Add NE Logo

**Standard Contract for Goods and/or Services - Order Form**

**DRAFT copy – to be completed upon award of contract**

|  |  |  |
| --- | --- | --- |
| 1. **Purchase Order Number** | To be confirmed | |
| 1. **Customer** | Natural England, Foss House, Kings Pool, 1-2 Peasholme Green, York, YO1 7PX | |
| 1. **Contractor(s)** | [**Insert** *Contractor’s name, registered address (if registered), and registration number (if registered]* | |
| 1. **Defra Group Members** | The following Defra Group members will receive the benefit of the Deliverables:  Natural England | |
| 1. **The Agreement** | This Order is part of the Agreement and is subject to the terms and conditions referenced at Appendix 1 and shall come into effect on the Start Date.  Unless the context otherwise requires, capitalised expressions used in this Order have the same meanings as in the terms and conditions.  The following documents are incorporated into the Agreement. If there is any conflict, the following order of precedence applies (in descending order):   1. this Order; 2. the terms and conditions at Appendix 1; and 3. the remaining Appendices (if any) in equal order of precedence. | |
| 1. **Deliverables** | **Applicable Deliverables** | **Goods Only:**  **Services Only:**  **Good and Services:** |
| **Goods** | None. |
| **Services** | Statistician to investigate scale and drivers of shellfish mortality in The Wash - as set out in Appendix 2 (Specification).  *[*To be performed at ***[*Insert *description of premises (including whether they are the Customer’s premises, the Contractor’s premises and/or a third party’s premises and in each case the address****)].]*  Date(s) of Delivery: 31st March 2025 |
| 1. **Start Date** | 1st December 2024 | |
| 1. **Expiry Date** | 31st March 2025 | |
| 1. **Charges** | The Charges for the Goods and/or Services shall be as set out [below ***[insert details]*** / in [Appendix 3 – Charges]]. The Charges are fixed for the duration of the Agreement. | |
| 1. **Payment** | Payments will be made to ***[Insert payment method(s) and necessary details]***  ***Payments will be made in pounds by BACS transfer using the details provided by the supplier on submission of a compliant invoice.*** | |
| 1. **Contractor’s Liability Cap (Clause 13.2.1)** | A sum equal to £5,000,000 | |
| 1. **Customer’s Authorised Representative(s)** | For general liaison your contact will continue to be  Pip Mountjoy – [Philippa.Mountjoy@naturalengland.org.uk](mailto:Philippa.Mountjoy@naturalengland.org.uk)  and  Lauren Ross – [Lauren.Ross@naturalengland.org.uk](mailto:Lauren.Ross@naturalengland.org.uk) | |
| 1. **Contractor’s Authorised Representative** | For general liaison your contact will continue to be  [**Insert *contract manager name and contact details***]  or, in their absence,  [**Insert *secondary name and contact details***]. | |
| 1. **Optional Intellectual Property Rights (“IPR”) Clauses** | The Customer has chosen Option **B** in respect of intellectual property rights provisions for the Agreement as set out in the terms and conditions. | |
| 1. **Progress Meetings and Progress Reports** | The Contractor shall attend progress meetings with the Customer every 2 weeks (in initial phase) | |
| 1. **Address for notices** | |  |  | | --- | --- | | **Customer:** | **Contractor:** | | Natural England,  Dragonfly House,  2 Gilders Way,  Norwich,  NR3 4QD  Attention: Pip Mountjoy  Email: Philippa.Mountjoy@naturalengland.org.uk | [**insert *name and address of Contractor*]**  Attention: **[insert *title***]  Email: [**insert *email address***] | |  | | |
| 1. **Key Personnel of the Contractor** | |  |  |  | | --- | --- | --- | | **Key Personnel Role:** | **Key Personnel Name:** | **Contact Details:** | |  |  |  | |  | | | |  |  |  | | |
| 1. **Procedures and Policies** |  | |
| 1. **Special Terms** | None | |
| 1. **Additional Insurance** | None | |
| 1. **Further Data Protection Provisions** | The further data protection provisions contained within Annex 4 of the terms and conditions are applicable to this Agreement where indicated below:  **Yes:**  **No:** | |

|  |  |
| --- | --- |
| Signed for and on behalf of the **Customer** | Signed for and on behalf of the **Contractor** |
| Name:  [**Insert** name]  [**Insert** job title] | Name:  [**Insert** name]  [**Insert** job title] |
| Date: | Date: |
| Signature: | Signature: |

**Appendix 1: Terms and Conditions**

The Customer’s Standard Good & Services Terms and Conditions which can be located on the [Natural England Website](https://eur05.safelinks.protection.outlook.com/?url=https%3A%2F%2Fwww.gov.uk%2Fgovernment%2Forganisations%2Fnatural-england%2Fabout%2Fprocurement&data=05%7C01%7Cdaniel.lavender%40dlapiper.com%7Ce61b389c5e15470f278e08dbcc060e37%7Ce855e7acc54640d299f7a100522010f9%7C1%7C0%7C638328098969691096%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C3000%7C%7C%7C&sdata=ymInFtzabvMF3T9or361i03D%2B4kyuzgt8T5CzJeS7Gc%3D&reserved=0) and which are called ‘Standard Goods & Services Terms and Conditions’

**Appendix 2: Specification/Description**

This Section sets out the Authority’s requirements.

