The status of breeding birds and other visitors in Surtsey since 2008

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ABSTRACT

This paper aims to provide an overview on the status of breeding birds and visitors on Surtsey since 2008 and is a continuation from Petersen's overview from 2009 of the status after the formation of the island. Specific ornithological expeditions to Surtsey have not taken place since 2003, besides a visit in Surtsey in May 2025. Annual research expeditions have been undertaken in mid-July in 2009–2025. Although the timing is not optimal for bird observations, various information regarding birds has been collected during those visits, including general observations on the presence - absence of known breeding species and regular visitors as well as anecdotes of new species for the island. Gull and fulmar nests have been counted annually on monitoring plots since 2003. Evening counts of gulls present in the colony were performed annually during July visits between 2011 and 2016, in 2023 and in May 2025. One aerial survey was conducted in June 2023 and the gull colony photographed. In May 2025 a breeding bird survey on ground nesting land birds was carried out. By 2025, a total of 95 bird species has been recorded for Surtsey, on the island itself and close by offshore. Out of those, 59 are regular breeders in Iceland, 24 are vagrants and the rest are migrants and winter visitors. Only four species have been recorded for the first time on Surtsey since 2008, of which three are vagrants and one an Icelandic breeder. During the same time, three new breeding species have been recorded, and all of them have been irregular breeders since.

INTRODUCTION

The island Surtsey, formed by a volcanic eruption in 1963–1967, has been studied comprehensively since the very beginning (Baldursson & Ingadóttir 2007). Birds hold a key role in the development of the island's new ecosystem as well as the island playing an important role for both breeding birds and migrants. The present paper is a follow-up of the overview published by Petersen (2009), summarizing bird observations since the formation of Surtsey in 1963 up until 2008. This earlier paper included continuous observations in the early years of the island: in spring and autumn 1967–1971 and summers 1970–1973, as well as whole island censuses in 1990 and 2003. There, Petersen puts forward several recommendations for future monitoring, regarding: a) Breeding bird surveys, by recording distribution and numbers of all breeding birds on the island every third year, using different census techniques, including aerial photography. b) Registration of visitors and other incidental observations during the annual mid-July expeditions and data collection in an appropriate database. c) Recording sea birds on sea during a) and b). Finally, d) Bird ringing. No additional ornithological expeditions to the island were carried out after 2003.

Annual expeditions of a team of researchers (biologists, geologists and others) have been undertaken in mid-July each year from 2009 to 2025, and they have collected various data regarding the birds on the island. They have partly met the monitoring suggestions of Petersen (2009). That is a), b) and c) which includes registration of some breeding birds, visitors and other incidental observations and recording of sea birds on sea. Twice during this period Surtsey was also visited by biologists in May, in 2009 to mount a weather station and in 2025 for

Pálsbær research hut maintenance. May is a more suitable time for evaluating breeding status of many breeding birds than July. Although the peak breeding season is in May-June for most species, it can be assumed that many individuals of most bird species are still around the breeding area in July, but it is too late in the season for accurate breeding bird surveys of ground nesting land birds (passerines and waders) (Davíðsdóttir 2010). From 2023, the objective has been that every two to four years a scientist with an ornithological background would join the annual July expedition to ensure comprehensive coverage of bird observations.

This paper aims to provide an overview on the status of breeding birds and visitors on Surtsey since 2008, what data has been collected, and which methods have been used. It is a continuation from Petersen's (2009) overview of the status since the formation of the island.

MATERIALS AND METHODS

Study area

Surtsey is the southernmost island of the Vestmannaeyjar archipelago south of the coast of Iceland. It is 1,2 km2 in size with dominant surface types being lava fields on the southern part, in some places filled by tephra sand, two palagonite craters in the centre, each nestling the lava craters Surtur and Surtungur, and a sandy spit on the northern side, fringed by boulders that wave action has transported from the eroding lava fields. The island is sparsely vegetated for the most part, except for the gull colony on the south part where vegetation cover is dense (Fig. 1).

Figure 1. Surtsey and the main landmarks used in the text. Map by Bjarney Guðbjörnsdóttir, satellite image 5.5.2018, Maxar 2018.

Breeding birds

During the annual July visits since 2009, various information regarding the island's bird fauna has been collected by the participating biologists. General observations on presence - absence of known breeding species and regular visitors as well as anecdotes of new species for the island were recorded. The July visits cover partly monitoring suggestions a.), b.) and c.) (registration of some breeding birds, visitors and other incidental observations and recording of sea birds on sea) mentioned in the introduction. However, July is too late in the season for accurate breeding bird surveys of ground nesting land birds (passerines and waders) (Davíðsdóttir 2010). Species were only considered as breeding if nests with eggs or chicks were found, or behavioural indications were observed such as adult puffins carrying food into nest sites. During each expedition, rough estimates of individual gull species numbers and their distribution throughout the colony were also made. This information was collected from different sources such as field books and Pálsbær guest book.

