Tees and North Yorkshire stock monitoring report

September, 2022

Date submitted:	07/09/2022
Report compiled by:	TS RB
Quality control by:	TS
Approved by & date:	DMc 07/09/2022
Version:	1

This report has been prepared by North Eastern Inshore Fisheries and Conservation Authority with all reasonable care and attention to detail. All information provided is the best available at the time of production.

This publication may be re-used free of charge in any format or medium for research for non-commercial purposes, private study or for internal circulation within an organisation. This is subject to it being re-used accurately and not used in a misleading context. The material must be acknowledged as a North Eastern Inshore Fisheries and Conservation Authority production and the title of the publication specified.

For any other use of this material please contact the Chief fishery officer through www.ne-ifca.gov.uk or by writing to;

North Eastern IFCA
Town Hall
Bridlington
East Riding of Yorkshire
YO16 4LP

Executive Summary

Beginning in October 2021, NEIFCA has been supporting a joint agency investigation into shellfish mortalities observed between Teesside and Robin Hoods Bay in North Yorkshire. The events were characterised by reports of dead and dying crab and lobster found washed up on beaches and in fishing pots, with animals displaying 'twitching' and lethargic behaviour as well as an inability to self-right.

Since October fishermen from Hartlepool to Scarborough have been reporting reduced catch rates, particularly from fishing grounds within 3 NM, raising concerns about the state of the crab and lobster stocks. In order to assess the scale of any potential impacts arising from the events of late 2021 and to monitor the recovery of the stocks, NEIFCA has been undertaking potting surveys from its research vessel, North Eastern Guardian III, and carrying out observer trips aboard commercial vessels working in the impacted area.

In addition, an assessment of landings data by region and by port has been undertaken to determine if overall landings figures for the past year have varied significantly from previous years. The aim of this report is to present the results of this work.

Significant reductions in landings for both lobsters and edible crabs in late 2021 were not evident and landings were broadly in line with historic data. As the 2022 season has progressed, lobster landings have increased in line with seasonal expectations. Edible crab landings and inshore catch rates, however, remain depressed suggesting that localised reductions in abundance persist. This supports anecdotal reports received from industry through the first half of 2022.

Shellfish health monitoring undertaken during surveys encountered very low numbers of dead or symptomatic shellfish, suggesting that no persistent health concerns remain. The assessment of landings data has highlighted significant increases in edible crab landings into Hartlepool since 2018-19. The impact of this change in fishing pressure on regional crab stocks requires further consideration.

Contents

1. Scope and key assumptions

Working on the basis that a significant mortality event involving edible crab and lobster occurred between October and December 2021, the work summarised within this report was intended to assess both the impact of the initial events and to monitor the recovery of the fisheries. It is not the intention of this report to address the investigation into potential causes of the events observed, which was summarised in the joint agency investigation report available here.

The events observed were characterised by:

- Wash ups of dead and dying crabs and lobsters on regional shores between Teesside and Robin Hoods Bay,
- Reports of increased in pot and post capture mortality rates.
- Reports of reduced catch rates

In order to assess the state of the shellfish (edible crab and lobster) stocks, NEIFCA undertook potting surveys utilising the Authority's patrol vessel and by accompanying commercial vessels during normal fishing operations in the affected regions to assess catch rates compared to historic data and to monitor animal health by quantifying dead or symptomatic animals. Additionally, landings data provided by the Marine Management Organisation was interrogated to assess deviation in annual and monthly landings compared to historic averages.

The key assumptions associated with this work was that a significant mortality event would result in 1) a significant reduction in landings (tonnage) in late 2021 when compared to previous years, 2) a significant reduction in catch rates compared to previous years and 3) continued occurrence of dead, dying and symptomatic animals.

The regional potting fisheries operate year round but follow consistent seasonal patterns. This is most evident with lobster where the bulk of annual landings occur between July and September in what is known as the 'new shelling' period. In terms of assessing long term impacts on the stock and recovery of the fisheries post-event, the key assumption was that a significant mortality event would result in reductions in monthly landings as the 2022 season progressed. In particular, industry feedback has highlighted that throughout 2022 edible crab catch rates and landings from within 3NM are significantly lower than expected.

Where long term data sets have been used for comparison with contemporary data, standard deviation was calculated to give an indication of whether deviation from historic average values could be considered significant.

2. Landings data assessment

Landings data was provided by the Marine Management Organisation extending back to 2009. The current assessment was limited to ports in the affected region, namely: Hartlepool, Redcar, Staithes, Whitby and Scarborough. Figures are also presented by ICES statistical rectangle for regions encompassing the impacted area. These include ICES rectangles 38E8, 38E9 and 37E9 (Figure 1).

Given the timing of the observed events and the data available, annual values were calculated as running from August to July of the following year. While not quantified, feedback from industry suggests that many commercial vessels took their pots out of the sea between December 2021 and spring 2022.

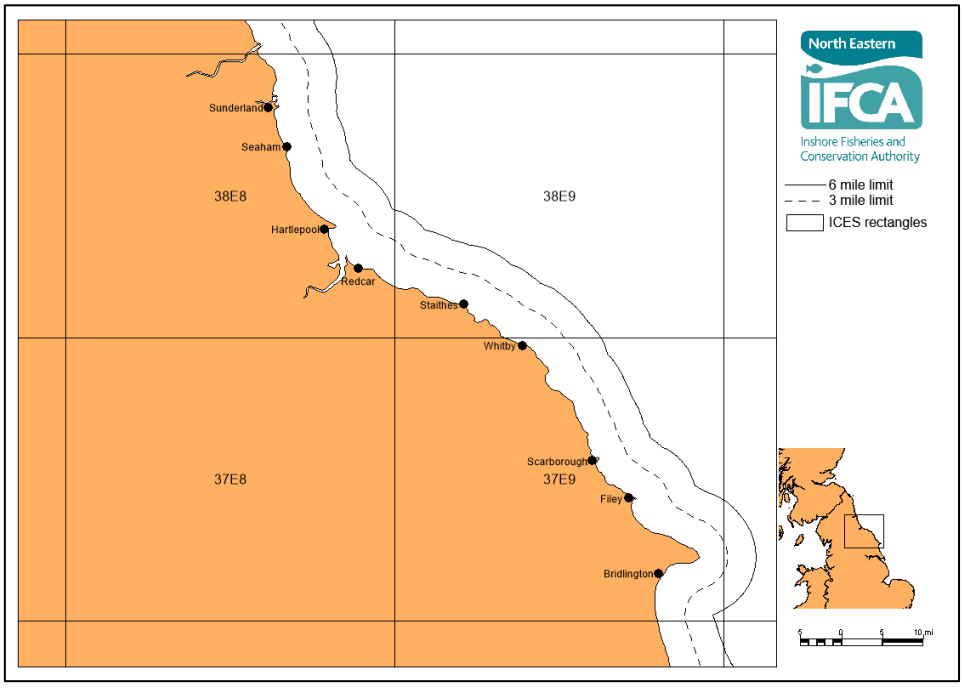


Figure 1. Regional map of key ports and ICES statistical rectangles considered in the current assessment.