**Background to Natural England**

The Authority is Natural England. Natural England (NE) is the government’s advisor on the natural environment. The Authority’s priorities are to secure a healthy natural environment; a sustainable, low-carbon economy; a thriving farming sector and a sustainable, healthy, and secure food supply We provide practical advice, grounded in science, on how best to safeguard England’s natural wealth for the benefit of everyone. Our remit is to ensure sustainable stewardship of the land and sea so that people and nature can thrive. It is our responsibility to see that England’s rich natural environment can adapt and survive intact for future generations to enjoy. This project forms part of the Marine Natural Capital and Ecosystem Assessment programme (mNCEA).

Further information about the Authority can be found at: <https://www.gov.uk/government/organisations/natural-england>

**Background to the specific work area relevant to this purchase**

The marine Natural Capital and Ecosystem Assessment (mNCEA) is a flagship Defra research and development programme. The mNCEA began in 2021 with a pilot year and has since developed into a full 3-year programme running from April 2022 until March 2025. The overarching aim is to deliver evidence, tools and guidance on the extent and condition of marine natural capital assets, the ecosystem services they provide and the trade-offs that are necessary in realising the natural capital benefits of most importance to society. Specialists across Natural England, the Environment Agency, Centre for Environment, Fisheries & Aquaculture Science, Marine Management Organisation and Joint Nature Conservation Committee are working collaboratively to develop and deliver the mNCEA programme.

Project background

The Wash has many overlapping designations. The Wash Site of Special Scientific Interest (SSSI) is the largest SSSI in England. The Wash is also protected by the Wash and North Norfolk Coast Special Area of Conservation (SAC), The Wash Special Protection Area (SPA), Ramsar Site and The Wash National Nature Reserve (NNR). Oystercatcher are a designated feature of the SPA and rely upon the intertidal mussel and cockle beds as an important food source. The intertidal mussel beds are a subfeature of Annex I Reef, a designated feature of the SAC. The intertidal cockle beds provide important supporting habitat for SPA birds and are a characteristic community for Intertidal sand and muddy sand, a subfeature of Annex I mudflats and sandflats not covered by seawater at low tide, another designated feature of the SAC. All are also protected under the SSSI. The condition of the oystercatcher, cockle beds, and mussel beds has been a cause of concern for many years and there has been ongoing work between partner organisations to try and restore them to favourable condition.

Shellfish mortalities have been occurring in The Wash since 2008-10. There is evidence of cockle dying after reaching spawning size (EIFCA, 2023), indicating that they may be too energetically compromised to survive spawning. This is thought to be altering the population dynamics of the cockle beds, shifting towards a system dominated by juveniles with fewer age classes present. This is a concern for fisheries and for SPA species reliant on shellfish stocks as a food source.

Eastern Inshore Fisheries & Conservation Authority (EIFCA) use a bird food model (BFM) in The Wash to determine how many tonnes of cockle and mussel are required to support the oystercatcher population, and therefore how many tonnes are available as Total Allowable Catch for the shellfisheries. This BFM does not account for these ‘atypical’ mortalities that have been occurring over the last decade, so may not be accurately calculating how much food is available for birds during the overwintering period.

Research by EIFCA and Cefas has been underway since 2020, investigating the pathogenic drivers of the shellfish mortalities. A novel parasite (*Marteilia cocosarum)* has been identified in the cockle, closely related to the parasite that is thought to be responsible for the crash of the Burry Inlet cockle fishery. More recently, a disseminated neoplasia has also been identified. The pathogenic drivers of the mussel mortalities are less defined, but *Myticola intestinalis* has been identified in the mussels and may be a contributing factor.

The causes of the mortalities are likely multifactorial, with environmental and human pressures thought to be playing a role – either by reducing the immune capacity of shellfish, reducing the ecosystem resilience as a whole, or altering the disease dynamics within cockle beds.

The proposed study will have the overall goal of identifying factors that may be contributing to mortalities of cockle within The Wash, which will help to inform the parameters of Bird Food Models and inform the management of the site.

