

# **Evolution, foraging behaviour and reproductive output of coastal breeders at Zeebrugge**

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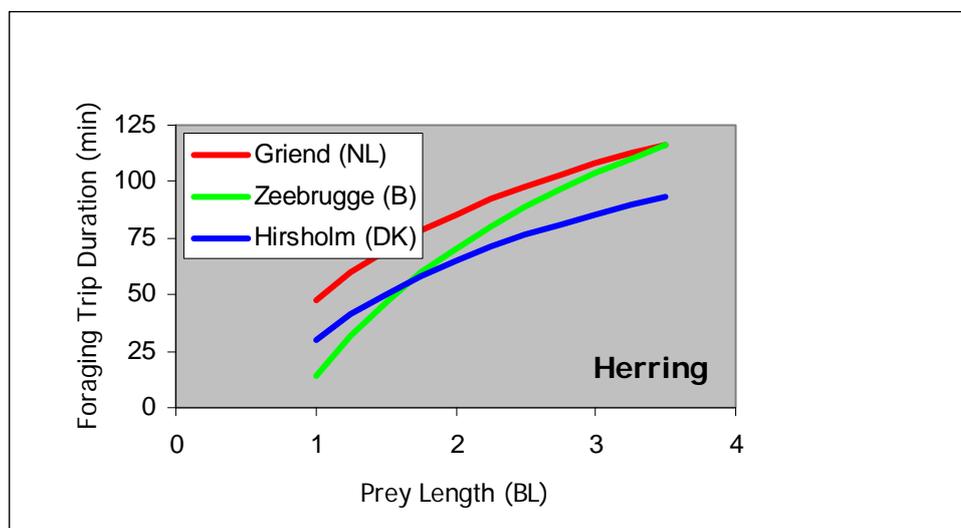
The creation of new land in the outer harbour of Zeebrugge in 1985 attracted large number of coastal breeding birds. Each species shows its own specific evolution in breeding numbers since the creation of new suitable nesting habitat. As a pioneer species the population of Little Tern initially increased up to a maximum of 425 pairs in 1997. Because of habitat loss and succession of the vegetation numbers decreased afterwards. The Common Tern population shows a gradual increase up to 2446 pairs in 2002, while the number of Sandwich Terns strongly fluctuated. The latter species shows peaks in occurrence in 1993 and 2000. The reasons for these strong fluctuations are not clear. All three species of gulls (Black-headed Gull, Herring Gull and Lesser Black-backed Gull) show a strong increase up to 2001. The Lesser Black-backed Gull further increased in 2002, but the number of Black-headed and Herring Gull slightly decreased, probably because of competition for nesting habitat with Lesser Black-backed Gull. For all species the outer harbour of Zeebrugge is by far the most important site within Flanders. Also at the international level, the numbers of Little Tern, Common Tern, Sandwich Tern and Lesser Black-backed Gull are extremely important (1.9% - 3.9% of the total geographical population!). European law protects all the three tern species because their populations are vulnerable for extinction. So, the Zeebrugge harbour has a unique and internationally important ornithological value, but unfortunately this is not translated into any protection of the breeding sites at the national level.

Being highly specialised piscivorous birds, terns are often used as bio-indicators for example to predict the abundance of specific species of fish or the presence of toxicants in the coastal marine environment. To serve as bio-indicator one must, however, know precisely how fluctuations in the marine environment translate into changes in the

biology of the investigated species. This requires the monitoring of a range of parameters for several years. For this reason the reproductive output of Common Terns at Zeebrugge is monitored since 1997 by enclosing a part of the colony with chicken wire to prevent the chicks to walk away from the study site. Up to and including 2001 clutch size (i.e. the average number of eggs per nest), hatching success (i.e. the proportion of eggs that actually hatched) and fledging success (i.e. the proportion of hatched eggs that actually fledge) of the Zeebrugge Common Terns was high. This resulted in a high reproductive output averaging 1.2 fledglings/pair during the period 1997-2001. Such output is by far sufficient to maintain a stable population and is high when compared to foreign colonies. The high reproductive success suggests a high availability of food at Zeebrugge. Surprisingly in 2002 none of the parents were able to fledge a chick. Clutch size and hatching success in 2002 were comparable to those in earlier years, but chick mortality was exceptional high. Data on food composition, food intake rate and growth of the chicks were gathered, but were not yet analysed. However, we got the impression that a combination of food shortage during the chick rearing period and high predation rates by Herring and Lesser Black-backed Gull caused the failure of the 2002-breeding season. Poor breeding success was also recorded in nearby colonies in the Dutch Delta area, suggesting a lack of clupeids in the entire southern North Sea. After all, clupeids are the major food source for Common Tern chicks.

Earlier research on terns in The Netherlands suggests that foraging trip duration (i.e. the time it takes a parent from leaving the colony until it returns with a fish) is a good indicator for the amount food available to the terns. In 2001 and 2002 foraging trip duration was measured at the Zeebrugge Sandwich Tern colony. It appears that the time a parent is absent from the nest is positively related to the size of the prey it brings back to colony (Fig. 1). Compared to Europe's largest colony, which is established at the isle of Griend in The Netherlands, it took parents at Zeebrugge less time to return with a fish. At Zeebrugge in particular small clupeids were brought to nest in a relatively short time. Even compared to a colony at Hirsholm (Denmark) where the availability of clupeids appeared to be very high, foraging trip duration of small clupeids was even shorter at Zeebrugge. In other words: at Zeebrugge there seems to be a superabundance of small

clupeids. There were no large differences in foraging trip duration between 2001 and 2002, suggesting that the availability of clupeids did not decline in 2002. This seems to be in contradiction with our above conclusions that for Common Terns the availability of clupeids has drastically decreased in 2002. There is, however, a major difference in the timing of breeding season between Common and Sandwich Terns, which can explain this seemingly contrast. The latter species hatches most chicks during the last week of May, while most Common Tern chicks hatch around the second half of June.



**Figure 1 Foraging trip duration in relation to the length of the clupeids brought to Sandwich Tern chicks at Griend, Hirsholm and Zeebrugge**

Although we have no evidence for this, it seems that in 2002 the population of small clupeids collapsed somewhere in June when Sandwich Tern chicks did no longer depend on these small prey. On the other hand, Common Tern chicks heavily depend on small clupeids from hatching until fledging. In the next period we will further analyse data gathered in 2002 on chick growth will be linked to the rate of food transport to the chicks. During the coming breeding season also new data will be collected. This will lead to a better understanding of the local food situation and fluctuations therein.

Peer reviewed publications:

Stienen, E.W.M. & Brenninkmeijer, A. 2002. Foraging decisions of Sandwich Terns in the presence of kleptoparasitising gulls. *Auk* 119: 473-486.

Stienen, E.W.M., van Waeyenberge, J, Vercruijssse, H.J.P. 2002. Zilvermeeuw *Larus argentatus* en Kleine Mantelmeeuw *Larus fuscus* als broedvogels in Vlaanderen. *Natuur.Oriolus* 68: 104-110.

Van Waeyenberge, J, Stienen, E.W.M., Vercruijssse, H.J.P. 2002. Kleurringproject van Zilvermeeuw *Larus argentatus* en Kleine Mantelmeeuw *Larus fuscus* aan de Belgische kust: overzicht van algemene resultaten. *Natuur.Oriolus* 68: 146-156.

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Vercruijssse, H.J.P., Stienen, E.W.M., van Waeyenberge, J, 2003. First pure pairs of Yellow-legged Gull *Larus [cachinnans] michahellis* along the North Sea coasts. *Atlantic Seabirds* 4: 127-129.