Given the timing of the observed events and the data available, annual values were calculated as running from August to July of the following year. A reliable record of effort (pots hauled per day) directly linked to the available landings data was not available. As such, the following considerations should be taken into account when interpreting the data. The number of vessels having reported landings for each of the ports considered in this report have been on a declining trend since 2018/2019, with the exception of Staithes which remains stable but low (Figure 2). Furthermore, while not quantified, feedback from industry suggests that many commercial vessels operating in the affected region took their pots out of the sea between December 2021 and spring 2022.

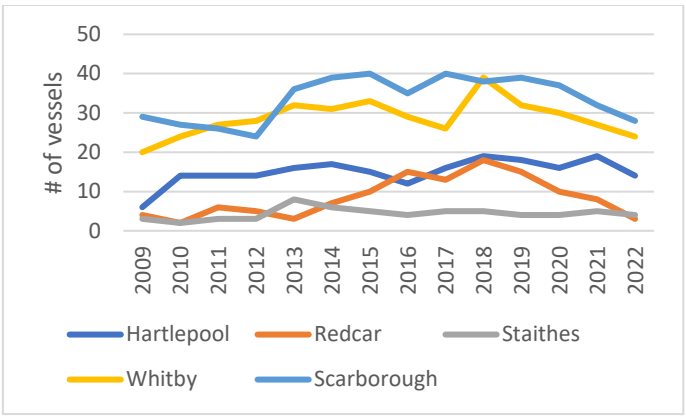


Figure 2. Number of vessels reporting landings of shellfish to regional ports by year.

Hartlepool

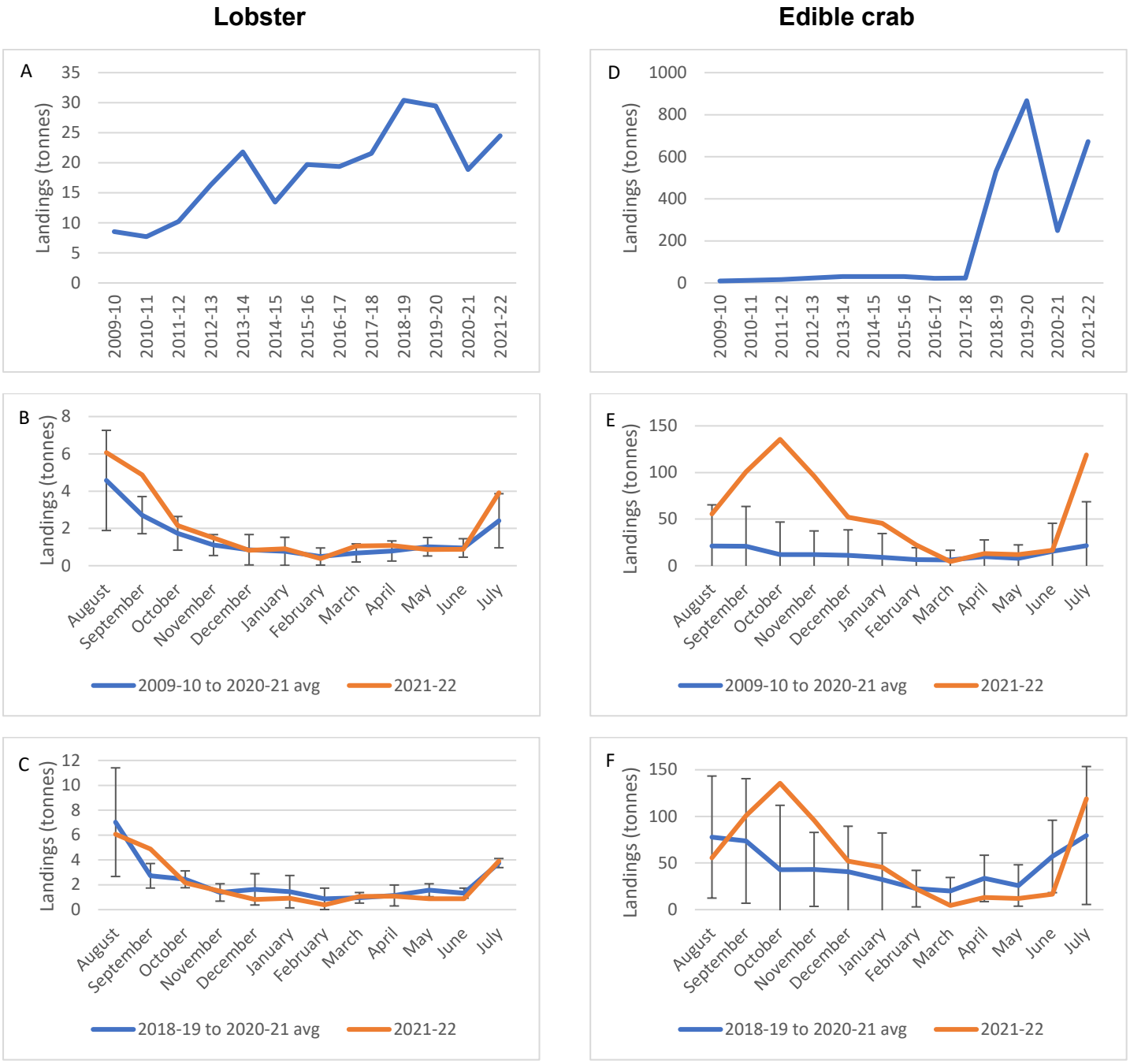


Figure 3. Annual landings for lobsters (A) and edible crabs (D) into Hartlepool. Monthly values are displayed with historic averages for the periods 2009-10 to 2020-21 and for 2018-19 to 2020-21 for both lobsters (B &C) and edible crabs (E & F). Error bars represent standard deviation.

The interpretation of landings data for Hartlepool (Figure 3) is complicated by the large increase in annual landings of edible crab reported since 2018-19. Based on officer knowledge this is attributed to larger, vivier vessels beginning to operate from the port from this time. These vessels typically range further from port than smaller inshore vessels and may operate in any or all of the three ICES rectangles considered in this report.

Despite the potential for minor variations in pot construction, vivier crabbing vessels utilise the same style of pots that are used by inshore vessels to target lobsters. It is assumed that while not targeting lobsters, these vessels will capture and land lobsters despite not being the target species.

Between 2009-10 and 2017-18 (Figure 3 D), edible crab landings into Hartlepool were consistently around 25 tonnes per year. Over the past four years, landings have been variable but significantly higher than the historic average. Average annual crab landings over this time were 579 tonnes. Lobster landings (Figure 3 A) into the port have been on an increasing trend since 2009 and increased notably in 2018-19, coinciding with the increase in crab landings.

