Agenda item B5

From: Philip Haupt, Lead Science and Conservation Officer, KEIFCA

To: Kent and Essex Inshore Fisheries and Conservation Authority – 25 May 2023

Subject: Whelk mortality issues – North Kent coast

Classification: **Unrestricted**

Summary:
This report updates the Members on KEIFCA's response to the reports of potential mass mortality event of whelks reported on the north Kent coast in 2022.

Recommendation:
Members are asked to **NOTE** the update of information and KEIFCA's effort to better understand the causes of continued low catches from an area that potentially underwent a mortality event in 2022.

Introduction

Moribund whelks in pots/traps were reported by whelk fishers (and verified by KEIFCA officers) from North Kent Coast (Whelk Area 2) from late August/early September 2022. KEIFCA whelk permit data also highlighted a significant drop in whelk landings from Area 2 in 2022. KEIFCA has increasingly invested time and effort to investigate the issue, as concerns were raised by fishers over the following four months.

KEIFCA has taken a proactive approach to better understand the problem in terms of the spatial scale and the magnitude of the effects on whelk stocks in the area. We carried out several investigations and consultations including the following:

1) Formally meeting and informally speaking with impacted whelk fishermen on at least four occasions and inspecting their catches taking note of whelk condition.
2) Carrying out an assessment of KEIFCA and MMO whelk landings data, environmental data with emphasis on water temperature.
3) Reporting on the problem at the KEIFCA Authority Quarterly meeting.
4) Cross referencing the issue with neighbouring and other IFCAs with whelk fisheries in their districts and whelk bait retailers that supply our district.

5) Consulting with relevant experts from the Environment Agency, CEFAS, DEFRA, Natural England, Bangor University, Herriot-Watt University, IFCAs, SeaFISH, the NFFO, and the Whelk Working Group over individual calls and two workshop calls covering a wide range of topics from causes to monitoring programmes.
6) Arranging a histology assessment and biotoxin screening of whelk samples on two occasions with the (CEFAS) Fish Health Inspectorate.
7) Developing a monitoring programme that records environmental data and monitors the whelk population, to be carried out in partnership with impacted whelk fishermen.

KEIFCA has investigated a range of possible causes and consulted widely with experts from the EA, CEFAS, Bangor University, other IFCAs and industry. After taking on board expert advice, currently the most compelling explanation with the evidence we have, points to the impact of sustained elevated water temperatures in 2022, especially during the summer months. We are also considering in-combination effect with disease which can be exacerbated by elevated water temperatures. While we are not ruling out other impacts like dredging, we do not currently have strong evidence linking this assertion to whelk mortality. KEIFCA is continuing to work with the industry and CEFAS to investigate these concerns further.

Background

Evidence of mortality
The first concern about the condition of whelks in the district was raised by a cockle fisherman who landed whelks as bycatch on 22 August 2022 from an area known as The Spile. An officer from KEIFCA was contacted and he inspected the whelks. We have escalated the issue as more whelk fishermen also reported concerns over the following four months. KEIFCA followed up with regular phone calls to fishermen, and site visits at Whitstable Harbour to meet up and ascertain the level of concern from fishers. August and September are traditionally the period when the fishery slows down, and many fishers switch to different types of fisheries because of the low catches, and reporting levels of concerns also dropped. There is thus a paucity of information that came in over this period about the condition of whelks from the affected area. In late October, when fishers expected the catches to return to normal, concerns started to be raised once again by fishers. Since then, the issue has been treated as a serious concern and is still actively being investigated. While we do not have data on the level of mortality (this is not something that we routinely collect), there is consensus among the following three lines of evidence: 1) analysis of landings data showed a significant decline of whelk landings since August 2022, especially into Whitstable Harbour, 2) direct observations made by KEIFCA Officers confirmed the poor condition of affected whelks, and 3) the concordance of fishers' reports about the condition of caught whelks, and their observations of dead whelks in pots/traps.

Chronology (Summary of actions)

1. 22nd Aug 2022: First report of whelks in poor body condition
2. 15th Nov: Concerns raised by number of whelk fishers that catches were not returning to normal.
3. 23rd Nov: Contact Environment Agency (EA) and CEFAS to discuss concerns.

