CLIFF-NESTING SEABIRD PRODUCTIVITY ON LUNDY 2010

by

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ABSTRACT

The productivity of Kittiwake (*Rissa tridactyla*), Guillemot (*Uria aalge*) and Fulmar (*Fulmaris glacialis)* was surveyed at six sites on Lundy in 2010. Average Kittiwake productivity was 0.67 per pair, average Guillemot productivity 0.68 and average Fulmar productivity 0.52. Increases in productivity were noted for all species in comparison to previous years.

INTRODUCTION

Lundy is a nationally important seabird breeding site supporting ten species of seabird. Notably the Lundy Site of Special Scientific Interest (SSSI) is notified for Guillemot, Razorbill, Puffin, Kittiwake and Manx Shearwater.

This report documents the results of seabird productivity surveys conducted on Lundy by the island wardens during the breeding season from May to August 2010. This is the fourth consecutive year that seabird productivity has been recorded on Lundy and forms part of the nationwide Seabird Monitoring Programme led by Joint Nature Conservancy Committee (JNCC) in partnership with the statutory country nature conservation agencies and other conservation organisations.

Productivity of Kittiwake (*Rissa tridactyla*), Guillemot (*Uria aalge*) and Fulmar (*Fulmaris glacialis*) was surveyed at six sites on Lundy, including Three Quarter Buttress (Kittiwake), Three Quarter Wall Inlet (Fulmar), Long Roost (Kittiwake and Guillemot), Jenny's Cove (Fulmar), Aztec Bay (Guillemot and Kittiwake) and Gannets' Rock (Fulmar).

METHOD

The method used to survey productivity of the three seabird species over the past four seasons was replicated for 2010. These methods are detailed in Walsh *et al.* (1995), briefly summarised as follows:

> The colonies were photographed in April, and on a laminated copy of the photograph each potential active breeding site or occupied nest was marked and numbered. From then, each site was visited twice a week where possible, and the development of each active site recorded until all chicks had fledged, or, in the case of Fulmar, a breeding attempt will be considered successful if a large chick is present in early to mid August.

RESULTS

Guillemot

Two Guillemot colonies were chosen for this study, at Long Roost and Aztec Bay on the North West and West coast of Lundy respectively. The colony at Long Roost (referred to in Lundy's site register as G24; Price, 2004) is the larger of the two: a north-facing nest site which was spread over several ledges and held on average 230 individuals during peak breeding and is interspersed with a few Kittiwake nest sites (documented in the following section).

In comparison the nest site at Aztec Bay (F7 in the site register) was a west-facing colony, situated on the south side of the entrance to a cave. It comprised, on average, 260 individuals at peak breeding time, nesting on the outskirts of a Kittiwake colony.

Long Roost

Guillemot eggs were observed on the first visit to the colony at Long Roost on 2 June with the first chicks recorded on 6 June the following visit. Chicks were estimated to be 'jumping' from 26 June until after 14 July, when three chicks were left at the colony; however, no actual observations of jumping were recorded. These were well developed and of a large size, expected to fledge over the following few days. No visits to the colony were made after this date.

From a total of 45 nesting attempts 32 young were successfully raised. The final productivity for this site was 0.71 per breeding pair.

Aztec Bay

Guillemot eggs and chicks were recorded on the first visit to the site, on 9 June. Of the five chicks, four were recorded as less than two days old and one between three and five days. Chick 'jumping' was estimated to have taken place at the colony from 20 June onwards, with no actual observations recorded; however, chick rearing continued until 21 July when three large chicks of fledging size remained at the colony and were expected to fledge successfully. No further visits to the site were made after this date.

From a total of 34 breeding attempts 22 chicks fledged successfully. The final productivity at the site was 0.65 per pair.

Table 1. Comparison by year of Guillemot productivity at nest sites on Lundy.

	2007	2008	2009	2010
Aztec Bay	–	–	*0.55	0.65
Long Roost	0.24	0.35	0.69	0.71

* First year productivity survey at Aztec Bay

The total productivity for Guillemots from combined nest sites in 2010 was 0.68 chicks fledged per breeding pair, 54 chicks fledging from a total of 79 attempts at the sites surveyed.

