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Responsible Fishing - Specification of good practice for fishing vessels

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Contents

Foreword

This Publicly Available Specification has been developed by the Sea Fish Industry Authority (Seafish) in collaboration with the British Standards Institution (BSI). Acknowledgement is given to the following organizations that were consulted in the development of this specification.

British Frozen Food Federation

British Retail Consortium

Food and Drink Federation

Marine Conservation Society

Moody Marine

National Federation of Fishermen's Organisations

South Devon Shell Fishermen Ltd

Sea Fish Industry Authority

Scottish Fishermen's Federation

Scottish Pelagic Fishermen's Federation

UK Association of Producer Organisations

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Introduction

This Publicly Available Specification (PAS) was proposed through the Seafish Advisory Committee structure as a means of recognising responsible fishing practices for individual vessels operating in a mixed fishery, controlled under international agreements. It is meant to develop, promote and bring reward for good practice.

1 Scope

This publicly available specification (PAS) specifies requirements for vessel operations and traceability in the sea fishing industry. It specifies requirements relating to fishing practices, vessel criteria, crew competence, environmental considerations and record maintenance.

It is applicable to the supply chain from the fisherman to the point of first sale.

NOTE It is assumed in standardization that users of standards will comply with the law. This PAS does not therefore make it a requirement that users comply with particular legislation. Such matters are outside the remit of standardization.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

UK small cetacean bycatch response strategy. DEFRA, March 2003.

The United Kingdom Turtle Code. The Marine Conservation Society.

3 Terms and definitions

For the purposes of this PAS, the following terms and definitions apply.

3.1
discard
release or return of fish to the sea, dead or alive, whether or not such fish are brought fully on board a fishing vessel

NOTE Fish can be discarded for a variety of reasons such as having physical damage, being a non-target species for the trip, and compliance with management regulations such as minimum size limits or quotas.

[Adapted from FAO (1998): Guidelines for the routine collection of capture fishery data. FAO Fish. Tech. Paper, 382: 113 p]

3.2
discharge
any release, other than fish or fish parts, from a ship howsoever caused, including any escape, disposal, spillage, leakage, pumping, emitting or emptying

NOTE This includes substances that are hazardous to human health and / or to the marine environment. Examples of discharges are fuel oil, oily ballast, bilge water, exhaust gases, refrigerants.

[Adapted from the MARPOL: International Convention for the Prevention of Pollution from Ships, 1973, Attachment 1]

3.3
environmentally friendly
actions whose implied consequences do not include an unacceptable, particularly irreversible, environmental impact

[Adapted from FAO Fisheries Glossary]

3.4
fish
all species harvested from the sea

NOTE For the purposes of this PAS, the term "fish" is used to include all species harvested from the sea, including crustaceans, shellfish, etc.

3.5
marine litter
debris, primarily man-made, and/or waste material that is found in the sea

3.6
non-commercial species
catches from fishing activity which have no, or very little current economic value to the vessel

3.7
fish quality
totality of features and characteristics of a product that bear on its ability to satisfy stated or implied needs

NOTE In terms of fish quality, it is the combined state of freshness, condition, appearance and presentation of the fish. Consumers and buyers from the marketplace consider odour, shelf life, fish appearance, packaging and presentation in order to help them determine what condition the fish is in.

[Adapted from the UN Atlas of the Oceans, definition of fish quality]

3.8
selective gear
gear allowing fishermen to capture few, if any, species other than the target species

[Taken from the FAO Fisheries Glossary]

3.9
sustainable
characteristic of resources that are managed so that the natural capital stock is non-declining through time, taking account of natural population dynamics, while production opportunities are maintained for the future

[Taken from the FAO Fisheries Glossary]

3.10
target species
species that are primarily sought by the fishermen in a particular fishery

NOTE Target species are the subject of directed fishing effort in a fishery. There may be secondary as well as primary target species.

[Adapted from the FAO Fisheries Glossary]

3.11
traceability
ability to determine the transfer of fish through the distribution chain from point of capture to point of first sale

NOTE Fish marketing regulations require the original details of the product (commercial designation, production method, catch area [FAO] and scientific [Latin] name) to be traced to its original source but not to any stages of distribution. These details need to travel with the product by means of direct labelling, or by commercial documents accompanying the product.

[Adapted from Seafish Traceability Update. 17th Nov. 2004]

3.12
undersized
fish caught at a size smaller than the minimum size limit established by regulation

[Taken from the FAO Fisheries Glossary]

4 Crew competence

4.1 General

All crew members shall be competent to carry out their duties onboard ship. As a minimum, this competence shall be demonstrated for all crew members by the completion of the safety training on basic sea survival, fire fighting, first aid and safety awareness.

In addition, skippers, mates and engineers shall hold the relevant MCA Certificates of Competency.

4.2 Training

4.2.1 *Training records*

Records shall be kept of all on-the-job training and of all formal training courses attended by individual members of the crew.

4.2.2 *Hygiene*

All crew members shall have received instruction in basic food hygiene and records shall be kept of all such training.

NOTE The training should ensure that all crew members have a clear understanding of the importance of high standards of cleanliness and the means of achieving them.

All crew members shall be instructed in the vessel cleaning regimes to be followed during fishing operations and when the vessel returns to port (see **6.3.1**).

4.2.3 *Fish handling*

All crew members shall have received instruction in the vessel's care of the catch quality procedures. Records shall be kept of all such training.

4.2.4 *Hazard analysis*

Skippers shall be aware of, and shall comply with, the techniques and the principles of hazard analysis as they apply to the reduction of risk of contamination to the fish.

NOTE For information on the principles and techniques of hazard analysis, please refer to the relevant parts of the Seafish Good Practice Guides.

4.2.5 *Responsible fishing*

Skippers shall be aware of, and shall comply with, the requirements on responsible fishing specified in Annex A, as it applies to their particular fishing operations.

NOTE Annex A is based on the Food and Agriculture Organization of the United Nations "Code of conduct for responsible fisheries", 1995.

4.2.6 *Discharges at sea*

All crew members shall be instructed in the policy on allowable discharges at sea for the individual vessel concerned (see **5.3**).

5 Environmental considerations

5.1 Good practice

In all types of fishing the crew shall make all efforts to conserve the marine ecosystem by following current good practice. Skippers shall be aware of, and shall comply with, the requirements on good environmental practice specified in Annex A, as it applies to their particular fishing operations.

Where good practice documents are published after the publication of PAS 72, the latest publication shall be regarded as the current good practice, once it has been approved by Seafish.

5.2 Marine litter

Fishermen shall make every effort to avoid creating marine litter as a result of their activities at sea.

Any marine litter produced or collected as a result of fishing operations shall be returned to port for safe disposal where it is physically safe and possible to do so. Fishermen shall recover other persistent garbage from the sea as opportunities arise and prudent practice permits.

Fishermen are encouraged to participate in litter surveys and wider marine surveys where available.

5.3 Discharge control

All vessels shall follow a documented procedure that specifies their policy and practice on the control of discharges at sea. The procedure shall include, as a minimum, procedures to minimize the disposal of oily waste, and to ensure safe and efficient handling and storage of shipboard rubbish in order to minimise marine litter.

NOTE Attention is drawn to the levels set by MARPOL 73/78.

5.4 Retrieval of gear

All crews shall take measures to minimise the loss of gear and make every effort to retrieve any gear lost, provided it is safe to do so.

If the crew retrieve any third party gear during fishing operations, it shall be dealt with in accordance with **5.2**.

6 Fishing practices

6.1 Capture

6.1.1 *Selective fishing*

Selective fishing practices and gear shall be used consistent with the principles of responsible fishing. It shall be appropriate for the target species and/or size grades targeted, and shall be appropriate to minimize discards in accordance with current good practice for the area of fishing concerned. Live discards shall be returned to the sea as quickly and as carefully as possible.

NOTE For general guidance on selective fishing in the context of responsible fishing, see Annex A.

6.1.2 *Cetaceans*

Vessels shall follow a documented policy on the avoidance of the capture of cetaceans for fisheries where a cetacean by-catch has been identified. The policy shall be based on the "UK small cetacean by-catch response strategy".

NOTE Work is ongoing on the subject of measures to reduce cetacean by-catch. Skippers should keep abreast of the results of the research and adopt good practice as soon as it has been agreed by Seafish.

6.1.3 *Sea birds*

Where appropriate, vessels shall follow a documented policy on the avoidance of the capture of sea birds.

6.1.4 *Turtles*

Any sightings of turtles and/or the occurrence of a turtle entangled in fishing gear shall be reported to the relevant body in accordance with “The United Kingdom Turtle Code”. Fishermen shall follow the guidelines of the code if handling of the animal is necessary due to entrapment in gear.

6.2 Storage

6.2.1 Fish holds and containers used for the storage of the catch shall allow for the efficient drainage and removal of melt-water and drip loss. The drainage system shall allow melt water to drain away into a sump from where it can be pumped overboard. The sump shall be cleaned on a regular basis.

6.2.2 Unless they are being retained for the live market, fish shall either be:

1. chilled, iced or frozen at sea. Chilling, icing and freezing shall be done as soon as practicable after catching; or
2. landed within 4 hours of being caught (see **6.2.3**).

Chilling, icing and freezing practice shall be in accordance with current good practice.

A log shall be kept of the temperature in the chilling room and frozen storage areas. Temperatures shall be recorded at least twice daily. The records shall be kept for at least 12 months.

If ice is used, it shall be made from potable water or clean sea water. When storing ice, it shall be held in clean surroundings and stored away from the elements. It shall not be left open to contamination from birds and the environment on the deck, or to contamination from crew, chemicals, glass or other substances in the hold. Ice shall be made, transported and handled under hygienic conditions to avoid its contamination.

Where vessels freeze fish at sea, the fish shall be stored at an even temperature below –20 °C. Storage rooms for frozen fish shall be equipped with a temperature recording device which is easily visible. Temperature records shall be kept relating to the periods of time during which frozen fish are stored.

