HERRING GULL *LARUS ARGENTATUS* WINTER DIET AT THE WESTERN BALTIC SEA COAST: DOES ICE COVER MAKE A DIFFERENCE?

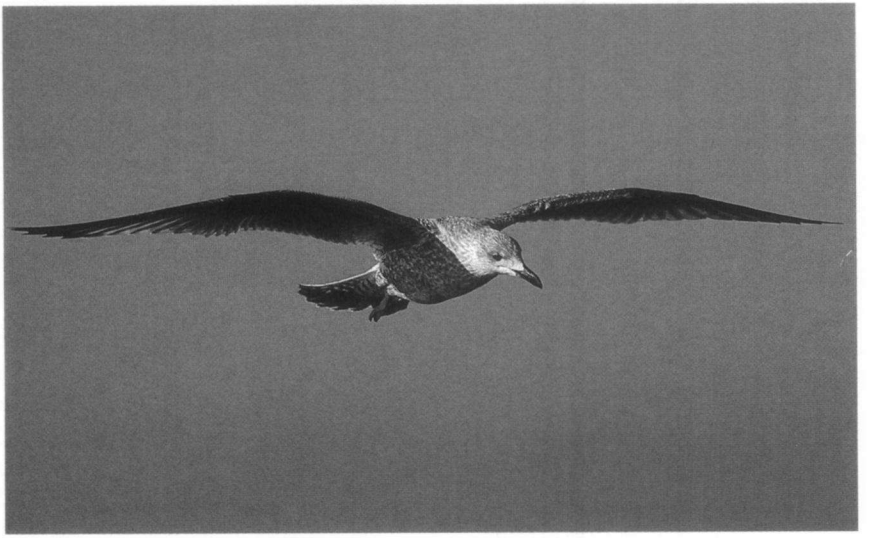
STEFAN GARTHE, KATJA WIENCK & INSA CASSENS

Garthe S., Wienck K. & Cassens I. 2003. Herring Gull *Larus argentatus* winter diet at the western Baltic Sea coast: does ice cover make a difference? Atlantic Seabirds 5(1): 13-20. *The diet of Herring Gulls* Larus argentatus *at Kiel Fjord, Baltic Sea, was assessed from pellets collected in a very cold winter (1995-96), in a very mild winter (1997-98) and in spring 1996 for comparison. Bivalves (mainly* Mytilus edulis*) were the most frequently occurring food item in all three periods. Gastropods (chiefly* Littorina spec.*) and crustaceans (mainly* Carcinus maenas*) were following next. Stones and different types of plant material were also quite frequently present in the pellets. Differences between the three periods were not very marked. Crustaceans, algae, grass and stones were most abundantly found in the cold winter. Oligochaetes occurred only in spring. Stones were quite common in the pellets both by frequency and by mass. In the cold winter 1996, mean stone mass comprised 47% of total pellet mass. It is concluded that Herring Gulls did not alter their diet in the cold winter to a major extent.*

Research and Technology Centre (FTZ), University of Kiel, Hafentörn, D-25761 Büsum, E-mail: garthe@ftz-west.uni-kiel.de and Institute of Marine Research, Dept. Marine Ecology, Düsternbrooker Weg 20, D-24105 Kiel, Germany

INTRODUCTION

Apart from the breeding season, the winter is considered to be the most demanding time for seabirds, especially because of bottlenecks in food availability (see e.g. Cairns 1992 for a review). Enhanced mortality during this period, partially, but not always enforced by human activities, has been described for many waterbird species (e.g. Meininger *et al.* 1991; Camphuysen *et al.* 1996). This might be particularly so for birds which are living in variable winter climates such as the Baltic Sea (Rheinheimer 1996). There, they are subjected to strongly varying water temperatures and ice cover. It is plausible that such conditions may in general influence food availability. Whereas pelagic species such as auks might avoid ice coverage, Herring Gulls *Larus argentatus* feeding extensively at the shore may be much more affected by severe winter conditions. In cold winters, coastlines become covered by ice; in very cold winters such as the winter 1995-96, also large offshore areas of the southwestern



Juvenile Herring Gull Juveniele Zilvermeeuw *(Stefan Garthe)*

Baltic Sea become ice-covered (Strübing 1996a, 1996b). In order to investigate whether diet changes do occur along with the ambient conditions, we compare the food spectrum of Herring Gulls at the western Baltic Sea coast between a very cold winter with considerable ice coverage and a very mild winter with hardly any ice.

