Marine Management Organisation

Cuttlefish Market Sampling Report

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Cuttlefish Market Sampling Report

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Abbreviations

CEFAS	Centre for Environment Fisheries and Aquaculture Science
CTC	Common Cuttlefish
CTL	Cuttlefish and bobtail squids
EJE	Elegant Cuttlefish
FAR	Fishing Activity Report
FMP	Fisheries Management Plan
GIB	Group 1 Breeders
IAR	Pink Cuttlefish
ICES	International Council for the Exploration of the Sea
ID	Identification
MEO	Marine Enforcement Officer
ML	Mantle Length
MMO	Marine Management Organisation
MSY	Maximum Sustainable Yield
NQS	Non-Quota Species
PLN	Port Letters Number
SFM	Sea Fisheries Management
UK	United Kingdom

Executive summary

The Cuttlefish Market Sampling Project was initiated under the Channel Demersal Non-Quota Species Fisheries Management Plan (FMP) to address critical data gaps in the management of cuttlefish (Sepia spp.) fisheries in UK waters. Cuttlefish represent a high-value, data-poor stock with annual UK landings averaging 4,000 tonnes but showing significant fluctuations, raising sustainability concerns.

The key actions of the market sampling project were:

- Develop species identification (ID) cards for common, elegant, and pink cuttlefish to improve species-level recording.
- Conduct market sampling at Newlyn and Brixham fish markets to test ID card efficacy and gather biological and fisheries data.

Between November 2024 and April 2025, 21 samples were collected: 14 from Brixham, 6 from Newlyn, and 1 from Hastings. Sampling recorded species identity, mantle length, weight, and associated vessel and gear data. Despite logistical constraints, all three species were successfully identified, confirming the effectiveness of the ID cards, however adjustments are recommended to increase elegant cuttlefish mantle length size range.

Key findings from the sampling indicate that common cuttlefish dominated landings, while elegant and pink cuttlefish were mainly present in smaller grades. Offshore trawl samples consisted largely of Grade 3 individuals (45%) and Grade 1 (39%), suggesting the removal of both juveniles and mature adults, which could affect recruitment and sustainability. Biometric analysis revealed strong weight-to-mantle length correlations across species, with elegant and pink cuttlefish showing smaller body sizes yet likely being mature, pointing to distinct life-history strategies. Seasonal trends showed larger individuals occurring in late autumn and early winter, with smaller grades dominating later months; elegant and pink cuttlefish were most frequent between December and February. Spatially, common cuttlefish were widely distributed, whereas elegant and pink cuttlefish exhibited localized occurrences. The Hastings sample, collected during the potting season, was dominated by Grade 1 common cuttlefish, reflecting gear selectivity during spawning.

The project demonstrates the value of species-level monitoring for sustainable management. Improved identification and continued biometric and spatial data collection will support evidence-based measures, including potential maximum sustainable yield (MSY) assessments. Further research is recommended on elegant and pink cuttlefish biology and market potential.

Introduction

Common cuttlefish (*Sepia officinalis*) represent a significant component of the marine biodiversity and fisheries economy in United Kingdom (UK) waters, particularly within the English Channel. As the most abundant and commercially valuable cephalopod species in the region, common cuttlefish is widely distributed along the south and west coasts of England where it inhabits depths up to 200 metres. Other species such as elegant cuttlefish (*Sepia elegans*) and pink cuttlefish (*Sepia orbignyana*) are occasionally recorded.

The cuttlefish fishery in the English Channel has grown in prominence due to its high market value and strong demand from continental Europe, particularly France and Spain (MMO, 2025). UK landings have averaged around 4,000 tonnes annually, with notable fluctuations ranging from

7,068 tonnes in 2017 to just 2,616 tonnes in 2021, raising concerns about stock sustainability (Stott and Reeve, 2022).

During the development of the Channel Demersal Non-Quota Species (NQS) Fisheries Management Plan (FMP) stakeholder consultations highlighted the cuttlefish fishery as a data poor species. Data is currently recorded at genus level rather than at specific species level, without specific management measures and has no formal International Council for the Exploration of the Sea (ICES) stock assessment.

Marine Management Organisation (MMO) was tasked to develop a Cuttlefish Fishery Action Plan that was published in April 2025 under the Channel Demersal NQS FMP (MMO, 2025).

Within the Cuttlefish Action Plan under Evidence Goals the following two actions were proposed:

- **Action 1** – Design Cuttlefish ID cards for the three cuttlefish species to improve data recording at species level.
- **Action 2** - Undertake market sampling of cuttlefish at Newlyn and Brixham Fish Markets.

The rationale behind action 1 was that currently fishers record cuttlefish landings under a general code for cuttlefish and bobtail squids (CTL). An evidence gap was identified in the FMP to collate landings data to species level for cuttlefish. The aim was to develop the cuttlefish species ID cards and educate fishers on the three cuttlefish species to improve the quality and accuracy of landings data being recorded. In turn this would provide evidence to develop and improve data poor stocks and establish distribution and spawning grounds. These improvements would potentially support the establishment of maximum sustainable yield (MSY) or other sustainability assessments in the future.

This project was based on the rationale of action 2, to test the efficacy of the species ID cards which were developed using Cefas ID card resources and consulting research papers regarding mantle length of elegant and pink cuttlefish. The project also aimed to survey the species present, their size, weight and catch composition throughout the season. Evidence on fishing practices, gears used, spatial and temporal data of landings across the sector was also gathered.

The results of this research are anticipated to contribute significantly to the improved understanding and management of cuttlefish fisheries in the English Channel. The introduction of species-specific identification cards is expected to enhance species-level recognition among fishers and market samplers, enabling accurate differentiation between common, elegant and pink cuttlefish. This improvement should lead to a measurable reduction in the use of generic CTL (cuttlefish and bobtail squids) landing codes and foster greater awareness of species-specific biological traits and spawning periods. Enhanced data quality is also anticipated, with market sampling providing quantitative insights into species composition, size and weight distributions, and seasonal and spatial trends in landings. These data will help establish baseline biometric profiles and identify spawning migrations and regional hotspots.

Methods

Biological Data Collection

MMO collected biological sampling data of cuttlefish (*Sepia spp.*) landed into Newlyn and Brixham fish markets between November 2024 and April 2025 during the trawling fishing season. An additional sample was taken at Hastings fish market in April 2025 during the potting season. The target was to sample Newlyn and Brixham once a month during the sampling period, with the aim to collect at least one sample from at least two vessels. Sample expectations were kept low due to resource constraints such as time, people resource and time available at the fish market so not to interrupt their daily operation.

