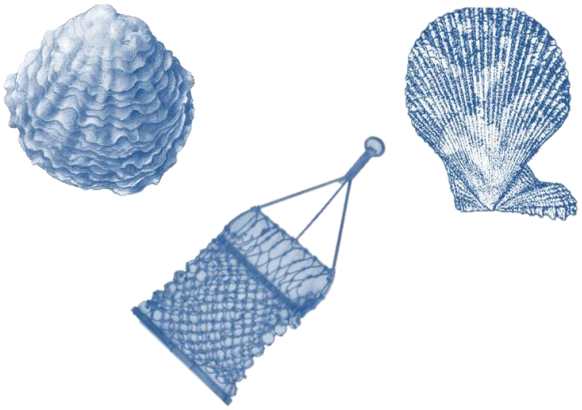

Fal Oyster Survey Summary report 2024

A temporal comparison from 2020 to 2024

Cornwall Inshore Fisheries and Conservation Authority
(Cornwall IFCA)

Authors: Annie Jenkin, Steph Sturgeon, Colin Trundle, Carly Daniels, and Kimara Street

Cornwall Inshore Fisheries and Conservation Authority

Fal Oyster Survey 2024 Summary Report

Introduction and methodology

Introduction

- Cornwall Inshore Fisheries and Conservation Authority (IFCA) has been responsible for the management of the Fal Oyster Fishery since July 2014.
- Cornwall IFCA initially authorised the fishery under the Closed Areas (European Marine Sites) Byelaw 2 then later, as Grantee of the Fal Fishery Regulating Order 2016. The Fishery Area is shown in (Figure 3).
- Cornwall IFCA has continued to monitor the stock of oysters by carrying out yearly surveys of the fishery since 2014.

Aims

- To investigate the temporal changes in the relative abundance and distribution of native oysters (*Ostrea edulis)* based on catch rates from 2020 to 2024 within the Fal Oyster Fishery.
- To investigate the temporal changes in the relative abundance and distribution of scallops (both queen scallop, *Aequipecten opercularis* and variegated scallop, *Mimachlamys varia)* based on catch rates from 2020 to 2024 within the Fal Oyster Fishery.
- To investigate the temporal changes of the relative abundance and distribution of slipper limpets (*Crepidula fornicate)* from 2020 to 2024 within the Fal Oyster Fishery.
- To record the distribution of substrate types across the fishery in 2024.
- To record the species of bycatch present across the survey area in 2024.

Method

The survey was carried out onboard Research Vessel (R/V) Tiger Lily VI (Figure 1). For all sites, a tow haul method was adopted. At each survey site the survey vessel was anchored and 60 m of anchor line was paid out. The dredge used was a 72 cm blade, Essex style oyster dredge, rigged with 34 mm diameter steel belly rings and a 45 mm (twin 3 mm nylon twine) mesh back. The dredge was deployed using the vessels A frame and the vessel's slave hauler winch was used to take up 50 m of marked anchor line, resulting in a 50 m dredge tow at a steady 0.5 to 1 knots. The towing warp was run via the A frame mounted hydraulic winch.

A target was created in HYPACK MAX 2022 to indicate the start of line (SOL); this was repeated at the end of line (EOL). A photo was taken of the full dredge contents with a clapperboard once onboard on the table (Figure 2). The native oysters were measured and weighed individually where possible, the scallops were measured and the slipper limpets were counted. Non-natives were removed from the fishery and bycatch species were recorded on a list as present for the survey period.

Figure 1: R/V Tiger Lily VI – Cornwall IFCA's research survey vessel

Figure 2: Survey setup on R/V Tiger Lily VI

Data normalisation – inferred data

The data from 2021 were normalised to include sites that weren't sampled because of crew capacity due to the Authority's Covid 19 working procedures. The average from 2018 to 2020 was used to represent the number of oysters and scallops for the size categories, the average number and the density of oysters. This resulted in an additional 50 sites being included in the number and density analysis for 2021 than were counted.

Survey positions

A total of 81 sites were surveyed in 2024, 30 in Area A, 35 in Area B and 16 in Area C, as shown in Figure 4. The sites are repeated year on year, where possible, to allow for temporal comparisons. Site A 16 was dropped from the survey after 2020 due to seven fragments of live maerl being recorded.

Cornwall Inshore Fisheries and Conservation Authority

Fal Oyster Survey 2024 Summary Report

Introduction and methodology

The Fal Oyster Fishery Management Areas

Created: A Jenkin 22/02/2023

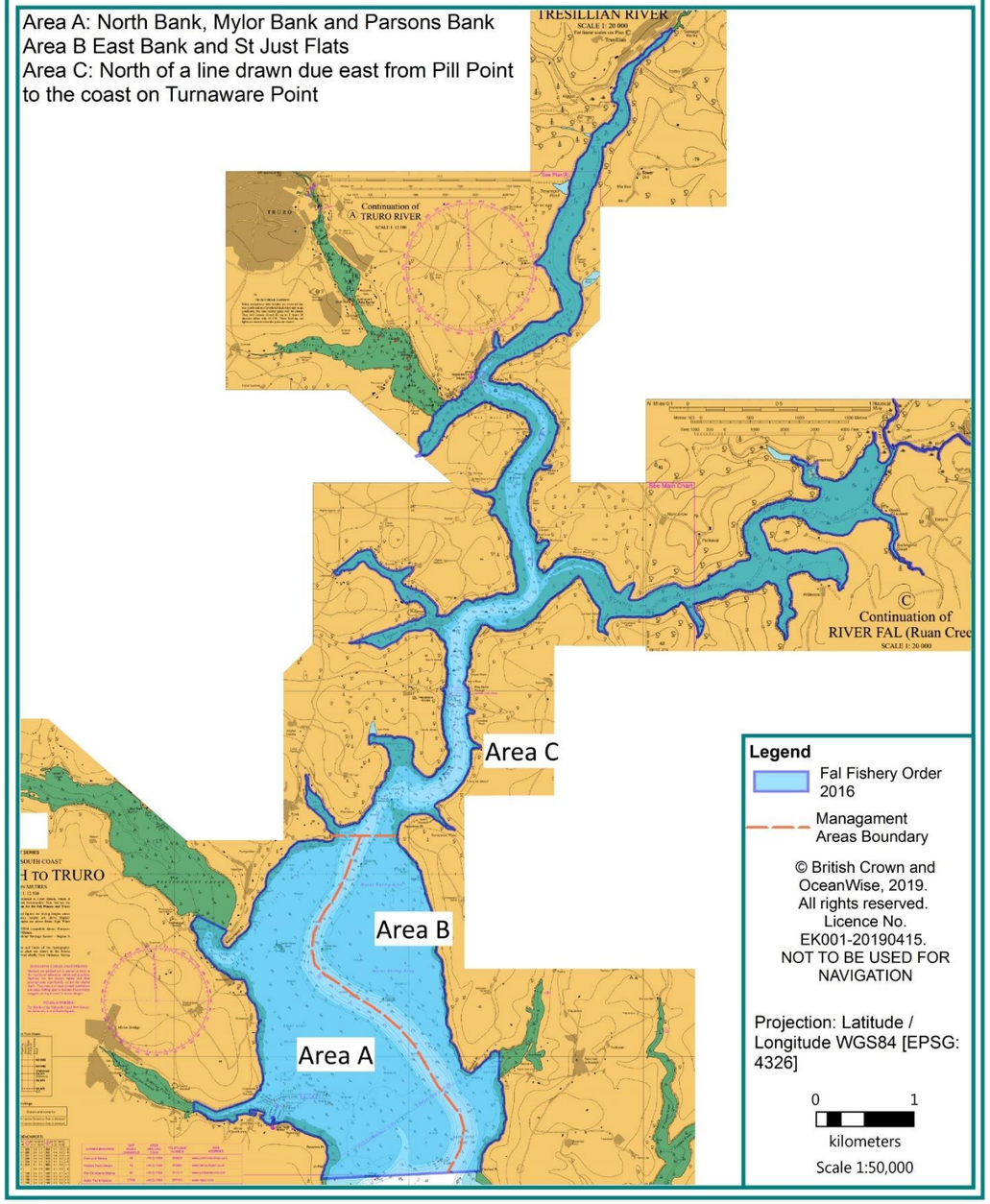

Figure 3: The management areas, A, B and C of the Fal Oyster Fishery

Site Positions 2024 Fal Oyster Survey

Created by: A Jenkin Date: 27/02/2024

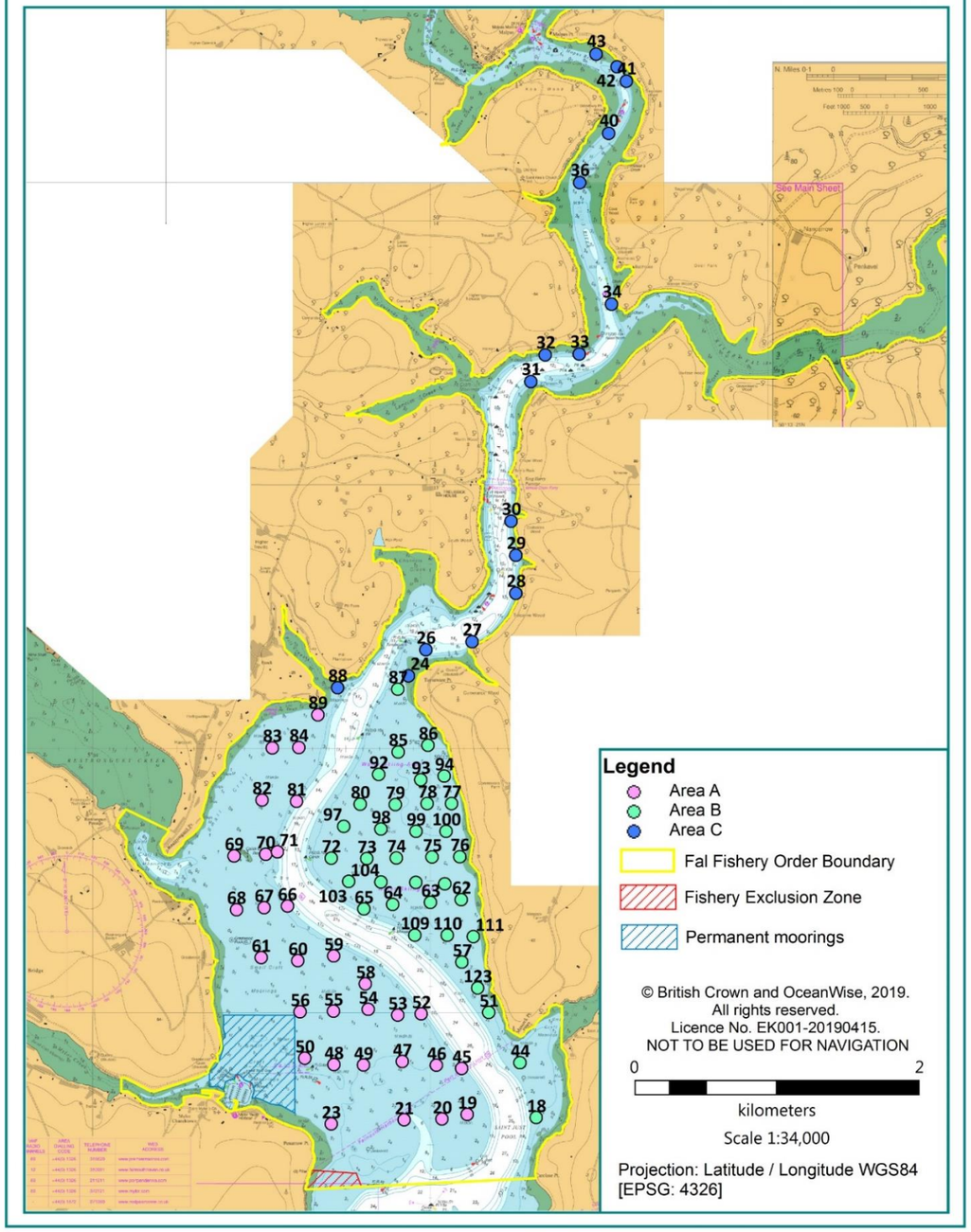

Figure 4: The Fal Oyster Survey area and survey sites in the River Fal, split by management areas A, B and C from the 2024 survey

