Isle of Man Queen Scallop 2025 Stock Survey Report

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Contents

1. Fishery Management: 3
2. Annual Landings and Fishing Effort: 4
2.1 Irish Sea 4
2.2 ICES Rectangles 36E5, 37E5 and 38E5 5
3. Landings and Fishing Effort in Isle of Man waters: 6
4. Scallop Surveys: 10
4.1 Background: 10
4.2 Prince Madog Annual Spring Survey: 10
4.2.1 Survey Methods: 10
4.2.2 Size Frequency: 11
4.2.3 Density estimates: 12
4.2.4 Survey Abundance Indices: 14
4.2.5 Stock Assessment (CSA): 17
4.2.6 Trawl TAC calculation (ICES Category 3 approach and biomass linked approach): 19
4.3 Industry Juvenile Spring Scallop Survey: 21
4.3.1 Survey Methods: 21
4.3.2 Size frequency and Density estimates: 22
4.3.2.1 Territorial Waters: 22
4.3.2.2 Fishing Grounds: 26
4.3.3.2.1 Targets: 26
4.3.3.2.2 Chickens: 29
4.3.3.2.3 East of Douglas: 33
4.3.3.2.4 Point of Ayre: 36
5. Summary: 39
6. References: 40

1. Fishery Management:

Since 1969, fishing for queen scallops (*Aequipecten opercularis*) has occurred within the territorial waters of the Isle of Man. In 2024, 35 vessels were licenced to fish for queen scallops in Isle of Man waters. Manx vessels now fish for queen scallops (QSC) exclusively with otter trawls. UK vessels also predominately fish with otter trawls although a limited toothless dredge fishery can take place from October. For 2024/2025, the dredge fishery was prosecuted by one UK vessel with the fishery opening in March 2025. Various management measures regulate the queen scallop fishery within Isle of Man territorial waters with those applicable during the 2024 queen scallop fishing season indicated in Table 1; spatial restrictions are indicated in Figure 1. For the 2024 trawl fishery the season was closed on 6th October 2024 (end of Week 14), however licence variations were issued to individual vessels to permit fishing until 27th October 2024 (end of Week 17).

Table 1: Management measures for the Isle of Man queen scallop dredge fishery during the 2024 fishing season

Management measure	Applicable
Total allowable catch of 726 - 1144 t	Trawl
Total allowable catch of ~58 t	Dredge
Weekly Catch Limit (WCL) 7098 kg per vessel	Trawl; General Territorial Sea; Weeks 1-4
Weekly Catch Limit (WCL) 9210 kg per vessel (~30% ↑)	Trawl; General Territorial Sea; Weeks 4-7
Weekly Catch Limit (WCL) 10140 kg per vessel (10% ↑)	Trawl; General Territorial Sea; Weeks 7 -17
Additional Exploratory WCL 2730 kg per vessel	Trawl; Point of Ayre; W 1-6
Queenie conservation zone (dredging prohibited)	0 to 12 nm zone except dredge box
Temporary closed areas	TAR x2 and EDG ERA
Permanent closed areas (i.e. MNRs)	Within 0 to 3 nm zone
Minimum landing size (55 mm)	0 to 12 nm zone
Spawning protection closure (01/04 – 31/05)	0 to 12 nm zone
Irish Sea Closure (01/04 to 30/06)	Irish Sea
Daily Curfew (18:00 to 06:00)	0 to 12 nm zone
VMS required for all vessels	0 to 12 nm zone
Submission of EU logbook	0 to 12 nm zone
Submission of IoM daily catch return	0 to 12 nm zone
Under 221 kW (except Grandfather Rights)	0 to 12 nm zone
≤ 15.24 m vessel registered length	0 to 3 nm zone

The Fisheries Act 2012 and restrictive licencing conditions enable the implementation of these management measures.

Outside of the territorial sea, although a minimum landing size of 40 mm is enforced, the fishery is subject to very few additional management measures except a statutory 3 month closure (April, May and June) for ICES areas VIa and VIIa which came into effect in 2018 following two years of industry voluntary closures.

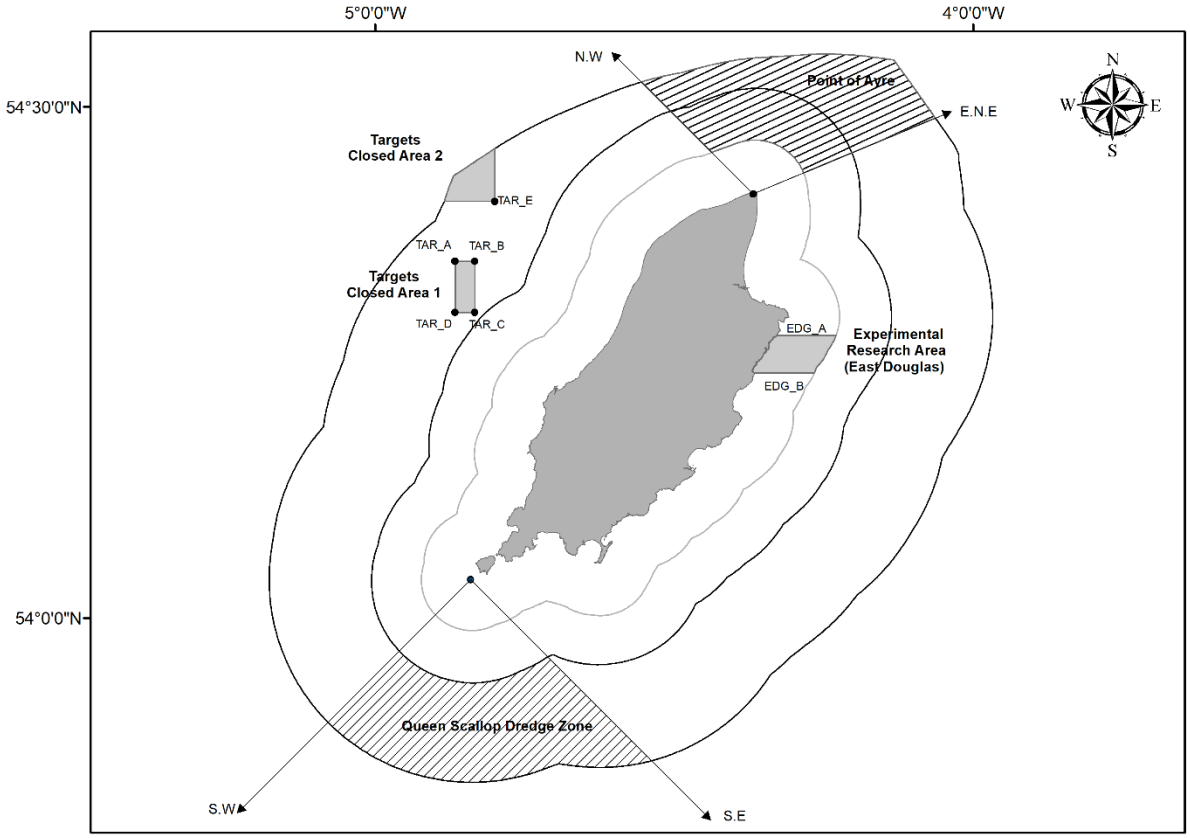

Figure 1: Map showing closed areas (grey boxes) and restricted/management areas (hashed boxes) for the 2024 queen scallop fishing season

2. Annual Landings and Fishing Effort:

2.1 Irish Sea

Annual landings of queen scallops from the Irish Sea (Area VIIa) over the period 1950 – 2022 (data lag of around 3 years) are shown in Figure 2 (ICES 2024; 2023). In the early part of the Irish Sea fishery (1950 – 1973), boats from the Isle of Man recorded the majority of catch (> 75%), but between 1997 and 2022 the average annual Manx share declined to around 21%, with United Kingdom vessels (Scotland, England, Wales and Northern Ireland) landing the remaining proportion (~78%).

Landings over the last 15 years have shown high variation with a rapid increase from 2008 to a peak of over 20,000 t in 2011 (Figure 2). These unprecedented levels were maintained briefly before declining rapidly. Given the general lack of management of the wider Irish Sea stock and our limited knowledge of the impact of such high fishing rates such a significant increase in landings was of concern. Reported landings in 2022 for queen scallops from the Irish Sea were over 80% lower than landings recorded at the peak in 2011.

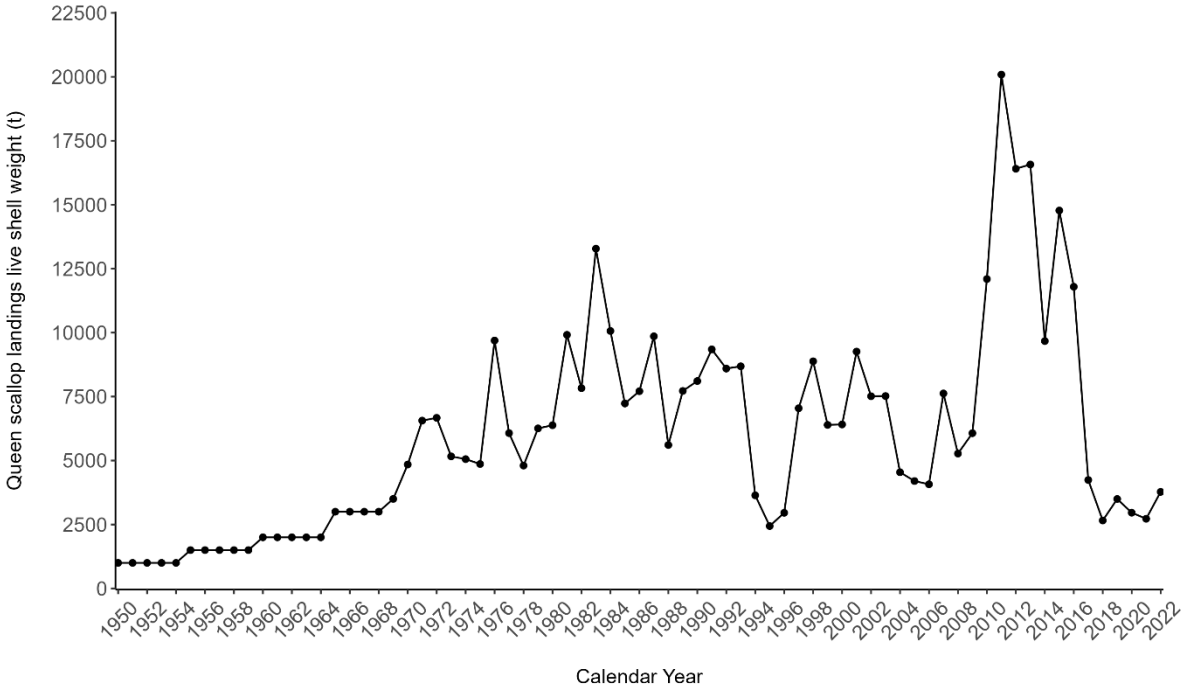

Figure 2: Annual live shell weight queen scallop landings (tonnes) from ICES Area VIIa for 1950 to 2022 using scallop landings from species Aequipecten opercularis (ICES 2023; 2024)

2.2 ICES Rectangles 36E5, 37E5 and 38E5

The annual landings of queen scallops from ICES Rectangles 36E5, 37E5 and 38E5, which cover the main extent of the Isle of Man's territorial waters, show a similar pattern of landings to those from the wider Irish Sea (Area VIIa) over the period 2000 – 2022 (Figure 3). Landings increased rapidly from 2009 to 2011 tripling over that period from 5015 t in 2009 to 16957 t in 2011. This was followed by a large decline; in 2020 landings reached a low of only 920 t (Figure 3) which represented only 6% of the landings at the 2011 peak. Since 2020, there has been annual increases in landings with total landings in 2024 of 4154 t.

Landings by both dredge and trawl have declined dramatically since 2011 (Figure 4). The dredge fishery has seen a reduction in landings from a peak of 12570 t in 2011 to only 293 t in 2020 before increasing again to 2724 t by 2024. The trawl fishery has seen a reduction in landings from a peak of 4517 t in 2013 to 579 t in 2019 before increasing to 1424 t in 2024. In 2020 (Covid lockdown year) the trawl fishery had a higher proportion of landings than the dredge fishery for the first time in the time series, with almost 50 % of landings contributed by either gear in 2021. However, in 2024 dredge landings are again higher than trawl landings. Dredge landings in recent years (2022 onwards) include additional landings of queen scallops as bycatch in the king scallop dredge fishery within the 12nm (5% of trip weight in 2022/2023, 10% of trip weight in 2023/2024 and 20% of the trip weight in 2024/2025) (Figure 4).

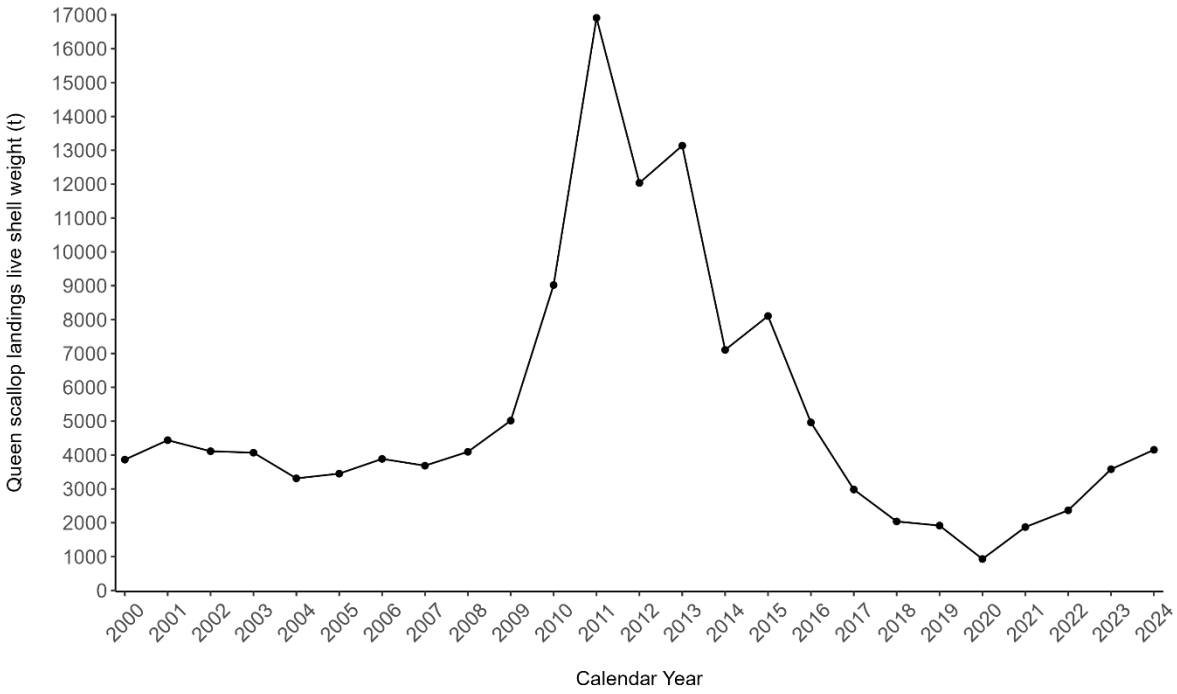

Figure 3: Annual live shell weight queen scallop landings (tonnes) from ICES Rectangles 36E5, 37E5 and 38E5 for 2000 to 2024 (Source: Paper logbook data DEFA and IFISH 2 Database).

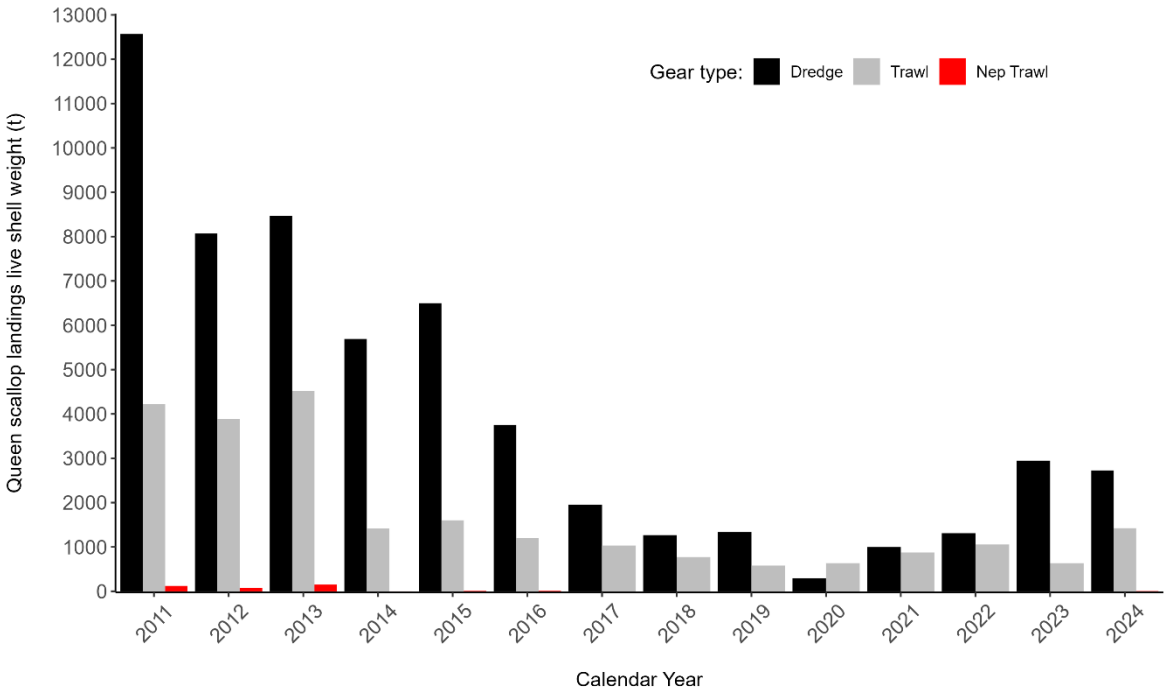

Figure 4: Annual live shell weight queen scallop landings (tonnes) from ICES Rectangles 36E5, 37E5 and 38E5 for 2011 to 2022 (Source: IFISH 2 Database) split by Gear type. Since the 2022/2023 fishing season for Isle of Man king scallops bycatch of queen scallops has been permitted (5% in 2022/2023, 10% in 2023/2024 and 20% in 2024/2025).

3. Landings and Fishing Effort in Isle of Man waters:

A requirement of the queen scallop fishing licence in the Isle of Man is that Daily Catch Return forms (DCRs) are submitted through an electronic App by midnight on the day of fishing. This provides almost

real-time fisheries dependent data for the fishery for monitoring total allowable catches (TACs) and catch rates (i.e. landings per unit effort [LPUE]).