6.2.3 If fish are to be stored for more than 4 hours on un-decked boats and boats without fish-rooms, suitable containers shall be used with the addition of ice to maintain chill temperatures. If chilled storage is not possible in suitable containers, all fish shall be landed within 4 hours of catching.

NOTE 1 Seafish strongly recommend that fish are chilled and kept in insulated containers even if they are to be kept on the vessel for less than 8 hours, due to the risk of deterioration in the quality of the fish, particularly during the warmer months of the year.

NOTE 2 For information on icing on small vessels, see the SFIA publication "Iced storage of fish on small inshore vessels".

6.2.4 Fish shall be protected from the elements and from sources of contamination as soon as possible.

6.3 Hygiene

6.3.1 Vessels shall have a fully documented cleaning regime for food handling areas, covering both the operations whilst at sea and when the vessel returns to port. The cleaning agents to be used and their application rates shall be specified in the cleaning regime information. The cleaning agents shall be food safe.

NOTE The regime should include a requirement that prior to the start of any fishing trip, the skipper or a designated crew member should check the standard of hygiene for all fish handling and storage areas.

6.3.2 At the end of each fishing trip and after landing of the catch, all fish handling and stowage areas, equipment, etc. shall be thoroughly cleaned and disinfected. Cleaning products and potentially toxic substances shall be stored separate from fish handling and fish storage areas.

6.3.3 Effective measures shall be taken to protect the fishing vessel from the infestation of any pests. If evidence of their presence is noted appropriate action shall be taken.

NOTE Measures are detailed in the relevant Good Practice Guides published by Seafish.

6.3.4 Vessels shall have a supply of clean seawater for washing fish and for cleaning down surfaces, and for the refrigerated sea water (RSW) or chilled sea water (CSW) tanks, if appropriate.

Deck hoses shall be stowed when not in use and kept clean, and shall be of sufficient length to easily reach all areas that need to be washed down. The water pressure shall be sufficient for effective wash down.

6.3.5 If the vessel uses bait in its fishing operations, containers for the bait shall be clearly marked as such and shall not be used for any other purpose. Bait shall be held separate from the catch and in such a manner that it cannot contaminate the catch.

6.3.6 Ice machines on board vessels shall be operated in such a way as to avoid sources of contamination and shall be regularly cleaned.

Containers and shovels used to store and dispense ice shall be regularly cleaned and shall not be used for any other purpose.

6.3.7 Gloves and protective clothing including waterproofs shall be cleaned at least daily.

6.4 Quality

6.4.1 *Hazard analysis*

Skippers shall minimise the chemical and microbiological contamination risk to the catch by adopting the techniques of hazard analysis (see **4.2.4**).

6.4.2 *Handling practice*

6.4.2.1 Handling, sorting and stowage of the catch shall be commenced and completed as soon as practically possible after taking the catch onboard.

6.4.2.2 Fish washers and/or deck hoses shall be supplied with clean seawater that is used exclusively for the washing of the catch.

6.4.2.3 If gutting operations are carried out at sea, the vessel shall, where appropriate size, design and layout allow, be equipped with a dedicated chute for the collection and/or disposal of offal.

6.4.2.4 Fish containers, knives, cutting boards, fish washers, hoppers, tables and any other equipment coming into contact with the fish shall be made of durable non-toxic materials, such as marine grade stainless steel, marine grade aluminium and food-grade plastics.

NOTE The use of wood is not recommended.

The presence of glass in fish handling and holding areas shall be avoided where possible. Where it is unavoidable in certain items of equipment or fittings on the vessel, it shall be protected against damage. Regular checks shall be undertaken to ensure that glass material remains undamaged and intact.

If glass damage does occur, it shall be reported to the skipper. Any fish products that may have been contaminated from any such breakage shall be disposed of.

NOTE Damaged glass should be immediately removed and the area thoroughly cleaned.

No person shall be permitted to introduce items made from glass into the fish handling and storage areas.

6.4.2.5 If the vessel is equipped with a refrigerated hold, the hold shall be running and stable at its suitable operating temperature before any product is stored in it.

If the vessel is not equipped with a refrigerated hold and does not have ice making machinery, a sufficient quantity of ice for the length of the trip shall be carried.

6.4.2.6 All fish shall be handled and stowed before taking the next haul onboard. The fish handling area shall be cleaned between hauls.

NOTE This is particularly important for maintaining fish quality.

6.4.2.7 Where the vessel has the capability to freeze all or part of the catch, the fish shall be fully processed and shall commence freezing within 4 hours of being taken onboard. The refrigeration equipment shall be capable of quickly freezing fish to a temperature below –20 °C within 3 hours.

6.5 Landing

6.5.1 All landing of product shall be carried out with care to prevent damage to the fish.

6.5.2 During landing operations every reasonable measure shall be taken to protect the catch from contamination from the open environment.

6.5.3 When the catch has been landed it shall be transferred to a place of storage that will maintain the product at a chilled temperature. If the place of storage is not refrigerated, adequate ice shall be used on the product to ensure it maintains a temperature of <5 °C.

6.6 Traceability

Skippers, vessel owners and operators shall ensure that all fishing activities are carried out in a manner that ensures full traceability. Appropriate measures shall be in place to enable relevant information to be passed to the appropriate authorities in the event of a query. The information shall, as a minimum, include the following:

- vessel identity;
- date of landing;
- location of capture (ICES Division/Sub-area);
- species;
- weight.

NOTE For guidance on traceability, see Seafish Update, 17 November 2004.

7 Record keeping

7.1 Crew

A record shall be kept onboard the vessel of all crew members listing the following information:

- name;
- address;
- next of kin;
- emergency contact;
- blood group and any specific health issues.

A record shall be kept of all crew training (see **4.2.1**).

7.2 Records and quota species

A record shall be kept of all fishing activity, including both quota and non-quota fishing (see **6.6**). The record shall cover the following items:

- vessel identity;
- name of master;
- trip departure and return details;
- quantities (live weight) of fish caught on every day's fishing;
- position details of where fish caught (ICES Division/Sub-area).

The record shall be signed off daily and signed off for the trip.

NOTE One suitable format for the records is the EU Log Book.

8 Vessel criteria

8.1 Standards of finish

The areas of the vessel where fish are taken onboard, handled and stowed shall be fit for purpose such that they are easy to clean and drain freely. The surfaces of the vessel in these areas shall be constructed from waterproof, durable and smooth materials. If the vessel is of wood construction, the surfaces shall be regularly scrubbed clean and shall be free from splinters.

8.2 Contamination risk

The area of the vessel where fish are taken onboard, handled and stowed shall be clear of contamination from bilge water, sewage, exhaust emissions, fuel, lubricants or any other substances hazardous to human health.

Where painted surfaces are present, they shall not be in a blistered or flaking condition which constitutes a contamination hazard.

Lighting in fish handling and storage areas shall be suitably protected against breakage.

Annex A (normative)
Responsible fishing operations

A.1 Background

Harvesting of the world's seas has become a major source of food for humanity, and a provider of employment and economic benefit to those engaged in the supply of fish from the oceans. These marine resources, although renewable, are not infinite and need to be properly managed if the economic and social well-being of the growing world's population is to be sustained. Over-exploitation of some of the world's fish stocks has threatened the long-term sustainability of some fisheries and the contribution of those fisheries to food supply.

In 1991 the FAO Committee on Fisheries (COFI) recommended that new approaches to fisheries management embracing conservation and environmental, as well as social and economic, considerations were urgently needed. Hence the "Code of Conduct for Responsible Fisheries" was adopted in 1995.

Building on the framework of the FAO Code, the EU has produced the "European Code of Sustainable and Responsible Fisheries Practices", directed primarily at fishing operators.

The principles and guidelines set out in the following clauses have been drawn up using the format and context of both the EU and the FAO codes, presented in a form that is concise and applicable to fishing operators in the UK.

A.2 General principles

The following principles set out the context for what shall be done in order to fish in accordance with the concepts of responsible fishing and good environmental practices.

A.2.1 *Principle 1*

Fishermen shall acknowledge that conservation and sustainable use of marine resources is a shared responsibility, and requires a spirit of cooperation among all industry participants and with the appropriate regulatory authorities.

A.2.2 *Principle 2*

Fishermen shall take appropriate measures to ensure fisheries are harvested and managed responsibly to safeguard the sustainability of marine resources for present and future generations.

A.2.3 *Principle 3*

Taking into account the economic importance of the fisheries to industry participants and their communities, fishermen shall take appropriate measures to pursue the ecological sustainability of UK, EU and international fisheries.

A.2.4 *Principle 4*

To the extent practical, fishermen shall minimize unintended bycatch and reduce waste and adverse impacts on the marine ecosystems and habitats.

A.2.5 *Principle 5*

Fishermen, in association with other industry organizations, shall develop, maintain and promote public awareness and understanding of the issues surrounding responsible fishing and the measures taken by fishermen to conserve stocks and protect the environment.

A.2.6 *Principle 6*

Fishermen shall promote the recognition of their specialized knowledge gained through experience, and the integration of this knowledge within scientific analyses and fisheries management policies and regulations.

A.3 Guidelines

The following guidelines set out in broad terms how to operate in line with the general principles set out in **A.2**.

Note that some of the actions associated with the following guidelines will not be applicable to some fisheries and to some fishermen, for example if the initiatives described have not yet started in that fishery, if a fisherman has not been called upon to participate in a research project, etc.

A.3.1 *Environmental interaction*

A.3.1.1 Practice environmentally sound waste management in all aspects of harvesting operations.

A.3.1.2 Cooperate with appropriate authorities and agencies to establish sound waste management policies and procedures.

A.3.1.3 Investigate with appropriate agencies, methods to optimize fuel consumption and other energy savings and adopt such energy conservation policies and procedures. Minimize emissions of dangerous substances arising from fishing operations to meet national standards and/or regulations.

