

**Final Report**

***Stakeholder Involvement in a UK Led  
Initiative to Align Spurdog Management with  
the Landing Obligation under the Reformed  
Common Fisheries Policy***

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## Executive summary

Spurdog (*Squalus acanthias*) in the North-east Atlantic (NEA) are classed as Endangered by the International Union for the Conservation of Nature (IUCN). Landings of this stock by commercial fishing vessels peaked in the 1960's, but have declined steadily ever since<sup>1</sup>. To address the decline in the stock, the European Commission (EC) first implemented management measures in 2000, with measures only becoming restrictive within the last decade. In 2010 a zero Total Allowable Catch (TAC) for the NEA stock was introduced, whereby no landings of spurdog are allowed by European Union (EU) Member State countries.

A zero TAC for spurdog does not result in a zero take from the stock. Fisheries scientists and managers, together with the fishing industry and NGOs, recognise that for the UK non-target fishery, a zero TAC for spurdog results in a requirement to discard all spurdog catches, whether dead or alive. Incidental by-catch of spurdog in mixed fisheries around the UK leads to fishing induced mortality of spurdog in terms of dead discards, a wasteful practice impacting on stock status.

The reformed Common Fisheries Policy (CFP) introduced a discard ban or landing obligation with a phased implementation from 2015. Species for which there is minimal or zero TAC have the potential to become 'choke' species in mixed fisheries, whereby it forces fishermen to stop fishing altogether and tie-up their vessels in areas where spurdog is caught as by-catch. As a zero TAC species, spurdog is not compliant with the principles of CFP reform and the new landing obligation.

One option for preventing spurdog from becoming a 'choke' species would be to add it to the Prohibited Species list, in effect opting out of fisheries legislation and therefore ensuring continued discarding. However, this is not an ideal solution. It is not in the spirit of implementing a landings obligation, would not contribute to reduction in fishing pressure of the stock, does not recognise the need for regional solutions to fisheries management, and does not address the continued issue of wasteful dead discarding.

Commissioned by Defra, a Cefas-led project MB0125 *Common Fisheries Policy reform implementation: aligning zero quota species and improving fisheries management – a spurdog case study (2013 – 2015)* proposed an alternative option. In May 2014, the output of the MB0125 project was as *an outline proposal for a UK pilot project to develop a real-time spurdog by-catch avoidance programme, mitigating the potential of spurdog as a 'choke' species, whilst reducing fishing induced mortality.*

This report summarises the stakeholder consultation process to take the initial outline proposal to a final proposal submitted to the Scientific, Technical and Economic Committee for Fisheries (STECF) for review in November 2014, then refined in

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<sup>1</sup> <http://www.ices.dk/sites/pub/Publication%20Reports/Advice/2014/2014/dgs-nea.pdf>

preparation for December Fisheries Council 2014 (Annex 3) for implementation of the UK pilot project in 2015.

Completed by the UK National Federation of Fishermen's Organisations (NFFO) (<http://www.nffo.org.uk>) and the Centre for Environment, Fisheries and Aquaculture Science (Cefas), a diverse range of stakeholders were engaged in the development of the proposal for a UK pilot project to align spurdog management in the NEA appropriately with the landing obligation.

In this collaborative Fisheries Science Partnership (FSP) project two regional consultation meetings and one national consultation workshop were convened and facilitated by the project team. Through peer-led facilitation, accessible meeting venues and the provision of comprehensive information, these meetings were well-attended and engagement from stakeholders was positive and constructive throughout. All of the stakeholders that were consulted are listed in the section titled 'Results'.

The process of stakeholder engagement developed and delivered through this FSP project met the projects aim to seek regional, national and European stakeholder involvement in the proposal for a UK pilot project to develop a real-time Spurdog By-catch Avoidance Programme.

It is recommended that the stakeholder engagement and consultation process developed through this FSP project be used as a model to inform the design and delivery of future consultative fora that seek to harness the views and knowledge of a mixed stakeholder group.

## **Fisheries Science Partnership**

A Fisheries Science Partnership involving the fishing industry, Department for Environment, Food and Rural Affairs (Defra) and Cefas scientists was established in 2003 to further relationships between UK fishermen and scientists and to involve fishermen in the co-commissioning of science, with the aims to:

- (a) Provide information from commercial fishing catches on key stocks to supplement data sources traditionally used in ICES assessments;
- (b) Investigate concerns raised by fishermen on scientific assessments or on stocks not currently assessed;
- (c) Investigate innovative scientific methods and or more selective / environmentally friendly fishing methods; and,
- (d) Support the work of Regional Advisory Councils.

To date, FSP projects have been successfully undertaken work on a variety of fish stocks and fisheries, including five previous studies specifically addressing elasmobranchs (sharks, skates and rays) in particular, two on spurdog (Ellis *et al.*, 2010; Bendall *et al.*, 2012). A full description of the FSP programme can be found on the GOV.UK website (<https://www.gov.uk/government/organisations/centre-for-environment-fisheries-and-aquaculture-science/about/research>).

This FSP project was set up as a collaboration between Cefas and the NFFO in order to engage a diverse range of stakeholders in the development of a UK-led pilot proposal to align spurdog management in the NEA appropriately with landing obligation under the reformed Common Fisheries Policy. It ran in parallel with the Defra-funded project *MB0125: Common Fisheries Policy reform implementation: aligning zero quota species and improving fisheries management – a spurdog case study* which commenced in October 2013.

## Introduction

In the NEA spurdog is found from Iceland and the Barents Sea southwards to the coast of Northwest Africa. The International Council for the Exploration of the Sea (ICES) Working Group of Elasmobranch Fishes (WGEF) considers that there is a single NEA stock ranging from the Barents Sea (Subarea I) to the Bay of Biscay (Subarea VIII), and that this is the most appropriate unit for assessment and management (ICES WGEF report 2013). Although they were considered nuisance fish in the 1800s, commercial landings increased during the first half of the 20<sup>th</sup> century with the UK, France, Ireland and Norway being the main exploiters of spurdog through large targeted fisheries in the NEA. The life-history traits (slow to reach maturity, long gestations and few young) of spurdog make them slow to recover from depletion, following significant fishing pressure. In consequence, commercial landings of spurdog have declined steadily since the peak of the fishery in the 1960s. To address the decline in the stock, the EC first implemented management measures in 2000.

However, it was only after ICES advised in 2006 that “*Targeted fisheries should not be permitted to continue, and by-catch in mixed fisheries should be reduced to the lowest possible level ...*” that EC measures to control fishing on spurdog became restrictive (in 2007). ICES also advised that “*...it is recommended that exploitation of this species should only be allowed when indicators and reference points for stock status and future harvest have been identified and a management strategy, including appropriate monitoring requirements, has been decided upon and is implemented*”. ICES reiterated the advice in 2008 and recommended a “*maximum landing length of 100 cm*”. Since 2010 there has been a zero TAC, which has environmental and economic implications for fisheries throughout the NEA (ICES WGEF report 2013). Since then (2011), ICES has advised that “*catches in mixed fisheries should be reduced to the lowest possible level ... a rebuilding plan should be developed for this stock but, given the longevity of spurdog, stock recovery will be slow*”. In 2014 ICES advised that “*there should be no target fishery and that by-catch should be minimized*”.

*Any possible provision for by-catch to be landed should be part of a rebuilding plan, including close monitoring of the stock and fishery”.*

Although the TAC for spurdog is set at zero, and there have been no targeted fisheries in EC or Norwegian waters since 2011, spurdog are still caught during operations in demersal trawl and gillnet fisheries within European waters. Consequently, spurdog are discarded, although the extent of the problem is unquantified. Some individuals do survive after discarding although the proportion surviving varies considerably depending on a number of factors (e.g. size of catch, gear type, volume of catch, time on deck, etc.; ICES Advice 2014).

The discarding of a TAC species such as spurdog will be a particular issue because Article 15 of the new CFP Basic Regulation introduces a discard ban or landing obligation with a phased implementation from 2015 (pelagics) and demersals from 2016-2019. The current level of dead discards of spurdog reported by the fishing industry is neither in-line with the principles of CFP reform or Defra's sustainable use of the marine environment, e.g. opposing wasteful discarding when supported by scientific evidence. Under a zero TAC, incidental by-catch of spurdog in mixed fisheries in the NEA has been reported to be high in some cases (Bendell et al, 2014). In consequence, under the CFP's new landing obligation, spurdog will become a 'choke' species in mixed fisheries because fishermen using gears that catch spurdog will be required to stop fishing if spurdog are being caught.

One option for preventing spurdog from becoming a 'choke' species would be to add it to the Prohibited Species list, in effect opting out of fisheries legislation and therefore resulting in continued discarding. However, this is not in the spirit of implementing a landings obligation, would not contribute to reduction in fishing pressure of the stock, does not recognise the need for regional solutions to fisheries management, and does not address the continued issue of wasteful dead discarding.

An alternative option was sought by Defra when in October 2013 they commissioned the Cefas-led project MB0125 *Common Fisheries Policy reform implementation: aligning zero quota species and improving fisheries management – a spurdog case study (2013–2015)*. The overall aim of this project was how to align spurdog with the new CFP landing obligation. Extensive data and scientific evidence were collated, including historic spurdog landings from the Marine Management Organisation (MMO) Fishery Activity Database (FAD), to develop a spatial model to test potential strategies such as closed areas for reducing spurdog discards in UK fisheries. Patterns of movements and distribution within the Irish and Celtic Seas were obtained from electronically tagged spurdog to determine their risk of capture. Evidence of spurdog survival, immediately post capture, was obtained for several gear types in the southern North Sea and Celtic Sea. Feasible options were identified for gear modifications and new technologies to reduce the quantity of spurdog by-catch in fixed nets (gill, trammel and tangle), trawl and longline fisheries.



In May 2014, the output of the MB0125 project was the draft Spurdog Alignment Plan – *as an outline proposal for a UK pilot project to develop a real-time spurdog by-catch avoidance programme, mitigating the potential of spurdog as a ‘choke’ species, whilst reducing fishing induced mortality*

This was proposed by the UK as a pilot project under article 7 and/or article 14.1 of Regulation (EU) No 1380/2013 of the European Parliament and of the Council. The Regulation allows for “pilot projects, based on the best available scientific advice and taking into account the opinions of the relevant Advisory Councils, with the aim of fully exploring all practicable methods for the avoidance, minimisation and elimination of unwanted catches in a fishery”. The UK proposed to use this provision to conduct a pilot project to assess the feasibility of a real-time Spurdog By-catch Avoidance Programme (Annex 3) with the purpose of:

- (i) Reducing the number of significant spurdog by-catch events in order to reduce wasteful dead discarding and overall fishing induced mortality of spurdog;
- (ii) promoting best practice in the return of live spurdog to the sea for the benefit of the stock;
- (iii) minimising the risk of spurdog becoming a ‘choke’ species by accounting for unpredictable and unavoidable bycatches within the future landing obligation through the provision of a by-catch quota for dead spurdog (at a level that allows for continued stock recovery and is within safe biological limits);
- (iv) not incentivising any targeting of the stock;
- (v) manage a dead by-catch quota at a level which is consistent with recovery of the NEA spurdog stock, along the same timelines as the ICES advice.

The UK pilot project proposed to adopt the format of previously used Real-Time Closures (RTCs) for cod in the North Sea and the highly successful real-time by-catch avoidance system in the US scallop fishery (O’Keefe & DeCelles, 2013). It is proposed that industry participants will avoid significant by-catch “hotspots” by adapting their fishing behaviour, through ‘move-on’ rules for relatively small areas, for a limited period. The location of these ‘move-on’ areas would be adaptive, and track the spatial dynamics of spurdog using real-time information from the fishery. Fishermen will be incentivised to participate in these avoidance measures. Such incentives include the provision of limited additional quota for commercial species, to an equivalent value of a hypothetical by-catch quota for dead spurdog.

The Fisheries Science Partnership was proposed as a way to provide funding for the necessary regional, national and European stakeholder involvement in the proposal for a UK pilot project to develop a real-time Spurdog By-catch Avoidance Programme. Cefas advertised a competitive tender seeking an industry partner, and the NFFO submitted a successful bid, sub-contracting Tegen-Mor fisheries consultants (<https://www.tegen-mor.co.uk>) to carry out the work with Cefas.



The present report documents the approach and outcome of two regional consultation meetings, and one national consultation workshop only, carried out as part of the FSP project. The revisions to the UK proposal for a real-time Spurdog By-catch Avoidance Programme, made as a direct consequence of the consultation phase through this FSP project, are reported separately in Annex 3 – A Working Document to December Fisheries Council 2014, following submission to and review by STECF.

## Objectives

The overall objective of this FSP project was to seek regional, national and European stakeholder involvement in the proposal for a UK pilot project to develop a real-time Spurdog By-catch Avoidance Programme to mitigate a ‘choke’ species and so minimise fishing induced mortality. The targeted stakeholders included the Devolved Administrations of Wales, Scotland and Northern Ireland, members of the North-west Waters and North Sea Advisory Council’s, fisheries organisations (NFFO, CFPO), fishermen and NGO’s (e.g. Shark Trust, Client Earth).