Cornwall Inshore Fisheries and Conservation Authority

Fal Oyster Survey 2024 Summary Report

Native oysters (*O. edulis*) –Number of oysters

Oysters

A summary of the number of sites surveyed, number of native oysters and the differences from 2020 to 2024 are shown in Table 1. The highest number of oysters (2,861) recorded across the years was in 2024 (the current survey). In 2021, sites surveyed were chosen based on the sites which showed high counts of oysters in previous surveys, which is why the number of oysters appears high for the number of sites sampled. This site selection process in 2021 also resulted in a reduction in the volumes of scallops and slipper limpets recorded during the survey. The 2021 data is as recorded and has not been normalised.

Table 1: Summary of survey data and the number of native oysters (*Ostrea edulis*) recorded during the Fal oyster survey between 2020 and 2024.

Year	Number of sites	Number of native oysters	Difference from previous year	Percentage difference from previous year
2024	81	2,861	+854	43%
2023	81	2,007	+347	21%
2022	81	1,660	+596	56%
2021[1]	32	1,064	-201	-16%
2020	82	1,265	-445	-26%

In 2024, the density of oysters per 10m^2 was lowest in Area C and highest in Area A, this is contrary to previous years, where Area C has always shown the highest density between 2020 and 2023 (Figure 5). An increasing trend in oyster density has been seen in Areas A and B from 2022 (Figure 5). The 2021 data is normalised.

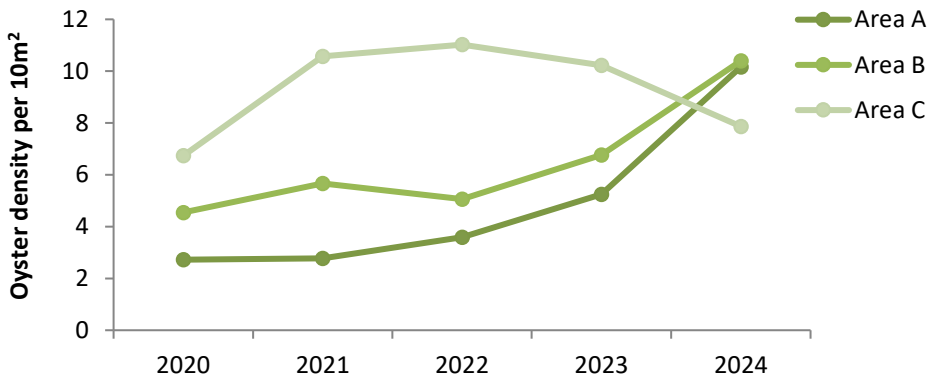

Figure 5: The density of native oysters (*Ostrea edulis*) per 10 m^2 for the three management areas (Area A, B and C) from 2020 to 2024.

The density of oysters for all size classes has varied across the years, in all three areas (Figure 6). The density of oysters for all size classes increased in 2024 in Areas A and B (most noticeably in the smaller size cases) and decreased in Area C, except for the oysters ≤35 mm which increased slightly (Figure 6). The 2021 data is normalised.

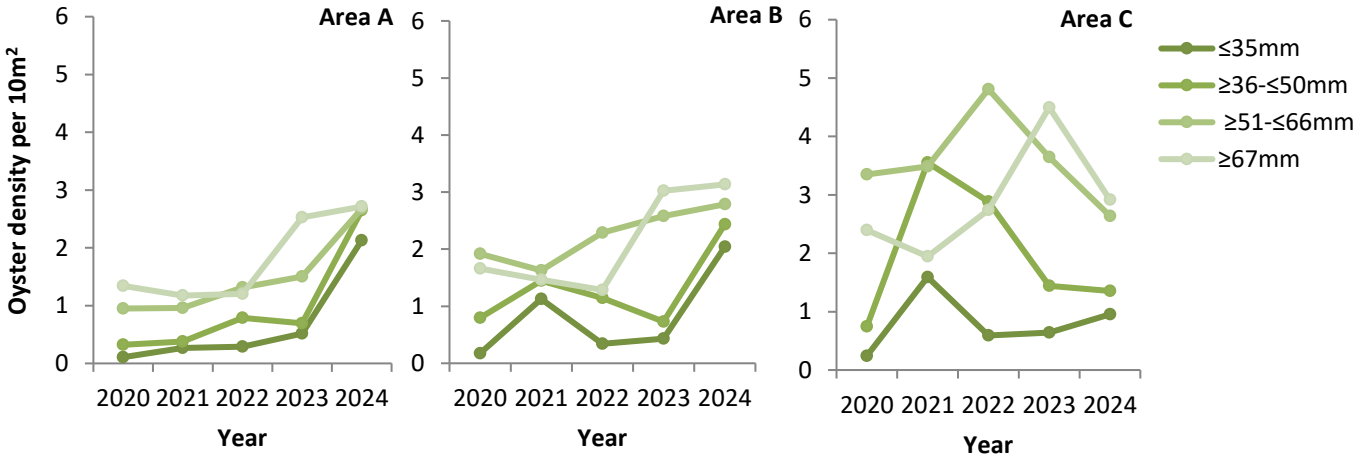

Figure 6: The density of native oysters (*Ostrea edulis*) per 10 m^2 for the three management areas (Area A, B and C) per size class from 2020 to 2024.

[1] A lower number of sites were sampled in 2021 due to the Authority's Covid 19 working procedures. In 2021, sites were chosen based on previous high counts of oysters

Cornwall Inshore Fisheries and Conservation Authority

Fal Oyster Survey 2024 Summary Report

Native oysters (*O. edulis*) – Density

Temporal density plots are shown for total number of oysters per 10 m^2 (Figure 7) and the number of native oysters ≥67 mm per 10 m^2 (Figure 8). When looking at the distribution of the total number of oysters, there is a clear increase in the density of oysters around Turnaware Point and the central parts of East and North Banks in 2024 (Figure 7). The distribution of oysters ≥67 mm was low across most of the fishery until 2023 when an increase was recorded with scattered patches of higher densities at Turnaware Point, a patch north-east of the moorings at Mylor on North bank and a central part of the East bank (Figure 8). In 2024, the density of oysters ≥67 mm remained high but decreased slightly at Turnaware Point and the central part of the East bank. Density plots of Area C, the upper reaches above Turnaware Point, were not mapped by density due to the lack of samples and their scattered distribution which could lead to misleading interpolation. The 2021 data is normalised.

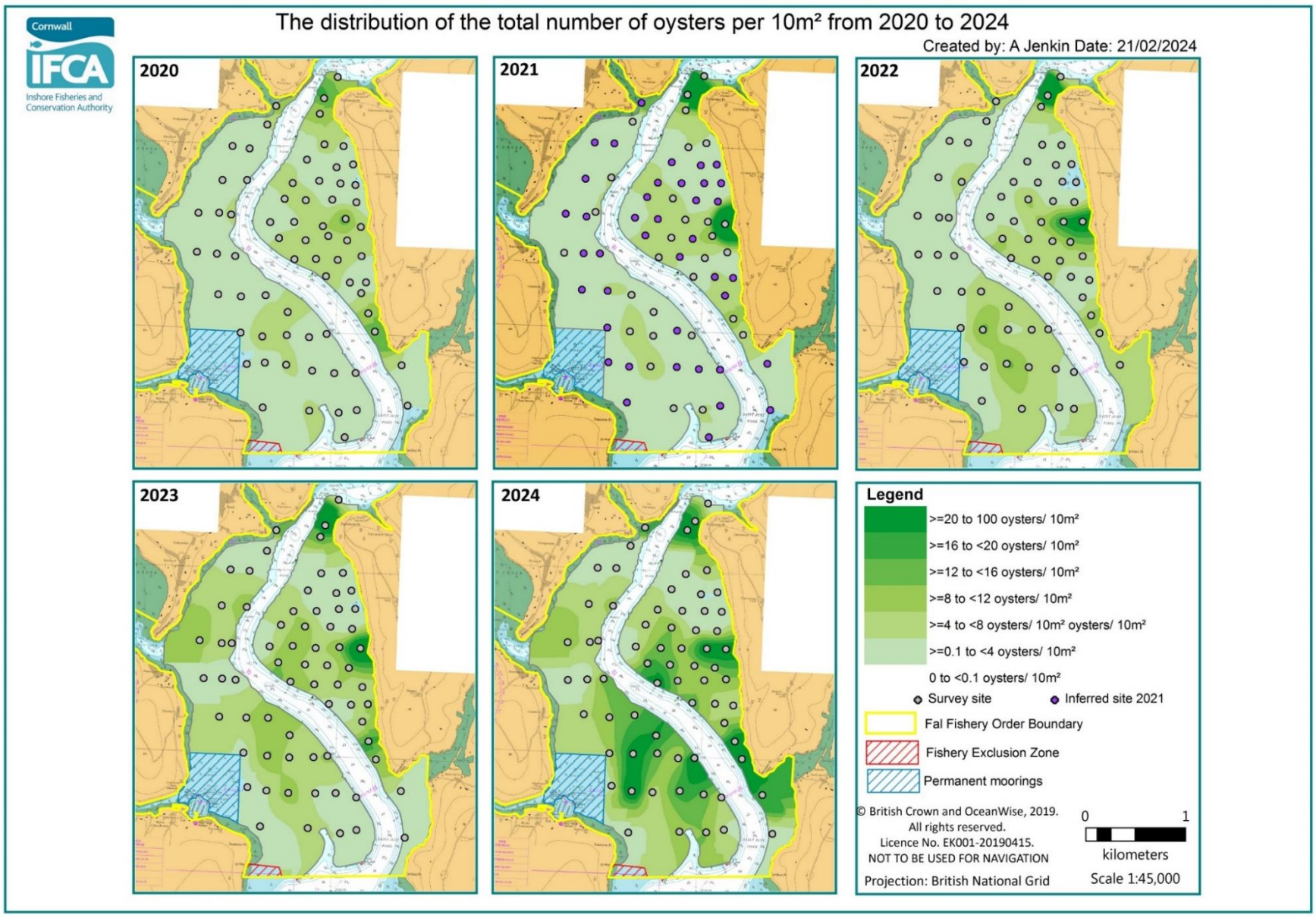

Figure 7: Density map displaying the total number of native oyster (*Ostrea edulis*) per 10 m^2 within Areas A and B from 2020 to 2024.

