Does size matter? Assessing the use of vessel length to manage fisheries in England

# Abstract

The economic and cultural importance of small-scale coastal fisheries (SSCF) is increasingly recognised worldwide. Recent European Union policy objectives have committed to support SSCF, but the characteristics and sustainability of SSCF in Europe are often poorly understood. In the UK, there is no clear definition of ‘small-scale’ beyond a 10-metre length threshold used for fishing vessel administration. This paper examines the consequences of length-based management of English fisheries, and explores future management possibilities. The 15 highest-value species for the English under-10m fishing fleet were evaluated according to Marine Stewardship Council (MSC) pre-assessment criteria. Based on the information collected through Project Inshore, very few of the key under-10m fisheries, the majority of which are shellfish, would be suitable for MSC certification due to poor stock health and/or stock uncertainty. The current structure of the under-10m fleet was examined by vessel length class. Policy measures based on the under-10m/over-10m vessel classification have led to an increase in high-catching capacity ‘super-under-10s’, which contribute disproportionately to total landings by under-10m vessels, and may have fishing patterns more representative of larger vessels. In a survey of English fishers (n=41), fisheries managers (n=12) and other stakeholders (n=8), the majority (91%) supported a distinction between small-scale/inshore and large-scale/offshore vessels. Most (65%) viewed the current classification (based on vessel length alone) as inappropriate. Length remained the most popular criterion for future management, but several alternatives scored highly, including fishing gear type. With the approach of post-‘Brexit’ UK fisheries reform, further examination of what ‘small-scale’ means is required, to ensure that support for SSCF is directed appropriately.

Keywords

Small-scale fisheries; stakeholder survey; sustainability assessment; coastal fleets; Brexit

Highlights

* Definitions of small-scale coastal fisheries (SSCF) vary widely around the world and within Europe.
* Few of the key stocks for SSCF in England would be considered sustainably managed according to Marine Stewardship Council criteria.
* The majority of English landings from the under-10m fleet are by ‘super-under-10’ vessels designed in response to length-based fisheries management
* There are several reasons to redefine small-scale fisheries in England to include criteria beyond length – a change supported by a stakeholder survey – and could support wider policy changes as a result of Brexit.

# Introduction

Globally, an estimated 90% of the world’s fishers are employed in artisanal or small-scale coastal fisheries (SSCF) [1].These fisheries provide a source of food, security, and income for millions of people in both developing and developed countries [2]. Estimates suggest that SSCF contribute around one-third of global marine fisheries landings, but a lack of reporting makes any estimate of SSCF activity highly uncertain [3]. Despite this, SSCF have often been overlooked with fisheries management focused on offshore, large-scale fleets [4]. However, the social benefits of SSCF are increasingly recognised; these include the nutrition and employment they provide to coastal communities, their cultural significance, and their role in attracting tourism [5]. In many instances small-scale fishers may derive a higher overall value per landed tonne than large scale fishers (LSF), and have also been shown to be more profitable than their large scale counterparts in some cases [6,7].

Many small-scale fishers have developed effective governance structures for the sustainable management of marine resources [8], but SSCF are not by definition ‘sustainable’. Like any fishery, SSCF have the potential to over-exploit resources. The impacts of poorly regulated SSCF on the marine environment can be severe [9]. Conflict and competition with large-scale fisheries has also emerged as a barrier to sustainability for the SSCF sector through having to fish for longer to achieve the same catches where stocks have been over-exploited [6]. SSCF, when considered as ‘low-impact’ fishing, offers the promise of supporting coastal communities and delivering food, jobs and revenue in a sustainable, equitable manner. Policies that aim to maximise employment, and minimise wider environmental impacts of fishing (such as bycatch, seabed impacts or fuel use) now support the development of SSCF [7]. However, these policies rely on a clear definition of SSCF.

## Defining small-scale fisheries

Globally, definitions of SSCF fishing vary greatly. Socio-economic studies of SSCF have tended to focus on developing countries, but developed countries with large industrialised fishing fleets also have fleets that are small-scale by comparison, and which make a significant contribution to landings and employment [10]. The European Union (EU) currently defines SSCF as vessels 12m-and-under in length, which do not use towed fishing gear [11]. However, within the EU, national policy makers have struggled to define SSCF in a consistent manner (Table 1). As national fisheries policies have evolved independently, fishing fleets in the EU have been divided into small-scale/large-scale for various administrative purposes. These purposes include allocation of fishing opportunities (quota), licensing and taxation [12]. In nations such as Belgium, SSCF are defined by multiple linked criteria relating to vessel size, fishing gear types, trip length and the markets they supply; in others, definitions of SSCF simply relate to physical characteristics of fishing vessels.

