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Technical note

Safe practices for sampling commercial trawler catches at sea

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Abstract

Fisheries scientists need accurate data about total catch. If the data are to include fish discarded at sea the scientists must sail with commercial fishing vessels to sample catches as they arrive on the deck. Commercial fishing is dangerous. In 1996, 20 fishers were killed and 26 vessels were lost in the UK alone. Trawling is considered most dangerous because of the frequent handling of heavy equipment. Catch sampling officers (CSOs) permitted by fishers to sail opportunistically on routine fishing trips are not in a position to demand high standards of marine safety as they might if the vessel were chartered. UK health and safety laws require the employer to ensure that all possible risks to staff are minimised, as far as is reasonably practicable. Therefore, when the English North Sea catch sampling study commenced in 1996, attention was given to the safety equipment, training and organisation needed to protect CSOs at sea. The resulting safety procedures and equipment are detailed in this note. Although tailored for UK legislation and climate, they may be a helpful starting point in other countries also. © 1999 Elsevier Science B.V. All rights reserved.

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1. Introduction

Sampling of catches is often undertaken aboard commercial fishing vessels to enable a more complete estimate of fishing mortality than can be obtained from sampling only the landings in port (Dunlin, 1993; Isaksen and Lokkeborg, 1993; Moth-Poulsen, 1994; Emberton et al., 1995; Sangster et al., 1996; Liggins et al., 1997). Discarded and unreported catch can be quantified at sea along with catch which is misreported to area or species (Alverson et al., 1994). This can

provide improved quality data but may increase potential hazards to research staff.

Commercial fishing is a risky occupation, with trawling considered as the most dangerous method because it involves frequent and direct handling of heavy equipment (Kjerstad and Grinde, 1989). For the UK between 1981 and 1988, there were 281 total vessel losses, 96 serious vessel casualties, and an increase in minor incidents from 56 in 1980 to 422 in 1988 (Anon., 1988a). In 1996, 26 vessels representing 0.32% of the total UK registered fleet were lost and 20 fishers killed. Of these deaths only nine could be attributed to the loss of a vessel, the others being caused by accidents on deck or falling overboard (Anon., 1996). Dorval (1989), for the French fishing fleet, estimated the “probability of a

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fisherman dying at sea as 3% and dying because of an occupational accident sustained during their career as 50%". These figures were also found to apply to fishers in Norway and other European countries (Dorval, 1989).

When chartering vessels, scientists can demand high standards of safety. However, chartering costs would severely restrict a sampling survey of commercial fishing vessels, and catches observed on chartered vessels may not be representative of those taken normally. For these reasons, catch sampling officers (CSOs) must seek opportunities to join routine fishing trips for subsistence costs only. In our experience, most skippers and vessel owners are happy to cooperate, but this would be unlikely if CSOs drew attention to low standards of safety on their vessel and demanded improvements. CSOs may be at less risk than the fishing crew because they generally avoid involvement with fishing operations. On the other hand, unfamiliarity with a vessel, its machinery and safety equipment could make overall risks higher for the CSO, particularly if inadequately trained. At present no specific regulations cover the safety of scientific staff who are carrying out opportunistic research aboard commercial fishing vessels.

This note summarises relevant features of UK and international legislation and guidance relating to safety at sea, together with the safety procedures developed at Lowestoft for catch sampling on commercial trawlers. Sea going scientists outside the UK would need to consider carefully the hazards posed by different climates and vessels, as well as the different requirements of their national legislation. We hope that this paper provides a useful starting point.

2. Legislation and guidelines

In 1974, the International Convention of Safety of Life at Sea (SOLAS) was held to address marine safety issues and codes of conduct. This led the UK government to improve regulations covering safety equipment, vessel construction, nautical equipment, crew qualifications, crew accommodation, etc., of fishing vessels (Anon., 1974, 1975a, b, c, 1988b). In addition, several organisations in the UK provide safety information to the fishing industry through advisory leaflets and training courses (Table 1). As well as observing these sea-based regulations and guide lines, the authors had regard to the UK's Health

Table 1
Organisations that provide safety training and guidance to the UK fishing industry

Organisation name (abbreviation)	Contact address	Services provided
Seafish Industry Authority (SFIA)	Seafish House, St. Andrew's Dock, Hull, UK, HU3 4QE	Advisory safety leaflets Technical reports Gear trials Safety training
Royal National Lifeboat Institute (RNLI)	West Quay Road, Poole, Dorset, UK, BH15 1HZ	Provide lifeboat rescue Advisory safety leaflets
The Department of Environment, Transport and the Regions (DETR)	Surveyor General's Organisation, Fishing Vessel Section (DSG1c), Bay 3/10, 105 Commercial Road, Southampton, UK, SO1 0ZD	Codes of conduct Safety legislation
International Maritime Organisation (IMO)	4 Albert Embankment, London, UK, SE1 7SR	Developing international codes of conduct Technical work and advice in all maritime issues, especially safety
Marine Coastguard Agency (MCA)	Spring Place, 105 Commercial Road, Southampton, Hampshire, UK, SO15 1EG	Advisory safety leaflets Vessel surveys

