

Optimising sampling intensity through observation, not simulation: An example from an at-sea, demersal fishery sampling programme

Pieter-Jan Schön and Mathieu G Lundy

A key requirement in support of stock assessment, fisheries management and ecosystem-based management is obtaining reliable estimates of commercial catches. These estimates rely greatly on observations from a subset of fishing operations, which are then extrapolated to all operations. The observations, made by fisheries observers or in the form of remote sensing, represent a significant financial burden to the data collection process. Ensuring optimal sampling levels is important for implementing cost effective and informative sampling programmes. Within the Irish Sea *Nephrops* fishery, an intensive observer-at-sea sampling scheme has been implemented since 2011, with more than 200 observer trips per annum. This large sample size allows for a study of optimal sampling levels through observation. The impact of temporal extrapolation assumptions and gear specific raising procedures was undertaken to review the efficiency of the scheme in providing reliable estimates of catch by species. The precision of discard estimates was investigated for a selection of species of different abundance and fishery selectivity. The results indicate species-specific differences in the quality of catch estimates, linked to the temporal stratification and raising methods applied. The study suggests that discards and catch estimates are potentially underestimated when derived from low sample sizes (<40 trips) and characterised by positively skewed distribution of discard rates. Sampling schemes, within defined areas, should consider temporal patterns, fishing gear selectivity and variation due to species encounter rates when setting appropriate sampling levels to improve the quality of estimates.

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Contact author: Pieter-Jan Schön, Agri Food and Biosciences Institute (AFBI), email: pieter-jan.schon@afbini.gov.uk