In England, the term ‘inshore fleet’ is used for SSCF. Inshore vessels are generally considered under-10m in length, not members of a fish producer organisation (PO), and fish mostly within the 6 nautical mile inshore zone [13].These ‘under-10s’ represent over 76% of the English fishing fleet by number [14] and provide 65% of the direct employment in fishing [13]. Inshore fishers employ a diverse range of vessel types and fishing methods, and are central to the identity and local economy of many coastal communities [15]. However, in recent years, profit margins have narrowed for the UK inshore fleet, against a backdrop of decade-high profits for larger vessels [16]. Difficulties for English inshore fishers have attracted national attention in government [17] and the media [18], as well as being at the centre of two high-profile court cases on a perceived lack of quota for under-10m vessels [30,31].

*Table 1 here (orientation landscape with section break)*

The length-based threshold, which now separates English inshore vessels from other vessels, may have had unexpected and unintended consequences. In the 1990s it is believed that many vessel owners modified their vessels or used decommissioning subsidies to scrap their vessels and purchase or build new ones below the 10m threshold [32]. This was to avoid new license conditions which restricted catch, which were first introduced for vessels over 10m, and to avoid new administrative requirements for skippers of over-10m vessels to record and report landings [33]. Due to these incentives, the inshore fleet experienced an increase in high catching capacity ‘super-under-10’ vessels, just under 10m in length [33]. This has effectively shifted fishing effort from the over-10m fleet to the under-10m fleet, but it remains unclear to what extent this effect may be driving recent quota shortages [34].

## Small-scale fisheries in the EU and England

Recently, new legislation has been created that could favour inshore fishers using low-impact methods. This includes Article 17 of the reformed Common Fisheries Policy (CFP), which urges European Member States to consider environmental, economic and social criteria when allocating fishing opportunities [35]. In the UK, the need for local management of inshore fishing has been recognised, with the creation of Inshore Fisheries and Conservation Authorities (IFCAs) in England, under the Marine and Coastal Access Act. There have also been attempts to address uncertainty relating to the species targeted in inshore waters, notably Project Inshore, a data gathering collaboration between Seafish and the Marine Stewardship Council from 2012 to 2014 [36].

This study attempts to improve the understanding of English under-10m fleet and examines how their management could be improved in the future. First, the current status of the under-10m fishing fleet was examined, by identifying key fisheries and assessing their sustainability in the context of Marine Stewardship Council criteria. The effect of the under-10m/over-10m division on fleet structure, and the rise of ‘super-under-10’ vessels was then investigated using the EU fleet register. The extent of vessel modification to enter the under-10m sector was quantified using historical licensing amendments within the fleet register. Finally, we surveyed current fishers and other fisheries stakeholders to examine the definition of ‘small-scale’ fishing in England. With the UK vote in 2016 to leave the EU (commonly known as ‘Brexit’) the UK government is currently re-evaluating and re-structuring its approach to fisheries management. Our research was specifically designed to provide a timely input into this process.

# Materials and methods

## MMO landings overview

Landings data were obtained from Marine Management Organisation (MMO) monthly statistics [37], which since 2008 have been divided by landings from under-10m and over-10m fleet segments. The 15 highest-value species for each fleet segment (under-10m, over-10m) from 2008-2016 were identified.

## MSC sustainability criteria

To gain an overview of the status of the most important inshore fisheries, a search of the Project Inshore [36] database was conducted for each of the 15 highest value species for inshore vessels. The database provides a detailed sustainability assessment for fisheries in English Inshore waters, according to the Marine Stewardship Council (MSC) framework, which assesses fishery sustainability according to 3 principles: 1) Health of the stock; 2) Impact on the Ecosystem; 3) Management and Governance [38]. Each principle contains several criteria, scored out of 100. Criteria scoring less than 60 in the MSC framework are considered ‘challenges’ towards achieving MSC certification. Scores of 60-80 are marked as ‘conditions likely’ and scores of 80 or above were marked as ‘recommended for certification’.

## Fleet structure analysis

Vessel metrics were obtained from the European Union fleet register [39], which provides information about every registered fishing vessel in the EU, including key data such as length, engine power and tonnage. To assess the prevalence of a ‘threshold effect’ towards the original 10m licensing ‘cut-off’ within the English under-10m fleet, vessels were divided into 0.2m length classes and the frequency of different classes was compared. To investigate the level of length-modification that may have occurred in order for vessels to enter the under-10m category, historical licensing amendments were examined within the ‘multiple records’ version of the fleet register, which provides a history of licensing events for all registered fishing vessels. Under-10m vessels in the current fleet that previously measured over 10m were recorded, along with the estimated year of modification based on license amendments.