A stratified sampling approach was implemented, in which each sample included either up to 200 specimens from landings without size grading, or up to 40 specimens per size category when landings were divided into two grades from a single vessel. This sampling approach was adopted from a previous sampling investigation on cuttlefish in the Western English Channel by Stott and Reeve (2020) at the Centre for Environment Fisheries and Aquaculture Science (CEFAS). Graded landings are separated by the fishers by eye into Grade 1 and Grade 2 animals. Grade 1 are typically greater than 15 cm mantle length (ML) and Grade 2 are less than or equal to 15 cm ML. Species ID cards were used to identify each species.

For each vessel sample the following parameters were recorded:

- Location of sample
- Date of sample
- Vessel name
- Vessel PLN
- Landing date
- Type of sample - graded or ungraded
- Total weight of sample box
- Species I.D
- Mantle length (ML)
- Weight of individual

The following additional background data was collected from each sample vessel logbook post sample from the Sea Fisheries Management (SFM) database for over 10 m vessels in length and from the Catch App for under 10 m vessels:

- ICES rectangle
- Economic Zone
- Gear type
- Mesh size
- Vessel length
- Total weight of cuttlefish landed
- Total weight of all catch
- Days at sea
- Notable weather conditions

Although the aim was to sample once a month at Newlyn and Brixham, achieving this was not always possible. Samples were taken at Brixham from November – February and taken in November, December and April at Newlyn. Some of the Brixham samples were taken at Plymouth as these landings were destined to be taken to Brixham for sale any way and it was easier for MMO staff to sample there as staff were based at Plymouth. On several occasions when MMO went to sample at Newlyn and Plymouth, no cuttlefish had been landed and unable to sample that day, as a result the sample size was smaller than anticipated. Twenty-one samples were taken in total, fourteen at Brixham, six at Newlyn and one at Hastings. Brixham and Hastings fish market was visited in early hours of the morning so not to interfere with the market. Newlyn was sampled on an ad hoc basis when cuttlefish was expected to be landed and an MMO Marine Enforcement Officer (MEO) was available to sample. Sample data sheets were submitted each time a sample was undertaken and inputted into a master database where additional information was collated with the sample data.

Data Processing

Sample data was used to test the efficacy of the cuttlefish ID cards to ensure they were fit for purpose for industry and if any modifications were required to improve the ID cards.

The weight and ML of cuttlefish was recorded to establish what grade of cuttlefish were being caught and what percentage of their cuttlefish catch was each species. Although grading on the vessels by fishers at sea was done by eye using the greater than 15 cm for Grade 1 and less than or equal to 15 cm for Grade 2. The grading analysis for this report utilised the Annexe II of Council Regulation (EC) No 2406/96 of 26 November 1996 laying down common marketing standards for certain fishery products Council Regulation(EC) No 2406/96 of 26 November 1996 laying down common marketing standards for certain fishery products. This legislation details the grade size definitions for common cuttlefish for grades 1 – 3, any individuals below grade three parameters were recorded as Grade 4, although this grade definition is not part of the current regulation. For this report these grade sizes were applied to the pink and elegant cuttlefish, however there is no current grading legislation for these specific species.

The grading definitions are:

- Grade 1 - 0.5 kg and over
- Grade 2 - 0.3 kg – 0.5 kg * The categories of weights include fish from the lower limit up to, but excluding, the upper limit
- Grade 3 – 0.1kg – 0.3 kg * The categories of weights include fish from the lower limit up to, but excluding, the upper limit
- Grade 4 – anything below 0.1kg – this is not included in the legislation, but used to illustrate the very small cuttlefish being landed

Location of fishing was estimated using the ICES rectangle that the sample fishing vessel recorded the most catch during that trip. Vessel gear information was taken from the registered gear captured from the Fishing Activity Report (FAR) on the Sea Fisheries Management (SFM) application for over 10 m vessels or from Catch App for under 10 m vessels.

Due to the small sample size Newlyn and Brixham results were collated for final analysis on species composition of catch. Initial analysis on separate sample port locations resulted in very similar results and trawlers from both ports were fishing in ICES rectangles very similar to one another.

Sampling Results

Sampling Overview

Table 1 provides an overview of sampling effort and biological data collected from Newlyn, Brixham, and Hastings fish markets between November 2024 and April 2025, Hastings was only sampled in April. It summarizes the number of samples, total individuals measured, and associated metadata such as vessel details and gear type. The table also indicates the cuttlefish ML and weight ranges, averages and species identified at each location. The inclusion of ML and weight ranges allows for assessment of size structure and potential seasonal shifts in population demographics.

Table 1. Sampling overview at Brixham, Newlyn and Hastings.

	Brixham	Newlyn	Hastings	Total
Samples	14	6	3	23
No. of individuals sampled All species	496	266	153	915
Unique Vessels	14	6	3	23
Vessel length range (m)	9.34 - 27.3	9.7 - 41.7	9.95	
Gear sampled	Single boat bottom otter trawls Beam trawls Twin bottom otter trawls Bottom trawls (nei)	Single boat bottom otter trawls Beam trawls	pots/traps	
Cuttlefish ML range (cm)	6 - 30	6 - 29	13 - 31	
Cuttlefish ML average (cm)	13.2	15.6	20.1	
Cuttlefish weight range (g)	50 - 2550	50 - 2250	200 - 2450	
Cuttlefish weight average (g)	388.7	625.4	950.3	
Species identifed sampling	Common, Elegant and Pink	Common, Elegant and Pink	Common	

Newlyn and Brixham

Species and Grade Analysis

The identification of species using the species ID cards was successful, all three cuttlefish species were identified during sampling from vessels fishing offshore. The proportion of all cuttlefish sampled at Newlyn and Brixham by commercial grade (Figure 1) indicate that grade 3 individuals dominate the catch (45%), followed by Grade 1 (39%), indicating a prevalence of medium-sized specimens alongside a substantial proportion of large individuals. Grades 2 and 4 represent minor proportions (9% and 7%, respectively). This distribution suggests that the fishery predominantly targets medium-sized individuals, with fewer very small or intermediate specimens, potentially reflecting gear selectivity and seasonal recruitment patterns of cuttlefish species.

