

Does pulse trawling force plaice onto a different diet?

Ribeiro Maria¹, Charlotte Desmet¹, Jozefien Derweduwen², Lorna Teal³, Bart Vanelslander³ and Jochen Depestele²

¹ Ghent University, Marine Biology, Krijgslaan 281-S8, 9000 Gent, Belgium
E-mail: maria.i.c.m.r@gmail.com

² Institute of Agricultural and Fisheries Research (ILVO), Ankerstraat 1, 8400 Oostende, Belgium

³ Institute for Marine Resources and Ecosystem Studies, Wageningen IMARES, PO Box 68, 1970 AB, IJmuiden, The Netherlands

Introduction

Beam trawl fisheries are one of the more important fisheries in the North Sea. Beam trawling has a significant impact on the physical properties of the sea floor, and on the benthic fauna inhabiting the substrate. The benthic animals may be killed directly by the passage of a beam trawl, they may be caught by the gear and subsequently discarded dead or alive or they may escape the passing gear. Scavenging organisms may profit from dead, stressed or injured organisms following a beam trawl's passage. Several beam trawlers have replaced their tickler chains by electrodes to catch Dover sole (*Solea solea*) and European plaice (*Pleuronectes platessa*). This reduces the intensity of physical contact with the seabed and may hence alter the mortality of benthic organisms in the wake of the gear passage. Our study investigated the contribution of moribund or dead benthic organisms from beam trawling to the diet of European plaice and compared differences in diet between areas impacted by tickler chains and areas where electric pulses were used.

Material & methods

Two experimental sites of 1 km by 150 m were delineated in the Dutch part of the southern North Sea (Frisian Front). Fishing disturbance took place along the longitudinal direction of the experimental site by either a 12 m tickler chain beam trawler or a 12 m pulse trawler. The gears were hauled after the first passage across the experimental site (i.e. without prior fishing disturbance) and plaice stomachs were collected. Fishing continued in the experimental sites for up to 13 passages across the site. Stomach samples were collected again after the trawls had passed multiple times across the experimental sites. Trawling took place during summer and in daylight hours. In total 280 plaice stomachs were analysed for individuals ranging between 15 and 37 cm, of which 80 stomachs were collected prior to fishing.

Results and discussion

The diet of plaice in the Frisian front was numerically dominated by annelids (*Scalibregma inflatum*, *Lumbrineris* sp.). The weight of the stomach content was, however, primarily determined by larger organisms such as sea potatoes (e.g. *Echinocardium cordatum*) and bivalves (e.g. *Nucula nitidosa*). Annelids particularly dominated the diet of smaller individuals, whereas larger individuals also preyed on other prey species like the masked crab *C. cassivelaunus*. Preliminary analyses indicated that the diet of plaice changed significantly after fishing disturbance as indicated by an increased stomach fullness and species number in the stomachs. The consumption of small annelids and especially the deep burrowing species *S. inflatum*, increased significantly, although its gravimetric contribution remained low. Changes in diet composition were particularly apparent after trawling with tickler chain beam trawls. The preliminary analyses indicate that plaice increases its foraging efforts after trawling by preying on smaller annelids. The replacement of tickler chains by electrodes reduces the change in the diet of plaice but does not seem to eliminate it.

Acknowledgments

The study was financed by the EU FP 7 project BENTHIS (grant no. 312088; www.benthis.eu).