Lobster, Crawfish and Crab Fishing Permit Byelaw 2016: Analysis of 2018 Fishing Activity Returns

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Cornwall IFCA Analysis of 2018 Fishing Activity Returns

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K Street	03/07/2019	Changes and final checks after QA	0.6
S Sturgeon	25/07/2019	QA	Final

Executive Summary

This report is the third annual report on the shellfish statistics collated by Cornwall IFCA since their reform in 2016. As per the previous two reports, the crustacean fisheries within the Cornwall IFCA District have been documented in terms of 'Landings per Unit Effort' (LPUE), describing the seasonality of the fisheries, with comparisons made on changes to previously observed trends (Naylor *et al.,* 2017, 2018).

In 2018 the number of permits issued by Cornwall IFCA has decreased from previous years; however the number of fishing days, pot hauls and net hauls has increased from that previously reported. Most notably potting effort has increased in the area to the West of Cape Cornwall, and netting effort on the south coast. In many of the fisheries monthly LPUE calculated overall for the year in the entire District fell from that reported previously, and monthly LPUE peaked around one month later than in previous years.

Recommendations have been made for changes to analysis methodology and reporting format for future reports, and areas for further investigation with multiyear analysis.

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Glossary

Belted statistical area	Refined fishing area including ICES rectangle, sub-rectangle and belt
CEFAS	Centre for Environment, Fisheries and Aquaculture Science (An Executive Agency of DEFRA)
ICES	International Council for the Exploration of the Sea
ICES statistical rectangle	A grid covering the sea area between 36°N and 85°30'N and 4°W and 68°30'E, made up of latitudinal rows of 30' and longitudinal columns of 1°, used for fisheries data analysis.
IFCA	Inshore Fisheries and Conservation Authority
LOA	Length over all
LPUE	Landing Per Unit Effort, calculated from reported data, as described in section 4.1.4
MMO	Marine Management Organisation
MSAR	Monthly Shellfish Activity Return
NM	Nautical mile
Soak	Amount of time fishing gear is left submerged and fishing

Cornwall IFCA Analysis of 2018 Fishing Activity Returns

1 Introduction

Cornwall Inshore Fisheries and Conservation Authority (Cornwall IFCA), is responsible for managing both the commercial and recreational fishing for crustacean species that takes place within the District, which extends out to six nautical miles from the coast. Cornwall IFCA manages the crustacean fishery by a number of byelaws, including the *Lobster, Crawfish and Crab Fishing Permit Byelaw 2016*. The byelaw states that any person 'who wishes to commercially fish for crustaceans must obtain a shellfish permit'. Without a permit, a person cannot remove more than five crustaceans from the fishery per day, of which lobsters and crawfish may only make up two of the five individuals. A condition of the permit is that the holder of the permit must, before the fifteenth day of every calendar month, send to the authority a shellfish return form stating the weight of shellfish species in kilograms (kg) taken from the District during the preceding calendar month, together with information of the fishing gear type, quantity of fishing gear used and area fished as specified on the shellfish return form provided by the Authority. The number of permits issued under the byelaw is not limited but permits are only obtainable by the owners of registered and licenced fishing vessels.

Between 2006 and 2015, Cornwall IFCA accepted the Marine Management Organisation's (MMO) monthly shellfish activity return (MSAR) forms as suitable submission of monthly statistics. It was identified that it was difficult to 'chase' missing or late MSAR forms meaning that there was often an incomplete dataset at the end of each year. It was assessed by officers that the statistical returns forms and ensuring compliance with the statistics returns condition could be improved. As a result of this, in 2016, Cornwall IFCA revised the statistical return forms but kept the same statistical reporting areas as used on the MSAR forms. The statistical areas can be seen in Figure 1.

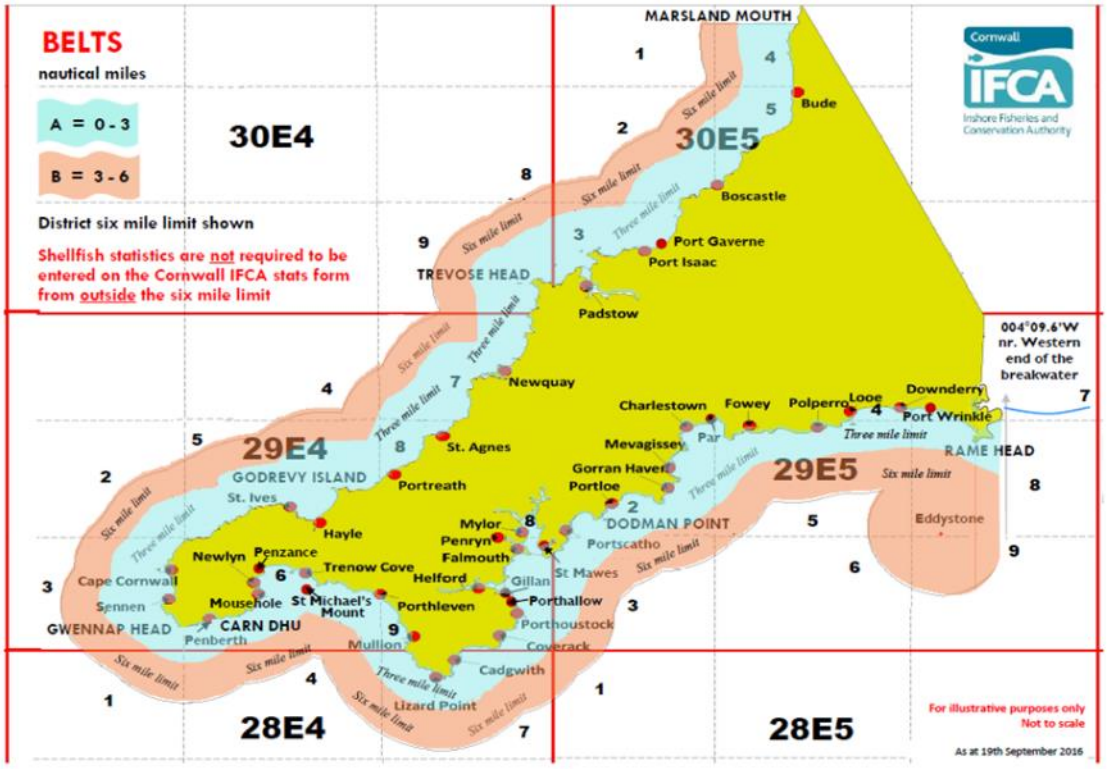

Figure 1: Guidance chart supplied to fishermen showing ICES Statistical rectangles (red grid), and belted statistical areas sub-rectangles (grey grid) with bands A (0-3 nm from the shore, blue shading) and B (3-6 nm from shore, red shading) overlaid.

From 2016, a more complete dataset of shellfish activity was collected compared to the previous years. Both the enforcement and administration teams at Cornwall IFCA made considerable efforts each month to make sure all shellfish return forms are received on time, and filled in correctly from each permit holder. Failure to submit returns constitutes a contravention of the byelaw, resulting in reminders, final warnings and ultimately in extreme cases, prosecution.

This data set and the previous two year's data can be used as a baseline to inform the proposed crustacean fishery management plan. This report provides analysis of the 2018 shellfish return data, concentrating on fishing effort and landing per unit effort (LPUE) within the ICES (International Council for the Exploration of the Sea) statistical areas and further refined belted statistical areas within the Cornwall IFCA District.

2 The Fishery in the Cornwall IFCA District

The fishery in Cornwall is exploited on both coasts by vessels of generally less than 10 m length over all (LOA) using both pots and nets. The ex-Cornwall Sea Fisheries Committee *Shellfish Boats Byelaw* restricts the maximum size of shellfish boats to 16.46 m LOA to reduce effort within the fishery. Pots are worked in strings of between 10 and 40, usually dependant on the size of the vessel. Pots are attached to a backline by straps which are usually around 1 fathom (1.8 m) in length and spaced at around 18 m apart on the backline. At each end of the backline there is an end weight, to which a surface marker is attached. When setting the pots, the vessel will usually head into the tide then shoot the first end weight; the tension on the backline is created by the sinking weight and the vessels motion pulls the remaining pots from the vessel and keeps them at the maximum distance from each other, allowing the most ground

to be covered. The skipper will often try to set their pots around certain features. Electronic navigation aids have improved the accuracy of setting and recovering pots.

Potting activities generally target edible crab (*Cancer pagarus*), European lobster (*Homarus gammarus)* and spider crab (*Maja* spp.). Potting vessels usually fish their strings of pots on a rotational basis, generally hauling between 100-500 pots a day depending on the vessels size/capabilities. Typically these pots are left to 'soak' for 24-48 hours before being hauled, cleared, rebaited and reset. Netting for shellfish usually targets spider crab (*Maja* spp.) and crawfish (*Palinurus elephas*). The nets used are large mesh entangling nets, set on the seabed and left to fish for a number of nights before hauling again. Crustaceans are also retained as a by catch in nets targeting fin fish, which is also reported through the permit returns forms. Again, these nets are generally bottom set entangling nets.

3 Aims and objectives

3.1 Aims

- Report on crustacean fishing activity within the Cornwall IFCA District in 2018.
- Provide a baseline of fishing effort to inform the Authorities proposed Crustacean Fishery Management Plan.

3.2 Objectives

- Analyse data submitted via the *Lobster, Crawfish & Crab Fishing Permit Byelaw* monthly activity returns using the same methodology employed in 2016 and 2017, producing statistics displaying the landing per unit effort (LPUE) of crustaceans within the Cornwall IFCA District.

4 Method

The same method was used as in Naylor *et al.* (2017) and Naylor *et al.* (2018), as described below.

4.1 Data handling

All permit returns data submitted to Cornwall IFCA were entered into a Microsoft Access Database by Cornwall IFCA Administrative and Scientific Officers. An example of a blank permit return form is shown in Annex 1. Data were entered as it had been submitted, therefore any errors or misreporting were not corrected. Quality assurance was carried out by a second Administrative Officer who reviewed 10% of all the data entered. The data was then exported to Microsoft Excel where records associated with area codes which either do not exist or are outside of the District were removed before the remaining data was analysed.

Where data has been presented in a graph the same axis scale has been used as in the 2017 report (Naylor *et al*., 2018), where possible, to aid in comparisons between years.

4.1.1 Geographic area

All analysis has been conducted based on 45 belted statistical areas created by ICES rectangle, sub square and belt A or B. Belt A represents 0-3 nautical miles (nm) zone and belt B represents 3-6 nm zone. Belted statistical areas were also

been grouped by 'north coast' and 'south coast'. The boundary between the north and south coast zones was defined by the boundary between 29E4 2 and 29E4 3 which is north of Cape Cornwall (Figure 2).

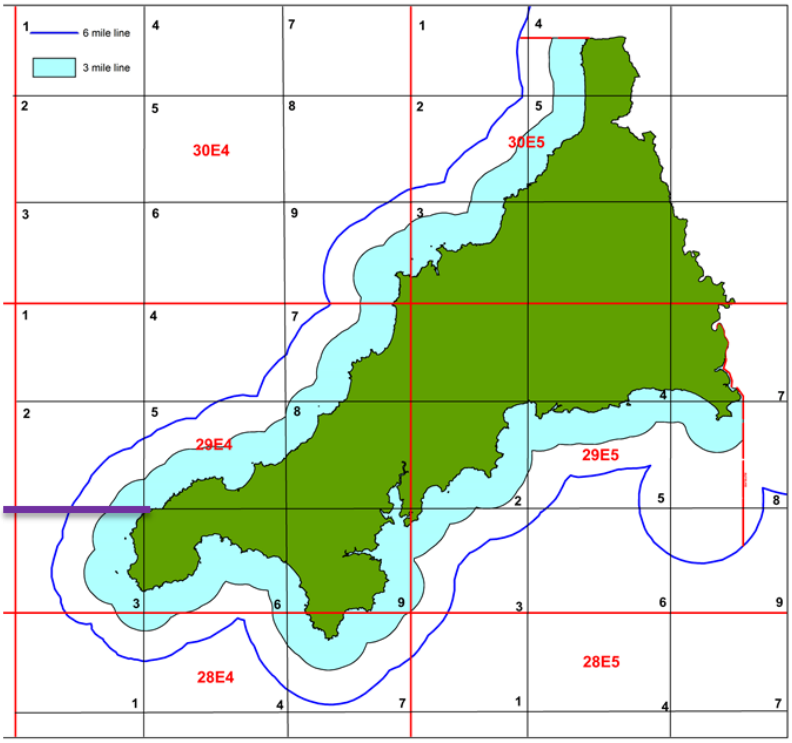

Figure 2: Chart of ICES statistical areas in Cornwall with the divide used for north and south coasts shown by the purple line.

4.1.2 Seasonality

Effort and LPUE were calculated for the entire year by month and also split by four quarters for thematic mapping. The quarters were split as shown in Table 1.

Table 1: Months relating to each year quarter of 2018 used for thematic mapping

Quarter 1			Quarter 2			Quarter 3			Quarter 4		
January	February	March	April	May	June	July	August	September	October	November	December

4.1.3 Effort

Fishing effort has been described as the number of pot hauls and the length (m) of net hauled in a time period and geographic area. As shown in Figure 2 above, there is considerable variation in the spatial area of each belted statistical area, ICES Rectangle and coastal area; north and south. To overcome this, the effort has been normalised based on the area in km^2 of the geographic area, thus resulting in the effort per km^2.

4.1.4 Landing per Unit Effort (LPUE)

The shellfish return forms require permit holders to record both the number of pot hauls and length of net hauled per day. Depending on the species targeted different gear is used. Lobsters and crabs are targeted mainly by pots, crawfish

by nets and spider crabs can be targeted by both depending on the location and time of year. To estimate LPUE, the unit of effort was taken as 100 pot hauls (100Ph) for lobsters, and for crawfish it was 100 m of net hauled (100m_Nh). LPUE for spider crabs and edible crab was calculated for both nets and pots using the same units of effort as previously stated.

LPUE (kg shellfish/100Ph) was calculated as:

LPUE (kg of shellfish/100Ph) = $(S_x/E_x)*100$

Where S is the weight in kg of shellfish landed in category x, and E is the number of pot hauled.

LPUE (kg shellfish/100m_Nh) was calculated as:

LPUE (kg of shellfish/100m_Nh) = $(S_x/E_x)*100$

Where S is the weight in kg of shellfish landed in category x, and E is the length of net hauled.

4.1.4.1 Thematic mapping of LPUE and effort

LPUE data were transferred to MapInfo Professional Version 17.0.2 to thematically map the LPUE by belted statistical area for the year, and divided into year quarters for each species (further separated by sex for edible crab).

Individual ranges were applied consistently for each year quarter chart for each species to allow comparisons to be drawn between them. A scale of ten equal value ranges was created based on the dataset with the largest range; these ranges were then applied to all other year quarters for that species. When presented for all of 2018 the most appropriate range was applied.

5 Results

In 2018, 332 permits were issued by Cornwall IFCA, with 100% compliance in completing and submitting shellfish permit returns forms. 86 vessels were fishing solely with pots, 39 solely with nets and 201 fishing with both pots and nets. Six vessels holding Cornwall IFCA shellfish permits were fishing using trawls or scallop dredges, the data received from these vessels has been omitted from this analysis as effort cannot be quantified. Table 2 summaries this data, along with other omitted data due incorrect area codes which are not within the District.

Table 2: Erroneous data due to area codes or trawl data omitted from 2018 analysis.

		Area Code Issues	Trawl Data
Effort	Pot Hauls	15,743	-
	Meters of nets	10,500	-
Catch (kg)	Lobster	1,597.10	121.87
	Crab (Total)	13,575.00	275.55
	Spider Crab	261.00	328.95
	Crawfish	0.00	1.1

5.1 Effort

A total of 12,390 vessel fishing days were reported to Cornwall IFCA during 2018.

5.1.1 Pots

In 2018, 285 vessels fishing with pots held Cornwall IFCA permits, with a combined total of 81,317 pots. In 2018 a total number of 2,048,872 pot hauls were reported through the permit returns forms, on 10,124 vessel days.

Potting effort, measured as pot hauls per km^2 and calculated for the entire District, increased rapidly from March to May resulting in 70.91 pot hauls/km^2, then dropping to 68.30 pot hauls/km^2 in June, before increasing again to a peak of 82.34 pot hauls/km^2 in July (Figure 3).

When plotted by ICES statistical rectangle (Figure 4), all areas resulted in LPUE values of <20 pot hauls/km^2 in January, increasing in the middle of the year before decreasing to December. 29E4 and 28E4 both peak in July; 118.43 pot hauls/km^2 and 108.95 pot hauls/km^2 respectively (Figure 4), however rectangles 30E4 and 30E5 peaked in June at the lower values of 81.37 pot hauls/km^2 and 67.13 pot hauls/km^2, before decreasing steadily to ~10 pot hauls/km^2 in December. LPUE in 29E5 remained steady from May to August, ranging between 40.82 and 45.40 pot hauls/km^2. Potting effort was only reported in 28E5 in May; 440 pot hauls, 15.78 pot hauls/km^2.

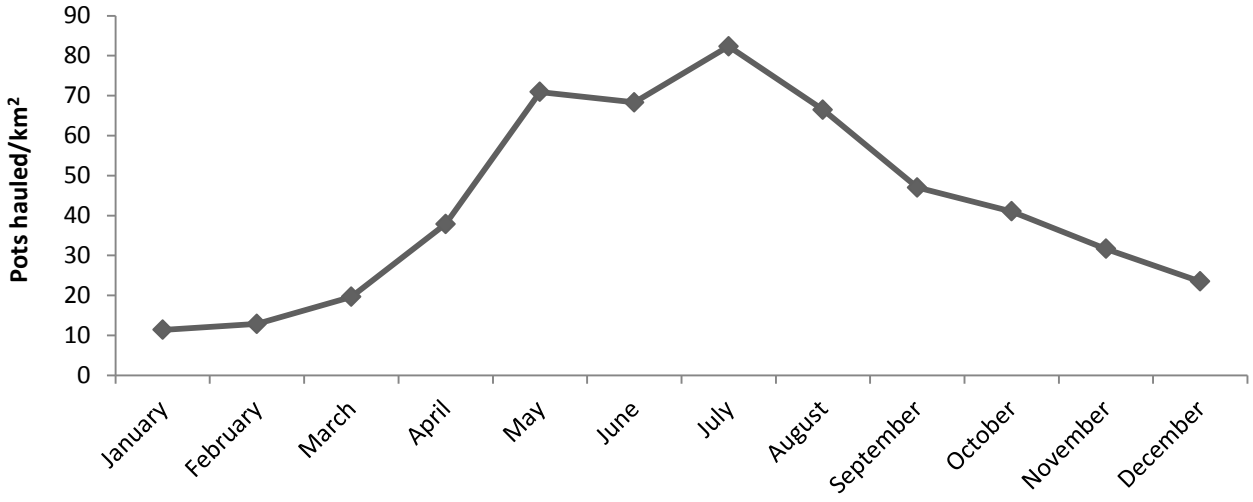

Figure 3: Pot hauls per km^2 by month within the Cornwall IFCA District in 2018.

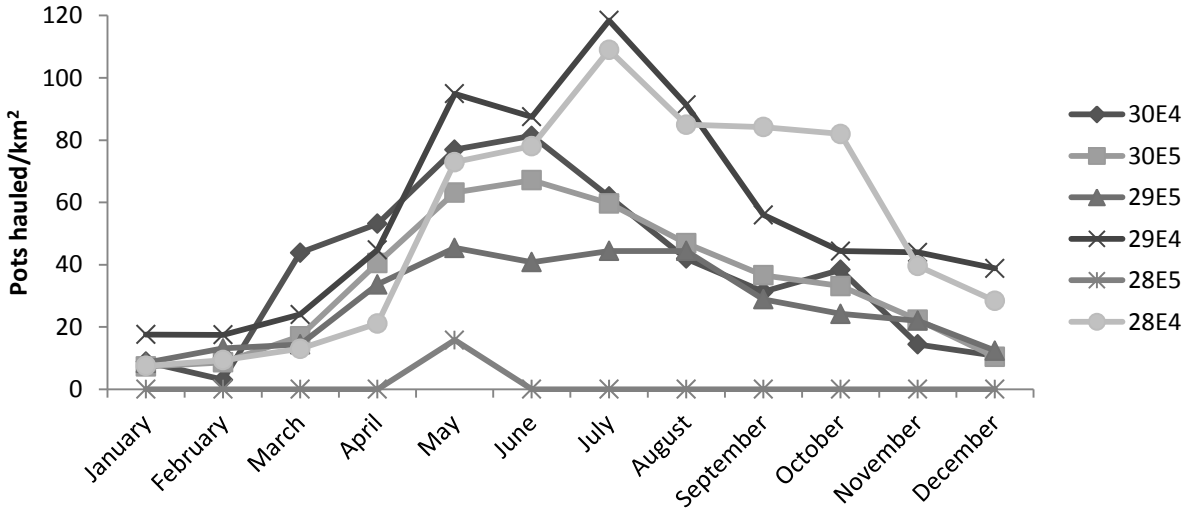

Figure 4: Pot hauls per km^2 by ICES statistical rectangle, by month, within the Cornwall IFCA District in 2018.

Both coasts, north and south, followed a similar trend of increasing effort to May, followed by a small decrease in effort in June and a peak in July of 80.12 pot hauls/km^2 on the north coast and 83.82 pot hauls/km^2 on the south (Figure 5). Effort was consistently higher throughout the year in band B on the north coast (Figure 6), and in band A on the south coast (Figure 7).

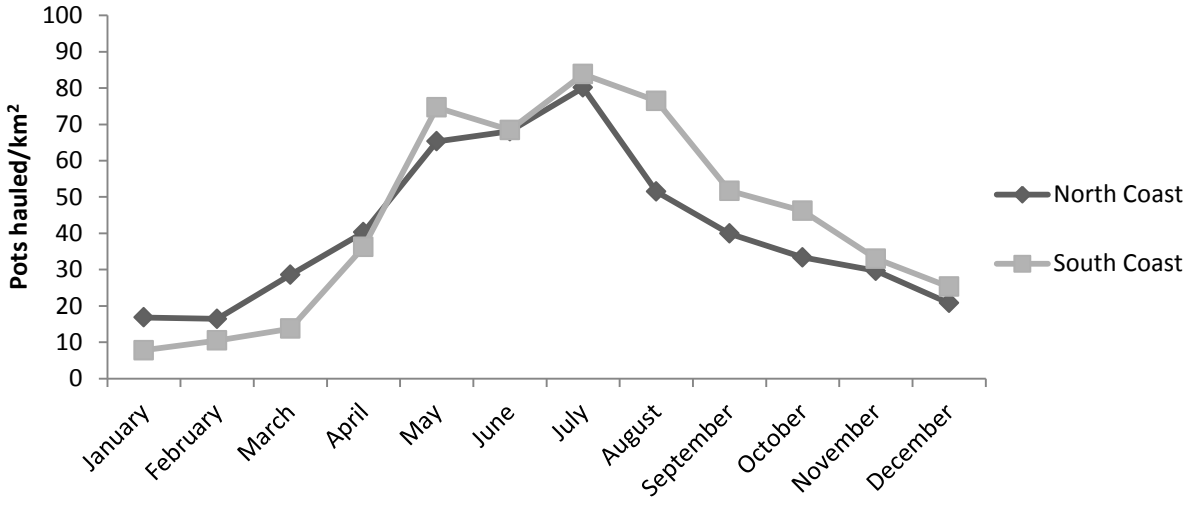

Figure 5: Pot hauls per km^2 by month within the Cornwall IFCA District in 2018, split by coast, north and south.

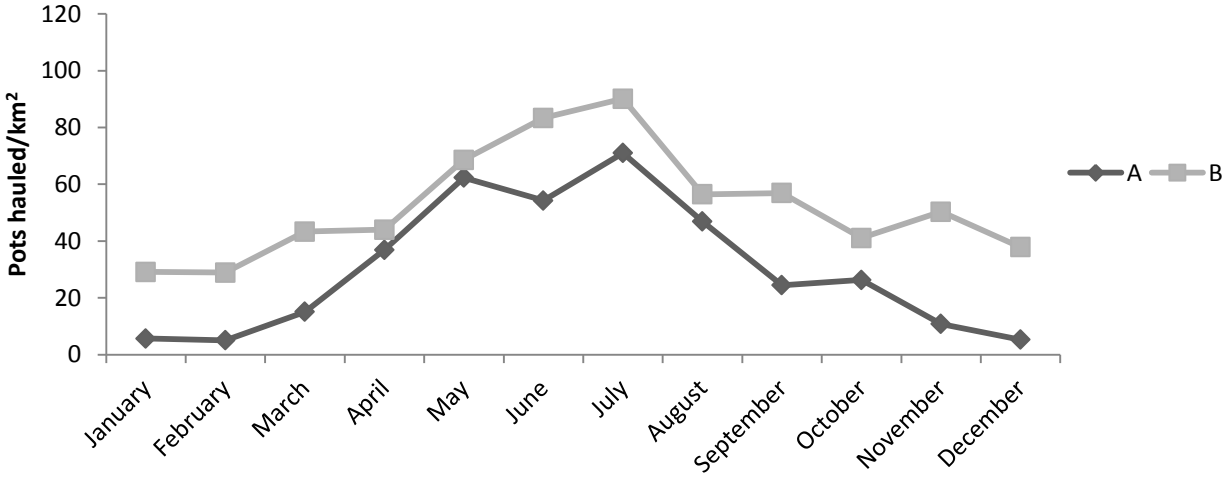

Figure 6: Pot hauls per km^2 by month, for belted statistical areas on the north coast, split by belt, A and B, within the Cornwall IFCA District in 2018.

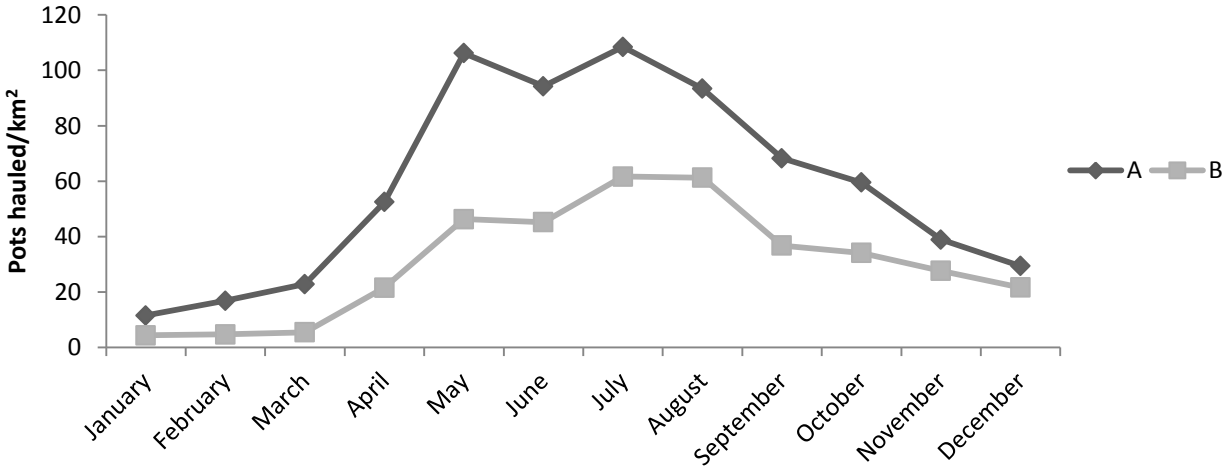

Figure 7: Pot hauls per km^2 by month, for belted statistical areas on the south coast, split by belt, A and B, within the Cornwall IFCA District in 2018.

Thematically mapped potting effort per km^2 for the entire year (Figure 8) further highlights the higher levels of effort in band B on the north coast, and band A on the south coast. When mapped by year quarters (Figure 9) the highest levels of effort are observed in quarter three to the west of Lands End (29E43B), south of the Lizard (28E47A and B), Whitsand Bay (29E55A and 29E58A), and off shore from Portreath (29E44B). In the quarter prior to this, quarter two, effort appears to be more widespread and more homogenous across the District.

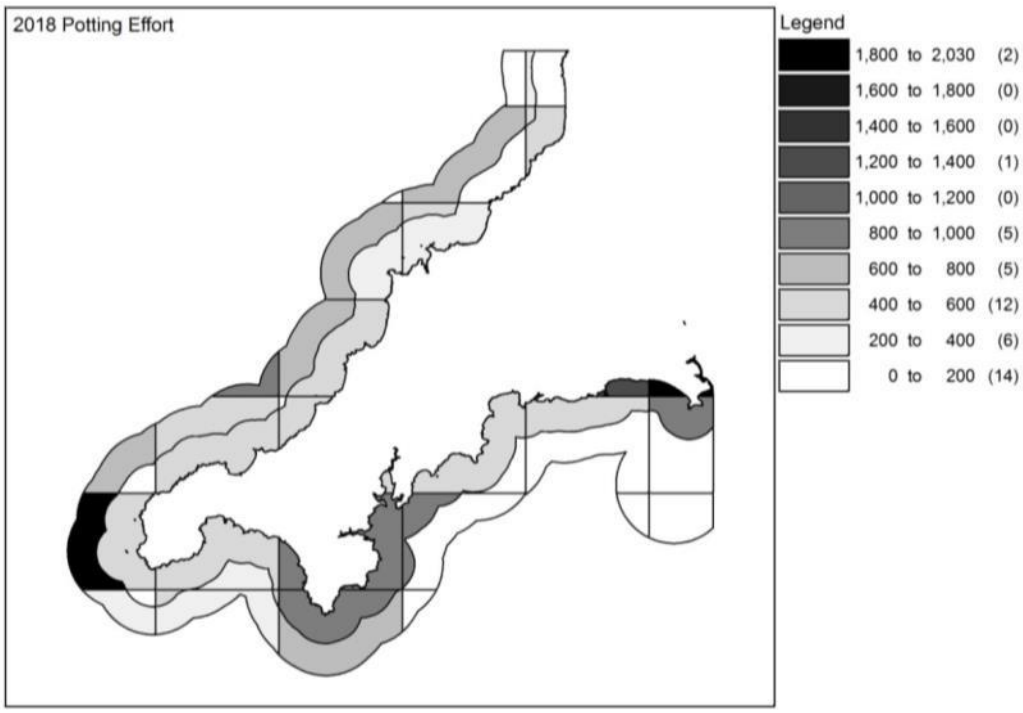

Figure 8: Pot hauls per km^2 in the Cornwall IFCA District in 2018, thematically mapped by belted statistical area, using increments of 200 pots per km^2.

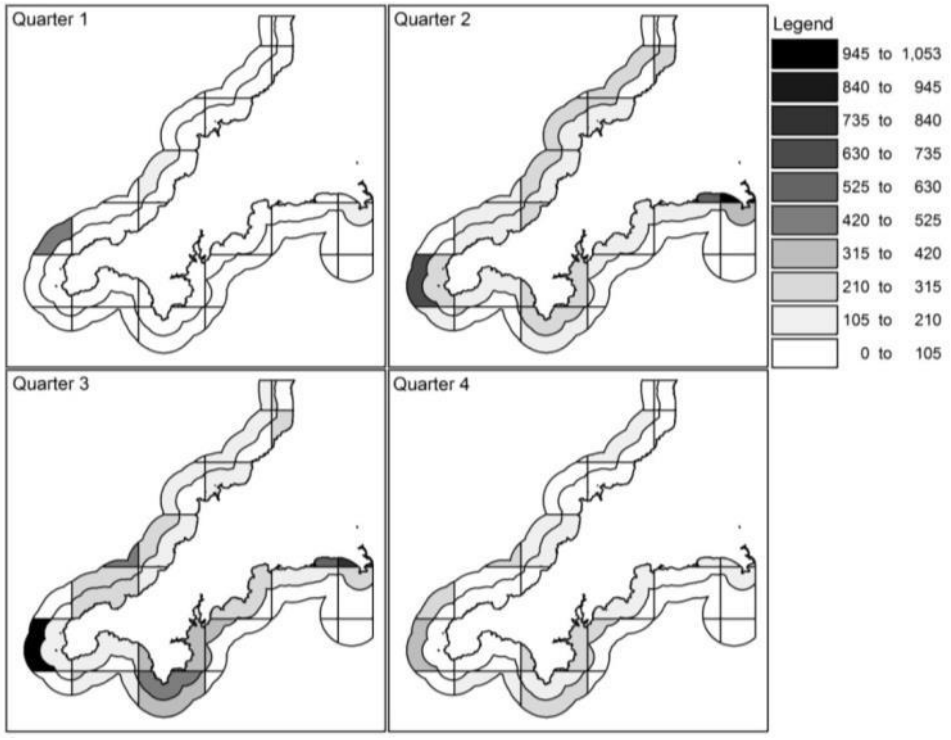

Figure 9: Pot hauls per km^2 in the Cornwall IFCA District in 2018, split by quarter, thematically mapped by belted statistical area, using increments of 105 pot hauls per km^2.

5.1.2 Nets

In 2018, 240 vessels fishing with nets held Cornwall IFCA Shellfish Permits for retaining shellfish with a reported total of 1,615,447m of nets of varying mesh sizes. There was a total of 2,265 vessel days during the year, resulting in a total of 8,359,890m of net hauls. When calculated for the entire District (Figure 10) effort increased to 347.86m nets hauled/km^2 in May, with a reduction to 282.05m nets hauled/km^2 in June, increasing again to 326.03m nets hauled/km in July before steadily declining to December, 47.19m nets hauled/km^2.

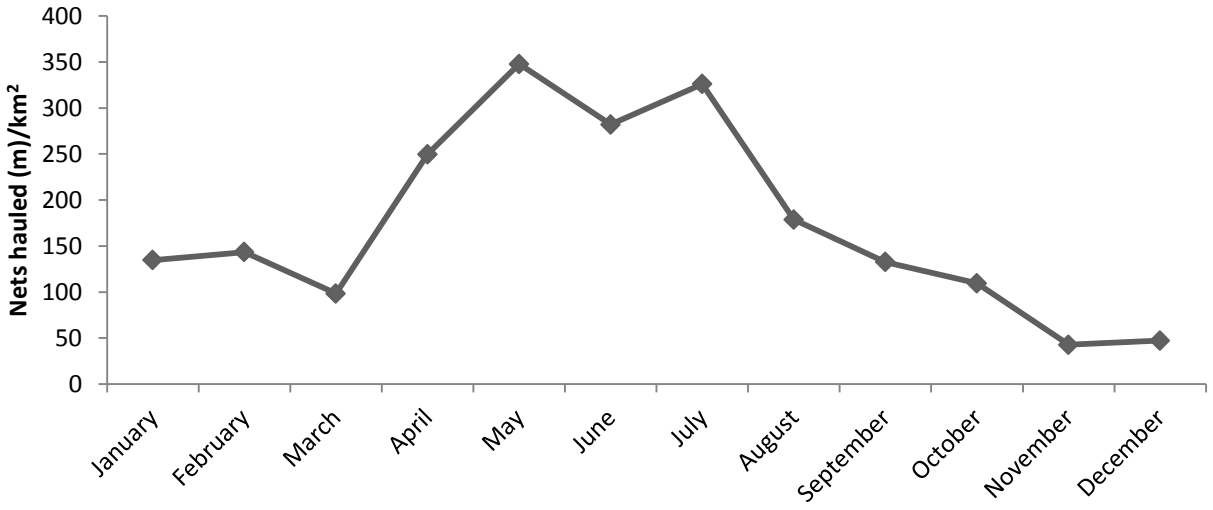

Figure 10: Meters of nets hauled per km^2 by month within the Cornwall IFCA District in 2018.