Lobster and crab landings in 2020-21 (Figure 3 A & D) were both reduced compared to the previous two years. This may be related to reduced effort associated with the covid pandemic. Landings into the port for both species over the past year, which includes the observed events, were higher than those reported in 2020-21.

Figures for the monthly data were replicated using both 2009-10 to 2020-21 and 2018-19 to 2020-21 as reference periods to give a clearer comparison with contemporary patterns. For edible crab (Figure 3 E), comparing the 2021-22 values to the 2009-10 to 2020-21 average does not provide a reliable comparison given the consistently low levels of landings reported prior to 2018-19. While the average landings for 2018-19 to 2020-21 (Figure 3 F) provide more realistic grounds for comparison, high levels of interannual variation further confound interpretation.

Between August and October 2021(Figure 3 E & F), crab landings increased to a peak of over 135 tonnes. Landings for October are considered to be high, above the standard deviation for the three previous years. Monthly landings decreased between October 2021 and February 2022 in line with seasonal patterns but still at or above average values. Values for March to June 2022 were low compared to the three year average, around the lower levels for standard deviation. Landings markedly increased in July 2022 with 118 tonnes being landed, above the three year average but still within the range of historic interannual variation observed.

Again, the interpretation of landings data for crab needs to be treated carefully given the spatially discreet (inshore 0-3 NM) nature of the events observed and the geographic scale of fishing grounds utilised by vessels targeting crabs from Hartlepool. The MMO has noted some inconsistencies with crab data for Hartlepool and further data assessments will review any changes.

When compared to the previous 3 years, lobster landings for the past 12 months are broadly in line with average values and within the expected variance. Values for December 2021 to February 2022 were depressed but have since recovered with landings in July 2022 at the historic levels.

Redcar

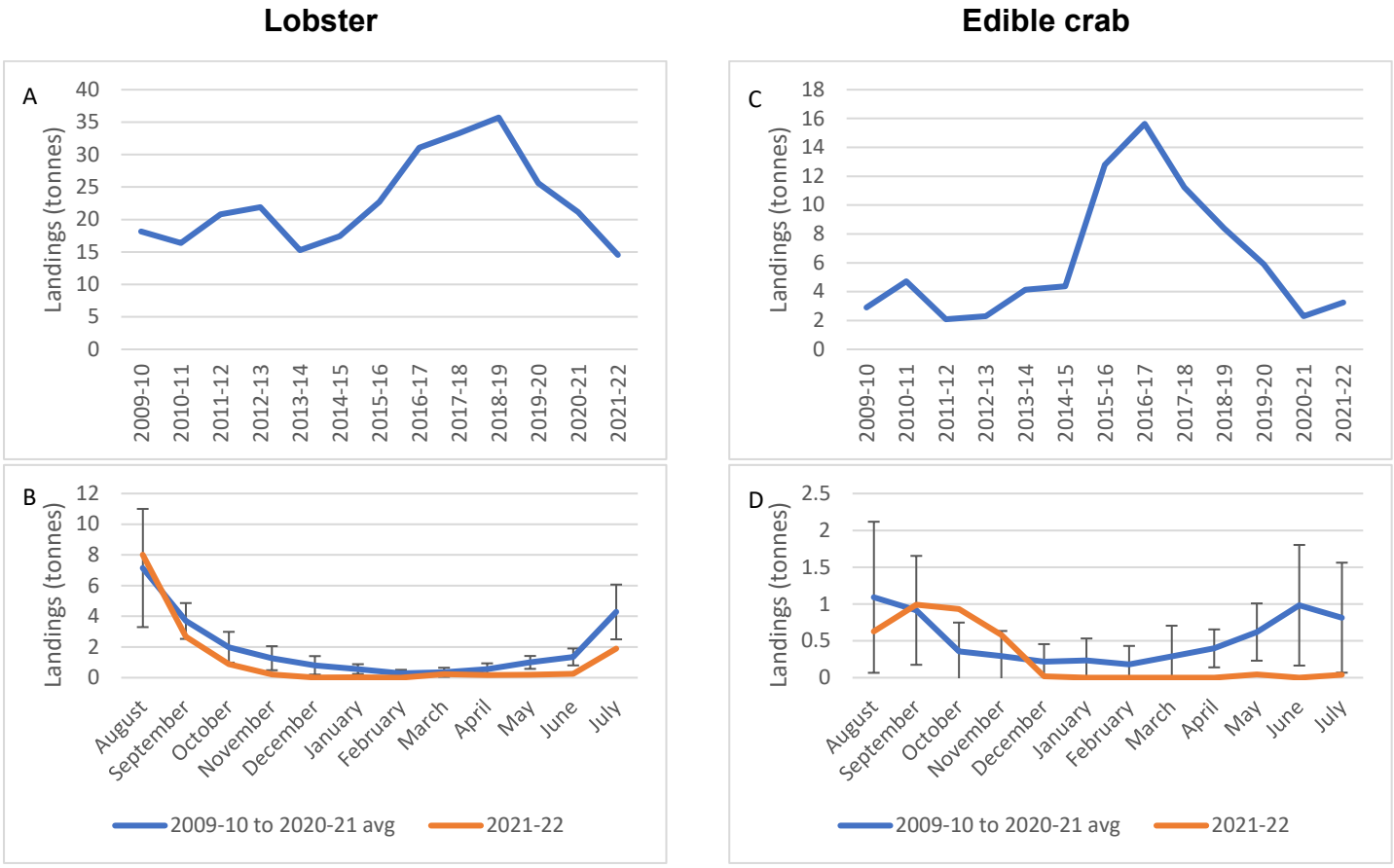


Figure 4. Annual landings for lobsters (A) and edible crabs (C) into Redcar. Monthly values are displayed with historic averages for the periods 2009-10 to 2020-21 for lobsters (B) and edible crabs (D). Error bars represent standard deviation.

Statistics for Redcar are considered more representative of the inshore fleet as all vessels operating from Redcar are small, beach launch boats that would typically not range as far from port as the larger vivier vessels operating from Hartlepool.

Annual statistics for both lobster (Figure 4 A) and crab (Figure 4 C) landings show declines since 2018-19 and 2016-17 respectively. The monthly statistics for crab show a significant decline in landings in December 2021 and depressed values through to July 2022 (Figure 4 D), however, landings for October and November 2021 were higher than previous years.

Anecdotal reports from industry suggest that many vessels took their pots out of the water in late 2021 due to poor catches. Bearing this change in effort patterns in mind, lobster landings between December 2021 and June 2022 were very low, below what would be expected to be landed over this time period (Figure 4 B). Landings did increase in July 2022 at the start of the new shelling season but were still far below expected values. The lack of an appreciable increase of crab landings in July supports the anecdotal reports that inshore fishermen were not seeing the quantities of crab in their pots that they would be expecting.