A.3.1.4 Work in full consultation with management, other regulatory agencies, and all interested groups to consider the possible introduction of conservation areas for vulnerable marine species.

A.3.2 *Fishing practices and operations*

A.3.2.1 Use only gear authorized for use in a particular fishery.

A.3.2.2 Cooperate and assist with relevant bodies' research to assess fishing gears and promote and utilize new fishing gears and practices which are consistent with sustainable fishing practices.

A.3.2.3 Where such opportunities arise, be prepared to assist and participate in research and assessment initiatives aimed at the protection of marine resources and the environment.

A.3.2.4 Employ fishing practices that minimize the risk of gear loss. Where loss does occur, make every reasonable effort to retrieve it.

A.3.2.5 Avoid interfering with fisheries operations being carried out by other vessels.

A.3.2.6 Preserve the quality of the catch.

A.3.3 ***Fisheries management and regulation***

A.3.3.1 Co-operate with fisheries management and scientific study to develop policy and action plans for sustainable fishing operations.

A.3.3.2 Identify, in consultation with national, regional and local management bodies (e.g. Sea Fisheries Committees, SFPA, DARD NI) any applicable regional or local codes of practice. Demonstrate familiarity and compliance with these.

A.3.3.3 Where such opportunities arise, be prepared to assist with the establishment of effective mechanisms to ensure consultation and participation of fishermen in the planning, development, conservation, and management of UK, EU and international fisheries.

A.3.3.4 Cooperate with fisheries management to integrate and balance the experience, expertise, and acquired knowledge of practicing professional fishermen with the best scientific research available.

A.3.3.5 Cooperate with industry and other fishermen to identify issues related to protection of the resource and the environment.

A.3.3.6 Cooperate with fisheries management to address problems experienced by individual fisheries and where there is shared jurisdiction, work cooperatively towards a fair and agreed basis for conducting individual fisheries.

A.3.4 ***Research***

A.3.4.1 Participate in the implementation of research and assessment initiatives aimed at protecting the biodiversity of the marine ecosystems and its habitats.

A.3.4.2 Collect and provide research and assessment data related to fishing activities.

A.3.4.3 Support research initiatives aimed at minimizing adverse impacts to the resource and the environment.

A.3.5 ***Environmental communication***

A.3.5.1 Notify relevant individuals and organisations of vessels' certification (e.g. customers, management bodies).

A.3.5.2 Participate with other organizations within the industry to assist in the promotion of public awareness and understanding of the issues and benefits surrounding responsible fishing, the industry's involvement in sustainable development initiatives, and measures taken to conserve fish stocks and protect the marine environment.

A.3.5.3 Assist in the communication of information to the general public and to other fishermen and their organizations regarding conservation principles and measures taken by fishermen, and rules and regulations formulated in consultation with other management groups.

Annex B (informative)
Nephrops guide

This annex contains information extracted from "The good practice guide for nephrops fishermen" published by Seafish.

B.1 Fishing practices

The design and use of fishing gear, e.g. mesh size, mesh shape, twine size, escape panels, cod-end configuration, should be consistent with the principles of responsible fishing, and should maximize target species and size grades, and minimize discards.

Trips should be kept to the shortest practical duration. Trawl tow times should be kept as short as practical. Long tow times result in damage and quality loss of product.

Where bottom conditions are muddy, the net may be towed behind the vessel for a short time to wash away mud and other sea-bottom detritus. As the temperature of the surface water may be higher than that at which nephrops are caught however, the period should be short.

B.2 Onboard handling

During any handling procedures associated with nephrops, great care should be taken as any damage will accelerate the spoilage process and thus reduce the market value.

Marketable fish bycatch should be treated with the same level of care as that given to nephrops and in accordance with good recommended practice.

When tailing nephrops, every effort should be made to remove all head parts, internal organs and legs.

Purpose-designed washers are recommended but where a fish basket and deck hose are used, the deck hose should be of low pressure. The basket should only be half-filled (5 kg to 6 kg) and gently shaken. Dock water must not be used.

Where a washer is used, care needs to be taken not to overload it and not to leave product in the washer for excessive time, as this will lead to damage and ultimately quality loss.

Tailed nephrops should be washed after tailing.

B.3 Onboard storage

Both tailed and whole nephrops should be thoroughly iced throughout the box to maintain the temperature close to 0 ^{o}C.

Pre-chilling nephrops by immersion for a short period of time, in an ice-water mix or slurry ice, before boxing and icing, will aid rapid cooling.

Using papers between the ice and nephrops reduces the effectiveness of chilling, by preventing the ice meltwater draining through the product.

Clean plastic mesh materials are ideal for placing on the top of the product prior to applying the top layer of ice. This lets the meltwater flow freely through the product, and allows easy removal of ice ashore, without damaging the nephrops.

After boxing and icing, nephrops should be stored under prescribed conditions of hygiene and temperature control (see **B.4**).

Fish boxes not held below deck must be covered to protect them from the elements and sources of contamination, at all times.

B.4 Dipping, weighing and packing at sea

Whole chilled nephrops which will be older than 48 hours from catch when landed, may be dipped in a sodium metabisulphite solution. Whole nephrops that are dipped should not be tailed and sold to processors.

It is not necessary to dip tails where adequate care is taken to preserve quality through good icing practices.

There is a demand from processors for undipped tails; however with customer's knowledge and approval, tails may be dipped. They should only be dipped where the dip strength can be accurately monitored, using a refractometer or similar measuring device. Where accurate monitoring equipment is not available, tails should not be dipped.

For the purposes of allergen labelling, the regulations do not apply to foods sold loose or those pre-packaged for direct sale. However, processors who purchase and present the nephrops for sale in a pre-packaged format need to declare the presence of any allergenic ingredients. They therefore need to be made aware of nephrops which have been dipped.

B.4.1 *Dipping Procedure – Good practice for whole prawns*

Immerse 10 kg to 12 kg of prawns in a 2.5 % solution of sodium metabisulphite for 3 minutes.

Only clean nephrops should be dipped as organic matter reacts with sodium metabisulphite and stops its action.

The volume of nephrops to sodium metabisulphite solution should not exceed 1:2.

This solution is made by dissolving 1 kg (2.2 lbs) in 40 litres (8 gallons).

The solution should be changed every 10^{th} basket.

A health and safety risk assessment should be made on this operation.

The sodium metabisulphite solution should only be used in a well-ventilated area, and suitable protective equipment should be worn to protect the handler's skin and eyes.

The solution is highly corrosive and should not be discharged to the bilge or via seacocks. Disposal of the used sodium metabisulphite solution should only be done while the vessel is underway in order to maximise its dilution. Disposal should never be carried out in the harbour as it is toxic, even in low concentrations, to many organisms.

B.4.2 *Weighing good practice*

It is recommended that the nephrops be weighed and labelled in the fish hold wherever this is practically possible. If not possible, then the scale should be located on deck.

Ensure the scales are correctly tared for the container used to weigh the nephrops.

Keep a calibration weight aboard and check the scales on a daily basis for accuracy. If possible record the calibration weight check.

Allow nephrops to stand for a suitable time to allow excess wash water to drain off before weighing.

The crewman needs to be instructed, or the weighing equipment set, to ensure that a minimum target weight of nephrops is achieved before a box is labelled and packed.

The crewman needs to be instructed not to make up boxes so that they are excessively heavier than the desired minimum target weight, otherwise high give away and quality loss due to overfilling could result.

B.4.3 *Packing good practice*

Add a good layer of ice to the bottom of the box; avoid using old solid ice.

Place layers of nephrops into the box, handling carefully to avoid damage, with a scatter of ice in the middle to aid rapid chilling throughout the box.

Top off with ice. Do not use excessive amounts of ice in each box or the pre-weighed nephrops will be proud of the top of the box.

A properly filled box should be below the level of the rim and be made up with ⅓ ice.

Recommended maximum weights for a 70 litre box are as follows:

Chilled whole nephrops – 20 kgs (approx 3 stone);

Tails – 25 kgs (approx 4 stone).

Nephrops packed in this way will not be subject to compression and therefore unnecessary damage.

Label each box.

On landing, the fresh product temperature should be <5 °C.

B.5 Freezing nephrops

Freezing of nephrops at sea might offer financial benefits, particularly for vessels working remote grounds that require long steaming times. It also allows for a greater proportion of the catch to be retained whole, compared with vessels working long fresh trips.

After grading and washing, whole nephrops should be pre-chilled in refrigerated or iced water prior to blast freezing. Nephrops should be handled and frozen in rigid containers to prevent the shedding of limbs or damage when handling frozen. Core temperatures should be brought down to –25 ^{o}C within 4 hours.

After freezing, nephrops should be stored under prescribed conditions of hygiene and temperature control.

Annex C (informative)
Pelagic fishing (RSW and CSW) guide

This annex contains information extracted from "The good practice guide for pelagic fishermen" published by Seafish.

C.1 Fish storage

RSW or CSW tanks should be adequately insulated to protect fish against heat from the engine compartment, ambient deck conditions and the surrounding sea. They should be made of or coated in a material that is waterproof, resistant to decay, smooth and easy to clean and disinfect. They should be designed and constructed to avoid dirt traps and to facilitate drainage.

C.2 Fishing practices

Between hauls, hoppers, deck-pounds, conveyors and any equipment coming into contact with fish should be rinsed down with clean sea-water. Any fish or debris trapped in the net/gear should be removed.

C.3 Fish handling

Pumps, chutes, hoppers, etc. should be designed to prevent physical damage to the fish caused by long drops or by crushing. Pump rates should be set at a level that does not lead to bruising of the fish or crushing in hoppers or chutes. Chutes should be angled so that the fish do not drop too quickly into the tank.

C.4 Icing and chilling practices

RSW tanks should be pre-chilled before fish is brought on board. It is essential that the ratio of fish to water is not too high, as smaller quantities of water will be used to chill larger quantities of fish, and it will be much more difficult to meet the temperature requirements. Furthermore, insufficient water will result in undue damage to the fish held in the tanks.