When calculated by ICES rectangle (Figure 11) effort was high in 28E4 and 28E5 in January; 656.54m nets hauled/km^2 and 631.28m nets hauled/km^2 respectively. Following this, netting activity retaining shellfish was only recorded in 28E5 in March and April. In 28E4 LPUE decreased in March to 195.72m nets hauled/km^2 then increased to over 647.03m nets hauled/km^2. In 29E4 peaked in May (423.21m nets hauled/km^2), as did 29E5 (549.65m nets hauled/km^2) followed by another peak in July (574.54m nets hauled/km^2).

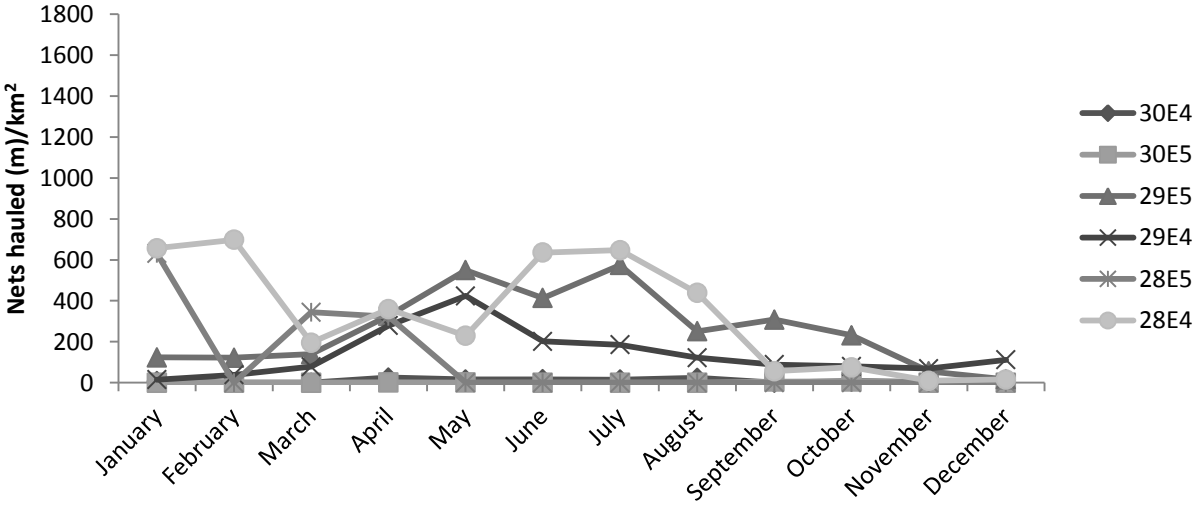

Figure 11: Meters of nets hauled per km^2 by ICES statistical rectangle, by month, within the Cornwall IFCA District in 2018.

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Netting effort was consistently higher on the south coast than the north throughout 2018 (Figure 12). Netting effort on both coasts peaked in May; however effort was over seven times higher on the south coast (530.54m nets hauled/km^2 compared to 73.82m nets hauled/km^2).

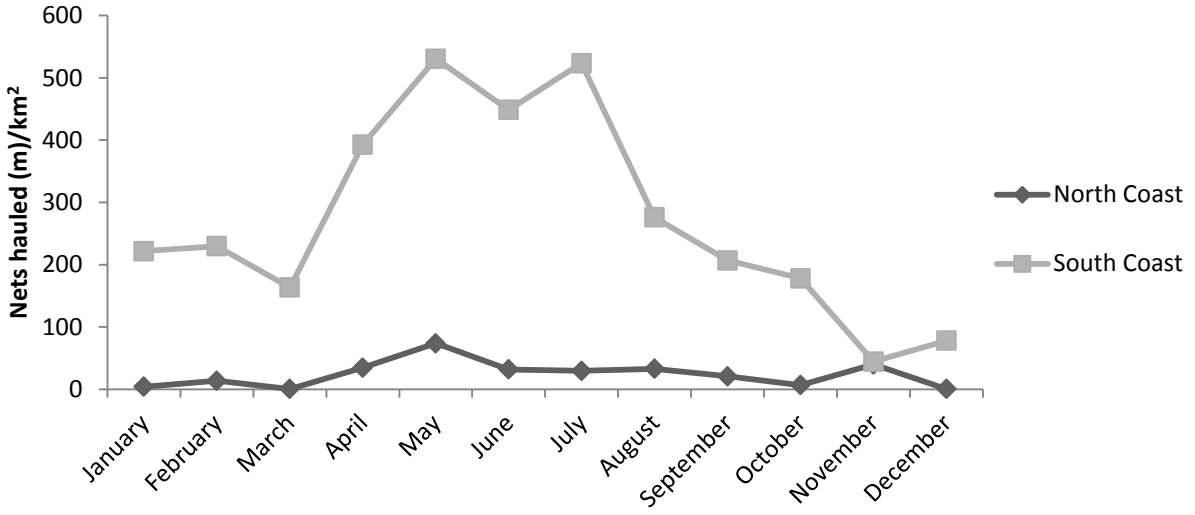

Figure 12: Meters of nets hauled per km^2 by month within the Cornwall IFCA District in 2018, split by coast, north and south.

On the north coast, when split by band A and B, effort was higher in band B from April to August, peaking in effort in May at 135.46m nets hauled/km^2 (Figure 13). On the south coast (Figure 14) effort was consistently higher in band A with the highest levels of effort in June, 805.93m nets hauled/km^2.

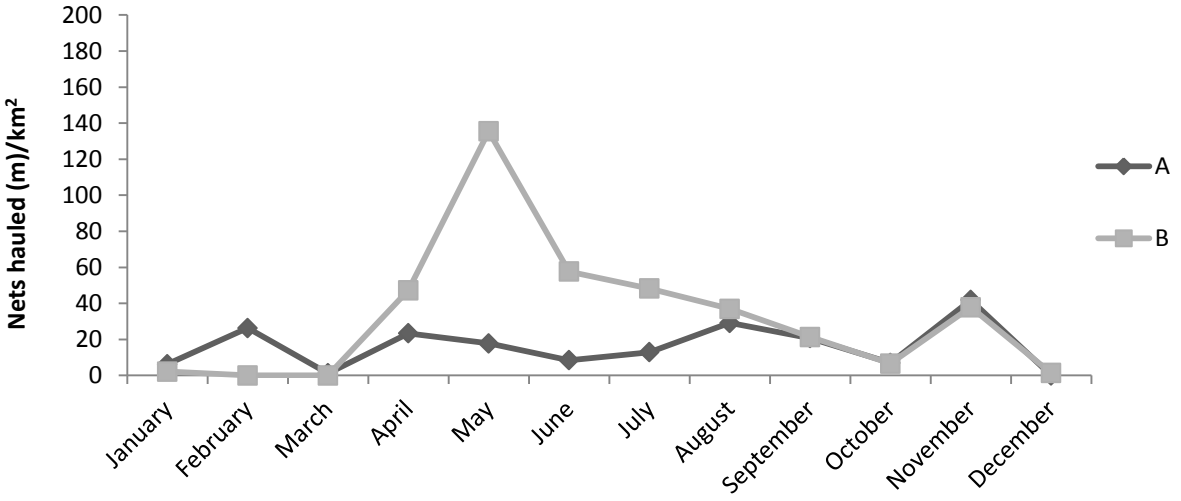

Figure 13: Meters of nets hauled per km^2 by month, for belted statistical areas on the north coast, split by belt, A and B, within the Cornwall IFCA District in 2018.

Cornwall IFCA Analysis of 2018 Fishing Activity Returns

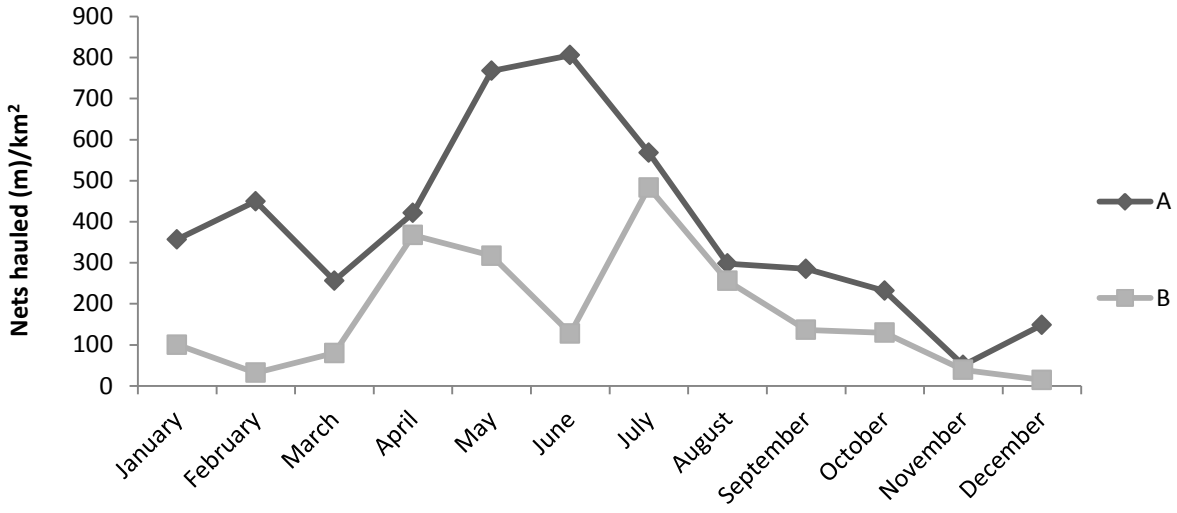

Figure 14: Meters of nets hauled per km^2 by month, for belted statistical areas on the south coast, split by belt, A and B, within the Cornwall IFCA District in 2018.

Thematic mapping of the data (Figure 15 and Figure 16) demonstrates the high netting effort on the south coast throughout the year, with high levels inshore in quarter two. The highest vaules of meters of nets hauled per km^2 were in 29E53A and 28E47A in quarter one; 5,568.65m of net hauled/km^2 and 4,430.00m of net hauled/km^2 respectively.

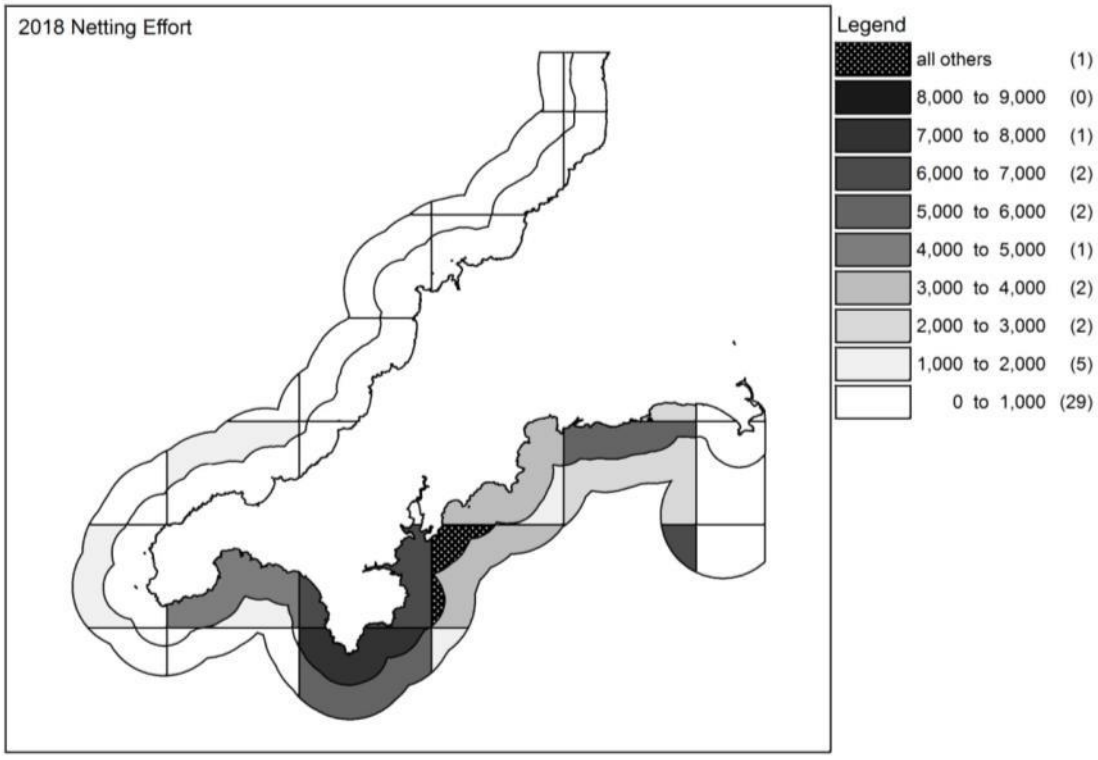

Figure 15: Meters of nets hauled per km^2 in the Cornwall IFCA District in 2018, thematically mapped by belted statistical area, using increments of 1,000 m of net hauled per km^2. Note: a high value of 13,232 m/km^2 was calculated for 29E53A, and was therefore assigned a new category represented in white dots on a black background.

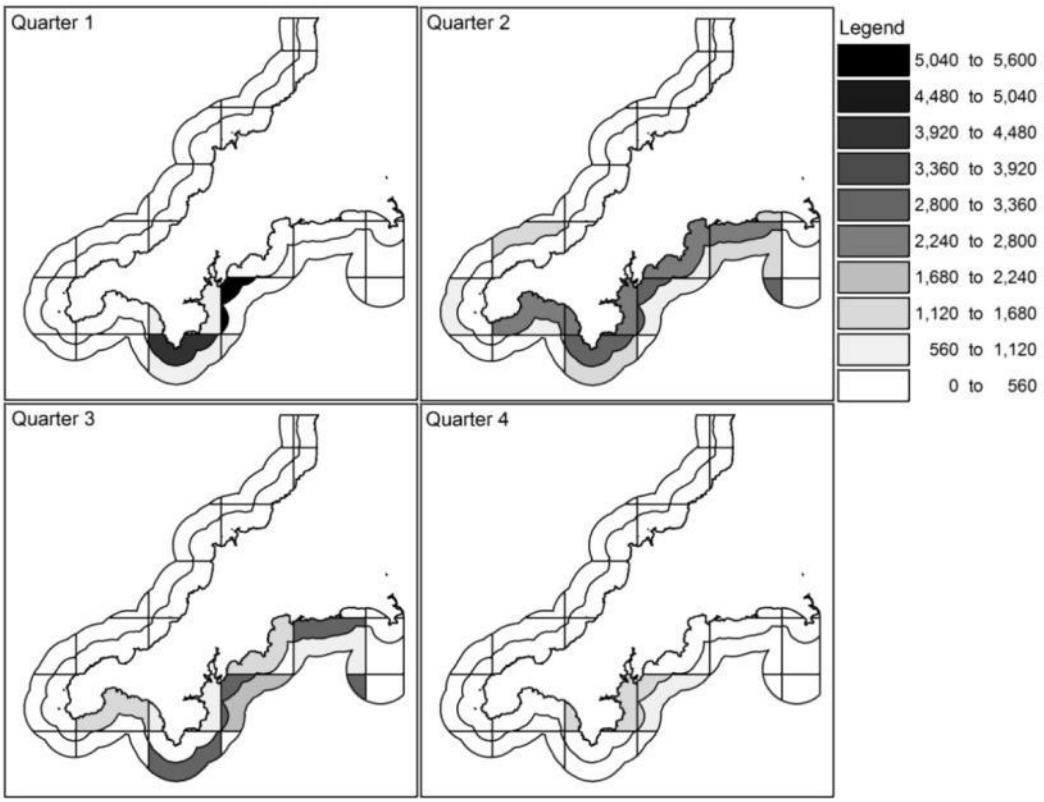

Figure 16: Meters of nets hauled per km^2 in the Cornwall IFCA District in 2018, split by quarter, thematically mapped by belted statistical area, using increments of 560 m of net hauled per km^2.

5.2 LPUE of Crustacean Species

5.2.1 European Lobster (*Homarus gammarus*)

In 2018, a total of 150,231 kg of lobster was reported to have been removed from the Cornwall IFCA District by vessels with a shellfish permit. The highest total weight of lobster reported to have been removed from the District by month was 33,840 kg in July (Figure 17).

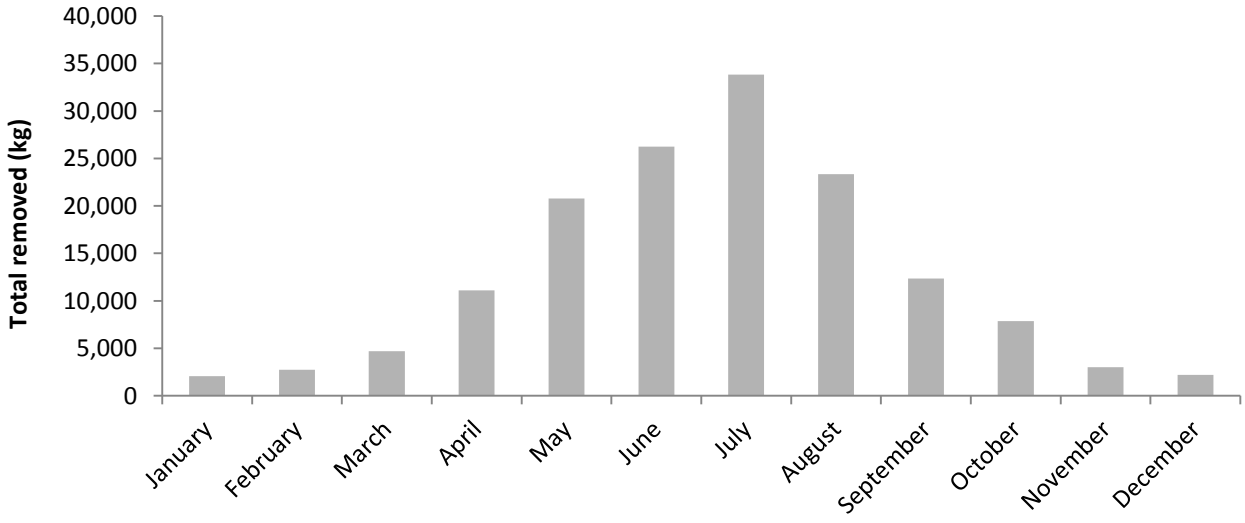

Figure 17: Total (kg) European lobster (*Homarus gammarus*) reportedly removed from the Cornwall IFCA District during 2018

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When calculated for the entire District LPUE peaked in July (Figure 18) at 10.29 kg/100 pot hauls. When calculated by ICES rectangle (Figure 19), 30E5 returned the highest LPUE of 13.61 kg/100Ph in July, and when split by coast, the north coast returned the highest LPUE, also in July, of 13.89 kg/100Ph (Figure 20), compared to 7.99 kg/100Ph on the south coast.

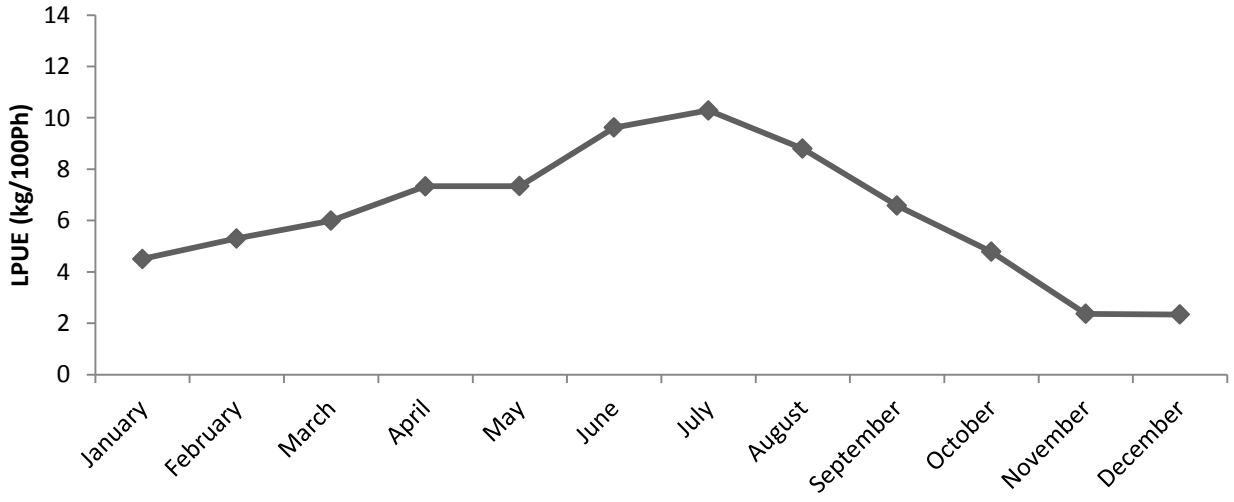

Figure 18: Monthly LPUE (kg landed/100Ph) of the European lobster (*Homarus gammarus*) during 2018, within the Cornwall IFCA District.

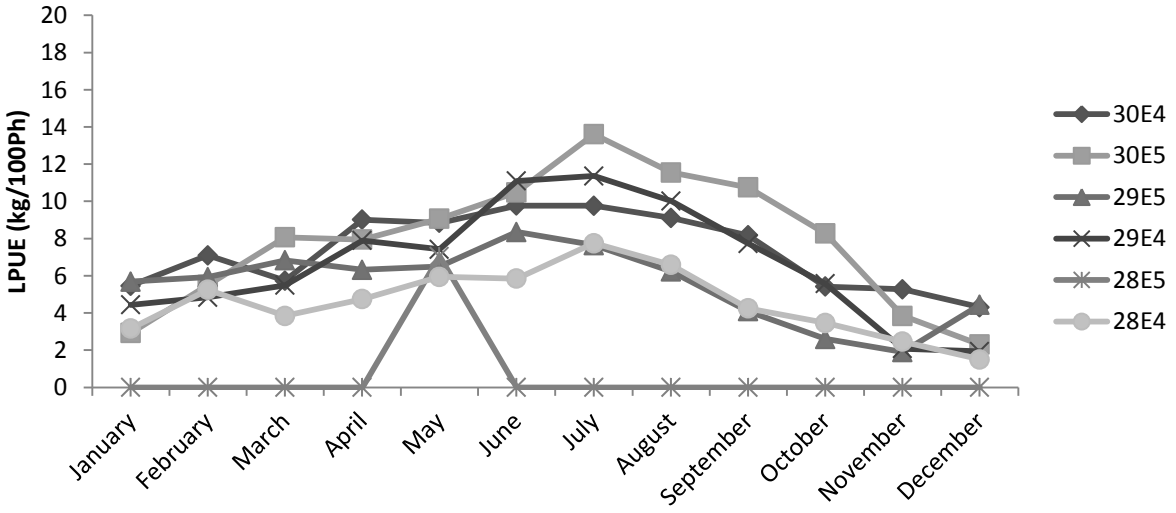

Figure 19: Monthly LPUE (kg landed/100Ph) of European lobster (*Homarus gammarus*) by ICES statistical rectangle for the year, 2018.

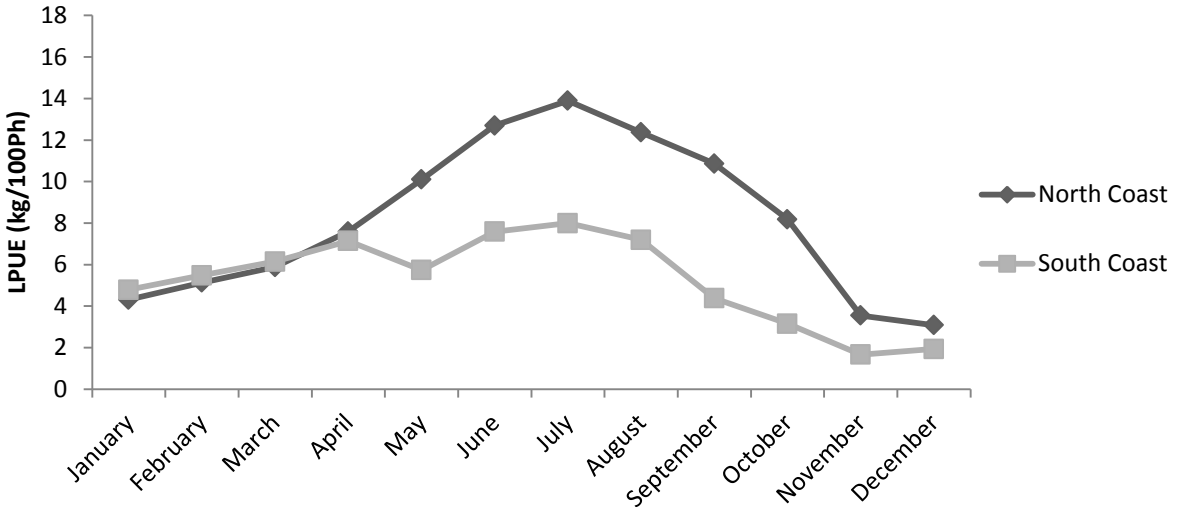

Figure 20: Monthly LPUE (kg landed/100Ph) of the European lobster (*Homarus gammarus*) split by coast, north and south, during 2018 within the Cornwall IFCA District.

On both the north and the south coasts LPUE of lobsters was generally higher in band A, than band B (Figure 21 and Figure 22). On the north coast in band A LPUE peaked in July at 19.85 kg/100Ph, in band B the highest LPUE was in June at 10.72 kg/100Ph. Similarly on the south coast the highest LPUE was attained in band A in July at 9.47 kg/100Ph and band B in April; 6.73 kg/100Ph.

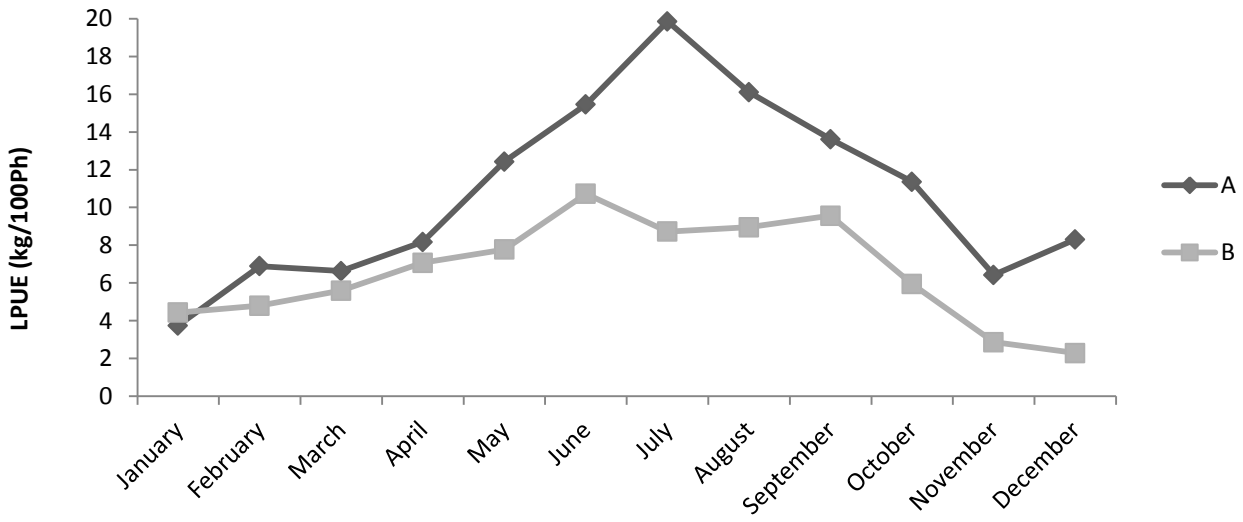

Figure 21: Monthly LPUE (kg landed/100Ph), of European lobster (*Homarus gammarus*) for belted statistical areas on the north coast, split by belt, A and B in 2018.

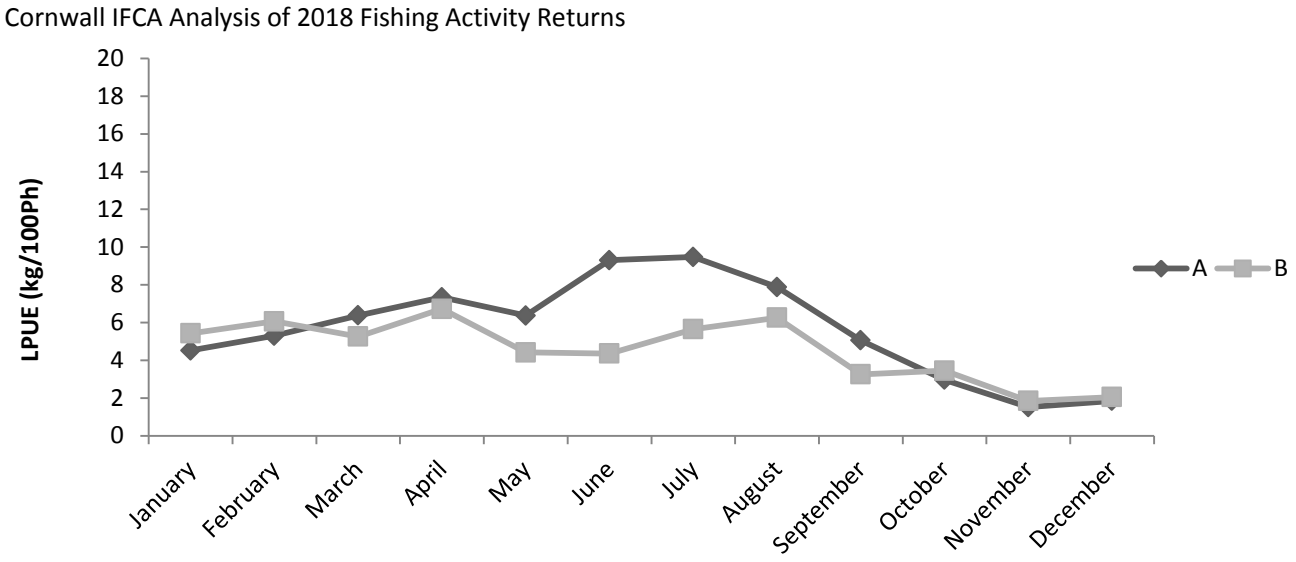

Figure 22: Monthly LPUE (kg landed/100Ph), of European lobster (*Homarus gammarus*) for belted statistical areas on the south coast, split by belt, A and B in 2018.

Thematic mapping further demonstrates the higher LPUE recorded on the north coast (Figure 23), especially in quarter three (Figure 24).

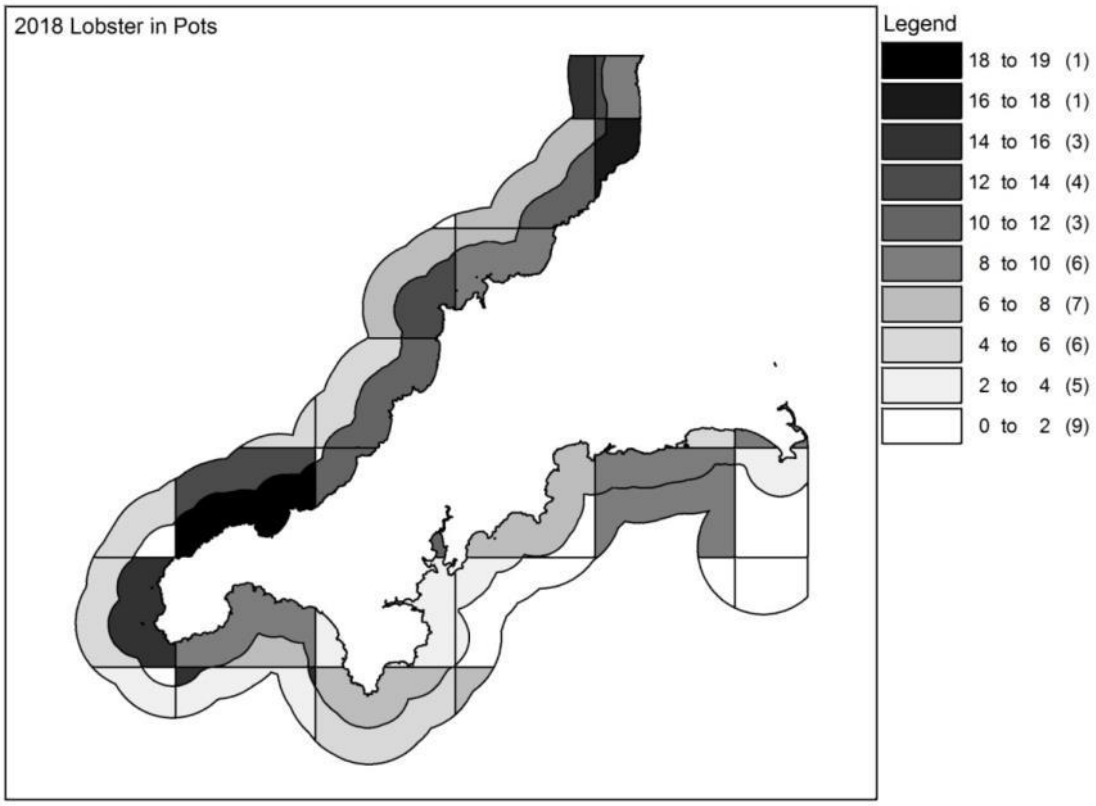

Figure 23: LPUE (kg landed/100Ph) of European lobster (*Homarus gammarus*) in the Cornwall IFCA District in 2018, thematically mapped by belted statistical area, using increments of 2kg increments.

