Assessment of king scallop stock status for selected waters around the English coast 2024

A Defra and Industry Funded Project

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Author contributions

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Contents

Executive Summary

This report details the status of selected king scallop (*Pecten maximus*) stocks around England in 2024, and development since 2017. Annual assessments have been undertaken since 2017 by the Centre for Environment, Fisheries and Aquaculture Science (Cefas), as part of a collaborative project with the UK fishing industry, the UK Department for Environment, Food and Rural Affairs (Defra), and the UK Sea Fish Industry Authority (Seafish).

King scallops around the English coast are one of the most commercially valuable marine species, and the most valuable of the wild-caught mollusc species (MMO, 2022). The stocks in the English Channel and approaches to the Bristol Channel are exploited primarily by the UK and France using towed dredges while those in the Central North Sea are almost exclusively UK fisheries.

The five stock assessment areas identified in 2017 as being of importance to UK fisheries were: three in ICES Division 27.7.e (Western Channel Inshore, 7.e.I; Lyme Bay Area, 7.e.L; Western Channel Offshore, 7.e.O), and two in Division 7.d (Eastern Channel North, 7.d.N; Eastern Channel South, 7.d.S). The two additional assessment areas defined in 2018 were: one in the approaches to the Bristol Channel (7.f.I), and another in Division 4.b (North Sea South, 4.b.S). Commercial landings data are available at the spatial resolution of statistical rectangles (1 degree in longitude, 0.5 degrees in latitude), as defined by the International Council for the Exploration of the Sea (ICES). The spatial definition of assessment areas is therefore based on statistical rectangles.

Two data streams were used for the assessments described in this report: dredge surveys using a commercial fishing vessel and underwater video system (UVS) surveys from the RV Cefas Endeavour. Dredge surveys have been carried out in the commercially fished parts of all stock units and were used to estimate scallop biomass available to the dredge fishery. Based on UVS surveys, estimates were obtained of the unfished biomass for the parts of the beds which are not fished commercially. The UVS beds are not surveyed annually but on a 5-year rolling cycle.

The assessments estimate the biomass of harvestable scallops and their exploitation rate in the areas subject to the dredge fishery. There is also some consideration made for the biomass of scallop that exists outside these fished areas, and which are assessed using the underwater video survey, however these estimates are more sporadic and therefore have higher uncertainty

Harvest rates are calculated as the ratio of international landings taken in the 12 months after the dredge survey to the estimate of harvestable biomass within the dredged areas. International landings (UK and non-UK landings) are compiled by the ICES scallop working group (WGScallop). At the time of publication for this report, ICES data have been compiled and published up to the end of 2022. International landings for the 12 months post survey are therefore only available for 2017-2021. Therefore from 2022 onwards, only UK landings were available for this assessment and non-UK landings for this period were estimated by scaling up UK landings by a recent ratio of UK to international landings

The evolution of the harvestable biomass of the dredged portions of six of the assessment areas (excluding stock units 7.d.S and 4.b.D) is shown in Figure ES1. The evolution of the harvest rates on the dredged portions of the six regularly assessed areas is shown in Figures ES2.

- The Lyme Bay area (7.e.L) continues to experience the highest exploitation levels, consistently above the MSY target since 2017.
- In the Eastern Channel North (7.d.N) the exploitation rate has generally been at or slightly above the proxy MSY since 2019.
- Exploitation rates in the Western Channel Inshore (7.e.I) and Western Channel Offshore (7.e.O) have consistently been below the respective MSY target since 2018.
- In stock unit of the Yorkshire and Durham Coast (4.b.S), the exploitation rate has generally been close to or below the MSY target. The exception is 2018, when landings were unusually high, combined with a low harvestable biomass. In the stock unit of the Bristol Channel (7.f.I) the harvest rate in 2019 was a few percent above the MSY target. We were unable to survey the area in 2021 and 2023, the harvest rate was below the MSY proxy in 2018 and 2020.
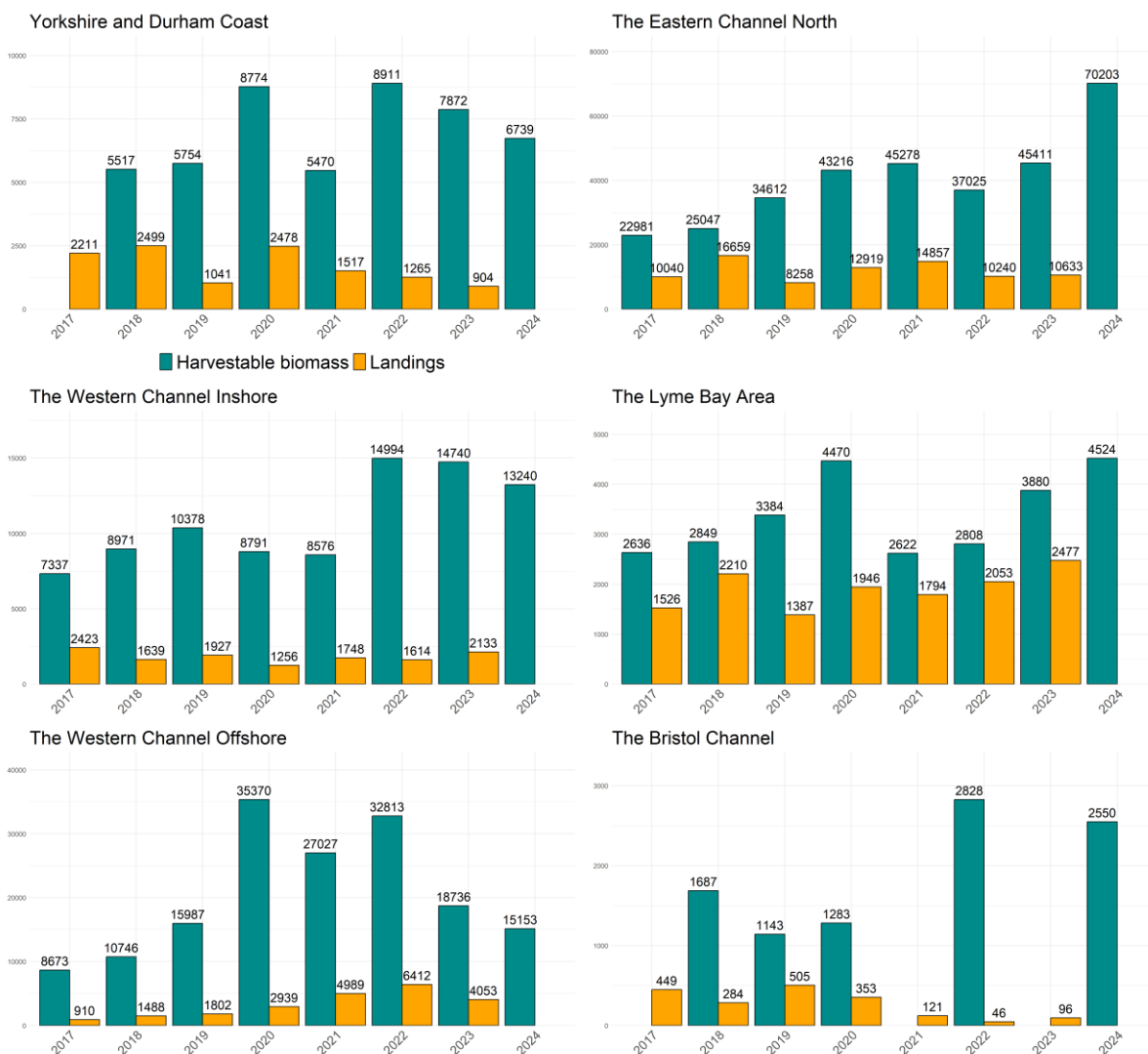

