

North East Crustacean Incident Monitoring Plan v.2 – 12/11/2021

1. Incident Summary

Dead crustaceans (crabs and lobsters) have been washing up on Tees coastal beaches since October 2021. An EA formal incident response structure has been established. A multi-agency partnership group is in place between the EA, MMO, Cefas, NEIFCA, and Local Authorities. Reports from 9th Nov of crustacean death indicate the area affected now extends as far south as Runswick Bay suggesting the area of influence is moving south at a rate of approx. <1 km a day, based on a start time of 6th October.

2. Aim

To provide evidence to support ongoing Teesside crustacean death investigation and impact assessment.

3. Monitoring objectives

- To inform if impact has affected more than just crustaceans – which would point to eliminating disease as the cause.
- To inform the scale of impact to wider environmental receptors – which would support other pollution event.
- To gather further data on the water column to make more robust chemistry assessment – to help trace cause of any possible pollution event and to help reduce uncertainty in results to date.
- To gather information on the scale and nature of the environmental impact – to support any possible future regulatory or legal case.

4. Survey Design

- In this incident, given the impacts currently seem to be focused on larger decapoda (Green shore, Velvet swimming, Edible, Porcelain crabs and Lobsters, a high number of 'coarse' samples may be more valuable in providing the required information of impact to these species than a small number of fully processed samples.
- Sampling to occur inside and outside the zone of impact, taking advantage of existing stations where we have relevant historical baseline data.
- Sampling to take place outside (to the south) of zone of impact to provide a control. NB. Control may need to move further south if the sampling takes time to implement.
- Work north from Whitby taking samples on the way. Additional trawls to be taken on route from Humber where time allows to indicate status further south of impacted area.

- Use Otter Trawl and Day Grab (WFR compliant). Add Go Pro where possible to grab to acquire video images of seabed.
- Gather information from grab and trawls as a **priority** to indicate state and health of fauna present. Collect evidence of any impact (or not) on wider ecosystem, that may not have been apparent in intertidal visual surveys e.g. shrimp are a keystone species for the ecosystem – have they been impacted? Both positive signs of impact and negative impact are needed. Both in-situ visual records of multiple samples (presence/absence, live/dead/moribund) and retaining samples preserved for full laboratory analysis will contribute to the evidence base.
- Prioritise trawling over benthic rapid assessment methodology if short of time.
- If conditions at sea deteriorate and samples cannot be assessed on board, the preserved samples will be important for those locations.
- Water samples required (chemistry scans, metals and phytoplankton) to support other investigation needs and as supporting data for benthic biological data.
- Specific sample numbers are not critical and it is recognised that the survey design may need to be flexible on the day.

5. Sampling methodology summary

Survey operations are due to commence on Monday 15th Nov (weather permitting).

Priority*	Sampling Device	Sampling Type (as indicated on maps)	Samples	Notes
1	Otter Trawl	Trawl	1 x 10–15 min tow (assuming SOG is 2 knots, the trawl would cover a distance of ~0.6–1.0 km).	Proposed Epifauna rapid assessment methodology (see Section 7 below)
1	Day Grab	Benthic	5 x Biota (stacked sieves)	Proposed Benthic invertebrates rapid assessment methodology (see Section 8 below)
2 (1 if rapid assessment is not possible)	Day Grab	Benthic	1 x Biota + PSA 1 mm in coastal WB, 0.5 mm in transitional WB.	WFR compliant sampling methodology as detailed in OI009_07 and OI104_10.

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3	Go-pro camera mounted on Day Grab	Benthic	Video captured during each grab deployment	Oblique view of the seabed if possible = wider field of view
1	Day Grab	Sed Chem	1 x Sed Chem + PSA Bottles: SOL SEDO x 2 PSIZC	EA sediment contaminants sampling methodology as detailed in OI452_09. RouteLIMS: NMPSD, GCMS Scan Det 3106/21
1	Water sampler – surface	WQ	2 x 1l glass organics GCMS and LCMS scans METALS – bottles TBC SMETD, HGD, ASSED. 2 x MPHYTO (live + preserved)	Phytoplankton sampling – please see Section 9
1	Sub-surface water sampler ~ 1 m above seabed	WQ	2 x 1l glass organics GCMS and LCMS scans METALS – bottles TBC SMETD, HGD, ASSED. 2 x MPHYTO (live + preserved)	Phytoplankton sampling – please see Section 9
1	Idronaut CTD vertical profile – surface and near-seabed measurements	WQ	Physico-chem determinands	Standard MARBAS suite – DO, temp, salinity, turbidity, pH?
3	Seaspyder camera system – Liaise with NEIFCA	Drop Camera	1 x 150 m tow at each site	2018 Runswick Bay MCZ Monitoring survey 841 images captured Crustaceans total abundance:

Priority*	Sampling Device	Sampling Type (as indicated on maps)	Samples	Notes
				<i>Ebalia</i> sp. = 1 <i>Cancer pagurus</i> =3 True crab spp. = 8 <i>Necora puber</i> = 8 Hermit crabs = 2 Squat lobsters = 40 <i>Hommarus gammarus</i> = 1 Prawns/mysids/shrimps = 310

*highest priority = 1, lowest = 3

6. Sampling station locations

Please refer to the latest version of the Crustacean_incident_sites. xlsx spreadsheet and associated maps.

7. Epifaunal rapid assessment methodology

- I. Deploy the Otter trawl for a 10–15 min tow at each of the specified stations.
- II. Rapidly separate all fish from the catch. Record species presence and note condition i.e. if individuals are alive/freshly dead/decaying/showing evidence of disease. Return all live individuals as soon as possible.
- III. Separate any crustaceans if present from the rest of the catch, recording species, sex individuals¹ (if possible), note down the range of sizes present for each species – are there adults and juveniles?, counts (if time) and condition as above.
- IV. Process the remaining catch – check and record other groups/species present – note anything unusual.
- V. Take photographs of the catch – ensure labels are clearly visible.
- VI. Record short video clips ~15 seconds to capture animal activity.

8. Benthic invertebrates rapid assessment methodology

- I. Sample effort should be as many 0.1 m² Day Grab deployments as practically possible. A minimum of **five** grabs has been suggested at each of the specified stations.

¹ Male and female crabs can be distinguished by looking at their underside. Males have a long thin triangle, whereas females have a short, fat triangle (used for carrying eggs). For lobsters the swimmerets (“feelers”) under the tail nearest the main body are soft and feathery in a female, but elongate and bony in a male.

- II. When processing the sample, stack the sieves with the largest mesh (5 mm) on top (assuming no 2 mm or 4 mm sieves are available) to reduce the time required for sieving multiple coarse samples whilst retaining the main taxa of interest.
- III. Note any observations such as: discoloured water, strange smell, signs of disease or foam.
- IV. Gently flush the sieve contents into a white sorting tray (if available) with a sample label. Ensure a small quantity of seawater is present to facilitate and/or encourage movement.
- V. Record a short video clip (~15 seconds) of the contents of the tray. Ensure the focus and lighting are adjusted appropriately and the label is clear. Note: There may be difficulties in determining whether smaller individuals are alive or dead in the video imagery.
- VI. If possible, record the underside of crabs to determine sex.
- VII. Try and capture signs of life from non-crustaceans (e.g. movement in echinoderms, polychaetes, gastropods [may need some time to emerge from shell] etc. and whether bivalves are firmly closed).
- VIII. Nearest identifiable group is sufficient in situ. If this is simply crabs (as listed above), lobsters, amphipods, shrimps, polychaetes, gastropods, echinoderms then that is still helpful. The practicalities of this on the day may determine the approach.

9. Epifauna specimen collection

Please be prepared to collect samples of affected crabs or lobsters. These may need to be refrigerated or frozen as required – **details TBC**. It is anticipated there may be a need for a larger supply of impacted material as the analysis methods develop.

10. Phytoplankton samples

Alongside the normal collection and preservation procedure for marine phytoplankton samples, please collect an additional unpreserved (live) sample. These will need to be analysed at the Cefas Plankton Laboratory **within 24 hours** of collection.

Please liaise directly with the Laboratory Manager, _____ to arrange this.

Cefas Plankton Laboratory,

Pakefield Road,

Lowestoft,

Suffolk, NR33 0HT, UK

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Please note: Live samples are only required at WQ sampling stations to the north of the Runswick Bay MCZ as indicated on the Crustacean_incident_sites. xlsx. spreadsheet.