Staithes

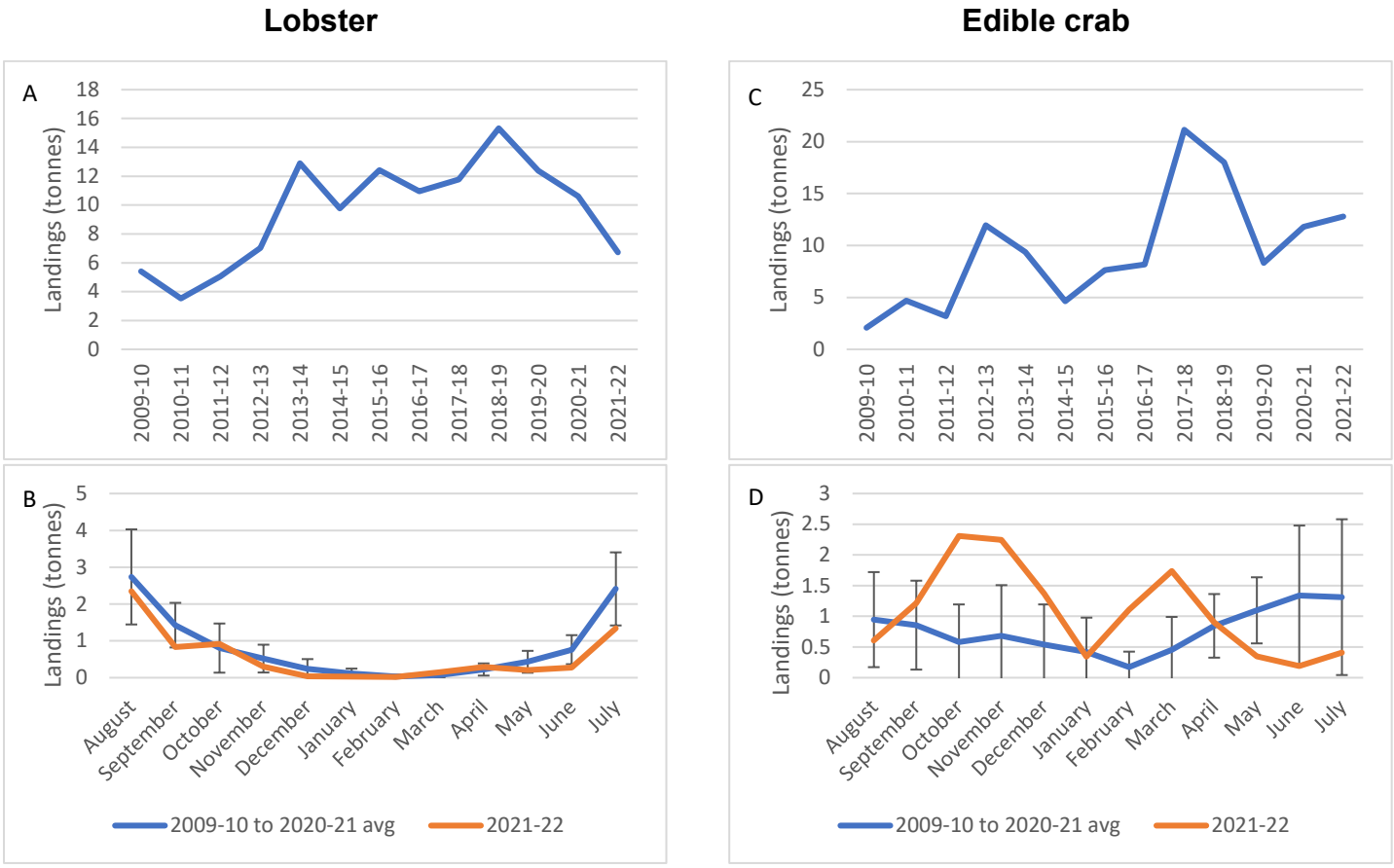


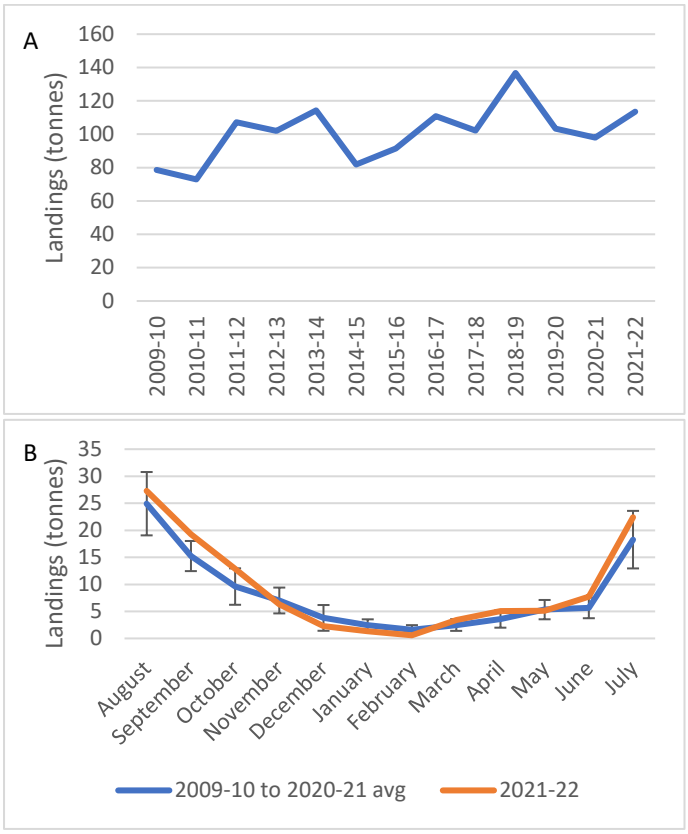
Figure 5. Annual landings for lobsters (A) and edible crabs (C) into Staithes. Monthly values are displayed with historic averages for the periods 2009-10 to 2020-21 for lobsters (B) and edible crabs (D). Error bars represent standard deviation.

Annual lobster landings into Staithes have been declining since 2018-19 (Figure 5 A), coinciding with the increase in crab landings into Hartlepool. Monthly landings over the past year follow the typical seasonal pattern with peak landings occurring in the new shelling period between July and August (Figure 5 B). Landings between August and December 2021 were below the long term averages for those months with the exception of October. Landings in 2022 increased in line with expectations up to April, however values for May to July were well below the average figures, at or below the standard deviation range for those months.

Crab landings exhibit high interannual variation with appreciable increases in 2012-13 and 2017-18, and have increased since 2019-20 (Figure 5 C). Monthly landings also demonstrate high variability when compared with the long term averages. Landings between October and December 2021, at the peak of the observed events, and between February and March 2022 were well above the average values. Landings after March do not follow the seasonal trend and fell month on month to June before a small increase in July. Caution in interpretation of these figures should be employed given the high variability observed and the relatively low tonnages involved.

