



MAIB
MARINE ACCIDENT INVESTIGATION BRANCH

**Analysis of UK
Fishing Vessel Safety
1992 to 2006**





ANALYSIS OF UK FISHING VESSEL SAFETY 1992 to 2006

Marine Accident Investigation Branch
Carlton House
Carlton Place
Southampton
United Kingdom
SO15 2DZ

November 2008

Extract from
The United Kingdom Merchant Shipping
(Accident Reporting and Investigation)
Regulations 2005 – Regulation 5:

“The sole objective of the investigation of an accident under the Merchant Shipping (Accident Reporting and Investigation) Regulations 2005 shall be the prevention of future accidents through the ascertainment of its causes and circumstances. It shall not be the purpose of an investigation to determine liability nor, except so far as is necessary to achieve its objective, to apportion blame.”

NOTE

This study is not written with litigation in mind and, pursuant to Regulation 13(9) of the Merchant Shipping (Accident Reporting and Investigation) Regulations 2005, shall be inadmissible in any judicial proceedings whose purpose, or one of whose purposes is to attribute or apportion liability or blame.

Further printed copies can be obtained via our postal address, or alternatively by:

Email: maib@dft.gsi.gov.uk

Tel: 023 8039 5500

Fax: 023 8023 2459

All reports can also be found on our website:

www.maib.gov.uk

CONTENTS

	Page
GLOSSARY OF ABBREVIATIONS AND ACRONYMS	
CHIEF INSPECTOR'S INTRODUCTION	1
SECTION 1 - BACKGROUND	2
1.1 General	2
1.2 Aim	2
SECTION 2 - METHODOLOGY	3
2.1 Overview	3
2.2 Statistical analysis	3
2.3 Other research	3
SECTION 3 - FINDINGS & ANALYSIS	4
3.1 Analysis of UK fishing vessel accident data	4
3.1.1 Accident trends	4
3.1.2 Vessel losses	4
3.1.3 Fatalities - General Overview	5
3.1.4 Injuries	7
3.2 Factors and influences affecting fishing safety	7
3.2.1 Background	7
3.2.2 UK safety regulatory framework	8
3.2.3 Overview of the UK fishing safety enforcement regime	11
3.2.4 UK fisheries regulatory framework	12
3.2.5 Other factors and influences affecting UK fishing safety	12
3.3 Review of MAIB fishing safety recommendations	17
3.3.1 Overview	17
3.3.2 General Review of Fishing Safety Recommendations	17
3.3.3 Review of Fishing Safety Recommendations since 2000	18
3.3.4 Conclusions	24
3.4 Review of UK fishing safety initiatives	25
3.4.1 Overview	25
3.4.2 Summary of recent major UK fishing safety initiatives	25
3.4.3 Overview of other major organisations influencing fishing safety	26
3.5 Fishing safety – An International perspective	29
3.5.1 Overview	29
3.5.2 Regulatory systems	29
3.5.3 International safety initiatives	31
3.5.4 Conclusions	31
3.6 Other industrial sectors	32
3.6.1 Overview	32
3.6.2 Comparison	32
3.6.3 HSE approach to improvement	33
3.6.4 Conclusions	34
SECTION 4 - DISCUSSION	35
4.1 Is fishing getting safer?	35
4.2 Review of MAIB accident data analysis	35

4.3	What can be done to make fishing safer?	36
4.3.1	General influences on fishing safety	36
4.3.2	Risk assessment	37
4.3.3	Codes of Practice	38
4.3.4	Survey and inspection	38
4.3.5	Stability	38
4.3.6	Safe working environment	39
4.3.7	Lifesaving appliances	39
4.3.8	Safety culture	40
4.3.9	Training	41
4.3.10	International	41
4.3.11	Grant funding	42
4.3.12	Marine Insurance	42

SECTION 5 - CONCLUSIONS **43**

5.1	Statistics	43
5.2	Risk Assessment	44
5.3	Codes of Practice	44
5.4	Survey and Inspection	44
5.5	Stability	44
5.6	Safe Working Environment	44
5.7	Life Saving Appliances	45
5.8	Safety Culture	45
5.9	Training	45
5.10	International	46
5.11	Grant Funding	46

SECTION 6 - ACTION TAKEN **47**

6.1	Department for Transport and Seafish	47
6.2	The Maritime and Coastguard Agency	47

SECTION 7 - RECOMMENDATIONS **48**

Annex A	Overview of Safety Study Statistical Analysis
Annex B	UK Fishing Industry Vessel and Crew Data (1992-2006)
Annex C	Tabulated MAIB Accident Data for UK Fishing Vessels (1992-2006)
Annex D	Analysis of MAIB UK Fishing Vessel Accident Data (1992-2006)
Annex E	Analysis of MAIB UK Fishing Vessel Loss Data (1992-2006)
Annex F	Analysis of MAIB UK Fishing Vessel Fatality Data (1992-2006)
Annex G	Analysis of MAIB UK Fishing Vessel Injury Data (1992-2006)
Annex H	Review of other data sources
Annex I	Tabulated comparison of the requirements of the Small Fishing Vessel Code with the Workboat Code
Annex J	Map showing the extent of the limited fishing area

GLOSSARY OF ABBREVIATIONS AND ACRONYMS

CFP	-	Common Fisheries Policy
DARDNI	-	Department of Rural Development of Northern Ireland
Defra	-	Department for Environment, Food and Rural Affairs
DfT	-	Department for Transport
EEC	-	European Economic Community
EFF	-	European Fisheries Fund
EPIRB	-	Emergency Position Indicating Radio Beacon
EU	-	European Union
FIFG	-	Financial Instrument for Fisheries Guidance
FISG	-	Fishing Industry Safety Group
FTAG	-	Fishermen's Training Advisory Group
fv	-	fishing vessel
FVLO	-	Fishing Vessel Liaison Officer
FVSO	-	Fishing Vessel Safety Officer
GRP	-	Glass Reinforced Plastic
GT	-	Gross Tonnage
GTA	-	Group Training Association
HMCG	-	Her Majesty's Coastguard
HSAW	-	Health and Safety at Work Act
HSE	-	Health & Safety Executive
ILO	-	International Labour Organisation
ISO	-	International Organization for Standardization
LOA	-	Length Overall
LSA	-	Life-saving Appliances
m	-	metre

Marine Office	-	A regional MCA office responsible for vessels' survey and certification
MCA	-	Maritime and Coastguard Agency (formerly MSA) ¹
MFA	-	Marine Fisheries Agency
MGN	-	Marine Guidance Notice
MIDS	-	Marine Incident Database System
MOB	-	Man overboard
MSA	-	Marine Safety Agency (precursor to the MCA) ¹
nm	-	nautical mile
PFD	-	personal flotation device
PUWER	-	Provision of Use of Work Equipment Regulations
RNLI	-	Royal National Lifeboat Institution
RPI	-	Retail Price Index
RSS	-	Registry of Shipping and Seamen
SAR	-	Search and Rescue
Seafish	-	Sea Fish Industry Authority
SFPA	-	Scottish Fisheries Protection Agency
SI	-	Statutory Instrument
SM	-	Sector Manager
SOLAS	-	Safety of Life at Sea
TAC	-	Total Allowable Catch
UK	-	United Kingdom
UK FVC	-	United Kingdom Fishing Vessel Certificate

¹ In April 1998, the Marine Safety Agency (MSA) and The Coastguard Agency merged to form the Maritime and Coastguard Agency (MCA).

CHIEF INSPECTOR'S INTRODUCTION

A research project², published in 2007 showed that the fatal accident rate for UK Fishermen for the decade 1996-2005 was 115 times higher than that of the general workforce in Great Britain. When compared to specific areas of other work, it was 81 times higher than in manufacturing and 24 times higher than the construction industry, which is often considered the most hazardous occupation in the UK. Alarming, while the fatal accident rate for almost all other UK occupations had fallen sharply over the last 30 years, there had been no discernible reduction in the fishing industry.

The results of this research project prompted the MAIB to conduct this Safety Study. Covering the years 1992-2006, it has analysed all 256 deaths of commercial fishermen operating on UK-registered fishing vessels, with a view to identifying causal and contributing factors, drawing conclusions, and making recommendations. In accordance with the principles of the MAIB, the study does not apportion blame, but is solely focussed on future safety.

In addition to detailed analysis of the MAIB database and investigation reports, the study team has conducted extensive interviews and collected contributions from all sectors of the industry including: fishermen; agents; fishing federations and organisations; MCA; insurers; Seafish; RNLI; and foreign administrations. All comment within the report is based upon a consistency of views from across the industry, tested against the MAIB's own experience.

While there is a downward trend in fatalities during the earlier years of the study, there is then an upward trend from 2002 to 2006. However, I believe this just confirms that, statistically, the absolute numbers are too low to accurately discern year-on-year trends. Thus, although it is pleasing to report that in 2007, the only full year since the period under review, there were only 8 UK fishermen killed, this cannot be taken as a sign that there has been a sudden significant improvement in safety.

A number of actions have been taken by responsible authorities during the course of this study; these are outlined at Section 6. Recommendations have been made in this study to build on those actions already in hand. The study as a whole is offered as a contribution to the important work that must urgently be pursued to bring the accident rate in the fishing industry down to a level that is acceptable in the 21st Century United Kingdom.



Stephen Meyer
Chief Inspector of Marine Accidents

² Roberts SE, Williams JC, Swansea University, *Update of mortality for workers in the UK merchant shipping and fishing factors*, Report for the Maritime and Coastguard Agency and the Department for Transport, MCA Research Project 578, July 2007, see: www.mcga.gov.uk.

SECTION 1 - BACKGROUND

1.1 GENERAL

Commercial offshore fishing is widely acknowledged as one of the most hazardous occupations around the world. High fatality and vessel loss rates have historically been reported in many countries, and in 2001 the International Labour Organisation (ILO) estimated there to be some 24,000 fatalities annually in the global fishing industry.

In the UK, recent research conducted by Dr Stephen Roberts for Swansea University on behalf of the Maritime and Coastguard Agency (MCA) shows fishing to be many times more hazardous than other occupations. This research also indicates that the fatal accident rate in other occupations, including UK merchant shipping, has fallen considerably since the 1970s, but there has been no similar reduction within the fishing industry.

In recent years, there has been a perception within the industry itself that safety has been improving. Losses and major accidents are believed to have reduced, at a time when sectors of the industry have seen a financial upturn. At the same time, various safety initiatives have been introduced by organisations including the MCA, Royal National Lifeboat Institution (RNLI) and the Sea Fish Industry Authority (Seafish). However, MAIB accident statistics do not support this perception.

1.2 AIM

The purpose of this study has been to review the MAIB database to identify key safety issues, and to consider options for improving future safety.



SECTION 2 - METHODOLOGY

2.1 OVERVIEW

In July 2002, the MAIB published a fishing safety study following detailed analysis of data for accidents reported during the period 1992 to 2000. The current study extends this previous analysis, focusing on areas identified as having a key impact on accident trends, whilst also conducting a general review of safety in the UK commercial fishing industry.

2.2 STATISTICAL ANALYSIS

For the current study, data recorded by the MAIB for the period 1992 - 2006 has been analysed by examining trends for accidents, vessel losses, fatalities and injuries. **Annex A** provides an overview of the scope and limitations of the Safety Study Statistical Analysis.

The number of boats and fishermen which make up the UK fishing fleet has declined in recent years. Therefore, the only way to obtain meaningful trends was to calculate rates of accidents in relation to the applicable fleet size and number of personnel at risk. Fleet size and personnel data used in the study are at **Annex B**.

The results of the main statistical analysis carried out as part of the study are at **Annexes C to G**. **Annex H** provides comment and analysis on data obtained from a number of other sources. Section 3 of this report summarises the main findings of the statistical analysis.

2.3 OTHER RESEARCH

The study also seeks to undertake a broad review of the many factors and influences affecting safety in the UK fishing industry. Representatives from various sectors and regions of the industry were consulted to provide MAIB with a broad spectrum of knowledge and experience. These included representatives from the MCA, insurance companies, RNLI, Seafish, fish producer organisations, fishermen's federations and associations, and most importantly, fishermen. The discussions were, without exception, frank and open and MAIB is grateful to everyone concerned for their time and assistance with this study.

A number of foreign fishing safety organisations and administrations were contacted, to briefly review and assess other regulatory systems and safety initiatives.

Research conducted by Dr Stephen Roberts indicates that although the fatal accident rate for the general UK workforce, including UK merchant shipping, has fallen over the past 30 years, there has been no reduction in the equivalent rate for the UK fishing industry [**Annex H**]. Comparisons have been drawn between the fishing industry and other hazardous industries in the UK to understand the reasons why the latter have apparently been successful in improving their respective safety records. In this respect, information obtained from the Health and Safety Executive (HSE) has been particularly helpful.

Finally, an attempt has been made to quantify the effectiveness of recommendations made by the MAIB.

SECTION 3 - FINDINGS & ANALYSIS

3.1 ANALYSIS OF UK FISHING VESSEL ACCIDENT DATA

The statistical analysis of accident data, both from MAIB and other sources, conducted during this study is at **Annexes A to H**. From the analysis a number of conclusions can be drawn:

3.1.1 Accident trends

- The annual number of UK fishing vessel accidents reported to MAIB has fallen during the period between 1992 and 2006. However, when considered in relation to the reduction in size of the UK fishing fleet, the relative accident rate has not reduced and has, in fact, been increasing since 2002. [**Annexes A & D, Figure D1**]
- The majority of reported fishing vessel accidents are due to “machinery failures”³, and an increase in these accidents contributed significantly to the overall accident rate rise since 2002. The accident rates for the other main incident types have either fallen or remained steady over the period. [**Annex D, Figures D2, D3 and D4**]
- Given the consistently high percentage of accident reports which are received via the coastguard, combined with the fact that all serious accidents and casualties in UK waters are likely to have come to the attention of the coastguard, the effects of under-reporting of serious accidents can be discounted. [**Annex A**]

3.1.2 Vessel losses

- The number of vessel losses and the corresponding vessel loss rate has fluctuated over the 15-year period, with a slight upward trend in the rate of losses. [**Annex E, Figure E1**]
- The majority of vessel losses (52%) were due to flooding/foundering, and most of these involved vessels with lengths <12m. 13% of losses were due to groundings, whilst capsizing/listing caused 12% of vessels to be lost. [**Annex E, Figures E2a & E2b**]
- Most flooding/foundering losses occurred in moderate weather. However, this needs to be considered against the likelihood that there would be fewer fishing vessels at sea when the weather is poor [**Annex E**].
- There was a disproportionate number of 15m to 24m vessel losses relative to the size of this fleet, with larger than expected numbers of vessels lost due to flooding/foundering, navigational accidents and fire/explosion. [**Annex E, Figures E2a, E2b & E3**]

³ The MAIB definition of “machinery failures” covers various vessel breakdown scenarios, including fuel-related problems and fouled propellers. It must result in the vessel being disabled for 12 hours or more, or needing assistance to reach port. Machinery accidents fortunately do not generally result in serious damage or injury, and have not been considered at length in this current study.

3.1.3 Fatalities - General Overview

- 256 fishermen died due to accidents to/on UK fishing vessels between 1992 and 2006. [Annex F, Figure F1]
- Because of the relatively small number employed within the industry, actual fatality numbers are quite small, averaging 11 deaths per annum since 2001. However, the fatality rate is high, at 126 deaths per 100,000 fishermen per year over the 15 years, and nearly 100 deaths per 100,000 fishermen per year since 2001. This is considered an unacceptable rate when judged against the rest of UK industry. [Annex F, Figure F1]
- With such small numbers, it is difficult to determine accurate trends. Multiple fatalities from the loss of a single large vessel inevitably distort analysis. However, although the number of fatalities and the fatality rate has reduced when comparing the period since 2001 with earlier years, since 2002 there has been no reduction in the fatality rate⁴ and the fatal accident rate has been increasing. [Annex F, Figures F1 & F2]

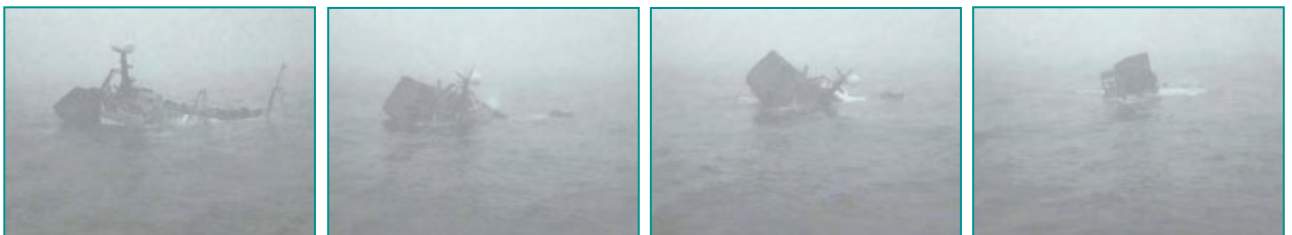
3.1.3.1 Deaths due to fishermen going overboard

- Nearly a third (83) of the 256 fatalities between 1992 and 2006 resulted from fishermen going overboard. The overall rate of this type of fatality has been fairly constant over the 15 years, although the fatality rate due to personnel accidents (excluding overboard) steadily fell over the same period. [Annex F, Figures F3a & F5]
- 18 deaths occurred in harbour, and 14 of these were when fishermen were returning to their vessel, often late at night. Alcohol was recorded as a possible factor in 13 of the 18 fatalities, and at least 8 cases identified inadequate arrangements for access to the vessel. [Annex F]
- 65 overboard fatalities occurred while the vessels were “at sea”, and only 1 of the fishermen was reported to be wearing a personal flotation device (PFD); even this one did not however appear to have been properly secured as it came adrift from the casualty, whose body was never recovered. 28 of the deaths occurred on <15m vessels, of which: 16 were on potters; and 18 were on single-handed vessels (including some of the potters). A further 4 deaths occurred on 15m to 24m potting vessels, although none of these were being operated single-handedly. The fatalities which occurred on potters typically involved crewmen becoming entangled in ropes during shooting, and being dragged overboard. Fatalities on other vessels tended to involve crewmen being knocked or dragged overboard during the shooting/hauling of fishing gear, or being washed overboard in heavy weather. [Annex F]

⁴ The accident rate is calculated by dividing the number of accidents by the number of registered fishing vessels for a given year, and multiplying by 1,000 to give a rate per 1000 vessels to take account of fleet size changes. Similar rates are also calculated for fatalities and injuries, albeit per 100,000 fishermen, this being the standard figure used to calculate worker accident rates.

3.1.3.2 Flooding, Foundering, Listing / Capsize and Missing Vessels

- Just under 40% (99) of all fatalities between 1992 and 2006 were due to flooding/foundering, capsize/listing or missing vessel accidents. [Annex F, Figures F3a & F3b]
- 63 of these (25% of all fatalities) involved <12m vessels. [Annex F, Figures F3a & F3b]:
 - Stability issues were identified in many of these accidents, with 18 fatalities attributed to vessels with low freeboard, 9 caused by inadequate stability and 8 due to vessel modifications. [Annex F]
 - Most of the vessels were less than 10m in length, and therefore not required to carry liferafts. Some of the vessels were voluntarily carrying liferafts, which helped to save 6 lives, but in 3 cases, liferafts failed to deploy correctly and possibly contributed to 6 deaths. [Annex F]
 - <12m vessels are not required to carry emergency positioning indicating radio beacons (EPIRB), and only 1 of the vessels had one fitted; problems with this EPIRB however, led to a delay in starting the search and rescue, and 3 crew died. [Annex F]
 - 34 of the 63 fishermen killed in these accidents were known not to have been wearing PFDs, and it is considered likely that neither were many of the other 29 deceased. [Annex F]
- 28 deaths resulted from 9 accidents involving 15m to 24m fishing vessels; of these, 4 vessels and 16 fishermen were lost in poor weather. [Annex F, Figure F3b]:
 - Although EPIRBs are required to be carried by 15m to 24m vessels, EPIRB problems were reported in 4 of the losses, when 13 fishermen died. 14 lives were lost in 4 other accidents despite the EPIRB activating correctly. [Annex F]
 - Liferafts were successfully deployed in 4 of the accidents, saving 8 lives. Liferaft deployment problems were however recorded in 4 other cases, when 17 fishermen died. [Annex F]



3.1.3.3 Other fatal accidents

- 30 fatalities occurred on >15m vessels as a result of accidents to persons (other than going overboard). Just under a third of these occurred in poor weather, and almost half involved crew being struck by fishing gear. Since 2001 there has, however, been a steady downward trend in this type of fatality on >15m vessels. [Annex F, Figures F3b & F7]

3.1.4 Injuries

- There has been a decline in the overall number and rate of reported injuries to fishermen over the 15-year period. [Annex G, Figure G1]
- Although the rate of injuries on >24m vessels has fallen over the 15-year period, the injury rate for 15m to 24m and <12m vessels has remained fairly constant. However, the rate of injuries on 12m to 15m vessels has fallen over this period. [Annex G, Figure G4]
- 80% of all injuries occurred on >15m vessels, despite these vessels representing only 16% of the fleet and employing an estimated 44% of all fishermen. As these larger vessels tend to be at sea longer than smaller vessels, their overall exposure to the risks involved in fishing will be greater. However, a more likely explanation is that the skippers/ owners of these vessels adhere to more robust reporting procedures than those of the smaller classes. [Annex G, Figure G3]
- Many of the injuries sustained by fishermen are extremely serious and potentially life-threatening. MAIB investigations conducted on two such accidents occurring in 2006 identified issues of concern regarding the risk assessments for these vessels.

3.2 FACTORS AND INFLUENCES AFFECTING FISHING SAFETY

3.2.1 Background

UK commercial fishing has developed into an extremely complex industry, with ever increasing technology and political influences affecting safety, complicated by factors such as vessels' condition, weather conditions, economics, regulation and culture.

The industry has long since departed from the days of freedom when fishermen could choose to go to sea in any vessel, fish where and when they wished, and land as much fish as they could catch. Some of this freedom has been removed specifically in an attempt to protect fishermen, and some to protect fish stocks, with the ultimate aim of providing a sustainable fishing industry for future generations of fishermen.

The industry has two principal strands of regulatory influence:

- i. Regulation of the safety of vessels and their operation, overseen by MCA; and
- ii. Fisheries management, administered, regulated and enforced by the fisheries departments of the UK government's administrations for England, Scotland, Wales and Northern Ireland.

3.2.2 UK safety regulatory framework

3.2.2.1 Development of the UK Fishing Vessel safety regulatory framework

The regulatory body assigned to the UK's marine industry is the MCA, an executive agency of the Department for Transport (DfT). The MCA was formed in 1998 following the amalgamation of the Marine Safety Agency (MSA) and Her Majesty's Coastguard (HMCG).

Although still retaining primary responsibility for their traditional roles (such as coordination of Search and Rescue operations, cliff and beach rescues), coastguards now also carry out the majority of inspections of <15m fishing vessels for compliance with the Fishing Vessels (Code of Practice for the Safety of Small Fishing Vessels) Regulations 2001, whilst MCA surveyors are responsible for surveying larger fishing vessels for regulatory compliance.

The MCA has divided the UK into three regions, namely: Scotland and Northern Ireland (ScotNI), East of England Region and the Wales and West of England Region. Operationally, these regions are semi autonomous, and do not necessarily adopt the same working priorities, although surveyors and headquarter's staff do meet regularly to discuss regional concerns. As a part of ongoing restructuring, Technical Performance Managers have been introduced to improve consistency across the regions.

Most MCA surveyors operate from central Marine Offices within the three regions and deploy to fishing ports as required, with the result that for many surveyors and fishermen the only time they meet is during formal survey or inspection. There are a few fishing vessel surveyors' offices actually sited on the quayside of active fishing harbours, which allows regular contact between surveyors and fishermen. It is considered by many fishermen that positioning these offices in close proximity to the fishing fleet has gone a long way to building bridges between the regulators and industry, and has encouraged the MCA and industry to work more closely together.

3.2.2.2 Overview of the current UK fishing regulatory requirements

A major milestone for fishing vessel safety regulation followed the Holland-Martin Inquiry into Trawler safety in 1969. This report was instrumental in the development of The Fishing Vessels (Safety Provisions) Rules 1975. The Safety Provisions Rules set out the first comprehensive safety requirements for fishing vessels, which have had numerous amendments since their implementation.

The Safety Provisions Rules saw the introduction of wide-ranging safety standards, among them the requirement for stability criteria for all vessels of registered length 12m and over. Vessels built before 1975 were given exemptions from complying with many of the rules, unless major modifications were carried out.

In 1973 the UK became a member of the European Economic Community (EEC); subsequent agreement to the Common Fisheries Policy (CFP), signified compliance with Community legislation regarding vessel safety and fish stock regulations.

Other important regulations are:

- the Torremolinos International Convention for the Safety of Fishing Vessels, 1977 and subsequent 1993 Protocol revision for FV 24m and over;
- Fishing Vessels (Certification of Deck Officers and Engineer Officers) Regulations, 1984;
- the Fishing Vessels (Life Saving Appliance) Regulations 1988;
- the Fishing Vessels (Safety Training) Regulations 1989;
- the Merchant Shipping Act 1995;
- the Merchant Shipping and Fishing Vessels (Health and Safety at Work) Regulations 1997;
- the Fishing Vessels (Code of Practice for the Safety of Small Fishing Vessels) Regulations 2001 (referred to in this document as the Small Fishing Vessel Code);
- the Fishing Vessels (Safety of 15-24 Metre Vessels) Regulations 2002, which gives statutory force to The Code of Safe Working Practice for the Construction and Use of 15 metre length overall (LOA) to less than 24 metre registered length (L) Fishing Vessels Regulations 2002, (referred to in this study as the 15-24 Code).

The Small Fishing Vessel Code and the 15-24m Code were part of a rationalisation of UK standards to comply with European Council Directive 93/103. The final element of the rationalisation will be the introduction of a Code of Practice for the Construction and Safe Operation of Fishing Vessels of 24m Registered Length and Over.

The Small Fishing Vessel Code is complicated with the inclusion of numerous break points based on vessels' length. Each length category has differing degrees of safety requirements, e.g. vessels less than 15m (currently) are not required to meet stability criteria, and vessels less than 10m are not required to carry liferafts. However, many responsible operators do recognise that the minimum mandatory equipment is not suitable for their particular operation, and choose to carry safety equipment in excess of the statutory minimum.

The Small Fishing Vessel Code originally applied to vessels under 12m in registered length; after the introduction of the 15-24 Code it was amended to incorporate vessels of less than 15m overall length. However, as the Small Fishing Vessel Code had no requirement for stability criteria, or carriage of EPIRBs, it transpired that vessels of between 12m and 15m would no longer be required to comply with the stability or EPIRB requirements specified in the Safety Provisions Rules. This discrepancy went unnoticed until after the Code had been incorporated in statute; it is presently *recommended* that vessels in the 12m to 15m length bracket carry a stability book and EPIRB, but will not be a requirement until the statute is further amended; this is currently being progressed.

This study has considered a direct comparison between The Fishing Vessels (Code of Practice for the Safety of Small Fishing Vessels) Regulations 2001 and the Code of Practice for the Safety of Small Workboats and Pilot Boats (the Workboat Code). The latter Code is applicable to small commercial workboats carrying cargo, which are, in many ways, not dissimilar to fishing boats. There are significant differences between these two codes; some of the extra safety requirements of the Workboat Code, over and above those contained in the code for small fishing vessels are shown at **Annex I**.

In 1984 the Fishing Vessels (Certification of Deck Officers and Engineer Officers) Regulations replaced certification under the Merchant Shipping Act of 1894. The 1984 Regulations replaced a structure which was based upon vessel tonnage with a vessel length-related system instead. Under the existing deck officer certification regime, no certificate of competency is required for skippers of vessels less than 16.5m registered length. Currently, anyone can take a fishing vessel of this size to sea, within the limited area (**Annex J**), without navigational training or seagoing experience. This is, however, currently being addressed by the development of a Bridge Watchkeeper's Certificate⁵.

3.2.2.3 Overview of the current UK fishing safety survey and inspection regime

As a rule of thumb, the degree to which fishing vessels are subjected to surveys and inspections is determined by the boat's length. In addition to the statutory surveys and inspections, the MCA also carries out random and target inspections.

The inspections of vessels less than 15m in length are generally delegated to coastguard Sector Managers (SM), as the inspections are regarded as substantially less onerous than those required for larger vessels. In recent years new build fishing boats down to just below 10m in length have been getting more complex, sometimes with gear and equipment comparable with vessels twice their length, making inspection equally complex. In two out of the three MCA regions, inspection of <15m boats is carried out by coastguard SMs; the third area, however, sees the issue of "rule beaters" as such a concern that they use marine surveyors to inspect vessels down to 9m in length. It should be noted that marine surveyors' training and background tends to be more vessel specific than that of coastguard SMs, whose generic training and daily work routine includes SAR coordination and organisation, cliff and shore rescue, which often cause conflicting demands on their time.