The addition of ice to the water can hasten the rate at which the temperature of the fish/water mix falls.

C.5 Cleaning of tanks

RSW/CSW tanks should be flushed clean and filled with clean seawater when the vessel starts a new trip. Water treatment systems may be used to clean the tanks during the flushing process.

Food safe detergents and sanitisers should be used in any cleaning operations.

C.6 Temperature monitoring

Pelagic vessels are normally equipped with refrigerated tanks or they use a mixture of ice and water. The correct setting and maintenance of the tank temperatures is essential if the fish is to be held over time with minimal quality loss.

If set too high the catch will be stored at a temperature which does not inhibit the bacterial growth of naturally occurring spoilage bacteria on the fish. This will result in a faster quality loss of the catch, thus reducing its potential shelf life. With pelagic species, good temperature control is necessary to inhibit the development of histamine in the fish.

Good circulation should be achieved in the tanks to prevent warm spots. If warm spots occur in any tank, some fish will spoil more rapidly than others. Temperature sensors should be fitted in areas which reflect the warmest temperatures.

RSW and CSW tanks should be fitted with a temperature recording device, ideally linked to a computer in the wheelhouse for continuous monitoring.Temperatures in the tanks should be monitored and recorded throughout the trip. The data should provide evidence to customers and enforcement officers that minimum temperatures have been reached within the required timescale, and maintained throughout the trip. As herring and mackerel are often frozen, it is recommended that the tank temperature data are kept for at least two years.

Annex D (informative)
Whitefish / Demersal fishing guide

This annex contains information extracted from "The good practice guide for demersal fishermen" published by Seafish.

D.1 Fish storage

Where holds are not refrigerated and where the vessel is not equipped with ice-making machinery, a sufficient quantity of ice should be carried for the length of the trip.

D.2 Fishing practices

Tow times should be kept to a minimum.

Between hauls, hoppers, deck-pounds, conveyors and any equipment coming into contact with fish should be rinsed down with clean sea-water. Any fish or debris trapped in the net/gear should be removed.

D.3 Onboard handling

The receiving pound/hopper for taking the catch onboard should be designed so as to protect the catch from the sun, the elements and any source of contamination. The use of spray bars and/or the application of ice to the catch is recommended to help keep it cool and moist.

Handling, sorting and stowage of the catch should be commenced and completed as soon as practically possible after taking the fish onboard.

Sharp instruments should not be used to handle fish, other than for handling large species which present a safety hazard for the crew. In such circumstances, such tools should only be used in the head of the fish so as not to damage the flesh.

D.4 Onboard processing

Where fish are processed onboard, such operations as heading and/or gutting must be carried out hygienically. Once gutted, fish should be washed without delay. Washing should ensure that all remaining viscera, blood and seabed debris is removed. All gutting activity must ensure that fish offal and other waste products are separated from the catch and are disposed of in such a way so as not to come back into contact with the washed and gutted fish.

Gutting and bleeding should take place as soon as possible to ensure the blood drains freely from the fish. Ideally, gutting and bleeding should be undertaken within one hour of coming aboard. The belly cavity should be opened with a single cut and all internal organs, including the heart and all traces of kidney and liver tissue removed.

If livers and roes are to be selected and kept, then they need to be stored chilled, iced or frozen.

Gutting stations and knives should be kept clean throughout the duration of the fishing trip. Knives used for gutting should be kept sharp and be regularly rinsed during use. Crew members handling fish should take particular care to maintain clean hands, gloves and clothing.

Where gutting machines are used, they should be rinsed frequently during long periods of use. Blades should be kept sharp at all times. Brushes should be checked and replaced when worn. Washing should be carried out with a good flow of continuously running clean

seawater. The quantity of fish in the washer should be regulated to avoid overloading and fish should be left for a suitable time to ensure they are fully cleaned.

Smoking and spitting should not be permitted in the fish-room or fish handling areas.

D.5 Onboard storage

Containers used for storing fish need to be fit for the purpose of holding product hygienically and chilled, and capable of being maintained in a clean condition. They should be constructed with an adequate number of drain holes of a large enough size to allow the free drainage of melt water from the fish.

Containers used for fish storage should have a layer of ice placed in the bottom of the container before fish is added. Layers of fish, followed by ice, should be placed into the container to fill it. A final layer of ice should be placed on the top of the container.

The top level of ice should not be proud of the upper rim of the container, to prevent crushing of the product. The volume of ice should be sufficient to maintain the product at a temperature of between 0 ºC to +3 °C.

Fish should be placed into the container belly-down to aid drainage and to prevent melt water accumulating inside the body cavity. Fish should also be aligned in the same direction, to prevent distortion, twisting and crushing of the product. Placing papers between the ice and fish reduces the effectiveness of chilling by preventing the ice melt water from draining through the product; as such the use papers is not recommended.

Where vessels store fish in bulked form, the same procedures for the icing and packing of boxed product should apply. Shelves should be inserted to prevent the crushing of fish in large bulk storage holds.

Where the volume and species mix is such that no serious detrimental effect will be experienced to the catch, fish species may be size graded at sea to an acceptable standard for the market requirement.

Where volumes of fish caught are sufficient, and the size of the vessel allows, weighing and boxing of fish at sea is recommended.

D.6 Weighing and labelling at sea

Where regional market conditions prefer, size grading, weighing and boxing of fish at sea may be carried out as it eliminates the need for de-icing, grading and weighing before sale.

It is recommended that the fish be weighed and labelled in the fish hold wherever this is practically possible. If not possible, then the scales should be located on deck.

Ensure the scales are correctly tared for the container used to weigh the fish.

Keep a calibration weight aboard and check the scales on a daily basis for accuracy. If possible, record the details of the calibration weight check.

Allow fish to stand for a suitable time to allow excess wash water to drain off before weighing.

The crewman should be instructed, or the weighing equipment set, to ensure that a minimum target weight of fish is achieved before a box is labelled and packed.

Target weights should include a drip loss allowance to help ensure a minimum weight of fish at landing.

The crewman should be instructed not to make up boxes so that they are excessively heavier than the desired minimum target weight, otherwise high give away and quality loss due to overfilling will result.

D.7 Labelling practice

As an aid to compliance with traceability regulations it is strongly recommended that containers of fish are labelled at sea with the following information:

- vessel identification;
- species of fish;
- size grade (where applicable);
- date of capture;
- unit weight;
- area of capture.

Any additional information such as haul number, fish code may be applied at the discretion of the individual but this is not mandatory.

Labels should be attached or displayed on each box in such a way that all fish label data is clearly visible to the buyer on the marketplace.

D.8 Box weight declaration

It is not recommended that labelling statements give any reference to a "guaranteed" weight. This is due to the fact that the various factors that have an effect on drip loss mean that it is not possible to accurately predict box weights 8 to 10 days in advance.

There are two methods of declaring box weights currently in use.

Method 1: Box labels published with the actual "weighed at sea" weight.

Each box label displays the actual weight of fish contained in the box at the time it was weighed and packed at sea.

When displaying fish weights in this way the label needs to incorporate a fixed statement, which clearly indicates that:

i) the weight relates to the weight of fish when it was weighed at sea;

ii) it will be subject to a degree of drip loss.

Method 2: Box labels published with the predicted weight of fish offered for sale.

The label displays the weight of fish that is estimated to be in the box after a drip loss factor has been taken into account (for advice on drip loss factors see "The good practice guide for demersal fishermen").

Weighing systems displaying label information in this way should incorporate a fixed statement that says that the published weight on the label is the "Target Weight".

Annex E (informative)
Dredge harvested live bivalves guide

This annex contains good practice guidance based on Seafish expertise. It also contains information taken from "*Guidelines for Facilities and Equipment Required for Handling Bivalve Molluscs from Harvesting through to Distribution to Retail Outlets*".

E.1 Harvesting areas

Mollusc harvesting areas are designated under EC Regulation No. 854/2004 according to their levels of microbiological contamination as determined by survey. Dependent on the results of this survey, molluscs designated waters are classified as one of the following designations:

- **A**: may be harvested and placed on the markets without further treatment.
- **B**: requires depuration (purification), relaying in "A" classification waters, or heat treatment in a specified temperature/time regime before being placed on the market.
- **C**: requires relaying for at least 2 months in "A" or "B" classification waters, followed by depuration as appropriate, or heat treatment in specified conditions of temperature and time.
- **D**: harvesting prohibited.

Harvested bivalve molluscs need to be dispatched through an approved centre and depurated in an approved plant if required. Registration documentation needs to accompany the consignment from harvest to dispatch centre using the common and Latin names for the species.

Wild scallop harvesting areas are not normally classified under the microbiologically based classifications but they are included under the measures designed to avoid harvesting of bivalves containing harmful levels of algal toxins. Note that this position is currently being reviewed. For further advice, please contact Seafish.

E.2 Shell fish diseases

In order to control the spread of molluscan shellfish diseases there are movement restrictions placed on bivalves originating from certain waters. Details are given on the CEFAS website.

E.3 Nature conservation

Some dredging activities can have an impact on habitats of nature conservation importance.

For activities such as plans and projects that could affect a conservation feature, fishermen should work with the competent authority to carry out an appropriate assessment. Guidance on assessments is given in the English Nature publication "*Habitat Regulations Guidance Notes No 1*".

In various parts of the country there are non-statutory schemes, in which fishermen can participate, that seek to conserve habitats of nature conservation importance but outside the statutory framework. Fishermen should be aware of such schemes and should participate in them where appropriate.

NOTE For information on responsible fishing, see Annex A.

E.4 Fishing strategy

Effort should be deployed in such a way as to allow dredged areas to recover before being dredged again. Where effort is regulated in a formal management structure this occurs for the whole fishery. In unregulated fisheries economic catch levels tend to regulate the amount of applied effort in a given area. Thus when catch per effort falls below an economic level, vessels move to other grounds.

