SEAPOP Short Report 1-2013

Key-site monitoring in Norway 2012, including Svalbard and Jan Mayen

Rob Barrett, Tycho Anker-Nilssen, Jan Ove Bustnes,
Signe Christensen-Dalsgaard, Sebastien Descamps,
Kjell-Einar Erikstad, Svein-Håkon Lorentsen,
Erlend Lorentzen, Hallvard Strøm, Geir H. Systad

NINA Norwegian Institute for Nature Research
NORSK POLARINSTITUTT
UNIVERSITETET I TROMSØ

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The 2012 breeding season was generally better on most SEAPOP key sites than in 2011, but still far from a good season. At Røst for example, none of the nine species whose numbers are monitored from year to year showed signs of increase between 2011 and 2012. The populations of many species dropped along the whole coast, and the breeding success of many species in many colonies was very poor (Table 1). No single species or colony had a comprehensively good season, and very few of the pelagic species had a good season anywhere. The results were a little better for coast-bound species, but here there was a large variation in success between species and colonies. Furthermore, many of the coastal species declined considerably in numbers in relation to 2011. A milestone for 2012 was the inclusion of Jan Mayen as an up-and-running key site for SEAPOP. After two years of mapping and establishment of monitoring plots, the first monitoring data were generated in 2012, with most effort being concentrated on the northern fulmar *Fulmarus glacialis*, common and Brünnich's guillemot *Uria aalge* and *U. lomvia*, great skua *Stercorarius skua* and the glaucous gull *Larus hyperboreus*.

Population changes

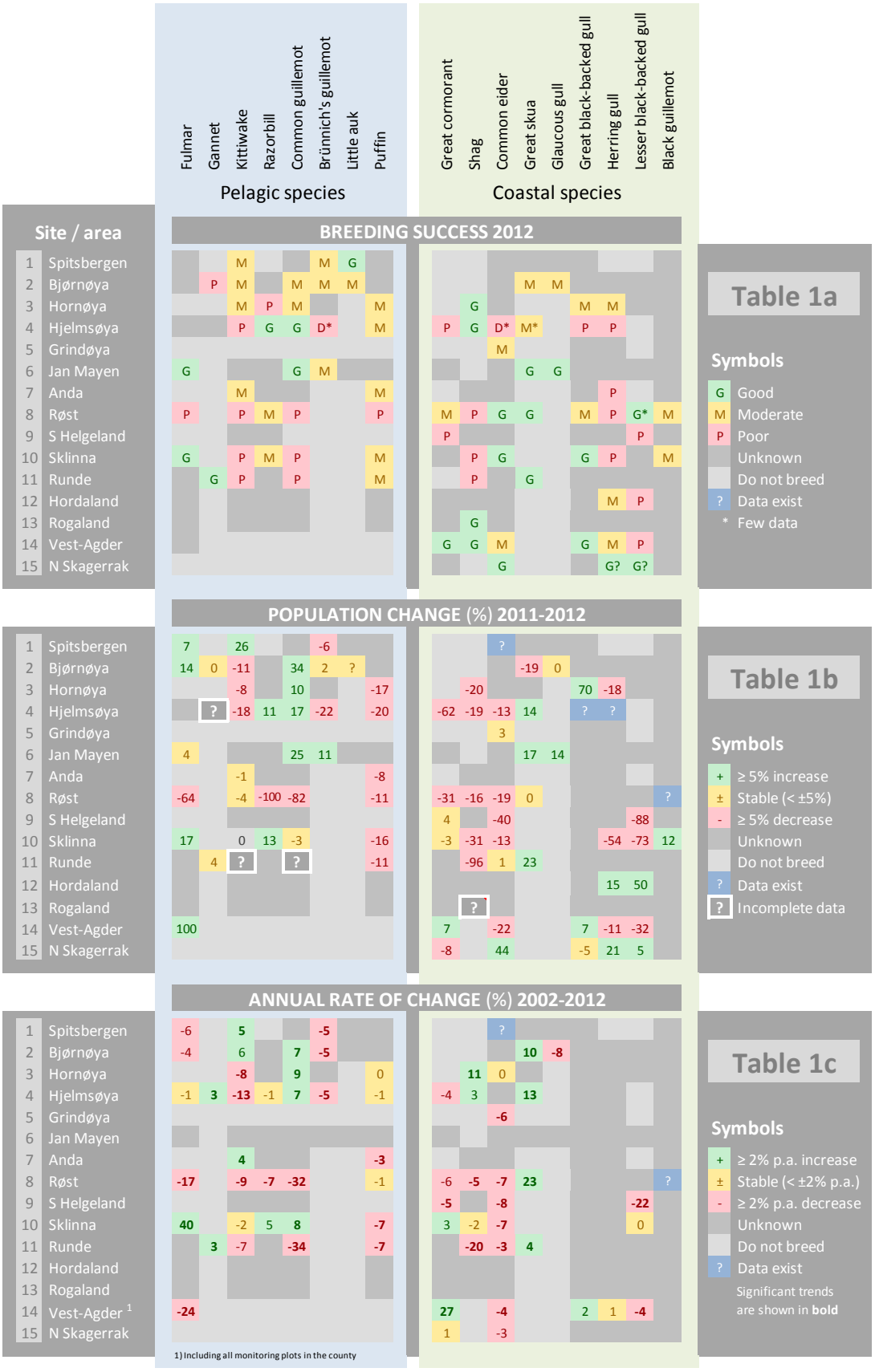
As in 2011, the **northern gannet** *Morus bassanus* attempted to breed on Bjørnøya in 2012, but no chicks were raised. At the most, six individuals were seen simultaneously, two fewer than in 2011. On Runde there was a slight increase (4%) in gannet numbers since 2011, and in Lofoten and Vesterålen the population continued to increase after a period (1990-2004) of decline.