Whitby

Lobster



Edible crab

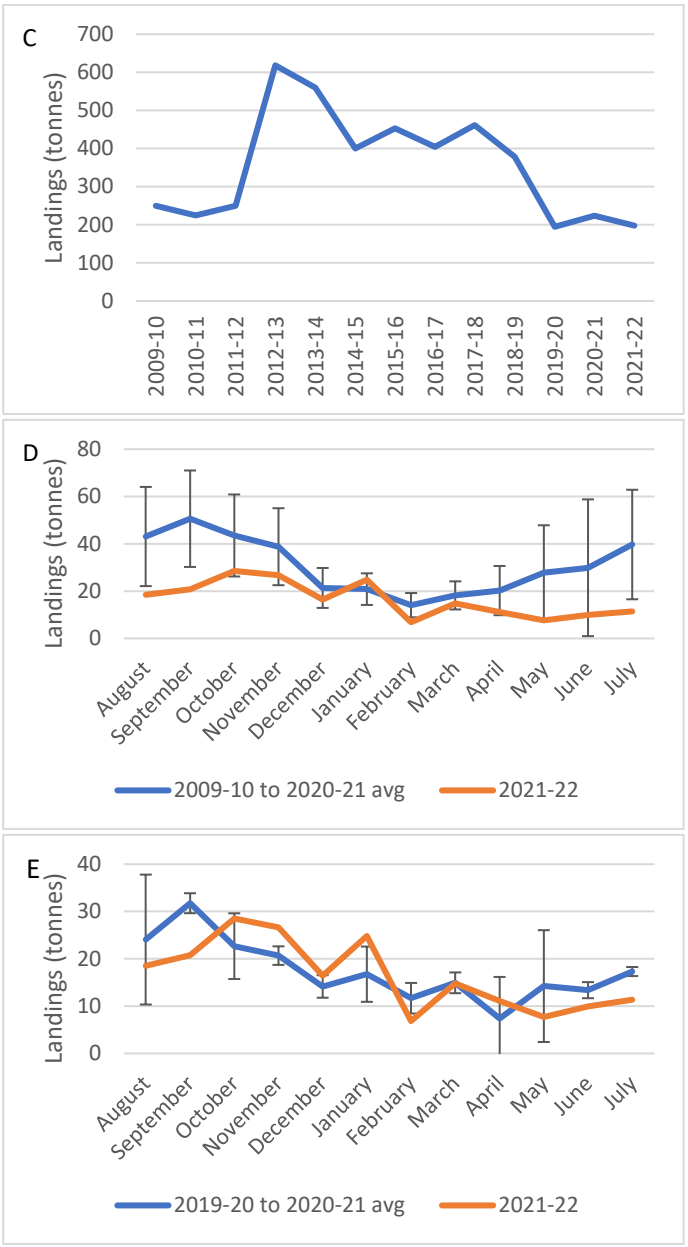


Figure 6. Annual landings for lobsters (A) and edible crabs (C) into Whitby. Monthly values are displayed with historic averages for the periods 2009-10 to 2020-21 for lobsters (B) and edible crabs (D). Monthly values for edible crabs are further compared with the average for the period 2019-20 to 2020-21 (E). Error bars represent standard deviation.

Lobster landings into Whitby average 100 tonnes per year and were higher over the past 12 months compared to the previous 2 years (Figure 6 A). Monthly values were above or at the average between August and November 2021 but fell below the average between December 2021 and February 2022. Landings have returned to expected levels since March 2022, at or above the average values.

Crab landings have been relatively low but stable for the past 3 years compared to the long term average (Figure 6 C). It is notable that landings decreased significantly after 2018-19, coinciding with the increase in crab landings into Hartlepool. Monthly landings were considerably lower than the long term average (2009-10 to 2020-21) (Figure 6 D), however when compared with the previous 2 years are broadly in line with expectations despite a high degree of variability (Figure 6 E).