Figure ES1. Harvestable biomass (blue) per assessment area, and commercial landings (orange) of the 12-month post-survey.
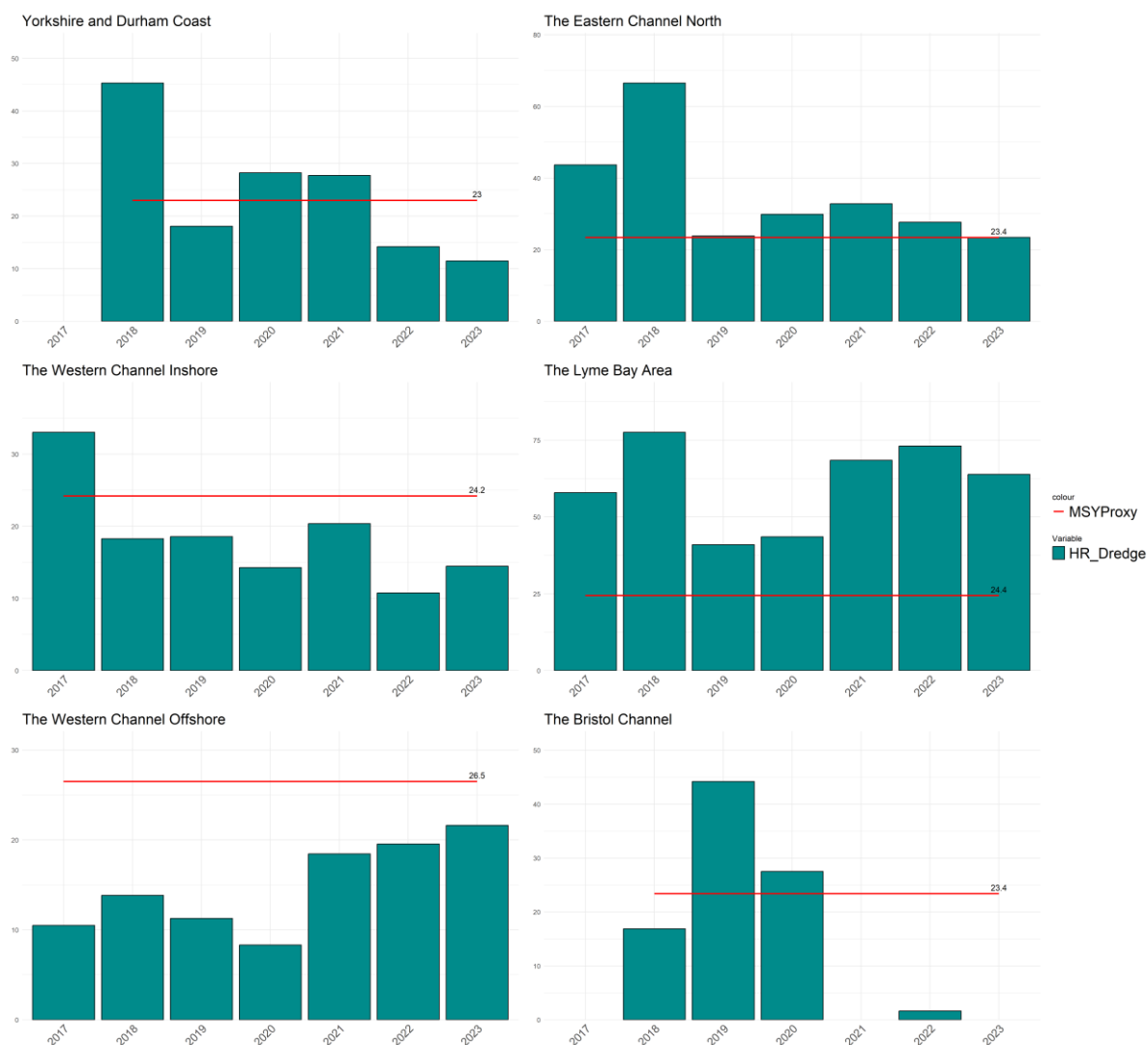
Figure ES2. Estimate of harvest rate from dredge surveys, along with MSY proxy reference points. The years refer to when the survey was conducted, with harvest calculated using the landings in the following 12 months.

1. General

1.1. Stock definition

Seven stock units are defined, of which six are assessed (no assessment is undertaken for 4.b.D). These stocks lie within four ICES subdivisions, 4.b, 7.d, 7.e and 7.f and these areas are further subdivided to give the stock units (figure 1 (a)). They are hereafter referred to as 'stock unit assessment areas', or 'stock unit'. Scallop beds where the main fishing activity occurs have been identified in each stock unit (figure 2 (b)), with further beds defined as non-fishing areas (not shown here) (see Stock Annex).

(a)   (b)
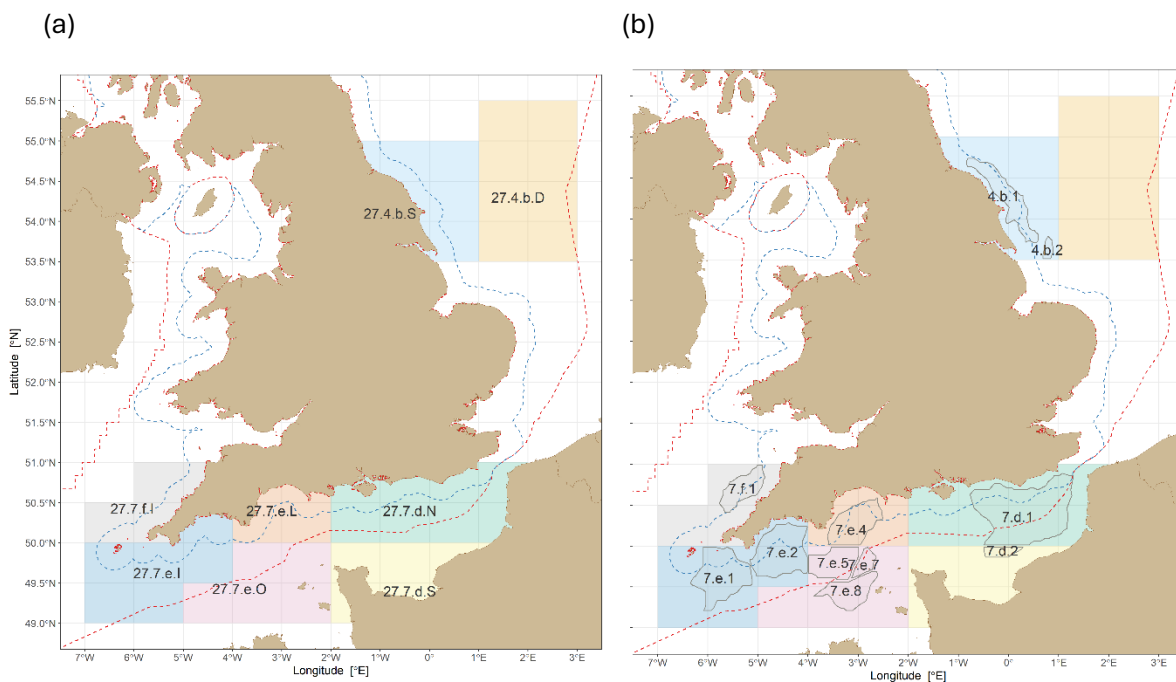
Figure 1. (a) King scallop stock unit assessment areas defined in the English Channel, the Celtic and North Sea (b) the king scallop stock unit assessment beds for the dredge survey. The dashed lines indicate the12nm Territorial Sea Limits (TSLs) of the UK, and the UK Economic Exclusion Zone (EEZ).

1.2. Management

In the Channel, France and the UK have put various seasonal closures into place. The scallop fishery management is described in the Stock Annex.

1.3. Fishery description (landings)

At the time of finalising this report (March 2025), provisional UK landings data to the end of Q3 of 2024 are considered reliable. As such, the landings from 2004 – 2023 are shown in Figure 2. The UK proportion of international landings has fluctuated greatly over the past two decades (Figure 2). However, as non-UK landings from 2022-2023 were not available at the time of finalising this report, the international landings were estimated based on trends of the previous three years of the UK to international landings ratio. Where the percentage of non-UK international landings showed no trend between 2019 and 2021, the mean percentage was

calculated and used to estimate the international landings of recent years. Where it showed a trend (increasing or decreasing), the latest value was used. The stock assessment area of the Bristol Channel showed an increasing trend in the percentage of non-UK landings, whilst all other areas showed fluctuating trends.