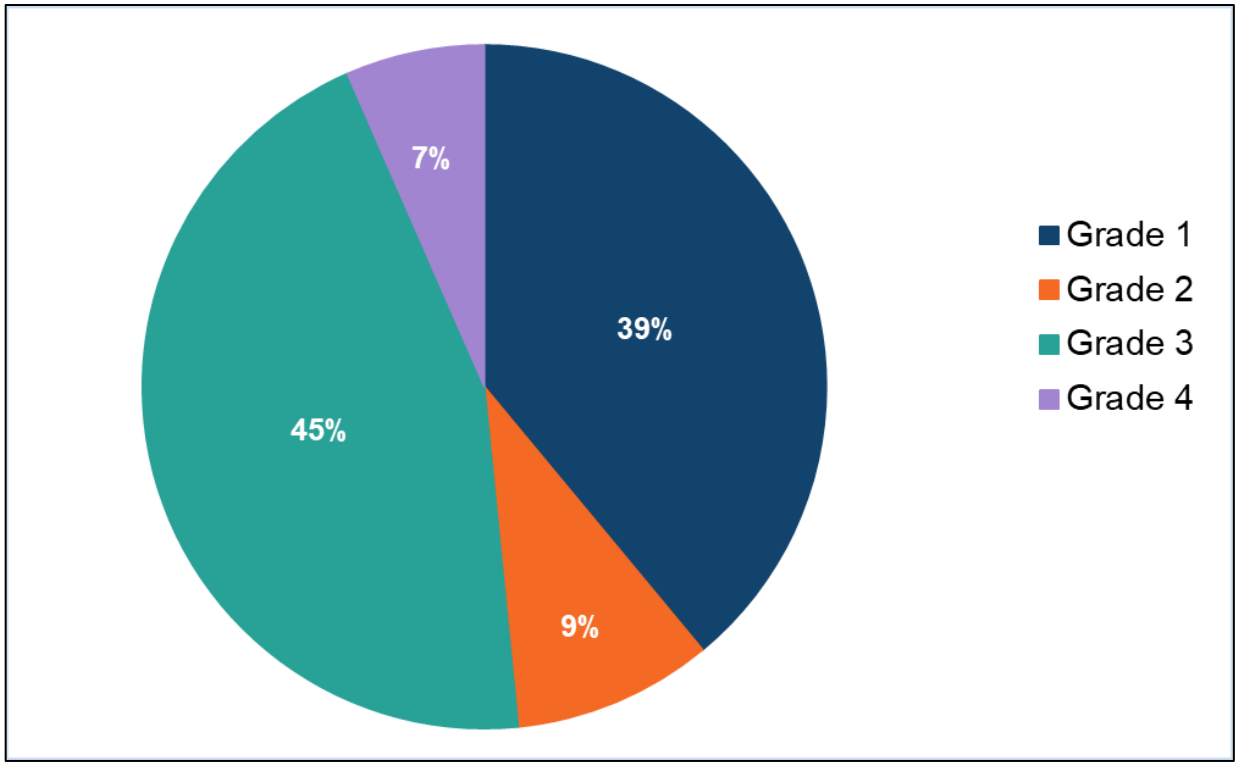

Figure 1. Percentage of all cuttlefish by grade sampled at Newlyn and Brixham

Almost all grade 1 species were identified as common cuttlefish, bar one individual that was identified as a grade 1 elegant cuttlefish and were removed from the species analysis by grade (Figure 2). Of the remaining 61 % of cuttlefish, common cuttlefish remain dominant across grades 2 – 4, particularly in Grade 3 common cuttlefish (47.7%). Grade 3 and 4 common cuttlefish are likely to be either juveniles or group 1 breeders (GIB) (Laptikhovsky *et al*., 2024). GIBs are individuals that reach sexual maturity and spawn within one year (Laptikhovsky *et al*., 2024). Elegant cuttlefish and pink cuttlefish occur mainly in smaller grades, with pink cuttlefish showing a notable presence in Grade 3 (13.7%). Elegant and pink cuttlefish are likely mature individuals despite their smaller size, suggesting species-specific morphological constraints and ecological niches. This pattern highlights potential differences in life history strategies and gear-related selectivity.

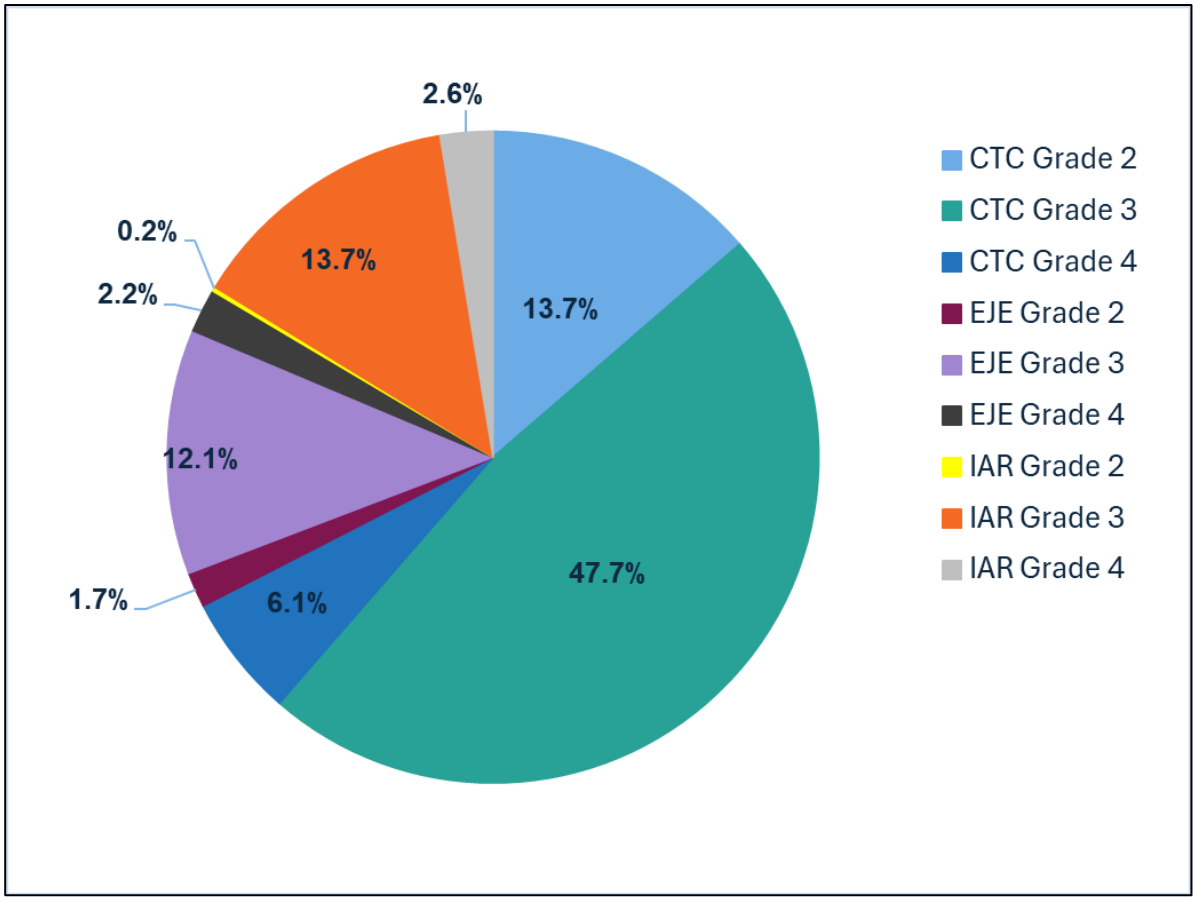

Figure 2. Percentage of cuttlefish by species and grade sampled at Newlyn and Brixham excluding the grade 1 samples (common cuttlefish (CTC), elegant cuttlefish (EJE) and pink cuttlefish (IAR)).

