The status of breeding seabirds on the Isle of Tiree, Argyll, 2004–13

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Abstract
Annual monitoring of breeding seabirds on the Isle of Tiree 2004–13 revealed significant declines in the numbers of Northern Fulmar *Fulmarus glacialis*, Common Guillemot *Uria aalge*, Razorbill *Alca torda* and Black-legged Kittiwake *Rissa tridactyla* at the main seabird colony of Ceann a' Mhara. Numbers of Herring Gull *Larus argentatus* and Lesser Black-backed Gull *L. fuscus* also declined significantly across the island over the same period, whilst numbers of Common Gull *L. canus* increased significantly. Most other breeding seabirds including European Shag *Phalacrocorax aristotelis*, Black Guillemot *Cepphus grylle*, Little Tern *Sternula albifrons*, Arctic Tern *Sterna paradisaea* and Black-headed Gull *Croicocephalus ridibundus* remained stable or showed non-significant declines. Breeding was confirmed for the first time on Tiree by single pairs of Great Skua *Stercorarius skua* and Atlantic Puffin *Fratercula arctica*. Annual estimates of breeding success were recorded for six species. There were complete breeding failures of Black-legged Kittiwake in 2007–08, Arctic Tern in 2004–05 and Little Tern in 2006, although all three species had higher breeding success in 2009–13.

Introduction

The island of Tiree (56°30'N 6°54'W) in Argyll and Bute, the westernmost of the Inner Hebrides, is flat, low lying and roughly 20 km long and 5 km wide, and has long been known for its important bird populations (Bowler & Hunter 2007). Coastal habitats include small rocky islets, extensive sandy bays, low rocky shores and higher cliffs on the western and southern coasts. Shell-sand rich machair fringes the coast, with areas of in-bye grassland wedged between this and the low grazed wet heathland in the centre of the island, all interspersed by extensive areas of freshwater marsh, pools and larger lochs. The island remains free of North American Mink *Mustela vison*, ferrets *M. putorius furo* and Red Foxes *Vulpes vulpes* and despite the presence of a recently introduced population of European Hedgehogs *Erinaceus europaeus* and a large population of Brown Rats *Rattus norvegicus*, it supports a varied assemblage of breeding seabirds: over 6,000 pairs of 14 species in 1999 in the Seabird 2000 census which are important in a regional context (Mitchell *et al*. 2004; ap Rheinallt *et al*. 2007). All of the Black-legged Kittiwakes *Rissa tridactyla*, Common Guillemots *Uria aalge*, Razorbills *Alca torda* and European Shags *Phalacrocorax aristotelis*, and the great majority of the island's Northern Fulmars *Fulmarus glacialis* and Black Guillemots *Cepphus grylle*, nest on 60 m high cliffs of the headland at Ceann a' Mhara (Figure 1), whilst the gulls and terns nest at scattered inland and coastal colonies around the island (Broad &

Cadbury 1989; Figure 1). Seabird breeding success was believed to have been generally good on the island between 1985 and 2001, but mass breeding failures were first noted amongst Arctic Terns *Sterna paradisaea* and Black-legged Kittiwakes in 2002–03. An unprecedented influx to the island's lochs of some 3,000 adults of the latter species on 25 June 2002, presumably also involved failed breeders from elsewhere (Bowler & Hunter 2007). These events stimulated more systematic annual monitoring thereafter.

Methods

Being additional to the author's work-plan, much of this monitoring was conducted *ad hoc* during other work or out-with work hours and time constraints meant methods employed did not always follow the Seabird Monitoring Handbook (Walsh *et al*. 1995) and were of necessity lower-input than might otherwise have been desirable. All counts were carried out under favourable weather conditions: wind less than Beaufort Force 4, not during heavy or continuous rain and with good visibility throughout.

