



**Planning & Communication
Sub-Committee Meeting**

To be held at:

**EIFCA Offices
6 North Lynn Business Village
Bergen Way, King's Lynn
PE30 2JG**

**Wednesday
14th March 2018
1030 hours**

Vision

The Eastern Inshore Fisheries and Conservation Authority will lead, champion and manage a sustainable marine environment and inshore fisheries, by successfully securing the right balance between social, environmental and economic benefits to ensure healthy seas, sustainable fisheries and a viable industry



Meeting: **Planning and Communication Sub-Committee**

Date: 14th March 2018

Time: 10.30 hours

Venue: EIFCA Office
6 North Lynn Business Village
Bergen Way
King's Lynn
Norfolk
PE30 2JG

Agenda

- 1 Welcome by the Chair - *Chair*
- 2 Apologies for absence - *Chair*
- 3 Declaration of members' interests - *Chair*

Action Items

- 4 Minutes of the Planning and Communication Sub-Committee meeting on 15th March 2017 - *Chair*
- 5 Matters Arising - *Clerk*
- 6 Strategic Assessment 2018 – *Senior IFCO (Regulation) / Project Officer*
- 7 Business Plan 2018-23 – *CEO*
- 8 Any other business

To consider any other items which the Chair is of the opinion are matters of urgency by reason of special circumstances which must be specified

J. Gregory
Chief Executive Officer

27th February 2018

Planning & Communication Sub-Committee

"EIFCA will lead, champion and manage a sustainable marine environment and inshore fisheries, by successfully securing the right balance between social, environmental and economical benefits to ensure healthy seas, sustainable fisheries and a viable industry".



A meeting of the Planning & Communication Sub-Committee took place at 10.30 hours on Wednesday 15th March, 2017, at the Eastern IFCA office, King's Lynn

Members Present:

Mr Stephen Worrall	Chairman	MMO Appointee
Mr Shane Bagley		MMO Appointee
Cllr Hilary Cox		Norfolk County Council
Mr C Donnelly		NE Representative
Mr Paul Garnett		MMO Appointee
Cllr Tony Goldson		Suffolk County Council
Mr Tom Pinborough		MMO Appointee
Mr Keith Shaul		MMO Appointee
Mr Rob Spray		MMO Appointee
Mr Stephen Worrall		MMO Appointee

Eastern IFCA Officers Present:

Andrew Bakewell	Head of Finance
Luke Godwin	Temp Staff Officer to A/CEO
Julian Gregory	Acting CEO

Observers

Cllr Peter Byatt	Suffolk County Council
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P&C17/01 Welcome by the Clerk

The Clerk welcomed everyone to the meeting.

P&C17/02 Apologies for Absence

Apologies were received from Dr Bolt (MMO Appointee).

P&C17/03 Declaration of members' interests

There were no declarations of interest.

P&C17/04 Minutes of the Planning & Communication Sub-Committee Meeting on 24th February 2016

Members Agreed that the minutes were a true record of the proceedings.

P&C17/05 Matters arising

There were no matters arising

P&C17/06 Strategic Assessment 2017

The Staff Officer gave a presentation explaining how and why the Strategic Assessment was used and the process which had been followed to develop it for 2017/2018. Members were advised that a risk based approach was applied to identify priority work streams, along with new criteria being applied to the initial assessment. Each criteria was divided into 4 categories and the mean score of each category was used to ascertain the priority levels.

Unlike previous years, Officers had also acknowledged that not all priority workloads would be completed in a one year timeframe so there were some which had been rolled over from the previous year.

The CEO acknowledged it was always difficult to achieve all priorities but the Strategic Assessment made it possible to identify key issues. He thanked the Staff Officer and MEO S Thompson for the significant work they had put into the production of the Strategic Assessment.

Mr Garnett believed a minimum of 10yrs data was required to see any real trends, not the 6yrs data which some decisions had been based on, he hoped the officers would be able to extend their data timescale in future. He also felt the mussel fishery should be looked at in a wider context as the current trend of low recruitment and parasites causing additional die off did not take into account the very much bigger fishery it had been in the past. He also noted there was reference to fisheries being in decline due to reduced landings, in particular he felt the officers should have noted the shrimp landings were reduced due to lack of market availability not lack of stock and similarly the sole & herring landings were reduced due to local boats being unable to get quota rather than a stock issue.

With reference to the closed areas he asked for assurance that despite the regulated areas byelaw being replaced the closed areas would still be reviewed as the industry were assured these areas would regularly be reviewed, he felt if this was not done EIFCA would lose some of the industry's trust. The CEO acknowledge that trust with the industry was a key issue at this time and advised that elements of the industry were not providing accurate information in the hope they would avoid management measures.

Mr Pinborough questioned whether there had been any progress on gathering information from under 10m vessels, the CEO advised there was a lot wrapped up in the Brexit issue, and better regulation. He felt with Defra insisting on the 'collect once, use many times principle' it would be difficult for EIFCA to impose their own data gathering exercise. The Staff Officer advised there were new methods being trialled nationally, using mobile phone technology.

Mr Donnelly advised there were still issues with the management of the Le Strange fisheries, whilst the work was ongoing NE had problems

with funding to put the management in place. He advised that it was important to move forward with this as without management measures in place the SSSI was considered to be, in an unfavourable condition. The CEO advised that EIFCA were not a police force for private fisheries, he suggested that a permitting scheme for that fishery may be the way to move forward but it would be a significant piece of work to make it a priority.

It was acknowledged that once the boundary of the Le Strange fishery was finally determined there would be an area of 'no-man's land' with no regulations applied to it, Mr Garnett advised that at the time the WFO 1992 was written the intention was that the 'no man's land' would become part of the WFO.

Members Agreed to note the content of the Strategic Assessment, including the priorities identified for 2017-18.

Members Resolved to Approve the Strategic Assessment 2017-18, including the priorities identified for 2017-18.

Proposed: Mr Spray

Seconded: Cllr Cox

All Agreed

P&C17/07 Business Plan 2017-2022

The CEO worked through the Business Plan, advising members that the objective of it was to provide a rolling plan to demonstrate effectively what the Authority do, the context in which it was done and the ability to do it.