MATERIAL AND METHODS

Diet was assessed from pellets during three markedly different situations. First, in the cold winter 1995-96, Kiel Fjord was nearly completely covered by ice for several weeks. Pellets were collected around the coldest period, on 25 February and 19 March 1996. Ice disappeared around the end of March (Strübing 1996b), and diet was studied again in spring on 16 May. Third, pellets were gathered in the very mild winter 1997-98 on 2 February, 9 February and 6 March 1998, with only very little ice near Kiel Fjord. Pellets were collected at two roosts at the Baltic Sea coast close to Kiel, Germany. At these sites, several tens to a few hundreds of Herring Gulls roosted, with a few Great Black-backed Gulls *Larus marinus*. It was impossible to distinguish between the pellets of the two species but the probability of finding Great Black-backed Gull pellets was less than 10% according to relative bird numbers. Pellets were dried and the contents subsequently analysed to the nearest possible taxon following Kubetzki *et al.*

Table 1. Composition (prey occurrence in %) of pellets collected in 1996 and 1998.
Tabel 1. Voedselsamenstelling (voorkomen in %) op basis van braakballen verzameld in 1996 en 1998.

	cold winter		spring	mild winter		
	25 Feb 1996	19 Mar 1996	16 May 1996	2 Feb 1998	9 Feb 1998	6 Mar 1998
Pellets (*n*)	26	37	75	23	18	36
Bivalves	88	97	87	100	89	94
Gastropods	35	32	21	52	50	19
Polychaetes	8	8	7	9	6	3
Oligochaetes	-	-	8	-	-	-
Crustacea	27	11	29	-	-	-
Fish	8	3	5	-	-	-
Insects	-	3	1	-	-	-
Birds	4	3	-	-	-	-
Mammals	-	3	-	-	6	-
Algae	46	57	13	22	28	17
Grass	42	38	5	13	-	17
Other plant material	12	19	23	9	6	17
Garbage	19	19	11	22	6	6
Stones	65	73	53	78	61	64

(1999). Because of the high proportion of stones in most pellets we estimated their percentage by mass per pellet from a subsample of the pellets collected.

RESULTS

Bivalves were the most frequent food type in the pellets in all three periods investigated (Table 1, Fig. 1), with the Blue Mussel *Mytilus edulis* as the main species throughout the study, but many other species were also found. Bivalves, especially Blue Mussels, made up the bulk of the diet also by mass since most of the pellets contained hundreds of fragments. Gastropods (chiefly *Littorina* spec.) and crustaceans (mainly *Carcinus maenas*) ranked second and third. Stones and different types of plant material were frequently present in the pellets. Differences between the three periods were not very marked. Crustaceans, algae and grass were found significantly more often in the cold winter than in the mild winter (χ^2-test of independence, $P < 0.001$ in all three cases). Oligochaetes occurred only in the spring pellets, whereas stones ($P < 0.05$), algae and grass (both $P < 0.001$) were detected more often in the cold winter compared to the following spring (χ^2-test of independence). Stones were quite common in the pellets both by frequency (Table 1, Fig. 1) and by mass. In