As much information on seabed composition should be used to target effort specifically on substrates containing the target species whilst avoiding damage to other habitats. The means to do this vary between fisheries from simple reference to a chart, through interpretation of echo sounder returns to sophisticated ground discrimination systems.

Dredges should be made as selective as possible using current technology. This reduces stress on those animals selected at the seabed rather than on deck.

NOTE: For information on scallops selectivity refer to documents [1] and [2].

E.5 Harvesting methods

The choice of fishing method should be based on ensuring that the product quality achieved meets the customer requirements. There are significant differences between fishing methods in this regard:

- For molluscs intended for depuration, the harvesting method and subsequent handling practices need to deliver a live product to the depuration plant in a suitable condition for depuration. This is currently not possible for scallops, cockles and dredge caught razor clams.

  NOTE There are depuration criteria only for hand gathered cockles and diver caught scallops.

- The presence of grit in scallops and cockles harvested by dredging may restrict their presentation as a live product. This is because the dredging process can result in the contamination of the inter-valvular fluid with grit. Grit may be removed by washing during factory processing and/or in certain circumstances by allowing the live animals to de-grit in holding tanks.

E.6 On board handling

Molluscs should be subjected to a number of washing, de-clumping, sorting, and packaging processes on board the vessel. These are specific to the species concerned and the customer requirements. Mussels require washing and de-clumping; scallops, cockles and clams require sorting. For certain species, the packaging system requires that the animals are held closed during subsequent storage and transport.

For molluscs intended for the depuration route, chipped animals should be returned to the sea. For scallops and cockles intended for processing, a degree of minor shell damage is acceptable.

Sorting, washing and de-clumping operations should be carried out in such a manner that avoids physical shock and damage to shells. Undersized animals should be returned to the sea as soon as possible. The species differ in their capacity to withstand physical shock with scallops, cockles and razor clams being the most vulnerable, and mussels the least, but the storage life of all species has been shown to be reduced if they are dropped on to hard surfaces. Washing operations should use adequate pressure to be effective. The water used should be clean and of a microbiological classification not less than the harvesting area (see **E.1**). Water abstracted from harbours and water contaminated with sewage, diesel and

chemicals should not be used. Re-immersion should be avoided in order to reduce the risk of re-contamination.

E.7 On board storage

The ability of the animals to withstand aerial exposure and extremes of temperature varies between species and is related to their natural habitat. Animals which naturally live on exposed surfaces such as mussels are more resilient than those species whose normal habitat is underwater. Scallops and razor clams are distinguished by their inability to seal their shells and so are more vulnerable to desiccation.

Storage containers, bags (not contaminated with previous contents) or boxes with drain holes may be used provided they prevent abrasion and stress. The requirement to hold certain species closed during transport may be fulfilled by tight net bags in the case of clams or by holding razor clams in bundles by rubber bands. Razor clams need to be packed horizontally.

Molluscan shellfish intended for depuration should be transported to the purification centre as soon as is practical. This should be within 6 hours from harvest for the less resilient species. Animals should be handled gently and not subjected to excessive wind, rain or high temperatures.

Scallops caught on day trips should be held in moist conditions at temperatures similar to those of seawater for up to 12 hours, provided they are chilled or iced on landing. If the scallops are known to be heavily contaminated with grit they should be processed as soon as possible, and within 12 hours at most. For longer trips, where the scallops are not intended for the live market, the scallops need to be chilled in the hold by direct or indirect icing or by refrigeration. Operators should be aware that whole scallops subject to direct icing prior to shucking absorb water, particularly if stored for 6 days. This may have implications for certain markets. If ice is not used, the hold refrigeration capacity needs to be sufficient to achieve chilling as well as temperature maintenance. The quality of the catch declines rapidly at 7 days storage on ice after capture. Thus trips should be planned to take this into account.

NOTE: For further information on scallop quality see document [3] and literature cited.

E.8 Discharge from the vessel

The discharge of the catch from the vessel should be planned to avoid crushing and other impacts during discharge, to ensure rapid transit to processing or depuration, and to avoid temperature shocks.

Annex F (informative)
Live crustaceans guide

This annex contains information extracted from "The good practice guide for live crustacea fishermen" published by Seafish.

F.1 General

The method that is used to capture live crustacea can have a great effect on their survival rate. Stress and damage caused during capture will weaken the animals for handling or storage thereafter. Fishermen, therefore, have a very important part to play, especially as stress and damage can take time to have an effect, e.g. when crustaceans are in the keep pot, shore-side holding tank or vivier lorry.

There is considerable interaction between individual crustaceans, and between species when trapped in a creel or lobster pot. Some individuals and/or species will dominate the creel depending on factors such as size, sex, moult and breeding status. These interactions can lead to stress and/or shell damage if fighting occurs.

When removing a crustacean catch from tangle nets great care needs to be taken as damage can easily occur, particularly due to the cutting effect of monofilament that is under tension.

All undersize and rejected crustacea should be returned to the sea as near to the point of capture as practically possible.

F.2 Guidelines for looking after crustacean stock

Crustacea suffer stress when subjected to changes in the conditions in which they live. Storage conditions should, therefore, represent a place of shelter where live crustaceans can rest, acclimatise to the new conditions and reduce their use of energy reserves.

The following are general guidelines to be followed when looking after crustacea stock.

1. Cool them (4 °C to 8 °C) and keep them cool.
2. Keep them in the dark.
3. Keep them in fresh, good quality flowing seawater.
4. If they cannot be kept in seawater, keep them cool and damp.
5. Handle gently; do not throw or drop, or do anything that might damage the shell.
6. Grade carefully; remove undersized, weak, diseased or injured animals.
7. Keep them free from contamination.
8. Prepare them for onward transport; maintain cool temperatures and do not feed.
9. Return poor quality animals to the sea; do not try to sell them.
10. Beware the "domino effect"; one mistake, one excessive stress, one death in a packed container, and the survival rate falls away.

F.3 Storage of crustaceans in seawater systems

The level of dissolved oxygen in seawater can be low, so aeration of the seawater in storage tanks, where stocking densities are much higher than in the wild, is essential. The seawater should be aerated to prevent oxygen saturation falling below 95 % (8 mg/l). The aeration should be done at a depth of at least 1 m (or at the bottom of the tank if it is shallower than 1 m) and a good quality diffuser is required to generate small bubbles and to ensure good

transfer of oxygen to the seawater. Cool seawater can contain more dissolved oxygen than warm seawater: aeration can help increase the concentrations in both.

Aeration of the seawater is particularly important when returning crustaceans to water after a period out of water because the animals will have a greatly increased oxygen demand for a few hours.

The rate of oxygen consumption by the animals will increase as a result of many factors associated with storage and handling, such as rapid temperature changes, stress, overcrowding, limb loss, being dropped, etc.

Consideration needs to be given to the way in which water, and aeration if used, is to be circulated to the centre of a container of crustaceans. Airlines and/or water supply pipes may need to be laid into the container at the bottom and/or during the filling of containers or tanks.

Experience in holding lobsters has shown that oxygen needs to be maintained at around 95 % (8 mg/l). Excessive aeration in order to boost oxygen levels massively is not recommended as it can reduce survival (gas bubbles form on membranes) and lead to high turbulence. Note, however, that nephrops are particularly susceptible to reduced survival when aeration is used. Oxygen levels should not be allowed to drop below 75 % (6 mg/l) as below this level the crustaceans will be in a weakened state. They tend not to moult successfully, the healing of wounds does not occur and survival during onward transportation is low.

F.4 Dry storage of crustaceans

Crustaceans breathe using gills that need to be in seawater or damp conditions to operate properly, i.e. gills need to be kept wet. They are irreparably damaged if allowed to dry out. Crustaceans should therefore be stored and transported in seawater whenever possible.

If dry storage has to be used then the crustaceans need to be kept in a dark, cool, damp environment. They need to be the "right way up" so that the water on the gills evaporates very slowly. The length of time in dry storage should be kept as short as possible.

If crustaceans are stored out of water metabolic waste products accumulate in their blood as they use mechanisms to survive with low oxygen concentrations. These survival mechanisms adversely affect their condition, quality, survival rate and the taste and quality of the eaten product. Crustaceans get rid of waste products through their gills if returned to water, but this will affect water quality. Biological filters in re-circulation systems will take time to remove the waste products. In flow-through systems the rate of water turnover may need to be increased to cope with the sudden increased load.

The following measures can be used to alleviate the situation.

- Keep the crustaceans in the shade, in fish boxes that are covered with a carpet or sacking and regularly drenched with seawater.
- Use "tube" arrangements similar to those used by the nephrops creel and trawl sector.
- Use a sprinkler tank whereby a small amount of seawater is sprinkled over the crustaceans in a flow-through system, although a re-circulating system whereby the water drains to a sump and is then recycled can also be used. It is important to ensure that the system remains cool and oxygenated if the water is re-circulated.
- Take care when stacking boxes containing crustaceans and provide protection where necessary. Dry storage conditions have the risk of damage by crushing from the weight of other crustaceans or by stacking boxes.

Special consideration should be given to the containers that are used to hold live crustaceans. Local practices vary greatly according to vessels and quay-side sets ups; bongos (half a 45 gallon plastic drum), fish bins, nesting fish boxes, fish baskets, keep creels, etc. are examples. There are some basic considerations for any container that is to be used:

- legs and claws are easily cracked and broken off if holes in the containers allow limbs to protrude;
- the containers should be robust enough to withstand any crushing force that may occur due to stacking. There may well be occasions where people will need to walk over containers of crustaceans, i.e. on a small fishing vessel, but this should be discouraged. Containers need to be robust enough to withstand a crew member standing on them without causing any damage to the crustacea. Damage to the carapace of crustaceans, such as cracks or crushing, will be fatal. This is particularly relevant to nest-and-stack boxes that can crush a catch if stacked in the wrong manner;
- containers should not be so deep that the weight of stock above risks crushing the animals in the bottom of the container.