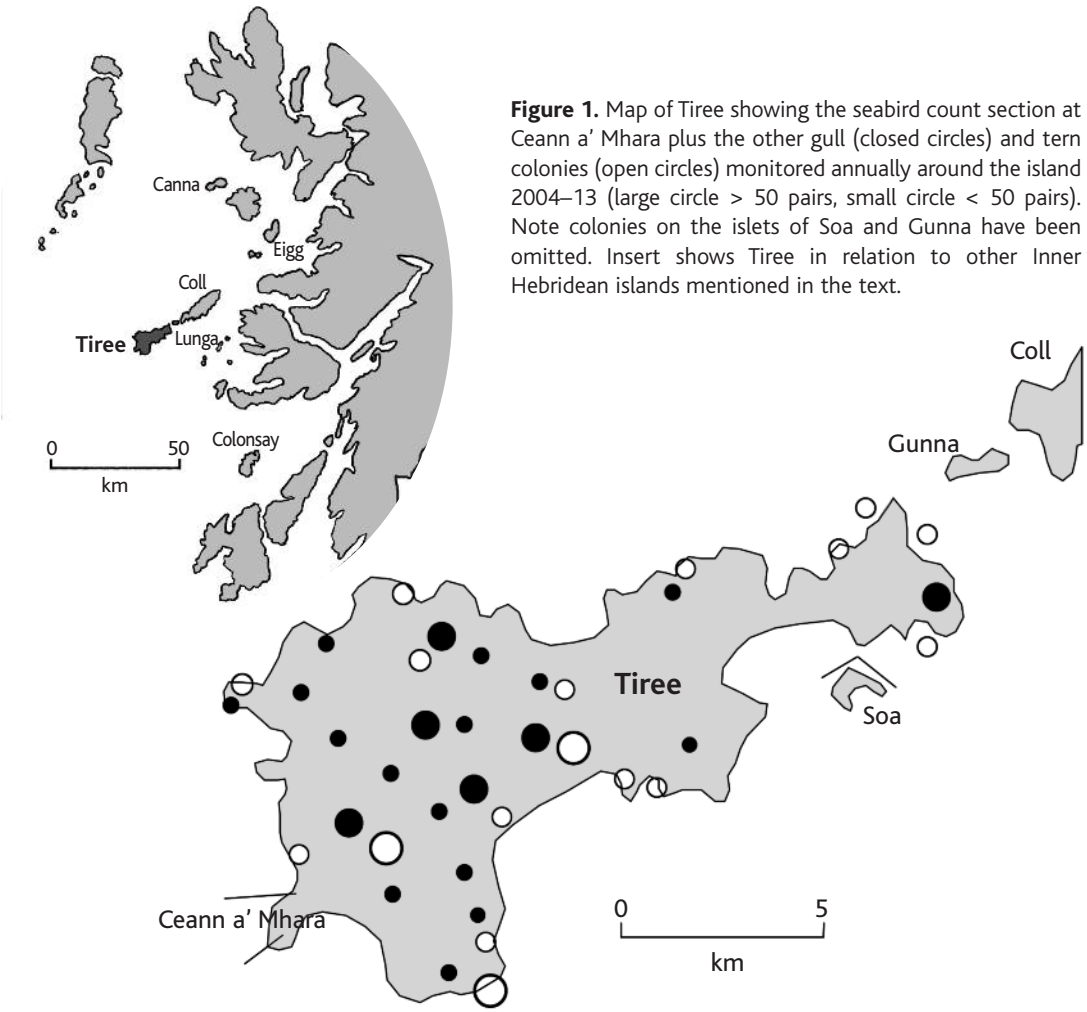


Figure 1. Map of Tiree showing the seabird count section at Ceann a' Mhara plus the other gull (closed circles) and tern colonies (open circles) monitored annually around the island 2004–13 (large circle > 50 pairs, small circle < 50 pairs). Note colonies on the islets of Soa and Gunna have been omitted. Insert shows Tiree in relation to other Inner Hebridean islands mentioned in the text.

Cliff-nesting species at Ceann a' Mhara: Each year a single dawn visit was made during 5–20 April to count adult **Black Guillemot** individuals (IND) displaying on the sea immediately below the nesting cliffs. Thereafter, 3–5 visits were made each year between mid May and early August, when the same sections of cliff were scanned with binoculars and a telescope from the same vantage points and the number of birds present in each section was recorded. Although it was not possible to see all of the seabird nests safely from these locations, it was known from earlier boat surveys that the number of these hidden nests represented only a small percentage (< 5%) of the total. For **Northern Fulmar**, the count unit was the apparently occupied site (AOS) and the June count is given (mean ± SD if two counts were made in June). The number of chicks present on the last visit each year (date range 12 July to 4 August) was divided by the June count of AOS to derive an estimate of breeding success. For **European Shag**, the maximum count of apparently occupied nests (AON) is given. The number of remaining AON and size of visible broods of large feathered young close to fledging was recorded on each visit in June–August and in years with protracted breeding seasons, a mean was taken of these to calculate the number of chicks that fledged. This number was divided by the peak nest count to derive a measure of breeding success. This may over-estimate breeding success for this species, as it may exclude nests which failed during the long fledgling period. However, observed nest failure rates seemed low compared to other species; for example the numbers of AONs recorded in early and late June of the same year were exactly the same in both 2009 and 2010. For **Black-legged Kittiwake**, the maximum count of AON is given and the number of chicks present on the last visit prior to fledging was divided by this maximum count of AON to derive a measure of breeding success. For **Common Guillemot** and **Razorbill**, the number of individuals (IND) present on breeding ledges and the cliff face generally was recorded, and the mean ± SD of counts conducted between mid May and late June is given. The number of Common Guillemot chicks remaining on the last count prior to fledging was taken as an annual measure of breeding success. It was not possible to estimate breeding success for Razorbills, as most chicks were hidden in crevices.

Counts of the gull and tern breeding colonies were conducted monthly around the island, visiting all sites for each species over one day. The tidal islet of Soa (Figure 1), which has small colonies of the larger gulls (< 30 pairs in recent years), plus Arctic Terns (< 20 pairs) in some years, was not counted every year and the results from this site have therefore been excluded from analysis. Similarly, counts of Great Black-backed Gulls *Larus marinus* were not considered complete in some years, on account of nesting birds switching between several more remote areas of heathland, and therefore this species is not considered here. Little Terns *Sternula albifrons* were counted under a Schedule 1 license. Time did not permit determination of breeding success at the scattered gull colonies but all tern colonies were checked weekly in order to record the number of fledglings each year.

Count data were not normally distributed and therefore non-parametric tests (Spearman's rank correlations) were used throughout.