The 2024 Isle of Man queen scallop trawl fishery, for which 35 vessels were licenced, had a TAC range of 726 t (20% increase from 2023 harvest value) to 1144 t (20% of estimated stock biomass). The trawl fishery opened on Monday 1st July 2024 and closed on 6th October 2024 (end of Week 14). As a limited quantity of catch quota remained, individual licence variations were issued to five vessels for 8 t per vessel (valid up until the end of Week 16). Of these five vessels two received further permit extensions until 27th October 2024 (end of Week 17). An initial weekly catch limit (WCL) of 7098 kg per vessel per week was implemented for the general territorial sea with an additional initial exploratory catch at Point of Ayre of 2730 kg per week per vessel (hatched area at PoA; Figure 1). For the general territorial sea, the WCL was increased to 9210 kg in Week 4 and then to 10140 kg in Week 7 (per vessel per week). The additional 'exploratory' WCL for Point of Ayre was suspended in Week 7 following a decline in LPUE. Total reported landings for the trawl fishery during the 2023 fishing season were ~ 1125 t with 18 unique vessels reporting landings. The majority of landings for the 2024 season came from Targets (Table 2). In 2024 0 t was landed from the Ramsey Bay permit only fishery which has its own total allowable catch and ~58 t was landed from Chickens as part of the dredge fishery which was fished in March 2025.

Table 2: Landings by ground for the 2024/2025 queen scallop fishery (trawl and dredge; 58 t landed from dredge fishery in March 2025)

Area	**Landings (t)**
IS9: Targets	838
IS15: East Douglas	190
IS21: Chickens	99
IS6: Point of Ayre	56

Weekly LPUE, standardised to 35 kg bags per hour fished per 10 fathoms of net, are displayed for each of the main fishing grounds in Figure 5. LPUE at both Targets (IS 9: TAR) and East of Douglas (IS15: EDG) both recorded LPUE for the 2024 fishing season at the top range of historical values (Figure 5).

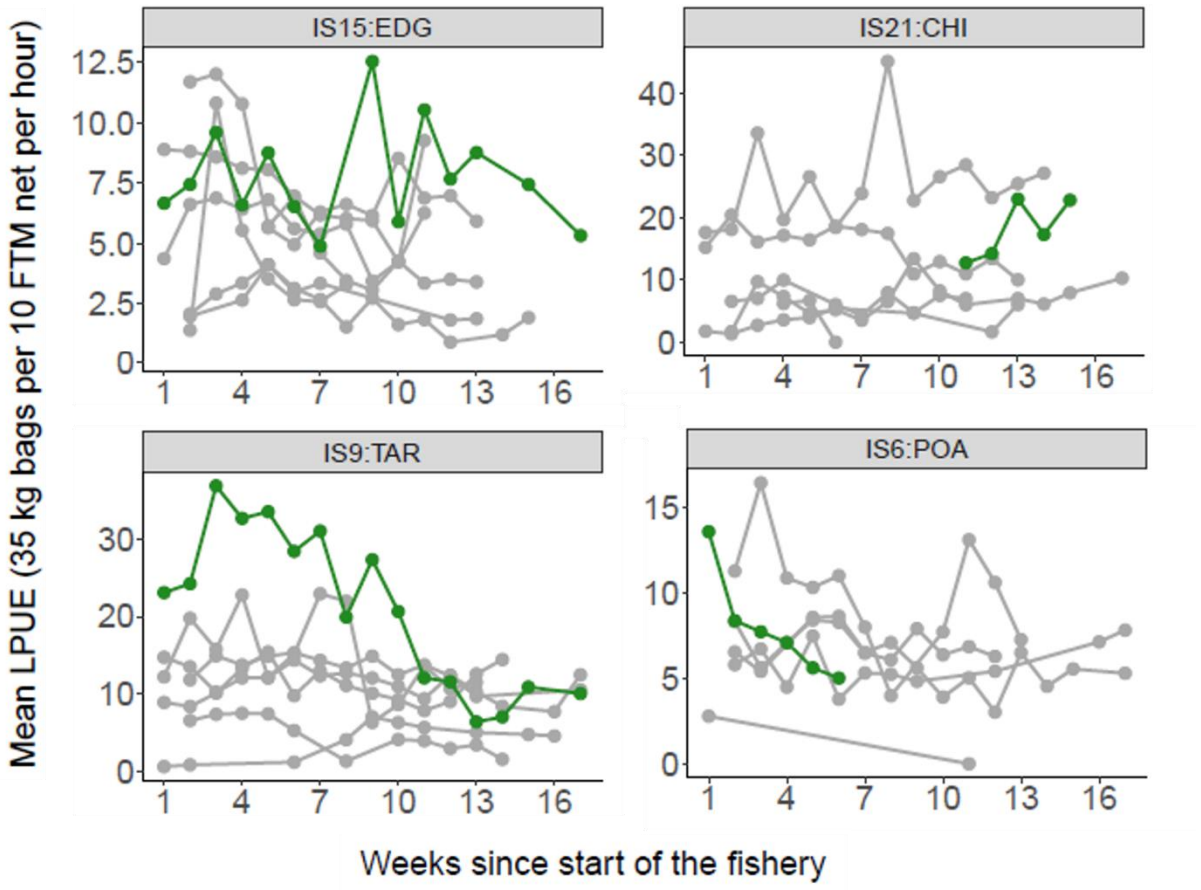

Figure 5: Mean queen scallop trawl LPUE (35 kg bags per hour fished per 10 fathom of net) for the 2024 queen scallop trawl fishing season (green) compared with previous seasons (2017 to 2023; grey lines) displayed by week and main fished ground.

Landings per unit effort, standardised to 35 kg bags per hour fished per 10 fathoms of net, is displayed for each fishing season from 2014 to 2024 in Figure 6. The boxplot indicates that the median LPUE for the 2024 fishery was the highest in the time series (Figure 6).

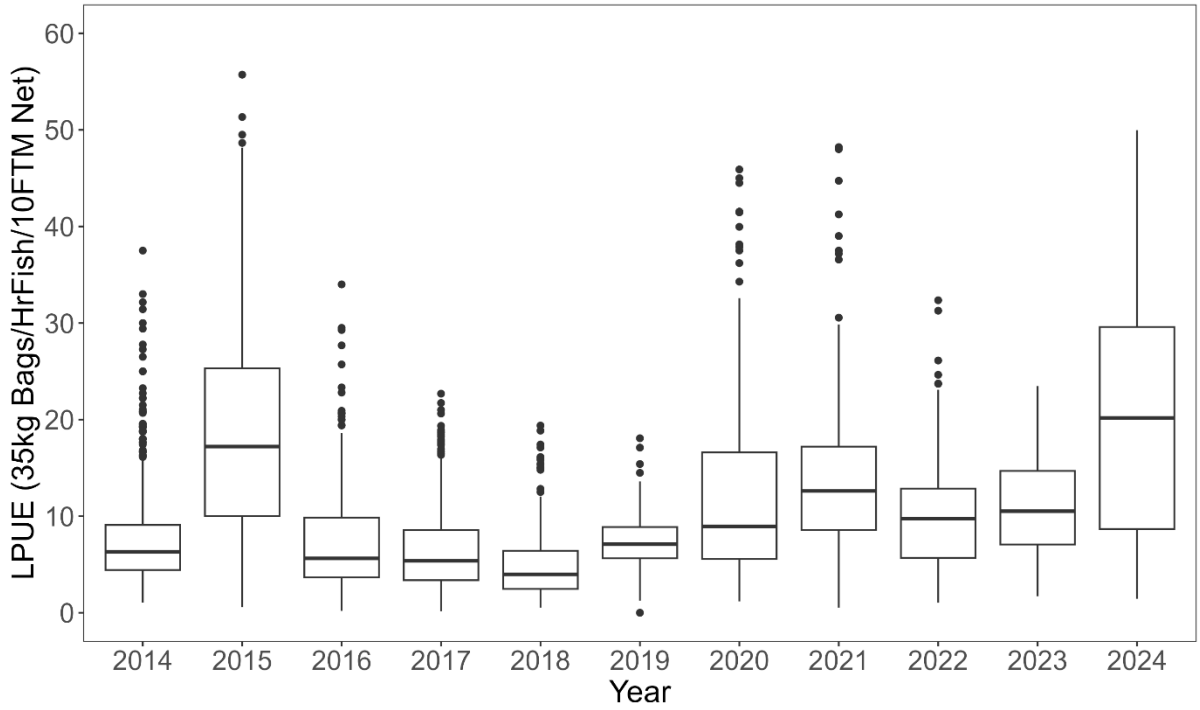

Figure 6: A boxplot of queen scallop trawl LPUE (35 kg bags per hour fished per 10 fathom of net) for all vessel trips by fishing season from 2014 to 2024.

The dredge fishery was allocated a sub-TAC of ~58.3 t which was fished by a single vessel in March 2025. Total reported landings for the dredge fishery during the 2024 season were ~ 58.4 t. Prior to 2021, LPUE for the dredge fishery had seen annual declines with the lowest value (based on a single trip) recorded in 2020. However, the LPUE for 2024 was significantly higher than the values at the start of the time series in 2017 (Figure 7).

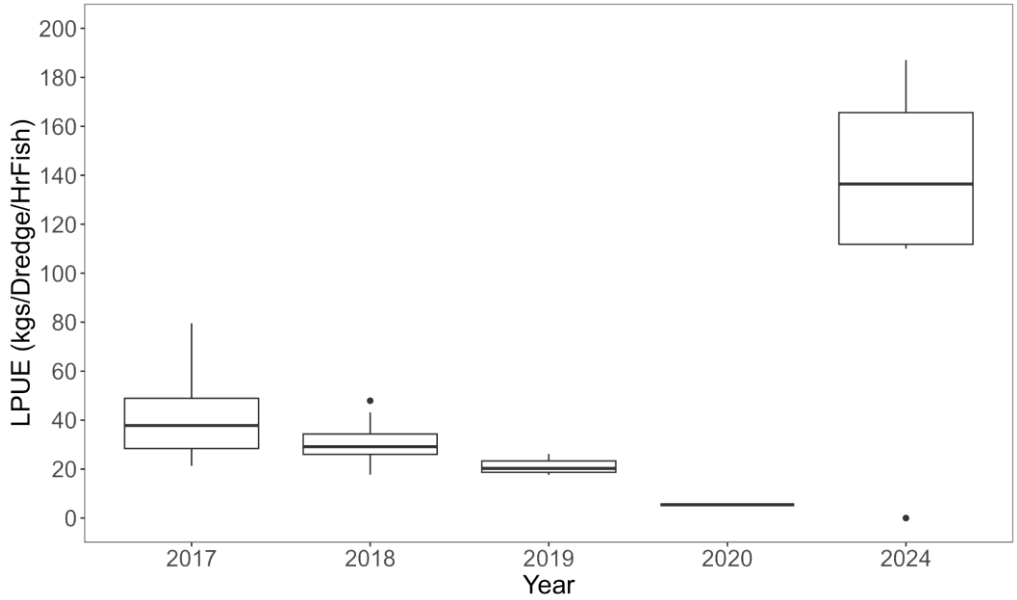

Figure 7: LPUE standardised to kg per dredge per hour for dredge vessels participating in the Isle of Man queen scallop dredge fishery which occurs within the dredge box located within the CHI fishing ground from 2017 to 2024. Note no landings reported in 2021, 2022 or 2023) and the October 2024 fishery was delayed until March 2025 and prosecuted by a single vessel.

4. Scallop Surveys:

4.1 Background:

There are currently two annual scallop surveys undertaken within the Isle of Man's territorial waters:

1. **Long-term, medium resolution, fixed site survey:** This survey has been undertaken since 1992 and is currently completed on the R.V. Prince Madog. It is a medium resolution survey (~ 3nm between survey sites), conducted at fixed survey stations. There is a long-term data set associated with this survey which enables stock assessment to be undertaken along with provision of a time series for TAC calculation using the approach outlined by ICES for Category 3 data limited stocks (i.e. survey based methods approach). Unfortunately, due to the Coronavirus restrictions in place in both the IoM and the UK this survey could not be completed in April 2020 but data collection has continued since April 2021.

2. **Short-term, fine resolution, random stratified survey:** This is a new survey that was undertaken for the first time in June 2019. It is currently completed on two industry fishing vessels and sampling is coordinated by the MFPO with scientific support from Bangor University. It is a fine resolution survey (survey cells: 1 min (longitude) x 0.5 min (latitude)). The 2024 survey included the four main fishing grounds (East of Douglas [EDG], Chickens [CHI], Targets [TAR] and Point of Ayre [POA]), and further survey work was also undertaken at a transient ground at Bradda [BRA] and within the East of Douglas Experimental Research Area [EDGERA] which has been closed since July 2017.

The long-term survey data has been used annually to undertake a quantitative length-based stock assessment using the catch survey analysis (CSA) approach to estimate biomass. Following the recommendations of the scallop management board (SMB), the data has also been used to calculate the Total Allowable Catch (TAC) using the approach outlined by ICES for Category 3 data limited stocks. This approach requires a minimum time series of five years with the survey indices of the two most recent survey years summed and then divided by the sum of the survey indices from the three years prior. This ratio is then used to adjust the previous year's TAC up or down by a maximum of 20%. The five-year time series of data is important in this calculation as stocks can be variable in any year and comparing one year against another doesn't incorporate trends in the data.

4.2 Prince Madog Annual Spring Survey:

4.2.1 Survey Methods:

Spring surveys of the Isle of Man's scallop populations have been undertaken annually since 1992 (Beukers-Stewart, Mosley, and Brand 2003). The 2025 spring scallop survey was undertaken by the R.V. Prince Madog over the period 22nd – 31st May 2025 [survey was undertaken on 7 of these 9 days owing to bad weather]. A total of 60 survey stations were sampled (Figure 8). The standard survey gear comprises of a set of four Newhaven dredges: two with 80 mm belly ring diameter and 9 teeth of 110 mm [king dredges] and two with 55 mm belly ring diameter and 10 teeth of 60 mm [queen dredges]. At each station, the dredges are towed at 2.5 knots for 20 minutes with the direction of the tow dependent on tidal state and current condition. For each tow the total biomass of king and queen scallops is recorded by dredge and a subsample of 90 queen scallops and 90 king scallops from each dredge are then weighed and measured (king scallops are also aged).

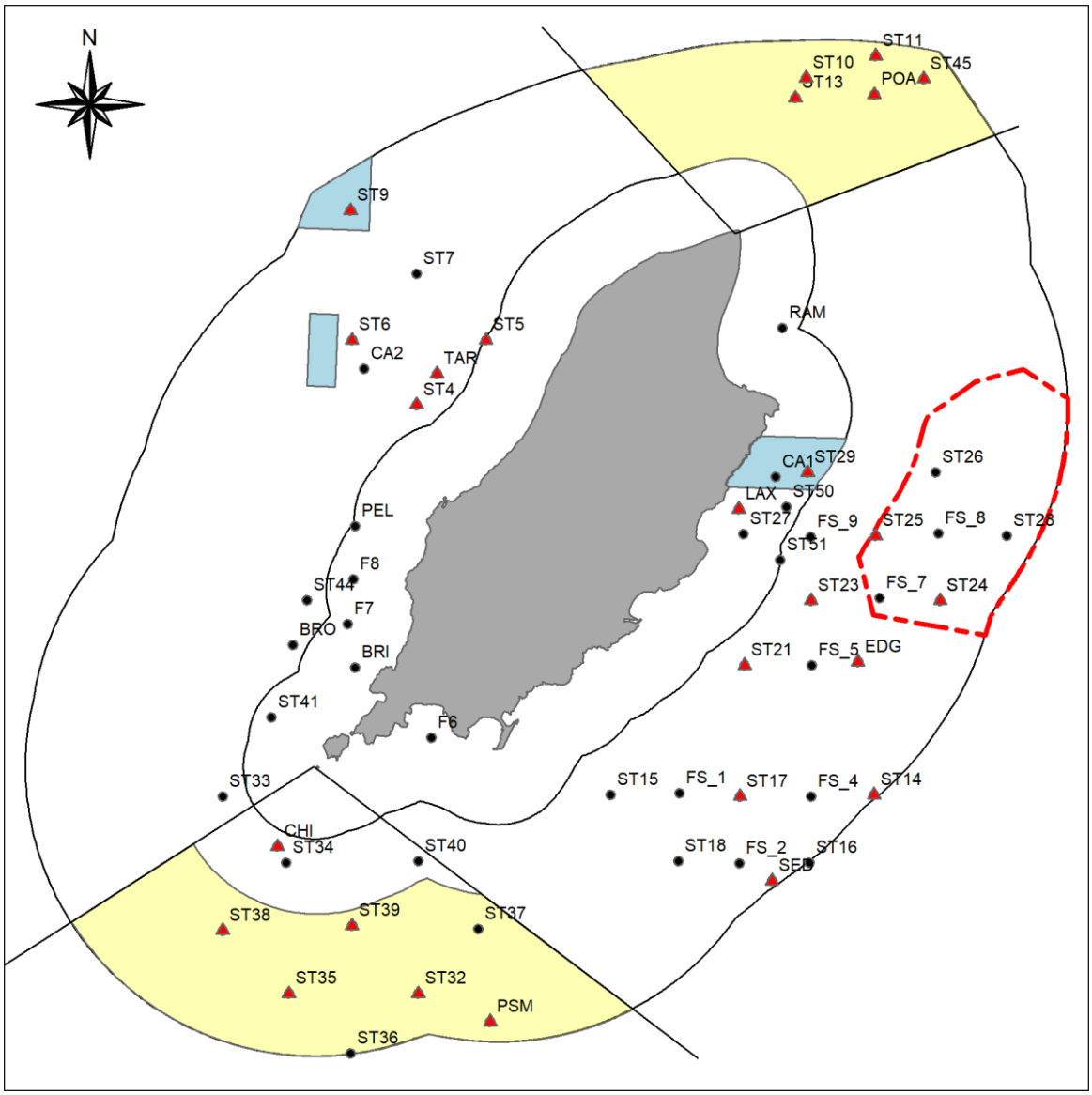

Figure 8: A map showing the location of all 2025 survey stations (red triangles = Stations used in stock assessment and survey abundance indices; black circles = Additional survey stations). During the 2024 queen scallop fishing season light blue boxes indicate closed areas, the green box indicates the experimental research area at East Douglas closed since July 2017 to allow recovery and the yellow boxes indicate the queen scallop dredge zone in the south and the exploratory WCL zone in the north. The red dashed line indicates the area for lease for the proposed Moor Vanin windfarm.

