Distribution of macrofauna in relation to the micro-distribution of trawling effort

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This study focusses on the impact of beam trawling on the Dutch Continental Shelf. As the gears scrape the surface, trawling causes mortality in target and non-target species. Direct mortality due to trawling occurs both among the caught and subsequently discarded animals as in the trawl path, among animals that are damaged or killed by the passing gear. Thus, evidence is available of the direct effects of beam trawling (Collie *et al.* 1997, Jennings and Kaiser 1998, Lindeboom and de Groot 1998) The longer term effects of demersal fisheries on benthic marine ecosystems are still a point of discussion. The long-term impact on a particular species will depend on the direct mortality at each fishing event, the distribution of the fishing effort, the distribution of that species and its life history characteristics such as longevity and fecundity. The longer-term effects may be evaluated from long term trends in benthos or by-catch data. They may also be inferred from comparisons between fished and un-fished areas. The detailed information of fishing effort that recently became available (Rijnsdorp *et al.* 1998) offered the opportunity to compare benthic fauna of areas under different levels of fishing disturbance. Previously, information on fishing activities was limited to a scale of approximately 30 by 30 nautical miles. The information was derived from automated position registration systems. The study focussed on two subareas on the Dutch Continental Shelf. The subareas are, among others, based on the known differences in the distribution of benthic animals in the North Sea. The data on the macrobenthic fauna comes from a detailed survey in the period 1985-1990 and presented in an atlas (Holtmann *et al.*, 1996).

A direct gradient analysis pointed to a globally significant difference in species composition between intensively fished and less heavily fished locations. It is, however, very likely that a major part of these differences are not related to differences in trawling effort but to differences in environmental factors. On the contrary, differences in spionid densities are most likely explained by differences in fishing effort. The total density of spionids, mostly opportunistic species, increased with increased fishing disturbance.