In May 2025 (29.-31.), a breeding bird survey on ground nesting land birds (passerines and waders) was carried out by mapping territorial (singing or alarming) individuals all over the island as well a general assessment on breeding status of various other species.

Gull colony

Since 2003, nests of gulls and fulmars have been counted annually in mid-July within a 1,000 m² circular area around permanent monitoring plots in the gull colony. The counts were carried out at the same time as the vegetation surveys. Only nests showing signs of use earlier in the summer were recorded. The gull species seen within the gull colony included great black-backed gull (*Larus marinus*), lesser black-backed gull (*Larus fuscus*), herring gull (*Larus argentatus*) and glaucous gull (*Larus hyperboreus*). The chicks of these species have generally left the nests by the time the counts were made, and nests

were therefore not differentiated between individual gull species, but nest bowls were still visible. Northern fulmar (*Fulmarus glacialis)* nests were counted separately from gull species as fulmars were either incubating, or chicks recently hatched and remained in the nests in mid-July. Over time, as the gull colony has expanded, more permanent monitoring plots on the southern part of the island and on the NNE spit have been added to the survey. Those results have been published in several papers, most recently in Magnússon *et. al.* (2023).

Evening counts of gulls present in the colony on the southern part of the island were performed from a fixed location south of the crater Surtur (Fig. 1), situated above the colony, during July visits in 2011 to 2016, 2023 and in May 2025. There are no counts available for the period 2017 to 2020 due to unfavourable weather conditions. Those are total counts of adult gulls (identified per species) present and visible in the colony late in the evening when human disturbance is minimal during research expeditions and the likelihood of birds being absent foraging is assumed to be less than during daytime (Conover & Miller 1980, Enners *et. al.* 2018). This is comparable to the method described in Petersen (2009) with the observer having a minimum impact on reactivity in the colony. The visibility of different gull species varies depending on the habitat and as the colony has expanded further east into rougher lava terrain it has become more difficult to observe both birds and nests.

To test for correlation between the number of gull nests found in the colony on the monitoring plots and the evening counts, a pearson correlation analysis was performed

One aerial survey was conducted on 10 June 2023 when the gull colony was photographed in order to generate more accurate numbers of breeding gull pairs. Seven transects were flown on a Partenavia P-68 Observer (TF-BMW), and vertical photographs were taken through a floor hatch at an altitude of 600 to 700 feet (189 m). Two Canon 5D SR (50.6 MP) cameras were used — one equipped with a fixed 50 mm Zeiss lens (Planar f/1.4), and the other with a Canon zoom lens (24–105 mm, f/4L) set at a 24 mm focal length. Both cameras were manually focused to infinity, with the setting secured using tape. A fixed shutter speed of 1/4000 was used, and the ISO was set to 800. The cameras were synchronized with an interval timer, capturing one image per second while flying over the colony. Photographs were later merged into seven transects, numbered 0–6. From the combined transect images, gull species were identified (great black-backed gull, lesser black-backed gull and herring gull and possibly glaucous gull), breeding status assessed (individuals or pairs evidently lying on nests / standing next to obvious nest bowls or chicks), and number of breeding units / pairs counted.

Other information

A special effort was made in July 2009 to find both of the Icelandic petrel species, storm petrel (*Hydrobates pelagicus*) and Leach's petrel (*Oceanodroma leucorhoa*). Staff from the South Iceland Nature Research Centre took part in the July-expedition and specifically investigated whether European storm-petrels and Leach's storm-petrels had colonized Surtsey, as these species are found on several of the Vestmannaeyjar islands. These birds are elusive and are mainly active at night. The team visited likely nesting sites and played recordings of their calls

In context with this article, available data from GPS-tagged birds from Iceland were also analysed to detect rare or undocumented species for Surtsey.

Table 1. Bird species seen on or around Surtsey 1963 – 2025. Species that have bred are marked with *, new breeding species since 2008 marked with **, new species overall to the island marked with ***. Note consistency of recordings differs between years and expeditions depending on individual scientists involved in each annual July visit.