Scarborough

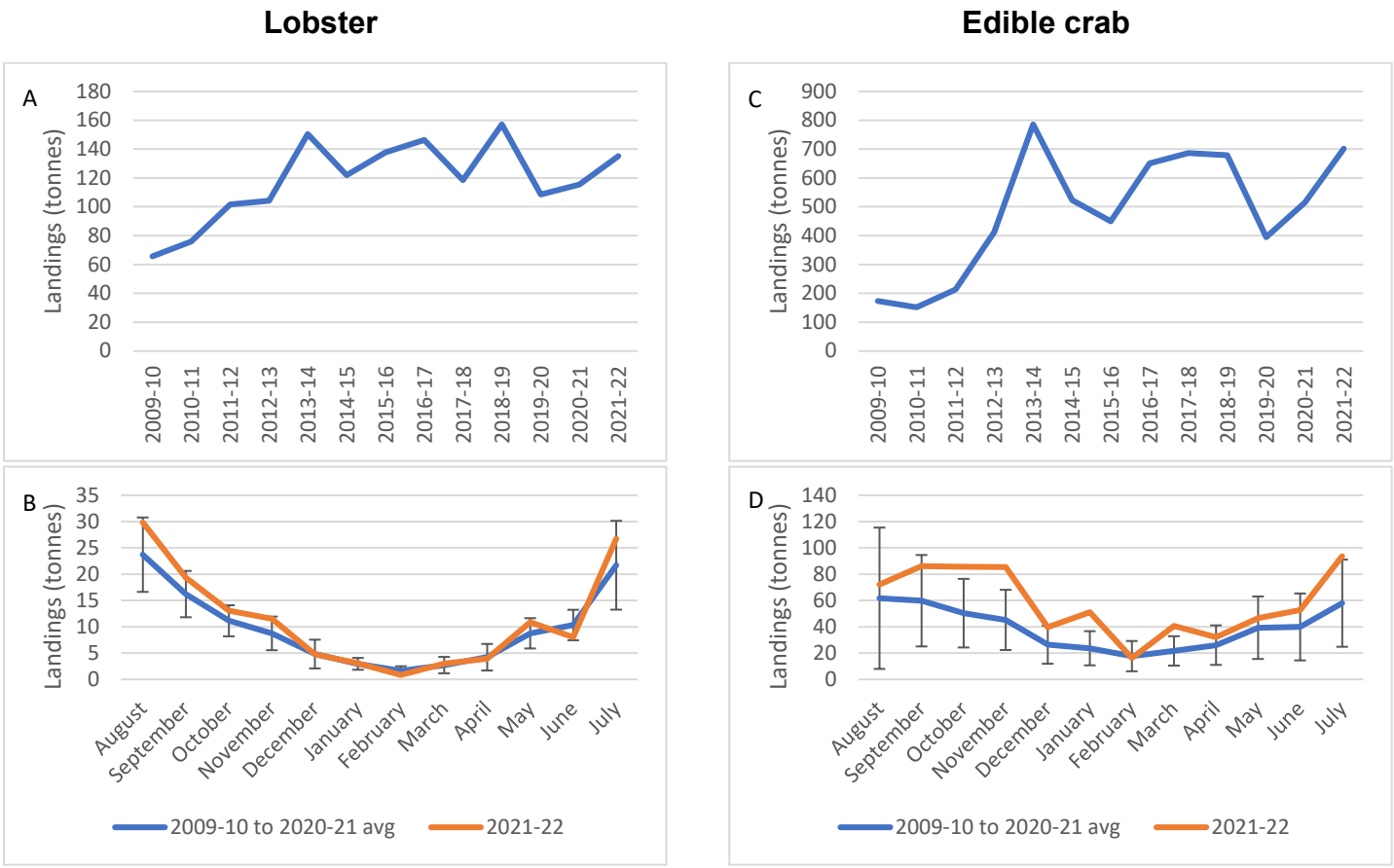


Figure 7. Annual landings for lobsters (A) and edible crabs (C) into Scarborough. Monthly values are displayed with historic averages for the periods 2009-10 to 2020-21 for lobsters (B) and edible crabs (D). Error bars represent standard deviation.

Both lobster and crab annual landings into Scarborough have been increasing since 2019-20 (Figure 7 A & B). Monthly values for both species over the past year follow seasonal trends and do not demonstrate any appreciable reduction in landings compared to the long term averages.

Landings by ICES rectangle

Lobster

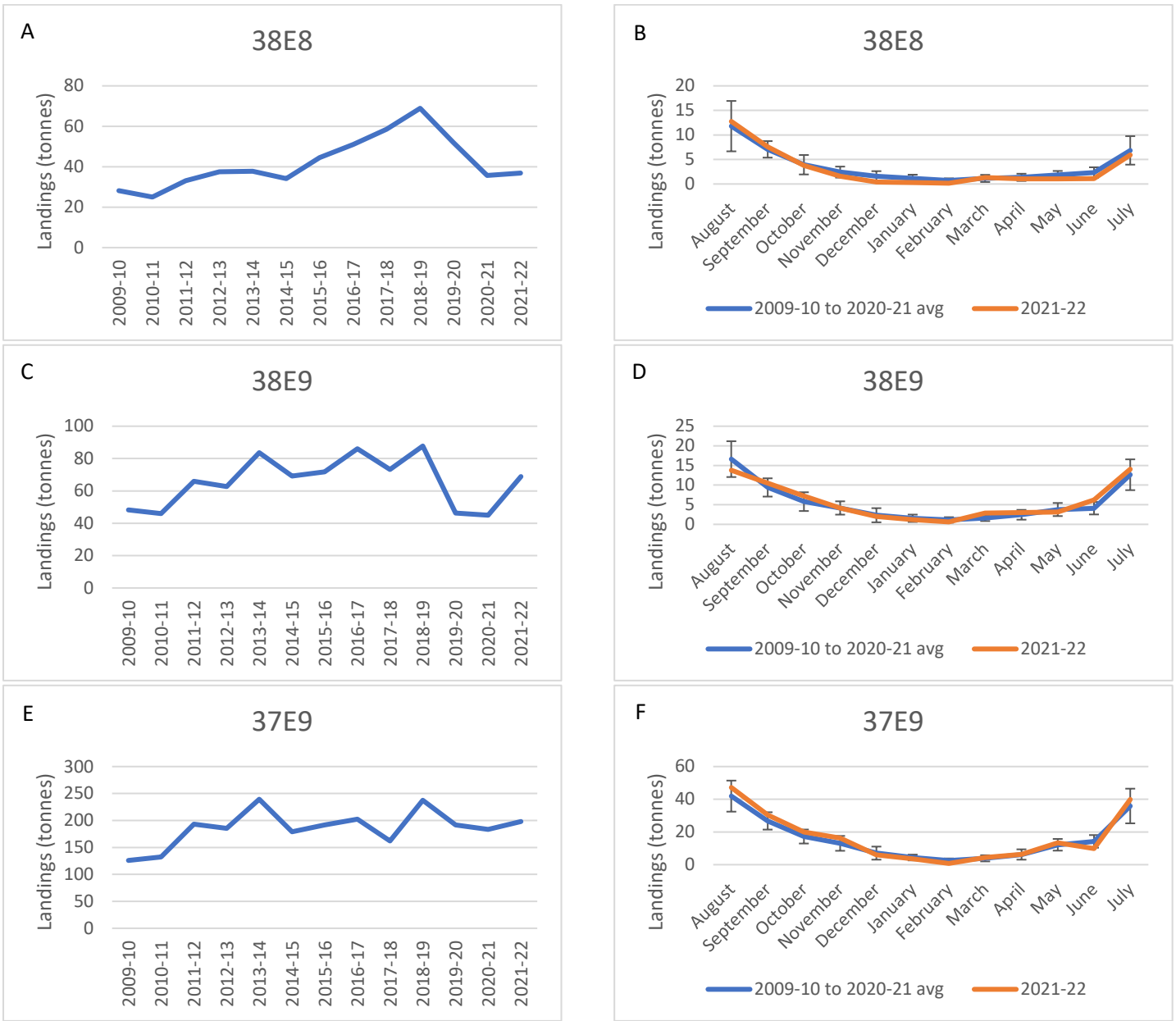


Figure 8. Annual and monthly lobster landings for ICES rectangles encompassing the affected region. Monthly values are displayed with historic averages for the period 2009-10 to 2020-21. Error bars represent standard deviation.

When considered by ICES statistical rectangles, annual lobster landings were all higher in 2021-2022 compared to the previous 12 months (Figures 8 A, C & E). Prior to this, landings from all 3 rectangles had been on a declining trend since 2018-19. Monthly values did not vary significantly from the long term averages (Figures 8 B, D & F), but were somewhat depressed between December 2021 and February 2022 in 38E8 which encompasses the Teesside area and Redcar. This could in part be due to fishermen taking pots out of the water.