Kittiwake

Kittiwake productivity was surveyed at three nest sites along the west coast of Lundy including Three Quarter Buttress, Aztec Bay and Long Roost. Kittiwake monitoring at Three Quarter Buttress, a south facing, sheltered cliff face and cave (F16 in the site register), recorded a total of 112 nesting attempts. At Aztec Bay, comprising a site on a westward-facing cliff in a relatively sheltered bay, monitoring recorded 33 nesting attempts, while at Long Roost, a north-facing exposed site, only one attempt was recorded.

Long Roost
At Long Roost, only one pair of Kittiwakes were seen to attempt breeding and despite this it appears that the pair managed to lay a clutch of eggs, as was observed by incubating behaviour. No positive sighting of a clutch was observed and no chicks were hatched. The nest site was abandoned by mid June and productivity was considered to be zero for the fourth year in succession. Due to the location, observations continued throughout the season as the Guillemot colony (also at site G24) continued to be surveyed. No further attempts to breed were made.

Coulson and Dixon (1979) mention that Kittiwakes do not appear to be able to breed without at least some social stimulation from neighbouring pairs and it is perhaps for this reason that the colony at Long Roost has declined. Since 2007, fewer and fewer pairs have attempted to breed at Long Roost and all without success. Table 2 below summarises the nesting attempts at Long Roost.

Table 2. Comparison by year of Kittiwake nesting attempts at Long Roost.

Year	2007	2008	2009	2010
Nesting attempts	13	4	0	1

Three Quarter Buttress
This large Kittiwake colony north of St Mark's Stone covered the upper part of a south-facing cliff wall leading and extending into a large cave. It is a sheltered site and was also the site of a small Guillemot colony of around 30-40 individuals which nested above the kittiwakes. Eggs were recorded at the colony on the first visit on 17 May, with the first chicks seen on 8 June. Fledging was estimated from 11 July onwards and by 23 July the chicks remaining at the site were of suitable large size and expected to fledge successfully.

Kittiwake productivity at St Mark's Inlet was 0.65 for the colony. From a total of 112 nesting attempts 73 chicks fledged.

Aztec Bay
This colony, located just north of St Phillip's Stone in Aztec Bay, is scattered over the west face of the cliff at the entrance to a cave. Approximately 30% of the nest site is visible from land (viewing point Fe in the site register) while the rest is located further into the cave. A count of the colony by boat in 2009 revealed there to be in excess of 80 nests.

Eggs were recorded on 16 May during the first visit, while the first young were seen on 6 June, with fledging occurring from 14 July onwards. On the last site visit on 21 July there were only large chicks present at the site and it was considered that they would fledge successfully over the following week.

Kittiwake productivity at Aztec Bay was 0.76 for the colony. A total of 33 nesting attempts were recorded, fledging 25 young. Out of the 25 nest sites where young were successfully raised, seven of the nests fledged two chicks and one nest successfully raised three chicks.

Table 3. Comparison of Kittiwake productivity at nest sites on Lundy.

	2007	2008	2009	2010
Aztec Bay	–	*0.29	0.68	0.76
Three Quarter Buttress	0.35	0.12	0.17	0.65
Long Roost	0	0	0	0

* First year productivity survey at Aztec Bay

The total Kittiwake productivity from combined nest sites was 0.67 chicks fledged per breeding pair, 145 nesting attempts successfully rearing a total 98 chicks.

Fulmar

Three sites were studied for Fulmar productivity: a large colony on Gannets' Rock, a small colony scattered on the north-facing wall of Three Quarter Wall Inlet and a site at Jenny's Cove. Poor weather conditions prevented the final return visits to collect productivity data from Three Quarter Wall Inlet and Jenny's Cove, resulting in the only conclusive data being recorded at the Gannets' Rock nest site.