Results

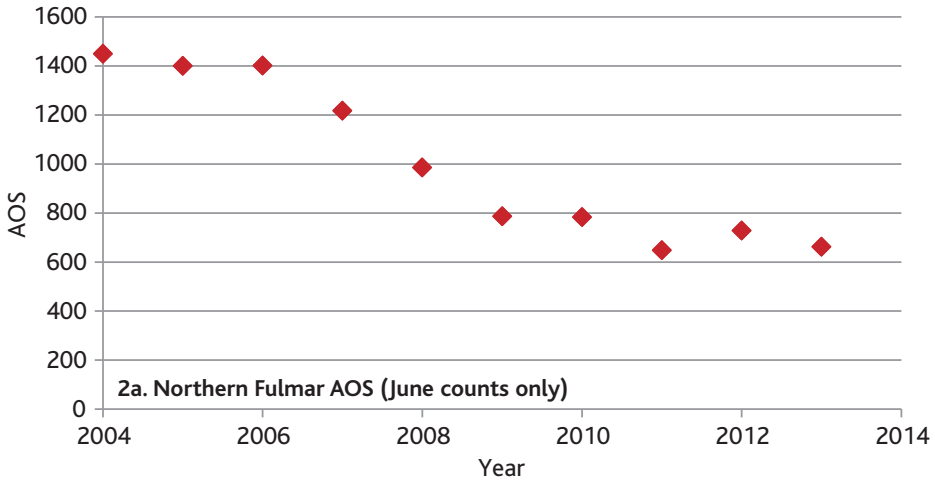
Northern Fulmar: June counts of AOS generally varied little within years except in 2009, when numbers dropped by 175 (20%) between 12 June and 28 June. Mean June numbers declined significantly over the study period, by 54% (r_s = -0.955, n = 10, P < 0.01; Table 1, Figure 2a). Estimated breeding success on the other hand increased significantly over the study period (r_s = 0.782, n = 10, P < 0.05), with the actual number of chicks counted in 2011–13 (323, 289, 458) being higher than in 2004–06 (305, 254, 294), despite the June counts of AOS having halved.

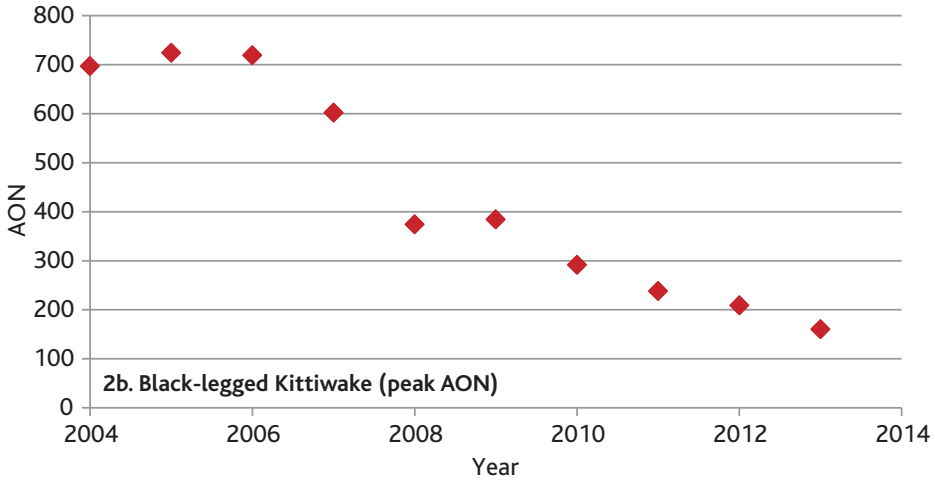
European Shag: With the exception of 2006 (57 AON), the maximum count of AON ranged between 85 (2011) and 129 (2008), with no significant trend (r_s = 0.061, n = 10, n.s.; Table 1). Breeding success was generally high, with counts of 1.36–2.40 young per AON in all years except 2006 (0.61), but with no significant trend over the period (r_s = 0.103, n = 10, n.s.).

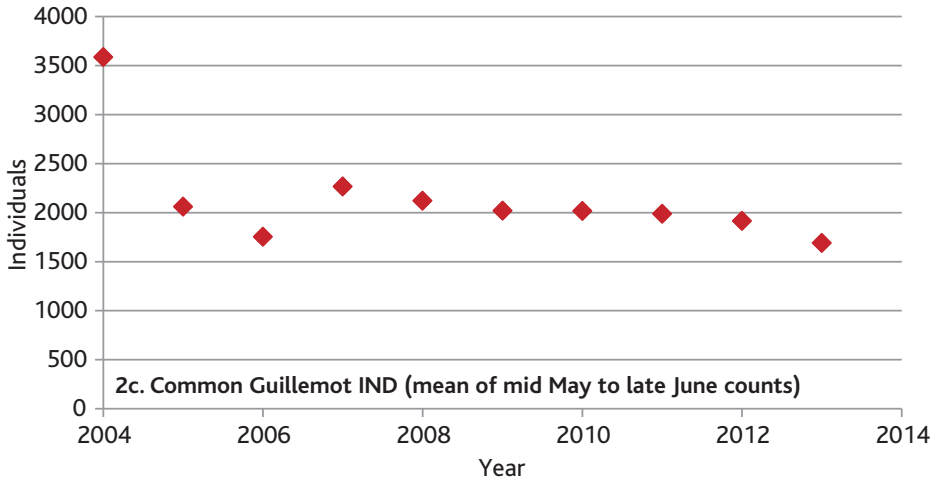
Black-legged Kittiwake: The maximum count of AON declined significantly, by 77% (r_s = -0.952, n = 10, P < 0.01) with a marked drop of 38% in 2007–08 (Table 1, Figure 2b). There was no significant trend in estimated breeding success (r_s = 0.173, n = 10, n.s.), which was high in 2004, low in 2005–10 and then moderate in 2011–13. Predation of chicks was noted on occasion by one or more Great Skuas *Stercorarius skua*, whilst strong NE winds on 21 July 2010 resulted in the loss of the majority of remaining chicks that year (from 75 chicks on 11 July to 20 chicks on 22 July).

Common Guillemot: A significant decline in numbers (r_s = -0.685, n = 10, P < 0.05) was largely due to two unusually high counts in 2004, of 3,480 on 15 May and 3,692 on 18 June (Table 1, Figure 2c), and the trend lost significance when the year 2004 was removed from analysis. There was no significant trend in the annual counts of chicks (r_s = 0.552, n = 10, n.s.), with few seen in 2004, very few in 2005, and higher but variable numbers in 2006–13.

