



Centre for Environment
Fisheries & Aquaculture
Science



Cefas

Lobster (*Homarus gammarus*)

Cefas Stock Status Report 2023

March 2024

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Cefas Stock Status report 2023: Lobster (*Homarus gammarus*)

Introduction relevant to all stock units

Cefas has published reports describing the status of the lobster (*Homarus gammarus*) stocks around the UK since 2012. It is planned to re-run the assessment periodically on a 2-3 year timescale. This report details the main findings of the assessments and provides background information describing how the assessments are undertaken, the data that are required, and description of the uncertainties associated with these assessments.

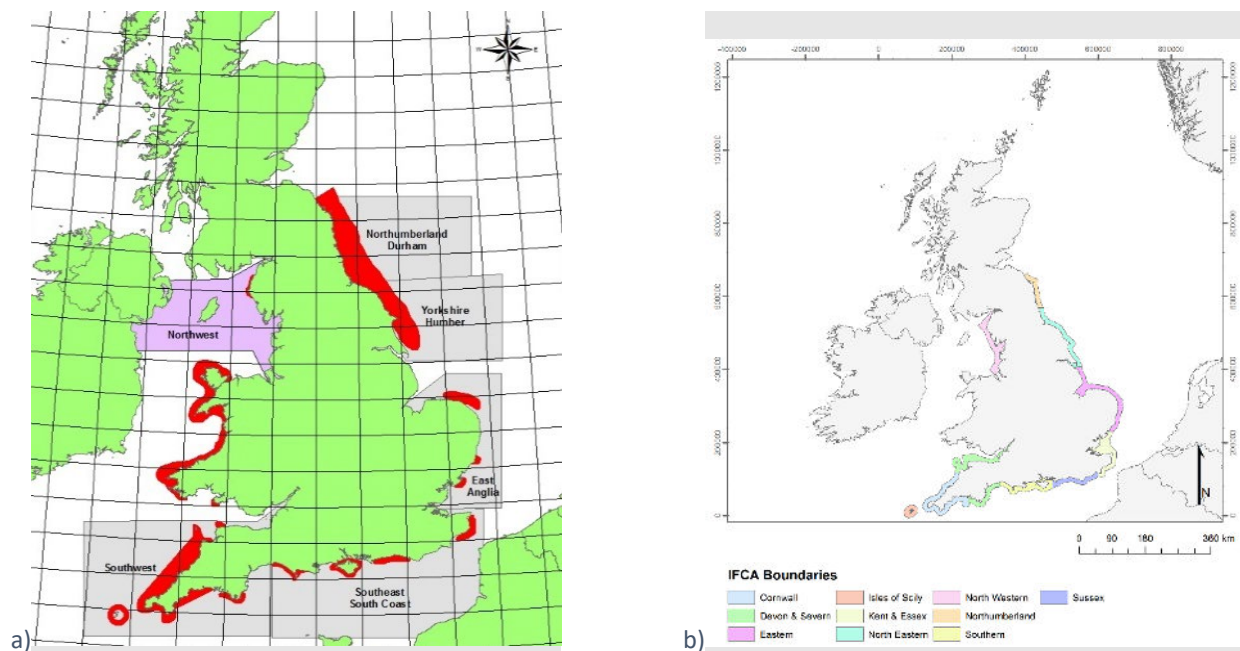


Figure 1. a) The Lobster Fishery Units (LFU's) used for the assessment regions. The LFU in purple did not have sufficient data for an assessment this year. b) The IFCA boundaries.

Biology

European lobster can be found from Scandinavia to North Africa, where they occupy solitary shelters in rocky substrates. They are opportunistic scavengers, as well as preying on small crustaceans, molluscs and polychaetes (worms). Moulting occurs in summer approximately once a year for adults, becoming less frequent in older animals. Mating occurs soon after the female has moulted, and most females are expected to have a 2-year reproductive cycle. After the eggs hatch the larvae are in the water for 3-4 weeks before the first juvenile stages settle on the seabed. Larval distribution depends on local hydrographical conditions and the behaviour of individuals. With such a lengthy time in the plankton, the probability of individual larvae surviving is low and consequently recruitment levels are expected to be variable. Both sexes are considered fairly sedentary (Øresland & Ulmestrand, 2013), although inshore/offshore and longshore migration is known to take place at some locations (Smith *et al*, 2001).

Fishery Unit Definitions

There are six Lobster Fishery Units (LFU) that have been defined for England. These units have been based upon the distribution of the fisheries, hydrographic conditions and what is known of larval

distributions and development. Each LFU encompasses waters covered by international, national and local (IFCA) legislation which may be different within each region. The LFUs are presented in Figure 1a.

Fishery management jurisdiction is organised on two different scales around England. Beyond 6 nautical miles, Defra and the MMO are responsible for managing lobster fisheries whereas from the coast out to 6 nautical miles, responsibility lies with the Inshore Fisheries and Conservation Authorities (IFCAs). There are 10 IFCAs within England (see Figure 1b). It is obvious that the LFU and IFCA boundaries do not match, which can make interpreting results for each management unit challenging, however given that one functional area is based on species biology and the other is based on governmental logistics, differences are to be expected.

Data sources used

Landings come from the official MMO data records. There have been changes in the way the MMO (and its predecessors) have gathered landings data through time. For larger vessels landings and effort are taken from the mandatory electronic logbooks. Prior to 2006, records of landings from smaller vessels ($\leq 10\text{m}$) were gathered by local officers. Since a change in legislation in 2006, sales note returns from merchants are used to support the landings declarations. Between 2006 and 2018, official MMO landings data are a combination of sales notes and self-reported records of landings from the Monthly Shellfish Activity Return (MSAR) forms, which began to be replaced by the self-reported Catch Recording App (Catchapp) in 2019. Since 2010, Cefas has used MSAR data to supplement MMO landings for the $\leq 10\text{m}$ fleet; from 2019 Catchapp data are also incorporated.

Fishing effort is derived from MSARs/Catchapp for $\leq 10\text{m}$ vessels and electronic logbooks for $>10\text{m}$ vessels. There is no requirement for potting fisheries to record the number of pots being fished, so in this report effort is measured as days fished.

Changes to reporting systems over time have predominantly improved the data quality but landings and effort series should not be viewed as coherent records through time. In particular the reported landings and fishing effort (days fished) increased substantially following the introduction of Buyers and Sellers legislation and the Restrictive Shellfish License Scheme in 2006. Since this period fishing activity data are thought to be generally more reliable, but some uncertainty remains.

Scientific officers visit ports to measure individual animals from catches and determine the ratio of landings by sex. Samples are also received from IFCA's in some regions, and these length samples are combined with Cefas' and scaled up to represent the total landings of lobster. Length distributions of data collected by Cefas and IFCA may differ due to logistical and operation differences, often (but not always) resulting in lower proportions of larger animals measured in IFCA samples than in Cefas samples. This may have an impact on the assessment outputs but the magnitude of any impact is expected to be relatively low

Overall Landings trends

Figure 2 presents the total official landings that are used within the assessments. These cover landings by English and Welsh vessels landing outside the UK, plus all landings into England and Wales by UK vessels. Due to changes in the way landings have been reported, care should be taken when comparing back through time. Data from 2010 to present have been collected in a consistent manner. Total removals were stable from 2011-2019 and increased in 2020-2022. The spring of 2018 saw extreme cold weather throughout the country; lobsters began to appear in pots very late in the season and mass mortalities occurred onshore in the North Sea. In 2020-21, Covid restrictions and adjusting to the new requirements for exporters following the UK's exit from the EU affected fishing effort, prices and markets for crab. Another mass mortality event occurred in Autumn 2021 along the North East English coast of the North Sea, the cause of which is uncertain.