4.2.2 Size Frequency:

A frequency plot of queen scallop size data is presented in Figure 9 from samples measured at stock assessment stations (queen scallop dredge data only). In 2025, there is a well-defined peak in queen scallops from 52.5-67.5 mm (Figure 9) and around 30 % of sampled queen scallops were below MLS. Queen scallops ≥ 55 mm represent post-recruits (i.e. queen scallops that are already at or above the minimum landing size (MLS) of 55 mm). Queen scallops ≥ 45 & < 55 mm represent recruits (i.e. queen scallops under MLS), some of which will be large enough to grow into the fishery during the upcoming fishing season. In 2025, the data also indicates a proportion of the sampled stock (~21%) to be pre-recruits queen scallops (i.e. 5-45 mm), which are unlikely to grow into the fishery for the current 2025 fishing season. This cohort, and its spatial distribution, should be considered when looking at

sustainable management over a > 1 year period and when discussing potential closures for areas containing high densities and proportions of queen scallop recruits.

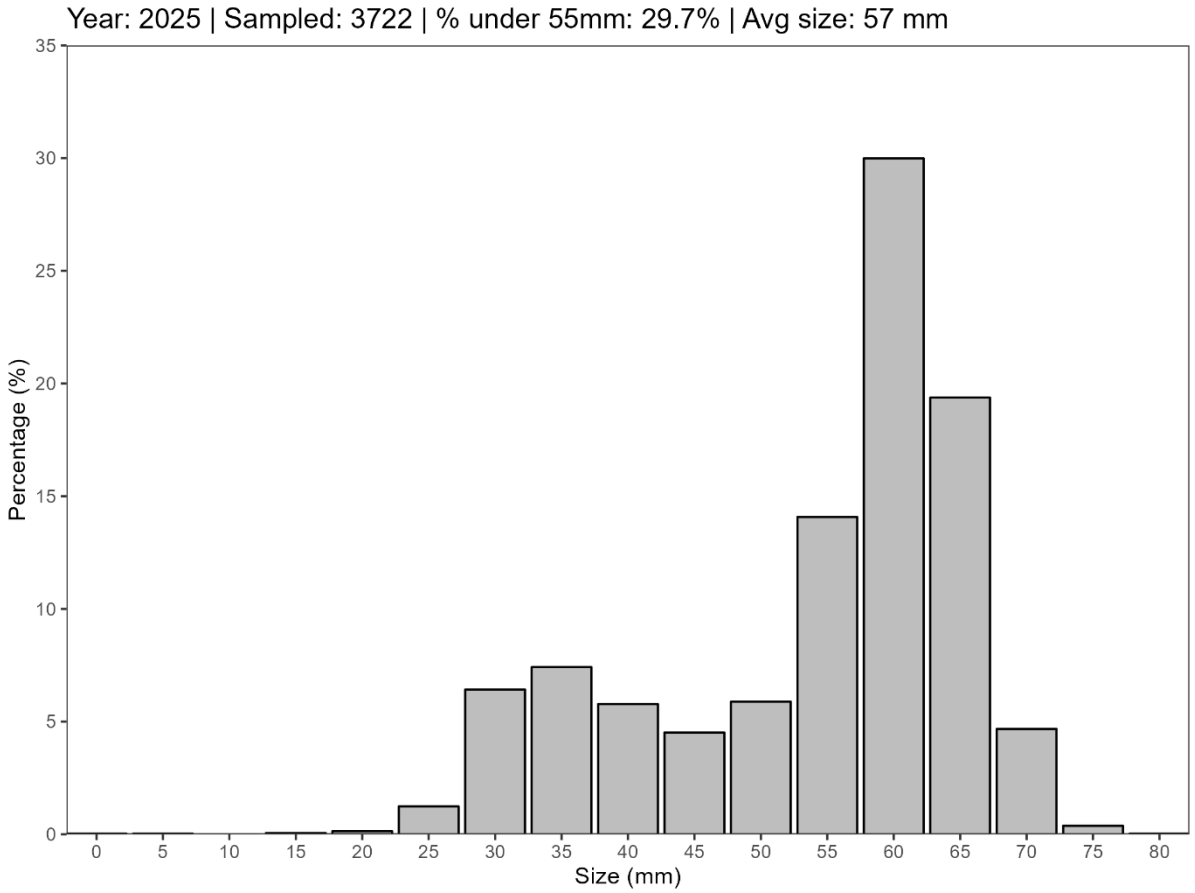

Figure 9: Queen Scallop size frequency plot for 2025 Prince Madog survey data for measured scallops. Data from stock assessment sites and queen scallop dredges only.

4.2.3 Density estimates:

The mean density (scallops per 100 m^2) of queen scallops from queen scallop dredges for all stations surveyed is displayed in Figure 10. The survey site with the highest density is ST9 (west coast; 265 queen scallops per 100m^2).

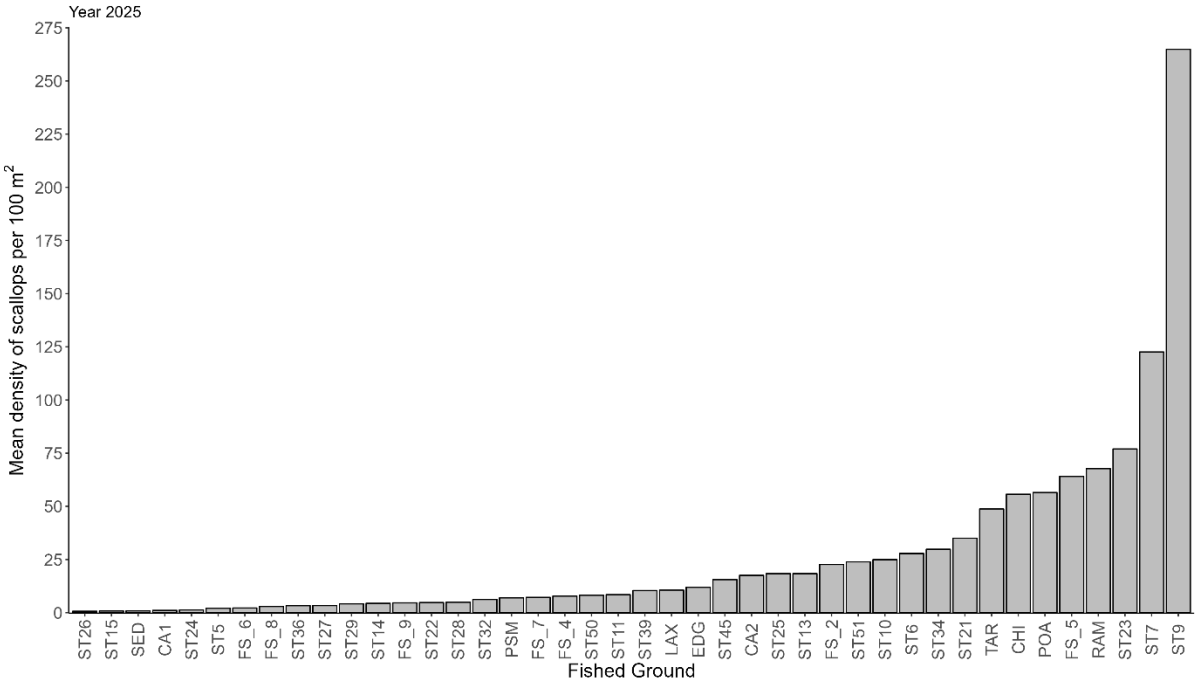

Figure 10: Average survey density (scallops per 100m^2) of queen Scallops from queen scallop dredges from all sites surveyed during the 2025 Prince Madog survey. For plotting purposes sites where QSC density was < 0.45 scallops per 100 m^2 are not displayed (see Figure 8 for station locations)

Stations that have been sampled over at least three years and at which queen scallops are present (3, 4, 5, 6, 9, 10, 11, 13, 14, 17, 21, 22, 23, 24, 25, 29, 32, 35, 38, 39 and 45), in addition to the standard historical queen scallop survey stations (CHI, EDG, LAX, POA, PSM, SED and TAR), were included in the current stock assessment (Figure 8). Please note that the inclusion of stations was updated in 2022 to include or exclude relevant stations (I. S. M. Bloor and Jenkins 2022). Since 2016 the model has been run at a smaller spatial scale using landings and survey data exclusive to the Isle of Man territorial sea.

The differences in mean survey density (scallops per 100 m^2) of queen scallops from queen scallop dredges between 2024 and 2025 are displayed for all stations used in the stock assessment in Figure 11. The highest density increase was on the west of the Island where the density had increased at TAR by around 30 scallops per 100 m^2. It should be noted that ST 9 also on the west coast had a density of ~265 scallops per 100 m^2, but there was no comparative data for 2024. The highest decrease in density was at the north of the Island where densities had decreased at POA by around 35 scallops per 100 m^2.

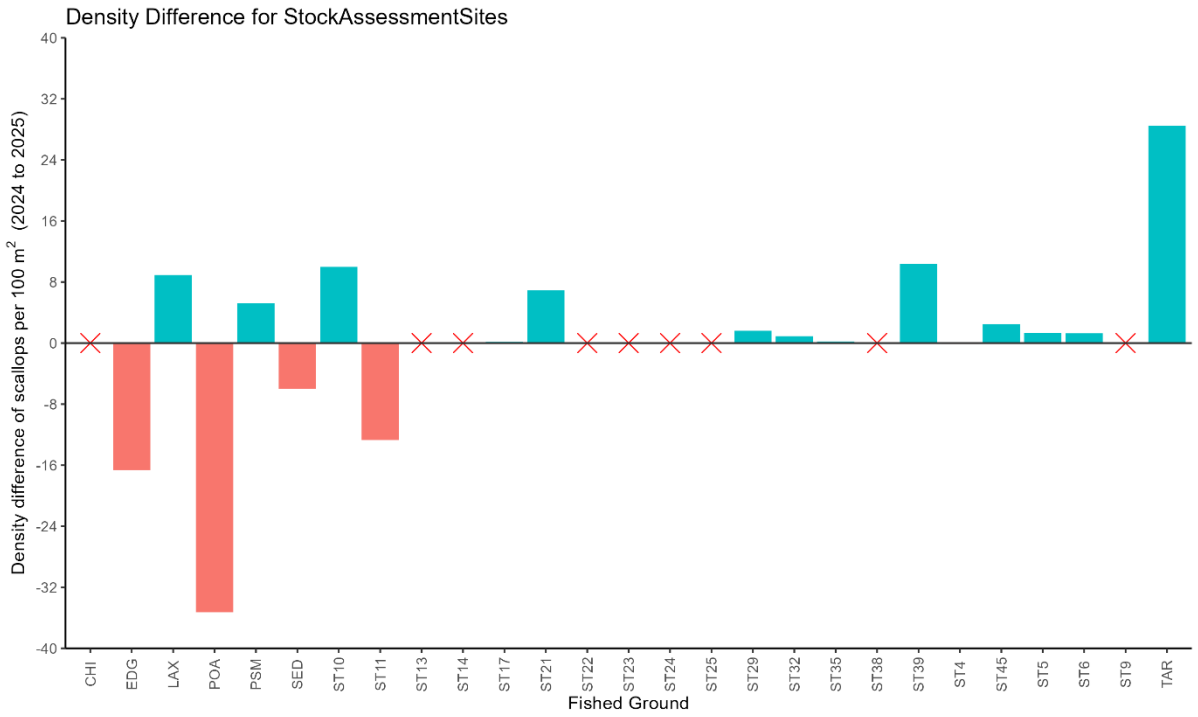

Figure 11: Difference in average survey density (scallops per 100 m^2) of queen scallops from queen scallop dredges between 2024 and 2025 (displayed for stations used in the stock assessment only). Red bars indicate decreases in scallop density from 2024 to 2025 and turquoise bars indicate increases in scallop density from 2024 to 2025. Red crosses indicates sites where density difference couldn't be calculated as the sites weren't surveyed in both years.

4.2.4 Survey Abundance Indices:

The abundance index (derived from the survey data using the geometric mean of queen scallop densities) for recruits (scallops < 55 mm) is typically very variable but has been consistently low since 2011. The value for 2025 (160) was the highest recorded for recruits since 2005 and is above the long-term mean of 82 (Figure 12).

The abundance index for post-recruits (scallops ≥ 55 mm) had an increasing trend from 2007 to 2010, reaching the highest levels on record in 2010 (Figure 13). From 2012 to 2019 there has been a declining trend in post-recruit abundance. The value for 2025 (292), although still below the long-term mean (~377), is the highest recorded for post-recruits since 2013 (Figure 13).

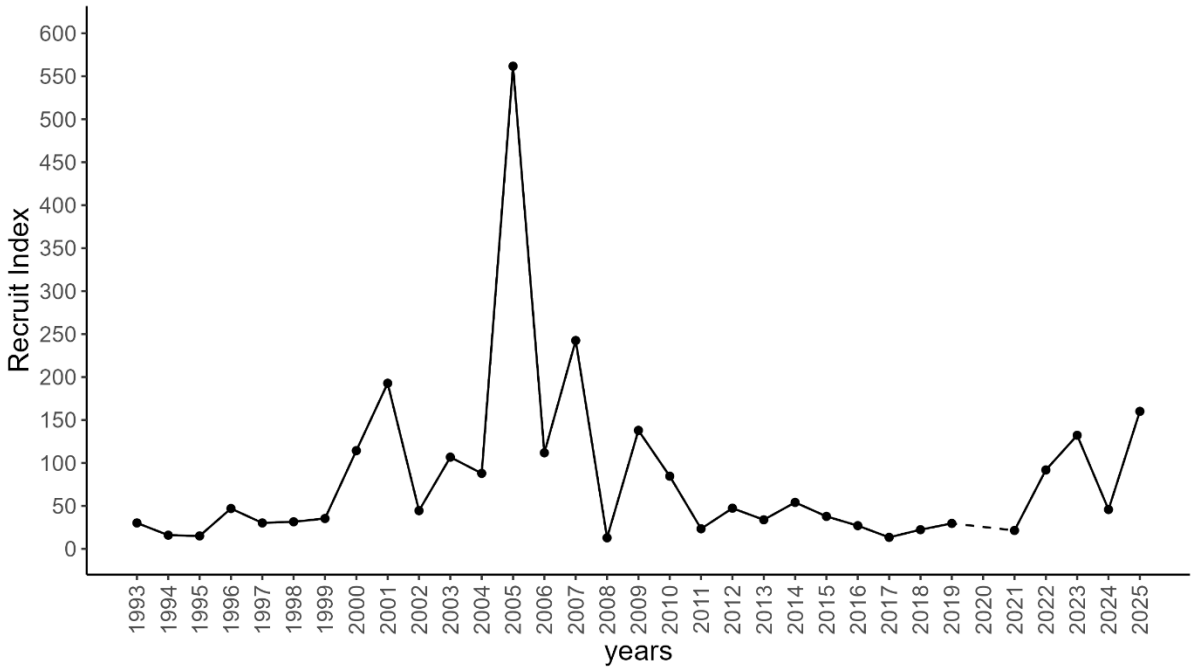

Figure 12: Abundance index (based on geometric mean) for recruits (under 55 mm) used in the catch survey analysis model. This is calculated using data from only the stations used in the stock assessment model. In order to calculate the geometric mean 0.01 was added to each site in order to account for zero data values. Dashed line represents missing values. Note that in 2005 there were only three historic sites surveyed of which one (LAX) had a very high density of recruits recorded which is driving the spike in that year.

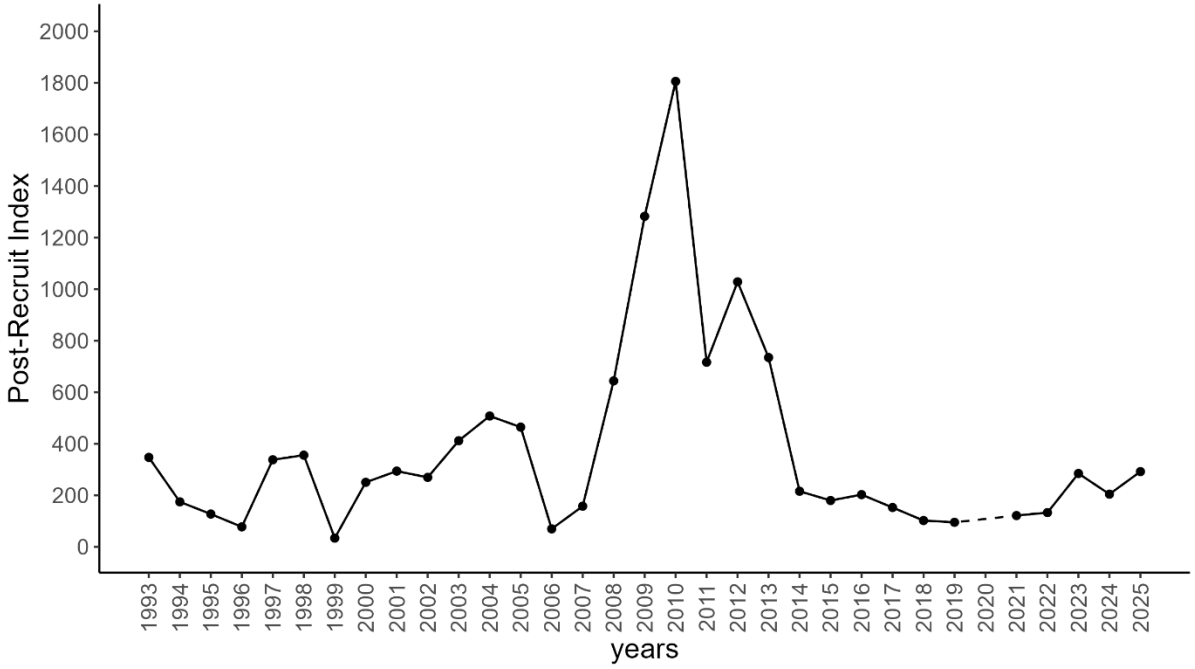

Figure 13: Abundance index (based on geometric mean) for post-recruits (over 55 mm) used in the catch survey analysis model. This is calculated using data from only the stations used in the stock assessment model. In order to calculate the geometric mean 0.01 was added to each site in order to account for zero data values. Dashed line represents missing values.

When viewed spatially and temporally by site over the time period of the survey, anomalies where exceptional densities of queen scallop recruits or post-recruits occur at a site in a given year can be identified.

The boxplots in Figure 14 indicate the typical ranges (box indicates inter-quartile range) of recruit density across years (1992 to 2025) for each site along with the median value (horizontal line). The red line indicates a density of 10 scallops per 100 m^2 that is above typical values and indicates a good recruitment event at that site within that year. The data for 2025 are plotted as blue points on the figure and indicate that there are very high localised densities of queen scallops recruits at ST9 and TAR on the west coast, CHI, ST34 and ST39 on the south coast, RAM on the north east coast and ST23 on the east coast (i.e. island wide). It could be appropriate to consider spatial management (i.e. closed area) for the 2025 fishing season for the high-density area at ST9 and for the area on the south coast (i.e. CHI and ST34).