Having worked through the plan members made suggestions on ways to tweak the plan for clarity, these included re-designating the column heading on page 49 to read 'supplementary priority', and changing the wording of high, medium and low priorities to something which was less likely to imply low meant insignificant to the Authority.

There was also discussion about ways to promote the fishing industry as a career as a lack of recruitment of fishermen could see the industry die out over time.

The Chairman felt that as the Business Plan was entitled 2017-2022 it should include more than one years' business, or be renamed. The CEO advised it as deliberately a 5 year plan which was reviewed annually, he believed it was a way of noting that while priorities may be set for 2017/2018 in reality they may not be finished in that timeframe. The Chairman suggested that it may be an idea to include a vision for the future and changes that may be coming in. The CEO agreed to supplement the Plan before it was given to the full authority.

Members Agreed to note the content of the Business Plan, including the priorities and plans for 2017-18.

Members Resolved to approve the Business Plan 2017-22, including the priorities and plans for 2017-18.

Proposed: Mr Spray

Seconded: Mr Bagley

All Agreed

There being no other business the meeting closed at 1205 hours.

Vision

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Action Item 6

Planning and Communications Sub-committee meeting

14th March 2018

Strategic Assessment 2018

Report by: Luke Godwin, Senior IFCO (Regulation) & Greg Brown, IFCO/Project Officer

Purpose of report

The purpose of this report is to present the Strategic Assessment for 2018 for approval and subsequent publication on behalf of the full Authority.

Recommendations

Members are recommended to:

- **Note** the content of the Strategic Assessment, including the priorities identified for 2018-19
- **Approve** the Strategic Assessment 2018, including the priorities identified for 2018-19

Background

An annual assessment of Eastern IFCA fisheries is undertaken each year. The Strategic Assessment is used to identify the highest risk elements of all the fisheries in the district, including fisheries sustainability, industry viability and environmental impacts.

This assessment was introduced in 2014 and each iteration of the assessment has been subject to update and development to ensure outputs are relevant and consider all the available evidence.

The Strategic Assessment draws on a data driven analysis (the initial assessment) and contextual knowledge of officers (the contextual assessment) to objectively identify potential work-streams and assign a priority based on the risk. This is used to inform the annual priorities set out in the rolling five-year Business Plan.

Report

Development of the Strategic Assessment

In previous years additional criteria have been added to incorporate new and improved information/evidence. No further criteria were identified this year and therefore criteria remain unchanged in the data driven, initial assessment. The criteria used reflect the main duties of the Authority. The criteria are as follows:

- *Evidence base* – an assessment of the available evidence for each species in relation to fishing effort, landings, stock health and presence of spawning and nursery areas.

- *Current Regulation* – assesses species based on measures currently in place in relation to protection of pre-spawning individuals, gear management or specification and effort restrictions.
- *Ecosystem impacts* – assessment considers the potential ecosystem level impacts of the main gears associated with each species (e.g. by-catch, habitat damage) and the presence or absence of spawning and nursery areas of each species.
- *Fisheries performance* – considers the landed weight and value of catch from within the Eastern IFCA district, any detectable trends in landed catch, landings from within the district as a proportion of the UK total and available ICES advice.
- *Presence or absence of spawning and nursery grounds* – This had previously been included as part of the contextual assessment. Scores were assigned to each fishery to reflect a higher risk where spawning and nursery grounds are present.
- *EIFCA landings in a UK context* – Landed weights from within the Eastern IFCA district were reflected as a proportion of UK total landings for each species. Scores were assigned which reflect a higher risk where fisheries had greater national importance.
- *Fisheries trends* – Landed weights were analysed to detect positive or negative trends in landed weights over time. Scores were assigned which reflect a higher risk where a strong positive or negative trend was detected.

Improvements were made to the system used for scoring. Particularly in relation to gear impact assessments where new data was utilised to improve the accuracy of results. Also new evidence was used to inform the presence/absence of spawning and nursery grounds criteria.

Risk scores have continued to be related to fisheries performance and the scoring system has remained simpler following changes from previous years. Additional use of the Community Voice method data has been incorporated into the assessment as part of the contextual issues section. This is of importance as it provides a level of objectivity to an otherwise subjective part to the strategic assessment.

An additional section has been added to the category of works to reflect the ‘viable industry’ element of the Authority’s statutory duties. This section is included to ensure that all aspects of Eastern IFCA’s vision are included in the assessment and any works related to this category are identified fully.

The 2018-19 assessment (Appendix 1) sets out the high priority work, key ‘business as usual’ work-streams and identifies future work and future priorities. ‘Business as usual’ priorities relate to established work-streams responsible for maintaining a lower risk score for certain fisheries. These include, for example, the annual cockle stock survey, without which, the risk associated with the cockle fishery would increase. These are set out to reflect the full suite of demands on the IFCA. Identification of future priorities and work streams relate to risks identified within the

assessment which are considered less of a priority. It is important to highlight these potential work streams as they may inform future Strategic Assessments or, opportunities may present during the year which enable additional benefit from existing or partner projects for which, these should be considered.

Additional consideration was given to key messages received from stakeholders throughout the year. These messages are routinely recorded through message forms, patrol reports and correspondence libraries. These messages have been included in the contextual issues section of each fishery area to give a more balanced approach to the contextualisation. Furthermore, they have been highlighted in a 'other work streams' table with a priority and a narrative explaining the issue and actions that Eastern IFCA can take to address them.

Outputs of the Strategic Assessment 2018-19

Annual priorities reflect the work which is the focus during the financial year rather than distinct, annual projects. Whilst the priorities identified during the 2017-18 Strategic Assessment have been progressed, most of these work-streams require continued development and completion.

This is reflected in the outputs of the 2018-19 assessment which has indicated that the key priorities are those carried over from 2017-18. Other 2017-18 priorities have been re-prioritised to account for wider developments which have reduced risk. In addition, one new priority work-stream has been identified. The new items are set out below.

New High Priority work 2018-19

Implementation of WFO Shellfish Lay lease conditions: this includes compliance with WFO lease conditions (putting on and removing shellfish), education and engagement in relation to biosecurity and the transfer of Invasive non-native species.