4. 2nd Dec: arrangements with Whelk fishery liaison and fishermen to obtain samples for CEFAS Fish Health Inspectorate. We have continued regular communication with the central contact liaison for the Whitstable whelk fishery throughout since then. We have paid regular visits to Whitstable Harbour to meet with whelk fishermen and discuss concerns.
5. KEIFCA carried out water temperature data analysis from Satellite data. The analysis showed that water temperatures was 2 – 4 degrees warmer than the long term mean and sustained over prolonged periods over the summer months.
6. 15th Dec 2022: Whelk samples supplied to CEFAS for biotoxin analysis.
7. 12th Jan 2023: Biotoxin Screening Results received, indicating none of the three regulated biotoxins were detected.
8. 18th Jan: Data received from EA for temperature, salinity and Dissolved Oxygen from data loggers in the region. Water temperature data supported our initial analysis (Available on request through EA).
9. 30th Jan: Water quality data preliminary analysis, with assistance from EWA and CEFAS in interpreting the data.
10. 26th Jan: KEIFCA Authority Meeting Report presenting whelk catches and potential causes in section B3 of the meeting papers https://www.kentandessex-ifca.gov.uk/website-content/agenda-item-b3-whelk-report-1674118521.pdf
11. 1st Feb: Meet fishers in Whitstable to discuss their continued observations and discuss report produced by KEIFCA for January Authority meeting on the subject. Need for monitoring whelk population discussed with fishers.
12. 13th Feb: Bangor University meeting to discuss environmental and potential disease pathways leading to observed mortality.
13. 20th Feb: Meet whelk fishermen to discuss inspecting prevalence of shells on the seabed as proxy for evidence of mortality and the use of sediment samples to examine contamination of whelks through pollution.
14. 9th Mar: Environmental data workshop with wide range of aforementioned bodies
15. 17th Mar: Mark and recapture workshop with wide range of aforementioned bodies
16. 22nd Mar: KEIFCA meet Whitstable fishermen to discuss mark and recapture methods.
17. 22nd March: Arrange with Whitstable harbour for *in situ* surface water temperature and water quality data to be shared.
18. 26th Mar: KEIFCA Purchase of loggers and tagging equipment.
19. 27th Mar: Contact DP World making a data inquiry: so far data does not appear suitable because it stopped in 2020.
20. 5th Apr: Second batch of whelks provided to Fish Health Inspectorate for histology and biotoxin analysis.
21. 14th Apr: Contact established with NFFO to discuss whelk issue as national concern.
22. 17th Apr: Report to update DEFRA on whelk mortality and strongest line of evidence.
23. 28th Apr: Update from Fish Health Inspectorate noting the presence of Rickettsia Like Organisms (RLO) in the gills of 4/7 whelks but requires larger and control sample to support any conclusions.
24. 3rd May: Deploy water temperature and depth data logger to record bottom temperature.

25. 3rd May 2023: Whelk fishermen continue to report low catches from the affected area and are still largely fishing outside of the area.

Catch data and affected area recap.
The affected area is Area 2 in the map below (Figure 1) showing the 4 fishing areas within the Kent & Essex IFCA district; the bar chart to the right of the map-figure shows the whelk landings in each area for 2022, with Area 2 having the largest landings. This is consistent with historical whelk landings records for the district. Fishing activity has been consistently higher since 2016 in Area 2 than in any other area of the district (Table 1), however the margin by which it was the largest in 2022 was lower than previous years (Figure 2).