F.5 Handling live crustaceans

Good handling practice by fishermen is essential to ensure good survival and quality during the later stages of the supply chain. The greatest increase in stress is likely to occur from the point that the fishing gear captures the crustacea, in the case of mobile gear and static nets, or when the catch is emptied from the creel. Crustaceans readily lose their claws and legs, and since mutilated or "crippled" animals are less valuable, it is important to use care when removing the catch from the net or creel. Some creels and pots incorporate a solid base to try to prevent claws and legs getting a firm hold.

When withdrawing a crab from the creel, avoid pulling on the claws since they may be cast in an escape response. Hauling creels or nets is a busy time and it is understood that good practice can slow the hauling process. However, adopting good practice may secure better returns as the landed catch is in better condition and reduced mortality ensures better financial return from the markets. The balance of time, cost and benefits has to be considered by the skipper.

The initial grading and selection that occurs on the fishing vessel is the most important part of the chain and fishermen need to recognise their responsibilities in this respect. Fishermen should aim to select the catch from the creel to ensure that the rejected portion of the catch is returned to the sea over suitable ground and as near to the point of capture as practically possible.

The economic value of live crustaceans does affect the way that they are handled. Good handling practices are often used by those who handle high value lobster or live prawns whilst the lower value species, such as velvet, brown and green crab, receive little care. Live crustaceans command premium prices and careful handling is essential since dead crustaceans are discarded and of little or no value.

F.6 Grading of crustaceans

Great importance is attached to the diligent grading of crustaceans at several stages through the handling process, e.g. emptying the creel, removal from nets, filling and emptying the storage/keep creels and packing the boxes for vivier transport. To be effective, grading should remove any weak or soft, or even slightly soft, crustaceans. Such crustaceans are

easily identified by gently squeezing the carapace shell. If the shell is anything other than solid, i.e. it yields under light squeezing, has cracks, etc., the crustacean should be rejected and returned to the sea. Weak crustaceans are easily spotted because they are less aggressive, will not struggle and fight if picked up and will allow their legs and claws to hang down. Recently moulted animals are especially prone to mortality and should not be targeted, and captured individuals should be returned to the sea as near to the point of capture as practically possible. A quality live crustacean will be undamaged, have eight legs and two claws. The need to grade so thoroughly and frequently is very important to remove any crustacea that may die. Any dead crustacea in a keep pot, storage system or vivier lorry will quickly start to decompose, affecting water quality, using up oxygen, releasing toxins, and these soon lead to further mortalities.

F.7 Species specific guidance

F.7.1 *Velvet swimming crabs*

F.7.1.1 *General*

Velvet swimming crabs (velvets) are one of the most difficult crustaceans to keep alive due to their susceptibility to stress. The markets for velvets are almost entirely based on live export by vivier lorry so correct handling is critical from the point of capture onwards. High levels of mortality are not uncommon when holding velvets and during the vivier shipment from the UK to distant markets, especially during summer months. Velvets are, therefore, seen to be a high risk species by those in the industry. All personnel that handle velvets have their part to play because a single error can have serious consequences for the entire consignment. The key to reducing mortalities with velvets is to ensure that all of the generic guidance for holding live crustaceans is applied to the highest standard possible.

F.7.1.2 *Storage*

Velvets are not suited to dry holding, i.e. out of seawater, for any more than the minimum possible time and consideration should be given to avoiding dry holding if possible. Vessel stability may make dry transport unavoidable. During dry storage velvets need to be kept the "right way up", and kept in damp conditions by covering with soaking carpet or ideally sprayed with seawater from a sprinkle bar. Velvets should also be kept cool. Even the short time that a keep creel can rest on the deck before landing or packing can be a problem as crushing can occur without the support of the water.

Velvets are normally packed tightly in 9 kg boxes for onward vivier transport. This task is often a source of considerable damage to the catch: broken legs and claws that protrude from the box, even cracked carapace shells with over zealous packing. These 9 kg boxes are however useful in reducing fighting damage between crabs and the crates pack conveniently into vivier tanks. However, the tight packing of crabs and crates can lead to poor availability of oxygen for animals in the middle of the stack. Thorough aeration of the seawater in the vivier tanks is essential. Some operators have adopted an alternative packing box that is made of plastic mesh such that legs and claws cannot protrude and the mesh allows a more thorough through flow of seawater and aeration bubbles.

NOTE Recent studies at Hull University have developed holding regimes for velvets although these remain of scientific interest because, at present, they are too expensive and labour intensive at the current market value.

F.7.2 *Brown crabs*

F.7.2.1 *General*

Brown crabs are often regarded by fishermen to be one of the hardiest of crustaceans, but handling does produce mortalities. They cannot withstand rough and inappropriate handling. It leads to high levels of mortality during onward transportation to distant markets. Prices for brown crab are very low so there is a temptation to treat them with the minimum of care and to regard them as a bulk commodity. They do however still require the same due care and attention that any crustaceans should be given. Brown crab should be treated in accordance with the general handling guidance if they are to survive and be sold as premium quality crabs. All markets need a vigorous live brown crab with eight legs and two claws.

F.7.2.2 *Storage*

Brown crabs have extremely powerful claws that present a problem for the care of the catch and for those that handle the animals. Immediate protection can be afforded by using sacking or carpet to keep the catch separate. Brown crabs should quickly settle in dry/wet storage, with minimal damage due to fighting, provided that gentle handling and storage practices are adopted. Such careful practices are often beyond the time and facility constraints when operating with commercial activity.

If the crabs are to be stored for any longer than a few hours, then "nicking" may be necessary and it should be done sooner rather than later. However, there are serious disadvantages to the practice as any break in the exoskeleton or connecting membranes exposes the animals to the risk of pathogenic disease, with consequent increased mortalities. This risk of loss has to be balanced against the expediency, for the fisherman, of nicking. Nicking of the claws is a skill that needs crew training since it can lead to claw loss, and hence loss of value, if done incorrectly.

Brown crabs are particularly susceptible to damage to the tips of the walking legs that can bleed and reduce survival. Such injuries are easily caused as creels are emptied and as bongos or keep creels are moved around the deck. A damaged limb should be made to cast by putting the point of a knife into one of the joints and, if necessary, twisting it a little. The crab will then naturally cast the limb at a point close to the body that will heal quickly with a minimum of blood loss.

F.7.2.3 *Grading*

Brown crab catches should be carefully graded for soft-shelled crabs that have recently undergone a moult. The shell is often very clean especially the areas of white. A brown crab should feel heavy for its size and experience will soon lead a handler to identify when a crab is too light. The underneath of the shell near where the legs join the body is the area of the shell that should be tested by gentle squeezing. If the shell yields at all, giving a soft, pliable feeling, then the crab should be returned to the sea where it will harden given time. However, if the squeezing is done roughly or vigorously, the shell will be cracked and the animals are likely to have a poor prospect of survival when returned to the sea. It is important to be gentle at all times.

F.7.2.4 *Dry storage*

Brown crabs are not suited to dry holding, i.e. out of seawater, for any more than the minimum possible time and consideration should be given to avoiding dry holding if possible. Dry transport of brown crabs is widespread in the industry, but so too are high

levels of mortality before the product arrives at market. Dry transport is stressful for brown crabs and their ability to survive does lead to the build up of metabolic by-products that can taint the flavour of the meat. The crabs will release these metabolic by-products when returned to seawater and that creates problems for shoreside holding tanks and vivier lorry operators.

Vessel stability may make dry transport unavoidable. During dry storage brown crabs need to be kept the "right way up", and kept in damp conditions by covering with soaking carpet or ideally sprayed with seawater from a sprinkle bar. Brown crabs should also be kept cool. Even the short time that a keep creel can rest on the deck before landing or packing can be a problem as crushing can occur without the support of the water.

F.7.3 *Lobsters*

F.7.3.1 *General*

Lobsters are one of the hardiest crustaceans and can survive frequent handling. However, they do still require the same due care and attention that any crustaceans should be given. The generic handling themes should be applied but lobsters require further good practice in handling. Their high value demands that they are in pristine condition and that starts with care on the vessel.

F.7.3.2 *Storage*

Lobsters' powerful claws are a problem for the care of the catch and the handlers alike. Immediate protection can be afforded by using sacking or carpet to keep the catch separate. Some fishermen have used bottles with the bottoms cut off to make lobster sized tube arrangements similar to those that are used for nephrops. This method is fast, reliable and offers the lobster very good protection. In every case lobster claws need to be carefully banded with elastic bands as soon as possible. Consideration should be given to the type of rubber band that is used to ensure that it doesn't perish in seawater and consequently break during subsequent storage. It is important to apply the rubber band in the correct way. It should be at the body end of the claws and behind the large peg or tooth on the claw in order to prevent the rubber band from working its way forward and falling off.

Lobsters are always in a state of preparing for or recovering from moulting. The moult cycle has two effects for those that are handling or holding live lobster. Firstly, there is a need to be aware that a soft lobster will not be very robust and will die easily. Secondly, there is a need to be aware that a lobster may moult whilst in a storage facility. Lobsters are cannibalistic and will readily eat a soft lobster given the opportunity so regular checks are needed of tanks that hold many lobsters. Soft lobsters may be held in individual chambers until their shell has hardened but will be unsuitable for sale for some time due to their poor meat quality.

It is difficult to assess if a lobster is going to moult but assessing lobsters that have recently undergone a moult is easier. A lobster should feel heavy for its size and experience will soon lead a handler to identify when a lobster is too light. The next test would again require some experience. A lobster is usually picked up by grasping it across the carapace and in doing so the fingers naturally rest at the region of the carapace that is nearest the legs. This region of the shell is not particularly robust but will feel noticeably soft if the lobster has moulted recently. Female lobsters will naturally be more flexible in this region of the shell than males.