English name	Latin name
Red-throated diver	*Gavia stellata*
Great Northern diver	*Gavia immer*
Northern fulmar*	*Fulmarus glacialis glacialis*
Manx shearwater	*Puffinus puffinus*
Storm petrel	*Hydrobates pelagicus*
Leach's petrel	*Oceanodroma leucorhoa leucorhoa*
Northern gannet	*Sula bassana*
Great cormorant	*Phalacrocorax carbo carbo*
European shag	*Phalacrocorax aristotelis aristotelis*
Squacco heron	*Ardeola ralloides*
Grey heron	*Ardea cinerea*
Whooper swan	*Cygnus cygnus*

Pink-footed goose	*Anser brachyrhynchus*
Greylag goose*	*Anser anser anser*
Barnacle goose	*Branta leucopsis*
Brent goose	*Branta bernicla hrota*
Canada goose***	*Branta canadensis*
European widgeon	*Anas penelope*
European teal	*Anas crecca crecca*
Mallard	*Anas platyrhynchos platyrhynchos*
Tufted duck	*Aythya fuligula*
Common eider**	*Somateria mollissima borealis*
King eider	*Somateria spectabilis*
Harlequin duck	*Histrionicus histrionicus*
Long-tailed duck	*Clangula hyemalis*
Common scoter	*Melanitta nigra*
Red-breasted merganser	*Mergus serrator*
Merlin	*Falco columbarius subaesalon*
Gyrfalcon	*Falco rusticolus*
White-tailed eagle***	*Haliaeetus albicilla*
Corncrake	*Crex crex*
Eurasian oystercatcher	*Haematopus ostralegus ostralegus*
Ringed plover**	*Charadrius hiaticula hiaticula*
Golden plover **	*Pluvialis apricaria altifrons*
Knot	*Calidris canutus islandica*
Sanderling	*Calidris alba*
Purple sandpiper	*Calidris maritima littoralis*
Dunlin	*Calidris alpina schinzii*
Common snipe	*Gallinago gallinago faeroeensis*
Eurasian Whimbrel	*Numenius phaeopus islandicus*
Redshank	*Tringa totanus robusta*
Turnstone	*Arenaria interpres interpres*
Red-necked phalarope	*Phalaropus lobatus*
Grey phalarope	*Phalaropus fulicarius*
Arctic skua	*Stercorarius parasiticus*
Great skua	*Stercorarius skua*
Little gull	*Larus minutus*
Black-headed gull	*Larus ridibundus*
Common gull	*Larus canus canus*
Lesser black-backed gull*	*Larus fuscus graellsii*
Herring gull*	*Larus argentatus argentatus*
Iceland gull	*Larus glaucoides*
Glaucous gull*	*Larus hyperboreus leuceretes*
Great black-backed gull*	*Larus marinus*
Kittiwake*	*Rissa tridactyla tridactyla*
Arctic tern*	*Sterna paradisaea*
Common tern	*Sterna hirundo*
Common guillemot	*Uria aalge aalge*
Brünnich´s guillemot	*Uria lomvia lomvia*
Razorbill	*Alca torda islandica*
Black guillemot*	*Cepphus grylle islandicus*
Little auk	*Alle alle*
Atlantic puffin*	*Fratercula arctica*
Turtle dove	*Streptopelia turtur*
Domestic (razing?) pigeon	*Columba livia domestica*
Long-eared owl	*Asio otus*
Short-eared owl	*Asio flammeus flammeus*
Sky lark	*Alauda arvensis*
Swallow	*Hirundo rustica*
Meadow pipit*	*Anthus pratensis pratensis*
Rock pipit	*Anthus spinoletta*
White wagtail*	*Motacilla alba alba*
European robin	*Erithacus rubecula*
Redstart	*Phoenicurus phoenicurus*
Wheatear	*Oenanthe oenanthe leucorhoa*
Ring ouzel	*Turdus torquatus*
European blackbird	*Turdus merula merula*
Fieldfare	*Turdus pilaris*
Song thrush	*Turdus philomelos*
European redwing	*Turdus iliacus coburni*
Garden warbler	*Sylvia borin*
Chiffchaff	*Phylloscopus collybita*
Willow warbler	*Phylloscopus trochilus*
Jackdaw	*Corvus monedula*
Raven*	*Corvus corax varius*
Starling	*Sturnus vulgaris vulgaris*
Chaffinch	*Fringilla coelebs*
Brambling	*Fringilla montifringilla*
Redpoll	*Acanthis flammea islandica*
Crossbill	*Loxia curvirostra*
Lapland bunting	*Calcarius lapponicus*
Snow bunting*	*Plectrophenax nivalis insulae*
Northern oriole	*Icterus galbula*
Common swift***	*Apus apus*
White-winged crossbill***	*Loxia leucoptera*

RESULTS AND DISCUSSION

The total species list

By 2025, a total of 95 bird species has been recorded for Surtsey, on the island itself and close by offshore (Table 1). Out of those, 59 are regular breeders in Iceland, 24 vagrants and the rest are migrants and winter visitors. Only four new species have been found on Surtsey since 2008, three vagrants, common swift (*Apus apus*) in 2013, white-winged crossbill (*Loxia leucoptera*) in 2021 and Canada goose (*Branta canadensis*) in 2025, and one Icelandic breeder, white-tailed eagle (*Haliaeetus albicilla*) in 2023.