Figure 3.a presents the landings per ICES rectangle for 2022, and Figure 3.b presents the average landings per rectangle from 2016 to 2021.

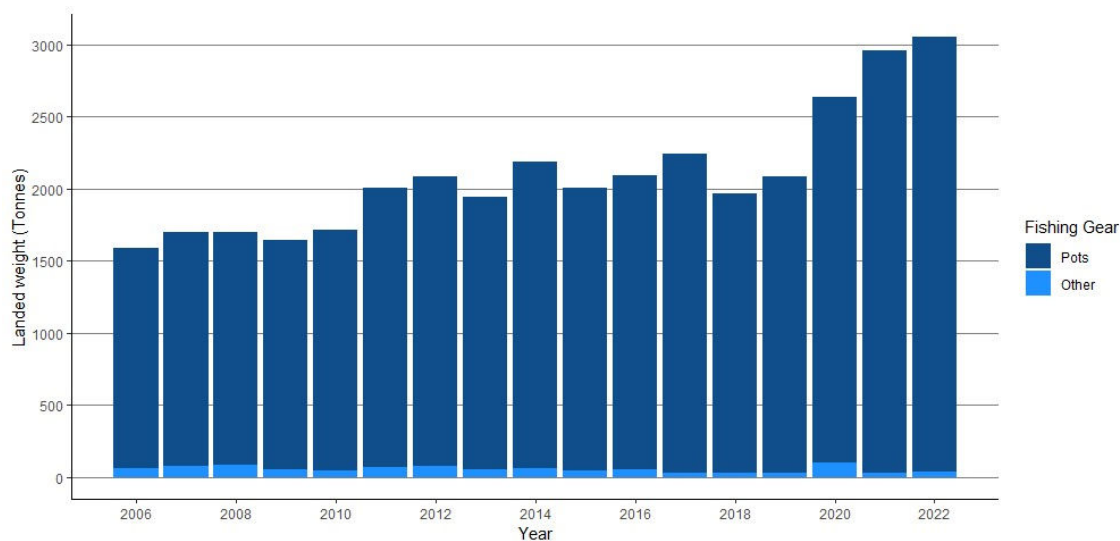


Figure 2 – Official landings by English and Welsh vessels landing anywhere plus landings into England and Wales by UK vessels.

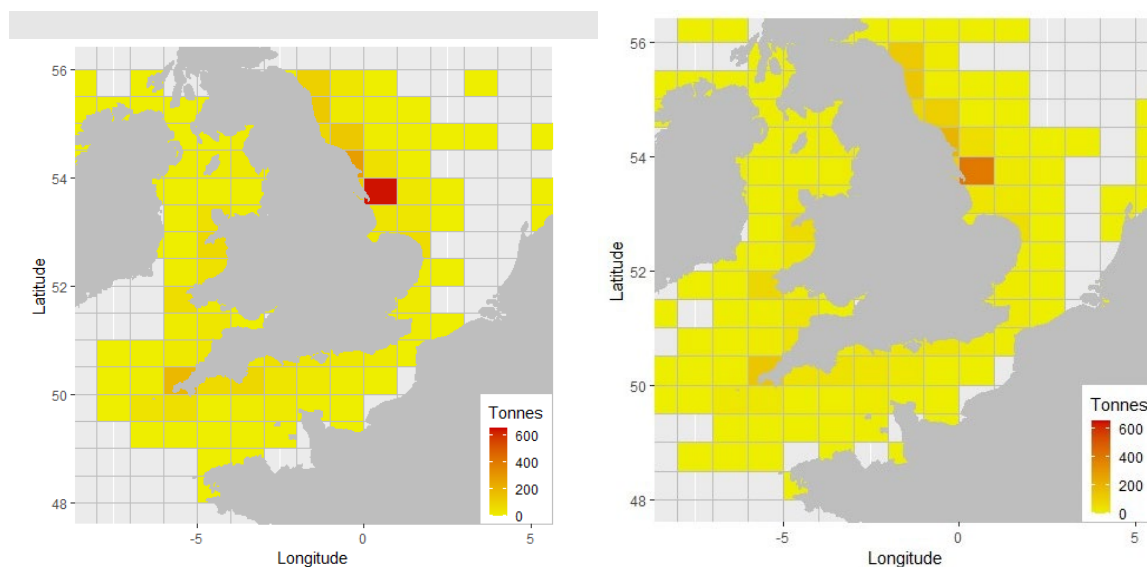


Figure 3: a) Live landings per ICES rectangle of English and Welsh vessels landing anywhere plus landings into England and Wales by UK vessels for 2022; b) Average landings per ICES rectangle from 2016 to 2021.

Assessment Methodology

Within European waters, most major fish stocks are assessed using methods which monitor the change in numbers over time for animals born in a particular year. This is possible because most finfish have bony structures which retain annual growth rings. Crustaceans shed their shell each time they moult and do not retain structures that can be easily used to determine their age, so an alternative assessment method has to be employed.

The methodology used in this assessment follows the change in shape of the length frequency (numbers-at-length) from one year to the next. The rates at which individual lobsters grow and die dictates how many animals at a given size there are in the population. Combined with knowledge of the growth rate of animals and the rate of natural death (M , assumed to be 15%), the shape of the length frequency curve is used to infer the rate at which the fishery is removing individuals.

For further details of the Length Cohort Analysis approach see Appendix 1: Stock Assessment Methods.

Reference point definition

A stock assessment result can indicate what the exploitation rate might be and how big the stock might be, but this is of limited use to fishery managers without any context. The production of reference points aims to give managers benchmarks to see whether the management structure is being effective and whether fishing rates are above or below these points.

Reference points can be determined to achieve a number of different management objectives. For instance, managers could simply want to ensure that the fishery was unlikely to collapse the stock, or alternatively managers could want the fishery to derive maximum long-term profit from the stock.

Within the Joint Fisheries Statement, (Defra, 2022), one of the precautionary objectives is to restore and maintain populations above biomass levels capable of producing Maximum Sustainable Yield (MSY). For crustacean fisheries, scientists have to do length-based assessments due to difficulties in ageing, which cannot directly calculate MSY, and so rely upon alternative ways to estimate it.

This assessment uses 35% of virgin Spawner per Recruit (SpR, the ratio of spawning biomass produced by a length class if 35% of the population is fished compared to an unfished population) as the MSY level proxy. This is commonly used around the world to estimate the fishing rate likely to deliver MSY. A second point termed a limit reference point has also been calculated and having fisheries operating beyond this level is considered to carry higher risk to the production of further generations. This value is defined as 15% of virgin SpR.