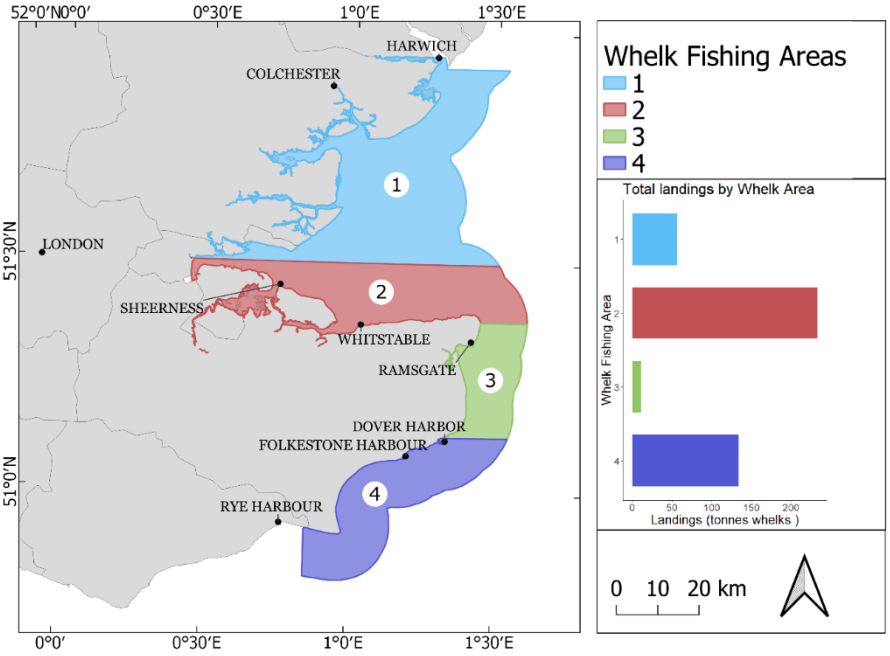

Figure 1. The four whelk areas in the KEIFCA district, showing the total annual landings by area on the right-middle panel.

Our records do show a significant reduction in days fished in April to November, with 237 days fished in 2022 compared with over 360 days fished for each of the previous 3 years 2018-2021, in Area 2. The fishery was largely abandoned during August and September of 2022, however reports of poor whelk condition escalated in October and November of 2023. Catches remained lower than usual for the remainder of 2022. See Agenda item B3 November 2022 for more detailed information.

Preliminary sea surface water temperature investigation recap.
When KEIFCA was first approached by the industry regarding this issue, some fishers also expressed concerns regarding the effects of the unusually warm summer experienced in 2022. KEIFCA launched an initial investigation of sea surface temperature (sst) from satellite observation (https://eutro-cube.cefas.co.uk/) data near Whitstable in the Thames estuary. KEIFCA confirmed that the summer of 2022 was 2 – 4° C warmer than the long-term mean (2007 – 2020) and frequently reaching the top end of the species temperature range (22° C), suggesting that high water temperatures could be related to low catches and poor body condition.

Low catches could be explained by, but not limited to the following three theories: 1) whelks have died-off, 2) whelks have migrated away the from affected area.

Whelks which remained in the shallow, especially intertidal area near Whitstable, would have been exposed to temperatures which surpassed the top end of the species range and is likely to have resulted in increased levels of stress experienced by these whelks. In turn, increased stress could have resulted in the observed morbidity and potentially explain the unusual mortality of whelks in fishers' pots.