Table 2

An excerpt from a risk assessment for staff conducting catch sampling aboard commercial trawlers

Hazards	Risks
<i>Physical hazards:</i>	
Fish slime on deck	Injury caused by slipping
Harsh working environment	Injury due to limited workspace
	Injury or death by falling overboard
	Strain injury from moving heavy equipment
	Fire on board vessel
	Vessel sinking
	Tiredness
	Falling in dock or on to a vessel from the quayside
Vessel's plant and cargo	Entanglement in winches, warps, nets, etc
	Warps parting under strain
	Cuts from knives
	Injury from overhead obstructions
	Noise from engines and gear
Remoteness of emergency services	Noise and vibration leading to lack of sleep, joint injury
Communications problems	Ill health or injury complications
	Loss of contact in emergency situations
<i>Natural phenomena:</i>	
Weather and sea state	Seasickness
	Working on deck in exposed conditions
	Adverse weather exacerbating all physical hazards
<i>Chemical Hazards:</i>	
	Diesel contamination
	Gas inhalation
	Cleaning fluids
<i>Biological Hazards:</i>	
	Food Poisoning
	Infection of wounds
	Poisoning from fish/catch e.g. weaver fish, jelly fish

and Safety at Work Act 1974 (Anon., 1990) which requires employers to minimise all risks as far as reasonably practicable and provide staff with all necessary information, instruction, training and supervision to undertake their work in safety.

3. Safety procedures for catch sampling on English trawlers

The following safety training and procedures are implemented at Lowestoft:

Firstly, a risk assessment was undertaken to identify the full range of hazards and risks that CSOs could encounter on trawlers fishing around England (Table 2). This guided decisions about the qualities

a person should have before recruitment as a CSO, training needed subsequently, personal safety equipment which should be carried on voyages, and general operational procedures.

Before recruitment, a CSO should have had extensive experience on small boats in all seasons to demonstrate that they are physically robust enough to withstand rough weather and the type of confined living accommodation found on many small fishing vessels. They must have passed the ENG1 medical examination. This is the minimum standard approved by the UK's Marine Coastguard Agency (MCA) for UK registered sea-going ships (Anon., 1983). They should have had sufficient experience of commercial fishing to be aware of the environment in which they will work and of some of the hazards it poses.

A new CSO should be trained:

- to assess the presence and condition of a fishing vessel's safety equipment, and the hazards presented by the deck layout and working space.
- To know the hazards presented by winches, warps and other deck machinery.
- To use pyrotechnics, communications and navigation equipment so that he/she is able to deal with an emergency situation.
- To use and maintain all issued personal safety equipment.
- To carry out basic first aid, fire fighting and prevention.
- To survive as long as possible in cold sea water. In England, sea survival courses are approved by the MCA. They include use of survival suits and life rafts, and vessel abandonment procedures. The courses are the same as required by law for UK registered fishing vessel crews (Anon., 1989).

A new CSO is accompanied by an experienced officer on all voyages until the officer can certify that the CSO is safe to travel alone. The statement is signed and kept on file.

CSOs should take several sensible precautions before leaving the office to undertake a sampling trip. They should check that the vessel they intend to board has a current MCA safety certificate permitting it to go to sea, and that the long range weather forecast does not indicate extreme adverse conditions. In England, fishing vessels must be boarded in distant ports at any time of the day or night and sailing times are not always reliable. In the event of a vessel being lost at sea, establishing whether or not a CSO was actually on the vessel could be difficult. Details of the expected trip are therefore recorded in a file stored in the office and prominently labelled so that it can be located quickly by anyone requiring it. They include the vessel's name and registration number, telephone numbers for the vessel, hotel, skipper/owner, and next of kin, car registration number, and a note of any times when routine mobile telephone contact with the office is unlikely to be possible.

The CSO should establish before departure who will receive and act upon communications from him/her both during and after office hours. A system for passing on routine messages is acceptable after hours,

for example using night watch staff. However, those staff should have a list of telephone numbers for people able to decide what action is necessary in response to an emergency call.

Before CSOs join the vessel, they are expected to discreetly survey its safety. If the dangers are judged too high the CSO should decline the offer of a trip. For instance, lack of a functional life raft or communications equipment would be unacceptable.