Figure 2a–g. Plots of seabird numbers for species showing significant trends, 2004–13 (P < 0.05). See Methods for details.




800
700
600
500
400
300
200
100
0
AON
2004
2006
2008
2010
2012
2014
Year
2b. Black-legged Kittiwake (peak AON)


4000
3500
3000
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Individuals
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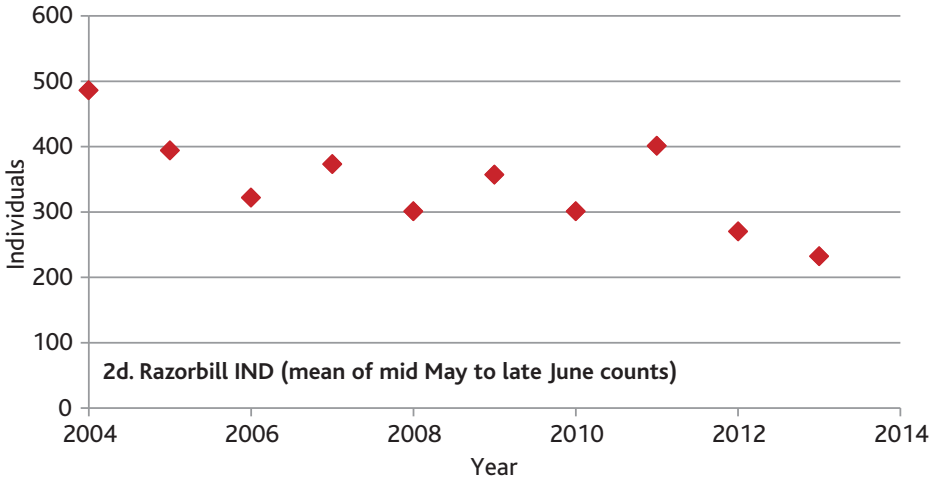
2c. Common Guillemot IND (mean of mid May to late June counts)


600
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Individuals
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2014
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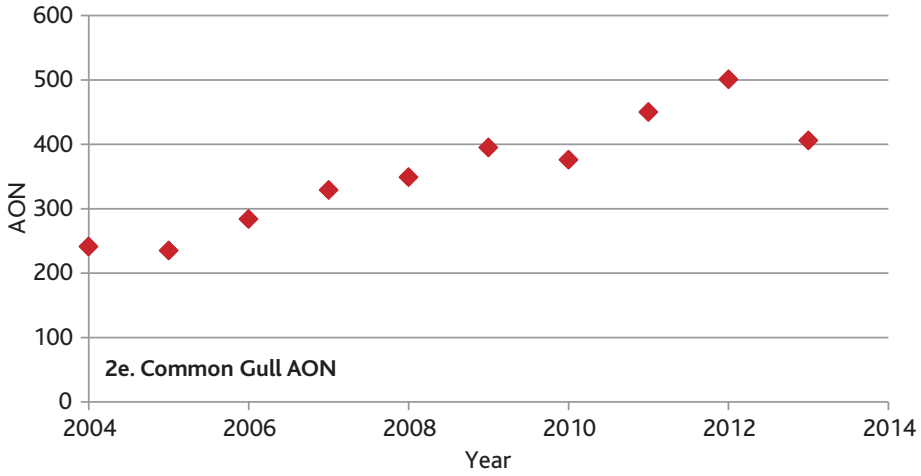
2d. Razorbill IND (mean of mid May to late June counts)


600
500
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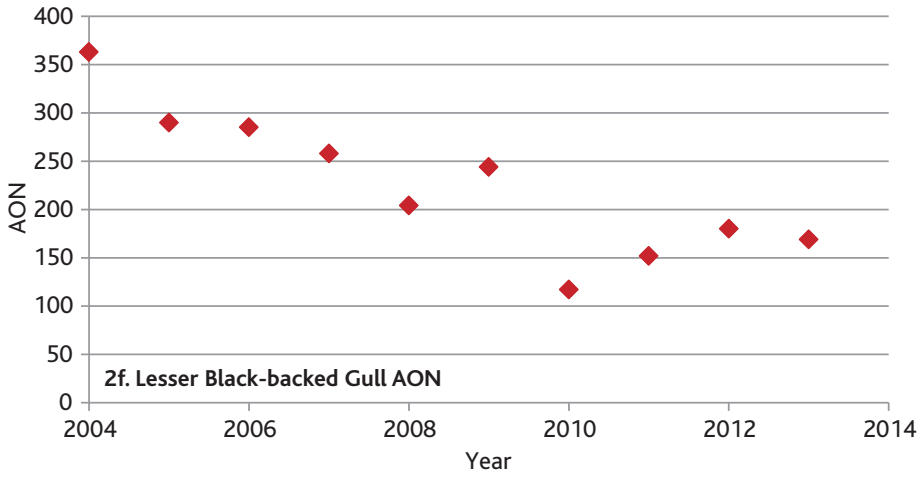
AON
2e. Common Gull AON
2004
2006
2008
2010
2012
2014
Year