Weight and Mantle Length Analysis

The weight-to-mantle length relationship for all species combined demonstrated a strong positive correlation with distinct clusters corresponding to grading categories, such as different species, age classes and sexes (Figure 3). Larger individuals (Grade 1) exhibited higher variability in weight at similar lengths, reflecting maturity and reproductive condition of common cuttlefish. This relationship may provide insight into growth dynamics and support the use of biometric data for stock assessments.

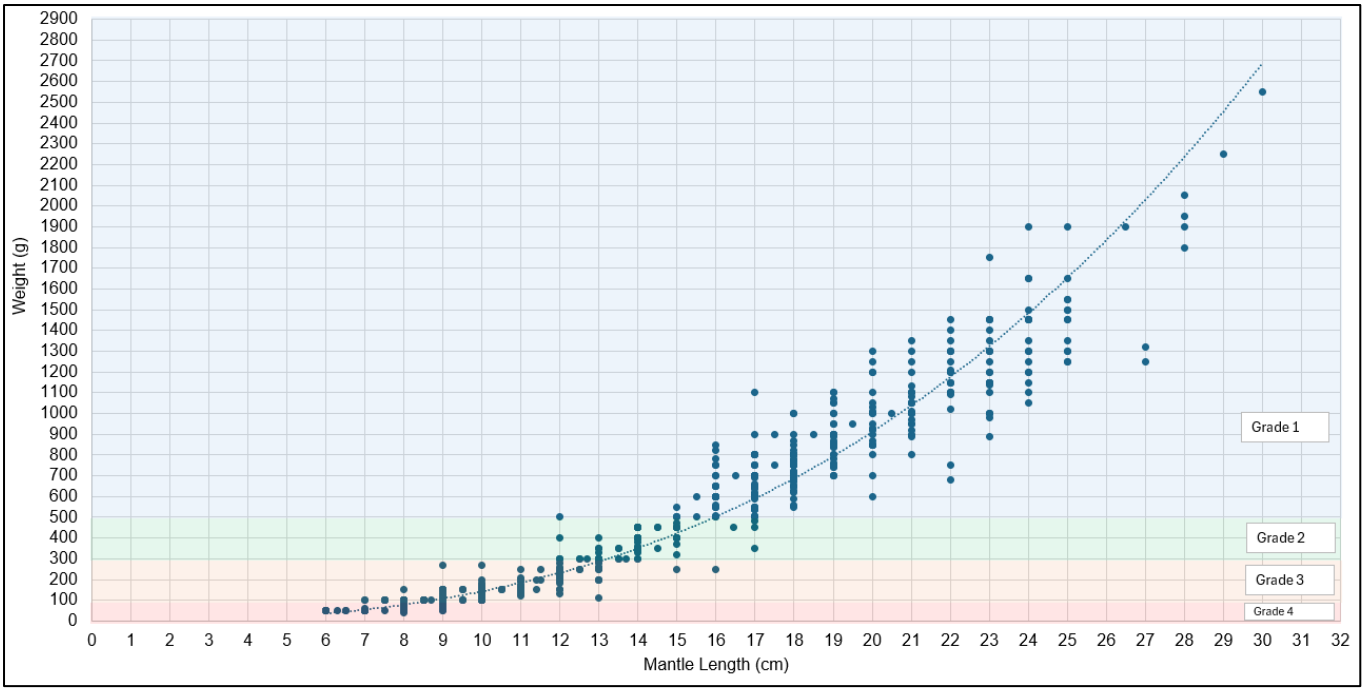

Figure 3. Weight to mantle length relationship of all species of cuttlefish sampled at Newlyn and Brixham (blue area grade 1 species , green area grade 2 species, organge area grade 3 species, red area grade 4 species).

The weight-to-mantle length inidcated a strong positive relationship for common cuttlefish (Figure 4). A broad size range was observed , with individuals distributed across all grades. Grade 1 specimens showed significant weight variability, with ML ranging from 12 – 30 cm. Grade 2 specimens had an ML range of 12–17 cm; Grade 3, 7–16 cm; and Grade 4, 6–9 cm.