## Stakeholder survey:

Throughout October and November 2017, fishers, fisheries managers and representatives were asked to complete a short questionnaire relating to the definition of SSCF in England. The survey was distributed online via email, through IFCA membership mailing lists, producer organisation membership mailing lists, and fisher’s organisation membership mailing lists. In addition, the survey was promoted on social media platforms twitter and Facebook, through the national ‘Fishing News’ page. This distribution method was chosen to increase the reach of the survey through ‘snowball sampling’, with the drawback of potentially opening the survey to duplicate responses or responses from outside England. Respondents were asked to provide their contact details to encourage genuine responses and allow for follow up.

### Survey structure

Our survey comprised of seven questions and was designed to take no more than five minutes to complete. The survey is included in Annex 1. Multiple-choice closed questions were chosen to allow quantitative analysis of survey responses, and open-ended questions were included to invite detailed comments from those willing to provide them.

#### Personal details

To compare responses between stakeholder groups, respondents were asked to state their involvement within the fishing industry. Fishers were asked to give the length category of the main vessel they worked on, the number of crew usually on board, types of fishing gear they used, and whether or not they belonged to a producer organisation (PO).

#### Small-scale/large-scale distinction

To assess the general opinion of respondents regarding the division of vessels into small-scale/large-scale categories, respondents were asked “*In your opinion, should a distinction be made between inshore/small-scale vessels and offshore/large-scale vessels for the purposes of licensing and quota management?”* Respondents answering ‘Yes’ were then invited to discuss what they thought the distinction should be based on.

#### Appropriateness of length-based classification

To assess the opinion of stakeholders toward the current under-10m/over-10m division of vessels, survey respondents were asked to rank the division as ‘very appropriate’, ‘somewhat appropriate’, ’somewhat inappropriate’, or ‘very inappropriate’. Respondents were asked to justify their responses if they wished.

#### Criteria for defining small-scale fisheries

To investigate the level of receptiveness toward potential criteria that could be included in the future definition of small-scale fishing in England, the final question asked respondents to choose their three most important criteria from the following list and rank them in order of importance;

* Vessel length
* Hull width
* Engine size
* Length of fishing trips
* Number of crew
* Distance from port fished
* Fishing gear type
* Supply-chain length
* Amount of fuel used
* Amount of local employment supported by vessel
* Species targeted
* Volume of catch
* Other – please specify below

# Results: Overview of the English under-10m fleet

As of January 2017, there were 2,876 vessels in the English fishing fleet, and most of these (82%) were under-10m in length. By contrast, under-10m vessels accounted for 9% of the fleet’s capacity (tonnage) and 36% of the fleet’s total power (Figure 1).

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| Figure 1: Under-10m vessels (dark grey) as a proportion of the England-registered fishing fleet by number, power (kW) and capacity (gross tonnage, Gt) (data: EU fleet register 2017) |

## Landings summary

From 2008-2016, under-10m vessels accounted for 21% of the total value landed by English vessels, including 33% of the total value of shellfish (Figure 2). Over the same period, 6 of the 15 highest-value species for the English under-10m fleet were quota species (Figure 3). By contrast, 11 of the 15 highest value species for larger vessels were quota species.

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| Figure 2: Proportion of landed value of shellfish, demersal and pelagic species by English under-10m vessels (dark grey) and over-10m vessels (light grey), 2008-2016 (data: Marine Management Organisation landings statistics). |

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| Figure 3: Mean annual landed value of top 15 species by English under-10m vessels, 2008-2016 (dark bars indicate quota species). Data: Marine Management Organisation landings statistics |

## Assessment of key under-10m fisheries

According to Project Inshore assessments in 2014, the vast majority of the fifteen highest-value fisheries that under-10m vessels target in England would face challenges toward achieving MSC certification (Figure 4). Fisheries of only two species (cod and sole), would be recommended for certification by Project Inshore.

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| Figure 4: Proportion of English under-10m fisheries in Project Inshore (2014) database recommended (green), likely facing conditions (yellow) and significant challenges (red) to full MSC certification, for top-15 species by landed value, 2008-2016. |

# Structure of the English under-10m fleet

By far the most common size class in the under-10m fleet is 9.8-10m (Figure 5a). There are over 300 vessels in this length class, compared to the next most numerous size class of 4.8-5m. Relative to their numbers, the ‘super-under-10s’ (vessels 9.5-10 m in length) made up a significant portion of the total power and capacity (tonnage) of the under-10 fleet (Figure 5b).

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| Figure 5a: English fishing vessels between 0 and 20m in length, by 0.2m length class, January 2017 | Figure 5b: Vessels between 9.5-10m (grey) as a proportion of England-registered under-10m fleet by number, power (kW) and capacity (gross tonnage, Gt)  |

## Vessel modifications

Of the 2,269 registered under-10m vessels in the English fleet, 77 of these (3.3%) previously measured over 10m but were modified to enter the under-10m fleet. Vessel modification events occurred throughout the early 1990s and into the 2000s, with the majority occuring between 1991 and 1999 (Figure 6).

