



SUB-COMMITTEE ON STANDARDS OF
TRAINING AND WATCHKEEPING
36th session
Agenda item 3

STW 36/3/2
12 August 2004
Original: ENGLISH

VALIDATION OF MODEL TRAINING COURSES

Model course – Safety of fishing operations (Support level)

Note by the Secretariat

SUMMARY

<i>Executive summary:</i>	This document provides a draft model course on training in the safety of fishing operations for support level.
<i>Action to be taken:</i>	Paragraph 4
<i>Related documents:</i>	MSC 50/27, STW 17/11 and STW 35/19

1 The Sub-Committee, at its thirty-fifth session (26 to 30 January 2004), noted that following the recommendations made at the regional seminars/workshops to promote the implementation of the STCW-F Convention, the Secretariat had taken steps to develop the model courses on the safety of fishing operations.

2 The preliminary draft model course on safety of fishing operations for support level training received by the Secretariat was forwarded to members of the validation panel for their comments. Relevant comments on the draft model course have been received from the validation panel and incorporated as appropriate.

3 The final draft model course is set out at annex.

Action requested of the Sub-Committee

4 The Sub-Committee is invited to consider the above information and decide as appropriate.

ANNEX

Model Course

SAFETY OF FISHING OPERATIONS

(Support Level)

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Model Course

Introduction

■ Purpose of the model courses

The purpose of the IMO model courses is to assist maritime training institutes and their teaching staff in organising and introducing new training courses, or in enhancing, updating or supplementing existing training material where the quality and effectiveness of the training courses may thereby be improved.

It is not the intention of the model course programme to present instructors with a rigid "teaching package" which they are expected to "follow blindly". Nor is it the intention to substitute audio-visual or "programmed" material for the instructor's presence. As in all training endeavours, the knowledge, skills and dedication of the instructor are the key components in the transfer of knowledge and skills to those being trained through IMO model course material.

Because educational systems and the cultural backgrounds of trainees in maritime subjects vary considerably from country to country, the model course material has been designed to identify the basic entry requirements and trainee target group for each course in universally applicable terms, and the skill necessary to meet the technical intent of IMO conventions and related recommendations.

■ Use of the model course

To use the model course the instructor should review the course plan and detailed syllabus, taking into account the information provided under the entry standards specified in the course framework. The actual level of knowledge and skills and prior technical education of the trainees should be kept in mind during this review, and any areas within the detailed syllabus which may cause difficulties because of differences between the actual trainee entry level and that assumed by the course designer should be identified. To compensate for such differences, the instructor is expected to delete from the course, or reduce the emphasis on, items dealing with knowledge or skills already attained by the trainees. He should also identify any academic knowledge, skills or technical training which they may not have acquired.

By analysing the detailed syllabus and the academic knowledge required to allow training in the technical area to proceed, the instructor can design an appropriate pre-entry course or, alternatively, insert the elements of academic knowledge required to support the technical training elements concerned at appropriate points within the technical course.

Adjustment of the course objectives, scope and content may also be necessary if in your maritime industry the trainees completing the course are to undertake duties which differ from the course objectives specified in the model course.

INTRODUCTION

Within the course plan the course designers have indicated their assessment of the time which should be allotted to each learning area. However, it must be appreciated that these allocations are arbitrary and assume that the trainees have fully met all the entry requirements of the course. The instructor should therefore review these assessments and may need to reallocate the time required to achieve each specific learning objective.

■ Lesson plans

Having adjusted the course content to suit the trainee intake and any revision of the course objectives, the instructor should draw up lesson plans based on the detailed syllabus. The detailed syllabus contains specific references to the textbooks or teaching material proposed to be used in the course. An example of a lesson plan is shown in the instructor manual. Where no adjustment has been found necessary in the learning objectives of the detailed syllabus, the lesson plans may simply consist of the detailed syllabus with keywords or other reminders added to assist the instructor in making his presentation of the material.

■ Presentation

The presentation of concepts and methodologies must be repeated in various ways until the instructor is satisfied, by testing and evaluating the trainee's performance and achievements, that the trainee has attained each specific learning objective or training outcome. The syllabus is laid out in learning objective format and each objective specifies a *required performance* or, *what the trainee must be able to do* as the learning or training outcome. Taken as a whole, these objectives aim to meet the knowledge, understanding and proficiency specified in the appropriate sections of the IMO/ILO Document for Guidance, Training and Certification of Fishing Vessel personnel.

■ Implementation

For the course to run smoothly and to be effective, considerable attention must be paid to the availability and use of:

- properly qualified instructors
- support staff
- rooms and other spaces
- equipment
- textbooks, technical papers
- other reference material.

Thorough preparation is the key to successful implementation of the course. IMO has produced a booklet entitled "Guidance on the implementation of IMO model courses", which deals with this aspect in greater detail.

■ Training and the 1995 STCW-F Convention

The standards of competence that have to be met by fishermen are defined in the STCW-F 95 the International Convention on Standards of Training, Certification and Watchkeeping for Fishing

INTRODUCTION

Vessel Personnel. This IMO model course has been developed to cover the competencies in STCW-F 95. It sets out the education and training to achieve those standards set out in Chapter 3, Reg. 1.6 and Attachment 2, Resolution 4 Annex. 2.2, of STCW-F 95.

Part A provides the framework for the course with its aims and objectives and notes on the suggested teaching facilities and equipment. A list of useful teaching aids, IMO references and textbooks is also included.

Part B provides an outline of lectures, demonstrations and exercises for the course. A suggested timetable is included but from the teaching and learning point of view, it is more important that the trainee achieves the minimum standard of competence defined in the 1995 STCW-F Regulation III/1.6 and Attachment 2, Resolution 4 Annex 2.2 and the criteria to demonstrate competence will be evaluated according to the FAO/ILO/IMO Document for Guidance on Training and Certification of Fishing Vessel Personnel. Depending on their experience and ability, some students will naturally take longer to become proficient in some topics than in others. Also included in this section are guidance notes and additional explanations.

Part C gives the Detailed Teaching Syllabus. This is based on the theoretical and practical knowledge specified in the FAO/ILO/IMO Document for Guidance on Training and Certification of Fishing Vessel Personnel. It is written as a series of learning objectives, in other words what the trainee is expected to be able to do as a result of the teaching and training. Each of the objectives is expanded to define a required performance of knowledge, understanding and proficiency. IMO references, textbook references and suggested teaching aids are included to assist the teacher in designing lessons.

The new training requirements for these competences are addressed in the appropriate parts of the detailed teaching syllabus.

■ Responsibilities of Administrations

Administrations should ensure that training courses delivered by colleges and academies are such as to ensure those completing training do meet the standards of competence required by 1995 STCW-F Regulation III/1.6 and Attachment 2, Resolution 4 Annex 2.2 and the appropriate guidance in the FAO/ILO/IMO Document for Guidance on Training and Certification of Fishing Vessel Personnel.

■ Validation

The Sub-Committee on Standards of Training and Watchkeeping has validated the information contained in this document for use by administrations and training providers for the training and certification of fishing vessel personnel so that the minimum standards implemented may be as uniform as possible. Validation in the context of this document means that the Sub-Committee has found no grounds to object to its content.

PART A: COURSE FRAMEWORK

Part A: Course Framework

Aims

This model course aims to provide the training for candidates to undertake fishing operations on board ship, in accordance with Chapter 3, Regulation 1.6, and Attachment 2, Resolution 4, Annex 2.2, of the IMO STCW-F 1995.

Objective

This syllabus covers the requirements of the 1995 STCW-F Convention and IMO/ILO Document for Guidance, Training and Certification of Fishing Vessel personnel, Chapter 6.24 and 6.29. On meeting the minimum standard of competence in fishing operations, a trainee will be competent to understand the fishing methods and associated fishing gear and to safely engage in fishing operation under the supervision of an experienced deckhand.

Entry standards

The course is open to all fishing vessel personnel that are to serve on board sea-going fishing vessels. There are no particular educational entry requirements.

Course certificate

On successful completion of the course and demonstration of competence, a document may be issued certifying that the holder has met the standard of competence specified in the 1995 STCW-F Convention.

A certificate may be issued by Administrations and other organizations approved by the Administration.

Course intake limitations

The maximum number of trainees attending each session will depend on the availability of instructors, equipment and facilities available for conducting the training. It should not exceed 10 to 12 trainees per instructor.

Staff requirements

The course should preferably be under the control of a qualified fishery training instructor assisted by other appropriately trained staff. Suitable staff to instruct trainee deckhands can be as follows;

- Master Mariner.
- Skipper (Fishing) with some experience in teaching.
- Training instructor or qualified teacher with sea experience.
- Any qualified Deck Officer with teaching/training qualification.

Training facilities and equipment

Ordinary classroom facilities including a computer and an overhead projector are required for the lectures. When making use of audio-visual material such as videos or slides, make sure the appropriate equipment is available.

PART A: COURSE FRAMEWORK

Smaller rooms for practical instruction, demonstration and workshop exercises should be available.

The following equipment should be made available:

- Fishing operations blocks, sheaves, towing block, marker buoy, purse rings in used or damaged condition.
- Various types of steel, synthetic, natural ropes, chains, marker buoys, mainlines and branch lines in new and in used or damaged condition.
- Scale model-fishing gear for key methods discussed.
- Scale model-fishing vessels for key methods discussed.
- Small winch and warping barrel and net/line hauler.
- Fish boxes and lifting hooks.

Where possible familiarization visits to appropriate fishing vessels to examine the fishroom, fishing gear, deck fishing systems and workstations for that method, should be carried out by the instructor.

For appropriate vessels such as factory ships visits to fish-processing factory and net and rope manufacturers is also advisable.

Teaching aids (A)

THE FOLLOWING ARE THE VIDEOS REFERRED TO IN THE TEACHING SYLLABUS, HOWEVER, THE LIST IS INCOMPLETE. FURTHER VIDEOS WILL BE INCORPORATED AT A LATER DATE AND WHEN APPROPRIATE.

	<u>Ref.</u>
1. Introduction to Set Net Fishing	V1
2. Care of the Catch	V2
3. Fishing Gear Technology (Beam Trawling)	V3
4. Safe Fishing	V4

Videos listed can be obtained at:

Seafish Training
Seafish Industry Authority
St. Andrew's Dock
HULL HU3 4 QE
United Kingdom
Email: training@seafish.co.uk
Tel: + 44 (0) 1482 327837

The videos listed below are available from:
Dovedale Studios, HULL, United Kingdom
Tel: + 44 (0) 1482 441007
www.dovedale-video-studio.co.uk

PART A: COURSE FRAMEWORK

TRAWLING, HOOK, LINE AND SINKER . . . **V5**

THE SCALLOPERS . . . **V6**

All reference material necessary for the course has been incorporated in the Course Compendium (T1)

IMO and other references (R)

- R1 The International Convention on Standards of Training, Certification and Watchkeeping for Fishing Vessel Personnel, 1995 (STCW-F 95)
- R2 FAO/ILO/IMO Document for Guidance on Training and Certification of Fishing Vessel Personnel
- R3 IMO/FAO/ILO Code of Safety for Fishermen and Fishing Vessels 1975 amended 1981

COMMERCIAL FISHING METHODS

An Introduction to Vessels & Gear

John C. Sainsbury

FISHERMEN'S HANDBOOK

Rear Admiral CRPC Branson

FAO CATALOGUE OF SMALL SCALE FISHING GEAR

C Nedelec / J Prado

FAO FISHERMAN'S WORKBOOK

Fisheries Industries Division

J Prado

Details of distributors of IMO publications that maintain a permanent stock of all IMO publications may be found on the **IMO website at <http://www.imo.org>**

Textbooks (T)

- **T1** A Course Compendium is provided for use as a textbook.
This also contains selected extracts from IMO/FAO/ILO Code of Safety for Fishermen and Fishing Vessels 1975 (Part A). (IMO Sales No.1749E). (Ref. R3)

Part B: Course Outline and Timetable

Lectures

As far as possible, lectures should be presented within a familiar context and should make use of practical examples. They should be well illustrated with diagrams, photographs and charts where appropriate, and be related to life at sea.

An effective manner of presentation is to develop a technique of giving information and then reinforcing it. For example, first tell the trainees briefly what you are going to present to them; then cover the topic in detail; and, finally, summarize what you have told them. The use of an overhead projector and the distribution of copies of the transparencies as trainees' handouts contribute to the learning process.

Course Outline

The tables that follow list the competencies and areas of knowledge, understanding and proficiency, together with the estimated total hours required for lectures and practical exercises. Teaching staff should note that timings are suggestions only and should be adapted to suit individual groups of trainees depending on their experience, ability, equipment and staff available for training.

PART B: COURSE OUTLINE

Course Outline

Competence: Deckhand to be familiar with the dangers associated with fishing operations such as, releasing the fishing gear into the water, hauling the fishing gear and landing the catch onboard.

Course Outline	Approximate time (hours)
Knowledge, understanding and proficiency	Lectures, demonstrations and practical work
<i>1 Fishing Methods</i>	1.5
<i>2 Fishing Systems</i>	3.0
<i>3 Releasing the Fishing Gear</i>	1.5
<i>4 Fish Catching</i>	1.0
<i>5 Recovering the Fishing Gear</i>	2.0
<i>6 Damaged Fishing Gear</i>	1.5
<i>7 Maintenance of the Fishing Gear</i>	1.0
<i>8 Fishing Operations Safety</i>	2.0
<i>9 Practices for Purse Seine</i>	1.5
<i>10 Basic Safety Awareness</i>	1.5
<i>11 Factory and Fishroom Practices</i>	1.5
TOTAL	18

Note: Teaching staff should note that outlines are suggestions only as regards sequence and length of time allocated to each objective. These factors may be adapted by lecturers to suit individual groups of trainees depending on their experience, ability, equipment and staff available for training.

PART B: COURSE OUTLINE

Course Timetable

Period/Day	1st Day	2nd Day	3rd Day
1st Period (1.5 hours)	1 Identify and sketch the different fishing methods and fishing systems	5 Recovering the fishing gear (continued)	9 Practices for purse seine
2nd Period (1.5 hours)	2 Sketch the fishing systems machinery and workstations (continued)	6 Damaged fishing gear	9 Practices for purse seine (continued)
LUNCH BREAK			
3rd Period (1.5 hours)	3 Releasing the fishing gear	7 Maintenance of the fishing gear 8 Fishing operations safety	10 Basic Safety Awareness
4th Period (1.5 hours)	4 Fish catching 5 Recovering the fishing gear	8 Fishing operations safety (continued)	11 Factory and Fishroom Practices

Teaching staff should note that the hours for lectures and exercises are suggestions only as regards sequence and length of time allocated to each objective. These factors may be adapted by the lecturer, to suit individual groups of trainees, depending on their experience, ability, equipment and staff available for teaching.

PART C: DETAILED TEACHING

SAFETY OF FISHING OPERATIONS

IMO
Ref.

Text
Book

Syllabus
Video Ref.

Part C: Detailed Teaching Syllabus

Introduction

This teaching syllabus has been written in learning objective format in which the objective describes what the student must do, to demonstrate that knowledge has been transferred.

All objectives are understood to be prefixed by the words, "The expected learning outcome is that the student will be able".

In order to assist the lecturer, references are shown against the learning objectives to indicate IMO references and publications, textbooks, additional technical material and teaching aids, which the lecturer may wish to use when preparing course material. The material listed in the course framework has been used to structure the detailed teaching syllabus; in particular,

Teaching video (indicated by **V**),
IMO references (indicated by **R**), and
Textbooks (indicated by **T**)

will provide valuable information to lecturers. The abbreviations used are:

App.	Appendix
Anx.	Annex
Ch.	chapter
pa.	Paragraph
p, pp	page, pages
Reg.	Regulation
Sect.	Section
Attach.	Attachment

The following are examples of the use of references:

- ***R/D.of G. Ch.6, App.34*** refers to, Appendix 34, Chapter 6 of IMO/ILO Document for Guidance 2001 Edition
- ***R/CSFFV Ch.5 Sect. 5.2. pa 5.2.1*** refers to, IMO Code of Safety for Fishermen and Fishing Vessels 1975 (Part A)
- ***R/S-F Ch. III Reg. 1.1.6*** refers to, STCW-F 95 Chapter III, Regulation 1.1.6
- ***R/S-F Reg. 4 App. 10.1*** refers to, STCW-F 95 Regulation 4 Appendix 10.1

PART C: DETAILED TEACHING

SAFETY OF FISHING OPERATIONS

IMO
Ref.

Text
Book

Syllabus
Video Ref.

■ Note

Throughout the course, safe working practices are to be clearly defined and emphasized with reference to current international requirements and regulations.

It is expected that the national institutions implementing the course will insert references to national requirements.

The syllabus has been developed for use in a classroom environment; however, it is recommended, where possible, that onboard application of the performances be applied. Alternatively, for institutions having fishing simulators, it should be employed where possible.

COMPETENCE: Deckhand to be familiar with the dangers and practice associated with fishing operations such as: releasing the fishing gear into the water, hauling the fishing gear and landing the catch onboard.

Knowledge, understanding and proficiency

Appreciation of fishing methods, the fishing gear and its function

Understanding of actions to be taken during fishing operations, including:

- .1 the release of various fishing gears
- .2 actions during the fish catching phase
- .3 how to recover the fishing gear
- .4 how to recover damaged fishing gear safely
- .5 the need for maintenance of the fishing gears
- .6 apply fishing operations safety
- .7 safety practices for purse seine
- .8 basic safety practices
- .9 factory and fishroom safety practices

Objectives are:

- 1. The identification of fishing methods and their fishing gear, fishing operations sequences and workstations.**
- 2. Recognize the appropriate safety responses and actions applicable for the prevailing situations during fishing operations.**
- 3. To reduce the potential for accidents through maintenance and risk assessed safety practices**

R/S-F
Ch.3
Reg. 1.6
Attach.2
Res. 4
Anx. 2.2

1
2,3,4,5
3
4
5
6
7
8
9
10
11

PART C: DETAILED TEACHING

SAFETY OF FISHING OPERATIONS		IMO Ref.	Text Book	Syllabus Video Ref.
1 Fishing Methods				
Required Performance:		R/D.of G. Ch.6.29.2		
1.1	identifies and sketches a fishing method and its set or towed fishing gear from each of the generic systems below: • Dragging methods • Static gears • Encircling methods		T1 p. 4-22 p. 29-37 p. 40-45	V5 V1 V6
.2	identifies and sketches the key components of typical fishing gear for two of the following: 1. Danish seine net 2. Purse Seine 3. A fleet of traps 4. A fishing method of your choice	R/D.of G. Ch.6.29.6.1	T1 p. 16 -17 p. 40 p. 32	V1 V3 V5
.3	describes the sequential events for fishing operations for a fishing method of his choosing during: • The release stage • The hauling stage	R/D.of G. Ch.6.29.6.6	T1	
2 Fishing Systems				
Required Performance:		R/D.of G. Ch.6.29.6.3		
.1	Outlines a deck plan view and identifies the essential fishing systems machinery and structures for: • Demersal side trawler • Gill net vessel • A fishing method of your choice		T1 p. 9 p. 29	V1 V3
.2	Sketches and identifies a deck plan view to show the essential workstations that apply for fishing operations for two of the following methods: • Stern demersal trawler • Line or trap • Purse seine • A fishing method of your choice	R/D.of G. Ch.6.29.6.4	T1 p. 14 p. 31 p. 42	V1 V5 V6

PART C: DETAILED TEACHING

SAFETY OF FISHING OPERATIONS		IMO Ref.	Text Book	Syllabus Video Ref.
3	Releasing the Fishing Gear			
	Required Performance:	R/D.of G. Ch.6.29.6. 6		
.1	describes and sketches the sequence of events in <u>releasing</u> (shooting) the fishing gear for any two of the following: • Stern trawling • Purse seine • Shellfish or fish traps • One method of your own choosing		T1 p. 13 p. 41 p. 32	
.2	identifies the main hazards of working on the main deck during fishing operations when: • The otterboards are surfacing • Hauling at the line hauler • Working at the stern ramp end or bulwark rail • Baiting hooks or handling lines or traps	R/CSFFV 5.2.21 5.5.8		V4
4	Fish Catching			
	Required Performance:	R/D. of G Ch.6.29.6. 3		
.1	recognizes the safety and operational issues when: • Setting the manually operated main winch brakes for towing • Monitoring the seine net ropes for tension • Monitoring the warp behaviour when towing a trawl	R/CSFFV 6.2.9 5.4.4	T1 p. 11,12	V4
5	Recovering the Fishing Gear			
	Required Performance:			
.1	describes and sketches the sequence of events when recovering the fishing gear in terms of: • Purse seine • A method of your choice • Any static net method	R/D. of G Ch.6.29.6. 4	T1 p. 41-44 p. 20 p. 31-34	
.2	demonstrates the appropriate safety precautions when: • Operating winch controls • Hauling using a line hauler • Removing dangerous fish from a hook • Needing to stand below a purse seine power block • Signalling by hand / voice	R/CSFFV 6.2.15/16 5.5.8 5.5.5 5.3.6 5.2.6	p. 56-57 p. 38-39 p. 23,46	

PART C: DETAILED TEACHING

SAFETY OF FISHING OPERATIONS		IMO Ref.	Text Book	Syllabus Video Ref.
6	Damaged Fishing Gear	R/D. of G Ch.6.29.6.4		
	Required Performance:			
.1	discusses the <u>dangers</u> and actions on deck when damaged fishing gear is being retrieved if:	R/CSFFV	T1	
	- Disrupted or changed work procedures - Reaching outboard - Near moving ground rigging and warp - Handling lines and hooks - In heavy weather or pitching or rolling of the vessel - Stoppering ropes and foul gear	4.3.1 4.4.16 5.5.13 4.3.2	p. 47 p. 48	V4
7	Maintenance of Fishing Gear	R/D. of G Ch.6.31.1.		
	Required Performance:			
.1	indicates the wear and tear signs that reveal a need for safety maintenance for the following components:	R/CSFFV		
	- Herding bridles - Otterboard - Ground rigging shackles - Running sheaves / blocks and their shackles - Danish seine net herding ropes - Purse wire and rings - Mainlines and branchlines	4.4.5 6.2.12 5.1.2 6.2.11 6.2.19	T1 p. 48 p. 49 p. 50	
8	Fishing Operations Safety	R/D. of G Ch.6.29.6.9		
	Required Performance:			
.1	specifies the main safety issues during fishing operations when:	R/CSFFV		
	- Releasing a marker buoy or anchor outboard - Connecting two ropes using G link clips - Setting a purse seine net - Releasing trapped netting - Pumping large catch of fish onboard from the net	5.2.5 5.3.2 5.3.7	T1 p. 25,26 p. 45,46	V4

PART C: DETAILED TEACHING

SAFETY OF FISHING OPERATIONS		IMO Ref.	Text Book	Syllabus Video Ref.
.2	discusses the dangers and actions of working during fishing operations in these areas:	R/CSFFV	T1	
	- Bollards, fairleads and blocks - Running wires or warp - Stern or ramp - Blocking the warp at the towing block aft - Operating a line or net hauler - Shooting tubs or racks of lines and hooks	5.2.2 5.1.4 5.2.7 5.2.1 5.5.8 5.5.12	p. 26 p. 25 p. 24	
.3	states the likely accident outcome on deck during fishing operations when:	R/CSFFV		V4
	- Standing on loose rigging or netting, still outboard - Standing or crossing under a hoisted object or net - Working in the vicinity of an open hatch - Wearing rings on a finger	5.1.6 5.2.19 3.3.3 5.1.3	T1 p. 23 p. 27 p. 53	
.4	indicates his actions when working with the fishing gear and in particular:	R/CSFFV		
	.1 clearing foul rope or fishing gear .2 unfamiliar objects in the net when retrieving the net .3 outrunning fishing gear and ropes or warp .4 when clearing a rope/line from the sheave of a block	5.1.7 5.1 5.1.5/6 5.1.9	p. 23 p. 24 p. 53 p. 54	
.5	demonstrates and describes the appropriate procedures for using a winch and in particular when:	R/CSFFV	T 1	
	.1 using a rope on the warping drums .2 operating the winch controls .3 examining the wire ropes for use .4 lifting a heavy load	6.2.14 6.2.15/16 6.2.19 6.2.13	p. 56,57 p. 53 p. 54	
.6.1	describes the appropriate actions or the effect on the use of ropes when:		T 1	
	- Withdrawing a rope from a new coil - Jerking a rope under tension - Exposed to weather and sunlight - Removing a kink in a rope - Discarding nets or ropes and other gear	R/CSFFV 4.4.7 4.4.9 4.4.6 4.4.8 4.4.15	p. 53, 54	

PART C: DETAILED TEACHING

SAFETY OF FISHING OPERATIONS

IMO
Ref.

Text
Book

Syllabus
Video Ref.

9 Practices for purse seine

Required Performance:

.1 recognizes how you might improve safety when carrying out fishing operations

- If fish lie heavily in the net.
- When handling a big catch in the net.
- Stowage of extension rope.
- Setting the net using a drogue or skiff.
- Stowing purse ring bridle.
- Stowing the net.
- Working below a power block.

.2 discusses what action you would consider good safety practice:

- When stowing purse ring bridles.
- As winchman releasing the purse wire when setting the net.
- When pumping or brailing the catch into the hold.
- When using the skiff or small boat.

10 Basic Safety Precautions

.1 indicate the basic safety precautions when:

- Working alone on deck in bad weather.
- Trying to reach fishing gear outboard in heavy weather.

.2 what actions to ensure your safety might you take before:

- Working on the main deck while steaming.
- Going aloft to repair a navigation light.

R/D.of G
Ch.6.29.6.9

R/CSFFV
5.3.7
5.3.4
5.3.2
5.3.1
5.3.11
5.3.6

T1
p. 40

p. 45
p. 46

R/CSFFV
5.3.1
5.3.3

T 1
p. 45
p. 46

5.3.7
5.3.16

R/D. of G
Ch.6.29.6.9

R/CSFFV

4.3.8

4.3.5

T 1
p. 51,52

p. 53

V4

R/CSFFV
4.3.4/7
7.4.1
4.5.4

T 1
p. 53
p. 58
p. 55

PART C: DETAILED TEACHING

SAFETY OF FISHING OPERATIONS		IMO Ref.	Text Book	Syllabus Video Ref.
.3	demonstrate and describe the equipment and/or clothing needed for:	R/CSFFV 7.4.5 7.2.5 5.7.3	T 1 p. 57,58	V2
	• Entering a compartment or room that may have gas • Working in a fish room used to store frozen fish			
11	Factory/Fishroom Practices	R/D. of G Ch.6.29.6.9		
.1	discusses the safety issues when engaged in the following practices on deck or in the factory:	R/CSFFV 5.7.3	T 1 p. 59 p. 61 p. 60	
	• Handling or moving whole frozen fish blocks • Using seawater hoses in enclosed spaces or factory • Opening the fish waste chute			
.2	indicate the safety benefits for:	R/CSFFV 7.2.6 7.2.8/9	T 1 p. 59	
	• Cleanliness in the processing factory • Self-protection issues for safe operation in the factory • Good hygiene when processing fish			
.3	state the main problems causing accidents when:	R/CSFFV	T 1 p. 59 p. 60	
	• Using fish gutting machinery • Operating banding machinery • Working with conveyor belts			
.4	eviscerate fish safely:	6.6.1/2/3 6.4/5 7.2	T 1 p. 59	
	• States the safety issues existing when using a knife to gut fish and why a sharp knife is important • Describes the correct clothing for safe working in gutting and processing fish			

PART C: DETAILED TEACHING

SAFETY OF FISHING OPERATIONS		IMO Ref.	Text Book	Syllabus Video Ref.
.5	demonstrate the correct procedure and recognize the hazards when: - Operating plate freezers - Lifting and stowing frozen blocks of fish		p.59 p.60	V2
.6	demonstrate the correct procedures when: - Stacking boxed fish in the fishroom to ensure their stability in all weathers - Lifting a box of fish to minimize back injuries - Boxes of fish are hoisted during discharge or stowage - Using old stored ice in the fishroom	R/CSFFV 4.5.5 5.7.5	T 1 p. 59, 60	
.7	enclosed spaces:			
.1	recognizes the dangers of entry into confined spaces or fishroom tanks	R/CSFFV	T 1 p. 58, 59	
.2	states that the internal atmosphere may contain dangerous gases or insufficient oxygen	7.4.5 7.4.9		
.3	recognizes the safety issues for making a safe entry into the fishroom or tanks			
.4	states the dangers working near or entering a hatch opening			

Part D: Instructor Manual

Introduction

This manual is intended to provide guidance on the material that is to be presented during the course. The course is based on STCW-F 95 Convention and the recommendations in chapters 2, 3 and 6 of the IMO/ILO Document for Guidance, Training and Certification of Fishing Vessel personnel 2001 Edition; requirements in:

STCW-F 95, CHAPTER III

Regulation 1

Basic safety training for all fishing vessel personnel

1.6 Prevention of shipboard accidents

Resolution 4

Training of deck-hands onboard fishing vessels of 24 metres and over.