New Business as Usual Critical work streams 2018-19

Continued monitoring of the chlorophyll and cockle and mussel meat yields as required by the model that is used as mitigation within the associated aquaculture (lays) habitats regulation assessment.

Identification of future priorities 2018-19

Further rationale as to the re-prioritisation of 2017-18 priorities and the emergence of 'new' priorities is presented within the Strategic Assessment 2017-18 as are all other priorities previously identified.

Risk

The risk associated with the assessment is that it does not detect a priority work-stream. This is mitigated by the further development of the assessment as set out above. In addition, the Strategic Assessment is a live document, which is intended to be updated to reflect new evidence and changing contextual needs.

Appendices

1. Strategic Assessment 2018

Vision

The Eastern Inshore Fisheries and Conservation Authority will lead, champion and manage a sustainable marine environment and inshore fisheries, by successfully securing the right balance between social, environmental and economic benefits to ensure healthy seas, sustainable fisheries and a viable industry



Action Item 7

Planning and Communications Sub-committee meeting

14th March 2018

2018-23 Business Plan

Report by: J. Gregory, CEO

Purpose of report

The purpose of this report is to submit the draft Business Plan for 2018-23 for approval and subsequent publication on behalf of the full Authority.

Recommendations

Members are recommended to:

- **Note** the content of the Business Plan, including the priorities and plans for 2018-19
- **Approve** the Business Plan 2018-23, including the priorities and plans for 2018-19
- **Note** the decision not to proceed with the Shrimp Beam Impact Study

Background

A rolling five-year Business Plan was developed and introduced in April 2016, bringing together all elements of activity undertaken by the organisation.

The plan is intended to project five years in advance with annual reviews to update the strategic and financial context and to prioritise and plan for each financial year.

The planning model is intended to provide a longer term and more cohesive approach to business planning by drawing together all elements of activity in a single plan.

Business Plan 2018-23

The plan (Appendix 1) provides the strategic framework within which Eastern IFCA operates and describes our ability to deliver against our vision and priorities. This is demonstrated by setting out factors such as effective leadership arrangements; the strength of the team in terms of experience, qualifications and skills; being appropriately equipped; operating effectively and; effective financial management.

An important element of this approach is to demonstrate that the work of Eastern IFCA as an investment in the local marine environment and to develop a narrative that would lead contributing authorities to view funding in that context rather than simply being another demand on hard pressed finances.

The plan shows a clear linkage to Defra's vision and strategy, including the recently published 25-Year Environment Plan. Although IFCA's are not Defra bodies, they do deliver into the Defra remit and understanding the link demonstrates synergy between the work of Eastern IFCA and the national framework. The Business Plan also incorporates the Success Criterion and High-Level Objectives, which will guide the work of Eastern IFCA during the next four to five years.

Priorities 2018-19

The overall priorities for 2018-19 have been identified by the annual Strategic Assessment and are set out in Appendix 3 of the Business Plan. Most priorities are carried over as work in progress from 2017-18.

The Enforcement plan is set out in Appendix 4 and follows a similar format to previous years.

The Communications and Engagement Plan is set out in Appendix 5. It proposes a significant shift in activity to make more effective use of resources through building upon the Community Voice Method project.

Shrimp Beam Impact Study

At the 23rd meeting of the full Authority held on 27th April 2016 members were updated on progress on the Habitats Regulation Assessment (HRA) for shrimp fishing in the Wash and North Norfolk Coast SAC, and the potential management measures to mitigate potential impacts on the features of the site. This work is an ongoing priority in the Business Plan to deliver fisheries management measures for 'Amber and Green' designated features within European Marine Sites (EMS) including shrimp management in the Wash and North Norfolk Coast SAC.

At the 23rd Authority meeting members were also advised that Shrimp Gear Impact Trials were being developed, which would include standard gear as well as more innovative gears. It was anticipated this would be a 2-year project involving both EIFCA and the Industry. Members were advised that the project was beyond EIFCA resources and would require a successful funding bid from EMFF and industry support.

EMFF funding was subsequently secured to support the study, which was being developed in partnership with the industry (Lyn Shellfish and John Lake Shellfish).

Existing scientific literature suggested beam trawls would have significant adverse impacts on several seabed features. The gears used in these studies were generally much heavier fish beams than those used in The Wash. The objective of the study was to seek to establish the actual impact that shrimp beam trawls have on site features.

Extensive work was undertaken by officers to establish the project but due to a combination of factors it has now been determined that it is not feasible to undertake the study.

A report setting out the full detail of the work and rationale leading to the recommendation to discontinue the study can be found at Appendix 2.

The study was not a priority agreed in the Business Plan but it was a workstream closely aligned to the priority set out in the Business Plan since 2015 and members are, therefore, asked to note that the study has been discontinued.

Risk

The risk matrix in the plan is set out in Appendix 1 reflects the most significant strategic risks to the Authority which demand management action. The key risk to Eastern IFCA is remains uncertainty of future funding due to New Burdens funding only being guaranteed to 2020.

Appendices

2. Draft Business Plan 2018-23
3. Review of Shrimp Beam Impact Study

Appendix 2

Review of Shrimp Beam Impact Study

Executive summary

When initially considering a Habitat Regulations Assessment (HRA) for The Wash brown shrimp fishery, existing scientific literature suggested beam trawls would have significant adverse impacts on several seabed features. The gears used in these studies were generally much heavier fish beams than those used in The Wash. Supported by the local fishing industry, EIFCA developed a project to study the impacts of the beams typically used in The Wash. Proposed to be a 2-year study, this project successfully received £140k of EMFF funding. Identifying a suitable site in which to conduct the project proved more challenging than expected. This caused a long delay in the planned start date for the project and the site eventually found was not optimal. Natural England also raised several concerns about various technical details of the study, some of which could not be resolved. While reviewing these concerns, power analysis was conducted on the sampling regime. This showed that while the regime would be able to detect large impacts, it would not be able to prove there was not an impact. Even if it were able to, unresolved issues relating to the recovery period of the control sites could invalidate the conclusions. That being so, the project would have minimal impact on management measures currently being developed. Because the costs in terms of time and public spending outweigh the benefits, it is recommended that the project does not continue.