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| Figure 6: Estimated number of modifications of over-10m vessels which allowed entry into the under-10m fleet segment per year, 1989-2014, based on historic licensing events of vessels in the 2017 under-10m fishing fleet. |

# Stakeholder survey

## Respondents

The online stakeholder survey gathered 61 respondents, after 5 responses were removed as duplicates or incomplete responses. Thirty-nine respondents (74%) identified as skippers of under-10m vessels, 12 respondents (24%) as fisheries managers and 2 respondents (4%) as skippers of over-10m vessels. Other respondents (8) included fisheries scientists, retired fishers, vessel owners, and PO representatives. Twenty of the fisher respondents (55%) worked on vessels in the 8-10m category and most fishers (77.5%) did not belong to a producer organisation (PO). Of the 11 fishers that were PO members, 4 listed membership of the Coastal PO, a recently recognised PO specifically for the inshore fleet.

## Small-scale/large-scale distinction

Fifty-five respondents (91%) thought that a distinction should be made between inshore/small-scale vessels and offshore/large-scale vessels for the purposes of licensing and quota management, and suggestions were made by 50 respondents as to the nature of this distinction. Vessel length was mentioned by 16 respondents (32%) as a criterion. Four respondents (8%) suggested a new under-8m category, but two also recognised that technological ‘creep’ could lead to a new class of high-catching under-8m vessels, in a similar fashion to what has occurred with the 10m threshold. Similarly, several respondents noted that whatever length is chosen, technological advancement will lead to greater efficiency and catching power for smaller vessels, and length classes will eventually become outdated.

While length was the most frequent criterion suggested, only four respondents (8%) suggested that the distinction should be based on length alone. Nine respondents (18%) suggested that gear type should be considered, and four of these deemed hook and line to be the most sustainable fishing method, suggesting that fishers using this method should not be subject to quota restrictions due to the difficulty of landing large volumes of fish. One respondent pointed out that some passive gears, such as ‘wreck-netting’ can be damaging to stocks and pose an ecosystem risk through ghost-fishing (where lost fishing gear continues to contribute to fishing mortality).

Seven respondents (14%) referred to ‘catching capacity’ or ‘catch capability’ in their suggestions. Six respondents (12%) mentioned the inability to work in certain conditions as a defining feature of inshore vessels compared to larger vessels. Five respondents (10%) referred to vessel power as a criterion that should be used to distinguish inshore vessels. Other suggestions by individual respondents were: distance from port fished, ‘environmental impact’, number of people on board a vessel, vessel capacity, historic landings/effort, value of catch landed, number of hulls (mono-hull vs. catamaran) and ‘economic link’ to the local economy.

## Appropriateness of current distinction

Most respondents (65%) ranked the current length-based categorisation of fishing vessels for the purposes of licensing and quota management as ‘very inappropriate’ or ‘somewhat inappropriate’. Another 24% saw the division as somewhat appropriate and 11% as very appropriate. Fishers were more likely than other groups to regard the distinction as inappropriate (Figure 7).

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| Figure 7: Responses to the question “*In your opinion, how appropriate is the current 10m-and-under/over-10m division of fishing vessels for the purposes of licensing and quota management?”* Responses by fishers (grey) and other stakeholders (managers, representatives) (black). |

Justifications from those answering ‘somewhat inappropriate’ or ‘very inappropriate’ fell into two broad categories. The first was the perceived lack of quota for under-10m vessels. Other respondents suggested that the 10m threshold itself was inappropriate due to the high-catching capacity of some modern vessels under 10m, variously referred to as ‘super-under-10s’ and ‘rule-beaters’, with a particular focus on modern catamarans due to their higher capacity and ability to fish in a greater range of weather conditions. Some suggested including catamarans as a different category in any future vessel classification, and releasing vessels under 8m or under 6m from quota constraints. Several comments related to the simplistic nature of the 10m threshold, with respondents suggesting that modern vessels ‘just below’ 10m in length may have a far higher catching capacity than older vessels over 10m. Selected responses are shown in Table 2.