Among the seabird species on the Norwegian Red List, there was little cause for much optimism after the 2012 monitoring counts. Only on Jan Mayen did most species increase in numbers from the previous year. On Spitsbergen, numbers of **black-legged kittiwakes** *Rissa tridactyla* increased in two colonies but declined in three others, while on Bear Island it declined by 19% compared to 2011. In all the mainland colonies numbers declined (by up to 18% on Hjelmsøya) since 2011. Nor was there any sign of a return of kittiwakes to Sklinna after the colony was abandoned in 2011. Overall, kittiwake populations continued their long-term declines at alarming rates of 7-13% p.a. over the last decade at four of the mainland key sites with numbers breeding on Vedøy, Røst hitting an all-time low of ca. 5100 pairs, while those on Anda, Bjørnøya and Spitsbergen are increasing at 4-6% p.a. (Table 1).

Numbers of **common guillemots** breeding on the four northernmost monitoring sites increased by 10-34% from 2011, and the three Barents Sea colonies have all grown at a rate of 7-8% p.a. since 2002. Farther south the trend is totally different, with a mean annual loss of about one third of the population breeding on open ledges at Røst and Runde throughout the last decade. Those breeding in shelter are clearly doing much better, but their numbers are not easily quantified. These once large colonies still remain in a very serious state. Numbers of **Brünnich's guillemots** increased 11%

Table 1

Schematic summary of breeding success (1a) and change in breeding numbers (1b) for focal seabird species at the regular SEAPOP monitoring sites in 2012, and their mean population trend over the last ten years (1c).



After six consecutive years of total breeding failures and an all-time low in breeding numbers, the outlook for the puffin population in Røst is an increasing cause for concern. (© Tycho Anker-Nilssen)

from 2011 on Jan Mayen, but decreased 9% in Spitsbergen and were pretty stable on Bjørnøya. The longer-term trend in Svalbard is negative with a decrease of about 5% annually over the last decade.

For **puffin** *Fratercula arctica* numbers, 2012 was a catastrophic year with declines of 8-20% at all six key sites, from Runde in the south to Hornøya in the northeast. Never have fewer puffins bred on Røst with only 349 000 pairs in 2012, or 25% of the 1979 population. The long-term trends are equally dismal on other colonies with more-or-less stable numbers on Hornøya and Gjesvær (denoted as Hjelmsøya in Tab. 1) and declines of 3-7% p.a. on Anda, Sklinna and Runde. At both Hornøya and Hjelmsøya, this seems to be a culmination of an earlier 10-20 year increase in numbers recorded until soon after the turn of the century.

After a 10% decline between 2010 and 2011, numbers of **razorbills** *Alca torda* monitored on Hjelmsøya returned to 2010 levels in 2012, while the colony on Sklinna also recovered a little (13%) after a 49% decline in 2010-2011. At Røst razorbills failed completely with a 100% decline (i.e. no birds present) on open ledges. Again, birds breeding in shelter fared much better and even raised young to nest departure.