Introduction

The brown shrimp (*Crangon crangon*) beam trawl fishery is one of the most important fishing activities occurring within the Eastern-IFCA district, and accounts for approximately 90% of the UK landings of this species. The majority of this activity occurs within The Wash and North Norfolk Coast SAC. In 2012 DEFRA announced a revised approach to the management of commercial fisheries in European Marine Sites. Under the revised approach, all UK commercial fisheries must be managed in line with Article 6 of the Habitats Directive. This requires all existing and potential commercial fishing activities to be assessed using an evidence based, risk prioritised approach, to determine whether there is potential for the activity to cause deterioration or disturbance to specific marine features and species.

When conducting the Habitat Regulations Assessment (HRA) for The Wash brown shrimp fishery, a review of existing available scientific literature was conducted to help inform the process. This assessment highlighted beam trawling for brown shrimp had the potential to cause adverse effect on a number of features, including sub-tidal mixed sediment habitats. However, although there have been numerous studies reporting on the impact that beam trawl fisheries have on bycatch species and environmental features, these studies have tended to be conducted using heavier gear¹ than is traditionally employed by The Wash brown shrimp fishery, or on different features to those of specific relevance in The Wash. Further, it is felt by

¹ The gear typically used in existing studies have been types used for benthic fin-fish fisheries. These gears are not only heavier, but usually have attachments not present on the beams used in The Wash fishery, such as tickler chains that are designed to disturb the seabed.

many of the fishers that the relatively shallow waters in The Wash, coupled with its high turbidity, create an environment in which natural disturbance is likely to minimize the disturbance that the fishery causes. In 2016 a two-year scientific project was proposed that would specifically study the impact that traditional beam trawls and innovative SeeWing beam trawls used by The Wash brown shrimp beam trawl fishery, have on sub-tidal mixed sediment habitats in a shallow, turbid area such as The Wash.

The project planned to study the environmental impact of two types of gear - traditional 7m beam trawls and innovative 7m SeeWing beam trawls. The aim of this experiment was not to look at a one-off impact and recovery, but to simulate the ongoing impacts of the fishery over an 18-month period. Advice was sought from scientists at Cefas, Plymouth Marine Laboratory and Imperial University, regarding the experimental design of the project, particularly regarding the level of sampling that would be required to detect any potential impacts the gear would have against a background of natural variation and change. Following this advice, a design was adopted that would involve conducting monthly fishery simulations with each gear type within replicated experimental areas (four areas per gear type) and comparing potential impacts with four unfished control sites.

Five phases of monitoring were planned to occur over a two-year period. These would primarily involve the full biota and particle size analysis of samples collected using a Day grab, supported with acoustic side scan data. Although camera imagery was also planned, due to the poor visibility frequently encountered in The Wash, this was planned to be secondary supporting evidence. In terms of experimental design, there was planned to be 4 replicate tracks for each type of beam and controls (total 12 tracks). During monitoring, 6 replicate samples were planned to be collected from each track (total of 72 samples on each of five sampling occasions – total of 360 samples). Quotations were sought from five ecological consultancies for the analysis of the biota and PSA samples, of which Thompson Unicmarine were considered the best value with a cost of £88,560 +VAT.

To cover the costs of the project, £200K of European Maritime and Fisheries Fund (EMFF) funding was applied for, of which £140K was approved. The project also had support from the local fishing industry, of whom two vessel owners offered the use of their vessels to help conduct the fishery simulations. Securing this funding involved significant staff time over a 12-month period.

Identifying an experimental site

When initially considering sites in which to conduct the experiment, there were several criteria that needed to be fulfilled:

- As the project was to study the impact of the fishery on sub-tidal mixed sediment habitats, the seabed within the site needed to be composed predominantly of sub-tidal mixed sediment habitat.
- Because the HRA indicated shallower sites are subject to higher natural disturbance than deeper water sites, and that this disturbance is potentially greater than fishery disturbance, it was decided that the study site should be deeper than 10m. This way, if the fishery was found to not have an impact, the

results could also be used to inform management of a less sensitive feature, whereas the reverse would not apply.

- To avoid contamination of the results from other anthropogenic activities, port anchorages and cable routes (including active cable laying exclusion zones) needed to be avoided. Similarly, areas of heavy potting activity were also avoided.
- Areas that were already closed to protect *Sabellaria spinulosa* reef and cobble/boulder features were avoided. Additionally, areas later identified during the surveys as supporting *Sabellaria* were avoided.
- To avoid damage to fishing gear used during the study, areas known to contain fastenings or rough ground (steep sand hills, boulders etc) were avoided.
- Because the project wanted to study the impacts in shallow, turbid waters such as are found in The Wash, the study site needed to have these conditions. As there were also strong logistical reasons for conducting the study close to the ports of King's Lynn and Sutton Bridge, where the participating vessels are based, sites within The Wash were sought.
- Because the study site would need to be closed to all external fishing activities during the entire study period, initially there was a preference to avoid areas that were known to be important fishing grounds. When difficulties arose identifying a site, this criterion was relaxed.
- To improve the robustness of the statistical analysis, it was also preferable to find a site that had a homogenous seabed as was possible.
- To minimise natural variation between sites, there was a preference to conduct the experiment in a single location. This required a site with an area of at least 1nm².

In March 2016, officers from Eastern-IFCA liaised with members of the local fishing industry who would be participating in the fishery simulation aspects of the study, to identify potential sites in which the study could be conducted. Habitat mapping surveys, involving 100% coverage of the site with side scan sonar, plus ground truthing with grab samples and video cameras were conducted at these sites. The seabed in these initial sites were found to support mosaics of several different habitats, but no single extents of sub-tidal mixed sediment large enough to fit the experimental site within.

Further potential sites were identified using advice from the industry, coupled with a combination of Hydrographic charts and GIS software to identify areas of correct depth required for the project, that avoided port anchorages and current closed areas protecting conservation features and windfarm cable laying activities. Between March 2016 and August 2017, habitat mapping surveys were conducted on 7 areas within The Wash, requiring a total of 18 days of vessel time at sea. 18 days of survey may not appear much over a period of 18 months, but as each survey required a significant amount of time to analyse the acoustic and ground truth data generated, prior to the requirement for the next survey to be planned and conducted, the whole process was lengthy. In all, approximately 630 hours of officer time was absorbed in this process during this period. None of these sites proved to be suitable for supporting the project.