Table 2. Breeding species in Surtsey and Icelandic breeding birds that are regular visitors or prospect breeders on and close to Surtsey. Species recorded are marked as white 1, species with breeding confirmed are marked as grey 1, species with only evidence of presence are marked white x, breeding not confirmed is marked grey ?, presence not confirmed marked white ?.

	Northern fulmar	Northern Gannet	Great cormorant	Greylag goose	Common eider	Eurasian oystercatcher	Ringed plover	Golden plover	Purple sandpiper	Redshank	Turnstone	Red-necked phalarope	Great skua	Lesser black-backed gull	Herring gull	Glaucous gull	Great black-backed gull	Kittiwake	Arctic tern	Black guillemot	Atlantic puffin	Meadow pipit	White wagtail	Wheatear	European redwing	Raven	Snow bunting	Recorded	Breeding
1969	1		1																		1				1	1	5	0
1970	1																			1	1						3	2
1971	1																			1							2	2
1972	1																			1	1						3	2
1973	1																			1							2	2
1974	1																1			1							3	3
1975	1																1	1	1	1							5	5
1976	1	1									1	1	1				1	1	1	1			1	1		1		12	4
1977	1											1					1	1	1	1			1			1		8	4
1978	1	1															1	1	1	1	1							7	4
1979	1																1	1		1								4	4
1980	1											1					1	1	1	1		1						7	4
1981	1														1		1	1		1								5	5
1982	1														1		1	1		1								5	5
1983	1														1		1	1		1								5	5
1984	1														1		1	1		1								5	5
1985	1													1	1		1	1		1								6	6
1986	1													1	1		1	1		1						1		7	6
1987	1													1	1		1	1		1								6	6
1988	1													1	1		1	1		1								6	6
1989	1													1	1		1	1		1								6	6
1990	1					1								1	1		1	1		1		1		1		1		10	6
1991	1													1	1		1	1		1						1		7	6
1992	1				1									1	1		1	1		1						1	1	9	6
1993	1													1	1	1	1	1		1						1		8	7
1994	1													1	1	1	1	1		1							1	8	7
1995	1					1	1							1	1	1	1	1		1			1		1			11	7
1996	1				1	1								1	1	1	1	1	1	1		1	1				1	13	8
1997	1													1	1	1	1	1		1							1	8	8
1998	1						1							1	1	1	1	1		1			1	1		1	1	12	8
1999	1													1	1	1	1	1		1		1		1		1	1	11	8
2000	1			1					1					1	1	1	1	1		1			1				1	11	8
2001	1			1					1					1	1	1	1	1		1	1		1				1	12	8
2002	1			1										1	1	1	1	1		1		1	1				1	11	11
2003	1			1										1	1	1	1	1		1	1	1	1	1		1	1	14	11
2004	1	1		1					1				1	1	1	1	1	1		1	1	1	1				1	15	12
2005	1	1		1	1		1		1					1	1	1	1	1		1	1	1					1	15	11
2006	1	1		1					1	1			1	1	1	1	1	1		1	1	1	1			1	1	17	12
2007	1						1							1	1	1	1	1		1	1	1	1	1		1	1	14	11
2008	1					1	1	1					1	1	1	1	1	1		1	1	1		1		1	1	16	11
2009	1			1	1	1		1		1			1	1	1	1	1	1		1	1	1	1			1	1	18	14
2010	1													1	1		1	1		1	?	1	1			1	1	10	11
2011	1													1	1		1	1		1	1	1	1			1	1	11	11
2012	1													1	1		1	1		1	1	1	1			1	1	11	11
2013	1				1	1			1					1	1	1	1	1		1	?	1	1			1	1	15	11