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| **Response** | **Justification** |
| Very appropriate, somewhat appropriate | *“I rarely run out of quota so am relatively happy with the present set up”* |
| *“If over 10 and under 10 quota management systems were merged so that under 10m quota allocations become tradeable, all quota would eventually be held by those that can afford to buy it”* |
| *“The division was created by MAFF[predecessor to Defra] and without a total re-allocation of quota there is no other way that the division can be bridged”* |
| Somewhat inappropriate, very inappropriate | *“Diversity of target fish species is key to inshore vessels. Defra and MMO keep restricting this via licence conditions and insufficient quota for abundant species”* |
| *“The fewest boats have the most quota”* |
| *“Non-sector Under-10's are discriminated against under the current regime.”* |
| *“Collective catching data has been lost for the under 10's when quotas were introduced. Defra made up under estimated figures. This is why we ended up with less than 3% of quota.”* |
| *“Under 10's can't make a living with what quota we have at the moment”* |
| *“Under 10 mtr boats nowadays are big enough to fish all waters inside 3 miles.”* |
| *“It works to a point but some under 10mtr work right into shoreline this should be restricted to within 4 miles and keep 4 for under 8mtr boats”* |
| *“Not possible to compare efficiency of a 12m vessel built in 1970 with that of a 9.99m catamaran built last year.”* |
| *“Too simplistic to use boat length as the only metric”* |
| *“It is difficult to define some of the under 10 boats as proper under 10s. The super under 10s are just over 10s in disguise. They have same fishing profile as over 10 boats but are not subject to the same level of enforcement or reporting as over 10s. Under 10s are a very cheap way to access quota”* |
| *“Some 10m vessels powerful and capable of catching large volumes”* |
| *“Defining a vessel's capability by length alone is a very crude method of categorising vessels”* |
| *“Efficiency. >10m vessel build 1960s will be less efficient than a new catamaran.”* |
| Table 2: Selected justifications for responses to survey question: “In your opinion, how appropriate is the current under-10m/over-10m division of fishing vessels for the purposes of licensing and quota management?” |

## Future criteria

Table 3 shows the results of the final survey question, in which respondents ranked possible criteria for inclusion in future definitions of small-scale fishing in England. Vessel length achieved the highest weighted score overall, followed by fishing gear type and volume of catch.

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| **Distinction based on:** | **First** | **Second** | **Third** | **Total votes** | **Weighted score** |
| Vessel length | 16 | 10 | 4 | 30 | 72 |
| Fishing gear type | 9 | 9 | 6 | 24 | 51 |
| Volume of catch | 9 | 3 | 9 | 21 | 42 |
| Engine size | 6 | 4 | 5 | 15 | 31 |
| Distance from port fished | 3 | 6 | 5 | 14 | 26 |
| Species targeted | 3 | 6 | 4 | 13 | 25 |
| Local employment by vessel | 3 | 5 | 1 | 9 | 20 |
| Length of fishing trips | 2 | 3 | 4 | 9 | 16 |
| Number of crew | 0 | 3 | 3 | 6 | 9 |
| Hull width | 1 | 1 | 3 | 5 | 8 |
| Supply-chain length | 0 | 1 | 2 | 3 | 4 |
| Amount of fuel used | 0 | 0 | 3 | 3 | 3 |
| Table 3: Responses to “*The UK government is creating a new Fisheries Bill as it prepares to leave the European Union. The Fisheries Bill may consider changing the definition of inshore/small-scale fishing to include other criteria besides vessel length, for the purposes of quota allocation and/or spatial management of fishing. Possible criteria are listed below. Please number your top 3 criteria in order of importance; 1 = most important to me, 2= second most important to me, 3 = third most important to me.”* To generate a weighted score for each criterion, votes for *‘*Most important’ scored 3, ‘second most important’ scored 2, and ‘third most important’ scored 1. |

# Discussion

## Landings and fishing opportunities

Under-10m vessels made a small contribution to overall fisheries landings in England, from 2008-2016, relative to their overall numbers and employment share of active fishers. During this period, only six of the 15 highest-value species for the under-10m fleet from were quota species (those species for which a European Total Allowable Catch, TAC, is set annually), and eight of the top-15 were shellfish. EU Member States have evolved many different ways of dividing TAC between vessels in their fishing fleets [12].In England, the division of fishing opportunities for pressure stocks solidified in the Fixed Quota Allocation (FQA) in 1999, where vessels received a fixed number of ‘quota units’ based on their previous fishing activity or ‘track-record’ [33]. As catch limits for quota species have reduced to combat overfishing in Europe, reductions in quota allocation have been felt acutely by inshore fishers in the UK, who are generally unable to trade or lease quota according to need due to prohibitively high lease costs [12]. Further, inshore fishers may receive less than their ‘fair-share’ of quota, due to track records being based on log-book data which the inshore fleet were not legally obliged to collect before the FQA [13]. Under-10m vessels in the UK are currently only allocated around 1.5% of fishing opportunities for quota species [40]. Here, the stakeholder survey results suggest that a perceived lack of quota for under-10m vessels is a significant challenge for small-scale fishers in England, with the perception that under-10m vessels are discriminated against under the current system of quota allocation.