Annex

- 2.2 Be familiar with the dangers associated with fishing operations such as shooting the fishing gear into the water, hauling the fishing gear and landing the catch on board.

The course structure follows the requirements of the STCW-F 95 Convention and the guidance in Chapter 2. (Para. 2.1. fig. 2.1.1.4 & para. 2.16. fig. 2.16.2.1.1), Chapter 3 (para. 3.25) and Chapter 6 of the IMO/ILO Document for Guidance, Training and Certification of Fishing Vessel personnel. The detailed teaching syllabus is based in part on (section 6.29 fig. 6.29.6) and Appendix 34 of the IMO/FAO/ILO guidance document.

The course should be under the control of a qualified maritime professional or professional teacher/instructor in fisheries. The precise structure, content of the lectures, practical work and the way in which the course work is arranged and developed is left to the discretion of that person.

A Course Compendium (T1) has been compiled by the author, making use of extracts from IMO/FAO/ILO Code of Safety for Fishermen and Fishing Vessels (Part A) (CSFFV), and this should be used to implement and support the course work, introducing specific national requirements as appropriate.

The detailed teaching syllabus is arranged in eleven main sections, which reflect the requirements in IMO/FAO/ILO Document for Guidance, 2001 Edition. Where supporting material is available in the Course Compendium (T1) an appropriate reference to it is indicated in the detailed teaching syllabus.

The times allocated for each section are suggested values, and the instructor should adjust them as necessary. In particular, it may be found necessary to increase the time allocated for practical

PART D: INSTRUCTOR MANUAL

applications to ensure that the trainees can demonstrate their competence to carry out the procedures and measures effectively.

Guidance Notes

Chapter III Regulation 1 Section 1 requires that fishing vessel personnel shall, before being assigned to any shipboard duties, receive basic training approved by the Administration in prevention of shipboard accidents.

The minimum standard of competence set out in STCW-F 95 Convention and the recommendations in Chapter 2 of the IMO/ILO Document for Guidance, Training and Certification of Fishing Vessel personnel. All fishermen should receive this elementary pre-sea training, i.e. before service aboard any vessel. It provides the fishermen with some preparedness for the potentially hazardous environment on board vessels.

The training ensures that the fishermen are equipped to work safely on deck while fishing operations are in progress.

The aim should be to familiarise the trainees with the safety practices and problems commonly found aboard vessels and the actions and procedures that can be immediately applied in any given situation. In particular the training should ensure that all fishermen are able, in the working environment, to understand and assess the fishing operation and the hazards to themselves.

Although the lectures based on the detailed teaching syllabus are important in informing and explaining and making sure that emphasis is placed on critical aspects, the practical sessions are of equal importance in establishing that understanding and knowledge have been properly transferred and, therefore, wherever it is practicable to do so, the trainees should demonstrate the actual procedures involved.

To support the objectives of the syllabus, a compendium has been compiled; a copy of this should be provided to each trainee taking the course.

The compendium for this course also consists of the following extracts from the IMO/FAO/ILO Code of Safety for Fishermen and Fishing Vessels (Part A):

- Chapter 4: Safety on Deck
- Chapter 5: Safety in Fishing Operations
- Chapter 6: Safety in Mechanical Spaces and of Mechanical Spaces
- Chapter 7: Special Safety Precautions

Only certain parts of the chapters 6 and 7 relate directly to the syllabus objectives, it was therefore considered preferable to provide the whole of these chapters, rather than parts of them.

PART D: INSTRUCTOR MANUAL

Table 1: Extracts from Code Safety for Fishermen and Fishing Vessels used in the Compendium

The following table shows the relevant pages and figures from **Code Safety for Fishermen and Fishing Vessels** used to support each section of the syllabus.

Section of Syllabus	Extract used from Textbook & CSFFV*
1. Fishing Methods	T 1 p 3, pp 5-31, pp 32-34
2. Fishing Systems	T 1 p 9, 12, 24, 26, 29
3. Releasing the Fishing Gear	R/CSFFV Ch. 5.2, p 31, 32. Ch. 5.3 p 33, 34 T 1 p 8, 11, 25, 33
4. Fish Catching	R/CSFFV Ch. 5.2, p 31, 32. Ch. 5.3 p 33, 34. Ch. 5.5 p 35, 36 Ch. 6.2 p 40, 41 T 1 p 10, 28
5. Recovering the Fishing Gear	R/CSSFV Ch. 5.2, p 31, 32 Ch. 5.3 p 33, 34 Ch. 5.5 p 22, 33
6. Recovery of Damaged Fishing Gear	R/CSSFV Ch. 4.4 p 27, 28, 29 Ch. 5.1 p 30, 31 Ch. 5.3 p 33, 34 Ch. 5.5 p 35, 36 T 1 p 35, 36
7. Maintenance of the Fishing Gear	R/CSFFV Ch. 4.4 p 27, 28, 29 Ch. 6.2 p 40, 41 T 1 p 38, 39
8. Fishing Operations Safety	R/CSFFV Ch. 4.4 p 27, 28, 29 Ch. 5.1 p 30, 31 Ch. 5.1 p 30, 31 Ch. 5.2, p 31, 32. Ch. 5.3 p 33, 34. Ch. 5.5 p 35, 36 Ch. 6.2.2 plus, Ch. 7.2 p 46, 47 T 1 p 35, 36 R/CSSFV Ch. 4.1 p 25, 26 Ch. 4.4 p 27, 28, 29 Ch. 6.2 p 40,
9. Practices for purse seine	R/CSFFV Ch. 5.3 p 33, 34.
10. Basic Safety Practices	R/CSFFV Ch. 4.1 p 25, 26, 27, 28, 29
11. Factory and Fishroom Practices	R/CSFFV Ch. 5.7 p 37, Ch. 6.6 p 44 Ch. 7.2 p 46, Ch. 7.5 p 48

* The page numbers (p) quoted are those in CSFFV.

PART D: INSTRUCTOR MANUAL

SAMPLE LESSON PLAN 1

COURSE: 1. SAFETY OF FISHING OPERATIONS-Support Level

Duration: 15 Minutes: Lecture

TRAINING AREA: 5. Recovering the Fishing Gear

30 Minutes: Demonstration/Practical

Main element	Specific learning objective	Teaching method	Textbook	IMO ref.	A/V aid	Instructor guidance note	Lecture notes	Time (mins.)
Identifies all the safety issues and actions of using a rope on the winch-warping drum.		Lecture, Demonstration/ practical	T1	R3		A		15
During fishing operations hoists a part of the fishing gear.	Examines the rope condition for safe use.							10
Accesses the safety situation and applies rope turns on winch warping heads.	Ensures that the winch man is present at the winch controls. Before hoisting or applying loads hand tightens the rope by hand before taking rope turns on the warping head. Applies two turns to take up slack rope then adds further one or two turns to heave. The student should maintain smooth and controlled heaving and lowering of weight.	Practical						20

PART D: INSTRUCTOR MANUAL

SAMPLE LESSON PLAN 2

COURSE: 1. SAFETY OF FISHING OPERATIONS-Support Level

Duration: 15 Minutes: Lecture

TRAINING AREA: 10. Basic Safety Awareness

30 Minutes: Demonstration/Practical

Main element	Specific learning objective	Teaching method	Textbook	IMO ref.	A/V aid	Instructor guidance note	Lecture notes	Time (mins.)
Identifies all the safety issues and actions of operating winch controls while heaving, lowering or stopping weights.		Lecture, Demonstration/ practical	T1	R3	V4	A		15
During fishing operations, hoists, lowers and stops a weighted part of the fishing gear.	Examines the appropriate areas for safe lifting or lowering of weight.							10
Assesses the safety situation and on instruction applies lifting/lowering power on winch.	Ensures that the winch rope man is ready at the winch-warping drum and awaits appropriate hand signals from deck officer (or instructor) in charge.							20
	Before applying winch loads student ensures the object weight and rope is unobstructed, before acting on the instruction to lift or lower.	Practical						
	The student should understand and respond to changes in forces acting on the winch and to maintain a smooth and controlled heaving, lowering and stopping of weight.							

PART D: INSTRUCTOR MANUAL

SAMPLE LESSON PLAN 3

COURSE: 1. SAFETY OF FISHING OPERATIONS-Support Level

Duration: 15 Minutes: Lecture

TRAINING AREA: 10. Basic Safety Awareness

30 Minutes: Demonstration/Practical

Main element	Specific learning objective	Teaching method	Textbook	IMO ref.	A/V aid	Instructor guidance note	Lecture notes	Time (mins.)
Identifies all the safety issues and actions of signalling by hand or voice while heaving, lowering or stopping weights.		Lecture, Demonstration/ practical	T1	R3	V4	A		15
Demonstrates hand signals to hoist, lower and stop a weighted part of the fishing gear.	Assessment of the appropriate areas for safe lifting, lowering or stopping of weight.							10
Assesses the safety situation and on instruction applies lifting/lowering and stop signals.	Ensures that the winch control and rope men are in position. Student ensures the object weight and rope is unencumbered, before demonstrating the hand signals to lift, lower or stop. The student should demonstrate and respond to hand signals and maintain varied speed controlled heaving, lowering and stopping of weight.	Practical						20

PART D: INSTRUCTOR MANUAL

SAMPLE LESSON PLAN 4

COURSE: 1. SAFETY OF FISHING OPERATIONS-Support Level

Duration: 15 Minutes: Lecture

TRAINING AREA: 7. Maintenance of the Fishing Gear

15 Minutes: Demonstration/Practical

Main element	Specific learning objective	Teaching method	Textbook	IMO ref.	A/V aid	Instructor guidance note	Lecture notes	Time (mins.)
Identifies all the fishing gear components and rope maintenance issues.		Lecture, Demonstration/ practical	T1	R3		A		15
Examination of ropes and other fishing gear components.	Examines specific ropes or fishing gear components to establish condition for use.							5
Understand maintenance issues and any problem/s and course of action.	Student demonstrates why the ropes or components can be considered as being in good or poor condition.	Practical						10

Author's Note

The Compendium for this Model Course forms an essential part of this fishing operations safety course. It is a document of 65 pages.

SAFETY OF FISHING OPERATIONS

Support Level

(COMPENDIUM FOR SAFETY OF FISHING OPERATIONS-SUPPORT LEVEL
TEACHING SYLLABUS)



IMO

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FISHING METHODS AND OPERATIONS TEXTBOOK

This compendium is intended to provide additional information to instructors using *Part C: Detailed Teaching Syllabus for Fishing Operations Safety*.

1 FISHING METHODS AND OPERATIONS

1.1 Fishing gear categories

It should be noted that the fishing methods outlined in this textbook are not all of the fishing methods in use throughout the world. A comprehensive list can be seen in the FAO/ILO/IMO Document for Guidance Training and Certification of Fishing Vessel Personnel (appendix 34). This document is intended to examine the most popular fishing methods and their operational safety. However, it should be noted that the operational and safety aspects discussed for these methods apply to the vast majority of fishing methods operated world-wide and not discussed in this textbook.

Fishing gear categories

Surrounding nets

- With purse lines (purse seines)
 - one-boat-operated purse seines
 - two-boat-operated purse seines
- Without purse lines (lampara)

Seine nets

- Beach seines
 - boat or vessel seines
 - Danish seines
 - pair seines

Trawl nets

- Bottom trawls
 - beam trawls
 - otter trawls
 - pair trawls
 - nephrops trawls
 - shrimp trawls

- Midwater trawls
 - otter trawls
 - pair trawls
 - shrimp trawls
 - otter twin trawls

Dredges

- boat dredges
- hand dredges

Lift nets

- portable lift nets
- boat-operated stationary lift nets
- Shore-operated stationary lift nets

Falling gear

- cast nets
- falling gear

Gill nets and entangling nets

- set gill nets (anchored)
- drift nets
- encircling gill nets
- fixed gill nets (on stakes)
- trammel nets
- combined gill and trammel nets
- gill nets and entangling nets (not specified)

Traps

- stationary uncovered pound nets
- pots
- fyke nets
- stow nets
- barriers, fences, weirs, etc.
- aerial traps

Hooks and lines

- handlines and pole-lines (hand operated)
- handlines and pole-lines (mechanized)
- set lines

drifting long lines
long lines (not specified)
trolling lines

Grappling and wounding
harpoons

Harvesting machines
pumps
mechanized dredges

1.2 Generic methods

The primary fishing methods used to hunt fish, can be categorized into three main generic groups, these are:

1. Dragging methods
2. Static methods
3. Encircling methods

Each of these generic methods can be further expanded to a wide range of fishing methods and systems of operation. Each group has a common basis with similar fishing gears and methods of operation. Dragging or towed systems are clearly fishing gears that are being towed or pulled through the water, at some speed, to catch their prey. Static gears such as gill net and trap tend to operate in a fixed position to attract or ensnare their target species. Drift netting as it suggests drifts with the vessel to catch the target species by their gills. Gill netting, as indicated, catches fish by their gills in the net mesh. Encircling methods target specific shoals to then surround the target species, using a large curtain of netting, which is then drawn at its base to enclose the shoal.

1.3 Fishing operations

Fishing operations vary significantly according to the method fished and design, size and type of vessel. However, all methods involve a series of sequential events that can be broken down into three stages or phases termed as fishing operations.

These three stages for all fishing methods are:

1. Releasing or shooting the fishing gear
2. Fish Catching
3. Recovery or hauling the fishing gear

1.3.1 Releasing (Shooting)

Regardless of the generic method in use, whether dragging, static or encircling the process involves, at some stage, the vessel moving ahead while releasing the net, traps and or rigging etc. Completion of this stage is achieved when the complete fishing gear has been released to the desired position where the fish-catching phase begins.

Static gears usually complete the release or shooting phase, with the release of the final marker buoy. Dragging completes the shooting process when the required length of towing wire or warp is stopped. Encircling completes the shooting phase when the marker buoy or skiff (small boat) is recovered. This period is often termed as the shoot.

1.3.2 Fish catching

Depending on the fishing method, this process will vary in terms of placement of the gear and time spent fishing. Dragging methods begin their catch phase when the towing warp is fully released to position the fishing gear at the desired depth or on the seabed. This period is termed as the tow and commonly lasts about three hours. Nevertheless, the time spent catching fish is determined by many factors and can vary from only minutes to several hours.

Static net or line gears in most cases start the fish catching process when the final marker buoy of the fleet is released. This catch period is termed as the soak time. This can vary from a few hours to 12 hours. Longer than this the catch quality deteriorates.

Encircling methods start to effectively catch fish when the curtain of netting is released and when the pursing begins, by hauling the purse wire. Completion of this confirms that the fish are caught or have escaped. Time spent catching can be twenty minutes but depends on the speed of encirclement and hauling of the purse wire.

1.3.3 Recovery (Hauling)

For dragging methods the recovery or hauling operation begins with towing wires being recovered by hauling on the main winch. In these methods, the vessel's speed is reduced from its original towing speed to allow hauling.

Static methods require that a marker buoy be first retrieved. In both static and encircling methods the vessel is often stationary or going slow speed ahead towards the fishing gear. In purse seine the recovery starts after encirclement, with the net hauler hauling the net for stowage aft while the vessel is stopped.

2 DRAGGING METHODS

Each generic group can, as indicated, be expanded into its range of different fishing methods. For dragging methods the key specific methods are as follows:

- .1 Bottom, midwater and pair trawling (side or stern)
- .2 Beam trawling or multi-rig
- .3 Scottish or Danish seine
- .4 Dredging
- .5 Trolling

2.1 Side bottom trawling

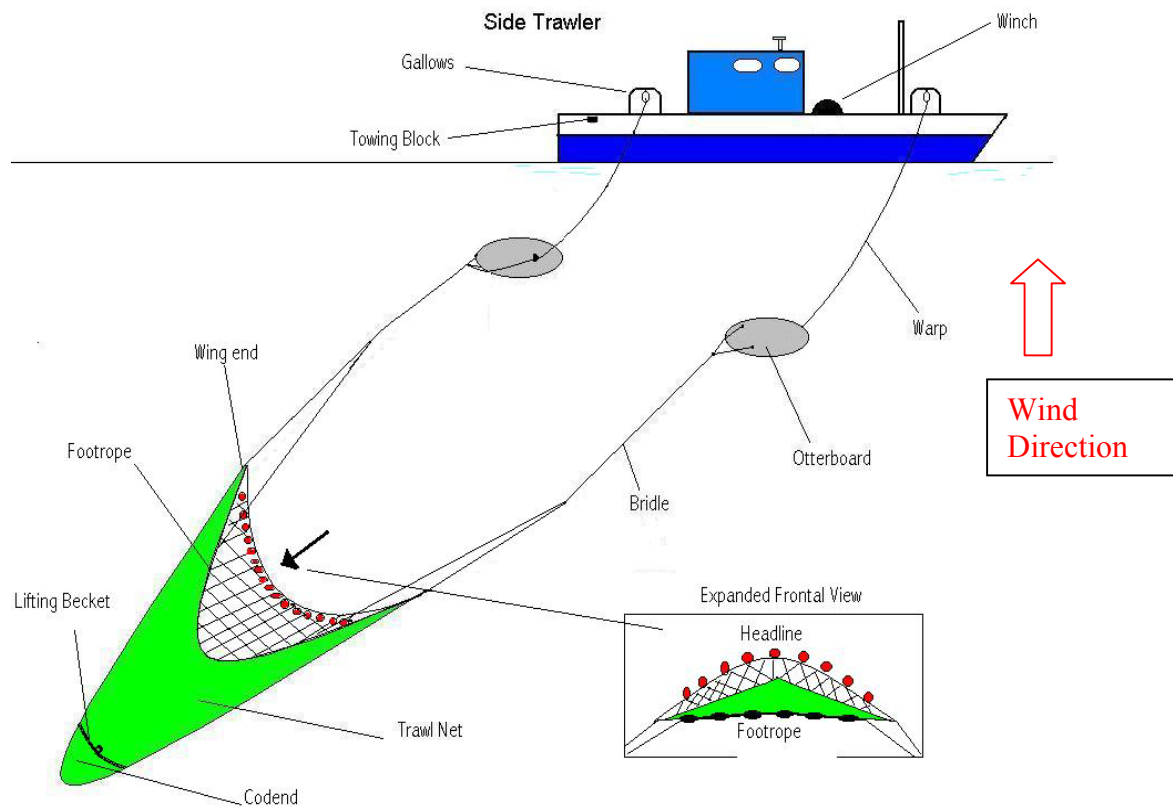


Fig.1 Side bottom trawling

Bottom or demersal trawling is one of the most common and successful methods of fishing in the world. Its mode of use varies, depending on the size of vessel and species fished. The above sketch shows a typical fishing gear of a bottom side trawler, with net to catch the fish, bridles to herd the fish, otterboards to keep the mouth of the net open and warps to tow the total fishing gear. The bottom of the net is protected from the seabed by means of a robust footrope or bobbin rig. Vertical opening of the mouth of the net is by use of buoyancy floats on the headline, while the cod-end or bag of the net is used to contain the fish and to allow lifting onboard the vessel.

2.1.1 Otterboards

Otterboards vary in their size and design depending on the power and size of vessel. The most popular design for smaller vessels is either rectangular wood or steel often having poor hydrodynamic efficiency. Larger vessels tend to operate very efficient steel cambered oval otterboard, which can weigh many tonnes. Below is a typical oval steel cambered otterboard. The important issues for a suitable otterboard is that of size, weight, stability, is it robust and catching/herding efficiency.

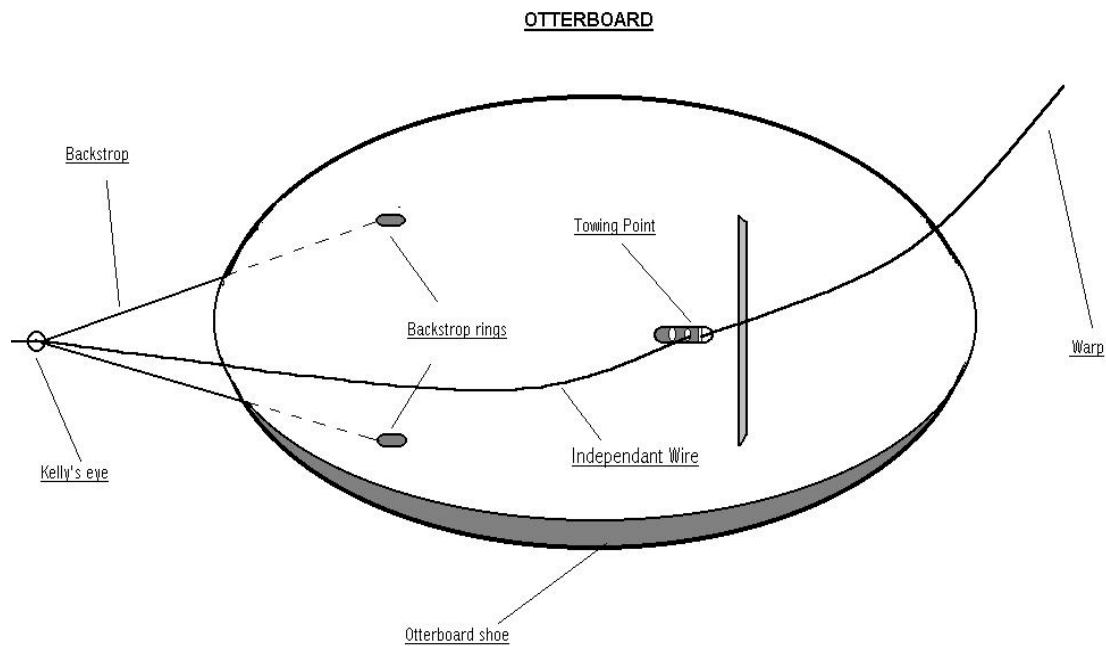


Fig.2 Otterboards

2.1.2 Ground rigging

In considering the ground rigging attached to the bottom of the net, its design is, primarily, related to the type of seabed fished. Large bobbins and rockhopper ground rigging is more effective at traversing over rocky ground to minimize damage. Conversely, these large bobbins will allow fish to escape. Therefore, the species targeted also have influence on the design of all the components used, such as footrope, bobbins, bridles and otterboards. Chain for instance is more aggressive on soft mud than steel wire and more likely to cause damage or become fast on the seabed. In considering the net and ground rigging, these and many other factors, need to be considered if an effective and safe fishing gear is to operate.

2.1.3 Net design

The design of net and its rigging selected for demersal trawling will vary according to the main species targeted and the seabed type fished. Some species are more prone to seek refuge on the seabed while others consider the pelagic regions as being more secure. Cod (*Gadus Morrhua*) for instance are predominantly a bottom seeking species that requires a net that is designed with minimal headline height but having long wings. Haddock (*Melanogrammus Aeglefinus*) on the other hand are predominantly surface seeking that requires a net that is designed with maximum headline height but having short wings.

The earlier sketches shows a fishing gear design similar in many respects that is used in all types of trawling such as two boat pair demersal or midwater. Multirig trawl designs also use this type

of general design that can be two or even three connected nets. Major difference often is net size, with multi-rig methods being the smaller and midwater the largest for any given size of vessel. Nevertheless, there are significant ship design differences between demersal and midwater systems and in the way they operate and the species they target.

2.1.4 Typical system

Basic Deck System:	Warp winch, two “A” frames or gallows, deck sheaves/bollards.
Fishing gear:	Net, ground rigging (footrope), two herding bridles, two otterboards, and two towing warps (See Fig.1).
Target species:	Demersal, midwater species e.g. cod, haddock, saithe, sole, plaice.
Strata fished:	Seabed or midwater
Capture influences:	Herding from bridles, net and mesh size, net speed.
Towing speed:	2 to 5 knots depending on the ship’s available power

The side trawling fishing operation can be performed from either the port or starboard side of the vessel but most commonly, starboard. However, before the fishing operation can be executed there are many preparations that need to be carried out to ensure that the fishing gear is ready for release. The majority of these preparations involve ensuring that the fishing gear is unsecured and ready for use.

2.1.5 Side trawler workstations

To carry out the fishing operation for side bottom trawling (Fig. 1), crewmen work in specific areas termed workstations (Fig. 3). The fishing operation begins as follows.

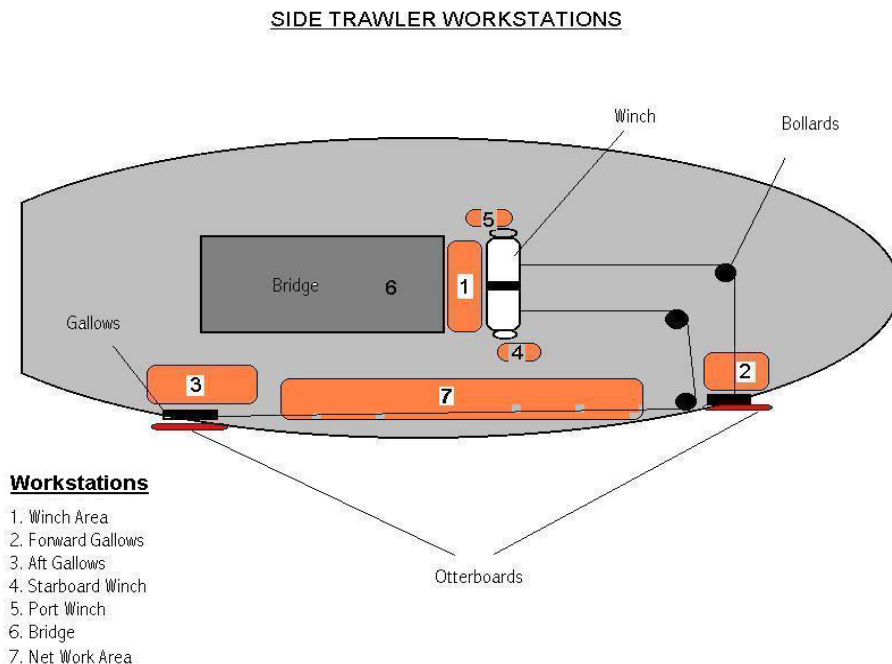


Fig.3 Side trawler workstation

1. Free all secured fishing gear such as doors, net and ground rigging.
2. All crewmen to standby their workstation and prepare the machinery and net for release. Crew to be aware of other workstations and bridge orders to release the fishing gear.
3. Crew duties (see Fig. 3)

The following is a general breakdown of the duties of deck crewmen at the various workstations shown above:

1. Winch Control (Station 1)
A very experienced deckhand should operate the main winch controls. His key role is to control the winch warp when needing to lift the net or rigging and/or otterboards. The bridles and warp may also be lowered or hove up by the winch controllers by engaging the winch drums.
2. Forward Gantry (Station 2)
Crew duties to connect or disconnect the otterboard, warp, independent and bridle/sweep wires.
3. Aft Gantry (Station 3)
Connect/disconnect the otterboard, warp, independent and sweep ropes/wires.
4. Amidships Starboard (Station 4)
To operate any lifting wires for aft, or assist at the winch.
5. Amidships Port (Station 5)
To operate any lifting wires for forward, or assist at the winch.
6. Bridge (Station 6)
Skipper to control the ship's movements throughout the fishing operation.
7. General fishing gear area, for releasing and hauling the net body, it's rigging and fish. All crewmen, at various times, are in this area during fishing operations.