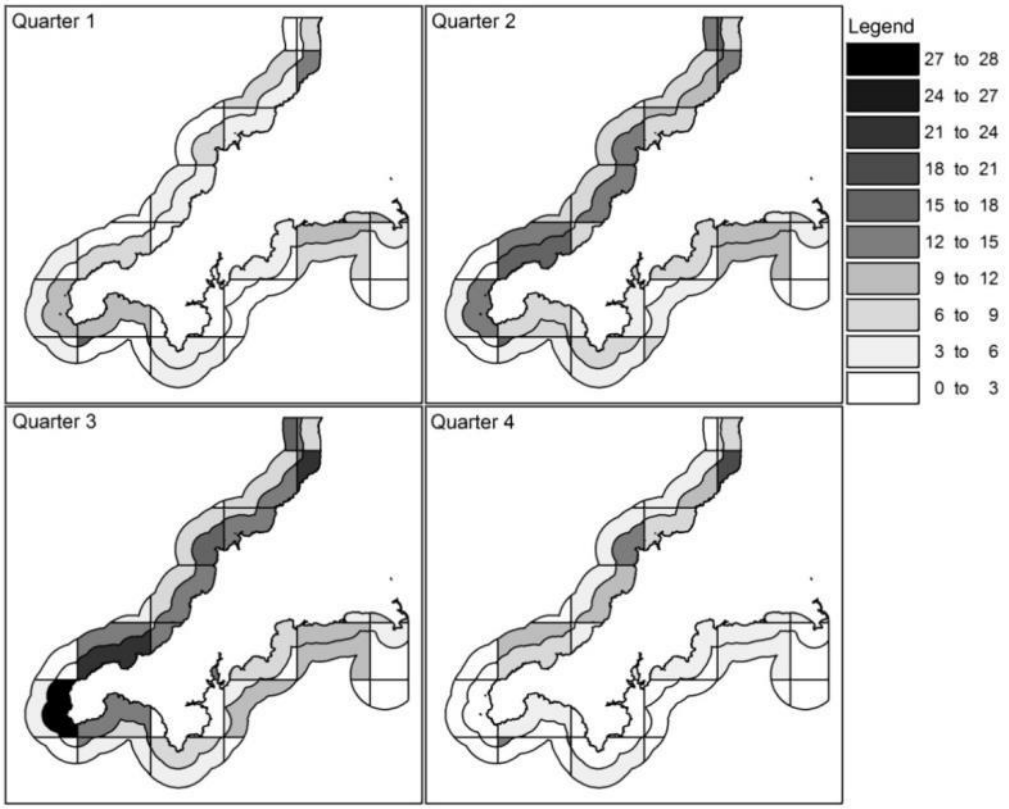

Figure 24: LPUE (kg landed/100Ph) of European lobster (*Homarus gammarus*) in the Cornwall IFCA District for quarters 1 to 4 of 2018, thematically mapped by belted statistical area, using increments of 3 kg increments.

5.2.2 Crawfish (*Palinurus elephas*)

2,807 kg of crawfish were reported to have been retained from nets in the Cornwall IFCA District in 2018. The highest monthly total was in July at 1,062 kg (Figure 25); monthly totals then declined to the end of the year.

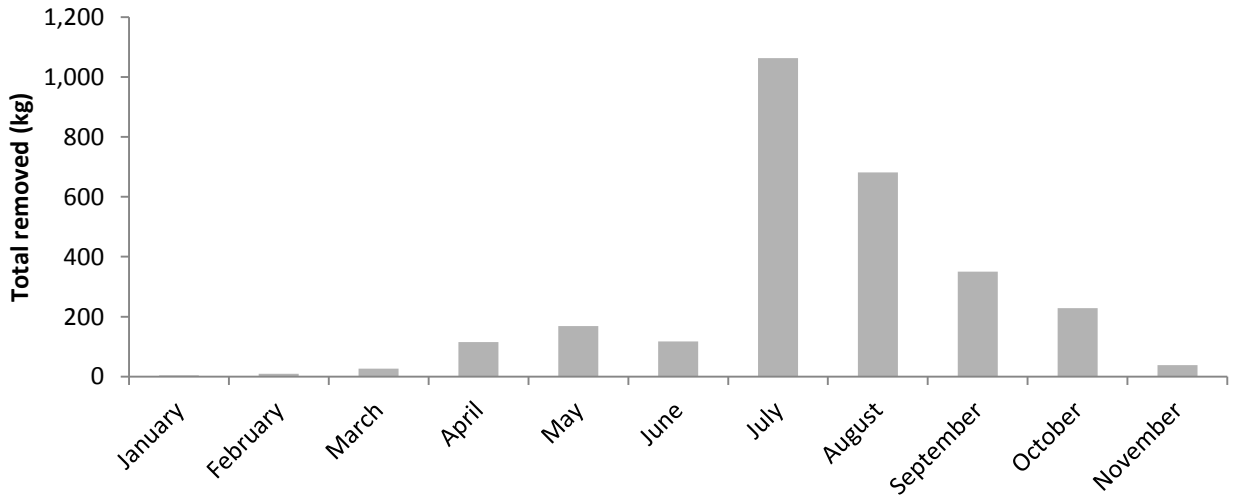

Figure 25: Total (kg) crawfish (*Palinurus elephas*) reportedly removed from the Cornwall IFCA District during 2018. Note no crawfish were reported to have been removed from the Cornwall IFCA District in December

LPUE gradually increased from January to May, and then sharply increased from June to July before a peak in August of 0.10 kg/100m_Nh (Figure 26).

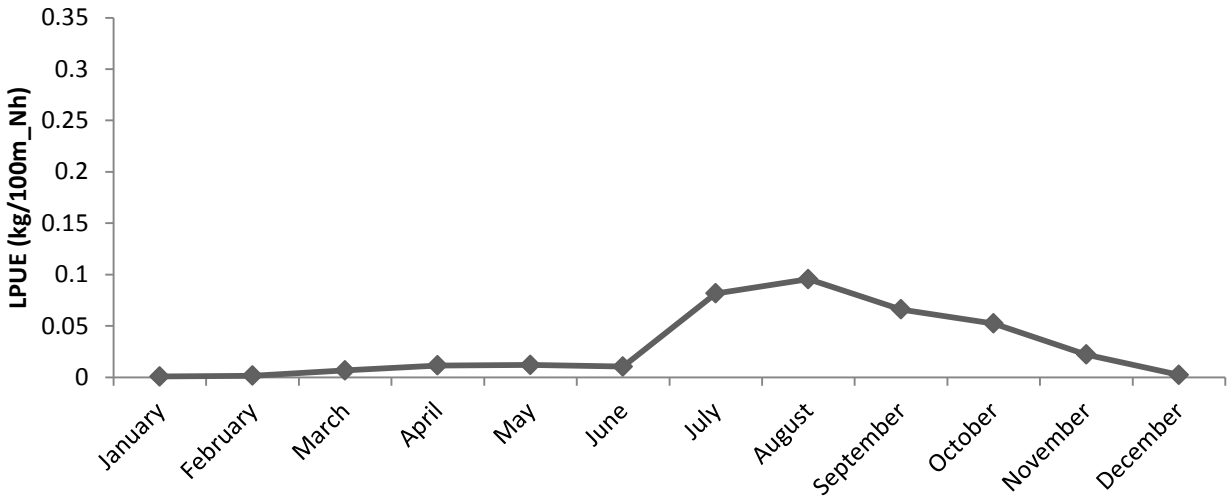

Figure 26: Monthly LPUE (kg landed/100m_Nh) for crawfish (*Palinurus elephas*), during 2018 within the Cornwall IFCA District.

When split by ICES Rectangle the two most northward Rectangles in the District, 30E5 and 30E4, were the most productive (Figure 27), with LPUE peaking in September (1.59 kg/100m_Nh) and October (1.05 kg/100m_Nh) respectively.

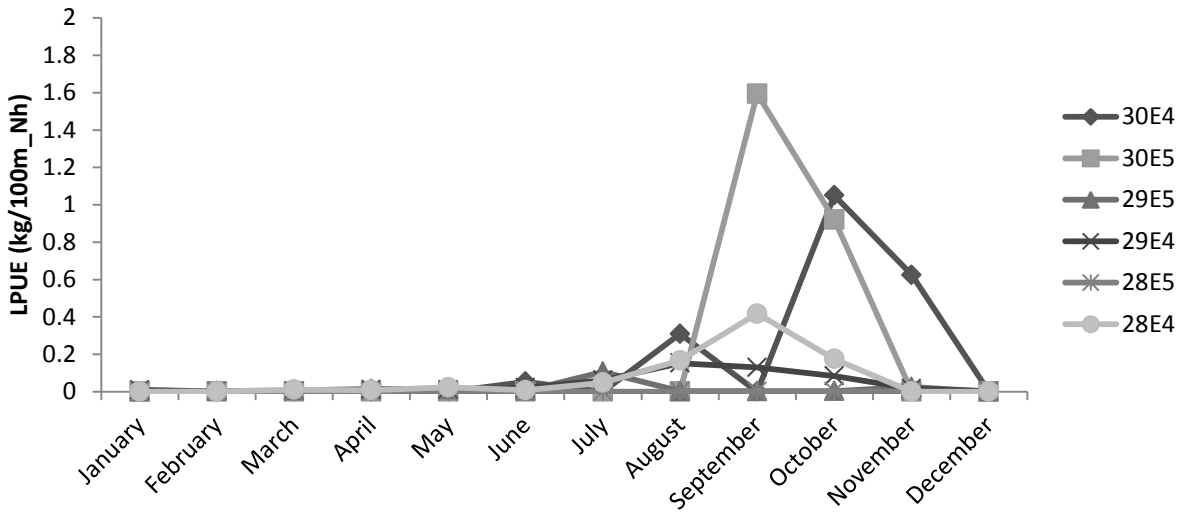

Figure 27: Monthly LPUE (kg landed/100m_Nh) of crawfish (*Palinurus elephas*) by ICES statistical rectangle for the year, 2018

When split by coast (Figure 28) both coasts showed an increase in LPUE from June to July, however most notably were the six fold increase in LPUE on the north coast from 0.14 kg/100m_Nh in July to 1.07 kg/100m_Nh in October, before dropping to 0.02 kg/100 m net hauled in November.

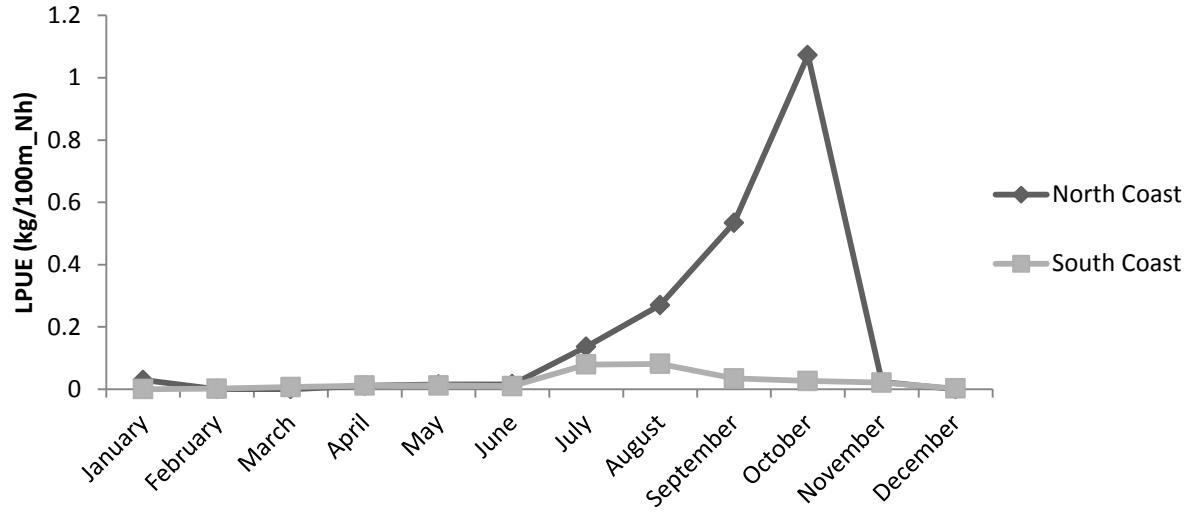

Figure 28: Monthly LPUE (kg landed/100m_Nh) of crawfish (*Palinurus elephas*) in the Cornwall IFCA District, split by coast, north and south, during 2018.

On the north coast band A appears to have two discrete peaks in LPUE, in July and October (0.52 kg/100m_Nh and 1.12 kg/100m_Nh respectively), however the LPUE in band B increased to a single peak in October of 1.02 kg/100m_Nh (Figure 29).

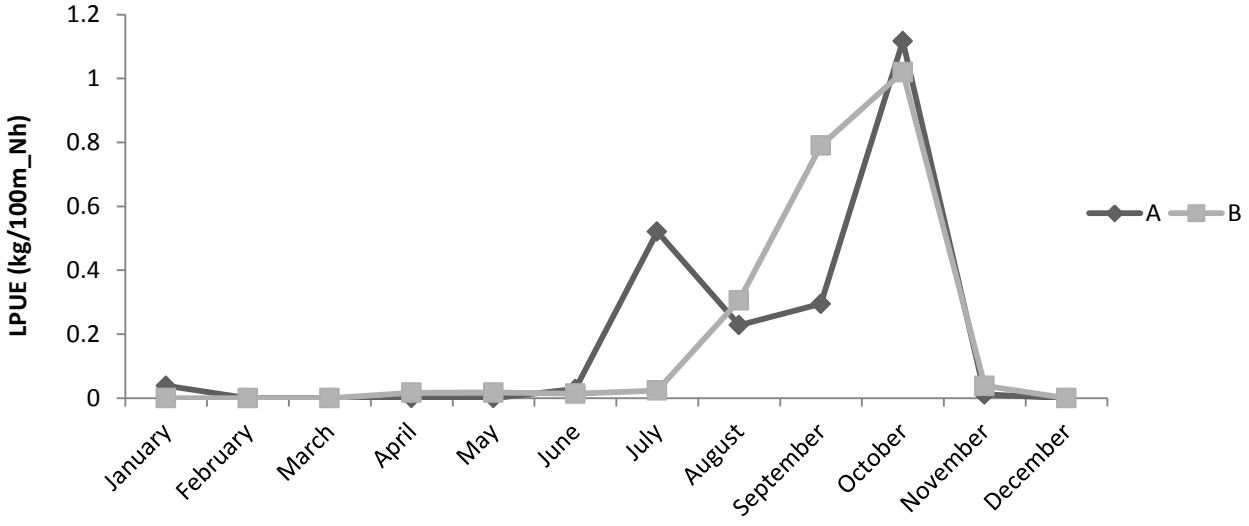

Figure 29: Monthly LPUE (kg landed/100m_Nh), of crawfish (*Palinurus elephas*) caught on the north coast, split by belt, A and B in 2018.

On the south coast band A and B appear to follow the same trend with two peaks (Figure 30); however band B is one month later. Band A peaks in July and October (0.14 kg/100m_Nh and 0.04 kg/100m_Nh), and band B in August and November (0.10 kg/100m_Nh and 0.01 kg/100m_Nh).

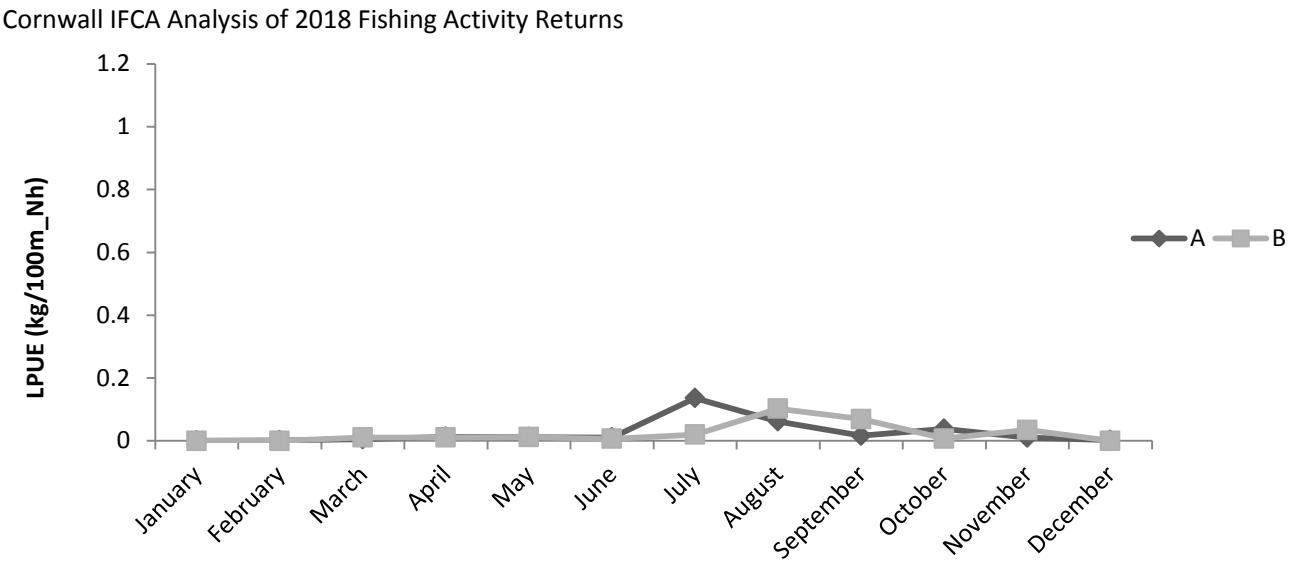

Figure 30: Monthly LPUE (kg landed/100m_Nh), of crawfish (*Palinurus elephas*) caught on the south coast, split by belt, A and B in 2018.

Thematic mapping by year (Figure 31) highlights 29E48A, off St Agnes, and 30E53B, near Port Isaac, as the areas of highest LPUE (0.90 kg/100m_Nh and 1.31 kg/100m_Nh respectively). When mapped and by quarter (Figure 32) 29E45A, off St Ives, returned relatively high LPUE in quarter 4 (1.5 kg/100m_Nh).

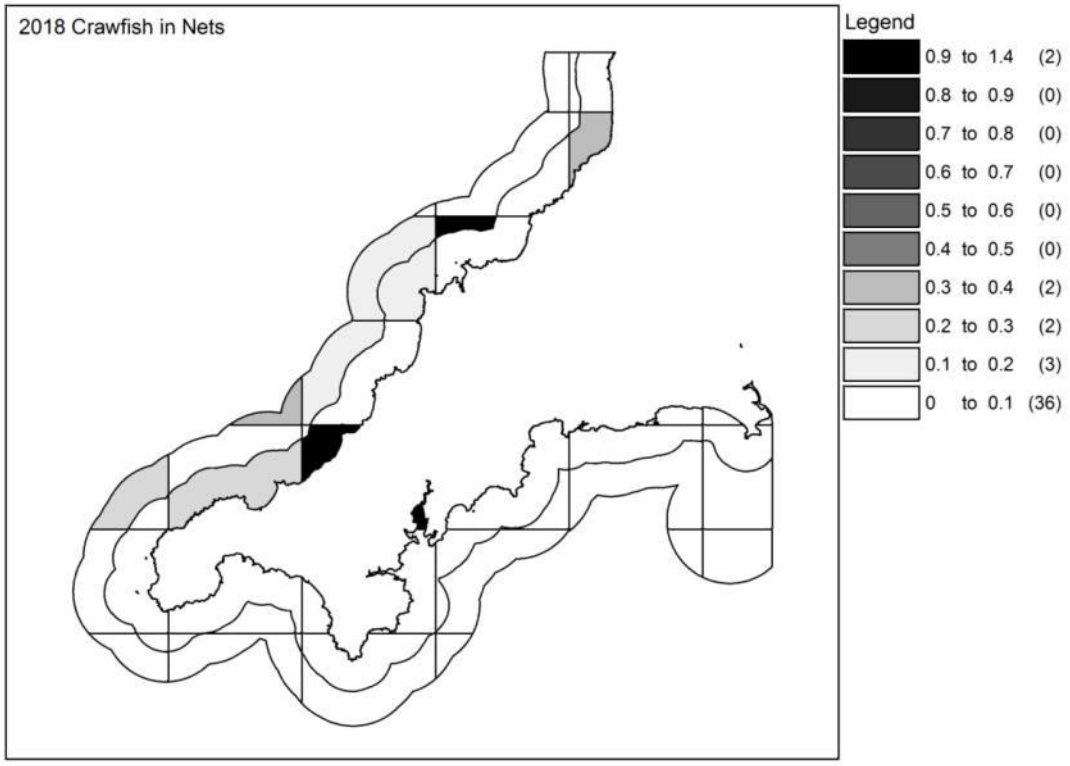

Figure 31: LPUE (kg landed/100m_Nh) of crawfish (*Palinurus elephas*) for 2018, thematically mapped by belted statistical area, using increments of 0.1 kg.

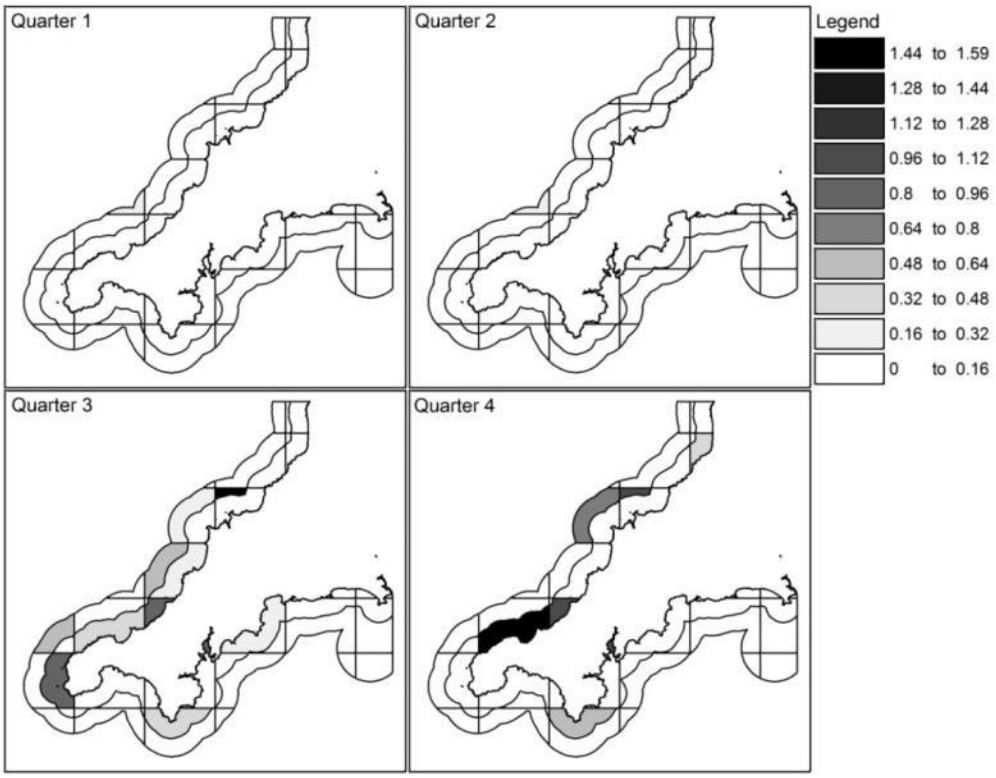

Figure 32: LPUE (kg landed/100m_Nh) of crawfish (*Palinurus elephas*) in the Cornwall IFCA District for quarters 1 to 4 of 2018 thematically mapped by statistical area, using increments of 0.16 kg.

5.2.3 Spider crab (*Maja* spp.)

5.2.3.1 Spider crab (*Maja* spp.) Fished by Pots

In 2018, 118,800.81 kg of spider crab were reported to have been removed from the Cornwall IFCA District, from fishing with pots. Total weights removed per month increased sharply in May to 28,376 kg (Figure 33), and was sustained at a similar level in June before declining to the end of the year.

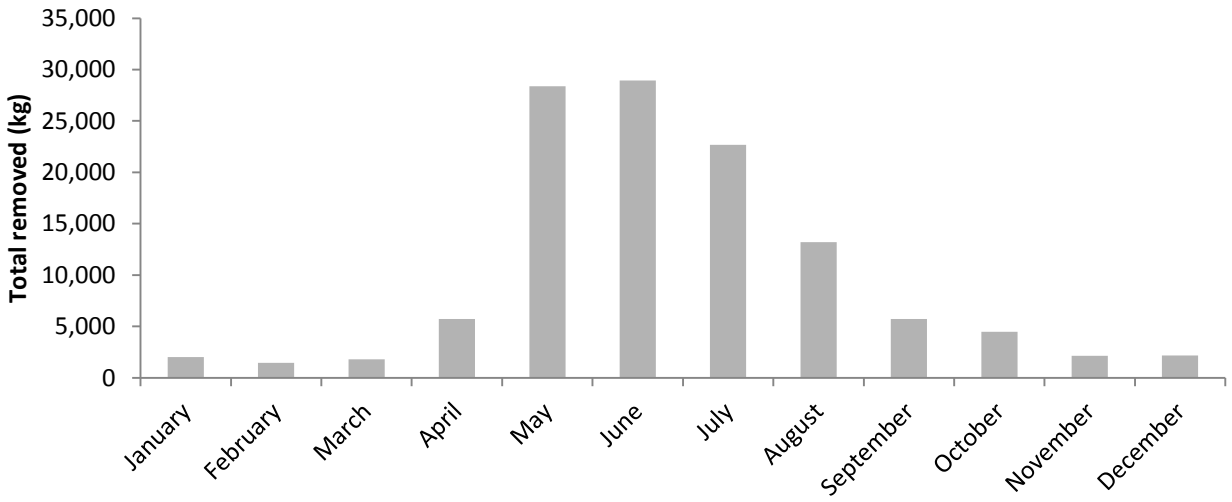

Figure 33: Total (kg) common spider crab (Maja spp.) reportedly removed from the Cornwall IFCA District during 2018

LPUE started at 4.47 kg/100Ph in January, and declined to 2.31 kg/100Ph in March, before sharply increasing to 10.02 kg/100Ph in May and 10.60 kg/100Ph in June and steadily declining to the end of the year (Figure 34).

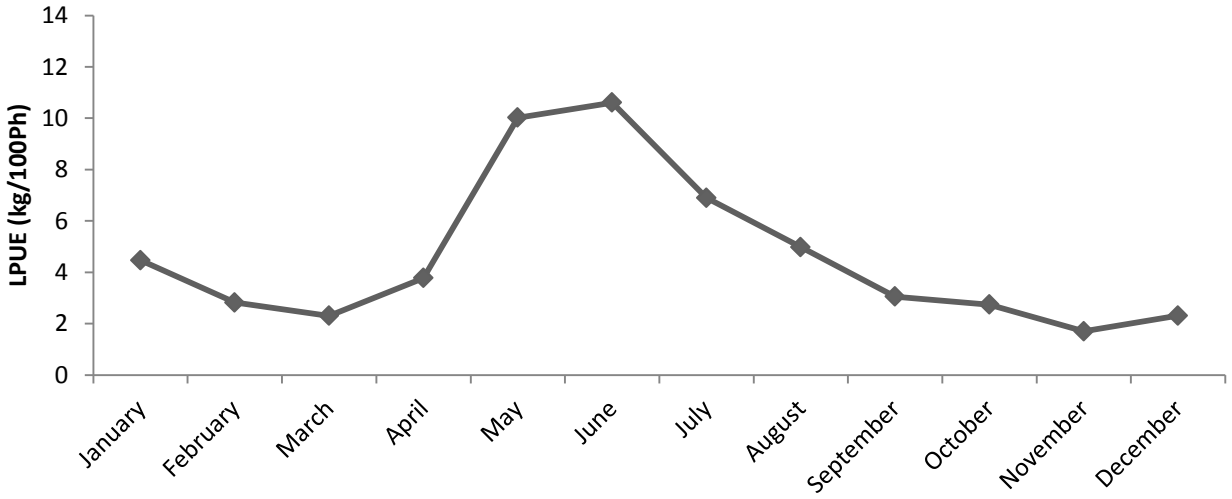

Figure 34: Monthly LPUE (kg landed/100Ph) of common spider crab (*Maja* spp.) during 2018, within the Cornwall IFCA District.

When charted by ICES Rectangle (Figure 35) all areas appeared to follow a similar trend with LPUE initially decreasing at the start of the year then increasing from March/April to a peak in May/June. 29E4 resulted in the highest LPUE in June of 17.24 kg/100Ph, peaking one month later than the majority of ICES rectangles.

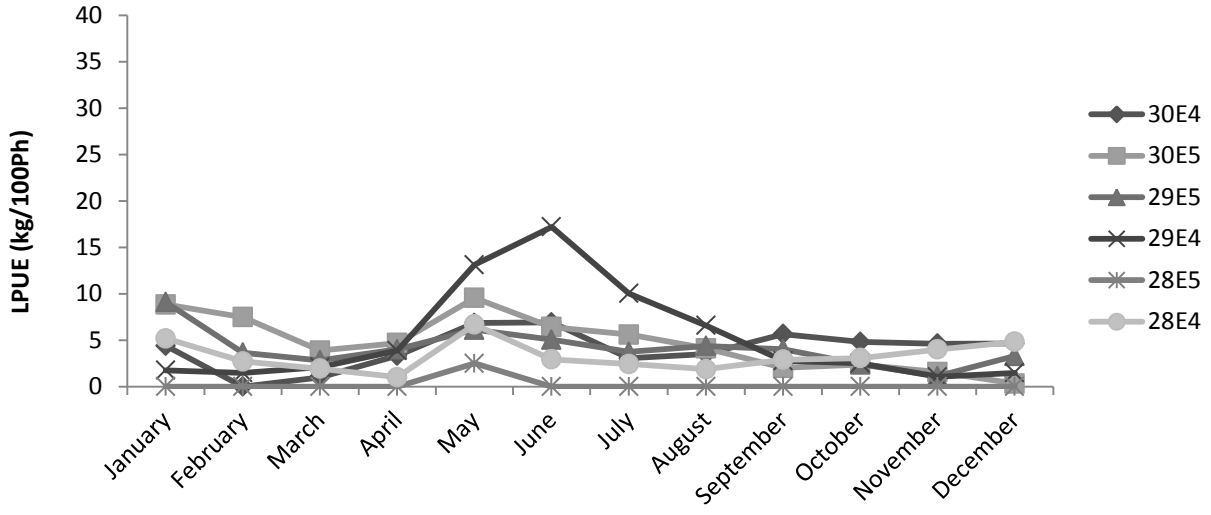

Figure 35: Monthly LPUE (kg landed/100Ph) of common spider crab (*Maja* spp.) by ICES statistical rectangle for the year, 2018.

When charted by coast (Figure 36) LPUE was highest on the south coast at the start of the year, however for the majority of the year LPUE was higher on the north coast with LPUE peaking at 17.81 kg/100Ph in June. The south coast peaked at 6.37 kg/100Ph in May.

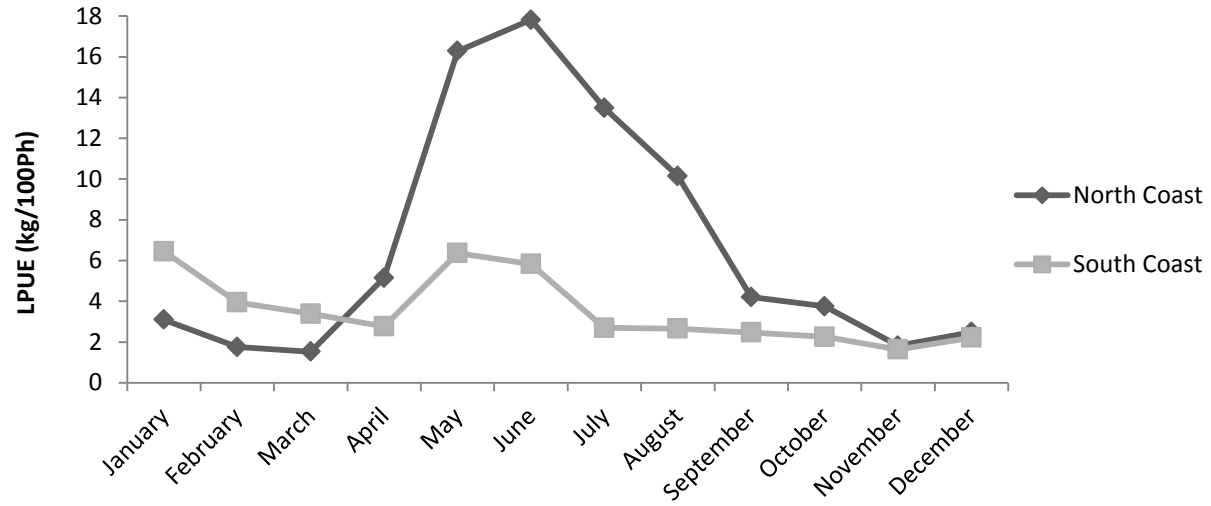

Figure 36: Monthly LPUE (kg landed/100Ph) of common spider crab (*Maja* spp.) split by coast, north and south, during 2018 within the Cornwall IFCA District.

On the north and south coasts LPUE was highest in band A for the majority of the year (Figure 37 and Figure 38). LPUE in band A on the north coast peaked in June at 30.60 kg/100Ph, on the south coast band A sustained high LPUE in May and June 8.64 kg/100Ph and 8.06 kg/100Ph.

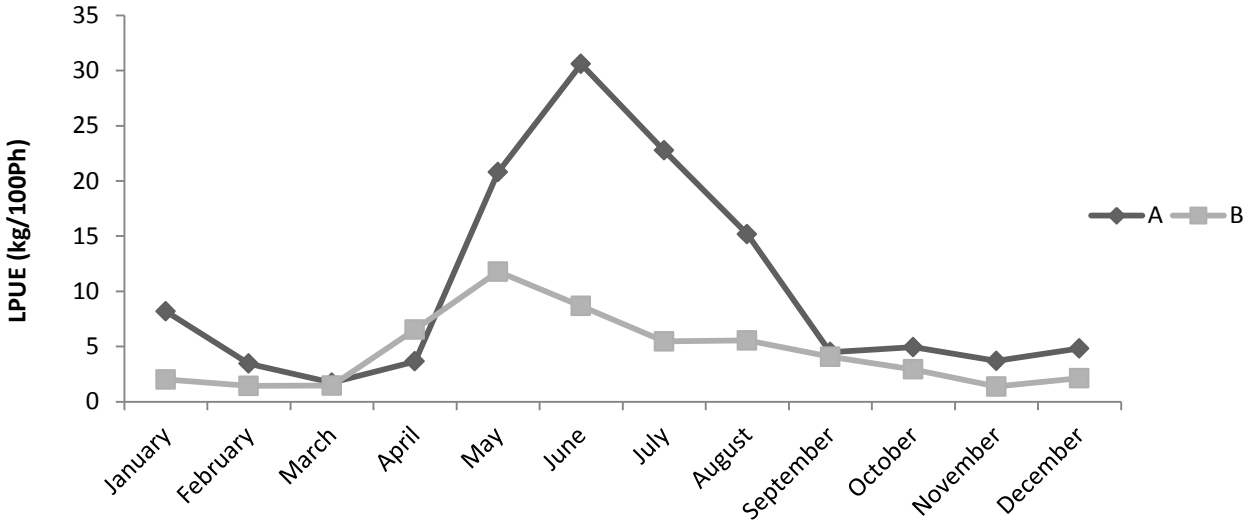

Figure 37: Monthly LPUE (kg landed/100Ph), of common spider crab (*Maja* spp.) caught on the north coast, split by belt, A and B in 2018.