Uncertainty

Fishery stock assessments are never perfect and assessment models will never exactly replicate reality. Scientific data collection (in this case landed numbers-at-length) are taken from a relatively small number of landings and then scaled up to represent the whole landings, a process which cannot be exactly correct but should be broadly representative of the population as a whole. Samples are bootstrapped, or re-sampled to create many more simulated samples, to provide 5% and 95% confidence limits. Not all landings will be recorded as there are exemptions from reporting requirements for some small-scale fisheries and recreational landings.

An assessment model is an attempt to simplify the real world into a few key structures and functions, so the assumptions made in the process will cause the modelled system to depart from reality. What fishery stock assessment does attempt to do is to capture the main processes and data streams so that the final estimate of fishing rate and/or stock size is broadly correct.

For this assessment the key uncertainties come from:

- the scientific understanding of growth and natural death rates
- the representativeness of the landings used to collect length samples
- the assumptions within the assessment model of
- the population being at equilibrium (constant recruitment)
 - the spatial coverage of the population is constant and all size ranges are equally available to the fishery
 - fishery statistics are complete and accurate
 - an assumed mortality rate of 20%

Cefas has a research program which continually searches to improve our understanding of processes governing population dynamics. We are also working with the MMO to ensure that landings statistics are as complete and accurate as possible, and working with the IFCA's to ensure maximum efficiency and best practice in data collection.

Given the uncertainty in the input data and assessment model it is acknowledged that the precise value of any estimate of fishing mortality of stock size is uncertain but has sufficient reliability to indicate rates on a high-medium-low scale, and changes over time.

2023 Assessments

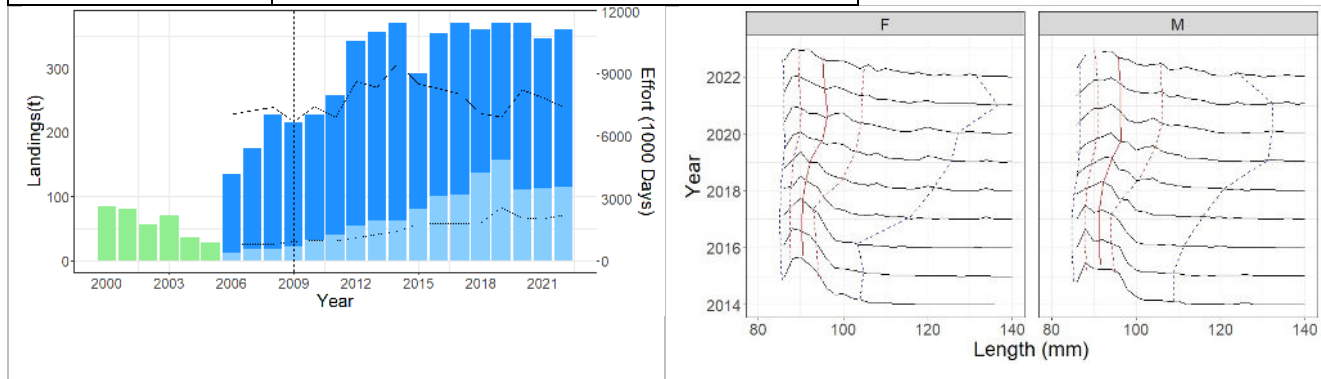
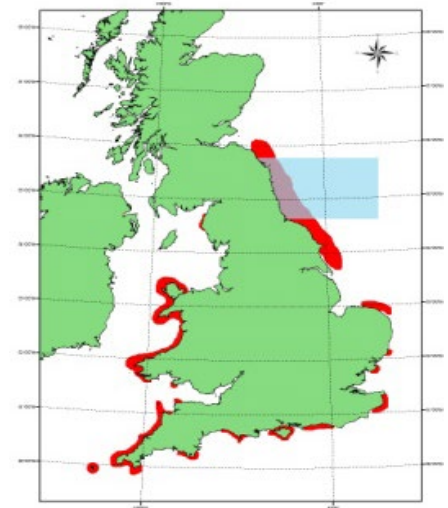
The stock status in some years may have changed compared to previous assessments as a result of recent revisions made in the data processing. The protocols for processing individual length samples used to estimate the size composition of annual landings were reviewed, which has resulted in a greater number of samples being incorporated, including a number of samples that previously had been excluded because they were missing ancillary data. Specifically, samples with missing landings data were previously not included in the processing, however the revised protocol allows them to be included by assuming that the sample represents the entire catch of that trip. While this may underestimate the proportion of total catch that this sample represents, total exclusion was considered to have a greater potential bias on the annual estimates compared to including them with lesser weight than they may actually represent. For some stocks this has led to a substantial change in the estimates of annual size composition which has implications for the assessment of stock status.

The length distributions displayed are averaged over three years as these are the used by the assessment and directly correspond to the assessment output figures, so appear different from those in the previous assessment report which showed individual years.

Cefas Stock Status 2023: European lobster (*Homarus gammarus*) in Northumberland & Durham.

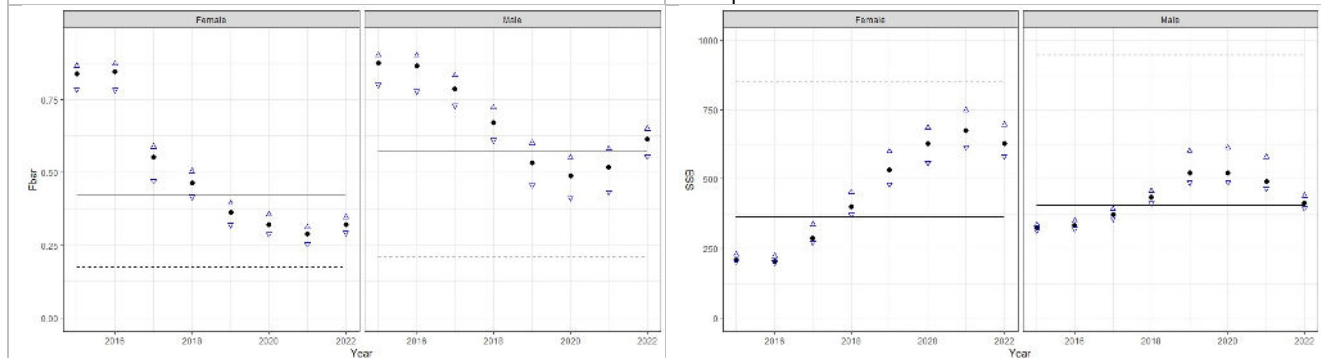
Sustainability Status

Minimum Conservation Reference Size (MCRS)	At the MCRS applied in this region around 100% males and 95% of females should be mature
Discarding	High discard survival assumed to be > 90%
Exploitation rate	High, between the MSY and limit reference point limit for females, above the limit reference point for males
Stock size	Between the minimum and MSY reference point for females, at the limit reference point for males
Confidence	Data are sufficient to run the assessment. No reported changes within the fishery.



a) Live landings (in tonnes, bars) and effort (days fished, lines) for less than or equal to (\leq)10m fleet (dark blue/solid line) and greater than ($>$) 10m fleet (light blue/dashed line): Note: Changes in recording levels in 2006 and 2009

b) Length distributions (running three year average) as used in the assessments. Solid red line represents the median length; blue dashed lines represent 25th and 75th percentiles; red dashed lines represent the 5th and 95th percentiles.



c) Fishing mortality three-year average with FMSY target (35% SPR, dashed) and maximum reference point limit (15% SPR, solid).

d) Spawning stock biomass (three-year average) with MSY target (35% SPR, dashed) and minimum reference point limit (15% SPR, solid).