1.4. Summary of stock assessment methodology

The assessment model is survey-based, using both a dredge survey in fished beds, and video survey in non-fished beds. The essence of the approach is to determine the harvestable biomass of scallops within each stock unit, as derived from fished and non-fished beds. Survey estimates of densities of scallops at or above MLS are raised by the gear efficiency parameter appropriate for the particular survey gear and ground type and raised to the area coverage of the stock unit. Harvest rates are then calculated for each stock unit using landing data. Harvest rate is a measure of the fishing mortality within a given area. Ideally it is calculated from the harvestable biomass immediately prior to the start of a particular fishing season, in relation to the total removals during that season. The UK and non-UK international landings of scallops are combined to provide a total harvest of scallop biomass per stock unit. Harvest rates are presented in relation to proxy reference points that were determined to establish exploitation levels consistent with maximum sustainable yield (MSY). Additional analysis of length distributions, of the populations from the dredged beds, are calculated and displayed in the supplementary information.
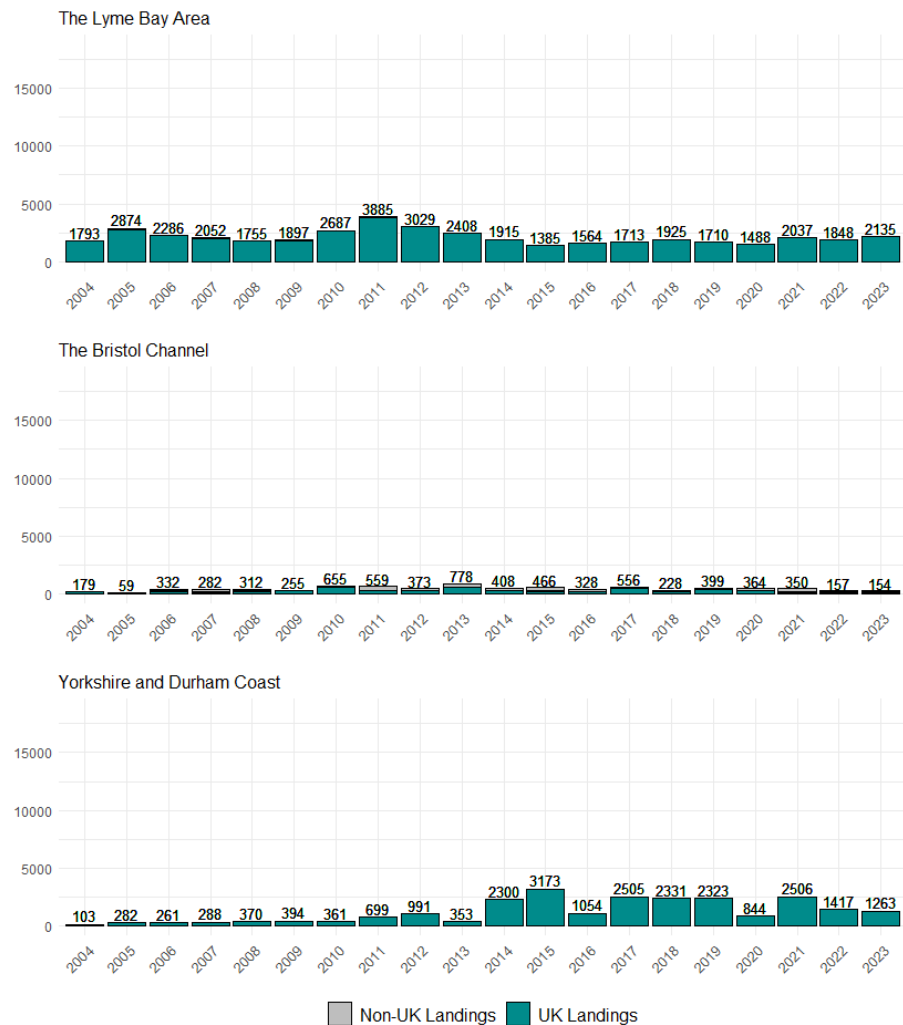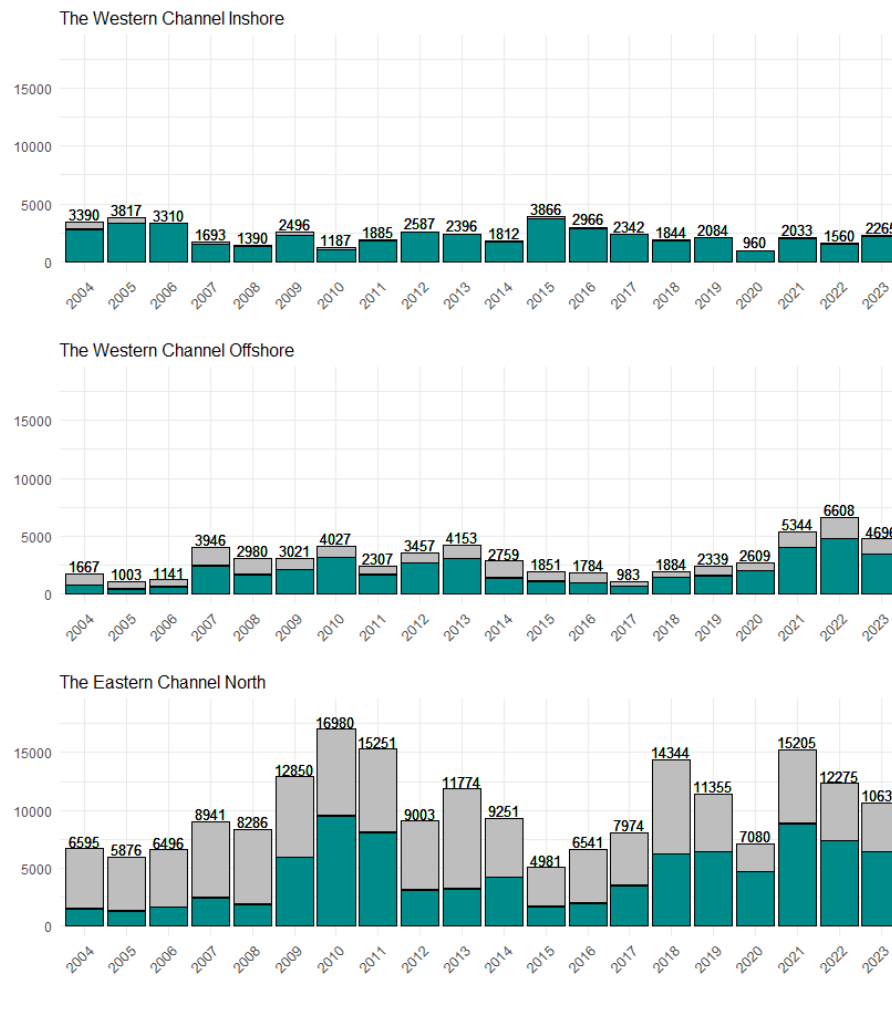
Figure 2. UK and non-UK landings (tonnes) for all stock assessment areas form 2004 - 2023, with the total international landings labelled per yearly column. The international landings for years 2022 and 2023 were estimated based on trends in the ratio of UK to international landings in recent years.

2. Data

2.1. Underwater video system (UVS) survey

The video (UVS) survey design and station selection procedure are described in Sections 5 and 7 of the Stock Annexe.

The UVS survey has covered unfished beds from different stock units approximately every five years (Table 1). The derived harvestable biomass has been combined per stock unit assessment area to calculate the contribution of currently unfished beds to the harvestable stock (Table 2). In the present approach, these estimates are assumed to be stable over time.

Table 1. The beds surveyed, per year, by the UVS including the number of transects, mean, minimum and maximum densities, and number of transects with zero counts recorded. Densities are given as numbers per 100 m2.

Un-Dredged Zone	Number of Transects	Mean Density	Min Density	Max Density	Number of Zero Counts
TV.7.e.A (2017)	25	1.71	0	7.01	9
TV.7.e.C (2017)	26	0.53	0	3.71	19
TV.7.e.D (2017)	12	0.43	0	2.42	7
TV.7.e.B (2019)	21	0.17	0	0.94	14
TV.7.e.E (2019)	11	0.05	0	0.30	9
TV.7.d.A (2019)	15	0	0	0	15
TV.4.b.A (2021)	16	0.13	0	1.80	14
TV.4.b.B (2021)	10	0.27	0	1.14	7
TV.4.b.C (2021)	31	0.44	0	6.78	24
TV.7.d.C (2022)	17	3.20	0	18.41	2
TV.7.e.F (2023)	51	1.31	0	9.39	7

Note: Data from the 2024 UVS survey will be available in the next stock assessment report.

Table 2. Estimated harvestable biomass (tonnes) and spawning stock biomass (tonnes) from the UVS beds and their total contribution to the stock unit.

Area	UWV Zone	UWV Zone Harv. Biomass (tonnes)	Area contribution Harv. Biomass (tonnes)	UWV Zone Spawn. Stock Biomass (tonnes)	Area contribution Spawn. Stock Biomass (tonnes)
Eastern Channel North (7.d.N)	TV.7.d.A	0		0	
	TV.7.e.E	29	995	28	993
	TV.7.d.C	966		965	
Western Channel Inshore (7.e.I)	TV.7.e.A	2826		2817	
	TV.7.e.B	0	5629	0	5614
	TV.7.e.F	2803		2797	
Lyme Bay Area (7.e.L)	TV.7.e.B	245		229	
	TV.7.e.C	1610	2151	1506	2030
	TV.7.e.D	169		168	
	TV.7.e.E	127		127	
Western Channel Offshore (7.e.O)	TV.7.e.B	32		31	
	TV.7.e.D	0	2742	0	2722
	TV.7.e.E	54		50	
	TV.7.e.F	2656		2641	
Bristol Channel (7.f.I)	TV.7.e.A	375	375	351	351
Yorkshire and Durham Coast (4.b.S)	TV.4.b.A	194		194	
	TV.4.b.B	130	856	130	855
	TV.4.b.C	532		531	

2.2. Dredge survey

2.2.1. Overview

The dredge survey design and station selection procedure are described in Sections 5 and 6 of the Stock Annexe.