Training SMs for vessel inspections is achieved through a 2-day course. Completion of the training provides the authorisation for an SM to go on board a vessel and carry out a checklist type inspection. If, during an inspection, the SM becomes concerned, he may request the attendance of a marine surveyor to assist. The marine surveyor then has the power to either issue an improvement notice or detain a vessel, as he sees fit. Unfortunately, there have been occasions when inspections have omitted to highlight structural deficiencies on vessels which have subsequently sunk⁶.

⁵ Bridge Watchkeepers Course: a short training course to give skippers' of less than 16.5m vessels a foundation on the collision avoidance Regulations and basic watch keeping principles.

⁶ Report on the investigations of the foundering of *fv Kathryn Jane* 4.6nm west of Skye on or about 28 July 2004 with the loss of the skipper and one possible crew member, the capsizing and foundering of *fv Emerald Dawn* off Kilkeel on 10 November 2004 with the loss of one life, the foundering of *fv Jann Denise II* 5 miles SSE of the River Tyne on 17 November 2004 with the loss of her two crew, MAIB Report No 15/2005, August 2005.



The majority of fishing vessels which make up the UK fleet were built before the introduction of the various codes. Strict compliance with the prescriptive requirements of the legislation can therefore often be problematic. MCA marine surveyors have a degree of freedom to interpret the rules as they see fit, and be pragmatic in their approach to survey, permitting equivalent or better standards than the codes require. Nevertheless, there have been instances where this pragmatism has been misplaced with particular regard to weathertight integrity and stability⁷.

Survey and inspection is generally carried out in port, giving little opportunity to establish if operational practices are safe. One MCA region does occasionally use a boat to inspect fishing vessels whilst out at sea, which provides an opportunity to evaluate working operations.

3.2.3 Overview of the UK fishing safety enforcement regime

The MCA's Enforcement Unit is responsible for investigating significant breaches of Merchant Shipping legislation resulting in loss of life or serious injury and serious marine pollution within the UK 12 nm territorial limit and 200 nm pollution zone. Lesser offences are dealt with by MCA Marine Offices and may result in serving improvement, prohibition or vessel detention notices.

The 1974 Health and Safety at Work Act (HSAW) and its subsidiary legislation do not apply to merchant ships and fishing vessels. The Merchant Shipping and Fishing Vessels (Health and Safety at Work) Regulations 1997 was implemented as an attempt to emulate the shore-based 1974 HSAW. These regulations are intended to give seafarers the same protection in the workplace as shore-based workers. While there has been a small number of successful prosecutions in recent years, for violation of regulation (COLREGs, alcohol etc.) as listed on the MCA's website⁸, there have been no prosecutions under the Merchant Shipping and Fishing Vessels (Health and Safety at Work) Regulations 1997.

The enabling Statutory Instrument SI 1997:2962 has been interpreted as applicable only to those who are employed, because of the statement in Regulation 3 that, "*These Regulations shall apply to all activities of workers on United Kingdom ships*", whereby a worker is described as "*any person employed by an employer under a contract of employment.*" The legal interpretation of the



⁷ Report on the investigation of the capsizing and foundering of the fv *Harvest Hope* PD120 40 miles north-east of Peterhead on 28 August 2005, MAIB Report No 21/2006, August 2006.

⁸ MCA Website www.mcga.gov.uk

word “worker” has, in practice, prevented the MCA from enforcing alleged breaches of health and safety regulations on fishing vessels, where share fishermen are involved, as they are considered to be self employed and have long been defined as such for taxation purposes. However, the interpretation to exclude the self employed appears to contradict Regulation 5, which describes the General Duties of an employer to, “*ensure the health and safety of workers and other persons so far as is reasonably practicable*”. This mirrors the “land based” Health and Safety at Work Act 1974 (HSAW), which makes no distinction between the employed or self employed.

3.2.4 UK fisheries regulatory framework

Britain’s sea fisheries have been protected and controlled by authority of Parliament for nearly 200 years. During that time fish stocks have risen and declined regularly with the combined effects of nature and man. More recently, however, stocks have been under greater pressure, and efficiencies realised from improving technology and the high demand for fish have led to over fishing, which has placed great pressure on fish stocks.

3.2.4.1 Stock Conservation

Membership of the EU requires that the UK complies with its Common Fisheries Policy (CFP) on fisheries management. The CFP places responsibility on the UK government to ensure a sustainable marine environment within the waters under its jurisdiction. This responsibility is in turn devolved to the governing Administrations to regulate through the Marine and Fisheries Agency (MFA) in England and Wales, the Scottish Fisheries Protection Agency (SFPA) in Scotland, and the Sea Fisheries Inspectorate of the Department of Rural Development of Northern Ireland (DARDNI). The main tools used for fisheries conservation are:

- total allowable catch (TAC) quotas, which regulate the quantities of particular fish species allowed to be landed following scientific recommendations to prevent stock depletion;
- fishing gear restrictions, which allow inappropriate species and immature fish to escape and reduce seabed damage;
- conservation areas, where fishermen are prohibited from fishing;
- sea time, i.e. restricting the number of days that vessels are allowed to fish in any given year;
- limiting fleet capacity, in both tonnage and engine power.

The effects of quota management and days at sea restrictions have been the topic of much debate over the years. This study does not attempt to comment on the conservation impact of such policies; nevertheless, constraints such as limited numbers of days at sea undoubtedly do influence skippers’ decision making.

3.2.5 Other factors and influences affecting UK fishing safety

During the period covered by this study, industry work patterns have changed significantly, and will continue to change as the industry adapts to the challenges posed by changing levels of fish stocks and associated fisheries regulation. The fishing industry is also extremely sensitive to commercial pressures, i.e. fish and oil related prices.

Defra figures indicate that fish landings have generally reduced as the fleet has shrunk. However, the total value of the fish landed has begun to increase since 2004, as prices have risen. The average number of days spent at sea by fishing vessels has varied little between 2000 and 2006. [Annex H, Figures H1, H2 & H3]

Crude oil prices have shown a marked rise since 2002. Given the effect that this has had on bunker prices, it is evident that this will have increased the commercial pressures on the industry. [Annex H]

The majority of factors affecting industry safety can, to a great extent, be governed by fishermen themselves, while other influences are beyond their control. The main factors are described below.

3.2.5.1 Fitness for purpose

To be able to fish safely, vessels and equipment must be fit for purpose. In achieving this, consideration should be given to: fishing areas; catching methods; gear dimensions and weight; vessel condition (age, deterioration etc.); maintenance; safety equipment; vessel size and stability. It is the responsibility of every skipper to operate within his vessel's capability. However, to a limited extent, fishing vessels' fitness for purpose is also governed by regulation through regular survey and inspection by the MCA.

There is evidence that the surveys sometimes fail to identify serious deficiencies in safety critical items which have subsequently placed vessels and crews⁷ at risk.

To effectively deal with an emergency at sea, vessels' safety equipment must also be ready for use and in good condition. Four/five yearly surveys, even with intermediate inspections mid term, are too infrequent to ensure vital safety equipment is in a state of readiness. Therefore there is an obligation on skippers and crews to carry out regular safety equipment checks and conduct emergency procedure drills on vessels of 15m in length and over. However, many fishermen who met with MAIB as part of this study confirmed that drills are seldom carried out on board fishing vessels, and rarely observed during survey and inspections by the MCA.

A number of MAIB investigations have highlighted failures in vessel fitness⁶ and crew preparedness due to lack of on board training (drills)⁹.



⁹ Report of the investigation of the fire on board the fishing vessel *Be Ready* while fishing 30 miles north-west of the Orkney Islands on 22 January 2000, MAIB Report No 30/2000, 2000.

3.2.5.2 Manning

During the period under review much of the white fish and shell fish sectors of the fishing industry suffered severe financial decline, particularly during the years either side of the turn of the century. This was mainly caused by restrictive fishery policies, declining fish stocks, increased fuel prices and poor fish prices.

The decline caused many fishermen with transferable skills to leave fishing and find work in other industries, whilst recruitment of young fishermen dropped to an all time low. The manpower shortage led to many vessels sailing short handed, which in turn meant fewer crew members to do the same amount of work, with resultant higher workloads - especially for skippers.

Crews on most fishing boats are, in the main, “share fishermen” i.e. their wages are based on a share of the profits (or losses) from the catch. Generally speaking, the fewer men on board, the greater the wages, provided the product is landed in equally good condition. Some skippers said that in times of hardship they chose to operate with fewer men on board to enable the leaner crew to maintain decent wage levels. Operating short handed has been recognised to have noticeable effects on the training of new recruits. Some of those contacted during the study explained that, where vessels had more crew members there was often someone allocated to guide, or keep a watchful eye on new recruits. When sailing short-handed, this became difficult, thus compromising the safety of many new entrants at the start of their fishing careers.

The continued expansion of the European Union enabled the migration of seamen from eastern European countries to the UK to find work on fishing vessels, which alleviated the manning shortage on many vessels. While improving the manning shortage for the industry, the use of migrant workers did, in turn, introduce communication difficulties on board these boats.

Some skippers expressed the opinion that, in times of poor profitability, man management issues and crew retention became more problematic and, for example, a skipper’s insistence on deckhands wearing personal protective equipment (PPE) might be enough to drive disgruntled crew members to other, less restrictive, boats. However, with improved revenues, those skippers felt more able to enforce their will and insist on PPE, with some willing to dismiss those who do not comply.

3.2.5.3 Operational Practices

Fishing is a job of repetitive routine. In this environment accidents will occur more frequently as fatigue and/or complacency lead crew to cut corners and/or ignore well tested, safe working procedures.

Over the 15 years under review, technological developments on vessels and fishing gear have occurred. Many vessels have introduced labour saving devices on deck, frequently with the effect of enabling reductions in manpower.

Fishing gear technology has evolved to a stage where vessels towing two trawl nets is commonplace (particularly for shellfish and ground fish), and trawls with two cod ends are also being seen more regularly. However, the intricacy of these developments does tend to lead to more complicated operating procedures, with accidents occurring as a consequence.

As fish stocks have depleted, and to fully utilise days at sea allocations, some fishermen confirmed they were now fishing longer hours at sea to reduce costs, by steaming less frequently to market and give extra time on the fishing grounds. This can, however, reduce the opportunities for repairs and equipment maintenance, and increase the potential for fatigue.

Static gear fishermen consulted during this study noted that they have increased the quantity of gear in the sea, by up to 50% in some cases, therefore requiring more time at sea, and on deck, to haul and shoot the additional gear, contributing to an overall increased exposure to risk.

Historically, the dangers associated with working practices have been governed by skippers and crews simply evaluating the dangers of the job and putting in place unwritten control measures to reduce the chance of injury or accident – or, to use present day terminology, “risk assessment.” Frequently, assessments of dangers are dynamic; varying with changing circumstances on board to suit the operation at the time. Dynamic risk assessment is the backbone of safe working practice; in times of crises or unusual work occurrences, crew members are required to “think on their feet,” yet ensure safety. There have been innumerable instances of accidents occurring when vessels’ routines have deviated from the norm without the assessment (dynamic or otherwise) of new risks taking place. However, during the last few years in particular, there is increasing evidence of risk assessments being more effective. This is supported by views of fishermen and the decrease in injury rates on all vessels and reduction in fatalities resulting from accidents to person (excluding Man overboard (MOB)) on vessels over 15m.

Personal flotation devices, such as constant wear inflatable lifejackets and thermal flotation jackets/waistcoats, are now commonly found on fishing vessels. However, many skippers said they have problems getting crew members to wear them, to the extent that some have even had their deckhands sign disclaimers if it is their choice to not wear a PFD provided by the vessel. Many static gear fishermen have indicated that existing PFDs are unsuitable for their particular work. Nevertheless, many fishermen told how they do now wear PFDs as a matter of course when on the open deck, and have proven they can be worn without too much restriction.

Statistics show that the trend for accidents to persons is decreasing, but that there has been little decrease in fatalities due to falling or being dragged overboard. It must be noted that MAIB receives few reports of successful recovery of MOBs (of which there are probably many), whereas all fatalities are reported, making evaluation of survival rates and effectiveness of PFDs difficult.

3.2.5.4 Safety Culture

Frequently, fishermen involved in accidents have made such comments as, “fishing is a dangerous job”; “that’s just how it is”; “there will always be accidents whilst fishing.” There would appear to be, for some, a fatalistic acceptance that safety at sea cannot be improved. Many accidents to vessels and crew members have resulted from dubious work activities and attitude to risk on board, i.e the onboard safety culture. Often, risk taking during a hazardous work activity becomes the norm, and it is not until the inevitable accident happens that it becomes apparent that the operation could have been carried out in a safer manner, without compromising work efficiency.

Onboard safety culture would appear to be greatly influenced by vessel owners – if an owner shows little concern for his crew members' wellbeing, there is less chance of the crew behaving responsibly. This has been evidenced time and again, whereby some owners' vessels are regularly involved in accidents, and intervention by the regulators appears to have little effect. This hardcore of people does, unfortunately, show the rest of the industry in a bad light. Many of those interviewed as part of this study proposed that more stringent enforcement of regulations is required as a means of protecting crew members against those vessel owners and skippers who resist education and guidance to improve safety, and continue to operate their vessels in an unsafe manner.

Vessel maintenance is also frequently influenced by the owner's safety culture. Not all owners recognise the benefits of keeping vessels well maintained, and some choose to operate continually under a corrective maintenance regime, spending only when they need to spend. This is based on the mistaken belief that they are taking maximum profit from the business by not spending on pre-emptive maintenance. In some cases owners have even ignored the need for corrective maintenance and have continued to operate their vessels with knowingly damaged equipment, rather than spend money on repairs.

Onboard safety culture is also influenced by good examples set by skippers and other colleagues, especially in the matter of wearing a PFD on open decks. Skippers who have led by example and worn a PFD when they go on deck have been shown to be more effective than those skippers who simply tell their crew to wear them.

3.2.5.5 Economic viability

Safety is an integral component of a vessel's economic viability. Financially astute skippers recognise the economic benefits of not only keeping a vessel well maintained, but also of keeping their crew safe. Any unplanned downtime, whether it is repairing damaged equipment, or due to an injured crew member, will undoubtedly result in lost revenue.

Economic pressures are perhaps one of the greatest driving forces in the fishing industry. During the earlier years of the period under review the owners of many tripping¹⁰ vessels employed extra crew to allow their vessels to work at sea longer by rotating part of the crew between trips. This enabled owners to maximise profits from their business, but it also increased the exposure to risk of crew members due to increased sea time, added wear and tear on vessels and equipment, and reduced time for shore maintenance.

Share fishermen earn their wages purely as a percentage or share of the catch. Understandably, they are likely to move to other vessels if wages or conditions are not to their satisfaction. Perceptive skippers are critically aware of their dependence on good crew members, and generally will do their utmost to keep them happy, through the balance of wages (good catches) and conditions. However, this has been known to force skippers to work outside their comfort zone, with the associated safety risks these pressures involve.

¹⁰ Vessels capable of staying at sea for prolonged periods as opposed to vessels landing every day/night.

Some skippers/owners explained that the employment of migrant workers on board UK fishing vessels has, in some ways, eased issues associated with share fishing. Most foreign itinerant crew members work for a fixed wage, rather than a share of the catch, thus making them employed workers rather than share fishermen. This can allow owners to factor wages as a known fixed running cost, thus taking share fishing pressures out of the equation, but of course replacing it with other issues such as communication with non-English speakers. There have been accidents where non-English speaking crewmen have been evacuated from the vessel at an early stage in an emergency because the skipper has perceived them to be a hindrance to his attempt to deal with a critical situation¹¹.

An issue that has arisen since the introduction of migrant workers on fishing vessels is an increase in the number of fatalities which occur in harbour. Traditionally, crew have left the vessel once she has landed her catch to spend time with their families ashore. However, it's now quite usual for migrant workers to live on board their fishing vessels continuously for several months. Accidents in harbour involving domestic equipment such as portable generators and heaters are therefore becoming more common.

3.3 REVIEW OF MAIB FISHING SAFETY RECOMMENDATIONS

3.3.1 Overview

When MAIB conducts a preliminary examination or investigation following an accident, the primary aim is to improve maritime safety by preventing future similar accidents. The principal means of achieving this is by making recommendations to stakeholders, which can range from industry organisations to individuals who might have been involved in, or had an interest in, the accident.

MAIB has been making recommendations since its creation in 1989. Responses to recommendations which were received from stakeholders are recorded on the MAIB's database. However, before 2004 there was no requirement for responses to be given, and feedback on this was inconsistent. In 2004, MAIB introduced a "closed loop" recommendation system to allow the effectiveness of its recommendations to be monitored. The system was incorporated into the 2005 amendments to the Merchant Shipping (Accident Reporting and Investigation) Regulations and which requires recipients to consider the recommendation and reply within 28 days with details of their intended actions. A Recommendations Annual Report has also been published since 2004, reviewing and reporting on the outcome of each year's recommendations.

3.3.2 General Review of Fishing Safety Recommendations

This study has reviewed recommendations made following fishing vessel accidents to assess their effectiveness, and to identify areas where further recommendations might help improve fishing safety.

MAIB made 692 safety recommendations related to fishing vessel accidents between 1992 and 2006. Of these, 346 (50%) were made to the MCA, with 34% made to fishing vessel owners or skippers.

The focus of MAIB recommendations has changed considerably since the 1990s. In the early years of the Branch's existence, many recommendations made to the

¹¹ See MAIB Fishing Accident Flyer dated October 2005 "Collision and sinking while Pair Trawling."

MCA proposed actions specific to a vessel or individual, whereas since about 2000, recommendations tend to address safety issues which are more generic.

3.3.3 Review of Fishing Safety Recommendations since 2000

An in depth assessment of MAIB recommendations made since 2000 has been undertaken.

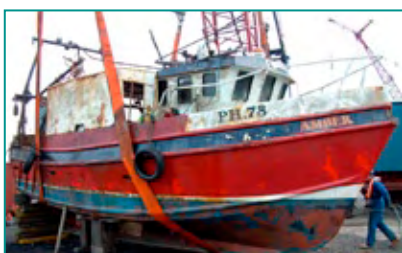
In this period, 291 recommendations have been made. The majority (54%) of these were to vessel owners or skippers and relate to vessel-specific issues rather than industry-wide matters. Given this specific nature, and the fact that most have been accepted, these have not been further reviewed.

The other 133 recommendations since 2000 were made to industry bodies or organisations, with most being directed to the MCA. 20 recommendations were made to federations, associations or other organisations, such as Seafish and FISG, with others made to bodies such as manufacturers and port authorities.

The MAIB categorises recommendations into three different levels of importance in the Recommendations Annual Reports; this section will only consider level 1 recommendations¹², which are the ones resulting in changes affecting the whole industry and are of most interest. There were 42 such recommendations out of the 133. These have been categorised into subject areas as detailed below.

3.3.3.1 Survey & inspection conduct and policy

14 of the 42 recommendations related to the conduct or policy of fishing vessel survey and inspections, of which 13 were made to the MCA. 7 dealt specifically with issues concerning the MCA survey and inspection of <15m vessels, following a series of tragic accidents involving vessels of this size.



The investigation into the loss of *Amber*¹³ in 2003 recommended that MCA:

Develop a risk-based approach to target uninspected fishing vessels of less than 15m overall length, so as to achieve 100% inspection as soon as is practicable.

This was partially accepted, with the MCA noting that a target of 100% would be impracticable and unproductive due to the resources required to track and inspect the un-inspected vessels. The programme of inspections was completed by September 2006.

¹² Level 1 recommendations are considered to have the broadest importance, and may include the requirement for new legislation or policy changes, whilst level 2 recommendations may call for changes or reinforcement of best practice. Level 3 recommendations are addressed to individual owners or companies and are specific to their vessel or company.

¹³ Report on the investigation of the loss of the fishing vessel *Amber* (PH78) in the Firth of Forth on 6 January 2003 with the loss of one life, MAIB Report No 25/2003, October 2003.

A number of further accidents involving <15m vessels in 2004, including the fire on board *Kingfisher II*¹⁴ and the losses of *Kathryn Jane*, *Emerald Dawn* and *Jann Denise II* reiterated these concerns. Further recommendations were made regarding the quality of Small Fishing Vessel “Code” inspections and the training and availability of surveyors to conduct these inspections:

Ensure that there is an adequate network of qualified MCA fishing vessel surveyors who are available to survey fishing vessels whenever required to do so.

Review the current training and guidance for MCA fishing vessel inspectors, to ensure clear terms of reference are established and understood with respect to the inspection and possible detention of fishing vessels.

All of these recommendations were fully accepted, with an undertaking that additional training would be provided for Sector Managers conducting “Code” inspections, and that these inspections would examine the whole vessel, rather than just areas relating to safety.

However, in 2006, concerns about the standards of surveys and inspections being conducted on <15m vessels were again raised during the investigation into the injury sustained by a crew member on *Sian Elizabeth*¹⁵. This resulted in a further recommendation to MCA to:

Ensure the effective inspection and survey of under 15m fishing vessels to ensure compliance with the Code.

In response, MCA conducted a review of its fishing vessel surveyor training needs.

Recommendations also addressed more general issues regarding the response to unauthorised vessel modifications identified during vessel surveys, and the re-surveying of required remedial work. This included a recommendation to MCA following the capsizing of the vessel *Amber Rose*¹⁶ in 1998 to:

Consider reviewing its procedure for the detention of fishing vessels in light of this accident.



¹⁴ Report of the investigation of the fire on board the fishing vessel *Kingfisher II* whilst on passage to recover creels, 5 miles east of North Uist on 26 April 2004, MAIB Report No 15/2004, November 2004.

¹⁵ Report on the investigation of the injury to a member of the crew on board the fishing vessel *Sian Elizabeth* 3 miles north of Kings Lynn 14 September 2006, MAIB Report No 3/2007, March 2007.

¹⁶ Foundering of mfv *Amber Rose* off the Isle of Man with the loss of one life on 15 October 1998, MAIB report No.24/2000.

This recommendation was rejected by the MCA.

Two further recommendations were made to the MCA during the investigation into the loss of *Solway Harvester*¹⁷ in 2000 to:

Review its policy on the survey of remedial work, and, if necessary, revise its guidance to surveyors to ensure that critical items are resurveyed.

Review its policy for dealing with cases where surveyors discover that substantial changes have been made to a fishing vessel, which could endanger the vessel, and have not been notified to the MCA.



These were accepted by the MCA, but similar concerns regarding unauthorised modifications and surveying remedial work were again raised during the MAIB investigation into the loss of *Harvest Hope*⁷ in 2005, after which the MCA conducted an internal inquiry to review its survey and inspection procedures.

3.3.3.2 Stability issues

Ten of the recommendations could be attributed to stability issues arising from the loss of 6 fishing vessels, with a combined total of 13 fatalities. Seven of the deaths were in three accidents involving <10m vessels in less than a year: *Charisma*¹⁸, *Kirsteen Anne*¹⁹ and *Amber*¹³.



¹⁷ Investigation of the capsizing and sinking of the fishing vessel *Solway Harvester* BA794 11 miles east of the Isle of Man on 11 January 2000 with the loss of seven lives, MAIB Summary Report No 1/2003, 13 June 2003 and MAIB Report No 1/2006, 20 January 2006.

¹⁸ Report on the investigation of the capsizing of the fishing vessel *Charisma*, OB588, with the loss of one crew member, Carlingford Lough, 30 January 2002: MAIB Report No. 38/2002, November 2002.

¹⁹ Report on the investigation of the loss of *Kirsteen Anne*, Firth of Lorn 31 December 2002 with the loss of her two crew, MAIB Report No 19/2003, July 2003.

Following the capsizing of *Amber Rose*¹⁶, which was due to overloading and probable undetected flooding, MAIB recommended that the MCA:

Consider options for improving fishermen's awareness and understanding of stability, including the introduction of mandatory training in stability for holders of Deck Officer Certificate of Competency (Fishing Vessel) Second Hand Special, equivalent to Class 2 Limited.

A stability awareness training course was subsequently developed, and has been successfully running during the past 2 years. Although not mandatory, this course has been readily accepted by the industry and has been found to be most beneficial by small and large vessel operators alike. Its success has been attributed to the practical nature of the course and the use of a floating fishing vessel model to demonstrate stability issues.

Following the investigation into the capsizing of *Charisma* in 2002, probably due to undetected flooding combined with a heavy deck load of bagged mussels, MAIB recommended that:

MCA, in consultation with the fishing industry, develop and promulgate guidance for the loading of fishing vessels under 15m LOA.

The MCA commissioned two research projects, RP559 and RP560, which were to develop a simplified method of assessing stability on <12m vessels, without the need for expensive inclining tests and stability books, and to produce a simplified stability notice for use on >12m vessels. The projects were completed in May 2006, but despite the efforts of the MCA and Seafish it has not proved possible to identify any vessels to participate in the validation of the results.

The *Amber*¹³ and *Kirsteen Anne*¹⁹ investigations, although resulting in separate reports, effectively made three parallel recommendations regarding small fishing vessel stability. Two of these recommendations revisited the areas of devising a simple method of assessing stability and of enhanced stability awareness among the operators of small fishing vessels, and were considered addressed by the actions above. A further recommendation was also made to MCA to:

Conduct a formal safety assessment of the introduction of a mandatory stability requirement for existing fishing vessels under 15m.

This was rejected, although the MCA agreed to conduct a risk and cost-benefit assessment into whether a stability standard for <15m vessels would materially affect the accident rate. In confirming this intention to MAIB, MCA noted that even if a mandatory stability standard on small vessels was proven to significantly enhance stability, it would be almost impossible to implement such a measure given the large number of vessels in the <15m fleet. The assessment was to be carried out on completion of the two research projects, but despite these being published²⁰, the results of the assessment are not yet known.

²⁰ Research Project 559, *Loading Guidance for Fishing Vessels Less than 12m Registered Length*, Phase II, Final Report, Report No. 1903/2, Wolfson Unit, May 2006; and Research Project 560, *Simplified Presentation of FV Stability Information for Vessels 12m Registered Length and Over*, Phase II, Final Report, Report No. 1905/2, Wolfson Unit, May 2006 – both available on www.mcga.gov.uk.

3.3.3.3 Risk assessment

Eight recommendations dealt with issues relating to risk assessments for fishing vessels.

One such recommendation to the MCA resulted from the investigation into the fatality on board *Solstice II*²¹ in 2000:

Consider introducing an enhanced programme of education across the fishing industry in respect of risk assessment.



This was instrumental in the successful introduction of the now mandatory Safety Awareness course, developed by Seafish and other industry representatives, to provide fishermen with training in the fundamentals of risk assessment.



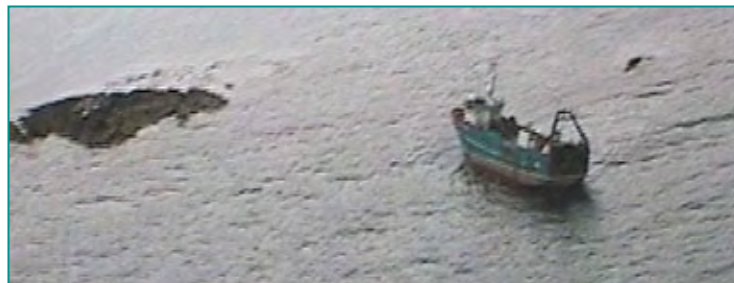
A further recommendation made to the MCA, as part of the *Solway Harvester*¹⁷ investigation, was:

Review and clarify the guidance on the application of the Merchant Shipping and Fishing Vessels (Health and Safety at Work) Regulations 1997 in respect to risk assessment on the safety of the vessel.

The MCA subsequently confirmed the establishment of a Fishing Industry Safety Group (FISG) Risk Assessment Working Group, under the chairmanship of Seafish. Part of the remit of this group was a review of the Seafish risk assessment folder, and resulted in the issue of a revised colour-coded folder in 2004, which continues to be updated. The recommendations of this group were also taken into account by the MCA when reviewing and clarifying the guidance provided in Marine Guidance Notice MGN 20 (M+F) on the conduct of risk assessments.

In 2001, the vessel *Lomur*²² grounded, fortunately without injury or serious damage, and the subsequent MAIB investigation recommended that the MCA:

Review and clarify the guidance provided in MGN 20(M+F) in respect to risk assessment on the safety of the vessel.



²¹ Report of the investigation of a fatal accident to a crew member on board *Solstice II* (BF 56) 25 miles south-west of Rockall, 13 May 2000, MAIB Report No 22/2001, May 2001.

²² Report on the investigation of the grounding of *mfv Lomur* in the approaches to Scalloway, Shetland Islands 14 June 2001, MAIB Report No. 7/2002, February 2002.

The MCA recommendation response stated that it was not considered appropriate for risk assessment to cover aspects of the safety of the vessel covered by other legislative provisions or good seamanship principles, and which do not relate to specific work activity; no further action was taken.

The *Amber*¹³ and *Kirsteen Anne*¹⁹ investigations again made parallel recommendations to the MCA on the subject of risk assessment:

Ensure the Merchant Shipping and Fishing Vessels (Health and Safety at Work) Regulations apply to all vessels regardless of the contractual arrangements of the crew, and that hazards which imperil a vessel are included in risk assessments.