Gannets' Rock

Gannet's Rock is a pinnacle of rock on the north-east coast of Lundy. The Fulmar colony here occupies a grassy cliff on the north face of the rock. Visits were made early and also later in the breeding season to check for apparently occupied sites (AOS) and later for chicks. Checks made early in the season recorded 42 nest sites at the colony. Since Fulmars sit tight while incubating, young were not seen until later in the season, by which time they had grown quite large.

The first small-sized young were recorded on 5 August during the first of the later season visits and further checks were made on 19 August, by when they had developed into large chicks capable of fledging. Although for a fourth successive year a pair of Great Black-backed Gulls successfully raised two chicks within the colony, no predation of the Fulmars was observed at this site.

From 42 apparently occupied nest sites, 22 young were observed large enough to fledge successfully, giving a total productivity of 0.52 chicks per pair.

Three Quarter Wall Inlet

The Fulmars at Three Quarter Wall Inlet nested on the north-facing wall of this narrow inlet, where also present breeding were small numbers of Razorbill (*Alca torda*), Guillemot and Shag (*Phalacrocorax aristotelis*).

The estimated number of regularly occupied Fulmar sites here was 13 and the site was re-checked on 19 July. From 13 nesting attempts, three were seen to contain chicks.

It is not possible to accurately calculate successful fledging and thus productivity from this data, as the final observations were made early in the season when chicks were still of a small size and some birds were recorded incubating.

Jenny's Cove

The Fulmar colony studied here covers a range of sites, including a north-facing slope west of Punchbowl Valley (E1 in the site register), the west face of a spur in a ravine (E4 in the site register), an overhanging cliff facing north-east and a steep face of sheer rock facing west (E5 and E6 respectively in the site register).

The estimated number of regularly occupied Fulmar nests for Jenny's Cove was 40. The site was re-checked on 19 July and again on 13 August by which time 23 nests contained hatched chicks. Of the 23 chicks, 13 were large and likely to fledge; however, 11 chicks were still either small, medium or not aged. The remaining 16 nest sites were either abandoned or still apparently incubating and therefore considered not successful.

Due to poor weather conditions preventing a final check of small- and medium-sized chicks, the final productivity is an underestimate of the potential productivity at Jenny's Cove. Only 13 chicks

out of 23 were large and considered capable of fledging successfully. This results in a productivity of 0.33 young fledging per regularly occupied site (Table 4). However, had the final check been made, productivity may have been higher, depending on whether the small- and medium-sized chicks survived to large size.

Table 4. Comparison of Fulmar productivity at different nest sites on Lundy.

	2007	2008	2009	2010
Gannets' Bay	0.57	0.34	0.47	0.52
Jenny's Cove	–	0.25	–	0.33
Three Quarter Wall Inlet	0.50	0.30	–	–

The total island productivity for Fulmar from combined nest sites is 0.43 chicks fledged per regularly occupied site, 82 nesting attempts successfully rearing a total of 35 chicks. However, this is potentially an underestimate due to incomplete survey data at Jenny's Cove.

Island productivity summary

Tables 5 and 6 present a summary of 2010 breeding successes and also compare seabird productivity for Kittiwake, Guillemot and Fulmar for the years 2007 to 2010.

Table 5. Summary of seabird productivity at nest sites on Lundy in 2010.

	Three Quarter Buttress	Aztec Bay	Long Roost	Three Quarter Wall Inlet	Gannets' Bay	Jenny's Cove
Kittiwake	0.65	0.76	–	–	–	–
Guillemot	–	0.65	0.71	–	–	–
Fulmar	–	–	–	–	0.52	0.33

Table 6. Comparison of average seabird productivity on Lundy.

	2007	2008	2009	2010
Kittiwake	0.31	0.13	0.28	0.67
Guillemot	0.27	0.35	0.63	0.68
Fulmar	0.54	0.30	0.47	0.43

Island weather summary

Figures 2 and 3 present rainfall and average wind speed in the months prior to and during the seabird breeding period on Lundy. In general, the 2010 season was drier during incubation and chick rearing times, and with a lower average wind speed, in comparison with previous years.