Most of the survey effort is focussed in the Eastern Channel North, bed 7.d.1 (in 7.d.N (north), see map (figure 1 (b)) in section 1.1). In 2018, four additional tows were carried out in a small bed in the Eastern Channel South (7.d.S) stock unit to the south of bed 7.d.1. From 2022 onwards, only a small bed, 7.d.2, was routinely surveyed at the northern edge of Eastern Channel South (7.d.S). This bed is too small to be representative of the entire Eastern Channel South (7.d.S) stock unit. The bed is surveyed as an extension to the bed in 7.d.N, and results are presented in Figure 5, but no assessment is run in 7.d.S by the UK.

2.2.2. 2024 surveys

Between the 11th of May and 24th May 2024, the dredge survey sampled stations in beds 7.e.1, 7.e.2, 7.e.4, 7.e.5, 7.e.7, 7.e.8, 7.f.1. Two stations were missed in bed 7.f.1. due to the presence of static gear. Between the 3rd of September and the 13th September 2024, stations were sampled in beds 4.b.1, 4.b.2, 7.d.1, 7.d.2. In May, most of the samples were taken from 7.e.1 and 7.e.2 with 30 and 34 stations respectively. In September, most of the sampling focuses on bed 7.d.1, in which there were 65 stations (Table 4).

The data storage tag (DST), which is used to calculate the distance covered by each fishing tow on the seabed, failed for the duration of the May 2024 survey. Instead, the lengths of the tracks were calculated based on the duration and speed of the tow, from the information provided in the station log sheet. Using speed and duration of tows rather than DST data would over-estimate the length of the actual tracks on the seabed. Therefore, an average correction factor was estimated for each bed by comparing the DST and log sheet data from previous surveys. The average difference per bed based on the May 2021-2023 surveys was thus subtracted from the tow lengths estimated for the 2024 May survey, to produce the tow lengths subsequently used in the assessment.

One grid cell in northern beds (in 4.b) did not have any survey stations, 10 grid cells across five beds in the Western Channel, and a further 10 grid cells in the Eastern Channel with a cluster of these in the south-west corner of the bed (Figure 3). This cluster of grid cells missing stations was caused by poor weather reducing the number of stations sampled.

In several beds, a low proportion of individuals at and above the minimum landing size (MLS) were caught in the king scallop dredges across stations, particularly 4.b.2, 7.e.8 and 7.e.4 where overall less than 30% of measured individuals were at or above MLS (this number does not represent the proportion at the bed level as observations were not standardised for tow length).

2.2.3. Ground types

Information on the skipper-reported ground type at each station sampled is presented in Table 5.

2.2.4. Size composition and raised biomass estimates

From the size samples taken at each station, the total number of harvestable scallops (above MLS) was calculated. From this, the population biomass (tonnes) of harvestable scallops (round shell lengths ≥ 110 mm MLS) could be estimated. The harvestable biomass within 0.1-by-0.1degree grid cells in 2024 is shown in Figure 4.

The uncertainty, calculated from the random re-sampling ("bootstrapping"), is shown in Table 6 for all assessment areas.

Table 4. Number of stations, individuals measured, and individuals at 110mm and above, and percentage of individuals above MLS per bed

Beds Sampled 2024				
Bed	Number of Stations	Individuals Measured	Individual Measured (>= 110mm)	% above MLS
7.e.4	24	1246	237	19.02
7.e.7	6	147	110	74.83
7.e.8	18	1966	516	26.25
7.f.1	11	270	149	55.19
7.e.1	30	850	596	70.12
7.e.2	34	1132	673	59.45
7.e.5	19	359	247	68.80
4.b.1	19	1002	690	68.86
4.b.2	2	218	24	11.01
7.d.1	65	10456	6382	61.04
7.d.2	4	124	76	61.29

Table 5. Number of tows by ground type in each bed with proportion described by the survey vessel skipper as having significant amounts of flint or cobbles.

Bed	Year	Ground Type: Clean, Some Stones	Ground Type: Flint or Cobbles	Total	Tows with Flint Cobbles (%)
4.b.1	2018	8	15	23	65
	2019	19	3	22	14
	2020	22	0	22	0
	2021	17	0	17	0
	2022	17	2	19	11
	2023	17	2	19	11
	2024	12	7	19	63
4.b.2	2018	2	2	4	50
	2019	1	0	1	0
	2020	2	0	2	0
	2021	2	0	2	0
	2022	1	0	1	0
	2023	1	0	1	0
	2024	1	1	2	50
7.d.1	2017	49	14	63	22
	2018	38	28	66	42
	2019	50	17	67	25
	2020	49	2	51	4
	2021	35	12	47	26
	2022	58	6	64	9
	2023	54	20	74	27
	2024	35	30	65	54
7.d.2	2018	1	3	4	75
	2019	-	-	-	-
	2020	-	-	-	-
	2021	-	-	-	-
	2022	3	1	4	25
	2023	3	1	4	25
	2024	1	3	4	25
7.e.1	2017	20	1	21	5
	2018	18	2	20	10
	2019	20	0	20	0
	2020	19	0	19	0
	2021	23	0	23	0
	2022	32	0	32	0
	2023	29	1	30	3
	2024	27	5	32	84
7.e.2	2017	32	3	35	9
	2018	29	3	32	9
	2019	32	0	32	0
	2020	33	0	33	0
	2021	33	0	33	0
	2022	31	0	31	0
	2023	25	0	25	0
	2024	25	13	38	66

Bed	Year	Ground Type: Clean, Some Stones	Ground Type: Flint or Cobbles	Total	Tows with Flint Cobbles (%)
7.e.4	2017	31	0	31	0
	2018	31	0	31	0
	2019	29	0	29	0
	2020	31	0	31	0
	2021	31	0	31	0
	2022	24	0	24	0
	2023	20	0	20	0
	2024	22	2	24	92
7.e.5	2017	16	8	24	33
	2018	18	2	20	10
	2019	18	0	18	0
	2020	20	0	20	0
	2021	16	0	16	0
	2022	18	0	18	0
	2023	19	0	19	0
	2024	9	10	19	47
7.e.7	2017	7	2	9	22
	2018	6	2	8	25
	2019	4	0	4	0
	2020	4	0	4	0
	2021	7	0	7	0
	2022	2	2	4	50
	2023	3	3	6	50
	2024	6	0	6	100
7.e.8	2017	13	8	21	38
	2018	9	10	19	53
	2019	5	3	8	38
	2020	8	0	8	0
	2021	20	1	21	5
	2022	18	2	20	10
	2023	18	2	20	10
	2024	5	15	20	25
7.f.1	2018	8	6	14	43
	2019	12	0	12	0
	2020	13	0	13	0
	2021	-	-	-	-
	2022	13	0	13	0
	2023	-	-	-	-
	2024	7	6	13	54

Table 6. Estimates of harvestable biomass per stock unit (tonnes) and the associated uncertainty (25 & 75) percentiles.