Among the coast-bound species, counts in 2012 revealed large declines among many species in many colonies. Worst were the large declines (16-96%) in **shag** *Phalacrocorax aristotelis* numbers in all the colonies monitored between Hornøya and Runde and similar (13-40%) declines in **eider** *Somateria mollissima* numbers at most sites between Hjelmsøya and Vest-Agder. The latter reinforced the long-term decline in eider numbers (3-8%) along the whole coast except in the northeast. Even if there was little change in eider numbers at Runde since 2011, it was there that the shag population collapsed by 96%. There were large declines in two of the northern **great cormorant** *Phalacrocorax carbo carbo* colonies (62% on Hjelmsøya and 31% on Røst) and a smaller one (8%) in the population

of ssp. *sinensis* at Øra on the northern Skagerrak coast, while numbers of ssp. *carbo* in Central Norway appeared more stable.

With the exception of the colonies monitored in Hordaland and northern Skagerrak where increases since 2011 were documented, population trends in the few colonies of **herring gulls** *Larus argentatus* and **lesser black-backed gulls** *L. fuscus* that are monitored along the coast were inconsistent, with increases since 2011 documented in Hordaland and northern Skagerrak and decreases in most other areas. In the north, numbers of **great black-backed gulls** *L. marinus* and **glaucous gulls** either increased or remained stable (Table 1). Despite a 19% decline in numbers on Bjørnøya between 2011 and 2012, the **great skua** has continued to spread and increase in numbers throughout the SEAPOP region since its establishment as a breeding species in Norway in 1975 (at rates of 4-23% p.a. at four key sites).

Breeding success

Among the pelagic species, the **kittiwake** had a moderate to poor season on all the key sites, being slightly better in the north than the south (Table 1). On Hornøya they produced only 0.4 chicks/nest, on Hjelmsøya 0.1, Anda 0.5, Røst none (for the 6th season in a row) and Runde 0.02 chicks/nest. In most of the colonies, the low success was a result of inadequate food supplies and/or heavy predation of eggs and chicks by white-tailed eagles *Haliaeetus albicilla*, crows, ravens and gulls. As in 2011, the colony at Sør-Gjæslingen near Sklinna, was abandoned early in the season due to harassment by crows and ravens. Predation by large gulls, this time glaucous gulls, was also evident on Spitsbergen where only 28% of the chicks survived the first 15 days at Grumantbyen. As in 2011, the kittiwakes on Bjørnøya produced 0.7 chicks/nest in 2012. Fulmars on Jan Mayen and the small colony on Sklinna (7 pairs in 2012) had a good season, while the population at Røst, which is ranked as the second largest on the mainland, failed again.

Kittiwakes did not reproduce well at any key sites in 2012, and their success was poorest at the sites along the Norwegian Sea coast. (© Tycho Anker-Nilssen)

Razorbills only had a good season at Hjelmsøya. Breeding success was moderate on Sklinna and Røst and poor on Hornøya (0.14 chicks/egg laid) where, as in 2011, there was heavy predation of eggs and chicks by gulls. **Common guillemots** had a moderate to good season on colonies in the Barents Sea, but failed totally on Røst and Runde. Breeding success on Sklinna was however moderate. Although no quantitative data could be collected on Hornøya due to harassment by white-tailed eagles causing a huge egg-loss (to scavenging gulls) and hence delayed breeding period in the monitoring site, the overall impression was that common guillemot breeding success was good in those parts of the colony not affected by eagles. On Bjørnøya and Jan Mayen, their breeding success was good (estimated to 0.71 chicks/nest), but on Jan Mayen this may be an overestimate due to the low sample size (n=14). Brünnich's guillemots also had a moderate breeding success in all three of the main monitoring sites for the species, but very poor in the remnant population on Hjelmsøya. **Puffins** had a moderate season along most of the coast, but for the 6th year running there was a total failure on Røst. On Runde, where no chicks were produced in 2011, the breeding success improved to at the least 0.4 chicks/burrow. As in 2011, only a quarter of the inspected burrows on Hornøya had chicks at the end of the 2012 season. On Sklinna, the breeding was delayed with hatching around the end of June/early July. There only half the eggs hatched, and by the end of the field season only 0.15 chicks/nest survived to 10 days of age. Similarly, on Anda breeding was late and chick mortality was high.