DISCUSSION

Lundy's seabird productivity has seen a striking increase for most of the sites surveyed throughout the 2010 season when compared with previous years. In particular this was most noticeable for Kittiwakes nesting at Three Quarter Buttress, which saw an increase in productivity of 282% on previous years, with a productivity of 0.65 chicks fledged per adult pair. On average, when compared with this season, Kittiwakes have exhibited an increase in productivity of between 116% and 415% since 2007.

Increases were also noted for Guillemot and Fulmar, although to a lesser degree. For Guillemot, when compared to 2009, increases in productivity of 18% and 3% were recorded at Aztec Bay

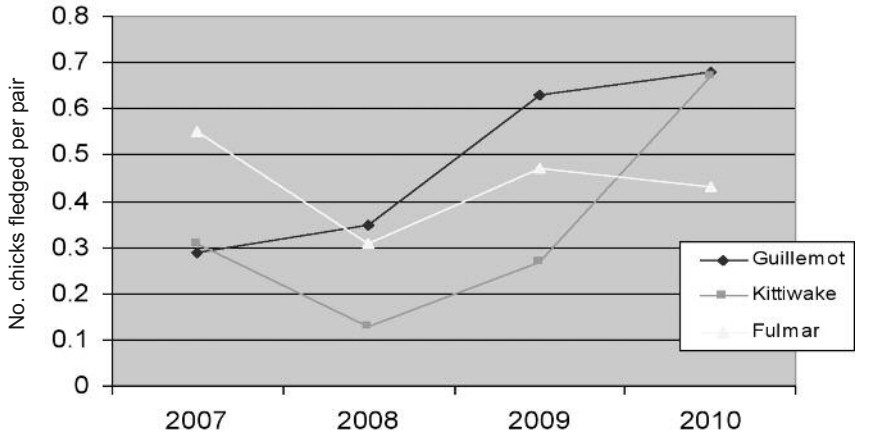

Figure 1. Average seabird productivity on Lundy, 2007-2010.

and Long Roost, with productivities of 0.65 and 0.71 respectively. However, since 2007 there have been significant increases of nearly 200% in Guillemot productivity at Long Roost (summarised in Table 1).

For Fulmar, while overall productivity was lower than the previous season, at 0.43 chicks fledging per regularly occupied site, there were increases at individual sites. This overall drop in productivity was due to the incomplete survey at Jenny's Cove where poor weather prevented follow-up observations of a number of small- and medium-sized chicks which may have fledged, thus contributing to a higher productivity score. However, as a result, fewer chicks were actually recorded as large enough to potentially fledge from the total number of breeding attempts, thus reducing the overall average. On the whole though, at individual sites – i.e. Gannets' Rock (productivity 0.52) and Jenny's Cove (productivity 0.33) and discounting Three Quarter Wall Inlet due to incompletion – productivity has increased marginally over the past few years.

Such increases may be due to the continued spell of fine weather the island experienced, with fairly low average wind speeds and a drier than usual season during the incubating and chick rearing stages of development (May and June – as can be seen in Figures 2 and 3). This fine weather, a vast improvement on previous years, may improve overnight foraging conditions for the adult birds, enabling successful trips to be made and suitable feeding and rearing of chicks to take place. However, as Furness *et al*. (1987) state, this is not necessarily the case, as most ecologists consider density-dependent regulation to be more important in vertebrates, which tend to be less affected by environmental factors such as weather and more influenced by biotic factors, such as competition for food.

In previous years, predation is thought to have played a role in the severe failure and poor productivity of seabird nest sites on Lundy. Throughout the 2010 season, while gulls were present from the time of hatching at both the Kittiwake and Guillemot colonies, no direct attacks were observed. However on several occasions gulls were seen swooping very close to nests, in an attempt one assumes to dislodge and scare adults from their site.

In addition to predation, lack of food provision during chick rearing plays a significant part in the failure of colonies. On the face of it, it would seem that for all the species observed chicks were well fed, with no signs of starvation at any of the colonies. However, without a direct study of provisioning, providing actual data on how many feeds chicks receive and the type of diet being delivered, it is difficult to surmise that poor provisioning or diet has been the reason for failures this season and the considerable failures at colonies in previous years.

