

1. Development of indicators of ecological and community change

Jochen Depestele^{1,2}, Marie-Joëlle Rochet³, Ghislain Dorémus⁴, Pascal Laffargue³ and Eric Stienen⁵

1. Institute of Agricultural and Fisheries Research (ILVO) Ankerstraat 1, 8400 Oostende, Belgium
2. Ghent University, Marine Biology Krijgslaan 281-S8, B-9000 Gent, Belgium
3. Institut français de recherche pour l'exploitation de la mer (IFREMER) B.P. 21105, 44311 Nantes CEDEX 03, France
4. Université de La Rochelle (Observatoire PELAGIS) 5 allée de l'Océan, 17 000 La Rochelle, France
5. Research Institute for Nature and Forest (INBO) Kliniekstraat 25, 1070 Brussels, Belgium
E-mail:jochen.depestele@ilvo.vlaanderen.be

Fisheries discards generate a major food source for scavenging seabirds and have been shown to significantly affect seabird ecology. Seabirds scavenge mainly on specific types of discards. Roundfish for instance are more easily swallowed than benthic invertebrates with protrusions. This implies that the amount of discards that becomes available to other marine scavengers, notably benthic communities, substantially depends on seabird consumption. Given that discard composition varies greatly amongst fisheries and spatio-temporal factors, the provision of edible discards shows great variability in space and time. So far, most studies estimated the consumption of discards by seabirds over vast areas such as the North Sea. Local effects were generally levelled off. This study developed an approach whereby the finest spatial and temporal resolution was determined for discard and seabird distribution in a single region, i.e. the Bay of Biscay (ICES Division VIIIa/b). The French fisheries that contributed the major part of discards in this area in 2009-2011 were included, namely fish bottom trawlers, *Nephrops* trawlers, gill netters, longliners and pelagic fisheries. The attraction of scavenging seabirds to fishing vessels was assessed by the seabird scavenging index, relating seabird densities to the number of ship followers. Attraction was highest for large gulls in April to September, followed by northern gannets during the rest of the year. Discard consumption rates of ship followers were estimated through an experimental trial on-board the RV Thalassa. Data gaps were resolved with estimates from literature, which served as a validation of our experimental estimates as well. Northern gannets consumed the highest proportions of discards with a strong preference for roundfish. The mechanistic model applied in this study highlights that food subsidies to benthic communities follow a spatio-temporal pattern. Our understanding of these patterns is a key aspect in the improvement of the management of discards and benthic habitats.

Keywords: benthic effects, discard consumption, food subsidies, seabirds, spatial effects