## Approach

The desired stakeholder involvement was achieved through convening and facilitating two regional consultation meetings with the fishing industry and one national consultation workshop involving all interested stakeholders. The approach was based on a previous FSP project (Programme 36: Scoping Industry Approaches to Fully Documented Fisheries; Dolder et al., 2013) which involved collaboration between a fishing industry appointed project manager and Cefas scientists to jointly identify key stakeholders, develop workshop materials (agendas, invitations, presentations and reports)

Three phases were implemented:

- i. Phase 1; *Engagement*. Members of the project team spoke with a cross-section of the fishing industry (representing different sectors) to seek views and consider the application of the UK initiative to align spurdog management appropriately with the landing obligation, in particular, the possibility of a bycatch provision for dead bycaught spurdog. This work informed the development of the pilot proposal and the agenda for the workshops. It also assisted in the identification of key stakeholders to be invited to the workshops.
- ii. Phase 2; *Regional meetings*. Two regional meetings were held with broad representation of experienced fishermen. These included those with practical experience of fisheries in which spurdog are taken as by-catch (identified under part i.). The location, time and venue for each workshop (Annex 1) was agreed by the fishing industry to maximise the chances of achieving good levels of industry attendance and engagement.

Chaired by a person nominated by the fishing industry, each meeting was used to evaluate the strengths and weaknesses from scientific and management perspectives of two potential spurdog management options under the landing obligation. These were (i) the addition of spurdog to the prohibited species list, and (ii) the proposed UK pilot project for a Spurdog By-catch Avoidance Programme.

A report of the meeting was circulated to meeting attendees.

- iii. Phase 3, *National consultation workshop*. Relevant stakeholders were brought together to inform the proposed UK pilot project. The workshop was held in London to facilitate convenient access for national and international attendees and speakers (Annex 2). Representation was drawn from ACs, NGOs, Government Policy Advisers and scientists to refine and finalise the aforementioned proposal, in preparation for submission to the STECF and the EC in time for December Fisheries Council 2014.

To inform discussion of the pilot proposal the workshop received presentations from two international scientists with practical experience in the successful implementation of real time by-catch reporting and mitigation programmes.

A report of the meeting was circulated to meeting attendees for further comment as necessary. A number of further points were raised by some stakeholders which were addressed

Following the consultations, the proposal for a UK pilot project was revised to best reflect the feedback received, before submission to STECF in the autumn of 2014, in preparation for the December Fisheries Council 2014 (Annex 3) and implementation of the pilot project in 2015.

## **Results**

The results of the two regional meetings and the one national workshop are provided below as reports of the discussions that took place during each event. Details of the invitations and agendas of the events are included at Annex 1 & 2.

### **First regional fishing industry engagement meeting**

**Newlyn, Wednesday 24<sup>th</sup> September 2014**

## Attendees

Paul Trebilcock (Chair)	CFPO	Kirsty McGregor	DEFRA
Victoria Bendall	CEFAS	Nathan de Rozarieux	NFFO
Stuart Hetherington	CEFAS	Scott Wharton	SP Trawlers
Amanda Young	CEFAS	Tony Rutherford	BD co-op
Rob Forster	CEFAS	David Stevens	FV Crystal Sea
Sam Smith	CEFAS	Elizabeth Stevenson	WS Ltd
Carol Billson	MMO	Phil Mitchell	FV Govenek of
Alan Dwan	FV Ajax		Ladram

## Background

The current level of dead discards of spurdog, a zero TAC species, reported by the fishing industry is neither in-line with the principles of the reformed Common Fisheries Policy or Defra's broader objectives for the marine environment.

## Aim

The aim of the meeting was to engage and consult with fishermen to develop an innovative pilot project intended to reduce discards of dead spurdog, whilst meeting the requirements of the reformed CFP.

## The proposal

How the landing obligation will be implemented for zero TAC species is unclear, without them immediately becoming a 'choke' species in a mixed fishery. This is where fishermen are forced to stop fishing altogether when spurdog is caught as by-catch, as there is an immediate uptake of the available TAC, set at zero.

There are currently 2 possible options, (i) the *de minimis* exception, or (ii) a prohibited/exception species list. The *de minimis* exception – a small discard proportion – and interspecies transfers, provides some departure from the Landing Obligation and flexibility to account for unpredictable and unavoidable catches. However, it is not applicable for data limited species, such as spurdog. Secondly, by placing spurdog on a prohibited species or exception species list, in effect 'opting out' of fisheries legislation, will not allow for future pragmatic fisheries management such as stock rebuilding plans.

Instead, Cefas proposed a third, alternative option, a nominal by-catch allowance for dead spurdog, managed through a Spurdog By-catch Avoidance Programme to mitigate the risk of spurdog becoming a 'choke' species and to minimise fishing induced mortality by decreasing the incidence of spurdog by-catch. The purpose is to aid conservation of spurdog, while providing legitimate flexibility within the future landing obligation to account for unpredictable and unavoidable catches. This third option was suggested as a pilot project, aligning spurdog, with the CFP Landing

Obligation under article 7 and/or article 14 of Regulation (EU) No 1380/2013 of the European Parliament and of the Council.

### **Outcomes.**

There was consensus that 'do nothing' would probably result in spurdog becoming a 'prohibited species' which was not seen as an acceptable option by the fishing industry representatives present.

There was support from fishermen for the Cefas/ Defra pilot project proposal, with some detail suggested as follows:

1. Up to 10 boats (5 trawlers & 5 netters) could be involved in the pilot project, for the Celtic Sea region, selected via a similar model to the issuing of UK Tuna fishing licences.
2. Real-time self-reporting could be triggered by catches of >500kg of spurdog in a 24hr period.
3. Live spurdog would be returned immediately to the sea.
4. Dead spurdog could be retained and landed to a permissible limit, to be determined.
5. Avoidance measures may differ by season i.e. move-on in autumn/ winter months, but in the spring/summer when spurdog are more mobile, remain in the same area as spurdog move through.
6. Industry would have to demonstrate 'responsible behaviour' that spurdog were not being targeted. This would be self-governed by those fishermen participating in the project, but outwardly demonstrated using real-time self-reporting, daily, via Sat-C (Inmarsat or e-mail).
7. It was proposed that the CFPO could co-ordinate the real-time self-reporting, disseminating information to the fleet.
8. Each grid cell of the real-time self-reporting grid was suggested to be 5 minutes of latitude x 5 minutes longitude (approx. area of 25 sq. miles) for netting vessels. The size of a grid cell for trawlers was not defined.

### **Actions:**

1. The outcome of the Newlyn consultation meeting, together with a draft summary of the proposed Spurdog By-catch Avoidance Programme to be circulated to the meeting attendees for comment.
2. The CFPO to bring comments back to National consultation workshop (Aligning Spurdog Management with the landing obligation under the Reformed Common Fisheries Policy – A proposed way forward) on the 10th October 2014.

## Second regional fishing industry engagement meeting

Aldeburgh, Friday 26<sup>th</sup> September 2014

### Attendees

Nathan de Rozarieux (Chair)	NFFO	Edward Burrell	FV Avril Rose
Stuart Hetherington	CEFAS	Ronald Richards	FV G&E
Victoria Bendall	CEFAS	Dave Cuthbert	NUTFA
Paige-Leanne Stromberg	NFFO	Colin Clarke	FV Mistress 3
Peter Draper	MMO	Nigel Hayter	FV Mistress 3
Rob Butters	FV Valerie Anne	John Knights	FV Icen
Neil Macro	FV Girl Fiona	Ed Butters	FV Rene B
Ove Jinkerson	FV Western lady	William Pinney	FV Jolene
Malcolm Tubby	FV Lady Cinderella		
Steve Wightman	Georgie Girl		
Terrance Wightman	Georgie Girl		
Kirk Stribling	Silver Harvest		

**Background, Aim and Proposal** – same as for the first consultation meeting (see above).

### Outcomes

There was consensus that ‘do nothing’ would probably result in spurdog becoming a ‘prohibited species’ which was not seen as an acceptable option by the fishing industry representatives present.

It was agreed by the fishermen present that spurdog by-catch along the East Anglian coast was primarily an issue to long-liners.

There was consensus that no type of gear selection or bait alternative would reduce spurdog by-catch on long-lines.

Concerns were raised regarding the classification of high discard survival of long-line caught spurdog, which are subsequently discarded.

Suggestions were made to carry out the pilot project in two phases.

**Phase 1:** Initially, determine the discard survival of long-line caught spurdog, from typical commercial practice, following the use of stripper bars.

**Phase 2:** Depending on the dead discard fraction of by-caught spurdog in the long-line fishery (informed by phase 1), extension of the proposed pilot project into the southern North Sea.

There was support from fishermen for the Cefas / Defra pilot project proposal, with some detail suggested as follows:

1. It was suggested that 6 vessels could participate in phase 2, 2 vessels (one offshore and one inshore) from the Northern, central and Southern limits of East Anglia. Issues were raised by some participants not to use the whole fleet. Any subsequent call for vessel-based work will be through an open, transparent and fair tender process, adhering to UK Government and EU procurement rules.
2. Real-time self-reporting could be triggered by catches of >250kg of spurdog in a 24hr period.
3. Live spurdog would be returned immediately to sea.
4. Dead spurdog could be retained and landed to a permissible limit, to be determined.
5. Industry would have to demonstrate 'responsible behaviour' that spurdog were not being targeted. This would be self-governed by those fishermen participating in the project, but outwardly demonstrated using real-time self-reporting, daily, via email, with-in 2 hours of returning to port.
6. It was proposed that the Cefas/ MMO could co-ordinate the real-time self-reporting, disseminating information to the fleet on hot-spot areas and move-on rules.

**Actions:**

1. The outcome of the Aldeburgh consultation meeting, together with a draft summary of the proposed Spurdog By-catch Allowance Programme to be circulated to the meeting attendees for comment.
2. The Lowestoft MMO office to facilitate comments back to the NFFO in time for the National consultation workshop (Aligning Spurdog Management with the Landing Obligation under the Reformed Common Fisheries Policy – A proposed way forward) on the 10th October 2014.

## **National consultation meeting workshop**

**London, Friday 10<sup>th</sup> October 2014**

### **Attendees**

Joanna Barker	Zoological Society of London
Jurgen Batsleer	VisNed
Victoria Bendall	Cefas
Claire Bowers	MMO
Tom Bryan-Brown	Mallaig & North-West Fishermen's Association
Liam Butterfield	Client Earth
John Butterwith	North Devon Fishermen's Association
Nuala Carson	Defra
Bernadette Clarke	Marine Conservation Society
Barrie Deas	National Federation of Fishermen's Organisations
Nathan de Rozarieux	National Federation of Fishermen's Organisations
Clive Fox	Scottish Association for Marine Science
Stuart Hetherington	Cefas
Irene KingmaDutch	Elasmobranch Society
Jonathan Labaree	Gulf of Maine Research Institute
Kirsty McGregor	Defra
Leeanne Mullan	Marine Scotland
John Nichols	NUTFA
Catherine O'Keefe	School for Marine Science & Technology
Jamie Rendell	Defra
Dale Rodmell	National Federation of Fishermen's Organisations
Heather Stewart	Marine Scotland
Paige-Leanne Stromberg	National Federation of Fishermen's Organisations
Paul Trebilcock	Cornish Fish Producers Organisation
Steve Wightman	Fisherman
Martyn Youell	Marine Management Organisation

### **A perspective from the fishing industry**

Spurdog was discussed as once being part of the mixed fishery in the Southwest, but now a zero TAC species. As a result of the upcoming landing obligation there is a need for a manageable solution to the issue of spurdog by-catch and discards. The behaviour shift of fishermen actively avoiding spurdog was discussed, and it was made clear that the proposed pilot project needs to engage all stakeholders in order to address the relationship between zero TAC species and the landings obligation in a way that is sensible, practical and sustainable.

### **Movement patterns of Spurdog in UK waters**

The current work by Cefas was discussed, including post capture vitality assessments of spurdog.



## **Defra policy on spurdog**

The bigger picture for Defra policy was discussed, including securing the best possible economic and social benefits from the marine environment from the least environmental cost. Legal drivers were explained and the need for flexibility within the proposed pilot project was discussed. It was made clear that although there was a possibility of spurdog being placed on the prohibited species list, this is not what the proposed pilot project was outlining as this does not eliminate the problem of wasteful discards. The next steps of the pilot project proposal in terms of seeking approval were explained.

## **The Proposal**

The proposal for a pilot project to develop a real-time Spurdog By-catch Avoidance Programme, incentivised by the landing of dead spurdog by-catch, to mitigate spurdog becoming a 'choke' species, was presented. It was explained that although a relatively new concept for the UK, real-time management has been achieved successfully for other species elsewhere in the world.