2014	1													1	1		1	1		1	1	1	1			1	1	11	11
2015	1				1									1	1		1	1		1	1	1	1			1	1	12	12
2016	1				1									1	1		1	?		1	?	1	1	1		1	1	13	10
2017	1	1			1			1	1				1	1	1		1	1	1	1	?	1	1	1		1	1	18	8
2018	1				1									1	1		1	?		1	?	1	1			1	1	12	9
2019	1				1			1	1		1			1	1		1	?		1	1	1	1			1	1	15	10
2020	1			x	1		1		1					1	1		1	?		1	1	1	1	1		1	1	15	10
2021	1		1	1			1							1	1		1	?		1	?	1	1			1	1	13	12
2022	1	1	1	1			1				1			1	1		1	?		1	?	1	1			1	1	16	10
2023	1	1	1	1	1			1	1			1		1	1	1	1	1		1	?	1	1	1	1	?	1	21	12
2024	1			x	1									1	1		1	1		1	1	1	1			1	1	12	10
2025	1	1		1	1		1		1					1	1		1	1		1	1	1	1			1	1	17	12
Total	**57**	**9**	**4**	**12**	**14**	**6**	**9**	**6**	**11**	**2**	**3**	**4**	**6**	**41**	**45**	**19**	**52**	**51**	**7**	**56**	**26**	**28**	**29**	**11**	**2**	**31**	**33**		
Years breeding	**56**	**0**	**0**	**10**	**4**	**0**	**1**	**2**	**0**	**0**	**0**	**0**	**0**	**41**	**45**	**17**	**52**	**42**	**1**	**56**	**16**	**23**	**22**	**0**	**0**	**18**	**30**		

Irregular or rare breeders

Three new breeding species have been recorded since 2008 for Surtsey and all of them have been irregular breeders since: Common eider (*Somateria mollissima*), golden plover (*Pluvialis apricaria)* and ringed plover (*Charadrius hiaticula*).

Common eider was first confirmed breeding in 2015 when a female with three chicks was found on the NNE spit (Fig. 2). For several years before that, common eiders were observed on and around the island, as well as after the first confirmed breeding (Table 2). In 2023, two nests with eider down were found on the NNE spit (Fig. 1) and one nest in 2024. In May 2025 a male eider held close to the spit during the whole expedition, and in July 2025, two eider nests with down were found on the NNE spit of the island. All three incidents are interpreted as breeding attempts here. An eider nest found with proper down means that the female had laid eggs inn it and can be interpreted as confirmed breeding (Þorvaldur Björnsson, pers. comm.), though breeding success remains unconfirmed, and eider males remain close to their mate while the female is incubating (Honza & Sládeček 2009).

Figure 2. Female common eider (*Somateria mollissima*) with its three chicks the first time breeding was confirmed for the species in Surtsey 2015. Photo: Erling Ólafsson

Golden plover was first confirmed breeding (nest found) in May 2009 and again in July 2025. Three observations were recorded in between, one of them in July 2019 when territorial behaviour (display flight) was observed but not interpreted further as this was judged as too late into the breeding season. Nonetheless golden plovers can be quite late breeders so this could possibly have been the second breeding attempt of three since 2009. There is only one breeding record for ringed plover (nest with eggs in July 2021) but there are several other records of the species being present in Surtsey (Table 2). Arctic tern (*Sterna paradisaea*) has not been found breeding since breeding attempts 1975 and 1978.

Other breeders

Greylag geese (*Anser anser)* were first found breeding in 2002 and have been confirmed breeding in small numbers (< 5 breeding pairs) in the gull colony 10 times since. In some years, only signs of geese activity on the island were found (Table 2). The geese have shown a high level of sensitivity to human disturbance during research expeditions. They have been expected to leave the island as soon as they are aware of human presence. However, during evening count above the gull colony in 2023, geese were found and are suspected to be

Figure 3. White wagtail (*Motacilla alba)* collecting insects as food for its offspring, an example of behavioural indication for breeding. Picture Erling Ólafsson.

hiding during daytime on inaccessible ledges on the edge of the colony. Since 2008, one raven pair (*Corvus corax*) has been breeding regularly in crater Surtungur (Fig. 1), or in a pit crater above a lava tube close by, in the western part of the island. Still, breeding could not be confirmed every year, when no recently used nests could be found, even with an adult pair along with juveniles being present during the expedition.

Three passerines breed on the island: Snow bunting (*Plectrophenax nivalis* in 1996), meadow pipit (*Anthus pratensis* in 2002*)* and white wagtail (*Motacilla alba* in 2002; Fig. 3), all consistent breeders since first breeding. In May 2025, 10 territorial meadow pipits, 3 territorial snow buntings and 7 territorial white wagtails were found. Their breeding distribution is largely unchanged from what was described in Petersen (2009), with meadow pipits breeding in the grassy gull colony and white wagtails and snow buntings breeding in the central and eastern part of the island from Pálsbær (Fig. 1) north towards the rocky shore.