2.1.6 Releasing the net

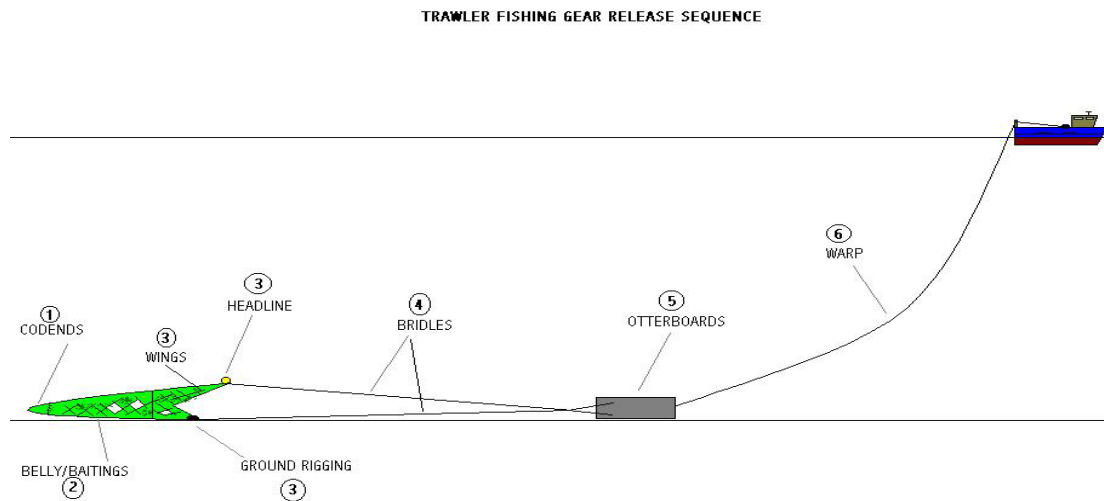


Figure 4 above shows, graphically, the sequence of events for a bottom trawler with 1 (cod-end) being the release start of the fishing operation and 6 (warp) being completion.

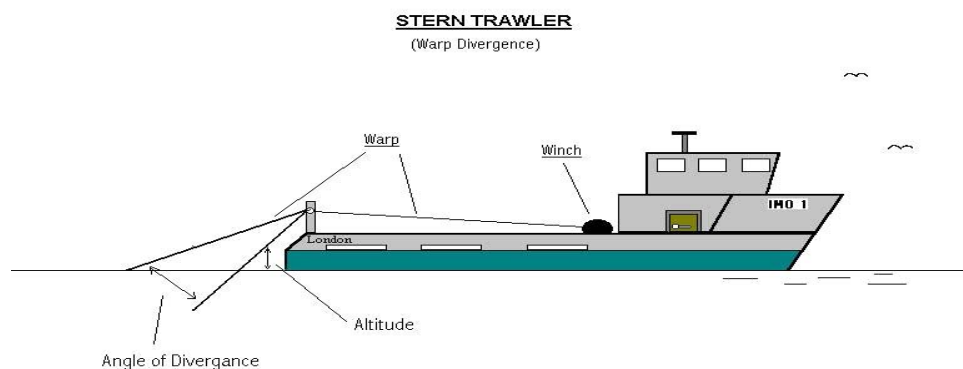
On completion of the initial preparation, the fishing gear is released as follows:

1. The operation starts with the lifting and release, outboard, of the cod end (1), followed by the net body or belly and baitings (2). The vessel is stationary and laid beam to windward on the fishing side. (Side trawler)
2. The next stage is to lift the rockhopper/bobbin rig outboard, to be followed by the net headline and its buoyancy floats (3) discharged from the area amidships.
3. Headline and footrope wires are then slacked outboard followed by the bridle/sweep wires (4) from their respective winches.
4. The bridles are then connected to the otterboards (5) and the warps, if not permanently attached, connected to the otterboards.
5. Once the Skipper has positioned the vessel, the otterboards are lowered from their respective gallows by slacking both warps (6).
6. The required length of warp is run off, winch is stopped and the brakes are applied.
7. A messenger wire is then used to bring both forward and aft warps together near the stern of the vessel (side trawler only).
8. Both warps are then secured to a towing block aft (see Fig. 1) to allow catch phase to begin.

2.1.7 Fish catching procedures

During the fish catching phase of the fishing operation the crewmen's role is confined largely to processing the catch. Nevertheless, there are duties and these are as follows;

- Standby to recover the fishing gear should it come fast on the seabed.
- Monitor the warp divergence and altitude to ensure that the fishing gear is operating properly.
- Monitor the warp vibrations/sound to ensure the fishing gear is operating properly.
- Monitor the warp markings to detect any change in length in either warp that might indicate the fishing gear has snagged on the seabed.
- Monitor the main winch brakes for correct tension.



(Fig. 5) Stern trawler

For dragging methods and in particular, trawling and seine net, warp divergence and altitude is fundamental to monitoring the fishing gear during the fish catch phase. Divergence or spread and altitude angles vary with depth and speed fished but otherwise should be constant when towing in a straight line. Alterations in these parameters indicate problems in the fishing gear, which should then be investigated.

2.1.8 Net hauling procedures

The following is the trawler hauling procedures at the respective workstations in Fig. 3.

	<u>Workstations</u>
1. Standby workstation, prepare main winch for hauling towing wires (warp).	1
2. If side trawler first release warp from towing block. Heave the warp on instructions from the bridge.	1
3. Alert bridge when 75 fathom of warp left to run out, and again when last 25 fathom mark. Reduce winch speed.	1
4. Alert bridge when otterboards are about to surface, and then secure otterboard with the dog chain to hanging gallows.	2&3
5. Unclip the independent wire from otterboard and connect to winch hauling wires.	2&3
6. Heave bridles to haul the danlenos/wing ends of net to sheaves or ramp.	1
7. Heave headline, footrope rigging and netting onboard or to arena side.	1
8. Heave the belly netting and cod-end extensions onboard until the bag of fish is at the ramp or ship's side.	1
9. Using the cod end lifting becket/strop, lift the bag of fish onboard.	1

Crew size is dependent on the size and type of vessel but as a rough guide, it is seldom less than 2 crewmen per ten metres of ship's length.

2.2 Stern bottom trawling

Fishing vessels can be grouped by their fishing methods; however, many fishing methods can be operated by a different design of vessel. One example of this is demersal trawling which could be a stern trawler or side trawler design. This vessel design difference has consequences on the working practices and position of workstations during fishing operations. Therefore, in any given method of fishing there can be a number of different ways in which the same fishing method can be operated to successfully release, fish and retrieve the fishing gear.

It should be noted that both side and stern trawler vessel designs could also be used to midwater or pair trawl. The following is the main deck release operation for stern trawling system design and their corresponding workstations. (W)

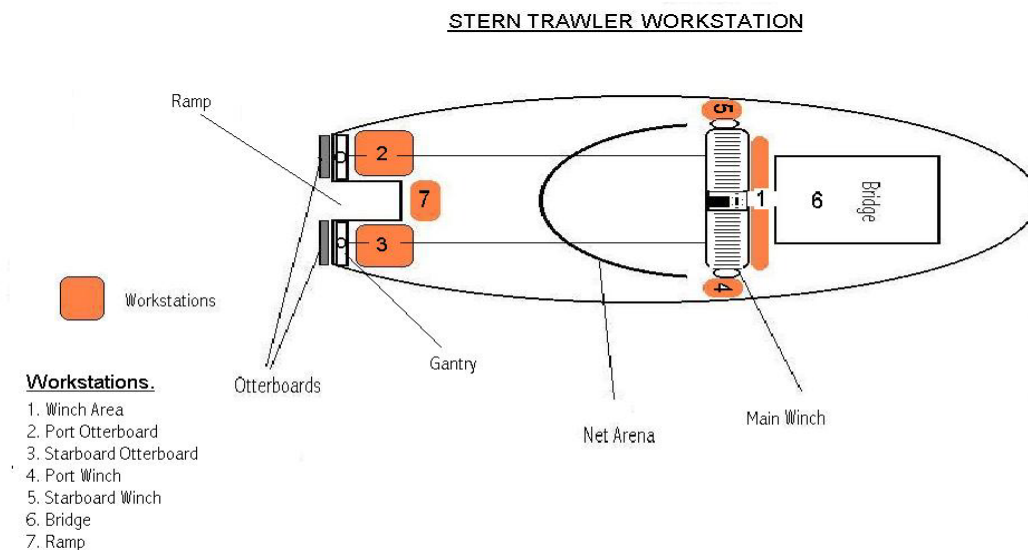
2.2.1 Releasing the net

The process of releasing the fishing gear on a stern trawler is very similar to that of a side trawler, except the net is released from the stern. The net and rigging is stowed and released in the net arena or, alternatively, a net drum.

The otterboards are positioned at the stern, one either side of the sloping ramp, down which the net and rigging is released. At the start of the operation the vessel is moving ahead at a slow speed and in a straight line.

1. The operation begins with the release from the net arena, down the ramp, of the cod end, followed by the net bellies. (W7) (see Fig. 6)
2. Next stage is to slack the rockhopper/bobbin ground rig outboard, to be followed by the net headline and its buoyancy floats. (W7)
3. Headline and footropes wires are then slacked outboard from the deck or net drum, followed by the herding bridles from the main or auxiliary winches. (W7)
4. On connection port and starboard of the bridles to the otterboards to the otterboard backstop and independent wire, the otterboards and the net are ready for release. (W 2 & 3)
5. Once the Skipper has gradually increased the speed of the vessel, the otterboards are lowered gradually to then slack both towing warps at speed. (W1)
6. When the required warp length is run off, the warp winch is stopped and the drum brakes are applied to then begin fishing (towing). (W1)

2.2.2 Stern trawler workstations

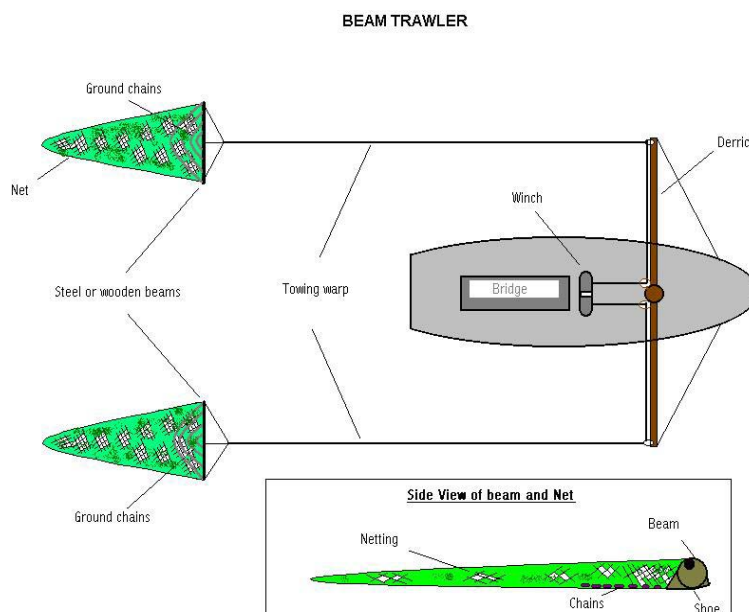


(Fig. 6) Stern trawler workstation

2.3 Beam trawling

Beam trawling is the precursor to all modern trawling methods. This type of method operated mainly using two nets, smaller but not dissimilar in general design to a demersal trawler. However, this method has no otterboards or bridles, to open the mouth of the net or to herd fish into the net. The net is kept open by the use of a wooden or steel beam to which the net is attached (see Fig. 7). The vessel operates a single beam and net on either side of the vessel. Moreover, two derricks on each side of the ship ensure that the beams can be operated safely, such that they do not tangle when towed on the seabed.

(Fig. 7) Beam trawler

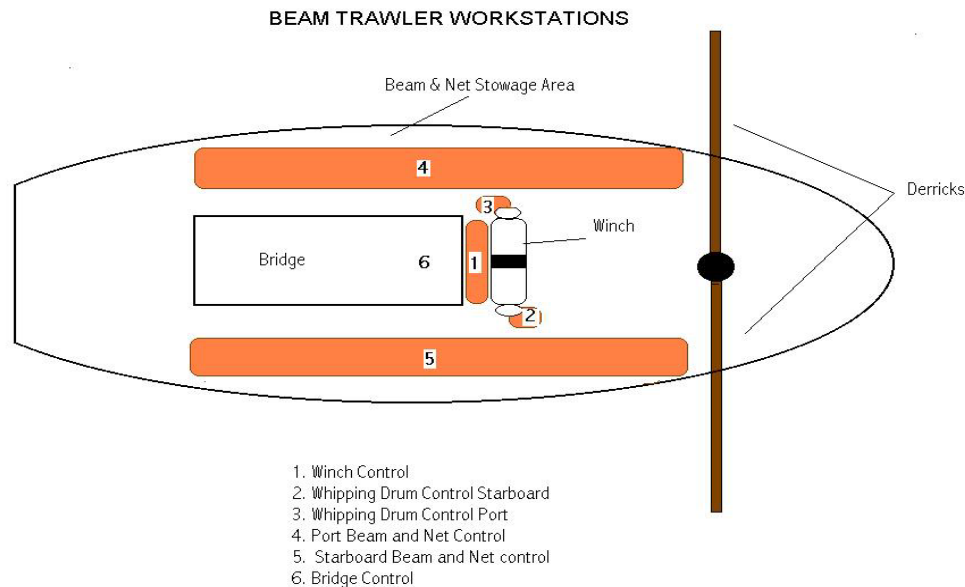


In addition to the net, large heavy chains are often used on the belly or bottom of the net and are attached behind the beam to make the fishing gear more aggressive and effective at catching bottom living fish. This method targets high value, largely bottom living species such as plaice, dover sole and shrimp. Figure 7 shows a beam trawler towing both of its nets.

It should be noted that some shrimp vessels use the same twin derrick / booms system as beam trawlers but replace the net beam with otterboards and buoyancy floats to obtain a net opening. Booms and fishing gear can also be operated from the aft section of the vessel.

2.3.1 Typical system

Basic system:	Winch, deck sheaves/bollards, two large derricks
Fishing gear:	Net, two beams, chains, two towing warps
Key species:	Most ground fish e.g. plaice, sole, shrimp, and prawns
Strata fished:	Seabed
Capture influences:	Beam size, chain weight and type, seabed type
Towing speed:	2-6 knots



(Fig. 8) Beam trawler workstation

Releasing the beam trawl is carried out in the following sequential manner, as the vessel is moving ahead at slow speed.

1. Lift outboard the beams, net and attached chains. (W4 & W5)
2. Heave outboard both codends. (W4 & W5)
3. Release the body of the net. (W4 & W5)
4. Lower both beams and increase speed. (W1)
5. Slack both warps to the required depth. (W1)

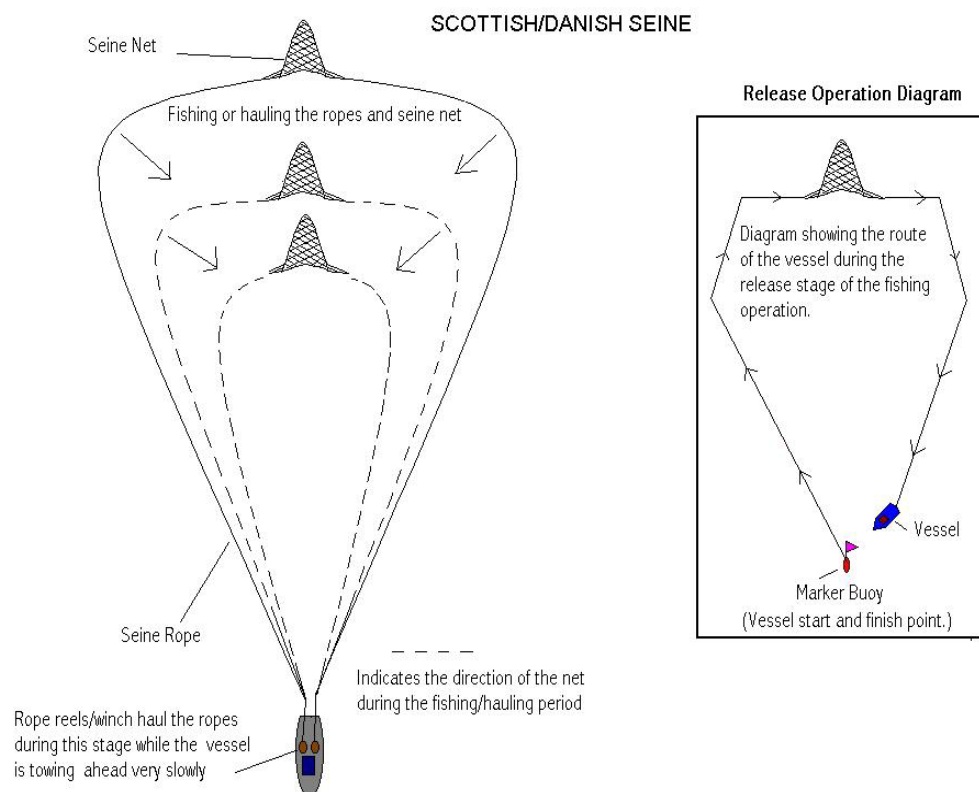
A quick release block/sheave system at the derrick end allows for easy release of the towing warp if the beam becomes fast to a wreck or obstruction on the seabed. This safety device reduces the likelihood of capsizing, as forces are directed away from the derrick end to the ship's side. Both beams are towed typically for one to two hours.

2.4 Scottish/Danish seine net

This method is more commonly used in the Northern Hemisphere particularly in Scotland, Denmark and Canada. The principal gear and its operation is that of a bottom trawl net whose wing ends are attached to two very long and weighted ropes. The fishing gear is set in a triangular fashion to be then hauled onboard.

The fishing operation begins with the release of a marker buoy (Scottish seine) and anchor (Danish seine) attached to a seine rope to be then released at speed. Depending on depth fished, lengths in excess of one mile of rope can be set. Once the first side of the triangle is set, the net wing end of the first rope is released. On setting the complete net from wing end to wing end, the second seine rope attached to the second wing end of the net is then released. This completes the second part of the triangle (see Fig. 9 Release Operation Diagram).

On return to the marker buoy the first seine rope is detached and connected to the rope reels/winch. Initially both ropes plus net are hauled at slow speed such, that the fishing and hauling phases are one and the same. The Scottish method requires that the vessel maintain a slow-ahead towing speed while simultaneously hauling on the ropes with the winch. In the Danish method the vessel is stationary and is anchored to the seabed throughout the hauling operation. As the ropes are largely recovered the speed of the winch is progressively increased until the net surfaces (see Fig. 9). The main determinants in catching fish with this method are the herding effect of seine ropes and the correct combined speed of the winch and/or ship. In Danish seine the ship is stationary and does not affect the catch efficiency. The process of herding or catching fish by recovery of the seine ropes can take 2 hours.



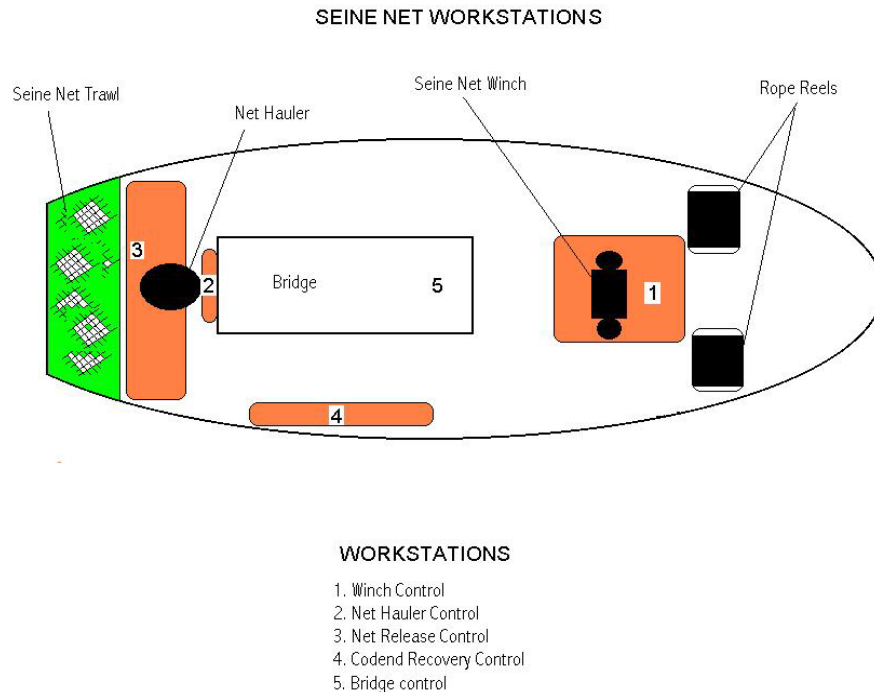
(Fig. 9) Scottish/Danish seine

For recovery both ropes are hauled using a winch/rope reels. On the net surfacing, it is hauled on board using a net hauler at the stern, where the bulk of the net is stowed. On many vessels the bag or cod end of fish is then pulled alongside, forward of amidships to then be lifted onboard. A rope becket or strop on the bag/cod-end is used to haul onboard the fish using a crane or lifting wire.

2.4.1 Typical system

Basic System:	Winch, rope reels, deck sheaves/bollards, net hauler
Fishing gear:	Net, ground rig, two seine ropes
Key Species:	Most demersal species
Strata fished:	Seabed

Capture Influences: Herding from ropes, net type/size, seabed type
Towing speed: 1 to 2 knots (ship) 1 to 3 knots (net)



(Fig. 10) Seine net workstations

2.4.2 Releasing the net and ropes

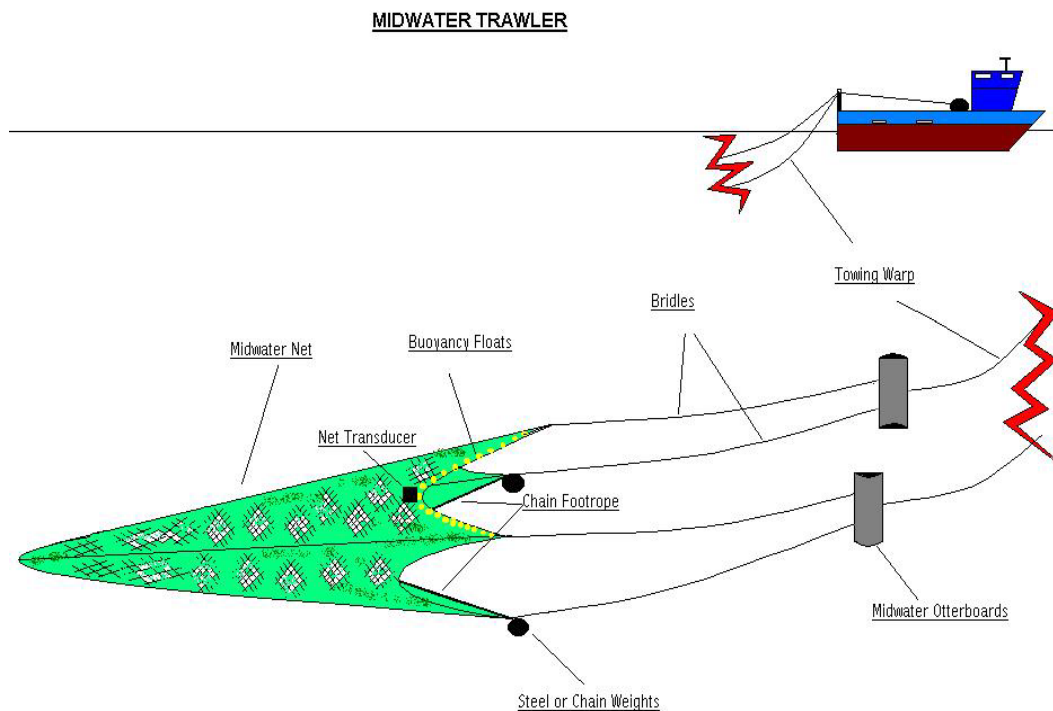
1. Release outboard the marker buoy with rope attached for first side of triangle. (W3)
2. Release one rope of required length from rope reels. (W1)
3. Connect to net wing end one. (W3)
4. Release net outboard from wing end to wing end. (W3)
5. Connect second rope to wing end two. (W3)
6. Release required amount for second part of triangle. (W1)
7. Arrival at marker buoy to recover first rope. (W4)
8. Heave slowly on both seine ropes till net surfaces. (W1)

Beach seines are in many ways similar in design and operation using a small boat to set the net offshore that is then hauled ashore by the fishermen on the beach.

2.5 Midwater trawling

Trawling midwater is very similar in operation to demersal trawling. However, the net and otterboard design is significantly different. As the name suggests the fishing gear is fished in midwater. In practice, this method can be fished on the seabed and at all other depths. The size of the net and otterboards is much larger than that used in demersal trawling. Otterboard design is also different being shorter in length but greater in height. The otterboards maintain the horizontal opening of the net.

To engage effectively in this method it is necessary to have a net monitoring system (net transducer). This registers the depths the net is fished and the size of the net mouth opening and allows viewing of fish entering the net. Heavy steel or chain type weights on the footrope and buoyancy floats on the headline are also required to ensure the net mouth vertical opening is maintained (see sketch below). Ideally, a net drum is used to ensure a controlled and efficient operation of releasing and hauling the net.



(Fig. 11) Midwater trawler

The following is the sequence of the release of the midwater trawler fishing gear:

2.5.1 Release sequence

Prior to release of the fishing gear the vessel will be moving ahead at slow speed.

1. Release cod end outboard and slack belly netting until headline centre at ramp.
2. Attach net monitoring transducer to headline. (Fig. 11)
3. Release footrope and headline until wing ends.
4. Attach steel/chain weights to footrope wing ends.
5. Slack weights and all four steel bridles down the ramp to their ends.
6. Connect bridle ends and independent wire to otterboards.
7. When ordered, slack otterboards and warp to the required depth.
8. Stop warp and maintain net depth by vessel speed or warp length changes.