Reference: Eastern IFCA (2023) Review of the cockle fishery Total Allowable Catch and rationale for potential changes. Available at: https://www.eastern-ifca.gov.uk/wp-content/uploads/2023/06/2023\_06\_02\_Review\_of\_Cockle\_TAC\_online\_version.pdf

**Requirement**

This commission is for a biostatistician to analyse data collected by this project in 2024 (see table 1), to address the project aims:

**Aim 1:** To determine the growth and mortality rates of cockle over the year

**Aim 2:** To investigate the scale of ‘atypical’ mortality

**Aim 3:** To investigate the effects of environmental parameters on cockle mortality, including multifactorial drivers

The contractor should be familiar with marine ecosystems and intertidal processes. This is a complex system, with data collected across different spatial and temporal scales. A significant component of this work will be data wrangling, data cleaning, and joining pre-analysis discussions to select the most appropriate predictors. Data is summarised in Table 1.

The aim of the analysis is to investigate multifactorial drivers of shellfish mortality; factors that may have a combined effect, but are independently sublethal.  There may be multiple methods that are appropriate for this analysis, such as a frequentist or Bayesian statistical model. The biostatistician is expected to consider the benefits of various methods and discuss this with the Natural England project team before carrying out the analysis.

The contractor will be required to liaise with project partners, who hold the data and have local expertise (i.e. the Eastern Inshore Fisheries and Conservation Authority, Cefas).

**Task 1: Estimating scale of atypical cockle mortality, using spring and winter stock assessments**

* Estimate a baseline ‘healthy’ mortality rate by collecting historical stock assessment data from EIFCA for the 6 key beds. Analyse trends in population dynamics over time, calculate average annual mortality rates for each bed.
* Account for additional drivers of cockle mortality utilising information such as fisheries landings reports and mapping high-use bird feeding areas.
* Utilise supporting evidence provided by fisher reports (forms, photographs), which includes information on areas where ‘atypical’ mortality have been observed. This will help to distinguish between other mortality events (e.g. density dependent mortality a.k.a ridging out).

**Task 2: Determine the most appropriate external variables to include in analysis**

* Identify and group relevant predictors by listing potential factors that could influence cockle mortality, consulting with experts to prioritise variables based on perceived importance. Engage with Natural England, EIFCA, Cefas and Environment Agency on these decisions.
* Liaise with project partners (such as Environment Agency) to ensure full consideration of covariates (e.g. relationship to consider between particle size analysis and certain contaminants)

**Task 3: Undertake statistical analysis**

* Data wrangling and data cleaning
* Conduct preliminary data exploration by performing descriptive statistics for all variables, creating visualisations to identify patterns and outliers, and testing for normality and other statistical assumptions. This should include simple statistical tests to compare hydrological parameters between beds, assess differences in mortality rates between beds, and calculate correlation coefficients between individual variables and mortality rates.
* Select appropriate statistical methods for the analysis, providing justification for chosen methods and explain reasoning to the project team before proceeding.
* Present the proposed analytical approach to the project team for discussion and refinement. Maintain communication throughout the analysis, updating on progress and discussing any challenges or unexpected findings.
* Undertake multifactorial analysis to assess combined effects of multiple variables on cockle mortality using the agreed upon methodology.

**Task 4: Produce report of findings**

* Produce a full report of the project which will be published on the Natural England Access to Evidence Catalogue. This should include an executive summary, introduction and background, methodology, results, discussion. The methodology should be fully reproducible and provide detailed descriptions of all data sources, explaining the rationale behind variable selection, documenting all data preprocessing steps, and describing statistical tests and models, including assumptions and limitations. Visualizations should be available to communicate key findings to non-technical audiences. The report should also include any recommendations for future monitoring or further study.
* Provide well-commented scripts and data that were used for the analyses, including a data dictionary explaining all variables, and organizing raw and processed data in a logical file structure.
* Conduct internal review and revision of the report, sharing the draft with the project team and other stakeholders for feedback, and revising the report based on feedback and addressing any concerns or questions raised.