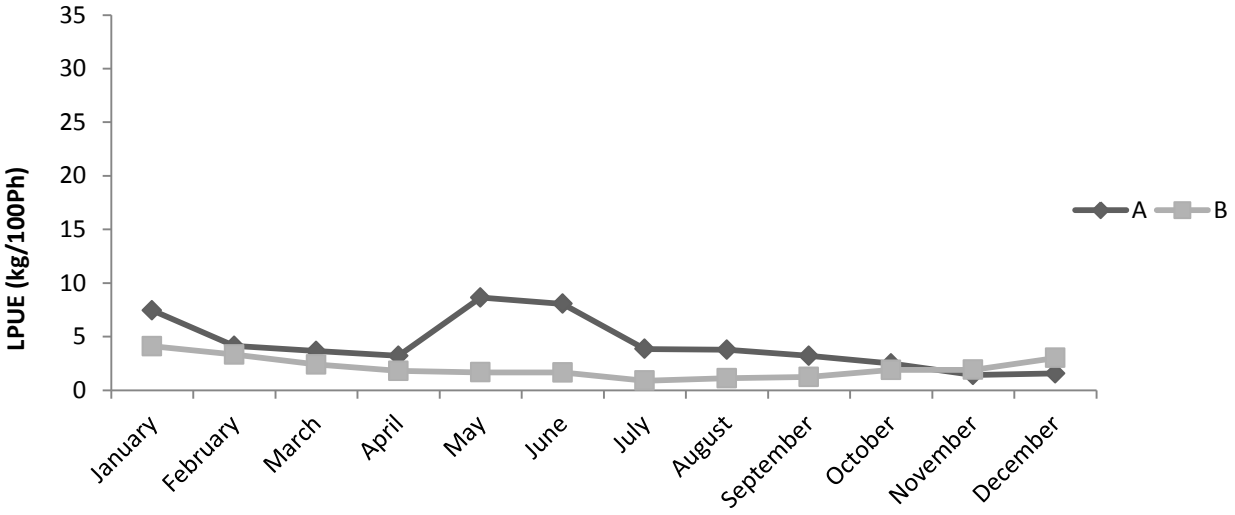

Figure 38: Monthly LPUE (kg landed/100Ph), of common spider crab (*Maja* spp.) caught on the south coast, split by belt, A and B in 2018.

When mapped thematically for the year (Figure 39) it is clear that the highest LPUE is inshore on the north coast between St Ives and Newquay. When thematically mapped by quarter (Figure 40) LPUE was highest in quarters two and three across the District.

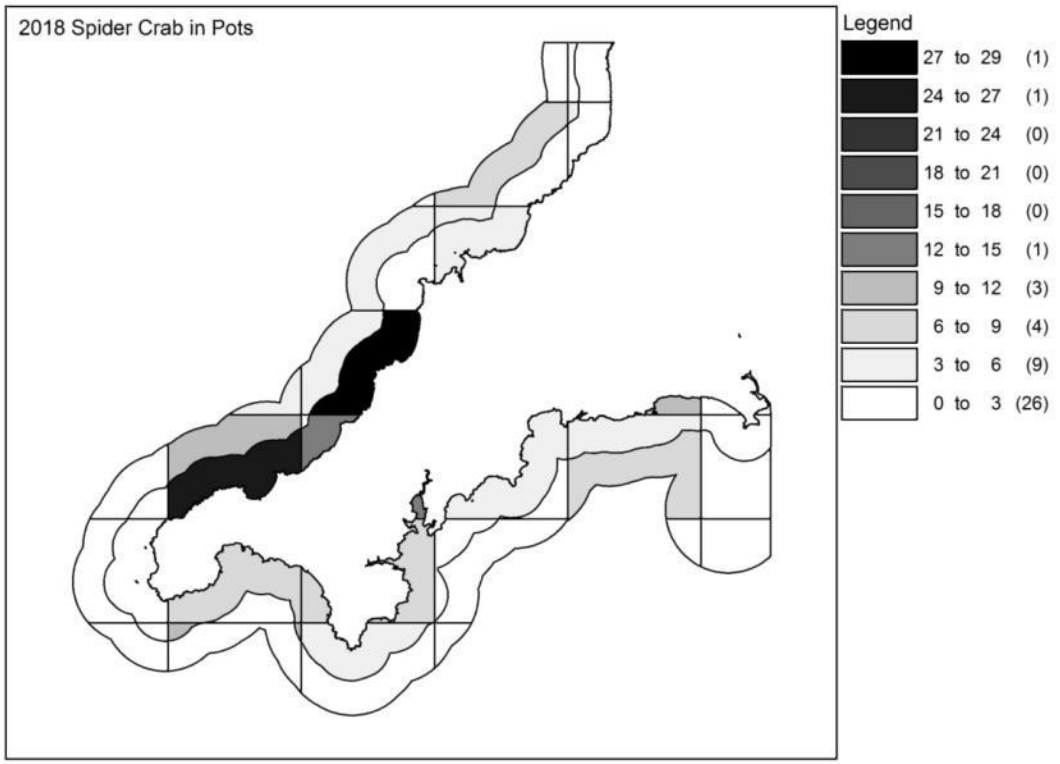

Figure 39: LPUE (kg landed/100Ph) of common spider crab (*Maja* spp.) in the Cornwall IFCA District in 2018 thematically mapped by belted statistical area, using increments of 3 kg increments.

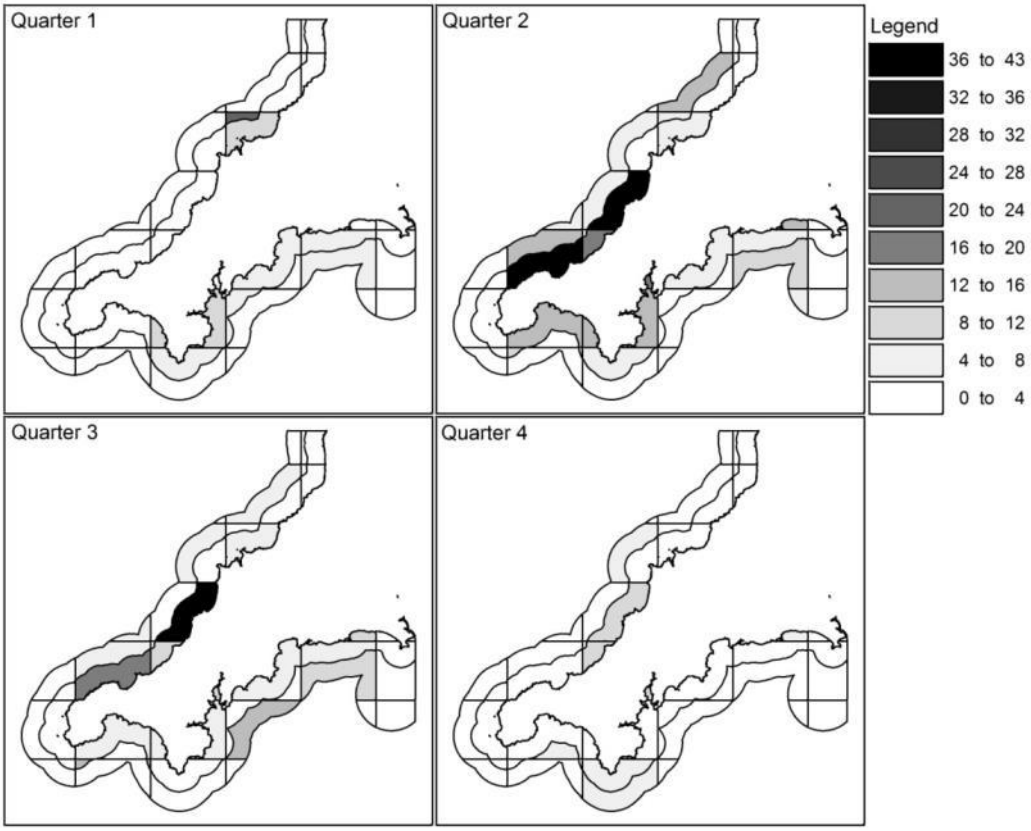

Figure 40: LPUE (kg landed/100Ph) of common spider crab (*Maja* spp.) in the Cornwall IFCA DIstrict for quarters 1 to 4 of 2018, thematically mapped by statistical area, using increments of 4 kg.

5.2.3.2 Spider crab (*Maja* spp.) Fished by Nets

In total 96,190 kg of spider crab were removed from the Cornwall IFCA District in 2018 using nets. Total monthly weights removed from the District increased from January to a peak in May of 25,984 kg (Figure 41).

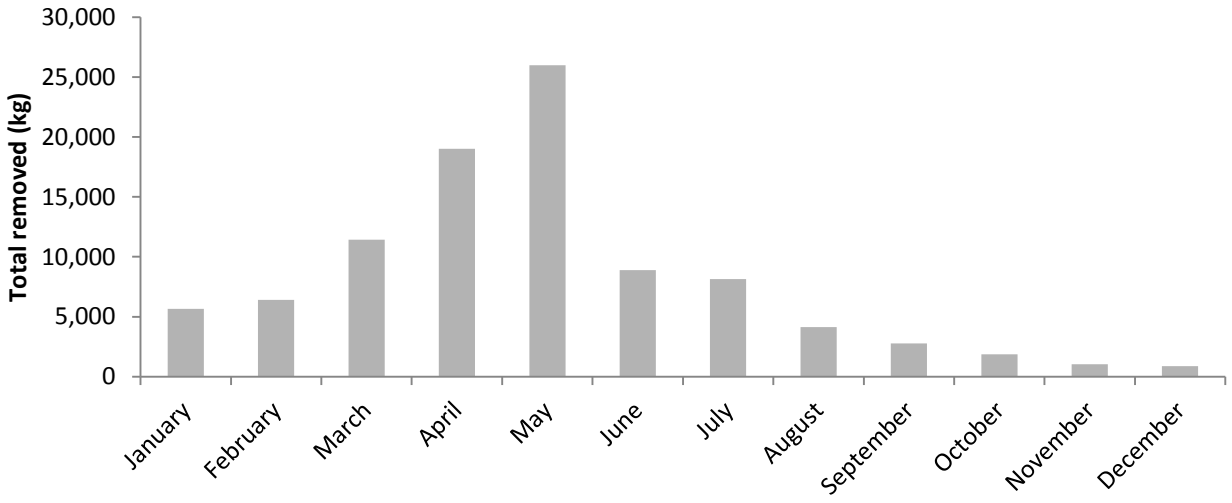

Figure 41: Total (kg) common spider crab (Maja spp.) reportedly removed from the Cornwall IFCA District during 2018

LPUE in the District (Figure 42) increased from February to March (1.12 kg/100m_Nh to 2.91 kg/100m_Nh), then declined to June (0.79 kg/100m_Nh) where LPUE remained below 1 kg/100m_Nh to the end of the year.

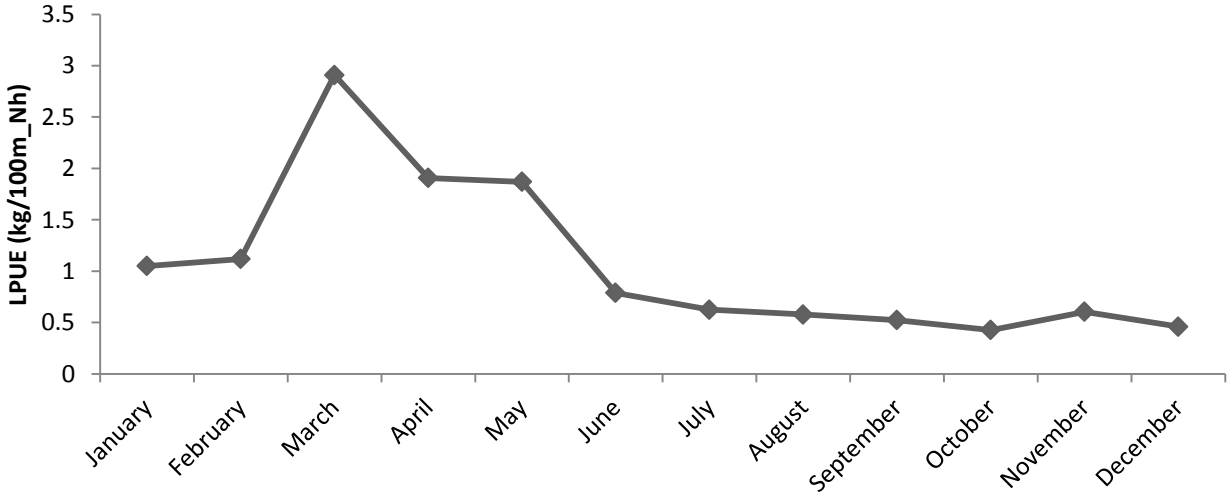

Figure 42: Monthly LPUE (kg landed/100m_Nh) of common spider crab (*Maja* spp.) during 2018, within the Cornwall IFCA District.

When charted by ICES Rectangle (Figure 43) the majority of the rectangles appeared to increase LPUE in March, however 30E5 and 30E4 have the highest LPUE peaking in May and July respectively (22.22 kg/100m_Nh and 20.97 kg/100m_Nh).

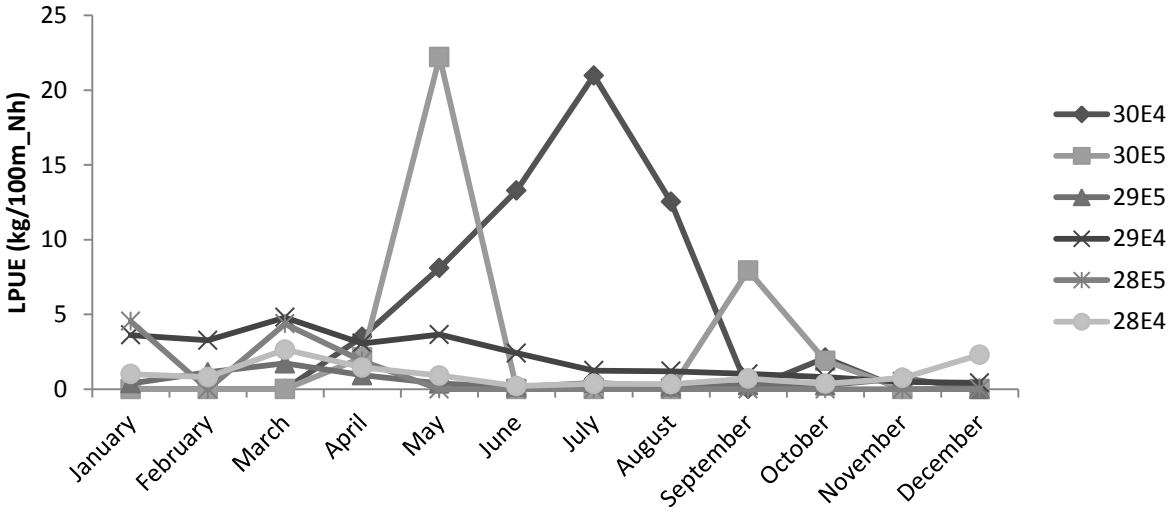

Figure 43: Monthly LPUE (kg landed/100m_Nh) of common spider crab (*Maja* spp.) by ICES statistical rectangle for the year, 2018

LPUE on the north coast was higher than the south from April to October (Figure 44). The north coast attained the highest LPUE in May at 6.09 kg/100m_Nh, and the south coast in March at 2.92 kg/100m_Nh.

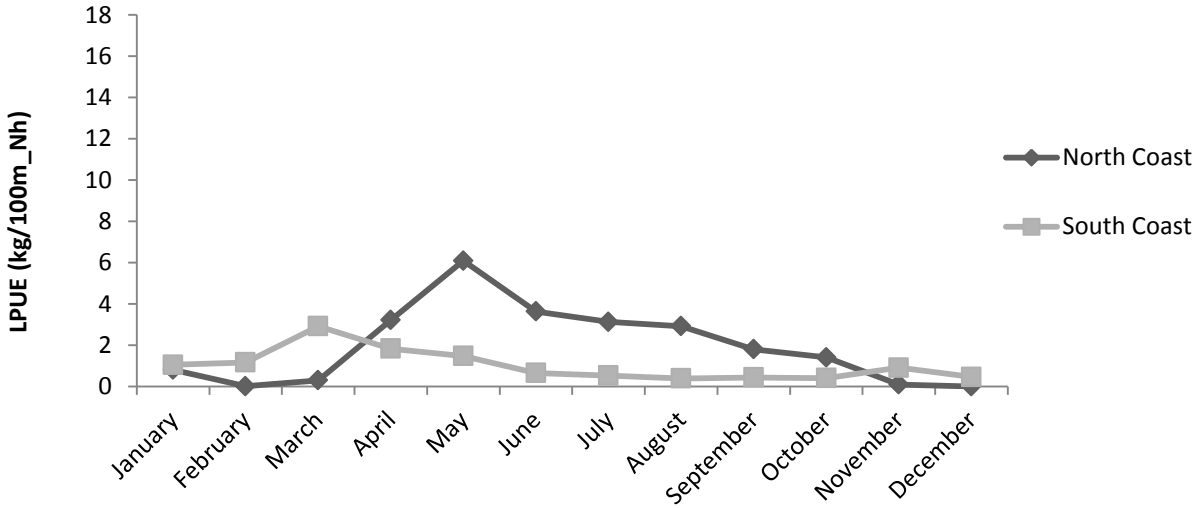

Figure 44: Monthly LPUE (kg landed/100m_Nh) of common spider crab (*Maja* spp.) split by coast, north and south, during 2018 within the Cornwall IFCA District.

On both coasts the highest LPUE values for the year occurred in band A (Figure 45 and Figure 46), in June on the north coast (18.52 kg/100m_Nh) and March on the south coast (3.21 kg/100m_Nh).

Cornwall IFCA Analysis of 2018 Fishing Activity Returns

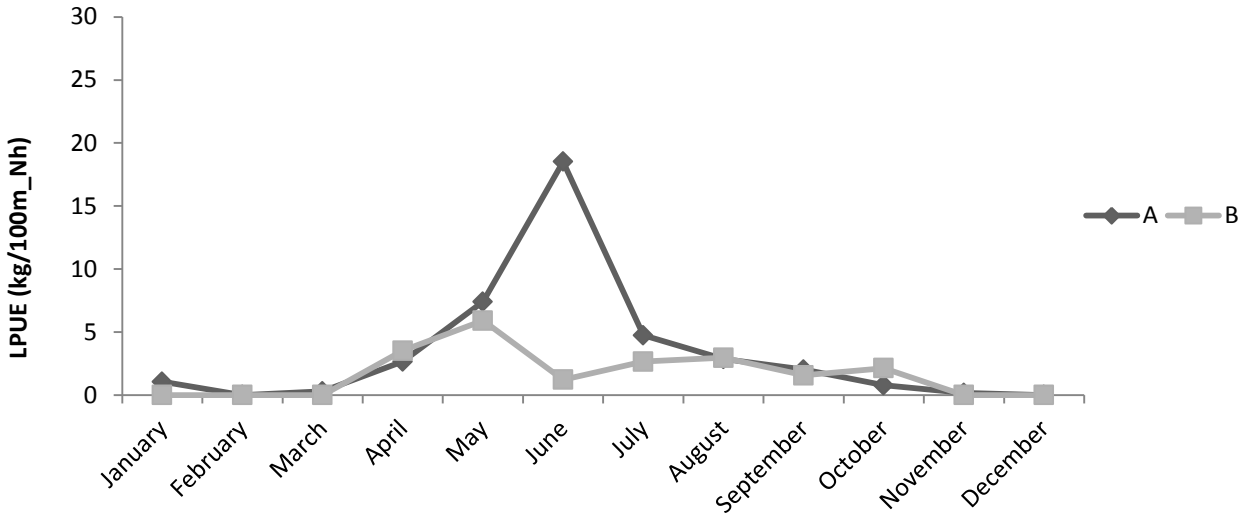

Figure 45: Monthly LPUE (kg landed/100m_Nh), of common spider crab (*Maja* spp.) caught on the north coast, split by belt, A and B in 2018.

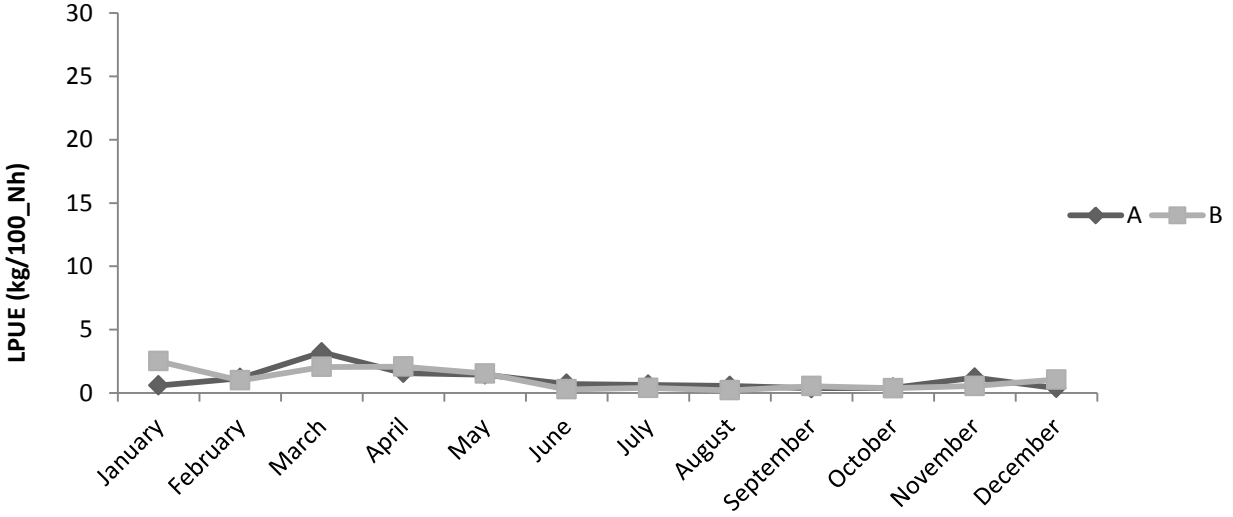

Figure 46: Monthly LPUE (kg landed/100m_Nh), of common spider crab (*Maja* spp.) caught on the south coast, split by belt, A and B in 2018.

Thematically mapped LPUE for the entire year (Figure 47) highlights 29E43 A and B off Cape Cornwall (11.64 kg/100m_Nh and 6.21 kg/100m_Nh respectively), and 30E49 A and B off Trevose Head (16.16 kg/100kg nets hauled and 8.48 kg/100m_Nh respectively) as areas of high LPUE, in both areas the LPUE is higher in band A, inshore.

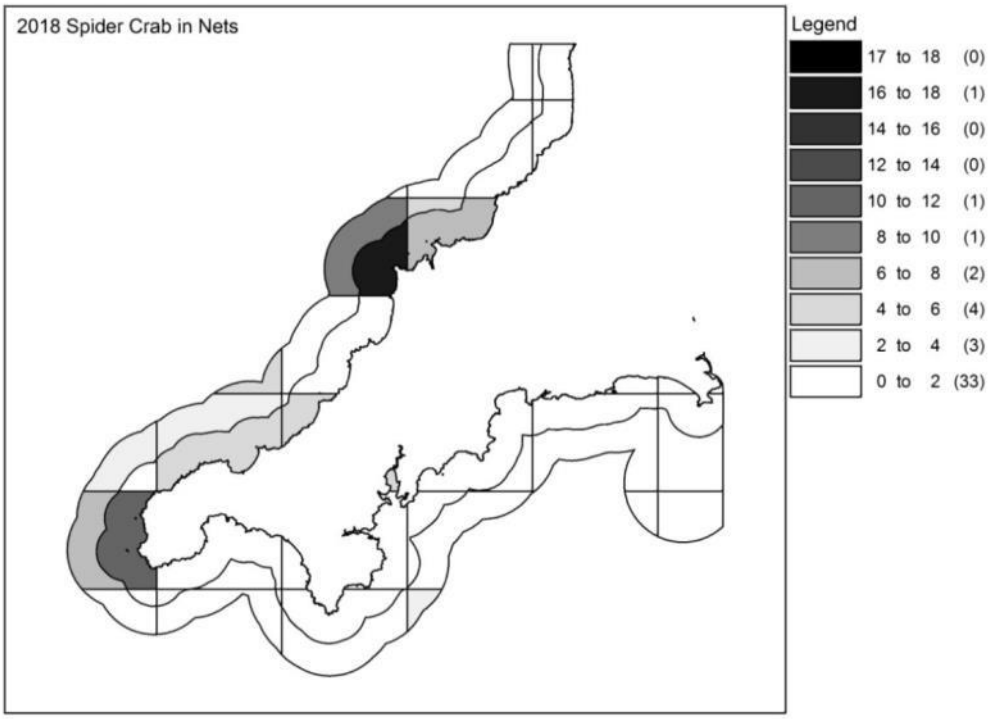

Figure 47: LPUE (kg landed/100m_Nh) of common spider crab (*Maja* spp.) in the Cornwall IFCA District in 2018 thematically mapped by belted statistical area, using increments of 2 kg increments.

Thematically mapped LPUE by quarter (Figure 48) showed highest levels of LPUE in quarter two on the majority of the north coast and an isolated high value in 29E58A, off Rame Head (13.5 kg/100m nets hauled) on the south coast.

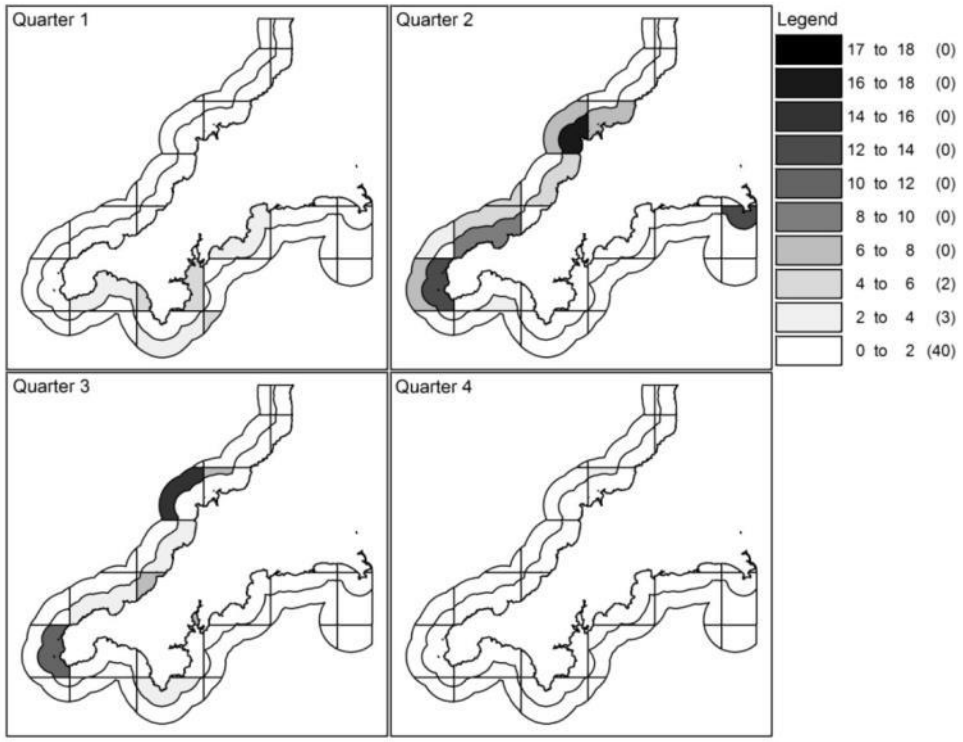

Figure 48: LPUE (kg landed/100m_Nh) of common spider crab (*Maja* spp.) in the Cornwall IFCA District for quarters 1 to 4 of 2018 thematically mapped by statistical area, using increments of 2 kg.

5.2.4 Edible crab (*Cancer pagurus*)

5.2.4.1 Edible crab (*Cancer pagurus*) Fished by Pots

In 2018, 1,424,738.69 kg of edible crab was reported to have been removed from the Cornwall IFCA District in pots. Total monthly weight of edible crab removed from the Cornwall IFCA District by pots rose sharply from March to a peak of 216,237 kg in July, and then gradually decreased overall to December (Figure 49).

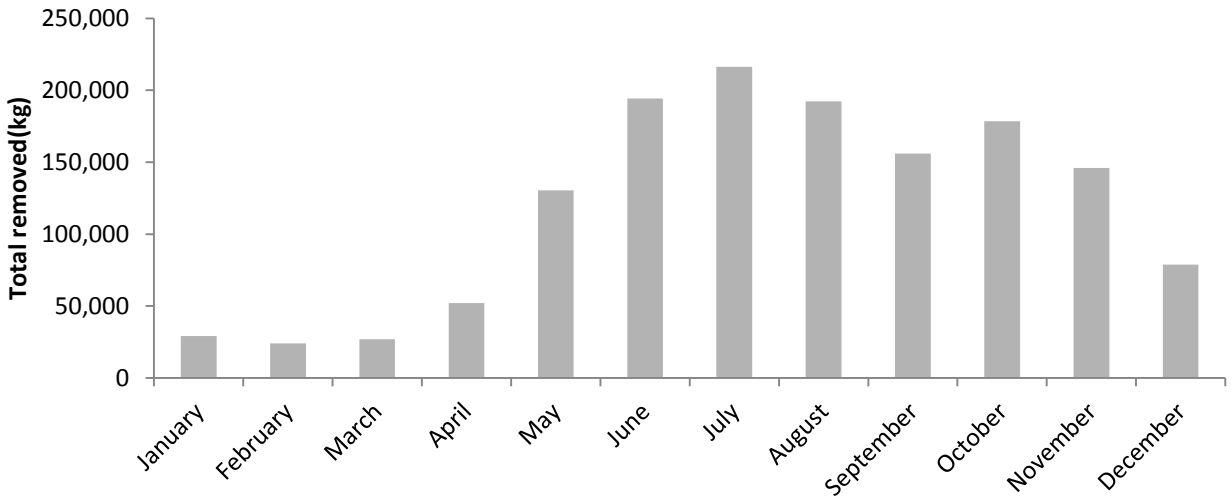

Figure 49: Total (kg) edible crab (*Cancer pagurus*) reportedly removed from the Cornwall IFCA District during 2018

LPUE in the District initially declined from January to March (64.06 kg/100Ph to 34.26 kg/100Ph) before increasing to 71.22 kg/100Ph in June, then 115.45 kg/100Ph in November (Figure 50).

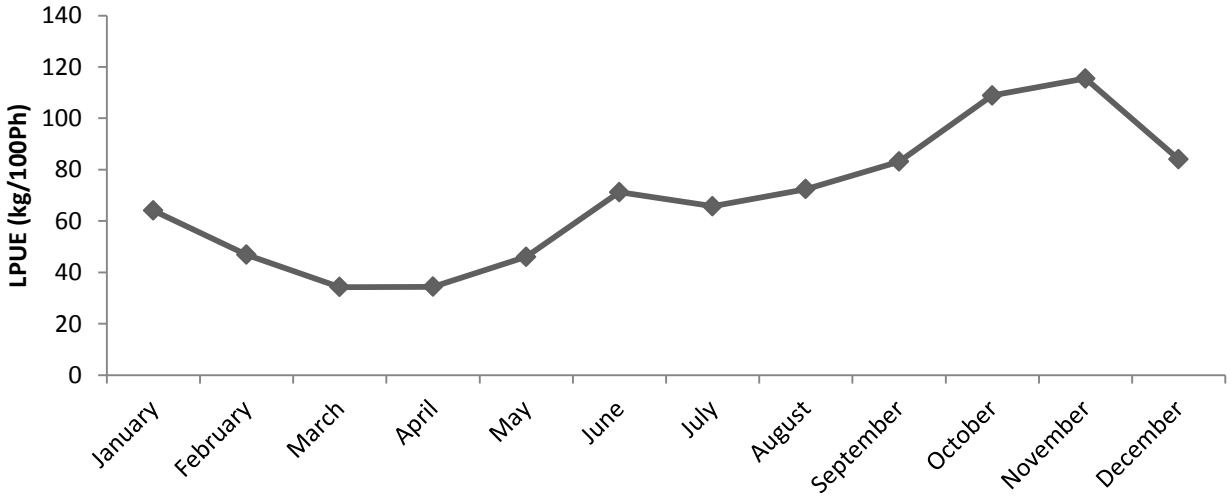

Figure 50: Monthly LPUE (kg landed/100Ph) of edible crab (*Cancer pagurus*) during 2018, within the Cornwall IFCA District.

When charted by ICES Rectangle all areas (other than 28E5) appear to follow a similar trend of decreasing LPUE from January to February, with the highest LPUE occurring in the later part of the year (October to December) (Figure 51).