Sampling levels

Table 1. Number of vessels sampled and total sample numbers (male and female combined) in the Northumberland and Durham assessment for the last ten years, collected by Cefas and IFCA. All vessels sampled landed into Northumberland and Durham English ports.

Year	Number of Vessels sampled		Cefas samples used		ICFA samples used		Total	
	<=10m	>10m	Samples	Individuals	Samples	Individuals	Samples	Individuals
2013	124	15	32	1,024	16	1,007	48	2,031
2014	119	14	36	1,490	27	692	63	2,182
2015	115	14	41	1,696	17	527	58	2,223
2016	119	16	49	2,003	5	610	54	2,613
2017	109	16	43	1,789	38	2,030	81	3,819
2018	110	21	38	1,650	36	2,584	74	4,234
2019	101	24	59	3,465	12	825	71	4,290
2020	88	25	28	1,105	13	998	41	2,103
2021	98	24	26	882	5	468	31	1,350
2022	85	23	61	2,173	14	1,052	75	3,225

Fishery overview and developments

General comments on the available data are contained in the introduction section. Reported landings increased substantially in 2012 but have been fairly stable since with the exception of a large dip in 2015. Effort in terms of days fished for the dominant <10m fleet has been generally declining since 2014 while effort from the >10m fleet has been increasing.

Biological sampling levels have been good with typically over 50 samples per year with slightly lower levels during 2020 and 2021 predominantly due to Covid impacts. IFCA length data have been incorporated into the Northumberland and Durham assessments for all years.

The exploitation rate of the stock of lobster in the Northumberland & Durham area is high; fishing mortality is above the limit reference point for males and between the limit and target for females. There was a decreasing trend for exploitation until 2020 with a subsequent increase for males, less so for females. The biomass status is mixed, with female biomass between the minimum and target reference level, and males around the minimum reference level. Landings and effort (in terms of days fished) increased from 2010 until 2014. The status of the stock in relation to the reference points has improved since the previous assessment in 2019. The change in status is largely due to the revisions to the input data (see Data section in the introduction) although the estimate of exploitation for females in 2022 is substantially lower than the revised estimate of exploitation in 2018.

There is a seasonal pattern to fishing activity with an inshore focus on lobster through the summer- autumn with a more offshore (4-30 miles) focus on crab during winter-spring and fewer days at sea during this period. Within the Northumberland IFCA there are around 115 shellfish permit holders, of which ~80% are active during the summer and ~65% during the winter. The number of available licences has not changed recently and the ban on vessels greater than 12 metres long within the district has excluded larger nomadic operations. There is a pot limit within the District waters of 800 per vessel. Those fishing outside beyond the 6 mile limit are understood to typically deploy a further 200-1000 additional pots per vessel although there are no official records of this. There is little gear conflict reported between mobile and potting outfits within the Northumberland IFCA district. Within this district there is a spatial gradient in reported size distributions with smaller individuals dominating in the south (North Shields – Newbiggin-by-the-Sea) compared to the northerly Amble-Berwick section.

Within the NEIFCA district improved landings have been noted since the mandatory inclusion of escape gaps, accompanied by anecdotal reports of increased pre-recruit density on the grounds from 2013 onwards. Data

collected by NEIFCA show that active vessel numbers have remained stable, as have pots hauled and pot numbers, although large animals are still relatively uncommon.

Fishery Management measures

- UK and EU legislation sets a minimum landing size of 87mm for lobster in the UK and prohibits the landing of parts of lobsters.
- National legislation restricts the number of shellfish licences available in the UK and also prohibits the landing of berried lobsters (introduced October 2017) and those with a v-notch in their tail fan.
- Local IFCA legislation varies and is detailed in the table below.

Table 2. Regional byelaws on Northumberland & Durham lobster fisheries.

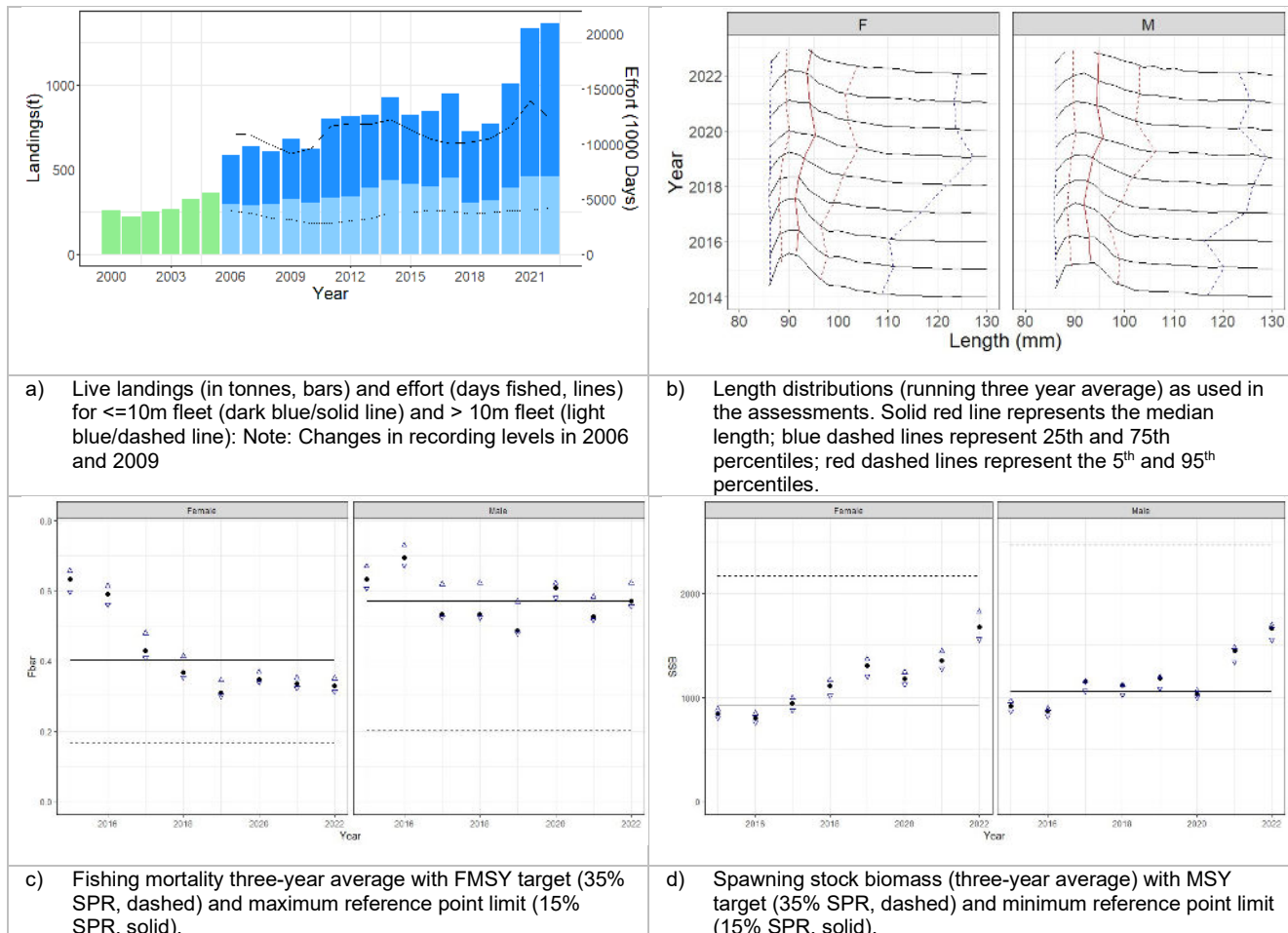
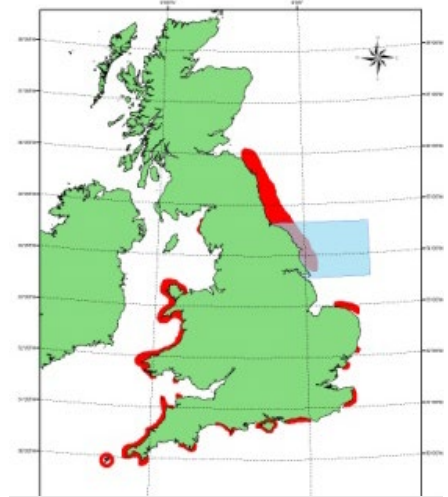
Title of Byelaw	Northumberland	North Eastern
Shellfish Permits	Yes	Yes*
Minimum Conservation Reference Size	National	National
Maximum Pot Limit	Yes - 800	No
Escape Gaps	No	Yes*
Maximum Vessel Length	Yes - 12m	Yes – 10/14m (some areas)
Towed Gear Restrictions	No	No
Prohibits the Removal of Parts of Lobsters	Yes	Yes