Shags *Phalacrocorax aristotelis* and **great cormorants** *P. carbo* are renowned for their variability, and 2012 was no exception with the success of both species ranging from failure to good. Many of the cormorant colonies of subspecies *carbo* in West Finnmark were abandoned early in the season whereas that on Røst had a moderate breeding success (1.3 chicks/nest). In Vest-Agder the subspecies *sinensis* had a successful season with 1.6 chicks/nest. In contrast to the cormorants, the shags in West Finnmark had a good season in 2012 but a poor one on Røst (0.4 chicks/nest). On Sklinna the shags produced < 1 chick fledged/nest while breeding failed completely on Runde due to a near abandonment of the colony early in the season.

Among the other coast-bound species, breeding success varied considerably among the colonies monitored**. Herring gulls** had a poor breeding success in four of the eight colonies, and moderate in three of the remaining, while **great black-backed gulls** fared from poor (on Hjelmsøya) to good at Sklinna and in Vest-Agder (Table 1a). While **lesser black-backed gulls** had a good season at Røst, breeding failed in South Helgeland, Hordaland and Vest-Agder. In keeping with the overall increase in numbers, **great skua** breeding success was moderate in the Barents Sea and good at all colonies in the Norwegian Sea, including Jan Mayen. Similarly, **glaucous gulls** did well on Jan Mayen but had moderate success on Bjørnøya.

APPENDIX – Key parameters from all key sites in 2012

Key to Tables A1-A13

Key population parameters (SE, n) of seabirds breeding on the key-sites indicated above each table. The start year of most data series are listed in Table 3.1.1 of Anker-Nilssen et al. (2008). Population change (expressed as percentage) is the numeric change in size of the breeding population registered between 2011 and 2012 on the basis of plot counts (p) or total censuses (t). In all cases the listed survival estimate was derived from the basic CJS model(s) that fitted the data set best (i.e. the one with the lowest AICc or QAICc value). If the analysis indicated survival varied between years the given estimate applies for the last estimable time step only (yrs=1), whereas it applies for the whole monitoring period indicated (yrs>1) if the analysis indicated a constant survival.

Ref.: Anker-Nilssen, T. (ed.), Barrett, R.T., Bustnes, J.O., Christensen-Dalsgaard, S., Erikstad, K.E., Fauchald, P., Lorentsen, S.-H., Steen, H., Strøm, H., Systad, G.H. & Tveraa, T. (2008) SEAPOP studies in the Barents and Norwegian Seas in 2007. **NINA Report 363**, 92 pp.

Table A1 *Key population parameters (SE, n) of seabirds on* ***Spitsbergen*** *in 2012.*

Species	***Colony***	**Population change**	**Annual adult survival** Period (yrs)	Estimate %	**Reproductive performance** Sampling unit	Estimate %
Fulmar	*Nøisdalen*	+ 7 [p]	*No data*		*No data*	
Kittiwake	*Ossian Sars*	+ 28 [p]	*No data*		*No data*	
	Grumantbyen	*No data*	2008-12 (4)	77.4 (3.1, 153)	Chicks >15d/nest [1]	27.7 (*n*=65)
	Fuglehuken	+ 11 [p]	*No data*		*No data*	
Brünnich's guillemot	*Ossian Sars*	− 2 [p]	2007-12 (5)	78.5 (8.6, 113)	Chicks >15d/egg	72.0 (*n*=50)
	Diabasodden	− 12 [t]	2005-12 (7)	90.5 (1.4, 399)	Chicks >15d/egg	45.9 (*n*=157)
	Fuglehuken	− 11 [p]	*No data*		*No data*	
Little auk	*Bjørndalen*	*No data*	*Result not yet available*		Chicks >15d/egg	86.2 (*n*=29)
	Feiringfjellet	*No data*	*Result not yet available*		*No data*	

1) *Nests with at least 1 chick surviving to 15 days of age.*

Table A2 *Key population parameters (SE, n) of seabirds on* ***Bjørnøya*** *in 2012.*

Species	**Population change** %	**Annual adult survival** Period (yrs)	Estimate %	**Reproductive performance** Sampling unit	Estimate
Fulmar	+ 14 [p]				
Gannet	0 [p 1]			Large chicks/nets	0.00 (0.00, 2)
Great skua	− 19 [p]	2005-2012 (7)	90.8 (2.9,178)	Large chicks/nest	0.50 (0.05, 38)
Glaucous gull	0 [p]	2009-2012 (3)	84.0 (2.9, 86)	Large chicks/nest	0.78 (0.05, 25)
Kittiwake	− 11 [p]	2004-2012 (8)	90.0 (1.8 ,311)	Large chicks/nest	0.70 (0.03, 389)
Common guillemot	+ 34 [p]	*Results not yet available*		Fledging success [2]	0.70 (0.07, 53)
Brünnich's guillemot	- 2 [p]	1988-2012 (4)	89.0 (1.2,341)	Fledging success [2]	0.60 (0.08, 40)
Little auk	[3]	2004-2011 (7)	82.6 (1.2, 749)	Fledging success	*No estimate*