Initial questions/comments:

- Is 24 hours a fast enough reporting time to avoid choking of the fishery? Turn-around time needs to be taken into consideration.
- Does the proposal consider different types of gear used and the length of time spent at sea? Issues were raised regarding the lack of baseline data for mobile gear with regards to spurdog, and whether or not this would need to be collected prior to the pilot scheme.
- Is the ability of smaller vessels to 'move on' taken into account?
- The provisions for the allocation of TAC were questioned, and it was suggested that selective measures be used in order to avoid targeting of the species.
- The issue was raised that communication needs to be clear, and it needs to be made apparent to EU member states that the project is not about gaining extra quota but creating a model tool that can be altered and shaped to help align zero TAC species with the landing obligation.

## **A US example - Using fishermen-reported data to reduce bycatch**

An example of using fishermen reported data to reduce bycatch of yellowtail flounder in the US scallop fishery was presented. It was explained that this was a voluntary programme initiated in 2009 which was developed by collaboration with fishermen in a two phase system:

The first phase examined existing data including dredge surveys prior to the fishery opening. This data was used to produce a ratio threshold for yellowtail flounder. The second phase consisted of establishing real-time communication based on access

areas heavily influenced by fishermen's knowledge. Data on area, number of tows and how much bycatch were reported on a 24 hour basis, compiled and sent back to the fleet as an advisory via VMS ship-to-shore email.

It was explained that the project included an initial data collection phase to use as a baseline, which provided evidence of behaviour change. Trigger levels for critical mass were questioned and it was explained that anything less than 3 vessels reporting per cell was not seen as accurate.

### **Fishing Area Selectivity Tool - One approach to real-time reporting**

The management of the groundfish fishery in the Gulf of Maine was presented and an example of real-time reporting in the form of an online fishing area selectivity tool was explained. This approach to real-time reporting allowed users to access various layers of data including historic data, oceanographic data and data reported by respective cooperatives. This method allows fishermen to share information amongst themselves regarding observations of constraining species.

### **Open Floor Discussion**

**Drivers:** The marketable value of spurdog was discussed, and it was estimated at roughly £1 per kilo. The issue of proportionate marketable value was raised with regards to the proportion of spurdog catch which can be sold. The possibility of spurdog being targeted was discussed and how this would be prevented. Questions were raised regarding assessments of the scheme, and it was explained that quality assurance checks would be carried out throughout the scheme, perhaps against pre-pilot data which could prove changes in fishermen's behaviour and that targeting the stock is not being incentivised. Issues were raised regarding EU participation and it was agreed that different EU interests would be considered.

**Trigger Figure:** The trigger figure to initiate real-time reporting was discussed, and options of using figures relevant to catch, a baseline of 500kg and counting individual spurdog were explored. Issues were raised regarding sex and maturity of spurdog and whether or not this affects the trigger figure. It was explained that from industry experience aggregations of spurdog are sporadic and irregular, but can be very substantial. Options of using both medium risk and high risk trigger figures were discussed. How far vessels would need to move was agreed to be a decision by fishermen based on their knowledge.

**Bycatch allowance:** Using ICES advice and landings data of spurdog into Padstow, Newlyn and Plymouth in 2009; Defra calculated a 25t precautionary bycatch allowance for the proposed pilot project. It was argued that this figure was too low to incentivise fishermen to participate and the options of using the bycatch data from the NEPTUNE project were explored. It was explained that this data did not account for seasonality but it was agreed that this would be explored in further detail.

**Number of boats:** The number of participants for the pilot project was discussed, and it was suggested that a maximum of ten (five static, five mobile) over 10m vessels would take part.

**Communication:** Options for communication were explored, and it was suggested that boats email their local Producers Organisation which coordinate data, with advisory maps prepared by Cefas. It was agreed that any advisory maps and data would be shared between the participants, Cefas and the MMO. In terms of public awareness, it was suggested that landed dead spurdog be tagged in order to show that they are part of the science programme aimed at reducing fishing mortality.

**Landing safeguards:** It was agreed by the MMO that if the landing of dead spurdog bycatch was allowed, landings would be monitored in the standard way - and perhaps more closely due to the nature of the project. Elog data would also be compared to what was landed.

## **Summary**

The workshop presented the project to a wide range of stakeholders. Experience in the US is valuable in the sense that it can be learnt from and adapted to suit the proposed pilot project. All the points and issues raised were considered to develop the proposal for a UK pilot project to develop a real-time Spurdog By-catch Avoidance Programme, before submission to STECF and December Fisheries Council 2014.

## **Discussion**

### **Stakeholder engagement**

The consultation and involvement of numerous stakeholders was achieved through appropriate peer-led facilitation, accessible meeting venues and comprehensive information being provided. The consultation events were well-attended and engagement from stakeholders was positive and constructive throughout.

The views and insight provided by stakeholders at the consultation events was subsequently used by Cefas and Defra to review and refine the UK pilot project to develop a real-time Spurdog By-catch Avoidance Programme before submission to STECF in October 2014, preparation for December Fisheries Council 2014 and implementation of the UK pilot project in 2015.

The response from UK stakeholders to workshop invitations was good (>80% attended) but the response from stakeholders from other Member States was less than anticipated. The reasons for this could be cost (both in time and travel) or that the issue is a lower priority in other Member States.

## **Concern's raised**

There was widespread stakeholder support for the proposal for a UK pilot project. However, some concerns were raised by the fishing industry and the wider stakeholders, outlined below. These concerns (and others) were addressed in the proposal (see Annex 3) subsequently agreed through bi-lateral conversations with the relevant stakeholder groups.

### **Fishing industry**

Discussions in all the workshops identified that the UK fishing fleet was already actively avoiding known spurdog aggregations and that stakeholders are receptive to the idea of formalising these avoidance measures. There is however some reluctance within the fishing industry to formalise their voluntary avoidance in fear of traditional closures that are fixed in space and time, curtailing fishing activity. For this reason, real-time by-catch avoidance measures are proposed, involving 'move-on' rules to fishing, for small areas, for a designated limited period, although the utility of such an approach needs to be evaluated.

### **Other stakeholders**

Whilst supportive in principle NGOs and Government Administrations voiced concerns about supply-chain integrity and safeguards that would be needed to ensure that only those dead spurdog caught during the pilot were landed and offered for sale. In addition, there was a view that great care should be taken to avoid incentivising the landing of spurdog.

## **Conclusion and recommendations**

The process of stakeholder engagement developed and delivered through this FSP project met the projects aim to seek regional, national and European stakeholder involvement in the proposal for a UK pilot project to develop a real-time Spurdog By-catch Avoidance Programme.

Workshops were co-ordinated and facilitated in partnership with the fishing industry and this collaborative approach helped ensure that discussions were proactive and positive. It is recommended that the stakeholder engagement and consultation process developed through this FSP project be used as model to inform the design and delivery of future consultative fora that seek to harness the views and knowledge of a mixed stakeholder group.

The consultation phase to inform the development of the proposed UK pilot project has been completed; however, stakeholders that participated in the project will wish to remain informed and engaged in the next steps to develop the pilot project proposal and future policy developments in this area.

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## Acknowledgements

The project team wishes to thank all those who engaged so enthusiastically in the workshops and provided a thoroughly productive and engaging discussion to develop the UK approach to align spurdog management with the landing obligation under the reformed CFP.

## Annex 1: Regional meeting invitation



### Aligning Spurdog Management with the Landing Obligation under the reformed Common Fisheries Policy (CFP): Regional Meetings

**White Lion Hotel, Aldeburgh, 26<sup>th</sup> September at 10am**  
**RNMDSF, Newlyn, 24<sup>th</sup> September at 10am**

**Background** - The current level of dead discards of zero Total Allowable Catch (TAC) species reported by the fishing industry is neither in-line with the principles of the reformed Common Fisheries Policy or Defra's broader objectives for the marine environment.

**Aim** - the aim of this project is to engage a wide range of stakeholders (scientists, fishermen and NGOs) regionally, nationally and at a European level to develop an innovative pilot project aimed at reducing discards of dead spurdog, whilst meeting the requirements of the reformed CFP.



**Outline approach** – the project will explore bespoke fishery specific management measures and nominal bycatch allowances (TAC) for dead bycatch, that do not incentivise targeting of the stock. This will be underpinned by biological research, fishermen's knowledge and the collation and analysis of relevant existing and new commercial bycatch and discard data.

Options for spatial and temporal avoidance, for example, using electronic tag

data, and by-catch mitigation will also be considered. The proposal will take account of i) ICES advice; ii) the conservation status of spurdog; iii) Defra policy of opposing wasteful discards; iv) that the zero-TAC is resulting in high levels of regulatory discards and v) that dead discarding is not in line with the CFP.



**Please confirm your attendance to Joanna Lenehan (01904) 635430,  
[Joanna@nffo.org.uk](mailto:Joanna@nffo.org.uk)**

## Annex 2: National consultation workshop invitation



Dear Sir / Madam,

### **Invitation to attend joint Cefas/NFFO workshop on 'Aligning Spurdog Management with the Landing Obligation under the Reformed Common Fisheries Policy (CFP)'**

**Venue: The Hilton London Green Park, Half Moon Street, Mayfair, London, W1J 7BN**

**Date: Friday 10<sup>th</sup> October 2014 Time: 11.00am – 16.00**

You are invited to take part in meetings to develop a proposal to align spurdog management with the landing obligation under the reformed Common Fisheries Policy.

The workshop has been set up under a Fisheries Science Partnership (FSP) project between the NFFO and Cefas. Your input is sought to explore the practicalities of proposals developed in consultation with the fishing industry and other stakeholders. Information and knowledge from the workshop will play an important part in shaping a Defra-led initiative to the European Commission later this year. Further background information about the project can be found on the enclosed sheet.

**To assist us in our organisation of the meetings we would be grateful if you could confirm as soon as possible to Joanna Lenehan at the NFFO (Joanna@nffo.org.uk, +44 01904 635430). Lunch and refreshments will be provided. Please advise if you have any special dietary needs.**

**If you are unable to attend but would still like to input your view then please contact a member of the project team: Dale Rodmell at the NFFO on +44 (0)1904 635430, or Stuart Hetherington, the Cefas project manager on +44 (0)1502 527719.**

Yours faithfully,

Dale Rodmell  
**Assistant Chief Executive**



## **Project Background Information**

The current level of dead discards of zero Total Allowable Catch (TAC) species reported by the fishing industry is neither in-line with the principles of the reformed Common Fisheries Policy or Defra's broader objectives for the marine environment.

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The aim of this project is to engage a wide range of stakeholders (scientists, fishermen and NGOs) regionally, nationally and at a European level to develop an innovative pilot project aimed at reducing discards of dead spurdog, whilst meeting the requirements of the reformed CFP.

### **Outline approach**

The project will explore bespoke fishery specific management measures and nominal bycatch allowances (TAC) for dead bycatch, that do not incentivise targeting of the stock. This will be underpinned by biological research, fishermen's knowledge and the collation and analysis of relevant existing and new commercial bycatch and discard data.

Options for spatial and temporal avoidance, for example, using electronic tag data, and by-catch mitigation will also be considered. The proposal will take account of i) ICES advice; ii) the conservation status of spurdog; iii) Defra policy of opposing wasteful discards; iv) that the zero-TAC is resulting in high levels of regulatory discards and v) that dead discarding is not in line with the CFP.

**Annex 3: UK Pilot proposal informed by stakeholder engagement**

**Proposal for a UK Pilot Project to develop a real-time Spurdog By-catch Avoidance Programme to mitigate a *choke* species and so minimise fishing induced mortality**

**Prepared (in alphabetical order) by**

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**Final Document**

**10<sup>th</sup> December 2014**

# UK Pilot Project Proposal

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# UK Pilot Project Proposal

## Summary

- Spurdog (*Squalus acanthias*) is currently managed by a zero Total Allowable Catch (TAC). However, incidental by-catch of spurdog in mixed fisheries in the North-east Atlantic (NEA) can be high. In consequence, under a landing obligation, spurdog has the potential to become a **choke species** in mixed fisheries, whereby it forces fishermen to stop fishing in areas where spurdog is caught as by-catch.
- One option for preventing spurdog from becoming a choke species would be to add it to the Prohibited Species list therefore ensuring no retention and continued discarding. However, this is not an ideal solution. It is not in the spirit of implementing a landings obligation, does not recognise the need for regional solutions to fisheries management, and does not address the continued issue of wasteful dead discarding.
- For this reason the UK proposes a pilot project under article 7 and/or article 14 of Regulation (EU) No 1380/2013 of the European Parliament and of the Council to allow industry participants to adapt their fishing behaviour **to avoid significant spurdog by-catch**. The UK pilot project will be undertaken in the Celtic Sea (ICES Divisions VIIe-j) and involves close collaboration between policy makers, scientists, industry, and NGOs.
- The pilot would contribute to the development of a rebuilding and management plan for spurdog by **aiding** in its conservation and recovery in the NEA. This would be achieved by **reducing fishing induced mortality and promoting by-catch avoidance**, while providing legitimate flexibility within the future Landing Obligation **to account for unpredictable and unavoidable by-catches**.
- Fishermen will be encouraged to participate in a spurdog by-catch avoidance programme, involving real-time spatial avoidance measures. The provision of a small (50 tonne) marketable **dead** spurdog by-catch quota is proposed to account for unavoidable by-catch and test the practicality of the approach throughout the supply chain.
- Safeguards will be established to ensure that **dead** spurdog by-catch quota is not accrued at an individual-vessel level, nor that between-vessel quota trading is permitted. This will prevent deliberate targeting of spurdog and any initiation of a limited target fishery.
- The proposed pilot project will be evaluated against clear measurable objectives including, but not exclusively, level of (i) landings, (ii) engagement, (iii) timely provision of data and (iv) data quality. In addition, baseline spurdog by-catch data and Vessel Monitoring System (VMS) data will be used to evaluate spurdog by-catch avoidance behaviour by participating commercial fishing vessels, and in turn levels of reduction in spurdog by-catch.
- If successful, the pilot project would reduce overall fishing mortality, speed stock recovery, minimise the risk of creating a *choke* species, support economically viable and sustainable fisheries, and **end the practice of wasteful dead discarding in line with the principles of the Landing Obligation**.
- Following informal feedback from the European Commission on the proposal, there has been additional stakeholder and Member State consultation. This UK pilot project proposal was submitted to the Scientific, Technical and Economic Committee for Fisheries (STECF) for review (STECF 2014), to refine the principles and approach, before implementation of the pilot project in 2015.
- If successful, wider engagement with Member States will be initiated to test the broader application of the principles of the pilot project with the intention of providing a model for the management of the NEA population of spurdog. The approach and lessons learnt could also be applied to other fishery species at risk of becoming *choke* species.