400
350
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250
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150
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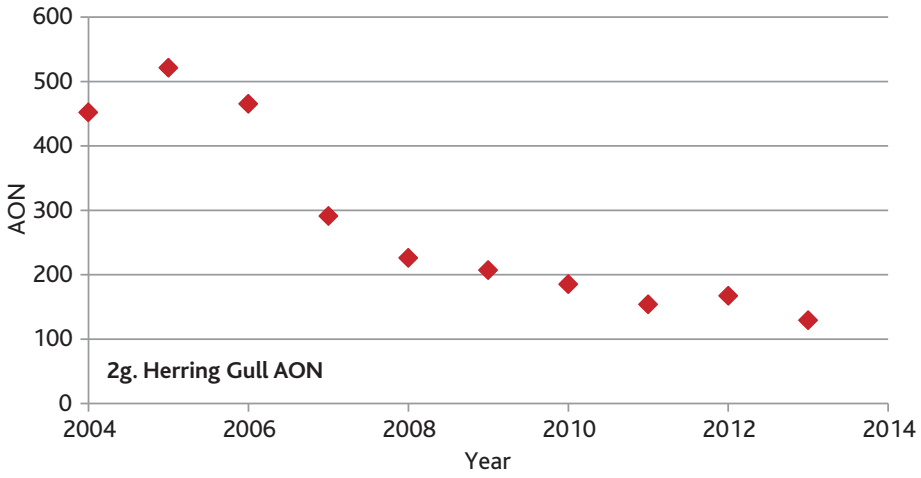
50
0
AON
2f. Lesser Black-backed Gull AON
2004
2006
2008
2010
2012
2014
Year


600
500
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200
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0
AON
2g. Herring Gull AON
2004
2006
2008
2010
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2014
Year

Razorbill: Apart from a high count in 2011, numbers showed a significant, gradual decline over the study period (r_s = -0.670, n = 10, P < 0.05; Table 1, Figure 2d).

Black Guillemot: There was no significant trend in pre-breeding counts (r_s = -0.373, n = 10, n.s.), with 29–31 birds recorded in 2004–05, 2008 and 2013, and counts as low as 13 in other years (Table 1).

Black-headed Gull *Croicocephalus ridibundus*: There was no significant trend in numbers (r_s = -0.430, n = 10, n.s.), despite the highest count being in 2004 (493 AON in 12 colonies; Table 2) and an unusually low count in 2012. The main colony each year was in wet reedbed habitat at Loch Bhasapol, with scattered smaller colonies at inland freshwater marshes but also on dry machair at The Reef.

Table 1. Annual counts of cliff-nesting seabirds and estimates of breeding success at Ceann a' Mhara Tiree, 2004–13, [n] = number of counts where more than one was made.

Species	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Visit dates	15/5	15/5	24/5	15/5	25/5	29/5	26/5	27/5	23/5	21/5
	18/6	19/6	24/6	4/6	23/6	12/6	10/6	21/6	19/6	19/6
	22/7	20/7	12/7	29/6	17/7	28/6	28/6	11/7	10/7	12/7
				2/8	11/7	28/7	23/7	11/7	21/7	19/7
					1/8		4/8	22/7		
Northern Fulmar AOS	1,454	1,406	1,402	1,223[2]	979	787[2]	783[2]	651	724	667
Standard deviation				31.8		123.7	15.6			
Estimated success	0.21	0.18	0.21	0.29	0.07	0.21	0.36	0.50	0.40	0.69
European Shag AON	97	112	57	96	129	112	111	85	111	99
Chick count date(s)	22/7	19/6	12/7	29/6	23/6	12/6	26/5	21/6	19/6	19/6
		& 20/7		& 11/7	& 17/7	& 28/6	& 10/6	& 11/7	& 10/7	& 12/7
Estimated success	1.73	1.54	0.61	1.60	1.43	1.96	2.40	1.36	1.78	1.76
Black-legged Kittiwake AON	697	724	719	602	374	384	295	238	209	160
Chick count date	22/7	20/7	2/8	1/8	17/7	4/8	22/7	21/7	10/7	12/7
Estimated success	1.15	0.08	0.04	0.00	0.00	0.21	0.07	0.80	0.56	0.52
Common Guillemot IND	3,586[2]	2,061[2]	1,754[2]	2,267[3]	2,119[2]	2,020[3]	2,016[3]	1,989[2]	1,914[2]	1,691[2]
Standard deviation	149.9	157.7	249.6	301.2	437.7	276.2	367.9	16.3	352.8	444.1
Chick count date	22/7	20/7	12/7	1/8	17/7	23/7	11/7	11/7	10/7	12/7
Chick count	85	4	475	200	145	250	290	260	230	445
Razorbill IND	486[2]	394[2]	322[2]	373[3]	301[2]	357[3]	301[3]	401[2]	270[2]	232[2]
Standard deviation	106.8	33.2	64.3	135.8	216.4	52.8	52.9	16.3	89.8	182.4
Black Guillemot IND	31	29	19	14	30	21	18	16	13	30
Count date	20/4	14/4	19/4	5/4	9/4	12/4	11/4	7/4	7/4	5/4

Table 2. Annual counts (AON) of breeding gulls and terns and annual estimates of breeding success of terns on Tiree, 2004–13.