Breeding seabirds

The first breeders on the island (1970) were northern fulmar and black guillemot (*Cepphus grylle*), which have been nesting there consistently ever since with no or little changes in distribution since the census in 2003 (Table 2). Fulmar nest counts on the monitoring plots within the gull colony showed a gradual increase with time, especially in recent years, although numbers fluctuate between years (Fig. 4). The fulmar colony in Surtsey is in some ways unusual since most of the birds do nest on level ground, not in the sheer cliffs of the island as is usually the case for other seabird colonies in Iceland. This can both be due to the fact that the sea-cliffs in Surtsey are constantly changing as the lava that makes up most of the cliffs is easily eroded by wave action. The lava fields on the island do however provide suitable nesting sites for the fulmar as it makes use of the diverse surface morphology to shield under. In addition, no land predators are present in Surtsey which may also affect the fulmar breeding distribution on the island. In May 2025 a dark morph, which predominantly resides in the Svalbard area (Flood & van Grouw 2015) was found at a nest site close to crater Surtur (Fig 1), but breeding could not be confirmed. The fulmar was sitting as on a nest but could also have been a prospector.

The Atlantic puffin (*Fratercula arctica*) was first confirmed as a breeding bird in 2004 and has been recorded present for most recent years (Table 2), but breeding has only been confirmed unregularly and as for northern fulmar and black guillemot no new census data are available since 2003. Kittiwakes (*Rissa tridactyla)* were last recorded breeding in 2015, and again in 2023, when birds on nests in the cliffs south of the gull colony were detected in aerial photographs taken in June 2023 (Table 2).

A special effort was made in July 2009 to find both of the Icelandic petrel species, storm petrel (*Hydrobates pelagicus*) and Leach's petrel

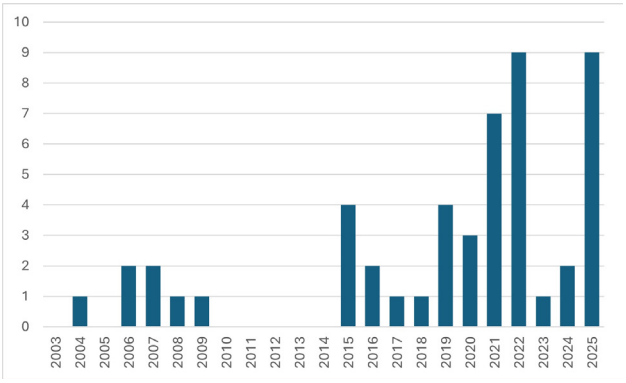

Figure 4. Numbers of northern fulmar (*Fulmarus glacialis*) nests in the vicinity of permanent monitoring plots within the gull colony on the south part of Surtsey during 2003-2025.

(*Oceanodroma leucorhoa*). No responses or other signs were detected, indicating that these species have not settled on Surtsey.

Gull colony

Species distribution in the gull colony has shifted since it was last censored in 2003. Today, great black-backed gulls nest in the centre and western part of the colony where vegetation cover is the densest. Lesser black-backed gulls nest predominantly in the eastern part of the colony and have been extending further east into the rough lava field with no or only sparse vegetation. Herring gulls nest primarily in the southern part of the colony closest to the cliffs. Just south of the automatic weather station (Fig 1) is the contact point of the three colony parts described.

When gull numbers in the colony were assessed in both in 1990 and 2003, breeding lesser blacked gulls were the most numerous. Since then, only rough estimates and evening counts from 2011 – 2016, 2023 and 2025 are available to evaluate any changes in numbers and species composition. Observational notes from the annual expeditions, as well as numbers from evening counts, indicate that great black-backed gull numbers have increased since 2003 (Table 3). Anecdotes from the excursion in 2010 first mentioned that great black-blacked gulls held higher numbers in the breeding colony than lesser black-backed gulls whose numbers had declined. However, the observed changes in numbers of lesser black-backed gull could also have been affected by the species gradually extending into lava habitat of rougher terrain and becoming less visible. Different visibility of the two species in their nesting habitats could therefore have masked possible changes in lesser black-backed gulls numbers. Great black-backed gulls (Fig. 6) are easily counted from the observation point while lesser black-backed gull numbers in cracks in the lava field are most certainly underestimated. Herring gull numbers from the 2003 census, observational notes recorded since then, and evening counts, all appear comparable and rather stable.