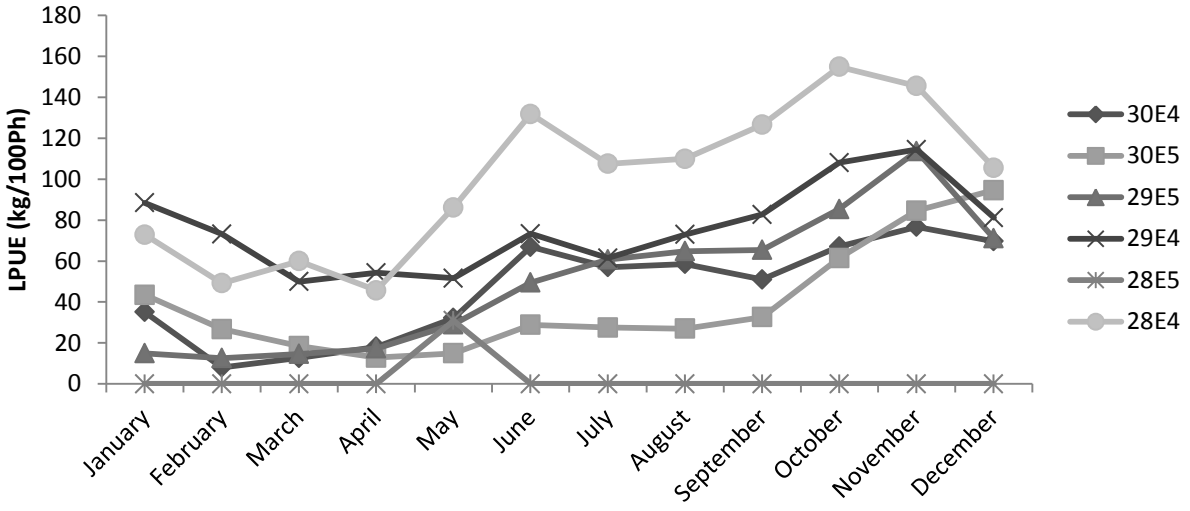

Figure 51: Monthly LPUE (kg landed/100Ph) of edible crab (*Cancer pagurus*) by ICES statistical rectangle for the year, 2018.

At the beginning of the year LPUE was higher on the north coast than the south; 84.06 kg/100Ph on the north and 35.27 kg/100Ph on the south (Figure 52). However, from April onwards LPUE values were consistently higher on the south coast. During this part of the year both coasts followed a similar pattern of increasing LPUE to June, decreasing in July, before steadily increasing to the highest LPUE in November (98.43 kg/100Ph on the north and 125.65 kg/100Ph on the south).

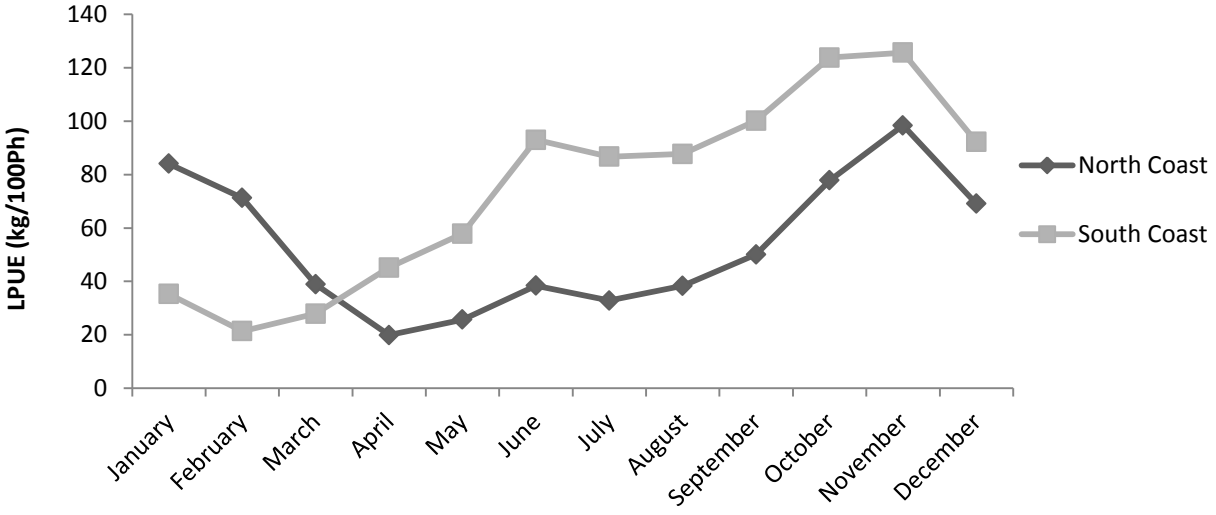

Figure 52: Monthly LPUE (kg landed/100Ph) of edible crab (*Cancer pagurus*) split by coast, north and south, during 2018 within the Cornwall IFCA District.

On both coasts band B returned consistently higher LPUE than band A for the entire year (Figure 53 and Figure 54) (except November on the north coast).

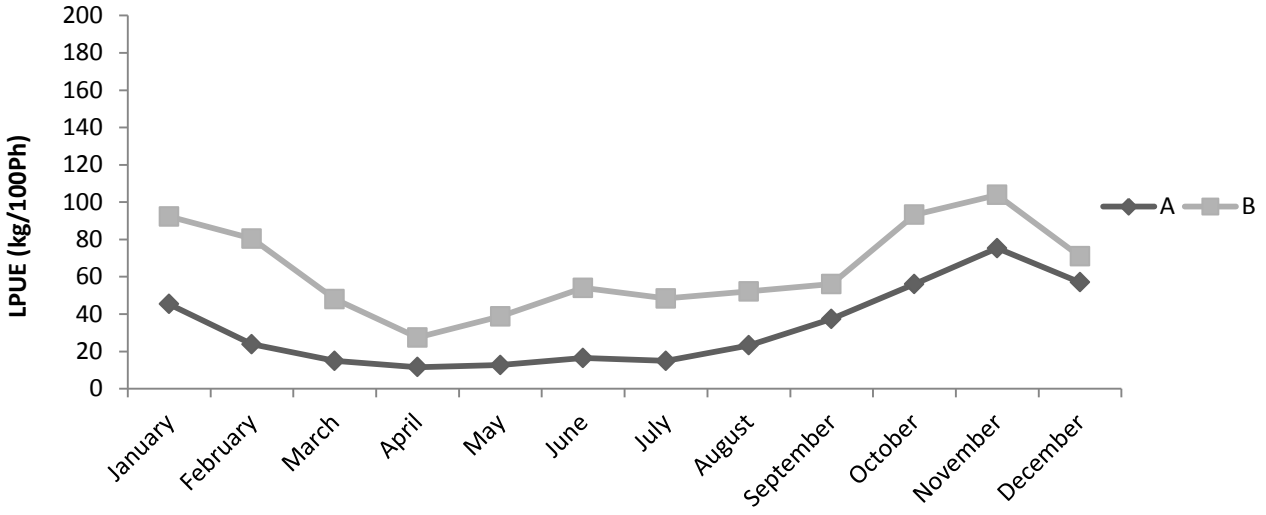

Figure 53: Monthly LPUE (kg landed/100Ph), of edible crab (*Cancer pagurus*) caught on the north coast, split by belt, A and B in 2018.

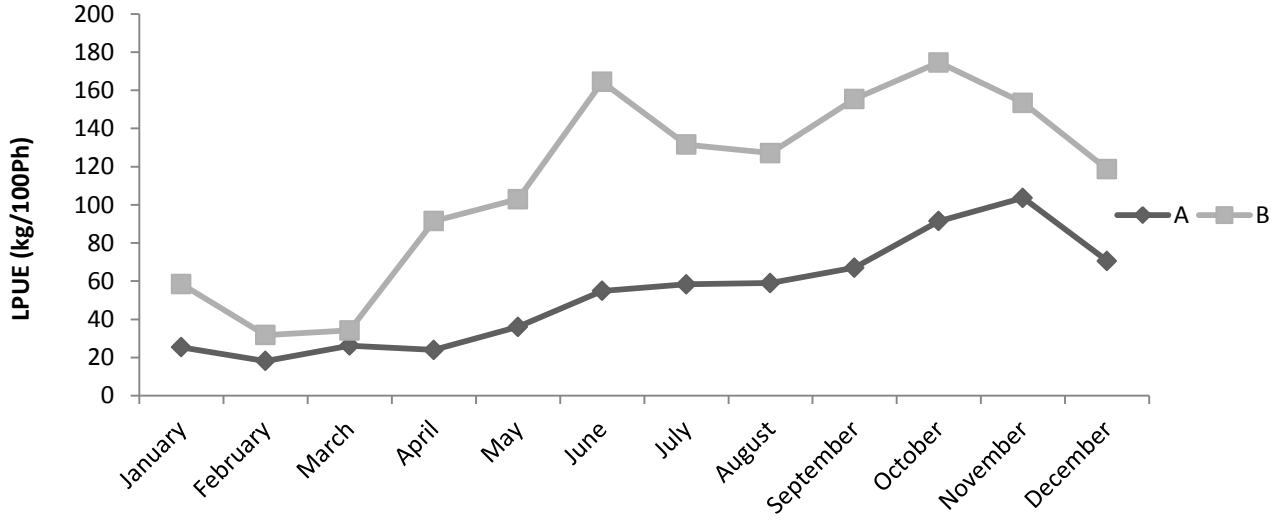

Figure 54: Monthly LPUE (kg landed/100Ph), of edible crab (*Cancer pagurus*) caught on the south coast, split by belt, A and B in 2018.

Thematically mapped LPUE of combined edible crab (Figure 55) showed that LPUE was highest in belted statistical areas in the far south west of the District. Thematic mapping of combined edible crab caught in pots by quarter (Figure 56) demonstrates the high LPUE values District wide in quarter four, and in the far south west in quarters two and three.

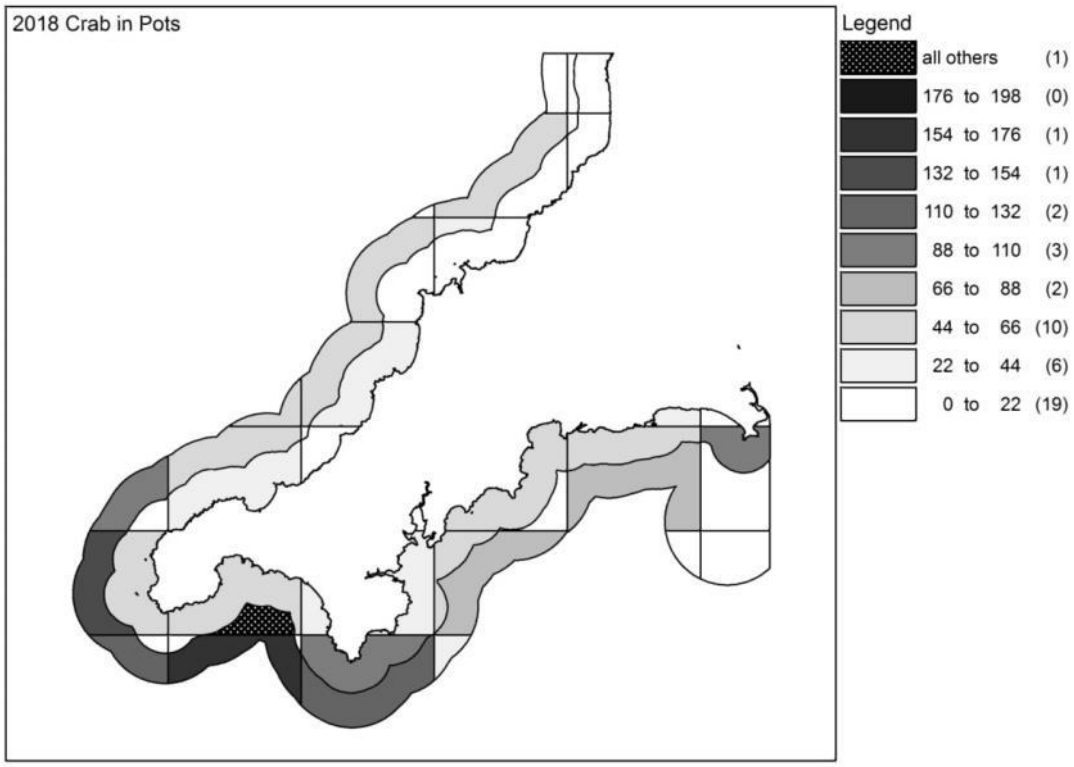

Figure 55: LPUE (kg landed/100Ph) of edible crab (*Cancer pagurus*) in the Cornwall IFCA District in 2018 thematically mapped by belted statistical area, using increments of 22 kg. Note: a higher value of 199.31 kg/100pots in 29E46B was assigned a new category represented in white dots on a black background.

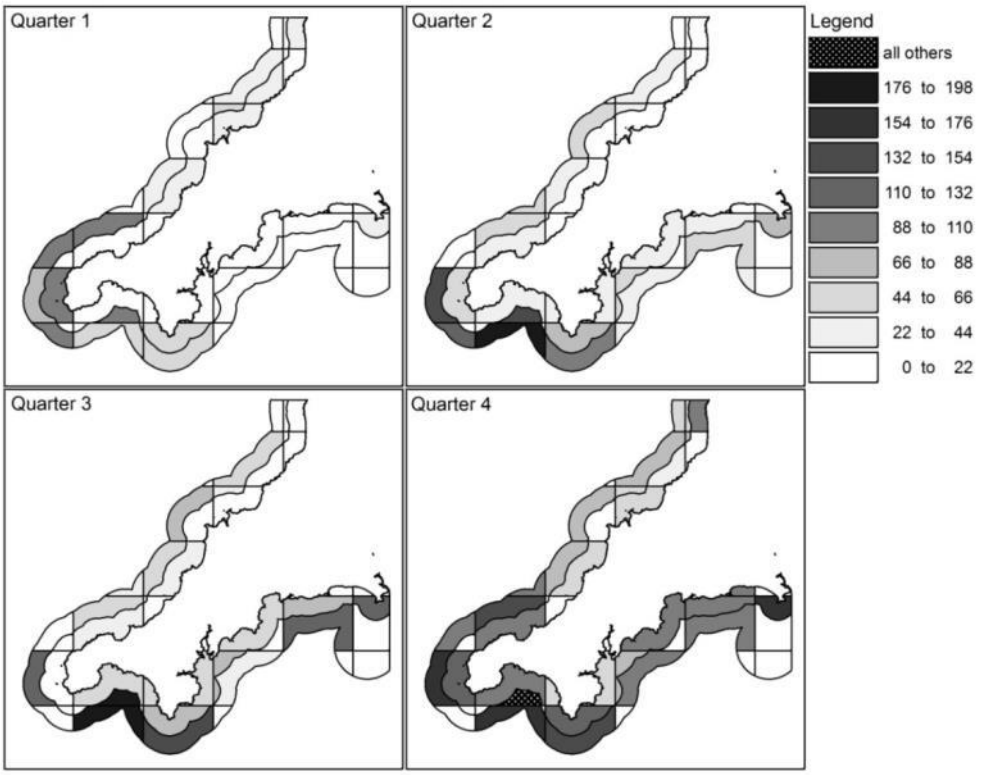

Figure 56: LPUE (kg landed/100Ph) of edible crab (*Cancer pagurus*) in the Cornwall IFCA District for quarters 1 to 4 of 2018, thematically mapped by statistical area, using increments of 22 kg. Note: a higher value of 297.67 kg/100pots was returned in quarter four in 29E46B therefore assigned a new category represented in white dots on a black background.

5.2.4.2 Male Edible crab (*Cancer pagurus*) Fished by Pots

A total of 121,053.58 kg of male edible crab was reported to have been removed from the Cornwall IFCA District in 2018 by pots. Total weight of male edible crab removed from the Cornwall IFCA District rose from February to May; the highest value was recorded in July (17,783 kg) then gradually declined overall to December (Figure 57).

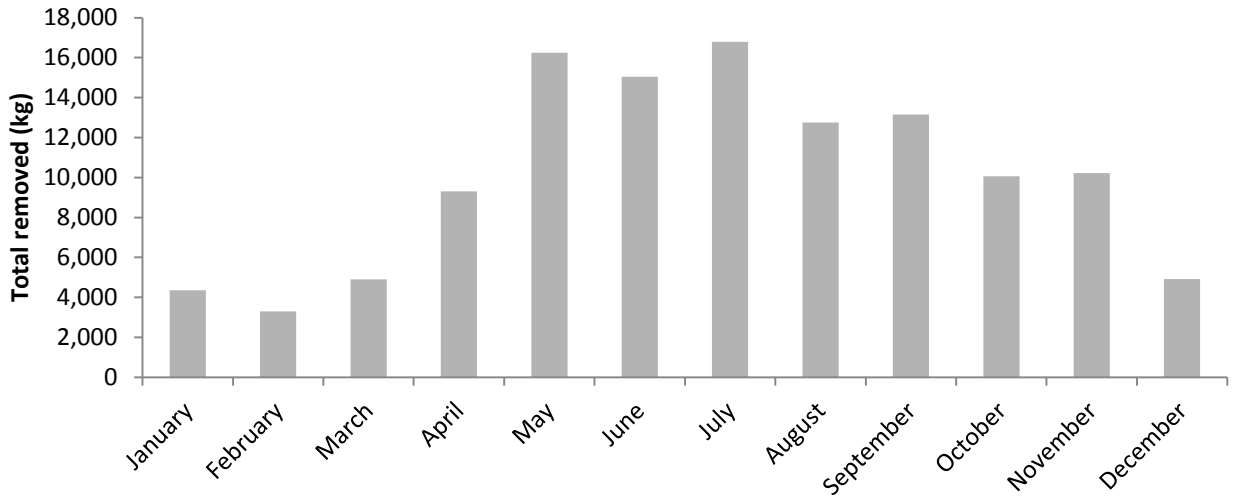

Figure 57: Total (kg) male edible crab (*Cancer pagurus*) reportedly removed from the Cornwall IFCA District during 2018

The year started with the highest monthly LPUE for the District at 9.58 kg/100Ph (Figure 58), which gradually declined to 4.80 kg/100Ph in August. LPUE rose again in September and November to 7.01 kg/100Ph and 8.08 kg/100Ph respectively.

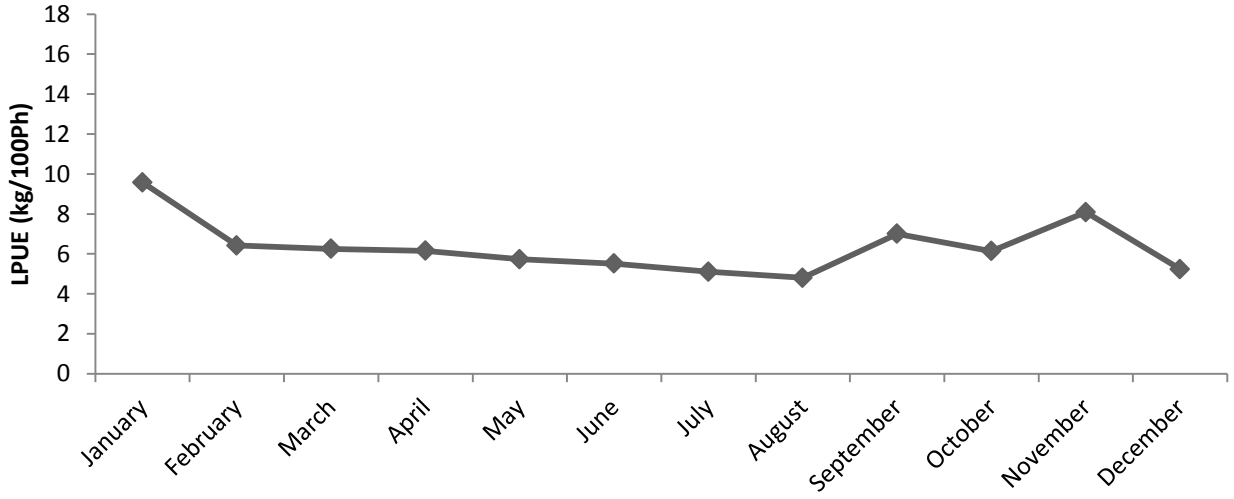

Figure 58: Monthly LPUE (kg landed/100Ph) of male edible crab (*Cancer pagurus*) during 2018, within the Cornwall IFCA District.

28E4 attained the highest LPUE values for the majority for the year (Figure 59) with a peak in March of 13.36 kg/100Ph. 29E5 and 30E4 follow a very similar pattern throughout the year with very little change in LPUE (29E5; 2.42 kg/100Ph minimum and 5.77 kg/100Ph maximum, and 30E4; 1.31 kg/100Ph minimum and 4.85 kg/100Ph maximum).

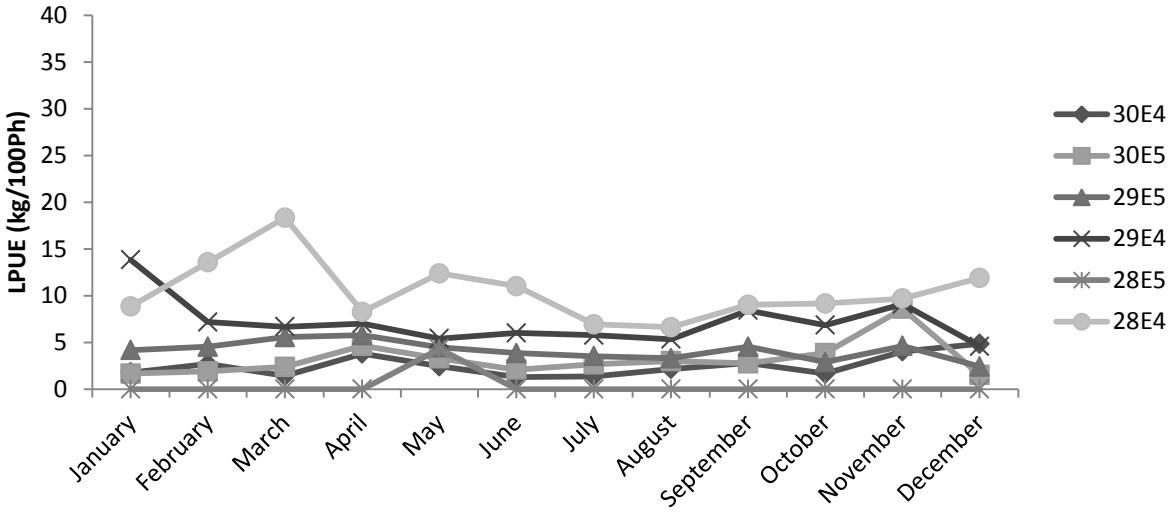

Figure 59: Monthly LPUE (kg landed/100Ph) of male edible crab (*Cancer pagurus*) by ICES statistical rectangle for the year, 2018.

When plotted by coast (Figure 60) LPUE values are higher on the north coast from August to December with a peak in November at 12.88 kg/100Ph. The highest LPUE on the south coast was attained in March at 7.76 kg/100Ph, 2.6 kg/100Ph higher than the north coast in the same month.

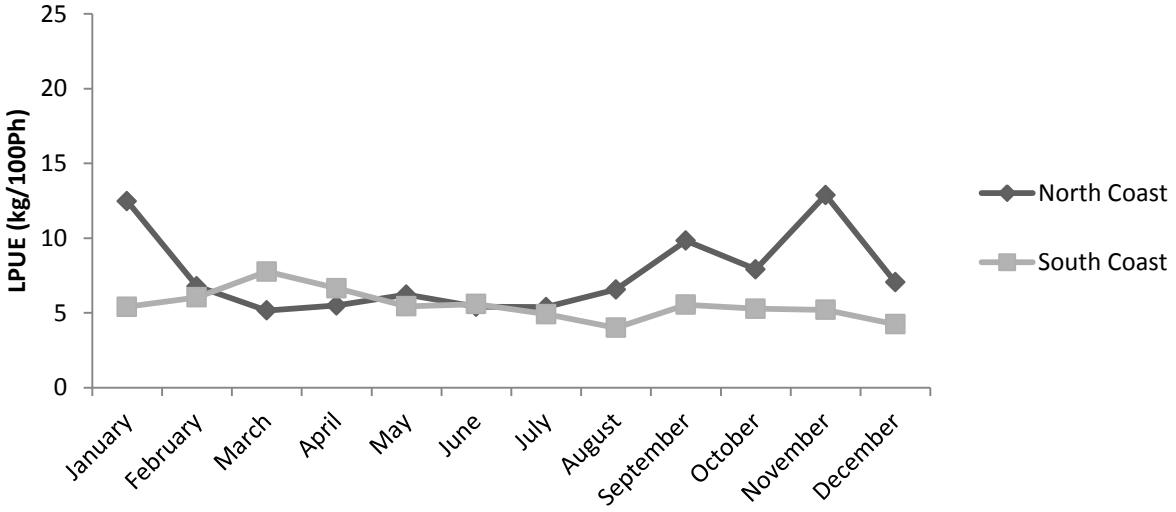

Figure 60: Monthly LPUE (kg landed/100Ph) of male edible crab (*Cancer pagurus*) split by coast, north and south, during 2018 within the Cornwall IFCA District.

LPUE was higher in band B than band A on the north coast for the majority of the year other than October and December (Figure 61). LPUE decreased from January to February in both bands then increased to a maximum in November (A; 12.29 kg/100Ph and B; 13.01 kg/100Ph - however a higher LPUE was attained in January of 13.08 kg/100Ph in B).

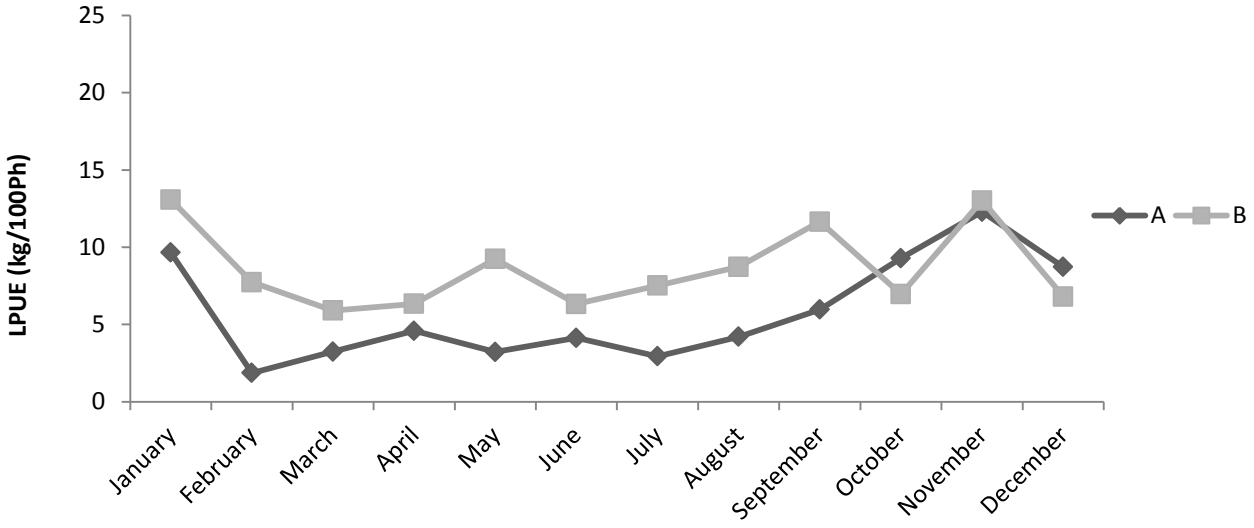

Figure 61: Monthly LPUE (kg landed/100Ph), of male edible crab (*Cancer pagurus*) caught on the north coast, split by belt, A and B in 2018.

LPUE was consistently higher in band B on the south coast (Figure 62) than band A.

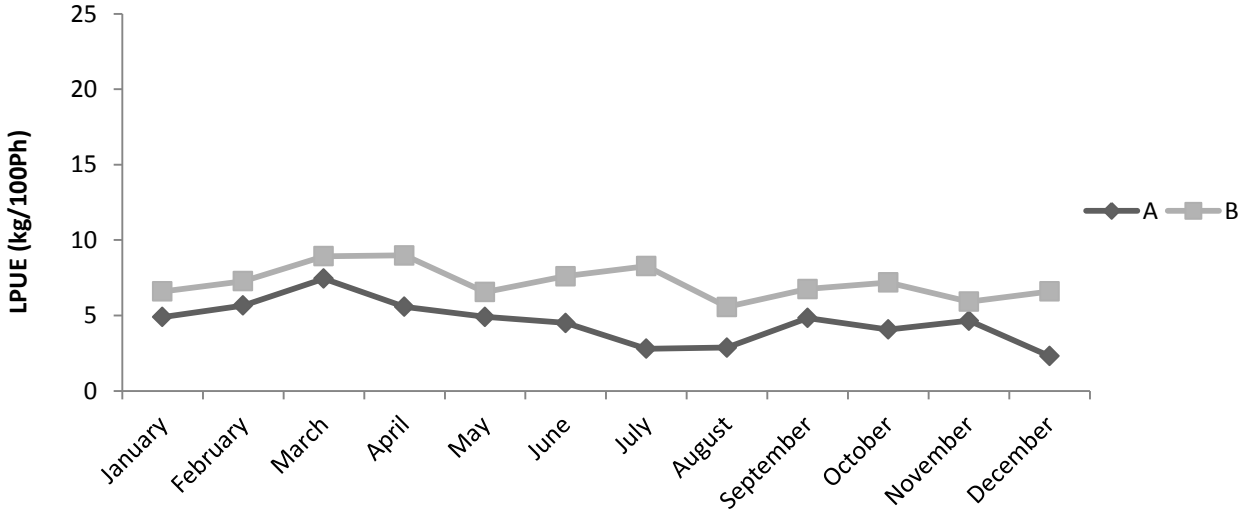

Figure 62: Monthly LPUE (kg landed/100Ph), of male edible crab (*Cancer pagurus*) caught on the south coast, split by belt, A and B in 2018.

When the 2018 data is thematically mapped (Figure 63) belted statistical areas 29E47B, 29E44B and 29E45B, offshore between St Ives and Newquay, on the north coast and 28E47B, around the Lizard, on the south coast are highlighted as the belted statistical areas with the highest LPUE. Thematically mapped by quarter (Figure 64), the area around Lizard Point (28E47) had a higher LPUE in band A than B in quarter one, however for the remaining three quarters LPUE was higher offshore in band B.

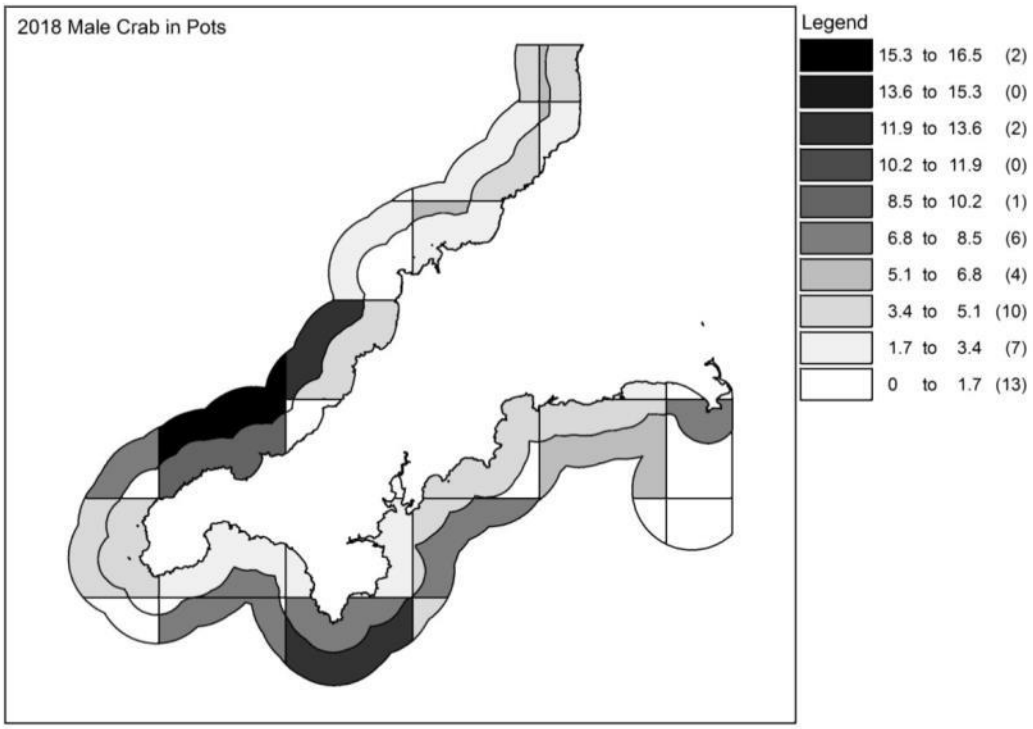

Figure 63: LPUE (kg landed/100Ph) of male edible crab (*Cancer pagurus*) in the Cornwall IFCA District in 2018 thematically mapped by belted statistical area, using increments of 1.7 kg.

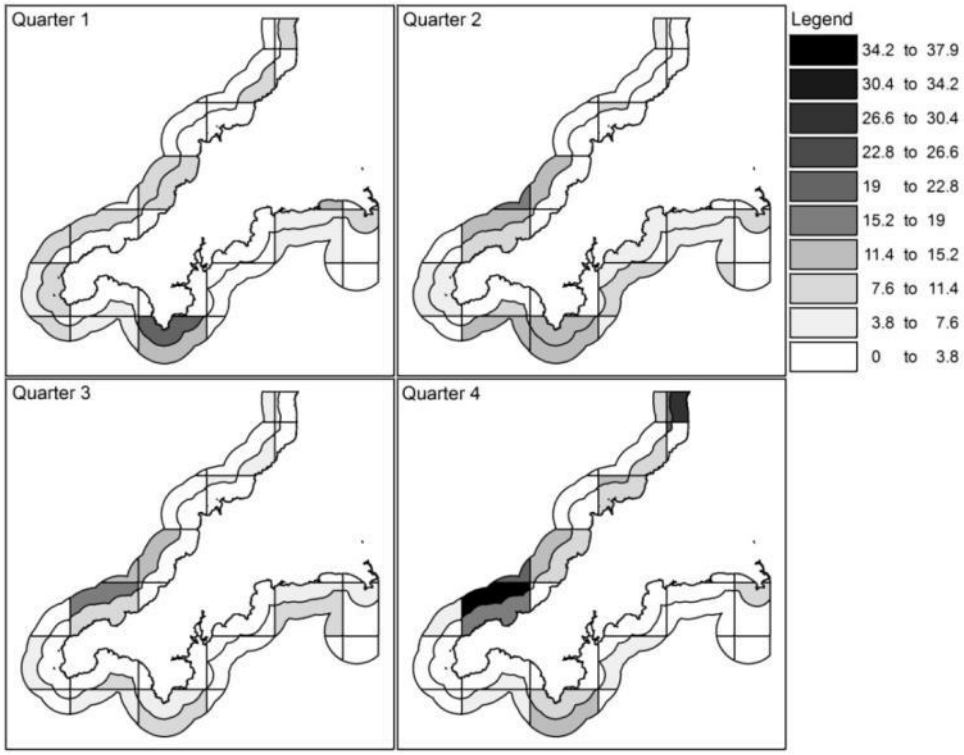

Figure 64: LPUE (kg landed/100Ph) of male edible crab (*Cancer pagurus*) in the Cornwall IFCA District for quarters 1 to 4 of 2018, thematically mapped by statistical area, using increments of 3.8 kg.

