsjer*	3
Nunatak *Nunatak*	11
Ice floe *Isflage*	4
Iceberg *Isbjerg*	1
Total *I alt*	45

Fig. 2. Ivory Gull colony site on a gravel patch on a large tabular iceberg in Independence Fjord 27 July 2019. Eleven birds were counted here. Photo: DB.
Ismågekoloni placeret i et grusområde på et stort isbjerg i Independence Fjord. Elleve fugle blev talt her den 27. juli 2019.

Fig. 3. Colony situated on small gravel banks (or perhaps on gravel covered ice floes anchored to the seabed) by the northern coast of Greenland. Photo: DB.
Ismågekoloni placeret på lave grusbanker nær kysten. Der er måske tale om strandede isflager dækket med grus.

Fig. 4. Colonies situated on small hilltops on A) gravel bank near the coast and B) a gravel bank on a glacier. Photos: DB (A), HHN (B).
Ismågekolonier placeret på små grustoppe på A) en grusbanke nær kysten og på B) gletsjer.

Tab. 3. Colony sites surveyed in 2009 and again in 2019 (N = 23). Survey results are individuals at colonies. Colony ID refers to the unique identification numbers in the Greenland Seabird Colony Register, and the first two digits refer to latitude. Two colonies (80505, 83501) were not occupied in any of the years, but are included here because they were occupied in 2008. Colonies on ice floes and icebergs not included. The number marked by * refers to numbers of nests recorded at the site (Yannic *et al*. 2014) but as Gilg *et al*. (2009) argue, there is usually only one bird present at each nest at this time of the year, and hence the figure can be compared to the other survey results. Reference to colony ID numbers can be found in Boertmann *et al*. (2019).
*Potentielle ynglesteder for Ismåge besøgt i både 2009 og 2019, i alt 23. Optællingsresultaterne er individer ved kolonierne. Koloninr. refererer til det unikke nummer i databasen med grønlandske havfuglekolonier, som varetages af Aarhus Universitet og Grønlands Naturinstitut. Koloninummerets to første cifre refererer til nordlig breddegrad. To af kolonierne var uden fugle både i 2009 og 2019, men er medtaget fordi de begge var med fugle i 2008. * Yannic* et al. *(2014); dette tal var oprindeligt angivet som reder, men da Gilg* et al. *(2009) argumenterer for, at antal fugle tilstede i en koloni på denne tid af året er ca. halvdelen af antallet af de ynglende individer, benyttes antallet af reder her. Der henvises til Boertmann* et al. *(2019) for nærmere forklaring af koloniernes referencenumre.*

Colony ID *Koloninr.*	Colony name *Koloninavn*	2009	2019
69504	'Hauges Nunatak'	0	12
79501	Tobias Ø	225	81
80505	Henrik Krøyer Holme	0	0
80515	Caroline Mathilde Alper	0	15
80518	East of St. Nord 2	50	94
80520	East of St. Nord 1	96*	0
81503	Kilen	55	95
81505	Nakkehoved	74	400
81507	St. Nord	50	0
81513	Southeast of Prins Frederik Øer	1	0
81514	West of Kap Prins Knud 2	0	5
81515	West of Kap Prins Knud 1	55	0
81516	Hjørnegletscher	2	0
81517	Prinsesse Magrethe Ø	110	0
82502	Prinsesse Magrethe Ø, central 2	1	6
82503	Prinsesse Magrethe Ø, central 1	8	0
82504	Prinsesse Magrethe Ø, north	5	0
82506	Flade Isblink	0	22
83002	Kap Washington	0	14
83501	Kap Kane	0	0
83503	Islands north of Bliss Bugt 1	80	16
83505	Islands north of Bliss Bugt 2	0	45
83506	Islands north of Bliss Bugt 3	0	12
Total		812	817
Average number, all sites *Gennemsnit, alle kolonier*		35.4	35.5
Average number, occupied sites *Gennemsnit, beboede kolonier*		58.1	62.8

there was also snow on the ledges. This was also true for the nunataks at around 67° N. Further north there were much less snow, with numerous snow free nunataks.

Both sites at Dove Bugt had no Ivory Gulls. The southern site was discovered in 1975, where a single pair of Ivory Gulls was observed (Meltofte *et al*. 1981). The other site is an island with breeding Arctic Terns *Sterna paradisaea* and Sabine's Gulls *Xema sabini*, and Ivory Gulls have been recorded there only in 1908 (7 pairs), in 1969 (no breeding proof), in 1993 (probably not breeding) and 2004 (no breeding proof) (Manniche 1910, Meltofte 1975, Boertmann 1994, O. Gilg *pers. comm*.). A historical Ivory Gull site – the island of Rosio – in this region was reported by Manniche (1910). It was overflown by the first author in 2008, 2009 and 2017 and as part of the present survey without finding Ivory Gulls.