1) *Six individuals recorded, two nests built;* ***2)*** *Measured at the age of 20 days;* ***3)*** *Pilot project data under analysis.*

Table A3 *Key population parameters (SE, n) of seabirds in* ***Hornøya*** *in 2012.*

Species	**Population change**	**Annual adult survival** Period (yrs)	Estimate%	**Reproductive performance** Sampling unit	Estimate
Shag	− 20 [p]	2004-2012 (8)	85.8 (2.1, 231)		
Herring gull	− 18 [p]	2006-2012 (6)	76.7 (4.4, 78)	Clutch size	2.57 (0.11,35)
				Fledging success [1]	0.74 (0.17,35)
Great black-backed gull	+ 41 [p]	2001-2012 (11)	83.1 (1.9, 192)	Clutch size	2.71 (0.08,31)
				Fledging success [1]	0.35 (0.15,31)
Kittiwake	− 8 [p]	2010-2011 (1)	79.8 (4.1, 1243)	Clutch size	1.61 (0.71, 263)
				Large chicks/nest	0.38 (0.01, 1477)
Common guillemot	+10 [p]	1988-2012 (24)	96.1 (0.5, 219)	Fledging success [1]	No estimate
Razorbill	no data	1995-2012 (17)	91.4 (0.9, 212)	Fledging success [1]	0.14 (0.04, 71)
Puffin	− 17 [p]	2010-2011 (1)	69.8 (5.8, 733)	Fledging success [1]	0.25 (0.05, 68)

1) *Medium-sized chicks/egg laid.*

Table A4 *Key population parameters (SE, n) of seabirds on* ***Hjelmsøya*** *in 2012.*

Species	**Population change** %	**Annual adult survival** Period (yrs)	Estimate %	**Reproductive performance** Sampling unit	Estimate
Great cormorant	− 62 [p]				
Shag	− 19 [p]			Clutch size	2.11 (0.09, 158)
				Large chicks/nest	1.66 (0.12, 82)
Common eider	− 13 [t]				
Great skua	+ 14 [t]			Clutch size	1.60 (0.24, 5)
				Large chicks/nest	1.33 (0.33, 3)
Common gull	+ 34 [t]			Clutch size	1.71 (0.19, 38)
Herring gull				Clutch size [1]	*Data exists*
				Fledging success	0.0 (*n*=37)
Great black-backed gull				Clutch size [1]	*Data exists*
				Fledging success	0.0 (*n*=54)
Kittiwake	− 18 [p]	2010-2011 (1)	0.78 (0.07, 264)	Clutch size	0.89 (0.90, 79*)*
				Large chicks/nest	0.11 (0.03, 102)
Common guillemot					
Open ledges (inds.)	− 29 [p]			Fledging success [2]	0.00 (no eggs laid)
Crevices (eggs)	+ 17 [p]	2004-2012 (9)	0.87 (0.02, 190)	Fledging success [2]	0.48 (*n=141*)
Brünnich's guillemot	− 22 [p]			Fledging success [2]	0.00 (no eggs laid)
Razorbill	− 10 [p]			Fledging success [2]	0.65 (*n=68*)
Puffin	+ 57 [p]	2004-2012 (6)	0.80 (0.03, 106)	Fledging success [2]	0.30 (*n=74*)

1) *Results not yet available;* ***2)*** *Medium-sized chicks/egg laid.*

Table A5 *Key population parameters (SE, n) of seabirds on* ***Jan Mayen*** *in 2012.*

Species	**Population change** %	**Annual adult survival** Period (yrs)	Estimate %	**Reproductive performance** Sampling unit	Estimate
Fulmar	+ 4 [p]			Chicks/nest [1]	0.64 (0.08, 33)
Common guillemot	+ 25 [p]	*No estimate yet possible* [2]		Breeding success [3]	0.71 (0.12, 14)
Brünnich's guillemot	+ 11 [p]	*No estimate yet possible* [2]		Breeding success [3]	0.38 (0.06, 61)
Great skua	+ 17 [p]			Large chicks/nest	1.32 (*n*=28)
Glaucous gull	+ 14 [p]			Large chicks/nest	1.20 (*n*=30)
Lesser black-backed gull	− 10 [p]			Large chicks/nest	0.00 (*n*=9)