5.2.4.3 Female Edible crab (*Cancer pagurus*) Fished by Pots

A total of 1,303,685.11 kg of female edible crab was reported to have been removed from the Cornwall IFCA District in 2018 in pots. The total weight of female edible crab reportedly removed from the District by month increased from February to July at a peak of 199,454 kg, monthly totals then gradually declined overall to December (Figure 65).

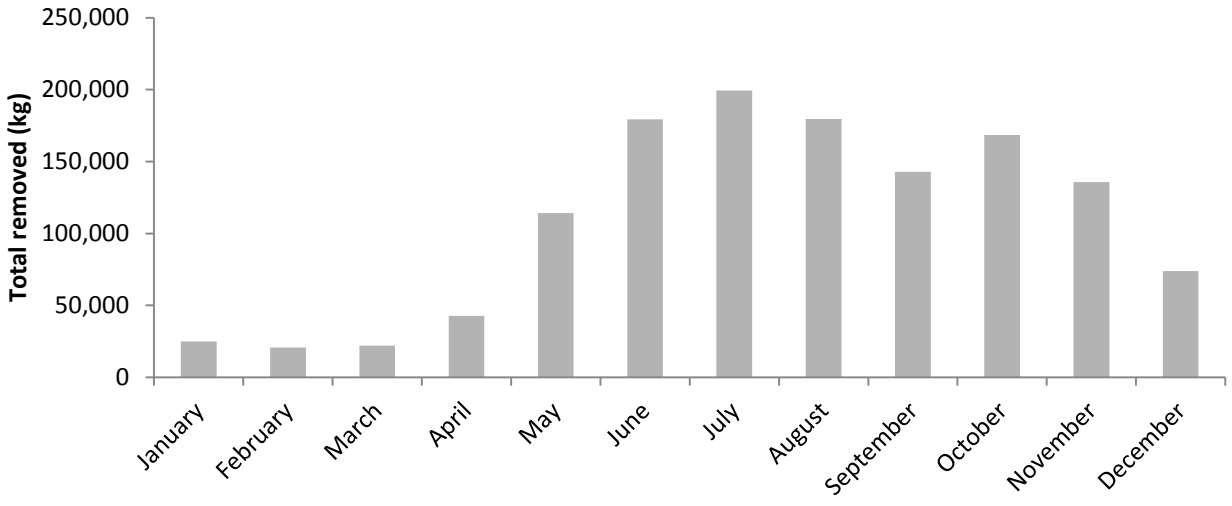

Figure 65: Total (kg) female edible crab (*Cancer pagurus*) reportedly removed from the Cornwall IFCA District during 2018

LPUE of female edible crabs caught in pots initially decreased from January to March (Figure 66), starting at 54.48 kg/100Ph in January and dropping to 28.01 kg/100Ph in March. LPUE then increased to 65.71 kg/100Ph in June. LPUE then decreased slightly then gradually increased to a high in November of 107.37 kg/100Ph.

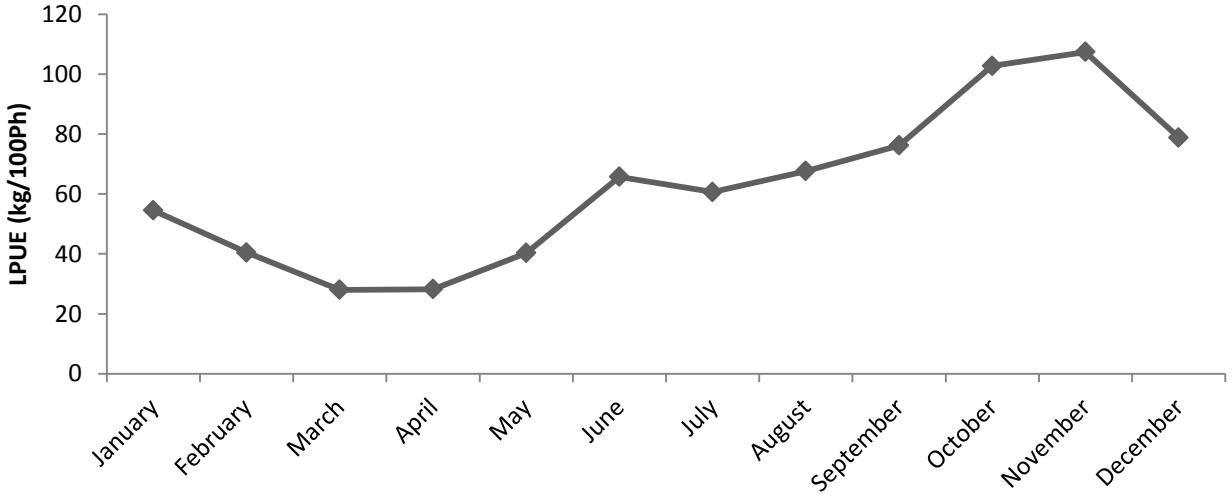

Figure 66: Monthly LPUE (kg landed/100Ph) of female edible crab (*Cancer pagurus*) during 2018, within the Cornwall IFCA District.

When calculated by ICES rectangle (Figure 67) all rectangles showed a decrease in LPUE from January to February, and an increase from May to June and September to October (other than 28E5 where potting effort was only reported in May). 28E4 attained the highest LPUE value of 145.75 kg/100Ph in October.

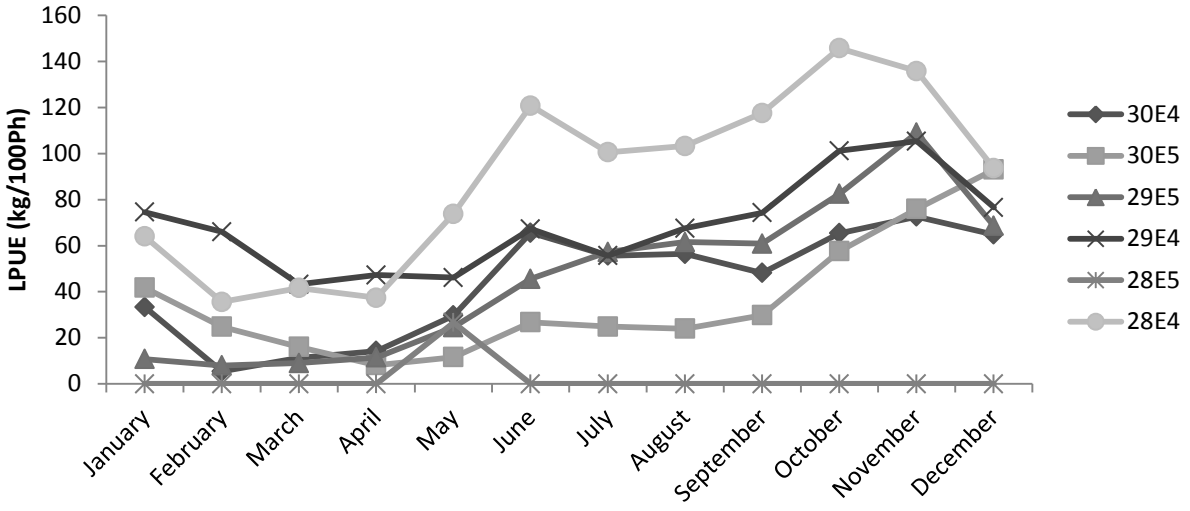

Figure 67: Monthly LPUE (kg landed/100Ph) of female edible crab (*Cancer pagurus*) by ICES statistical rectangle for the year, 2018.

When split by coast (Figure 68) LPUE started at far lower levels on the south coast, (29.87 kg/100Ph on the south, 71.59 kg/100Ph on the north). Both coasts observed a decrease in LPUE from January to February, on the south coast LPUE then increased in March, however on the north coast LPUE continued to fall until an increase in May. From April onwards LPUE was consistently higher on the south coast with very similar patterns in fluctuating LPUE.

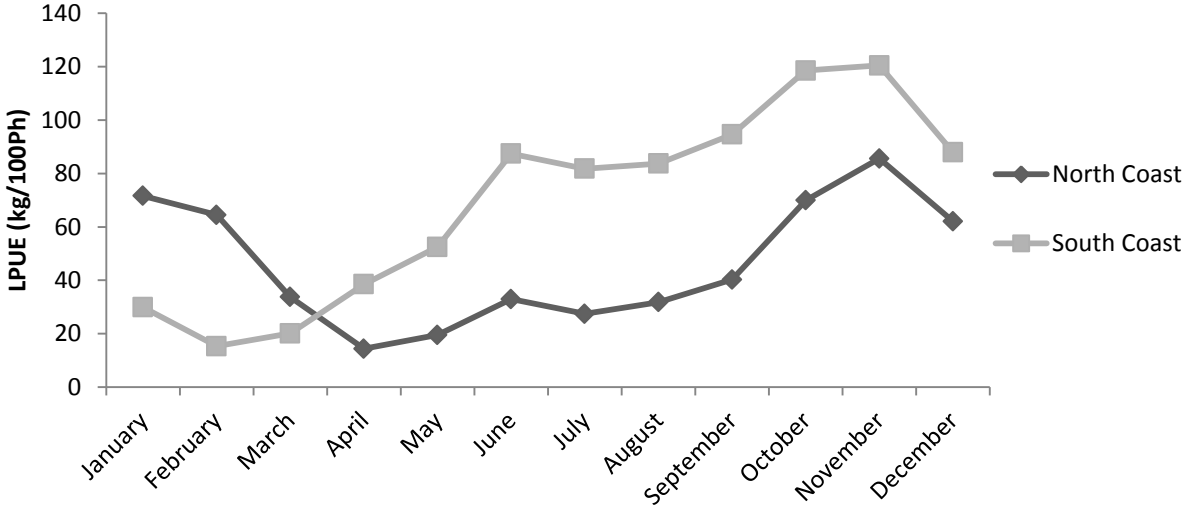

Figure 68: Monthly LPUE (kg landed/100Ph) of female edible crab (*Cancer pagurus*) split by coast, north and south, during 2018 within the Cornwall IFCA District.

On both the north and the south coast LPUE was higher in band B than band A for the entire year (Figure 69 and Figure 70). Band B peaked at 90.87 kg/100Ph in November on the north coast and 167.4 kg/100Ph in October on the south coast. Band A peaked in November on both coasts at 63.01 kg/100Ph on the north and 99.01 kg/100Ph on the south.

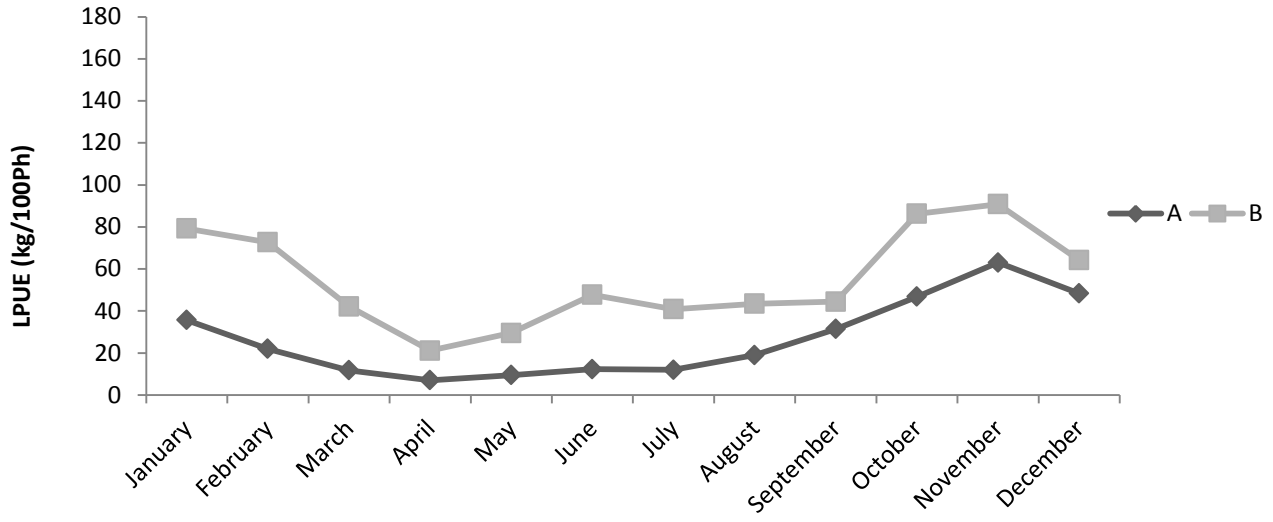

Figure 69: Monthly LPUE (kg landed/100Ph), of female edible crab (*Cancer pagurus*) caught on the north coast, split by belt, A and B in 2018.

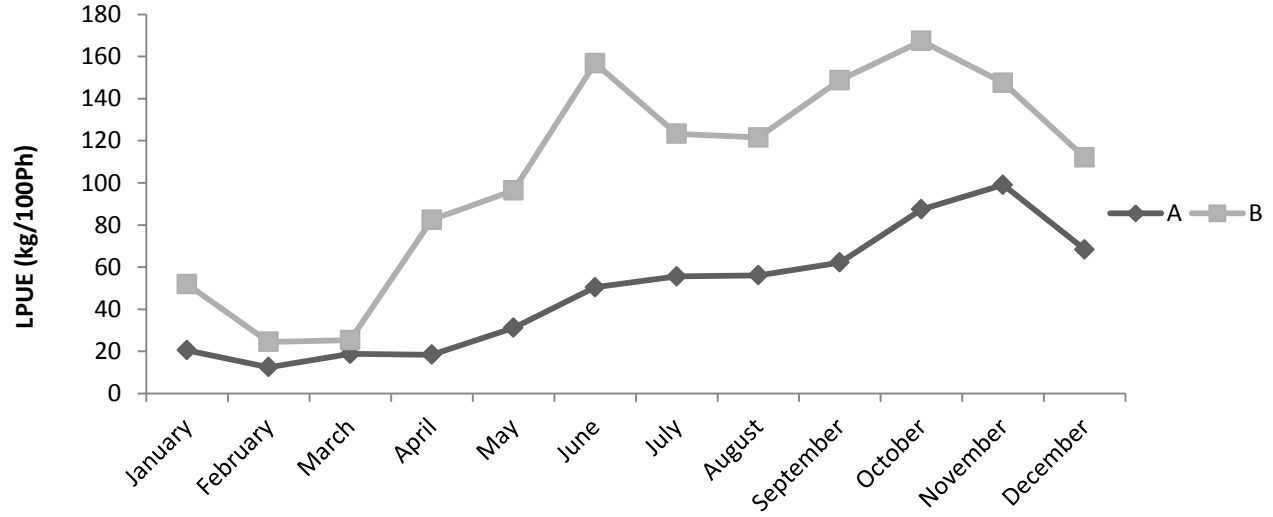

Figure 70: Monthly LPUE (kg landed/100Ph), of female edible crab (*Cancer pagurus*) caught on the south coast, split by belt, A and B in 2018.

When the data is thematically mapped for the year the majority of belted statistical areas in belt A have a higher LPUE than their band B counterpart (Figure 71). There are however a few exceptions to the rule (29E53 and 29E58).

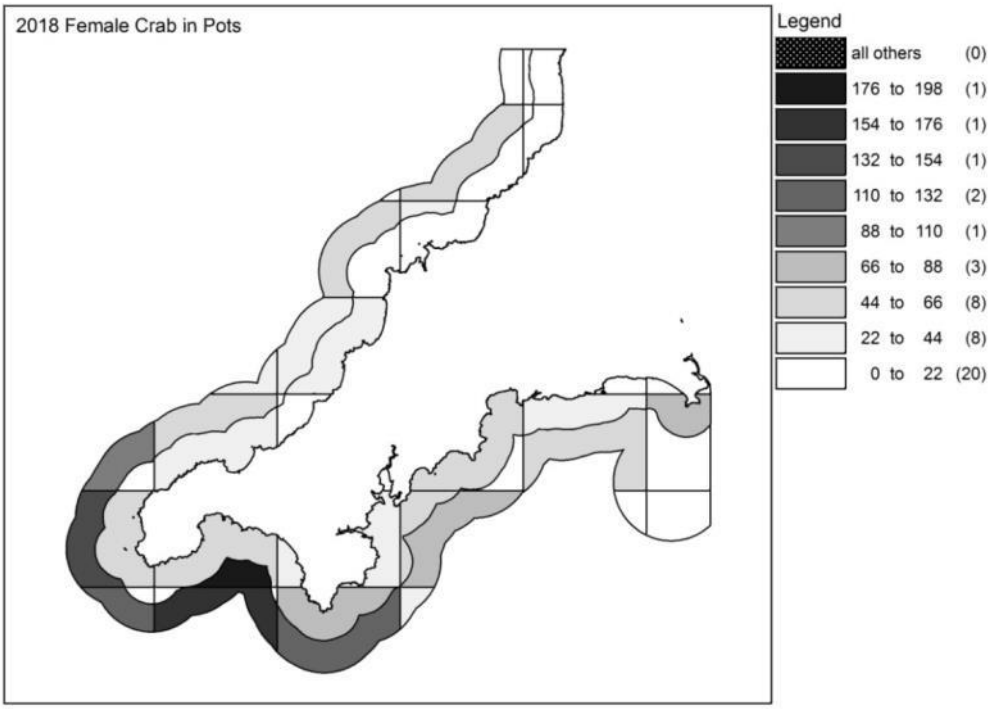

Figure 71: LPUE (kg landed/100Ph) of female edible crab (*Cancer pagurus*) in the Cornwall IFCA District in 2018 thematically mapped by belted statistical area, using increments of 22 kg.

When thematically mapped by quarter, the area of the south coast from Zone Point in Falmouth Bay to Gribbin Head in St Austell Bay returned higher LPUE in quarters two and three in band A (Figure 72).

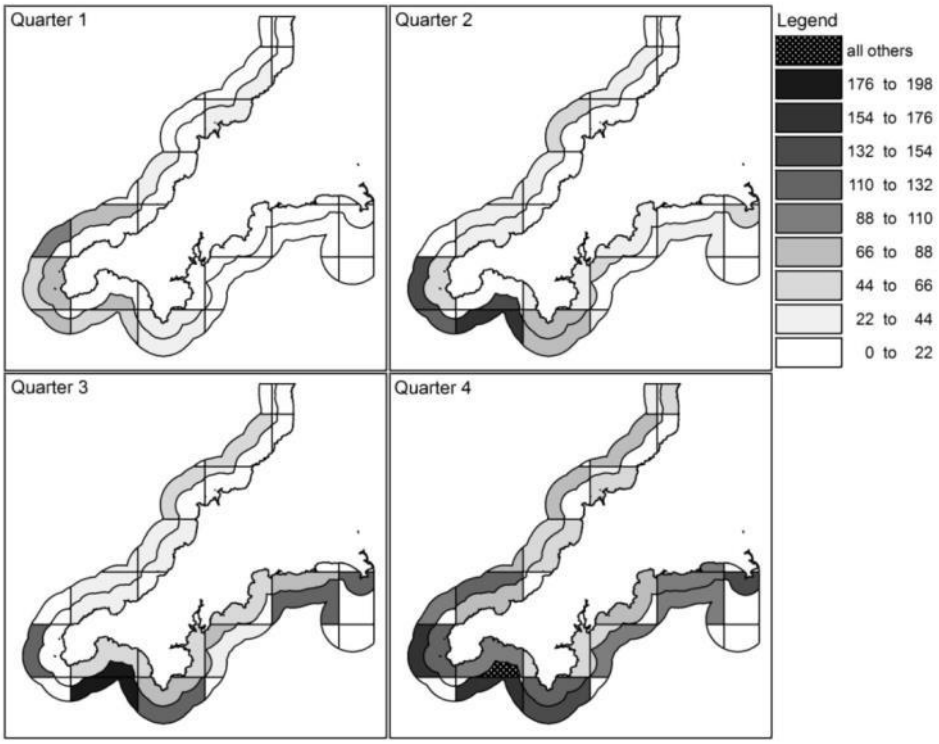

Figure 72: LPUE (kg landed/100Ph) of female edible crab (*Cancer pagurus*) in the Cornwall IFCA District for quarters 1 to 4 of 2018, thematically mapped by statistical area, using increments of 22 kg. Note: a high value of 291.01 kg/100pot hauls was calculated for 29E46A during quarter 4 and therefore assigned a new category represented in white dots on a black background.

5.2.4.4 Edible crab (*Cancer pagurus*) Fished by Nets

A total of 34,563.69 kg of edible crab was reported to have been removed from the Cornwall IFCA District in 2018 using nets. Monthly reported totals of combined edible crab removed from the Cornwall IFCA District rose from February to a peak in June of 8,579 kg, then decreased to December (Figure 73).

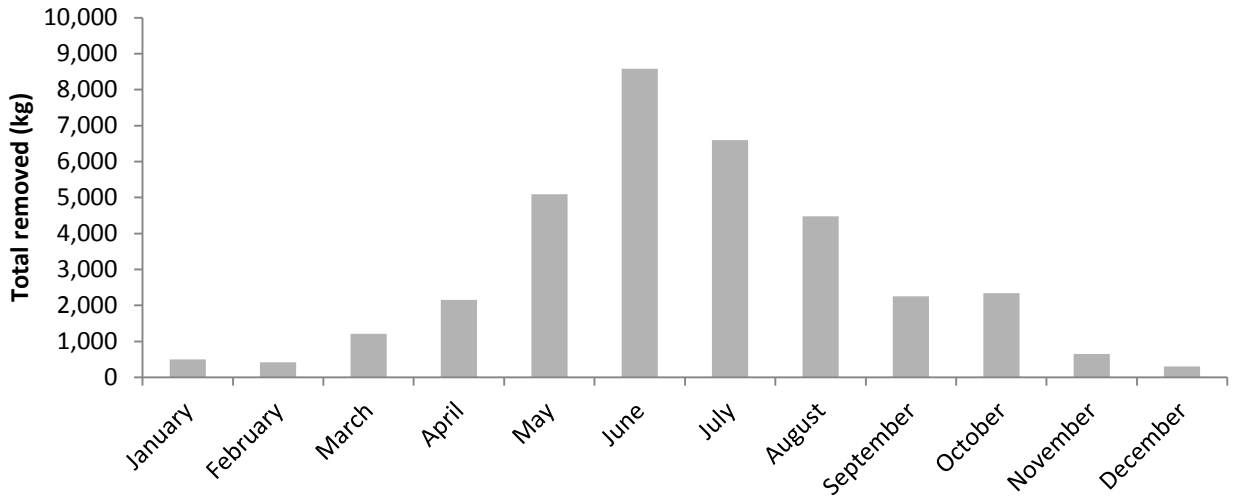

Figure 73: Total (kg) combined edible crab (*Cancer pagurus*) reportedly removed from the Cornwall IFCA District during 2018

LPUE throughout the year (Figure 74) fluctuated between months with a peak in LPUE in June at 0.76 kg/100Ph.

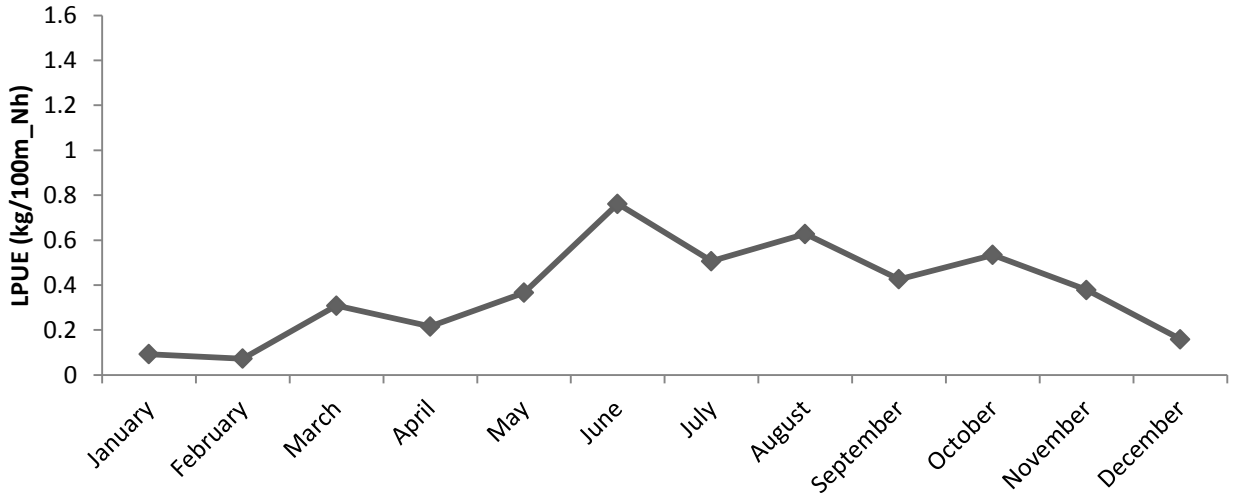

Figure 74: Monthly LPUE (kg landed/100m_Nh) of combined edible crab (*Cancer pagurus*) during 2018, within the Cornwall IFCA District.

When calculated by ICES rectangle (Figure 75) the majority of the rectangles had low LPUE throughout the year (>0.5 kg/100m nets) however three had notable peaks above this; 29E4, 28E4 and 30E5. 30E5 returned the highest LPUE in October 2.97 kg/100m_Nh.

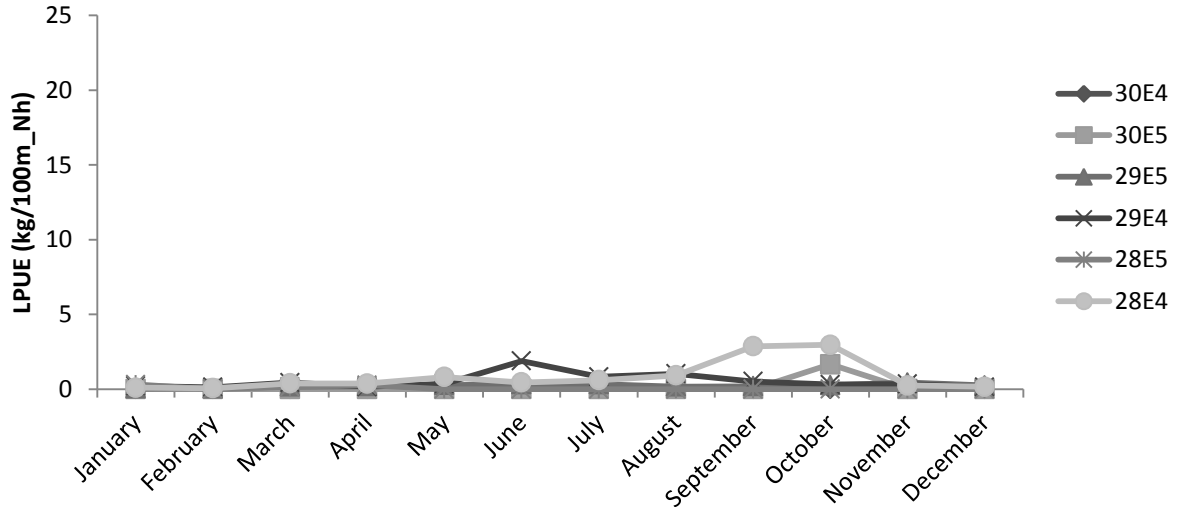

Figure 75: Monthly LPUE (kg landed/100m_Nh) of combined edible crab (*Cancer pagurus*) by ICES statistical rectangle for the year, 2018.

On the south coast LPUE fluctuated very little throughout the year and remained at low levels (minimum 0.07 kg/100m_Nh, maximum 0.64 kg/100m_Nh) (Figure 76). On the north coast June, July and August attained notably higher LPUE values than the rest of the year, the highest of which being 3.29 kg/100Ph in June.

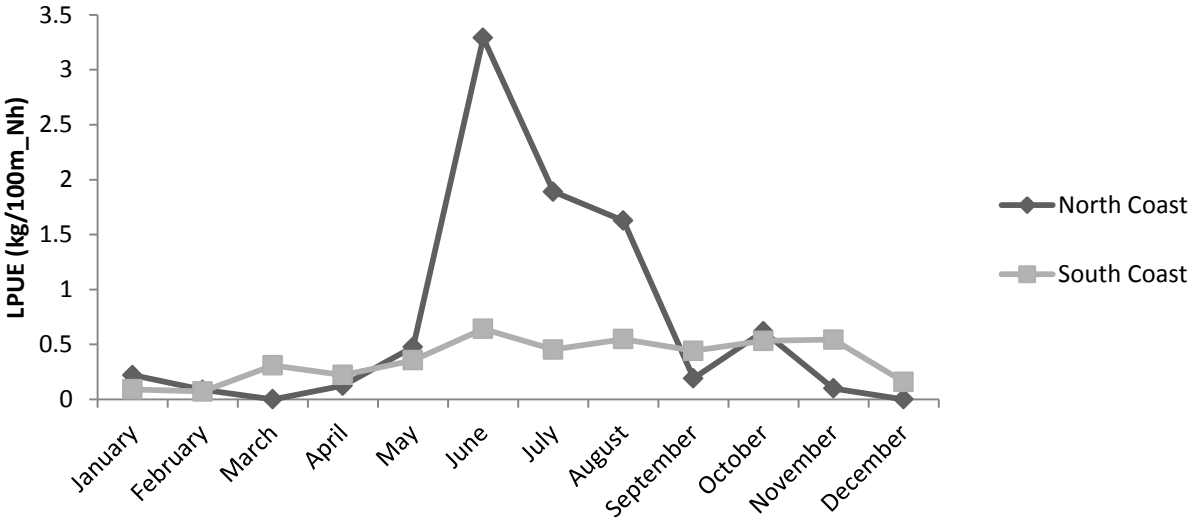

Figure 76: Monthly LPUE (kg landed/100m_Nh) of combined edible crab (*Cancer pagurus*) split by coast, north and south, during 2018 within the Cornwall IFCA District.

On the north coast, when split by band A and B (Figure 77), LPUE was low in both A and B from January to April (>0.23 kg/100m_Nh). Both increased sharply from May to June with a higher LPUE achieved in A than B (6.49 kg/100m_Nh and 2.77 kg/100m_Nh respectively). Elevated LPUE was sustained in band B until a sharp decline in September, whereas in band A LPUE fell sharply to 0.03 kg/100m_Nh in July.

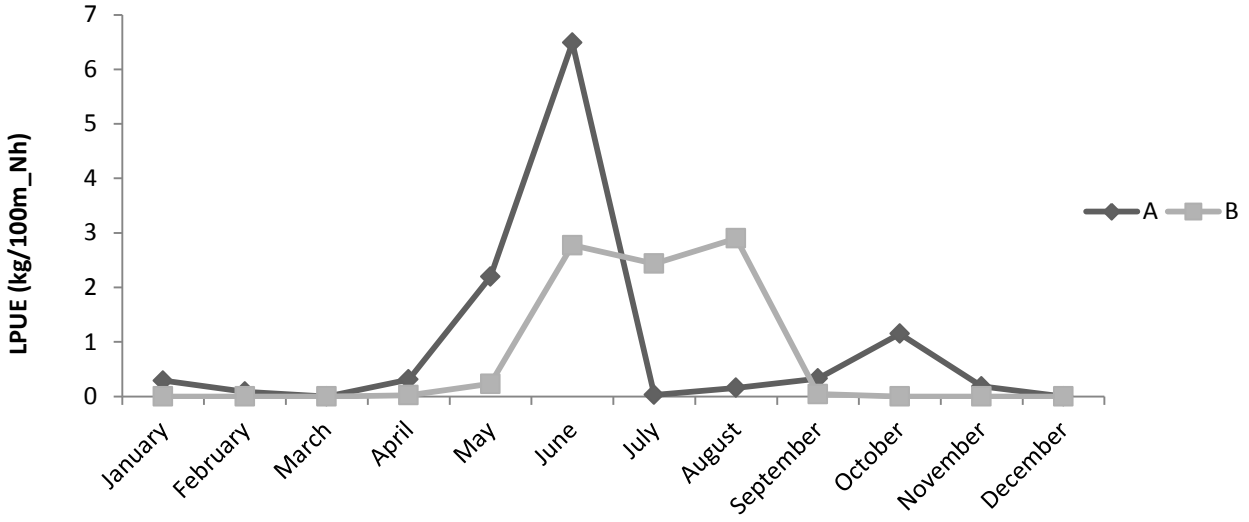

Figure 77: Monthly LPUE (kg landed/100m_Nh), of combined edible crab (*Cancer pagurus*) caught on the north coast, split by belt, A and B in 2018.

On the south coast (Figure 78) LPUE was very similar in band A and B from March to July. In the months either side of this LPUE was higher in band B than band A.

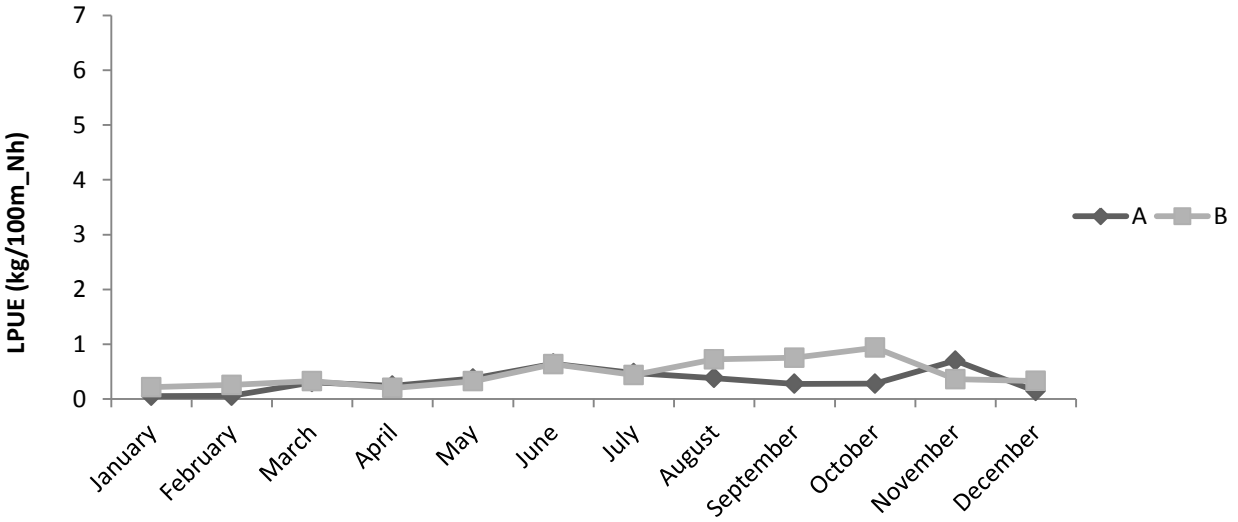

Figure 78: Monthly LPUE (kg landed/100m_Nh), of combined edible crab (*Cancer pagurus*) caught on the south coast, split by belt, A and B in 2018.