*Only applicable within the previous North Eastern Sea Fisheries Committee District

Cefas Stock Status 2023: European lobster (*Homarus gammarus*) in Yorkshire Humber

Sustainability Status

Minimum Conservation Reference Size (MCRS)	At the MCRS's applied in this region around 100% of males and 95% of females should be mature.
Discarding	High discard survival assumed to be > 90%.
Exploitation rate	Around the limit reference point for males and between the MSY and limit point for females.
Stock size	Between minimum and maximum reference point for males and females.
Confidence	Recent expansion of the fishery may be masking declines in stock



Sampling levels

Table 1. Number of vessels sampled and total sample numbers (male and female combined) in the Yorkshire Humber assessment for the last ten years, collected by Cefas and IFCA. All vessels sampled landed into Yorkshire Humber English ports.

Year	Number of Vessels sampled		Cefas samples used		ICFA samples used		Total	
	<=10m	>10m	Samples	Individuals	Samples	Individuals	Samples	Individuals
2013	161	33	77	3,896	67	3,694	144	7,590
2014	161	32	96	4,244	47	2,501	143	6,745
2015	159	32	78	4,027	57	3,104	135	7,131
2016	150	35	103	5,947	58	3,286	161	9,233
2017	138	35	87	5,548	35	3,994	122	9,542
2018	139	39	81	5,447	68	4,854	149	10,301
2019	130	40	109	6,398	0	0	109	6,398
2020	129	43	102	6,458	2	265	104	6,723
2021	135	41	109	6,607	11	867	120	7,474
2022	121	43	73	4,934	14	997	87	5,931

Fishery overview and developments

General comments on the available data are contained in the introduction section. Between 2011 and 2020 landings had been reasonably steady between 750 and 1000 tonnes albeit with lower landings in 2018 & 2019. However landings increased sharply in 2021 to over 1250 tonnes and remained at a similar level in 2022 with most of the increase coming from the dominant <10m fleet which also saw a slight increase in the number of days fished in 2021. The number of days fished for the larger vessels has remained fairly constant for the past 10 years.

Sampling levels have been good throughout the available time series with more than 100 samples in all years except 2022. IFCA data have been incorporated into the current Yorkshire Humber assessment for all years except 2019 and fewer IFCA samples have been available since 2019. As mentioned in the introduction this may have an impact on the assessment results but the magnitude of any impact is expected to be relatively small.

The exploitation status of the stock of lobster in Yorkshire Humber is high, around the proposed limit reference point for males and between the MSY level and the limit level for females. Fishing pressure is particularly high on animals around the Minimum Landing Size. The biomass status of both sexes is between the minimum and maximum reference points for both sexes having increased since 2020. The status of the stock has improved since the previous assessment in 2019.

Since 2010 the fishery has expanded to offshore grounds. An increase in offshore vivier vessels has been seen and a lot of vessels have increased their pot numbers (North Eastern IFCA, *pers. comm.*). This expansion of the fishery and change in fishing habits may be exploiting previously unfished populations with larger animals, which could explain the apparent decrease in F and increase in biomass in recent years, and the wider spread in length distributions. Abnormally cold temperatures in early spring 2018 caused mass mortalities of lobster that were found washed up on the north east coast. Another mass mortality event occurred in autumn 2021, the cause of which is uncertain.

NEIFCA data sources indicate that landings have continued to increase, following a trend established in the fishery since the early 1990's. The number of pots hauled has remained stable across the fishery, although accompanied by a reported increase in overall pot numbers. Displacement of gear has occurred within the Holderness fishery due to two offshore wind farm developments, pipeline works and associated surveys. Additionally, oil & gas exploration also caused temporary displacement of some offshore operators. Vessel upgrades have also allowed for some operators to expand their fishing grounds into some areas that were previously lightly exploited.

Fishery Management Measures

North Eastern IFCA byelaws apply between the River Tyne and the River Tees (part of their area) and extend to 6nm out from coastal baselines.

- UK and EU legislation sets a minimum landing size of 87mm for lobster in the UK and prohibits the landing of parts of lobsters.
- National legislation restricts the number of shellfish licences available in the UK and also prohibits the landing of berried lobsters (introduced October 2017) and those with a v-notch in their tail fan.
- Local IFCA legislation varies and is detailed in the table below.

Table 2. Regional byelaws on Yorkshire Humber lobster fisheries.

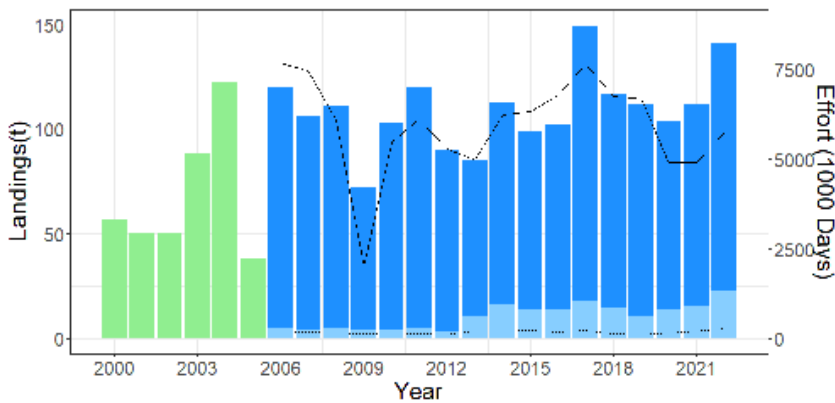
Title of Byelaw	North Eastern
Shellfish Permits	Yes*
Minimum Conservation Reference Size	National
Maximum Pot Limit	No
Escape Gaps	Yes*
Maximum Vessel Length	Yes – 10m/14m (some areas)
Towed Gear Restrictions	No
Prohibits the Removal of Parts of Lobsters	Yes

*Only applicable within the previous North Eastern Sea Fisheries Committee District

Cefas Stock Status 2023: European lobster (*Homarus gammarus*) in East Anglia

Sustainability Status

Minimum Conservation Reference Size (MCRS)	At the MCRS's applied in this region around 100% of the males and between 88-96% of the females should be mature
Discarding	High discard survival assumed to be > 90%
Exploitation rate	Unknown- data insufficient for assessment
Stock size	Unknown- data insufficient for assessment
Confidence	No recent assessments: sparse data increases uncertainty in assessment results.