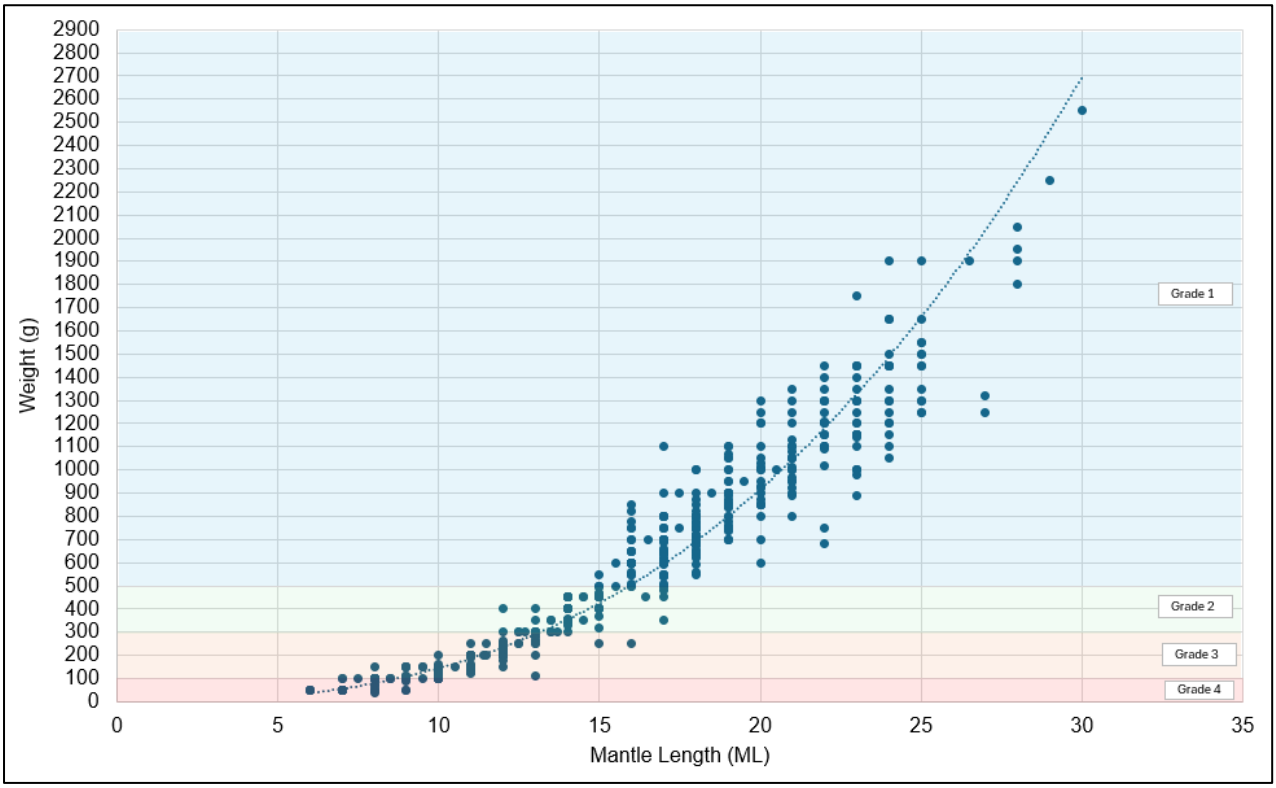

Figure 4. Weight to mantle length relationship of common cuttlefish (CTC) sampled at Newlyn and Brixham (blue area grade 1 species , green area grade 2 species, organge area grade 3 species, red area grade 4 species).

The weight-to-mantle length relationship for elegant cuttlefish indicated a narrower size range compared to common cuttlefish, with most individuals falling within Grades 2 and 3 (Figure 5). Many of these individuals had a ML above the stated ML on the species ID card. These individuals are at the upper end and above their species-specific mantle length range, suggesting they are mature adults. This finding has implications for understanding species-specific growth and reproductive strategies.

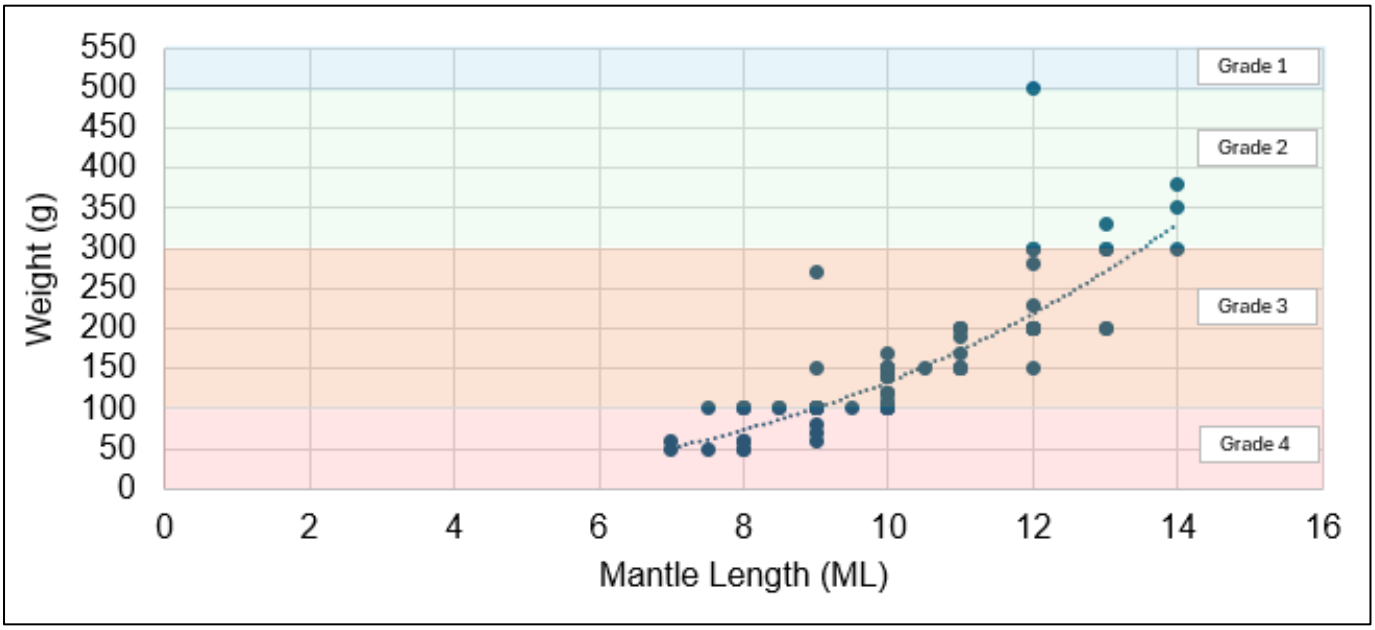

Figure 5. Weight to mantle length relationship of elegant cuttlefish (EJE) sampled at Newlyn and Brixham (blue area grade 1 species , green area grade 2 species, organge area grade 3 species, red area grade 4 species).

The weight-to-mantle length relationship for pink cuttlefish indicated that the species was predominantly small - bodied, with clustering within Grades 3 and 4 (Figure 6). The MLs were consistent with the ID card ML data. However, despite their small size, these individuals were likely mature, as mantle length is at the upper range for this species.