Besides protection against predators, a crucial factor in where Ivory Gulls choose to establish colonies must be presence of snow free nesting substrate. The colonies on gravel banks on a glacier and off-coast were typically placed on small hill tops (Fig. 4) which probably blow free of snow and become dry earlier than level ground. When the colony at Station Nord was established in 1961, nests were placed on the runway, which was kept free of snow throughout winter and spring (Salomonsen 1961). The same applies to the cliffs and nunataks where it was obvious that the southernmost surveyed nunatak areas were not suitable due to long lasting snow cover (cf. above).

The numbers of Ivory Gulls in the colonies are known to vary greatly from year to year (Gilg *et al*. 2009), which was also confirmed in 2019. Several well-known colonies were abandoned or reduced in size, while others were new (in previously surveyed areas) or had increased. For example, the colony on Henrik Krøyer Holme, previously considered as the largest in Greenland with a maximum of 510 birds recorded in 1993 (Falk *et al*. 1997), was without birds in both 2009 and 2019. This variation combined with choice of temporally unstable substrates – ice floes and icebergs – indicate that Ivory Gulls have low fidelity to their breeding sites and redistribute widely between years, probably as an adaption to unpredictable snow conditions in spring.

The five sea ice based colonies discovered in 2008, 2009 and 2019 were all on static ice where the floes and the berg were frozen into the shore-fast ice. However, later in the season these floes may become free and float off shore. Only one other such colony has been recorded in Greenland: on an iceberg in the open sea, however, the iceberg was probably stranded (Nachtsheim *et al*. 2016).

The new site found on Kap Nansen at Norske Øer with 820 birds was situated on a steep cliff facing northeast. This archipelago has never been surveyed before and according to the relatively well-developed vegetation of lichens, mosses and vascular plants, this colony must have been there for many years. It was actually discovered by an airborne whale survey team in August 2017 that reported a "large flock of gulls" on the cliff (R. Hansen *pers. comm.*). So far, this is the southernmost situated colony recorded in the northern survey area, and Gilg *et al*. (2009) actually predicted that this area could hide colonies. They also suspected that the newly discovered island Tobias Ø could have breeding Ivory Gulls, which was proven in 2009 and again in 2019 (Boertmann & Nielsen 2010).

The total count of the 2019 survey was 2028 individuals. But if the large, newly discovered site with 820 birds is excluded, the total is about 1200 individuals. This is close to the 1300 individuals recorded at breeding sites during the previous survey (primarily conducted in 2008/09). Direct comparison of the counts at the 23 potential colony sites surveyed both in 2009 and 2019 did not indicate any increase nor decrease in numbers of breeding Ivory Gulls in Greenland. There is therefore no reason to conclude that the population size at least in the northern range has changed since 2009.

Today, we can conclude that the coasts of the northern range are well surveyed though undiscovered colonies may still be hidden in some inland areas (such as the one we missed in Amdrup Land) and along the fog covered coasts and especially in the nunatak areas, which are particularly hard to survey.

It is more difficult to assess the population and its trend in the southern range. Gilg *et al*. (2009) found a decreasing trend based on a rather meagre data set. The 2019 results do not contradict this hypothesis, although the data are even sparser. However, it was encouraging to find birds at 'Hauges Nunatak' after the zero count in 2009 and to locate two new sites.

Finally, there may be breeding Ivory Gulls in the unsurveyed part of North Greenland from where there are historical records (see Gilg *et al*. 2009) and in areas where Ivory Gulls are observed in summer. However, the nunatak area inside Køge Bugt did not look promising as breeding ground for Ivory Gulls.

A population estimate based on the 2019 survey results in approximately 2000 pairs, assuming that observed numbers of individuals are more or less equal to the number of breeding pairs at this time of the year (Gilg *et al*. 2009). To this should be added unreported numbers representing breeding pairs in the unsurveyed areas, including the areas with historical observations and recent summer observations and in the missed colonies in the surveyed areas. The numbers in the historical sites are most likely low, if any birds are still at these sites. The breeding numbers in the areas with summer observations are probably also very low, as shown by this survey. The size of the unsurveyed regions was reduced by the present survey. However, large colonies may still remain hidden in unsurveyed inland areas (see above), while large colonies in the coastal areas would most likely have been detected in 2019 though the large new colony on Norske Øer easily could have been missed due to fog (we actually surveyed the site twice, because fog almost covered the cliff at the first visit). We know that we missed two known colony sites

in the northern and one in the southern. This may represent 135 birds in areas surveyed previously based on an average of 45 birds in the surveyed colonies (including empty sites) in our 2019 survey. There are surely more unknown colonies in the surveyed areas where several hundred pairs may be undiscovered. Therefore a conservative estimate of the breeding population in Greenland in 2019 is 2000-2500 pairs, which is in agreement with Gilg *et al*. (2009).