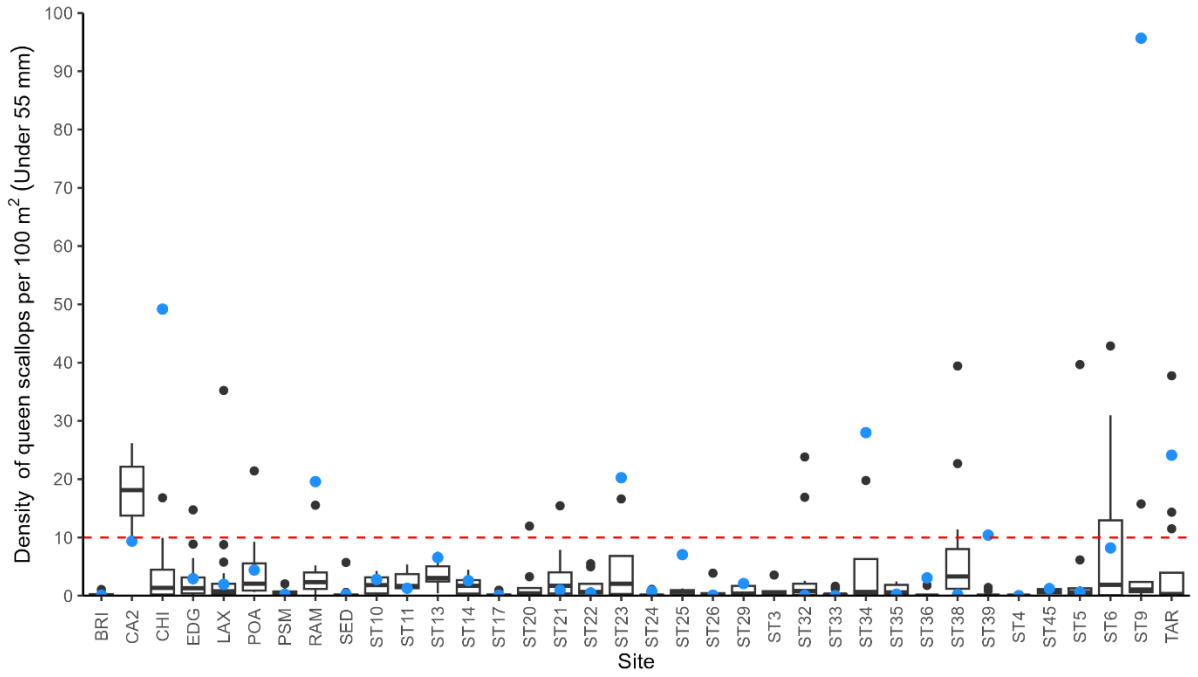

Figure 14: Boxplot of recruit (< 55 mm) queen scallop density per 100 m^2 for stations where queen scallops are typically present. Outliers over 10 (which appear as points above the red dashed line) are exceptional years of recruitment. The data includes all surveys from 1992 to 2025 and the blue points are the data from the current 2025 survey.

The boxplots in Figure 15 indicate the typical ranges (box indicates inter-quartile range) of post-recruit density across years (1992 to 2025) for each site along with the median value (horizontal line). The red line indicates a density of 50 scallops per 100 m^2, which is above typical values and indicates an exceptional density of post-recruits at that site within that year. The data for 2025 is also plotted as blue points on the figure and indicates that the highest localised densities of fishable queen scallops is at ST9 on the west coast. It could be appropriate to consider spatial management for the 2025 fishing season for this high-density area of post-recruits, especially as this area overlaps with the highest density of recruits.

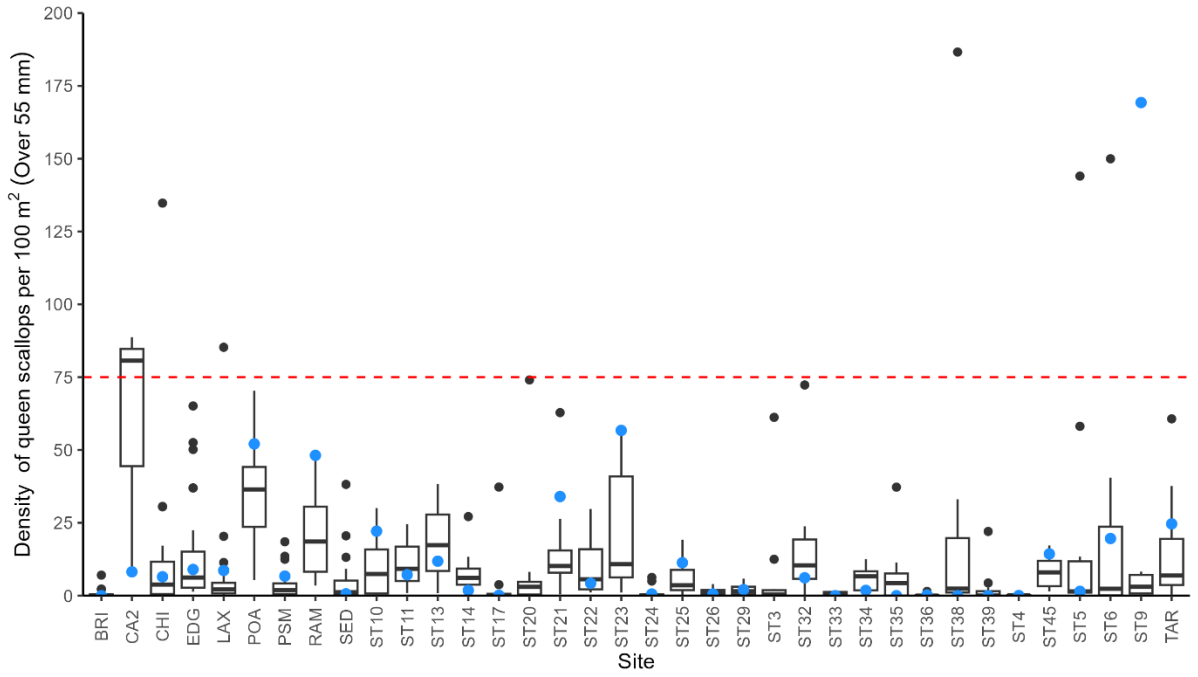

Figure 15: Boxplot of post-recruit (≥ 55 mm) queen scallop density per 100 m^2 for stations where queen scallops are typically present. Outliers over 50 (which appear as points above the red dashed line) are exceptional years of post-recruits. The data includes all surveys from 1992 to 2025 and the blue points are the data from the current 2025 survey.

4.2.5 Stock Assessment (CSA):

An annual assessment of the Isle of Man queen scallop stock has been undertaken since 2012 using the Catch-Survey Analysis (CSA) method, first developed by Collie and Sissenwine (1983). Further information on this method and the results from previous stock assessment are presented by Murray and Kaiser (2012a; 2012b), Murray (2013) and Bloor et al., (2014; 2015; 2017; 2018; 2019). CSA has been advocated as a valuable method to support management advice where age data is not available (Mesnil, 2003). The CSA method estimates stock size using abundance indices and is generally well-suited to the data available for the Isle of Man's queen scallop fishery. Absolute estimates of stock size and fishing mortality derived from CSA are sensitive to input parameters, although trends over time are more robust to changes in these input parameters (Mesnil 2003). The stock assessment was implemented using CSA v4.3 (NOAA 2014). The timing of the survey in spring allows data collection before the main queen scallop fishing season and at a time of year when seawater temperatures mean dredges are a more effective means of sampling queen scallops (Jenkins et al. 2003).

Within the stock assessment unit (Isle of Man's territorial waters), the trend from the model output indicates that following five years of increasing biomass (2006-2010), total biomass has decreased during each of the subsequent eight years (2011–2018) before slight annual increases in each of the last 6 years (2019 – 2025) (2025: median estimated biomass of 7853 t) (Figure 17). *Note, that there is a missing year of survey data for 2020 in the input data.*

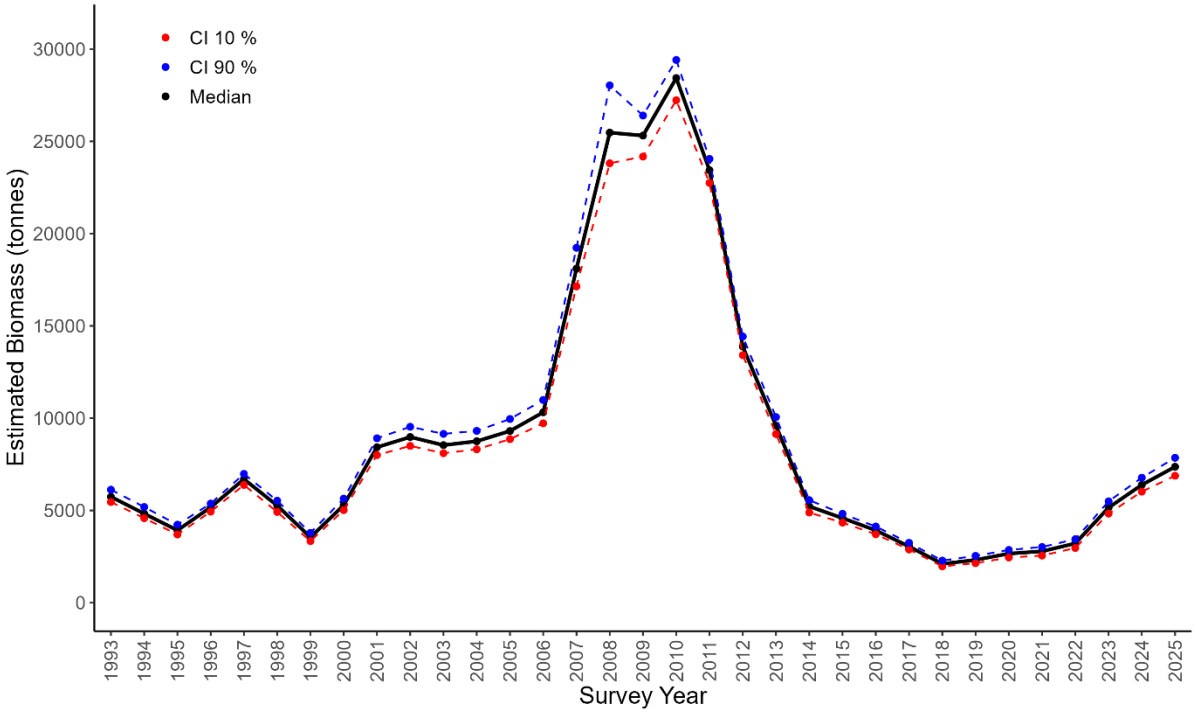

Figure 16: Estimated biomass (all scallop sizes) for the stock assessment unit (Isle of Man territorial waters) MCMC results from CSA Version 4.3.

Estimated biomass can be further subdivided into post-recruit (≥ 55 mm) and recruit (< 55 mm) biomass (Figure 17); for 2025 these values are 5,247 t post-recruit and 2107 t recruit. From this data, we can see that peaks in recruit biomass (i.e. 1996, 2001, 2007, 2009) are typically followed by peaks in the post-recruit biomass, with a 1-year lag (Figure 17). Following this pattern, the increase in recruit biomass in 2022 and 2023 has seen a subsequent increase in post-recruit biomass in 2023 and 2024 (Figure 17). The recruit biomass for 2025 is the highest recorded since 2010 and should lead to a further increase in post-recruit biomass in 2026 if managed correctly. A 20% harvest rule (proposed as a sustainable proportion for fishing mortality during the period of Marine Stewardship Council certification), using post-recruit (i.e. fishable) biomass, would give a biomass linked TAC for the 2025 fishing season of 1570 t.

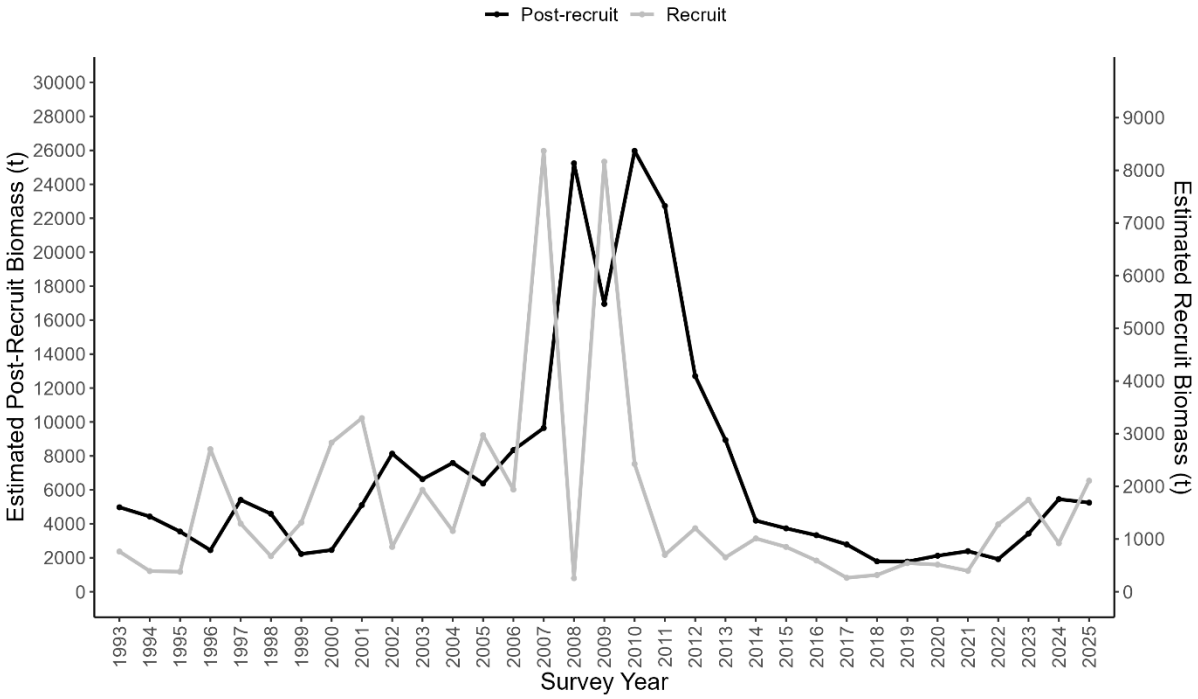

Figure 17: Estimated biomass for the stock assessment unit (Isle of Man territorial waters) MCMC results from CSA Version 4.3. The black line is for post-recruit (≥ 55 mm) biomass (left y-axis) and the grey line is for recruit (< 55 mm) biomass (right y-axis), please note different axes scales.

The management currently in place for queen scallops within the Isle of Man's territorial waters has included closing areas of high-density juvenile scallops for on-growing which has created spatially discrete high-density areas within several fishing grounds. The methods used for the stock assessment down-weights high density isolated patches of queen scallops when calculating the overall stock biomass. As such, assessing the stock at the territorial sea level may be less applicable for the current fine scale spatial management that is in place for queen scallops. Whilst the overall biomass remains lower than the peak from 2007- 2012, there are spatially discrete areas within grounds with high densities of post-recruits. In this scenario data assessment and management at a fishing ground level may provide a better basis for on-going spatial management than assessment of the overall stock biomass.

4.2.6 Trawl TAC calculation (ICES Category 3 approach and biomass linked approach):

The TAC advice for the trawl fishery is based on the methods developed by ICES for Category three data limited stocks (ICES 2012). This approach requires an index of abundance or biomass to be available usually derived from a research vessel survey. For the purposes of providing management advice, the recent trend in biomass is assessed by calculating the mean biomass index in the last two survey years (index A) compared with the previous three years (index B). Given the uncertainty that the stock survey index is representative of true stock status, large inter-annual changes in TAC are avoided. This is achieved by capping any annual advised changes in the TAC by + 20 %, known as the uncertainty cap.

For the Isle of Man Queen Scallop fishery, the TAC advice calculated based on the ICES Category 3 approach for data limited stocks is indicated in Table 3.

Table 3: Queen scallops in Isle of Man territorial waters, TAC calculation for the trawl fishery based on ICES Category 3 approach for data limited stocks: 2025 advice (total abundance index i.e. scallops of all sizes).

Index A (2024 & 2025)		351
Index B (2021-2023)		261
Index ratio (A/B)		1.34
Uncertainty cap	Applied|	0.8
Landings from 2024 (trawl)		1125 tonnes
Precautionary buffer	Not applied|	NA
Catch advice for 2025 (trawl)		1350 tonnes
% advice change relative to prior season		+ 20 %

In considering the output of the ICES Category 3 approach, which would give a recommended TAC of 1350 t (equating to an uplift of 20% on 2024 landings), the following points should be noted:

- In the case of the Isle of Man queen scallop fishery the original TAC, which is then adjusted each season, was not biomass linked.
- The ICES protocol uses actual landings (as above) rather than proposed TAC as the metric for adjustment for setting the next seasons TAC.

4.3 Industry Juvenile Spring Scallop Survey:

4.3.1 Survey Methods:

A survey for king and queen scallops was undertaken onboard two industry vessels (F.V. Benolas and F.V. Our Sarah Jane) from 11nd May - 10th June 2025. Four main queen scallop fishing grounds, one transient bed and an Experimental Area at East Douglas (EDGERA) were surveyed (Table 4):

Table 4: Grounds surveyed during the 2025 industry scallop survey with the ground and number of survey tows detailed. EDGERA = East of Douglas Experimental Research Area (closed since July 2017). Note, not all tows are within queen scallop ground as king scallop grounds are surveyed at the same time.

Ground	Survey Tows	Type
Targets (TAR)	47	Permanent
Chickens (CHI)	46	Permanent
East of Douglas (EDG)	85	Permanent
Point of Ayre (POA)	10	Permanent
Bradda (BRA)	58	Transient
EDGERA	7	Closed

Survey areas were split into a fixed grid with a resolution of 1 min (longitude) x 0.5 min (latitude). Survey cells were sampled randomly within each ground strata (strata were defined predominately by depth) with approximately equal effort to ensure relatively even distribution of survey effort across the entire fished ground. Within each survey cell a 10 minute tow was undertaken at ~ 2.5 knots. Each vessel towed a 'standard survey dredge bar' and a 'juvenile survey dredge bar'. The standard bar had two King and two Queen dredges interspersed along the bar (Queen dredges had 10 teeth) while the juvenile bar was of the same design but using Queen dredges with 17 teeth and a mesh (60 mm) attached internally that when stretched into a fixed position resulted in a maximum mesh size of 38 mm. The catch from each dredge was counted and a subsample of up to ~ 90 kings and 90 queens were measured.

Data cleaning: During 'data cleaning' any scallops in the subsample that were recorded as queen scallops over 100 mm were assumed to be under 90 mm and the data adjusted accordingly. Discrepancies between the number reported on the tow sheet and the number sampled (where the whole dredge catch were measured) were altered to reflect the number measured.

