



Technical Guideline No. 03– Collection of finfish
and shellfish of commercial and by-catch species

Richard Ayers

2014

To be used in conjunction with:

**GUIDELINES FOR THE ENVIRONMENTAL MONITORING
AND IMPACT ASSESSMENT ASSOCIATED WITH SUBSEA
OIL RELEASES AND DISPERSANT USE IN UK WATERS**

1 Purpose and Scope

The collection of macro biota as a result of an emergency can be for a number of reasons, to include assessing the immediate impact on population density or individual contamination.

This document discusses the issues that need to be addressed if a fishery survey is required as part of a response to an incident.

This document does not include discussion of survey design or detail on preservation, storage or analysis of samples.

This document supports and should be used in conjunction with environmental monitoring guidelines for subsea oil releases (Law et al., 2014)

2 Health and Safety considerations

The deployment and recovery of fishing gear of all types is considered hazardous, the need to employ an appropriately equipped and laid out vessel along with a skipper and crew that are experienced and competent with the selected gear type(s) cannot be emphasised enough.

Scientific staff engaged in sampling catches must be fully briefed on the gear handling process specific to the vessel and operation, the briefing should include the location of safe and no-go areas for the various phases of fishing operations that can be expected (Transit, Shooting, Towing and Hauling). The scientific team, or each watch if multiple shifts are used, should be led by someone with experience of working with fishing gear in general, ideally with the specific gear in use. Specific risk assessments should be in place to cover manual handling, identification and handling of hazardous species (e.g. weaver fish), any chemicals in use etc.

If the vessel will be working within a hazardous plume or is likely to be exposed to such then an appropriate briefing should be given to both the scientific and vessel staff. PPE should be supplied, along with necessary emergency equipment and a post exposure monitoring plan put into place.

Unless suitably trained, assessed as competent and having completed risk assessments prior to commencing the survey, scientific staff should not be involved in any aspect of deploying or recovering fishing gear.

Prior to any staff joining a vessel to undertake a fishing survey the vessel must be assessed to ensure it is a safe platform to undertake the work required. This prior assessment should also determine the appropriate PPE to be worn during survey operations.

3 Selection of fishing gear

In broad terms, fishing gear can be broken down into 2 main themes : Towed and Static, within these themes further breakdowns provide types of gear that are more and more specialised in terms of (the list is not exhaustive) :

- the species groups and sizes of individual they are designed to catch
- the area of the water column they operate in

- the type of seabed that they can be effectively used on
- the depth of water they can be fished in

It may be the case that to effectively sample the range of species encountered in an impacted area multiple gear types and survey methodologies need to be employed.

If commercial fishing was taking place in an area prior to an incident, the type of gears in use and the species landed will give an indication of what is commercially viable in that locality. If a survey is primarily concerned with assessing the level of contamination of the human food chain as a result of an incident, then selection of the local commercial gear(s) would be considered most appropriate. What should also be considered at this point is whether the impacted area is a nursery ground; although the local commercial fishery may be focussed on, for example potting for crabs, the area could be an important nursery for (e.g.) turbot which migrate elsewhere after several months or years feeding locally. The potentially contaminated juveniles would not be represented in any local commercial catch and would be completely missed if only the most prevalent local gear was selected.

It should be noted that a number of fisheries are seasonal and others dependant on targeting spawning aggregations of fish (e.g. Herring). If the monitoring of an incident or its impacts continues for an extended period of time, the selection of survey gear(s) should be reassessed.

If survey aims are broader and target more than commercially exploited species/size ranges then selection of fishing gear becomes complex. In general terms, towed gears are less selective, i.e. they catch a more representative sample of the species/sizes present in the surveyed area, and would be the preferred selection for mixed (finfish) fishery sampling. Demersal trawls, those towed in contact with the sea bed, are restricted by the nature of the sea bed; a sea bed mostly consisting of bedrock outcrops, boulders, ridges and canyons would present a very challenging environment to fish successfully. Pelagic and semi pelagic trawls, towed some distance off the sea bed, are not subject to these restrictions, but unfortunately, a large percentage of the fish species (by number of species rather than weight or numbers of fish) in UK waters are not found in these areas of the water column in representative numbers.

There are 2 broad types of demersal trawl gear, door trawls and beam trawls, which have some vastly different characteristics, highlighted below with examples from current survey trawls.

Characteristic	Door Trawl (GOV)	Beam Trawl (4 m)
Effective fishing width	60 m	4 m
Effective fishing height from sea bed	4.5 m	0.8 m

Beam trawls can generally be fished on much rougher grounds and are a more robust trawl. Beam trawls have a much tighter ground contact and are more effective at catching species that live on or just below the sea bed surface. Door trawls can be modified to fish rougher grounds but the modifications generally result in less catch of sea bed hugging species (Sole, Plaice etc) and macro benthos.

Both trawl types can be constructed using various mesh sizes and have liners fitted to modify retention rates for smaller species, such as gobies, and juvenile fish.

Static gears such as gill nets, long lines, pots and traps are far more selective and less likely to provide the cross species/size samples of a towed gear. They are a lot less immediate in terms of sample production, for example, a string of crab pots may need to be left in situ for a day or more before hauling to provide a representative sample. These gear types should not be discounted out of hand, factors such as the nature and accessibility of the sea bed and species of interest may make them the ideal survey tool.