Live landings (in tonnes, bars) and effort (days fished, lines) for ≤10m fleet (dark blue/solid line) and > 10m fleet (light blue/dashed line): Note: Changes in recording levels in 2006 and 2009

Sampling levels

Table 1. Number of vessels sampled and total sample numbers (male and female combined) in East Anglia for the last ten years, collected by Cefas and IFCA. All vessels sampled landed into East Anglia English ports.

Year	Vessel size		Cefas samples used		ICFA samples used		Total	
	<=10m	>10m	Samples	Individuals	Samples	Individuals	Samples	Individuals
2013	109	6	10	355	22	757	32	1,112
2014	110	8	7	156	0	0	7	156
2015	109	7	12	419	5	125	17	544
2016	120	6	10	184	3	90	13	274
2017	122	5	21	480	8	409	29	889
2018	127	5	9	284	19	1,369	28	1,653
2019	121	5	18	610	0	0	18	610
2020	93	5	17	596	0	0	17	596
2021	99	6	12	688	0	0	12	688
2022	97	5	3	57	7	387	10	444

Fishery overview and developments

General comments on the available data are contained in the introduction section. Reported landings and effort have fluctuated without trend over the available time series. Landings are dominated by the <10m fleet. The proportion of landings coming from the >10m sector is low but has been increasing gradually since 2009.

Sampling levels have been less than 30 per year for all years except 2013. While the numbers of samples per tonne landed is relatively high in comparison to other stock areas, the number of animals per sample is lower than most areas and there is a high level of variation in size composition between samples. The combination of these factors means that the length data are too uncertain to run any form of analytical assessment.

The exploitation status of the stock of lobster in East Anglia is unknown.

Fishery Management measures

Eastern IFCA byelaws apply between the Wash and the River Stour (part of their area) and extend to 6nm out from coastal baselines. Kent & Essex IFCA byelaws apply between the River Stour and the eastern end of Rye Bay and extend to 6nm out from coastal baselines, which, due to drying sandbanks, extends up to 15 miles offshore in some places.

- UK and EU legislation sets a minimum landing size of 87mm for lobster in the UK and prohibits the landing of parts of lobsters.
- National legislation restricts the number of shellfish licences available in the UK and also prohibits the landing of berried lobsters (introduced October 2017) and those with a v-notch in their tail fan.
- Local IFCA legislation varies and is detailed in the table below.

Table 2. Regional byelaws on East Anglia lobster fisheries.

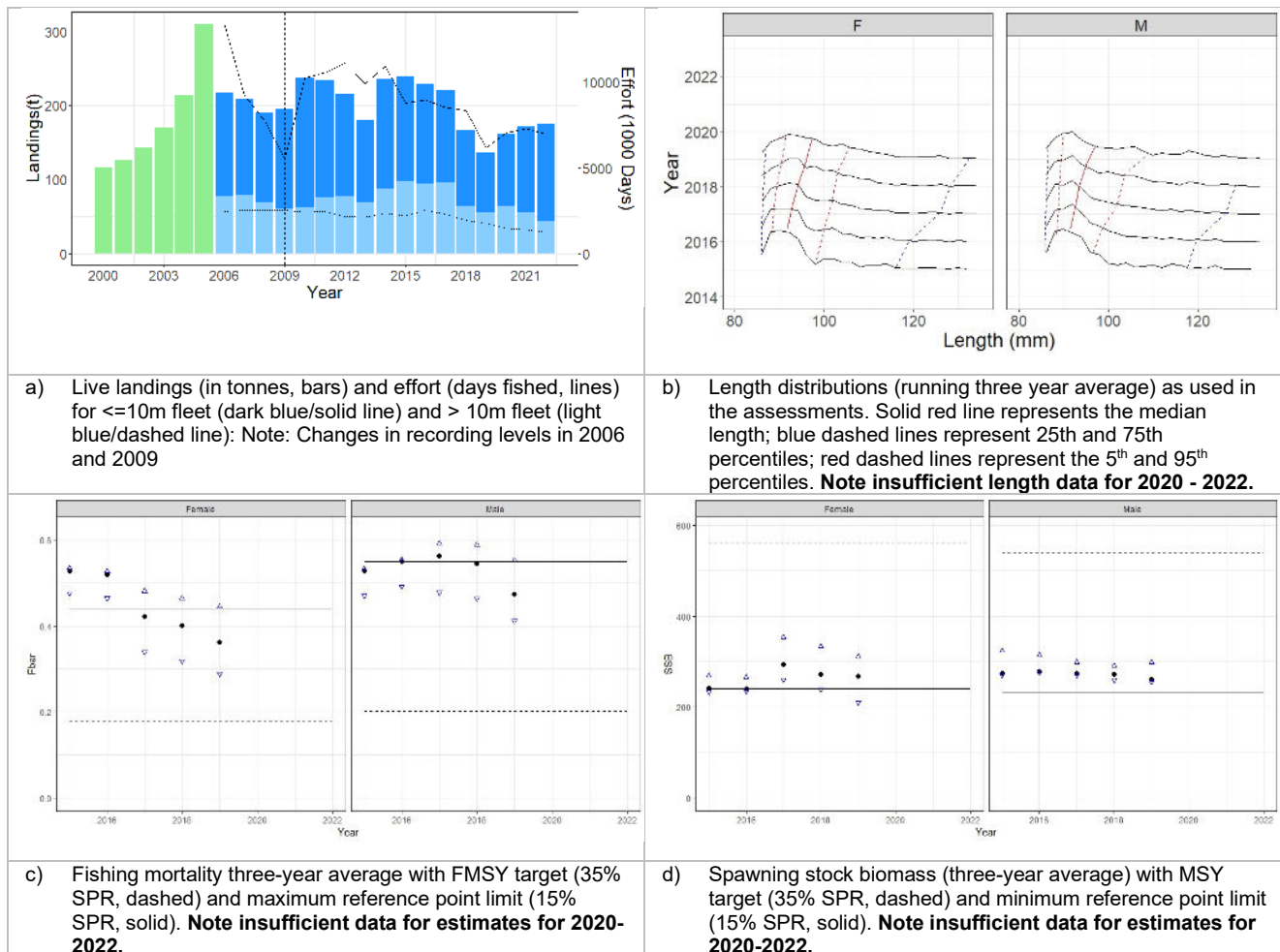
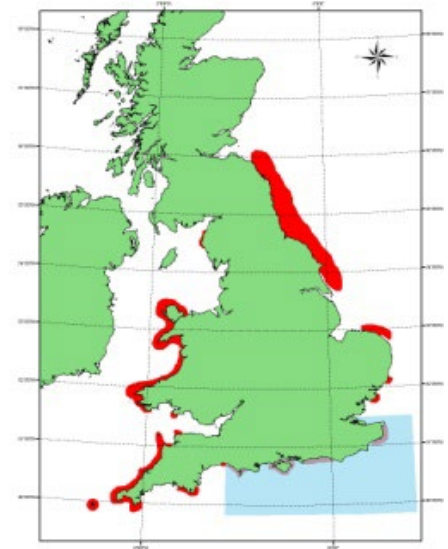
Title of Byelaw	Eastern	Kent & Essex
Shellfish Permits	Yes*	Yes*
Minimum Conservation Reference Size	National	National
Maximum Pot Limit	No	No
Escape Gaps	Yes*	Yes*
Maximum Vessel Length	No	Yes – 14m
Towed Gear Restrictions	No	No
Prohibits the Removal of Parts of Lobsters	Yes	Yes (some areas)