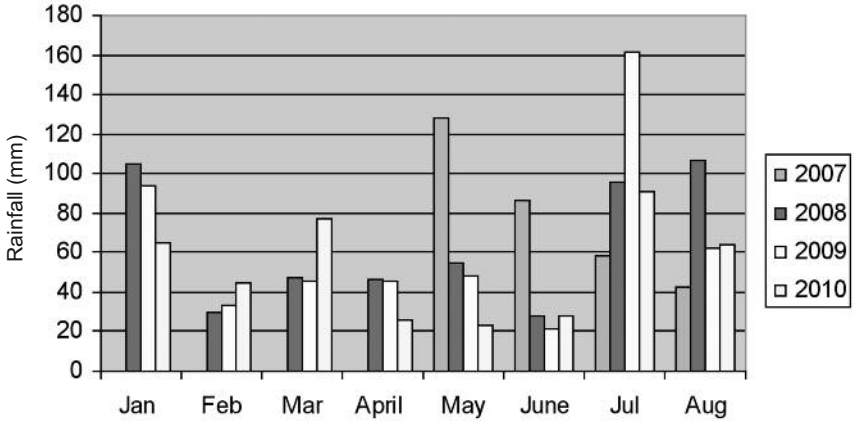

Figure 2. Rainfall on Lundy from January to August, 2007-2010.

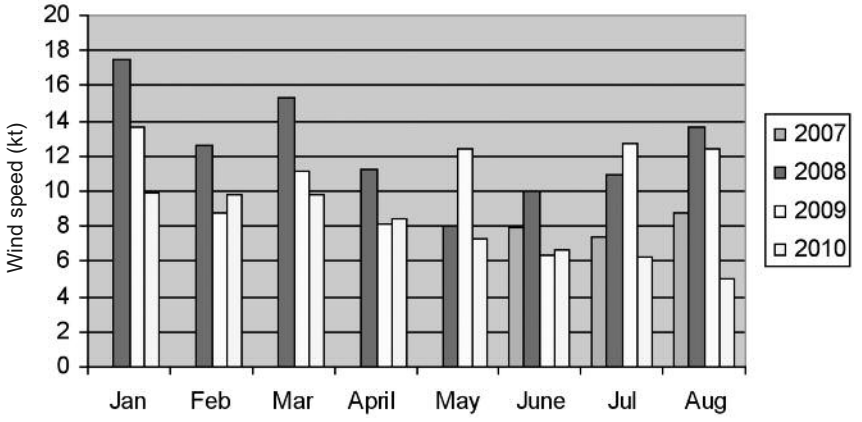

Figure 3. Average wind speed on Lundy from January to August, 2007-2010.

In support of this, Breton *et al*. (2008) exposes the unreliability of using indirect evidence to implicate prey availability as the primary cause of widespread breeding failures in colonial seabirds, and thus until further monitoring is carried out the root cause of failure at nest sites on Lundy cannot be fully determined.

CONCLUSION

This survey has revealed considerable increases in the productivity of all seabird species surveyed on Lundy during the 2010 breeding season. In comparison to previous seasons, 2010 experienced a drier season with fine weather during the incubation and chick-rearing period in comparison to previous years when weather was extremely poor. In the absence of fish provisioning and predation data, this fine weather period has been loosely attributed to the increase in productivity of seabird species on Lundy.

In light of the difficulties in determining the reasoning behind breeding success and failures, it is recommended, in accordance with Breton *et al*. (2008), that long-term monitoring studies on Kittiwakes and other seabirds carefully consider multiple working hypotheses that might explain major changes in breeding success.

On Lundy this may involve, in future years, parallel studies to monitor fish provisioning at the sites surveyed and to establish and quantify the frequency of fish delivered to chicks and the species being delivered. In addition, more in-depth monitoring of predation is required to obtain a better understanding of what is depredating the species being surveyed. Only when such additional monitoring is undertaken can a more accurate explanation be offered as to the fluctuations in breeding success at the various seabird colonies around Lundy.

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