# UK Pilot Project Proposal

## **Background**

Article 15 of the new CFP Basic Regulation introduced a landing obligation with a phased implementation from 2015 (pelagics) and demersals from 2016-2019. Species for which there is minimal or zero TAC have the potential to become *choke* species in mixed demersal fisheries. Spurdog is a zero TAC species, and the current level of dead discards would not be compliant with the principles of CFP reform and the new Landing Obligation.

Article 7.1 (h) of Regulation (EU) No 1380/2013 of the European Parliament and of the Council allows for '*pilot projects on alternative types of fishing management techniques*' that will help to achieve '*sustainable exploitation of marine biological resource*' and '*minimise the negative impact of fishing activities on the marine environment*'. Article 14.1 of the same regulation allows for "*pilot projects, based on the best available scientific advice and taking into account the opinions of the relevant Advisory Councils, with the aim of fully exploring all practicable methods for the avoidance, minimisation and elimination of unwanted catches in a fishery*".

**The UK proposes to use these provisions to conduct a pilot project to assess the feasibility of a real-time spurdog by-catch avoidance programme**, with the purpose of:

- avoiding significant spurdog by-catch events in order to reduce wasteful dead discarding and overall fishing induced mortality of spurdog;
- promoting best practice in the return of live spurdog to the sea for the benefit of the stock;
- minimising the risk of spurdog becoming a choke species by accounting for unpredictable and unavoidable bycatches within the future landing obligation through the provision of a by-catch quota for **dead** spurdog (at a level that allows for continued stock recovery and is within safe biological limits);
- not incentivising any targeting of the stock;
- effectively managing a **dead** by-catch quota within model projections that results in similar levels of population growth to the current zero TAC; i.e. 13% (10–17%) in 5 years and 28% (21–35%) in 10 years, with the population doubling in 30 years.

With the addition of minor gear modification measures, the proposal adopts the format of previously used Real-Time Closures (RTCs) for cod in the North Sea and the highly successful real-time by-catch avoidance system in the US scallop fishery (O'Keefe & DeCelles, 2013). It is proposed that industry participants will avoid significant by-catch "hotspots" by adapting their fishing behaviour, through 'move-on' rules for relatively small areas, for a limited period. The location of these 'move-on' areas would be adaptive, and track the spatial dynamics of spurdog using real-time information from the fishery. Fishermen would be encouraged to participate by the provision of an evidence-based, by-catch quota for **dead** spurdog, providing flexibility to account for unpredictable and unavoidable catches.

**Scientific data from studies of spurdog distribution, by-catch and survivability in the Celtic Sea (ICES Divisions VIIe-j), have been collated and analysed to underpin the principles of the proposal.** Following informal feedback from the European Commission on the proposal in May 2014, there has been additional stakeholder consultation to refine the principles and approach, before submission to STECF for review and implementation of the pilot project in 2015.

## **Spurdog stock status and distribution**

In the NEA, spurdog is found from Iceland and the Barents Sea southwards to the coast of Northwest Africa. The International Council for the Exploration of the Sea (ICES) Working Group of Elasmobranch Fishes (WGEF) considers that there is a single NEA stock ranging from the Barents Sea (Subarea I) to the Bay of Biscay (Subarea VIII), and that this is the most appropriate unit for assessment and management.

## UK Pilot Project Proposal

Spurdog was traditionally taken in a variety of commercial fisheries, including as a by-catch in various trawl and gillnet fisheries, and targeted long-line fisheries along certain parts of the European coast (ICES WGEF Report 2013). Although they were considered nuisance fish in the 1800s, commercial landings increased during the first half of the 20th century, but have declined steadily since the peak of the fishery in the 1960s (Figure 1a). The present decline in the spurdog stock has been assessed from commercial catches (Figure 1b), and International Beam Trawl Surveys (IBTS; Figure 2a&b). **Note that all figures are collated in Annex A for ease of reference.**

ICES advised in 2006 that *“Targeted fisheries should not be permitted to continue, and by-catch in mixed fisheries should be reduced to the lowest possible level ... it is recommended that exploitation of this species should only be allowed when indicators and reference points for stock status and future harvest have been identified and a management strategy, including appropriate monitoring requirements, has been decided upon and is implemented”*.

ICES reiterated the advice in 2008 and recommended a *“maximum landing length of 100 cm”*. In 2011 ICES advised that *“catches in mixed fisheries should be reduced to the lowest possible level ... a rebuilding plan should be developed for this stock but, given the longevity of spurdog, stock recovery will be slow”*.

The ICES' assessment of spurdog has been recently benchmarked (De Oliveira et al., 2013), with the age- and sex-structured stock assessment model for NEA spurdog estimating 2010 population levels to be about 23% relative to 1955 and 19% relative to 1905. These results confirm that the stock is depleted, but not to the extent estimated in the previous assessments. Last year's ICES' stock assessment for NEA spurdog reported projections in population growth of 16% (with 95% probability interval of 12–19%) after 5 years and 33% (26–40%) after 10 years, for a zero catch scenario. **This assumes zero fishing mortality which is unrealistic given the occurrence of spurdog by-catch and dead discarding.** However, based on this assessment, which is more positive than those of previous years and subsequently, confirmed by the most recent assessment reported this year, a case for reclassification of spurdog from 'Critically Endangered' to 'Endangered' was made at the IUCN Shark Specialist Group workshop in May 2014 (outcome still pending).

Furthermore, although the spurdog stock is currently assessed in the NEA, the data supporting population mixing at this scale is limited. A mark-recapture study undertaken in the 1960s, when the fishery was at its peak, indicates that some individuals can undertake seasonal migrations into neighbouring ICES' Divisions (Irish Sea VIIa, Scottish waters VIa & North Sea IVa-b; Figure 3a Vince 1991). A recent electronic tagging study of predominantly mature female spurdog in the Celtic Sea has shown that, during winter, horizontal movements appear to be relatively limited, and that northward migrations occur in the summer and are linked to the seasonal development of fronts that are likely linked to prey availability (Figure 3b; Bendall et.al., 2014). These results provide first-time data for the fine-scale location and timing of seasonal aggregations for mature female spurdog and suggest that **adaptive regional management measures may be more effective than area-wide NEA measures that may have unintended consequences for the activity of the EU fleet.**

### **The commercial fishery in the Celtic Sea**

The Celtic Sea region (ICES Divisions VIIe-j), is fished by UK vessels from England, Jersey, Northern Ireland & Wales. Commercial landings of spurdog from UK vessels were extracted from the Marine Management Organisation (MMO) Fishery Activity Database (FAD) for 2000–2005. These data include all catch landings into UK ports and landings in foreign ports by UK vessels. Vessels from other nations (Belgium, France, Ireland & Spain), also operate in the Celtic Sea and land catches of spurdog into foreign ports (only allocated quota details are available at present and can be found in Annex C). Catches between 2006 and 2013 were subject to increasing management measures, with zero TAC applied in 2010, and so were not used. Average yearly landings (weighted in kg), by ICES' rectangle in the Celtic Sea are shown

## UK Pilot Project Proposal

in Figure 4a. UK landings were further differentiated by month and rectangle according to gear type, with information on otter trawls (mid-water & pelagic trawls), nets (trammel, gill and fixed), and beam trawls (bottom & benthic trawls) (Figure 4b). Total landings data show that the major fisheries landing spurdog from the Celtic Sea (after removal of long-line fisheries), are nets (56%), otter trawl (36%), beam trawl (6%), and others (2%). All line fisheries were excluded from the landings data, due to their absence in current Celtic Sea fishing fleets.

### **Current spurdog by-catch levels in the Celtic Sea**

Between August 2011 and April 2014, fishery dependant field studies were undertaken to improve knowledge of spurdog by-catch within commercial fixed net (gill, trammel & tangle) fisheries, under commercial conditions, in the Celtic Sea (ICES Divisions VIIe-h):

Three, seven day charter field studies were carried out (using two commercial netters FV “Charisma” and FV “Govenek of Ladram”) under a Fisheries Scientific Partnership (FSP) programme (published data; Bendall *et al.*, 2012), between August 2011 and February 2012. In all, commercial by-catch data for 389 spurdog (135 females, mean length  $79 \pm 14$  cm; 249 males, mean length  $76 \pm 7$  cm; 5 unknown), were collected (Table 1). Throughout the field studies by-catch levels of spurdog was relatively low, ranging between a minimum of one percent of the total catch composition during August, up to 10% of total catch composition during September.

Fifteen commercial netting trips (a total of 56 days at sea), were recorded aboard FV “Govenek of Ladram”, between October 2013 – April 2014 under the Defra funded, fishery-dependant programme; NEPTUNE Shark, Skate and Ray Scientific By-catch Fishery (NEPTUNE). In all, an estimated 11,037 kg of spurdog were recorded, with mean commercial by-catch levels ranging from one percent during January and March 2014, up to 20% during December 2013 (Unpublished data, prior to QA) (Table 2).

Due to the infancy of the NEPTUNE fishery-dependant data collection programme, with limited coverage to date, these data are only representative for South-west fixed net fisheries, and show limited annual and seasonal coverage, with no apparent observations of significant spurdog by-catch episodes. Consequently, whilst these data should be regarded as ‘anecdotal’, they indicate higher levels of spurdog by-catch within the fixed net fisheries of the Celtic Sea.

### **By-catch survivability studies in the Celtic Sea**

Between August 2011 and October 2013, field studies were undertaken to improve knowledge of spurdog by-catch survival (health condition prior to discarding), within commercial net (gill, trammel & tangle), fisheries under commercial conditions, in the Celtic Sea (ICES Divisions VIIe-h). In all, 444 spurdog were captured in four separate week-long commercial netting trips. The typical gill net soak time was less than 26 hours, reflecting typical commercial practice when targeting hake and other whitefish. Survival rates were consistently high for spurdog regardless of gillnet soak time (varying between 11 – 45hrs), and 262 (59%) were discarded back to sea in ‘lively’ condition (Table 3). The remaining 41% of spurdog scored poor health state conditions, with 35 individuals classed as ‘sluggish’ and 147 classed as ‘dead’ prior to discarding.

These survival rates include recent unpublished field data. Based on the three field studies reported by Bendall *et al.*, 2012, survival rates were slightly higher for spurdog, with 248 (65%), discarded back to sea in a ‘lively’ condition. The remaining 35% of spurdog scored poor health state conditions, with 35 individuals classed as ‘sluggish’ and 101 classed as ‘dead’ prior to discarding.



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## **By-catch mitigation**

A spurdog by-catch mitigation workshop was held in Exeter, UK, in April 2014 to discuss and identify potential feasible options for gear modifications and new technologies to reduce the quantity of spurdog by-catch in fixed nets (gill, trammel and tangle), trawl and long-line fisheries. Participants included fishermen working the relevant gear metier in the Celtic and southern North Sea regions, Seafish (UK Fishing Industry Authority), the CFPO (Cornish Fish Producers Organisation), UK Government Policy Advisor on Elasmobranchs and gear technologists from the ICES' Working Group on Fishing Technology and Fish Behaviour (WGFTFB), Mike Montgomerie and Massachusetts' Division of Marine Fisheries, David Chosid.

The use of technical measures was discussed for the trawl, gill net and long-line fisheries around the UK. It was thought that excluder grids for trawls may be appropriate in a single species trawl fishery, for example the nephrop bottom trawl used off the Western Isles of Scotland. For gill nets, modification to the hanging ratio was discussed, but the trial of different coloured monofilament strands was preferred as a measure to reduce spurdog by-catch. This gear modification measure could be trialled as part of the proposed pilot project.