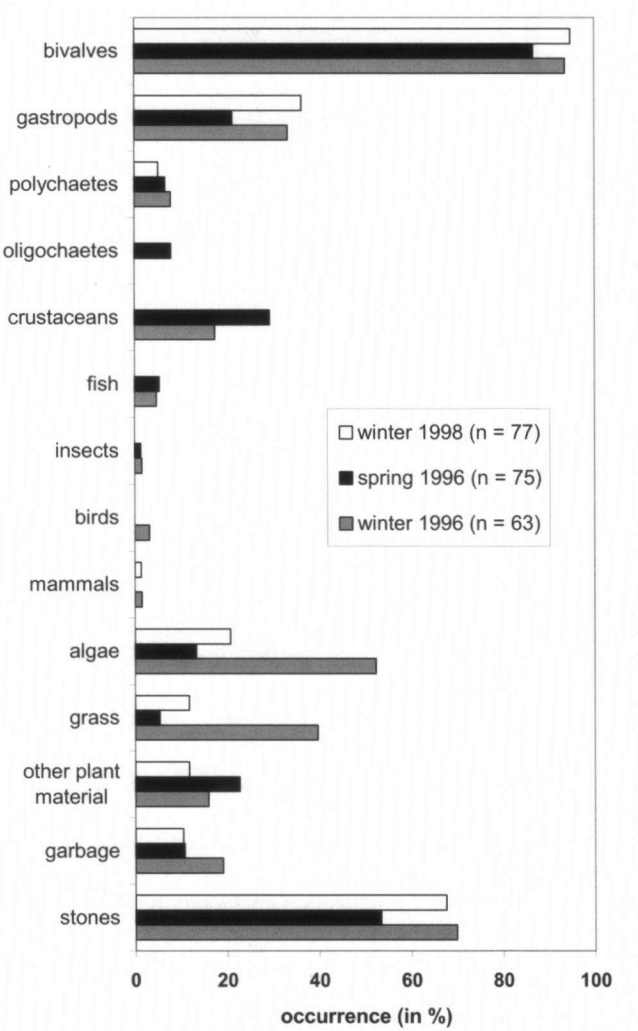


Figure 1. Composition (prey occurrence in %) of pellets collected in the cold winter of 1996, in spring 1996 and in the mild winter of 1998.

Figuur 1. Voedselsamenstelling (voorkomen in %) op basis van braakballen verzameld in de koude winter van 1996, in het voorjaar van 1996 en in de zachte winter van 1998.

the cold winter 1996, mean stone mass comprised 47% (range 0-96%; n = 50) of total dry pellet mass; values for spring 1996 (mean = 9%, range 0-52%; n = 20) and winter 1998 (mean = 15%, range 0-80%; n = 47) were lower.

DISCUSSION

The food choice of Herring Gulls apparent from pellet analysis differed little between the three periods. This is remarkable in so far as the ambient conditions differed fundamentally. The winter of 1995-96 had the highest "ice values" since 1963 (http://www.bsh.de/Meereskunde/Eisdienst/) and have not been reached since then. The same "ice values" ranked close to zero in the mild winter of 1997-98.

Movements of gulls in winter, mostly connected to cold spells, are a common phenomenon in northern Germany (e.g. Prüter 1982; Garthe 1996) so that it is probable that at least some birds leave the area when there is insufficient food. Leege (1943), reporting about the cold winter 1941-42 on the East Frisian Islands, found that Herring Gulls left the ice- and snow-covered Wadden Sea for the mainland because no prey was available at all on the tidal flats. Regular mid-month counts over the years in the study area (count area: Laboe-Bottsand) showed that numbers of Herring Gulls at Kiel Fjord in the cold winter studied were within the range of observations from other years whereas those from the mild winter were lower than usual (Fig. 2; J. Kieckbusch and B. Struwe-Juhl pers. comm.). It remains uncertain whether the birds could meet their energy requirements in the cold winter because pellet analysis does not allow food consumption to be calculated in gulls (e.g. Duffy & Jackson 1986). However, although Herring Gulls are considered to be generalists feeding opportunistically, the birds that produced pellets in the cold winter largely took the same prey as birds staying in the study area in the mild winter. It appears that the birds were able to get food which was thought to be out of reach for them due to ice coverage. As one example, we observed frequent attempts of Herring Gulls stealing mussels from Eider Ducks (*Somateria mollissima*) which might have compensated for reduced food availability. However, such behaviour has also been observed in other, less cold winters (pers. obs.). In contrast to our study, Spaans (1971) showed that percentages of anthropogenic food items increased during periods of deteriorating food availability in the Dutch Wadden Sea area. It is possible that the bivalves, especially Blue Mussels, differed in their origin between the contrasting winters. However, this has not been traced back. Usually, bivalves are exploited by gulls in the littoral zone of the Baltic Sea, particularly in the subtidal on stony beaches and sand banks or when wind causes low tides. Herring Gulls also exploit discards and

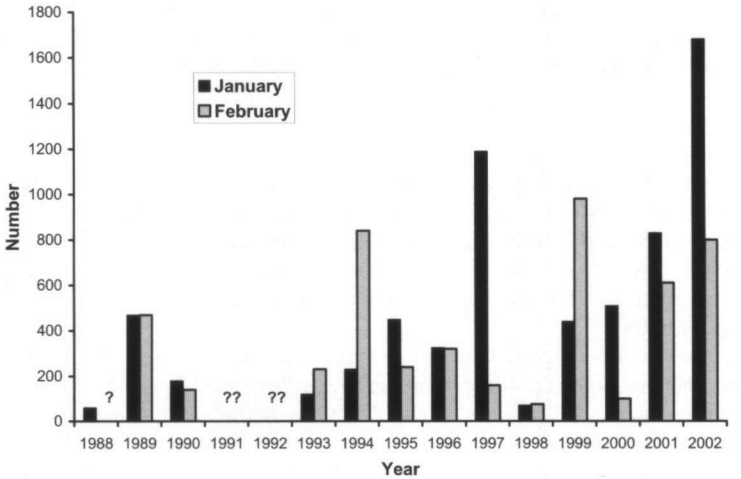


Figure 2. Numbers of Herring Gulls counted during regular mid-month waterbirds counts in the study area (Laboe-Bottsand). Data courtesy of J. Kieckbusch and B. Struwe-Juhl.

