Subsampling beam trawl catches: a necessary evil

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An ecosystem approach to fisheries management shifts the focus from single (commercial) species to wider ecosystem functioning. Such an approach requires data from the entire catch, including non-commercial species such as e.g. benthic invertebrates in addition to the targeted fish species. Such data is rarely readily available from the fisheries industry since it is work intensive and entire catches are often too large and difficult to manipulate. Estimating total catch composition will therefore have to rely on subsampling in order to obtain estimates. This study focuses on the subsample size necessary to obtain reliable estimates of species abundance in flatfish beam trawl fisheries in the southern North Sea.

Required size for a representative subsample depends on the area-specific diversity of the catch and its mixture during catch handling, but since subsamples were taken from a randomized catch, the mixture of the catch was not at stake. Catch diversity and the effect of subsample sizes were addressed specifically. A variety of hauls with different total catches were randomly divided into 10kg boxes. Using an index of relative abundance, each species was classified into different categories individually for each haul: rare, common or abundant. This index clearly indicates that only few species were highly abundant in most of the sampled hauls, such as *Asterias rubens* and *Psammechinus miliaris*. A large number of species were categorized as common, such as *Liocarcinus holsatus* and most discarded species were classified as rare (*Callionymus lyra*, *Aphrodita aculeata*, etc.). Furthermore, a permutation approach was used to identify the number of 10kg boxes required to reasonably estimate species abundance within different ranges of accuracy. This number of boxes required then translates into an acceptable subsample size. As expected, the larger subsample size (i.e. the more boxes used), the higher the accuracy of the species abundance estimate. In addition to this, accuracy leveled off at different subsample sizes for the different abundance categories. Estimations for abundant species required a lower subsample size than estimations for rare species. This study quantifies the abundance specific relationships between subsample size and accuracy in detail and allows recommendations for sampling methodology in the case off flatfish beam trawl fishery in the southern North Sea.