Thematic mapping of the data for 2018 (Figure 79) shows two belted statistical areas with relatively high LPUE on the north coast, 29E47B off Newquay and 30E55A between Boscastle and Bude.

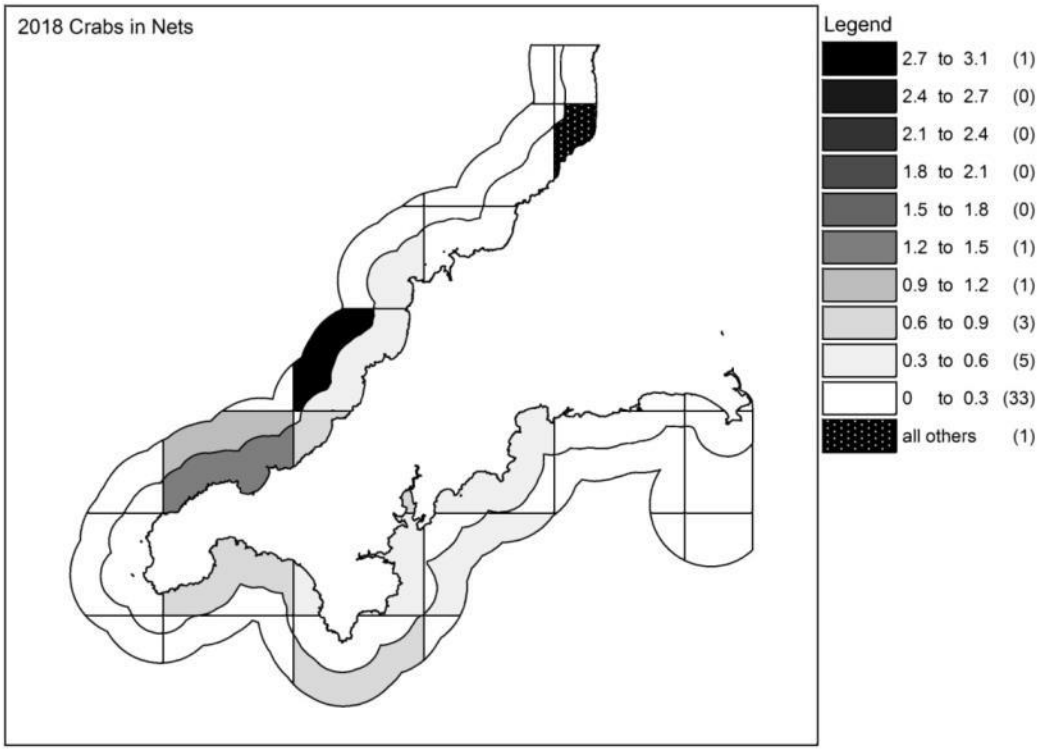

Figure 79: LPUE (kg landed/100m_Nh) of combined edible crab (*Cancer pagurus*) in the Cornwall IFCA District in 2018 thematically mapped by belted statistical area, using increments of 0.3 kg. Note: a high value of 13.57 kg/100m_Nh was calculated for 30E55A and was therefore assigned a new category represented in white dots on a black background.

Thematic mapping of the data by quarter (Figure 80) suggests that LPUE was lowest overall across the District in quarter one.

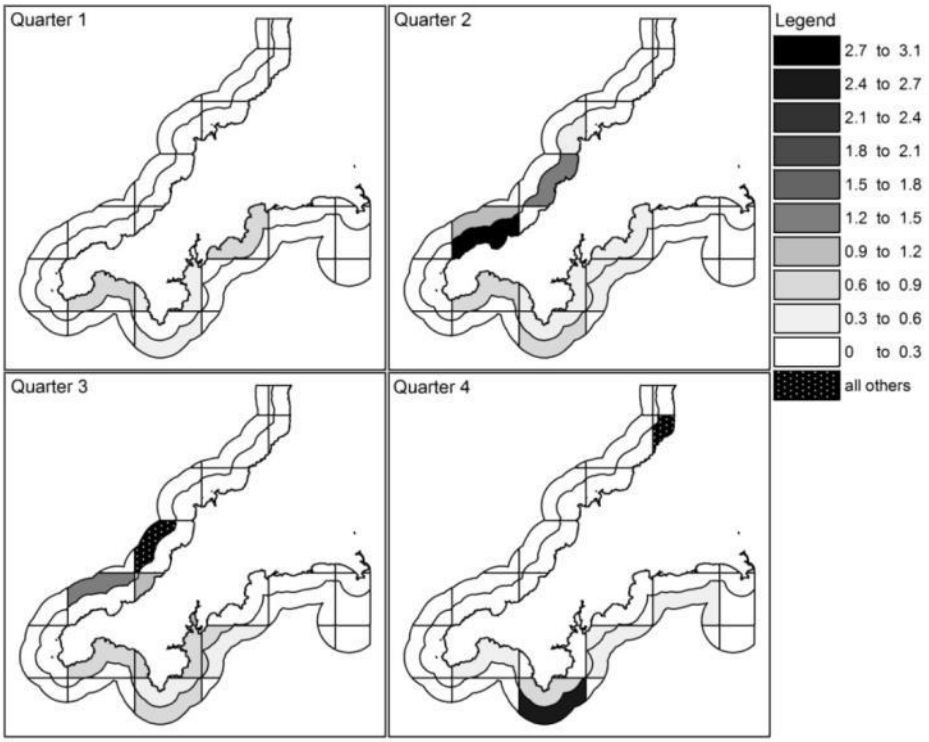

Figure 80: LPUE (kg landed/100m_Nh) of combined edible crab (*Cancer pagurus*) in the Cornwall IFCA District for quarters 1 to 4 of 2018, thematically mapped by statistical area, using increments of 0.3kg. Note: high values of 13.57 kg/100m_Nh and 18.73 kg/100m_Nh was calculated for quarters 3 and 4 respectively and therefore assigned a new category represented in white dots on a black background.

5.2.4.5 Male Edible crab (*Cancer pagurus*) Fished by Nets

A total of 9,370.72 kg of male edible crab was reported to have been removed from the Cornwall IFCA District in 2018 using nets. Monthly reported totals of male edible crab removed from the Cornwall IFCA District rose from January to a peak in May of 2,085 kg, and then decreased steadily to December (Figure 81).

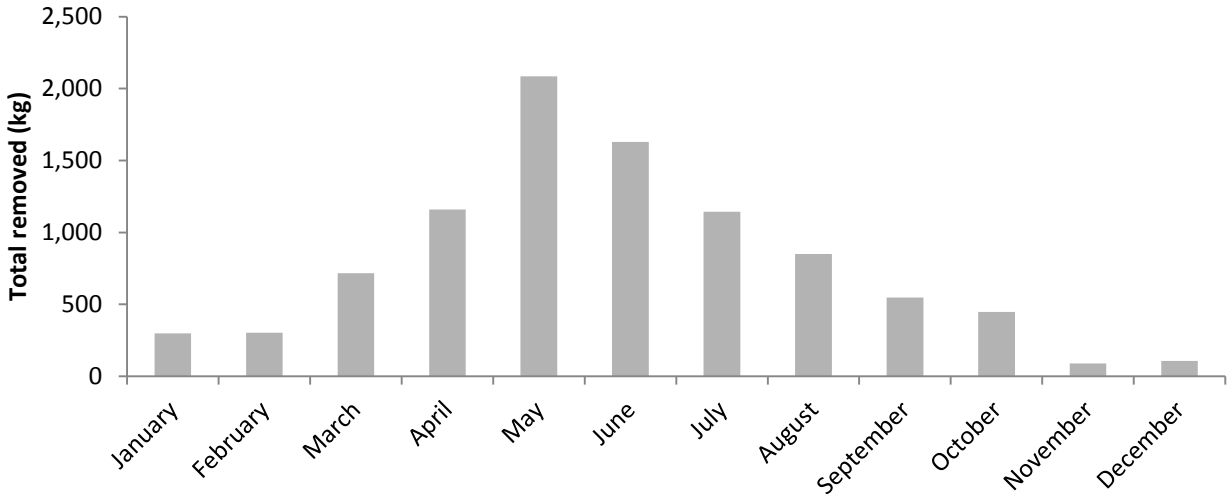

Figure 81: Total (kg) male edible crab (*Cancer pagurus*) reportedly removed from the Cornwall IFCA District during 2018

Overall LPUE in the District (Figure 82) started low, 0.06 kg/100m_Nh and peaked at 0.18 kg/100m_Nh in March, LPUE showed some fluctuations with an overall decrease to December.

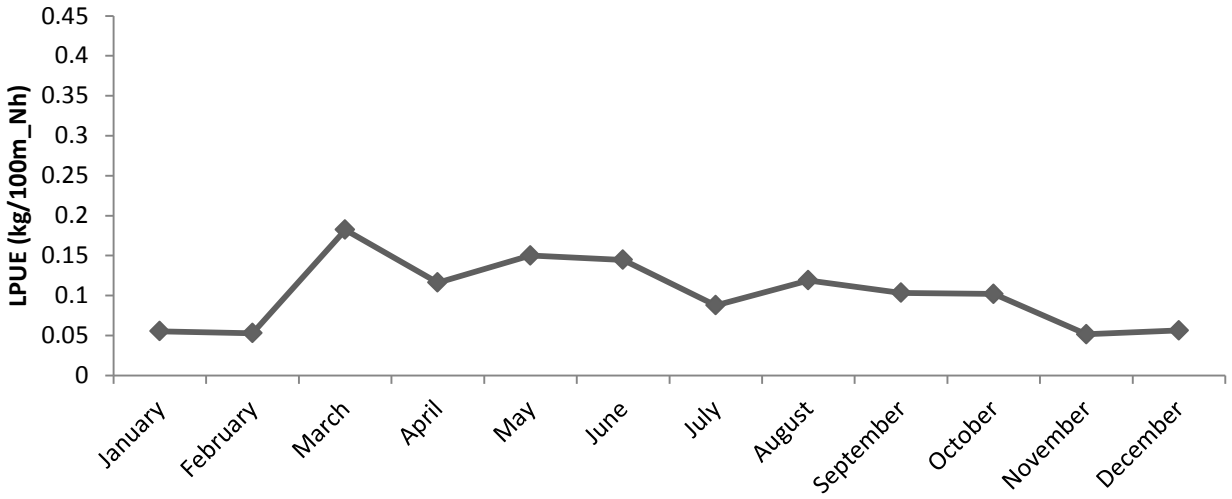

Figure 82: Monthly LPUE (kg landed/100m_Nh) of male edible crab (*Cancer pagurus*) during 2018, within the Cornwall IFCA District.

The majority of ICES rectangles returned LPUE of less than 0.4 kg/100m_Nh, other than 30E4 and 28E4 where in September (28E4; 0.7 kg/100m_Nh) and October (28E4; 0.63 kg/100m_Nh, 30E5; 0.56kg/100m_Nh) values were higher (Figure 83).

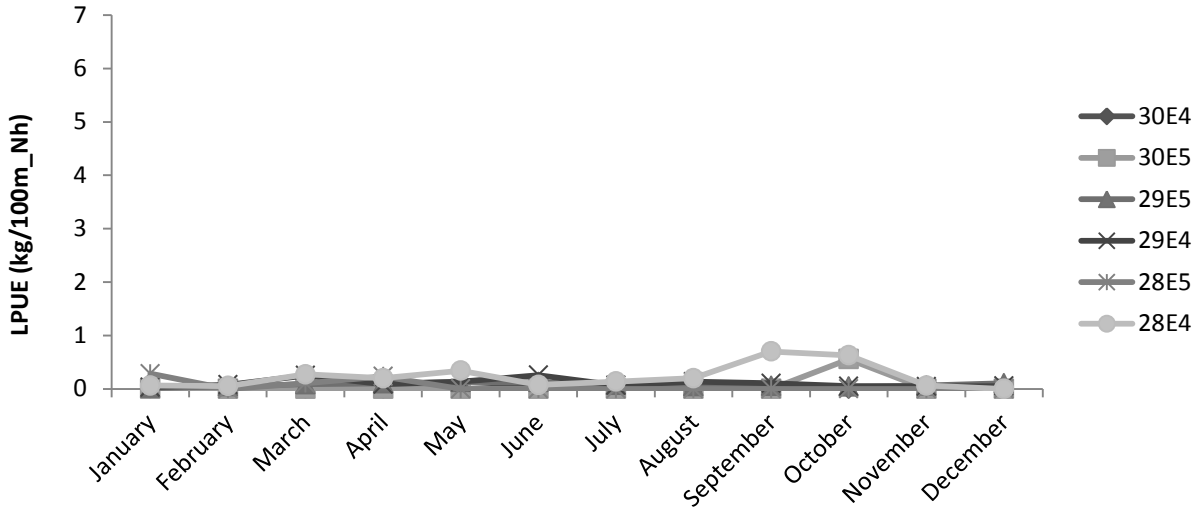

Figure 83: Monthly LPUE (kg landed/100m_Nh) of male edible crab (*Cancer pagurus*) by ICES statistical rectangle for the year, 2018.

On the north coast LPUE was relatively high in June at 0.86 kg/100m_Nh (Figure 84) and fluctuated between 0 kg/100m_Nh and 0.26 kg/100m_Nh for the remainder of the year. LPUE on the south coast is fairly constant throughout the year fluctuating between a minimum of 0.05 kg/100m_Nh (February) and maximum of 0.18 kg/100m_Nh (March).

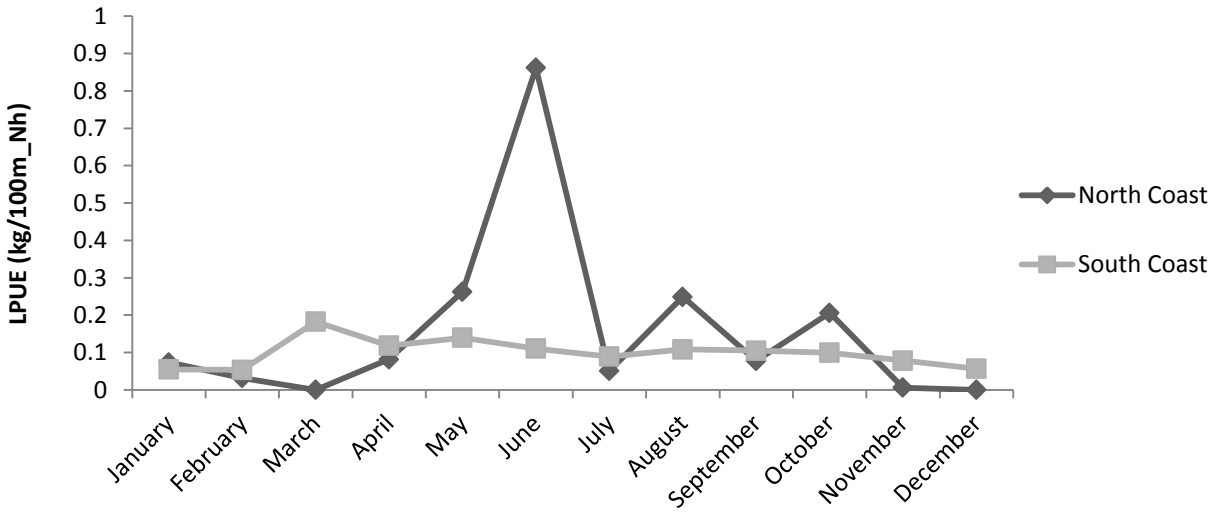

Figure 84: Monthly LPUE (kg landed/100m_Nh) of male edible crab (Cancer pagurus) split by coast, north and south, during 2018 within the Cornwall IFCA District.

On the north coast LPUE was low in both belts from January to April (Figure 85). LPUE peaked in both belts in June, however at a higher level in band A than B (2.67 kg/100m_Nh and 0.14 kg/100m_Nh respectively).

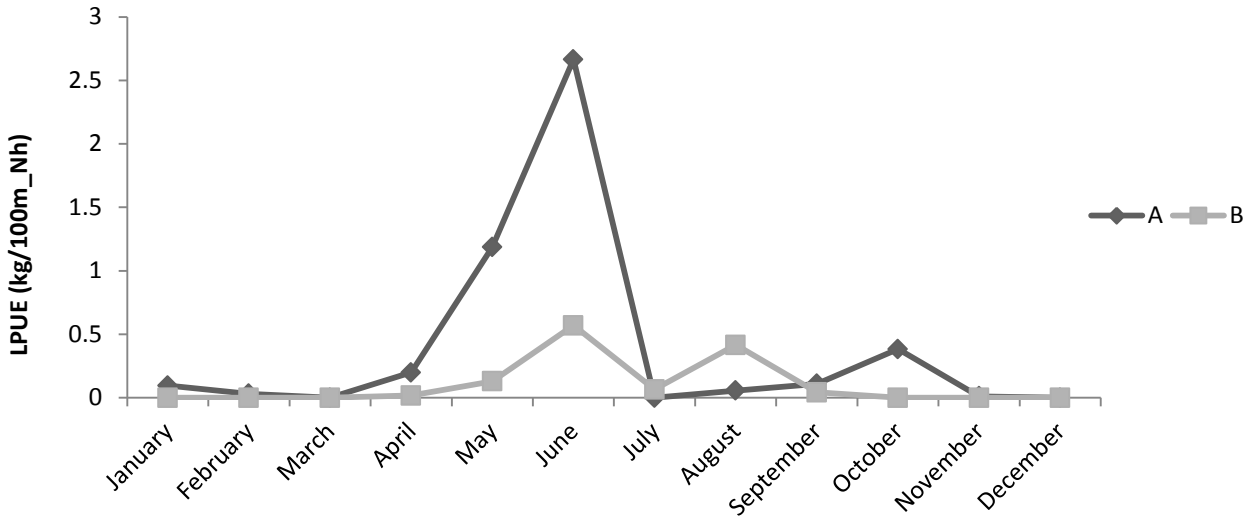

Figure 85: Monthly LPUE (kg landed/100m_Nh), of male edible crab (*Cancer pagurus*) caught on the north coast, split by belt, A and B in 2018.

On the south coast LPUE was generally higher in band B throughout the year (other than April and November). LPUE was highest in March in both bands A and B (0.18 kg/100m_Nh and 0.20 kg/100m_Nh) (Figure 86).

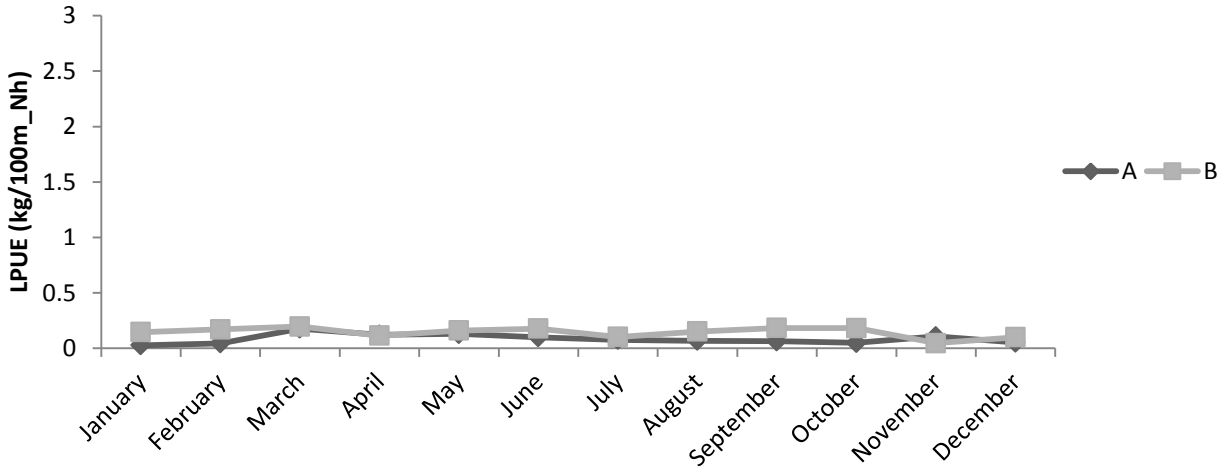

Figure 86: Monthly LPUE (kg landed/100m_Nh), of male edible crab (*Cancer pagurus*) caught on the south coast, split by belt, A and B in 2018.

Thematic mapping of the data (Figure 87) highlights the higher LPUE on the north coast on average for the year. Effort appears to be more widespread across the District in quarter two (Figure 88).

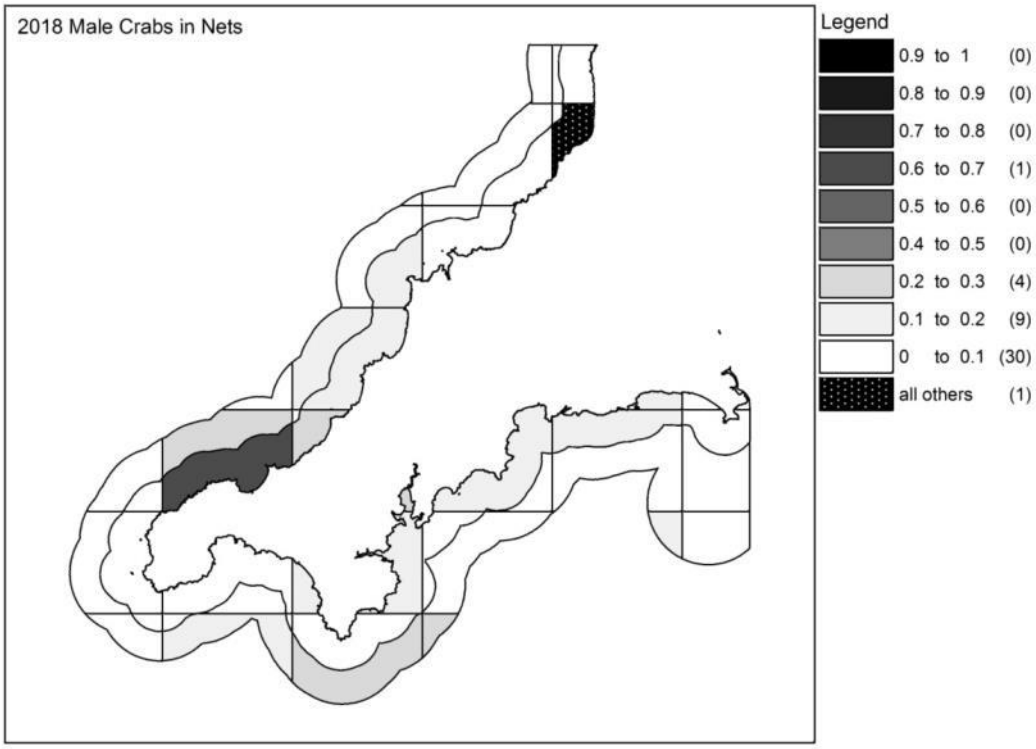

Figure 87: LPUE (kg landed/100m_Nh) of male edible crab (*Cancer pagurus*) in the Cornwall IFCA District in 2018 thematically mapped by belted statistical area, using increments of 0.1 kg. Note: a high value of 4.52 kg/100Ph was calculated for 30E55A and therefore assigned a new category represented in white dots on a black background.

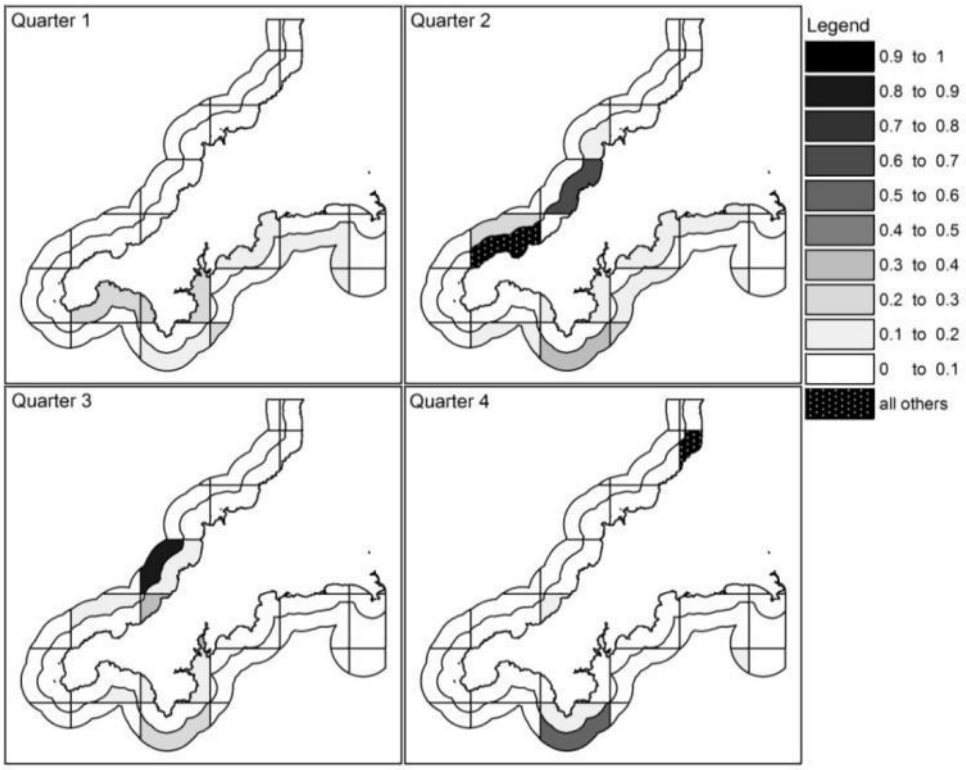

Figure 88: LPUE (kg landed/100m_Nh) of male edible crab (*Cancer pagurus*) in the Cornwall IFCA District for quarters 1 to 4 of 2018, thematically mapped by statistical area, using increments of 0.1 kg. Note: a high value of 4.52 kg/100Ph was calculated for 30E55A in quarter 4 and 1.49 kg/100m_Nhs in 29E45A in quarter 2, and therefore assigned a new category represented in white dots on a black background.

5.2.4.6 Female Edible crab (*Cancer pagurus*) Fished by Nets

In 2018 a total of 25,192.97 kg of female edible crab was reportedly removed from the District using nets. Monthly reported totals of female edible crab removed from the Cornwall IFCA District rose from the beginning of the year to a peak in June of 6,951 kg, then declined overall to December (Figure 89).

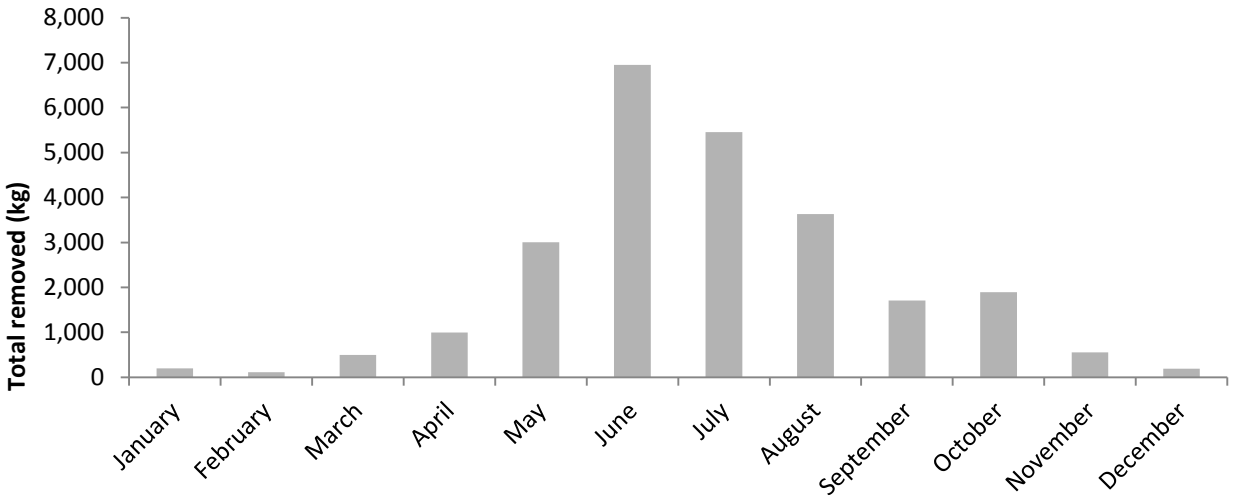

Figure 89: Total (kg) female edible crab (*Cancer pagurus*) reportedly removed from the Cornwall IFCA District during 2018

LPUE was low (<0.3 kg/100m_Nh) from January to May (Figure 90) and rose to 0.62 kg/100m_Nh in June. LPUE then fluctuated between months, overall reducing to a low of 0.10 kg/100m_Nh in December.

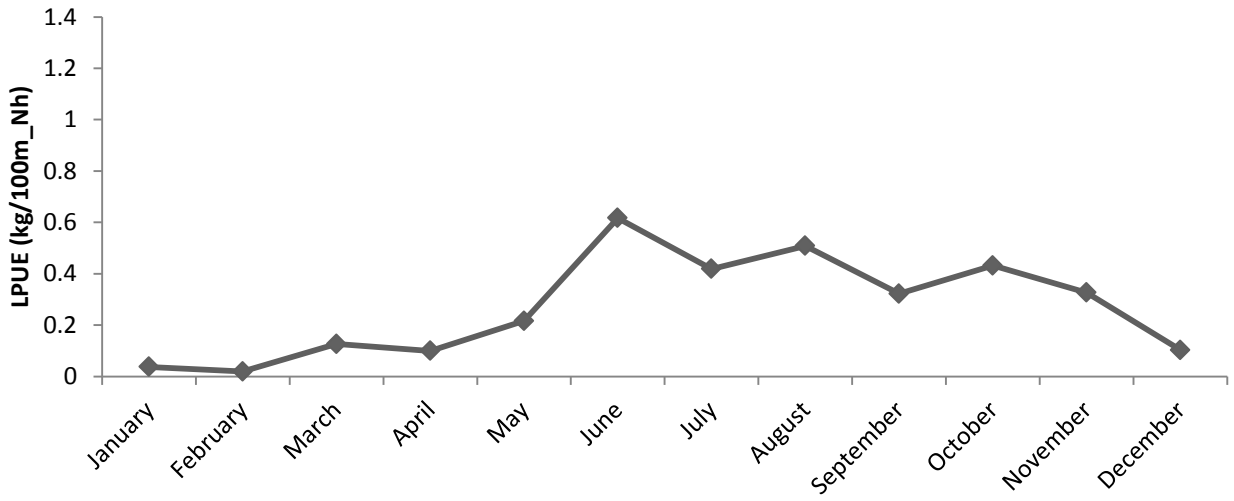

Figure 90: Monthly LPUE (kg landed/100m_Nh) of female edible crab (*Cancer pagurus*) during 2018, within the Cornwall IFCA District.

When calculated by ICES rectangle (Figure 91) all areas had low LPUE at the beginning of the year to April (<0.2 kg/100m_Nh). 29E4 increased in June to 1.63 kg/100m_Nh and decreased to 0.09 kg/100m_Nh in December. 28E4 and 30E5 both peaked in October at 2.34 kg/100m_Nh and 1.11 kg/100m_Nh respectively before sharply decreasing to December.

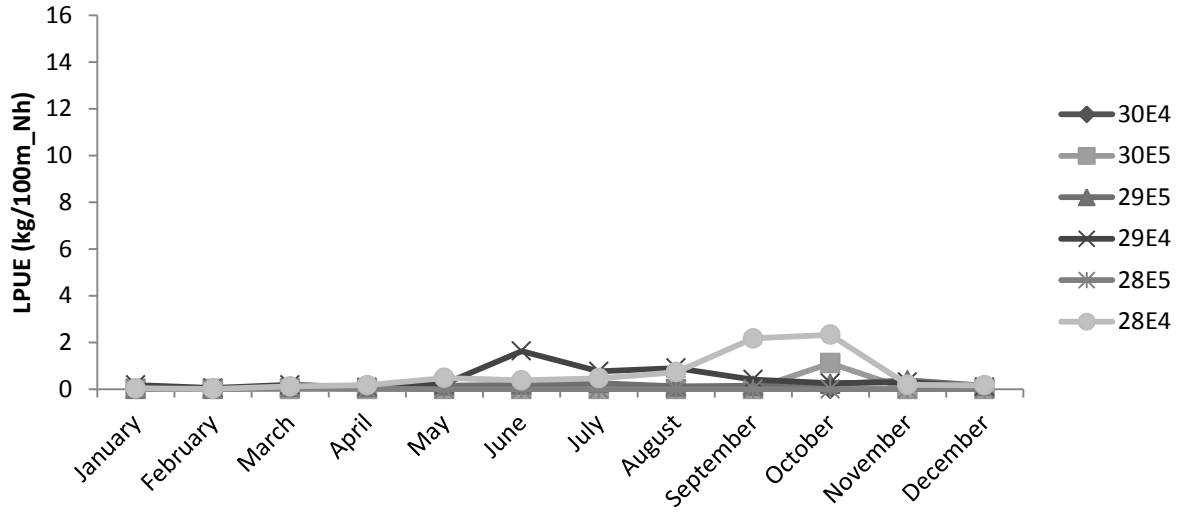

Figure 91: Monthly LPUE (kg landed/100m_Nh) of female edible crab (*Cancer pagurus*) by ICES statistical rectangle for the year, 2018.

When calculated by coast (Figure 92) both had similar LPUE from January to April (<0.15 kg/100m_Nh), then LPUE on the north coast increased sharply from May to June (0.21 kg/100m_Nh to 2.43 kg/100m_Nh) decreasing back to 0.11 kg/100m_Nh in September.