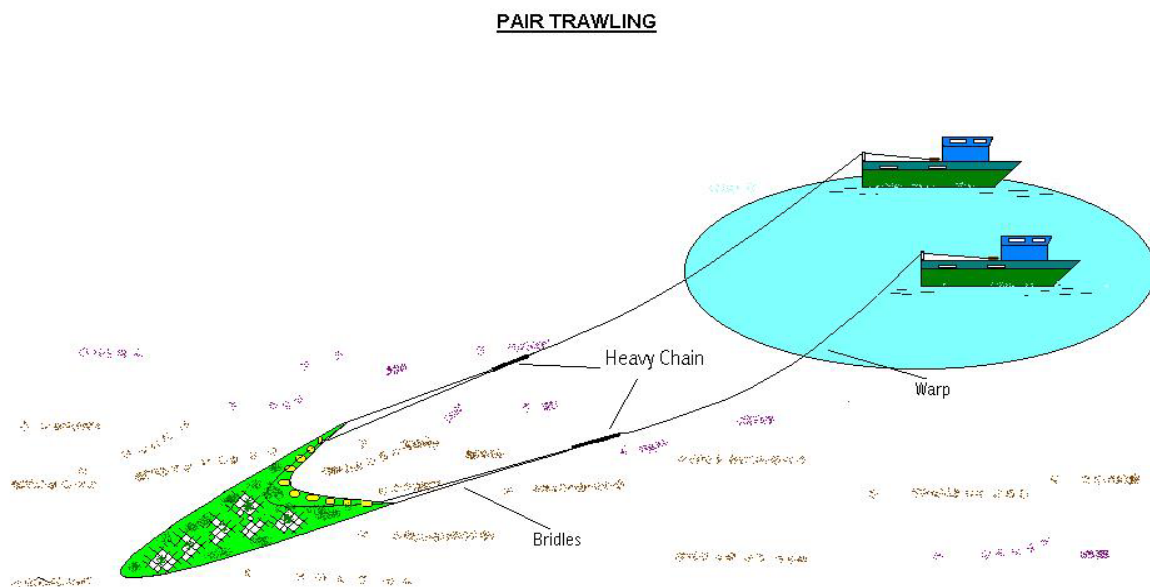
Throughout the release, the Mate on the deck and the Skipper on the bridge will give operational instructions to slack or hold. The net and otterboards will only be released on instruction from

the bridge. On lowering the otterboards (7 above) and net together the vessel's speed will be increased to approximately three-quarters of full speed.

Hauling is the reverse of this procedure. Workstations are very similar to that of a demersal stern trawler as shown earlier in Fig. 6.

2.6 Pair trawling (Bottom or midwater)

This method requires the use of two vessels, which tow one net. The net is much larger than that normally used by one vessel. Additionally, the herding bridles are of much greater length. The vessels' tow at some distance apart to open the net, consequently, there is no requirement for otterboards and these can be replaced by heavy chain. In many other respects, the fishing gear is very similar in design to that of a single boat only without otterboards.



(Fig. 12) Pair trawling

Parts of the fishing operation for the two vessels are, however, very different to that of single boat trawling. This method can also be used for demersal or midwater trawling.

2.6.1 Fishing operations (Stern trawler design, Fig. 6)

Release

1. Cod end and belly netting released outboard at the ramp. (W1 & W7)
2. Slack outboard headline and ground rigging till wing ends. (W1 & W7)
3. Slack headline wires and both bridles until ends. (W1 & W7)
4. Sister ship closes alongside to throw line for the transfer of the warp.
5. The shooting vessel connects the sister vessel's warp to net bridle.
6. Both ships begin shooting process, while separating themselves to a fixed distance apart. (W1)

7. Both warps released to required length to then begin fishing. (W1)

Fishing

Fish catching operation for pair trawling similar to that of single boat trawling, except:

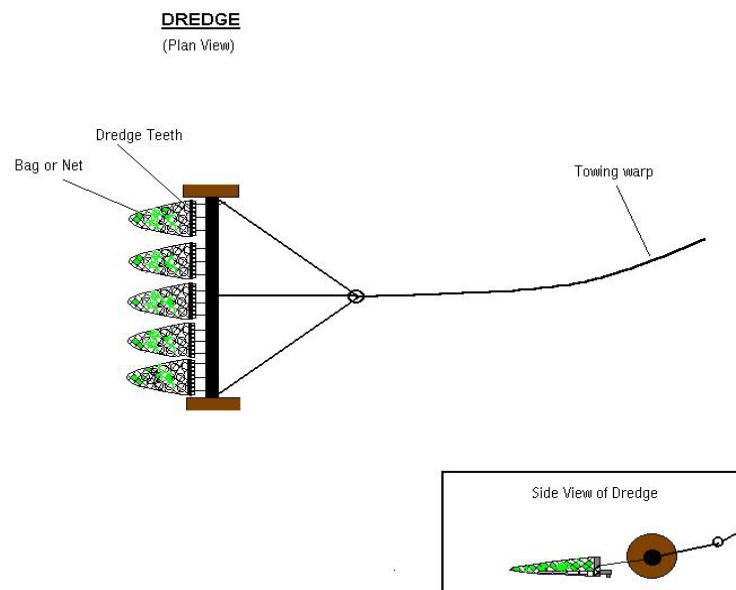
1. Both vessels maintain a fixed distance apart during the catch operation.
2. Ideally, only one skipper is in charge during the towing period.

Hauling

1. Both vessels close their distance apart and haul the warp simultaneously.
2. At the warp end transfer bridle to the master vessel whose net has been in use.
3. Master vessel hauls the bridles and net as normal for a single boat.

2.7 Dredge

Europe and North America use this method to catch scallops, a bivalve mollusc of the genus *Pecten*. Both small and large vessels use this method. Smaller vessels tend to operate as little as one dredge.



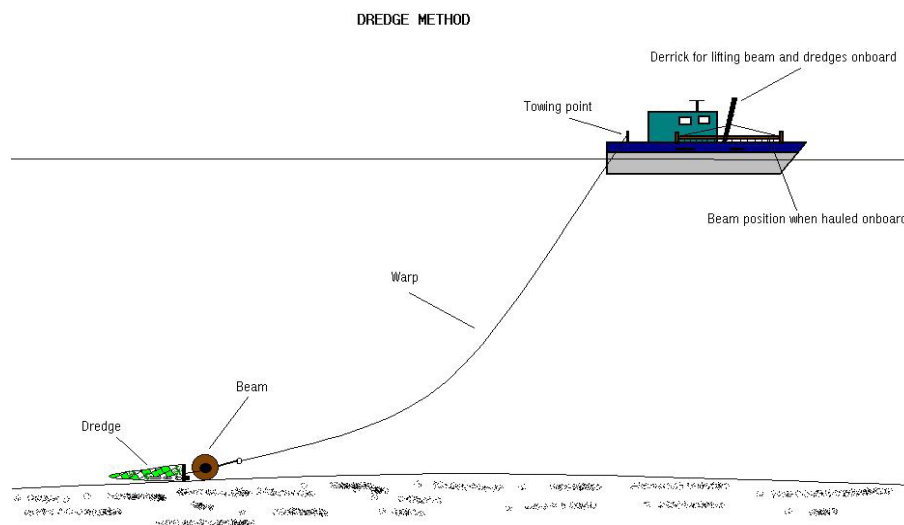
(Fig. 13) Dredge

More than this requires a single beam with shoes or wheels and often having three to five dredges attached. Larger vessels use two beams, operating one beam from each side of the vessel and can have in excess of five dredges per beam.

The fishing operation is similar to that of beam trawling where the two beams attached to the warp are lowered into the sea. The vessel steams ahead to release the beams onto the seabed with the appropriate length of warp. The beams and dredges are then towed at speeds of 2-6 knots depending on the size and power of the vessel.

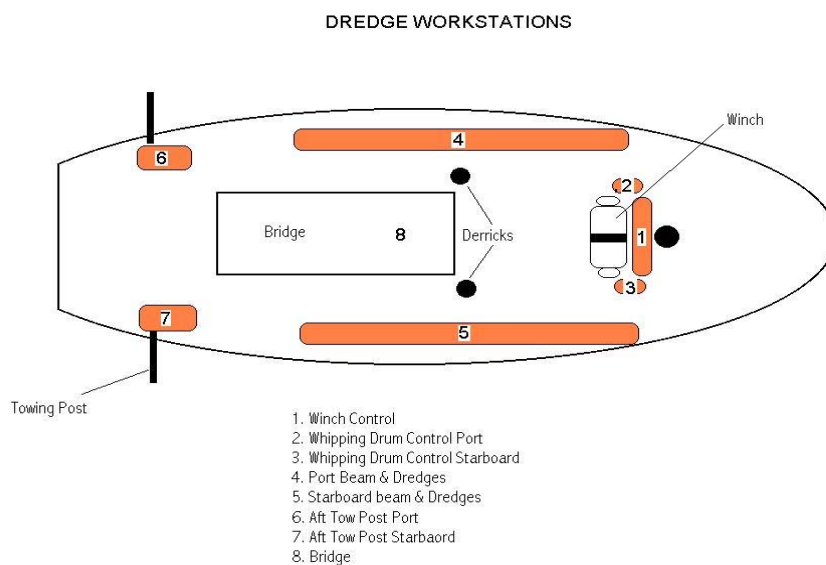
Each dredge (Fig. 13) consists of a steel toothed spring frame, which scrapes along the seabed to dislodge target species. Attached to each frame is a bag, constructed of netting on the top and chain mail on the bottom. The teeth across the mouth of the dredge are sprung to provide give when scouring the seabed.

Two steel beams and their dredges are towed side by side from either side of the vessel. On recovery of the beam and the dredges are pulled inboard to be emptied. A typical basic deck system consists of two warps, a winch and towing posts (points) and dredges on either side of the vessel aft.



(Fig. 14) Dredge method

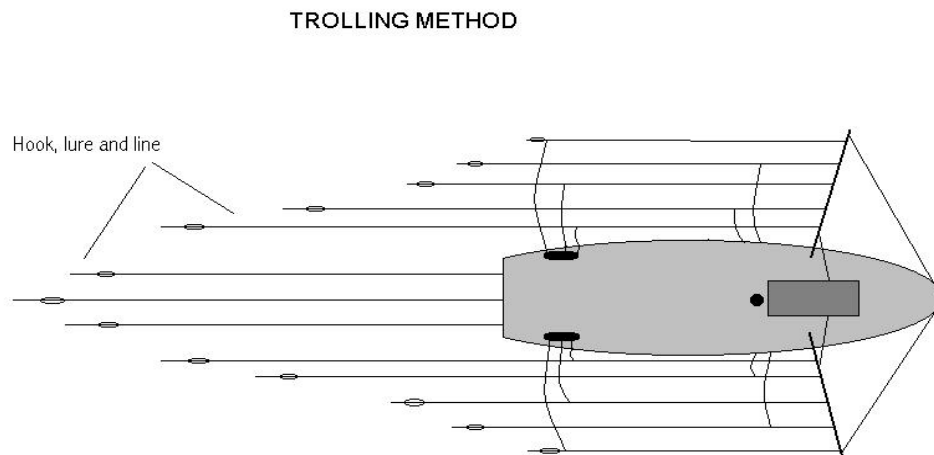
The following is a plan view of the workstations for this design of scallop dredger.



(Fig. 15) Dredge workstations

2.8 Trolling

Trolling methods are commonly used to catch large pelagic species such as tuna. The method consists of a number of rods on both sides and stern of the vessel, to which lines and lured hooks are attached. The vessel moves ahead at some speed for the lures to attract the prey. Chumming can also be used to attract the fish to the area.



(Fig. 16) Trolling method

3 FISHING OPERATIONS SAFETY (Dragging methods)

Trawling and other dragging methods are most dangerous of fishing methods and, therefore, it is essential that crewmen be aware of the following safety issues.

On blocking up warp on a side trawler, do not stand off of the messenger wire used to pull both warps to the ship's side. Standing between the casing side and wire is also dangerous. The gallows and otterboards are areas to be avoided when the otterboards are being hove in or out. One man should have clear space to secure the dog chain at all times. When releasing or knocking out the towing block, never stand behind the block, always stand forward side of the block.

If the towing warp is secured by chain at a towing post or other point, it is important that crewmen secure this correctly with suitable high tensile chain. Great caution should be exercised when stoppering off the warp. Slacking to the chain stoppers should be treated with caution. Taking in the slack warp before hauling is also dangerous and crew should stay well clear of the slack warp.

Beam trawlers when fast, can become unstable if warp forces acting at the end of the derrick are not removed. Safety release gear transfers the force from the derrick and to the ship's side. A quick release is normally situated at the heel of the derrick. This device must be kept well maintained and greased. Keep well clear of warps if the release gear is to be used.

Always keep hands clear of the ship's rail when the beam is outboard. Due to the weight of the beam, always use the correct shackles and blocks and ensure the blocks are well greased at all times.

Dredge fishing has its own dangers, particularly when handling the dredge inboard or outboard. Always ensure you cannot be trapped between the dredge and casing or any deck obstruction. The sharp teeth and chain mat are an obvious hazard for fingers and hands.

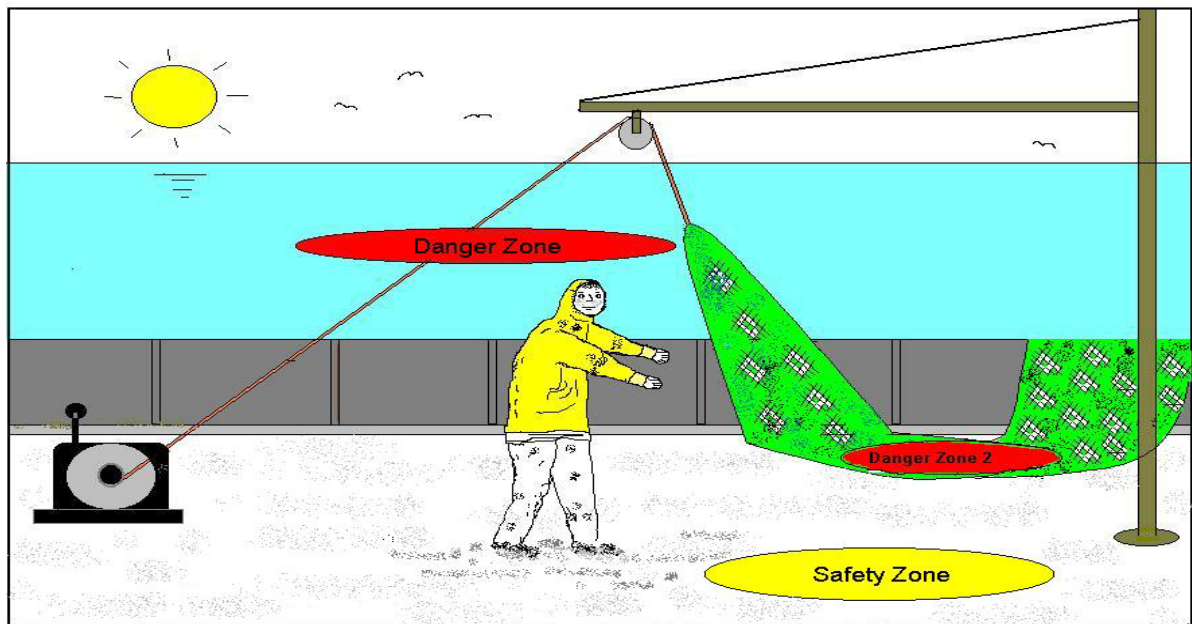
Danish or Scottish seine net is somewhat less dangerous than trawling nevertheless there are hazards. In vessels without rope reels or drums, correct secure slacking of the ropes is essential so that they do not move in heavy weather. If a rope fouls when shooting, do not try to clear without first stopping the vessel. If rope reels are fitted then the leads to the reels must be rigged properly. Winch operators should never leave the winch when it is in use. Buoy ropes should be kept well clear of the propeller when being retrieved.

On dredge systems avoid leaning outboard to hook or unhook the dredges and always be aware of loaded dredges that may have stones or other objects.

3.1 General precautions

In the following Section 3.1, are safety extracts relating to all systems, from IMO/FAO/ILO Code of Safety for Fishermen and Fishing Vessels (Part A).

- 1 - The skipper on the bridge should keep a sharp lookout on all fishing operations and use signals, which are positive and clearly understood.
- 2 - Fishing gear should be in good order and all parts of hauling gear, hoisting gear and related equipment should be checked before use.
- 3 - Fishermen should not wear rings when handling nets or other fishing gear.
- 4 - Fishermen should stand clear of running warps so that the vessel's motion does not throw them onto the ropes.
- 5 - Fishermen should keep clear of outrunning gear of all types.
- 6 - Fishermen should not stand on parts of the gear lying on deck when the remaining part is still in the water, see Fig. 17.
- 7 - Fishermen should be aware of the dangers of handling unfamiliar objects, such as explosive devices or drums of chemicals, hauled up by the fishing gear.
- 8 - Fasteners (obstructions to gear on the seabed) are a source of danger on deck until the last section of gear is onboard. The pull to clear fasteners should be from as low a point and as near to the ship-side as possible. Great strains can occur in unexpected places when heaving on taut warps or by the motion of the vessel. Fasteners, which result in the gear being parted at one end and the entire load being hauled from one warp present dangerous situations.



(Fig. 17)

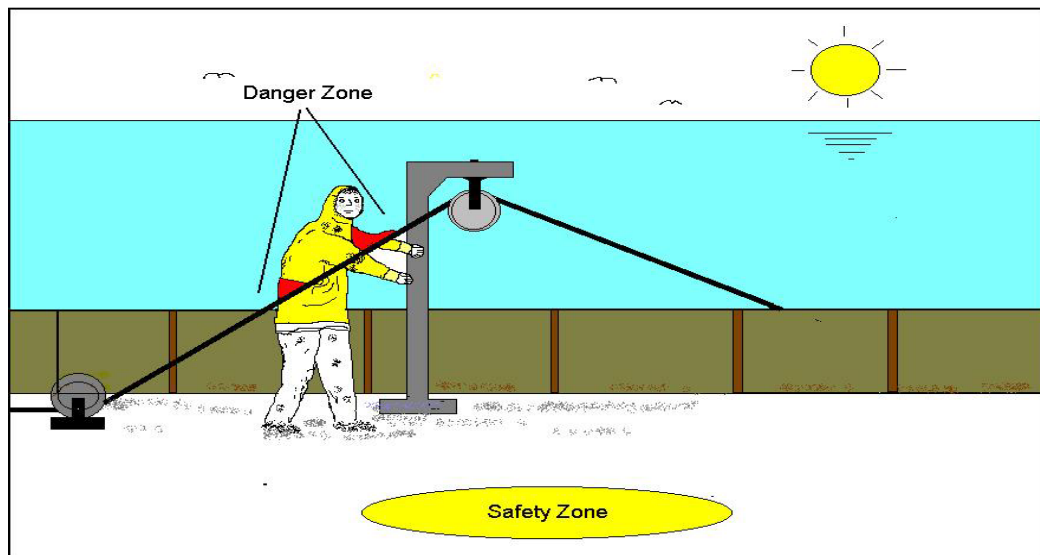
- 9 - Fishermen should not risk crushing their fingers by trying to clear a line from the sheave of a block.
- 10 - Deck fish-washing machines should be assembled and dismantled with care.
- 11 - In fish rooms, shelving and staging should be erected carefully. Pound boards should not be piled in a loose stack. As work progresses, front boards should be removed one by one.
- 12 - Pound-boards on deck and means for stowing and working the fishing gear should be arranged so that the effectiveness of the freeing ports will not be impaired or water trapped on deck and prevented from easily reaching the freeing ports.

3.2 Trawling

In the following Section 3.2, are safety extracts relating to all trawling, from IMO/FAO/ILO Code of Safety for Fishermen and Fishing Vessels (Part A).

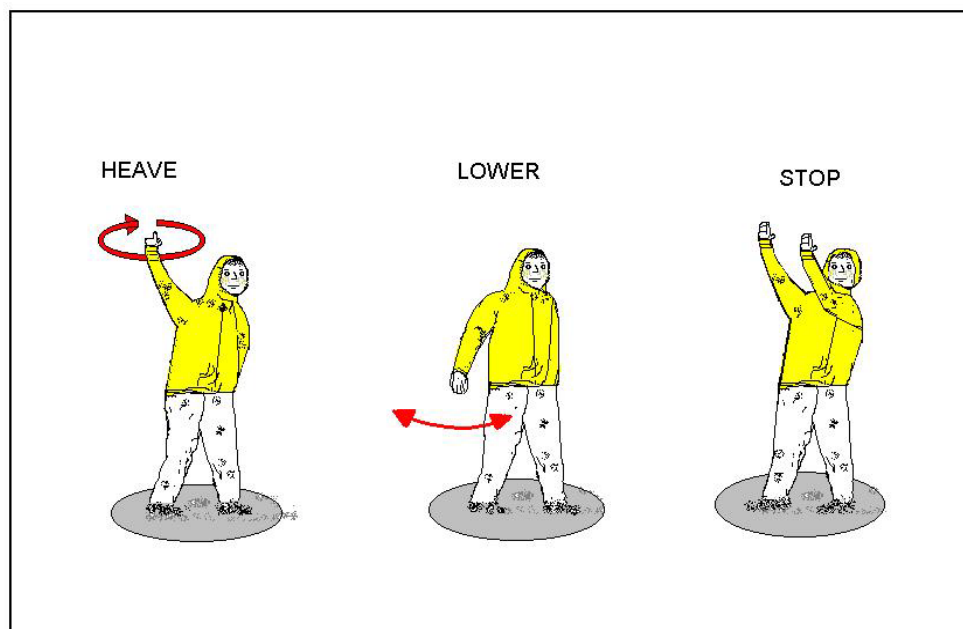
- 1 - A person standing at or near the towing block in a side trawler when the warps are being secured or knocked out, exposes himself to the risk of serious injury. Only an experienced fisherman should "block up" or "knock out" the gear. When blocking up, there is a real danger of the messenger parting, with the likelihood of serious injury, and it is essential not to stand aft of the messenger or between the messenger and the centre casing. When knocking out, fishermen should stand forward of the towing block and never immediately behind it.

- 2 - The vicinities of bollard fairleads are also danger areas, and fishermen should never get too close when the gear is being worked, see Fig. 18.



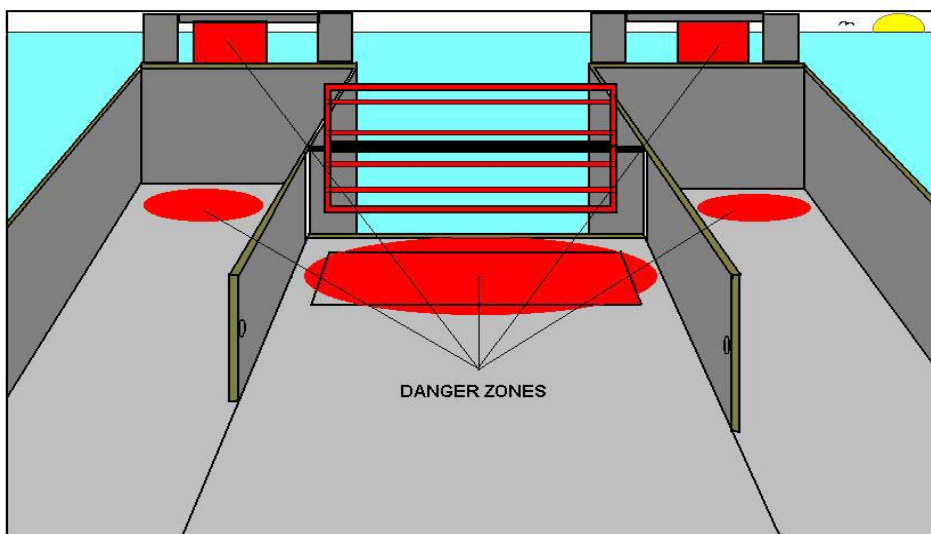
(Fig. 18)

- 3 - When clutching for support, the fisherman should make sure that he does not grasp the warp.



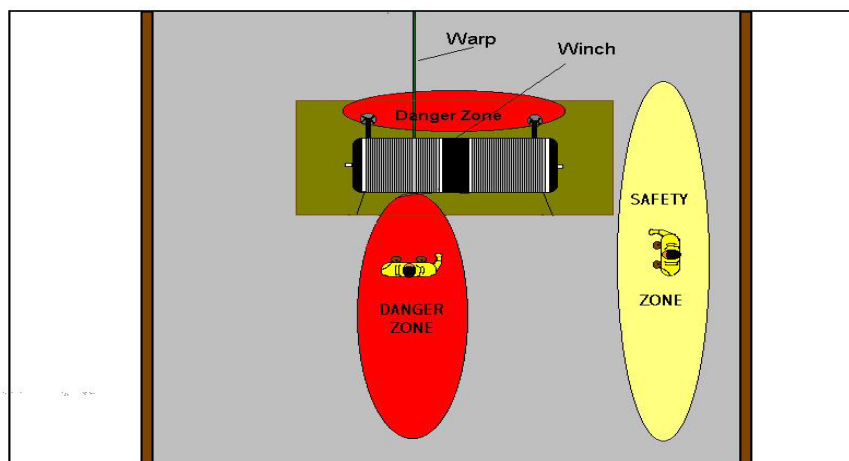
(Fig. 19)

- 4 - Releasing and securing trawl boards is a skilled and dangerous operation. This should be done by trained men who understand the proper signals to communicate with the winchman, see Fig. 19.
- 5 - Fishermen should not put their fingers in the links when fixing dog chains or G-links.
- 6 - A standard code of hand signals should be adopted for signalling to the winchman handling the trawl.
- 7 - It is dangerous to work near the ramp of a stern trawler. Safety devices should always be used to prevent sliding overboard, see Fig. 20.



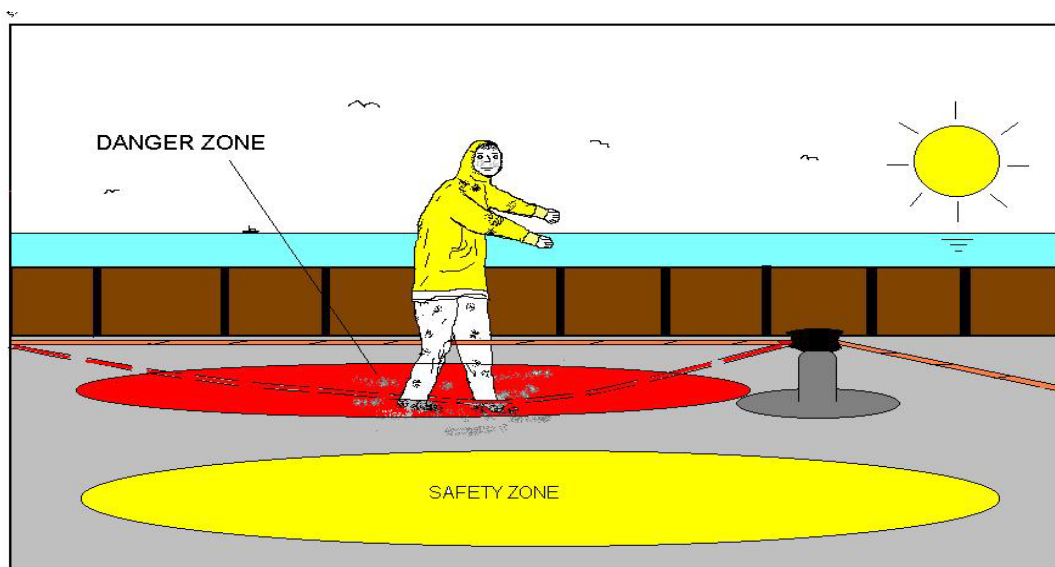
(Fig. 20)

- 8 - At least three complete turns of a trawl warp should remain around a trawl winch drum at all times; the end of the warp whipping off the drum could cause serious accidents.
- 9 - During shooting and hauling, fishermen whose presence is not necessary for the operation should keep clear of the operating area, see Fig. 21.