Figuur 2. Aantallen Zilvermeeuwen op basis van maandelijkse tellingen in het onderzoeksgebied (Laboe-Bottsand). Gegevens van J. Kieckbusch en B. Struwe-Juhl.

offal from set net fishing boats and trawlers in the Baltic Sea. Although such food remains have also been found in Kiel Fjord, proportions in pellets were much higher further east in the Baltic Sea (Garthe & Scherp *in press*).

Probably the most striking result was the high proportion of stones in the pellets of Herring Gulls. One explanation could be that the gulls took stones to suppress hunger. However, stones have also been found in many pellets in spring 1996 (this paper) and in up to 7% of the pellets collected during the second half of 1999 (Garthe & Scherp *in press*), always at the western Baltic Sea coast. Such observations have neither been made at recent diet studies at the North Sea coast (Hüppop & Wurm 2000; Kubetzki & Garthe *in press*) nor have stones been mentioned to any major extent as stomach content of gulls in the literature (e.g. Vauk & Prüter 1987; Cramp & Simmons 1983). Although stones are sometimes attached to Blue Mussels in the study area, this alone can hardly explain the high percentage (by mass) of stones in the pellets.

It is concluded that Herring Gulls were able to survive in the cold winter 1995-96 without the need and/or the possibility to alter diet to a major extent.

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HET VOEDSEL VAN ZILVERMEEUWEN *LARUS ARGENTATUS* IN DE WINTER IN DE WESTELIJKE OOSTZEE: MAAKT EEN PAK IJS IETS UIT?

De prooikeuze van Zilvermeeuwen *Larus argentatus* in de Kieler Bocht (Oostzee) werd onderzocht aan de hand van braakballen in een zeer koude winter (1995/96), in een zachte winter (1997/98) en in het voorjaar van 1996. Tweekleppigen (hoofdzakelijk Mosselen *Mytilus edulis*) werden het meest frequent aangetroffen in elk van de onderzoeksperioden (tabel 1, figuur 1), op de voet gevolgd door slakken (vooral *Littorina* spp.) en kreeftachtigen (vooral Strandkrabben *Carcinus maenas*). Daarnaast werden o.a. steentjes en allerlei plantaardig materiaal in de braakballen aangetroffen. De verschillen in voedselkeuze tussen de drie onderzoeksperioden waren niet bijzonder groot. Kreeftachtigen, algen, gras en steentjes werden het meest gevonden in de koude winter. Oligochaeten (i.c. regenwormen) werden alleen in het voorjaar in de braakballen gevonden. Geconcludeerd wordt dat Zilvermeeuwen hun menu in de koude winter niet substantieel behoefden aan te passen.

DIE WINTER-NAHRUNG VON SILBERMÖWEN *LARUS ARGENTATUS* AN DER WESTLICHEN OSTSEE-KÜSTE: MACHT EISBEDECKUNG EINEN UNTERSCHIED?

Die Winter-Nahrung von Silbermöwen *Larus argentatus* wurde anhand von Speiballen an der Kieler Förde, westliche Ostsee, untersucht. Die Proben wurden im sehr kalten Winter 1995/96, im sehr milden Winter 1997/98 und für Vergleichszwecke auch im Frühjahr 1996 gesammelt. Muscheln (vor allem Miesmuscheln *Mytilus edulis*) waren die am häufigsten gefundene Nahrung in allen drei Perioden. Schnecken (vor allem *Littorina* spec.) und Crustaceen (hauptsächlich Strandkrabben *Carcinus maenas*) waren die nächsthäufigsten Beutetiere. Steine und verschiedenes Pflanzenmaterial waren ebenfalls recht oft in den Speiballen vertreten. Unterschiede zwischen den drei Perioden waren nicht sehr markant. Crustaceen, Algen, Gras und Steine wurden am häufigsten im sehr kalten Winter gefunden. Oligochaeten (d.h. Regenwürmer) traten nur im Frühjahr auf. Steine waren relativ häufig in den Speiballen; im kalten Winter 1995/96 umfasste ihre mittlere Masse 47 % der gesamten Speiballen-Masse. Anhand der Studie zeigte sich, dass Silbermöwen ihre Nahrung im sehr kalten Winter nicht wesentlich gegenüber dem sehr milden Winter änderten.

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