**Table 1: Surveys & data summary**

|  |  |  |  |
| --- | --- | --- | --- |
| Surveys & Data | Data format | Purpose | Spatial scale & data comments |
| Spring cockle stock assessment 2024 – May 2024 | Spreadsheet & GIS    Cockle abundance, weight, size, calculations of biomass, density & age cohorts – all cockle beds. Data is taken at station-level (>1000 stations in The Wash, spread across 20 cockle beds). | Baseline of cockle population before fishing & mortality season. | Station-level    >1100 stations across The Wash, evenly spaced, each station is 12.44 ha.    However, other surveys (i.e. contaminants & hydrological parameters) are focusing on 6 cockle beds, so these will be the areas we are investigating environmental drivers for.    Cockle mortality to be estimated across all cockle beds, but drivers to only be investigated across 6 beds. |
| Winter cockle stock assessment 2024 – November / December 2024 | Spreadsheet & GIS    Repeat of spring data – Cockle abundance, weight, size, calculations of biomass, density & age cohorts – all cockle beds. Data is taken at station-level (>1000 stations in The Wash, spread across 20 cockle beds.    Dependent on weather, may just focus on 6 key beds. | Population after mortality has occurred, when food availability data is needed for overwintering birds.    This will be used with the spring assessment & the fisheries landing data to estimate mortality. | Station-level    >1100 stations across The Wash, evenly spaced, each station is 12.44 ha.    However, other surveys (i.e. contaminants & hydrological parameters) are focusing on 6 cockle beds, so these will be the areas we are investigating environmental drivers for.    Cockle mortality to be estimated across all cockle beds, but drivers to only be investigated across 6 beds.    These estimations will be limited by the resolution of the fisheries landings data, which is only reported at bed-level and in tonnes. Will need to transform the landings data first, to estimate growth between spring survey & the month fished.    These cockle surveys will happen in Nov/Dec, months after the start of the overwintering bird period. This will introduce more uncertainty (i.e. need to account for bird predation/include a weighting to account for higher feeding areas). |
| Fisheries landing data | Reports from Eastern IFCA    Fishers report cockle landings per bed, in tonnes. | Fisheries landings data, will feed into calculations for amount of *atypical* mortality between spring + winter surveys. | Cockle bed level    Approx. 20 beds across The Wash, of varying sizes (~500-2000 ha).    This will limit us, as we can only estimate mortality to bed level.    Data is in different units – the cockle stock assessments give us abundance/size/weight to calculate biomass, but fisheries landings are only reported in tonnes. Data will need to be processed to account for growth (using a rough growth rate & month of landings report). |
| Cockle mortality observations – Summer 2024 | Fisher reports - Photographs (with GPS coordinates) and forms (semi-quantitative assessment, reporting high/medium/low mortality).    EIFCA mortality recording (ad hoc, approx. 3 trips) - Photographs (with GPS coordinates) and forms (semi-quantitative assessment, reporting high/medium/low mortality), notes/observations. | At the end of the season there will be multiple factors that could have contributed to mortalities (fishing pressure, bird food, baseline natural mortality, density dependent ridging out, ‘atypical’ mortality).    We are interested in estimating how much is attributed to the atypical mortality, and these reports will provide supporting evidence for what conditions on each bed have been like over the year. | Cockle bed level    Reports from fishers to inform EIFCA trips to record atypical mortalities across the 6 target beds. Will provide supporting evidence for what conditions on each bed have been like over the year.    Should help to inform areas where there have been mass mortalities due to other factors (e.g. density dependent ridging out), or where atypical mortality has been reported. |
| Sediment & water sampling – July 2024 | Lab report, analysis for:   * Particle size analysis [PSA] – sediments only * Metals Suite (As, Cd, Cr, Cu, Hg, Ni, Pb, Zn) * PAHs (DTI 2-6 Ring Aromatics   & EPA 16) * Total Hydrocarbon Content (including Saturates) * Organochlorine Pesticides * Phosphate as PO4 * Nitrate * Total Organic Carbon     60 sediment and 30 water samples collected in total: 10 sediment samples & 5 water samples collected from 6 beds. Sample points chosen to represent different conditions across each bed. | Identify whether/how contaminants vary between the beds, and whether there are correlations between mortalities & these factors.    Identify whether/how contaminants vary across different conditions (e.g. grouped by distance from rivers, sediment types, fishing pressure). | Sample points    Point samples taken from a sample of stations, across 6 cockle beds (each cockle bed is a different size). 10 sediment samples + 5 water samples taken from each bed.    Sample points chosen to represent different conditions across each bed, so can be grouped by bed and by different conditions (i.e. PSA, distance from river, distance from channel). |
| Hydrological parameters (temperature, pH, salinity, turbidity, chlorophyll-A) – July 23-Dec 24 (monthly) | Spreadsheet | Identify whether/how hydrological parameters vary between the beds, and whether there are correlations between mortalities & these factors. | Monthly point samples taken across 2-3 beds.    Not yet clear what data is available. There will be some hydrological data that needs to be assessed, but will likely be gappy.    To be grouped by bed (or closest available) to investigate if they differ, and if correlated with mortalities. |

**Appendix 3: Charges**

[***Guidance note: Include a clear breakdown of the charges in as much detail as necessary***]