Having exhausted all areas in The Wash that could potentially support the project design in a single site, in August 2017 the survey data was revisited to see if two or three smaller suitable areas could be identified that the trial area could be split between. Two potential areas were identified and further surveys conducted on them during August and September 2017. Although smaller extents of sub-tidal mixed sediment features were being sought during these latter surveys, none were identified that were large enough.

Although sub-tidal mixed sediment habitat is thought to be a common feature in The Wash, the series of surveys conducted to identify an experimental site on this type of feature found the seabed tended to support amorphous mosaics of several different habitat features that gradually merged into each other. As such, although numerous areas of sub-tidal mixed sediment habitats were found, no large extents could be found that were predominantly of this habitat. Having exhausted all potential sites in which the experiment could be conducted on sub-tidal mixed sediment habitat in The Wash, alternative solutions were explored.

During the latter two surveys, the Particle Size Analysis (PSA) from the grab samples had shown that while the site supported a mosaic of four different EUNIS sediment types, when displayed on a Folk triangle of EUNIS sediment classifications, they were closely clustered around the border of the four types. This meant that while only about a third of the samples were classified as being sub-tidal mixed sediment, the seabed as a whole was fairly homogenous across the site. Following advice from Natural England, that it should be possible to study the impact the beams had on communities rather than on specific EUNIS classifications, it was determined that the site would be suitable and large enough to support the trial site.

Time scales

The project was planned to involve several critical elements. These included:

1. Identification of a study site
2. Closure of the study site to fishing activities. This would involve submitting a new byelaw to Defra, a process that could take potentially 9+ months.
3. Allowing a 6-month recovery period within the study site following closure.
4. Conducting monthly fishery simulations for 18 months following the 6-month recovery period.
5. Conducting 5 monitoring surveys, commencing at the time of the closure and ending following the final fishery simulation.
6. Analysis of data and compilation of scientific reports

Because the cost of sample analysis for the project was prohibitive unless external funding could be secured, officers commenced the process of applying for EMFF funding in March 2016. As EMFF funding for projects could only be used over a maximum two-year duration, various elements of the project became time-critical. The fishery simulations and monitoring programme would need to be completed within two years of the funding start date. It was originally planned to identify a suitable site and use the EIFCA Protected Area Byelaw to prohibit fishing within it

during the period funding was being sought. This would then allow the time-critical phases of monitoring and fishery simulations to occur during the allotted funding period.

Initial dialogue with the MMO EMFF project board indicated funding would be secured by October 2016. However, the application process took longer than was anticipated, and confirmation of a successful application was not received until February 2017. The difficulties described above in identifying a suitable site, however, meant this delay in receiving funding was not a critical factor, but the lack of an experimental site definitely was. To make matters worse, while the original intention to close the site using a regulatory notice under the Protected Area Byelaw should have been a relatively quick process, in the interim period this byelaw was rescinded by Defra. This meant that the closure of a study site would require a new byelaw to be written and approved. Recent experience with other byelaws indicated this process could take 9 months or more. By the time a site had finally been identified in October 2017, one of the three funding deadlines had already passed. Because a second deadline would most likely have also passed by the time a byelaw could be introduced to close the site, an internal decision was taken to cancel the project on financial grounds. Thompson Unicomarine, who had been contracted to conduct the sample analysis, were informed of this decision.

This decision was disappointing for the industry, who still supported its continuation. They felt that with industry support, the byelaw could be fast-tracked. Clarification was sought from the MMO project board to determine if the funding period could be extended. They confirmed the initial deadlines could be moved forward. With full funding still available and a site found, continuation of the project was given further consideration.

Natural England concerns

Because the results of the project were intended to be used to help inform our management of a major fishery within a Marine Protected Area, potentially contradicting other existing scientific literature, it was important for Natural England to be comfortable that the project's experimental design would deliver statistically robust results. Their lack of confidence in the results for any reason would invalidate its use in informing any future management decisions.

The project plan was forwarded to the local Natural England team on 21 April 2017 for comment on the methodology. This was forwarded to two Natural England national marine specialists, who responded with their respective advice on 20 July 2017. Their advice contained a mixture of scientific advice concerning the methodology and some additional concerns about whether such studies should be conducted within MPA's. Their comments included advice about potentially changing the design of the experiment from conducting the fishery simulations in narrow (40m strips) to wider boxes, and making use of non-impacted areas for the placement of control sites. A meeting was held between EIFCA science staff and Natural England on 29 August 2017, to discuss some of the concerns that had been raised. Where practical, the methodology was adapted to account for this advice (and reasoning provided where it was impractical). This update was provided to Natural England on

13 September 2017. On 6 November 2017 Natural England responded formally with a letter outlining their concerns about the project. The concerns they raised in their letter were:

1. *Survey technique – As the primary impact of the fishing gear would be on sessile epibenthic species, grab sampling would not be the most appropriate survey technique for this type of study as they primarily sample infauna rather than epifauna. Alternative techniques, such as cameras with fresh freshwater lenses and divers, should be used instead.*
2. *Control sites – Because The Wash is an impacted site that has been fished for a long time, the control sites would require closing for sufficient time for the communities to fully recover before they could be confidently used for a comparison between baseline and study areas. Natural England monitoring and fisheries specialists advised 5 years would be preferable for the site closure.*
3. *Identifying fishing impacts from natural variation – Because changes to the sediment and communities due to natural variation may be frequent, large and complex, confidently detecting change due to fishing impacts would require a huge number of replicates.*
4. *Conducting a gear trial in an MPA – Although Natural England recognised the environmental conditions in The Wash are distinct from the wider region, and the project was to specifically study what impact beam trawling has on these features, conducting fishing gear impact studies in a Marine Protected Area (MPA) is something they would discourage. If the study were to proceed in an MPA, a Habitats Regulation Assessment would be required. They advised it would be preferable to find an area as analogous as possible outside of the MPA to conduct the study in.*

Natural England were concerned that if we were not aligned on study methodology beforehand, there could be differing interpretations of the results. For instance, unless they were confident in the design, they would not be confident that a result showing no change would mean fishing does not impact the habitat.

