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Herring gulls feeding again on Pacific oysters *Crassostrea gigas* in the Dutch Wadden Sea near Texel

Gerhard C. CADÉE
Royal Netherlands Institute for Sea Research, POBox 59, NL 1790 AB, Den Burg, Texel, The Netherlands; cadee@nioz.nl

In December 2007, herring gulls again started dropping Pacific oysters on the Wadden Sea dike on the island of Texel (The Netherlands). On this locality they had done this for the first time in 2000, but never since. They were now more successful, crushing over 90% of the oysters against only 30% in 2000. Moreover, they crushed larger and heavier oysters than in 2000. They selected single oysters or small clusters as did the oystercatchers, which started feeding here on Pacific oysters only two months earlier in 2007. Herring gulls take on average larger specimens than the oystercatchers.

Key words: Bivalvia, Ostreidae, *Crassostrea gigas,* predation, gulls, oystercatchers, alien species, Wadden Sea.

INTRODUCTION

The Pacific oyster *Crassostrea gigas* (Thunberg, 1793) was introduced in the southern part of The Netherlands in 1964 and it was introduced into the Wadden Sea near Texel in 1976 (Wolff, 2005). The development of the population in the Wadden Sea has been studied regularly (Dankers et al., 2006; Troost, 2007; Cadée, 2007). My interest is particularly in the reaction of predators to Pacific oysters in this new environment. By growing rapidly and forming large clusters and reefs the adult oysters are difficult to predate upon.

Herring gulls started feeding on the introduced Pacific oysters on Texel in 2000, as I observed during my regular bike ride along 3 km of the Wadden Sea on the southern part of the island. Studying the oysters they dropped from the air I could observe their success in crushing the shells, which was not very high at that time. Only about 30% were broken and consumed against almost 100% of the dropped mussels (*Mytilus edulis* L., 1758) on the same locality (Cadée, 2001). It was my intention to continue this study to find out whether the herring gulls would improve their capabilities. However, for unknown reasons they stopped feeding on Pacific oysters along the part of the dike I visit regularly.

In December 2007, however, herring gulls started again dropping oysters at the same locality. More herring gulls were active now than in 2000 and the cycle path soon became littered with broken shells (fig. 1). Finally, the moment was there to study again their performance!

RESULTS AND DISCUSSION

New observations. -- On 27 and 29 December 2007 I collected all dropped oysters on part of the cycle path to measure their size frequency distribution. It appeared immediately that they were more successful in crushing oysters than in 2000. On the 7th of January 2008 I counted around noon all the oysters dropped on the cycle path, which in the morning was mechanically cleared of broken shells. Of the 139 specimens dropped only 9 (6.5%) had remained intact. A week later I had the same opportunity and found 112 freshly dropped oysters of which only 7 (6.3%) had remained intact. So >90% were broken and consumed as compared with only 30% in 2000. Apparently the gulls persevered longer in dropping oysters, as seldom an oyster is broken during the first trial (Cadée, 2001). As in 2000 the oysters selected by the herring gulls were mainly single ones that had

Figure **1**. Collection of Pacific oysters dropped and broken by herring gulls on the cycle path along the Wadden Sea, Island of Texel, 29 December 2007 (diameter 2€ coin 25.5 mm).

settled as larvae on small objects, mainly shells. In a few cases they dropped clusters of two or more oysters.

Comparison with 2000. - In 2000 the average length of the oysters dropped was 60.9 mm with a range of 36.2-97.4 mm (Cadée, 2001). The herring gulls now dropped larger oysters: the average was 79.5 mm and the range 49.5-150.3 mm (fig. 2).

Also the weight of the oysters carried by the gulls into the air now was higher. In 2000, the maximum weight of the dropped but not crushed oysters, so inclusive of the animal inside, was 93 grams. In January 2008, the maximum weight of dropped but still intact oysters was more than twice that weight, the largest weighing 380 grams and consisted of a cluster of seven oysters all still intact (fig. 3). Apparently the herring gull decided not to spend more energy on this cluster and did not carry it again into the air. In some cases I collected a dropped oyster still connected to a piece of brick to which it had attached itself. One stone plus (empty) oyster weighed 325 grams!

The herring gulls have improved their abilities to crush oysters as compared with 2000. The fact that they now crush also larger oysters is not due to the fact that such large ones were not available in 2000: also at that time (single) oysters up to 140 mm length did occur (Cadée, 2001).

CONCLUSION

Herring gulls in December 2007 and early 2008 consumed larger oysters than they did in 2000. They also consumed larger oysters (average 79.5 mm, range 49.5-150.3 mm) than

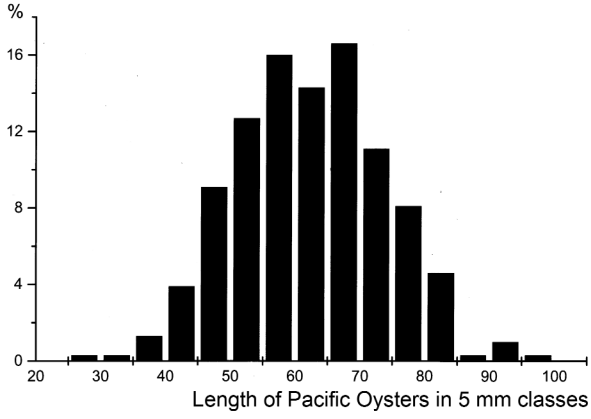

Figure **2**. Size Frequency distribution of Pacific oysters dropped by herring gulls on the cycle path along the Wadden Sea, Island of Texel, 27-29 December 2007.

Figure **3**. A large cluster of 7 Pacific oysters (weighing 380 gr), dropped by a herring gull but not broken

the oystercatchers, which had started here feeding on (single) oysters about two month earlier (Cadée, 2008). Oystercatchers selected oysters from the same oyster population living along the foot of the dike and consumed oysters with an average size of 62.4 mm (range 28.2-98.2 mm). It appears that the herring gulls have taken over exploitation of this food source: oystercatchers were rarely seen feeding on Japanese oysters in the beginning of 2008. Herring gulls and oystercatchers only feed on single oysters and small clusters. Therefore, they are no real threat for the adult oysters living on the oyster reefs. Juvenile oysters may be predated upon by amongst others crabs, but the main predator on adult oysters is still man (Galtsoff, 1964).

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