Overall, the selection of a fishing gear to conduct a survey in these circumstances has to take a lot of competing factors into account, expert advice should be sought at the earliest opportunity.

The act of fishing is a regulated activity, and there are UK and EU legislations covering the gear and its use, all of which require consideration before a survey could commence.

4 Operation of the gear as a survey tool

4.1 Tow selection

Prior to the survey a decision should have been taken as to how the positions for survey tows are to be selected, whether a fixed, random or semi random grid is employed or a more dynamic in the field approach based on for example plume location, drift etc. The survey manager on board in conjunction with the master or fishing skipper will agree the tow positions, towing direction in relation to survey requirements, vessel capability and weather etc.

4.2 Pre tow assessment

Prior to deploying any bottom contact gear it is essential that the sea bed is assessed as being fishable with the selected gear. If there is prior knowledge of the ground, from the skipper, previous surveys or information from external sources (local fishermen, other institutes) then a detailed assessment may not be required. If the ground to be towed is unknown it is highly recommended that the proposed tow track is run over slowly with the SIC and fishing skipper/master examining an echo sounder or multibeam trace to assess suitability.

4.3 Tow duration

Fishery surveys co-ordinated by ICES usually operate with tow durations of 30 minutes, timing starts from when the gear has 'settled' and is considered to be fishing. When fishing in deep water it may be considered appropriate to fish for longer as it may take more than an hour for the gear to settle and be settled on the bottom. Fishing using pelagic gears targeting a 'mark' is not usually time limited but aims to catch a sample of a size suitable for processing. The survey aims may require different tow durations but if direct comparison to existing survey data is required then it becomes a consideration.

4.4 Tow monitoring

During the tow it is advisable to monitor an echo sounder for unexpected obstructions that could potentially damage the net or result in significantly more serious issues for the vessel. Some trawl gears, door trawls in particular, can be fitted with a variety of sensors that provide real time feedback to the ship on trawl performance; these should be monitored to ensure that the gear is fishing correctly. A particular trawl setup will have defined parameter ranges, for example, headline height and door spread. If a trawl is operating outside the expected parameter range it may not have

deployed correctly or may have been damaged in some way, it should be retrieved, examined and redeployed as necessary.

4.5 Catch handling and sub sampling

Once a trawl has been recovered the catch needs to be processed to obtain the required samples. A trawl catch, dependant on the gear and what fish is on the ground, can be from a few fish up to several tonnes. Usually the catch is emptied from the codend into a hopper or baskets before being sorted.

Once the catch is available to the scientific staff, the processing can begin. Usually this part of the work flow is managed by an experienced person designated as Deckmaster. The role of deckmaster encompasses many things, the main ones being:

- making decisions on how best to process the catch to meet the survey requirements
- allocating tasks across the sampling team
- ensuring protocols and procedures are followed
- managing the data capture process and data integrity/quality
- ensuring the health and safety of the sampling team

Depending on the survey requirements, the catch will be sorted into its constituent species or species groups for sampling, these may be further split by sex and/or size group, this bulk of individuals is referred to as 'a sampled element'. A sampled element may be further sub sampled (by weight, volume or ratio) to provide a manageable quantity to process according to the survey's requirements. The sorting and sub-sampling processes are designed to ensure that any sampling undertaken is representative across the species, sex and size ranges of the individuals in the catch.

4.6 Post tow process

The deployment, towing and recovery of fishing gear can result in the gear being damaged over time. Major damage is immediately obvious, minor damage is often spotted by the deck crew when shooting or hauling the gear and can be repaired quickly. However, gear can sustain damage that is not immediately obvious and it is advisable, where possible, to initiate a process whereby the gear is thoroughly inspected on a regular basis during a survey.

It is also important when fishing at depth to note the condition of the warp. If a vessel carries a large amount of warp but does not regularly fish at depth, the lower layers of warp on the drum, which do not get deployed regularly, can deteriorate to the point of not being suitable to use. This will only become apparent when the trawl has been deployed and is halfway to the bottom on the first tow.

4.7 Cross contamination and geo location of samples

Unlike other forms of sampling (water for example) fishing gear, especially trawl gear, cannot provide samples free of surface cross contamination or from a particularly precise location. A trawl track 1800 m long (an average 30 min tow) will combine fish from that entire area into a single codend, a particular fish can have been caught at any point along the track and have been in contact with other fish, any plume the trawl may have gone through, the sea bed, and the trawl itself for the duration of the tow, accumulating or losing surface contamination throughout the whole process.

Once the catch is on the vessel it still remains difficult to minimise external contamination from hoppers, sorting tables, sampling benches, fish baskets etc as it would be virtually impossible to clean these with, for example pentane.

If these issues need to be avoided or reduced, a method of catching single or small groups of individuals must be employed; the gear selection and survey methodology needs to be revisited. Gears more suited to precise and controlled sampling will be static gears such as gill nets, long lines, hand lines and pots.

5 References

Law, R.J., Brant, J.L., Kirby, M.F., Lee, J. Morris, D. and Rees, J. 2014. Guidelines for the environmental monitoring and impact assessment associated with subsea oil releases and dispersant use in UK waters. Science Series Technical Report. Cefas, Lowestoft, 58 pp.



www.cefas.defra.gov.uk/premiam