Ground refinement: As the main survey grid was defined to include both king and queen scallop at each fishing ground the outer survey extent for each ground was further refined for queen scallops (Figure 18) using vessel monitoring system data (VMS) amalgamated from 2011 – 2019. In order to identify queen scallop fishing activity VMS data from the queen fishing season were filtered to only include vessels moving at fishing speed (i.e. 1.0-4.0 knots). In addition, depth and sediment profiles were also considered when refining each survey ground as well as skippers' survey comments and any expansions to the survey grid due to increased fishing extents.

Ground inclusion: POA and the transient bed at BRA were only surveyed for the first time in 2020 (& POA was not surveyed in 2021). To keep the data constant only EDG, CHI and TAR are included in the main territorial sea analysis section. Each ground will be analysed individually later in the report.

Targeted Cells: In addition to the random Survey Cells described above, additional selected cells were surveyed in some areas on the basis of suitability for closed area or hotspot placement or exploratory fishing. These were excluded from the main analysis because these areas were chosen specifically because they were typically areas of known high queen scallop density (i.e. they were not a random selection of the particular fishing ground).

Data analysis: The geometric mean was used for data analysis due to the skewed (non-normal) distribution of the density data. In addition, the juvenile dredges appear to be more efficient for catching both post recruits (i.e. ≥ 55 mm) and recruits (i.e. < 55 mm) and so the analysis within this report focuses on that data set.

Survey timing: It should be noted that the 2019 survey was undertaken in June whilst the 2020 and 2022 surveys were undertaken in April, the 2021 survey in May and the 2023, 2024 and 2025 survey in May/June. Size data is presented here as a snap shot at the time of the survey and the data has not been adjusted for size increase due to growth between these periods.

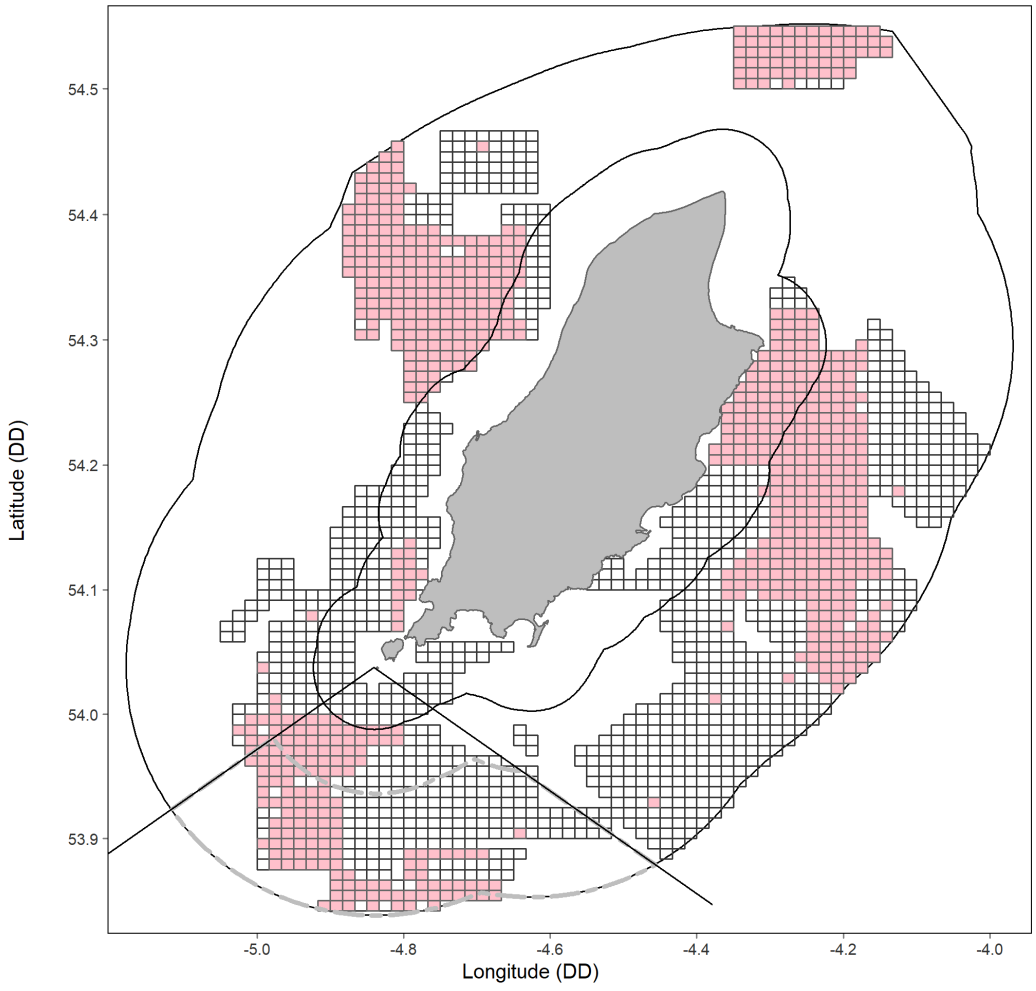

Figure 18: Current extent of the industry scallop survey grid with survey cells defined as queen scallop area highlighted in pink

4.3.2 Size frequency and Density estimates:

4.3.2.1 Territorial Waters:

A size frequency plot of queen scallop size data is presented in Figure 19 from samples measured at all industry scallop survey stations (queen scallop dredge data only). Scallops > 55 mm represent post-recruits (queen scallops that are already at the minimum landing size (MLS) of 55 mm). Scallops < 55 mm represent recruits (queen scallops under MLS), some of which will be large enough to grow into the fishery during the upcoming fishing season (i.e. > 45 mm) and some which will not reach MLS until next year's fishery (i.e. <45 mm).

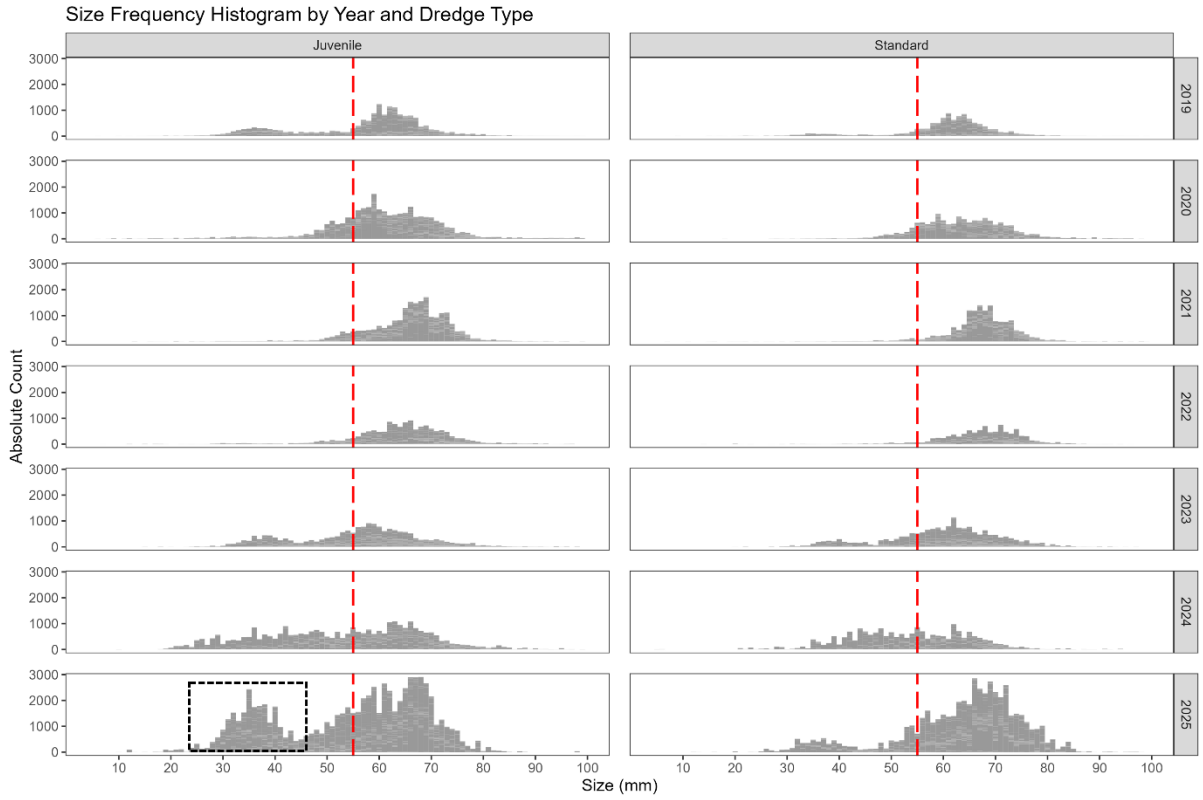

Figure 19: Size frequency distribution (by 1 mm size bin) of absolute counts of queen scallops displayed by year and dredge type (red dotted line indicates the MLS of 55 mm) for survey cells at East of Douglas, Targets and Chickens combined (targeted survey cells excluded). The absolute count is calculated by using a scalar (i.e. the ratio of total observed to subsampled counts) to scale the size frequency distributions. The black dotted box in 2025 highlights a significant new recruitment peak (i.e. queenies of ~ 25 – 45 mm). Note recruitment peak absence in 2020, 2021 and 2022.

In 2019, 2023 and 2025 there are well-defined peaks in recruiting queen scallops in the juvenile dredge data. In 2024 there was also good recruitment, but it was across a more protracted range of sizes with potentially two overlapping cohorts resulting in a sustained level of high recruitment rather than the likely single cohort peak seen in other years. In 2025, this recruitment peak is focused in two key areas at Chickens and Targets (Figure 19 and Figure 20). These recruitment peaks are an important consideration when looking at sustainable management over a > 1 year period.

Figure 20 and Figure 21 shows the spatial distribution of recruitment (i.e. under 55 mm) and harvestable (i.e. over 55 mm) scallops respectively around Isle of Man territorial waters for 2025. For both recruits and harvestable scallops most higher densities are focused on the west coast at the Targets fishing ground although high densities of post-recruits are also evident at a single cell on the south coast and an area off the east coast.

The survey index (based on the geometric mean) indicates a significant increase in the survey index for 2025 from 2024 for all three categories (all sizes, over 55 mm and under 55 mm) and is the highest value for all three categories in the current time series (Table 5).

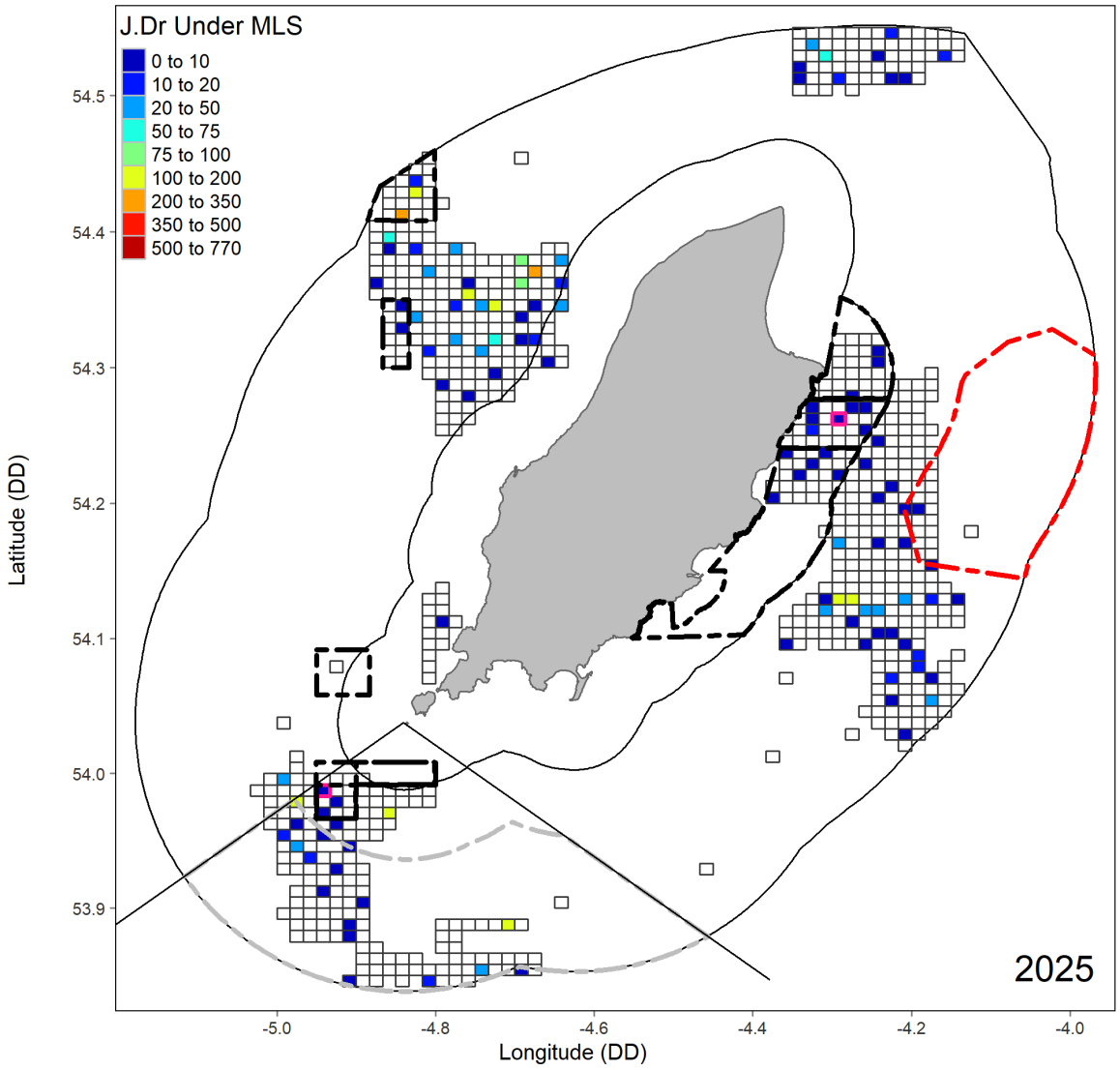

*Figure 20: Maps illustrating the survey densities for queen scallops **under** MLS from juvenile dredges for 2025. The pink cell borders indicate cells that were part of an additional targeted survey. The black dashed boxes indicate closed or managed areas for the 2024 queen scallop fishery and the 2024/2025 king scallop fishery. The red dashed line indicates the area for lease for the planned Moor Vanin wind farm. The grey dashed line and solid black lines indicate the queen scallop dredge zone.*

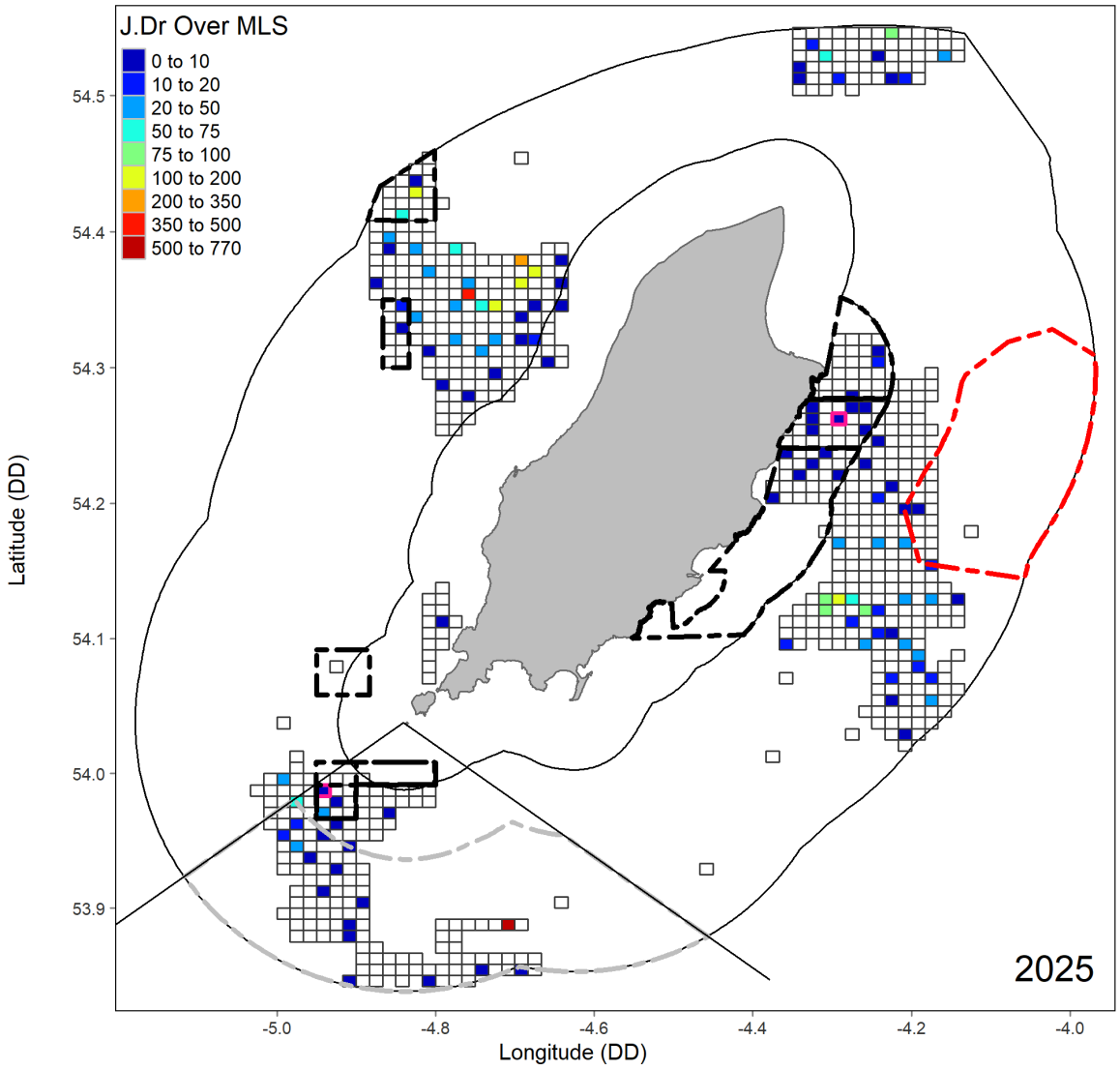

*Figure 21: Maps illustrating the survey densities for queen scallops **over** MLS from juvenile dredges for 2023. The pink cell borders indicate cells that were part of an additional targeted survey. The black dashed boxes indicate closed or managed areas for the 2024 queen scallop fishery and the 2024/2025 king scallop fishery. The red dashed line indicates the area for lease for the planned Moor Vanin wind farm. The grey dashed line and solid black lines indicate the queen scallop dredge zone.*

Table 5: Industry queen scallop survey index (based on the geometric mean) for all sizes of queen scallops and then split between over 55 mm and under 55 mm queen scallops.