Area		25th Percentile	Median	Survey	75th Percentile
27.4.b.S	2017	-	-	-	-
	2018	5219	5483	5517	5739
	2019	5392	5797	5754	6142
	2020	8406	8797	8774	9198
	2021	5204	5458	5470	5704
	2022	7659	8405	8911	9111
	2023	7559	7917	7872	8263
	2024	6241	6820	6739	7401
27.7.d.N	2017	20876	22732	22981	24602
	2018	23506	24965	25047	26332
	2019	33157	34752	34612	36477
	2020	40192	43149	43216	45872
	2021	42012	44791	45278	47610
	2022	35368	37007	37025	38671
	2023	43567	45341	45411	47199
	2024	64542	70273	70203	75938
27.7.e.I	2017	6417	7045	7337	7608
	2018	8585	9059	8971	9518
	2019	9547	10286	10378	10864
	2020	8373	8857	8791	9329
	2021	7389	8350	8576	9412
	2022	14195	14957	14994	15708
	2023	13673	14713	14740	15779
	2024	12413	13145	13240	13893
27.7.e.L	2017	2449	2563	2636	2722
	2018	2593	2792	2849	2995
	2019	3056	3362	3384	3664
	2020	4028	4404	4470	4777
	2021	2384	2602	2622	2813
	2022	2533	2806	2808	3065
	2023	3455	3841	3880	4236
	2024	3895	4529	4524	5093
27.7.e.O	2017	6919	8469	8673	9401
	2018	9119	10403	10746	11809
	2019	13382	14877	15987	19868
	2020	31772	35158	35370	38362
	2021	20226	25292	27027	30767
	2022	29023	31902	32813	34782
	2023	17228	18773	18736	20245
	2024	14190	15151	15153	16134

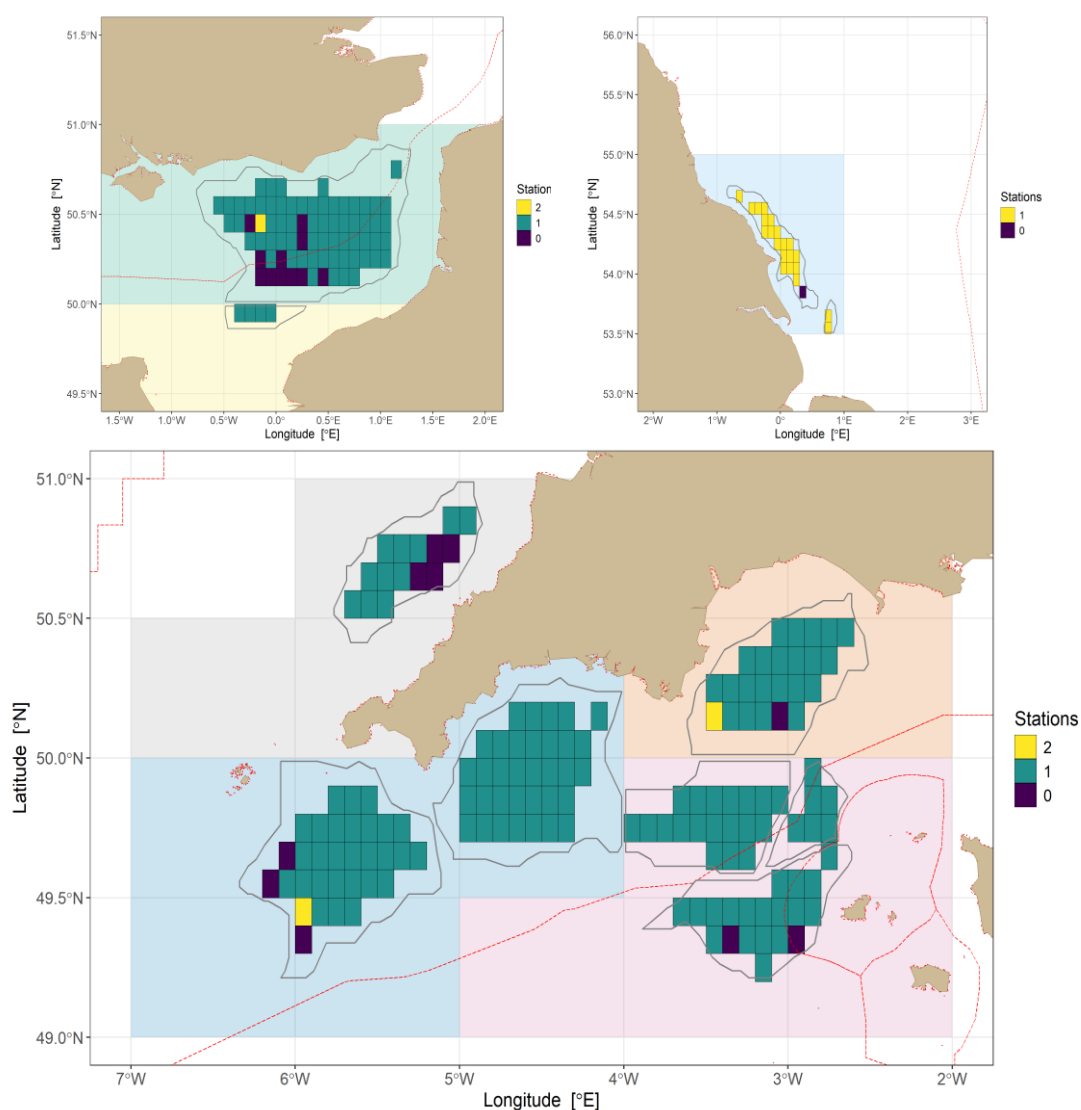| Area		25th Percentile	Median	Survey	75th Percentile
27.7.f.I	2017	-	-	-	-
	2018	1532	1674	1687	1815
	2019	945	1104	1143	1283
	2020	1132	1280	1283	1420
	2021	-	-	-	-
	2022	2496	2784	2828	3071
	2023	-	-	-	-
	2024	1968	2586	2550	3014

Figure 3. The number of stations sampled on the 2024 dredge survey, per grid, for the north, western channel and eastern channel beds
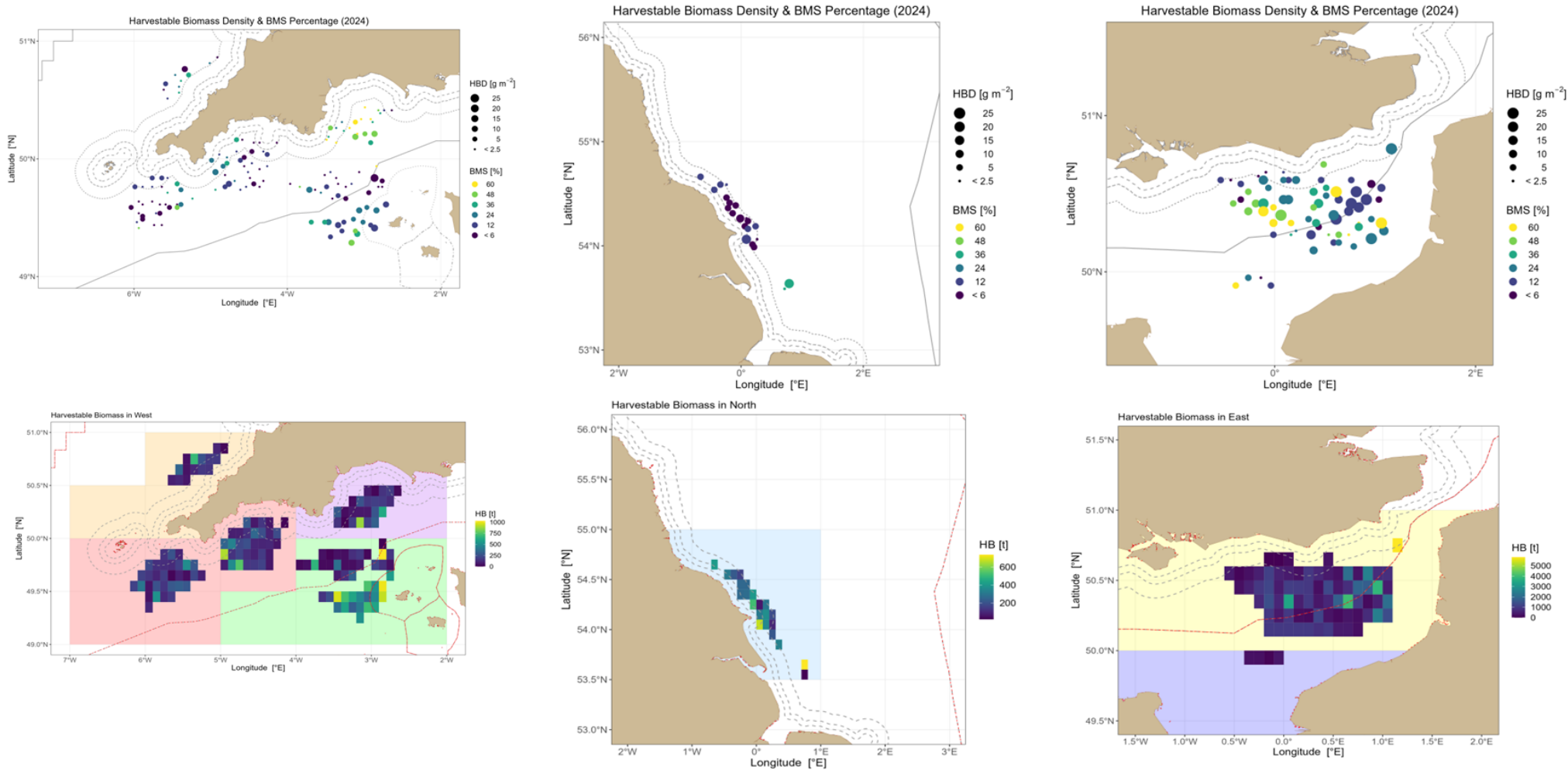
Figure 4. Estimates of harvestable biomass density (HBD, g/m^2) and percentage of individual of harvestable size (BMS %), top row for the western channel, north coast and eastern channel survey beds. Estimates of harvestable biomass (tonnes) of scallops of at least MLS (110 mm round shell length), bottom row, per bed in the western channel, north coast and eastern channel survey areas. The red line indicates the boundary of the UK EEZ. The three black dashed lines indicate the outer limits of the 3-, 6- and 12- nm zones.