* Only applicable in some areas of District

Cefas Stock Status 2023: European lobster (*Homarus gammarus*) in Southeast South Coast

Sustainability Status

Minimum Conservation Reference Size (MCRS)	At the MCRS's applied in this region around 100% of the males and 96% of the females should be mature
Discarding	High discard survival assumed to be > 90%
Exploitation rate	No estimate for 2022 due to insufficient data
Stock size	No estimate for 2022 due to insufficient data
Confidence	No assessment for 2020-22, sparse data increases uncertainty in assessment results



Sampling levels

Table 1. Number of vessels sampled and total sample numbers (male and female combined) in the Southeast South Coast assessment for the last ten years, collected by Cefas and IFCA. All vessels sampled landed into Southeast South Coast English ports.

Year	Number of Vessels sampled		Cefas samples used		ICFA samples used		Total	
	<=10m	>10m	Samples	Individuals	Samples	Individuals	Samples	Individuals
2013	224	23	0	0	0	0	0	0
2014	225	24	35	1,506	8	261	43	1,767
2015	252	23	27	1,043	4	82	31	1,125
2016	244	26	21	912	5	107	26	1,019
2017	222	25	29	884	0	0	29	884
2018	221	26	20	867	0	0	20	867
2019	178	22	16	456	0	0	16	456
2020	150	26	5	105	0	0	5	105
2021	153	25	2	14	0	0	2	12
2022	149	18	9	456	2	33	9	456

Fishery overview and developments

General comments on the available data are contained in the introduction section. Landings of lobster in this stock unit have been generally declining since 2015 although landings from the <10m fleet increased 2020-2022. Effort in terms of days a sea have been declining over the same period.

Sampling levels since 2020 have been insufficient to undertake an assessment over that period. Prior to this period sample numbers were moderate and the length frequencies sufficiently well defined to be considered appropriate to use in assessment. IFCA data have been incorporated into the Southeast South Coast assessment for years 2014-2016 and 2022.

The exploitation level of lobster in the Southeast South Coast in 2019 was between the limit and target for both sexes. Fishing effort for females steadily declined from 2015-2019, with F for males decreasing in 2018/19. Biomass was between minimum reference point limit and MSY target for males and females, remaining relatively stable for both sexes. Length samples were sparse in 2012–2013 and 2020-2021, consequently no assessment was presented for 2014, or 2020-2022 as the assessment is based on the latest 3 years of length data. The status of the stock in relation to the exploitation rate reference points has not changed from the previous assessment in 2019.

Fishery Management measures

Kent & Essex IFCA byelaws apply between the River Stour and the eastern end of Rye Bay and extend to 6nm out from coastal baselines, which, due to drying sandbanks, extends up to 15 miles offshore in some places.

Sussex IFCA byelaws apply between the eastern end of Rye Bay and Hayling Island and extend to 6nm out from coastal baselines.

Southern IFCA byelaws apply between the Devon/Dorset border to the west and the Hampshire/Sussex border to the east including Portland and the Isle of Wight.

- UK and EU legislation sets a minimum landing size of 87mm for lobster in the UK.
- National legislation restricts the number of shellfish licences available in the UK and also prohibits the landing of berried lobsters (introduced October 2017) and those with a v-notch in their tail fan.
- Local IFCA legislation varies and is detailed in the table below.

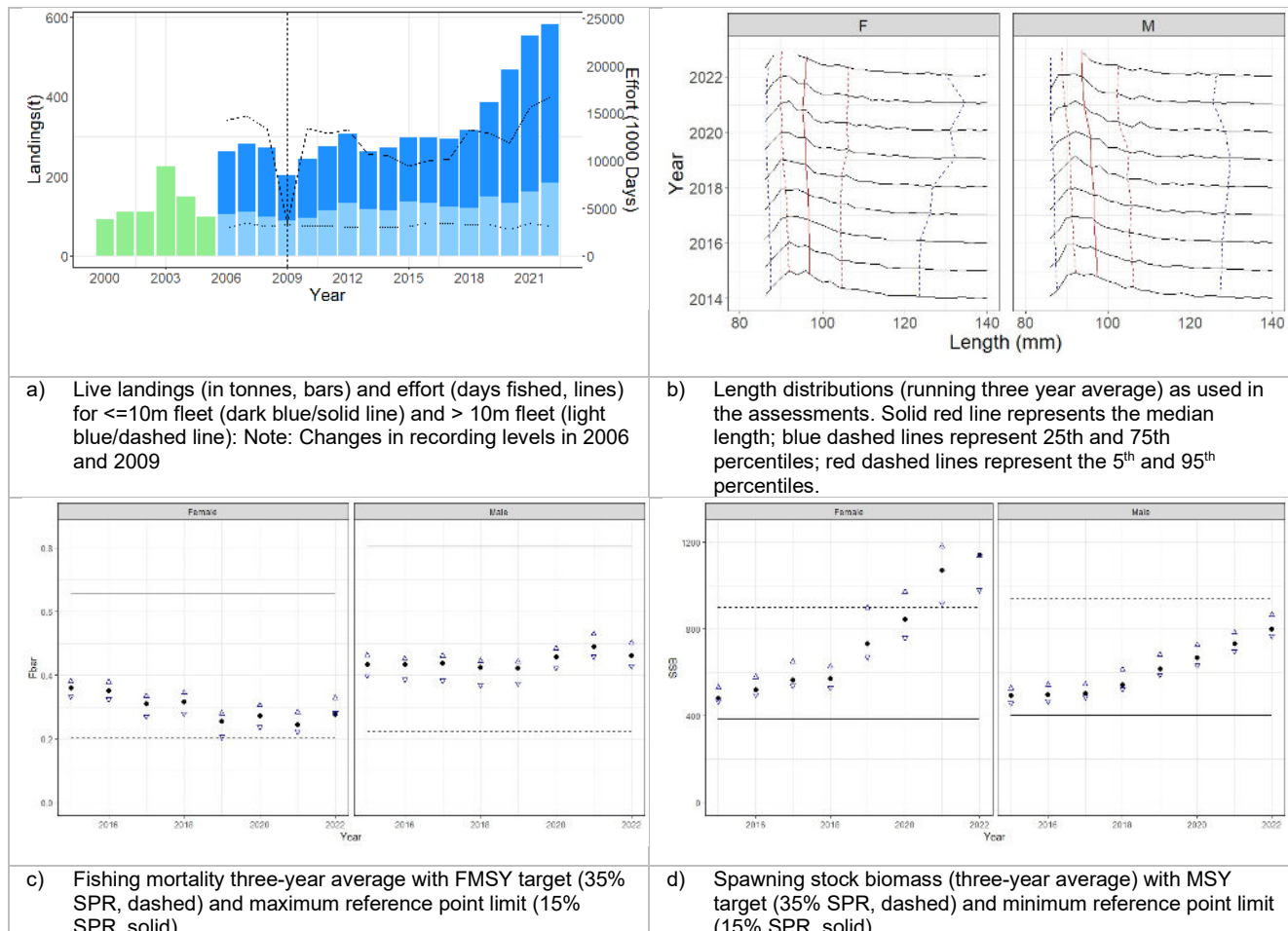
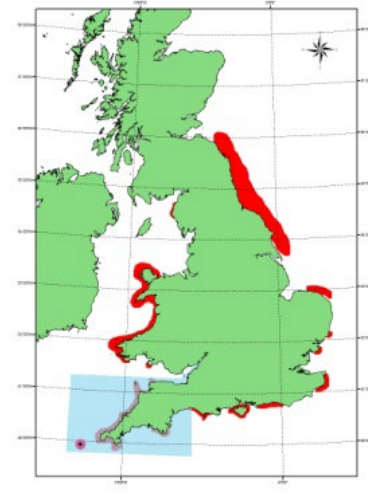
Table 2. Regional byelaws on Southeast South Coast lobster fisheries.