With quota species increasingly off-limits, inshore fishers in England appear to have diversified into targeting non-quota species, which may be driving regional overexploitation [41]. In 2016, inshore vessels caught around 30% of the shellfish landed in the UK, compared to around 6% in 2000 [42], suggesting a shift towards shellfish in recent years, most of which are not quota species. Quota shortages for inshore vessels may have been an important factor in this shift, but other drivers include an expanding export markets for shellfish in Europe and Asia [43] and changing species composition as a result of ocean warming [44]. Some quota species are locally important for inshore vessels but were not considered here, including plaice, turbot and skates. A heavy reliance on these species, coupled with reductions in TAC, may be behind the high-profile difficulties of inshore fishers in the south east of England [34,45]. For bass (*Dicentrarchus labrax)*, lack of management of inshore vessels, coupled with reduced fishing opportunities for quota species, has contributed to an uncontrolled exploitation, resulting in closure of a drift-net fishery dominated by under-10m vessels [46,47].

## Sustainability of key species for under-10m vessels

Project Inshore revealed that many key stocks for inshore vessels in England were in poor health due to overexploitation, while others lack comprehensive stock assessment or integrated data collection. Increasing landings of whelks and lobster over the last eight years is therefore a concern. The biological characteristics of whelks, including a lack of larval dispersal, may make them prone to local depletion, and therefore a high risk of a ‘boom-and-bust’ fishery developing [43]. Promisingly, several IFCAs have begun to introduce effort capping strategies for selected mollusc and crustacean fisheries. As a result, some of the challenges to MSC certification identified by Project Inshore may now have been addressed in areas where harvest controls have been implemented, such as permits and pot limits which seek to limit fishing effort through local byelaws [48–50]. A persistent challenge for inshore fisheries management, however, is distinguishing stocks which are suitable for management by individual IFCAs at regional or local level from those which require cooperative strategies between regions and therefore require national governance [51].

Based on MMO landings statistics, under-10m vessels employed more passive gear types (fixed nets, pots and traps) compared to larger vessels. These methods are not intrinsically more sustainable than mobile gears such as trawls and dredges, but in species where direct comparisons have been undertaken using a holistic approach, including cod [52], *Nephrops*[53] and bass[54], passive gear fishing is more environmentally favourable in terms of benthic impact and scores higher on social and economic criteria. The application of Marine Stewardship Council criteria is a relatively robust way to assess fishery sustainability, and certification may help fishers afford the initial costs of improving their methods by allowing them to gain a premium for their product [55]. However, while many small-scale fisheries may fit the requirements for MSC certification, they often lack the means to undergo costly pre-assessment. The MSC has faced criticism for favouring large fishing operations for certification [56]. It is notable that of the key under-10m fisheries identified here, those recommended for MSC assessment (cod and sole) by Project Inshore are also key fisheries for over-10m vessels [57], as well as the fisheries that have achieved certification since Project Inshore (North Sea cod and North East Atlantic mackerel [58,59]).

Paradoxically, the likelihood of a fishery gaining MSC certification may be boosted by historical overexploitation, thanks to the management plans and stock assessments that have been implemented to abate further decline in stock biomass. Low-impact fishers in the UK should be supported in attempts to achieve MSC certification, allowing them to add value to their catch; initiatives such as Project UK [60] (the successor to Project Inshore) are a positive step in this regard.

## Fleet structure

The distribution of vessel size classes showed a ‘threshold effect’ towards the 10m threshold, due in part to vessel modifications in the 1990s. According to the fleet register, vessels in the 9.5-10m length class are more likely to deploy mobile gears than smaller vessels [39]. Estimations of effort from sightings data also suggest that they may range much further from port; 8-10m vessels fish throughout the 6 nautical mile inshore zone, often fishing up to and even beyond the 12nm zone, while smaller vessels (under 8m) have a much shorter range [61]. In 2015, vessels 0-8m in length landed 9,000 tonnes of fish and shellfish worth £26.1m, while 8-10m vessels landed 33,500 tonnes worth £64.1m [57]. The super-under-10s currently make up around 50% by number and 70% by capacity of the under-10m fleet [39], so while data were not available on their exact contribution to landings, it is likely to be substantial.