Species	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Black-headed Gull	493	338	301	385	404	341	367	363	233	333
Colonies	12	8	7	8	6	7	7	7	6	9
Common Gull	241	235	284	329	349	395	376	450	501	406
Colonies	5	7	11	12	11	12	14	14	15	15
Lesser Black-backed Gull	363	290	285	258	204	244	117	152	180	169
Colonies	5	6	6	9	5	8	8	6	11	6
Herring Gull	452	521	465	291	226	207	185	154	167	129
Colonies	6	6	7	8	5	8	8	10	10	8
Common Tern	1	0	0	5	0	0	0	0	2	1
Colonies	1	0	0	1	0	0	0	0	1	1
Arctic Tern	601	450	281	220	305	338	307	286	308	204
Colonies	15	13	11	19	15	12	12	13	19	15
Breeding success	0.00	0.00	0.11	0.23	0.03	0.27	0.36	0.38	0.49	0.29
Little Tern	67	55	43	39	41	47	38	47	52	38
Colonies	9	12	10	8	6	6	6	6	3	4
Breeding success	0.16	0.42	0.00	1.62	0.83	0.89	0.58	0.68	1.04	0.95

Common Gull *Larus canus*: Breeding numbers increased rather steadily over the study period (r_s = 0.939, n = 10, P < 0.01), from 241 AON in five colonies in 2004 to 400–500 AON in 15 colonies by 2012–13 (Table 2, Figure 2e). The largest colonies were on dry machair at the Reef and on grazed wet heath at Crossapol, with scattered smaller colonies at grazed inland heath sites and on coastal islets.

Lesser Black-backed Gull *Larus fuscus*: Numbers declined significantly (r_s = -0.879, n = 10, P < 0.01), with the 2013 count of 169 AON being 53% lower than that in 2004 (Table 2, Figure 2f). Most birds bred at mixed colonies with Herring Gulls *Larus argentatus* at grazed inland heath sites such as Bhirceapol and Moss, with smaller numbers in coastal Herring Gull colonies.

Herring Gull *Larus argentatus*: The decline in numbers was even greater than in the previous species (r_s = -0.939, n = 10, P < 0.01, see Figure 2f), the 2013 count of 129 AON being 71% lower than that in 2004 (Table 2g, Figure 2g). Most birds bred at mixed colonies with Lesser Black-backed Gulls at grazed inland heath sites such as Bhirceapol and Moss, with smaller numbers at scattered coastal sites, including the much diminished one at Ceanna a' Mhara, which held an average of 596 pairs in 1986–88 (Broad & Cadbury 1989) but only 7 AON in 2013.

Common Tern *Sterna hirundo*: Common Terns only bred erratically and in very small numbers, usually on their own on an islet off Milton.

Arctic Tern *Sterna paradisaea*: There was high annual variability and no significant trend in breeding numbers (r_s = -0.455, n = 10, n.s.), although the total of 204 AON in 2013 was 66% lower than that in 2004 (Table 2). Estimated breeding success on the other hand increased significantly over the same period (r_s = 0.883, n = 10, P < 0.05), as a result of very poor seasons in 2004–2008 and moderate success in 2009–2012. The largest colonies were inland on short grassland adjacent to Loch a' Phuill and at The Reef, with scattered smaller colonies on islets, promontories and beaches around the coast.

Little Tern: There was no significant trend in numbers (r_s = -0.467, n = 10, n.s.), with annual counts ranging between 38 and 67 pairs, or in breeding success (r_s = 0.600, n = 10, n.s.), with complete failure at ten colonies in 2006 thought to be linked to poor food supply, higher success (> 1.0 chick per nest) in 2007 and 2012 and moderate success in all other years (Table 2). Tiree holds about 15% of the Scottish breeding population. The main colonies are at a coastal islet in East Tiree and on former concrete aircraft hangar bases inland at The Reef. Smaller numbers nest on scattered beaches around the island and occasionally on the shore of Loch a' Phuill, although numbers and nest success at these smaller colonies have been low in recent years, possibly in relation to increased human disturbance. Additional small colonies occur on the neighbouring islands of Coll and Gunna. Those on Coll are monitored annually and have declined in recent years but the Gunna colony is rarely checked. It is therefore possible that annual fluctuations in numbers on both Tiree and Coll could at least partly reflect interchange with the Gunna colony.

Figure 3. Little Terns *Sternula albifrons* at The Reef inland breeding site on old concrete runways enjoyed another good breeding season in 2014, with 22 chicks fledged from 27 nests. © *John Bowler*

Other species: Great Skua and Atlantic Puffin *Fratercula arctica* were both recorded breeding successfully at Ceann a' Mhara for the first time ever on Tiree. A pair of Great Skuas held territory and attempted to nest there in every year from 2010 and raised two young to fledging in 2012, following the presence of a territorial pair near Vaul in East Tiree in 2004 (Bowler & Hunter 2007) and occasional summer records elsewhere in 2005–09 (pers. obs.), whilst a pair of Atlantic Puffins frequented a crevice in May 2009 and were observed close to a juvenile on the sea below the breeding site in July 2009.

Discussion

Populations of many seabird species have been declining in Scotland since the mid 1980s with particularly steep declines noted in the Northern Isles in the last 20 years, although trends vary both with species and region (Mitchell *et al*. 2004; JNCC 2014). For Argyll, population changes up to and including the Seabird 2000 census are well described by ap Rheinallt *et al*. (2007), and within the Inner Hebrides there are some long-term on-going studies with which to compare the 2004–13 data from Tiree (see Figure 1). These include work on the adjacent island of Coll (counts provided by Ben Jones, RSPB), on Lunga in the Treshnish Isles, 20km E of Tiree (Ward 2013), Eigg, 35km NE of Tiree (data submitted to the Seabird Monitoring Programme (SMP) by John Chester, SWT, provided by Roddy Mavor, JNCC), Canna, 40 km to the NNE of Tiree (Swann 2013) and on Colonsay, 60 km SE of Tiree (Jardine 1998; David Jardine *in litt*.), which all contribute to the SMP database (JNCC 2014). There has also been extensive study of the impact of North American Mink predation at seabird colonies on small, inshore islands along much of the west coast of Scotland (Craik 1997, 2000; Craik & Campbell 2000).