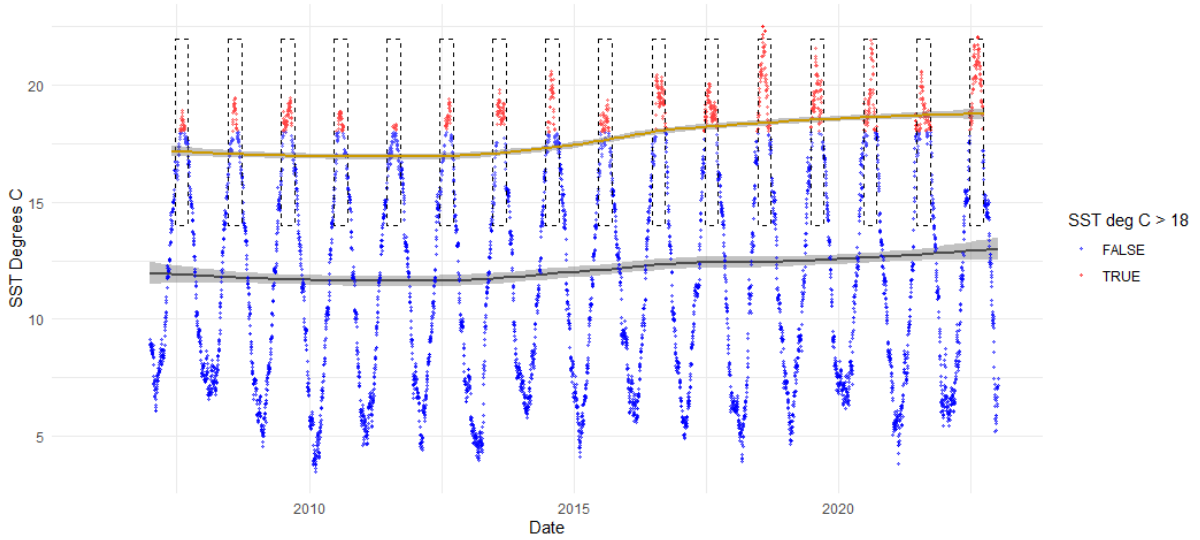

Figure 2. Sea surface temperature (sst) records from "Pathfinder" satellite observations over the Thames key whelking grounds of Whitstable from 2007-2023 (source: https://eutro-cube.cefas.co.uk/). Red data points are above 18 degrees C. Dashed boxes indicate the period between 21 June and 21 September. The fitted curves show the trend by which water temperature has been increasing since 2007 on average (grey line) and for summer months (21st June – 21 Sept in orange).

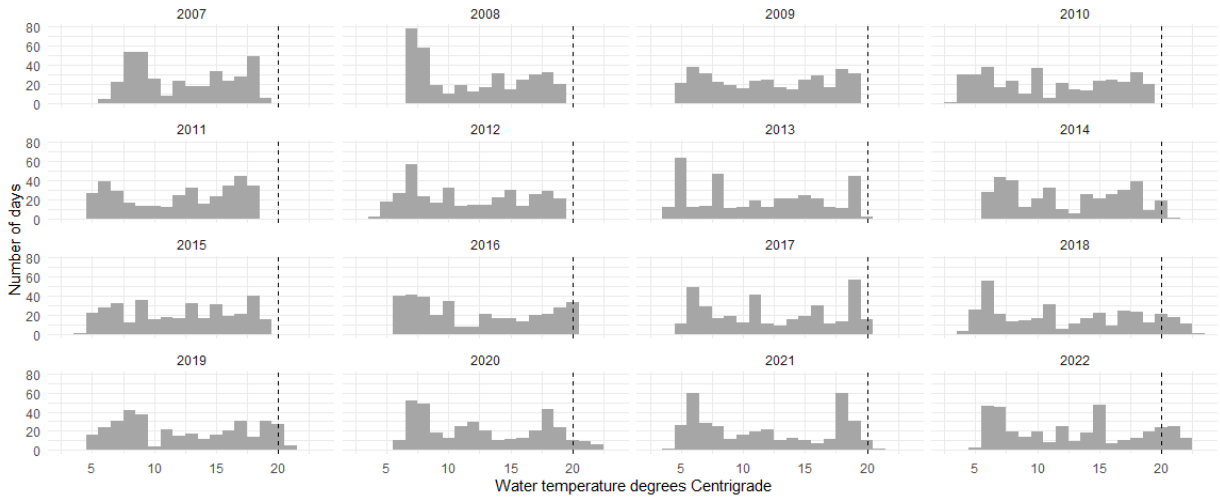

Figure 3. The number of days (y-axis) at given water temperature (x-axis), with each year represented in its own graph, based on the Sea surface temperature (sst) records from "Pathfinder" satellite observations near Whitstable from start 2007 to end 2022 (source: https://eutro-cube.cefas.co.uk/).

Water temperatures recorded in the summer of 2022 were warmer than the long-term mean by 2 – 4 degrees centigrade. While the most recent preceding summers (2018 – 2021) were also warmer than the long-term mean, they did not have the same level of mortality and low catches reported. One difference between 2022 and other recent warmer than average years is that there were more days when the temperature was warmer than average in 2022, than any other year (Figure 3).

The effects of elevated water temperature require further investigation, not least because there are other plausible explanations to consider, such as dissolved oxygen levels, toxins, and disease among others. Other physico-chemical data available from the EA point data sources have been explored and discussed at on the 9th of March; so far, the parameters examined did not reveal the same level of concern as water temperature, however, it is understood that dissolved oxygen and disease levels may act synergistically with elevated water temperature and cannot be discounted at this point.

After these initial conclusions were drawn KEIFCA decided to establish a monitoring programme to better understand the causes of the problem.

The monitoring programme has three objectives:

1. Monitor histology (disease) and biotoxins in partnership with the Fish Health Inspectorate
2. Collect *in situ* water temperature at the surface and at the seabed.
3. Assess changes to the whelk population abundance and size distribution in the affected area.

We remain concerned by the possible longer-term effects of climate change on this fishery because of evidence of continued increases in water temperature beyond the species thermal threshold.