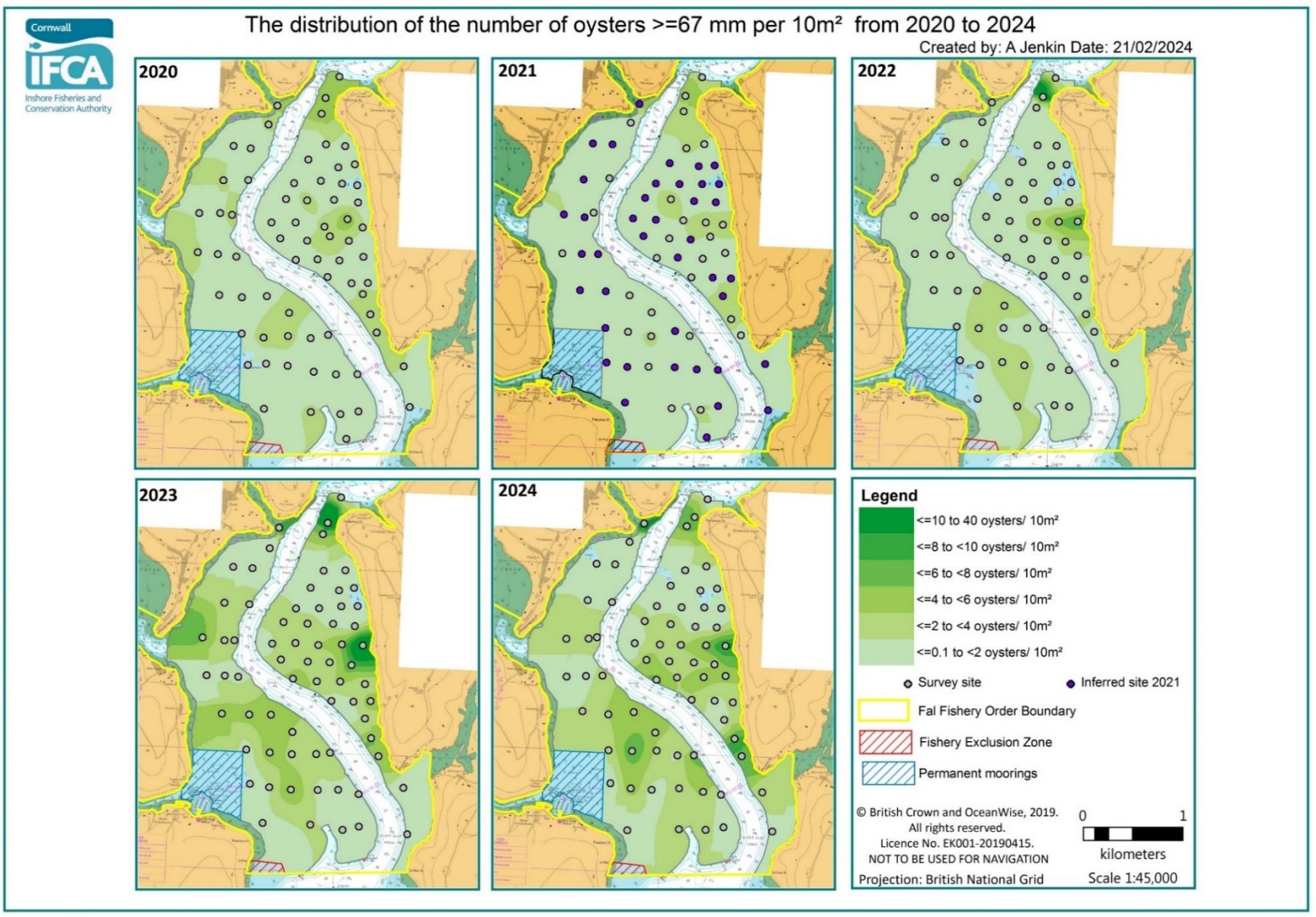

Figure 8: Density map displaying native oyster (*Ostrea edulis*) ≥67 mm per 10 m^2 within Areas A and B from 2020 to 2024.

Cornwall Inshore Fisheries and Conservation Authority

Fal Oyster Survey 2024 Summary Report

Native oysters (*O. edulis*) –Size class distribution

The length distribution plot for all oysters sampled from 2020 to 2024 is shown in Figure 9. The total mean length (cm) and spread of oyster sizes increased from 2021 to 2023, then decreased in 2024. The 2021 data is as recorded and has not been normalised.

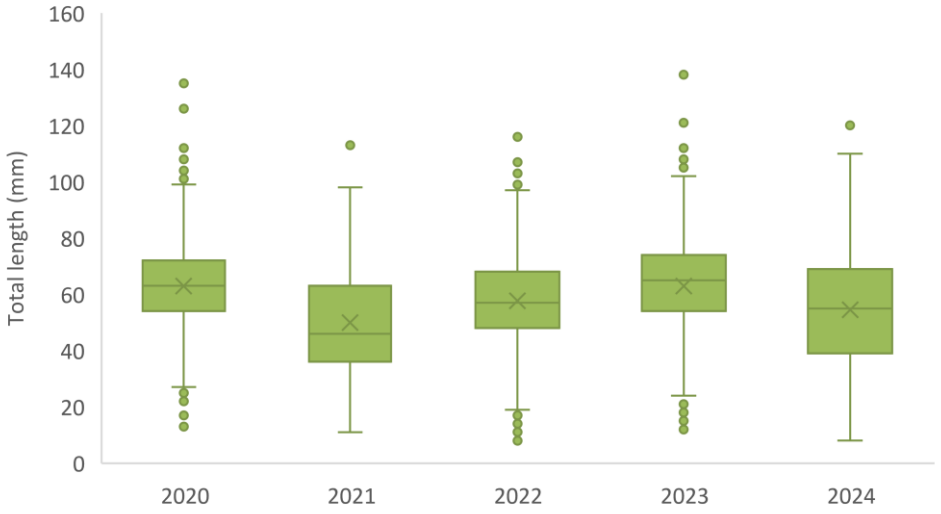

Figure 9: Length distribution plot for all native oysters (*Ostrea edulis*) from 2020 to 2024. Data is grouped by year. X represents the mean, the line represents the median, boxes represent the interquartile range, whiskers represent 1.5* interquartile range, and the filled circles represent outliers.

The percentage of oysters per size class from 2020 to 2024 are shown in Figure 10. A more even percentage distribution of oysters was recorded for all four size classes in 2024 which is more akin to the distribution in 2021. The 2021 data is as recorded and has not been normalised.

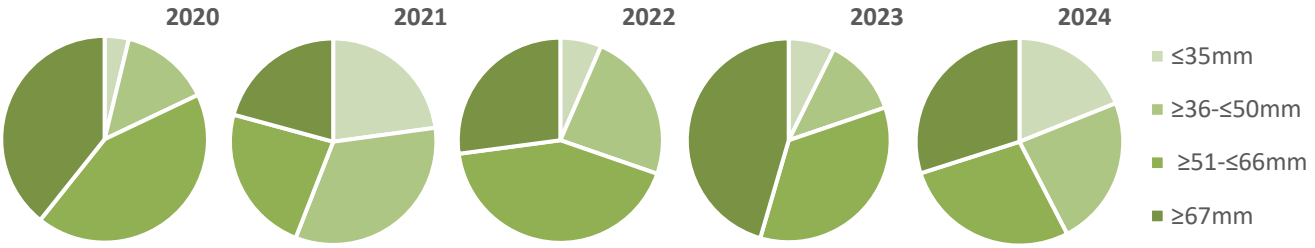

Figure 10: The percentage of native oysters (*Ostrea edulis*) per size class (≥67 mm, ≥51-≤66 mm, ≥36-≤50 mm and ≤35 mm) from 2020 to 2024.

The minimum size for native oysters from the fishery is 67 mm. The percentage of oysters over and under the minimum size for the management areas, A, B and C is shown in Figure 11. For all three areas, in all years, the percentage under the minimum size was greater than over the MLS although in 2023 the percentages under and over minimum size were more even. The 2021 data is as recorded and has not been normalised.

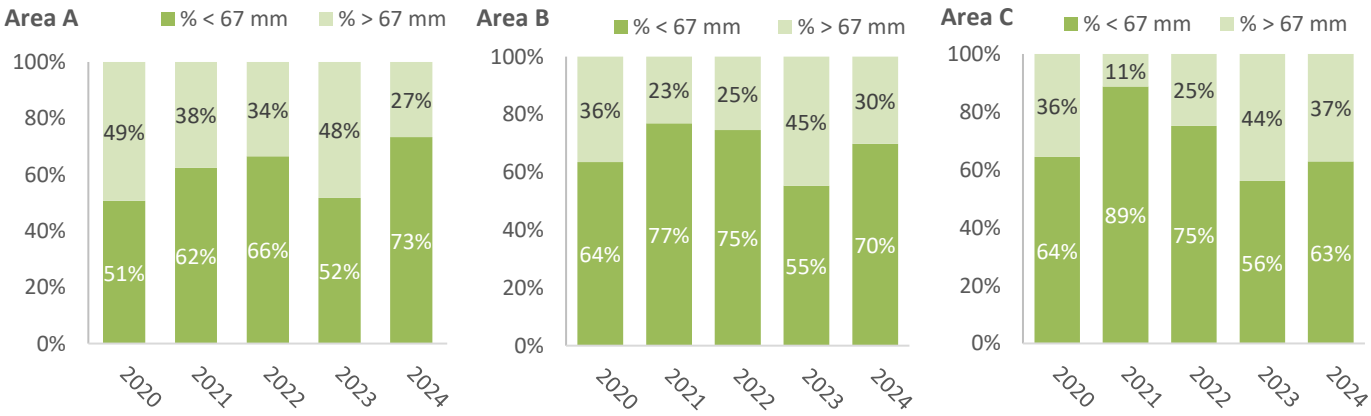

Figure 11: The percentage (%) of native oysters (*Ostrea edulis*) over and under the minimum size (67 mm) for all three management areas (Area A, B and C) of the Fal Oyster Survey area from 2020 to 2024.

Cornwall Inshore Fisheries and Conservation Authority

Fal Oyster Survey 2024 Summary Report

Native oysters (*O. edulis*) –Size class composition

The composition of size classes of oysters at each site in Area C (Figure 12) and A and B (Figure 13) has varied from 2020 to 2024 with most sites composed of a range of size classes. A more even proportion of oyster sizes was recorded in 2024, with an increase in the number of oysters ≤ 35 mm and ≥36 to ≤50 mm compared to previous years. The 2021 data is as recorded and has not been normalised.

