



## Key site monitoring on Anda in 2009

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The 2009 breeding season on Anda (69°04'N 15°10'E), Vesterålen was characterised by moderate breeding success for both kittiwake and puffin. As in previous breeding seasons on Anda, sandeel *Ammodytes* sp. dominated the diet of both species. In 2009, herring *Clupea harengus* larvae, however, again entered the diet of especially the puffin in significant proportions.

Anda was established as a SEAPOP key-site in 2005. The main target species are puffin and kittiwake, but shag, herring gull, common guillemot and black guillemot are also being monitored. In 2009, the monitoring of population size, breeding success, survival and chick diet was continued for puffin and kittiwake. For monitoring of adult survival, 22 puffins and 34 kittiwakes were fitted with individual colour rings, supplementing the 241 and 233 adults respectively colour-ringed in 2005-08. Forty-seven food samples containing a total of 664 prey items were collected from puffins, and 63 food loads from kittiwakes.

### Monitoring of puffins

Results from The National Monitoring Programme for Seabirds (unpubl. data) suggest that the breeding population of puffins at Anda has declined from an estimated 22,200 pairs in 1981 to 17,880 pairs in 2009, a total decrease of 19.3%. Between 2008 and 2009, the breeding population of puffins on Anda however remained stable (Table 1).

**Table 1** Key population parameters (SE, n) of seabirds at Anda in 2009. Population change is the numerical change between 2008 and 2009, in both cases calculated on the basis of plot counts (p). For each species, the listed survival estimate was derived from the basic CJS model(s) that fitted the data set best, i.e. that (those) with  $\Delta QAI Cc < 2$  when adjusting for median c-hat.

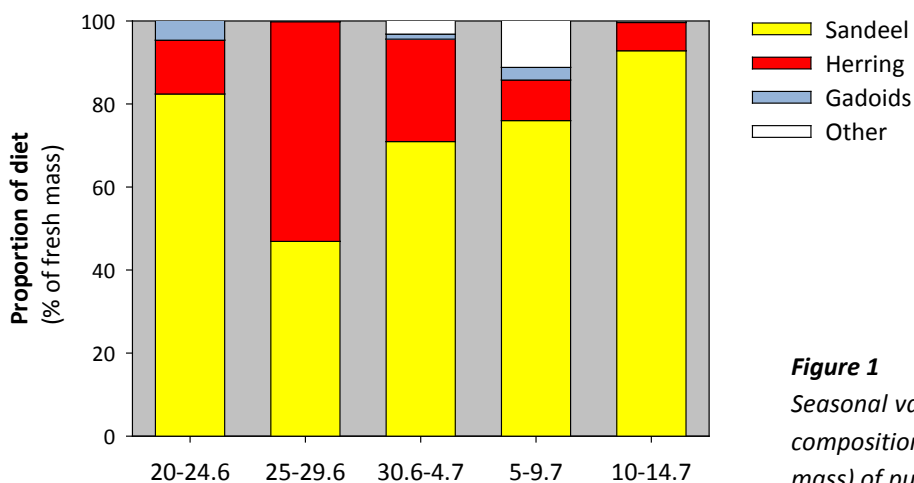
| Species         | Population change   | Annual adult survival<br>Period (yrs) | Estimate        | Reproductive performance |                  |
|-----------------|---------------------|---------------------------------------|-----------------|--------------------------|------------------|
|                 |                     |                                       |                 | Sampling unit            | Estimate         |
| Shag            |                     |                                       |                 | Clutch size <sup>1</sup> | 2.33 (0.31, 12)  |
| Herring gull    |                     |                                       |                 | Clutch size <sup>1</sup> | 2.25 (0.10, 53)  |
| Kittiwake       | + 5.8% <sup>p</sup> | 2007-08 (1)                           | 84.7 (3.7, 233) | Clutch size <sup>1</sup> | 1.73 (0.07, 52)  |
|                 |                     |                                       |                 | Clutch size <sup>2</sup> | 0.86 (0.09, 101) |
| Puffin          | + 0.2% <sup>p</sup> | 2008-09 (1)                           | 74.0 (6.8, 241) | Large chicks/nest        | 0.74 (n=652)     |
|                 |                     |                                       |                 | Chicks ≥ 10d/nest        | 0.64 (n=47)      |
|                 |                     |                                       |                 | Chicks ≥ 20d/nest        | 0.49 (n=47)      |
| Black guillemot | - 3.5% <sup>3</sup> |                                       |                 |                          |                  |

**1)** Number of eggs or small chicks per nest (excluding empty nests). Sample dates: shag 19 June, herring gull 19 June, kittiwake 16 June. **2)** Number of eggs or small chicks per nest (including empty nests). Sample date: 16 June. **3)** The value is population change from 2007-2008. In 2009 it was not possible to count the black guillemot.