(Fig. 21)

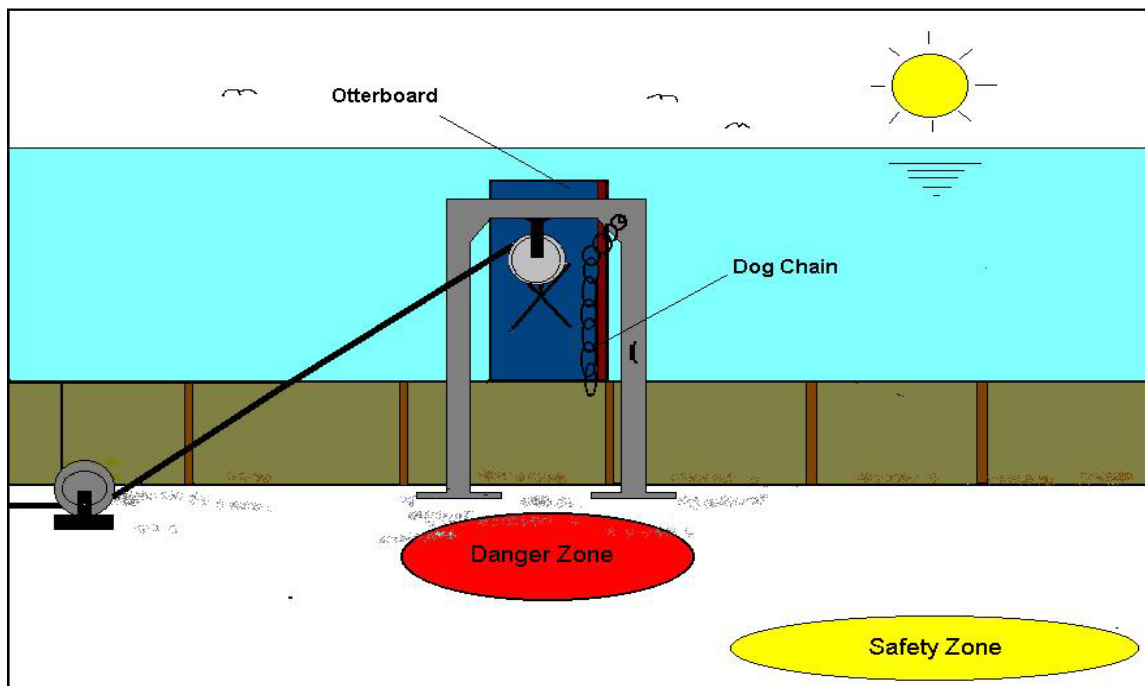
- 10 - When the quarter rope is released from the fairlead during shooting, fishermen should not stand between the rope and the rail, and should not stand in a bight of the rope. If a man is trapped by the rope, it should be cut at once.
- 11 - Fishermen should pay special attention to ropes connected to the net such as bridles, quarter ropes, false headlines, etc., when shooting. They should never stand in the bights of such ropes.
- 12 - If a headline float gets caught in a man's clothing, it should be released at once by cutting the clothing.



(Fig. 22)

- 13 - Fishermen should not stand under the fore warp on a side trawler when the vessel is towing; nor should they stand over a slack warp as a load may suddenly come on it. Stepping over trawl warps during shooting or hauling is extremely dangerous, see Fig. 22.
- 14 - When beam trawls or otter trawls are towed from the outboard end of outrigger booms the rudder should always be hand-operated.
- 15 - During double-rig trawling the winch drums should not be clutched in. The drums should be held on the brakes only.
- 16 - The outboard ends of the outrigger booms should be kept as low as possible and be prevented from lifting.
- 17 - When a net becomes fastened to an obstruction on the seabed, the winch drum brakes should immediately be released. The warp block, at the out-board end of the boom, should then be lowered and brought inboard.

- 18 - The skipper should never try to recover an obstructed net with the warp running over the block at the outboard end of the outrigger boom. There is a danger of capsizing the vessel in this way. The same applies to hoisting heavy or unknown weights in this manner.
- 19 - No fisherman should stand under the cod-end when it is being hoisted.



(Fig. 23)

- 20 - Fishermen should stand clear of the man who holds the dog chains since he must have sufficient room to jump clear if the boards come up awkwardly, see Fig. 23.
- 21 - When the boards are coming up, fishermen should stand aft of the aft gallows and for of the fore gallows to give the winchman a clear view. They should not stand between the gallows and the bulwark when the boards are coming in.
- 22 - Fishermen should not climb on the bulwark when fixing the dog chain. If this fixing has to be done out of easy rich, the steps and protective rail provided should be used.
- 23 - Fishermen should beware of the dangers overhead when working near the gallows.

3.3 Danish/Scottish seining

- 1 - To avoid the danger of foul bights in the warp, fishermen should:
 - (i) take care in stacking coils;
 - (ii) check that shackles are the right way round so that the lower coil will run freely;

- (iii) secure coils so that pitching and rolling will not dislodge them.
- 2 - If a warp fouls, fishermen should stand clear until all way is off the vessel. The foul coils should then be thrown overboard by hand and not kicked overboard.
- 3 - When setting the first warp, the speed of the vessel should be reduced for the last 30 fathoms of rope and slow speed maintained until the net is all in the water.
- 4 - If the warps are not coming in evenly, fishermen should never put their hands on them. The tension-adjusting handle should be used.
- 5 - Towing blocks should be firmly anchored, the clasp closed and the safety chain in position.

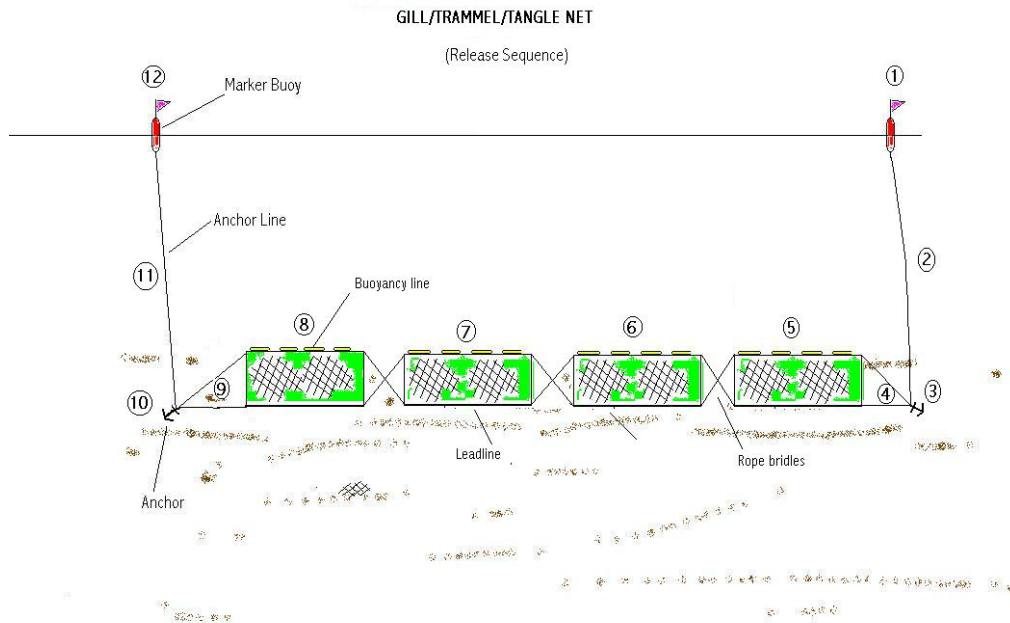
4 STATIC FISHING METHODS

Static fishing gears are not towed but set in an appropriate position and are designed to capture or ensnare the target species. The following are the main methods operated:

- .1 Gill net, trammel net, tangle net and drift net (demersal & midwater)
- .2 Line and hook (demersal & midwater)
- .3 Traps
- .4 Lift nets

4.1 Gill/tangle/trammel net

Gill, tangle and trammel net all share the same fishing operations characteristics and general design of the fishing gear. The only significant difference between all of these methods is the design and size of the netting panels.



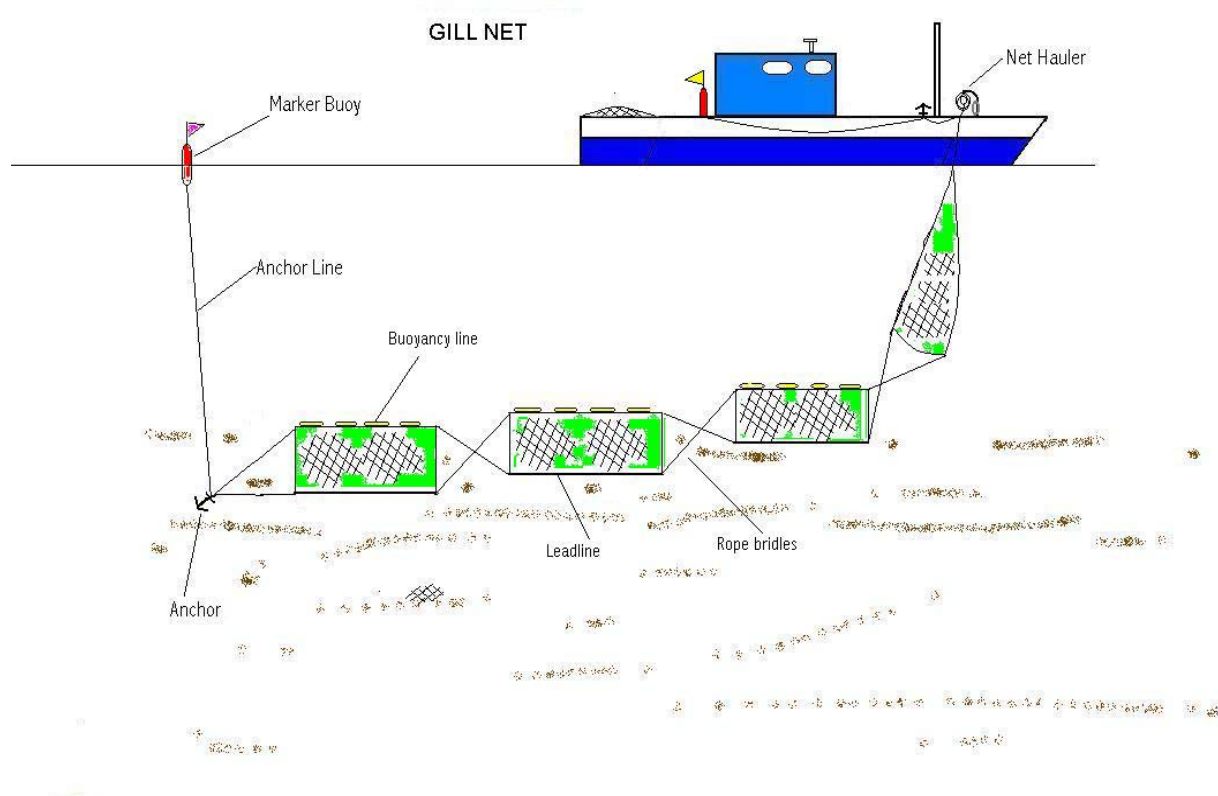
(Fig. 24) Gill/trammel/tangle net

The above sketch shows the static net fishing gear after it has been set and is now in the catch phase of the fishing operation. The numbers indicate the release sequence from start at 1 to completion at 12.

The operation, usually at three-quarter speed from the stern of the vessel, begins as follows:

	<u>Sketch Sequence</u>
First release the marker buoy and line	(1) & (2)
Anchor and end bridles	(3) & (4)
Net panel and connecting ropes	(5) (6) (7) (8)
Bridle and anchor	(9) (10)
Line and marker buoy	(11) (12)

The following sketch is of a gill-net vessel in the early stages of hauling its nets having first recovered the marker buoy and anchor.



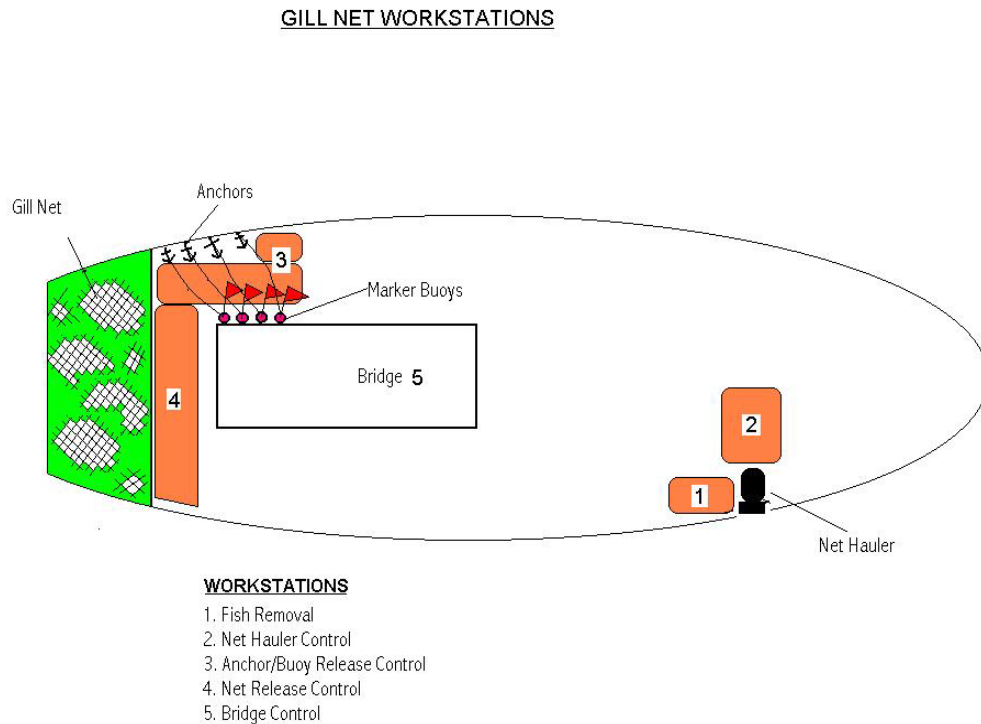
(Fig. 25) Gill net

The gill netting operation consists of a varied number of rectangular panels or sheets of netting made often with monofilament twine, which has the properties to gill and entangle fish in a mesh or netting such that they can not escape. Each panel (see above sketch) has buoyancy on the headline or top of the net and weighted footrope on the bottom of the net. A given number of connected net panels make up a fleet that requires an anchor to secure the fleet to the seabed. A marker buoy assists visual recovery, at either end of the fleet. This method is commonly fished on the seabed but can be operated at varying depths by attaching lines and weights to the footrope or bottom of the netting.

The total fishing effort for one vessel can be any number of fleets depending on vessel size and its capability. The gill net method can be highly selective and depends on mesh size as the main determinant for capture of fish by their gills. Larger mesh sizes will gill larger fish and vice versa.

Other static net methods such as trammel or tangle may not be as size selective depending less on gill capture and more on entangling fish in the net. The tangle net fishing gear is very similar in design and operation to gill net and differs mainly in the hanging ratio (length of net to length of frame of the panel) of the net on each panel. This has the effect of increasing the netting in each rectangular panel area to increase snaring or entanglement of the fish.

Basic System:	Net hauler
Fishing gear:	Netting panel, two anchors, two marker buoys, two-anchor lines
Key Species:	Most demersal species
Strata fished:	Seabed
Capture Influences:	Net size, mesh size, number of nets/fleets
Towing speed:	Static



(Fig. 26) Gill net workstation

4.2 Trammel net

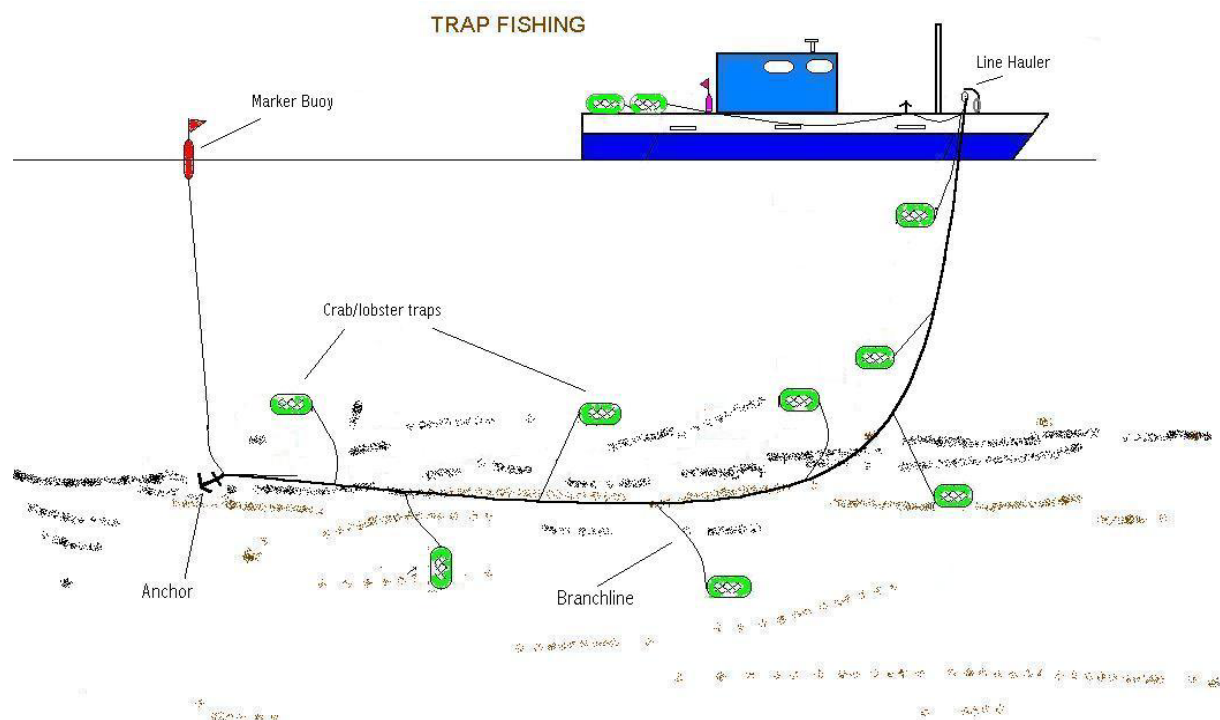
Trammel netting is almost identical in its fishing operations procedure to gill net, however, the netting and design of each net panel will be significantly different to that of gill or tangle net. The essential difference is that a gill net consists of one panel or sheet of netting, while each trammel net panel consists of three layered sheets of netting. The two outer layers are constructed with a large mesh size with the middle sandwiched layer being a smaller mesh size. The main determinant for fish capture in this method is increased entanglement of the fish.

Release of the netting, anchors and buoys is often at the stern of the vessel and hauling is operated mainly forward of amidships. Retrieval is usually by a net hauler forward of amidships. On smaller vessels having a forward fitted hauler the netting is transported back to the stern of the vessel ready for next release.

Basic System:	Net hauler
Fishing gear:	Netting panel, two anchors, marker buoys/lines per fleet
Key Species:	Most demersal species
Strata fished:	Mostly the seabed
Capture Influences:	Net size, mesh size, hanging ratio and number of nets/fleets
Towing speed:	Static

4.3 Trap fishing

Trap fishing for crabs, lobsters and other shellfish species is operated in a similar way to line fishing but with the hook branchlines being replaced by the traps or pots. These baited traps are connected to the mainline by back lines, but still having anchors and marker buoys at either end of the fleet. One string of traps is considered a fleet. A small vessel may only have 10 traps per fleet while a larger vessel may have 25 and more traps per fleet. As in gill, tangle or trammel netting a number of fleets of can be operated depending on the size of the vessel. The sketch below is that of a typical arrangement for a trap method of fishing which is in the process of hauling. A small vessel may only operate 80 traps while a large vessel may operate 800.



(Fig. 27) Trap fishing

4.3.1 Releasing traps

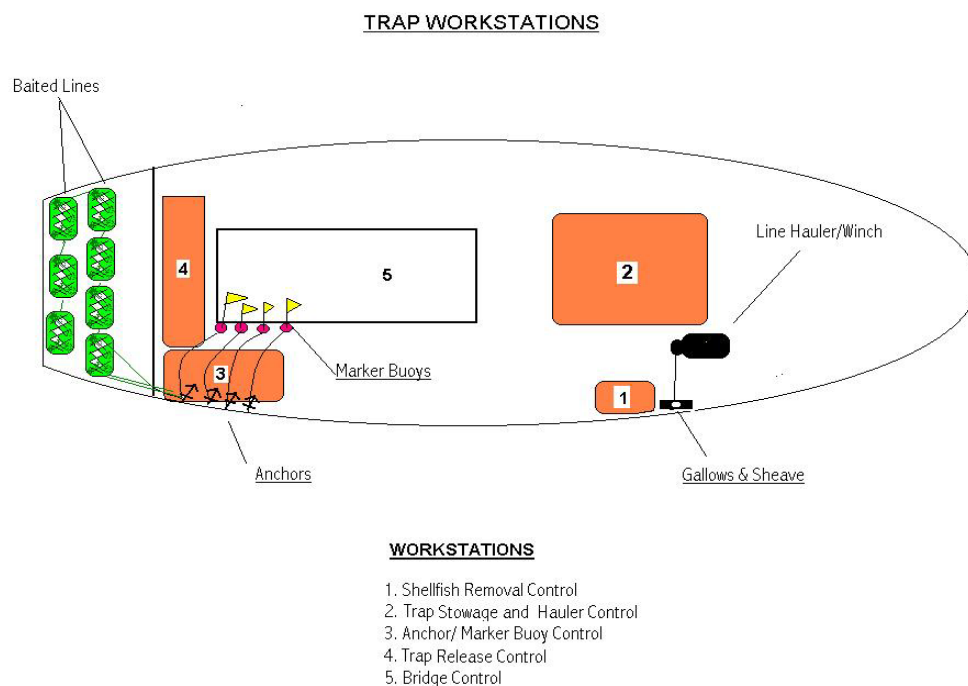
The following is the procedure for releasing one fleet of traps. Vessel moves ahead and crew to standby at the stern workstations (Fig. 27) and then on order from the Skipper to:

1. First release marker buoy. (W3)
2. Release anchor & line. (W3)
3. Release each trap, main line and branchline. (W4)
4. Lastly release second anchor, line and second marker buoy. (W3)

This operation is then carried out a number of times depending on the number of fleets a vessel is operating. Hauling is carried out in reverse order and at the line hauler forward of amidships.

Basic System:	Line hauler
Fishing gear:	Traps, two anchors, two marker buoys, two-anchor lines
Key Species:	Most demersal shellfish species
Strata fished:	Seabed
Capture Influences:	Entrance sizes, bait type, design, mesh size, number of traps/fleets
Towing speed:	Static

There are a variety of designs of these traps depending on the species fished. In Europe, the most common use of traps is for shellfish with many different designs being used. The determinants for capture are trap design, its size and the size of the entrance or aperture. Bait type is also very important in determining catch rates.



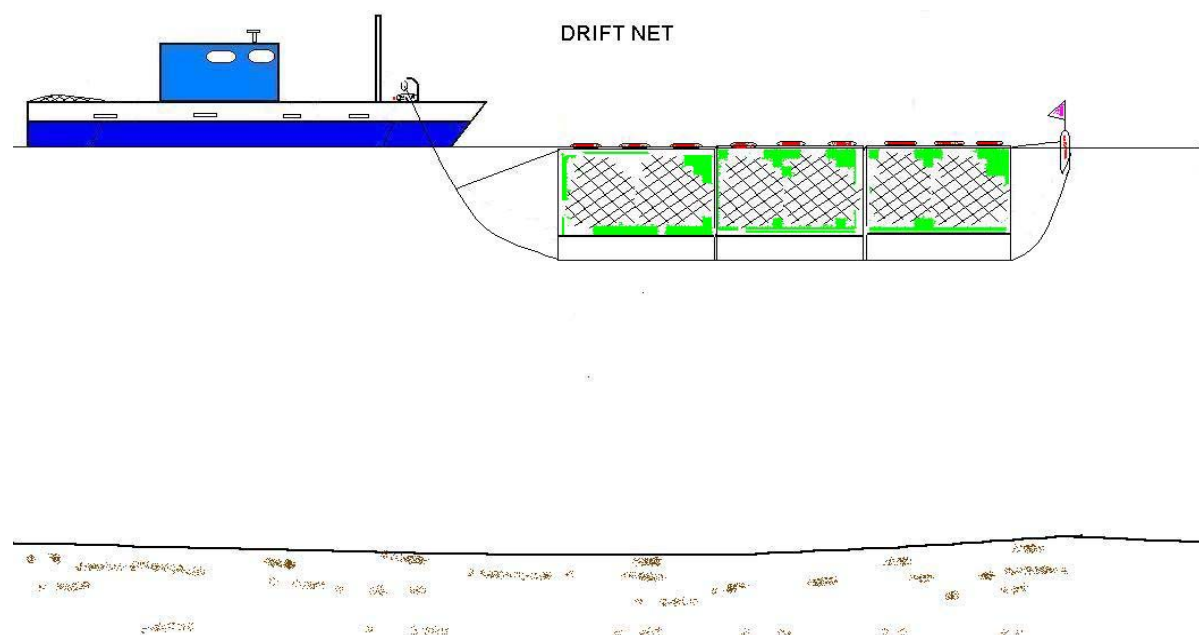
(Fig. 28) Trap workstation

The above workstation plan is for a typical trap vessel targeting shellfish such a crab or lobster. It should be noted that this design is for operation on the starboard side of the vessel and that changes in this design are common. There is no reason why portside should not be utilized provided the line hauler and it's a frame and sheave are moved.

4.4 Drift net

Drift net method is similar to gill net but having a continuous fleet of netting and without anchors but having one marker buoy. The netting is fished close to the surface and the end of the one continuous fleet is attached to the vessel at the bow, throughout the fish catching operation. Total length of the netting can be in excess of one mile. Again the netting is buoyant at the headline and weighted at the bottom. However, in addition a heavy wire rope/cable is also hung on the bottom of the fleet to weigh down the netting and is attached at the bow of the vessel. Release of the net is at the stern and hauling is at the forward end or amidships of the vessel using a net hauler. As in gill netting the main determinant for capture of this method is by mesh size to gill the fish.

In smaller vessels particularly in less technologically advanced countries all of these static gear method can be operated manually without net or line hauler. However, the fishing operation is very similar, having many of the same problems to that of mechanical operations.



(Fig. 29) Drift net

Basic System:	Net hauler
Fishing gear:	Netting panels, marker buoy, and footrope
Key Species:	Most pelagic species
Strata fished:	Surface area
Capture Influences:	Net size, mesh size, number of nets/fleets
Towing speed:	Drifting with tide/currents

Workstations are common to that of other static methods, (Fig. 26) but will vary from vessel to vessel. However, during the catch phase the vessel remains attached to the nets.