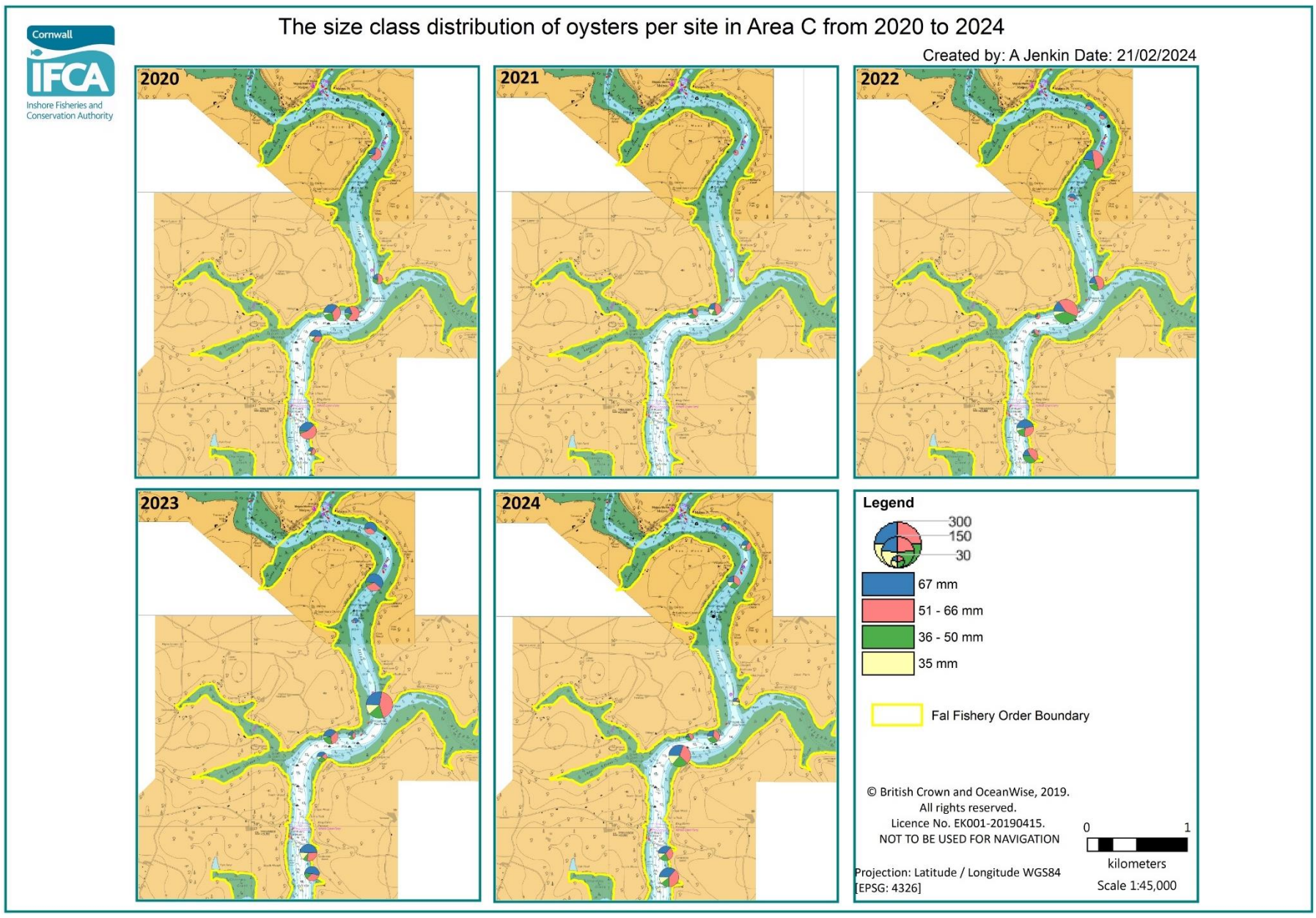

Figure 12: The composition of size classes (≥67 mm, ≥51 to ≤66 mm, ≥36 to ≤50 mm and ≤35 mm) of native oysters (*Ostrea edulis*) per survey station within Area C from 2020 to 2024.

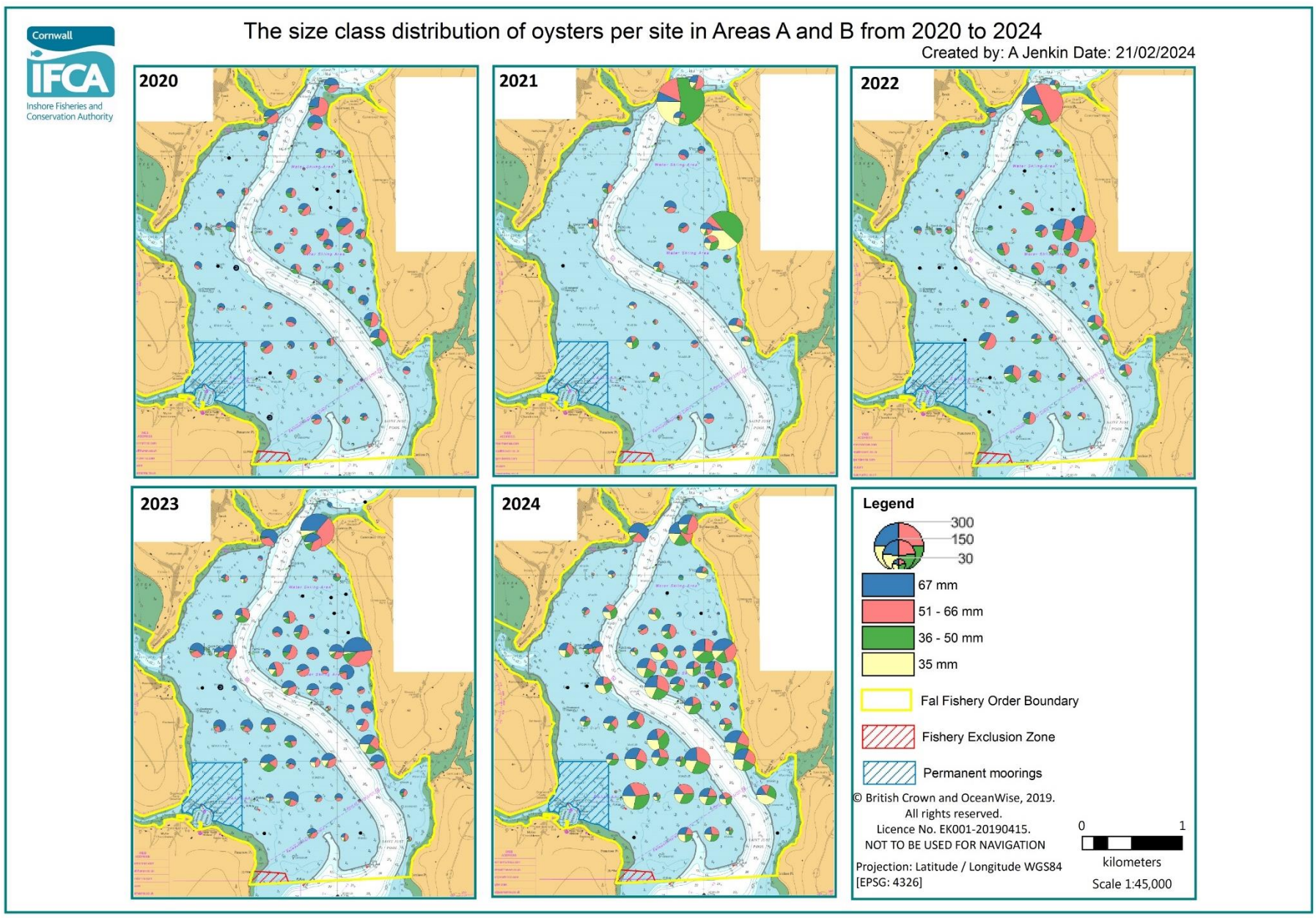

Figure 13: The composition of size classes (≥67 mm, ≥51 to ≤66 mm, ≥36to ≤50 mm and ≤35 mm) of native oysters (*Ostrea edulis*) per survey station within Areas A and B from 2020 to 2024.

Cornwall Inshore Fisheries and Conservation Authority

Fal Oyster Survey 2024 Summary Report

Native oysters (*O. edulis*) – Weight (g)

The average weight of oysters (g) has varied from 2020 with a peak recorded in 2023 and the lowest value recorded in 2021 (Table 2). There was also a peak in the number of oysters ≥67 mm in 2023 and 2021 showed the highest average weight (83.0 g) of oysters ≥67 mm. The 2021 weight data is as recorded and has not been normalised.

Table 2: The number of native oysters (*Ostrea edulis*) weighed and the average weight of native oysters (g) ±standard error and number of oysters ≥67 mm weighed and the average weight of native oysters (g) ≥67 mm ±standard error from 2020 to 2024

Year	Number of native oysters weighed	Average weight (g) of native oysters	Number of oysters ≥67 mm weighed	Average weight (g) of oysters ≥67 mm
2024	1,495	49.8 ±1.0	743	75.2 ±1.3
2023	1,491	55.2 ±0.9	827	72.7 ±1.2
2022	1,135	45.8 ±1.1	395	80.61 ±2.0
2021	810	37.4 ±1.2	217	83.02 ±2.2
2020	1,107	53.6 ±1.0	465	78.24 ±1.4

A weight distribution plot for all oysters weighed from 2020 to 2024 is shown in Figure 14. There is no obvious trend in total weight mean or distribution from 2020 to 2024.

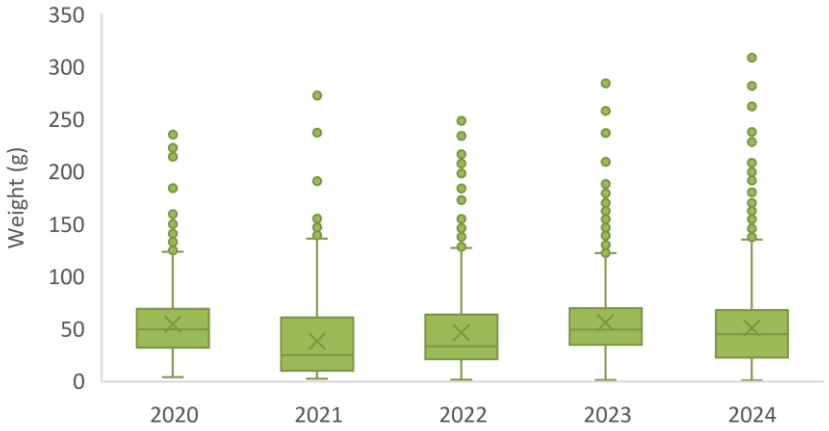

Figure 14: Weight (g) distribution for all native oysters (*Ostrea edulis*) from 2020 to 2024. Data is grouped by year. X represents the mean, the line represents the median, boxes represent the interquartile range, whiskers represent 1.5* interquartile range, and the filled circles represent outliers.