English fishers had several incentives to enter the under-10m fleet in the 1990s. Restrictive licenses for targeting quota species were first applied to over-10m vessels in 1990, and licensing was not extended to vessels under 10m in length until 1993 [33]. Since then, there have been no statutory requirements to record and report catches for vessels less than 10m in length [62], although there are now requirements to register sales [63]. Fishers choosing to enter the under-10m fleet through vessel modifications have been referred to as ‘rule-beaters’, but this label is undeserved; as the National Federation of Fishermen’s Organisations (NFFO) argued, in other industries these individuals would be applauded for their entrepreneurial nature, and for adjusting their business model to fit the ‘regulatory landscape’ [64]. Nonetheless, the issue surrounding ‘super-under-10’ vessels was a feature of survey responses (see Table 2) and represents a significant challenge facing the inshore fleet. The shift in catching capacity from the over-10m to under-10m fleet as a result of length-based management may have contributed to the other main issue highlighted by the survey responses i.e. the lack of quota for under-10m vessels. Suggestions for resolving the issue have included targeted decommissioning schemes and incorporating the high-catching under-10s into Producer Organisations [64], allowing them to trade quota with other vessels and potentially avoid quota ‘pinches’, where quota shortages relative to stock abundance lead to considerable discarding [65]. However, the complex legal status of quota ‘ownership’ [66] means that reallocating quota from one group to another is not a simple affair, nor can producer organisations be forced to accept new members.

## Defining small-scale coastal fishing in England

Efforts to support SSCF must be directed by knowledge of what features and outcomes are being promoted. There is no universal definition of small-scale, and nor would it be appropriate to impose one, but general features and common characteristics of diverse small-scale fleets can and should be identified [67]. In developed countries, attempts to define features of SSCF using a range of methods have been made. In Sweden, Natale et al. used comprehensive vessel logbook data to distinguish the fishing patterns of large-scale/small-scale vessels based on operational range [68]. In England, sightings data have been used to distinguish the spatial fishing patterns of different sized vessels within the under-10m fleet [61], while Guyarder et al. [69] used a case-study approach to find commonalities between European small-scale fleets, which generally related to their catching capacity.

Here, respondents were asked to define their personal ‘sense’ of small-scale, and the survey responses suggested that some notion of ‘catching capacity’ or ‘catch capability’ is a characteristic of SSCF in England for many people. However, the catching capacity of a fishing vessel is not an easily measured concept; it is a function of many vessel characteristics including length, gear type, power and cubic capacity (tonnage). Of the options listed in our survey, vessel length was the most popular suggestion for a distinction between the English small and large-scale fleet. However, classifications based on length alone are a crude and simplistic proxy for catching capacity, and the application of length-based licensing and regulation in England has resulted in a substantially skewed fleet structure. Gear-type, vessel power and distance from port fished were suggested as important in the definition of small-scale in England, with several respondents championing low-impact gears such as hook-and-line, and even suggesting that these should be removed from quota calculations. European definitions (Table 1) of SSCF include aspects of gear type, engine power and tonnage, and these results suggest an appetite among fishers and fisheries managers for these factors to be considered in England. Crucially, there need not be an absolute threshold between small/large scale; an approach which scores the ‘small-scaleness’ of vessels based on several features has been suggested [10,70], and in light of our results is worthy of further development in an English context, and likely more widely.

While the survey reached a range of stakeholders, it should not be treated as a completely balanced sample of groups within the fishing industry. The online distribution method meant that true identities could not be verified. Another area of potential bias was in the response rate, as those happy with status quo may have been less likely to complete the survey. Further, it is possible that a considerable proportion of fishers do not use email or social media. To counter that, the ‘Fishing News’ page on Facebook is extremely popular, with over 11,500 members (14/12/17) compared to around 11,800 active fishers in the UK [57].

# Conclusion & Implications

In order to understand some of the common features of SSCF in England, as well as some of the major differences within what are currently defined as SSCF in the English context, it is hoped that any future divisions in the fleet reflect what is actually happening, rather than what is easiest to implement. The high-capacity, high-range nature of modern ‘super-under-10’ vessels, which contribute disproportionately to landings from the under-10m category, is in stark contrast to smaller ‘traditional’ inshore vessel. Both of these categories are important parts of the English fishing fleet, and considering their current and future requirements as well as impacts is clearly necessary. As demonstrated here, there is clearly an appetite among fishers and managers to re-evaluate the under-10m/over 10m distinction. The potential for criteria beyond length to be taken into consideration when awarding fishing opportunities should be investigated as a priority. This will help ensure that the upcoming Fisheries Bill does not further compound problems around quota allocation, stock depletion and the divergence between lower and higher catch capacity vessels.