4.5 Line and hook

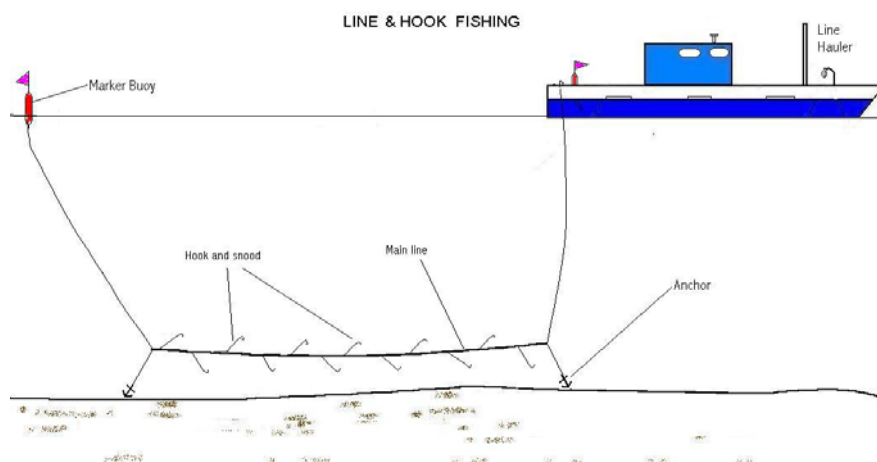
Line and hook methods, again, also have a similar fishing operations procedure to static net systems but with a main line, branchline and hooks between the anchors and marker buoys. The system consists of two marker buoys, two anchor lines and a strong fishing line with periodic branch lines (snoods) each having a hook. The size, number of hooks and bait used will depend upon the species fished and the depth fished. Generally speaking, larger hooks are used if large species are sought and smaller for small fish. Bait used also varies according to species its size and the area fished. The condition and securing the bait to the hook is fundamental to successful catch rates. Bait needs to be fresh but not too fresh as this has a reducing effect on the attractive forces emanating from the bait. It is essential that the bait stays attached to the hook at all times during the release and catch phases of the fishing operation. Sometimes the area fished is chummed to attract fish to the area.

The fishing system can be manual, where boxes or baskets of lines are baited and released by a crewman and hauled by a crewman or possibly, line hauler. Alternatively, the system can be partly or fully automatic where the whole fishing operation from baiting of the hooks to release of the lines is by machine.

The following is the procedure for releasing one fleet of lines with what might be termed as a semi-automatic system (Fig. 30). Crewmen to standby at the stern and then to:

1. Release manually first marker buoy. (W3)
2. Release anchor & anchor lines. (W3)
3. Release line and hooks. (W4)
4. Lastly, anchor its anchor line and second marker buoy. (W3)

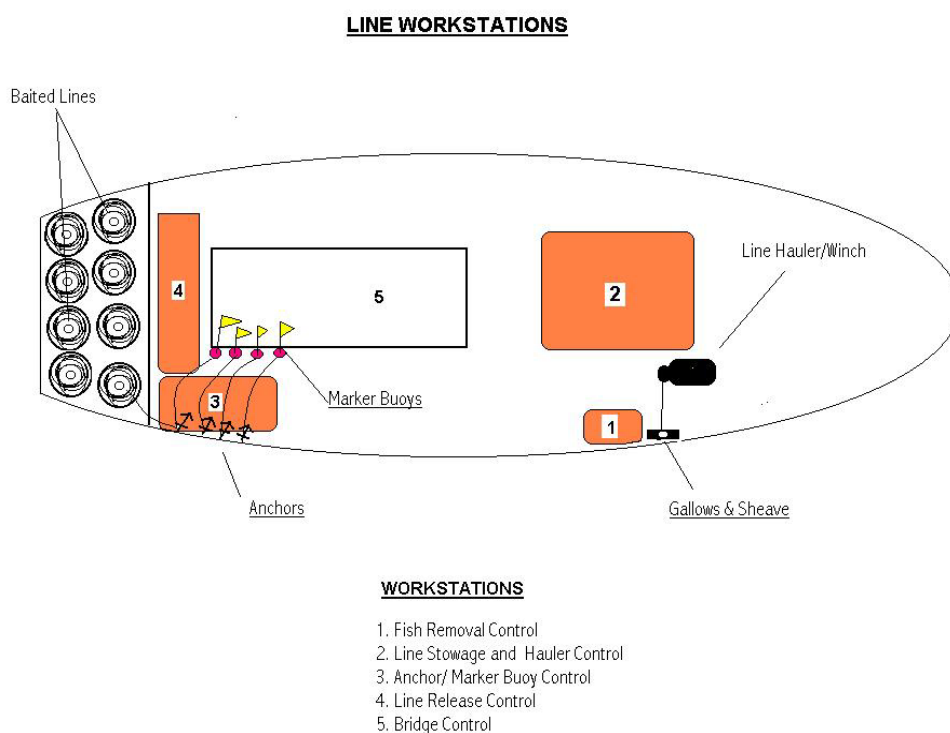
Hauling of the lines is carried out in reverse order at the mechanical line hauler forward of amidships.



(Fig. 30) Line & hook fishing

Basic System:	Line hauler
Fishing gear:	Line, hooks, two anchors, marker buoys/lines
Key Species:	Most demersal and pelagic species
Strata fished:	Seabed or midwater
Capture Influences:	Hook size, number hooks, bait type, number of fleets
Towing speed:	Static

Line systems can also be operated to fish on the seabed or some distance from the surface. Periodic weights attached to the hook line allow the hook line to be positioned at some selected depth. Attached buoyancy floats on the surface ensure that the main line maintains the selected depth.



(Fig. 31) Line workstations

The above workstation is that of a manual system of line fishing.

4.5.1 Autoline

There are various options for automating the line and hook method of fishing. Automatic systems such as those by Mustad of Norway are significantly different in their operation and workstations. A fully automated method involves the removal of the hooks and branchlines or snoods from the mainline. Once fish are removed, the hook is cleaned and the snoods are then untangled. The hooks and snoods are then stowed on racks ready for release. During hauling, the main line is stowed on a drum ready for release or setting.

Releasing begins with the marker buoy, line and anchor being released with the main hook line being released from its drum. As the line is released from the drum the snoods and hooks are automatically attached to the line at regular intervals.

During setting or release the operation of baiting the hooks takes place using a mechanical baiter. Bait or small chopped fish is fed into the baiter for hooks to be drawn through on their release outboard. On completion of the fleet of hooks selected the second anchor, line and marker buoy is released.

The fishing gear arrangement is much the same as in the manual method where two marker buoys and two anchors separate the main line, snoods and hooks.

4.6 Pole and line

Like trolling, this method incorporates the use of poles and lines with lured hooks to catch high quality pelagic/surface feeding fish. Often the area around the stern of the vessel is chummed with bait or small fish to attract or cause a feeding frenzy for the target species.

There are a variety of designs for this type of vessel.

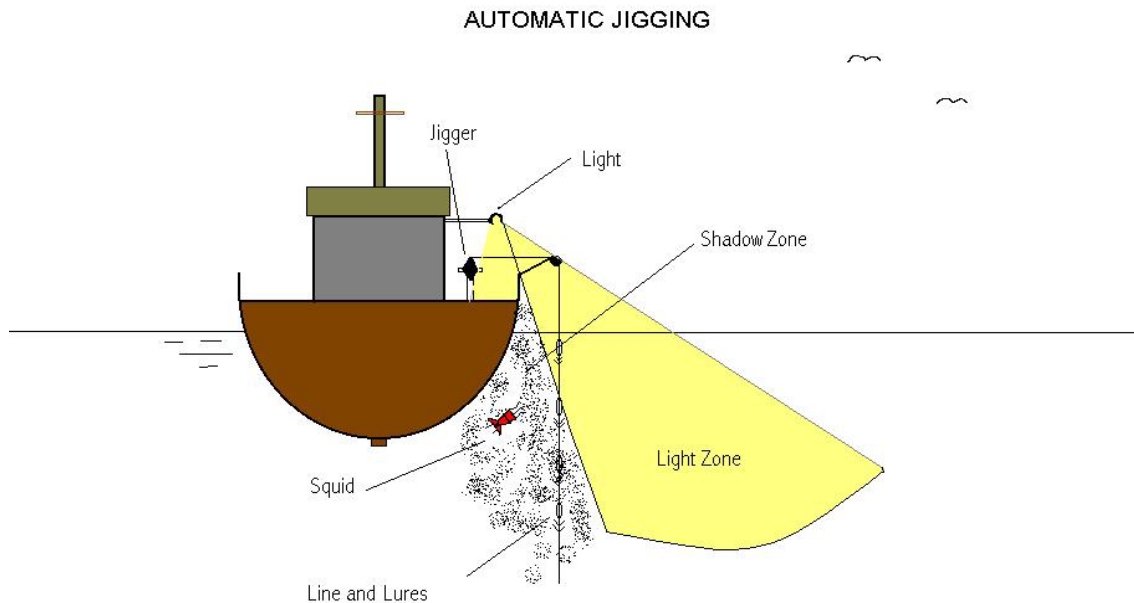
4.7 Line jigging

Typically this line method is also operated by small vessels and operated by hand. In Europe it commonly used to catch mackerel (*Scomber Scumbrus*) by one or two man 10 metre long vessels. In recent years the method has been automated allowing small and large vessels to be more productive. The method uses light attraction to improve the catching efficiency for certain target species. Squid are attracted to the shadow zone of the light, making it easier to catch (see sketch below).

Automatic jigging of the lines and hooks is a common feature of large Japanese and Taiwanese factory vessels. A large number of the automatic jigging machines are operated along each side of the vessel. Japanese squid (*Loligo*) jiggers are one of the most successful using this type of method.

The system consists of any number of jigging machines, depending on the length of the vessel close to the ships bulwark rail. Each jigging machine operates independently and automatically lifts and lowers the line and barbed lures.

A thin monofilament line having a number of barbed lures is lowered to a specific depth to be jigged which results in the target species being drawn by both the light and the barbed lure.



(Fig. 32) Automatic jigging

The above sketch is a stern view of one jigging system on one side of the vessel. However, as noted there can be any number of these on each side of the vessel and each jigging machine can be regarded as a workstation. Serious accidents are rare and confined mainly to the fingers and hand from the barbs on the lures.

5 FISHING OPERATIONS SAFETY (Static methods)

Preparing bait or baiting hooks or handling the lines can lead to injuries. Using a sharp knife or axe to cut bait should be treated with caution. Unless involved in the setting of the lines, avoid the area of the lines and hooks. When hauling, be aware of hooks and lines flying after hitches or snags in the operation of the line hauler. Always ensure that you select the correct position for control of the line hauler.

In trap fishing, ensure that you stay clear of the man who is shooting the traps. Where possible, stay forward of the lines and traps. Traps should be stowed in rotation. If a trap is placed aside for repair, the next trap should be marked. This will enable crewmen to spot the wrongly stowed trap when shooting. As in line fishing, always stay close to the line hauler controls should a trap line foul. Bights of rope or backropes when shooting are a hazard, stay clear at all times.

Marker buoys release should be treated with caution ensuring that the lines are thrown clear to run and that bights do not exist to catch anyone standing. Anchors also need to be treated with caution as they can snag on clothing. Knots and splices in the mainline going around the hauler or capstan can become fast to foul the hauler or trap fingers.

In the following Section 5, are safety extracts relating to static systems, from IMO/FAO/ILO Code of Safety for Fishermen and Fishing Vessels (Part A).

5.1 Long-line fishing

- 1 - When baiting hooks or handling lines, fishermen should at all times take particular care that their hands are not injured, and that hooks do not snag in their clothing. Loose scarves or loose sleeves should not be worn.
- 2 - Lines should be coiled carefully and the hooks safely arranged, so that the line runs freely without snags when being paid out.
- 3 - Baskets, tubs or reels of line should be adequately secured so that they do not spill in bad weather.
- 4 - Fishermen not directly engaged in setting or hauling lines should keep away from the immediate vicinity of moving lines.
- 5 - When biting or other potentially dangerous fish are being hauled on board, they should be killed before they reach the deck, and the hook should not be removed until the fish is dead.
- 6 - When taking bait from the hold, fishermen should be careful to dig into the pile in such a way as to avoid it caving in on top of them.
- 7 - Fishermen should handle the glass floats of a line carefully to avoid cuts from broken glass.
- 8 - Fishermen hauling by line-hauler should avoid getting their hands caught by the mainline or branchlines. Others should stand clear of the hauler at all times. The fisherman operating the hauler should be able to control it quickly and easily.

5.1.1 Traditional tuna long-line fishing

- 1 - When setting lines by hand the fisherman whose duty it is to join the lines should confirm to the thrower that the next part is connected properly and ready for use.
- 2 - If abnormal strains occur when the line is being set, and this cannot be corrected by easing the vessel's speed, several coils of the line should be thrown overboard quickly or the line should be cut.

5.1.2 Modern semi-automated tuna long-line fishing

- 1 - When setting the long-line, the skipper should adjust the speed of his vessel to the capabilities of the line-setting mechanism.
- 2 - As line storage reels may suddenly reverse when long-lines are being set, fishermen should be aware of this possibility and avoid having their hands caught; they should take care that they are not injured by floats and branchlines coming back on deck.
- 3 - When the line is fouled, fishermen should keep clear of the conveyor and guide rollers.

5.2 Tuna, pole and line fishing

- 1 - Fishermen should be spaced at adequate intervals on the fishing platform.
- 2 - Fishermen should not swing their poles carelessly but should have regard to the position of other persons and avoid injuring them with flying hooks. It is recommended that goggles should be worn to avoid eye injuries caused by flying hooks.
- 3 - If a fisherman finds that he is in danger of being pulled off the fishing platform by an exceptionally large fish, he should lower his rod so that the line is in a straight line with the rod so permitting it to be easily broken.
- 4 - When a fish is landed on deck, and the hook does not disengage itself, the fisherman should not turn around to pull forcibly on it but wait until the deck crew have cleared it.
- 5 - Chummers (bait-throwers) should position themselves at the proper distance from the pole fishermen.
- 6 - When open-circulation seawater bait tanks are used, no fisherman should go into the tank for any purpose, e.g. to close seawater circulation holes, unless a second man is present and watching.
- 7 - Where there is a long narrow fishing platform, fishermen should not use it as a passageway.
- 8 - When the fisherman ceases to fish, he should return at once from the platform to the deck of the vessel.

6 ENCIRCLING METHODS

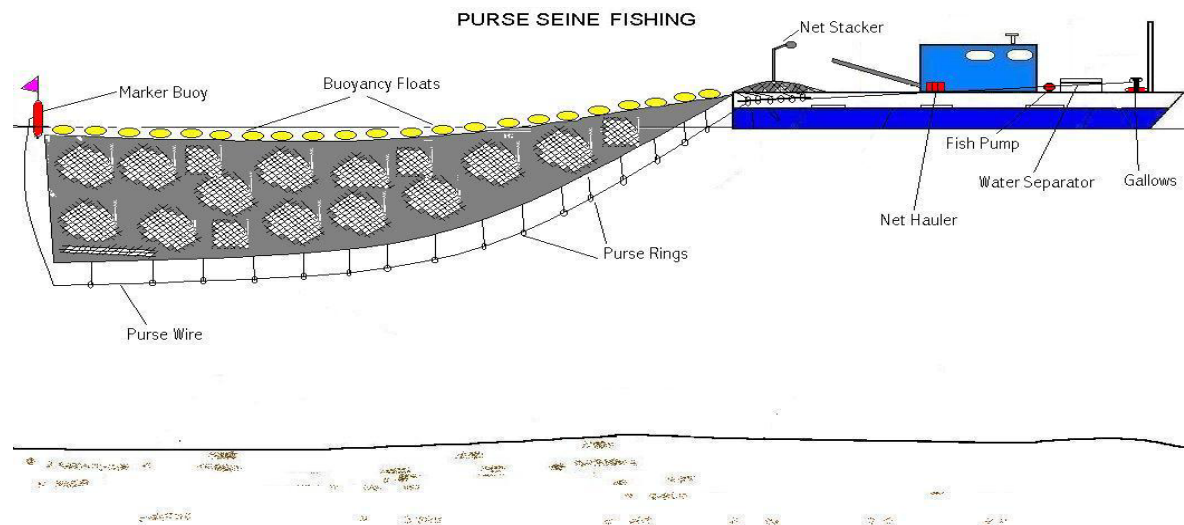
The encircling methods are best represented by purse seine, the most efficient and commercially common method of this type. There are two versions which are very similar and tend to be separated by geography. One is South/Central American system and the other is European. The essential difference between the two systems is the use of a small boat or skiff by the South American method to release and control the net and ship. The European system uses bow and stern thrusters to control sideways movement of the vessel and a drogue to help release the net and a marker buoy for easy recovery.

Both systems use a very large rectangular curtain of netting to capture large shoals of pelagic species. Length can be 700 fathom with 100 fathom of depth; however, nets can be significantly smaller depending on vessel size and depth fished. The net consists of a headline with buoyancy floats and a footrope with leaded weights, purse rings and a purse wire to close the bottom of the net. One vessel may have a number of nets with differing depths.

Good manoeuvrability is necessary for operation of the surrounding and seine nets. Large seiners are often fitted with watching crows nets are fitted on mast. The deck equipment of seiners consists usually of a power block and a net bin for hauling and stowing the net on board and one or more winches for setting and hauling operations.

In order to remove the fish collected in the purse, a brailer attached to a derrick is provided. Variety of small size are often removed by pumping arrangement. In that case a pump is lowered from the derrick into the pursed seine and the fish is pumped through a hose and a water separator on deck into the hold. From the viewpoint of deck arrangement there are two main types of purse seiners, which can be distinguished as a European type and American type.

6.1 Purse seine (European type)

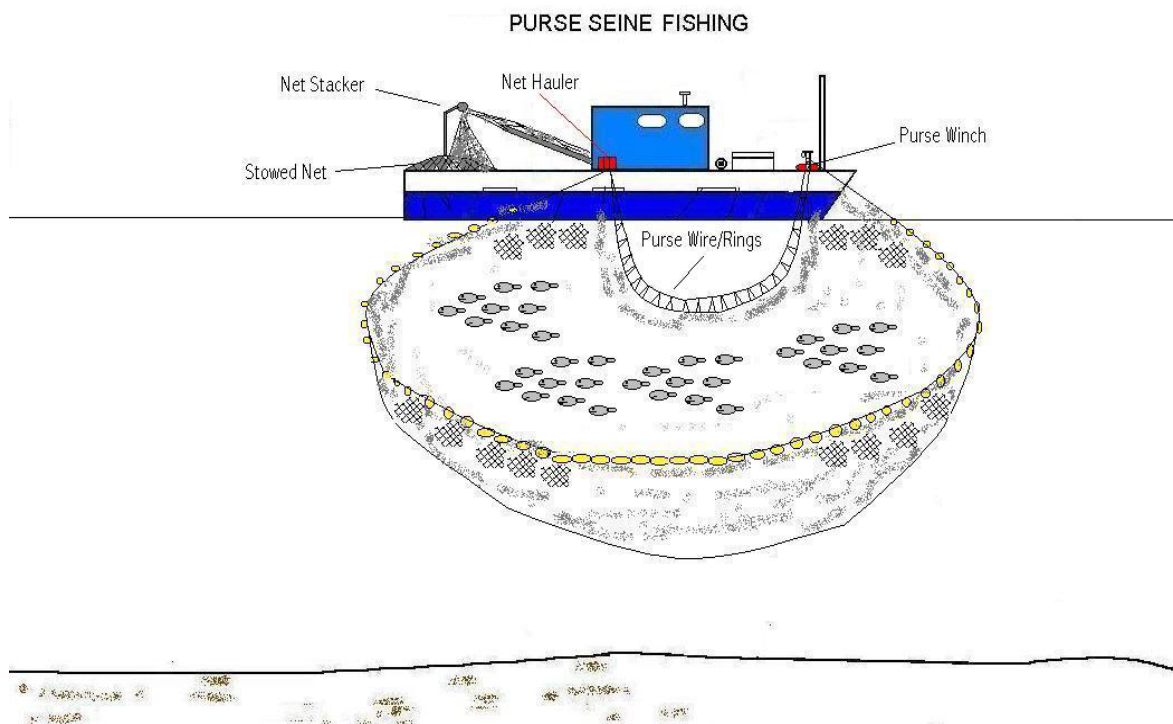


(Fig. 33) Purse seine fishing

6.1.1 Purse seine fishing operations

Fishing operations start with release of one end of the curtain of net from the stern (see Fig. 36), to first encircle the fish shoal. On completion of a 360 degree turn the end of the net and purse wire is recovered at the forward end of the vessel. The main winch then gathers the purse wire plus its purse rings to the ships side to close the bottom of the net (see sketch below). The net hauler is used to recover the net, headline and its floats. A net stacker and crew stow the net aft, ready for another operation. On some vessels the net hauler is deck mounted amidships and on others the derrick is mounted above the stowage area of the net aft. Additionally, a net stacker is used to stow or fleet the net into the stowage bin. On some vessels net drums are utilized to release and recover the net. After containment of fish shoal, fish are pumped or brailed onboard to be separated from the seawater and then stored in fish tanks.

The sketch below shows a purse seine operation in the final stages of closing the purse as the purse rings approach the rail. Operation to release the purse seine is as follows.



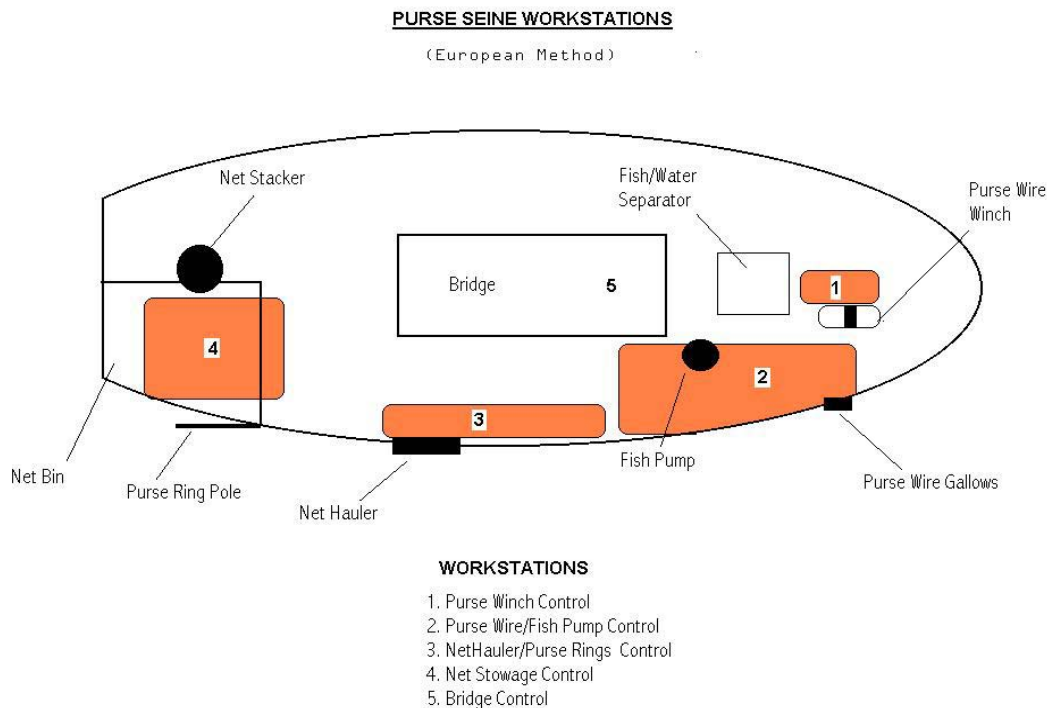
(Fig. 34) Purse seine fishing

Release

1. Release the drogue and buoy or skiff attached to the net from the stern. (W4)
2. Net curtain, purse wire and rings to run out while the vessel turns in a circle till it returns to marker buoy or skiff. (W4)

Recovery

1. Retrieve purse wire and net bunt end from the buoy or skiff. (W2)
2. Secure the net bunt end to the ship at the bow and both ends purse wire to purse winch drums. (W1 & W2)
3. Haul both ends of the purse wire to close bottom of net till all purse rings at the ship bulwark rail. (W1 & W2)
4. Feed net into hauler and haul net from amidships to feed to net stacker and stow net aft in the bin. (W3 & W4)
5. Continue to haul net while removing rings to totally reduce the net to a minimum. (W3 & W4)
6. Place fish pump outboard in the net. (W2)
7. Pump fish onboard to seawater separator and then to fish tanks. (W2)



(Fig. 35) Purse seine workstation

South and Central America operate large purse seine of a design similar to a forward bridge stern trawler where the net is released at the stern using a skiff. The net hauler is mounted on a boom positioned aft above the stowage area. The purse seine winch is positioned amidships and aft of the bridge. The net is hauled either port or starboard amidships and towards aft.

In North America, purse seines are operated for Salmon using a net drum at the stern of the vessel to release and haul the net. The vessel design relates more to the stern trawler design. A skiff or buoy is used to release and control the net during fishing operations. In all other respects the operation and machinery is very similar to that of a typical South American purse seine vessel.

6.2 Tuna purse seining (American type)

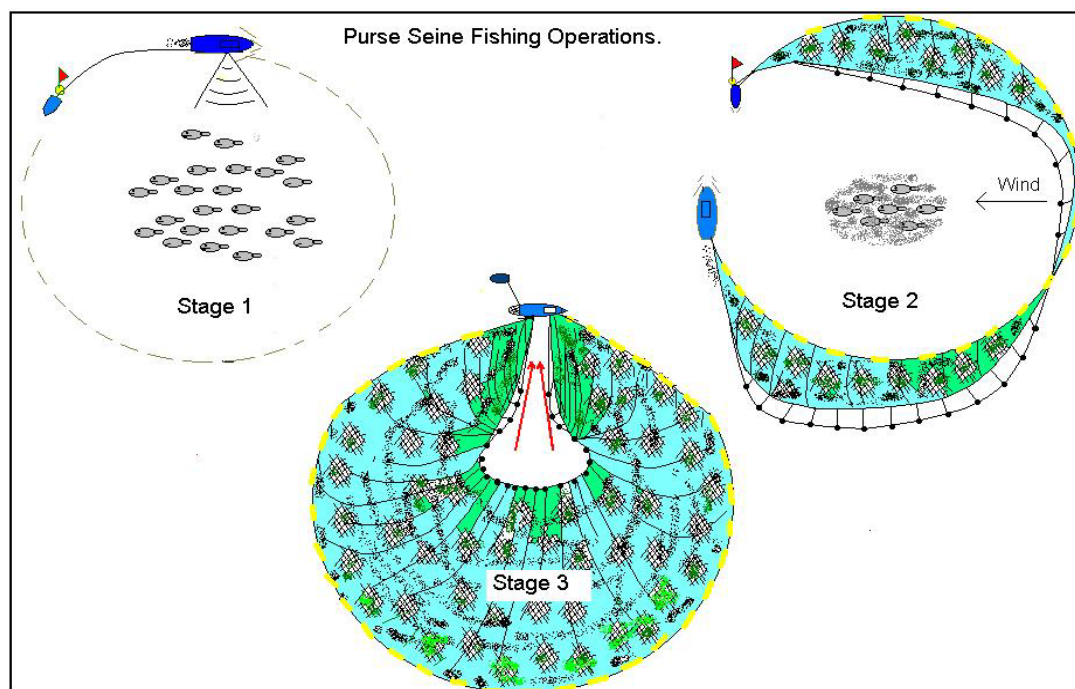
These vessels are large purse seiners with the same general arrangement as the European type, equipped to handle very large and heavy purse seines for tuna. They are normally equipped with a skiff located on top of the net at the sloped part of the stern of the vessel as well as they are equipped with three or five speedboats located on the middle deck (see Fig. 37).

Their deck equipment consist of a three-drum purse seine winch and a power block, with topping, cork and other specific winches to handle the heavy boom and net. A crow's nest is placed at the top of the mast. The search for tuna schools is often carried out by a helicopter, for which a landing platform is provided.

As a class of fishing vessel the tuna purse seiner is particularly equipment-intensive. They have to be fast, because the tuna shoals move quickly and the migrational pattern covers thousands of miles of ocean. Deck machinery is lavish and sufficiently powerful to handle a net weighing perhaps 50 tons.

Storage of tuna once it is caught presents a problem, for the size of the fish is large. Some vessels are equipped to bulk-freeze the catch, but the commonest method is to keep fish in refrigerated brine tanks, which form much of the lower parts of the hull and are equipped with batteries of seawater pumps for circulation.