Edible crab

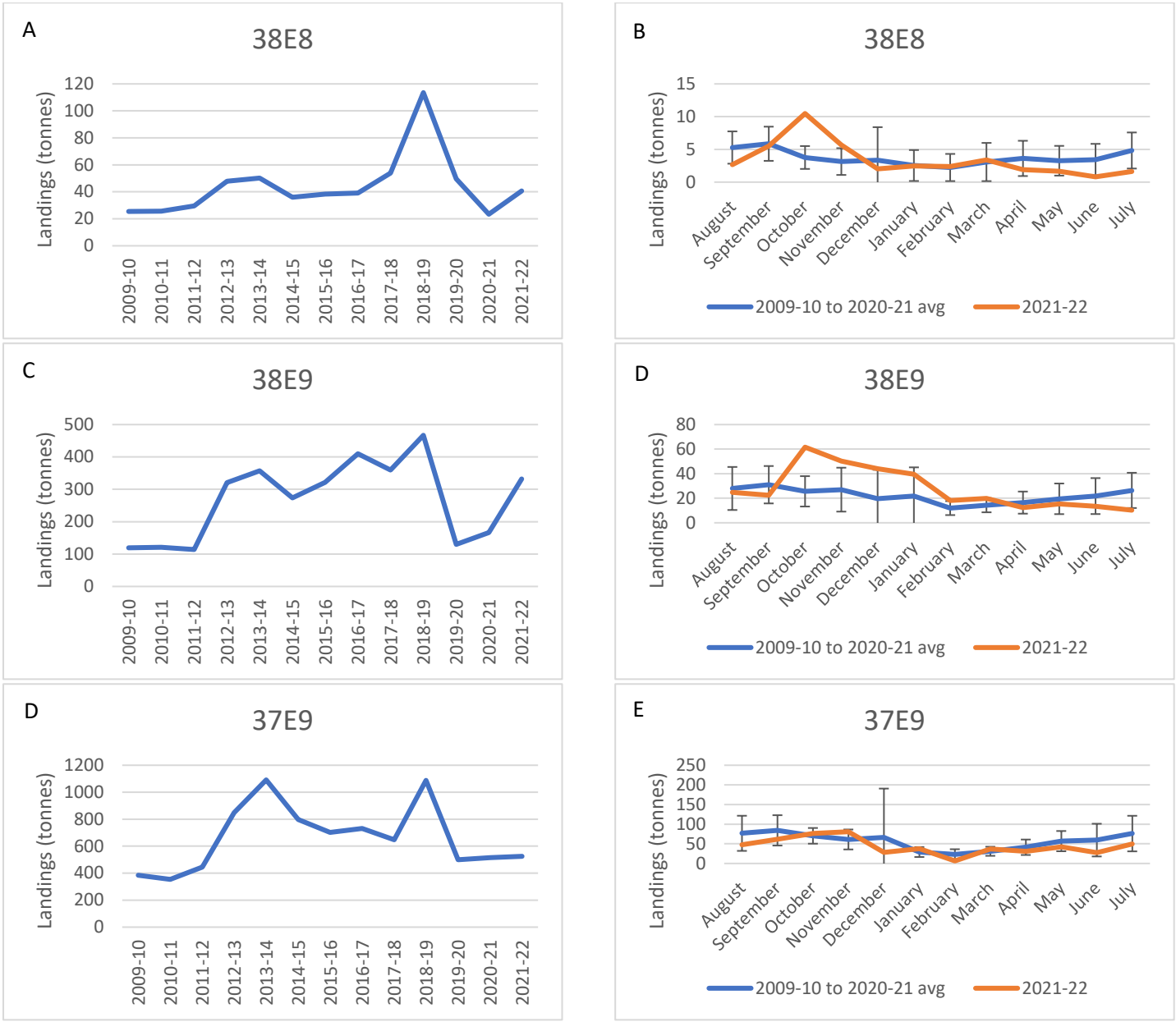


Figure 9. Annual and monthly edible crab landings for ICES rectangles encompassing the affected region. Monthly values are displayed with historic averages for the period 2009-10 to 2020-21. Error bars represent standard deviation.

Peak annual crab landings for the 3 ICES rectangles considered can be seen in 2018-19 before appreciable reductions in subsequent years. In all cases, crab landings for 2021-22 were higher than landings for 2020-21 (Figures 9 A, C & D).

Monthly crab landings for October and November 2021 for 38E8 and for October 2021 to January 2022 for 38E9, the ICES rectangles closest to the epicentre of the observed events, were above the average values for the reference period and in some cases above the expected variation. Conversely, landings between April and July 2022 have been significantly lower than the historic averages, at the limit of typical variance.

3. Potting survey assessment

Potting surveys from the IFCA patrol and commercial fishing vessels began in March 2022. Due to a lack of historic data for March, the current assessment only considered survey data captured since June 2022. Survey fleet locations were distributed in the main affected area between Hartlepool and Scarborough (Figure 10).

Following consultation with industry and knowledge of the geographic scale of the events, this assessment only included survey data originating within 3 NM from shore. The analysis area was further subdivided into three areas based on industry feedback to assess if a gradient of impact could be detected with increasing distance from the epicentre of observed events, understood to be in the Teesside region. Catch Per Unit Effort (CPUE) was calculated as the number of animals (lobsters or edible crabs) captured per pot hauled.

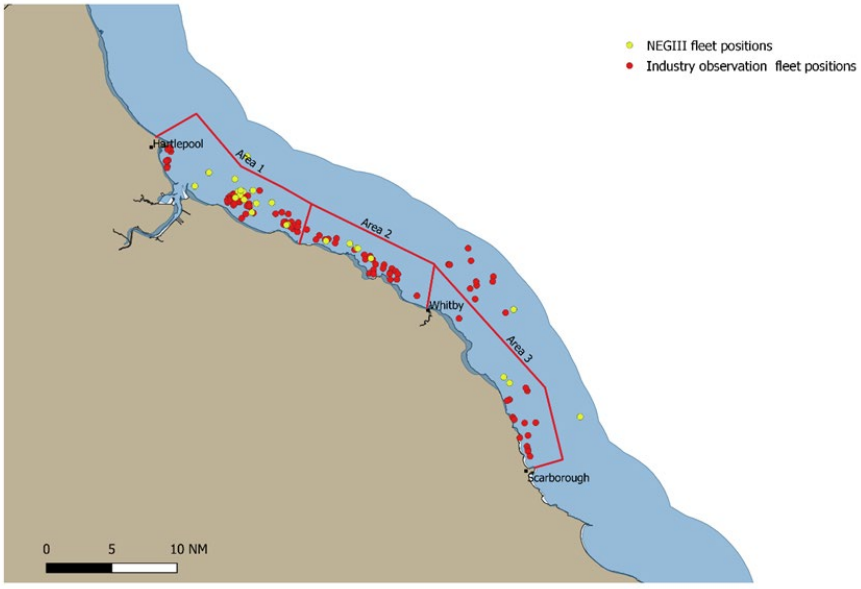


Figure 10. Sampling locations from observer trips on industry vessels and North Eastern Guardian III surveys in March, June and July 2022 within the affected areas (Teesmouth to Scarborough).

When considering the region as a whole, CPUE for lobster in June 2022 was below the monthly average but within the expected variance (Figure 11 A). CPUE increased significantly in July as the new shelling period began, well above both the monthly average and expected variance. Size frequency for male and female lobsters was comparable with historic data, indicating no significant change in size structure.

CPUE for edible crab for both June and July were significantly lower than previous years (Figure 11 B), at or below the lower limit of expected variance. This supports anecdotal reports from the industry regarding reduced crab catch rates from within 3 NM.