Glaucous gulls were recorded breeding up to 11 pairs in 2003, but only very low numbers have been recorded lately (Table 3). Mixed pairs of herring gulls and glaucous gulls have been documented on Surtsey, and hybridization of those species is common (Ingólfsson 1970, Vigfúsdóttir *et al.* 2008). With ongoing hybrid breeding, differentiation between herring gulls, glaucous gulls and hybrid individuals becomes increasingly more difficult. Several glaucous gulls were observed in the colony in 2023 identified from body size but could also possibly have been large hybrids. In 2025, only hybrids were observed.

Number of gull nests around monitoring plots in the gull colony was rather stable over the two last decades with annual numbers fluctuating between 20-50 nests. No correlation was found between total gull numbers from evening counts (Table 3) and numbers of gull nests in the colony around permanent plots (Fig. 5) (Pearson correlation: r=0.36, p=0.38).

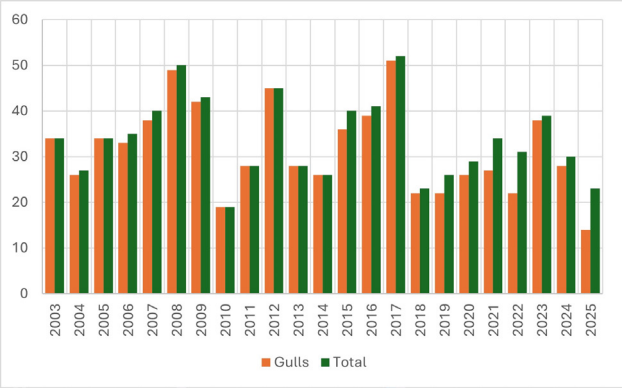

Figure 5. Number of gull nests around permanent monitoring plots in the gull colony on the south part of Surtsey.

Table 3. Gull numbers in Surtsey during evening counts in mid-July (2011–2023) and May 2025 (numbers in parentheses are breeding pairs detected in aerial photographs in May 2023).

	2011	**2012**	**2013**	**2014**	**2015**	**2016**	**2023**		**2025**
Great black-backed gull	162	112	180	180	262	268	200	(115)	167
Lesser black-backed gull	66	167	123	100	60	87	57	(127)	98
Herring gull	61	61	36	82	38	60	45	(52)	45
Glaucous gull	-	-	1	-	-	-	-	(2)	-
Total	**289**	**340**	**340**	**362**	**360**	**415**	**302**	**(296)**	**310**

Figure 6. Pair of great black-backed gulls (*Larus marinus)* easily detectable both in evening counts and on aerial pictures. Picture Erling Ólafsson

Individual gull species appeared to respond differently to aerial disturbance during the aerial survey. From pictures derived from the aerial survey great black-backed gull pairs or individuals by or on nests were easily detectable, no non-breeders were found on the photographs and were presumably flushed by the plane. In total, 115 nesting pairs/individuals were counted (Table 3). Nesting herring gulls were not as obvious as great black-backed gulls, but rather easily detectable, with few extra birds on photographs whose status was difficult to determine. From the photographs, hybrids could not be clearly differentiated from glaucous gulls but there was an obvious size variation in gulls identified as herring gulls. Overall, 52 nesting pairs/individuals of herring gulls were counted and 2 pairs of either glaucous gulls or very large hybrids (Table 3). Lesser black-backed gull pairs or individuals on nests were more challenging to identify from the aerial photographs as their nests are more difficult to distinguish in the breeding habitat and non-breeders appear not to be flushed as easily as the other species. The resulting estimate was 127 nesting pairs/individuals (Table 3). These numbers compared to the 2023 evening count (Table 3) indicate that great black-backed gulls are fairly well represented in the evening counts, but lesser black-backed gull numbers are highly underestimated. Herring gull numbers are both possibly underestimated in the evening counts and/or overestimated from the aerial photographs.

Visitors

Various Icelandic (breeding) birds are visitors to Surtsey. Some use the island as a stop-over site, such as purple sandpipers (*Calidris maritima*), which are recorded regularly along with other waders. Other species could be prospective breeders, such as wheatear (*Oenanthe oenanthe*) that has regularly been observed in July past breeding time, and great cormorant (*Phalacrocorax carbo*) that uses the island as a resting site (Table 2).