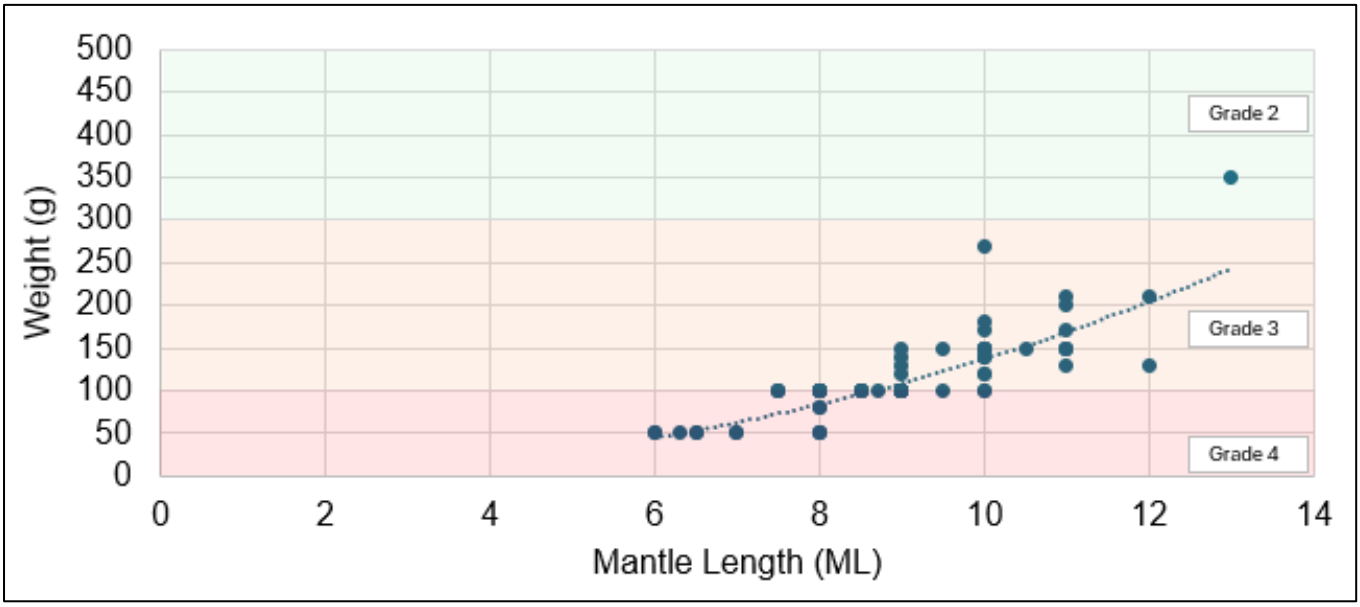

Figure 6. Weight to mantle length relationship of pink cuttlefish (IAR) sampled at Newlyn and Brixham (blue area grade 1 species, green area grade 2 species, organge area grade 3 species, red area grade 4 species).

Seasonal and Spatial Data

Seasonal grading patterns for all species at Newlyn and Brixham summarized in figure 7 indicate larger individuals (Grade 1) appearing more frequently in late autumn and early winter, while smaller grades dominate later months. Sampling only identified common cuttlefish in November, with elegant and pink cuttlefish appearing mainly December to February, and elegant cuttlefish absent from sampling in April. These temporal shifts may reflect spawning migrations or recruitment dynamics of each species of cuttlefish.

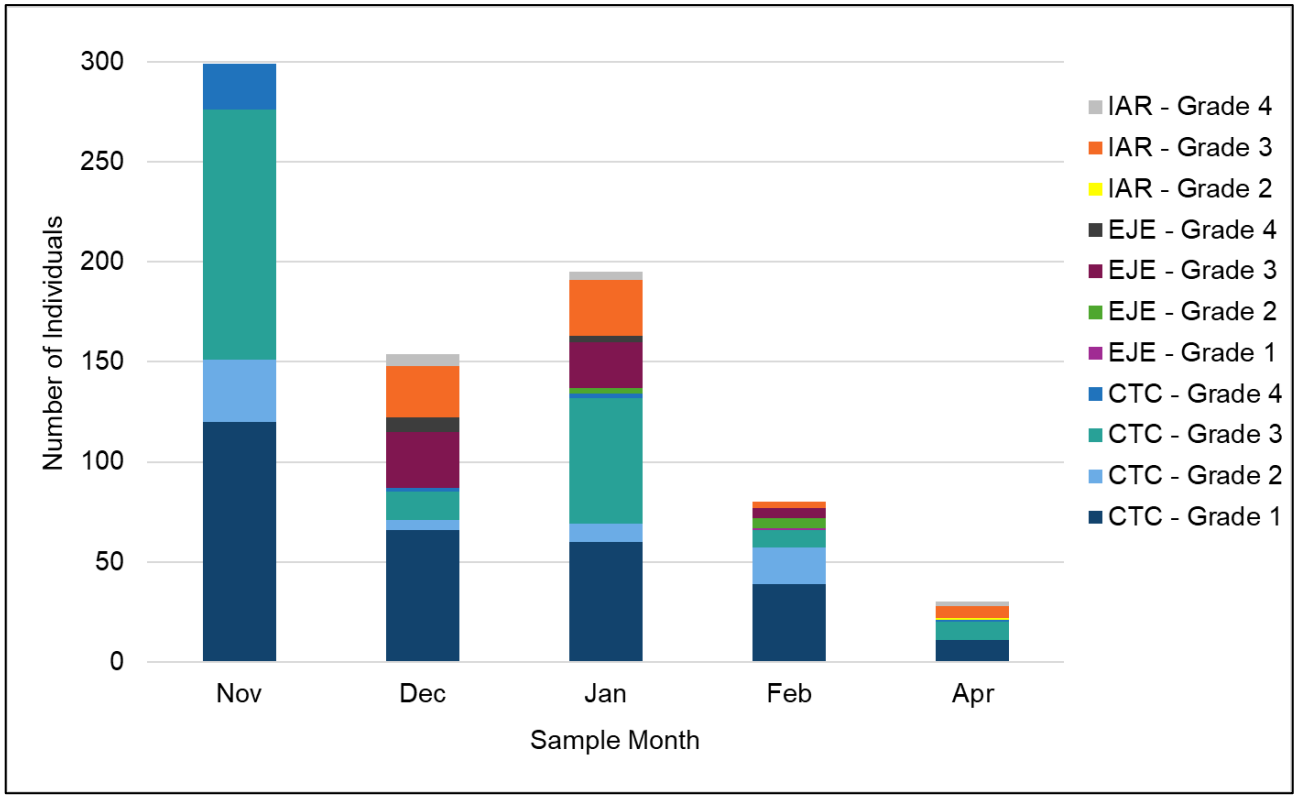

Figure 7. Seasonality of species and grading of cuttlefish sampled at Newlyn and Brixham (common cuttlefish (CTC), elegant cuttlefish (EJE) and pink cuttlefish (IAR)).

Figure 8 integrates spatial and seasonal data, mapping species and grade distributions by ICES rectangle and month. Common cuttlefish are widespread, while elegant and pink cuttlefish show localized occurrences. Seasonal trends align with gear deployment and migration, highlighting potential management zones.

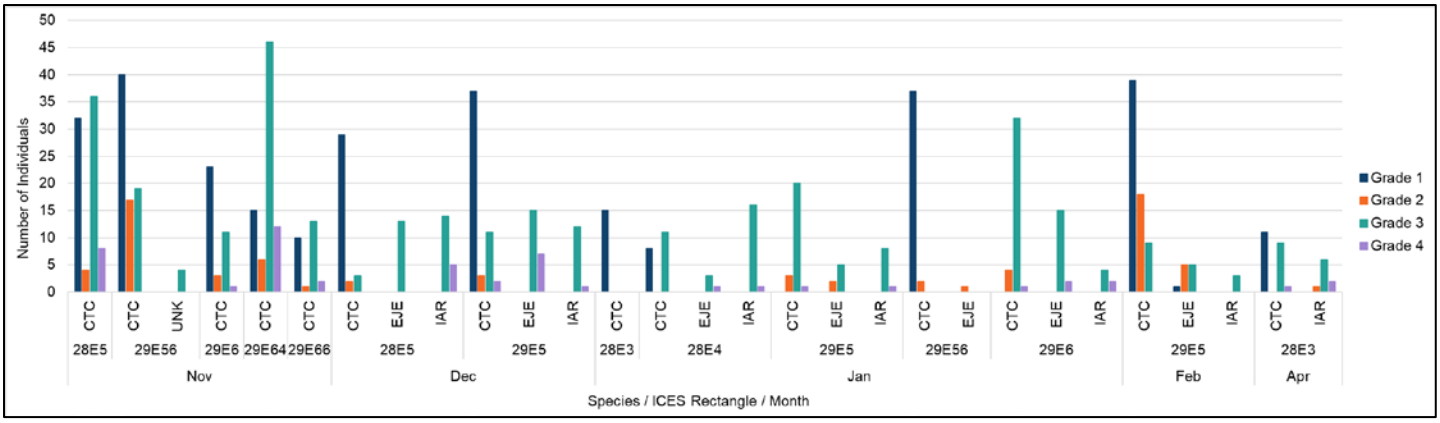

Figure 8. Spatial and seasonal data of the number of individuals identified per species and grade by capture month and ICES rectangle sampled at Newlyn and Brixham (common cuttlefish (CTC), elegant cuttlefish (EJE) and pink cuttlefish (IAR). Spatial information is the ICES rectangle where the largest proportion of cuttlefish were caught during that fishing trip.