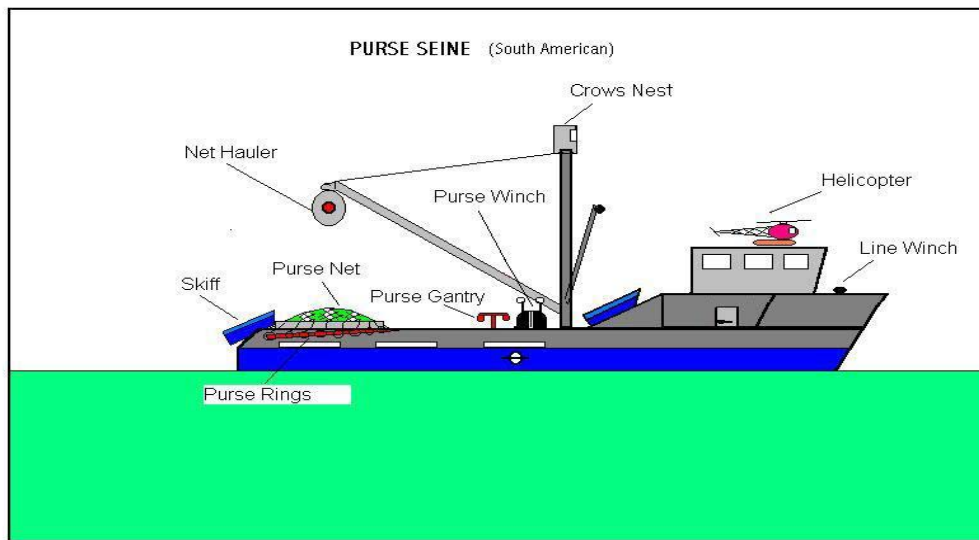
The purse seiner, as well as being fast, must be highly manoeuvrable, for having encircled the shoal the vessel will be stationary, or nearly so, while the net is pursed and hauled and must at this time be perfectly controlled.



(Fig. 36) Purse seine fishing operations

6.2.1 Hauling the gear

Hauling the gear is one of the most dangerous operations on board Tuna fishing vessels. The pursuing wire is then hauled and the bridles pulled inboard as quickly as possible and the wing bridles passed over the sheave of the power block ready for hauling the net. Once the pursuing rings come up to the gallows they are unclipped from the pursuing wire and re-clipped round the lead wire.



(Fig. 37) Purse seine (South America)

The recovering procedures commence and the net being restacked as it comes through the power block. It is most important that every member of the crew should know exactly what he has to do, do it quickly and at the right time taking into account safety precautions described further on in order to avoid accidents. Speed and teamwork are vital if the shoal is to be effectively trapped. As more and more netting is hauled the fish are herded in the direction of the bunt until they are concentrated close to the ship's side, from where they can be brailed or pumped out. When all the fish have been taken on board the rest of the net is hauled through the power block and the gear made ready for shooting again.

The crew members working on deck the same precautions should be observed as on any fishing boat. Stand clear of the net as it goes over the stern and keep clear of all running wires, especially while the net is being pursed. It is imprudent to stand under the power block during hauling, as a pursuing ring may swing clear and give you a nasty knock. It is unlikely that the block will break away, however it has happened some times. If you have to work near or below the power block, wear a safety helmet and please be alert maintaining watching the purse rings.

6.2.2 Chase-boats

The tuna purse seine vessel can be recognized by its auxiliary boats one or more (in some fisheries called "chase-boats or speed-boats") stowed on the boat deck. The large, powerful 'skiff' carried notably on the sloping launch-way at the stern. The use of these craft varies from region to region and forms fishery to fishery. The speed-boats are normally used to herd the shoal immediately after the decision has been made to make a set and they may also distribute bait, which helps to maintain the shoal compact. The heavier work, assisting the net as it streams off the stern, towing it is performed by the skiff, which will then contribute to the closing of the circle around the tuna shoal as it is rejoined by the seiner, see Fig. 37.

The chase-boats are also used for untangling enmeshed dolphins which are often found swimming with a tuna shoal. In order to release them and allow them escape is necessary to perform cork-line suitably backed down.

6.3 Ring netting

Ring nets are the precursor to modern purse seine, where a curtain of netting is released, simultaneously, by two parallel vessels. Both vessels carry out a semi-circular track to encircle a shoal of fish.

7 FISHING OPERATIONS SAFETY (Encircling methods)

Keep clear of the net and the pursing wire when shooting. When the buoy and bag or bunt end is being recovered, keep clear of the wedge rope and pursing wire. If the wire is being heaved up, keep clear. Never stand inside the loops of purses ring bridles during shooting. The end of the net and wedge rope should be stowed or coiled separately so they can run freely. Nets going ashore should have the purse rings clipped onto the footrope to stop them from falling out.

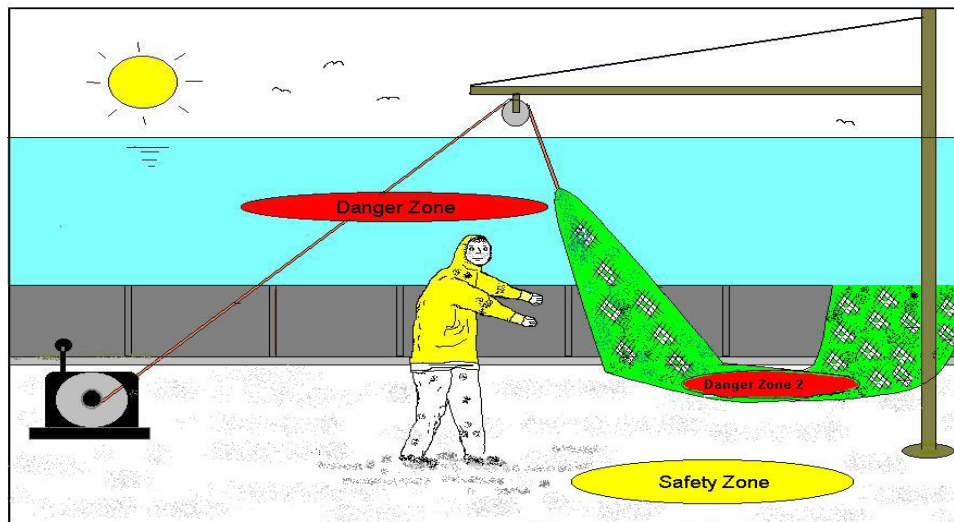
If a lookout is positioned in the crow's nest, he should use the means provided for climbing the mast, position himself properly inside and not straddle the protective rails.

In the following Section 7.1, are safety extracts relating to encircling systems, from IMO/FAO/ILO Code of Safety for Fishermen and Fishing Vessels (Part A).

7.1 Purse seining

- 1 - To reduce the danger of fishermen stepping inside loops of purse ring bridles during setting of the net, the bridles should be coiled in the net or else stowed in a separate box or compartment next to the "clothes-pin" (rack or bar) from which the ring runs out.
- 2 - When setting begins, the net should be so arranged that it is pulled out by a buoy or skiff without the crew having to expose themselves to danger by going aft of or on top of the net. Where men have to go on top of the stowed net in an exposed position safety harness should be worn.
- 3 - During setting of the net the winchman should take care not to allow the drums to turn faster than the purse line wire runs out, so as to avoid fouling the wire.
- 4 - The extension rope attached to the tail end of the net should be coiled down in a separate box or compartment so that there is no danger of fishermen being caught in the loops during setting.
- 5 - A sharp knife should always be kept handy near the net bin or platform.
- 6 - Seawater in the hold causes the fish to become fluid and shift. Care should be taken to separate seawater from the fish during brailing or pumping before the catch reaches the hold, using slanting gratings leading to the hatches. Similarly blood water seeping from the fish should be pumped out frequently.
- 7 - When handling big catches it is essential to brail or pump the fish on board as quickly as possible to avoid an excessive weight of dead fish in the net.

- 8 - The sinkerline and breastline of the bunt should be so attached to the vessel that they can be quickly released if fish lie too heavily in the net and endanger the stability of the vessel. Preferably, the breastline and that part of the sinkerline, which is tied up on the bunt boom and/or on the railing of the vessel during brailing or pumping, should be fitted with rings through which is threaded a wire, fixed to the vessel at either end with an easily released sliphook.



(Fig. 38)

- 9 - When the netting is liberally hung in, the bunt may still retain a heavy weight of fish even after the breastline and sinkerline have been released. It is therefore advisable to attach bridles to the bunt floatline so that it can be hoisted up to release the fish.
- 10 - Should the vessel heel over dangerously and if it is not possible to release the fish the vessel should be driven ahead and turned towards the listing side. When this does not succeed in righting the vessel, the net should be slacked off immediately or cut.
- 11 - Where the net is stacked high in an exposed place it is highly desirable to fit removable stanchions with guard ropes to prevent men from falling overboard, or men should wear a safety harness.
- 12 - Fishermen should avoid standing below an overhead power block or transfer block because of the danger of their being hit by heavy purse rings passing through the blocks. Where such a danger exists, fishermen should wear protective helmets and should be maintaining watching the purse rings, see Fig. 38.
- 13 - Fish carried on deck should be covered by double tarpaulins securely fixed, for instance by nailing wooden strips over the edges to the outside of the railing and to fixed pound boards. On steel vessels a wooden plank should be bolted on for this purpose.
- 14 - In an emergency the skipper should be able to release the deck load through special ports by a quick-release mechanism.

- 15 - When fish are carried on deck, lifelines should be rigged at a suitable height.
- 16 - Where a small auxiliary boat is used, it should always carry light and sound signal equipment in good working order, and the crew should wear life jackets.
- 17 - Where a small auxiliary boat is used, it should always carry a lantern and a set of tools in case it becomes necessary to carry out small repairs.
- 18 - Where a small auxiliary boat is used, the radio communications equipment and the engine should always be tested before going out to sea.

8 DAMAGED FISHING GEAR (All methods)

8.1 Recovery of damaged gear

Fishing operations when correctly implemented ensures a minimum risk environment to all crew. A crew familiar with its surroundings and the fishing operation for that vessel and method operated will minimize the likelihood of an accident. However, it is the nature of fishing that operational continuity is not permanent. During the release, catching or hauling phases, the fishing gear may become entangled or damaged. This results in a change of working practices, particularly during the hauling operation.

The consequence of these changes is to disrupt the normal working procedures, create an unfamiliar working environment and develop conditions, ripe for an accident. To minimize the probability of an accident it is important to recognize certain dangers that exist when hauling under these difficult circumstances.

The following are the essential work practices to be observed when hauling damaged fishing gear or when it is fast to the seabed.

8.1.1 Loose netting or lines

Loose or tangled net or lines can snag on other parts of the fishing gear or the ship to cause excessive loads that result in supporting ropes parting. Net or lines can also become entangled on crew and their clothing or if being stood on to cause the crewman to fall. Loose ropes or gear rigging such as bobbin rigs or anchors can also be dangerous when the vessel is rolling, with similar consequences, if not under total control or secured. Loose netting or lines running through a net/line hauler can be extremely dangerous if not kept under control by the operator. No attempts should be made to clear fast netting or ropes using hands and fingers.

8.1.2 Loading

A very common hazard is when fishing gear is recovered partially damaged or individual ropes part, to cause excessive loading on the remaining chains or ropes. Moreover, movement of the vessel due to weather can lead to additional load fluctuations on the remaining rope/s or chain/s. It is clear that such conditions can lead to further breakage to the fishing gear or the hauling ropes used to recover the gear. During the fishing operation, it is important to recognize the inherent dangers that can exist. Anyone standing underneath or in the path of such overloaded ropes and

chains is at a high risk of serious injury. Standing under a power hauler or hanging codends is to be avoided. Winch operators should be very aware of these problems and act accordingly treating the fishing operation with greater observation and care.

8.1.3 Awareness

An awareness of the dangers posed when fishing gear is damaged is essential to ensure a safe working environment. Fishing gear when damaged or lost will also need replacing. Such an operation will create changes in working practices that make accidents more probable. Each fishing method will have its own specific dangers and in demersal or midwater trawling replacing or moving the otterboards can be considered a dangerous event. Uncontrolled movement of these heavy components can lead to serious injuries. In other methods, such as static gear, it is the disorder of the fishing gear on deck, particularly lines, chains, anchors that may lead to an accident. Lines and hooks during release can easily snag anyone close to the area of operation. Awareness is important to recognize the effect of a changed fishing sequence be it the releasing or hauling stage.

A common high-risk event is when fishing gear becomes tangled outboard and requires clearing. Normal practice is for a crewman to reach out to clear such a problem, however, any attempts to climb outboard should be resisted. If the foul gear needs to be accessed then it is important that a safety harness is used and that a second crewman is providing physical support.

8.1.4 Stoppering

When clearing fouled or fast fishing gear it is often necessary to stopper a rope or parts of the fishing gear to enable clearance to take place. This type of operation is fraught with dangers that often stem from the use of inadequate materials to carry out this type of operation. Therefore, it is important that suitably strong stopper chains or ropes be used and with great caution. Moreover, any operation using the winch to heave or lower should be treated with great caution and risk assessed to ensure the appropriate action is being taken. Caution in these situations is a byword for safety.

8.1.5 Weather

In further considering working safely on deck, the weather conditions and the movement of the ship should not be underestimated, in the dangers they pose. Movement of the ship is dependent on its heading in relation to the direction of running seas and the strength or height of these seas. A beam to sea situation results in greater rolling making slippage or becoming unbalanced more likely. Therefore, it is important in these circumstances to consider one hand for yourself and one hand for the work in question. Furthermore, if the vessel is underway and or releasing the fishing gear the higher ships speed will magnify the pitching, heaving and rolling motions of the vessel. Where possible, crewmen should not stay on deck or should keep clear of the dangerous workstations such as line/net haulers or moving fishing gear or ropes.

9 MAINTENANCE OF FISHING GEAR

It is clear that fishing operations safety is in part due to the condition of the fishing gear and all the ancillary ropes and rigging used to release and haul the gear. The following is a general assessment of the factors involved in determining the causes of fishing gear deterioration.

9.1 Components

Regardless of fishing method from the moment the fishing gear is installed it begins to deteriorate. Deterioration by whatever means results in weakening the fishing gear and making it more prone to failure. Therefore, maintenance of fishing gear is an essential part of fishing operations safety and maintaining catching efficiency. The level of maintenance depends on a number of factors. Key factors deciding the level of deterioration and therefore maintenance in the fishing gear are as follows:

1. Fishing method type
2. Quality of the fishing gear
3. Degree of use
4. Seabed type
5. Quantity of fish caught
6. Type of fish species caught
7. Environmental conditions

All fishing gear and its ancillary equipment deteriorates, with one of the main causes being wear and tear due to use during fishing operations. Good maintenance is fundamental to all safety onboard a fishing vessel. Consequently, it is essential that a regular maintenance programme be implemented throughout any voyage. During fishing operations, a lack of maintenance of the fishing gear can lead to accidents. Therefore, to minimize this possibility it is important that regular maintenance of the fishing gear be undertaken throughout the voyage. Regular maintenance will also ensure high fishing efficiency. All components require maintenance with certain components being significantly more important to safety of the crew.

The key components to monitor for signs of deterioration are:

- All machinery associated with fishing operations.
- Working sheaves, blocks and bollards and their associated shackles.
- Working derricks and their connections.
- Ropes (all types) and chains connected to or part of the fishing gear.
- Shackles or rings, clips and links connecting various parts of the fishing gear.
- All ropes used in the frame of the net, traps and lines.
- Running ropes used for lifting or hauling fishing gear.
- Fish bag lifting ropes.
- Towing warps or ropes.
- Anchors, beams and shoes and ground rigging.

Every working component has a limited working shelf life dependant on quality, level of use and treatment. More use requires more maintenance. Good maintenance provides a longer shelf life for the fishing gear and all equipment associated with its use. Suitability for the intended role is very important. Sheaves, bollards, blocks need to be of suitable strength and size for the load and rope diameter in use. Derrick safe working loads should not be exceeded. Regular inspection of all moving parts such as sheaves or bollard bushes and pins should be carried out periodically.

9.2 Fishing methods

The fishing method determines to a large extent the type and levels of wear and tear. Dragging methods are more aggressive and therefore more prone to abrasive wear and tear. Beam trawling is the most aggressive of methods and the quality and robustness of the fishing gear takes this into account. Demersal trawling maintenance can vary from vessel to vessel depending on the type of trawling that is being executed.

Static gears have less wear from abrasion due to the seabed. However, the fishing gear is not as robust as the dragging methods and therefore, these methods may require the same degree of maintenance as the dragging systems. Some gears such as trap fishing is more prone to abrasive contact with the seabed and is will experience more wear and tear from this source.

Encircling methods seldom experience seabed contact and little wear and tear from this source. However, they do catch large volumes of fish which adds to the stress and strains experienced on the net and its rigging. The type of net hauler used by the encircling methods when operated with large catches also cause considerable stress and strain to accelerate the wear and tear to all parts of the fishing gear.

The seabed is also a significant influence on the wear and tear sustained by the fishing gear. Hard volcanic rock can be considered the most abrasive while soft mud the least with sand and gravel being somewhere in between depending on the material type.

Ropes (steel or other) must be appropriate for their intended use, in diameter, material, type, breaking strength and elasticity. Synthetic and steel ropes will with use stretch and wear, to reduce their safe working load. Rope becket or strop used to lift the bag of fish from outboard needs to be overhauled or replaced regularly to ensure that it is always in good condition. Mainlines and branchline ropes for static gears need to be regularly inspected. Any splintered, frayed or damaged ropes need replacing.

In bottom trawling the use of steel rope or chain bridles to herd fish is common and their wear and tear largely depends on speed towed, seabed type and usage. Splintered steel rope, is often an indication of severe wear and tear indicating a need to change. Regular examination of these bridles is required to ensure they are in good working order. Scottish seine ropes will loose weight and stretch when worn. Chain links will show a reduction in their diameter at points of contact. On soft mud steel ropes may last many weeks but on volcanic ground only a few days. Much the same applies to all the components in towed gears and to some extent static gears. Otterboards will wear mainly in the area of the shoes their towing points and or any shackle pins. All shackles used in fishing gear will show some wear in the area of the pin. Of particular concern, often showing excessive abrasive wear are shackles making abrasive contact with the seabed. These need to be replaced according to the degree of use and the abrasive quality of the seabed.

Beam trawling uses large amounts of chain and, in addition to the beam shoes, all undergo a great deal of abrasive action with the seabed. Consequently, all these parts need regular inspection and periodic replacement to ensure safe and efficient use. Dredges also have similar wear and tear problems to that of the beam trawler in that the dredges, their teeth and dredge beam all need regular maintenance. Beams, shoes and towing chains are prone to wear and damage.

On static fishing gear it is the operational use and weather that can influence the wear and tear while encircling fishing gear, wear and tear and weather equally deteriorate the fishing gear. The more wear and tear on any fishing gear part, the weaker the component and the more probable that it will fracture or break during fishing operations, to cause a serious accident. Normal usage is the main factor causing wear and tear from these methods.

Encircling gear such as purse seine has large areas of netting that needs to be regularly repaired or replaced. Purse wires and the rings and lines should be inspected for wear and tear. The rings will show specific grooved wear to weaken the ring. Buoyancy floats in all fishing methods need to be periodically inspected for physical damage or loss of buoyancy or that the connection rope is in good order.

Catch rate or quantity of fish handled by the fishing gear can influence the rate of wear and tear depending on the type of fish species caught. Large fish with hard scales and spikes are clearly going to be more abrasive than small soft smooth skinned species. Net hauler use and fish weight/forces are the main factors in causing wear and tear.

The importance of good practices of maintenance of the fishing gear and its ancillary equipment cannot be overemphasized. This not only reduces the risk of accidents but also improves fishing efficiency, both of which are desirable.

10 BASIC SAFETY AWARENESS

In this Section, are safety extracts relating to all fishing vessels and their systems, from IMO/FAO/ILO Code of Safety for Fishermen and Fishing Vessels (Part A).

10.1 Safety on deck

10.1.1 Gangways, stairways, ladders, railings and guards

- 1 - All ladders and stairways should be properly maintained. Wooden ladders should not be painted but varnished or coated with transparent preservative.
- 2 - Gangways, stairways, ladders and alleyways should be kept clean to prevent falls due to slippery conditions. Stairways and ladders should have non-skid treads.
- 3 - Gang planks, shore gangways and ladders should be made safe against dislodgement or collapse and should not be located within the swinging radius of derricks or expose personnel to other hazards.
- 4 - Frequently accidents occur through not using the proper means of getting on or off the vessel. Fishermen should never jump from the vessel to shore or from the shore to the vessel. When a vessel does not lie close against a quay and quay steps are used, platforms should be hooked over the bulwark. When vessels are berthed alongside each other, suitable steps should be provided in order to give safe access between vessels. There should also be a life buoy with a suitable line readily available by the gangway. A net under the gangway may also be useful in some circumstances.

- 5 - When the shipboard end of a ladder or gangway rests upon the bulwark, firmly fixed steps should lead from the top of the bulwark to the deck, and be provided with a substantial and properly secured handhold such as a rail or stanchion. Care should be taken that the arrangement is such that it permits easy and comfortable access from ladder or gangway to steps or vice versa.
- 6 - Ladders should be firmly secured.
- 7 - Precautions should be taken when ladders are used on board. Loads should not be carried on them and ladders should never be used where stairways or gangways are provided for boarding or leaving the vessel or for crossing from one vessel to another.
- 8 - The use of portable ladders at sea should be avoided, but should it be necessary to use them they should be firmly secured against slipping. Non-slip bases may be used or the ladder held, at its lower end, by another person. The legs at each end should be placed on flat and solid surfaces and always lashed in place.
- 9 - Rope ladders should be provided with two cross battens to prevent twisting. They should not be made of steel wire rope and should not be used:
 - (i) if any rungs are missing, cracked or rotten;
 - (ii) if the rope is in poor condition or has broken strands;
 - (iii) If they are not long enough to reach the water level or quay.

Such ladders should be fully extended and should not be secured to the bulwark by the rungs. Only one person at a time should be permitted on a rope ladder. Persons ascending or descending a rope ladder should take care to hold the ropes and not the rungs.

- 10 - A ladder should not be used if it has:
 - (i) missing or defective parts;
 - (ii) a rung repaired by nails, spikes or other insecure means.
- 11 - Portable stanchions should be secured against accidental lifting out.
- 12 - Toeboards or stops should be securely fastened.
- 13 - Railings should be maintained in good repair.
- 14 - Portable handrails should always be secured and in position when the vessel is under way.
- 15 - Fishing vessels, when engaged on voyages in the course of which pilots are likely to be employed should carry a pilot ladder.

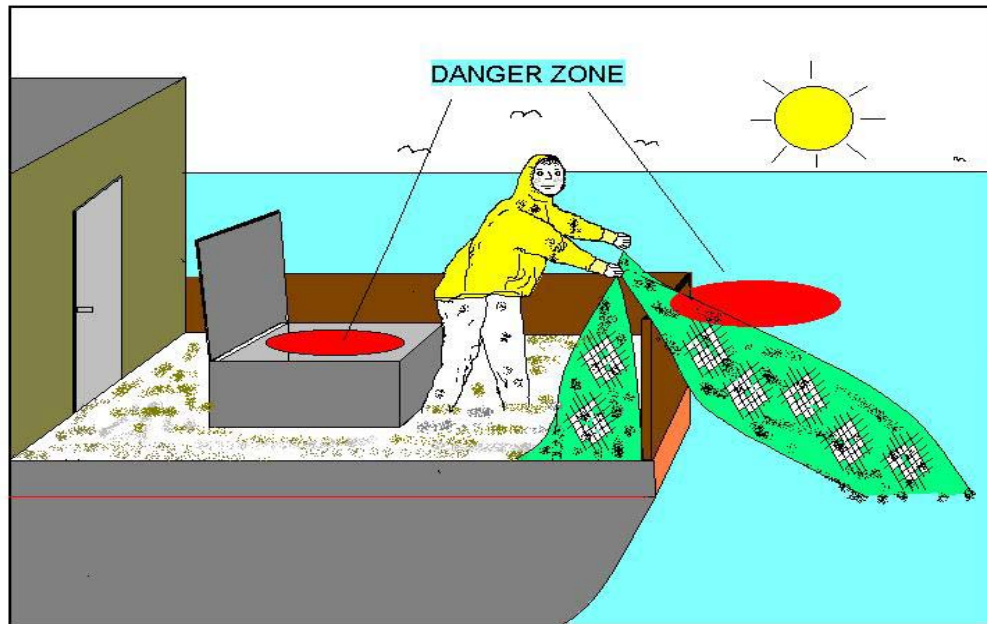
10.1.2 Deck lighting

- 1 - During hours of darkness sufficient lighting should be provided at gangways and all other locations on deck where personnel must work or pass so that obstructions are readily visible. A hand lantern should be used, if necessary.

- 2 - During fishing, lighting on deck should not be extinguished unless the fishing operations require darkness.
- 3 - Lighting should be placed so that it does not dazzle a look-out or interfere with the effectiveness of the prescribed navigational lights.

10.1.3 Precautions against falling overboard

- 1 - Fishermen should always be on guard against falling overboard, as it is a major cause of fatalities among fishermen. The pitch and roll of small vessels, the sudden accelerations, the conducting of complex fishing operations on open decks, the frequent hauling in and letting out of gear over the side or stern, the working on wet slippery decks which are sometimes covered with fish blood and offal, and the inevitable fatigue which results from long working hours, are conditions favouring accidental falls overboard.
- 2 - In bad weather fishing vessels are most vulnerable to shipping water when they are getting under way after lying broadside on to the waves, especially if the new course is into the wind. Men working on deck are conditioned to the broadside roll and the sudden change in motion can catch them unawares; as the vessel is at this point most liable to ship seas, the crew is vulnerable. In these conditions it is advisable to warn the crew of a change of course or an increase in speed.
- 3 - There should be an efficient warning and communication system between the bridge and the crew.
- 4 - As a safety precaution, lifelines should be set up as appropriate to the class and size of the vessel.
- 5 - When fishermen are required to work in an exposed place or to reach overside in heavy weather, they should be secured by a safety line or safety belt, or wear a life-jacket or a safety work vest.
- 6 - During bad weather, or when the vessel rolls heavily, the speed of the vessel should be reduced for the disposing of ashes, the fetching of food, the reading of the log, soundings, inspections and other work on deck.
- 7 - To prevent men from falling or being washed overboard in bad weather, suitable lifelines with man ropes should be rigged on the working deck.
- 8 - In heavy weather, fishermen should not work alone on deck without the watch in the wheelhouse being aware of their presence, see Fig. 39.