1) *Recorded on the last day of fieldwork when most chicks were still small or medium sized;* ***2)*** *Colour-ringing of adults was initiated in 2011;* ***3)*** *Number of chicks ≥15 days of age divided by number of breeding pairs (n).*

Table A6 *Key population parameters (SE, n) of common eider on* ***Grindøya*** *in 2012.*

Species	**Population change** %	**Annual adult survival** Period (yrs)	Estimate %	**Reproductive performance** Sampling unit	Estimate
Common eider	+ 2.8 [t]	2010-11 (1)	66.8 (17.8, 1335)	Clutch size	4.33 (0.08, 123)

Table A7 *Key population parameters (SE, n) of seabirds at* ***Anda*** *in 2012.*

Species	**Population change** %	**Annual adult survival** Period (yrs)	Estimate	**Reproductive performance** Sampling unit	Estimate
Kittiwake	− 1.4 [p]	2010-11 (1)	85.4 (4.2, 344)	Large chicks/nest	0.47 (*n*=476) [1]
Puffin	− 8.4 [p]	2011-12 (1)	81.5 (8.8, 288) [2]	Fledging success	*No estimate*
Black guillemot	− 15.7 [t]				

1) *Value summarised for study plots 1-5, 6.2 and 8-10.1;* ***2)*** *Less effort was put into re-sighting of colour-ringed puffins in 2012 than in previous years. We therefore chose to present the result of the best model with a time-dependent recapture rate, although this was not the best fit model in terms of QAICc.*

Table A8 *Key population parameters (SE, n) of seabirds in* ***Røst*** *in 2012.*

Species	Population change %	Annual adult survival		Reproductive performance	
		Period (yrs)	Estimate %	Sampling unit	Estimate
Fulmar	− 64 [p]				
Cormorant	− 31 [t]			Clutch size [1,2]	2.81 (0.18, 31)
				Large chicks/nest [2]	1.26 (23) [3]
Shag	− 16 [p]	2010-11 (1)	91.5 (23.7, 429)	Clutch size [4,5]	2.04 (0.04, 312)
				Clutch size [2,5]	1.77 (0.05, 348)
				Large chicks/nest [2]	0.39 (0.18, 18) [6]
Common eider	− 19 [p]			Clutch size	3.66 (0.19, 29)
Great skua	0 [t 7]			Breeding success	1.60 (0.25, 5)
Common gull				Clutch size [4]	2.69 (0.11, 35)
Herring gull				Clutch size [4]	2.26 (0.21, 19)
Great black-backed gull				Clutch size [4]	2.08 (0.12, 50)
				Large chicks/nest [2]	1.17 (0.29,18)
Kittiwake *Vedøy*	− 4 [p 8]			Large chicks/nest [8]	0.00 (*n*=190)
Gjelfruvær [9]	+ 9 [t 9]			Large chicks/nest	0.16 (*n*=193)
Kårøy area	− 7 [t]	2011-12 (1)	76.3 (5.0, 244)	Clutch size/pair [10]	2.05 (0.05, 43)
				Large chicks/pair [10]	0.70 (0.11, 43)
				Large chicks/nest [11]	0.25 (*n*=587)
Arctic tern				*No quantitative data 2012* [12]	
Common guillemot	− 82 [p]	*No data 2012*		*No data 2012*	
Razorbill	− 100 [p]				
Puffin	− 11 [p]	2010-11 (1)	90.6 (3.5, 452)	Hatching success	0.00 (0.00, 45)
				Breeding success	0.00 (0.00, 45)
Black guillemot	*No data 2012*	1997-12 (15)	84.9 (1.7, 104)	Clutch size	1.85 (0.11, 20)
				Large chicks/clutch	1.25 (0.25, 8) [13]

1) *Minimum estimate on 18 June, when some clutches possibly were still incomplete and only one clutch (3%) had chicks;* ***2)*** *Including empty nests;* ***3)*** *Largest colony on 12 July, when all but one clutch (95%) had hatched and 28 (60%) of 47 chicks had reached ringing age. Provided all chicks fledged, maximum breeding success would be 2.04 (SE=0.26, n=23);* ***4)*** *Excluding empty nests;* ***5)*** *On 1 July; estimated by linear regression of mean values for seven different counts between 22 June and 21 July;* ***6)*** *Maximum breeding success calculated as in comment 3 above, was 0.83 (SE=0.20, n=18);* ***7)*** *Five breeding pairs in both 2011 and 2012;* ***8)*** *Based on total counts in study plots;* ***9)*** *Small cliff-breeding colony with 193 pairs in 2012 situated 9 km SW of Vedøy;* ***10)*** *On main buildings only (plot VIII);* ***11)*** *Based on total counts of entire colony on buildings;* ***12)*** *A colony of 80-100 birds established early July but disappeared within 2 weeks;* ***13)*** *Delayed breeding, probably because many nest sites were blocked or altered by a spring flood in stormy weather in December 2011.*