Reviewing concerns

Experimental design

In the project plan, the trial area had been designed as having 12 parallel tracks for the fishery simulations and controls. These were each planned to be 1,850m long and 40m wide, and separated from each other by 75m buffer zones. Natural England's comments in the project plan and the subsequent meeting raised concerns about this design. They felt the tracks themselves were too narrow to accurately tow the beams through and to sample. Additionally, they felt the buffer zones were too narrow to effectively function as buffers. They suggested it would potentially be a better design to use discrete boxes rather than long narrow tracks. Taking this advice into account, three options were designed, in which 12 tracks were still used, but their widths were increased to as much as 75m, with 150m buffers between each track.

On 7 December 2017, advice was sought from Cefas questioning the pros and cons of using parallel tracks for impact sites and controls, as opposed to conducting each treatment in separate blocks. Cefas's advice was that in these types of studies, the

experimental impact should be as representative as possible to the impact which they are trying to replicate. In this example, they felt a series of trawled corridors was a closer representation of fishing practises than a single block of impact. With regard to the minimum widths of experimental tracks and buffers, they felt the main consideration was ensuring the buffers were wide enough to ensure that the trawling of one track doesn't impact on the neighbouring track. No further concerns were highlighted by Cefas on the use of tracks.

Survey technique/sampling method

Because visibility encountered in The Wash is frequently poor, it was planned to use PSA and full biota analysis of samples collected with a Day grab as the primary monitoring method. Although grabs are better suited for collecting infaunal samples than epibenthic data, they will pick up epifauna. They also have the benefit of providing quantifiable physical samples that can be weighed, measured and counted. Natural England, however, were concerned that as the primary impact was likely to be on sessile epibenthic species, it would be more appropriate to use cameras than grabs to gather this evidence. Cefas supported this concern, suggesting a freshwater lens camera with a fixed field of view could potentially be used to collect 'quantitative' images in challenging environments like The Wash.

Control Sites

Natural England felt that because The Wash was already an impacted site, the control sites for the experiment should remain closed for five years in order to provide appropriate baselines. As the project could not wait five years for a site to fully recover, they suggested placing the control sites within a neighbouring windfarm cable fishery exclusion zone, which had already been closed to fishing activities for two years. This option was considered, but raised a number of concerns of our own:

- When conducting experiments of this type, both the control and impacted areas should start from similar baseline conditions, not from different states of recovery. Cefas supported this view, saying, "*the important thing is to start from a comparable baseline (e.g., across all treatments and controls). Ideally all treatments and controls should start from an unimpacted (reference) status but in reality you'd be unlikely to find a sufficient area of seabed that represents such conditions. Therefore, I think you just have to try and meet these criteria as far as possible e.g., ensure that the 'starting point' for all treatments and controls are representative (i.e., similar seabed type, similar biological communities (infaunal and epifaunal) and similar fishing pressure prior to the experiment commencing).*"
- When Seasearch divers surveyed the proposed trial area and the fishery exclusion zone adjacent to it, they reported the seabed was markedly different between the two. While they described the seabed within the trial area as being mostly flat, they described the seabed in the exclusion zone as containing large sand waves. These waves were also detected on the vessel's echo sounder. The divers also reported that there was noticeably less epifauna growing in the exclusion zone than in the trial area.
- Although fisheries have been excluded from the exclusion zone for two years, it hasn't been left undisturbed during that period, as two cables have been laid through it during that time. There is also uncertainty as to whether the site will

remain undisturbed in the future as the windfarm company has applied for a licence variation to rebury some of their cables that have scoured out. Although the request to place rock berms along some parts of the cable route does not occur within the area adjacent to the trial area, there are plans to conduct remedial burial and trench backfilling activities along their length. These latter activities, if consented, could occur in areas where the control sites were positioned.

Although we shared Natural England's view that ideally sites would be left at least five years to recover prior to conducting such studies, in this case that was not practical. As such, it was felt it was important to maintain the function of control sites, as being areas that replicated the treatment areas in all possible ways barring the treatment being tested. Although it is accepted that the slower-growing species would not recover during a 6-month recovery period, it was felt that as the control sites would remain unfished for the full two years of the study period, this would be sufficient to detect impacts on any fast and medium growing species. The decision was made, therefore, to continue with the original plan of incorporating the control tracks in parallel with the treatment tracks.

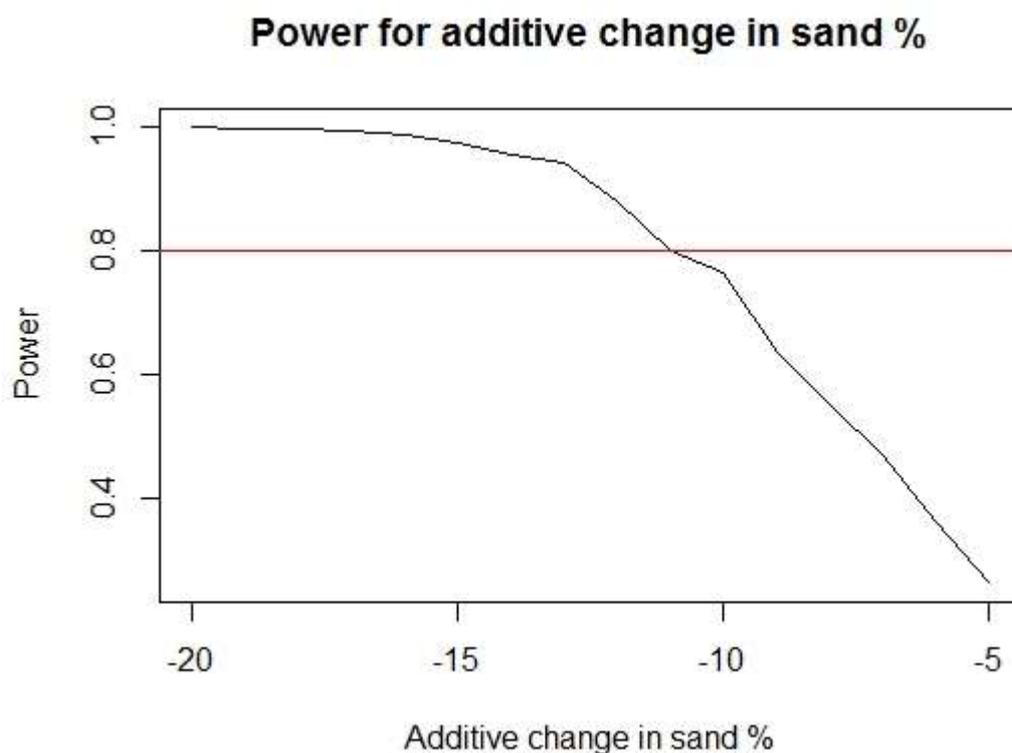
Identifying fishing impacts from natural variation

When conducting scientific studies, there are two types of error that can result in an incorrect conclusion being drawn.