Cornwall Inshore Fisheries and Conservation Authority

Fal Oyster Survey 2024 Summary Report

Native oysters (*O. edulis*) – Weight (g)

The length weight relationship of oysters from 2020 to 2024 is shown in Figure 15 with polynomial regressions for all years. Polynomial curves were chosen as the weight data fluctuates. The polynomial curves for 2021 and 2022 are similar, but the slope of the line is smaller in 2024, 2023 and smaller again in 2020 suggesting a lighter weight of oyster for given lengths during that year.

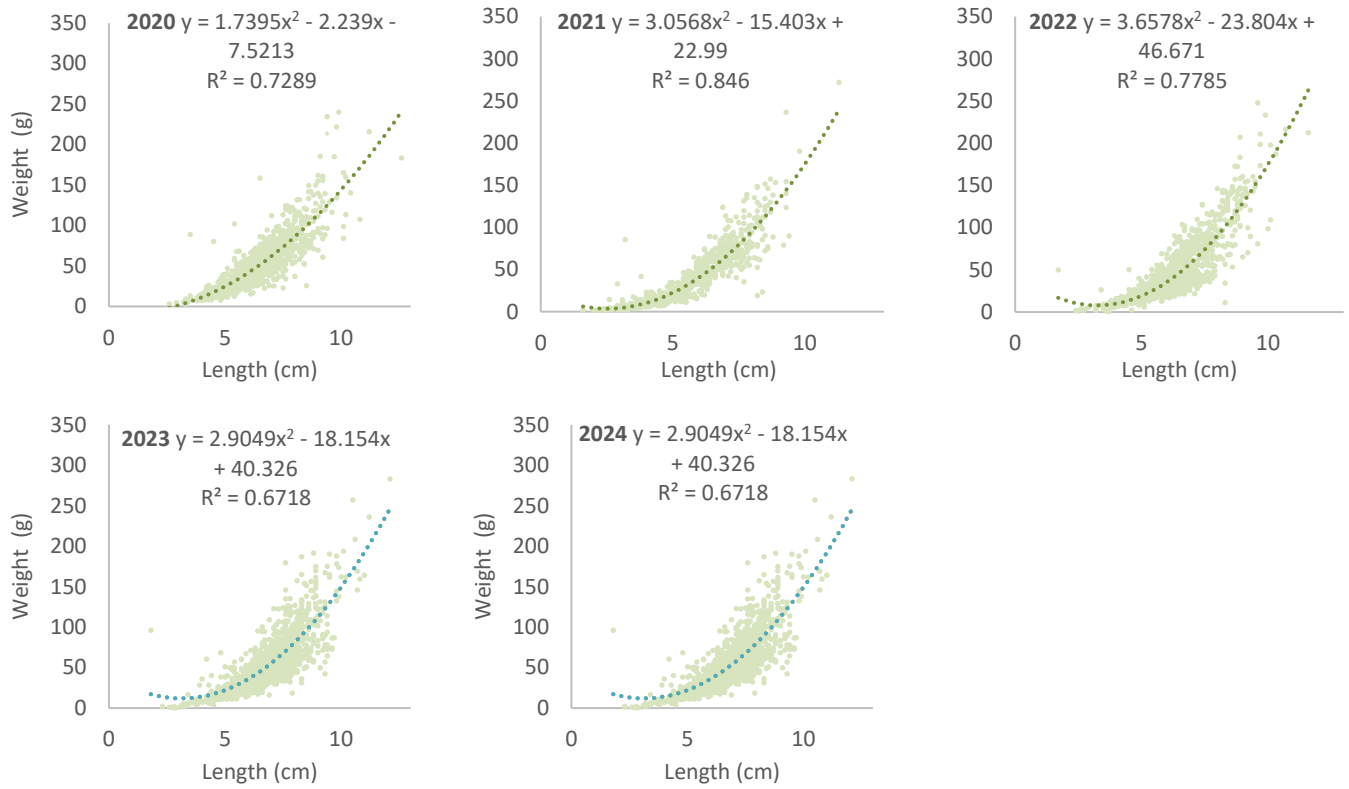

Figure 15: Length (cm) Weight (g) plot for all native oysters (*Ostrea edulis*) both measured and weighed from 2020 to 2024.

Cornwall Inshore Fisheries and Conservation Authority

Fal Oyster Survey 2024 Summary Report

Queen scallop (*A. opercularis and M. varia)* – Number of scallops

Queen scallops

In total, 2,963 scallops were measured and recorded in 2024, a decline since 2021 (Table 3). The number of survey sites changed year on year so the total number of scallops recorded across the years are not directly comparable. The average number of scallops per site has decreased since 2020 if excluding 2021 which is not directly comparable. The 2021 data is as recorded and has not been normalised.

Table 3: Summary of survey data and the number of queen scallop (*Aequipecten opercularis*) and variegated scallop (*Mimachlamys varia*) recorded during the Fal oyster survey between 2020 and 2024

Year	Number of sites sampled	Number of scallops	Average number of scallops per site	Difference from previous year	Percentage difference from previous year
2024	81	2,963	36.6	-202	-6.38%
2023	81	3,165	39.1	-543	-14.64%
2022	81	3,708	45.8	+1129	43.78%
2021[2]	32	2,579	80.6	-2398	-48.18%
2020	82	4,977	60.7	-2038	-29.05%

The density of scallops per 10 m^2 for all three management areas from 2020 to 2024 is shown in Figure 16. The density of scallops was highest in Area A and lowest in Area C. The density in Areas A and B has shown a marked decrease since levels in 2021 and Area C has remained consistently low in Area C, though showed a slight increase in 2024. The 2021 data is normalised.

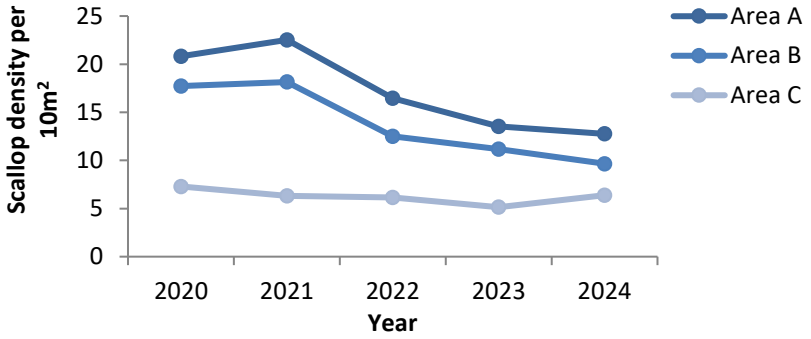

Figure 16: The density of queen scallop (*Aequipecten opercularis*) and variegated scallop (*Mimachlamys varia*) per 10 m^2 for the three management areas (Area A, B and C) from 2020 to 2024.

The density of scallops per 10 m^2 has varied across the years, for all size classes, in all three areas, and remained lowest in Area C (Figure 17). The density of scallops was generally highest in the larger size classes and lowest in the smaller size classes until 2024 when a decrease in larger scallops and an increase in smaller scallops was recorded. A marked increase in small scallops ≤19 mm was recorded in all three areas in 2024. The density of large scallops ≥60 mm has remained steady until a reduction in 2024. A steady reduction in scallop density in all areas in the ≥40-≤59 mm size class has been seen across the years. The 2021 data is normalised.

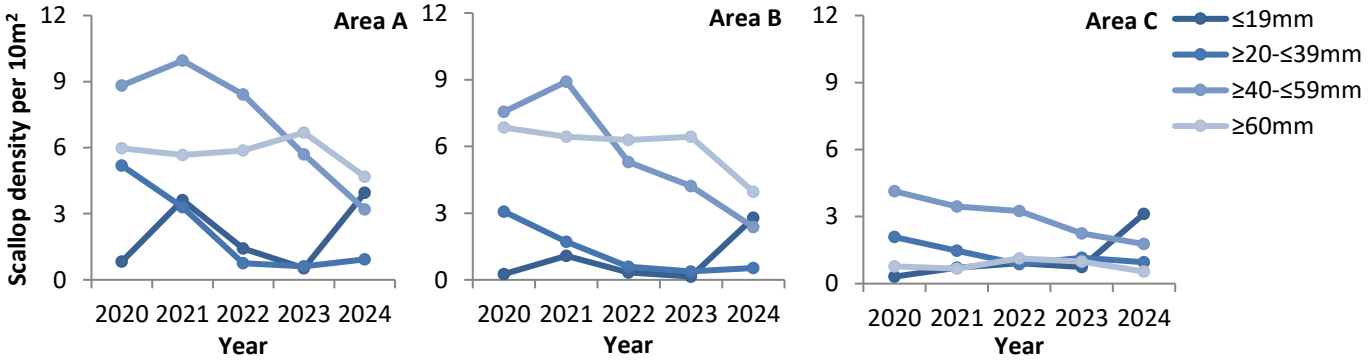

Figure 17: The density of queen scallop (*Aequipecten opercularis*) and variegated scallop (*Mimachlamys varia*) per 10 m^2 for the three management areas (Area A, B and C) per size class from 2020 to 2024.

[2] A lower number of sites were sampled in 2021 due to the Authority's Covid 19 working procedures. In 2021, sites were chosen based on previous high counts of oysters and sites with previous high counts of scallops were a secondary factor in site selection.

Cornwall Inshore Fisheries and Conservation Authority

Fal Oyster Survey 2024 Summary Report

Queen scallop (*A. opercularis and M. varia)* – Density

Temporal density plots are shown for the total number of scallops per 10 m^2 (Figure 18) the number of scallops ≥60 mm per 10 m^2 (Figure 19) for Areas A and B. The distribution of the total number of scallops shows that density has declined since 2020. The distribution of scallops ≥60 mm remained relatively similar from 2020 to 2023 with patches of high density recorded either side of the channel on the East bank and North bank throughout the survey years, however, the density decreased in 2024. The density in the remainder of the survey area was low, between 0.1 to 12 scallops per 10 m^2. The 2021 data is normalised.