## **Stakeholder considerations**

Discussions have taken place with the UK's Devolved Administrations of Wales (Welsh Government Fisheries Directorate), Scotland (Marine Scotland) and Northern Ireland (AFBI), lending their support in terms of data collection and provision for a UK partnership. In addition a series of workshops, meetings and discussions have taken place, involving the fishing industry, Fish Producers Organisations, the Shark Trust, and the MMO. These have been used to inform on progress and gain buy-in and support for taking forward work to align spurdog management with the Landing Obligation, eliminate dead discarding, and reduce fishing induced mortality. These preliminary discussions have identified that the UK fishing fleet is already actively avoiding known spurdog aggregations and that stakeholders are receptive to the idea of formalising these avoidance measures. There is however some reluctance within the fishing industry to formalise their voluntary avoidance in fear of traditional closures that are fixed in space and time, curtailing fishing activity. For this reason, **real-time by-catch avoidance measures are proposed, involving 'move-on' rules to fishing, for small areas, for a designated limited period**, although the utility of such an approach needs to be evaluated.

## **Proposal for pilot study**

**The UK proposes a voluntary pilot project (Real-time Spurdog By-catch Avoidance Programme) to allow industry participants to avoid significant spurdog by-catch by adapting their fishing behaviour.** The pilot project would be undertaken through a self-reporting scheme that relies upon participating fishermen to collect and provide daily information (over a 24 hour period) before midnight, on spurdog by-catch within pre-defined reporting grids. This information will be compiled for the participating vessels, and the amount of spurdog by-catch in each grid cell classified to predetermined thresholds, using a traffic light system. The cells of the reporting grid will be coloured to the level of spurdog by-catch (Figure 5), low (green, 'carry on'), medium (amber, 'be on alert') and high (red, 'stop'), which is sent back in near real-time to those vessels actively taking part, enabling them to avoid by-catch "hotspots" and prevent *choking* the fishery. If those fishing vessels taking part in the proposed pilot project exceed the spurdog by-catch 'stop' level in any of the grid cells (turned red by the traffic light system), then there would be a real-time 'move-on' rule for that *cell*, for a predetermined time for the participating vessels. In addition, the same vessels will trial technical measures to reduce the incidence of spurdog by-catch, there-by potentially further reducing fishing mortality.

### **Safeguards relating to the marketing and sale of spurdog**

Fishermen will be encouraged to participate by the provision of a by-catch quota for **dead** spurdog, to be marketed and sold. The provision of such a quota would incentivise involvement in the project and recover economic costs, and allow for the practical assessment of the economic feasibility of the approach and the likelihood of changes in fishing behaviour being adopted more widely by the fleet. In addition it would help identify and address any issues relating to supply chain, monitoring, and enforcement on a small and manageable scale and provide a clear indication of the amount of dead by-catch that is actually marketable.

Sufficient and robust legislation currently exists in the UK (e.g. Fish Buyers and Sellers and Designation of Fish Auction Sites Regulations 2005) to monitor and enforce the legal marketing and sale of spurdog resulting from this pilot project. This existing legislation includes auction centres, fish markets and individuals who buy first sale fish directly from either a fishing vessel or an agent. Both sellers and buyers of first sale fish must be registered with the Marine Management Organisation (MMO). Sellers must provide sales notes to their local MMO office within 48 hours of sale when they sell fish through registered auction centres and markets. In addition, all dead spurdog which are landed for sale will be tagged with an electronic identification tag for traceability and offered for sale with an approved fish wholesaler with a managed supply chain, again allowing for full traceability.

### **Prevention of the incentivisation of targeting spurdog and monitoring avoidance behaviour**

In order that **dead** spurdog by-catch quota does not incentivise targeting of the stock and spurdog remains a by-catch, the **dead** by-catch quota for each vessel could be set towards the lower end of a 'sliding scale'. Timely provision of good quality data and a positive change in fishing behaviour by each participating vessel demonstrating spurdog by-catch avoidance could be rewarded by the vessel moving up the 'sliding scale' towards the maximum quota allowed in predetermined increments (e.g. poor - 1 tonne per vessel per annum; good – 3 tonnes per vessel per annum; Excellent – 5 tonnes per vessel per annum), an incentivised approach to reducing spurdog by-catch.

The spurdog by-catch quota will be distributed evenly across a period (i.e. year), and will not be 'rolled over' or 'banked' into the next month if uptake is low. Safeguards will be established to ensure that quota is not accrued at an individual-vessel level, nor that between-vessel quota trading is permitted. This will help prevent deliberate targeting of spurdog and the initiation of a limited target fishery. Instead spurdog will remain an incidental catch in the mixed fishery, with encouraged avoidance incentives imposed.

The use of electronic fish counters (as used in aquaculture), at the point of discard on the vessel, may be used as a definite measure to ensure that the retention of live spurdog for sale, especially large females, is not incentivised. This technology will provide the number of live spurdog discarded, for comparison against the number of dead spurdog landed to ascertain whether landings of dead spurdog, against those discarded alive, are within the expected parameters (see By-catch survivability studies in the Celtic Sea).

Three indicators will be used against which spurdog by-catch avoidance behaviour by commercial fishing vessels will be measured. They are as follows.

1. The NEPTUNE project involves South west UK commercial fishing vessels acting as a 'reference fleet' to help quantify levels of spurdog by-catch and discards in the Celtic Sea, as well as survivorship. The dataset (soon to be a complete 12 month dataset for two vessels) from this programme will provide a baseline of current spurdog by-catch levels within the fixed net commercial fishery in the Celtic Sea, prior to the implementation of the proposed pilot project.

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2. For the participating commercial fishing vessels, VMS data for a 12 month period prior to their involvement (therefore before any exhibited avoidance behaviour) will be used as a baseline and compared to VMS data during their involvement within the proposed pilot project.
3. Commercial fishing vessels not involved in the proposed pilot project will in effect act as a 'control' to those participating vessels. VMS data from a number of similar regional vessels (e.g. size & gear type), outside of the pilot project will be used to compare their spatial activity with those directly involved in the proposed pilot project.

These 'indicators' will allow for fishing behaviour and the uptake of the dead spurdog by-catch quota to be closely monitored against controlled baselines, allowing avoidance behaviour of spurdog by-catch and therefore a reduction in spurdog by-catch, to be evaluated.

### **Considerations for the proposed nominal dead by-catch quota – state of knowledge**

An obvious condition of a by-catch quota would be that any such landings still allow for recovery of the depleted NEA stock of spurdog, and relates only to **dead by-catch**. Model projections show that the 2009 TAC (the last non-zero TAC) would allow future population growth, at similar levels to the current zero TAC. For this pilot project we therefore propose to set the maximum level of permissible landings of **dead** spurdog by-catch **well within** the UK allocation of the 2009 quota. The level at which to set a by-catch quota for the study area will be informed by (i) historical spurdog landing figures within the study area, immediately prior to the zero TAC; and (ii) fishery-dependent data from self-sampling schemes on current levels of spurdog by-catch and survivorship.

A **50 tonne** marketable **dead** by-catch quota is proposed for use by vessels taking part in the pilot project. This is considered a sufficient allocation to test the pilot project but not substantial enough to incentivise any targeting of spurdog or the retention of live specimens. Additionally, this would not prevent continued stock recovery as per the latest ICES' assessment. The rationale used to calculate this amount is outlined below with relevant data and information used in Annex C.

#### *Key considerations*

1. Primary Member States historically landing spurdog are France, Ireland and UK.
2. 10 vessels are proposed for inclusion in the pilot project.
3. 100 tonnes of spurdog were landed into the South-west of the UK in 2009, the last time significant volumes of spurdog were landed prior to the 0 TAC coming into force.
4. ICES assessment concluded a TAC of up to 1422 t would allow the population to grow at a similar rate to that forecast with a zero TAC in the short-term.
5. Survivability of spurdog caught by the UK netting fleet in the Celtic Sea region (ICES Divisions VIIe-j) is estimated to be around 60%.
6. The FV Govenek of Ladram (netter) caught and discarded an estimated 11.037 tonnes of spurdog during six months under the NEPTUNE project

Survivability is assumed to be at 60% (59% based upon four recent scientific field studies undertaken in the Celtic Sea. Fisheries Science Partnership, Bendall et al 2012; NEPTUNE Bycatch Fishery 2013-2014, unpublished data). If this is applied to the 100 tonnes (all gear types) landed in 2009 into the South-west of the UK then in the region of 40 tonnes of dead by-catch could be expected. However, this estimate of 40% mortality should be considered a minimum since it applies only to vessels operating nets and mortality is considered to be significantly higher in trawls.

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Since only six months of discard data for the FV Govenek of Ladram under the NEPTUNE project are currently available (Table 1), it is not yet possible to conclude an annual by-catch rate (due to the likelihood of inter-annual variations). However, the lowest recorded monthly by-catch rate of 99 kg (January 2014) could be used as a proxy for the remaining 6 months of the year resulting in an estimated annual by-catch total of 11.6 tonnes (6 months recorded total by-catch of 11037 kg plus precautionary 99 kg multiplied by the remaining 6 months of the year – 594 kg). A 40% mortality rate would equate to 4.6 tonnes of dead by-catch per annum per vessel (10 vessels proposed for the pilot project). This has a number of assumptions within it and is therefore likely to be an underestimate.

The above presumptions therefore suggest a quota of between 40-50 tonnes (5 tonnes per vessel per annum) would be sufficient to initially test the pilot project. Presuming an average weight of 3 kg per fish this would equate to around 1600 individuals per annum.

### **Quality assurance**

Scientific observer coverage (at a level to be determined) will provide '*matched*' trips, with the vessels crew recording independently of the scientist aboard. This will provide a (i) comparative assessment of relevant scientific data provision and quality, and (ii) a safeguard against misreporting of the health state of "lively" fish as "dead" so to obtain marketable landings, hence increase fishing mortality.

In addition, a voluntary Code of Conduct for zero TAC, and prohibited species of sharks and skates within Celtic Sea fisheries (currently being developed by the NEPTUNE project), will be implemented in order that participating fishermen adopt good practical handling and discard practices, to further aid the long-term survival of live spurdog, post discard.

### **Collection of relevant scientific data**

Through self-reporting of total by-catches observed by commercial fishing vessels, the proposed pilot project will improve the data collection of spurdog distributions in the Celtic Sea fisheries (ICES Divisions VIIe-h) and provide real-time mapping of seasonal abundance, something that is currently hampered by limited scientific data. Such data on seasonal distribution and abundance of spurdog are currently lacking and will help underpin future decisions on avoiding by-catches in key 'hotspot' areas. By utilising data collected directly by the fishing industry, fishermen will more likely '*buy-in*' to adapting their fishing behaviour to avoid spurdog by-catch, as the evidence provided will be based on their own observations. Cefas scientists will work directly with South-west fishermen who regularly encounter spurdog by-catch, training them to record scientific biological information while undertaking normal fishing practices, maximising data collection of both live and dead spurdog by-catch. Entire by-catches of spurdog (or a proportion thereof) for each 'fished' location will be counted, measured (total length), sexed (male/female), and scored on health state condition (i.e. lively, sluggish, very sluggish, dead, or scavenged), before being returned to sea.

Data collected during this pilot study will not increase mortality of spurdog by-catch, but support and provide valuable evidence for any future long-term rebuilding and stock recovery plans for spurdog (in accordance with ICES advice for 2014).

### **'Traffic light' system**

To inform the appropriate size of the reporting grid cell in relation to the spatial extent for a grid-based 'move on' rule, horizontal distances (in km) that spurdog travelled between successive days were calculated from daily movements of 12 spurdog tagged in the Celtic Sea with electronic tags between 2010 - 2011 (Figure 6). Results found that 64% ( $120 \pm 26$  d), of daily distances travelled by spurdog were 'localised', where spurdog moved  $>5$  km but  $<20$  km a day. This appeared to remain a consistent behavioural trait throughout the year.

However 29% ( $54 \pm 13$  d), of daily distances travelled by spurdog were 'residential' (with spurdog moving  $<5$  km a day), and this typically occurred during winter months (Nov-Feb),

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and late summer (July – August), when spurdog spent more prolonged time close to the seabed and therefore were more susceptible to bottom set fisheries. Daily distances >20 km a day were rare (7%;  $14 \pm 8$  d), although distances of up to 90 km in a single day were observed (predominantly during April and May when they became more active, moving away from the seabed travelling through thermal frontal waters).

Based on the above data, '128<sup>th</sup>' of an ICES rectangle (approximately 5 km (latitude), by 7 km (longitude)), is deemed an appropriate size for each cell within the reporting grid.