These were afforded a “qualified acceptance”, although the second part was in essence rejected by the MCA, using the same logic as quoted for the *Lomur* recommendation above. More encouragingly, the first part of the recommendation, regarding the contractual arrangements of crew, was noted as being under consideration, albeit raising complex policy issues that would require amending regulations, and has not been on the list of legal priorities.

3.3.3.4 Safety promotion

Six recommendations covered the promotion of safety by various means, such as the issue of guidance to the industry or safety publicity campaigns. The most significant of these resulted from the investigation into the loss of *Solway Harvester*¹⁷ in 2000, and recommended that the MCA take immediate action in its promotion of safe practice. The introduction of the 15 to 24m Code in 2002 addressed many of the areas of concern.

3.3.3.5 Liaison between organisations

Two of the recommendations resulting from the “trilogy” report⁶ in 2005 effectively required government bodies to liaise with other organisations to improve cooperation on safety-related matters. One was made to the DfT, the other to MCA, and both are recorded as fully accepted / fully implemented.

DfT was recommended to:

Consult with DEFRA to establish a link between the inspection, registration and licensing of <15m fishing vessels.

This recommendation was discussed at a meeting between DfT and Defra in December 2005, when it was confirmed that the system developed by MCA, in consultation with Defra and Registry of Shipping and Seamen (RSS), would be taken forward. In this system, MCA would write to a vessel owner, asking for an inspection within 30 days, with a follow up warning of 7 days. If these requests were ignored, RSS would then also write to the owner, warning of de-registration if proof of inspection could not be provided. If de-registration did occur, Defra would be informed of this, and then suspend the licence to fish.

Although this system initially was reported to be very successful, with a number of vessels removed from the register, it was found during meetings held as part of this study, that the linkage between the inspection, registration and licensing of small fishing vessels was still not as effective as it could be, with some vessels not being removed from the register, despite adequate warning and time to rectify defects.

The second recommendation, to the MCA, was to:

Work with DEFRA, Scottish Government Directorate for Marine and DARDNI to make government funding for the provision of non-mandatory LSA more easily available.

In response to this recommendation, the MCA confirmed that it had written to Defra, and will be consulted as part of the development of a new European Fisheries Fund (EFF) scheme.

3.3.3.6 Life Saving Appliances (LSA)

Two recommendations were made which related to LSA, of which, perhaps the most significant was directed to FISG as a result of the investigation into the loss of *Donna M*²³:

FISG to raise an agenda item on the compulsory wearing of lifejackets for fishermen when working on deck, and to seek the views of fishermen's representatives on this subject.



MAIB has recorded this recommendation as *Partially Accepted*, and the matter was discussed at FISG, when the general consensus was for “encouragement” rather than “instruction” to wear appropriate PFDs.

In July 2000, the MCA also published MGN 155 (F), which strongly recommended that all fishermen wear constant wear buoyancy equipment while working on deck. However, this MGN was withdrawn in February 2007.

3.3.4 Conclusions

Given the large number of recommendations made by the MAIB, it would require a separate study report to fully comment on the success or otherwise of the MAIB recommendation process over the years. The brief review of a selection of recent key recommendations in this report, however, provides an overview of the effectiveness of the system in recent years.

The review highlights that some recommendations made by MAIB have evidently had a positive and significant impact on safety within the fishing industry. However, it is also clear that in certain cases, not only could the scope of the recommendations have perhaps been tighter, but that the responses received and actions implemented have not always captured the spirit of the original intent, and have not always been effectively followed up.

²³ Report of the investigation into the capsizing of the fishing vessel *Donna M* off the coast of the Orkney Islands with the loss of two lives on 31 August 1999, MAIB Report, 2000.

Over the last 5 years, the MAIB has introduced two innovations to improve the effectiveness of its recommendations:

- i. It has introduced a recommendations meeting to engage with stakeholders and industry representatives in the development of appropriate recommendations which are proportional, effective and help to drive improvements in safety within the fishing industry; and
- ii. It has developed a “closed loop” monitoring system to help ensure the appropriate implementation of its recommendations.

Together, these are seen to be improving the effectiveness of its more important recommendations.

3.4 REVIEW OF UK FISHING SAFETY INITIATIVES

3.4.1 Overview

There have been numerous safety initiatives undertaken during the period considered by this study. Most initiatives have required considerable funding from benefactors, which have included the EU, RNLI, marine insurers, The Corporation of Trinity House, the MCA and the fishing industry itself. The initiatives include, among others: supply of non-mandatory safety equipment; design and delivery of safety training; and research and development of innovative safety products. As detailed in section 3.3, some of these safety initiatives were a direct result of recommendations arising from MAIB accident investigations, while others have been driven by concerned parties close to the industry.

3.4.2 Summary of recent major UK fishing safety initiatives

3.4.2.1 Assistance to acquire non-mandatory safety equipment

One of the most notable initiatives of the period was facilitated by regional government fisheries departments accessing funding through the EU Financial Instrument for Fisheries Guidance (FIFG). This funding allowed some vessel owners to acquire additional safety equipment that was not required to be fitted to the relevant vessel by the applicable regulations. The initiative undoubtedly saved fishermen’s lives. However, the autonomy bestowed upon the four fisheries departments meant that there was a differing view on the types of equipment that could be funded through the funding scheme. While FIFG funding has now been withdrawn, a similar EU scheme, the UK European Fisheries Fund (EFF) commenced in September 2008.

3.4.2.2 MCA initiatives

The MCA carried out numerous campaigns to raise safety awareness among fishermen. These campaigns have generally been through posters, literature and video media.

Between 2005 and 2007, instead of conducting the normal “visual” campaigns, ScotNI region of the MCA experimented with an interactive assistance and education scheme. An MCA Fishing Vessel Safety Officer (FVSO), who was also an experienced fishing skipper, visited 520 >15m vessels and carried out onboard safety discussions using the vessels’ own risk assessment to facilitate this. This initiative was hailed a success by many skippers and crew members, as it proactively involved all members in the discussion, thus removing the mystique surrounding risk assessment, and it gave crews

a feeling of ownership. The success of this project was attributed to the effectiveness of the FVSO, who made a point of meeting crews at their convenience (often in the middle of the night), rather than trying to visit during office hours. Additionally, as an ex-fisherman himself, he had credibility within the industry.

3.4.2.3 Loading and Stability

MAIB recommendations have led to a number of MCA initiatives regarding fishing vessel stability and loading. These include the successful stability awareness training course and the MCA research projects to develop simplified loading and stability guidance for small fishing vessels.

3.4.2.4 Personal Flotation Devices (PFDs)

During 2005 and 2006, the RNLI and Seafish conducted evaluation research into PFDs for their suitability in a commercial fishing environment. This research was prompted as a result of the ongoing high number of MOB fatalities on fishing vessels and the often publicised belief that there are no suitable PFDs available in the marketplace, appropriate for use by fishermen. This informative research has provided invaluable information regarding PFDs. Intriguingly, the simple act of providing PFDs for evaluation to a test group of fishermen increased their continued wearing by the participants (post trial) by some 900% compared to the number regularly using PFDs at the start of the trials. Nevertheless, that a number of fishermen chose not to continue to wear PFDs after the trial ended is of concern, and possibly an indicator that further research and development is required on durable PFD equipment that can be easily worn on any type of fishing vessel, without hindrance. The results of this research can be obtained from the RNLI or Seafish, or viewed on their websites: www.rnli.org.uk/fishingsafety and www.Seafish.org/resources/publications

3.4.3 Overview of other major organisations influencing fishing safety

There are several organisations outside the recognised regulatory bodies which have influenced fishing industry safety. These organisations have recognised the inherent dangers of fishing, and have tried to improve safety within the industry, through practical or financial contributions to the areas of training and research.



3.4.3.1 Fishing Industry Safety Group

One of the main drivers for safety initiatives throughout the period covered by this study has been the Fishing Industry Safety Group (FISG).

FISG is the recognised forum for discussion of industry safety standards and includes representation from the MCA, Fishermen's Federations, Ship builders, Fisheries Departments, Seafish, Marine Insurers and other organisations with a direct interest in the safety of UK fishing vessels and their crews. FISG has an advisory role in the development and implementation of safety standards. It has the following terms of reference:

“As part of the overall process of determining and applying policy in safety standards for fishing vessels and their crew, to advise the Department for Transport through the Maritime and Coastguard Agency on the development of proposals and their implementation”

FISG meets twice yearly and is supported by a number of sub groups, which meet as required.

As an example of FISG's work, the Fishermen's Training Advisory Group (FTAG) has been instrumental, not only in driving forward improved training standards within the industry, but also in obtaining funding for training. The Group has been instrumental in taking forward the Bridge Watchkeepers Course⁵. This course has been agreed in principle with the fishing industry. There is currently an ongoing debate as to whether the qualification should be a requirement for skippers of all vessels below 16.5m in length, or applicable only to skippers of vessels between 7m and 16.5m, and will be subject to formal consultation. The qualification should ensure small vessel skippers have a basic knowledge of watchkeeping, with particular emphasis on collision avoidance.

Other FISG sub groups have been equally proactive in promoting and driving forward initiatives to enhance safety within the industry.

Disappointingly, many fishermen, when approached during the production of this study, were unaware of FISG or who their local representative was on the Group.

3.4.3.2 Marine Insurers

There is no legal obligation for owners to insure their vessels, however, most prudent owners do so. It was established during meetings with the major UK fishing vessel insurers that they had different approaches to client and vessel standards. Some companies, as part of their own quality control, inspect their clients' vessels annually or bi-annually as a means of satisfying that the craft, and skippers, meet required standards, whereas other insurers simply relied on proof of regulatory compliance. One insurer required additional basic safety items on board their insured vessels, which, although not costly, has proven effective, e.g. chain preventers on all overhead hanging blocks (where possible). A notable initiative was the decision of two major mutual insurance companies to part fund MOB locator devices for all their clients. Additionally, one of these insurers also sponsors monthly onboard training drills (to its American clients) as a means of protecting both their interest and crew members' safety; training

drills are also required to be carried out by crews of UK vessels under the 15-24 Code, but seldom are. It was also noted that at least one insurance company effectively maintains a “black list” of owners, who they consider to be “high risk”, either following large numbers of claims, or potentially dubious claims.

3.4.3.3 Royal National Lifeboat Institution (RNLI)

The RNLI is better known for its invaluable voluntary service of rescuing mariners in times of distress. It, however, also recognises the benefit of proactive education and training, which can effectively reduce the amount of rescues its lifeboats are required to perform.

The RNLI has, through its two Fishing Vessel Liaison Officers (FVLO) based in the NE of Scotland and SW of England, conducted numerous pier side safety demonstrations of vital safety equipment, which in many cases would only be seen during emergencies. It has also used its vast experience in assisting with delivery of Sea Survival training to the industry.

The RNLI has also co-funded a valuable marine safety study in conjunction with MCA, The North East Fishermen’s Training Association, Sunderland Marine Mutual Insurance and The Corporation of Trinity House²⁴.

3.4.3.4 Sea Fish Industry Authority (Seafish)

Seafish is a Non Departmental Public Body funded and supported by the four UK government fisheries departments. Income is also obtained by levies on seafood and through trading of its commercial arm, Seafish Marine Services. Seafish works with all sectors of the UK seafood industry: fishermen, processors and wholesalers etc. to promote sustainable seafood. It carries out research projects and raises standards, improving efficiency and ensuring that the industry develops in a viable and sustainable way.

Seafish provides the fishing industry with advice and assistance on vessel and gear technology and produces seabed cartography through liaison with the offshore oil industry and fishermen.

Of vital importance is its role in providing vocational and safety training to the industry through its network of affiliated Group Training Associations (GTA). Seafish is a highly regarded member of FISG and, as such, many training issues raised in that forum are devolved to Seafish for development and delivery.

Seafish has been instrumental in obtaining funding from EU sources for continued safety training for the industry. A major part of its delivery is in meeting the legal requirement for all fishermen to be trained in First-Aid, Fire-Fighting, Sea Survival and Safety Awareness (or Basic Health and Safety for new entrants). Additionally, it provides training in non-mandatory stability awareness and open learning modules for certificates of competency.

It is regrettable, that during its investigation of fishing vessel accidents, MAIB comes across many fishermen who have not completed the required mandatory safety

²⁴ “Flooding of UK Fishing Boats” a study by Banff and Buchan College of Further Education and the Universities of Glasgow and Strathclyde, 01/2003.

training courses and it is worthy of note that, whilst Defra figures show in excess of 10,000 regular fishermen in 2006, Seafish records for “properly trained” fishermen are some 30% lower than this. This of course takes no account of alternative training routes, such as STCW. Further, concern regarding two particular areas of training was regularly raised by many of those interviewed during the course of this study; the issue of training assessment and refresher training.

Candidates attending Seafish’s 1-day safety training courses are not currently subject to end of course assessment. Attendees achieve course completion certificates for simply being there, even when their participation during the course is minimal. An assessment of the candidate at the end of a course would ensure that the learning goals had been achieved.

Concern was also raised by many of those met during the study at the “once only” requirement of these training courses with no need for refresher training, as is required in other dangerous industries such as the offshore oil and gas industry, which requires regular refresher training in Sea Survival, Fire-Fighting and First-Aid every 4 years.

3.5 FISHING SAFETY – AN INTERNATIONAL PERSPECTIVE

3.5.1 Overview

Fishing industries in different countries will obviously vary in terms of their fleet structure and methods, affected by factors such as operating areas, prevailing weather and available fish stocks. In addition, regulatory systems will also differ depending on each country’s political and cultural backgrounds, thus affecting the varying levels of enforcement and regulation.

It is difficult to compare other countries’ fishing industries and safety records with that of the UK. It is also difficult to obtain information on the effectiveness of many countries’ fishing regulations and initiatives. However, it is possible to review a selection of countries’ relevant regulations and initiatives to identify possible best practice and ideas that may have relevance to the UK. The more significant findings are summarised below.

3.5.2 Regulatory systems

In addition to the review carried out by MAIB, research conducted in Canada by Windle et al.²⁵ also provided a useful comparison of fishing regulatory regimes from around the world.

3.5.2.1 General regulations

In South Africa, fishing safety regulations are based on tonnage, whilst in Canada regulations are primarily based on tonnage and voyage category. In New Zealand, Iceland and Ireland, length is used as the division for the different levels of requirements, while in the USA, the determining factors for setting requirements for safety equipment are documentation status, number of crew, operation area, and to a lesser extent, length. The French system uses a combination of length and categorised

²⁵ Windle, M.J.S, Neis, B., Bornsetin, S. & Navarro, P. (2006), *Fishing Occupational Health and Safety: A Comparative Analysis of Regulatory Regimes*, SafetyNet, Memorial University of Newfoundland, www.safetynet.mun.ca.

areas of operation to introduce graded requirements for vessels, eg. for <12m vessels EPIRBs are not required for vessels operating in sheltered waters, but are required for trawlers up to 5 miles from sheltered waters and all vessels beyond 5 miles.

Scheduled safety inspections are mandatory for all vessels in New Zealand and South Africa, but in the USA, enforcement inspections are implemented during either random or risk-based at-sea boardings by the US Coast Guard, with a no-fault voluntary dockside boarding program used only for educating fishermen. As is the case in the UK, Iceland has an element of self-certification for smaller fishing vessels. In Ireland, the granting or renewal of fishing vessel licences is only carried out if the vessel complies with the prescribed safety requirements.

3.5.2.2 Small fishing vessel stability

Research conducted by the MCA in 2004 on behalf of FISG identified that within Europe there is a variety of different standards for small fishing vessel stability. In France and Portugal, vessels <12m were required to have a roll test, with vessels over 12m meeting a standard based on IMO Resolution A.749(18). In Spain, vessels <20GT must have a roll test, although the requirement was introduced in 2007 for all new <12m vessels to meet the stability standards of ISO 12217. There were no reported stability requirements for small fishing vessels in the Netherlands, but Ireland introduced a Code of Practice for <15m vessels in 2005 stipulating a stability standard, based on roll tests. There is no stability standard for vessels <24m in the USA, and <25GT in South Africa, whilst in Canada, stability requirements apply to certain vessels >15GT, with other vessels subject to policy guidance.

3.5.2.3 Personal Flotation Devices (PFDs)

Other countries have experienced high numbers of fatalities on fishing vessels due to drowning following overboard accidents, with various approaches being taken to counter the problem.

In 2002, South Africa introduced a requirement for the skippers of vessels <25GT to ensure that a PFD is worn by all crew members either working on deck at night, or performing work that creates a risk of being lost overboard. Whenever a vessel is launched or operated in the surf, or when operating in rough conditions, all crew must wear a PFD.

Regulations were introduced in Ireland, requiring all crew members of any fishing vessel, irrespective of size, to wear a PFD at all times when on deck on a fishing vessel, whether at sea, in harbour or coming to and from moorings. Irish skippers are required to take all reasonable steps to ensure that this requirement is complied with.

The Spanish authorities went further in 2002, with the requirement on >24m vessels for crew working on deck to not only wear a PFD, but also to carry an approved personal radio beacon to alert the vessel and shore authorities of the crew member's position should he go overboard. This requirement is to be extended to include all vessels fitted with cabins, with funding available to assist with the fitting of the man overboard alert systems.

France has a requirement to wear PFDs under certain circumstances, such as working on deck or in bad weather. In Canada, fishing safety regulations are currently under review, and consideration is currently being given to the requirement for wearing PFDs. This is likely to be risk based, with some discretion left to the owner/skipper of the vessel.

Unfortunately, limited feedback is available on the success or otherwise of these requirements. However, it is of note that since wearing of PFDs became mandatory in South Africa, fatalities due to overboard accidents have fallen from 6 in 2002 to zero in both 2006 and 2007.

3.5.3 International safety initiatives

In New Zealand, a partnership between the fishing industry and government agencies, known as FishSAFE (www.fishsafe.org.nz) was introduced in 2004 with the aim of improving safety in the commercial fishing sector. Major initiatives have focused on promoting the industry developed Health and Safety Guidelines for small vessels, with industry-facilitated training workshops and a mentoring process. This uses experienced individuals with a strong industry background to help owners/skippers to personalise the Guidelines for individual vessels and to identify and manage operational hazards.

Among the initiatives conducted in South Africa are various safety seminars conducted with industry by the South African Maritime Safety Agency. These are both at a higher level (e.g. fishing company chief executives, fishing association chairmen) and at community level (every known fishing community in South Africa has recently been visited over a 3-year period, including targeting fishermen's wives and families).

Denmark is renowned for its formal training system for fishermen, and the majority of safety courses are paid for by the Danish Government, with fishermen also able to receive a daily allowance while training. Prior to working on a vessel, fishermen must first complete a 3-week safety course, which takes place in fishing ports around the country on a training ship, whilst new entrants under 18 must enrol on a 2-year basic training programme after completing the safety course. In Spain, training courses are also delivered locally in fishing ports with the use of special training buses travelling around the country.

During the early 1990s, a mobile damage control training facility was developed in the USA to prepare fishermen for potential flooding and sinking scenarios, and is reported as having been favourably received by fishermen.

3.5.4 Conclusions

It is evident from this brief sample of international activity in the area of fishing safety that there are various strategies and initiatives underway around the world, some of which exceed those in the UK, and which are worthy of further research and comparison.



3.6 OTHER INDUSTRIAL SECTORS

3.6.1 Overview

Although commercial offshore fishing is unique in terms of the hazards faced by its workers, there are many other traditionally hazardous occupations with high accident rates, including construction, agriculture, commercial diving, and the offshore petrochemical industry.

Research conducted by Dr Stephen Roberts (**Annex H**) indicates that land-based industries have succeeded in significantly reducing their fatal accident rates over the past 30 years, while the comparable fatality rate for UK commercial fishing has remained relatively constant. This section of the report therefore seeks to examine the potential reasons for the reported improvements in these hazardous industries, and possible lessons that can be transferred.

3.6.2 Comparison

The Health and Safety Commission is responsible for almost all health and safety regulation in Great Britain, including all land-based industries and some offshore activities, such as fish farming and oil and gas installations. Working in support of the Commission are the enforcing authorities, the Health and Safety Executive (HSE) and local government.

As part of this study, MAIB met with the HSE divisions responsible for the offshore oil and gas, construction and agriculture industries to enable comparison between the HSE enforcement methods and safety initiatives with those of the MCA.

The offshore, agriculture and construction industries all share similarities with fishing, given that not only are they all affected by the weather, but they often use self-employed workers, commonly paid on a productivity basis. More significantly, all three industries used to have high fatality rates, which have, however, reduced over the years.

The offshore industry includes both global petroleum giants and smaller independent producers, as well as service industries, again ranging from multi nationals to self-employed contractors, all regulated by the HSE.

Agriculture comprises several sectors, not that dissimilar to the fishing industry, with large company-owned businesses using sizeable workforces, medium sized family units employing smaller workforces and one-man self-employed farms, with no hired labour. All typically employ individuals, remote, not only physically, but also from regulation, whilst the majority of workers are self-employed or work for small or family businesses. HSE research²⁶ has concluded that agricultural sectors have been resistant to developing a safety culture and have a '*deep seated culture of unwise risk taking*'. The sector's fatal accident rate has fluctuated over the last 10 years between 7.7 and 11.3 deaths per 100,000 workers.

Although there are a number of very large companies in the construction industry, 85% of workers are self-employed or work for small or family businesses. While safety management has generally improved in the larger companies, HSE reports that

²⁶ Nourish, R., *A vision for Agriculture: The UK strategy for progressively improving health and safety outcomes in the agricultural industry*, HSE.

increasing numbers of fatalities and serious injuries involve self-employed workers or those with the smaller companies. The fatal accident rate in the construction industry has also fluctuated over the last 10 years, with between 3 and 5.9 deaths per 100,000 workers.

Meaningful comparisons between fatal accident rates for different sectors of workers are difficult, due to their differing levels of exposure to risk, with fishermen typically at their workplace on board their vessels for many more hours per year than a shore-based worker. However, the figures above are significantly lower than the fishing industry's fatal accident rate of around 126 deaths per 100,000 fishermen each year between 1992 and 2006; it is of note how much effort is being put into reducing fatalities in industries that already have dramatically lower fatal accident rates than in fishing.

3.6.3 HSE approach to improvement

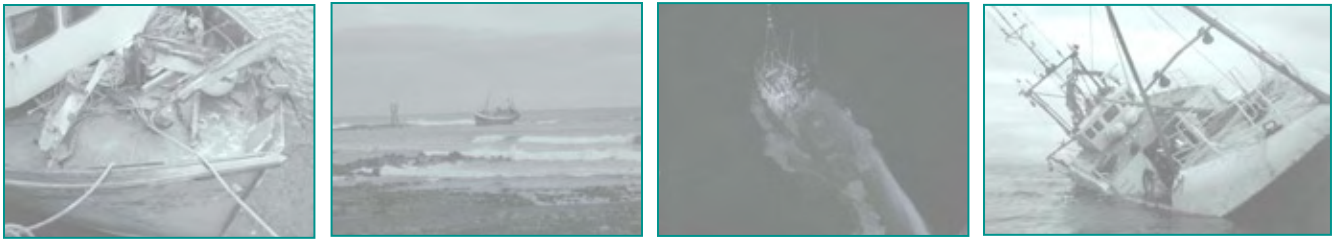
Following the tragic consequences of the Piper Alpha disaster in 1988, the offshore industry came under the regulatory control of the HSE Offshore Safety Division. This took a firm hand with the industry, and has continued to do so, with strict enforcement against operator infringements through prohibition, improvement notices and, in extreme cases, installation shut down.

Offshore operators recognise that any such interference with productivity can result in substantial loss of revenue, and therefore demand strict health and safety compliance from their workers and contractors. Safety improvement targets are often set by management, while the industry's safety culture encourages "whistle blowing" among colleagues. Interestingly, a substantial proportion of the UK's offshore oil and gas workforce is made up of ex-fishermen who have left fishing. This required them to adopt a totally different safety culture to work in the petrochemical industry.

In 2002-2003, an HSE performance review of working methods resulted in a change to the traditional approach to safety management in agriculture and construction, with a move towards working in partnership with industry and workers by improving communications and providing help and guidance.

Key to this was the effective engagement with the self-employed and small business employees. For example, regional safety awareness presentations have been conducted for invited groups of workers, with the incentive not only of a free lunch, but also more significantly, the undertaking that HSE will not make a proactive inspection of their premises during the following year. These 'working lunches' have been effective in communicating key safety messages, and routinely attract more attendees than are invited. Another example is the facilitation of open discussion between industry and equipment manufacturers, by hosting workshops to develop solutions to particular recurring problems, such as the co-operative development of mechanical handling equipment for heavy kerb stones in highways construction.

Information technology has also been used to provide aids to farmers and to help reduce regulatory burdens. For example, an interactive risk assessment tool was developed for the agricultural sector in 2002. A highly successful pilot scheme attracted 1800 users, and positive feedback ensured that the scheme is now widely available. The system is reported as being simple to use, with user prompts to consider a



wider range of risks than in traditional risk assessment forms, as well as providing benchmarks of acceptable methods to control risks. Where users do not meet these benchmarks, an action plan is automatically compiled and relevant HSE guidance leaflets ordered. Completed assessments can also be e-mailed to HSE for comment and further assistance.

In common with the fishing industry, agriculture and construction tend to suffer from skilled labour shortages. The emphasis remains on ensuring competency through appropriate technical and safety training, and the construction industry has introduced a system of identity cards for accredited workers, with the agricultural industry considering similar schemes.

HSE acknowledges that safety management has yet to be universally accepted as part of good business management in either the agriculture or construction industries, and has used the economic supply chain to try to influence smaller businesses. Compliance and incentives have both been used, such as requirements to complete a safety course in order to tender for certain contracts, with the client paying the winning contractor's training costs.

Although robust intervention via formal inspections and enforcement action continues where necessary, HSE has exploited its effect in new ways. A small number of proactive prosecutions are now made, where no accident has occurred, but where working practices have fallen grossly short of basic public expectations; these have been found to have a positive effect on the temptation to cut corners. Publicised inspection campaigns are also conducted, with one 'blitz' on 223 construction sites in London resulting in the issue of 110 Prohibition notices, 11 Improvement notices and 4 site closures.

Pressure remains to reduce fatal accidents and serious injuries, not only from the moral perspective of providing a safe working environment but also because of the financial cost to business and society. HSE invests considerably in research, firstly to identify underlying problems and develop technical solutions and, critically, to evaluate the effectiveness of safety initiatives. Systems have also been developed to measure and evaluate the effectiveness of each programme, with the widespread sharing of best practice and benchmarking providing practical support to workers, by showing that there are better ways to tackle high risk jobs.

3.6.4 Conclusions

HSE has been successful in reducing accident rates within the agriculture, offshore and construction industries using a combination of enforcement and incentive. In view of the many similarities between these and the fishing industry there may well be benefits to be gained by examining the approach taken by HSE towards safety management within these industries.

SECTION 4 - DISCUSSION

4.1 IS FISHING GETTING SAFER?

The statistical analysis of MAIB accident data conducted for this study has revealed that although reported rates of some types of accidents have improved over the period between 1992 and 2006, in other respects, notably the fatality rate, there has been no significant improvement.

MAIB's objective, in common with all associated with the industry, is to prevent future accidents, in particular serious injury and loss of life. While it might not be practical to expect accident rates ever to be reduced to zero, it is clear that the rates of accidents in the fishing industry are still unacceptably high, particularly when compared with other hazardous occupations.

4.2 REVIEW OF MAIB ACCIDENT DATA ANALYSIS

Detailed analysis of MAIB accident data collected for the period 1992 to 2006 reveals a varied picture on safety, particularly given the effects of the reductions in fleet size and personnel numbers over the 15-year period.

Reported accidents involving UK fishing vessels have fallen, but the continued reduction in the size of the fleet means the accident rate has been increasing since 2002. The numbers and rate of vessels lost have both generally fluctuated, although the latter has shown a slight upward trend. Reported injuries have shown a marked reduction, but the situation for fatalities is not so positive. Annual fatality figures have generally reduced over the 15 years, but the rate of fatalities as a measure of the number of vessels and fishermen at risk have both increased since 2002.

Although all accidents are obviously undesirable, it is the high relative level of fatalities identified during this study that is of greatest concern to MAIB. Between 1992 and 2006, 256 fishermen died as a result of accidents on UK fishing vessels. The annual fatality figures, averaging 11 deaths in recent years, may sound low, but this still represents an unacceptably high rate of fatalities relative to the size of the workforce. Although direct comparisons with other industries can sometimes be misleading, the average rate of 126 deaths per 100,000 fishermen each year is many times higher than that for other areas within the UK workforce.

Perhaps the most surprising statistic is the consistently high fatality rate due to overboard accidents, which represent nearly a third of all fatalities.

65 of these fatalities happened whilst the vessel was "at sea", and only one of the deceased was reported to be wearing a personal flotation device (PFD). Nearly a third occurred on potting vessels, generally as crew became entangled in ropes during shooting, and were dragged overboard, while over a quarter occurred on single-handed vessels. Even more disappointing are the 18 overboard deaths that occurred in harbours, mostly as crew returned to their vessels, typically late at night, with alcohol and inadequate vessel access arrangements involved.

