Marine Management Organisation

Impact evaluation framework for Lyme Bay fisheries management measures (MMO1414)

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Report prepared for:
Marine Management Organisation

Project funded by:
Marine Management Organisation

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When referencing this publication, please cite as:
MMO (2024). Impact evaluation framework for Lyme Bay fisheries management measures; Final Report. A report produced for the Marine Management Organisation, MMO Project No: 1414, March 2024

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Executive Summary

The problem

Following an increase in the quota of Dover sole (*solea solea*) there was an increase in fishing effort within Lyme Bay, in particular in the International Council for the Exploration of the Seas (ICES) rectangles 30E6 and 30E7. This has caused an increase in competition for space, gear conflict, reduction in volume of sole catches, and the size of fish caught. The MMO consulted with fishers, scientists, policy makers and fisheries managers to capture views on the environmental, social, and economic sustainability of the sole fishery in the Lyme Bay area. The result of this consultation was the introduction of new fisheries management measures by MMO.

Aims and objectives

The aim of this study was to collect baseline data to be used in for future impact evaluations of fisheries management measures. The specific objectives of the study were to:

1. Develop an impact evaluation framework
2. Develop a baseline against the indicators in the framework for future evaluations.

Method

The method was developed in line with HM Treasury Magenta Book guidance and included the co-development (between the contractor and MMO) of a Theory of Change (ToC) to explain how the new management measures are intended to work and benefits and impacts they are intended to bring. An evaluation framework focusing on economic, social and ecological impacts to be delivered by new management measures was developed, drawing on the ToC. The evaluation framework includes a set of evaluation questions with indicators that are used to help identify the information that needs to be collected to answer each question. Baseline data was collected against the indicators and drawing on the baseline data, a counterfactual was described. The counterfactual represents a projection of the baseline to 2028 had new management measures not been implemented.

Baseline and counterfactual

The baseline sought to measure five evaluation questions, which are:

1. **Did the management measures achieve the expected outcomes and impacts?** This uses indicators around number/volume of gear lost; landings (total, by season, by type of fishing gear, and from inside and outside Lyme Bay); number of vessels fishing in Lyme Bay and number of days at sea (under 10m and over 10m); landings per unit effort (LPUE); average size of sole fish landed (inside and outside Lyme Bay); level of sole bycatch; profit; employment; number of incidents of gear conflict; number or frequency of conflicts with fishers and the MMO, or with other fishers; and impacts on the environment including level of fish stock, and damage to benthic habitats.

2. **Did the management measures cause the changes?** Development of the counterfactual is intended to provide a future projection (to 2028) that can be used to assess differences with the management measures introduced and whether changes occurred in the indicators. Taking account of any external factors that may have affected the indicators, it is possible to deduce whether changes can be attributed to the new management measures.
3. **To what extent have different groups been impacted in different ways, how and why?** The baseline data collection considers impacts on a range of different groups (to the extent that data can be disaggregated) including Lyme Bay Fishermen's Community Interest Company (CIC), local fishers (typically under 10m), fishers from outside Lyme Bay (typically over 10m), fishers by gear type, recreational anglers, local producer organisations, and the MMO.
4. **Is the intervention replicable elsewhere?** There is no baseline data for this question as it depends on the findings from the above evaluation questions.
5. **What lessons have we learned about impacts?** As above, this depends on the findings from the earlier evaluation questions.

The baseline itself provides a snapshot of the current conditions, trends and dynamics. For this study, the baseline sets out the current state of play of fishing in Lyme Bay with particular focus on Dover sole. The key findings were that projected trends would be concerning to CIC fishers and under 10m fishers within Lyme Bay. These fishers report challenges in netting for sole due to difficulties in finding safe spaces to shoot nets, with this leading to concerns over gear loss, ghost fishing, and stock impact. This is reported as being due to over 10m vessels increasing their fishing effort and their associated landings, while under 10m fishers are expending more effort for a decreasing amount of sole. This has caused a year on year decrease in profits for CIC fishers since 2017, resulting in their profits in 2021 being lower than they were in 2011.

