

## European research surveys for fisheries assessment *vs* The ARRIVE Guidelines; or how to reduce unnecessary mortality on some species – octopus, rays and demersal sharks in Portuguese surveys

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With the publication in 2010 of a directive of the European parliament and of the council, on the protection of animals used for scientific purposes, adaptations to scientific research using animals were converted from advice to legislation. Censuses of marine life and other forms of assessing the identity and abundance of marine animals however, may either be considered omitted or at least partly excluded. However, if scientific practice is advised to adopt the ARRIVE guidelines ([www.nc3Rs.org.uk/ARRIVE](http://www.nc3Rs.org.uk/ARRIVE)), we may proactively streamline research surveys at least with regard to species that can survive on haul-back.

This paper describes the Portuguese bottom trawl survey design and how it impacts the estimation of abundance and population biology for the Common octopus, the Thornback ray and Small-spotted catshark, and how an improvement in operational design may help to achieve a Refinement and Reduction of the use of animals in research, while not compromising the aims of the survey.

### Introduction

The use of animals in research has been increasingly subject to regulation and control, as public awareness on the welfare of animals rises, and their use in human activities is pondered. Although the determination of numbers and distribution of animals may be legally covered by an exclusion of the principles adopted for animal research (Directive 2010/63/EU, article 1, number 4 (e) “practices undertaken for the primary purpose of identification of an animal”), it is the obligation of researchers to be proactive in applying the same principles, as far as possible, to any research conducted. In relation to a limited number of species, it is apparent that censuses are conducted in a way that may sometimes be confused for negligence. Most commonly for the application of assessment methods that are thoroughly researched and scrutinized for scientific correctness and statistical validity, attention is not necessarily devoted to species which are not the object of the survey. The International Bottom Trawl Survey Working Group (IBTSWG) of ICES supervise and validate survey designs, certifying methodologies and enforcing the adoption of protocols. However, details are not provided on the procedures to follow to Reduce the numbers of animals and Refine research, particularly as regards survival beyond the requirements of the research. Our objective was to select a small number of species which are of little added scientific value for the objectives of the demersal trawling research programme, and are known to survive on haul-back. With this case study we aim a greater awareness, and to provide contributions to Reduce mortality and Refine animal use in fisheries research surveys.

### Material and Methods

Standard Portuguese research survey protocols include a set of *ad hoc* requests on species other than the target. Protocols were analysed between 2007-2011 and 2012 to determine all of the procedures to be followed for each of the three species of interest: *Octopus vulgaris*, *Raja clavata* and *Scyliorhinus canicula*. Actions to be taken and numbers required were recorded. Captured species were analysed in the same period to determine unused catches. Acquisition of samples from other sources was also quantified. Responsible researchers were interviewed to determine 1) the use of the specimens from surveys and their added value in relation to commercial acquisition; 2) alternatives when research surveys are not available.

## Results and Discussion

The Norwegian Campbell Trawl 1800/96 (NCT) used for the assessment of demersal species in Portugal is an inadequate sampler of a number of species, since it is equipped with large rollers that keep the ground rope >20cm off the bottom (Pereira, 1999). Octopus is our “flag-species” because of the three it is the most abundant, the most important to fisheries, and arguably the most resistant to handling and capable of understanding the interaction. They mostly avoid the net by remaining squatted on the bottom. Therefore, it is not possible to determine the abundance of the species or its distribution from results of the surveys. In total 597 animals were caught in the period and killed to determine individual length, weight, sex and maturity. Additionally, due to research requirements, samples are commercially purchased monthly from two locations. Data obtained from research surveys are used, but are of no significantly added value. The Thornback ray is a relatively abundant species (Machado et al., 2004) which is not perfectly sampled by NCT although not as poorly as octopus. In the period analysed, 957 specimens were caught, of which 953 were killed. Stocks of species are assessed based solely on the survey index. Presently only numbers per sex and sizes are required, but in order to improve the assessment, extra biological research will be necessary. The Small-spotted catshark is an increasingly abundant species with a low commercial value although the largest individuals are used by fishers for own consumption. Assessment will be based on survey catch rates. The NCT seems to be an adequate sampler for the species which rises from the bottom when chased. In the period analysed, 3330 specimens were caught and their catch locations and quantities recorded. Of those, 3148 were measured and weighed, of which 3 were kept for biochemical and toxicological studies. An undetermined number were killed for the consumption of the crew, a few were released alive at the discretion of the technicians, and the majority were discarded dead due to processing delays.

The objective of the monitoring survey programme is the collection of information on fisheries-interest species, which provide time-series used for the calibration of catches/landings. The majority of the species are of no added value but are killed as unavoidable “collateral damage” due to hereto impossible selectivity. Animals alive on haul-back in research surveys may allow immediate studies or be retained for laboratory research. However, most are of no further value than the recording of catch location and most basic biological parameters. Furthermore, since not all are well sampled, some are not even useful for most basic purposes. Awareness of scientists about the unnecessary utilization of animals is essential, not only for professional and training ethics, but also to ensure that the funding public accepts and supports research efforts. It is clear that the use given to the three selected species is still below standard and may raise ethical issues. Fitting vessels with transient holding tanks might permit additional work while minimizing death. Alternatively, a change of attitude is simply required to Reduce unnecessary mortality. Animals alive on haul-back must be processed first. When time to process “by-catch” animals alive on haul-back is not expandable, an executive decision must be made to waive basic data collection and proceed with immediate release. In order to implement such changes and ensure respect for procedures, a task-force should be selected to identify species/surveys lists and complement existing protocols. We believe this will be acceptable to all parties involved although we realise that for cultural reasons the crew and staff may be allowed the use of a limited number of animals for own daily consumption, provided selection screening is possible immediately upon haul-back.

## References

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