The other, perhaps less surprising, major cause of fatalities was due to a combination of flooding/foundering, capsizing/listing or missing vessel accidents, resulting in nearly 40% of the 256 fatalities and 65% of all vessel losses. Almost two thirds of these deaths occurred on <12m vessels, with poor stability and low freeboard factors in many such cases. More than half of the fishermen killed were reported to be not wearing PFDs, and it is likely that neither were many of the remainder.

Emergency positioning indicating radio beacons (EPIRB) are not mandatory on <15m vessels, while liferafts are not compulsory on <10m vessels. Evidence shows that some lives were saved due to effective liferafts and EPIRBs being voluntarily carried by smaller vessels, and it is likely that further lives would have been saved with the carriage of these items.

The other significant cause of fatalities was accidents to persons (excluding overboard), with 13% of the total deaths. Encouragingly, the rate of these fatalities has steadily fallen over the 15 years.

4.3 WHAT CAN BE DONE TO MAKE FISHING SAFER?

4.3.1 General influences on fishing safety

The influences on safety within the fishing industry are numerous, and are almost constantly changing and evolving. The period between 1992 and 2006 has experienced stock depletion, environmental issues, varying degrees of regulatory impact, and intensified commercial pressures, typified by the marked rise in crude oil prices since 2002. Not only have these factors influenced social and economic developments within the industry, but also working practices, leading, for example, to “non-stop” working, extended fishing trips, the use of additional gear and reduced manning. Such changes have themselves contributed to increased exposure to risk, and created additional challenges regarding training, manning, and work practices for certain sectors, which in turn will undoubtedly have an effect on safety and accident rates.

There can be no doubt that economic pressures on the industry and, in particular, vessel operators, will affect work attitudes and activities and, ultimately, safety. When times become difficult, skippers will tend to drive themselves, their vessels and crews harder to remain viable, thus leading to higher exposure to risk. Times of hardship may also unfortunately lead to reduced expenditure on preventative maintenance, or on non-mandatory safety equipment, as well as reductions in crew size, with experienced fishermen with transferable skills often leaving the industry altogether.

In recent years, the fishing industry has, like many areas of UK society, witnessed a dramatic influx of lower paid migrant workers, which has helped to alleviate this manpower shortage problem. There seems to have been a mixed response to this transition, with concerns raised over the potential for communication problems, particularly in emergency situations, while other industry sources have welcomed the introduction of, what are, often highly experienced and skilled workers. From an MAIB perspective, there is little statistical evidence at this time to establish any effect on accident rates from the increased usage of foreign workers on UK fishing vessels.

Although logic suggests that fisheries policies, whether they be “days at sea” or quotas, must have some effect on fishing safety, there is little evidence from accident data to show that this is the case. It may be argued that the present quota-based system could persuade fishermen to spend longer periods at sea, thus increasing their exposure to risks and the probability of fatigue-related accidents. Likewise, the current 10m quota breakpoint has contributed to the concept of <10m “rule beater” vessels, designed to operate in a similar way to much larger vessels, which is an important area of concern.

One positive recent development has been the approval by the EU of a Scottish Government proposal to count time spent at sea by fishing vessels in hours rather than days. It is believed that this will be beneficial to safety by, for example, removing the previous incentive of working longer days. Such sensible adjustments to the conservation policy are to be welcomed, and fisheries policy makers should be encouraged to work closely with industry safety representatives wherever possible to ensure pragmatic safety concerns can be integrated in future conservation policy measures.

4.3.2 Risk assessment

Most fishermen are probably quite adept at carrying out dynamic risk assessments as they go about their everyday work activities. However, problems occur when attempts are made to transfer the process onto paper, although the development of a pro-forma by Seafish has helped to simplify this process.

It is almost impossible to review and update a risk assessment unless it is written down, but there is currently no formal requirement for this to be done.

Recent initiatives by both Seafish and the MCA, offering practical onboard assistance in achieving this, have generally been well received.

MAIB investigations into accidents involving routine work practices have often identified issues of concern regarding the vessels’ risk assessments. However, evidence suggests that continued acceptance of, and improvements in, risk assessment have possibly contributed to the reduction in working practice accidents that tend to result in injuries and fatalities.

There is, however, no requirement in the Merchant Shipping & Fishing Vessels (Health and Safety at Work) Regulations 1997 for the assessment of risks that may endanger the vessel itself, such as environmental hazards or the condition of the vessel, including its stability. Several MAIB recommendations have been made in this area to try to bring these hazards under the umbrella of risk assessments. Although MAIB acknowledges that this is a potentially complex issue, this area should be revisited to help the continued development of risk assessment as a practical working tool for the industry.



4.3.3 Codes of Practice

Given the significant disparity between the codes of practice governing small fishing vessels and small workboats, it would appear logical to work towards progressively aligning the requirements for fishing vessels with those for comparably sized workboats. Not only would this offer a solution to the fishing vessel stability issue, but would also introduce the concept of categorised operational areas, that could require the carriage of safety equipment appropriate to the vessels' activities, as is the case in France.

MAIB is well aware that previous attempts to introduce such a robust code of practice faced strong opposition from some. However, it is noted that Ireland has recently introduced a similar code for <15m vessels, and it would seem that the UK fishing industry is again lagging behind and needs to progress.

4.3.4 Survey and inspection

Integral to safety in the UK's fishing industry is of course the regulation and enforcement of safety-related legislation, conducted by the MCA.

Various recent MAIB investigations, particularly of smaller fishing vessel accidents resulting in loss of life, have identified problems with the MCA's survey and inspection regime. A number of MAIB recommendations have been made to the MCA regarding survey and inspection procedures, while one MAIB investigation was the trigger for a major MCA internal review of this area.

As part of this safety study, the three MCA regions were all visited, and all seen to be successfully conducting differing survey policies and initiatives to improve safety. These include basing surveyors on the quayside, and the use of a local fishing vessel safety officer to providing practical onboard assistance with risk assessments. Clearly each region is faced with a different fleet structure and its own unique geographical situation, so not all best practice may easily transfer. Although the MCA holds regular Headquarters meetings and annual fishing vessel surveyor seminars, which have been successfully used to discuss and share best practice between the regions, it is believed that there may still be some further scope for enhanced transfer of best practice between the regions.

MAIB experience has shown that safety and emergency drills have seldom been carried out on fishing boats and were rarely witnessed by the MCA during surveys, with the result that fishermen often learn for the first time during an actual emergency. Common sense suggests that drills can only be a good thing if conducted seriously, and the decision in April 2008 to commence witnessing drills as part of MCA survey and inspection national policy is welcomed.

4.3.5 Stability

Part of the MCA's remit is the development of regulations for fishing vessels, and broadly speaking, the smaller the vessel, the less stringent the requirements are that need to be complied with. This is understandable, given the relative complexity of vessels compared to their size. However, smaller vessels account for a high number of serious accidents and fatalities.

MAIB accident data and various recent accident investigations have continually highlighted areas of concern regarding the safe operation of <15m vessels, particularly from the perspective of operational stability and freeboard. Various recommendations have been made to the MCA on these matters, which have led to the introduction of an acclaimed voluntary stability awareness course, and two key research projects relating to small vessel stability. The latter were completed 2 years ago, resulting in a number of proposals for a simplified method of identifying a vessel's stability condition. Unfortunately, to date, there has been little progress in translating these findings into a workable solution to help combat this ongoing problem.

A further quandary relates to the possible introduction of stability criteria for smaller fishing vessels. Currently, <15m vessels are not required to meet any stability standard, and MAIB has previously recommended that this be addressed. Although it could introduce a substantial additional burden on both operators and the MCA, this study has identified that other countries already have stability requirements for smaller fishing vessels.

4.3.6 Safe working environment

From an enforcement perspective, the MCA has been seen in a number of high profile cases not to have proceeded against significant breaches of health and safety legislation. One of the principal reasons for this is that "share fishermen" are not considered as employees for the purposes of the Merchant Shipping and Fishing Vessels (Health and Safety at Work) Regulations 1997, and are therefore exempted from its provisions. However, these regulations also appear to apply to "other persons" on board vessels, which surely must include a fisherman, whether he has an employment contract or not. This anomaly appears to be clouded in some confusion, and is in need of urgent clarification to ensure that the safety of all fishermen, in what is the most hazardous of occupations, is protected.

4.3.7 Lifesaving appliances

Other practical shortcomings have been identified with the regulations for small fishing vessels, and reiterated in this present study. EPIRBs and liferafts are, for example, currently not required on smaller vessels, but would undoubtedly save lives if they were. The argument often given is that it is impractical to fit safety equipment such as this on a small boat, yet similarly sized commercial workboats are required to do so, despite, in many cases, neither operating as far out to sea nor in as arduous weather conditions as their fishing counterparts.

One of the most striking findings of this study has been the continuing high rate of fatalities resulting from crew members going over the side and drowning, particularly on smaller potting and single-handed vessels, where the fatality rates are much higher than for trawling, dredging or seining.

Given the nature of fishing, with gear being deployed and recovered, often in poor weather conditions, the risk of going overboard will be great, and the first line of defence must be to try to avoid going over the side. Effective risk assessment is again a key factor here, but the particular problem identified with potters suggests that further research into improving the technology and methods of static gear fishing to reduce the risks of crewmen being dragged overboard would be beneficial.

Once a fisherman is in the water, there are three main aids to his hopeful survival, namely: thermal protection; flotation aids; and rapid location and recovery. For the first of these, the majority of fishermen, by necessity, wear sensible clothing while working, and it is not considered practical to expect fishermen to work on deck in immersion suits in all circumstances.

The latter two areas, despite recent encouraging signs, are still however in need of improvement. Although PFDs are readily available on most vessels, many fishermen are still reluctant to wear them, despite recent positive research conducted by Seafish and the RNLI. Part of this unwillingness may result from the culture within the industry, but this is not insurmountable, as changes to attitude in the offshore oil and gas industry bear testament.

The only rational argument for not wearing a PFD is if it has the potential to introduce a hindrance or hazard as part of the working process. If this is indeed the case, it should not be beyond the capability of PFD manufacturers to further develop items to reduce such risks.

Technology, in the form of personal locator devices, is now readily available to provide fishermen with a means of being located, and, like PFDs, their use should be encouraged, especially for fishermen working single-handedly.

One solution is for owners or skippers to impose the wearing of such PPE on board their vessels, but some skippers expressed the opinion during this study that the ability to successfully do this is again linked to revenues. With higher wages on offer, skippers can more robustly insist on the use of PPE.

In 2000, MAIB made a recommendation to FISG to consider the compulsory wearing of lifejackets for fishermen when working on deck, but this failed to result in any firm action. Since then, a number of countries have introduced varying requirements for the compulsory wearing of PFDs, combined in one case, with the mandated use of personal locator devices. Feedback is unfortunately limited on the success of these schemes, although the results from South Africa appear compelling. Given: that 8 years have passed since the previous recommendation; that positive measures have been adopted in other countries regarding the use of PFDs; and the clear results of this study- it is time to reconsider the issue in relation to the UK fishing industry.

4.3.8 Safety culture

One term that is frequently quoted in relation to the industry is “safety culture”, albeit unfortunately often in a negative context. In recent years MAIB has, however, started to sense an improving “safety culture” developing in the industry, particularly with some of the larger vessel operators, and perhaps borne out by some of the small improvements in accident trends reported in this study. However, there still appears to be a deep rooted fatalistic attitude to safety among many fishermen, leading to a “blinkered” view of acceptable risk taking, and until the whole industry can itself embrace this need for change, tragic accidents will continue to occur.

The analysis of MAIB accident data conducted as part of this study has highlighted that there are a small number of vessel owners and skippers whose vessels are regularly involved in accidents. Some might attribute this to bad luck, but the unpalatable reality is that poor local safety practices and safety culture result in repeated incidents,

often culminating in tragedy. It would appear that many of this small number are not responding to gentle persuasion and, in such extreme cases, it may be that the regulating authorities need to take firm action. It should however be reiterated that many operators have quite the opposite attitude, with skippers setting good examples by, for example, wearing PPE when they go on deck, and thus improving crew attitudes towards their own safety.

Part of this safety study reviewed the Health & Safety Executive's (HSE) approach to regulating and enforcing safety in a number of other hazardous industries, and there appears to have been interesting developments in safety best practice for some - otherwise hazardous - land-based industries. Although MAIB is not in a position to consider the practicalities of whether such initiatives could easily be transferred to the fishing industry, there would appear to be considerable merit in conducting formal research into the possibility of adapting such best practice to the fishing industry.

4.3.9 Training

The changing demographic of the fishing industry, with smaller crews, and experienced crew members moving away from fishing, has clearly left a void in the traditional onboard training and education of new recruits. This gap has in some ways been filled with shore-based training, but everyone acknowledges that this will never be a substitute for the wealth of experience that can be handed down from onboard crew members.

The current safety training formally delivered by Seafish affiliated GTAs has helped save many lives, and is generally well received. It is unfortunate, however, that many fishermen have failed to complete the mandatory safety training required by regulation. Further, the courses are "attendance only", with no assessment element, and it is possible that candidates, particularly when English is not their first language, may receive certification without having fully understood what has been taught. There is also no requirement for refresher training in vital safety issues, unlike other dangerous professions and industries, and many industry sources indicated that both assessed and refresher training courses would be highly beneficial.

In some areas visited by MAIB as part of this study, it was suggested that training was not flexible enough, with a perception that courses were being run remotely from fishing areas. In Denmark, a training ship travels round fishing ports as a base for delivering training, while Spain has a similar arrangement, albeit using buses. Perhaps more significantly, Denmark not only funds many safety training courses, but also provides daily allowances for fishermen who attend these courses, which is not the case in the UK.

A brief review of international training has identified that other countries appear to be ahead of the UK. A review of projects and initiatives undertaken within other countries may well identify ideas that could be beneficial to the UK fishing industry.

4.3.10 International

Perhaps one of the most interesting elements of this study has been the review of international best practice in fishing safety. It is evident that the problems of fishing safety are not unique to the UK, and countries around the world are adopting different approaches to reduce accidents. This is worthy of more detailed review so that best practice experiences from abroad can be assessed and adopted, if appropriate.

4.3.11 Grant funding

With the increased commercial pressures of recent years, an invaluable source of financial assistance to the industry has come from the EU. Until recently, FIGG grant aid has helped fund vessel improvements, safety training, and non-mandatory safety equipment, all of which have helped save lives. Funding is disbursed via the four UK fishery administrations which all apply different criteria for how the funds may be used. For the sake of clarity and equity it would appear to make sense for these authorities to coordinate their activities.

The most recent round of FIGG funding has now expired and been replaced by EFF funding. It is understood that this latest round of funding is lower than its predecessor and unlikely to be available for the continued support of mandatory safety training. As a result, the MCA and Seafish put forward a proposal to the DfT to provide “matched funding” for continued safety training. This has been successful and funds have now been allocated for non-mandatory training.

The system of funding only non-mandatory safety equipment has also led to the perverse situation whereby in some respects it would be advantageous for key items of safety equipment, such as EPIRBs, to remain non-mandatory to allow them to be potentially financed as part of funding initiatives. The grave danger here is that the people who might need such equipment most, may well be the ones who miss out on the funding, or even be unaware that they may apply. Other European countries, such as Spain, have made funding available to assist with the introduction of new mandatory equipment; it is proposed that the current funding system within the UK for safety items should be reviewed, with consideration given to prioritising the funding of mandatory safety training and equipment.

4.3.12 Marine Insurance

Some mutual insurance companies have been highly proactive in funding initiatives to improve safety on their clients’ vessels, as well as often demanding additional safety measures in excess of what is required by statute. The insurance industry has an important role to play in helping improve safety, and it is suggested that by working together to share best practice, they can continue to contribute to a safer industry.



SECTION 5 - CONCLUSIONS

The following conclusions are listed under headings reflecting areas of specific interest or where action is required to improve the safety of UK fishing vessels:

5.1 STATISTICS

- Fishing vessel accidents have fallen over the period, but the continually reducing UK fleet size means the accident rate has increased since 2002.
- The numbers of vessels being lost and the rate of loss have both generally fluctuated, although the latter has shown a slight upward trend. The majority of vessels are lost due to flooding/foundering, mostly involving <12m vessels.
- There has been a general decline in the number of injuries, with the majority occurring on larger vessels, despite representing a small proportion of the fleet.
- 256 fishermen died as a result of UK fishing vessel accidents between 1992 and 2006, equivalent to an annual average rate of 126 deaths per 100,000 fishermen, which is many times higher than for the UK general workforce, as well as other hazardous industry sectors, such as agriculture and construction.
- Nearly a third of all fatalities resulted from crew going overboard, and the rate of these fatalities stayed fairly constant over the period, whilst the equivalent personnel accident (excluding overboard) fatality rate steadily fell.
- 18 overboard deaths occurred in harbour, mostly as crew returned to their vessels late at night.
- Nearly a third of the other 65 overboard fatalities occurred on potting vessels, generally as crew became entangled in ropes and were dragged overboard. Over a quarter occurred on single-handed vessels, whilst only one of the deceased was reported to be wearing a PFD.
- Nearly 40% of all fatalities and 65% of vessel losses were attributed to flooding/foundering, capsizing/listing or vessels going missing. Almost two thirds of these deaths occurred on <12m vessels, with poor stability and low freeboard often an issue. More than half of the fishermen killed in these accidents were reported as not wearing PFDs, whilst it is likely that the carriage of EPIRBs and liferafts would have saved many lives.
- The other significant cause of fatalities was due to personnel accidents (excluding overboard), with 13% of the total deaths, but since 2001 there has more encouragingly been a steady downward trend in these fatalities.
- Many injuries sustained by fishermen are extremely serious and potentially life-threatening. MAIB investigations conducted on two such accidents in 2006 identified issues of concern regarding the risk assessments for these vessels.
- Commercial pressures on the fishing industry have had an increasing effect on the industry.
- There is little statistical evidence to establish any effect on accident rates from the increased usage of foreign workers on UK fishing vessels.

5.2 RISK ASSESSMENT

- Despite fishermen being adept at carrying out dynamic risk assessment, many have struggled with recording the results on paper, which is the most effective way to enable regular review.
- Recent initiatives by both Seafish and the MCA have offered practical onboard assistance in compiling suitable risk assessments. Although these initiatives have shown the benefits of recording risk assessments, there is no requirement for these to be written.
- Evidence suggests that continued improvements in risk assessment have contributed to the reduction in the typical working practice accidents that tend to result in injuries and fatalities.
- There is no requirement in the Merchant Shipping and Fishing Vessels (Health and Safety at Work) Regulations 1997 for the assessment of risks that may endanger the vessel itself.

5.3 CODES OF PRACTICE

- Some of the requirements in the code of practice for small commercial workboats are in excess of those in the equivalent code for small fishing vessels, despite the latter often operating in more extreme conditions. There would appear to be a compelling need for the requirements of these Codes to be more aligned to ensure the highest safety standards are applicable for all vessels.

5.4 SURVEY AND INSPECTION

- Recent MAIB investigations of accidents leading to loss of vessels and lives, have identified problems with the MCA's survey and inspection regime, but these issues are being addressed.
- The three MCA regions have all successfully conducted different initiatives to improve safety. Best practice is shared at annual seminars, but until recently not necessarily transferred, between the regions. (See 6.2)
- Drills are seldom carried out on fishing boats and historically have been rarely witnessed by the MCA during surveys. In April 2008 it was agreed that this would be commenced as a matter of national policy.

5.5 STABILITY

- Recent MCA research projects have resulted in proposals for a simplified method of identifying a vessel's stability condition, but these are yet to be implemented.
- There is currently no statutory stability requirement for <15m vessels in the UK, despite other countries already having a stability standard for smaller fishing vessels.

5.6 SAFE WORKING ENVIRONMENT

- Although the Merchant Shipping & Fishing Vessels (Health and Safety at Work) Regulations 1997, appears to exempt share fishermen from its provisions, they do apply to "other persons" on board vessels. This has inhibited the enforcement of these regulations in a number of serious accidents and the matter requires clarification.

5.7 LIFE SAVING APPLIANCES

- EPIRBs and liferafts are currently not mandatory on smaller vessels, but would undoubtedly save lives if they were.
- There are disproportionately high numbers of overboard accidents resulting from smaller static gear fishing vessels.
- PFDs are often not worn by fishermen on deck possibly due to the perceived potential hazards introduced by wearing them. Recent practical trials conducted by Seafish and the RNLi have, however, identified PFDs suitable for most fishing activities.
- Technology, in the form of personal locator devices, is now readily available to provide fishermen with a means of being located, and, like PFDs, their use should be encouraged, especially for fishermen working single-handedly.
- A number of countries have introduced varying requirements for the compulsory wearing of PFDs and personal locator devices.

5.8 SAFETY CULTURE

- A growing sense of “safety culture” has been developing in the industry, particularly with some of the larger vessel operators, but MAIB accident data indicates that there are a small number of operators whose vessels are regularly involved in accidents.
- HSE has introduced various interesting developments in regulating and enforcing safety in various other hazardous industries, which have over the years been able to reduce previously high accident rates and promote a stronger safety culture within the industries’ workforce. Similar measures should be considered for the fishing industry.
- Stock conservation policies can influence skippers’ decision making.

5.9 TRAINING

- MAIB sees many fishermen who have failed to complete the mandatory safety training required by regulation.
- The current safety training formally delivered by Seafish affiliated GTAs has helped save many lives, and is generally well received. However, concern has been raised at the lack of practical assessment and refresher courses. The effectiveness of mandatory courses needs to be practically assessed and a regime of refresher courses implemented.
- Nearly a third of overboard fatalities recorded during the period covered by this study occurred on potting vessels, generally as crew became entangled in ropes and were dragged overboard. Over a quarter occurred on single-handed vessels, while only one of the deceased was reported to be wearing a PFD. Training and/or education needs to be focused on this sector of the industry

5.10 INTERNATIONAL

- A brief review of international training has identified that some countries appear to be ahead of the UK. Improvements in safety could be realised if the best practice experiences of other countries are researched and applied to the UK fishing industry.

5.11 GRANT FUNDING

- Invaluable EU financial assistance to the industry has helped save lives, but this funding generally covers only non-mandatory safety items. Consideration should be given to extending the schemes to pay for mandatory safety equipment.
- Different criteria are applied for the distribution of EU grant funding by the four regional fishery authorities.



SECTION 6 - ACTION TAKEN

6.1 DEPARTMENT FOR TRANSPORT AND SEAFISH

Shortly prior to the publication of this report, the Department for Transport and Seafish launched a jointly funded training programme to provide a range of basic training to those fishermen operating in vessels under 16.5m in length or less than 750kW propulsive power. This package provides training in navigation watchkeeping, engine watchkeeping, stability awareness and radio operation, and will also provide some additional subsidy for those seeking to obtain Class 2 (Fishing) Deck and Engineering Certificates of Competency.

6.2 THE MARITIME AND COASTGUARD AGENCY

The Maritime and Coastguard Agency has recognised the importance of consistency in operations across the regions and has, as part of a recent restructuring, introduced three posts of “Technical Performance Managers” whose responsibilities include ensuring consistency of MCA's procedures and standards throughout the UK.

The Maritime and Coastguard Agency intends:

1. To consult on a new statutory instrument to underpin: a new code of practice for the construction and safe operation of fishing vessels of 24 metres registered length and over; a revision of the 15-24 metre code; the reintroduction of stability requirements for 12-15 metre fishing vessels; the mandatory reporting of fishing vessel modifications; the introduction of liferaft requirements for 7-15 metre vessels and a certification requirement for small fishing vessels.
2. To extend nationally the practice of utilising specialised teams of inspectors to inspect fishing vessels of 9 metres and over, currently under trial.

SECTION 7 - RECOMMENDATIONS

The **Maritime and Coastguard Agency** is recommended to:

- 2008/173** In developing its plan to address the unacceptably high fatality rate in the fishing industry, identified in its study of statistics for the years 1996 to 2005, in addition to delivering the actions outlined at 6.2, the MCA are recommended to consider the findings of this safety study, and in particular to:
- Clarify the requirement for risk assessments to include risks which imperil the vessel such as: environmental hazards; condition of the vessel; stability etc.
 - Work towards progressively aligning the requirements of the Small Fishing Vessel Code, with the higher safety standards applicable under the Workboat Code.
 - Clarify the requirements of The Merchant Shipping and Fishing Vessels (Health and Safety at Work) Regulations 1997 to ensure that they apply in respect of all fishermen on board fishing vessels, irrespective of their contractual status.
 - Ensure that the current mandatory training requirements for fishermen are strictly applied.
 - Introduce a requirement for under 15m vessels to carry EPIRBs.
 - Review international safety initiatives and transfer best practice to the UK fishing industry with particular reference to the use of PFDs and Personal Locator Beacons.
 - Conduct research on the apparent improvement in safety in other hazardous industry sectors, such as agriculture, construction and offshore, with the objective of identifying and transferring best safety practice from those industries to the fishing industry.

The **Department for Transport** and the **Maritime and Coastguard Agency** are recommended to:

- 2008/174** Agree the coherent resourced plan for reducing the fatality rate in the fishing industry (see Recommendation 2008/173).

The **DfT/ MCA/ Defra/ DARDNI/ Scottish Government Directorate for Marine** are recommended to:

- 2008/175** Work closely together and with fishing industry safety representatives, to ensure pragmatic safety concerns are integrated into conservation policy measures.
- 2008/176** Review the provision and allocation of grant funding for both mandatory and non-mandatory safety equipment and training, to ensure that the funding achieves maximum impact on safety.

The **Maritime and Coastguard Agency** and **Seafish** are recommended to:

2008/177 Review the current requirements for safety training with particular reference to training assessment and refresher training.

Seafish is recommended to:

2008/178 Conduct research into the present methods of potting with a view to identifying improvements in technology and procedures to reduce the current high incidence of accidents and fatalities within this sector.

**Marine Accident Investigation Branch
November 2008**

Safety recommendations shall in no case create a presumption of blame or liability

Overview of Safety Study Statistical Analysis

A.1 OVERVIEW OF SAFETY STUDY STATISTICAL ANALYSIS

A.1.1 The MAIB Database

In an average year, the MAIB receives around 1700 incident reports involving merchant and fishing vessels, of which about a third are for UK-registered fishing vessels. Details of all reported incidents are entered onto the MAIB's accident database, Marine Incident Database System (MIDS). MIDS uses a combination of menus and text summaries to capture the data relevant to each incident, allowing overall trends to be identified.

The data used in this study may differ in some minor respects from statistics reproduced in other MAIB publications. As new information becomes available for an accident, historical data in MIDS is reviewed and updated; some data recorded in MIDS has likewise been revisited and revised as part of the current study.

MIDS evolved into its current form in 2001, and more data is now recorded for incidents than was the case in the early 1990s. One of the key values which has, however, been recorded throughout is the incident type, representing the overall categorisation of an accident, e.g. collision, fire, accident to person¹, etc. For the purposes of this study, an additional incident type, "person overboard", has been created to record accidents to person where a fisherman went overboard, either at sea or in harbour. It should also be noted that subtly different rationales regarding the recording of initial or main incident types have been used by MAIB at various stages during the 15-year period covered by this study. However these differences should not affect the validity of the study's findings.

A.1.2 Analysis parameters

Database records were analysed for the period 1992-2006. Although MAIB has been recording accident data since its inception in 1989, 1992 was the first full year when detailed text summaries of accidents were recorded on MIDS, and so, that year was selected as the starting point for the statistical analysis. 2006 was the last complete year of data available whilst the study was being conducted.

The analysis of data has been focussed to highlight key areas which appear to have the biggest impact on the industry's accident record. As such, the data shown in this report represents only a small fraction of the analysis undertaken during this study - many other areas and factors have been explored, but are not discussed in this report.

Vessel length is the principal means by which the UK's fishing fleet is sub-divided for regulatory purposes. The main breakpoints are registered lengths of 12m and 24m, with an intermediate break at 15m length overall (LOA). Accordingly, four length categories are referred to throughout this analysis:

① < 12m reg. length;	② 12m reg. length \geq Length < 15m LOA; (12 to 15m)
③ 15m LOA \geq Length < 24m reg. length; (15 to 24m)	④ > 24m reg. length

¹ "Accident to person" is the incident type attributed to fatalities and injuries resulting from a personnel accident rather than an accident to the vessel itself.

Finally, although the MAIB's remit includes investigating accidents to foreign-flagged vessels in UK territorial waters, such as the capsizing of the Belgian beam trawler *Noordster* in December 2005, with three fatalities², the study restricts itself to considering the data held on accidents involving UK-registered fishing vessels anywhere in the world.

A.1.3 Under-reporting of incidents

It is impossible to gauge to what extent marine accidents are under reported to the MAIB.

The MAIB's previous Safety Study on the Fishing industry, which covered the period from 1992-2000 showed a fairly consistent level of initial reporting from the coastguard of between 87 and 92% of all incidents reported. Since 2000, this has increased to the coastguard being the major source of 94% of all fishing vessel incidents reported to the MAIB. In the period 1992-2006 the percentage of all incidents initially reported by fishing vessel owners/skippers has fallen from around 8% to 3.5%. It is possible that this shift is coincidental, with MAIB's immediate follow-up actions following a coastguard report obviating the need for the vessel to file a report.