2.3. Landings

International landings (i.e. landings from both UK vessels and non-UK vessels) are available for the period 2017 – 2021 and correspond to the 12-month period post-dredge survey, are shown in Figure 5. As described earlier, the non-UK component of international landings had to be estimated based on past trends of share for 2022 onwards.

When comparing the landings 12 months post survey to recent years, there was an increase in UK landings from the Dogger Bank (4.b.D), the inshore of the western Channel (7.e.I), the Lyme Bay area (7.e.L); a decrease in the Yorkshire and Durham coast (4.b.S) and the offshore of the western Channel (7.e.O) and similar landings in the Eastern Channel (7.d.N) and the Bristol Channel (7.f.I).
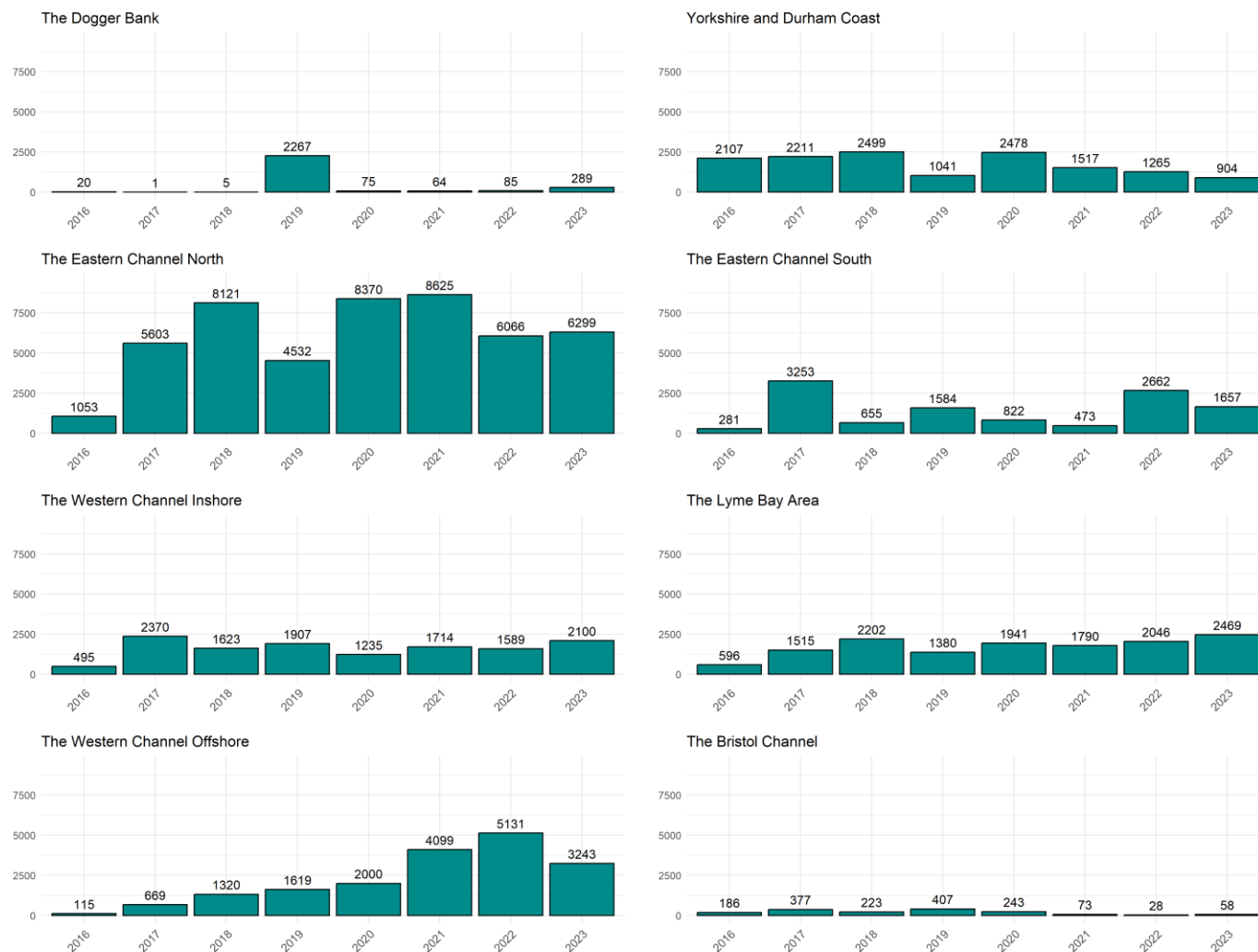
Figure 5. UK landings in the 12-month period post-survey. The survey month for areas Dogger Bank, Yorkshire and Durham Coast (4.b.S), Eastern Channel North (7.d.N), Eastern Channel South is September, and the survey month for the Western Channel inshore (7.e.I), the Lyme Bay Area (7.e.L), the Western Channel Offshore (7.e.O) and the Bristol Channel (7.f.I) is May.

3. Harvest rate estimates

Harvest rates for all stock units along with the MSY proxy harvest rates are shown in Table 7. Two estimates are provided: one for the fished areas, and one for the fished and non-fished areas combined. The biomass estimates from the fished portions of the beds are based on the dredge survey, and from the non-fished portions of the bed are based on the UVS survey. Un-dredged areas are assumed to be at carrying capacity with no fishing mortality, and the combined biomass estimates from the UVS surveys have been included for all years. These harvest rates are applicable only when connectivity between dredged and un-dredged populations is complete.

For **stock unit the Yorkshire and Durham coast (4.b.S)**, the harvestable biomass in the dredged area has increased from 2018-2020, when it peaked at 8,774t. The area saw a drop in harvestable biomass from the dredge survey in 2021 to 5,470t. There was an increase in harvestable biomass in 2022, but there has been a gradual decline in harvestable biomass of the dredge areas from 2022 (8,911t) to 2024 (6,739t).

The UK landings for this area are 99-100% of the international landings, making the harvest rate a reasonable estimate of the harvest rate even with the missing non-UK landings (figure ES1 and ES2). Though initially high (45.30% in 2018), the harvest rate on the dredge portion of the stock has subsequently been at or below 28.24% since, and below MSY proxy reference in 2019, 2022 and 2023.

For **stock unit the Channel (7.d.N),** the harvestable biomass from the dredged portion of the area had previously fluctuated between 22,981 (in 2017) and 45,278t (in 2021) however in 2024 the area saw an unusually high harvestable biomass of 70,203t. The UK landings for this area is often below 50%, though in recent years it's been as high as 66%. The harvest rate estimates from 2017-2021, based on international landings (figure ES1 and ES2), have been above MSY proxy (23.4%) in all years apart from 2019 in which it was 23.86%. For 2022 and 2023, using the estimated total international landings results in harvest rates of 27.66% and 23.42% respectively.

For **stock unit the western Channel Inshore (7.e.I)** the harvestable biomass from the dredge portion of the area, in general has ranged between 7,337t (in 2017) to 14,994t (in 2022). In the past three years harvestable biomass of the dredged areas has seen a gradual decline from 14,994t to 13,240t. The UK landings for this area have ranged between 82-99% of the international landings with the last three years of available data (2019-2021) being between 96-99% of the landings. The HR of the dredge portion of the area has been consistently below MSY proxy (24.2%), with 2023 being 14.47% (figure ES1 and ES2).

For **stock unit the Lyme Bay area (7.e.L)** the harvestable biomass from the dredge portion of the area has fluctuated between 2,636t (in 2017) and 4,524t (in 2024). In the past three years harvestable biomass has seen a gradual increase from 2,808t in 2022. From 2004-2021, the UK landings for this area range between 97%-100% of the international landings. The harvest rate on the dredge portion of the area has always been above the MSY proxy (24.4%), with a range of observed harvest rates of 40.98% to 77.56% (figure ES1 and ES2).