CSOs are asked to notify the office when sailing and returning to port, and when at sea, to contact the office daily, if possible. This depends on the vessel's distance from shore and the type of on-board communications equipment available. Any periods where communications are expected to be difficult are advised, e.g. when the vessel will be more than 50 miles from the English shore if using the currently best available mobile telephones. The main purpose of the calls is to provide a recent fix on the CSO's position in the event of an emergency. The opportunity to call the office independently of the vessel's communications may also protect the CSO in the not-unheard-of situation when he/she urgently needs medical attention but the skipper of the vessel refuses to return to port.

The lack of an expected communication from a CSO will only exceptionally indicate a problem at sea. The office contact must judge whether to take action. This would at first involve trying to contact the CSO or vessel through normal communication channels (e.g. VHF radio, telephones), telephoning the contact numbers left in the office by the CSO, and questioning port authorities and the Coastguard if necessary. They would decide if an emergency exists, and if so, what action to take.

Table 3 shows the list of safety equipment issued to CSOs and the basic criteria these items have to satisfy. The CSO should take all items to sea but may not always use them all. The warm clothing and thermal floatation suit are needed to cope with the cold climate of the North Sea and the risk of hypothermia, particularly, if a fall overboard is suffered. However, excessive clothing on warm days would be extremely uncomfortable and could cause thermal exhaustion. A hard hat should be worn on deck when work is going on overhead and during rough weather when there is a danger of slipping. The life jacket should be worn at all times on the deck of any vessel with low rails. Modern designs cause very little discomfort or incon-

Table 3
The safety equipment supplied to catch sampling officers

Safety article	Specifications
Oilskins	Waterproof, oil resistant, washable
Steel toe capped safety boots	Oil, diesel and chemical resistant
Steel toe capped rubber boots	Waterproof and non-slip
Thermal/floatation work suit	50 N buoyancy, fish oil and chemical resistant, washable, flexible, thermal, reflective strips
Clothing – boot socks, woolly hat, boiler suit, jersey, waterproof jacket for dockside	Warm, hard wearing and washable
Rubber gloves and liners	Thin to allow easy fish handling but still strong
Safety hard-hat	Bright colour, chin strap, British Standard Approved
Department of Transport Environment, Transport and the Regions (DETR)/SOLAS/MCA approved lifejacket	Compact, lightweight, comfortable to work in, double chambered, inflatable (oral, manual, and automatic) and of 275 N buoyancy
EPIRB	Small, hand-held, robust, 121.5 mhz (International Distress Channel)
Mini-flares	Pocket sized and easy to operate
First aid kit	Small and compact
Safety harness	Strong, British Standard approved
Small fire extinguisher	Type – dry powder, lightweight (1 kg)
Portable telephone and charging kit	Analogue for best range
Torch	Waterproof
Set of general sea trip procedures and guidelines	Specifically designed to highlight danger areas and safe working practice aboard fishing vessels
Safety at sea advisory leaflets	Produced by MCA, SFIA, MAFF, Departments Trade and (Transport)

venience whilst working. The safety harness may prevent a fall overboard in rough weather but may also cause tripping in confined areas. It should therefore be used judiciously. The fire extinguisher, personal EPIRB, flares and first aid kit are needed because the vessel's equipment may be defective or missing. The flares and EPIRB could also be carried into the liferaft if a vessel had to be abandoned, to help location by rescue services.

Avoidance of danger whilst on board the fishing vessel is a matter of training and common sense. The CSO must stand well clear of working machinery, warps under tension, otter boards, unsecured fish boxes, etc. He/she should never work on deck alone unless clearly in view of the watch keeper. All catch sampling must therefore be completed whilst the crew are on deck processing the catch. Discarded fish which have not been measured, etc. can be bagged up and preserved for later attention. The CSO should obtain sufficient rest and not attempt to sample all catches when hauling occurs many times throughout the 24 h of the day, as on some beam trawlers in the North Sea. Working long hours at sea has been linked to injury risk and poor health in fishers (Kjerstad and Grinde, 1989)

4. Comments

These safety procedures have been in operation for two years and have not been found to affect catch sampling work adversely or to inconvenience fishers. Daily logging in has been reasonably reliable, although accurate prediction of communication difficulties has proved difficult. A need for longer range communications exists since CSOs may be denied permission to use the vessel's own VHF system or it may be unreliable. Satellite communications equipment has a better range than mobile telephones but currently available designs are considered too bulky to carry on small vessels. Issued safety equipment has been found satisfactory, but there is a need to maintain alertness for new, improved products.

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