- Type I errors occur when a positive impact is concluded that has actually occurred randomly. When a p-value of 0.05 is used (as is common in biological experiments), it means there is a 5% probability that random events could have produced the result. The strength of the p-value will give an indication of how likely detected impacts may have occurred randomly.
- Type II errors occur when there actually is an impact but it is not detected. Where there is a large natural variation, or when impacts are light, type II errors are prone to occur. When Natural England raised the point that "*unless they were confident in the design, they would not be confident that a result showing no change would mean fishing does not impact the habitat.*", their concern is highlighting that non-detection of an impact does not necessarily mean there isn't an impact, but that a type II error may have occurred.

Ways of reducing type II errors include trying to minimise natural variation and ensuring sampling regimes are sufficient to detect changes against the level of natural variation. It is for this reason that areas of homogenous seabed have been sought for the experiment, as this will reduce spatial variation. Similarly, conducting the experiment within a single area will reduce natural spatial variation that may occur if multiple sites were used. Nevertheless, it is important that sampling regimes are sufficiently large to ensure the statistical analysis is robust enough to minimise type II errors. This can, as Natural England advised, involve taking "huge numbers of samples". Because collecting and analysing samples is costly, power analysis can be conducted on planned sampling regimes to determine what level of sampling would be required to detect various levels of change. Conducting power analysis

does rely on having samples beforehand, however, from which the natural variation can be determined. No power analysis was originally conducted when designing the monitoring regime, but advice was sought from scientists at Cefas, Plymouth Marine Laboratory and Imperial University who had conducted similar studies previously. In January 2018, when reviewing whether the project should continue, Cefas were commissioned to conduct power analysis on the planned design, using 38 PSA samples that had been collected from the proposed study site. The results from this analysis were heavily caveated, because they were conducted on sediment data rather than biota data, and they did not include any temporal data that might affect the site, but they concluded the monitoring regime would be sufficient to detect a 10-12 percent point change 80% of the time (see graph below).



In terms of marine and biological experiments, in which large numbers of variables are usually present, this level of detection is quite good, particularly if relatively large impacts are expected to occur. For instance, looking at the graph generated from the power analysis, it can be seen that the sampling regime would have an almost 100% chance of detecting 20% point changes. However, looking at it the other way, an 80% chance of accurately detecting a 10% point change means positive impacts could remain undetected 20% of the time. This level of non-detection would increase rapidly the smaller the impacts became, with a 5% point change only being detectable about 10% of the time. In effect, that means if an impact was light enough to only create a 5% change (but an impact nevertheless), it would remain undetected 90% of the time.

Conducting a gear trial in an MPA

Although it was agreed that ideally, such studies would not take place in MPA's, logistically, it would be difficult to conduct the study outside of one. All of the vessels involved in the study were based in King's Lynn or Sutton Bridge, so steaming to and from sites outside of The Wash would significantly impact on the time left to conduct work on the trial site. Either the study would need to be significantly reduced in scale or costs would significantly increase. Further, the project was specifically designed to study the impact on the environmental conditions in The Wash, where the fishery is currently occurring. It was felt, therefore, that if continued, the study would need to take place in The Wash.

Conclusions - Should the project continue?

The concerns raised by Natural England have been considered and additional advice sought from Cefas regarding them. The concerns mainly applied to the experimental design, sampling techniques, function of control sites and the ability to detect impacts.

The design of the experimental area was influenced by the ability to identify a large enough area in which to conduct the experiment, taking into account several critical criteria. Although Natural England had suggested using separate blocks for the impacted and control areas, Cefas advised this was not necessary. Instead, the main considerations should be replicating accurately the activity being studied and ensuring the individual impacts did not interfere with each other. Taking advice into account, the design was changed slightly to increase the width of the trial tracks from 40m to 75m wide and the width of the buffer zones from 75m to 150m. The layout of this design would slightly increase the complexity of conducting the fishery simulations, but was achievable.

Because the largest impact would be to epifaunal communities, Natural England had suggested the sampling regime should primarily focus on video footage rather than PSA and biota analysis of grab samples. Cefas had supported this view. Due to the poor visibility encountered in The Wash, this would require the use of a water-lens camera. The IFCA's do not have this type of camera, so one would need to be hired, incurring additional costs. Analysis of the video footage would also need to be conducted externally if accurate quantifiable data were to be extracted, because EIFCA staff do not possess these skills to the level required. These costs could be absorbed from the savings made by no longer collecting and analysing biota and PSA samples, but it is likely a robust level of PSA samples would also be required. The danger of changing the design to rely on camera footage is the reliance on collecting good quality footage in poor visibility. From experience, images taken in The Wash are frequently poor.

Natural England had raised concerns about the experiment being conducted on ground that was already impacted. They advised impacted ground should be closed for five years to allow slower-growing species to recover, so that the full impact of the gear could be demonstrated. As we cannot be certain how impacted any ground has been previously, this would mean closing an area for five years prior to commencing the project. This would not be possible within the funding time frame. As a potential solution, Natural England had suggested placing the control sites within an adjacent

windfarm cable corridor that had been closed to fishing activities for two years. Both ourselves and Cefas had misgivings about this, however, because the main principle of control sites is that they should have similar baselines and conditions as the experimental sites. Starting the experiment with different baselines would not be at all appropriate. Further, when investigated, the adjacent site in the cable corridor was found to support different seabed features to those in the experimental site and could potentially be impacted by future remedial cable reburial activities. Should the project continue, therefore, our plan was to continue using the original layout of control sites, albeit with only 6 months of recovery. If significant impacts were caused by the beam trawls, EIFCA staff felt these would be detectable over the two-year study period. However, if impacts were only light or non-existent, and not detected, the failure to allow sufficient recovery would always lead to uncertainty in the results, because the species that take longer to recover are those likely to be most impacted. A solution to this issue could not be found.