It is concluded that, given the consistently high percentage of incident reports received via the coastguard, combined with the fact that all serious accidents and casualties are likely to have come to the attention of the coastguard, the effects of under-reporting can be discounted for this particular study.

² Report on the investigation of the capsizing of the fishing vessel *Noordster* Z122 with the loss of three crew 11.5nm south of Beachy Head, 13 December 2005, MAIB Report No 30/2006, November 2006.

UK Fishing Industry Vessel and Crew Data (1992-2006)

B.1 UK FISHING INDUSTRY VESSEL AND CREW DATA (1992-2006)

B.1.1 UK Fishing Industry population data

The UK fishing fleet has declined in numbers over recent years. It would therefore be expected that the number of accidents would also have fallen. In order to assess any possible developing trend, the accident rate for each year of the study was calculated using information obtained from the Registry of Shipping and Seamen (RSS), and Marine Fisheries Agency (MFA), part of the Department for Environment, Food and Rural Affairs (Defra), as detailed at **Table B1**.

Fleet data is plotted at **Figure B1**, along with the numbers of regular fishermen for the whole fleet. This confirms the steady decline in the fleet size and number of fishermen since 1992, and the high proportion of vessels in the <12m fleet. The steep reduction in the fleet between 1993 and 1996 is likely to be due to a number of factors, including licence amalgamation and vessel decommissioning schemes underway at this time.

Figure B1: Number of UK Registered Fishing Vessels and Regular Fishermen

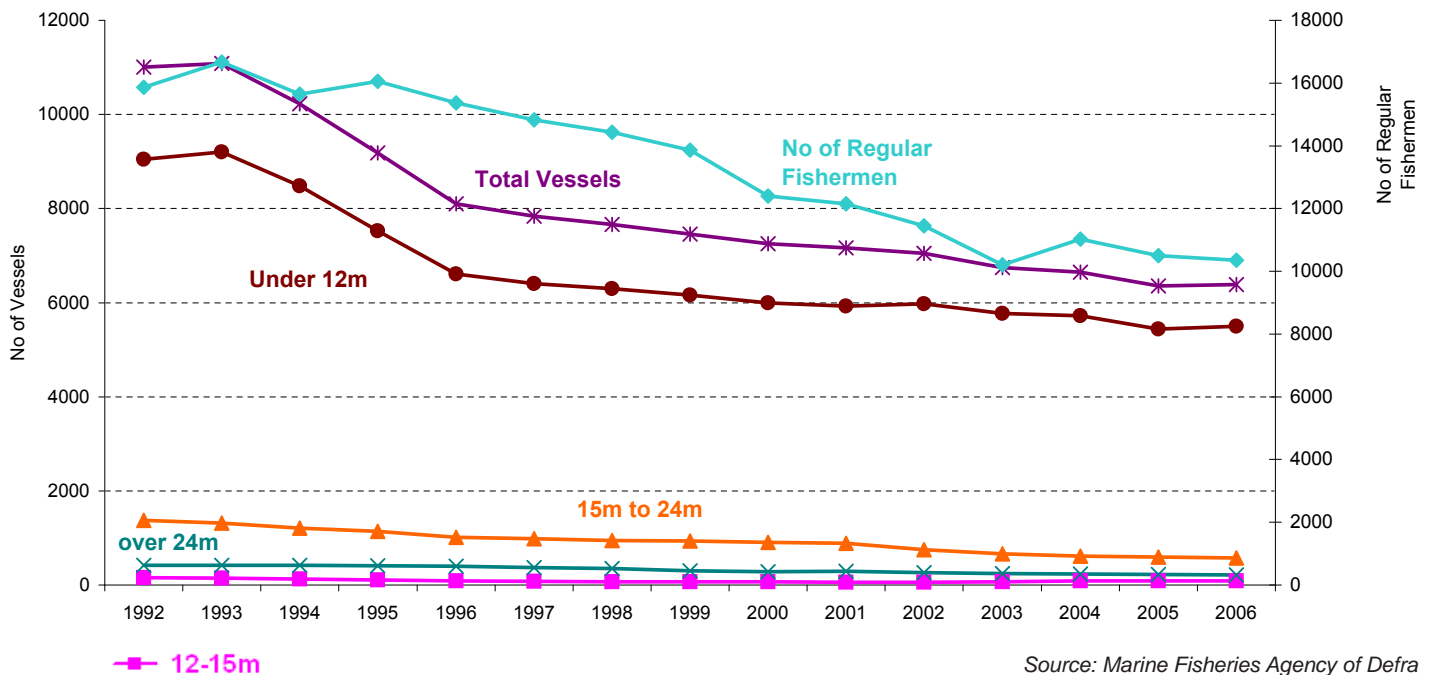


Table B1: United Kingdom Registered Fishing Vessels and their Regular Crew

	United Kingdom Registered Fishing Vessels ¹				Regular Fishermen Employed on United Kingdom Registered Fishing Vessels ²					
	Under 12m	12m to 15m	15m to 24m	Total Vessels	Under 12m ³	12m to 15m ³	15m to 24m ³	Over 24m ³ Fishermen	Total Fishermen	
1992	9 048	157	1 378	418	11 001	9 729	240	3 445	2 456	15 870
1993	9 200	142	1 315	423	11 080	9 999	242	3 662	2 768	16 671
1994	8 484	122	1 204	415	10 225	9 212	213	3 434	2 782	15 640
1995	7 527	104	1 141	411	9 183	8 454	223	4 000	3 386	16 062
1996	6 605	86	1 017	397	8 105	7 503	206	3 996	3 666	15 371
1997	6 400	76	986	372	7 834	7 272	184	3 909	3 467	14 832
1998	6 299	70	943	351	7 663	7 125	173	3 808	3 331	14 436
1999	6 159	68	933	302	7 462	6 983	170	3 812	2 900	13 864
2000	5 992	65	907	287	7 251	6 650	141	3 216	2 392	12 399
2001	5 927	63	888	288	7 166	6 543	134	3 103	2 365	12 145
2002	5 976	59	747	264	7 046	6 581	125	2 587	2 149	11 442
2003	5 770	73	659	245	6 747	6 271	137	2 026	1 770	10 204
2004	5 722	83	615	232	6 652	6 391	194	2 352	2 086	11 023
2005	5 443	89	599	222	6 353	6 078	204	2 250	1 960	10 492
2006	5 500	91	580	211	6 382	6 119	208	2 173	1 858	10 358

Source: Marine Fisheries Agency of Deira

Source: Marine Fisheries Agency of Deira

¹ Fleet sizes are for 31 December of each year.

² Based on Marine Fisheries Agency (MFA) data for numbers of regular fishermen, whose main employment is fishing on board UK-registered fishing vessels, including those vessels beneficially owned by owners normally resident outside the UK. Figures for part-time fishermen have not been included in this study, as MFA record these as people who only fish during a limited season, or who fish occasionally or whose main employment is not fishing. The figures are drawn from surveys carried out by the MFA in England and Wales, by the Sea Fisheries Inspectorate in Northern Ireland and by Sea Fisheries Protection Agency in Scotland.

³ Relative breakdowns of fishermen by vessel length have been estimated by MFA using scaling factors based on an assumed average number of fishermen working in each length category. No accurate employment figures are currently available by length.

Tabulated MAIB Accident Data for UK Fishing Vessels (1992-2006)

C1: Tabulated MAIB Data for Accidents to UK Registered Fishing Vessels (1992-2006)

C.1.1 Basic MAIB accident data

Table C1 below shows the summarised MAIB accident data for UK registered fishing vessels during the period 1992 to 2006. The total numbers of reported accidents have been broken down into numbers of accidents to person and vessels, with the latter further broken down by the incident category recorded in the MAIB database for each accident. Separate annual figures are provided for vessel losses, along with the figures for fishermen fatalities and injuries in each of the fifteen years.

Table C1 MAIB Accident data for United Kingdom registered fishing vessels between 1992 and 2006

Incident Type	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	Total
Machinery Failure	278	317	321	385	327	317	244	233	173	213	180	222	200	232	239	3881
Accident To Person	136	104	122	97	83	104	88	63	69	69	46	56	45	52	51	1185
Flooding/Foundering	99	87	90	74	68	51	62	54	59	47	39	52	38	57	31	908
Grounding	51	61	56	59	63	43	40	32	39	29	27	37	29	19	24	609
Collision/Contact	30	36	28	31	28	23	18	22	20	19	13	19	13	20	14	334
Fire/Explosion	19	21	20	17	19	17	11	15	16	10	14	12	15	16	15	237
Person Overboard	4	11	15	18	8	15	9	8	11	11	3	3	6	10	12	144
Capsize/Listing	6	7	8	7	9	8	11	15	4	3	6	3	2	6	5	100
Other	1	5	3	5	2	1	3	4	5	0	2	2	3	4	1	41
Missing Vessel	0	0	0	1	0	0	1	0	1	0	0	1	1	0	1	6
Total Accidents	624	649	663	694	607	579	487	446	397	401	330	407	352	416	393	7445
Vessels Lost	31	38	42	32	25	23	21	33	40	35	18	28	24	36	17	443
Dead Crew	16	17	26	17	20	29	26	9	32	10	10	9	10	9	16	256
Injured Crew	140	113	124	107	95	107	90	69	75	76	49	59	58	54	53	1269

Source: Marine Accident Investigation Branch

Analysis of MAIB UK Fishing Vessel Accident Data (1992-2006)

D.1 ANALYSIS OF MAIB UK FISHING VESSEL ACCIDENT DATA (1992-2006)

D.1.1 Accident trends

Figure D1 depicts the total number of accidents, both to vessels and fishermen, reported to MAIB between 1992 and 2006, along with the accident rate calculated per 1,000 vessels.¹

A breakdown of the recorded incident types for all accidents is shown at **Figure D2**. The data confirms the finding of the MAIB's 2002 study, that machinery failures represent over half of all reported fishing vessel accidents.

The rates of machinery failure accidents and all other accidents per 1,000 vessels are illustrated at **Figure D3**, whilst **Figure D4** shows the equivalent accident rates for the other main incident types (excluding machinery failures).

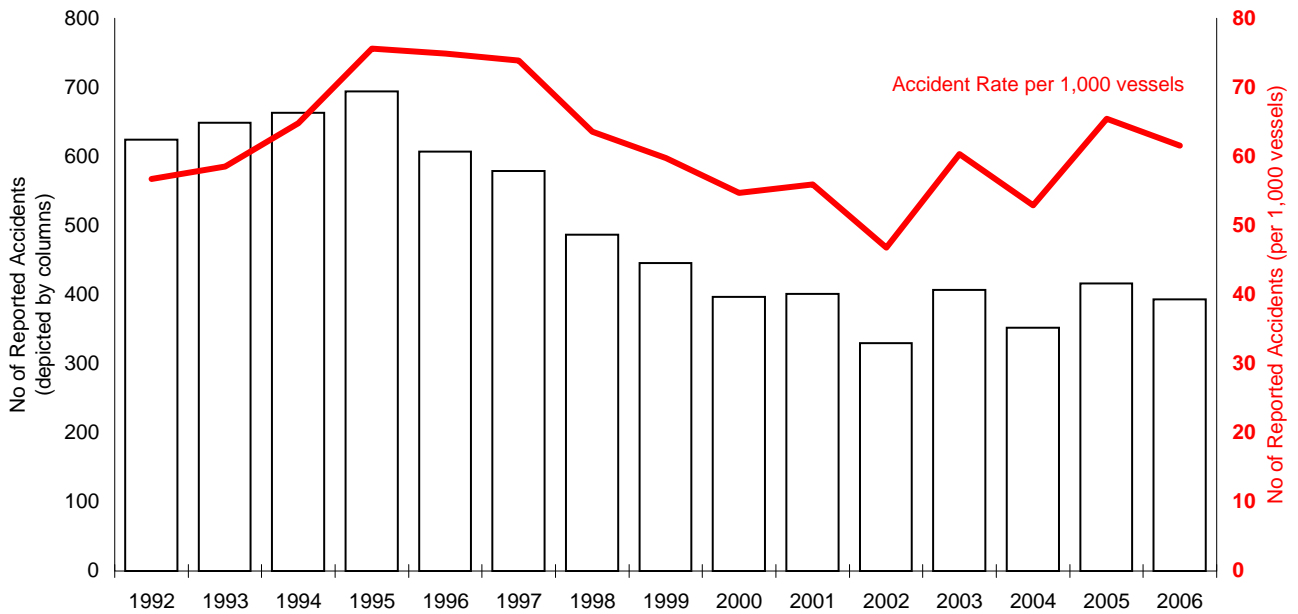
A comparison of **Figure D1** with **Figures D3** and **D4** confirms that the overall accident rate largely mirrors that of the rate of machinery failure accidents. In particular, the apparent rise in the overall accident rate from around 2002 onwards can be attributed to a relative increase in reported machinery failures. **Figure D4** confirms that the accident rates for most other types of accident have either slightly fallen or remained steady over the 15 years considered by this study.

The MAIB definition of a "machinery failure" includes all cases in which a machinery breakdown has either caused the vessel to be disabled for 12 hours or more, or necessitated assistance to reach port. This incident type includes a variety of scenarios involving vessel breakdowns, including fuel-related problems and fouled propellers; the latter was deemed to represent a large proportion of all "machinery failure" accidents considered in the MAIB 2002 safety study.

Although machinery-related accidents can be considered useful indicators of vessels' maintenance standards and operational practices, such accidents fortunately do not themselves generally result in serious damage or injury. As the purpose of this study is to focus on more serious accidents, such as losses and fatalities, no further analysis has been conducted of this rise in reported machinery accidents.

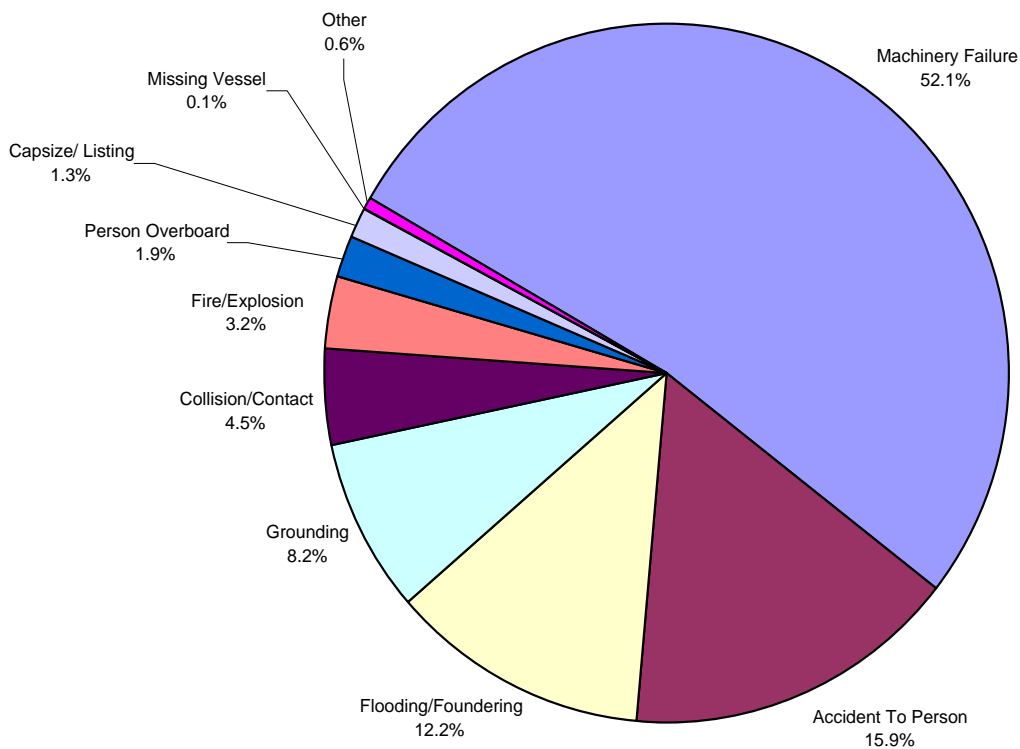
¹ The accident rate is calculated by dividing the number of accidents by the number of registered fishing vessels for a given year, and multiplying by 1,000 to give a rate per 1,000 vessels to take account of fleet size changes. Similar rates are also calculated for fatalities and injuries, albeit per 100,000 fishermen, this being the standard figure used to calculate worker accident rates.

Figure D1: Reported Accidents 1992 to 2006 and Accident Rate per 1,000 UK Registered Fishing Vessels



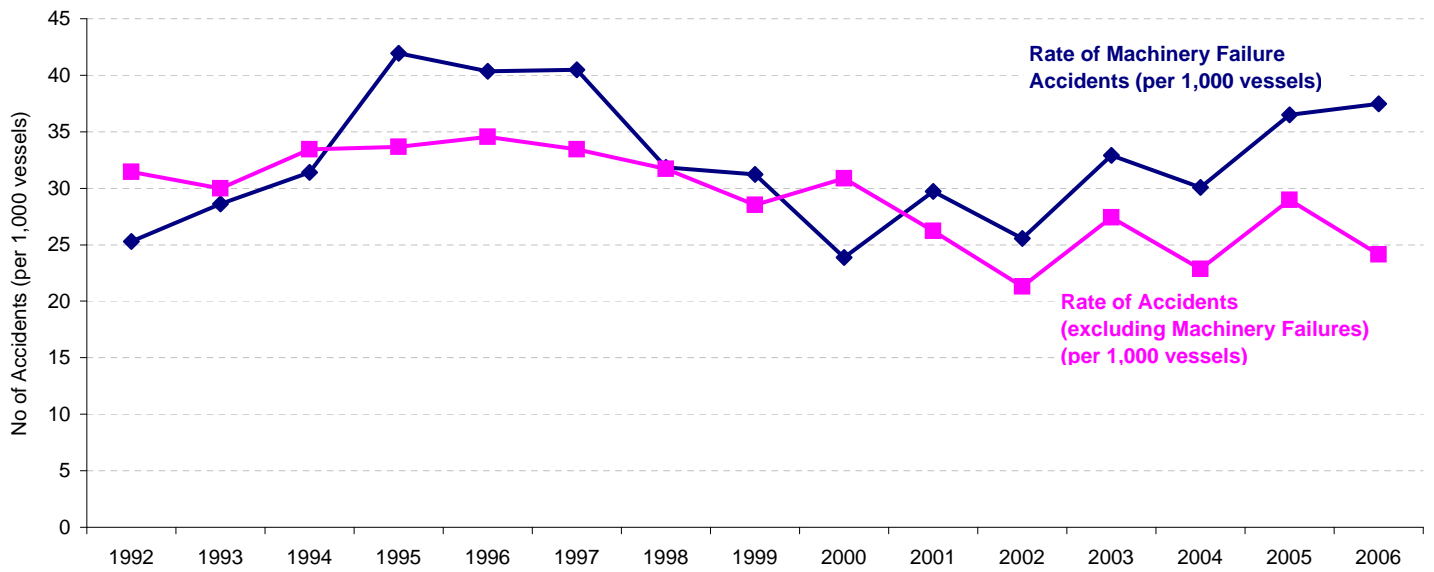
Source: Marine Accident Investigation Branch

Figure D2: Percentage of Reported Accidents to UK Registered Fishing Vessels 1992 to 2006 by Accident Type



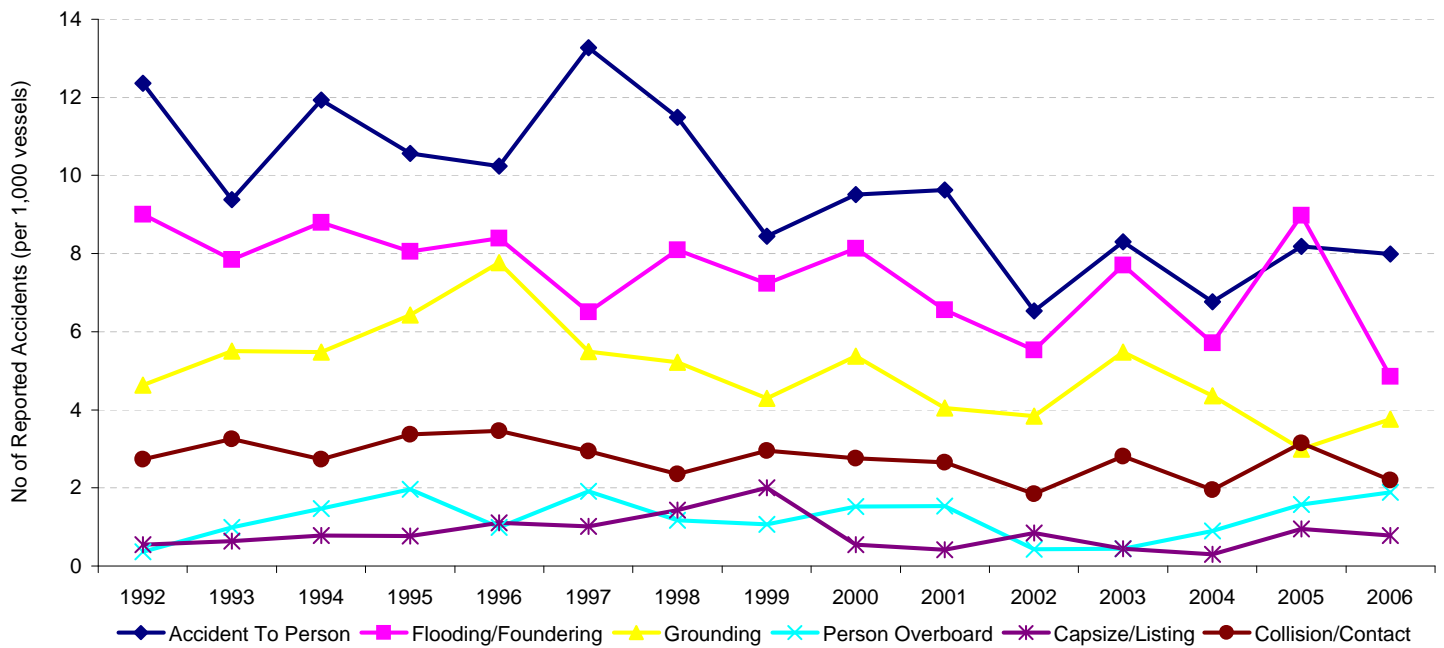
Source: Marine Accident Investigation Branch

Figure D3: UK Registered Fishing Vessels - Machinery Failure Accidents and All Other Accidents - Rate per 1,000 Vessels 1992 to 2006



Source: Marine Accident Investigation Branch

Figure D4: UK Registered Fishing Vessel Accident Rate per 1,000 Vessels 1992 to 2006 - Selected Accident Types



Source: Marine Accident Investigation Branch

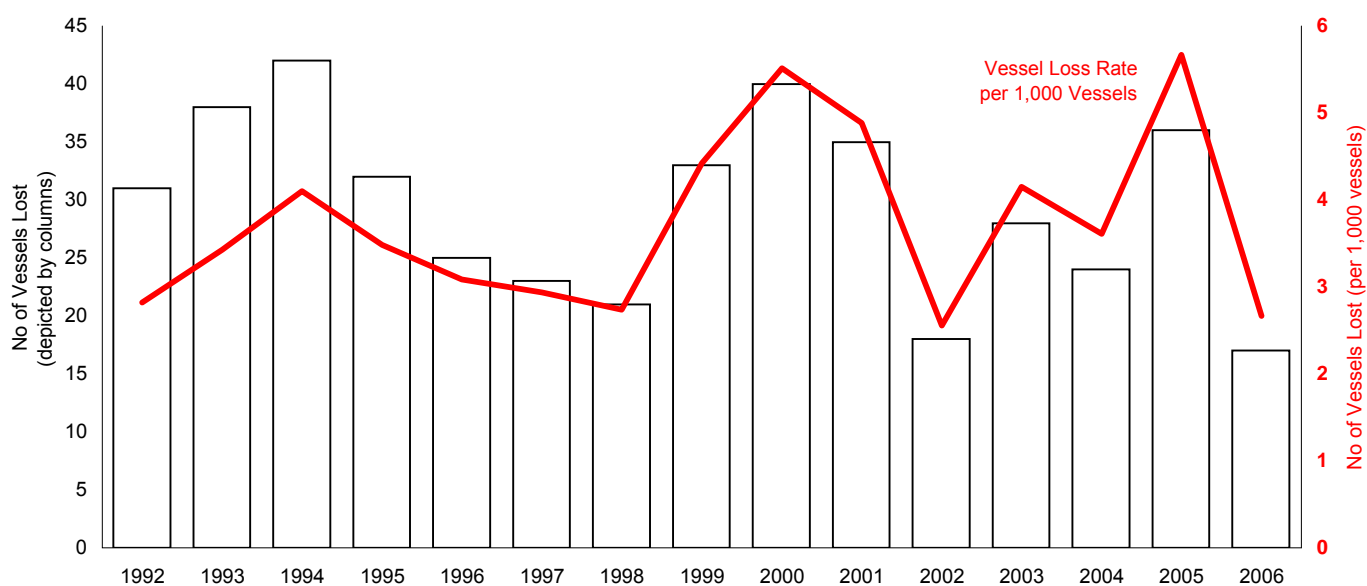
Analysis of MAIB UK Fishing Vessel Loss Data (1992-2006)

E.1 ANALYSIS OF MAIB UK FISHING VESSEL LOSS DATA (1992-2006)

E.1.1 Vessels Lost

Figure E1, which depicts the total number of vessels reported either lost or as constructive total losses¹, shows an almost cyclic pattern of losses, with troughs in 1998, 2002 and 2006, and peaks in 1994, 2000 and 2005. The charted blue line denotes the loss rate per 1,000 vessels for each year, and shows a slight overall increasing trend. 2005 represents the highest loss rate during the 15-year period, even though greater numbers of vessels were lost, for example, in 1994 and 2000. The spike in 2005 is assessed in more detail below.

Figure E1: UK Registered Fishing Vessels Lost* in Accidents 1992 to 2006 and Vessel Loss Rate per 1,000 Vessels



* Includes Total Losses and Constructive Total Losses

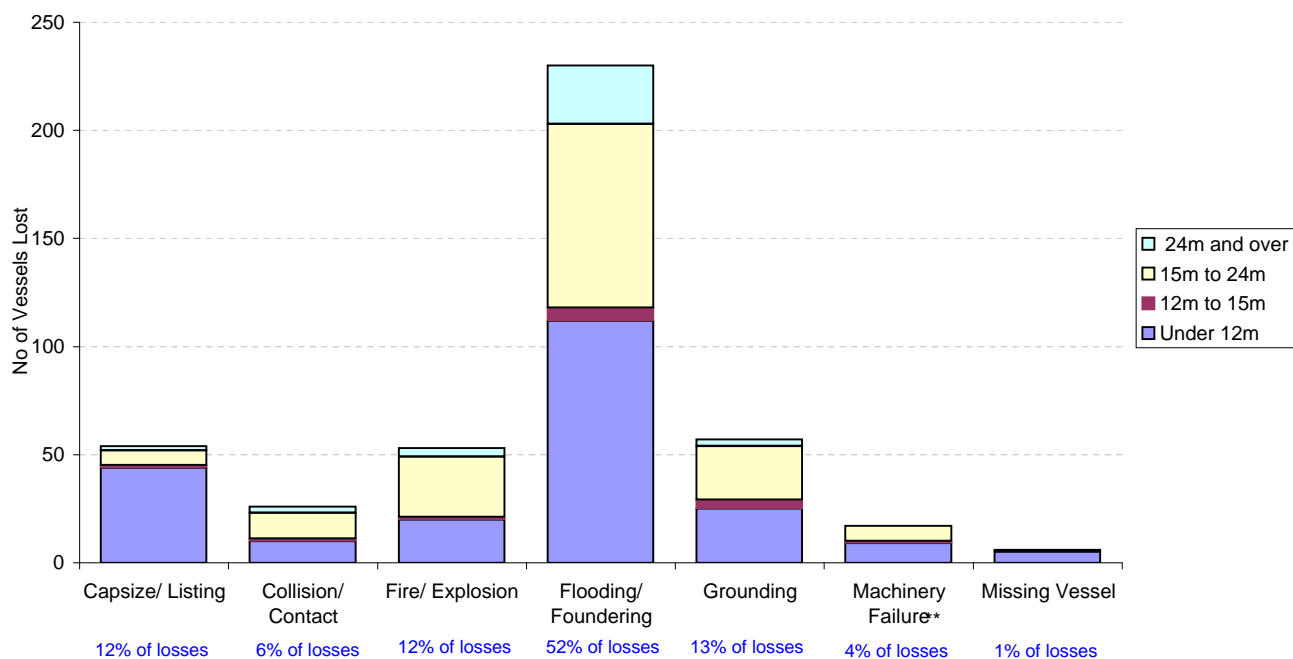
Source: Marine Accident Investigation Branch

Figures E2a and E2b provide a breakdown of vessels lost both by incident type and vessel length category, confirming that flooding/foundering was the cause of more than half the losses, with 230 vessels sinking in this way. Losses due to capsizing/listing tend to be closely aligned to floodings, with the initiation of flooding often due to a capsize or heavy list, and vice-versa; sometimes the distinction between these incident types is not clear, particularly when a vessel sinks rapidly. 12% of the total vessels lost were recorded as capsizing/listings, while it is likely that some of the 6 vessels reported as “missing”, either foundered or capsized. 19% of losses were attributed to navigational accidents, either from collision, contact or groundings.