Year	All Scallops	Over 55 mm	Under 55 mm
2019	4.74	2.45	0.62
2020	5.37	4.24	0.45
2021	1.66	1.51	0.11
2022	1.55	1.36	0.16
2023	1.51	1.18	0.36
2024	1.17	0.65	0.35
2025	15.9	6.55	5.59

4.3.2.2 Fishing Grounds:

4.3.3.2.1 Targets:

Targets supported the highest quantity of landings from the 2024 fishing season (838 t; ~71% of total landings). The size frequency distribution of scallops at Targets indicates that in 2025 there are high levels of both recruits (i.e. under 55 mm) and harvestable scallops (i.e. over 55 mm) (Figure 22). For recruits (under 55 mm) the 2025 data indicates good levels of recruitment across a relatively wide area when compared to the data from previous years (Figure 23). For post-recruits (over 55 mm) the 2025 data also indicates that there are high densities across a relatively wide area of the commercial fishing ground (Figure 24).

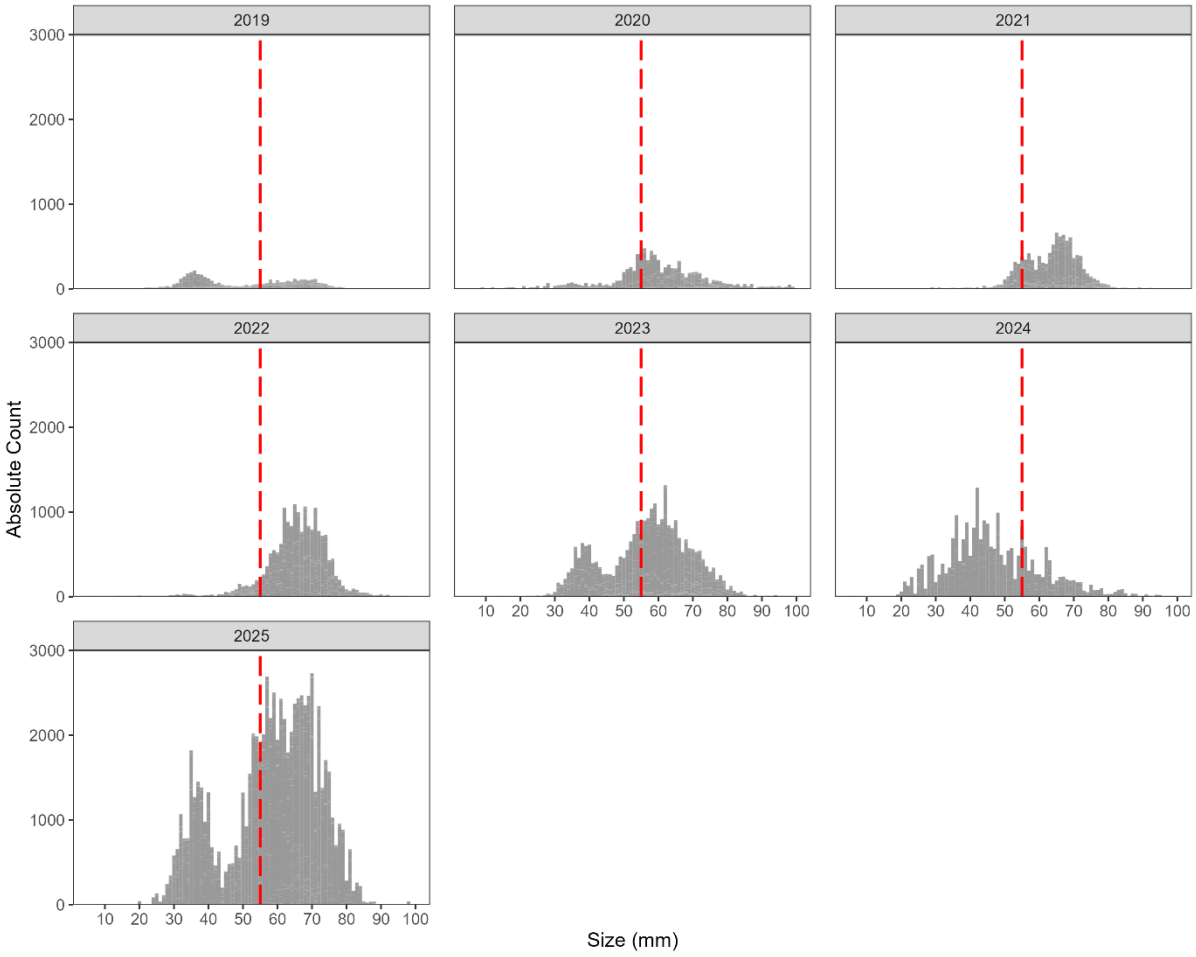

Figure 22: Size density histogram of absolute counts of queen scallops displayed by survey year for Targets (red dotted line indicates the MLS of 55 mm). Excludes targeted survey cells.

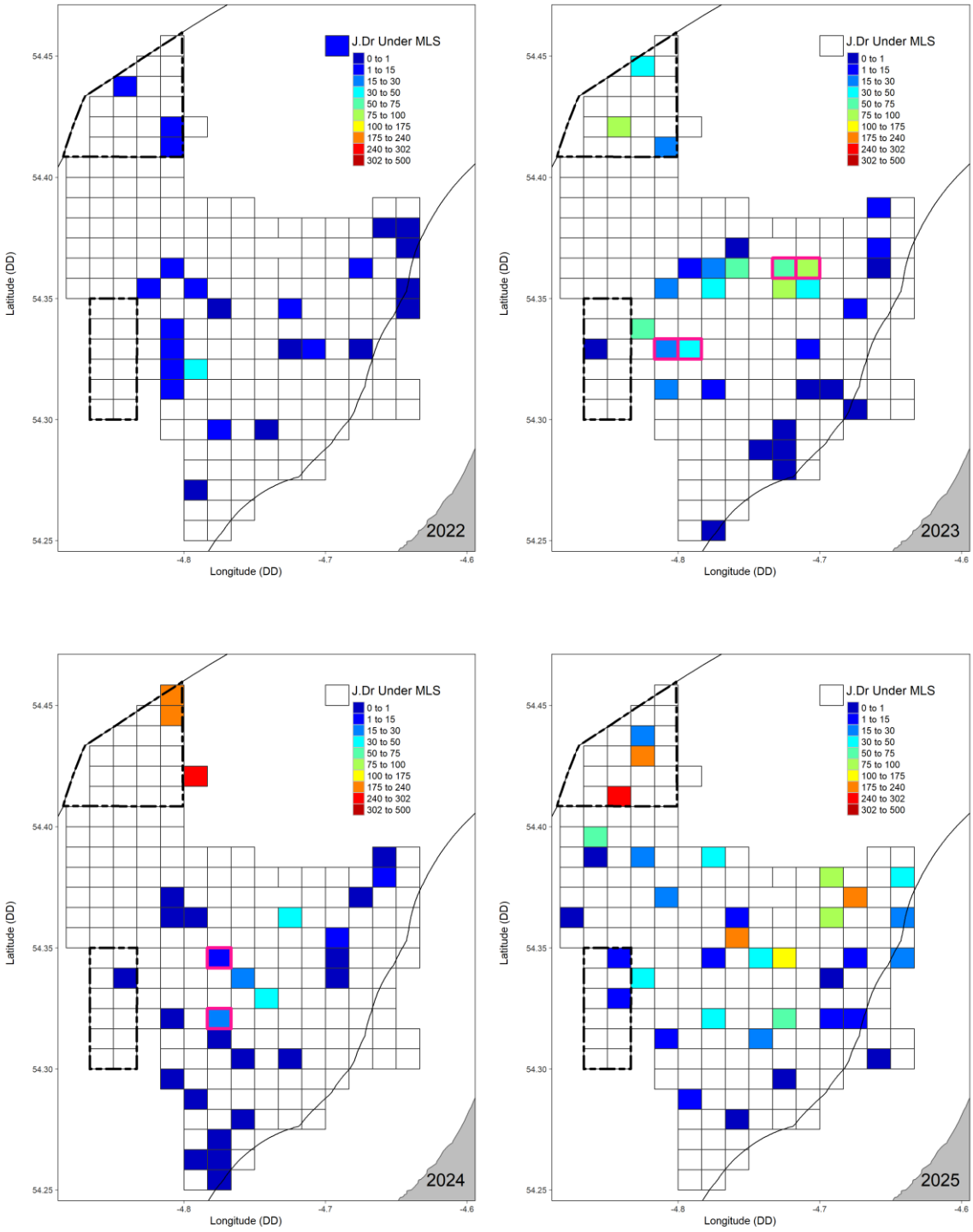

*Figure 23: Maps illustrating the survey densities for queen scallops **under** MLS from juvenile dredges for 2022 to 2025 at Targets (West coast). The black boxes indicates areas closed to scallop fishing in 2024/2025. Pink borders indicate cells that were part of an additional targeted survey and are not included in the main analysis for the TS, or for individual fishing area.*

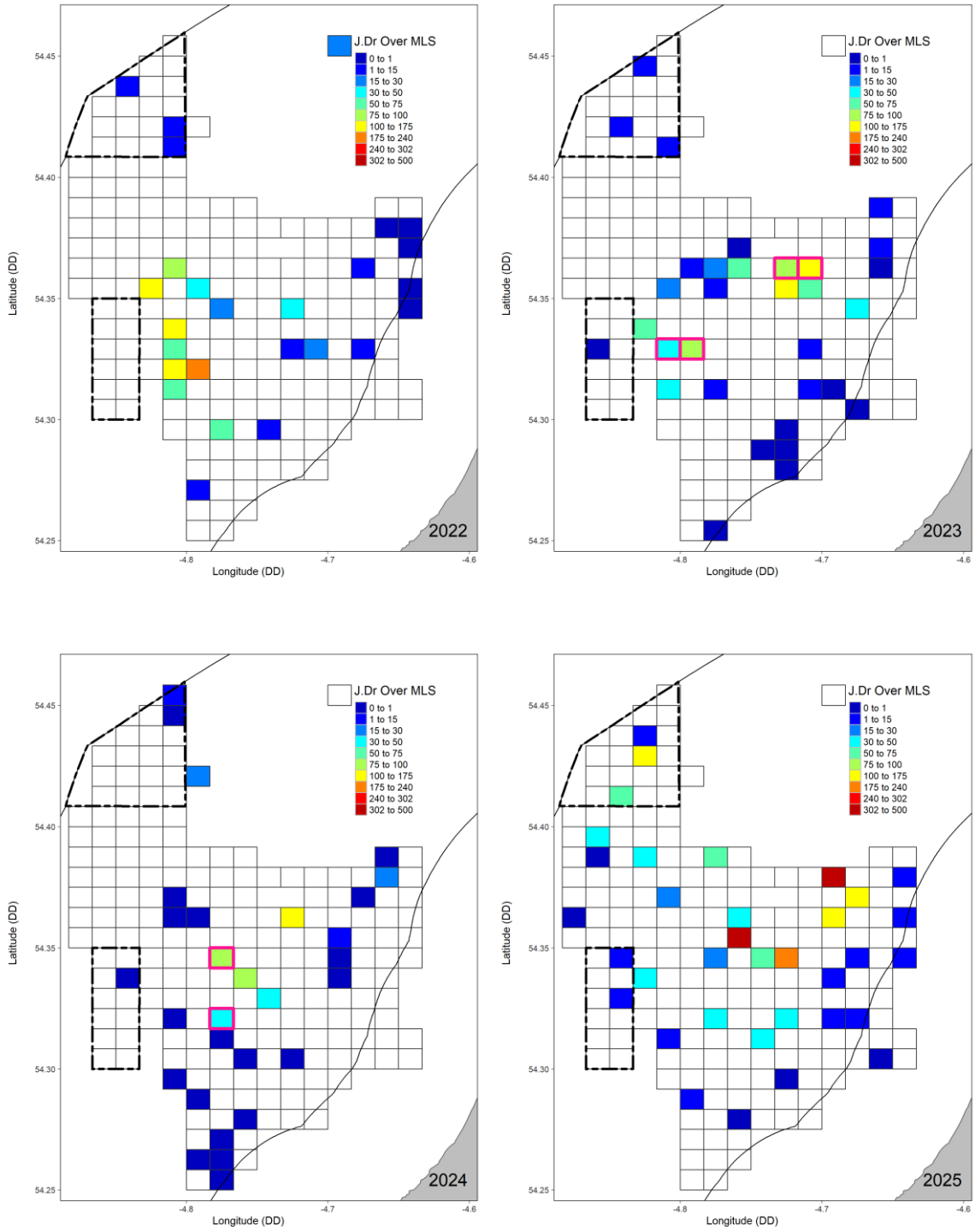

*Figure 24: Maps illustrating the survey densities for queen scallops **over** MLS from juvenile dredges for 2012 to 2025 at Targets (West coast The black boxes indicates areas closed to scallop fishing in 2024/2025. Pink borders indicate cells that were part of an additional targeted survey and are not included in the main analysis for the TS, or for individual fishing areas.*

The locations of potential closed areas for the 2025 fishing season to protect recruits from fishing activity are indicated by solid red boxes in Figure 25. By focusing on queen scallops under 45 mm (i.e. scallops unlikely to recruit to the fishery until the 2025 fishing season) two potential locations can be identified for closure during the 2025 fishing season to protect these pre-recruit (i.e. scallops under

45 mm) scallops (solid red line boxes in Figure 25). The western closed area is in muddy ground and the intention from the SMB is that this area should continue to remain closed as it is an area where recruitment of queen scallops is common, but the sizes and yield are typically low and therefore not of commercial value.

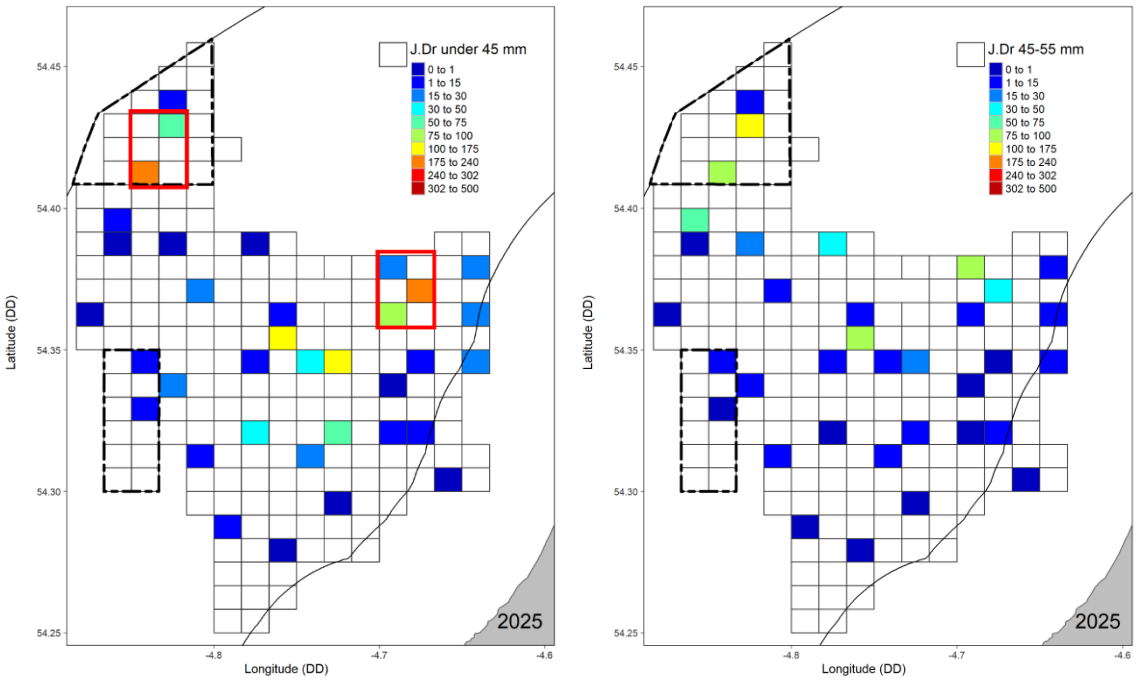

Figure 25: Maps indicating the split of queen scallops at TAR in 2025 which are under 45 mm (Left) and between 45 and 55 mm (Right). Queen scallops under 45 mm are not likely to be harvestable until the 2026 queen scallop fishing season. Red boxes (solid lines) indicate suggested closures for consideration to protect queen scallops under 45 mm during the 2025 fishing season. Black box (dashed line) indicates closed areas for 2024 fishing season.

4.3.3.2.2 Chickens:

Chickens supported a low quantity of landings during the 2024/2025 (dredge fishery was postponed until March 2025) fishing season (~100 t; ~8% of total landings). The size frequency distribution of scallops at Chickens indicates that 2025 had good levels of both recruits (i.e. under 55 mm) and harvestable scallops (i.e. over 55 mm) compared to previous survey years (i.e. 2019 to 2024; Figure 26). For recruits (under 55 mm) there are signs of isolated patches of good recruitment and for post-recruits (over 55 mm) there is only one high density survey station (however, it is the highest in the 2025 survey) (Figure 27 and Figure 28).

Given the potential signs of recruitment for queen scallops, further supported by data from the Prince Madog survey, within the inshore area of the Chickens fishing ground (in a similar area to previous closures), there is a recommendation to consider a closed areas to protect high densities of recruits (Figure 29).

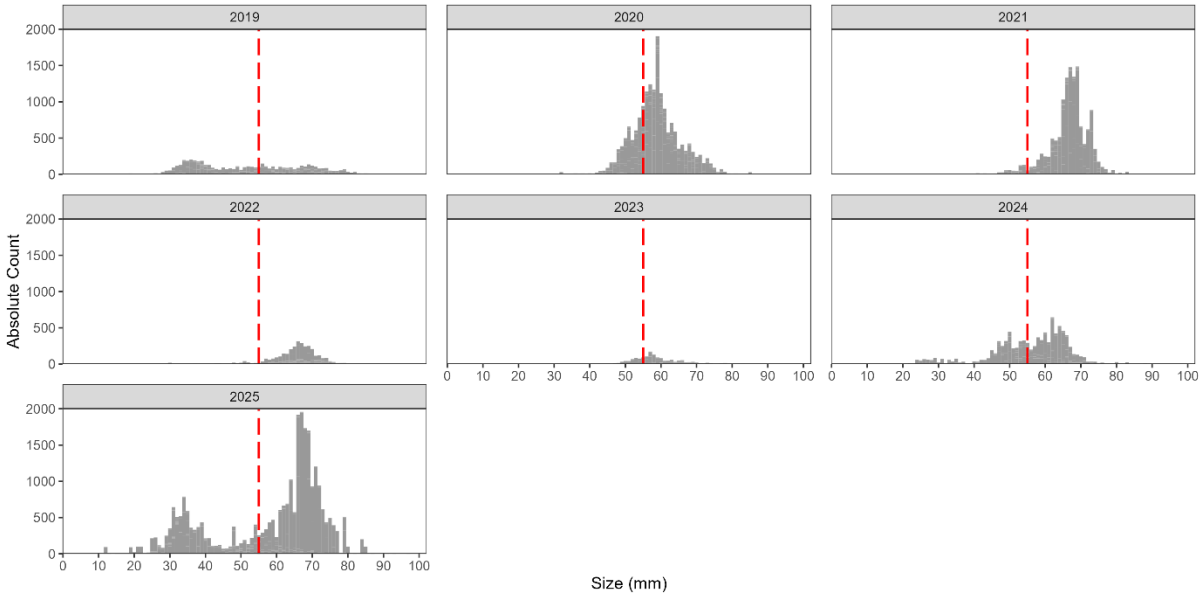

Figure 26: Size density histogram of absolute counts of queen scallops displayed by survey year for Chickens (red dotted line indicates the MLS of 55 mm). Excludes targeted survey cells.