Using a traffic light system, the amount of spurdog by-catch in each grid cell, reported by those vessels taking part, will be set to predetermined thresholds (to be defined at the outset of the proposed pilot project), and coloured to the level of spurdog by-catch, as follows:

- Low (green): areas with low spurdog by-catch rates that are expected not to result in spurdog becoming a *choke* species (low risk of closure to the mixed fishery);
- Medium (amber): Areas with variable by-catch rates that may cause spurdog to become a *choke* species (medium risk of closure to the mixed fishery);
- High (red): Area with high by-catch rates that will cause spurdog to become a *choke* species (high risk of closure to the mixed fishery).

If the participating vessels exceed the 'stop' threshold in the grid cells turned red by the traffic light system, there would be a 'move-on' rule for that cell for a predetermined time (dependent upon season of the fishery & fishing state). The duration of time that this 'move-on' rule will apply is likely to be influenced by season. As detailed above, in the winter time when spurdog are less active, spending prolonged amounts of time on the seabed and therefore at risk to demersal fisheries, a 'move-on' rule may be for the remainder of that fishing trip (e.g. maximum of 7 days). In the summer months when spurdog are more active and away from the seabed, a 'move-on' rule for a grid cell is likely to be for a much shorter period of time e.g. 48 hours. The precise durations and nature of the 'move-on' rules will be determined at the outset of the proposed pilot project in discussions with the fishermen and subsequently trialled.

### **Number of vessels**

In the region of 10 commercial fishing vessels (>12m in length) will participate in the proposed pilot project. The vessels will predominantly be comprised of gill netters in the Celtic Sea, reflecting the evidence base for which this proposal is based. However, a small number of commercial vessels deploying towed gears will be included, so to collect new evidence on the by-catch levels, discard rates and survival of spurdog for towed gears, which is currently lacking.

### **Catch handling**

Live spurdog will be returned to the sea immediately. Training of the vessels crew on the health and vitality assessment of spurdog will be provided by Cefas scientists. Dead spurdog will be retained on board up to a permissible limit, marketed and sold.

Fishermen will also be required to adopt a code of practice developed under the NEPTUNE project which requires the adoption of best practice such as in the handling of spurdog in order to maximise survivability.

### **Impact on the mixed fishery**

An illustrative example of the traffic light system classifying spurdog by-catch levels is shown in Figure 5. ICES rectangles that have been selected as potential 'hotspot' areas of spurdog by-catch are overlaid on top of 2013 UK VMS data.

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It is proposed that rather than manage the whole Celtic Sea area with the traffic light system, resources be focused on reducing large unavoidable by-catches in key 'hotspot' areas. Spurdog landings, discards, diet analysis and DST tag data have been used to inform 'hotspot' areas by quarter. For the purpose of this illustrative exercise, if 2 or more of the above data sources were present for an individual ICES rectangle, they were termed as a 'hot-spot' area.

From Figure 5, there is not an obvious overlap with high UK fishing activity and the proposed managed areas. That said, during the proposed pilot project, analysis of landings data of other species from those participating vessels, including the use of VMS data, will be used to determine the relative incidence of by-caught spurdog by gear and by season, investigating the effect of spurdog real-time avoidance on the target fishery. Included in this will be the effect of the retention of dead spurdog by-catch to alleviate fishing pressure on other elasmobranch species, such as smooth-hounds (*Mustelus* spp.).

### **Legitimacy of proposal**

Article 7.1(h) of Regulation (EU) No 1380/2013 of the European Parliament and of the Council, states that *"measures for the conservation and sustainable exploitation of marine biological resources may include, inter alia, pilot projects on alternative types of fishing management techniques and on gears that increase selectivity or that minimise the negative impact of fishing activities on the marine environment."*

Article 14.1 of the same regulation allows for *"pilot projects, based on the best available scientific advice and taking into account the opinions of the relevant Advisory Councils, with the aim of fully exploring all practicable methods for the avoidance, minimisation and elimination of unwanted catches in a fishery"*.

It is through these articles that the UK proposes the pilot project.

### **Partnership working and consultation for this pilot project proposal**

Following informal consultation with the European Commission in May 2014, this UK pilot project proposal has been reviewed by the ICES' WGEF, together with an extensive consultation with the UK fishing industry. The proposal has been discussed with the UK's Devolved Administrations of Wales, Scotland and Northern Ireland, members of the NWWRAC, NSRAC, fisheries organisations (NFFO, CFPO), Marine Conservation Society and NGO's (e.g. Shark Trust, Client Earth). Following submission to STECF for further review (STECF report 2014), the proposal has been revised to best reflect the feedback received to date, before submission of the final proposed pilot project to December Fisheries Council 2014 and implementation of the pilot project in 2015.

### **Communication and outreach**

The proposed pilot project will be publicised through media coverage, dedicated workshops and on-line forums in order to engage directly with fishermen, fisheries management bodies, NGO's and members of the public. This will provide a greater understanding of the Spurdog By-catch Avoidance Programme, including the background to the initiative and the proposed benefits.

### **Evaluation**

The proposed pilot project will be evaluated against clear measurable objectives including, but not exclusively, level of (i) landings, (ii) engagement, (iii) timely provision of data and (iv) data quality. In addition and as detailed in section *"Prevention of the incentivisation of targeting spurdog and monitoring avoidance behaviour"*, baseline spurdog by-catch data and VMS data

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will be used to evaluate spurdog by-catch avoidance behaviour by participating commercial fishing vessels, and in turn levels of reduction in spurdog by-catch.

Voluntary compliance to real-time spurdog avoidance measures will be monitored against the uptake of the by-catch quota for dead spurdog. Non-compliance with either aspect will allow for the pilot project to be suspended, if appropriate and a decision taken on whether to terminate the pilot project.

### **Future options outside the scope of the current proposed pilot – extension to other sea areas and fisheries**

Should the pilot project be successful, two additional UK fisheries have been usefully identified where similar approaches could be developed and taken forward:

- (i) Southern North Sea (ICES Division IVc): The under-10 metre, demersal long-lining fleet in the southern North Sea primarily target cod (*Gadus morhua*), thornback ray (*Raja clavata*) and bass (*Dicentrarchus labrax*), however, spurdog is sufficiently common in the southern North Sea, both locally and seasonally, between November to April, that the level of by-catch and discarding is significant.
- (ii) Western Isles waters (ICES Division VIa): the *Nephrops* bottom trawl fishery around the western Isles of Scotland (Sound of Raasay and Inner Sound) experiences regular spurdog by-catch episodes during the period October to January.

Furthermore, should the pilot project be successful in mitigating spurdog becoming a potential choke species under the Landing Obligation, the UK would work with other Member States to help adopt it more widely.

### **Future work**

There remain a number of points to consider which include:

1. Capturing the change in behaviours/ gear modifications already adopted by the fishing industry to mitigate spurdog by-catch;
2. Address the female sex bias in the data;

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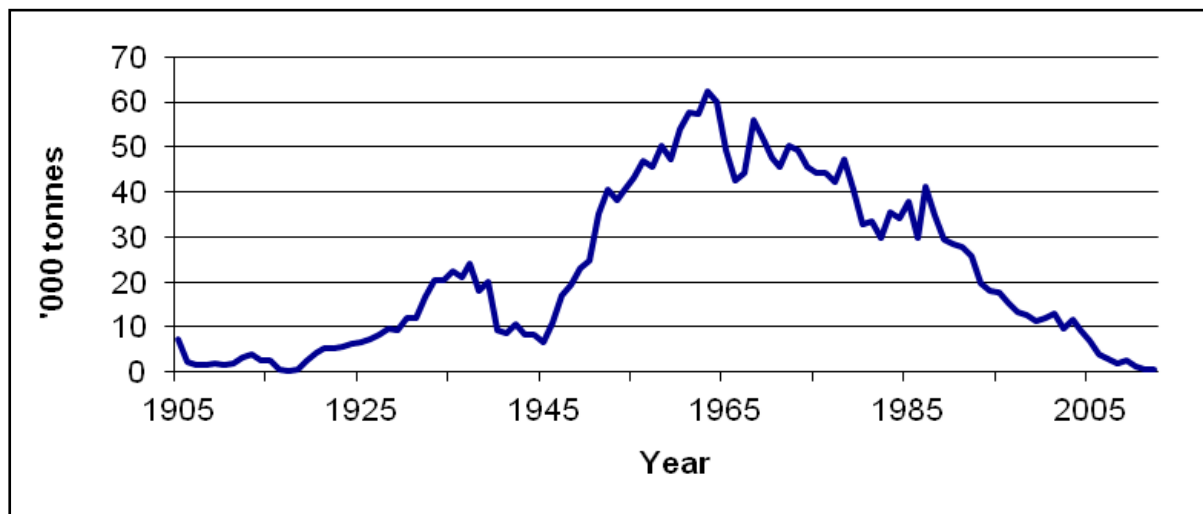
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## ANNEX A – COLLATED FIGURES

(a)



(b)

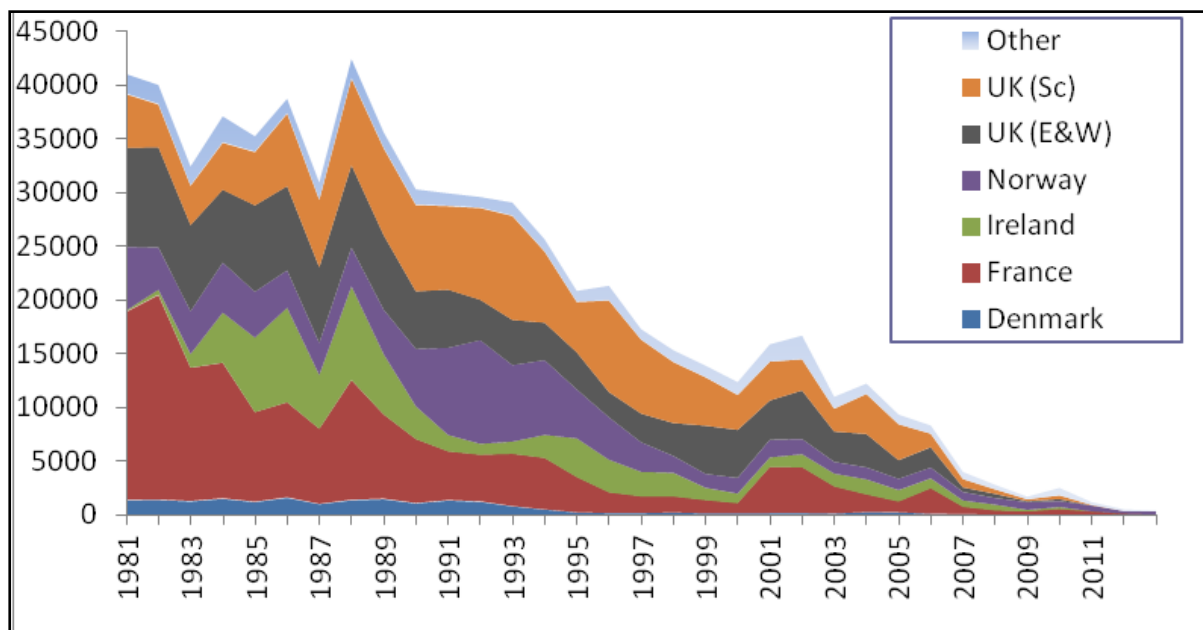
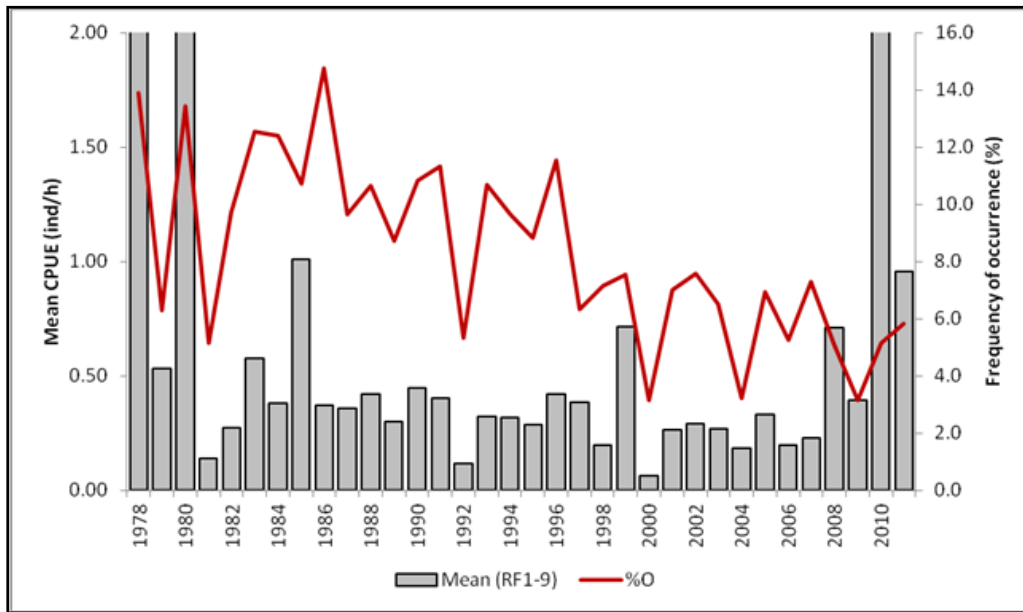


Figure 1: NEA international landings showing a) Working Group (WG), estimates of total international landings of NEA spurdog (1905 – 2012), and b) WG estimates of spurdog landings by nation (results from: ICES WGEF Report 2013).