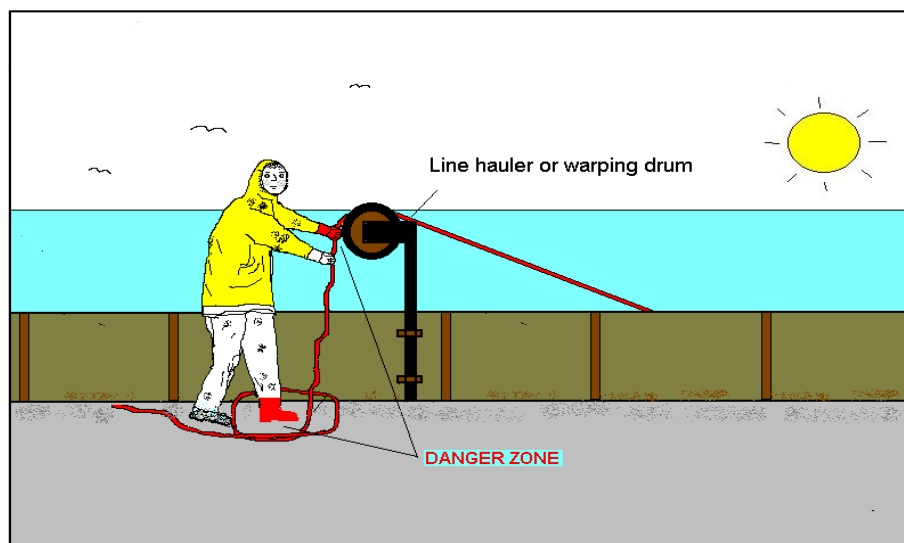


(Fig. 39)

10.1.4 Ropes and lines

- 1 - Fishermen should become familiar with the various types of ropes and twines and their special uses on board and, in particular, with the breaking characteristics of synthetic ropes.
- 2 - Wire rope should always be handled with great care, and gloves used as a protection against injury from projecting strands.
- 3 - Care should be taken to avoid damaging or weakening ropes through excessive strains or rubbing and chafing against sharp objects.
- 4 - Fishermen should always ensure that they use ropes only for the purpose for which they are intended. Care should be taken to see that all ropes in use are in good condition and have strength appropriate to their application.
- 5 - Ropes should be frequently examined for abrasions, broken or deteriorated or displaced fibres or strands and other defects.
- 6 - Ropes should not be exposed to excessive heat or harmful chemicals. When not in use they should be coiled and stored under well-ventilated conditions away from direct sunlight.
- 7 - Rope of right-hand lay taken from a new coil should be withdrawn from the inside counter-clockwise in order to retain the twist.

- 8 - Kinks in ropes should always be taken out by correct coiling – right-hand coiling for a right-hand rope. A kinked wire should never be pulled taut.
- 9 - A load should not be placed on a rope suddenly or with a jerk, as this may overload the rope and weaken it.
- 10 - A splice should be used where possible in place of a knot, which weakens a rope to a greater extent.
- 11 - All blocks should be of sufficient strength and large enough for the rope. The diameter of the sheaves should be suited to the ropes.
- 12 - A wire rope should never be passed over an undersized diameter pulley, sheave or winch barrel.
- 13 - A wire rope which is fitted round a thimble of suitable size to form an eye should be well spliced or secured by means of U-clamps fitted so that the U-bolt fits over the short end of the wire.
- 14 - A warp or rope should not be thrown loosely over the side, as it may foul the propeller.
- 15 - Discarded ropes, nets or other gear should not be jettisoned, as they constitute a danger to other vessels.
- 16 - During the handling of mooring lines or other wires or ropes, care should be taken not to stand in the bights. Hawsers should be coiled down in their correct place and wires wound on their reels to reduce the likelihood of bights forming. Fishermen should keep clear of ropes or wires in tension, see Fig. 40.



(Fig. 40)

10.1.5 Miscellaneous

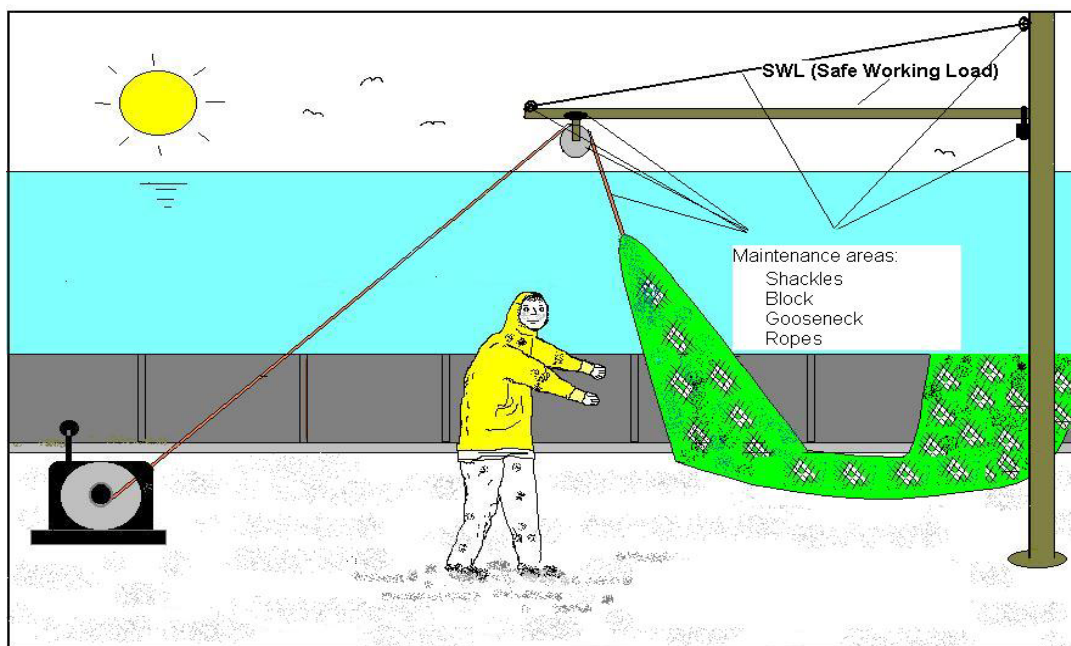
- 1 - Decks should be kept clear of all loose gear liable to cause tripping.
- 2 - Oil or grease spills or fish debris should be hosed down and cleaned off to prevent slipping. Deck hoses should be kept clear of moving warps.
- 3 - Mats may be used on deck as and when practicable to provide a good foothold.
- 4 - When fishermen are required to work aloft they should use a boatswain's chair or safety belt. When rigging the boatswain's chair to a stay, the bow and not the pin of the shackle must rest on the stay or standing part. Boatswain's chairs should always be held by a block and gantline; the use of open hooks on ladders to this end should be forbidden.
- 5 - For lifting, thigh rather than back muscles should be used.
- 6 - A draw-bucket should not be used when a vessel is underway as there is a danger that a man may be pulled overboard.

10.2 Safety in machinery and mechanical spaces

In this Section, are safety extracts relating to all fishing vessels and their systems, from IMO/FAO/ILO Code of Safety for Fishermen and Fishing Vessels (Part A).

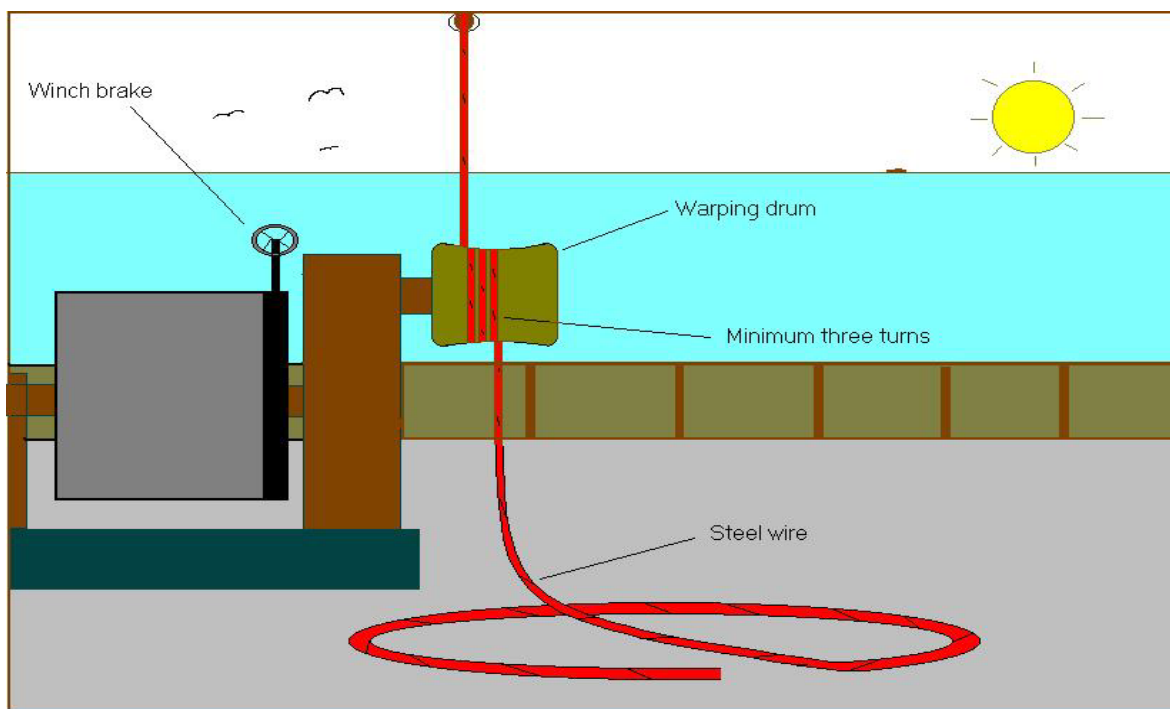
10.2.1 Winches and hoists

- 1 - As far as is practicable, all moving parts of winches, which may present a hazard should be securely guarded or fenced. Sheaves should also be guarded where practicable.



(Fig. 41)

- 2 - A winch or windlass should only be operated by a competent person.
- 3 - All equipment used in hoisting should be tested and examined at periodic intervals as established by the competent authorities.
- 4 - All parts of hauling gear, hoisting gear and related equipment should be maintained in good repair and working order.
- 5 - The maximum safe working load of hoisting gear should be marked on the derricks, see Fig. 41.
- 6 - Fishermen should be aware of the danger of trying to lift too great a load by putting extra turns of rope or wire on a warping drum.
- 7 - Ropes or wires should be led onto winches at an angle, which will minimize slipping. They should not normally be guided on by hand.



(Fig. 42)

- 8 - When warps on winches are renewed, the correct size and length should be obtained so that the winch drum can accommodate the full length. When the warp is fully unwound, three complete turns should remain coiled on the drum, see Fig. 42.
- 9 - Winch brakes should be kept in good adjustment and should operate without grabbing, chattering or slipping.
- 10 - The controls of winches should have clear operating instructions attached to or adjacent to them.

- 11 - Wire ropes used for hoisting and warps should be maintained in good condition and suitable for the work to be performed. They should not have knots, kinks, reverse bends or broken strands. Ends of wire ropes should be seized or otherwise secured to prevent the strands from coming loose.
- 12 - Blocks and sheaves should be properly lubricated at regular intervals. All shackles used aloft should be of a locking type or should be fixed so that they cannot come loose by themselves.
- 13 - Loads should be applied smoothly to warps, wires and ropes. Sudden jerks should be avoided.
- 13 - Before hoisting or applying loads to wires and ropes by warping heads the wire or rope should be hand-tightened before being laid on the warping head. Special attention should be given to ensure that the turns on the warping head do not cross each other.
- 14 - Winch drivers should not leave winches unattended with power on or with a load suspended.
- 15 - The winchman should assure himself that all men are standing clear of the danger zone before applying any load.
- 16 - Loads being hoisted or lowered should not pass over or remain suspended over persons.
- 17 - Scarves or loose clothing are liable to be caught in a winch and should not be worn.
- 18 - Frayed wires constitute a danger and should be promptly replaced.

10.3 Special safety precautions

10.3.1 Eye protection

- 1 - Fishermen should keep clear of water dripping from nets, as the drip may be irritant to the skin and especially to the eyes. They should not rub their eyes with wet hands.
- 2 - Eye injuries are often caused by fragments of metal or paint, and are generally serious. Fishermen should always wear goggles for protection when performing such work as chipping rust or paint, scaling, using a cold chisel, grinding tools, handling chemicals and working on electrical storage batteries.

10.3.2 Protective clothing and equipment

- 1 - Working clothes should fit as closely to the body as possible; there should be no loose strings or cuffs on trousers. Pockets, if any, should be few and as small as practicable.
- 2 - Fishermen should wear footwear, which is appropriate for the work being performed and is in good condition.
- 3 - Waterproof safety boots should be worn in certain working conditions.

- 4 - During rain or bad weather and in darkness protective clothing having a highly visible colour should be worn.
- 5 - Fishermen working at very low temperatures in holds for deep frozen fish should be adequately clothed.
- 6 - Aprons should not be worn near revolving or reciprocating machine parts or electric motors.
- 7 - Safety belts and harnesses should be worn by men working aloft or overside. They should be tested periodically and checked before being used.
- 8 - Fishermen engaged in cutting or gutting of fish should wear gloves sufficiently reinforced to provide adequate protection against cuts.
- 9 - In selecting work gloves, consideration should be given to the hazards to which the wearer may be exposed and to the need for free movement of the fingers. Gloves should fit snugly at the wrists.
- 10 - Only self-contained breathing apparatus, smoke helmets, smoke masks, or masks of a type approved by the competent authority, should be worn as a protection against the inhalation of smoke, fumes, gases, vapours or dust which are injurious to health. Fishermen should be instructed in the proper working of such apparatus before being required to use it.
- 11 - The attention of fishermen should be drawn to the harmful effects of high noise levels in the engine room and to the various methods to minimize them.

10.3.3 Dangerous work

- 1 - When a fishing vessel is underway, work overside should only be undertaken in cases of emergency, when harnesses should be worn. In such cases a second man should be in attendance.
- 2 - Fishermen should not carry out overside work between vessels moored side to side or between a vessel and an adjacent pier or quay.
- 3 - Should it be necessary for fishermen to climb on rails while fishing or performing work on nets, precautions should be taken for their safety. Safety harnesses or safety lines should be worn.
- 4 - Corrosive chemicals such as lye oxalic acid and caustic soda should be handled with care and according to instructions in order to avoid injury to the eyes and skin.
- 5 - Compartments which have been closed for long periods such as water tanks, coffer dams or double bottoms should be checked and found "gas free" and with sufficient oxygen before anybody is permitted to enter without approved breathing equipment. Safety lines should always be used when such spaces are entered, and a second man should be in attendance.

- 6 - It is hazardous to work in the vicinity of radio antennae or radar scanners due to danger from both radiation and the rotation of scanners. Permission should be obtained from the person in charge of the bridge before such work is undertaken and the circuit fuses should be removed to make the equipment inoperable.
- 7 - Fumigated rooms should not be re-entered until the authorities carrying out the fumigation have certified that all parts of the vessel are safe.
- 8 - Fishermen should not be required to work for unduly long periods in low-temperature refrigerated spaces. The length of such periods should vary according to the temperature of such spaces.
- 9 - Fishermen should be aware of the dangers of the emission of poisonous gases from fish-holds, which may arise under certain circumstances from chemicals or industrial fish.

11 FACTORY AND FISHROOM PRACTICES

On larger fishing vessels, below deck factory space is often utilized. The type and design of factory deck will depend on the type of vessel. Some vessels have two such decks for processing and freezing of fish. Factory spaces on any fishing vessel should be treated as being full of potential hazards likely to cause an accident/s. Limited space and dangerous processing machinery and equipment facilitate accidents. The most common accidents involve head and hands.

The following are important factory and fishroom safety issues:

11.1 Handling fish

In iced fish vessels lifting boxes or baskets of fish should be lifted with caution and in an appropriate manner to ensure that back injuries do not occur. Where possible and in bad weather particularly, two people should lift boxes or baskets. When using lifting ropes to discharge fish in boxes or baskets ensure that the lifting hooks are suitable and are secure. Do not lift more than two boxes in any one lift.

In vessels that are freezing fish, lifting blocks should be carried out using proper gloves to stop freezer burns to hands and to stop slippage. Frozen blocks of fish should be handled with both hands using non-slip gloves and clothing and ensuring a good foothold at all times. Plastic and wool mittens are a suitable combination for handling frozen blocks of fish.

Live fish can be difficult to gut and can lead to knife cuts on fingers and hand, when they struggle. Some species of fish have teeth and / or poisonous spines that can cause cuts or poisoning when in contact with hands. Good protective gloves are essential and should be worn at all times.

11.2 Factory decks

One of the main causes of accidents in factories on vessels is a lack of cleanliness, which can result in slippage. It is, therefore, important to regularly clean the decks and associated machinery of any fish waste. Suitable wooden gratings or non-slip decks or mats should be used in the area of a machine operator.

11.3 Gutting

During gutting / handling or filleting of fish, injuries from use of a knife are common. It is, therefore, important that the correct type of knife is used and that it is sharpened regularly. Gutting and filleting knives should be different size and type. The appropriate gloves should also be worn.

11.4 Plate freezer

The freezing plates and their hydraulic operation are sources of accidents. Contact with bare hands on the plates should never be contemplated, as freezer burn will result. Gloves should be worn at all times. Any leaking refrigerant gas should be reported immediately to the factory manager. When closing a freezer plate ensure that everyone is clear. Do not try to pack fish wider than the plate width. Lifting a frozen fish block from a vertical plate freezer should be treated with great care.

11.5 Conveyor belts and lifts

Power driven conveyor belts for transporting fish are dangerous to hands if handled while moving. Avoid contact with the belt or associated mechanisms at all times.

Hydraulic lifts to the fishroom should not be used to travel in and out of the fishroom in a piggyback fashion. Use suitable ladders to gain access at all times.

11.6 Machinery

All machinery used to process or pack fish can be dangerous if used improperly. Ensure that you have had the appropriate instruction on using the machinery. Machinery of concern is:

- Filleting
- Gutting
- Heading
- Packing
- Banding
- Separating
- Washing

All of the above requires that gloves be worn and in some cases of the chain mail type. Extreme care should be taken in changing or operating close to cutting blades. Fingers and hands are the most likely to have a serious accident. Loose clothing can also be very dangerous when feeding such machines. Under no circumstances try to clear a fouled machine without first switching off the power supply. The regular sharpening of blades and cleaning of these machines is essential good practice.

11.7 Stowage of fish

The fishroom is a source of many accidents. The correct secure stowage of boxes or blocks of fish is important. Never stack fish vertically without supports such as wooden pound boards.

Bulk stowage of fish should be regularly supported with boards both vertically and horizontally to stop movement and maintain quality.

Ensure that all fishroom false decks, stages or shelves are securely constructed and can support the intended weights of fish and crew. Stage bottom boards should always be of suitable strength and size. Temporary conveyors or rollers used to transport fish or ice should be properly secured.

11.8 Ice

When working with ice, ensure that it is stable and not likely to move. Old ice is prone to wastage and can have unseen hollow caverns, which could cause it to collapse. Avoid standing on old ice. Always where possible work from the top and the side of the ice. Ensure melt ice can flow throughout the fishroom to an appropriate drain which should be pumped and inspected regularly to ensure it is clear of any waste or objects to cause obstruction.

11.9 Fish waste hatch

This hatch should be kept closed and only opened where no other option to remove waste is available. Ensure that having opened the waste hatch that it is always closed on completion of any waste removal or departure from the factory. Entry of seawater from outboard into the factory deck is extremely dangerous.

11.9.1 Seawater

At any time, seawater in the factory is considered dangerous. Hoses, fish washers and fish chutes should be monitored to ensure that water is directed outboard or no longer running. On completion of any processing of fish shut off all unnecessary water sources into the factory. It is important to periodically examine the factory outboard drains to ensure that they are clear of any fish waste or other objects and that they are operating.

12 FISHING OPERATIONS SAFETY (Factory/fishroom practices)

In this Section, are safety extracts relating to all fishing vessels having a fishroom or factory, from IMO/FAO/ILO Code of Safety for Fishermen and Fishing Vessels (Part A).

12.1 Fish and ice handling

- 1 - In the gutting, washing and stowing in ice of the catch, fishermen should be familiar with the proper handling of different species of fish to avoid hand injuries from teeth or the sharp spines of certain species.
- 2 - Pricks and cuts from fish spines should be bled and treated without delay; some give poisonous wounds, which can be painful and troublesome.
- 3 - When handling blocks of frozen fish in the fishroom, fishermen should wear protective gloves and appropriate warm clothing.
- 4 - Fishermen should be careful when chopping ice in the ice hold and use only the proper tools.

- 5 - In ice holds a pile of ice may become hollow owing to left-over ice melting; fishermen should take precautions against falling into an ice cave.

12.2 Hand tools

- 1 - Hand tools should be of good material and construction and maintained in safe condition.
- 2 - Hand tools should be periodically checked by a competent person, and defective tools should be immediately repaired or replaced. The use of tools with mushroomed or broken heads should not be permitted.
- 3 - Fishermen should keep all tools clean, use the right tool for the job, and keep cutting tools sharp and stored safely when not in use.
- 4 - Handles of hand knives should have hilt guards or finger grips, to prevent the hand sliding onto the blade.
- 5 - Open-bladed knives, fish hooks, gaffs and similar sharp implements should be sheathed or otherwise put safely away when not in use.
- 6 - Tools or small parts of equipment should never be left lying on staging, gratings, etc., in the engine room or aloft on deck. They should always be placed in a box, bucket or bag, or lashed to prevent them from accidentally falling and injuring persons passing or standing below.
- 7 - Tools and other equipment should be lowered from above by use of a gantline.
- 8 - When an eye-bolt is used to lift machine and boiler parts, it should be screwed down into the receiving hole as far as its collar. Over-length eye-bolts should not be used.
- 9 - Cold chisels and punches should preferably be held between the thumb and index finger with the palm of the hand open and turned towards the holder.
- 10 - A spanner or wrench should be the correct size for the job, have jaws, which are not worn and fit squarely on the nut. The adjustable jaws of a wrench should lie on the side of the handle towards which the handle is moved. Pipe wrench jaws should be kept in good condition.
- 11 - It is dangerous to use a wrench on moving machinery. Tools and other gear should be removed before restarting a machine, which has been serviced.
- 12 - Hand tools should only be used for the purpose for which they are intended.
- 13 - Hammering on the hardened surfaces of tools, machinery parts or equipment is hazardous because metal chips may fly.

12.3 Liver and fish oil boilers

- 1 - Care should be taken that the outlet pipes of liver boilers do not become obstructed. If, during the boiling of livers, steam does not escape from the pipe, the steam-inlet valve should be closed immediately and with care, and the pipe cleared.
- 2 - Fishermen should be aware that livers stored in liver boilers at room temperature for more than 48 hours start to develop flammable gases.
- 3 - Warning notices should be posted at appropriate places, that naked lights or flames are prohibited in the vicinity of a liver boiler when cover is removed, and that the boiler should not be filled with livers to more than three-quarters of its capacity.
- 4 - Only properly instructed fishermen should be permitted to carry out liver boiling.
- 5 - Liver boilers should never be left open and unattended with steam on.

13 REFERENCES

1. COMMERCIAL FISHING METHODS

An Introduction to Vessels & Gear

John C. Sainsbury

Fisheries Commercial Fishing Methods is widely accepted by professionals and students as one of the most accessible and informative introductory texts on the economically important fishing methods of the world.

Information on fishing methods and gear and their applications for the capture of different species. Extensive references for further reading are provided; new vessel designs are fully covered, and completely new sections review the increasing use of combination vessels able to work several gears in order to meet modern resource management requirements. Numerous new explanatory photographs and diagrams enhance the text.

Areas covered within Commercial Fishing Methods include: Towed or dragged gear – bottom otter trawling, side trawling, stern trawling, multi-rig trawling, midwater trawling, pair trawling, dredging.

Encircling gear – purse seining, seine netting.

Static gear – gillnets, trapnets, longlines, and pots.

Other gear – trolling, harpooning, pole and line, mechanised line fishing, life net.

Materials – equipment and vessels, materials and applications for fishing gear, combination vessels, catamarans, other developing designs.

140 illustrations, 224 pages, 224 x 172 mm

2.

FISHERMEN'S HANDBOOK

Rear Admiral CRPC Branson

A practical handbook for all fishermen wishing to be proficient deckhands. For example, instead of describing well-known fishing methods, it analyses specific hazards relating to trawling, seining, scallop dredging and the use of static gear. The general approach has been to eliminate detail easily found elsewhere, and concentrate on broader subjects which are set out under the headings: management, navigation, watch-keeping and ship-handling, fishing operations, safety and survival, anchors and cables, cordage and its uses.

3.

FAO CATALOGUE OF SMALL SCALE FISHING GEAR

C Nedelec / J Prado

This fully trilingual companion to the FAO Catalogue of Fishing Gear designs deals especially with small-scale fisheries. It is particularly valuable to the inshore or coastal fisherman, operating from the shore or from vessels up to 15 m long overall or with an engine power of not more than 150 hp.

This book presents a selection of the main types of gear that have proved profitable in commercial fisheries, and by means of particularly clear illustrations, shows how such gear is stowed, handled, set out and collected. Types shown are: surrounding nets, seine nets, trawls, dredges, liftnets, castnets, gillnets and entangling nets, traps, hooks and lines, scoop nets.

Parallel texts in English, French and Spanish. 172 pages illus., 224 pages, 297 x 210 mm Hardcover

4.

FAO FISHERMAN'S WORKBOOK

Fisheries Industries Division

J. Prado

Fishing technologies are not dependent on exact science, as individual experience, knowledge and skill are of the utmost importance. This *Workbook*, therefore, contains a set of guidelines drawn from the wide experience of master fishermen, to be used in combination with the individuals own experience, knowledge and expertise. The *Fisherman's Workbook* is divided into the following sections: Materials and accessories; Fishing gear and operations; Equipment for deck and wheelhouse; Fishing vessel operations; Formulae and tables; Ordering equipment; Index.

43 illustrations, 192 pages, Paperback

5.

IMO/FAO/ILO CODE OF SAFETY FOR FISHERMEN AND FISHING VESSELS

(Part A) Safety and Health Practice for Skippers and Crew

International Maritime Organization. London, 1975 (Sales No. IMO – 1749E)

6.
STCW-F CONVENTION 1995

International Convention on Standards of Training, Certification and Watchkeeping for Fishing Vessel Personnel, 1995

International Maritime Organization. London, 1996 (Sales No. IMO – 915E)

7.
IMO/FAO/ILO DOCUMENT FOR GUIDANCE ON TRAINING AND CERTIFICATION OF FISHING VESSEL PERSONNEL

International Maritime Organisation. London, 2001 (Sales No. IMO – 948E)

THE FOLLOWING ARE THE VIDEOS REFERRED TO IN THE TEACHING SYLLABUS, HOWEVER, THE LIST IS INCOMPLETE. FURTHER VIDEOS WILL BE INCORPORATED AT A LATER DATE AND WHEN APPROPRIATE.

	<u>Ref. Number</u>
1. Introduction to Set Net Fishing	V1
This video examines fishing operations and the practical handling of set nets on small fishing vessels. A video guide accompanies the video.	
2. Care of the Catch	V2
This video examines the handling of white fish at sea and presents powerful arguments from all parts of the industry for taking proper care of the catch (includes a video guide).	
3. Fishing Gear Technology (Beam Trawling)	V3
This video shows beam trawls being tested at a flume tank and describes the key parameters for efficient operation of the fishing gear.	
4. Safe Fishing (available free)	V4
This is a safety video for all types of fishing vessels showing many types of situations that a deckhand may experience and what precautions he may take onboard.	

Videos listed can be obtained at:

Seafish Training
Seafish Industry Authority
St. Andrew's Dock
HULL HU3 4 QE
United Kingdom
Email: training@seafish.co.uk
Tel: + 44 (0) 1482 327837

The videos listed below are available from: Dovedale Studios, HULL
Tel: + 44 (0) 1482 441007
www.dovedale-video-studio.co.uk

5. **TRAWLING, HOOK, LINE AND SINKER . . .** **V5**
Deep-Sea Fishermen cine-films of the 1960's; both illustrate fishing out of Aberdeen; one trawling on the "Mary Craig", one long-lining for Halibut off Greenland on the "Glenstruan's" maiden voyage.

6. **THE SCALLOPERS . . .** **V6**
Training and information video detailing fishing gear and operations on scallop dredging by Martin Melhuish.