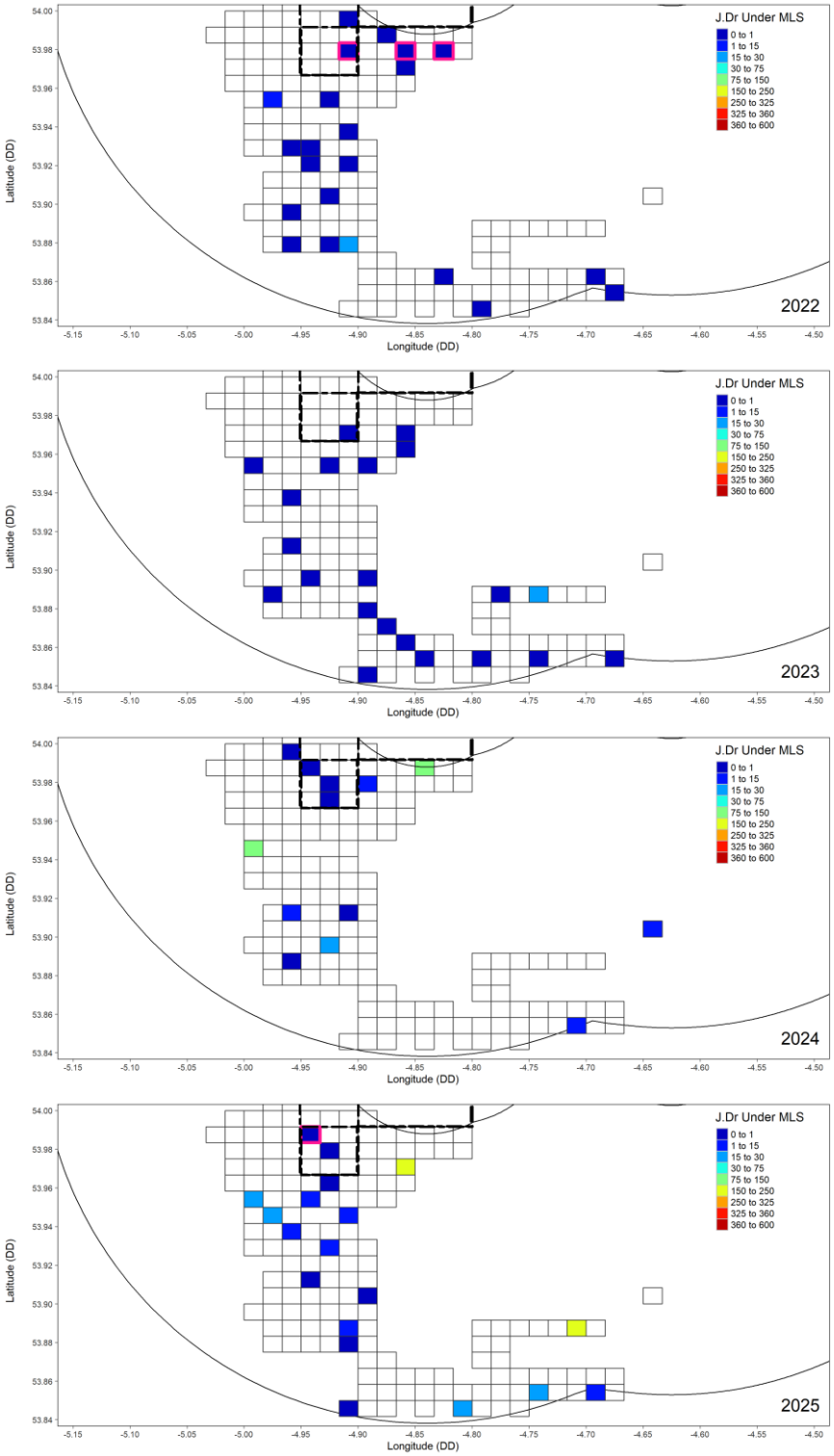

*Figure 27: Maps illustrating the survey densities for queen scallops **under** MLS from juvenile dredges for 2022 to 2025 at Chickens (South coast). Pink borders indicate cells that were part of an additional targeted survey and are not included in the main analysis for the TS, or for individual fishing areas.*

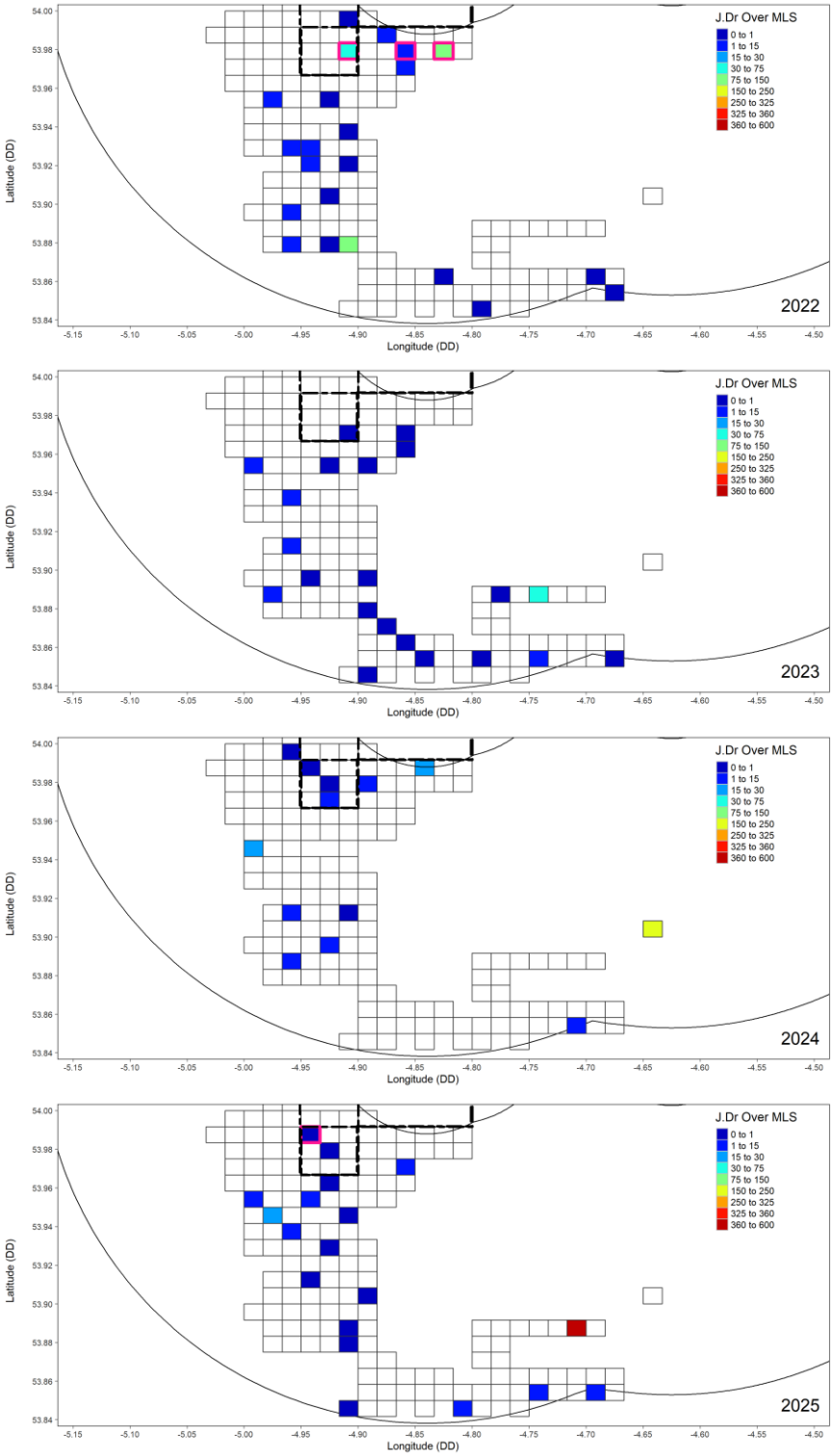

*Figure 28: Maps illustrating the survey densities for queen scallops **over** MLS from juvenile dredges for 2022 to 2025 at Chickens (South coast). Pink borders indicate cells that were part of an additional targeted survey and are not included in the main analysis for the TS, or for individual fishing areas.*

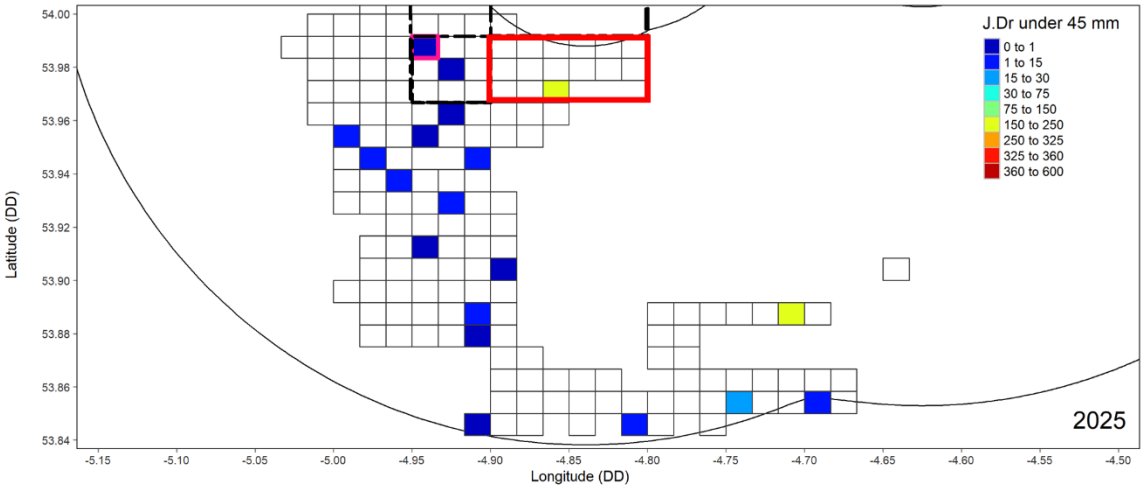

Figure 29: Map indicating the density of queen scallops at CHI in 2025 which are under 45 mm. Queen scallops under 45 mm are not likely to be harvestable until the 2026 queen scallop fishing season. Red box (solid lines) indicate suggested closures for consideration to protect queen scallops under 45 mm during the 2025 fishing season. Black box (dashed line) indicates closed areas for 2024/2025 fishing season.

4.3.3.2.3 East of Douglas:

East of Douglas supported a small quantity of landings during the 2025 fishing season (~190 t; 16 % of total landings). The size frequency distribution of scallops at East of Douglas indicates that 2025 had relatively good levels of recruits (i.e. under 55 mm) and post-recruits (i.e. over 55 mm), similar to 2024 but typically better for recruitment than all previous years in the time series (Figure 30). For 2025 recruitment is mainly concentrated in the southern part of the survey area (Figure 31) whilst post-recruits were recorded in good densities across the majority of the survey ground (Figure 32).

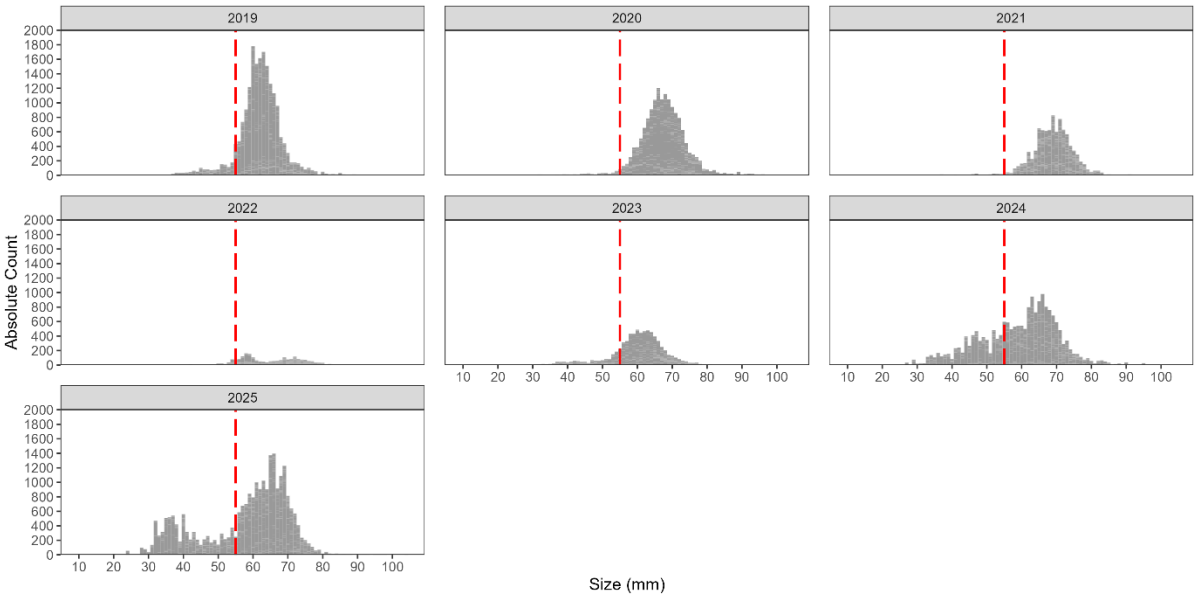

Figure 30: Size density histogram of absolute counts of queen scallops displayed by survey year for East Douglas (red dotted line indicates the MLS of 55 mm). Excludes targeted survey cells.

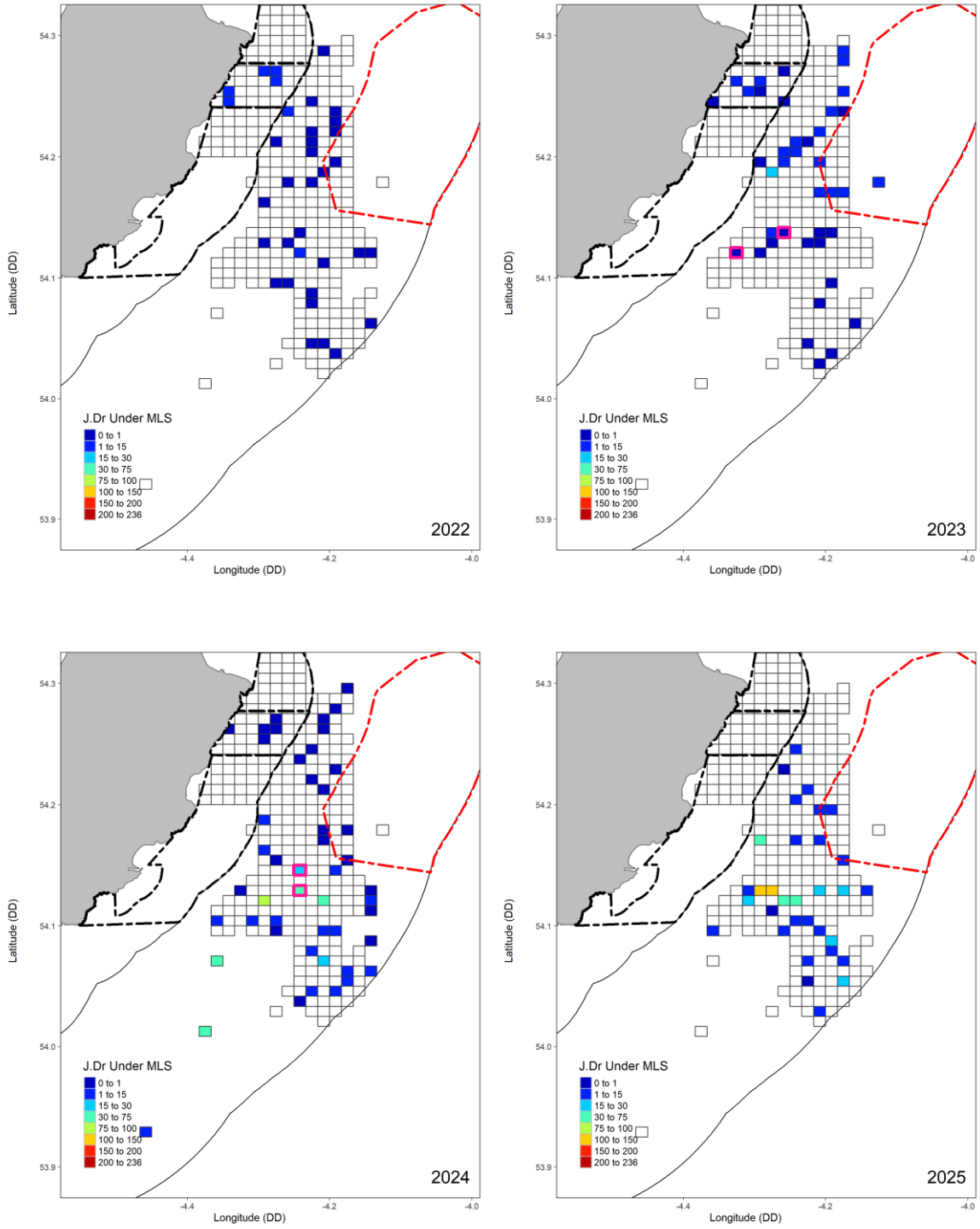

*Figure 31: Maps illustrating the survey densities for queen scallops **under** MLS from juvenile dredges for 2022 to 2025 at East Douglas (East coast). Pink borders indicate cells that were part of an additional targeted survey and are not included in the main analysis for the TS, or for individual fishing areas. The black dashed box indicates the East Douglas Experimental Research Area which has been closed since 2017 and the east coast restricted area which was implemented during the 2024/2025 king scallop fishing season. The red dashed box indicates area for lease for the planned Moor Vannin wind farm.*