Figure E2b shows that the majority (69%) of the 39 vessels lost in the >24m category, were due to flooding/foundering, and that the loss figures are dominated by <12m vessels lost due to flooding/foundering, capsizing/listing or missing.

¹ Constructive total loss is when a vessel remains largely intact but is so badly damaged that it is beyond economical repair.

Figure E2a: UK Registered Fishing Vessels Lost* in Accidents 1992 to 2006 by Initial/Main Accident Type and Vessel Length Range

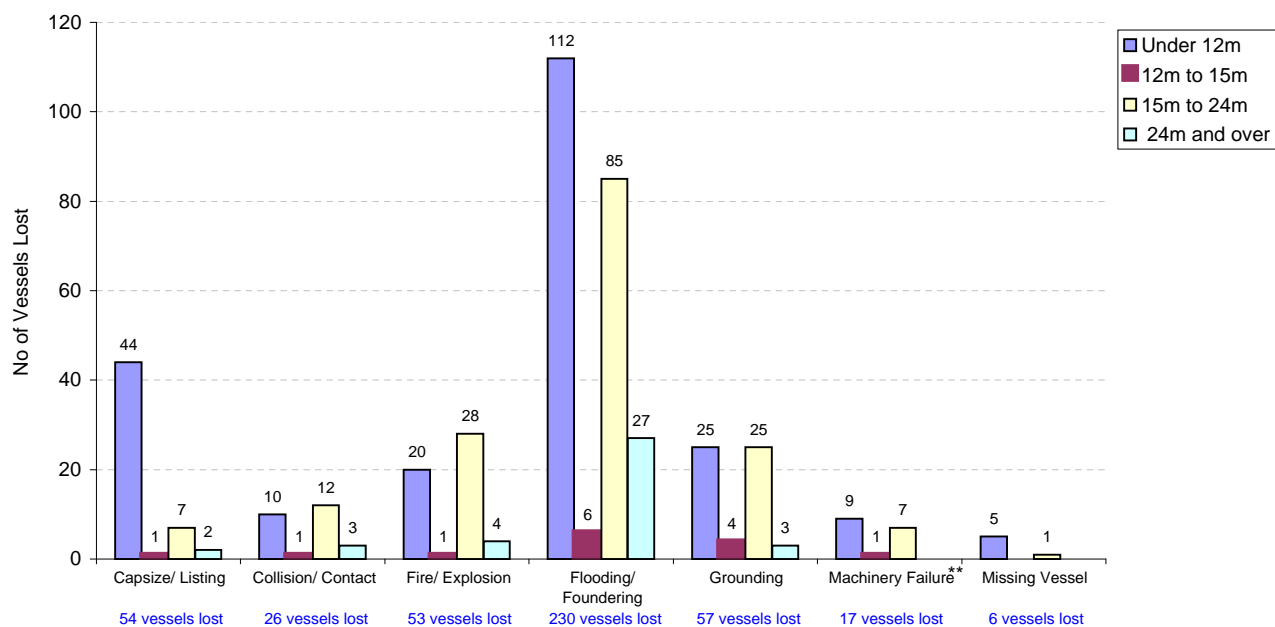


* Includes Total Losses and Constructive Total Losses.

** Machinery Failure was recorded by MAIB as the initial cause of the vessel loss in these cases.

Source: Marine Accident Investigation Branch

Figure E2b: UK Registered Fishing Vessels Lost* in Accidents 1992 to 2006 by Initial/Main Accident Type and Vessel Length Range



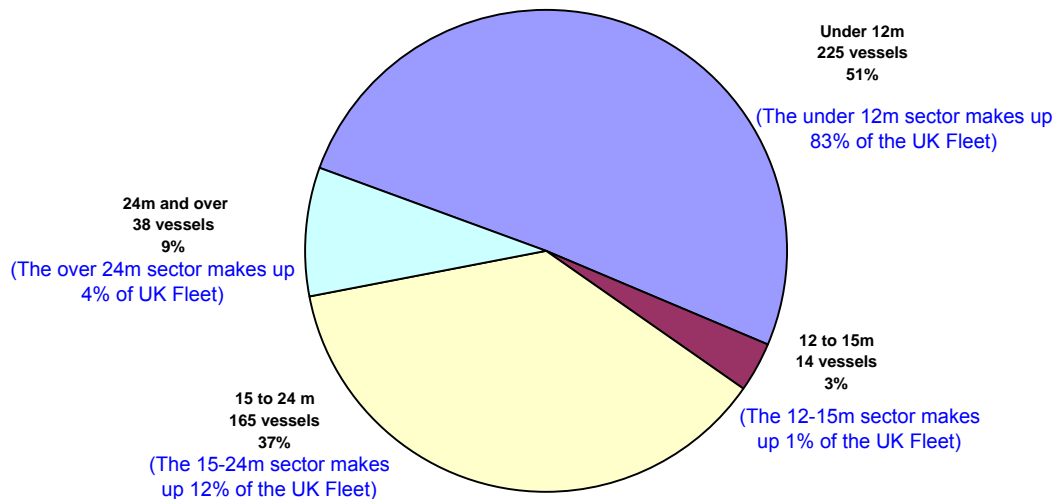
* Includes Total Losses and Constructive Total Losses.

** Machinery Failure was recorded by MAIB as the initial cause of the vessel loss in these cases.

Source: Marine Accident Investigation Branch

Figure E3 shows that 51% of vessels lost between 1992 and 2006 were <12m in length, even though this sector has represented, on average, 83% of the total fleet during the study period. Of particular interest is that 165 vessels, or 37% of the total fleet lost were between 15m and 24m in length, even though this represents only 12% of the entire fleet. **Figures E2a** and **E2b** indicate this is due to larger than expected vessel losses in this sector from fire/explosion (28 vessels lost), grounding (25), and most significantly flooding/foudering (85).

Figure E3: UK Registered Fishing Vessels Lost* in Accidents 1992 to 2006 by Vessel Length Range



* Includes Total Losses and Constructive Total Losses.

Source: Marine Accident Investigation Branch

A plot of the vessel loss rates by length category and incident type has not been included, as it indicated a generally confused picture. A gradual upward trend could, however, be detected in vessels being lost in the length categories 15m to 24m and >24m, whilst the <12m loss rate, not surprisingly, given the relative proportion of this category with the whole fleet, mirrored the overall loss rate. Little change was evident in the loss rates evaluated by incident type, although it is notable that the rate of flooding/fouderings and fire/explosions resulting in vessel loss have both gradually increased over the 15-year period.

In order to establish which incident types have most significantly contributed to the overall loss rate, an analysis has been conducted of those identified in **Figure E2b**.

<12m Flooding/Foudering, Capsize/Listing and Missing Vessel Losses

Analysis of the available data indicated that, over the 15-year period, the numbers of <12m vessels lost due to flooding/foudering have remained steady. There did appear to have been a slight downward trend in vessels lost as a result of capsizes or listings.

The figures showed that 80% of the vessels were lost in coastal waters, with 70% occurring during daylight hours, corresponding with the greater tendency for smaller vessels to be operating closer to shore, often as day boats. There does, however, appear to have been a gradual increase from 2002 of <12m vessels being lost in the hours of darkness, which may be indicative of this fleet now working longer hours.

Surprisingly, the majority of these losses occurred in moderate weather conditions, with only 13% recorded as occurring in rough seas, and 10% while the wind was greater than Force 6.

The average age of the vessels lost was 17 years old, which is less than the <12m fleet average of 18.5 years, while no evidence of a “rule-beating²” effect was evident from the vessel casualty figures, with a wide spread of vessel lengths featuring in the loss figures. Little can be concluded regarding the hull material for the vessels lost, other than that GRP featured most frequently, followed by steel, then wooden vessels.

Progressive flooding, along with flooding being detected too late, was recorded as a casual factor in many of the foundering cases. Various causes of flooding were noted, including pipework and hull failure, with inadequate design or poorly designed equipment for its operation suggested as possible reasons. Growth in the vessels’ lightship weight, insufficient freeboard, and overloading were all identified as issues for a number of the capsized/listing losses.

15m to 24m Flooding/Foundering, Capsized/Listing and Missing Vessel Losses

93 vessels in this category were lost, either due to flooding/foundering, capsized/listing or by going missing. Although fewer than the 161 vessels similarly lost in the <12m fleet, this represents a far higher proportion when compared with the size of the fleet for this sector, given that **Figure E3** confirms that on average over the 15-year period there have been nearly 7 times as many <12m vessels (83% of the entire UK fleet) as 15m to 24m vessels (12% of fleet).

As **Figure E2b** indicated, the majority of losses in this category were recorded as being due to flooding/foundering, with 85 vessels lost. Plotting the distribution of these accidents over the study period demonstrates that although the number of such accidents has gradually reduced, the accident rate trend has slowly increased due to the reduction in the fleet size.

62% of the losses were on the high seas, with an almost equal split between daylight and darkness. Weather conditions do not seem to have a particular effect on the losses, with only 13% of the accidents occurring in rough conditions, and 69% when the wind was reported as being less than Force 7. Wooden boats were the most likely to be lost, representing 57%, while the average age of the vessels lost was 26 years old.

A third of the 18 vessels lost were reported to be towing fishing gear, while a further third were on passage and not fishing. The only vessel in this category to be reported as ‘missing’ was *Meridian*, which was lost with all four of her crew whilst on guard ship duty for the offshore oil and gas industry in the North Sea in October 2006³.

Progressive flooding and failure of the main engine cooling systems were recorded in MIDS as the most common causes of flooding incidents.

² “Rule beaters” is the terminology describing vessels that have been designed specifically to have a length just less than a regulatory breakpoint length, but at the same time maximising various other size and operational parameters for the given length.

³ Report on the investigation of the loss of the fishing vessel *Meridian* KY147 with the loss of four crew 160nm due east of Aberdeen on 26 October 2006, MAIB Report No 20/2007, September 2007.

> 24m Flooding/Foundering Losses

The most common cause of losses in the >24m fleet was due to flooding or foundering, with 27 vessels recorded as lost in this way between 1992 and 2006. During this period, there has been a gradual increasing trend in this type of accident, until 2002, which saw the highest loss rate over the period, after which the number of incidents has reduced with no vessels lost in either 2004 or 2006.

93% of the losses were recorded as being on the high seas. Again, few were recorded as happening in poor weather, with only 15% being noted as sinking in a rough sea state, although 26% of the vessels were lost when the wind was greater than Force 6. The average age of vessel lost was 25 years, greater than the average age of 21 for the >24m fleet, whilst the most common hull material for losses was steel, with 74% of the total.

15m to 24m Grounding and Collision/Contact Losses

37 vessels were reported as being lost during the study period due to this combination of navigational-related accidents. By far the most common incident type was grounding, accounting for 25 of the losses which, together with losses caused by collision, showed a slight increasing trend during the period of the study.

57% of the losses occurred in darkness, with a further 11% occurring in semi-dark conditions. Only 16% were reported to have occurred in poor visibility, with 57% described as taking place in good visibility.

The principal regulatory breakpoint length for skippers to hold a navigational certificate of competency is above 16.5m; 15 of the vessels lost in this category were below that length, and two of these accidents each resulted in a single fatality: the grounding of *Sovereign* in November 1995, and *Audacious* in December 2004.

Inappropriate bridge procedures, lack of a watchkeeper, and inadequate passage planning were all reported as being causal factors in many of the losses. Fatigue was also identified as a particular issue in a number of cases, including the grounding and subsequent foundering of *Betty James* in 2000⁴.

15m to 24m Fire/Explosion Losses

Figure E4 depicts the rate of loss due to fire or explosion for 15m to 24m vessels, which shows an increasing trend for this type of vessel loss.

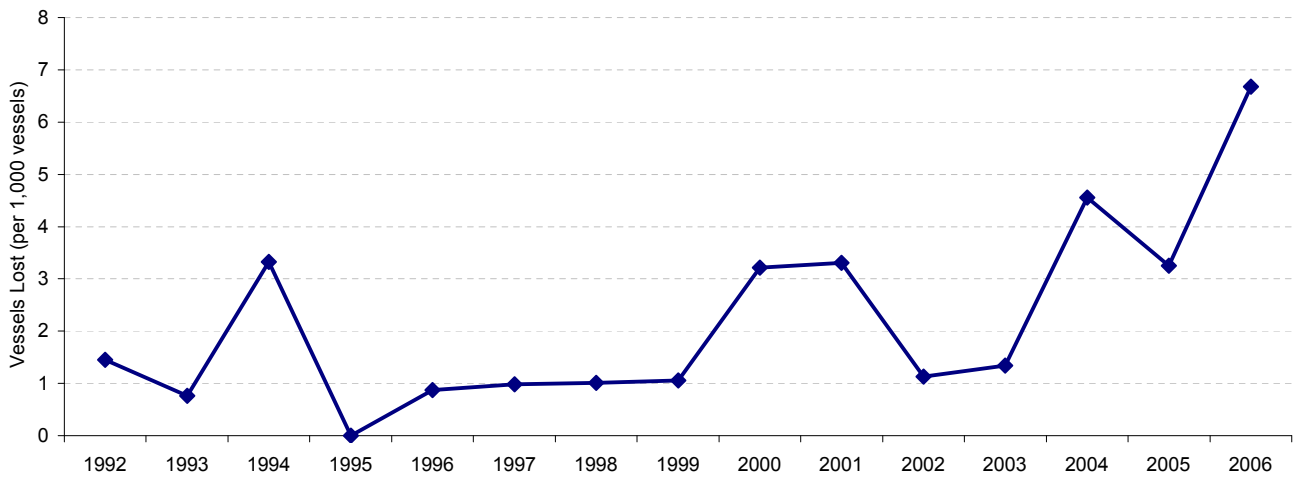
No fatalities resulted from the 28 vessels in this category that were lost, although there were 6 injuries, including 4 during the explosion and foundering of *Fleur de Lys* in April 2000⁵. 27 of the losses are recorded as occurring at sea, but fortunately the majority have been in reasonable weather conditions, otherwise the consequence could have been much worse.

68% of the losses involved wooden vessels, and there have been a number of losses caused by electrical-related fires in recent years.

⁴ Report on the investigation of the grounding and subsequent loss of mfv *Betty James*, Isle of Rhum on 10 July 2000, MAIB Report No 34/2000.

⁵ Report on the investigation of an explosion on board fv *Fleur de Lys* which then foundered 18 miles south-east of Portland Bill on 16 April 2000, MAIB Report No 36/2001, October 2001.

Figure E4: Loss Rate* of 15-24m UK Registered Fishing Vessels (per 1,000 vessels) due to Fire/Explosion



* Includes Total Losses and Constructive Total Losses.

Source: Marine Accident Investigation Branch

2005 Vessel Losses

The highest loss rate for vessels across the entire fleet was recorded in 2005, when 36 vessels were lost.

Further analysis has shown that this peak was due to above average numbers of <12m vessels being lost due to flooding/foundering and fire/explosion. In 2006 this spike appears to have been reversed, with a substantial drop for both these loss categories.

No obvious trend is evident from a review of the flooding/foundering losses, although it is notable that four occurred while the vessels were alongside, three of which were during extreme storms. Other losses included a mussel dredger being swamped, having experienced un-reported gale force winds and heavy seas while on passage back to port, and the foundering of *Blue Sinata*⁶ in September 2005, causing the death of her skipper.

Of the six <12m losses due to fire/explosion, three were attributed to electrical systems, with the other cases all related to main or auxiliary machinery systems.

⁶ Report on the investigation of the foundering of the fishing vessel *Blue Sinata* in Weymouth Bay on 8 September 2005 with the loss of one life, MAIB Report No. 7/2006, March 2006.

Analysis of MAIB UK Fishing Vessel Fatality Data (1992-2006)

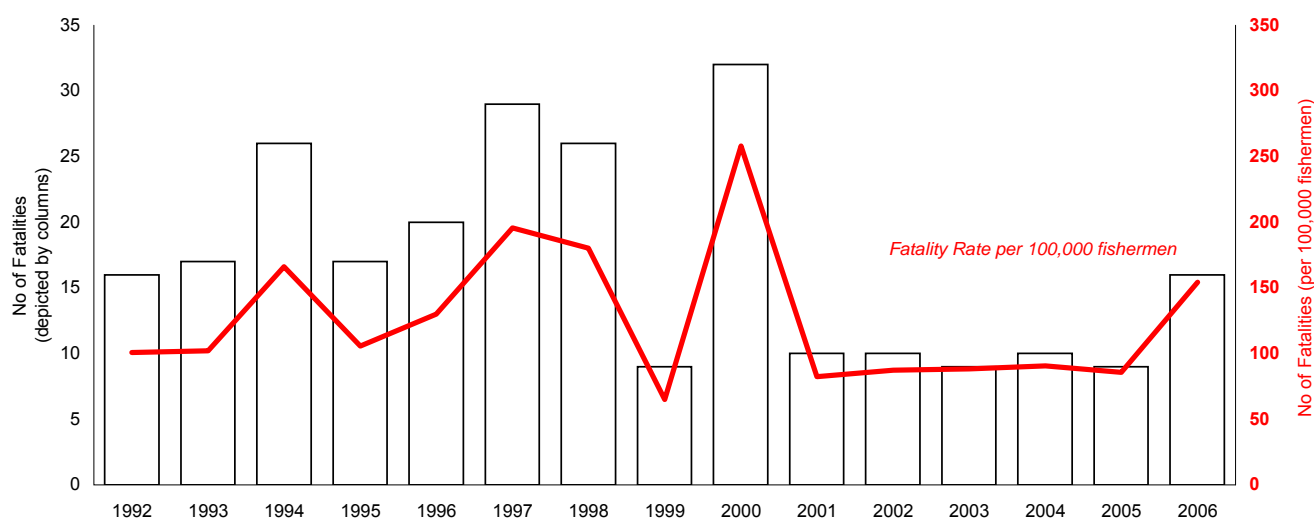
F.1 ANALYSIS OF MAIB UK FISHING VESSEL FATALITY DATA (1992-2006)

F.1.1 Fatalities

Between 1992 and 2006, the UK fishing industry experienced 180 fatal accidents, resulting in the death of 256 fishermen. MAIB has also recorded the deaths of three non-fishermen on UK fishing vessels during this period including, sadly, the 8-year old son of the skipper of *Tullaghmurry Lass*, lost in February 2002 with the loss of 3 lives¹. The three non-fishermen fatalities have been excluded from this data analysis, which only considers commercial fishermen operating on UK registered fishing vessels to allow worker accident rates to be calculated.

The columns in **Figure F1** below show the number of accidental deaths of regular fishermen each year, while the red line depicts the rate of fatalities, calculated relative to 100,000 fishermen.

Figure F1: Fatalities Involving UK Registered Fishing Vessels 1992 to 2006 and Fatality Rate per 100,000 fishermen



Source: Marine Accident Investigation Branch

It is difficult to visually ascertain any trend from this chart, but there does appear to have been only a very gradual reduction over the 15 years, in both the number of deaths which have occurred each year and rate of fatalities.

Over the entire period, there has been an average of just under 16 fatalities per year, which has reduced to around 11 since 2001. The average fatality rate over the 15 years was 126 deaths per 100,000 fishermen, but with a fair degree of fluctuation. The lowest rate of fatalities was 65 in 1999; with the highest the following year in 2000, at over 250. Between 2001 and 2005, however, the rate was relatively constant, varying only between 82 and 91, but then jumping back up to over 150 fatalities per 100,000 in 2006.

¹ Report of investigation into sinking of *fv Tullaghmurry Lass* N246 with loss of three lives in the Irish Sea on 14 February 2002, MAIB Report No 4/2003, February 2003.

Several of the peaks in **Figure F1** can be attributed to accidents involving multiple loss of life. 2000 was the worst year for fatalities, with the deaths of 32 fishermen, nearly two-thirds of which resulted from the loss of *Arosa*² and *Solway Harvester*³, with 12 and 7 deaths respectively.

1997 saw the second highest number of fatalities, with 29, when 3 vessels, *Margaretha Maria*⁴, *Sapphire*⁵ and *Westhaven*⁶ were lost, each with 4 of their crew. The slight increase in the 2006 figures can also be partially attributed to the loss of *Meridian*⁷ and her 4 crew that year, which was the first instance of more than 2 fishermen dying in a single accident since 2000.

Clearly, accidents involving major loss of life have an effect on the overall picture, and it could possibly be argued that if it wasn't for the tragedies involving *Arosa*, *Solway Harvester* and *Meridian*, the fatality figures since 1999 might well have reached an almost level plateau. One way of assessing this is to review the numbers of fatal accidents, i.e. those resulting in one or more fatality, which is depicted at **Figure F2**. The red line shows the corresponding fatal accidents rate, scaled this time to a hypothetical population of 1,000 vessels⁸.

Although the numbers of fatal accidents do seem to vary less, the expected levelling-out from 1999 onwards is not evident, and the number of fatal accidents seems to show an upward trend from 2002 onwards.

A further statistical way of reducing the effect of data variation is to plot rolling averages, i.e. the average values over the 3 year period up to and including each year. The rolling averages for the fatalities and fatal accident rates have not been reproduced here, but both appear to increase until around 1998, then fall until about 2004, before beginning to slowly increase thereafter.

² Report on the grounding and total loss of the United Kingdom-registered fishing vessel *Arosa* (M321) on Doonguddle rock off the west coast of Ireland with the loss of 12 crew members on 3 October 2000, MAIB Report No 41/2001, December 2001.

³ Investigation of the capsizing and sinking of the fishing vessel *Solway Harvester* BA794 11 miles east of the Isle of Man on 11 January 2000 with the loss of seven lives, MAIB Summary Report No 01/2003, 13 June 2003 and MAIB Report No 1/2006 20 January 2006.

⁴ Report of the Inspector's Inquiry into the sinking of the fishing vessel *Margaretha Maria* BM148 with the loss of 4 crew between 11 and 17 November 1997, MAIB Report No 3/99, July 1999.

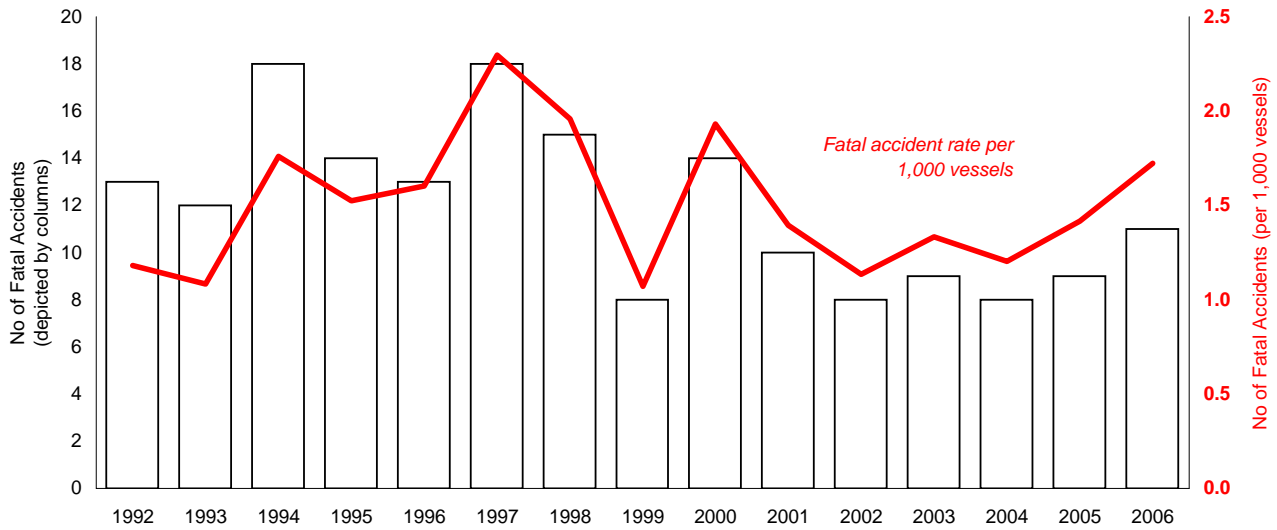
⁵ Report of the Inspector's Inquiry into the sinking of the fishing vessel *Sapphire* PD 285 with the loss of 4 lives on 1 October 1997, MAIB Report No 1/99, March 1999.

⁶ Report of the Inspector's Inquiry into the loss of the fishing vessel *Westhaven* AH 190 with 4 lives on 10 March 1997 in the North Sea, MAIB Report No 4/98, November 1998.

⁷ Report on the investigation of the loss of the fishing vessel *Meridian* KY147 with the loss of 4 crew, 160nm due east of Aberdeen on 26 October 2006, MAIB Report No 20/2007 September 2007.

⁸ The fatal accident rate is quoted relative to vessel numbers rather than fishermen, as the probability of an accident occurring is considered to be more proportionate to the number of vessels than the number of fishermen, given that the majority of fatal accidents occur due to a vessel accident rather than a personal accident, as shown later in this section.

Figure F2: Fatal Accidents* Involving UK Registered Fishing Vessels 1992 to 2006 and Fatal Accident Rate per 1,000 Vessels



* The number of fatal accidents will be lower than the number of accidents (Figure F1) as more than one person may be killed in a single accident

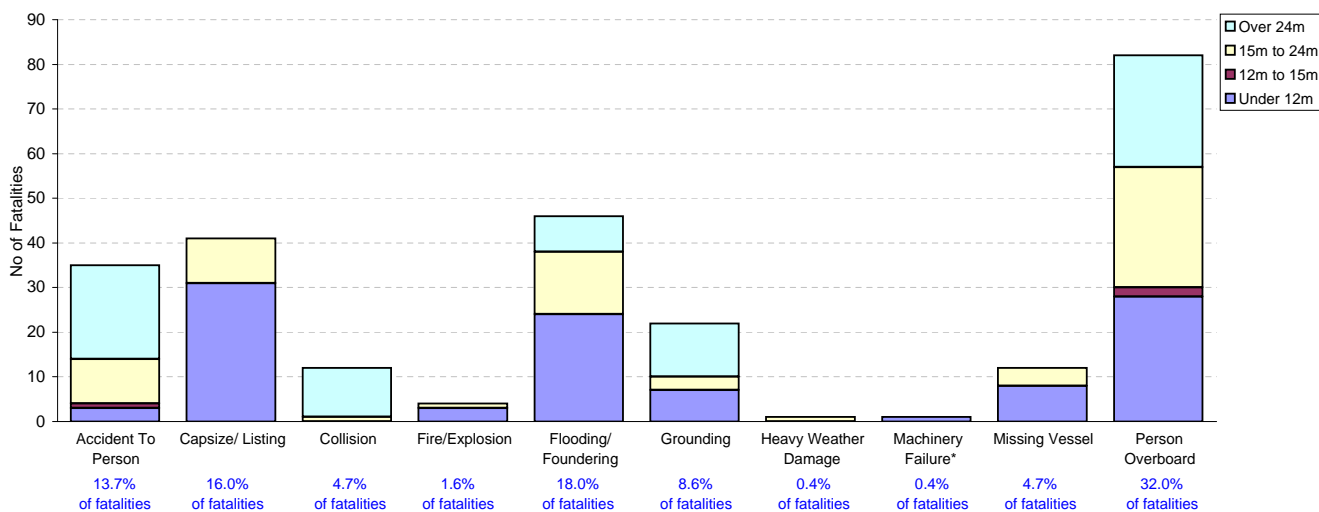
Source: Marine Accident Investigation Branch

In conclusion, it would seem that over the 15 year period there has been a gradual reduction in fatality rates, which appears to have begun to reverse slightly in recent years. Although the actual numbers of fatalities have reduced to a relatively low number, averaging around 11 per year, this still represents an unacceptably high fatality rate of nearly 100 fishermen per 100,000, or 1 in 1,000 dying needlessly each year.

In order to examine more closely the causes of these fatalities, **Figures F3a** and **F3b** provide a breakdown both by incident type and vessel length category for all the recorded accidental deaths between 1992 and 2006.

Nearly a third of the 256 fatalities are attributed to fishermen going overboard, with the 83 such deaths divided almost equally between each of the three main length categories, namely <12m, 15m to 24m and >24m vessels. If the incident types of capsize/listing, flooding/foundering and missing vessels are again considered together, these accidents account for 99 deaths or 39% of the total. **Figure F3b** illustrates that the majority of these involved <12m vessels, whilst 15m to 24m vessels represented over a quarter of such fatalities. As previously mentioned, 127 fatalities, equivalent to almost 50% of the total, occurred during a vessel loss. These loss figures include collisions and groundings, both of which include a predominance of >24m vessel deaths. The other incident type that has resulted in a significant proportion of fatalities during the 15 years covered by this study is accident to persons, occurring mostly on >24m vessels.