The habitats and survey conditions of the Ivory Gull in Greenland resemble the situation in Canada as described by Robertson *et al*. (2007). The colonies have similar locations, the surveys face the same challenges and large unknown colonies were discovered in hitherto unsurveyed areas. Robertson *et al*. (2007) described a declining population, where the Ivory Gulls settled in fewer but larger colonies, but this tendency is not apparent (so far) in the northern part of the Greenland range because the average colony size did not differ between 2009 and 2019.

The future for the Ivory Gull is dire. According to the most recent model projections, the Arctic Ocean may be ice free in summer even before 2050 (SIMIP Community 2020), with declining and ultimately very restricted feeding opportunities for Ivory Gulls in the breeding season as a result. The area where sea ice is oldest and will remain the longest in summer is the arch north of the Canadian Arctic and North Greenland (Moore *et al*. 2019). This means that the Canadian Arctic Archipelago and North Greenland may end up being the last suitable land areas for breeding Ivory Gulls. Russia and Svalbard will probably be too far away, even though Ivory Gulls can move considerable distances during foraging trips from their colonies (Frederiksen *et al*. 2020). In southeast Greenland, many glacier fjords and coasts are nowadays the only ice-covered seas in the summer. They act as summer refugia for both polar bears *Ursus maritima* (Ugarte *et al*. 2020) and also for Ivory Gulls, and most likely are where gulls breeding in the southern distribution area forage in the summer (Boertmann & Rosing-Asvid 2017). Yet even though these fjords and coasts will remain more or less ice covered in the future, they are probably too restricted in area to sustain a population of breeding Ivory Gulls in the long term.

Acknowledgements

Frank Rigét helped with the statistics. The personnel at the military outposts, Station Nord and Mestersvig, helped with logistics and accommodation, Captain Guðmundur Emilsson and pilot Nebojsa Marijan skilfully navigated the Twin Otter. One anonymous reviewer and Christian Hjort provided valuable comments on the first draft of the manuscript and Nick Quist Nathaniels corrected the English.

Resumé

Ismågens bestandsstatus i Grønland 2019

Arktisk Råds arbejdsgruppe CAFF (Conservation of Arctic Flora and Fauna) efterlyste i 2008 en optælling af den samlede ynglebestand af den truede Ismåge *Pagophila eburnea*. En sådan optælling inden for artens udbredelsesområde omkring Nordpolen blev gennemført i sommeren 2019, og her rapporteres resultaterne af optællingen i Grønland.

Optællingen foretoges fra fly og dækkede de to kendte kerneområder (og det mellemliggende område), nemlig det nordøstlige hjørne af Grønland, som ligger op til polynyet Nordøstvandet, og området mellem Scoresby Sund og Tasiilaq i Sydøstgrønland. Tab. 1 viser resultaterne af optællingerne i de to områder. I det nordlige område var dækningen særdeles god, mens det sydlige område var meget vanskeligt at undersøge, fordi kolonierne der er placeret i nunatak-områder, som er meget svære at overskue og opdage fugle i. Vi konkluderer, at bestanden i det nordlige område ikke har ændret sig siden den seneste optælling i 2009, mens den formentlig er reduceret i det sydlige. Det samlede antal observerede fugle (ca. 2000) anvendes her som et minimumsestimat for det samlede antal ynglepar i Grønland, idet antal individer observeret ved en optælling på denne tid af året nogenlunde svarer til antal par i kolonien (Gilg *et al*. 2009). Dertil skal lægges anslået 500 par fra uopdagede og oversete kolonier, hvorfor et grønlandsk bestandsestimat ender på 2000-2500 par, hvilket er i overensstemmelse med – men dog mere præcist – end det tidligere estimat fra 2009.

Undersøgelsen i 2019 bekræftede, at ismågekolonierne varierer meget i størrelse og placering mellem de enkelte år, idet der var stor variation i antallet af fugle i 23 kendte kolonier mellem 2009 og 2019 (Tab. 2), ligesom der blev fundet flere nye kolonier i områder, der også tidligere var velundersøgte. Denne variation, og det faktum at Ismågerne også etablerer kolonier på tidsmæssigt ustabile underlag (grusdækkede isflager og isbjerge), viser, at de ikke er særlig bundet til bestemte lokaliteter ved valget af ynglested. Denne dynamik kan ses som en tilpasning til skiftende sneforhold fra forår til forår. Andre lokaliteter bliver dog tilsyneladende benyttet år efter år. Kolonien på Kilen har været besat alle de år, den er besøgt, og en stor nyopdaget koloni på Norske Øer havde tydelige tegn på mangeårig beboelse, idet der var en relativt frodig vegetation af mosser, laver og blomsterplanter under de beboede dele af stejlvæggen.

Ismågens fremtid er dyster. Fremskrivning af isens udbredelse i Arktis tyder på, at sommerisen forsvinder inden 2050. Dermed forsvinder Ismågens vigtigste fødesøgningsområde, og arten må forventes at gå stærkt tilbage i antal og udbredelse. Bestanden vil formentlig holde længst i Nordgrønland og på de arktiske canadiske øer, fordi sommerisen her vil være den sidste, der forsvinder.

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