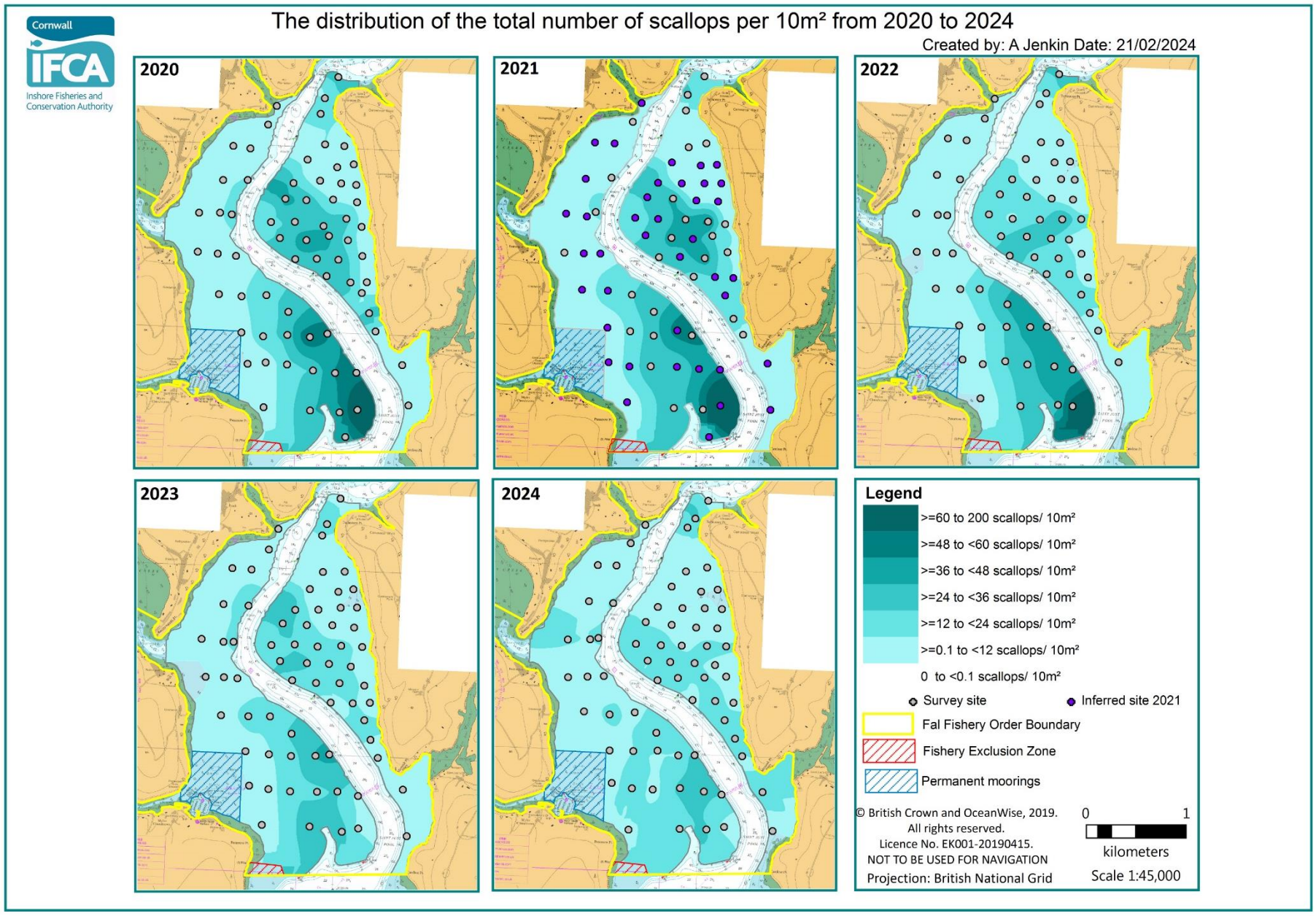

Figure 18: Density map displaying the total number of queen scallop (*Aequipecten opercularis*) and variegated scallop (*Mimachlamys varia*) per 10 m^2 recorded within Areas A and B from 2020 to 2024.

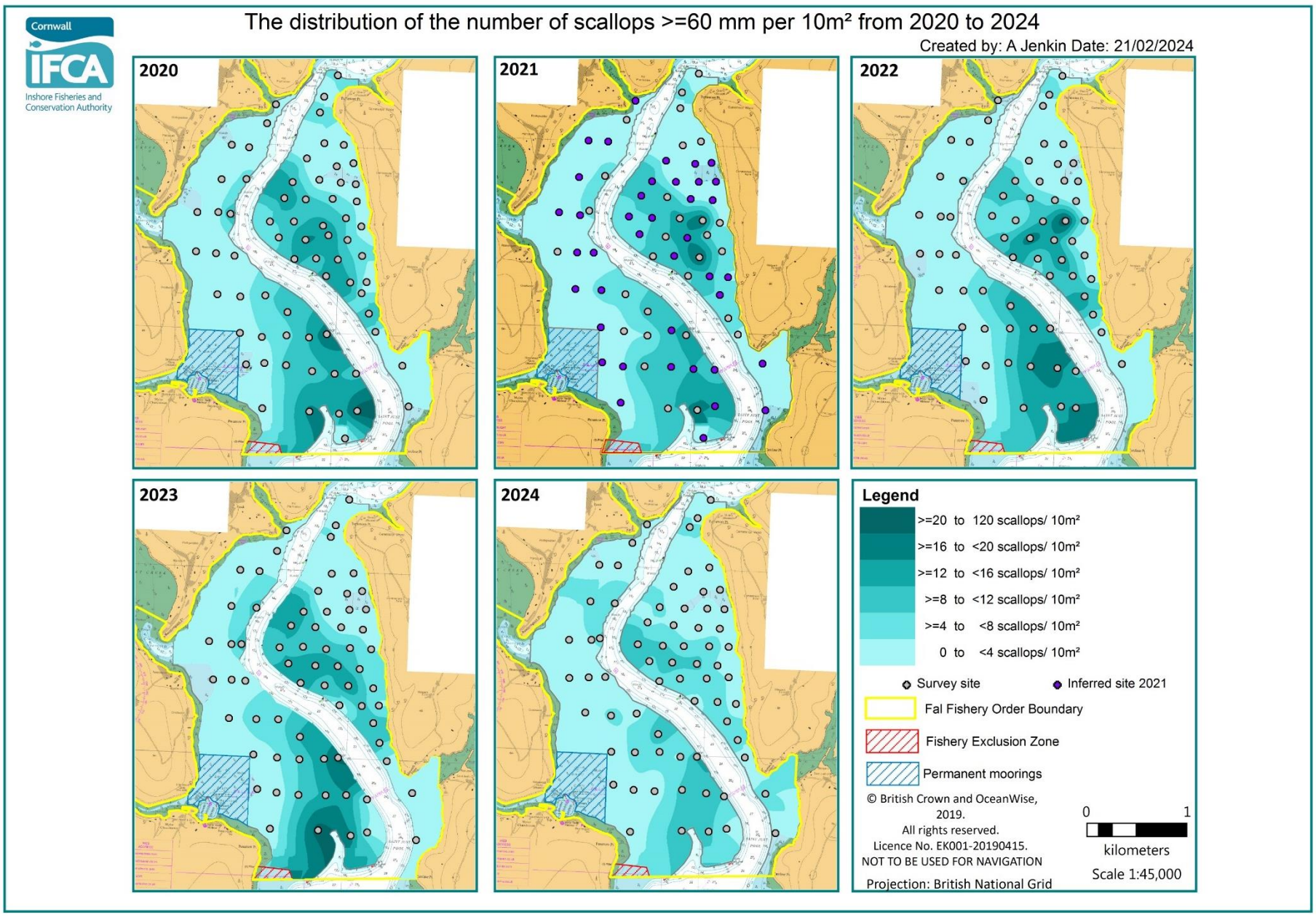

Figure 19: Density map displaying queen scallop (*Aequipecten opercularis*) and variegated scallop (*Mimachlamys varia*) ≥60 mm per 10 m^2 recorded within Areas A and B from 2020 to 2024.

Cornwall Inshore Fisheries and Conservation Authority

Fal Oyster Survey 2024 Summary Report

Queen scallop (*A. opercularis and M. varia)* – Size class distribution

The length distribution plot for all scallops sampled from 2020 to 2024 is shown in Figure 20. The total mean length (cm) increased from 2020 to 2023 and decreased in 2024 and the spread of scallop sizes increased. The 2021 data is as recorded and has not been normalised.

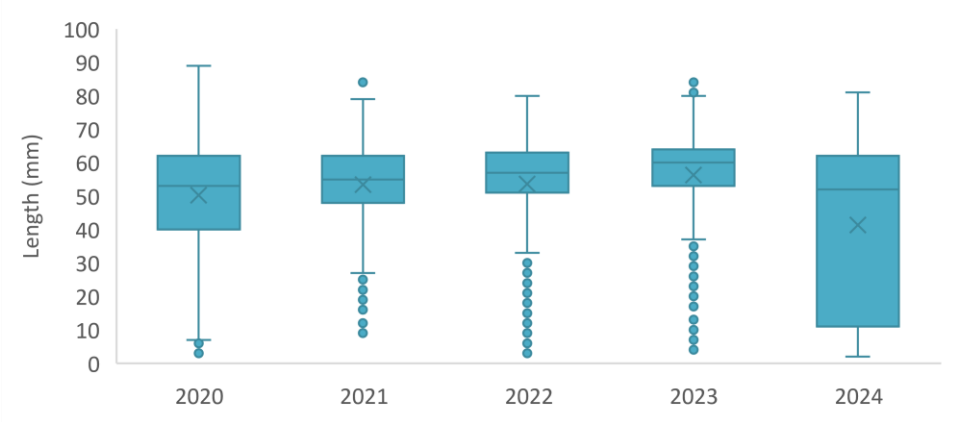

Figure 20: Length distribution plot for all queen scallop (*Aequipecten opercularis*) and variegated scallop (*Mimachlamys varia*) from 2019 to 2023. Data is grouped by year. X represents the mean, the line represents the median, boxes represent the interquartile range, whiskers represent 1.5* interquartile range, and the filled circles represent outliers.

The percentage of scallops per size class from 2020 to 2024 are shown in Figure 21. The percentage of small scallops ≤ 19 mm and ≥20-≤39 mm increased in 2024 and larger scallops in the size classes ≥40-≤59 mm and ≥60 mm decreased across the survey years. The 2021 data is as recorded and has not been normalised.

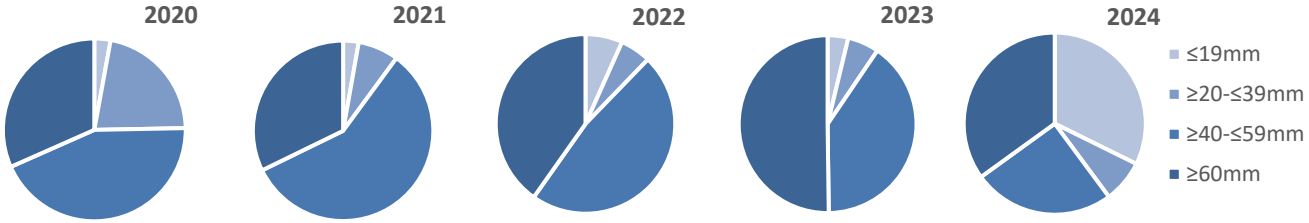

Figure 21: The percentage of queen scallop (*Aequipecten opercularis*) and variegated scallop (*Mimachlamys varia*) per size class (≥60 mm, ≥40-≤59 mm, ≥20-≤39 mm and ≤19 mm) from 2020 to 2024.

The Minimum Conservation Reference Size (MCRS) for queen scallops (*Chlamys* spp.) is 40 mm. Despite the MCRS not applying to vessels targeting the fishery because they are not registered and licenced, it was felt that it was appropriate to analyse the data in respect of the MCRS.

The percentage of scallops over and under the MCRS is shown in Figure 22. For all three areas in all years the percentage over the MCRS was greater than under the MCRS apart from in 2024 when the percentage greater than the MCRS decreased to leave a greater proportion of smaller scallops recorded in Area C. The 2021 data is as recorded and has not been normalised.