Table A9 *Key population parameters (SE, n) of lesser black-backed gull on* ***Sør-Helgeland*** *in 2012.*

Species	Population change %	Annual adult survival		Reproductive performance	
		Period (yrs)	Estimate %	Sampling unit	Estimate
Lesser black-backed gull	− 87 [t]	2005-2012 (7)	89.1 (1.5, 179)	Clutch size	2.3 (0.16, 20)
				Large chicks/nest	0.0 (*n*=26)

Table A10 *Key population parameters (SE, n) of seabirds on* ***Sklinna*** *in 2012.*

Species	Population change %	Annual adult survival		Reproductive performance	
		Period (yrs)	Estimate %	Sampling unit	Estimate
Fulmar	+ 16.7 [t]				
Great cormorant	− 2.6 [t]			Clutch size [1]	
Shag	− 30.9 [t]	2010-11 (1)	73.4 (5.54, 333)	Clutch size [2]	1.58 (0.05, 493)
				Hatching success/nest	0.42 (*n*=52)
				Clutch size hatching	0.79 (0.14, 52)
				Chicks ≥ 10d/nest	1.48 (*n*=21)
				Chicks ≥ 20d/nest	1.0 (*n*=7)
				Chicks ≥ 30d/nest	No data
Common eider	− 12.8 [t 3]			Clutch size	3.86 (0.20, n=23)
Herring gull[4]	− 53.7 [t]			Clutch size [5]	0.88 (0.22, 25)
				Clutch size [6]	1.83 (0.24, 12)
Great black-backed gull				Clutch size [7]	2.12 (0.34, 12)
Kittiwake *Sklinna*	− 0.0 [t 8]				
Sør-Gjæslingan	− 0.6 [t 9]	No estimate yet possible [10]		Large chicks/nest [9]	0.00 (*n*=517)
Common guillemot	− 2.8 [t]	2010-11 (1)	85.6 (4.91, 215)		
Razorbill	13.0 [t]				
Puffin	− 15.8 [p]	No estimate yet possible [11]		Hatching success/nest	0.51 (*n*=41)
				Chicks ≥ 10d/nest	0.15 (*n*=41)
				Chicks ≥ 20d/nest	No data
Black guillemot	11.5 [p]	2008-12 (5)	87.8 (3.00, 58)		

1) *Not collected in 2012;* ***2)*** *Counted on 8 June; 3****)*** *Population counts from Hortavær, Leka municipality;* ***4)*** *Monitoring of adult survival discontinued in 2010;* ***5)*** *Including empty nests, counted 6 June;* ***6)*** *Not including empty nests, counted 6 June;* ***7****) Counted 6 June;* ***8)*** *No kittiwakes have been breeding on Sklinna since 2010;* ***9)*** *Numbers of breeding birds based on counts of pictures taken in mid-May;* ***10)*** *Colour ringing for monitoring of survival rates was initiated in 2011;* ***11)*** *Colour ringing for monitoring of survival rates was initiated in 2007 but no adults were re-sighted in 2008 and re-sighting rate was very low in 2009-2012 due to poor breeding success and very few birds attending the colony during the incubation period.*

Table A11 *Key population parameters (SE, n) of seabirds on* ***Runde*** *in 2012.*

Species	Population change %	Annual adult survival		Reproductive performance	
		Period (yrs)	Estimate %	Sampling unit	Estimate
Common eider	+ 0.7 [t]				
Gannet	+ 4.2 [t]				
Shag	− 96.0 [p]	No estimate yet possible [1]		Clutch size [2]	
Great skua	+ 22.6 [t]			Large chick/nest	0.85 (*n*=55)
Kittiwake *Runde*	No data [3]			Large chicks/nest	0.02 (*n*=557)
Sildegarnsholmen	+ 29.1 [t]	No estimate yet possible [4]		Large chicks/nest	0.82-0.92 (*n*=546) [5]
Common guillemot	No data [3]			Breeding success	Very low [6]
Puffin	− 11.4 [p]	2010-11 (1)	82.8 (1.5, 220)	Hatching success/nest	0.71 (*n*=48)
				Chicks ≥ 10d/nest	0.63 (*n*=48)
				Chicks ≥ 20d/nest	0.60 (*n*=48)
				Fledged chicks/nest[7]	0.42(*n*=48)