The Scottish population trend for Northern Fulmar has been of gradual decline since the late 1990s (JNCC 2014), while numbers on Colonsay, Lunga and Canna have been declining since the early 1990s (Jardine 1998, D. Jardine *in litt*.; Ward 2013; Swann 2013). On Tiree, the census counts of 1,281 AOS in 1987 and 1,382 AOS in 1999 would suggest a peak in numbers around 1999–2004, in line with the national trend. Numbers nesting at Ben Feall on Coll have similarly declined from 161 AOS in 2003 to 58 AOS in 2013 (B. Jones *in litt*.). The cause(s) of this widespread decline is likely to be complex, but may be linked to a decline in discards from trawlers, representing a return to more natural levels following a period of artificially elevated population size, and changes in natural prey induced by changes in sea temperatures (JNCC 2014). Improved productivity of Northern Fulmars at Ceann a' Mhara during 2004–13, particularly since 2010, also mirrors the national trend, from a low level in 2004 (JNCC 2014).

The relatively stable numbers of European Shags nesting on Tiree in 2004–13 and indeed since 1987 and 1999 when 100 and 155 nests were counted respectively (Broad & Cadbury 1989; ap Rheinallt *et al*. 2007) contrasts with a 41% decline in numbers on Canna in 2004–11 (although the 2011 figure was probably an undercount; Swann 2013), a 64% decline on Colonsay in 2004–13 (D. Jardine *in litt*.) and a 54% decline on Lunga in 2004–13, where after an increase during the

previous decade, numbers crashed from 340 nests in 2004 to 184 in 2005 and have not recovered since (Mavor *et al*. 2006; Ward 2013). On neighbouring Coll, numbers at Ben Feall increased annually from 35 in 2008 to 65 nests in 2013 following 115–116 nests there in 2002–03 (B. Jones *in litt*.). The overall Scottish trend between 2004 and 2013 is of decline, but heavily influenced by reductions at east coast colonies following a wreck in winter 2004/05 (JNCC 2014). The ability of European Shags to breed successfully in years when other seabirds have failed due to low sandeel availability has been noted elsewhere (Swann *et al*. 2008; Wanless & Harris 2012), and this would appear to have been the case in several years on Tiree when Black-legged Kittiwake success was very low, and especially in 2005 when very few Common Guillemot chicks were counted (Table 1). European Shags can also skip breeding in years when local environmental conditions are unfavourable (Harris *et al*. 1998), and this would appear to have occurred on Tiree and Lunga in

Figure 4. A view of west Tiree looking north across Loch a' Phuill and adjacent machair habitat towards the southernmost Outer Hebrides. Black-headed Gulls *Croicocephalus ridibundus*, Common Gulls *Larus canus*, Arctic Terns *Sterna paradisaea* and occasional Little Terns *Sternula albifrons* nest around the loch. June 2014. © *John Bowler*

2006 (but not on Canna or Colonsay), when very low nest counts during a summer of apparent locally-poor food availability were followed by a return to 2005 numbers in 2007 (Table 1; Ward 2013; Swann 2013; D. Jardine *in litt*.).

The decline in Black-legged Kittiwakes on Tiree began between the last two national censuses (1,231 AON in 1987, 849 AON in 1999) and the colony has now declined by 87% since 1987. In contrast, numbers on Canna increased to a peak of 1,340 AON in 2004, before falling abruptly in 2005 and fluctuating around 1,000 AON since (Swann 2013). Numbers on Lunga also increased in the 1990s to a peak of c. 1,000 AON in 2001–04, but have declined since to just 233 AON in 2013 (Ward 2013). Numbers on Colonsay increased from 4,076 AON in 1969 to 6,485 AON in 1999 (ap Rheinallt *et al*. 2007) but subsequently declined by 82% in 2004–13 at monitored plots (D. Jardine *in litt*.). Breeding success on Tiree was zero or close to zero in 2005–08, when it was also zero or low on Canna, and despite improved breeding success on Tiree in 2011–13, the continued reduction in breeding numbers there reflects the overall trend in Scotland (JNCC 2014).

Numbers of Common Guillemots at Ceann a' Mhara increased markedly between the Seabird Colony Register and Seabird 2000 census counts (704 IND in 1987, 1,874 in 1999) and the 2004 counts (mean of 3,586) would suggest a further increase in the early 2000s. Numbers also increased on Lunga in the late 1990s, but a count there of 10,385 IND in 2004 was markedly higher than in 2003 (7,316) or 2005 (6,943), with all other counts in 2001–13 being in the range of 6,000–8,000 IND (Mavor *et al*. 2005, 2006; Ward 2013). Numbers in study plots on Colonsay in 2001–14 were also highest in 2004 (D. Jardine in *litt*.). It is unclear therefore whether the Tiree counts in 2004 represented a peak in breeding numbers or unusually high colony attendance at the central Inner Hebridean Islands that year. Comparison with Canna, where there was a steep decline in numbers between 2001 and 2011, is complicated by differences in the count unit (sites with an egg or chick) and timing of visits (early July; Swann 2013), whilst a 48% decline in 2004–13 on Colonsay masked even lower counts in 2007–08 followed by a partial recovery from 2009 (D. Jardine *in litt*.).