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(a)



(b)

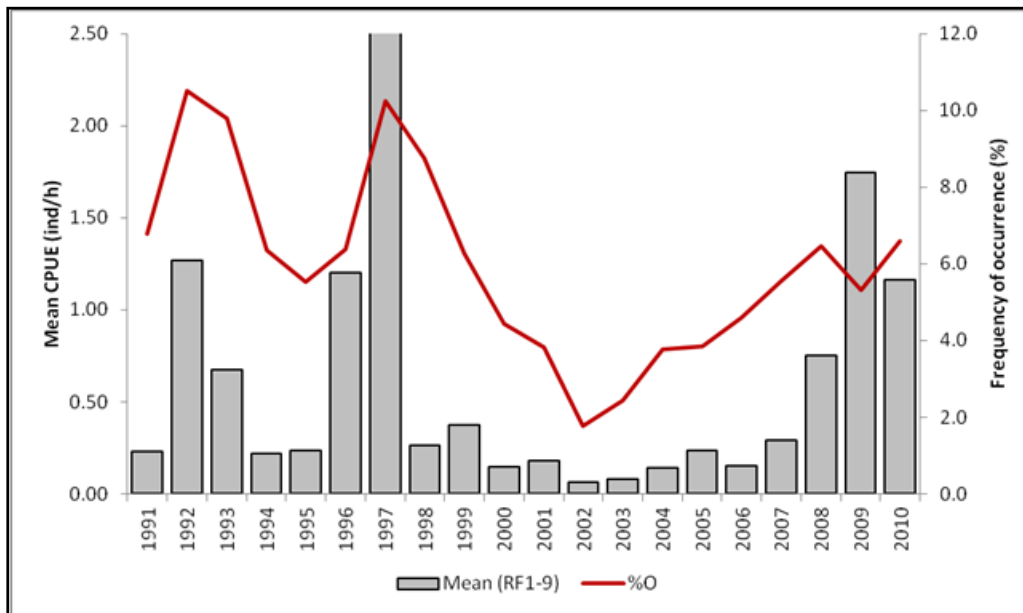
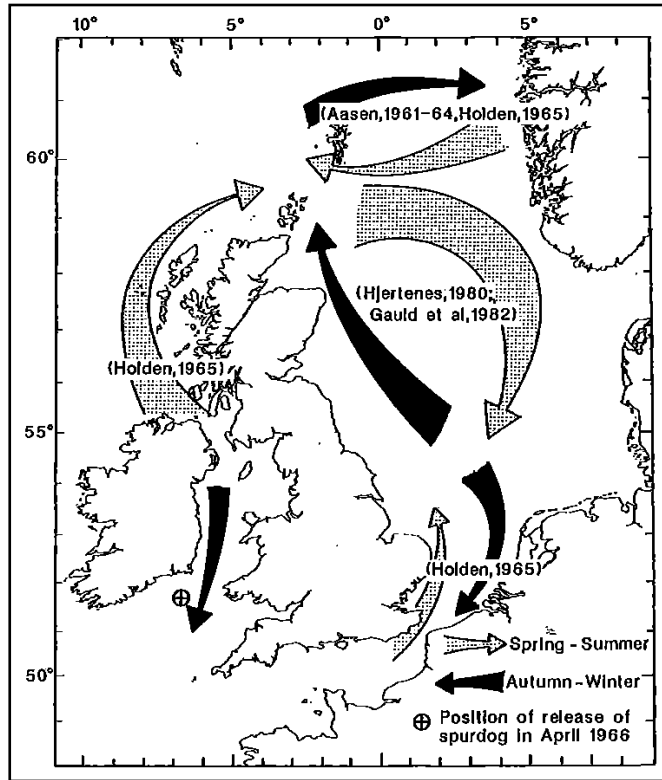


Figure 2: NEA spurdog catch rates in the UK (England and Wales), for a) westerly (IBTS) Q1 Survey, top, (1978–2011) and Q3 Survey, below (1991–2011). Mean cpue (numbers per hour, columns) and frequency of occurrence (red line) are shown (ICES WGEF 2013).

(a)



(b)

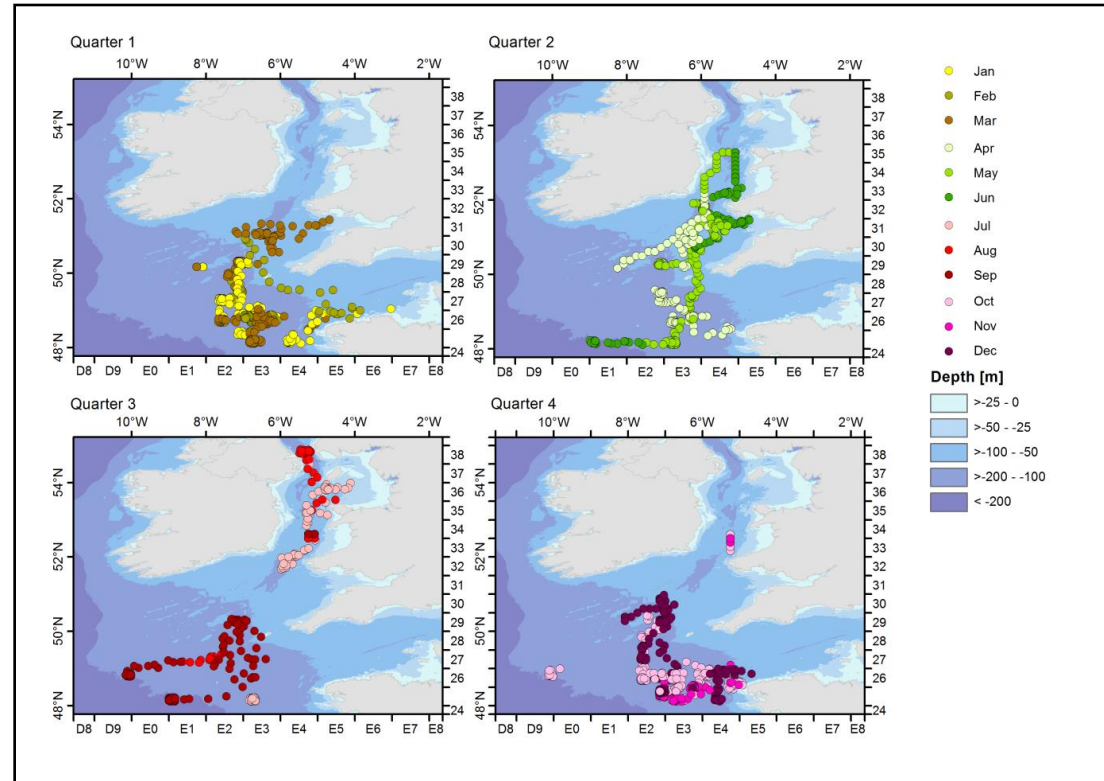
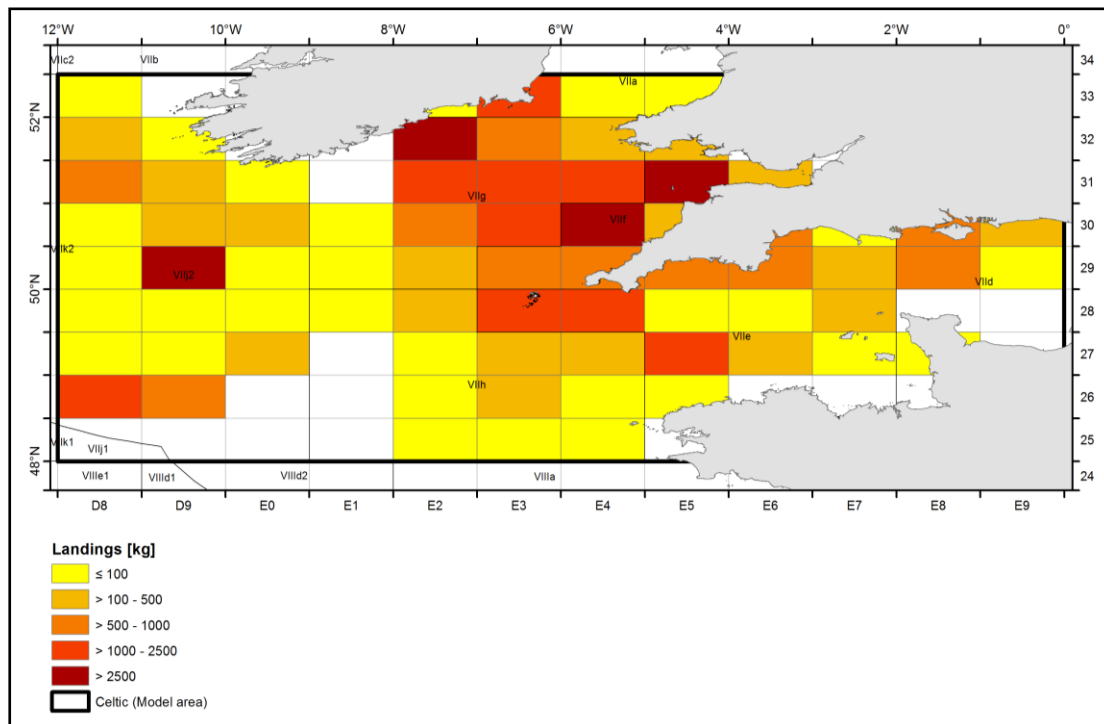


Figure 3: Summary of known spurdog migration patterns, showing a) results of mark ID tagging studies 1961 - 1982 around the UK (Vince, 1991), b) daily movements of 12 spurdog (10 females; two males; Bendall et.al., 2014), tagged in the Celtic Sea with electronic tags in 2010/11, showing the northward movement during Q2 and the return movement south during Q3 and Q4.

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(a)



(b)

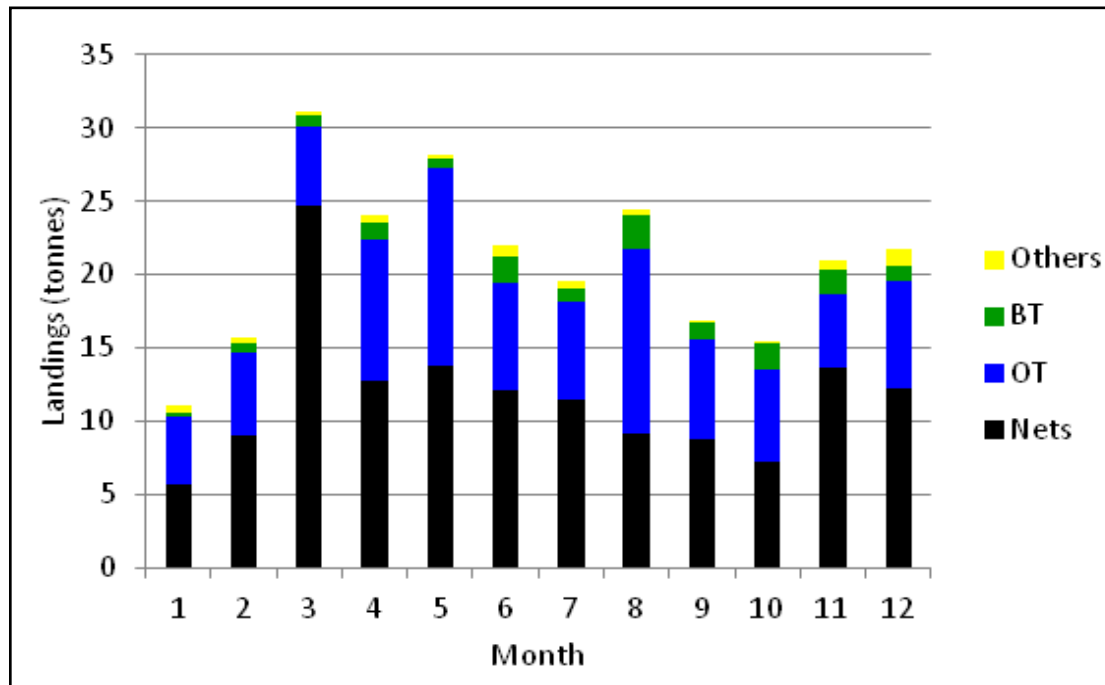


Figure 4: UK spurdog landings for all gears in the Celtic Sea region (VIlle-j), prior to fisheries restrictions (2000 – 2005), showing a) quantitative UK landing *heat map* by ICES' rectangle, and b) total monthly landings of spurdog (tonnes) by gear type.