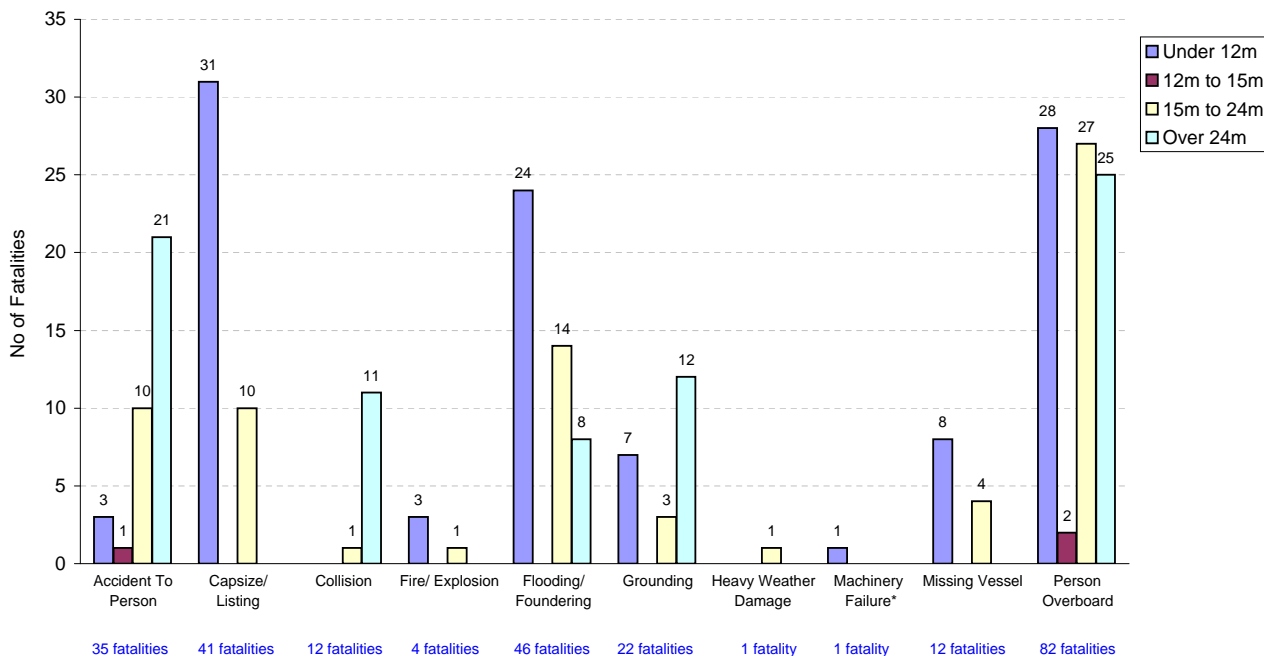
Figure F3a: Number of Fatalities by Initial/Main Accident Type for UK Registered Fishing Vessels 1992 to 2006



* Machinery Failure was recorded by MAIB as the initial cause of the fatality in this case.

Source: Marine Accident Investigation Branch

Figure F3b: Number of Fatalities by Initial/Main Accident Type for UK Registered Fishing Vessels 1992 to 2006



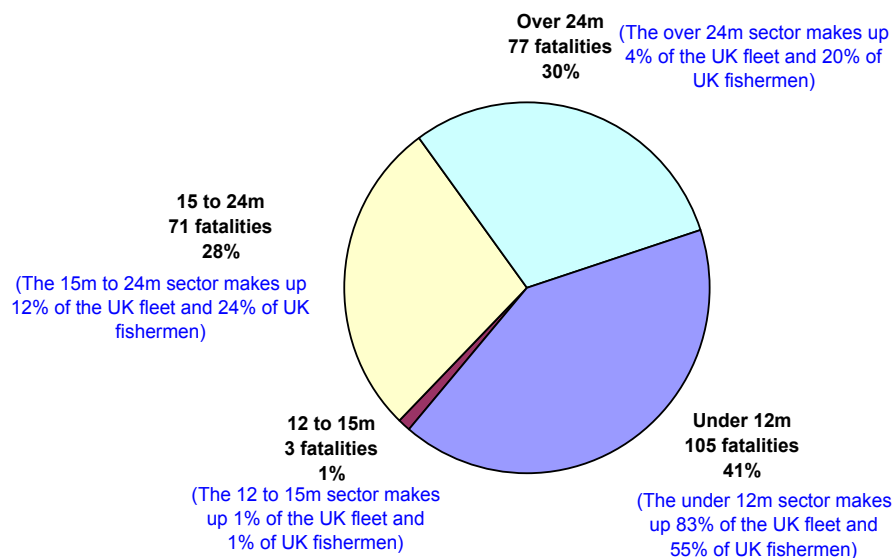
* Machinery Failure was recorded by MAIB as the initial cause of the fatality in this case.

Source: Marine Accident Investigation Branch

A further possible method of identifying trends in the fatality numbers is to determine the relative proportions of deaths in each of the vessel length categories, as depicted at **Figure F4**.

Figure F4 confirms that the largest proportion of the fatalities between 1992 and 2006 occurred on board <12m vessels, with 105 deaths, equating to 41% of the total. This is slightly less than would be expected for this length category, given that this sector represents 83% of the total fleet and employs an estimated 55% of all UK regular fishermen⁹. An above average number of fatalities occurred on fishing vessels of 15-24m and > 24m when compared with the relative sizes of the fleet and the number of fishermen at risk in these vessels. **Figure F3b** indicates that for >24m vessels, this can be attributed to larger than expected numbers of fatalities due to personnel accidents, such as persons falling overboard (26 deaths), accident to persons (20), as well as to vessel accidents such as grounding (12), collision (11) and foundering (8).

Figure F4: Percentage of Fatalities by Vessel Length Range for UK Registered Fishing Vessels 1992 to 2006



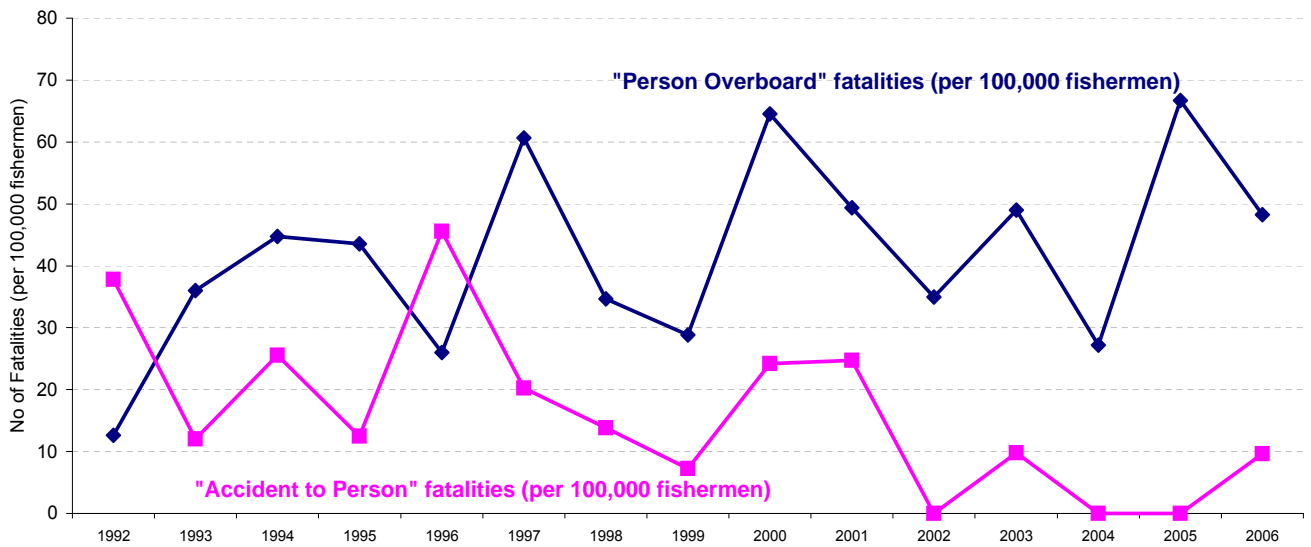
Source: Marine Accident Investigation Branch

Breaking the fatality rates down by both length category and incident type proves inconclusive in terms of identifying significant trends. **Figure F5** however indicates that the rate of fatalities resulting from falls overboard appears to have gradually increased over the period, whilst deaths resulting from accidents to person have steadily fallen. Evaluating fatality rates for each of the length categories suggests a gradual upward trend in deaths on board 15m to 24m vessels, with the other lengths showing, if anything, a very slight fall in fatality rates over the 15 years.

Returning to **Figure F3b**, it is clear that the overall fatality rate is largely driven by a limited number of incident types and length categories. As before, an in depth analysis has therefore been conducted to examine the circumstances and causes.

⁹ Based on estimates evaluated by MFA, Defra, as detailed at **Annex B**.

Figure F5: Fatality Rates per 100,000 Fishermen for UK Registered Vessels 1992 to 2006 due to “Persons Overboard” and “Accidents to Person”



Source: Marine Accident Investigation Branch

Persons Overboard

Of the 83 fishermen’s deaths resulting from overboard accidents, 65 (78%) occurred whilst underway or at sea, with the remaining 18 fatalities taking place when the vessel was moored alongside or in the process of coming alongside to tie up.

Looking firstly at harbour fatalities, it is evident that a combination of alcohol and poor vessel access arrangements are key factors. 89% of these deaths occurred in vessels over 15m in length, and 14 fishermen died whilst returning to their vessel, with at least 8 happening either late at night or in the early hours of the morning. Alcohol is recorded as a likely factor in 13 of the fatalities, including the deaths of two fishermen during a single incident in 2000 as they returned to their vessel, *Astra II*¹⁰, when the vessel was berthed outside 6 other fishing vessels, as depicted in **Figure F6**. The possible contribution of alcohol is unknown in a further 3 cases. At least 8 of the fatalities record inadequate access arrangements to the vessel as a significant factor, whilst it is likely that a more appropriate means of access would have probably prevented many of the other 10 fatalities.

The majority of overboard fatalities occurred at sea, and breaking these down by length category reveals a virtually identical percentage distribution to the corresponding figures for all fatalities, as detailed at **Figure F4** above. Discernible trends are again difficult to identify from the fatality rates for each length category, although there would appear to have been slight reductions in the rates for 15m to 24m and >24m vessels, whilst the rate for vessels <12m in length has, if anything, increased.

56% of the “at sea” overboard fatalities occurred in daylight, with 55% in good visibility. Although a number of fatalities were directly due to crewmen being washed overboard, weather conditions do not generally seem to be a significant factor in the majority of cases. Only 17% of the deaths were recorded as occurring in a rough sea state and 14% in winds greater than Force 6. The two most common activities when overboard fatalities occurred were shooting or hauling operations (42% of the total), and vessels steaming (15%).

¹⁰ Report of the investigation of the loss of two crewmen from fv *Astra II* while berthed at Carbost pier, Loch Harport, Isle of Skye on 2 April 2000, MAIB Report No 31/2000.

Figure F6 (Taken from: Report of the investigation of the loss of two crewmen from fv *Astra II* while berthed at Carbost pier, Loch Harport, Isle of Skye on 2 April 2000, MAIB Report 31/2000)



Fishing vessels at Carbost pier on 2 April. *Astra II* is at the extreme right. The vessel that had been third from the pier at the time of the accident sailed before this photograph was taken.

Photograph courtesy of the Northern Constabulary

Reviewing these fatalities by length category highlights some interesting facts. Of the 28 manoverboard fatalities involving <15m vessels¹¹, 16 happened on potting vessels, whilst 18 of the 28 occurred on boats being operated single-handedly. Reviewing the MIDS text summaries for the potting accidents reveals a series of virtually identical accidents involving crewmen becoming entangled or caught in ropes during the deployment of fleets of pots, and being dragged overboard and under the surface. Typical of this type of accident is the fatality on *Dunan Star* in 2000¹², and it is evident that the risks and hazards involved in this activity, particularly when working alone, are substantial.

Of the 16 fishermen lost overboard from 15m to 24m vessels at sea, 8 died while trawling, compared to 4 fatalities during potting. Defra figures for this length category suggest that the fleet has a significantly higher proportion of trawlers than potters, which again highlights the relative risks of potting.

There were no reported deaths from overboard accidents on >24m potters, but these vessels represent only a small proportion of this length category. However, nine overboard deaths from trawlers at sea were recorded, along with three from long lining vessels. Given that the vast majority of the >24m fleet are trawlers, it is evident that the relative risks of an overboard accident resulting in death appear to be far greater on static gear vessels than for trawlers.

Perhaps the most significant statistic of all is that of the 65 fishermen who died after going overboard at sea, only 1 was reported to be wearing a lifejacket. This, however, did not appear to have been secured properly, as it came adrift from the casualty, whose body was never recovered.

¹¹ For the purposes of this analysis, the 1 overboard fatality involving a 12m to 15m vessel has been grouped with the 27 fatalities from <12m vessels.

¹² Report on the investigation of a fatal accident on board *mfv Dunan Star* (CY 26) 1.5 miles south-west of the Isle of Arran on 10 August 2000, MAIB Report No 38/2000.

<12m Flooding/Foundering, Capsize/Listing & Missing Vessel Fatalities

Figure F3b clearly indicates that with 63 deaths, another area of concern from a fatality perspective involves smaller vessels experiencing capsizes/listings, flooding/foundering, or going missing.

The annual distribution of these fatal accidents and the corresponding fatality rates has shown a gradual reduction over the 15 years, particularly in the accidents recorded as capsizes/listings. The statistics, as always, are susceptible to vessel losses resulting in multiple casualties, as evidenced by the spike in the flooding/foundering fatalities in 2004 due to the loss of *Kathryn Jane* and *Jann Denise II*, both with two crew members¹³.

90% of these fatalities have been the subject of full investigations by MAIB, which has provided a strong body of evidence for the factors relevant to these accidents. As would be expected for this size of vessel, 98% of the deaths occurred in coastal waters, with only one recorded as taking place on the high seas. Over a third of the fatalities occurred while the vessel was on passage, rather than fishing, which rises to 50% of all such fatalities for the period since 2000.

By far the majority of the fatalities have occurred on <10m vessels, but this is to be expected, given that between 1992 and 2006 there were typically between 7 and 11 times as many <10m vessels as there were between 10m to 12m in length. More than half of the fatalities (32) occurred on trawlers, with 23 deaths occurring on potting vessels.

Of the 38 accidents that resulted in the 63 deaths in the <12m category, only 1 vessel is recorded as having had an Emergency Position Indicating Radio Beacon (EPIRB) fitted. However, problems with the registration and coding for this EPIRB led to a delay in commencing the Search and Rescue operations for the vessel, which was lost with three of her crew.

Despite liferafts not being a statutory requirement for <10m vessels, it is notable that several of the fatal accidents involved vessels voluntarily carrying liferafts. These helped save 6 lives in 4 separate accidents, each of which involved the death of 1 of their crew mates who did not manage to board the liferaft, including the capsizing of *Constancy* in 1998¹⁴. In three cases, it is possible that the failure of liferafts to deploy correctly contributed to a total of six fatalities.

As for the fatal overboard accidents, the limited usage of personal flotation devices (PFDs), such as lifejackets or buoyancy vests, again proves to be an area which might have contributed to many of these deaths. 34 of the fatalities were recorded as not wearing PFDs at the time of the accident, and it is likely that the majority, if not all, of the other 29 fishermen lost were also not wearing a PFD.

Analysis of the causes of the accidents that led to these fatalities shows a consistent pattern of stability and watertight integrity-related issues. 18 fatalities can be attributed to vessels with low freeboard, 14 of which were caused by overloading of the vessel. Inadequate stability was cited as a primary cause in 9 of the fatalities, with 8 deaths due to vessel modifications resulting in a reduction of stability margins. Interestingly, heavy weather was a significant factor in 19 of the deaths, with capsizes in poor weather conditions leading to the loss of 12 fishermen. 18 of the fatalities were attributed to flooding, either through hull fittings or non-secured openings, whilst a lack of seaworthiness or poor material condition of the vessel was a factor in 6 deaths.

¹³ Report on the investigations of the foundering of fv *Kathryn Jane* 4.6nm west of Skye on or about 28 July 2004, the capsizing and foundering of fv *Emerald Dawn* off Kilkeel on 10 November 2004 and the foundering of fv *Jann Denise II* 5 miles SSE of the River Tyne on 17 November 2004, MAIB Report No.15/2005, August 2005.

¹⁴ Report into the sinking of fv *Constancy* BCK 371 on 30 July 1998, with the loss of 1 life.

15m to 24m Flooding/Foundering, Capsize/Listing & Missing Vessel Fatalities

Between 1992 and 2006 there were 28 fatalities due to 15m to 24m fishing vessels either flooding/foundering, capsizing/listing or going missing. Only 9 accidents contributed to this total, including the 7 crew members of *Solway Harvester*³, and the 4 deaths on each of *Margaretha Maria*⁴, *Sapphire*⁵, *Westhaven*⁶, and *Meridian*¹⁵.

8 of the vessels were trawlers, resulting in 24 fatalities. The statistics did not show a correlation between vessel losses and weather conditions, 4 of these fatal accidents occurred in poor conditions, and contributed to the deaths of 16 fishermen. The hazards associated with trawl gear coming fast on the seabed are also evident, with the loss of 4 vessels and 7 lives. Flooding was an initiating cause in at least 4 of the losses, including *Solway Harvester* and *Sapphire*.

In 4 of the accidents, problems were reported with either the activation or registration of the EPIRB; it is possible that some of the 13 lives lost in these accidents might have been saved if the EPIRB had correctly alerted the coastguard. However, it is worth noting that in four of the losses, the EPIRB operated successfully but still failed to prevent the deaths of 14 fishermen, due to the rapid nature of the vessel's loss.

As was the case for EPIRBs, liferafts were also found to have a mixed success in these nine accidents. Liferafts were successfully deployed in four of the accidents, and in fact saved eight lives, whilst fellow crew members perished. However, 17 fishermen were lost in the 4 vessel losses where problems were noted with the deployment of the liferaft. It is considered entirely possible that some of these lives might have been saved if a liferaft had successfully deployed.

15m to 24m and >24m Accident to Person Fatalities (excluding Persons Overboard)

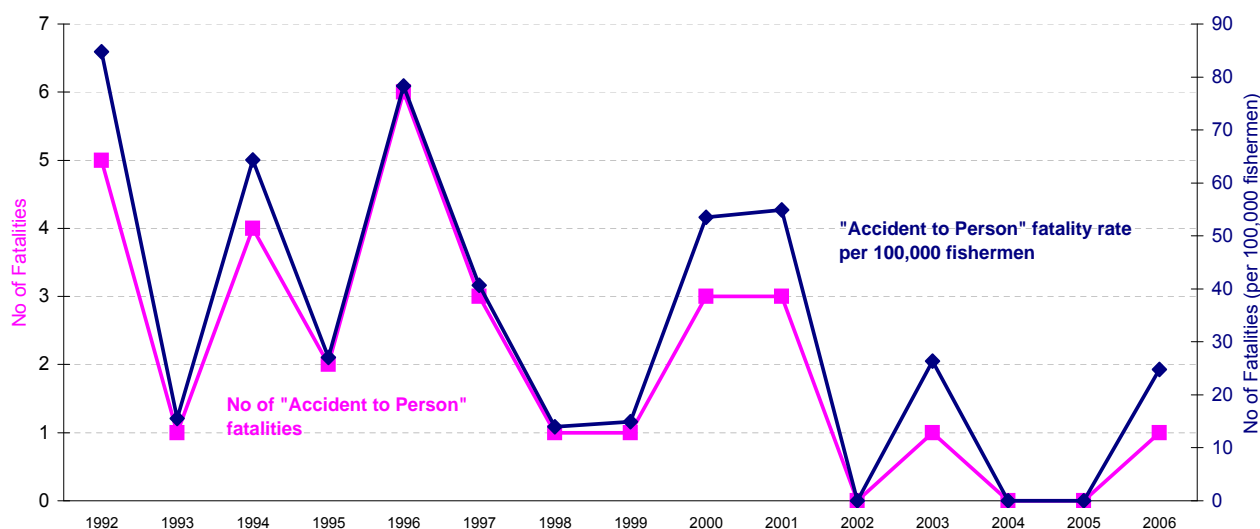
Figure F3b also indicates that relatively high numbers of fishermen sustained fatal injuries following 'accident to persons' (excluding overboard accidents) on board fishing vessels. 10 fatalities occurred on 15m to 24m vessels, but more significantly there were 20 deaths resulting from "accidents to person" on >24m fishing vessels, especially given the comparatively small size of this fleet, as shown at **Figure B1** and **Annex B**.

The distribution of these fatalities, along with the corresponding fatality rate, based on the estimated number of fishermen working on vessels over 15m in length, is at **Figure F7**. This clearly indicates that although the overall number of deaths from these accidents has historically been relatively high, there has been a clear improvement in these figures in recent years. In fact, since 2001 there have been no accident to person fatalities on an >24m vessel, and only 2 such deaths on 15m to 24m vessels.

Despite this recent reduction in fatalities, reviewing these accidents as a whole reveals some striking similarities and makes sober reading. By far the majority of fatalities have occurred on board trawlers, with just under a third attributable to working in poor weather conditions; three of these fatalities resulted from fishermen being swept against the vessel's structure or gear by green seas. 50% or 15 of the fatalities were due to crew members being struck by fishing gear or equipment, with 7 of these due to the

¹⁵ Report on the investigation of the loss of the fishing vessel *Meridian* KY147 with the loss of four crew 160nm due east of Aberdeen on 26 October 2006, MAIB Report No 20/2007, September 2007.

Figure F7: Fatalities and Fatality Rates per 100,000 fishermen for >15m UK Registered Vessels 1992 to 2006 due to “Accidents to Person” (Excluding “Persons Overboard”)



Source: Marine Accident Investigation Branch

failure of part of the gear, such as on board *Ocean Star*¹⁶ in 2001. Not surprisingly, nearly two-thirds of the accidents occurred during either the preparation for, or the shooting/hauling of fishing gear, such as the crushing of a crew man on the scallop dredger *Geeske*¹⁷ in 1998.

Several accidents involved fishermen being dragged into moving machinery, including the fatality on board *Solstice II*¹⁸. A number of accidents were due to crew being overcome by fumes, including the death of 3 crew members in a single accident on board *Atlantic Princess*¹⁹ in 1996, following the release of toxic fumes onto a working deck.

>24m Collision & Grounding Fatalities

Navigational-related accidents involving >24m vessels resulted in 23 fatalities over the 15 year period. These, in fact, are the result of only three separate accidents: the grounding of the Anglo-Spanish vessel *Arosa* in 2000 with the loss of 12 lives², and collisions involving *Larissa* in 1994 and *Silvery Sea*²⁰ in 1998, with the loss of 6 and 5 lives respectively.

¹⁶ Report on the investigation of the failure of a warp block on board the UK registered fishing vessel *Ocean Star* north of the Shetland Islands, resulting in one fatality on 26 November 2001, MAIB Report No 13/2003, May 2003.

¹⁷ Report of the inspector’s Investigation into the death of one person on the fishing vessel *Geeske* BM140 while fishing off Beachy Head on 9 December 1998, MAIB Report.

¹⁸ Report of the investigation of a fatal accident to a crew member on board *Solstice II (BF 56)* 25 miles south-west of Rockall, 13 May 2000, MAIB Report No 22/2001.

¹⁹ Report of the inspector’s inquiry into three fatalities and injuries to six crew members on board *Atlantic Princess* on 25 July 1996 off the Coast of Mauritania, West Africa, MAIB Report, July 1997.

²⁰ Report on the investigation of the collision between the German container ship *Merkur* and the United Kingdom fishing vessel *Silvery Sea* which then foundered about 35 miles west of Esbjerg, Denmark with the loss of 5 lives on 14 June 1998, MAIB Report No 21/2000.

It is difficult to conclude any meaningful accident trends from such a limited dataset, particularly as the reasons for the grounding of *Arosa* are not known. *Silvery Sea* sank rapidly along with all her crew following a collision with the German registered container ship *Merkur*, when she did not meet her obligation under the Collision Regulations to give way to *Merkur*.

>24m Flooding/Foundering Fatalities

The loss of three vessels contributed to the 8 recorded fatalities resulting from >24m vessels flooding or foundering, and it is again difficult to conclude any meaningful trends from such a limited dataset. 6 Spanish fishermen were lost in 1998 when the Anglo-Spanish vessel *Pescalanza* foundered²¹, and one crew member died following the loss of *Amber Rose*²² and *Radiant*²³ in 1998 and 2002 respectively.

Pescalanza was a “side-winder”²⁴ trawler. These are renowned for their susceptibility to heavy rolling and shipping water on deck whilst they are beam on to the sea recovering their trawl gear. During such an operation in heavy weather in November 1998, the vessel was struck by a succession of large waves and took a significant amount of water on board, before listing to port and then foundering. The MAIB investigation considered it probable that water had become trapped on deck and down flooded through an open door to the engine room.

Both *Amber Rose* and *Radiant* effectively capsized, the former following probable undetected flooding of a forward space, while *Radiant*'s port net became snagged on a seabed obstruction, causing a heavy list that led to downflooding into her engine room.

²¹ Report of an investigation into the loss of *Pescalanza* PZ744 and 6 lives on 2 November 1998, MAIB Report, April 1999.

²² Report on the investigation of the foundering of mfv *Amber Rose* (B417) off the Isle of Man with the loss of one life on 15 October 1998, MAIB Report No 24/2000.

²³ Report on the investigation of the capsize and foundering of *Radiant* PD298, about 45 miles north-west of the Isle of Lewis, with the loss of 1 life on 10 April 2002, Report No 2/2003, January 2003.

²⁴ “Side winder” trawlers haul their net on the side of the vessel. It is therefore necessary to turn the vessel beam on to the sea and weather when hauling, to prevent the vessel riding over the top of the trawl gear

Analysis of MAIB UK Fishing Vessel Injury Data (1992-2006)

G.1 ANALYSIS OF MAIB UK FISHING VESSEL INJURY DATA (1992-2006)

G.1.1 Injuries

MAIB has recorded 1270 injuries to fishermen as a result of 1220 accidents between 1992 and 2006. Just under 90% of these injuries were due to accidents to person (i.e. injuries resulting from a personnel accident rather than an accident to the vessel itself), with 58 injuries or 4.6% due to falls overboard. Only 5.8% of the total occurred due to vessel accidents, such as fires or collisions. It is acknowledged that these figures will undoubtedly not include many accidents that result in relatively minor injuries, which will often not be reported to MAIB.

Figure G1 depicts the distribution of these accidents over the 15 years covered by this study, along with the corresponding rate of injuries, shown by the red line. There is a reduction.

Figure G2 demonstrates that accidents to personnel, leading to injuries, represent by far the largest category reported to MAIB. The downward trend for the incidence of this type of accident over the period of the study represents the most significant reason for an overall reduction in the number of reported injuries.

Figures G3 and **G4**, represent the percentages of injury and rate of injuries for each length category of fishing vessel.

It is evident from **Figure G3** that as for fatalities, the majority of accidents leading to injuries (80%) occurred on vessels >15m in length, despite these vessels only representing 16% of the UK fleet, and having an estimated 44% of all fishermen working on them. The 232 injuries on <12m vessels is a smaller proportion of the total injuries than might be expected given the relative size of this sector.

Figure G4 shows that despite starting at a higher rate in the early years of the study, the rate of injuries per 100,000 fishermen appears to have fallen for 12m to 15m and >24m vessels. The injury rate has, however, remained fairly constant for <12m and 15m to 24m vessels, with the latter averaging around 1000 accidents per 100,000 fishermen, i.e. 1 fisherman in 1000 sustaining an injury each year. Notwithstanding a decline in injury rates across all sectors in the 1990's, the overall trend has remained fairly consistent since the 'turn of the century'.

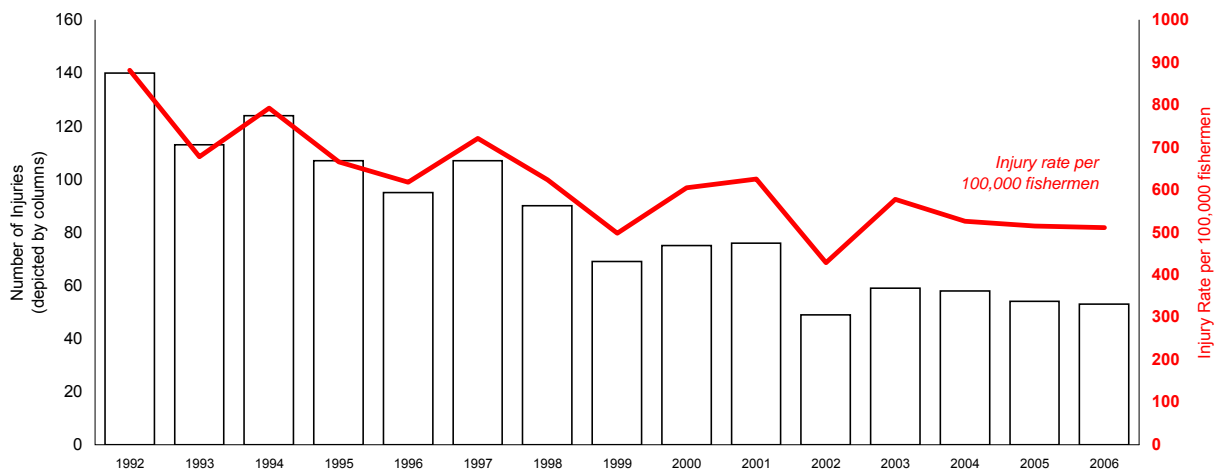
All injury types are grouped together in MIDS and recorded under headings such as "cuts/wound/lacerations" and "crush injury" to allow analysis of the trends for different injury types. It is not, however, possible to discern any trends over the 15 year period for each of the injury types recorded on the database. **Figure G5** plots a selection of injuries that tend to lead to more serious and potentially life-threatening scenarios.