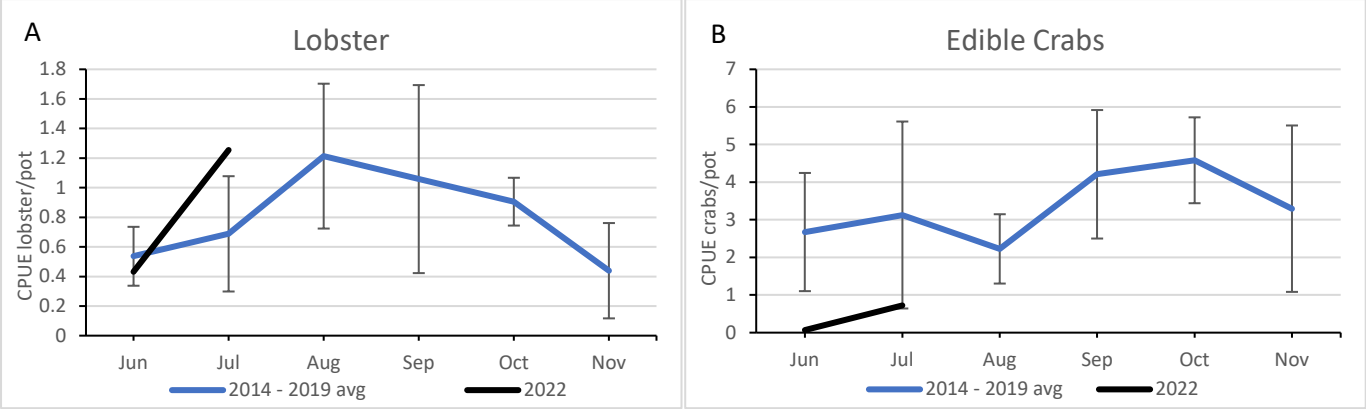


Figure 11. Catch Per Unit Effort (CPUE) for lobsters (A) and edible crabs (B) from surveys aboard NEGIII in 2022 compared with the historic monthly averages for NEIFCA data. Error bars represent standard deviation.

CPUE for both species from survey fleets operated from NEGIII were consistently higher when compared to fleets worked from industry vessels (Figure 12), however this can be attributed to escape gap regulations minimising capture of undersize animals in commercial pots. Lobster CPUE from IFCA data for area 3 was significantly higher than areas further to the north, as well as the historic average. Data from industry surveys also shows an increasing trend in lobster CPUE with increasing distance from Teesside, however the lack of comparable historic data means caution should be employed in interpretation.

Similarly, CPUE for edible crab was higher in area 3 compared to the areas further north for both IFCA and industry data, but was still significantly below the historic average for all areas considered.

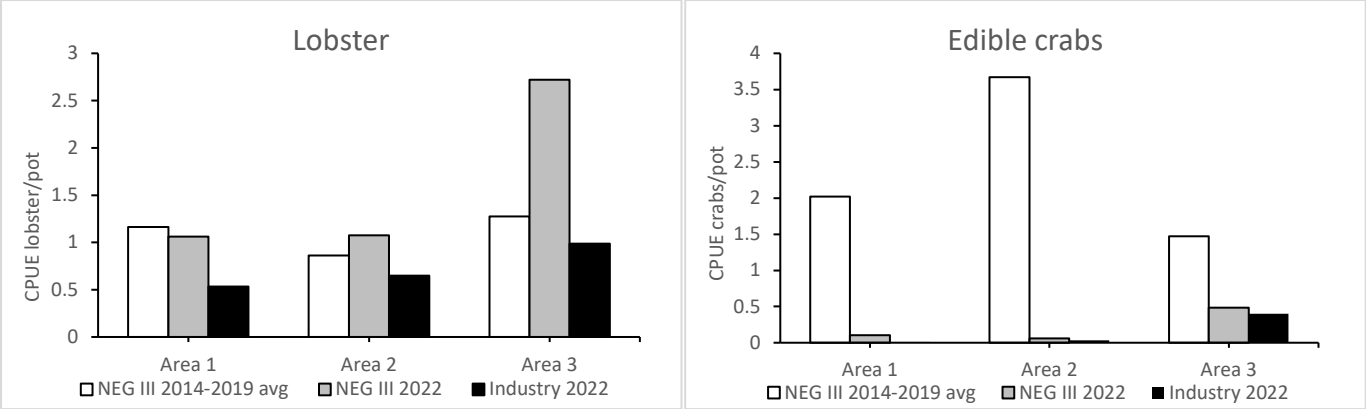


Figure 12. Regional Catch Per Unit Effort (CPUE) for lobsters and edible crab from IFCA and industry surveys compared with the historic averages.

Shellfish health has been monitored across all surveys completed in 2022 and notes taken when animals were either symptomatic or dead at sea. No animal health issues were encountered during surveys aboard NEGIII. On one observer trip on a commercial vessel, 2 lobsters were found to be displaying the characteristic twitching symptoms, while on a separate industry trip 5 lobsters were found to be dead once the vessel had returned to port. All of these were kept by Officers and passed onto partner agency laboratories for analysis. The low numbers of animals observed displaying symptoms or subject to post capture mortality does not suggest any on-going health concerns within the population (Table 1).

Table 1. Numbers of lobsters and edible crabs assessed as part of potting surveys undertaken during 2022 including those observed to be either symptomatic or dead.

	Lobsters	Edible crabs
NEGIII	674	314
Industry vessels	2112	1046
Symptomatic	2	0
Dead	5	0

4. Conclusions

The landings data assessment indicates that the scale of the impact of the observed events was not as severe as originally feared. This does not preclude the possibility that some highly localised fishing grounds suffered significant mortalities, but at a regional scale, landings in late 2021 were broadly in line with historic data and a significant reduction in landings in October and November were not observed. The resourcefulness of individual fishermen, however, and their capacity to find alternate grounds should also be taken into consideration. Should future events occur, an assessment of IVMS data to look at changes in individual vessel fishing patterns may be able to detect significant shifts in behaviour in response to similar events.

From a wider fisheries management perspective, the increase in edible crab landings into Hartlepool over the past 4 years, which is attributed to the increase in vivier vessels operating from the port, is considered to be significant and there is some indication that these vessels may be impacting stocks as far south as Whitby.

As the 2022 season has progressed, landings of lobsters into the larger ports of Hartlepool, Whitby and Scarborough have increased in line with seasonal

expectations. Lobster landings into Redcar and Staithes, however, have remain depressed suggesting that localised reductions in abundance persist. The catch rates of lobsters from surveys in mid-2022 do give some reassurance that recovery of this socio-economically important species is occurring.

Some concern still remains regarding inshore stocks of edible crabs. While a sharp decline of landings in late 2021 was not evident, the very low abundance of crabs captured during surveys and the depressed monthly landings compared to historic averages for many regional ports in 2022 supports industry reports. Whether this reduced abundance is due solely to the events of late 2021 or is an indication of wider fisheries issues associated with increased regional fishing mortality is not clear. The very low numbers of dead or symptomatic shellfish observed during surveys in 2022 does however give confidence that no persistent shellfish health concerns remain.