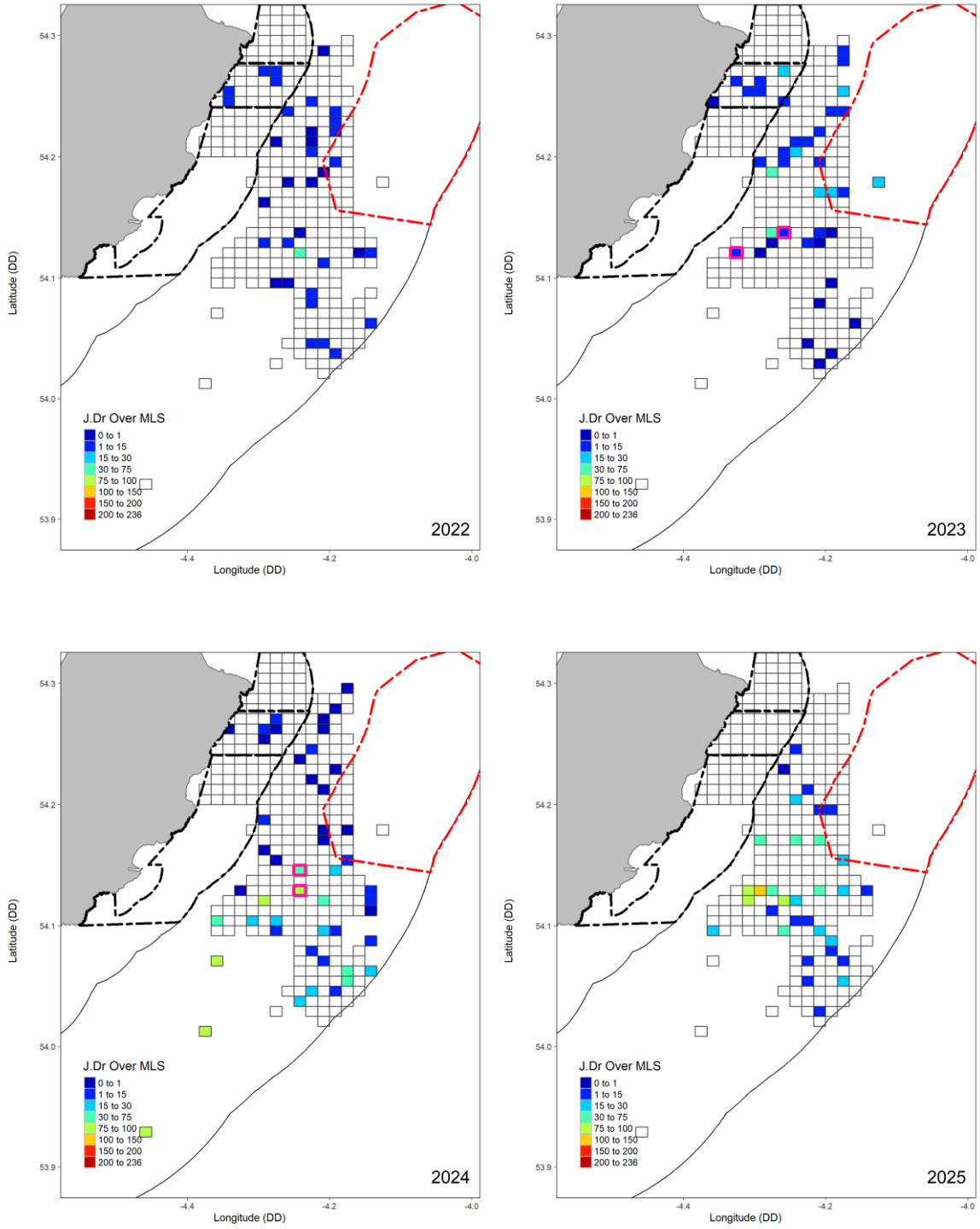

*Figure 32: Maps illustrating the survey densities for queen scallops **over** MLS from juvenile dredges for 2022 to 2025 at East Douglas (East coast). Pink borders indicate cells that were part of an additional targeted survey and are not included in the main analysis for the TS, or for individual fishing areas. The black dashed box indicates the East Douglas Experimental Research Area which has been closed since 2017 and the east coast restricted area which was implemented during the 2024/2025 king scallop fishing season. The red dashed box indicates area for lease for the planned Moor Vannin wind farm.*

4.3.3.2.4 Point of Ayre:

Point of Ayre (POA) had a separate 'exploratory' weekly catch limit of 2370 kg per vessel for Weeks 1-6 of the 2024 fishing season at which point it was closed due to indications of low landings per unit effort. POA had the lowest quantity of landings for the season (56.3 t; ~4.7 % of total landings). The size frequency distribution of scallops at Point of Ayre indicates that the 2025 survey recorded high levels of both recruits (i.e. under 55 mm) and harvestable scallops (i.e. over 55 mm) (Figure 33). For both recruits (i.e. under 55 mm) and post-recruits (i.e. over 55 mm), the 2025 data indicates good levels of recruitment across the majority of the survey area (Figure 34 and Figure 35).

Given the small area of the fishing ground at Point of Ayre there are no recommendations for discrete closed areas to protect high densities of recruit of post-recruit queen scallops.

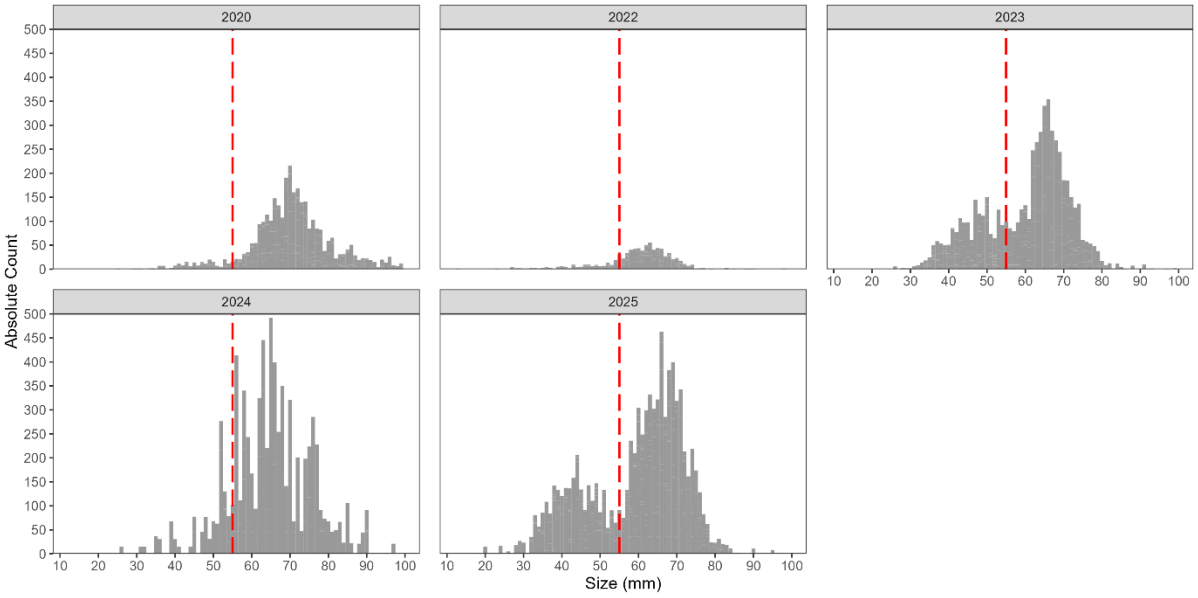

Figure 33: Size density histogram of absolute counts of queen scallops displayed by survey year for Point of Ayre (red dotted line indicates the MLS of 55 mm). Excludes targeted survey cells.

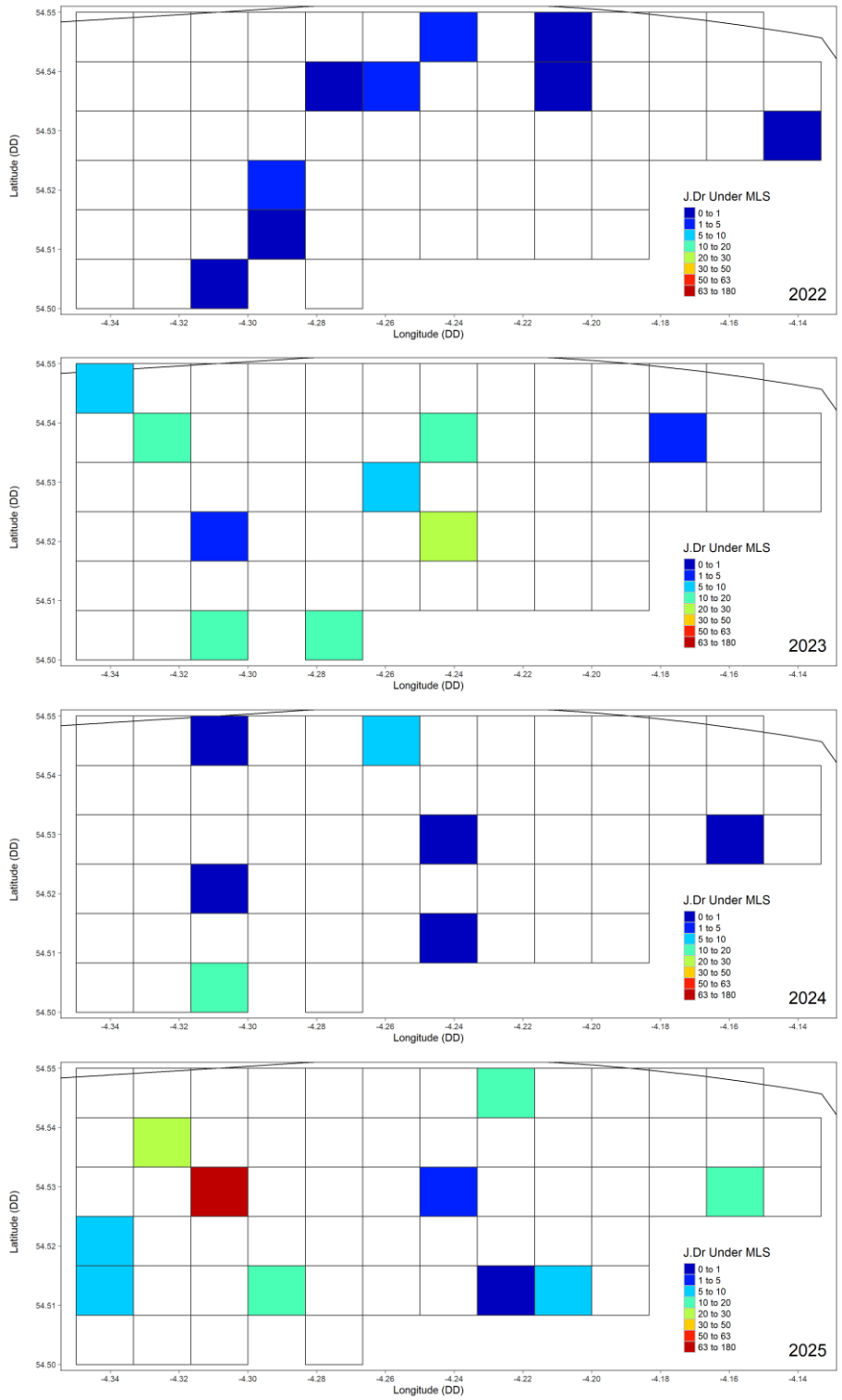

*Figure 34: Maps illustrating the survey densities for queen scallops **under** MLS from juvenile dredges for 2022 to 2025 at Point of Ayre (North coast).*

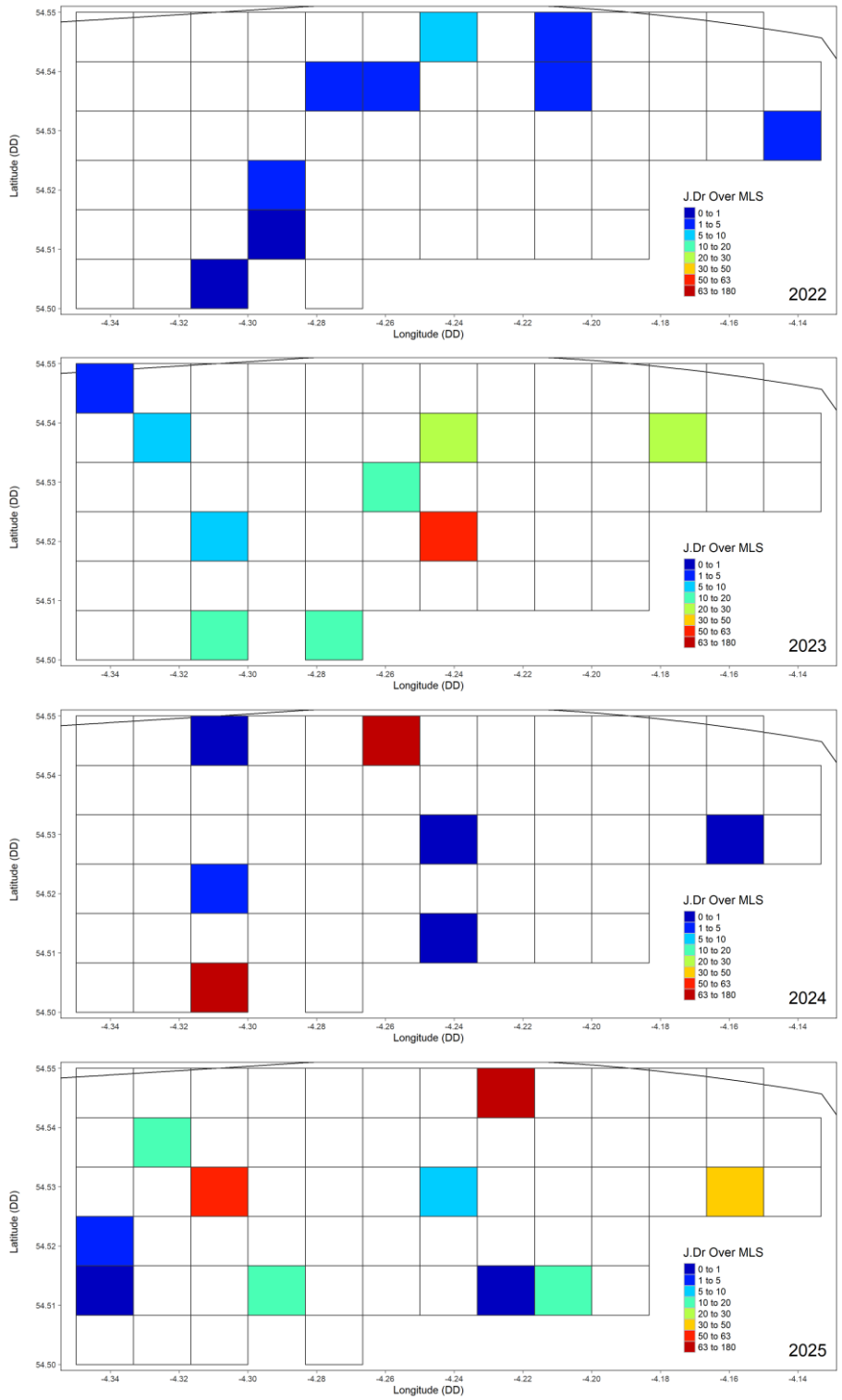

*Figure 35: Maps illustrating the survey densities for queen scallops **over** MLS from juvenile dredges for 2022 to 2025 at Point of Ayre (North coast).*

5. Summary:

Summary of findings:

The 2025 Queen Scallop stock assessment for the Isle of Man territorial sea indicates a broadly positive outlook for the fishery, with both scientific and industry surveys showing increases in recruit (under 55 mm) and post-recruit (over 55 mm) indices compared to 2024. These findings suggest a potential improvement in stock status, particularly in key fishing grounds.

The **Targets ground** on the west coast continues to be the most productive area, contributing approximately 71% of total landings in 2024. Both surveys identified this ground as a hotspot for queen scallops, with high densities of both recruits and post-recruits, particularly around stations ST7 and ST9 (scientific survey) and survey cells 1638, 1710, 1782, 1851, 1926 1335 and 1190 in the industry survey. The industry survey also highlighted a relatively widespread recruitment event in this area, reinforcing its importance for future management considerations.

At **Chickens**, on the south coast, survey results were more mixed. While overall densities were low, one high-density cell was identified in the industry survey (survey cell 5942; the highest recorded density in the 2025 survey), and signs of recruitment were evident particularly in the 3nm area around survey cell 5203 and survey stations CHI and ST34. This suggests potential for recovery, though spatially targeted management may be required.

The **East of Douglas** ground showed relatively strong performance in 2025, with good levels of both recruits and post-recruits. Station 23 recorded the third highest density in the scientific survey, and the industry survey indicated relatively good recruitment in the southern part of the ground.

At **Point of Ayre**, although landings from 2024 were low, both surveys recorded good densities of recruits and post-recruits across the area. Given the small size of the ground, no specific closures were recommended.

The **stock assessment model** (CSA) estimated a total biomass of 7,853 tonnes in 2025, with 5,247 tonnes of post-recruits and 2,107 tonnes of recruits. This represents the highest recruit biomass since 2010 and suggests potential for further increases in fishable biomass in 2026 if managed appropriately.

Recommendations:

A harvesting reference point (TAC) of 1350 t has been calculated for the 2025 fishing season using the ICES Category 3 data limited approach which calculates a 20% increase in the TAC based on actual landings from the season prior. Using the harvest rule proposed for sustainable fishing mortality as part of the MSC certification in 2011 (20% of the estimated post-recruit biomass) would give a biomass linked TAC for the 2025 fishing season of 1570 t, which is higher than the ICES Category 3 approach. It should be noted that setting a TAC at the territorial sea level does not consider the spatial variability in fishing opportunities.

Recommendations for the management approach for the 2025 queen scallop fishing season are as follows:

- TAC range of a between 1350 – 1570 t (note the upper value is slightly higher than that calculated for the original SMB meeting – originally 1486 t). The upper value should include any catches from the dredge fishery as it is based on estimated biomass for the entire territorial sea.

- Separate management for high-density hotspots should be considered (i.e. closure of high-density areas of pre-recruits at Targets and Chickens for the 2025 fishing season).
- Regular monitoring and triggered reviews of all fishing areas throughout the fishing season in terms of LPUE thresholds and total catch.
- Development of a long-term management plan for queen scallops within the Isle of Man and wider Irish Sea (including development of future Harvest Control Rules and TAC calculations and the future of the dredge fishery).

Future work:

To enhance the robustness and comparability of the Queen Scallop industry survey results, future work will focus on standardising the survey index using advanced statistical modelling techniques. Specifically, a spatiotemporal Generalised Linear Mixed Effect Model (GLMM) will be fitted using the sdmTMB package in R. This approach allows for the integration of spatial and temporal autocorrelation structures, improving the precision of abundance estimates and accounting for variability in survey effort and environmental conditions.

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