Figure G5 indicates that although the numbers of potentially severe injuries occurring on all fishing vessels has clearly reduced over the study period, it would appear that the rate of these injuries when measured against the number of fishermen at risk, has not reduced to the same degree.

Earlier in this study, concern was raised regarding the high and steady injury rate observed on 15m to 24m vessels. Although not plotted in this report, there is again no clear trend in the injury types occurring on these vessels, whilst the overall percentages of injury types are remarkably similar. The most common recorded injury is a "cut/wound/laceration", representing around 16% of all injuries, with about 13% being crush injuries and 23% as fractures.

It is evident that given the nature of the machinery and heavy gear on board fishing vessels, combined with vessel movement, many of the injuries sustained by fishermen are extremely serious, and potentially life-threatening. Two MAIB investigations of accidents in 2006 on board *Danielle*¹ and *Sian Elizabeth*² are a timely reminder of the appalling injuries sustained by crew members when things go wrong during fishing operations. Both investigations identified issues of concern regarding the risk assessments for these vessels.

Figure G1: Number Injuries and Injury Rate per 100,000 Fishermen for UK Registered Fishing Vessels 1992 to 2006

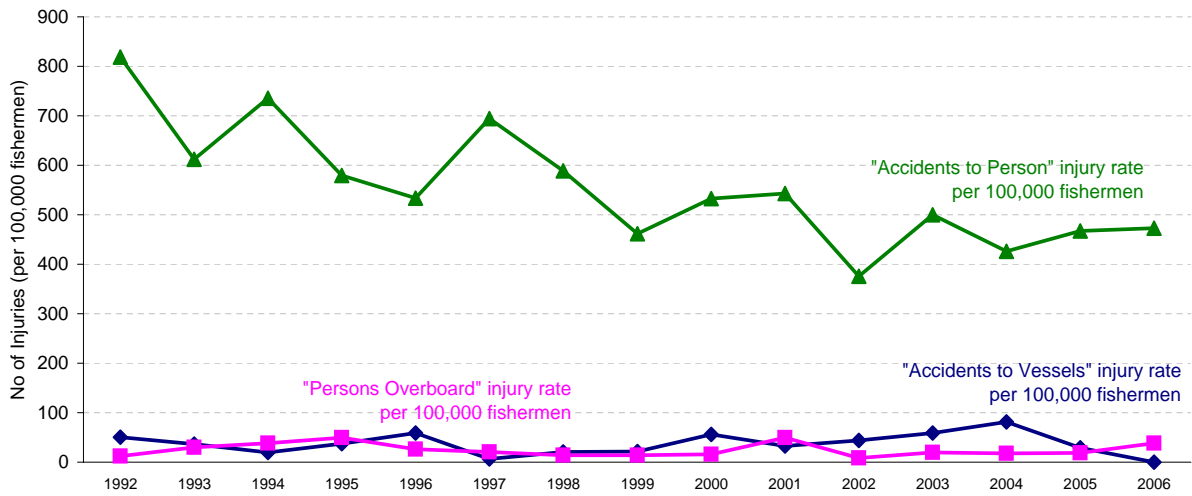


Source: Marine Accident Investigation Branch

¹ Report on the investigation of the major injuries sustained by a deckhand on board *fv Danielle* BM478 17 miles south-south-east of Falmouth on 6 June 2006, MAIB Report No 5/2007, March 2007.

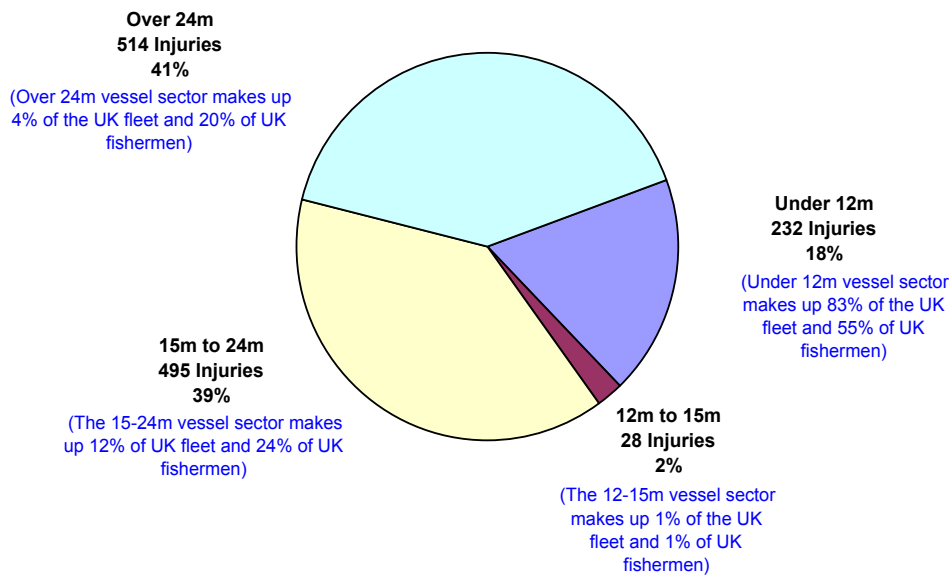
² Report on the investigation of the injury to a member of the crew on board the fishing vessel *Sian Elizabeth* 3 miles north of Kings Lynn 14 September 2006, MAIB Report No 3/2007, March 2007.

Figure G2: Injury Rates per 100,000 fishermen for UK Registered Fishing Vessels 1992 to 2006 Grouped by Category



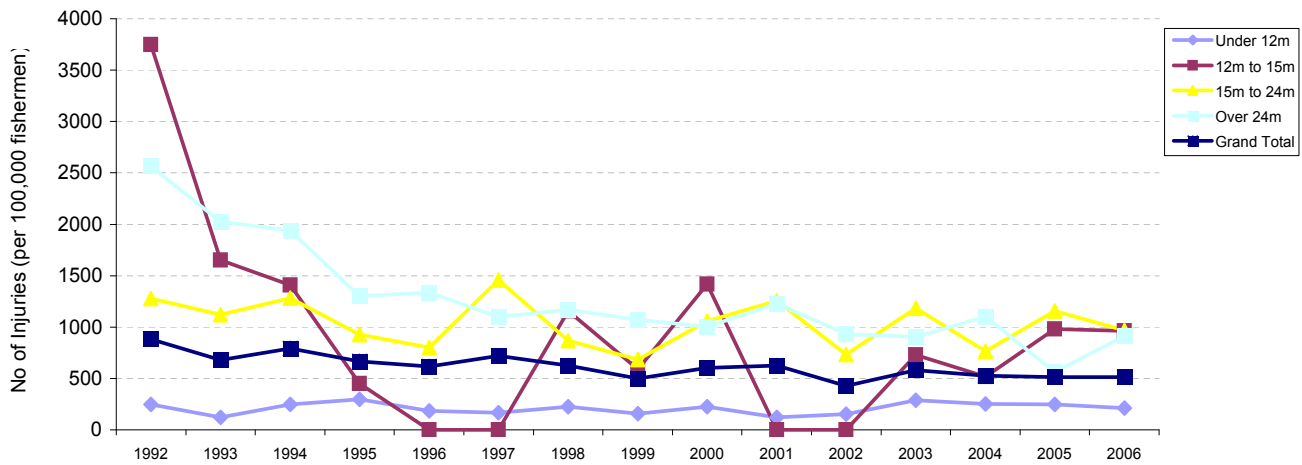
Source: Marine Accident Investigation Branch

Figure G3: Percentage of Injuries by Vessel Length Group on UK Registered Fishing Vessels 1992 to 2006



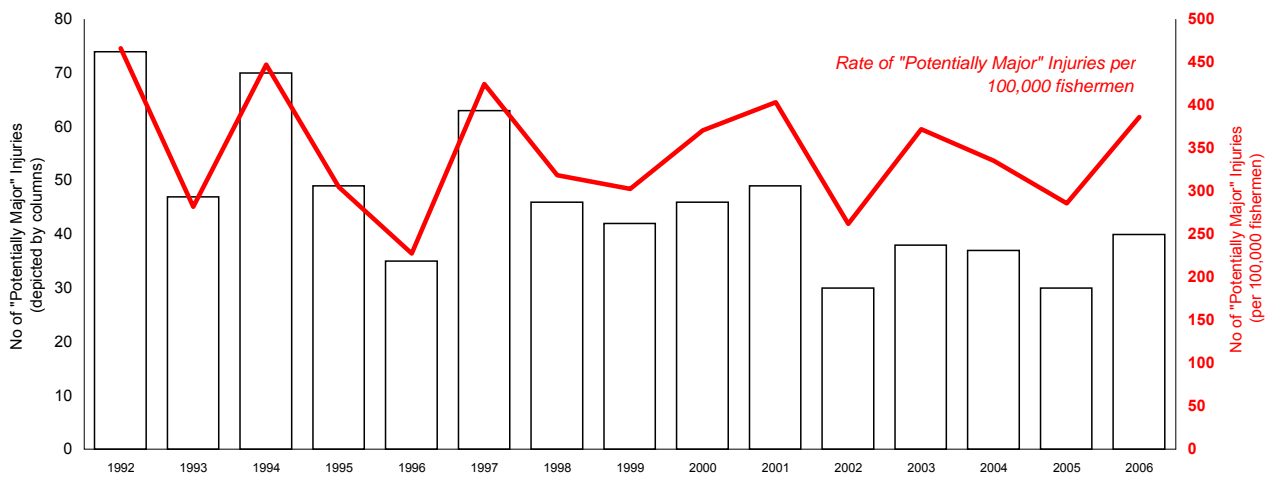
Source: Marine Accident Investigation Branch

Figure G4: Injury rates per 100,000 Fishermen for UK Registered Fishing Vessels by Length Group 1992 to 2006



Source: Marine Accident Investigation Branch

Figure G5: Number of "Potentially Major" Injuries and corresponding Injury Rate per 100,000 Fishermen for UK Registered Fishing Vessels 1992 to 2006



"Potentially Major" Injuries include:
 - Cuts/wound/lacerations
 - Crush injury
 - Fracture - of the skull/spine/pelvis/major bone in arm or leg
 - Concussion/unconsciousness due to head injury
 - Dislocations
 - Hypothermia - body temperature too cold

Source: Marine Accident Investigation Branch

Review of other data sources

H.1 REVIEW OF OTHER DATA SOURCES

H.1.1 Other data sources

As part of this safety study, MAIB reviewed other sources of contemporary UK fishing vessel accident data that might provide a further indication of safety trends within the industry.

Swansea University research work

In July 2007 the findings of a major MCA research project regarding mortality rates in both the UK merchant shipping and fishing industry were published¹. Conducted by Dr Stephen Roberts at Swansea University, this study was divided into three projects: reviewing UK merchant shipping mortality, UK fishing vessel fatal accidents and risk factors affecting survival following UK fishing vessel casualties.

The project evaluated and compared fatal accident rates for the UK merchant shipping and fishing industries between 1996 and 2005. These were 11 per 100,000 seafarer-years and 102 per 100,000 fishermen-years respectively. The latter statistic is commensurate with the findings of the MAIB figures calculated at **Figure F1** in **Annex F**.

No discernible reduction in the fatal accident rate in the UK fishing industry was reported by the project over the past 30 years. It was also concluded that as the fatal accident rate in the general UK workforce, including UK merchant shipping, has fallen sharply during this period, in relative terms commercial fishing has progressively become more hazardous over time.

The research also highlighted a continuing increase in both the mortality rate for fishermen working alone and the numbers of fatalities occurring on potting vessels, with the latter accounting for a quarter of all accidental deaths in the fishing industry between 1996 and 2005.

RNLI

Following every deployment of an RNLI lifeboat in the UK and Ireland, data is recorded and compiled by the Institution regarding the nature of the incident and its outcome, including whether lives were lost or saved.

Given that most accidents are reported to MAIB via the coastguard, which co-ordinates the search and rescue activities during an incident, it is likely that MAIB will be aware of the vast majority of RNLI activity relating to fishing vessels.

RNLI data for UK fishing vessel deployments has nevertheless been obtained and reviewed as part of this study to assist with identifying accident trends, acknowledging that there will be several key differences between the RNLI and MAIB data. For example, not all accidents reported to MAIB will have required the involvement of RNLI, whilst some lifeboat launches to assist fishing vessels might not necessarily be related to incidents considered reportable by MAIB.

¹ Roberts SE, Williams JC, Swansea University, *Update of mortality for workers in the UK merchant shipping and fishing factors*, Report for the Maritime and Coastguard Agency and the Department for Transport, MCA Research Project 578, July 2007, see: www.mcga.gov.uk.

Summary data from the RNLI indicates that, although there has been a reduction in the number of lifeboat launches assisting in the rescue of UK fishing vessels and fishermen, the rate of both has gradually risen due to the shrinkage of the fleet. Reviewing the figures for lives saved by the RNLI, as well as lives lost in an accident to which a lifeboat has been deployed, indicates a reduction in both the numbers and rates of these more serious accidents.

Insurance companies

Another source of data is provided by marine insurance companies, who tend to compile statistics of accidents involving fishing vessels that have been insured with their company.

Each company obviously insures different fleets of vessels, which can also change year-on-year, as vessels change insurance company for various reasons. Any such data therefore does not have the same consistent population as MAIB statistics, which cover the whole fleet of UK registered fishing vessels.

A number of UK-based major insurance companies were, nonetheless, approached and basic accident data obtained and reviewed. These indicated a general reduction in accidents and claims in recent years.

Marine Fisheries Agency (MFA), Defra

As part of this study, MAIB has obtained substantial amounts of data from MFA, Defra, providing various indicators of activity within the UK fishing industry. A selection of the more relevant data is provided below.

Figure H1 depicts the annual average price of fish for all species (blue line), based on the price per tonne of liveweight fish, along with the estimated figures (yellow line), based on the 1992 fish price increasing over the 15 year period in line with the annual UK Retail Prices Index (RPI)². The former shows a steady increase in the price of fish, with a more noticeable increase from 2004 onwards.

An indication of the amount of fish landed by UK fishing vessels, and the value of this fish, is provided at **Figure H2**. This confirms that although the amount of fish being landed has reduced over the 15 year period, the value has generally increased in line with the liveweight fish price.

Finally, as an indication of actual fishing activity by the fleet, figures for the average “days at sea” have been obtained from MFA and are plotted at **Figure H3**. Data was provided from 2000 to 2006, but exclude figures for <10m vessels due to limited data for these smaller vessels. It should be noted that any part of a day spent at sea is recorded as a complete “day at sea”, and therefore does not necessarily represent a full 24 hour’s fishing activity, nor indeed a full 24 hours spent at sea.

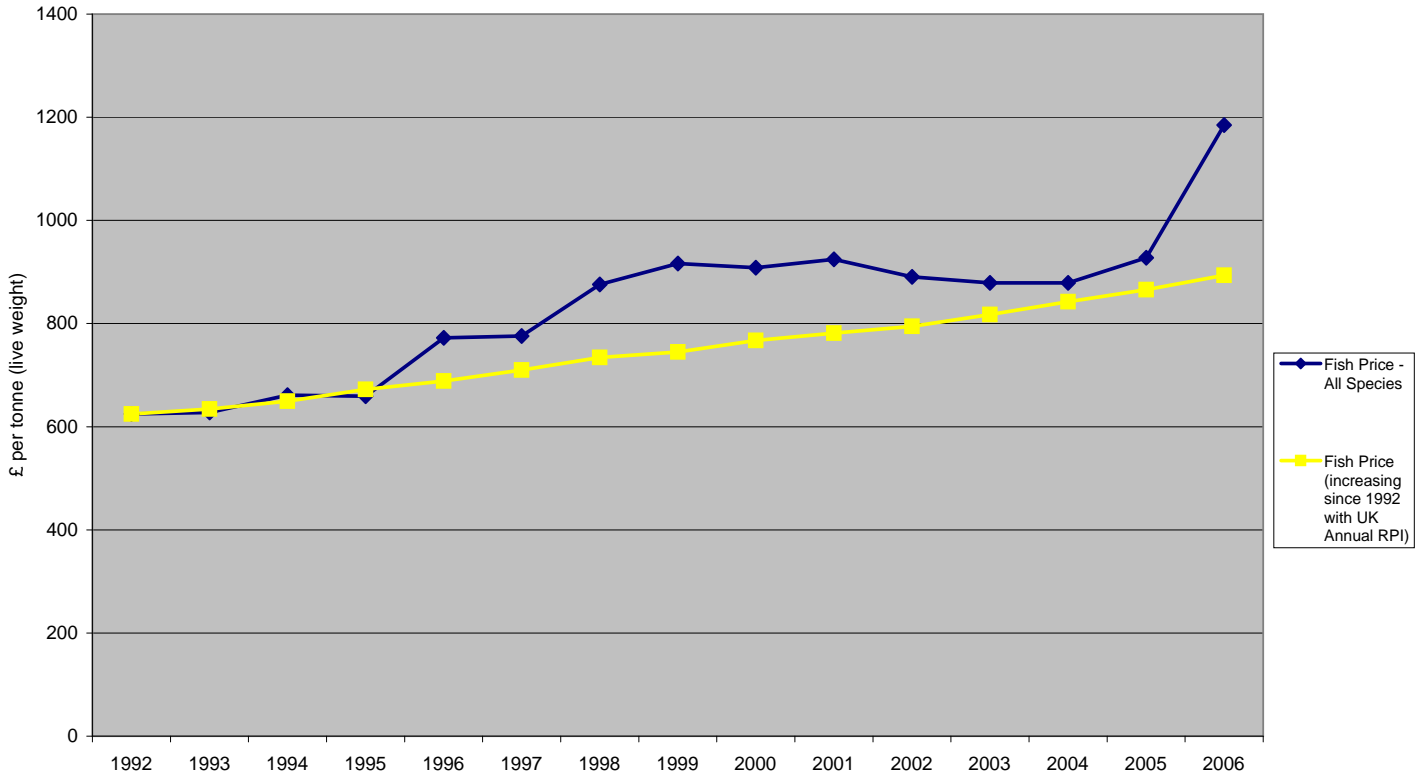
This suggests that during the period for which data has been provided there has been little overall change in the average amount of time spent by fishing vessels at sea.

² Refers to the value for “All Items”, as published on the National Statistics website:
www.statistics.gov.uk

Oil price

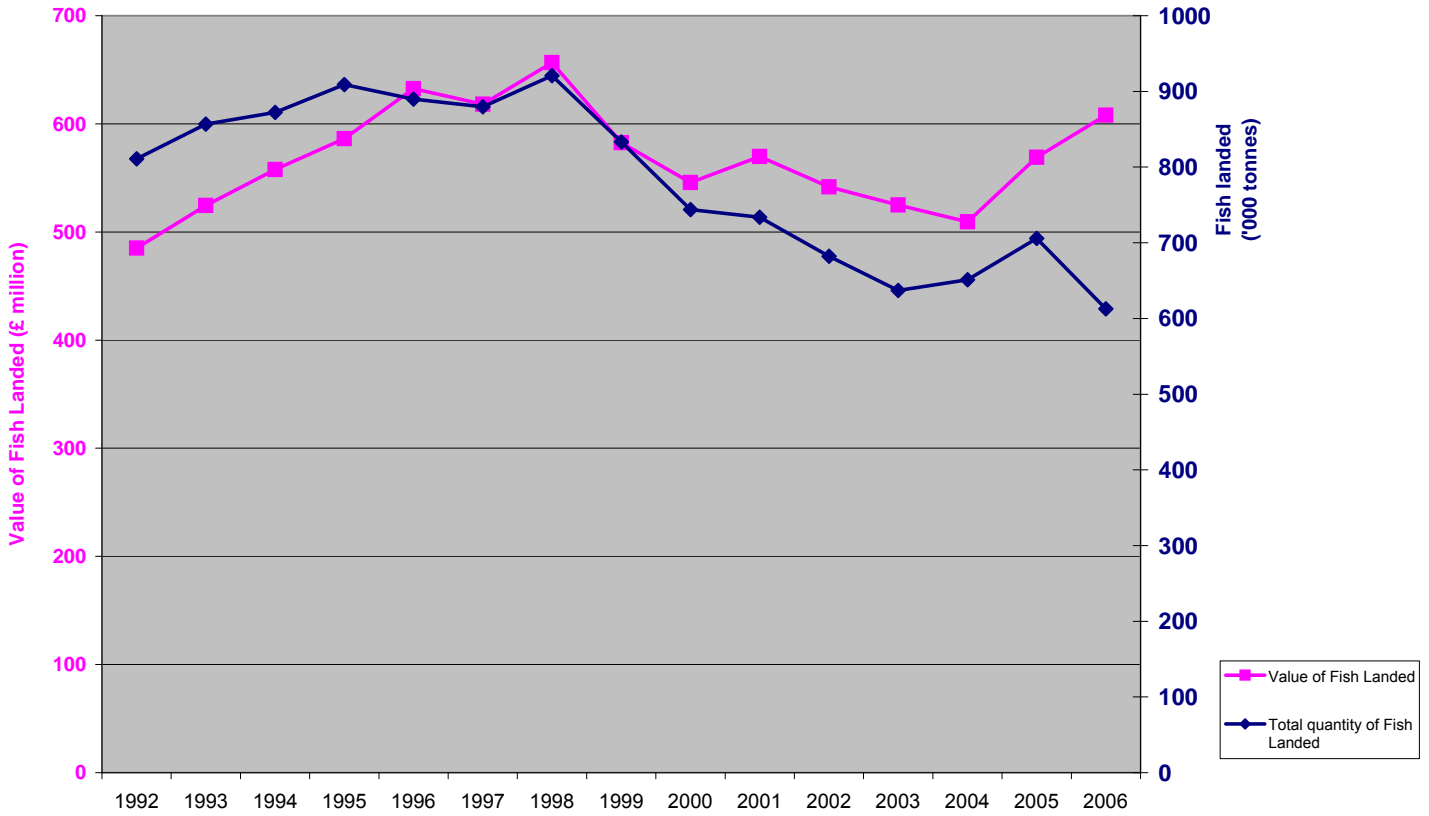
As a further indication of financial influences on the fishing industry, the impact of the price of oil has been assessed, based on available data for spot crude oil prices. These figures have not been recreated in this report, but indicate that oil prices generally increased over the 15 years, with a marked rise from around 2002.

Figure H1: Price of Fish for All Species per tonne live weight (1992-2006) for All UK Fishing Vessels



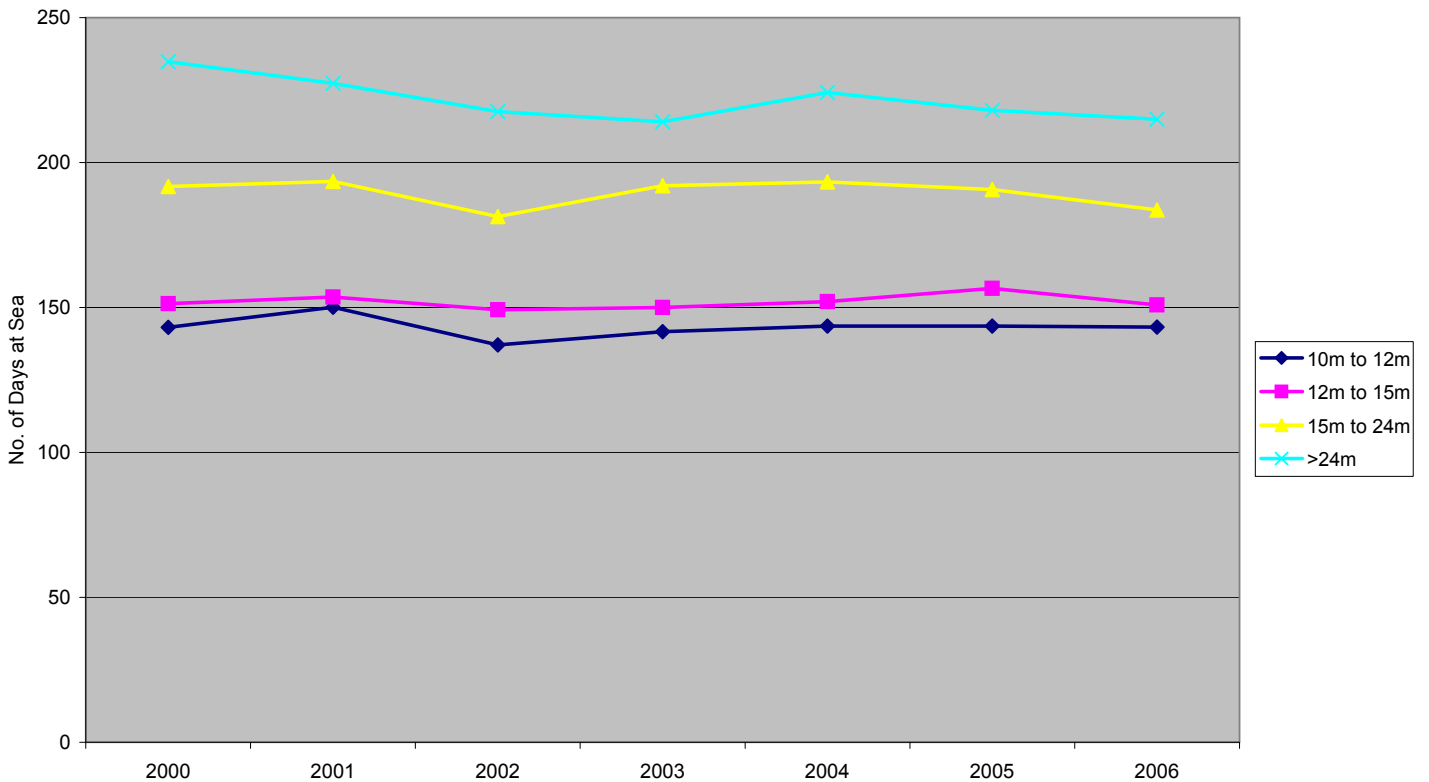
Source: Marine Fisheries Agency of Defra and www.statistics.gov.uk

Figure H2: Total Quantity and Value of Fish Landed by UK Fishing Vessels in UK and Abroad



Source: Marine Fisheries Agency of Defra

Figure H3: Average No. of Days at Sea per Vessel in Length Categories Over 10m in Length



Source: Marine Fisheries Agency of Defra

**Tabulated comparison of the requirements of the Small Fishing
Vessel Code with the Workboat Code**

I.1 TABULATED COMPARISON OF THE REQUIREMENTS OF THE SMALL FISHING VESSEL CODE WITH THE WORKBOAT CODE

Workboat Code Requirement	Small Fishing Vessel Code. Requirements for existing vessels before 01 April 2001	Small Fishing Vessel Code. Requirements for new vessels since 01 April 2001
Liferaft to be carried	No liferaft required on vessels less than 10m	No liferaft required on vessels less than 10m
Minimum freeboard of 400mm	No minimum freeboard requirements	No minimum freeboard requirements
Intact and damaged Stability required	No requirement	No requirement below 12m; recommended only for 12m to 15m vessels
Periodic out-of-water inspection by Certifying Authority	Third party inspection not required.	Third party inspection not required.
Annual examination by Certifying Authority	Third party inspection not required. Annual self certification by owner.	Third party inspection not required. Annual self certification by owner.
All hatchcovers and coamings to be properly secured and weathertight	No requirement	All hatchcovers and coamings to be properly secured and weathertight (Seafish construction standard)
Safety critical bulkheads to be watertight	No requirement for bulkheads.	Requirement for watertight bulkheads (Seafish construction standard)
Two bilge pumps required with combined capacity of not less than 8.4 tonnes/hour	One bilge pump required, capacity not specified.	Requirements for bilge pumps; number and capacity based on vessel length: <7m – 1 pump >7m – 2 pumps (Seafish construction standard)
Skipper to have a Certificate of Competency	No requirement below 16.5m, unless proceeding beyond Limited Area, (Annex J)	No requirement below 16.5m, unless proceeding beyond Limited Area, (Annex J)
Radar reflector required	No requirement (except for open vessels between 7m and 12m registered length)	No requirement (except for open vessels between 7m and 12m registered length)

Map showing the extent of the limited fishing area

FIGURE J1: MAP SHOWING THE EXTENT OF THE LIMITED FISHING AREA