Title of Byelaw	Sussex	Southern	Kent & Essex
Shellfish Permits	Yes	Yes	No
Minimum Conservation Reference Size	National	National	National
Maximum Pot Limit	Yes-300<3m, 600<6m	No	No
Escape Gaps	Yes	No	Yes
Maximum Vessel Length	Yes -14m	Yes- 12m	Yes – 14m
Towed Gear Restrictions	No	No	No
Prohibits the Removal of Parts of Lobsters	No	No	Yes (some areas)

Cefas Stock Status 2023: European lobster (*Homarus gammarus*) in the Southwest

Sustainability Status

Minimum Conservation Reference Size (MCRS)	At the MCRS's applied in this region around 100% of the males and 96% of the females should be mature
Discarding	High discard survival assumed to be > 90%
Exploitation rate	Above rates consistent with MSY but below maximum reference point limit for males and females.
Stock size	Between the limit reference point and MSY target for males, above MSY target for females
Confidence	Data are sufficient to run the assessment. No reported changes within the fishery.



Sampling levels

Table 1. Number of vessels sampled and total sample numbers (male and female combined) in the Southwest assessment for the last ten years, collected by Cefas and IFCA. All vessels sampled landed into Southwest English ports.

Year	Number of Vessels sampled		Cefas samples used		ICFA samples used		Total	
	<=10m	>10m	Samples	Individuals	Samples	Individuals	Samples	Individuals
2013	273	44	20	932	13	849	33	1,781
2014	291	44	27	1,213	38	1,343	65	2,556
2015	297	41	44	2,024	71	3,274	115	5,298
2016	315	47	58	1,334	28	1,030	86	2,364
2017	315	45	49	1,930	2	150	51	2,080
2018	311	47	39	1,596	14	605	53	2,201
2019	309	41	52	1,456	0	0	52	1,456
2020	306	42	31	1,755	0	0	31	1,755
2021	340	39	75	3,660	0	0	75	3,660
2022	337	39	91	3,927	0	0	91	3,927

Fishery overview and developments

General comments on the available data are contained in the introduction section. Reported landings were relatively stable between 2006-2018 at around 300t per year however these have increased steadily 2019-2022 to reach nearly 600t. Most of this increase in landings has come from the <10m fleet which has also seen an increase in the number of days fished 2021-2022. Landings and effort from the >10m sector have been more steady with a smaller proportional increase in landings 2021-2022 compared to the <10m sector.

Sampling levels have been good with typically more than 50 samples per year (fewer in 2020 due to Covid impacts). IFCA data have been incorporated into the Southwest assessments for years 2014-2018. As mentioned in the Introduction, the lack of samples from IFCA sources in recent years may have an impact on the assessment results but the magnitude of this impact is expected to be relatively low.

Exploitation level of lobster in the Southwest is between MSY target level and the maximum reference point limit for both sexes, and has remained relatively stable for both males and females in recent years. Spawning biomass levels are between the minimum reference point limit and the MSY target level for males and above the MSY target for females, having increased for both sexes since 2018. The status of the stock in relation to the fishing rate reference points has improved since the last assessment in 2019.

Fishery Management measures

Devon & Severn IFCA jurisdiction applies between Lyme Regis and the River Tamar on the south coast and between Marsland Mouth and the Welsh border on the north coast and extend to 6nm out from coastal baselines. Cornwall IFCA jurisdiction applies between the River Tamar (including the western shore) and Marsland mouth, and extend to 6nm out from coastal baselines. Isles of Scilly IFCA byelaws apply to the 6nm boundary around the Isles of Scilly.

- UK and EU legislation sets a minimum conservation reference size (MCRS) of 87mm for lobster in the UK, however, Devon & Severn, Cornwall, and Isles of Scilly IFCAs all enforce an MCRS of 90mm. EC legislation also prohibits the landing of parts of lobsters
- National legislation restricts the number of shellfish licences available in the UK and also prohibits the landing of berried lobsters (introduced October 2017) and those with a v-notch in their tail fan.

- Local IFCA legislation varies and is detailed in the table below. Devon & Severn IFCA (D&S) enforce a total fishing ban in the No Take Zone on the east coast of Lundy Island inside the Marine Protected Area (SAC and MCZ designation).

Table 2. Regional byelaws on Southwest lobster fisheries.

Title of Byelaw	Devon & Severn	Cornwall	Isles of Scilly
Shellfish Permits	Yes	Yes	No
Minimum Conservation Reference Size	Yes – 90mm	Yes – 90mm	Yes – 90mm
Maximum Pot Limit	No	No	No
Escape Gaps	Yes	No	No
Maximum Vessel Length	Yes - 15.24M	Yes - 16.46M	Yes - 11M
Towed Gear Restrictions	Inshore Potting Agreement Area	No	Yes
Prohibits the Removal of Parts of Lobsters	No	No	No

References

Oresland V., Ulmestrand M. 2013. European lobster subpopulations from limited adult movements and larval retention. *ICES Jour. Mar. Sci.* 70(3): 532-59.

Smith I. P., Jensen A. C., Collins K. J., Matthey E. L. 2001. Movement of wild European lobsters *Homarus Gammarus* in natural habitat. *Mar. Ecol. Prog. Ser.* 222: 177-186.

Glossary

Cefas	Centre for Environment, Fisheries and Aquaculture Science.
IFCA	Inshore Fisheries and Conservation Authority.
F	Fishing Mortality.
FMSY	The fishing effort which will produce Maximum Sustainable Yield.
M	Natural Mortality.
MCZ	Marine Conservation Zone
MMO	Marine Management Organisation
MSY	Maximum Sustainable Yield, the maximum landings which can be regularly taken while avoiding stock collapse.
SAC	Special Area of Conservation
SpR	Spawner per Recruit