All Icelandic geese species except white-fronted goose have been recorded on Surtsey (greylag goose, pink-footed goose (*Anser brachyrhynchus*), barnacle goose (*Branta leucopsis*) and brent goose (*Branta bernicla*). In 2025, one pink-footed goose was recorded flying just past the gull colony and a pair of Canada geese was observed several times during the expedition, the first record of the species in Surtsey. It could not be determined which of the various subspecies those Canada geese were, but their size was approximately between barnacle and greylag goose size which rules out the largest subspecies and the cackling goose (*Branta hutchinsii;* the smallest of all subspecies, defined as a separate species today). Data from GPS tagged barnacle geese has shown that at least one individual stayed on the island for one day from 3.–4. of April 2023, during spring migration from Scotland to Iceland, before continuing to the South coast of Iceland and from there along the coastline to the breeding grounds in the Southeast (Natural Science Institute of Iceland, unpublished data).

A young GPS-tagged white-tailed eagle, hatched in 2023 in the Northern highlands of Iceland, stayed in Surtsey for some time according to data recorded from 2.–6. December 2023 (Natural Science Institute of Iceland, unpublished data). That was the bird's first journey leaving its parents' territory. Young eagles, from first calendar year leaving their parents territory until settling at a breeding site with sexual maturity at about 5-6 years, show this behaviour of travelling widely over the species breeding distribution area (Whitfield *et al* 2009). The bird's transmitter stopped sending data after 6. December when the bird was still located on Surtsey but neither the bird's remains, nor the transmitter, could be found in the following expedition in July 2024, and its fate entirely unknown.

Future prospects for bird life in Surtsey

Surtsey is the southernmost point of Iceland and therefore provides a key position for travelling and migrating birds. Multiple vagrants were recorded in the early years when ornithological expeditions were more frequent, as well as in annual biological expeditions since. Many Icelandic migrants have also been recorded, which has revealed a large range of species using the island as a stopover site.

The composition of breeding birds in Surtsey has changed little since 2008. All seabird species that bred in the island before 2008 remain as such and only a few new breeding species have been recorded since then. The development of both breeding seabird numbers and species composition is probably mainly controlled by food availability at sea and the erosion of their breeding habitat on the island. Limiting factors for other possible future breeding species, with Surtsey being a suitable habitat otherwise, are food and freshwater availability as discussed by Petersen (2009).

The number of breeding greylag geese pairs has the potential to increase but the human disturbance in annual July expeditions at a sensitive point during their breeding season could possibly be a limiting factor. Common eider, ringed plover and golden plover are now probably only irregular breeders, but their numbers could potentially increase.

Arctic terns might begin nesting again in Surtsey and Eurasian oystercatcher (*Haematopus ostralegus*) could also be mentioned as a prospective breeder. Wheatears have been recorded regularly without breeding confirmed and European redwings (*Turdus iliacus*) have been observed in July and could possibly colonize the island if the shrub species already present (Magnússon *et al.* 2023) disperse progressively.

Passerine species composition has changed since 2003 when snow buntings were dominant among passerine species, with 11 breeding pairs, 2 meadow pipit breeding pairs and one white wagtail breeding pair (Petersen 2009). This can be compared to the findings in May 2025, when 10 territorial meadow pipits, 3 territorial snow buntings and 7 territorial white wagtails were found. Although based on scant data, this can be interpreted to reflect both habitat changes on the island with more grassy habitat available in the gull colony for meadow pipits as well as a recent decrease in the Icelandic snow bunting population (Natural Science Institute of Iceland 2025).

Recommendations for future monitoring

Regular bird observations are essential to ensure a comprehensive coverage of the development of avian communities in Surtsey. From 2023 the aim has been to regularly (every 2-4 years) involve a scientist with an ornithological background in the annual July expeditions. On those occasions, if feasible, sailing around Surtsey upon arrival or departure to assess breeding seabirds in cliffs around the island is recommended. Breeding bird survey on ground nesting land birds (passerines and waders) at peak breeding season in May-June should be routinely conducted (every 5-10 years).

Since seagulls are an important driver of ecological change in Surtsey it is of high importance to monitor their numbers and distribution. For assessing numbers in the gull colony, regular evening counts in July (every 2-4 years) combined with aerial surveys (every 5 years) during early breeding season while the birds are lying on eggs or young chicks should be conducted. The option of performing evening counts in the colony from two different advantage points should be explored as well as including a count on the NNE spit.

Northern fulmars are long-living species, and it is of interest to monitor the nesting site where the dark morph was found to verify if the bird returns and if it turns out being a breeder rather than a prospector.

No bird ringing has been carried out since 2003. During the annual expeditions, many different aspects of research are conducted simultaneously in the gull colony, which means a near constant disturbance. Bird ringing, although it would provide useful information on e.g. foraging of seagulls, would increase disturbance substantially, as also mentioned by Petersen (2009), and is therefore not recommended during the annual July expeditions.

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