The best fit model to estimate adult survival for puffins was one where survival but not recapture rates were time-dependent, indicating that the survival of puffins varies between years. The survival rate for adults between 2008 and 2009 was estimated at 74.0% (Table 1), compared to 83.0% in 2005-06, 77.3% in 2006-07 and 79.4% in 2007-08. This is a remarkably low survival compared to that of puffins breeding in other Atlantic colonies (e.g. Harris et al. 2005). At the colony on Hernyken in Røst, which is 227 km southeast of Anda, the survival for puffins in 2006-07 and 2007-08 was also quite low (83.0% and 80.4%, respectively). Nevertheless, the consistent low survival rates on Anda throughout the monitoring period seem remarkable. At present it is not certain whether this poor survival is real, or if it is an artefact of possible difficulties in resighting the ringed birds in the site chosen for the survival study.

The breeding success of puffins in 2009 was monitored in 47 study nests. Chicks hatched in 72% ( $n=34$ ) of these nests. The mean hatching date was 19 June ( $SE=0.91$ , range=10-28 June,  $n=34$ ), which is the earliest hatching recorded on Anda since the monitoring started in 2005. We used growth curves for the head+bill length of chicks of known age to estimate the remaining chicks' ages and thus compute an overall index of reproductive performance (Table 1). In 2009, 64% of the puffin chicks reached the age of at least 10 days, and 49% reached the age of 20 days (compared to 74%, 37%, and 28%, in 2006, 2007 and 2008, respectively).

In 2009, the diet (by mass) of the puffin on Anda was dominated by sandeel throughout the breeding season (**Figure 1**). In total, sandeel comprised 74% of the diet. First year herring (comprising 21% of the diet) again entered the diet after having been almost missing in 2008. The sandeels in the puffin diet were mainly 0-group fish (97.4% of all sandeels by number) with a mean length of 53.4 mm ( $SD=11.8$ , range 27-94 mm,  $n=301$ ). The remaining 2.6% were larger fish, which could be identified as lesser sandeel *Ammodytes marinus*. These had a mean length of 140.3 mm ( $SD=10.2$ , range 107-185,  $n=8$ ). All, but three of the herring in the food samples were larvae, with a mean length of 35.9 mm ( $SD=5.3$ , range 14-48 mm,  $n=244$ ), and mean mass of 0.15 g ( $SD=0.28$ ). The last three fish had a mean length of 116.7 mm ( $SD=12.1$ , range 104-128). Other species found in puffin diet samples included pearlside (*Maurolicus muelleri*), lumpsucker (*Cyclopterus lumpus*) and small shrimps.



**Figure 1**  
Seasonal variation (5-day periods) in composition of the chick diet (% by mass) of puffins on Anda in 2009.

## Monitoring of kittiwakes

About 1000 pairs of kittiwakes (Figure 2) bred on Anda in 2005-09. Compared to a census made in the early 1980s (Røv 1984), the population seems to have remained fairly stable over the last three decades. This is in strong contrast to the 65-80% decline in most colonies along the Norwegian mainland between the 1980's and 2008 (Lorentsen & Christensen-Dalsgaard 2009). From 2008 to 2009 there was a 5.8% increase in population size (Table 1). Annual survival rates for adults equalled 84.7% between 2007 and 2008 (Table 1), which is within the “normal range” for kittiwakes in the NE Atlantic (Frederiksen et al. 2005).