F.7.3.3 *Grading*

A healthy lobster will react quickly to being picked up by raising its claws in a defensive posture with the tail either fully extended and/or undergoing powerful tail flicks. If the tail and claws drop limply when the lobster is picked up, and there is a white membrane showing between the carapace and the tail, then the lobster is in poor condition and should be rejected. Such a lobster needs to be put in cool well aerated seawater if it is to survive.

F.7.4 ***Nephrops***

F.7.4.1 *General*

Live nephrops can be caught by either the more traditional creel method or in more recent times by trawl, a method used more usually for tail and dead product. Both methods have advantages and disadvantages for conservation and quality of live product. This guidance relates to the live product only.

The markets for nephrops are almost entirely based on live export by vivier lorry or by airfreight, so correct handling is critical from the point of capture onwards. Unfortunately, high levels of mortality are not uncommon when holding nephrops or during the vivier shipment from the UK to distant markets, especially during summer months. The key to reducing mortalities is to ensure that all of the generic guidance for holding live crustaceans is applied to the highest standard possible.

F.7.4.2 *Storage*

Live nephrops should not be directly iced – the cold will kill them. Indirect icing, such as floating seawater ice in a vivier tank, may be used to keep a catch cool during summer heat.

Live nephrops should never be dipped in sodium metabisulphate or similar products that are used to preserve the appearance of fresh-dead, frozen whole animals or tail meats. The chemicals will kill them.

F.7.4.3 *Storage in tubes*

Nephrops are often stored in a complex of individual chambers called tubes. Great care needs to be used when filling the tubes. A gap can often exist between the end of the tube and the tray that forms the base. The tail of a prawn may become caught under the end of the tube and then be damaged as the top tray is put in place and the complex tied tightly shut. Fishermen have found that elastic bands can be used to prevent any gaps forming. The orientation that tubes are stored might have a slight influence over survival and fishermen are encouraged to experiment. Prawns held horizontally might have the best survival rate.

The tubes containing smaller prawns are quickly filled and placed into a vivier tank as the days fishing progresses whereas tubes for the larger grades may take longer to fill. Inadvertently, the larger prawns might be exposed to the air for much longer, risking poor survival during storage and transport. Drying wind, cold or heat will reduce survival. It might be appropriate to provide a seawater sprinkler arrangement over the tubes as they are being filled or to consider putting partially filled tubes into a vivier tank between fishing events.

Tubes are an excellent method for storing live nephrops, but they are considered to be bulky by vivier operators where space is at a premium. To overcome this issue some vivier operators ask that the catch is removed from the tubes and rubber bands applied to the claws, as with lobsters. Specific rubber bands are available with colours relating to individual grades. Banded nephrops can then be packed in punnets for onward vivier transport.

F.7.4.4 *Dry storage*

Nephrops are not suited to dry holding, i.e. out of seawater, for any more than the minimum possible time and this should be avoided if possible. Vessel stability might make dry storage unavoidable. During dry storage, tubes should be orientated so that the prawns are head up and therefore retain any water that is in the gill chamber. Conditions should be kept damp by covering with soaking carpet or ideally spraying the stock with seawater from a sprinkle bar. Nephrops should be kept cool at all times during storage and transport.

F.7.4.5 *Trawl-caught nephrops*

The sale of live nephrops that have been caught by trawling requires particular care by the crew if the quality of the product is to be maintained.

Fishing over particularly soft sediments should be avoided as fine sediments risk choking the gills of the catch. Rough ground should be avoided since items such as boulders in the cod end will cause damage that will affect survival.

Trawling involves a series of stressful events for the nephrops and ameliorating action should be taken to ensure a quality product. Nephrops are stressed whilst trying to escape the towed gear, whilst tumbling down the belly of the net, being hauled in, during transfer to and within the hopper and then during sorting of the catch. Periods of recuperation are believed to occur when stored in the tubes in a vivier tank. The best towing regime would not appear to be the shortest in duration, but rather a tow that will not have too much bulk in the cod end, as a large bulk will extend handling time on the deck. Skippers will have some idea of the bulk that a tow will yield, but tows should not exceed 2 hours.

Good, careful handling practices for trawl-caught nephrops commence with a slow and gentle haul that does not shake up the contents of the cod end. Low bulk in the cod end will allow more control of the net as it is handled. It can more easily be prevented from slamming into the gunwale and it is easier to control as it is emptied into the hopper. These actions will help to reduce damage to the catch by crushing. High volume sprinkle bars over the hopper will ensure that the catch is rinsed and will allow the animals' gills to continue to work.

F.7.4.6 *Grading*

Grading by the crew needs to be of the highest standard to prevent damage whilst removing stock from the hopper. Each animal will need to be checked for liveliness before placing them into tubes. Tubes should have high volume sprinklers over them. Once tubes are filled, they should be placed in a vivier tank containing seawater or high volume sprinkle system. The value of the vivier tank cannot be overstated since it is a place of recovery for the catch and they should be in there for as long as possible before landing. If there is a large haul, the crew will have to make a decision as to when the animals in the hopper become unsuitable for live sale and would be better sent to the fresh market. A short tow at the end of the day, followed by a short time in the vivier tank before landing and transport to a shore-based storage tank, is likely to lead to low survival. A morning tow, followed by the whole day in the on board vivier tank, gives the nephrops catch time to recover and will lead to greater survival.

F.7.4.7 *Seawater in vivier tanks*

The storage of live trawl-caught nephrops requires high volumes of pumped seawater. This has two implications. Firstly, the water needs to be of the highest quality, so it should be drawn from deep down on the hull. In addition, the intake has to be located to avoid areas where freshwater contamination may occur. Secondly, existing pumps, such as mechanical

deck washes that can double up as a bilge pump, are not suited to vivier use because of contamination from bilge water and their dependence on engine revs to provide enough volume and pressure. Separate electrical pumps can provide a constant pressure.

F.7.5 ***Common prawns (Paelemon serratus)***

F.7.5.1 *General*

Common prawns need to be handled carefully throughout the handling process even though they are not difficult to keep alive due to their hardy nature and ability to tolerate varying environmental conditions. They survive well within the temperature range 9 ºC to 25 ºC, but are believed to be intolerant of temperature extremes, suffering mortality at temperatures below 4 ºC and above 30 ºC. They prefer well oxygenated, full salinity water, but can tolerate reduced salinity (27 ppt to 34 ppt) and reduced levels of dissolved oxygen (50 % saturation / 3 mg/l) during immersed storage.

They are regarded as fairly robust with regard to handling and transportation, if sensible precautions are taken, but are particularly sensitive to crushing and exposure to air and wind, especially during the summer months. Recently moulted animals should not be targeted as they are particularly prone to damage and cannibalism during storage in seawater.

Common prawns are targeted using mainly barrel pots or traps but fyke nets are also used. The catch from all pots on a string should first be emptied carefully into fish boxes or shallow trays, to a recommended depth of no more than 25 mm (one inch), and covered immediately with a cover (fish box or similar) to protect the animals from wind, rain and light (especially direct sunshine).

F.7.5.2 *Grading*

When the whole string has been hauled, the catch should be selected by hand to remove unwanted species and debris. Prawns have a sharp tip to the horn on the head section of their shell (the rostrum) and this can easily puncture the shell of another prawn. Selection should remove all damaged animals. Recently moulted animals should not be targeted as they are especially prone to damage and mortality through cannibalism. All recently moulted individuals should be returned to the sea as near to the point of capture as is practically possible.

If riddles are used to remove or grade out the smallest prawns they should be used in water and either shaken by the crew or left immersed in seawater so that the catch can grade itself.

F.7.5.3 *Storage*

F.7.5.3.1 *Dry storage*

Although common prawns can tolerate short times out of water this situation should be avoided whenever possible.

Animals that have to be stored dry need to be kept dark and damp and stored in layers no more than 25 mm (one inch) deep. Onboard the vessel, approximately 2 kg of animals should be placed inside mesh baskets measuring approximately 40 × 30 × 10 cm. Baskets should be located inside containers and covered with a fish box or carpet soaked with seawater.

F.7.5.3.2 *Immersed storage*

Approximately 2 kg of animals should be placed gently into mesh baskets (40 × 30 × 8 to 10 cm) to a depth of approximately 25 mm. Baskets need to be placed into a vivier tank

containing full salinity seawater that needs to drain away (overflow) continuously to waste so that animals do not suffocate from oxygen starvation.

F.7.6 ***Spider crabs***

F.7.6.1 *General*

The markets for spider crab are based almost entirely on exporting live animals by vivier lorry so correct handling is critical from the point of capture onwards. High levels of mortality are common when holding spider crab, and during vivier shipment from the UK to distant markets, especially during extremes of temperature, i.e. summer months and cold winters. Spider crab are caught typically from February to August but are targeted mainly at Easter for European markets.

F.7.6.2 *Handling*

Spider crabs need careful handling throughout the capture and storage process. Spider crabs are targeted using mainly tangle, trammel or gill nets that entangle live animals, or by using traps. Removing animals from netting is difficult and rough handling can cause limb shedding and reduced value. To minimise damage during hauling, entangled crabs should not be allowed to go over or around the net hauler as the animals come aboard. They should be placed into a pile or put into a large container on deck, to protect them from the wind, sun and rain. The remainder of the netting should be placed into a separate pile. While individual animals are being removed from the netting, the pile/container of crabs should be soaked frequently with seawater and covered with wetted carpet to protect them from wind and drying out.

Two methods of removing crabs from nets have been identified. Crabs should be removed from the netting manually, using the hands to pull meshes over the crab and down the legs starting with the rearmost legs. Alternatively, a right angle hook (a picker) can be used to tease the meshes over the crab and down the legs. Great care needs to be taken to ensure that the nylon monofilament of the nets does not cut into the tendons at the joints of the legs and claws since spider crabs are prone to die from bleeding.