1) *Colour ringing for monitoring of survival rates was initiated in 2008;* ***2)*** *Not assessed due to collapse in breeding attempts during egg-laying;* ***3)*** *Not assessed due to collapse in breeding attempts before egg-laying;* ***4)*** *Colour ringing for monitoring of survival rates was initiated in 2011;* ***5)*** *An estimated 450-500 chicks were produced in the colony;* ***6)*** *Some chicks were seen or heard during the period of colony departure, but their numbers were impossible to quantify;* ***7)*** *Minimum estimate.*

Table A12 *Key population parameters (SE, n) of seabirds on the different localities in* ***Hordaland*** *in 2012.*

Species	**Population change** %	**Annual adult survival** Period (yrs)	Estimate %	**Reproductive performance** Sampling unit	Estimate
Lesser black-backed gull	+ 50.0 [t]	No estimate yet possible [1]		Clutch size [2]	2.05 (0.10, 118)
				Fledged chicks/nest	0.08 (*n*=118)
Herring gull	+ 15.4 [t]	No estimate yet possible [1]		Clutch size [2]	2.26 (0.05, 364)
				Fledged chicks/nest	0.77 (*n*=364)

1) *Colour ringing for monitoring of survival rates was initiated in 2009, still too few ringed birds re-sighted;* ***2) I****ncluding empty nests.*

Table A13 *Key population parameters (SE, n) of seabirds on the different sites in* ***Vest-Agder*** *in 2012.*

Species	**Population change** %	**Annual adult survival** Period (yrs)	Estimate %	**Reproductive performance** Sampling unit	Estimate
Cormorant	+ 6.8	No estimate yet possible [1]		Clutch size	2.29 (0.11, 252)
				Large chicks/nest	1.59 (*n*=252)
Common eider	− 21.8[2]			Clutch size	3.30 (0.14, 103)
				Small chicks on sea	0.54 (348)
				Large chicks on sea	0.47 (348)
Lesser black-backed gull					
Slettingene	− 3.1	2008-12 (4)	73.6 (4.5, 357) [3]	Clutch size [4]	2.32 (0.09, 99)
				Fledged juv./pair	0.40 (*n*=99)
Storøy	− 2.6	See estimate above		Clutch size [4]	1.81 (0.07, 229)
				Fledged juv./pair	0.16 (*n*=258)
Klovholmene	+ 7.2	See estimate above		Clutch size [4]	1.96 (0.10, 169)
				Fledged juv./pair	0.00 (*n*=178)
Rauna	− 38.1	2007-12 (5)	84.1 (2.8, 771)	Clutch size [4]	2.31 (0.18, 26)
				Fledged juv./pair	0.66 (*n*=1670)
Herring gull					
Slettingene	+ 20.8	2008-12 (4)	68.7 (9.5, 207) [3]	Clutch size [4]	1.56 (0.18, 62)
				Fledged juv./pair	0.94 (*n*=64)
Storøy	+ 15.8	See estimate above		Clutch size [4]	2.22 (0.09, 95)
				Fledged juv./pair	0.55 (*n*=110)
Klovholmene	− 22.6	See estimate above		Clutch size [4]	2.71 (0.10, 41)
				Fledged juv./pair	0.17 (*n*=41)
Rauna	− 13.9	2007-12 (5)	87.9 (3.9, 98)	Clutch size [4]	2.77 (0.09, 22)
				Fledged juv./pair	0.52(*n*=310)

1) *Colour-ringing of chicks for later monitoring of survival rates was initiated in 2008;* ***2)*** *based on counts of adult male in Farsund municipality;* ***3)*** *Applies as an estimate for Slettingene, Storøy and Klovholmane (the Mandal colonies);* ***4)*** *Empty nests included.*

Cover photo:
Counting a monitoring plot of Brünnich's guillemots in Glupen on Bjørnøya, Svalbard. (© Hallvard Strøm)

Author contact information

R. Barrett, rob.barrett@uit.no, Tromsø University Museum, NO-9037 Tromsø

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Series editors
Tycho Anker-Nilssen, tycho@nina.no
Robert T. Barrett, rob.barrett@uit.no