Body condition, histology and biotoxins
KEIFCA examined whelks collected by fishery officers, and confirmed the poor condition of the animals, which had a slimy appearance, were discoloured and some with decayed digestive glands and gonads at the top end of the whorl.

KEIFCA liaised with local fishermen and sent a sample of 30 whelks collected from the Whitstable area to be sent to the Fish Health Inspectorate (FHI) for histology and toxicology analysis. The FHI report showed that no regulated biotoxins, namely, 1) lipophilic, 2) amnesic shellfish poisoning, or 3) paralytic shellfish poisoning toxins, were found in the samples sent for analysis.

A small second sample of whelks were sent off for histology analysis at the FHI Wednesday the 5th of April 2023. Four out of seven whelks had signs of Rickettsia Like Organisms (RLOs) in the gills and signs of necrosis. RLOs are known to cause mortality in marine animals including molluscs. While it is plausible that disease may have acted synergistically with elevated water temperatures, this sample is too small, too little is understood about the specific effects on whelks, and we don't yet know how common RLOs are naturally in the whelk population

of the Thames Estuary to draw meaningful conclusions at this point in time. However, it has now been arranged with the FHI that a larger sample will be collected for analysis from affected and control (unaffected) sites to better inform our understanding.

Water temperature
Between April and May of 2023 KEIFCA purchased water temperature data loggers that were installed in a set of unbaited KEIFCA's experimental whelk fishing pots. A data set for surface water temperature has said to be available to KEIFCA from Whitstable Harbour, thereby supplying KEIFCA with a far richer data set than analysed thus far. One of the two seabed water temperature data loggers was deployed (Figure 4) near Studhill (nearshore from Whitstable area) and first week's data successfully downloaded (Figure 5), and pots with logger redeployed by KEIFCA officers in Kent. A first look at this data which the red line shows the steady seasonal increase of temperature from 12.5 to 14.6 C, and in blue the effects of water level on daily variation.

Figure 4. Rob Watson deploying whelk pots from FPV Nerissa near Studhill, Kent.

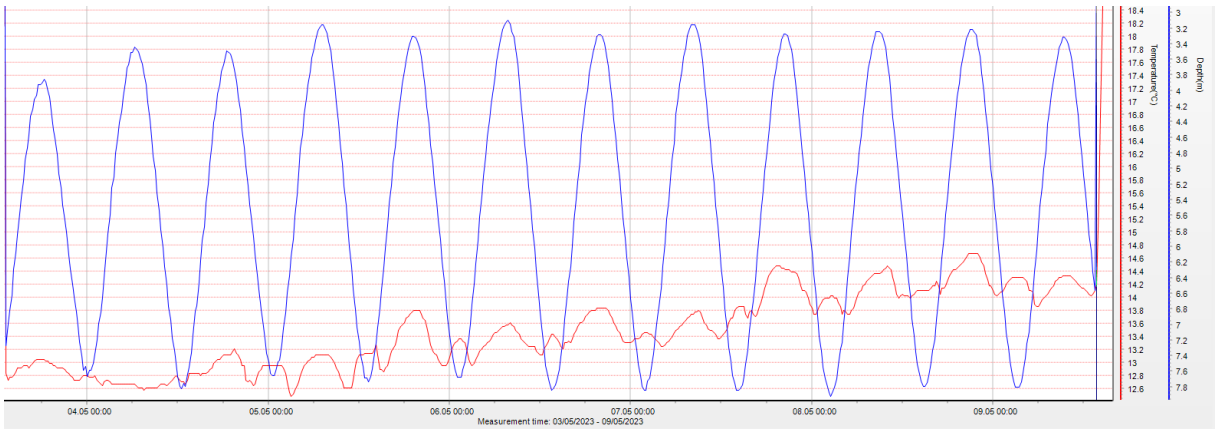

Figure 5. A first look at water temperature (red line) and water depth (blue line) data.

Population assessment

KEIFCA plans to start the mark and recapture with a fisherman from Whitstable Harbour to assess changes to the whelk population by comparing the ratio of marked individuals to recaptured individuals over the next few months. (This study depends on sufficient numbers of whelks being in the affected area). This work is due to start in the next two to three weeks.

Recommendation:
Members are asked to **NOTE** the update of information and KEIFCAs effort to better understand the causes of continued low catches from an area that potentially underwent a mortality event in 2022.