Hastings

The grade composition of common cuttlefish sampled at Hastings in April (Figure 9) indicated that the catch is dominated by Grade 1 individuals. This is consistent with potting gear selectivity for larger specimens during the spring spawning period and that fishers tend to return grade 2 cuttlefish to sea.

Species and Grade Analysis

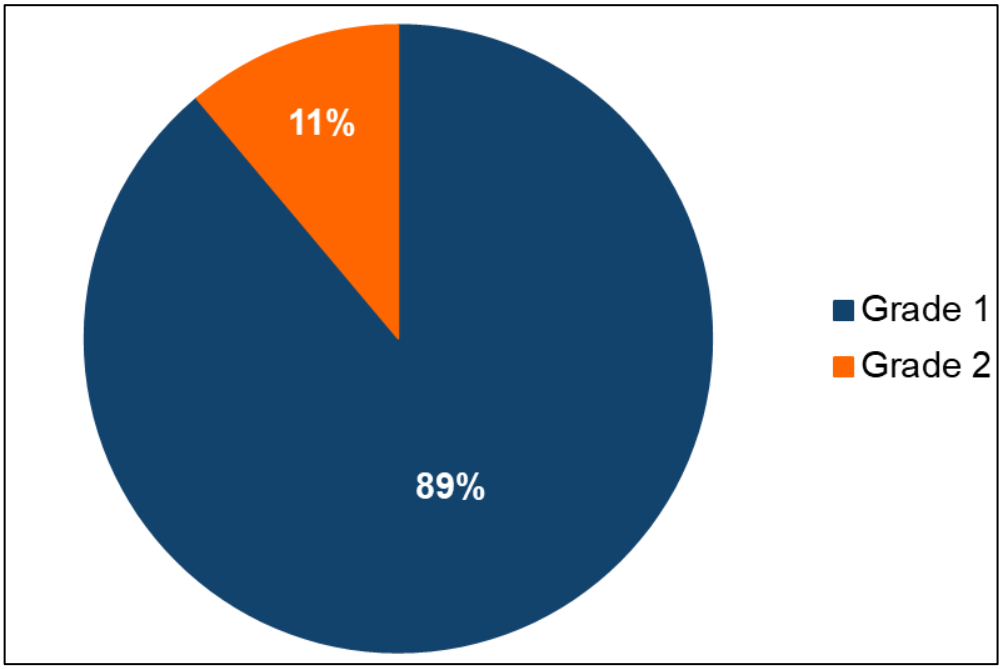

Figure 9. Percentage of all common cuttlefish by grade sampled at Hastings in April.

Weight and Mantle Length Analysis

The weight-to-mantle length relationship for common cuttlefish at Hastings indicate a positive correlation, with distinct clusters corresponding to grading categories age classes and sexes (Figure 10). The data confirm the predominance of large individuals, with most falling within Grade

1 and a few in Grade 2, reflecting gear-specific size targeting and sexually mature common cuttlefish.

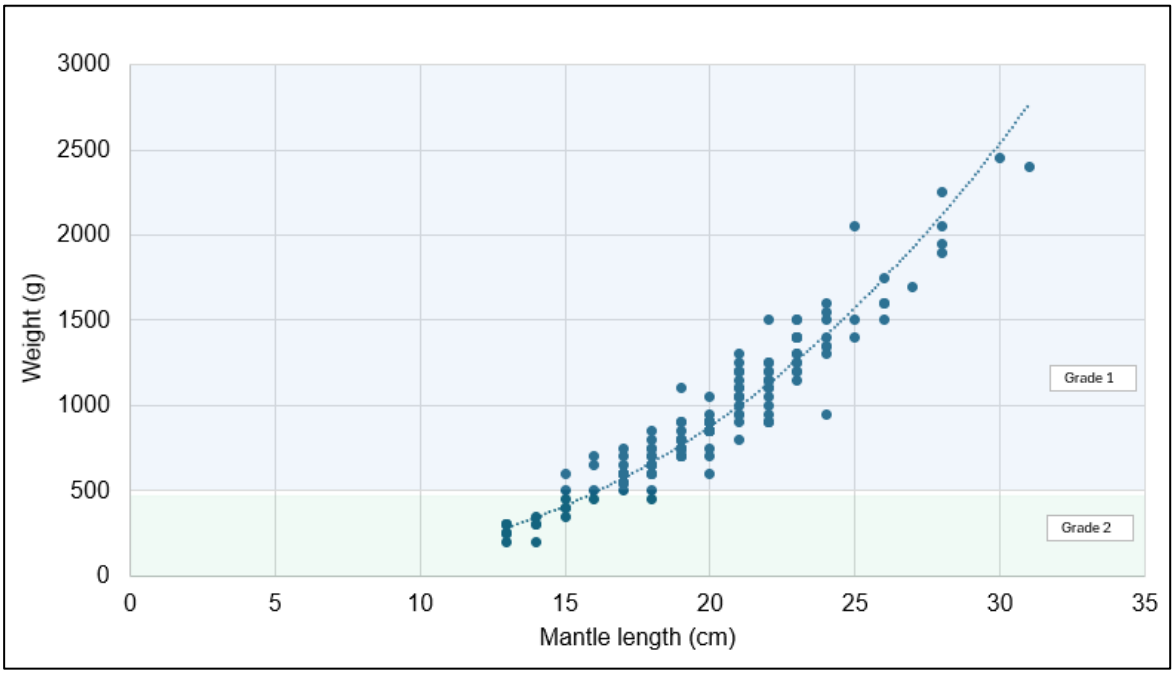

Figure 10. Weight to mantle length relationship of common cuttlefish (CTC) sampled at Hastings (blue area grade 1 species , green area grade 2 species).