In the EU, legislation aimed at supporting SSCF has recently been created, including Article 18 of the European Maritime and Fisheries Fund (EMFF) Regulation, which requires “Member States where over 1,000 vessels can be considered small-scale coastal fishing vessels, to include an action plan for the development, competitiveness and sustainability of small-scale coastal fishing” within their operational plan [71]. Thus far, no action plan has been created in England or the UK as a Member State. Given the size and importance of the English inshore fleet, and the fact there are well over 1,000 vessels categorised as small scale by the EU definition, it is an imperative to address the current failure to produce an action plan for small-scale fishing vessels. To achieve this, a clear definition of the characteristics of SSCF in England will be necessary. The current length-based distinction is arbitrary, and combines diverse fishing operations with very different needs into one homogenous pool. Through the English case study, this research can help the UK define something meaningful to consider for the UK Fisheries Bill, which is currently being developed as the UK prepares to withdraw from the EU in 2019 [72].

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# Annex 1: Stakeholder survey

Before you decide to take part in this study it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully and discuss it with others if you wish. Take time to decide whether or not you wish to take part.

Purpose of the study

The study relates to the definition of inshore/small-scale fishing in the UK, which is currently defined as fishing undertaken by vessels 10 metres-and-under in length. The aim of the study is to explore possibilities for updating the definition of small-scale fishing to include criteria beyond fishing vessel length, for the purposes of quota management, spatial management of fishing, and fishing licensing.

Why have I been chosen?

As part of the study, we would like to gather opinions from people directly related to the fishing industry, including fishers, fisheries managers and members of fishermen’s organisations. You have been chosen because you may fall into one/all of those categories.

Do I have to take part?

Taking part is entirely voluntary. You may withdraw at any time. Refusal or withdrawal will involve no loss, now or in the future.

What do I have to do?

Please complete the short questionnaire. This should take no more than 5 minutes.

Will my taking part in this project be kept confidential?

Your responses will be treated in confidence, and at all times data will presented in such a way that your identity cannot be connected. All data will be identified only by a code, with personal details kept on secure computer with access only by the immediate research team.

What will happen to the results of the research project?

The results of the study will be used to provide recommendations for the future management of inshore/small-scale fishing in the UK, and inform debate around the new Fisheries Bill currently being drafted by the UK government.

Who is organising and funding the research?

The research is undertaken, organised and funded by the xxxx

Who can I contact about the research?

If you have any questions or concerns about the research, or the questionnaire, you are welcome to contact xxxx.

Personal Details

Name

……………………………………………………………

Company/Organisation

……………………………………………………………

Email Address (optional)

……………………………………………………………

About you (please indicate all that apply)

I am a:

1. Skipper of a 10m-and-under vessel
2. Crew member of a 10m-and-under vessel
3. Skipper of an over 10m vessel
4. Crew member of an over-10m vessel
5. Fisheries manager
6. Other – please specify below

……………………………………………..

If you are a fisher, how many people are usually on board your boat (including skipper)?

|  |  |
| --- | --- |
| Number of people on board | ✓ |
| One  |  |
| Two  |  |
| Three  |  |
| Four |  |
| More than four |  |

If you are a fisher, please select the length of the main boat you fish on.

|  |  |
| --- | --- |
| Boat length | ✓ |
| Less than 6m |  |
| 6 - 8m |  |
| 8 - 10m |  |
| 10 - 12m |  |
| Over 12m |  |

If you are a fisher, please select all the fishing gear types you use.

|  |  |  |
| --- | --- | --- |
|  | Main gear type ✓ | Other gear type ✓ |
| Pots/traps |  |  |
| Dredge |  |  |
| Trawl |  |  |
| Hook and line |  |  |
| Drift nets |  |  |
| Fixed nets |  |  |

If you are a fisher, are you a member of a Producers Organisation?

a. Yes

b. No

If you wish, you may specify Producers Organisation below

……………………………………………………………………………………….

In your opinion, should a distinction be made between inshore/small-scale vessels and offshore/large-scale vessels for the purposes of licensing and quota management?

1. Yes
2. No

If yes, what do you think that distinction should be based on?

………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………….

In your opinion, how appropriate is the current 10m-and-under/over-10m division of fishing vessels for the purposes of licensing and quota management? If you wish, explain your answer in the space below.

1. Very appropriate
2. Somewhat appropriate
3. Somewhat inappropriate
4. Very inappropriate

……………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………...……………………………………………………

The UK government is creating a new Fisheries Bill as it prepares to leave the European Union. The Fisheries Bill may consider changing the definition of inshore/small-scale fishing to include other criteria besides vessel length, for the purposes of quota allocation and/or spatial management of fishing. Possible criteria are listed below. Please number your top 3 criteria in order of importance; 1 = most important to me, 2= second most important to me, 3 = third most important to me.

1. Vessel length
2. Hull width
3. Engine size
4. Length of fishing trips
5. Number of crew
6. Distance from port fished
7. Fishing gear type
8. Supply-chain length
9. Amount of fuel used
10. Amount of local employment supported by vessel
11. Species targeted
12. Volume of catch
13. Other – please specify below

…………………………………………………………...…………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………