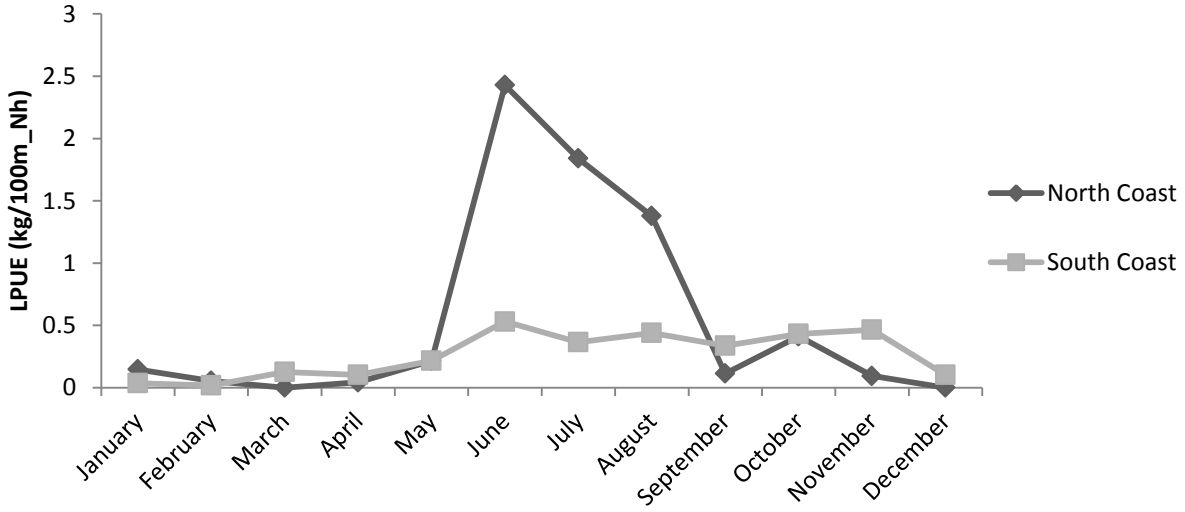

Figure 92: Monthly LPUE (kg landed/100m_Nh) of female edible crab (*Cancer pagurus*) split by coast, north and south, during 2018 within the Cornwall IFCA District.

When split by band A and B the north coast (Figure 93) band A increased in June to 3.82 kg/100m_Nh and returned to lower levels again in July, however in band B there was a more prolonged increase in LPUE, however at a lower level than band A (June; 2.20 kg/100m_Nh, July; 2.37 kg/100m_Nh, August; 2.48 kg/100m_Nh).

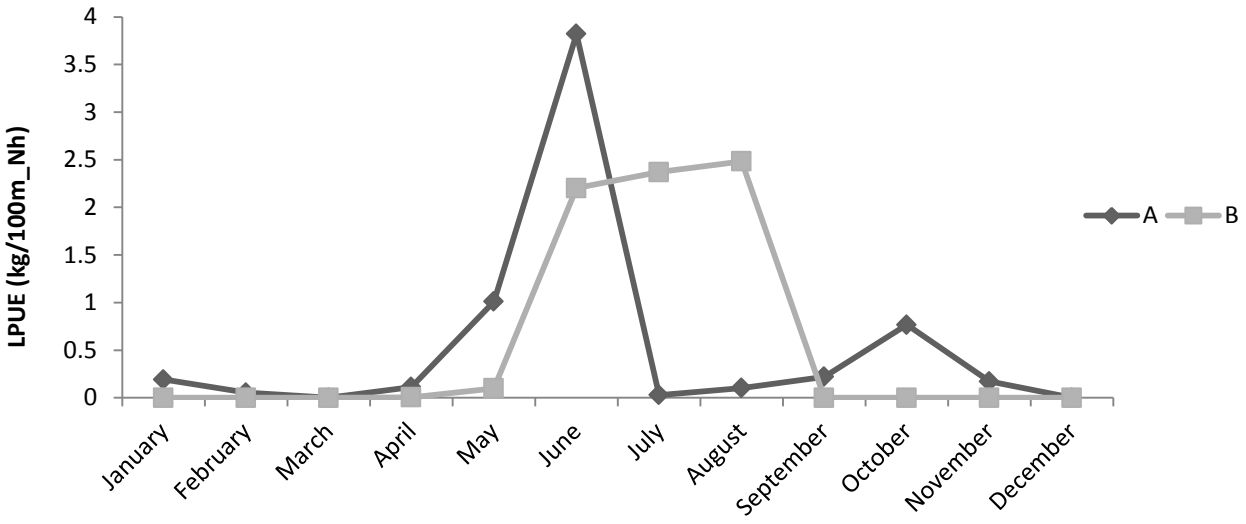

Figure 93: Monthly LPUE (kg landed/100m_Nh), of female edible crab (*Cancer pagurus*) caught on the north coast, split by belt, A and B in 2018.

On the south coast LPUE was similar in band A and band B from January to July (Figure 94), then from July to August the LPUE continued to fall in band A, and increased in band B. This resulted in an overall increase in LPUE in band B throughout the year to a peak in October (0.76 kg/100m_Nh). Band A had two peaks in LPUE with a similar LPUE value (June; 0.54 kg/100m_Nh and November; 0.59 kg/100m_Nh).

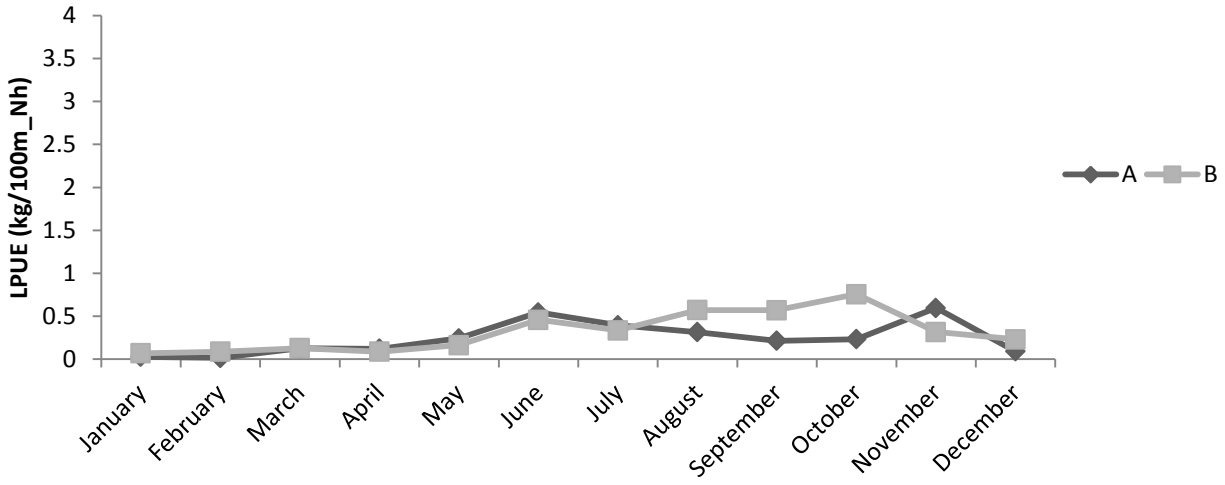

Figure 94: Monthly LPUE (kg landed/100m_Nh), of female edible crab (*Cancer pagurus*) caught on the south coast, split by belt, A and B in 2018.

Thematic mapping of LPUE of female crab in nets in 2018 (Figure 95) highlights two isolated areas of high LPUE on the north coast. Mapped by quarter (Figure 96) effort is lowest across the District in quarter one. In quarter two LPUE is highest in belted statistical areas on the north coast, in quarter three LPUE is higher offshore in these areas.

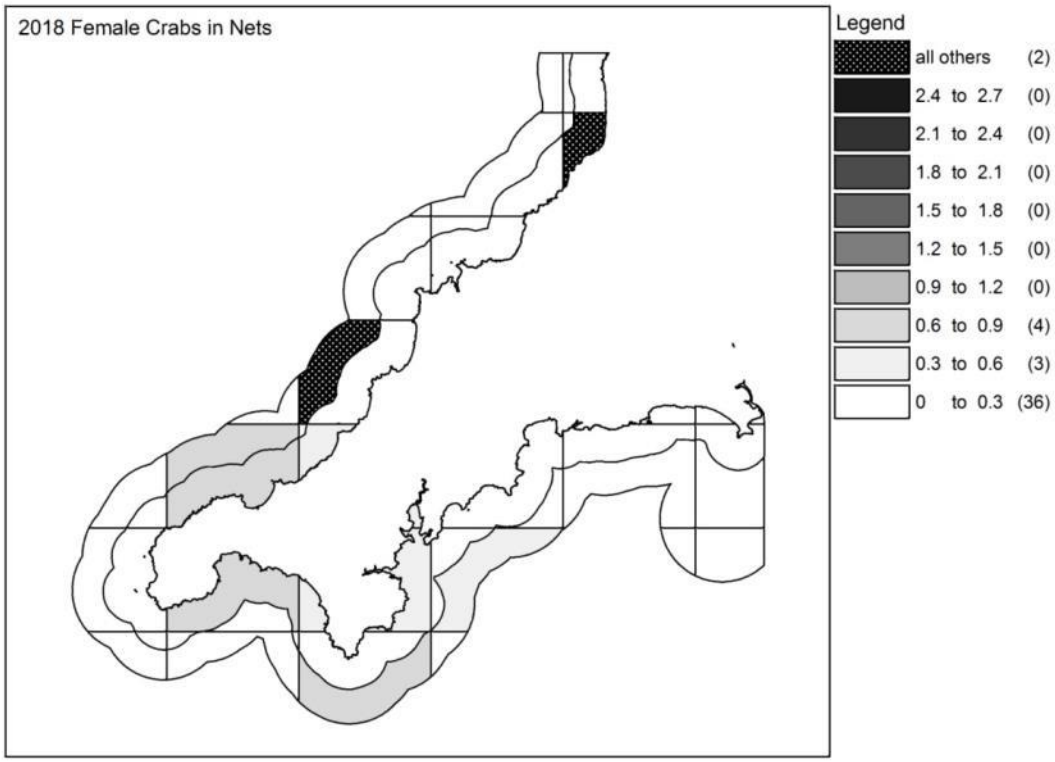

Figure 95: LPUE (kg landed/100m_Nh) of female edible crab (*Cancer pagurus*) in the Cornwall IFCA District for 2018 thematically mapped by belted statistical area, using increments of 0.3 kg. Note: a high value of 9.5 kg/100 m nets hauled was calculated for 30E55A and therefore assigned a new category represented in white dots on a black background.

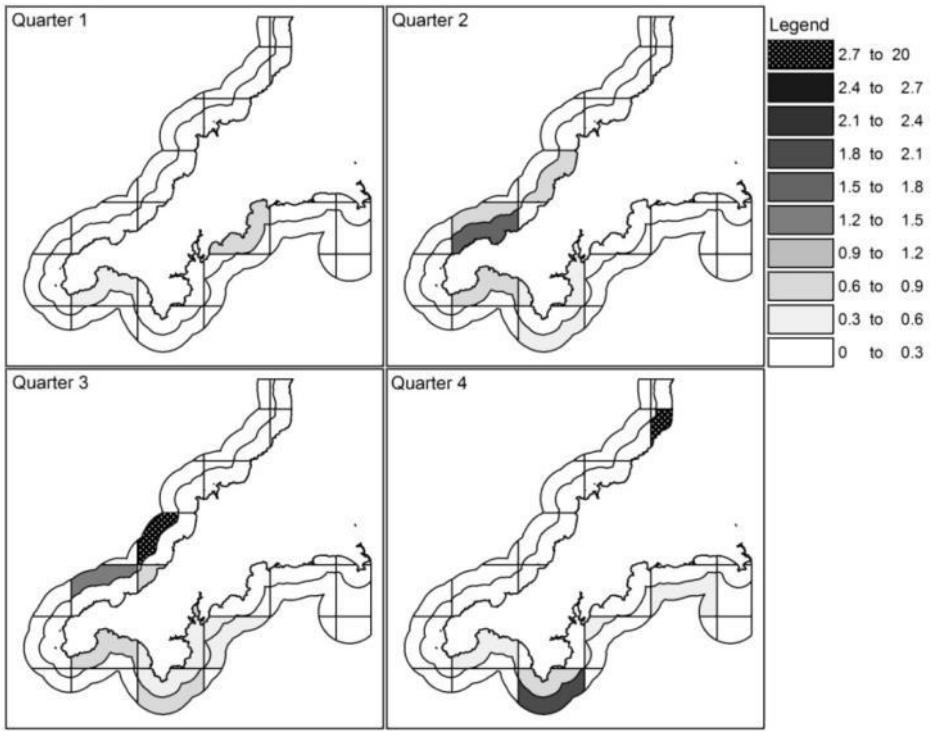

Figure 96: LPUE (kg landed/100m_Nh) of female edible crab (*Cancer pagurus*) in the Cornwall IFCA District in 2018 thematically mapped by belted statistical area, using increments of 0.3 kg. Note: high values of 9.5 kg/100 m nets hauled was calculated for 30E55A, and 17.88 kg/100 m nets hauled for 29E47B and therefore assigned a new category represented in white dots on a black background.

6 Discussion

6.1 Effort

In 2018 the number of permits issued by Cornwall IFCA fell to 332, 6.7% lower than the 356 permits issued in 2016 (Naylor *et al.*, 2017). In the same time period the number of vessel fishing days where crustaceans have been removed from the District has increased by 5.8% to 12,390 vessel fishing days (Naylor *et al*., 2017). This may be a result of more favourable weather allowing for more fishing days, or more capable vessels being able to work in less favourable weather and therefore extending fishing time.

6.1.1 Potting

The number of pots declared to Cornwall IFCA in 2018 was higher than 2017, though lower than recorded in 2016 (Annex 2.1). When calculated for the year annual effort has increased by 3% since 2016 (Annex 2.1). As with previous years, potting effort was highest during the summer months. In all three years effort increased sharply to between 60 to 70 Ph/km^2 in May, in previous years effort then declined to June, however in 2018 effort rose again to a peak of over 80 Ph/km^2 in July (Figure 3), around 30% higher than in the same month in the previous two years (Naylor *et al*., 2017, 2018).

Overall potting effort was similar between the north and south coast in 2018, with effort marginally higher on the south coast (Figure 5), however in previous year's effort has been marginally higher on the north coast (Naylor *et al*., 2017, 2018). On the north coast in 2018 it would appear that potting effort was more homogenous across the belted statistical areas (Figure 8) with effort generally slightly higher offshore for the year. On the south coast there was a greater disparity in effort between the inshore and offshore bands with the highest effort occurring inshore throughout the year (Figure 8). 29E43B, the area offshore from Cape Cornwall, had unusually high effort in 2018 compared to previous years and it is recommended that this be investigated further.

6.1.2 Netting

The total length of nets reported in permit applications, and the total length of nets hauled in 2018 was higher than reported in 2017 (29% and 25% increase respectively, (Annex 2.1)). The biggest increase in netting effort was observed inshore on the south coast (Figure 12) where in January netting effort was over five times higher than in the same area in 2016 (Naylor *et al*., 2017). In this same area, monthly effort peaked at 805.93 Nh/km^2 in June, 40% higher than peak monthly effort in in previous years (Naylor *et al*., 2017, 2018).

In 2018, as in previous years, netting effort was higher on the south coast than the north (Figure 12); in all three years of data monthly effort on the north coast never rose above 100m_Nh/km^2, however on the south coast the monthly effort was rarely less than 100 Nh/km^2(Naylor *et al*., 2017,2018). This is further demonstrated in the thematic mapping of the 2018 data where south coast belted statistical areas effort values were far higher than on the north (Figure 15 and Figure 16). It is likely that this is a result of more sheltered conditions on the south coast allowing for more netting activity.

As has been discussed previously (section 2), the netting activity reported through the monthly shellfish statistics forms are generally large mesh, bottom set, tangle nets either targeting fin-fish or shellfish. This increase in reported netting effort may be as a result of more shellfish being retained and reported or an increase in this type of netting and is recommended to be investigated further.

6.2 LPUE of Crustacean Species

6.2.1 European Lobster *(Homarus gammarus*)

The lobster fishery in the Cornwall IFCA District in 2018 is comparable to that reported in 2016 and 2017 (Annex 2.1). The total reported weight of lobster removed from the Cornwall IFCA District has declined since 2017, but is higher than reported in 2016, and LPUE has seen similar fluctuations with the highest value achieved in 2017 (Annex 2.1).

In 2018, as in 2016 and 2017 (Naylor *et al*., 2017, 2018), LPUE was higher on the north coast than on the south (Figure 20). Monthly LPUE was very similar between the north and south from January to April, and then from May onwards LPUE was consistently higher on the north coast. In previous years the divergence between LPUE on the north and south coasts has occurred earlier in the year in March. Similarly on both the north and south coasts peak LPUE in 2018 occurred in July, around one month later than in previous years.

On the north coast disparity between LPUE values inshore and offshore has increased; in 2018 inshore peak LPUE was 24% higher than 2017, and offshore peak LPUE 42% lower than 2017 (Naylor *et al*., 2018). This pattern on the north coast was highlighted when the data was thematically mapped by year (Figure 23), and the pattern extended into Mounts Bay. Currently in all analysis, belted statistical areas are split into two geographic areas; the north and south coast, with the boundary being the line between 29E42 and 29E43 (4.1.1), to the north of Cape Cornwall. For lobster analysis it may be more appropriate to treat the area from Cape Cornwall to the Lizard as a separate geographic area, therefore dividing the District into three geographic areas for analysis, as it appears to be very different to the rest of the south coast. This will be recommended for future reports.

In 2018 on the south coast, similarly to the north coast, the inshore band A had a higher LPUE for much of the year than B (Figure 22). Offshore appears to have varied in seasonality between years (Naylor *et al*., 2017, 2018), however in shore, band A, appears to have followed a similar trend, and at similar values, to that reported previously (Naylor *et al*., 2017, 2018). In all three years LPUE of lobster on the south coast peaked in the summer months, though in 2018 this was in July, as opposed to June in 2017 and 2016 (Naylor *et al*., 2017, 2018).

In all three years LPUE increased in December (Figure 18, and Naylor *et al*., 2017, 2018). This is likely to be a result of more effort being targeted to lobsters as market prices increase at this time for Christmas markets. This increase in effort is not accounted for in the current analysis method as a similar number of pots may have been hauled overall, however a greater proportion of them will have been set targeting lobster, therefore the LPUE increases. In January 2018 the Christmas market price for lobster sustained through January (Matthew *et al*., 2018a) and LPUE for lobster was unusually high at that time (Figure 19, and Naylor *et al*., 2017, 2018). It is suggested that this again is a result of more effort being directed to lobsters at a time when market prices were high.

6.2.2 Crawfish (*Palinurus elephas*)

The seasonal trend of LPUE in the District for crawfish caught in nets followed a similar pattern to that observed in 2016 (Figure 27, and Naylor *et al*., 2017), with the main fishing season, as described by elevated LPUE, from July to October with a peak in August. Monthly LPUE values were consistently lower in 2018 than in the previous two years (Naylor *et al*., 2017, 2018). When calculated for the year, overall LPUE for the District has declined by 50% from 2016, as reported netting effort has increased and weight of crawfish removed from the District has decreased by around 40% (Annex 2.2).

The greatest fall in LPUE was observed offshore on the north coast (Figure 29 and Naylor *et al*., 2017, 2018). Despite the overall decrease in LPUE, peak monthly LPUE on the north coast was twice that reported in 2016 (Naylor *et al*., 2017, 2018), though in previous years elevated LPUE values were sustained for a longer period of time. Thematic mapping of the data demonstrated a spatial change in the fishery on the north coast (Figure 31); LPUE values appear to have decreased in the majority of belted statistical areas with two isolated areas of high LPUE. This may indicate a development of the fishery on the north coast into a small scale targeted fishery, with a shorter season, where localised LPUE values are higher, despite lower overall landings.

On the south coast the volume of crawfish reportedly removed from the Cornwall IFCA District has fluctuated little between years; $^{+}/_{-}$20% of the mean, and LPUE has returned to the same as reported in 2016, following an increase in 2017 (Annex 2.2). Similarly to the north coast, offshore there was a reduction in LPUE which changed the relationship between inshore and offshore from that observed in previous years; in 2016 and 2017 LPUE was higher offshore, whereas in 2018 LPUE was similar between the two areas (Figure 29, and Naylor *et al*., 2017, 2018). LPUE inshore was the same in 2018 as that calculated for 2017; however both reported removal of crawfish and netting effort were at higher levels in 2018 than in 2017 (Naylor *et al.*, 2017, 2018).

It is likely that the crawfish fishery in the Cornwall IFCA District will increase in coming years as the large numbers of undersized individuals that have been observed by fishers across the District recruit to the fishery. A more accurate way of monitoring the fishery may be required to ensure appropriate management can be delivered by Cornwall IFCA. It is suggested that data analysis for crawfish could be developed to refine the effort (netting) data to only include vessels where crawfish has been reported to have been removed from the District. As previously discussed, it is impossible to ascertain which nets were set to target crawfish, and those where crawfish was a by catch, therefore reducing the reliability of calculated LPUE for this species. This new methodology would remove a lot of effort presumably not targeted at crawfish and refine the LPUE. The data and analysis would have many limitations but would be an improvement on current analysis methods.

6.2.3 Spider Crab (*Maja* spp.)

The spider crab fishery is diverse in the Cornwall IFCA District; different fishing methods are employed, either targeting spider crab or retaining it as a by-catch, and complex market drivers control the volume of fish landed.

In 2018 there appeared to be a succession in the start of the fishery, as described by LPUE, where the net fishery first peaked in March on the south coast (Figure 44), and then in May offshore on the north coast and June inshore (Figure

45). LPUE in the pot fishery then peaked in May on the south coast and June on the north (Figure 36). This succession between gear types and area may be explained by mating behaviour of spider crab, modifying their catchability in different gears and in different areas. Early in the year spider crabs migrate inshore from deeper water to breed and therefore are targeted using nets; this inshore migration may be illustrated in the succession of LPUE peaks in the north coast net fishery where LPUE first peaked offshore , then later inshore. Later in the season individuals may be attracted by bait once mating has ceased and feeding resumes or males may be attracted by females already retained in pots, therefore increasing the LPUE of spider crab retained in pots. In both the net and pot fishery in 2018 peak LPUE occurred on the south coast before the north coast (Figure 36, Figure 44), a trend not clearly observed in previous years (Naylor *et al.*, 2017, 2018).

In the spider crab pot fishery inshore on the north coast (Figure 37), LPUE values per month were initially similar to that observed in 2016 and 2017 (Naylor *et al*., 2017, 2018), whereas in these previous years LPUE peaked in May, in 2018 LPUE continued to rise sharply from May to a peak in June of around twice the peak LPUE value recorded in May 2016. Similarly in the net fishery on the north coast (Figure 45) both offshore and inshore peak LPUE occurred one month later than observed in 2017 (May and June respectively, compared to April and May in 2017).

There were other notable changes to the seasonality of the spider crab fishery; on the south coast LPUE of spider crab retained in pots, was unusually high in January compared to previous years (Figure 38). It is unclear what the drivers were for this change in the fishery, and it will be recommended that it be investigated further. It is also important to remember that in the case of spider crabs, observed changes in LPUE are not always clearly linked to population size and catchability as the fishery is driven by the market demand; for much of the year many merchants were not taking spider crab due to low demand, therefore making LPUE drop, however catch rates may have remained stable.

When the data is thematically mapped for LPUE of spider crabs retained in nets (Figure 47) 29E43 appears to be more similar to the north coast than the south in LPUE values, however in the current analysis methodology this statistical area is on the boundary between the north and south coast and falls within the south coast. It is recommended that this dividing line could be moved, or as suggested for other species, a third geographic area could be defined for the area from Cape Cornwall to the Lizard.

6.2.4 Edible crab (*Cancer pagurus*)

In total over 1,456,000 kg of edible crab were reportedly removed from the Cornwall IFCA District, of which 98% were retained in pots (Annex 2.1). This difference in proportion between gear types is consistent with previous years (97% in 2016 to 98% in 2018) and reflects the different nature of the two fisheries in that the pot fishery is far larger and targeting crab, as opposed to the net fishery where crab is a valuable by-catch.

6.2.4.1 Edible crab retained in pots

In 2018 over 1,400,000 kg of edible crab was reportedly removed from the Cornwall IFCA District using pots; 13% less than in 2017 (Annex 2.1), simultaneously potting effort has increased from 2016 to 2018 (Annex 2.1) and therefore LPUE overall for the District has decreased from 0.37 kg/100Ph in 2016 to 0.30 kg/100Ph in 2018.

Generally the seasonality of the fishery of combined edible crab, as described by LPUE (Figure 50), was similar to previous years (Naylor *et al.,* 2017, 2018) with an initial decline from January to April followed by two increasing peaks in LPUE. In 2016 and 2017 the first peak was in May/June and the second in October, in 2018 both peaks in LPUE were around one month later; June and November. This was also observed in 2018 in lobster and spider crab LPUE. Local fishers have suggested this slow start to the season may be linked to colder water temperatures in 2018 (Trundle *et al.,* 2018). Similarly, offshore on the south coast, LPUE of female edible crab in January 2018 was 56% less than in 2017 (Figure 70). Despite the slow start to the year, peak LPUE of female and combined edible crab both offshore and inshore on the south coast has remained relatively similar through the three years studied (Naylor *et al*, 2017, 2018).

On the north coast (Figure 67) LPUE of female edible crab in January was similar to previous years, however when split by belt (Figure 69) LPUE inshore was around half of that in previous years (Naylor *et al.,* 2017, 2018). In the following months inshore LPUE remained at a lower level to that observed in previous years with peak LPUE occurring in November, one month later than in 2017 and 15% lower. This supports comments from local fishermen that crab catches have been low, most notably inshore (Matthew *et al.,* 2018b). In all years LPUE was higher offshore throughout the year on both coasts, supporting comments from local fishers that fishing for edible crabs was better offshore, with the crab inshore mainly soft shelled and undersized (Matthew *et al.,* 2018c).

Male edible crab represented 8% of the total crab removed from the District in 2018 (similar though lower to 2016 and 2017; 11% and 9% respectively (Annex 2.1)). Due to the very high proportion of females it is unsurprising that the data for females and combined edible crab followed a similar pattern, however male edible crab fishery distribution is very different. Similarly to the female edible crab fishery, LPUE for male edible crab was higher offshore (Figure 61 and Figure 62), however the thematic maps (Figure 71) showed that the belted statistical areas with the highest LPUE were around Lands End to the Lizard, however for males highest LPUE were east of this on both the north and south coasts (Figure 63); around the Lizard and from St Ives to Newquay. This may be because of habitat preference, or the south and western migrations of female edible crab in the autumn for favourable spawning grounds (Davis, 2007).

The seasonality of the male edible crab pot fishery was different between the two coasts in 2018 (Figure 60). On the north coast LPUE initially fell from January to a low in March with two peaks in LPUE in the autumn and winter. On the south coast LPUE was generally lower than on the north, however LPUE initially increased from January to a peak in March, a value higher than on the north coast in the same month, then declined for the remainder of the year.

6.2.4.2 Edible crab retained in nets

In the Cornwall IFCA District nets are not routinely set to target edible crab, the reported edible crab removed from the District using nets is a by catch of a fin-fish fishery, generally bottom set entangling nets. Therefore LPUE calculations are often not a reflection of population size. In comparison to the pot fishery for edible crab, the net fishery represents around 2% of the total edible crab removed from the Cornwall IFCA District in 2018 (Annex 2.1), however in 2018 this equated to 34,500 kg, and therefore a valuable fishery and important to Cornwall IFCA's management.

The composition of male to females is different in the net fishery to the pot fishery with a higher proportion of males to females in nets (27% males in nets, 8% males in pots). This effect may be due to the species ecology and catchability;

i.e. males are more transient and therefore more likely to be caught in nets, or market drivers; it can be time consuming removing edible crab from nets with both claws attached ('crippled' crabs with one or both claws missing achieve a lower price with merchants), and male crabs achieve a higher price per kilo than females, therefore it may be more cost effective to carefully remove and retain males and discard females.

As with the pot fishery total weight of crab landed increased from April to June (Figure 73), though in the net fishery monthly total weight removed then declined to the end of the year, compared to the pot fishery (Figure 49) where high values were sustained for several months with a more gradual decline. This is demonstrated in the LPUE values where both fisheries LPUE was elevated at the end of the year (Figure 74, and Figure 50), which may reflect a larger fishable stock at this time of year or greater catchability of a resident population. The increase in LPUE was smaller in the net fishery; this is likely to be a product of the differences in the targeted and by-catch fisheries; where LPUE in the pot fishery may be artificially inflated further through the increased proportion of the potting effort being targeted to crab at this time.

7 Recommendations

This report is the third annual report on the shellfish statistics collated by Cornwall IFCA since their reform in 2016. The aim of these reports was to document the fisheries in terms of LPUE to provide a baseline for management. Comparisons have been drawn between the three years in terms of the fisheries scale and seasonality; however these comparisons have been limited in the current format of data analysis. It is suggested that there is now a sufficient time series of data to conduct multiyear analysis, also incorporating other data sets held by the IFCA, to investigate changes over time and inform management. It is envisaged that annual shellfish statistics reports from 2019 onwards will be reformed and streamlined to supplement the multiyear analysis, incorporating the following recommendations;

- The methodology for calculating netting effort for crawfish should be modified, where instead of using all netting effort to calculate LPUE the netting effort should be filtered to only include vessels data that have reported removing crawfish in that year, therefore a higher portion of the netting effort considered may have been set targeting crawfish.
- In current analysis belted statistical areas are split into two geographic areas; the north and the south coasts. It has been noted for a number of the species (lobster, edible crab and spider crab) that from Cape Cornwall to the Lizard, an area currently within the 'south coast', the fishery is quite different to that of the rest of the south coast. It is suggested that the 'south coast' geographic area be split, creating a third geographic area from Cape Cornwall to the Lizard.
- Unlike previous reports, the reported landed weight data for each species by month has been included. It is recommended that this be included in future reports as it is a valuable metric and adds context to the analysis.

8 References

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9 Appendices

Annex 1: Cornwall IFCA Monthly Shellfish Statistics

Cornwall IFCA Monthly Shellfish Statistics

These return forms are required every month and are to be submitted to the Authority by the 15th day of the following month

Name of Vessel: ---------- **Reg No:** ---------- **Permit No:** ----------

(main berthing port)
Base Port: ---------- **Month:** ---------- **Year:** ----------

	Area Code			Gear		Other methods	Species (estimated weights in kilos)								
Day	Main area fished each day eg 29 E4 7 A			No. Pots hauled	Metres Nets hauled	(advise) (T) Trawling (S) Scalloping	Edible Crab Cocks	Edible Crab Hens	Spider Crab	Lobster	Crawfish	Velvet Crab	Green Crab	Crab Claws Edible	Crab Claws Spider
1															
2															
3															
4															
5															
6															
7															
8															
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31															

Comments: If you wish to provide extra information for byelaw/research purposes, please tick this box and write in the comments box overleaf ☐

A SHELLFISH RETURN MUST BE MADE EVERY MONTH, TO ARRIVE AT THE CORNWALL IFCA OFFICE NO LATER THAN THE 15TH OF THE FOLLOWING MONTH

If there has been 'nil' shellfishing in the Cornwall IFCA District this month, please tick the "no fishing" box and give a reason for this. e.g. outside 6 mile limit, boat re-fit, holiday, illness etc.

No shellfishing in District this month ☐

Reason ----------

IF THIS IS YOUR LAST STATS RETURN FOR A WHILE

For example, gear brought in. Please advise the month you expect to re-commence fishing. Statistics will be due again from that month.

I have stopped fishing ☐

I plan to re-start (advise month) ----------

I certify that the information I have provided is correct to the best of my knowledge and belief.

Signature of Owner or Representative: ---------- **Date:** ----------

For office use only. Please do not write below this line

Sc ☐ S/S ☐ Ent ☐ Sh: Received date

v.2
Jan 2017

Comments

Data Protection

The information you supply is covered by the Data Protection Act 1998. The data is processed by Cornwall IFCA in accordance with the data protection principles contained within the Act. The information you provide will be used by us for fisheries management purposes in order to process your permit and will be shared with the Marine Management Organisation so that your permit can be validated through proof of a valid fishing licence and registration. Only the minimum amount of information is asked for. Cornwall IFCA complies with Schedule 2 of the processing conditions, in that the data subject (the signatory of this document) has consented to the processing of the data and because information is processed in order to fulfil a function imposed by legislation.

REMINDERS BEFORE SUBMITTING

Have you advised the full six-figure area code for the main area fished each day?

- ICES rectangle, sub-rectangle and belt (A or B) is required.
- Cornwall IFCA do not require stats for shellfish caught outside the 6 mile limit.

Have you advised the gear hauled each day?

Have you estimated in kgs your catch for each species each day?

Don't forget to sign the form overleaf before sealing the envelope.

If posting the form, please ensure the correct postage is paid.

Please return the completed form to:

Cornwall IFCA
Chi Gallos
Hayle Marine Renewables Business Park
North Quay
Hayle
Cornwall TR27 4DD

ENQUIRIES
tel: 01736 336842
e-mail: enquiries@cornwall-ifca.gov.uk
website: www.cornwall-ifca.gov.uk

This form has been designed to fit into a window envelope.
Fold at the --- marks

Annex 2: Summary Data, 2016 to 2018

Annex 2.1 Summary of pot fisheries in the Cornwall IFCA District, 2016 to 2018

Year	Total number of pots declared	Number of pot hauls (Ph)	Lobster		Spider Crab		Edible Crab (Combined male and female)		Edible Crab (Female)		Edible Crab (Male)	
			Total removed from District (kg)	LPUE (kg/100Ph)	Total removed from District (kg)	LPUE (kg/100Ph)	Total removed from District (kg)	LPUE (kg/100Ph)	Total removed from District (kg)	LPUE (kg/100Ph)	Total removed from District (kg)	LPUE (kg/100Ph)
2018	81,317	2,048,872	150,231	7.33	118,801	5.80	1,424,739	69.54	1,303,685	63.63	121,054	5.91
2017	76,265	2,012,495	162,396	8.07	84,632	4.21	1,642,165	81.60	1,501,740	74.62	140,425	6.98
2016	83,781	1,984,868	148,445	7.48	91,666	4.62	1,504,793	75.81	1,334,552	67.24	169,901	8.56

Annex 2.2 Summary of net fisheries where shellfish has been retained in the Cornwall IFCA District, 2016 to 2018

Year	Total length of nets declared	Total length of net hauled	Crawfish		Spider Crab		Edible Crab (Combined male and female)		Edible Crab (Female)		Edible Crab (Male)	
			Total removed from District	LPUE	Total removed from District	LPUE	Total removed from District	LPUE	Total removed from District	LPUE	Total removed from District	LPUE
	(m)	(Nh)	(kg)	(kg/100m_Nh)	(kg)	(kg/100m_Nh)	(kg)	(kg/100m_Nh)	(kg)	(kg/100m_Nh)	(kg)	(kg/100m_Nh)
2018	1,625,997	8,359,890	2,807	0.03	96,190	1.15	34,564	0.41	25,193	0.30	9,371	0.11
2017	1,255,865	6,684,300	4,827	0.07	44,851	0.67	31,438	0.47	22,870	0.34	8,568	0.13
2016	1,519,274	7,308,578	4,628	0.06	44,468	0.61	40,114	0.55	27,008	0.37	13,106	0.18