Unlike Common Guillemot, there was little difference in the national census counts of Razorbills on Tiree (387 in 1987, 364 in 1999) and apart from high counts of 410 on 15 May and 561 on 18 June 2004, the mean counts fluctuated between 300 and 400 in 2005–11, with reduced numbers in 2012–13. Counts on Lunga were also rather stable during 1999–2008, but as with Common Guillemot there was a marked peak in 2004 (1,244 IND in 2003, 2,064 in 2004, 1,127 in 2005), before a reduction in 2009 with no subsequent recovery (408 in 2013; Ward 2013). On Colonsay, numbers in study plots in 2001–14 fluctuated annually, again with a peak in 2004, but were otherwise rather stable (D. Jardine *in litt*.). Comparison with Canna is problematic, as a decline in Razorbill numbers starting in the late 1980s was reversed after the eradication of Brown Rats from the island over the 2005/06 winter (Swann 2013). The apparently stable Black Guillemot numbers at Ceann a' Mhara reflect the general situation in Scotland (JNCC 2014).

The decline in Herring Gulls on Tiree began in the late 1980s with numbers dropping by 36% from 1,247 AON in 1987 (plus 226 AON on Soa) to 792 AON in 1999 (plus 76 AON on Soa); the 1987–2013 decrease is therefore 90%. This mirrors a 96% decline on Canna from a peak count of 1,525 AOT in 1988 to 63 AOT in 2011 (Swann 2013), a decline of 11.6% p.a. on Lunga since 1994 to 11 pairs in 2013 (Ward 2013), and a 63% decline on Eigg in 2004–13 (J. Chester SWT data). On all four islands, numbers seem to have stabilised since about 2007 at the new, low level. Although breeding success has not been assessed on Tiree, fledged young were seen in all years from 2004. Within an overall Scottish decline since 2000 (JNCC 2014), local factors are likely to operate on this species and it may be that in the context of Tiree, the slow phase-out and eventual closing of the Gott landfill site in 2010, the loss of arable cropping on the island and changes in fishing practices in the surrounding seas could have played a role in the decline.

The same factors may apply to Lesser Black-backed Gulls on Tiree, numbers of which peaked in 1989 at 544 AONs (with a further 53 AON on Soa) and declined steadily thereafter with an apparent leveling off at around 150–180 pairs after the low-point in 2010. The same trend has occurred on Canna, with a decline from a peak of 69 pairs in 1975 to 9–11 pairs in 2009–11 (Swann 2013), whilst a similar decline on Eigg from 35–40 pairs in 2004–06 to 12–15 pairs in 2008–11, was followed by even lower numbers (6–9 pairs) in 2012–13 (J. Chester SWT data).

Numbers of Common Gulls on Tiree in 1987 (335 AONs) and 1999 (308 AONs) were a little higher than in 2004–05, but have more or less doubled since, and the number of colonies has trebled. The same has occurred in the last decade with the small population on Canna (6 AOT in 2004, 16–21 in 2009–11; Swann 2013), which contrasts with an overall decline at Scottish coastal colonies since the mid 2000s (JNCC 2014). The effects of North American Mink predation on Common Gull breeding numbers and success at colonies on inshore islands of the west coast of Scotland have been well documented (Craik 1997, 2000; Craik & Campbell 2000), and while Craik (1997) previously found no evidence for a shift in distribution to offshore islands free of mink, this may now be occurring (Balmer *et al*. 2013), whether through immigration of experienced breeders or differential recruitment rates of younger birds. There is however no recent evidence of a similar increase in numbers nesting on Coll where numbers are now very low (B. Jones pers. comm.), on Colonsay where the anecdotal colony counts since Seabird 2000 are insufficient to determine recent trends (D. Jardine *in litt*.), or on Eigg where numbers declined from 80 pairs in 2004 to 16 pairs in 2010 with a slight recovery to 25–46 pairs in 2011–13 (J. Chester SWT data).

The Seabird 2000 census showed Tiree to be the stronghold for Black-headed Gull in Argyll (ap Rheinallt *et al*. 2007), and apart from an inexplicably low count in 2012 and a high count of 685 pairs in 1987 (Broad & Cadbury 1989), the population on the island has fluctuated between 300 and 500 pairs since 1986,

showing no significant trend. This compares with a 28% decline in Scotland between 1985–88 and 1998–2002 (Mitchell *et al*. 2004) and an unclear trend thereafter (JNCC 2014).

The decline in breeding Arctic Terns on Tiree is in line with a decrease in the Scottish population of 34% between 1985–88 and 1998–2002 (Mitchell *et al*. 2004), and a continued decline since (JNCC 2014). Despite this, Tiree remained the stronghold for Arctic Terns in Argyll (ap Rheinallt *et al*. 2007). However, numbers and individual colony sizes vary considerably from year to year on Tiree, as they do elsewhere, and it is likely that some interchange with smaller colonies not counted every year on nearby islets such as Soa and Gunna may mask any trend to some extent.

Tiree holds the largest concentration of Little Terns in Scotland (JNCC 2014). Birds nested at 15 different sites around Tiree in 2004–13, although in recent years the majority nested at just two sites, one a remote coastal islet and the other an inland site that is managed (including intermittent provision of fresh nesting substrate) and protected from human disturbance by RSPB. The reduced use of the remaining predominantly coastal sites is probably linked to increased human disturbance as a result of increased visitor numbers to the island in May and June. This may also be a factor in the decline of numbers nesting on Coll, from 15 pairs in 2003 to just 3 pairs in 2013 (B. Jones *in litt*.). Poor breeding success in 2004 and 2006 was attributed to low availability of suitable prey during chick-rearing, with few sandeels brought in by adult birds, and exacerbated in 2004 by a prolonged period of cool windy weather in June. The lack of significance in the apparent declines and improved breeding success by both Arctic and Little Terns in recent years is encouraging, with numbers of Little Terns on Tiree remaining of national importance. Indeed the generally improving breeding success between 2004 and 2013 amongst all six seabird species for which productivity data was recorded on Tiree, including Little Tern, gives some hope for the future of seabirds on the island.

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