The capability to detect impacts is a vital consideration in any scientific study. Existing evidence suggests beam trawls do have an impact on environmental features. If the results from the project detected an impact, it would support the existing literature but not change the management that has already taken account of that evidence. For the project to alter management decisions that were influenced by existing literature, the results would need to show the gear does not have an impact, or to quantify the level of impact occurring as within manageable levels. In terms of management decisions, therefore, there is little benefit in conducting a study that supports existing literature, only one that potentially has an impact on that decision-making process by disagreeing with current literature. Unlike many studies, in which the detection of an impact is the main interest, for this project to make a difference, it would need to prove beam trawls were not having an impact.

As has been described above in the section concerning power analysis, failure to detect an impact is not the same as there not being an impact. In scientific studies the chances of a result being true and not just an artefact of chance is tested using statistical analysis. These tests predict the probability of a given result being achieved purely by chance. Errors can be caused when the results show a positive impact that is not really there but was actually caused by chance (type I error), and when the results fail to detect an impact that is actually occurring (type II error). While it is relatively easy to detect and even quantify impacts that are occurring, it is much harder to prove conclusively that an impact has not occurred. Failure to detect an impact does not mean there is no impact.

The power analysis conducted on the sampling regime provided the likely probability of being able to prove with statistical robustness whether impacts were occurring. This showed that if the level of impact was high, there would be a high probability of detecting the impact with strong statistical rigor. However, for smaller impacts the sampling regime would only detect 10% point changes 80% of the time and 5% point changes 10% of the time. It is clear from the power analysis, therefore, that the sampling regime proposed for this study would not be able to prove with any confidence, that beam trawls were not having an impact. Even if the beams were not having any impact at all, this conclusion would be lost amid high probabilities that a

type II error had occurred. These margins of error would be too high for the Authority to be able to conclude no impacts were occurring, and base their management of the fishery upon.

It should also be stressed the detection probabilities predicted by the power analysis are optimistic. They are based on PSA samples rather than full biota, and as such were likely to have less natural variation than the biota samples that would be studied during the project's sampling regime. Further, because they were all collected on the same day, they are not influenced by temporal variations that would affect the project over a two-year duration. In reality, therefore, the strength of the statistics would be lower than those predicted from the power analysis. This strength could be improved by increasing the number of samples collected, but this is not a linear relationship. Increasing sampling intensity would rapidly suffer from diminishing returns. As the project was already sampling at the highest intensity affordable within the funding boundaries, increasing further would not be an option that could be considered anyway.

In addition to the concerns raised by Natural England, there was also a concern from EIFCA officers regarding the site location. The aim of the project was to study the impact that beam trawls have on sub-tidal mixed sediments. However, the difficulties encountered when trying to locate a large enough expanse of sub-tidal mixed sediment had resulted in an area being selected that was not sub-tidal mixed sediment. This meant the question being answered by the study had changed from what impacts the beam trawls have on sub-tidal mixed sediment habitats, to what impact they would have on the sub-tidal community present at the selected site. Although the experimental design of the study would remain the same, there was concern over what this change would mean when informing management decisions. Even if the results categorically proved the beams had not had an impact on the communities within the site, would they then be allowed to inform management on sub-tidal mixed sediment habitats? Possibly not, because it could be argued that sub-tidal mixed sediment habitats have their own specific communities that potentially have different sensitivities to the pressures than those at the study site. If on the other hand, the study did find there was an impact on these communities, it could potentially be argued that as the study was conducted on communities generic to The Wash, the results could be applied across the whole site. This would include areas that the HRA process has currently scoped out as being less sensitive to the pressures.

The above issues were discussed by the EIFCA science team on 29 January 2018. Overall, it was felt that because it would not be possible to confidently prove beam trawls did not have an impact, the project would have minimal impact towards affecting future management of the fishery. As the project would be a major commitment of EIFCA and industry time over the next two years, and of public funding to finance it, it was agreed the costs greatly outweighed predicted benefits. The recommendation, therefore, was that **the project should not continue further**.

There is still an evidence gap in the literature concerning the impact the lighter gears typically used in The Wash have on certain habitats. In absence of clear evidence for

this type of gear, however, other metrics and information have been used in producing the latest draft of the shrimp fishery HRA. These have included looking at the effects of specific pressures, such as abrasion and penetration on a range of sensitive species present in The Wash; examining the impacts of natural disturbance on seabed features, and where possible, determining the current condition of various species by examining current and historic grab sample data and Infaunal Quality Index (IQI) values. The information gained from these studies has provided us with a much better understanding of the current condition of the features, and their sensitivities to various pressures, than we had when the shrimp beam project was first conceived in March 2016.

Going forward, the management process for the shrimp fishery will require the submission of a HRA detailing the impacts the fishery has on the environmental features; the development of management measures to mitigate any adverse effects raised by the HRA; and a Monitoring and Control Plan (M&CP), which will detail future monitoring regimes that will check the management is having the desired effect. It is likely the M&CP will highlight the need for regular sampling regimes to assess the condition of the features. If so, this condition monitoring coupled with iVMS information of where the fishery is occurring, would provide solid information on the impacts the beam trawl fishery is having. Through the processes developed within the M&CP, this information would be able to inform ongoing management of this fishery.

Significant time and resources have already been spent on this project to date, including developing plans, seeking funding, conducting habitat mapping surveys, data analysis and frequent meetings. These resources have not been wasted, however, as we have greatly improved our knowledge of the seabed features in the seven sites in which we conducted surveys. Further, the process has provided useful training experiences to all the staff involved in the project, including conducting habitat mapping surveys and data analysis, project management and planning, and statistical power analysis.

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