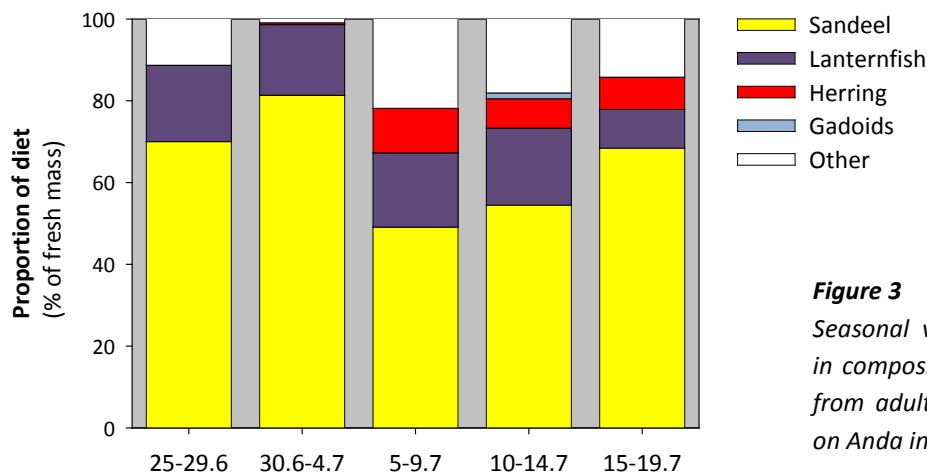


**Figure 2**

*In contrast to the situation in most colonies along the Norwegian mainland the population size of kittiwakes on Anda has remained stable. (© S. Christensen-Dalsgaard)*

The mean hatching date for kittiwakes in 2009 was 24 June, which is more than a week later than in 2008 but similar to 2007. The breeding success was moderate with an average of 0.74 fledglings per nest (Table 1). As the mean clutch size (including empty nests) recorded when the field team arrived on Anda in the middle of June was only slightly higher (0.86), the final outcome was clearly determined earlier in the season. Whether this low clutch size was due to initially small clutches or a high egg predation is unknown. A local contact noted that he had found a lot of predated kittiwake eggs on the small islands off Anda (K. Brun pers. comm.), which could indicate that crows and ravens had taken their share.

Sandeel again dominated the kittiwake diet in 2009 (65.5% by mass), but also glacier lanternfish *Benthoosema glaciale* (16%) and herring (5%) were common prey (Figure 3). In 2009, Anda was again the only key-site colony of kittiwakes in mainland Norway that appeared to have a reasonably good breeding season. This was most likely due to a better access to food during the breeding season. The key-site studies on Anda in recent years and an at-sea survey of birds and prey abundance in nearby feeding areas in July 1998 (Anker-Nilssen et al. unpubl. data) indicate there is a local population of sandeel which the birds benefit from.



**Figure 3**

Seasonal variation (5day periods) in composition of the diet sampled from adult kittiwakes (% by mass) on Anda in 2009.

As a part of a North Atlantic collaborative study on the non-breeding distribution of kittiwakes, 20 breeding kittiwakes were fitted with Global Location Sensing loggers (BAS model Mk13) on Anda in 2009 and will hopefully be retrieved in 2010/2011.

### Special observations

In the summer of 2009 a new species was added to the list of species on Anda, albeit just for a short while. On 7 July an adult female moose *Alces alces* was seen on the island. It stayed for about a day, wandering around looking for good feeding areas, before it decided that Anda was not suitable moose-land and swam off again. Moose tracks were later observed on the beach on Langøya southeast of Anda, so it seems it made it to land.



**Figure 4**

A female moose visited Anda on 7 July 2009. After having looked around the island it decided that this was not suitable moose-land and swam off to the local mainland. (@ S. Christensen-Dalsgaard)

**Thanks...**

During these last five field seasons the lighthouse building at Anda has proved to be an excellent field station. So, many thanks to the Norwegian Coastal Administration for letting us use the lighthouse! Thanks also to my field assistants Kristin S. Hatlen and Pål Adolfsen and to the "locals" Vidar Carlsen and Mads Henriksen who were of great help with the logistics, and to Rob Barrett for analysing the kittiwake food samples.

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**Cover photo:** Evening in the kittiwake colony on Anda. During the breeding season the cliffs of Anda are full of activity: Birds flying to and from their nests, pairs greeting each other and chicks begging for food. But suddenly the colony turns silent and all the adults fly out like a wave. The peregrine *Falco peregrinus* is on the hunt. (© S. Christensen-Dalsgaard)

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