For **stock unit the western Channel Offshore (7.e.O)** the harvestable biomass from the dredge portion of the area has seen an increase, from 8,673t in 2017 to 32,813t in 2022, and then a decrease to 15,153t in 2024. The bed has returned to a harvestable biomass similar to earlier

years of the survey series. The proportion of international landings generated by UK vessels ranges from 38% to 78%, 2019-2021 being between 66-75. The harvest rate has below the MSY proxy value between for all years. The MSY proxy for the bed is 26.5% (figures ES1 and ES2).

For **stock unit the Bristol Channel (7.f.l)** the harvestable biomass from the dredge portion of the area has remained relatively stable ranging from 1,143t (in 2019) to 2,828t (in 2022). The harvestable biomass from the dredge portion of the bed for 2024 was 2,550t. Note that in 2021 and 2023 the area was not surveyed. The proportion of international landings which are landed by the UK fleet has a large variation in this area, between 22% and 86%. The harvest rate was not calculated in 2021 and 2023 due to the lack of survey. Harvest rates have been below the 23.4% MSY proxy for three out of the four years for which a survey has been completed.

Table 7. International landings (UK and non-UK) over 12-month periods following annual dredge surveys in the stated years, and harvestable biomass estimates for the dredged parts of each area, the harvestable biomass estimates from non-fished areas, the total harvestable biomass estimates, the harvest from the harvestable biomass estimate from the dredge survey, the harvest rate on stock combined harvestable biomass estimates from the dredge and the UVS surveys, the MSY proxy value for harvest rates.

	International Landings (tonnes)	Harvestable Biomass in Dredged Area (tonnes)	Harvestable Biomass from UVS Survey (tonnes)	Total Harvestable Biomass (tonnes)	Harvest Rate on Dredged Portion of Stock (Dredge Survey Only, %)	Harvest Rate on Wider Stock (Incl. UVS Survey, %)	MSY Reference Point Harvest Rate (%)
Area 27.4.b.S							
2017	2211	-	-	-	-	-	-
2018	2499	5517	856	6373	45.30	39.21	23
2019	1041	5754	856	6610	18.09	15.75	23
2020	2478	8774	856	9630	28.24	25.73	23
2021	1517	5470	856	6326	27.73	23.98	23
2022	1265	8911	856	9767	14.20	12.95	23
2023	904	7872	856	8728	11.48	10.36	23
2024	-	6739	856	7595	-	-	-
Area 27.7.d.N							
2017	10040	22981	995	23976	43.69	41.87	23.4
2018	16659	25047	995	26042	66.51	63.97	23.4
2019	8258	34612	995	35607	23.86	23.19	23.4
2020	12919	43216	995	44211	29.89	29.22	23.4
2021	14857	45278	995	46273	32.81	32.11	23.4
2022	10240	37025	995	38020	27.66	26.93	23.4
2023	10633	45411	995	46406	23.42	22.91	23.4
2024	-	70203	995	71198	-	-	-
Area 27.7.e.I							
2017	2423	7337	5629	12966	33.03	18.69	24.2
2018	1639	8971	5629	14600	18.28	11.23	24.2
2019	1927	10378	5629	16007	18.57	12.04	24.2
2020	1256	8791	5629	14420	14.28	8.71	24.2
2021	1748	8576	5629	14205	20.38	12.31	24.2
2022	1614	14994	5629	20623	10.77	7.83	24.2
2023	2133	14740	5629	20369	14.47	10.47	24.2
2024	-	13240	5629	18869	-	-	-

	International Landings (tonnes)	Harvestable Biomass in Dredged Area (tonnes)	Harvestable Biomass from UVS Survey (tonnes)	Total Harvestable Biomass (tonnes)	Harvest Rate on Dredged Portion of Stock (Dredge Survey Only, %)	Harvest Rate on Wider Stock (Incl. UVS Survey, %)	MSY Reference Point Harvest Rate (%)
Area 27.7.e.L							
2017	1526	2636	2151	4787	57.90	31.88	24.4
2018	2210	2849	2151	5000	77.56	44.19	24.4
2019	1387	3384	2151	5535	40.98	25.05	24.4
2020	1946	4470	2151	6621	43.53	29.39	24.4
2021	1794	2622	2151	4773	68.43	37.59	24.4
2022	2053	2808	2151	4959	73.10	41.39	24.4
2023	2477	3880	2151	6031	63.84	41.07	24.4
2024	-	4524	2151	6675	-	-	-
Area 27.7.e.O							
2017	910	8673	2742	11415	10.49	7.97	26.5
2018	1488	10746	2742	13488	13.84	11.03	26.5
2019	1802	15987	2742	18729	11.27	9.62	26.5
2020	2939	35370	2742	38112	8.31	7.71	26.5
2021	4989	27027	2742	29769	18.46	16.76	26.5
2022	6412	32813	2742	35555	19.54	18.04	26.5
2023	4053	18736	2742	21478	21.63	18.87	26.5
2024	-	15153	2742	17895	-	-	-
Area 27.7.f.I							
2017	449	-	-	-	-	-	-
2018	284	1687	375	2062	16.86	13.79	23.4
2019	505	1143	375	1518	44.21	33.29	23.4
2020	353	1283	375	1658	27.52	21.30	23.4
2021	121	-	375	-	-	-	-
2022	46	2828	375	3203	1.64	1.44	23.4
2023	96	-	375	-	-	-	-
2024	-	2550	375	2925	-	-	-

4. Conclusion

5.1. Harvestable biomass and harvest rate conclusions

This latest assessment presents the biomass estimates derived from the 2024 surveys, and harvest rates for 2023-24 (12-month period post-surveys), using UK landings and estimated international landings.

The most recent 3-year trends in harvestable biomasses (as calculated using the dredged portion of each area) can be summarised as:

- Slight declines in Yorkshire and Durham coast (4.b.S) and the Western Channel Inshore (7.e.I) from peaks in 2022
- Large decline in Western Channel Offshore (7.e.O)
- Steady increases in Eastern Channel North (7.d.N), and in the Lyme Bay area (7.e.L)

Similarly harvest rates can be summarised as:

- Slight declines in Eastern Channel North (7.d.N)
- Fluctuating in Western Channel Offshore (7.e.O) and Lyme Bay area (7.e.L)
- Large decline in Yorkshire and Durham coast (4.b.S)

It should be noted that the Eastern Channel North (7.d.N), the Western Channel Offshore (7.e.O) and the Bristol Channel (7.f.I) have higher rates of non-UK landings, which are estimated based on the non-UK landings percentage share from 2019-2021. In stock units where landings are likely to be mainly/exclusively UK, the harvest rate was above the MSY proxy for the Lyme Bay area (7.e.L), and below for the Yorkshire and Durham coast (4.b.S) and the Western Channel Inshore (7.e.I).

It should be noted that the assessment of scallops only covers the fished part of the stock and selected un-dredged zones. Additional stock is known to exist outside the surveyed areas, for which there is currently no information about either biomass or the ability to contribute to recruitment to the fished stock. Provided that there is evidence that scallops in un-dredged areas make significant contributions to the recruitment in the dredged areas, proportionate inclusion of biomass from un-dredged areas is likely to revise estimates of realised harvest rate downwards. Hydrographic and particle dispersal modelling to determine the level of larval connectivity between exploited and unfished areas has been carried out for the North Sea and the English Channel (Cefas report currently in review, titled 'Larval Connectivity of Scallop beds in the English Channel').

5.2. Future Developments

This report summarises the results of an ongoing series of assessments of king scallop stocks around the English coast. The methodology employed is expected to evolve over the coming years as more data become available and data quality improves. Key data issues to develop as resources permit include:

- A review of current method of analysing the UVS survey counts and their contribution to the assessment.

- A review of the most appropriate assessment method for future king scallop stock assessments in English waters, including potential data sources such as the Industry Self-Sampling Scheme.

- An analysis of the king scallops below MLS, including the data from the modified dredges from the sample side of the vessel, to ascertain the data's usefulness in age cohort tracking.

- Continue to improve understanding of the recruitment linkage between dredged scallop beds and un-dredged areas and incorporate this information into stock assessments and management advice.

5.3. Assessment caveats and assumptions

- Landings data for the 12-month period post survey are required to provide a realised harvest rate. At the time of finalising this report (March 2025), international landings (UK and non-UK) were only available until the end of 2021 post survey season. Therefore, the harvest rates for survey years 2022 and 2023 had to be estimated from the landings share of previous years. Harvest rates will be updated in future reports as data become available.

- Dredge surveys only cover the portions of stock found on the main fished grounds. Harvest rate estimates from dredge surveys only apply to the fished portion of the stock.

- The gear-efficiency factor used to convert dredge survey data to total harvestable biomass used unpublished Cefas data. These data came from depletion experiments which are broadly in line with similar studies.