F.7.6.3 *Storage*

Spider crabs are difficult to keep alive due to their susceptibility to stress and due to their fragile nature. They are believed to be intolerant of temperature extremes, suffering mortality at temperatures below 6 ºC and they are extremely sensitive to wind and aerial exposure, especially during the summer months. They require full salinity seawater during immersed storage and are very sensitive to rough handling. Recently moulted animals are especially prone to mortality and should not be targeted. Captured recently moulted individuals should be returned to the sea as near to the point of capture as is practically possible.

Animals that have to be stored dry need to be kept the “right way up” and damp. Onboard the vessel, crabs should be placed carefully into large storage bins and covered with carpet soaked with seawater, or, ideally, sprayed with seawater from a sprinkle bar to prevent them from drying out. Ideally, spider crabs should be immersed in full salinity seawater on the vessel. They should be placed gently into large storage containers that should be filled with good quality seawater that needs to be allowed to drain away continuously to waste so that the animals do not suffocate.

F.7.7 *Squat lobsters*

F.7.7.1 *General*

Live squat lobster are caught by either the more traditional creel method or, in more recent times, by trawl, employing the same methods as used for live nephrops. Both methods have advantages and disadvantages for conservation and quality of live product. This guidance relates to the live product.

The markets for squat lobsters are based upon a tail only product although the claws of the larger males also contain a high quality and tasty meat. Live export by vivier lorry or by air freight might develop so correct handling is critical from the point of capture onwards to reassure developing markets that the product is of a reliable high quality.

F.7.7.2 *Storage*

The live storage and handling requirements of squat lobsters are believed to be similar to those of velvet swimming crabs or nephrops (see **F.7.1** and **F.7.4**). Unfortunately high levels of mortality are not uncommon when holding squat lobsters and during the vivier shipment from the UK to distant markets, especially during summer months. The key to reducing mortalities with squat lobsters is to ensure that all of the generic guidance for holding live crustaceans is applied to the highest standard possible, especially keeping them in cool and well oxygenated seawater. Live squat lobsters should not be directly iced because the cold will kill them. Indirect icing, such as floating seawater ice in a vivier tank, may be used to keep a catch cool during summer heat.

Squat lobsters caught from soft muddy seabed types have a tendency to blacken in the air, although the reasons are unknown (it might be due to oxidation of sulphur compounds, but this has to be proven). Blackening renders the catch worthless. It appears that some of the discoloration is attributable to superficial water that blackens in air and gathers in the articulations of the exoskeleton. The reasons for this effect are unknown. Seawater washing of the catch can reduce, but does not alleviate, the problem. Animals from harder, rocky substrata are not as susceptible to blackening.

Squat lobsters should be kept in clean seawater, possibly with gentle aeration, rather than in the air. A fresh dead squat lobster product could be dipped in sodium metabisulphate or similar products that are used to prevent the development of the blackening phenomenon in nephrops, but this should not be done to live animals as it will kill them (see **B.4.1**).

Nephrops are often stored in a complex of individual chambers, called tubes, and these may also be ideally suited for storing live squat lobsters. Great care needs to be used when filling the tubes. A gap can often exist between the end of the tube and the tray that forms the base. The legs may become caught under the end of the tube and be damaged as the top tray is put in place and the complex tied tightly shut. Fishermen have found that elastic bands can be used to prevent any gaps forming. The orientation of stored tubes might have a slight influence over survival and fishermen are encouraged to experiment. Squat lobsters held horizontally can have the best survival rate. Squat lobster claws are not as powerful as those on other crustaceans so they might be suited to storage in keep creels or punnets.

Annex G (informative)
Factory vessels

G.1 General

A fishing boat which not only catches fish but also carries out processing on board during part of its normal operation, often falls into the category of a factory vessel. A factory vessel is defined as any fishing vessel on board which fishery products undergo one or more of the following operations:

- filleting,
- slicing,
- skinning,
- shelling,
- shucking,
- mincing,
- processing;

followed by wrapping or packaging and, if necessary, chilling or freezing.

Extra provisions specifically applicable to factory vessels are included in EC Regulation No.853/2004 laying down specific hygiene rules for food of animal origin. This annex sets out good practice guidance that is applicable to this type of vessel.

G.2 Design and layout of the fish handling and storage areas.

Cramped work areas increase the risk of contamination of the fish. The layout of the processing areas should allow a progressive production flow. These areas should be capable of handling maximum quantity hauls, and they should be designed to facilitate easy cleaning and disinfection.

It is recommended that water intakes are not only located away from waste discharge systems, but also from the deepest available draft position. This should ensure that any surface seawater contaminants are not taken aboard.

The taps on the hand-wash station need to be knee, foot or magic-eye operated in order to prevent any contamination spreading to the hands.

G.3 Handling and storage

Fish from each haul should be handled and processed before the next haul is brought on board.

Clean storage facilities are needed to minimise the risk of the fish becoming contaminated.

Vessels with waste processing and storage facilities on board should make the entrance to each store clearly marked with intended use, i.e. waste or human consumption.

Packaging should be stored in clean and dry conditions, off the floor, and away from potential contaminants such as cleaning chemicals.

Only small quantities of packaging materials should be kept in the product packing area. This should be no more than is sufficient for immediate needs.

Packaging materials should be used only once. If contaminated with diesel, oil, chemicals, or glass or other dangerous foreign objects, the packaging materials needs to be discarded.

G.4 Freezing and frozen storage

Rapid freezing and cold storage at -18°C or colder is needed for preservation purposes.

Freezing evaporators should be regularly defrosted to ensure efficient operation of plant.

Records of freezing times and storage temperatures should be available for customers and enforcement officers.

Visible dials and digital displays allow regular temperature checks. Alarms can be set to sound if the temperature rises above -18°C for any length of time.

G.5 Crew hygiene

Training should ensure that all crew members have a clear understanding of the importance of high standards of cleanliness and the means of achieving them. Crew members should also be trained in care of the catch and quality procedures.

Skippers should familiarise themselves with the concept and use of hazard analysis to help minimise the risk of catch contamination.

There should be a supply of single-use towels, with a lidded bin. Soap should be unscented, liquid and bactericidal.

If a crew member develops symptoms of a disease likely to be transmitted through food, e.g. diarrhoea; infected sores, wounds or skin, he should not be involved with any of the fishing, packing or freezing operations.

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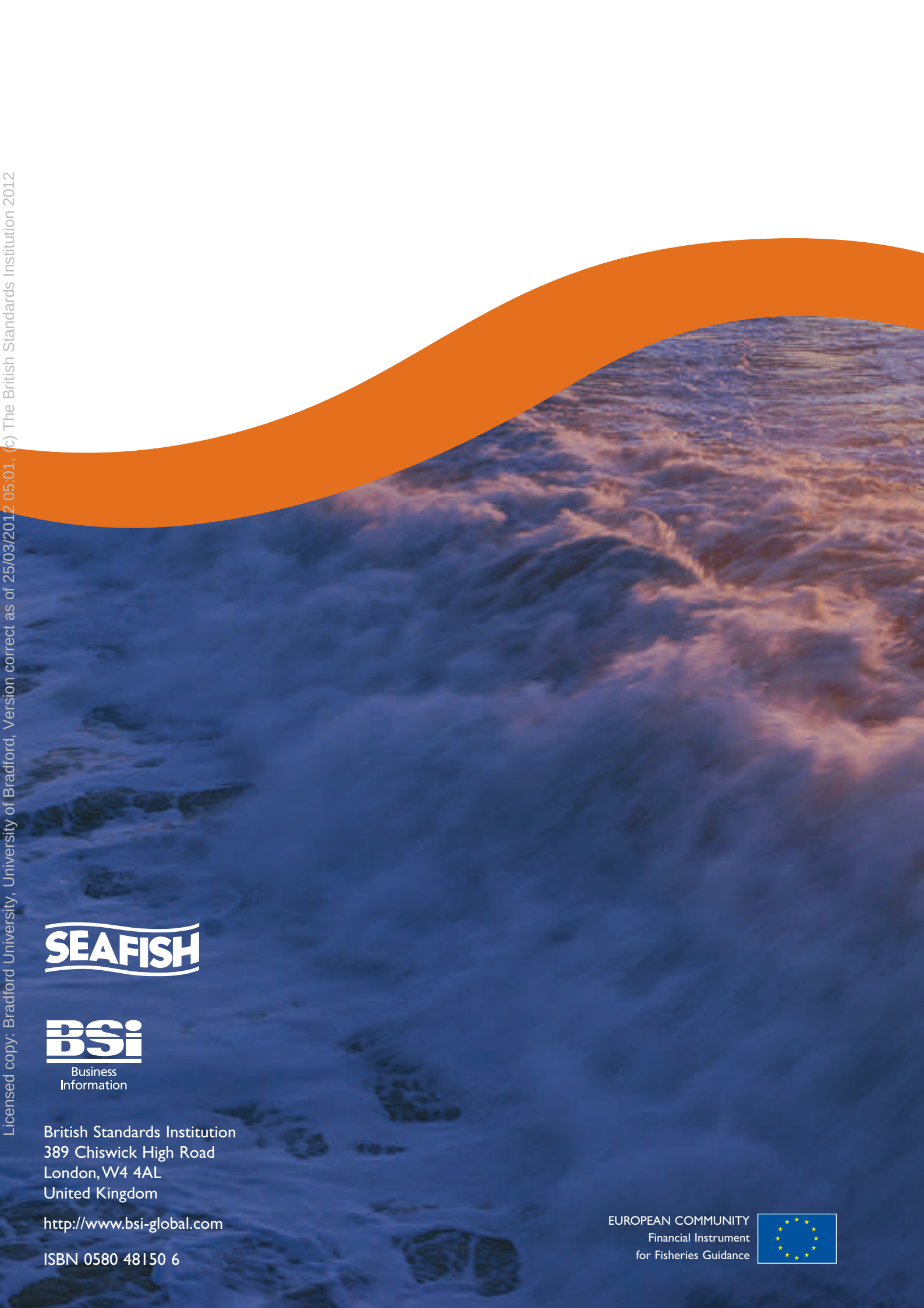

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