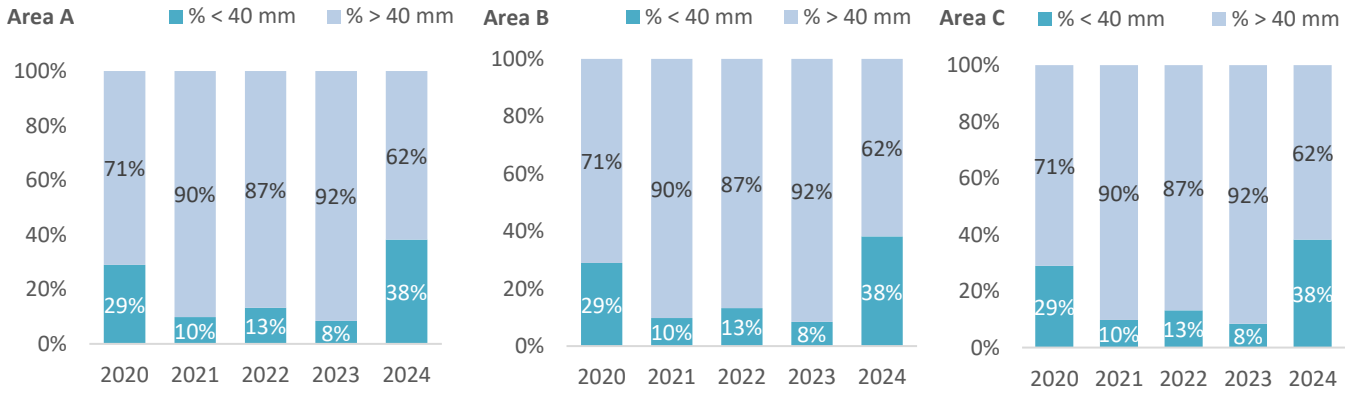

Figure 22: The percentage (%) of queen scallop (*Aequipecten opercularis*) and variegated scallop (*Mimachlamys varia*) over and under the minimum conservation reference size (40 mm) for all three management areas (Area A, B and C) of the Fal oyster survey area from 2020 to 2024.

Cornwall Inshore Fisheries and Conservation Authority

Fal Oyster Survey 2024 Summary Report

Queen scallop (*A. opercularis and M. varia)* – Size class composition

The size composition and distribution of size classes (≥60 mm, ≥40-≤59 mm, ≥20-≤39 mm and ≤19 mm) of scallops for each site is shown in Figure 23 (Area C) and Figure 24 (Areas A and B). A low level of scallops has been recorded in Area C since 2020. In Areas A and B, larger scallops ≥ 40 mm have dominated since 2020, however in 2024 a greater proportion of scallops ≤19 mm were recorded compared to previous years. The 2021 data is as recorded and has not been normalised.

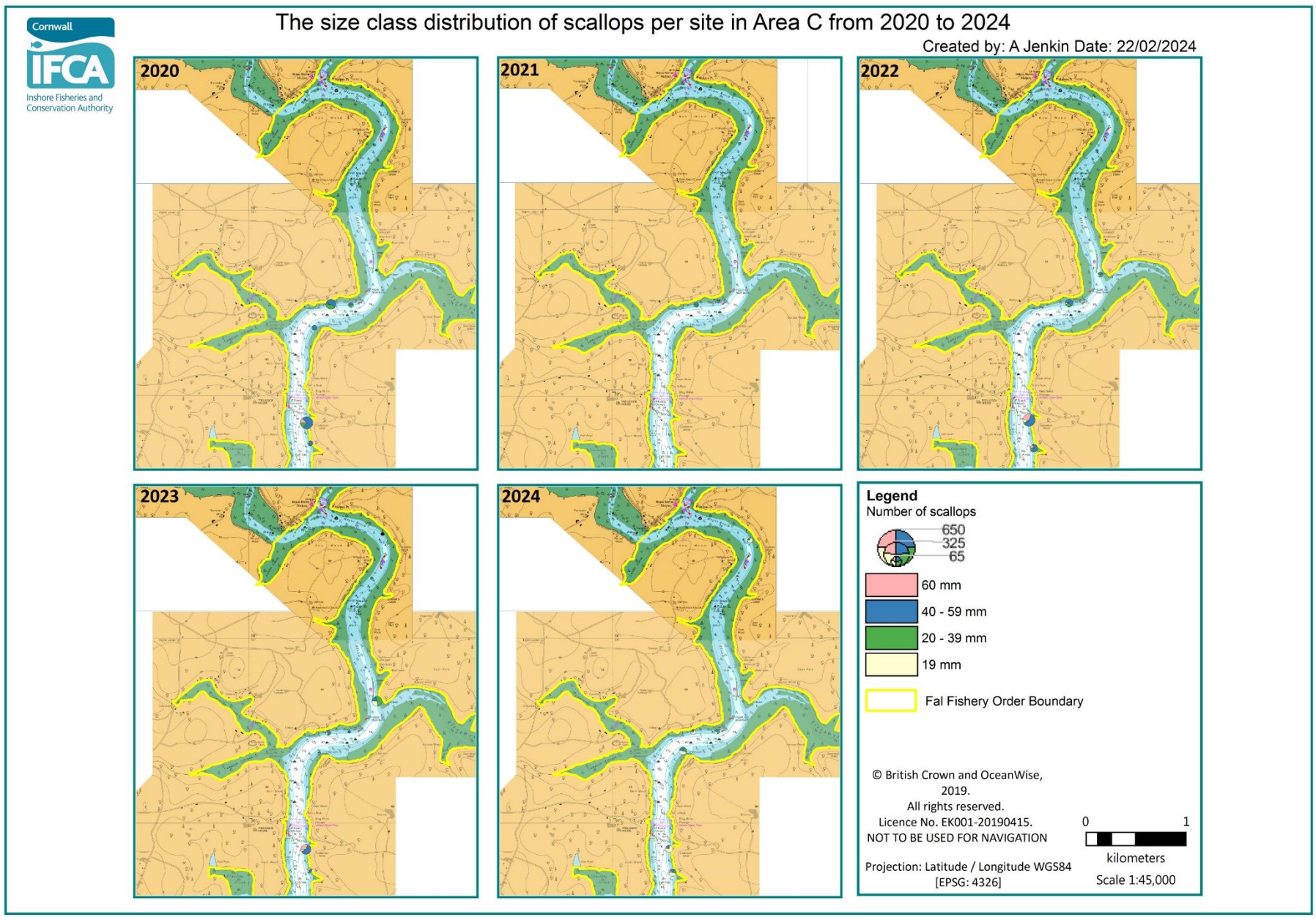

Figure 23: The size composition and distribution of size classes (≥60 mm, ≥40-≤59 mm, ≥20-≤39 mm and ≤19 mm) of queen scallop (*Aequipecten opercularis*) and variegated scallop (*Mimachlamys varia*) for each site within Area C from the 2020 to 2024.

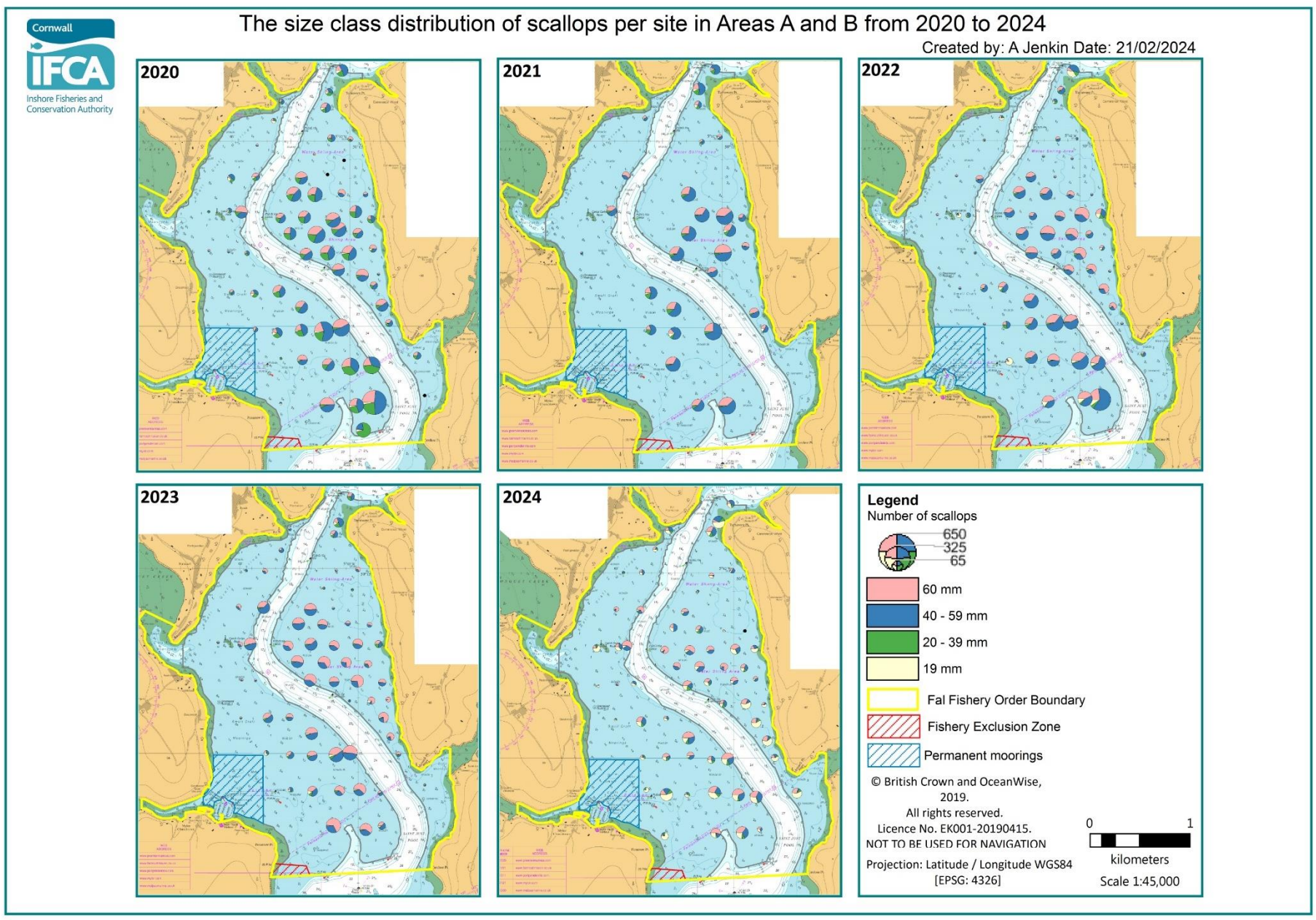

Figure 24: The size composition and distribution of size classes (≥60 mm, ≥40-≤59 mm, ≥20-≤39 mm and ≤19 mm) of queen scallop (*Aequipecten opercularis*) and variegated scallop (*Mimachlamys varia*) for each site within Areas A and B from 2020 to 2024

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Bycatch, non-natives and dredge composition

Non-native species

Two non-native species were recorded during the 2024 survey, slipper limpets (Table 6) and four leathery sea squirts. The number of slipper limpets has decreased since 2020 and the relatively low density of slipper limpets in 2024 for Areas A and B is shown in Figure 25. All non-native species recorded during the survey were kept onboard, removed from the fishery and were collected by a biological waste company from Mylor. The 2021 data is as recorded and has not been normalised.