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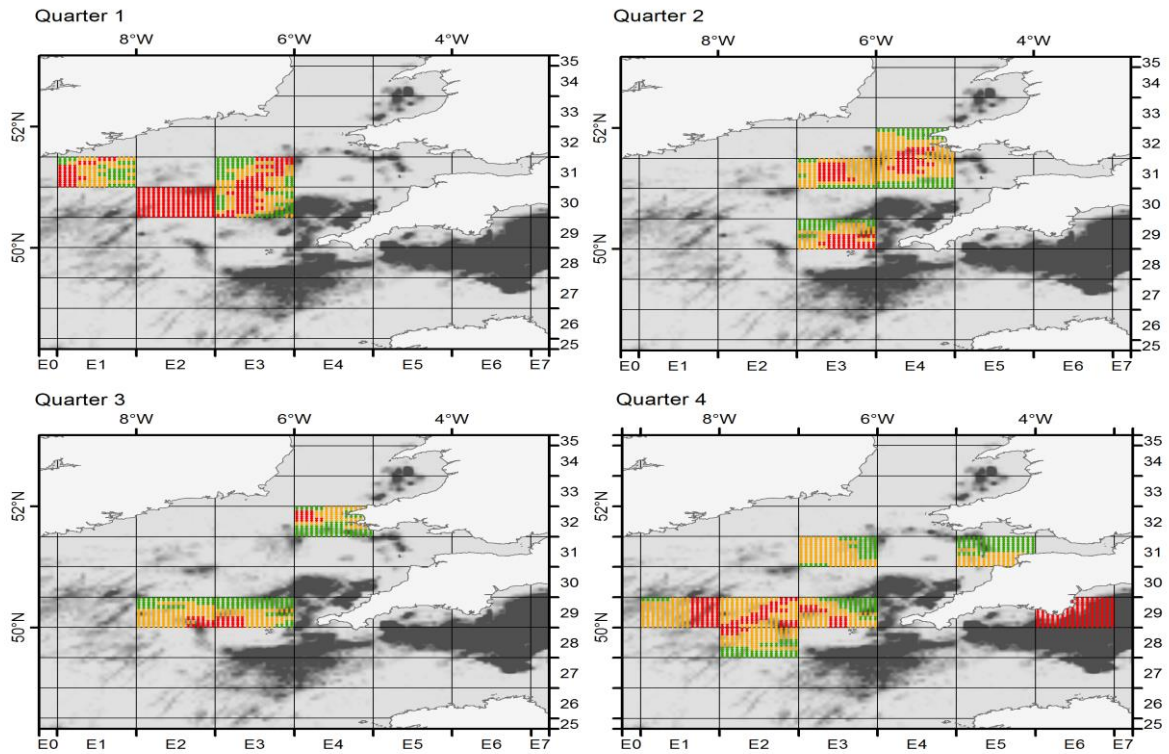


Figure 5: An **illustrative example** of the Spurdog By-catch Avoidance Programme traffic 'traffic light' system'. The plot includes 2013 UK VMS data and shows UK EEZ boundary lines.

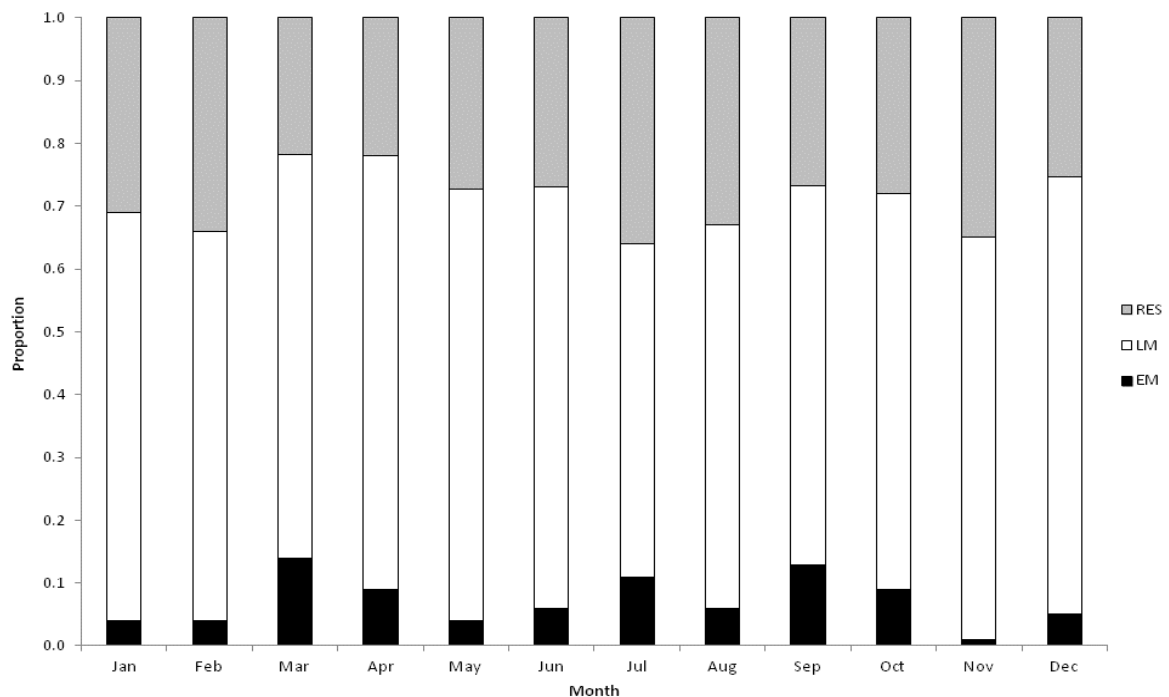


Figure 6. Proportion of time (%) spent by spurdog for classified horizontal movements. Black shading denotes Extended Movement (EM) = horizontal movement > 20km; white denotes Localised Movement (LM)= horizontal movement >5km and <20km; and grey shading denotes Residential (RES) = movement <5km.

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### **ANNEX B – COLLATED TABLES**

<b>Fishing Vessel</b>	<b>Month</b>	<b>No. Days Fishing</b>	<b>No Fixed Nets</b>	<b>*Total Catch (No.)</b>	<b>Spurdog By-catch (No.)</b>	<b>% Spurdog in total catch</b>
FV Govenek of Ladram	Aug-11	7	33	2982	149	05%
FV Charisma	Sep-11	7	21	1885	187	10%
FV Charisma	Feb-12	6	17	6759	53	01%
<b>Total:</b>		<b>20</b>	<b>71</b>	<b>11626</b>	<b>389</b>	<b>03%</b>

Table 1. Summary data for spurdog by-catch composition collected during three seven day charter field studies carried out (using two commercial netters FV “Charisma” and FV “Govenek of Ladram”), between August 2011 and March 2012. \*Total catch includes number of commercial species and discarded fish. Figures based upon data published within Bendall, et.al., 2012.

<b>Month</b>	<b>No.Days Fishing</b>	<b>No. *Nets ('Tier')</b>	<b>Total Catch (Kg)</b>	<b>Spurdog Bycatch (Kg)</b>	<b>Spurdog in Total catch (%)</b>	<b>Total Mean Catch (Kg)</b>	<b>Total Spurdog Mean Bycatch (Kg)</b>	<b>Spurdog in Total Mean catch (%)</b>
<b>Oct-13</b>	<b>5</b>	17	13316	1601	11	783	94	12
<b>Nov-13</b>	<b>11</b>	18	35408	4800	12	1967	267	14
<b>Dec-13</b>	<b>9</b>	10	13473	2690	17	1347	269	20
<b>Jan-14</b>	<b>3</b>	4	10453	99	1	2613	25	1
<b>Mar-14</b>	<b>12</b>	15	20950	165	1	1397	11	1
<b>Apr-14</b>	<b>16</b>	18	24198	1683	7	1344	94	7
<b>Total:</b>	<b>56</b>	82	117797	11037	9			

Table 2. First six months of mean catch data estimates (Kg), encountered by month aboard FV Govenek of Ladram, observed for a total of 56 days at sea, between October 2013 – April 2014 (prior to final QA: Unpublished data). \*Total commercial catch & spurdog bycatch (Kg), show estimated total and mean catch levels encountered per fixed net ‘tier’ (GNS (120mm; 7 x 1.5 miles); GTR (250-300 mm; 9 X 3 miles)).

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Vessel	Month	Total No. Spurdog	Males		Females		Lively		Sluggish		Dead	
			No.	Length range	No.	Length range	No.	%	No.	%	No.	%
Govenek of Ladram	Aug 2011	149	84	56 - 84	65	57 - 107	73	50%	18	12%	58	38%
Charisma	Sept 2011	182	115	64 - 91	67	60 - 123	135	72%	10	5%	37	23%
Charisma	Mar 2012	53	50	67 - 86	3	69 - 82	40	75%	7	13%	6	12%
<b>Total</b>		<b>384</b>	<b>249</b>	<b>56 – 91</b>	<b>135</b>	<b>57 - 123</b>	<b>248</b>	<b>65%</b>	<b>35</b>	<b>9%</b>	<b>101</b>	<b>26%</b>
Govenek of Ladram	Oct 2013	60	38	75 – 100*	22	50 – 100*	14	23%	NR	NR	46	76%
<b>Overall Total</b>		<b>444</b>	<b>287</b>	<b>56 - 91</b>	<b>157</b>	<b>57 - 123</b>	<b>262</b>	<b>59%</b>	<b>35</b>	<b>8%</b>	<b>147</b>	<b>33%</b>

Table 3. Summary details of spurdog caught over four scientific field studies (2011 – 2013; under commercial conditions), to improve knowledge of spurdog by-catch survival within commercial net (gill, trammel & tangle) fisheries in the Celtic Sea. Shaded figures based upon data published within Bendall, et.al., 2012; Un-shaded figures include recent unpublished field data. \* Length range estimate only (individuals not recorded to nearest cm); NR = “Sluggish” health state not recorded for this study.



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### **Annex C - data and information used to calculate a dead spurdog by-catch quota**

The following data and information have been used in order to propose the **dead** spurdog by-catch allocation.

#### **ICES**

The most recent assessment (ICES, 2013 and De Oliveira *et al*) carried out in 2013 confirms that the stock is depleted, but not to the extent estimated in previous assessments. Model projections show that **a TAC up to 1422t** would allow the population to grow in the future at a similar rate to that forecast with a zero TAC (i.e. 28% increase in biomass in 10 years instead than 33% with a zero TAC).

However this assessment makes no distinction between live and dead retention since the UK pilot project only involves the landing of dead by-catch and is intended to improve avoidance behaviours thus bringing down overall fishing mortality and enhancing stock recovery.

#### **UK spurdog quota and landings (tonnes)**

Year	2007 <sup>(1)</sup>	2008 <sup>(1)</sup>	2009 <sup>(2)</sup>	2010 <sup>(3)</sup>	2011 <sup>(4)</sup>
Total UK quota (from Fishing Opportunities regulations)	640	1209	584	0	0
Total UK landings spurdog (MMO data)	798	279	545	63	1
Total landings by English vessels (MMO data)	211	43.2	122	7	0.2
Total landings by English vessels into the South West of England (MMO data)	57	27	<b><u>100</u></b>	0	0
Total landings of <u>dogfish</u> recorded by Cornish Fisheries Producer Organisation (CFPO)	103	78	62	0	0

- (1) By-catch quota. These species shall not comprise more than 5 % by live weight of the catch retained on board.
- (2) A maximum landing size of 100 cm (total length) shall be respected.
- (3) By-catches are permitted up to 10% of the 2009 quotas established in Annex I to Regulation (EC) No 43/2009 under the following conditions:
  - a. Catches taken with longlines of tope shark, kitefin shark, bird beak dogfish, leafscale gulper shark, greater lanternshark, smooth lanternshark, Portuguese dogfish and spurdog are included;
  - b. A maximum landing size of 100 cm (total length) is respected; and
  - c. The by-catches comprise less than 10% of the total weight of marine organism on board the fishing vessel.

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- (4) Catches taken with longlines of tope shark, kitefin shark, bird beak dogfish, leafscale gulper shark, greater lanternshark, smooth lanternshark, Portuguese dogfish and spurdog are included. Catches of these species shall be promptly released unharmed to the extent practicable.

### **Other EU Member States quota (Fishing Opportunities Regulations) (tonnes)**

*EU and international waters of I, IIa, V, VI, IV, VII, VIII, XII and XIV*

<b>Year</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>
Norway	50	50	50	0	0
Denmark	77	57	26	0	0
France	25	636	317	0	0
Ireland	-	390	195	0	0
The Netherlands	21	17	8	0	0
Germany	14	41	21	0	0
Belgium	13	155	77	0	0
Portugal	-	3	2	0	0
Sweden	1	1	0	0	0
Spain	-	75	38	0	0
TAC	841	2635	1318	0	0
EC	791	2585	1268	0	0

### **NEPTUNE project**

The UK funded NEPTUNE project has estimated survivability of spurdog at the point of discard by South-west netters to be **around 60%** (this does not consider long-term survivability post discard).

In the first 6 months of data collection under the NEPTUNE project the FV Govenek of Ladram caught and discarded **11.037 tonnes of spurdog**, representing 9% of its total catch (for the period Oct 2013 – April 2013 – 56 days of fishing). The remaining 6 months of data to complete the year are currently being processed.