- UVS surveys detected biomass of scallop on grounds not exploited by dredgers, but not all un-dredged grounds were surveyed with UVS.

- Studies of larval drift between beds indicate incomplete connectivity, whereby the main dredged areas appear to have a degree of larval retention (i.e., they are self-perpetuating). Incorporation of the un-dredged area biomass into harvest rate calculations assumes complete interchange. Restricting the biomass estimate to the dredged beds assumes no interchange.

- Basic biological parameters that are used in this assessment – such as growth rates, size at maturity, and natural mortality -- are derived from unpublished studies that were conducted more than 20 years ago. Natural mortality is difficult to determine, especially for a species that is heavily commercially exploited. Cefas does not determine maturity stages anymore, as part of the sampling programme.

6. References

Bell, E., et al. 2018. Initial assessment of Scallop stock status for selected waters within the Channel 2016/2017. Lowestoft, UK : Cefas, 2018.

MMO. (2022). UK Sea Fisheries Statistics. Newcastle upon Tyne, England: Marine Management Organisation.

Supplementary information. Additional analysis of length Distributions

Length distributions for the dredged portion of the survey assessment areas the Channel Inshore (7.e.I), the Lyme Bay Area (7.e.L), the Channel Offshore (7.e.O) and the Bristol Channel (7.f.I), are show in Figures SI1-SI3. The length distributions for areas Channel Inshore (7.e.I) and Bristol Channel (7.f.I) for 2024 are within the ranges of previous surveys. The length distribution of area Lyme Bay Area (7.e.L) shows a higher than usual level of 100m (MLS) king scallops for this year and a very large abundance of animals below MLS. The Channel Offshore area (7.e.O) has seen a gradual decline in numbers at MLS.
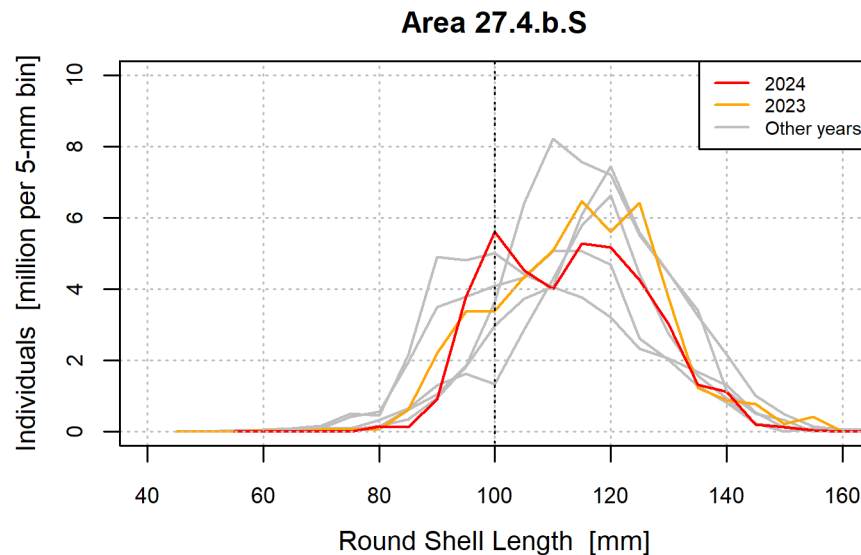

Figure SI1. Annual relative frequency-at-length distributions (round shell length in 5mm size bins) of the dredged portion of the survey assessment area 27.4.b.S on the Yorkshire/Durham coast.
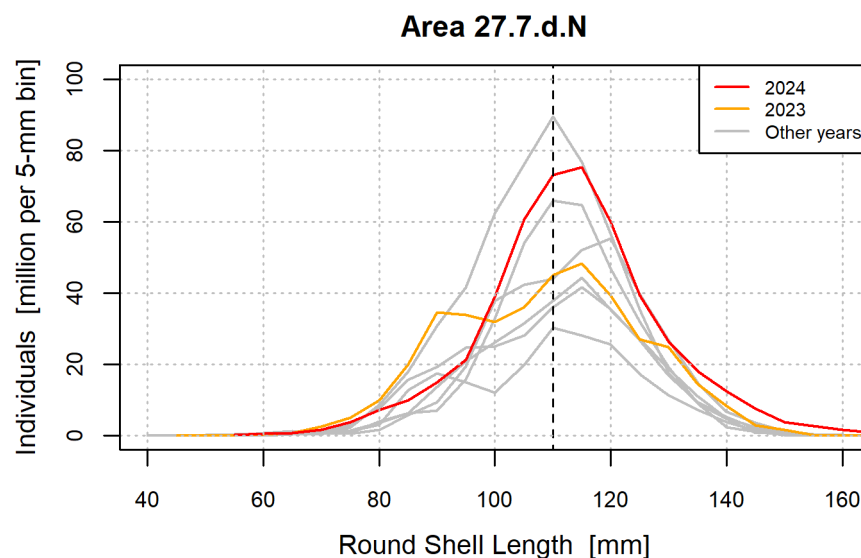

Figure SI2. Annual relative frequency-at-length distributions (round shell length in 5mm size bins) of the dredged portion of the survey assessment area 27.7.d.N in the eastern channel.
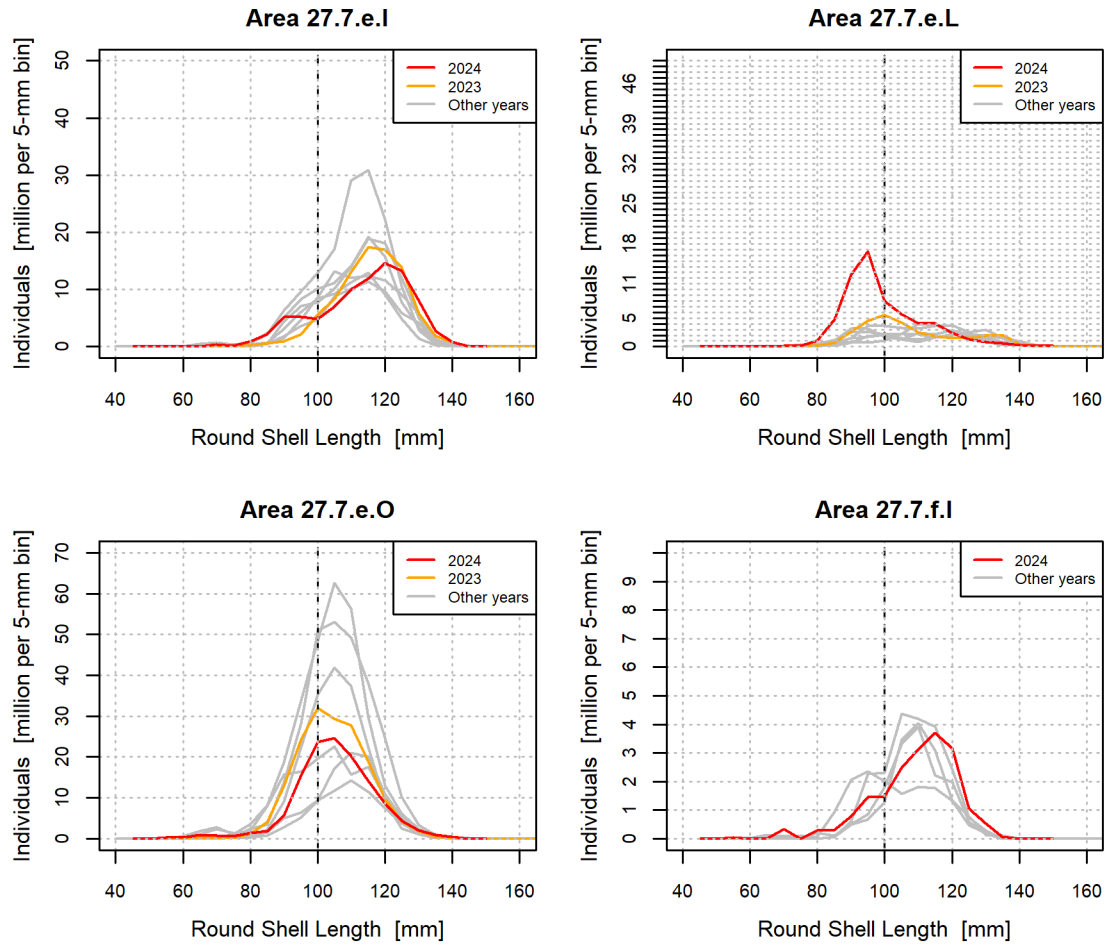
Figure SI3. Annual relative frequency-at-length distributions (round shell length in 5mm size bins) of the dredged portion of the survey assessment area 27.7.d.N in the eastern channel.