Seasonal and Spatial Data

Spatial and seasonal data for Hastings samples indicate that all individuals were captured in a single ICES rectangle during April (Figure 11). This likely to indicate localized fishing activity and potential spawning aggregation sites targeted by potting vessels, however this sample was very small and was only sampled once in April.

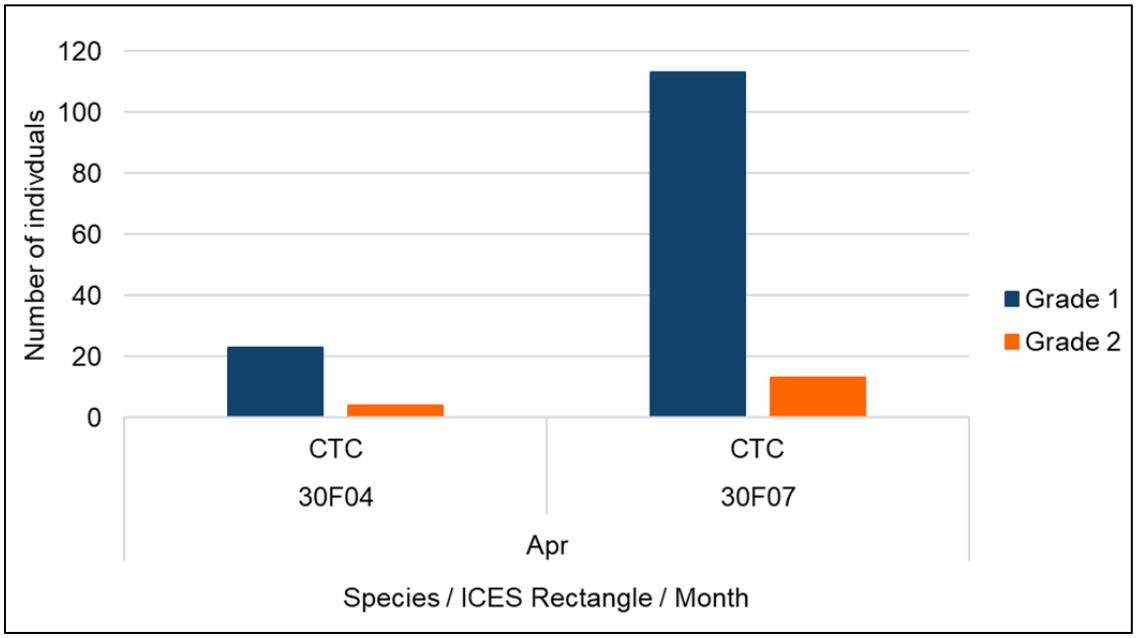

Figure 11. Spatial and seasonal data of the number of individuals identified per species and grade by capture month and ICES rectangle sampled at Hastings (common cuttlefish (CTC)).

Discussion

The findings from market sampling of cuttlefish (Sepia spp.) in the English Channel provide valuable insights into species composition, size structure, and seasonal dynamics, despite the small sample size. The predominance of common cuttlefish in landings aligns with its role as the primary commercial cephalopod in UK waters (MMO, 2025).

The identification of all three cuttlefish species within the sample indicates a high efficacy of the species ID cards that were developed as part of the action plan for cuttlefish. However, identification of larger mantle lengths than the norm in elegant cuttlefish may warrant a modification to the elegant cuttlefish ID card. Studies of elegant cuttlefish in warmer waters record smaller mantle lengths (Salman, 2015) on which the ID cards were based. These data may provide crucial information on elegant and pink cuttlefish in UK waters, as little is currently known. Improved species ID may identify stock units in our waters, their migration patterns or whether these species spawn in our waters.

The sampling of vessels fishing offshore was dominated by Grade 3 (45%) and Grade 1 (39%) individuals. This indicates that the fishery targets a broad size range, including mature and juvenile individuals. Common cuttlefish are known to migrate offshore during late autumn and winter to mature before migrating inshore to spawn. A large proportion of the sample were grade 3 common cuttlefish which are likely to be either juveniles or group 1 breeders (GIB) (Laptikhovsky *et al.*, 2024). This is likely due to gear selectivity and may potentially affect future recruitment and the fishery sustainability, due to removal of either juvenile of sexual mature one year old cuttlefish. The large removals of grade 1 common cuttlefish from the offshore may also potentially effect recruitment and sustainability as sexually mature adults are unable to migrate inshore to spawn.

Species-specific analysis revealed that elegant cuttlefish and pink cuttlefish were primarily represented in smaller grades. Despite their smaller size, biometric data indicate these individuals were near the upper mantle length range for their species, suggesting sexual maturity. This may indicate that elegant and pink cuttlefish exhibit distinct life-history strategies compared to common cuttlefish. Specific grading maybe required for these two species, and further exploration into the value of these species, if any, in the UK market and export market to European member states.

Weight-to-mantle length relationships demonstrated positive growth across all species, consistent with cephalopod growth models where weight increases disproportionately during maturation (Bloor *et al.*, 2013). Grade 1 common cuttlefish exhibited significant weight variability at similar lengths, likely attributable to gonadal development during spawning, which increases body mass without proportional changes in mantle length (Bloor *et al*., 2013). The effects of temperature on growth and age of spawning of cuttlefish in the Channel have been demonstrated by Laptikhovsky *et al*., (2024) which is likely to explain the large range in mantle length in grade 3 individuals within a narrow weight range. These biometric patterns underscore the importance of considering reproductive status in stock assessments.

Seasonal and spatial analyses of the offshore revealed that larger individuals were more prevalent in late autumn and early winter, while smaller grades dominated later months. Elegant and pink cuttlefish appeared primarily between December and February, with elegant cuttlefish absent in April, suggesting species-specific migrations. Spatial mapping indicated that common cuttlefish were widely distributed, whereas elegant and pink cuttlefish exhibited localized occurrences, potentially linked to habitat preferences or gear deployment strategies (Laptikhovsky *et al*., 2023). However, there was limitations on the data due to small sample size and spatial bias of fishing effort in the offshore.

The Hastings sample, collected during the potting season in April, was dominated by Grade 1

common cuttlefish, reflecting spawning patterns and potting gear selectivity for larger individuals. Anecdotal evidence was reported by stakeholders during sampling at Hastings, that smaller individuals below grade 1 were usually returned to the sea. Although only common cuttlefish was recorded during sampling, a pair of elegant cuttlefish with a ML 13 cm were identified, that had been trapped near Boscombe pier, in UK inshore waters. Images were sent to the MMO for identification by a fisher, the identification was confirmed by MMO and CEFAS.

Overall, these findings highlight the need for species-level monitoring, further market sampling and adaptive management strategies to ensure sustainability. Improved species identification, combined with continued biometric and spatial data collection, will support evidence-based management under the Channel Demersal Non-Quota Species Fisheries Management Plan.

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