Table 6: Summary of survey data and the number of slipper limpets (*Crepidula fornicata*) recorded during the Fal oyster survey between 2020 and 2024

Year	Number of sites	Number of slipper limpets	Area A	Area B	Area C
2024	81	3,384	1,278	942	1,164
2023	81	3,410	1,542	1,068	800
2022	81	4,507	1,459	991	2,057
2021	32	1,879	980	661	238
2020	82	8,753	3,929	2,313	2,511

Dredge composition

The percentage volume of each dredge and the distribution of mud, shell (live and dead), weed, gravel, vegetation (sticks and leaves), dead maerl and stone is shown for Areas A, B and C in 2023 (Figure 26).

Maerl

Live maerl – recorded at five sites; one fragment at three sites, five fragments at one site and seven fragments at one site.

Dead maerl – recorded at 14 sites.

Bycatch

Species caught as bycatch were present in all 81 dredge samples and included algae, Annelida, Arthropoda, Bryozoa, Chordata, Cnidaria, Echinoderms, Hydroida, Mollusca, Porifera and Tunicata. Due to the light footprint of the dredge and short tow durations bycatch species were good condition and returned alive to the water straight away (unless a non-native species).

Similar to previous years, the species of red algae, *Solieria chordalis* was recorded in abundance at many sites (Figure 26), with a high abundance of red weed in a basin in the central part of East Bank but it was also recorded in scattered samples across the survey area.

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Bycatch, non-natives and dredge composition

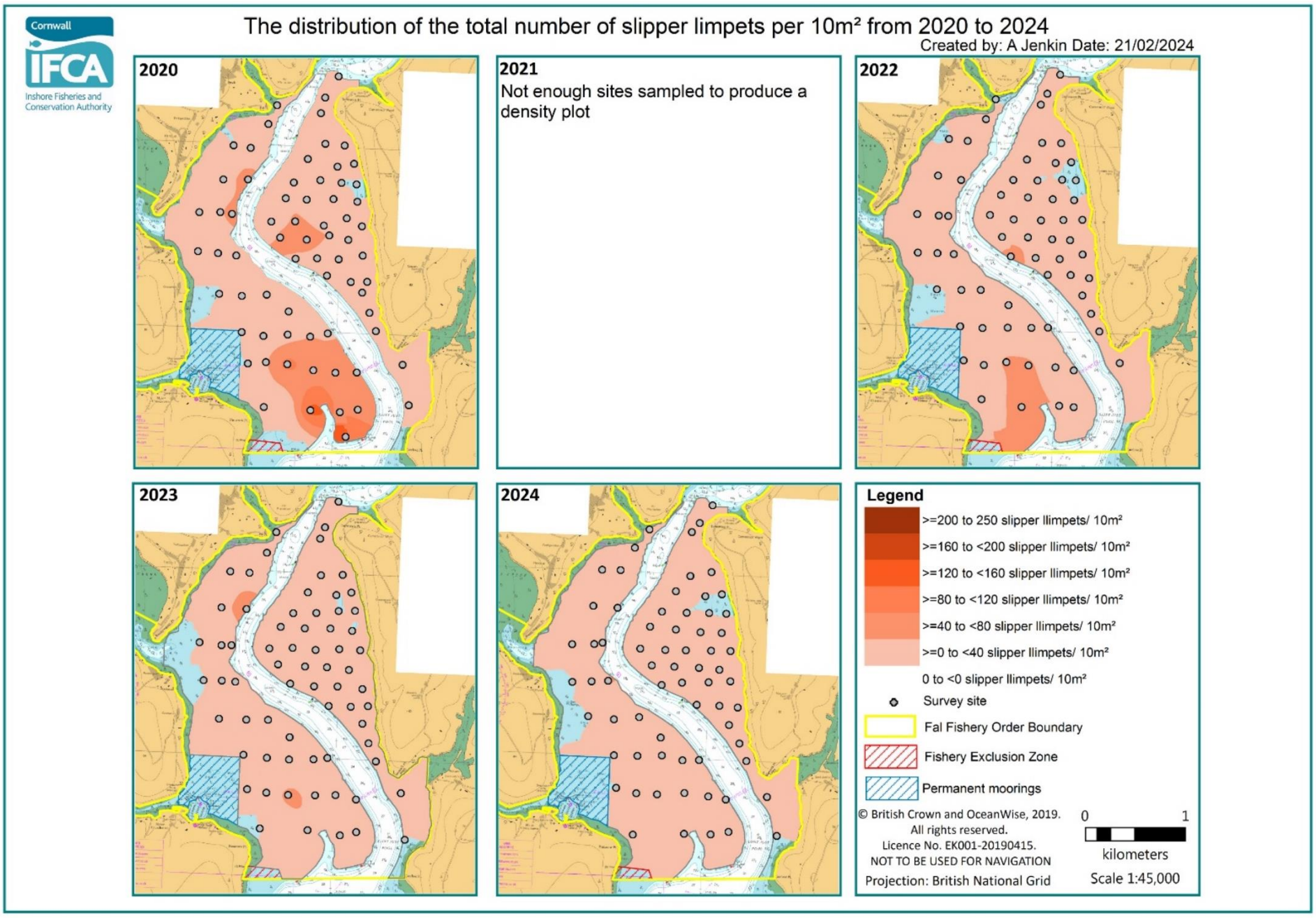

Figure 25: Density map displaying the total number of slipper limpets (*Crepidula fornicata*) 10 m^2 recorded within Areas A and B from 2020 to 2024.

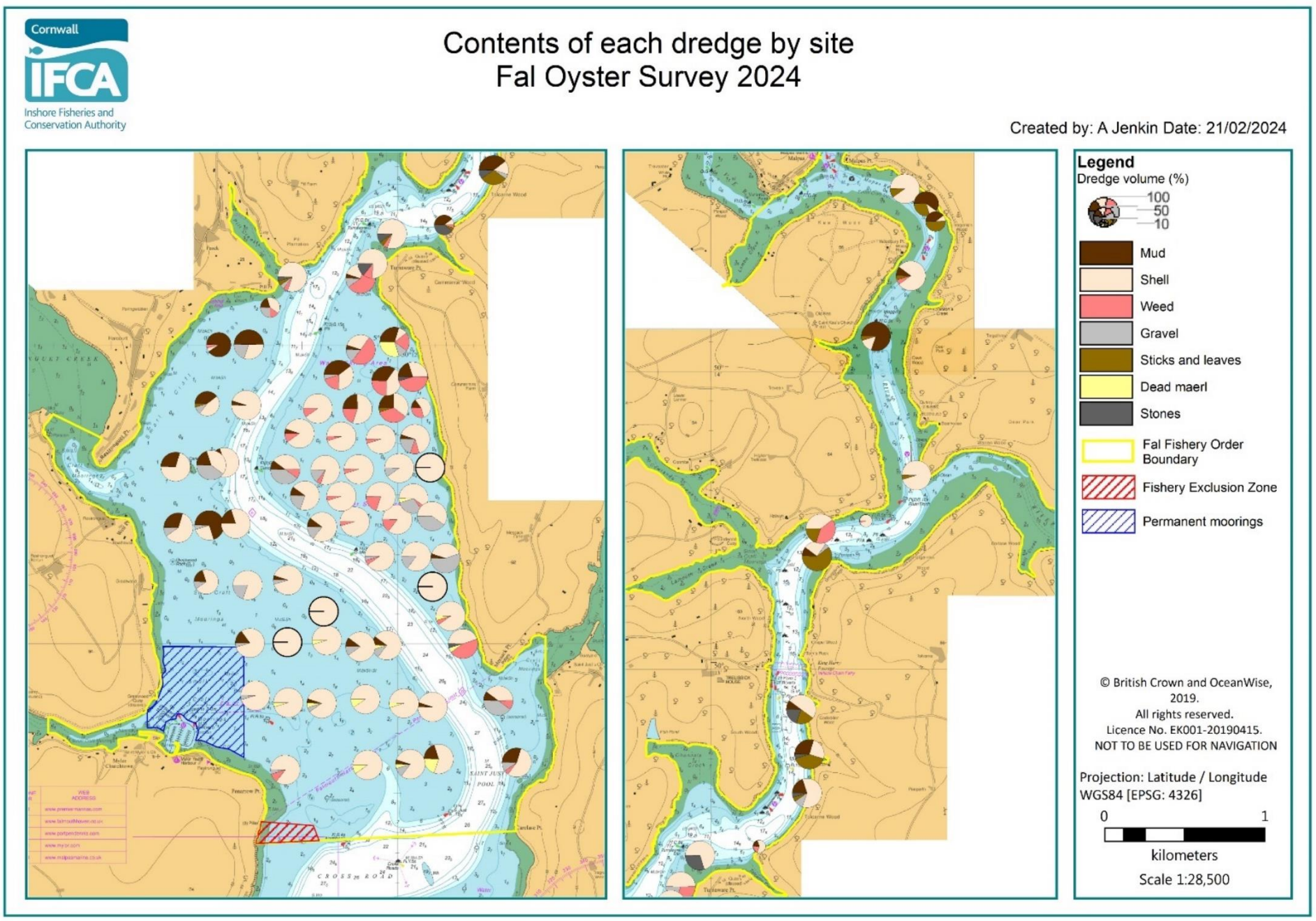

Figure 26: The dredge volume and the contents of each dredge per site recorded during the Fal Oyster Survey 2024.

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Fal Oyster Survey 2024 Summary Report

Key points

Survey sites

A total of 81 sites successfully sampled.

Oysters

Highest number of oysters recorded in 2024.

Lowest proportion of large oysters (≥51 mm) since 2021.

Highest proportion of small oysters (≤35 mm) since 2021.

Even spread of oysters across the four size classes in 2024.

Average weight of oysters has fluctuated slightly since 2020.

The density of oysters per 10 m^2 has increased overall across the survey site since 2020.

Scallops

Decrease in the number of scallops in 2024.

An increase in the proportion of small scallops (<40mm) since 2020.

A decrease in the proportion of large scallops (≥40mm) since 2020.

Highest proportion of scallops (≤19 mm) since 2020.

The density of scallops per 10 m^2 has decreased since 2021 in Areas A, B and C.

Non-natives

Decline in the number of slipper limpets since 2020.

Two non-native species identified, all specimens removed from the fishery.

Bycatch

Live maerl recorded at five sites.

Dead maerl recorded at 14 sites.

Large number of bycatch species returned unharmed.

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Cited as:

Jenkin, A., Sturgeon, S., Trundle C., Daniels, C. and Street, K. 2024. Fal Oyster Survey 2024 Summary Report. Cornwall Inshore Fisheries and Conservation Authority (Cornwall IFCA, Hayle).