The counterfactual presents trends in the baseline data to 2028, with a five year extrapolation used (from 2023) to reflect the timeframe over which baseline data were available. The counterfactual provides a narrative of the situation in 2028 and represents a theoretical situation that could exist if management measures had not been implemented. Key issues seen in the baseline data is expected to continue resulting in smaller vessel skippers (under 10m) experiencing increased levels of stress and operating costs due to gear conflict. This, alongside an estimated reduction in days at sea of 62% and reduction in catch per unit effort of 67%, was projected to increase financial difficulties for smaller vessels and more of them would be expected to stop netting for sole by 2028. It is estimated that around 45 under 10m vessels would be fishing for sole in 2028, reduced from 250 under 10m vessels in 2015, and from 132 vessels in 2022. Landings at Axmouth, Beer, Lyme Regis and West Bay continue to decrease as a result. Landings of sole thus become dominated by the over 10m vessels at Brixham and Mevagissey. These changes would result in continued and increasing dissatisfaction with the MMO due to impacts on smaller vessels, which may result in increased lobbying to the MMO for measures to be introduced. This would increase engagement costs to the MMO and degrade relationships.

Conclusions and next steps

The study provides the basis for undertaking an impact evaluation of new management measures. The impacts measured as the management measures become established can be compared against the counterfactual to assess the benefits that have been delivered. This will require on-going data collection against the indicators for each evaluation question and Primary data collection through engagement with fishers will be required, to elicit their views on the measures and how they may be helping to address the pressures observed in the baseline and projected to 2028 in the counterfactual.

1. Introduction

1.1 Policy context

Between 2015 and 2022, the quota for Dover sole (*Solea solea*) in the international Council for the Exploration of the Sea (ICES) area 7.e (Western English Channel) approximately doubled. Area 7.e, as a result of the changes, has witnessed a notable increase in fishing effort, in particular within Lyme Bay (ICES rectangles 30E6 and 30E7, as well as further afield in rectangles 29E6 and 29E7).

The increase in fishing effort, particularly relating to the fishing of Dover sole, has resulted in increased competition for space, gear conflicts, a reduction in the volume of sole catches and in the size of fish caught. In response, the MMO launched a consultation with fishers, scientists, policy makers and fisheries managers to collect stakeholder views on the environmental, social and economic sustainability of the sole fishery of the area. This included a workshop, held in June 2023, with representatives from the fishing industry to discuss the key issues and to identify ways to manage the sole fishery and reduce gear conflict.

This consultation led the MMO to announce new fisheries management measures in September 2023, with their coming into force in November 2023, with further potential measures to be implemented in the future. The measures implemented in November 2023 are as follows:

- marking of passive fishing gear (via licence condition) in rectangles 30E6 and 30E7 that requires the east and west ends of the gear to be differentiated to easily determine the direction of travel of the gear
- a monthly 200kg catch limit for sole when using scallop dredges in 7.e for non-sector vessels (set via licence condition)
- introduction of a form for anonymous reporting of lost/found gear
- encouraging use of tools such as WhatsApp to inform other fishers about location of gear, to reduce conflict.

Further additional actions the MMO noted they would undertake included:

- facilitating a meeting for representative industry members to discuss the potential for separating areas of Lyme Bay (ICES Rectangles 30E6 and 30E7) out to 12 nautical miles (nm), for separate use of gear temporally or spatially
- hold discussions with producer organisations on incentivising reduction in sole bycatch when fishing with dredges
- continuously analyse fish landings data and regularly review bycatch limits, to allow the MMO to make changes as and when necessary
- hold further consultations on existing and potential future management measures
- explore evidence gathering for supported measures with limited data.

1.2 Problem definition

The MMO sought to understand the impacts and trade-offs of the new management interventions to ensure management can be adaptive in the future and wider lessons can be taken forward in other comparable Fisheries. As part of the MMO's efforts to understand the impacts of the newly implemented management measures, this study was commissioned, to develop an impact evaluation framework and to collate the baseline data that future evaluations of the management measures can assess against. This will allow future analysis of the trade-offs in decision making, and allow the future impacts (positive and negative, intended and unintended) to be tracked. The MMO has also separately conducted a process evaluation to capture lessons learned from the development of the Lyme Bay fisheries management measures, to support the MMO's future approach to collaborative fisheries management (see MMO1406 Final Report, forthcoming).

1.3 Aims and objectives of the study

The MMO commissioned RPA with the aim of developing a dataset that can inform future evaluations. The objectives were to engage with the MMO to develop a theory of change (ToC), impact evaluation framework, assess data availability for the baseline and create the baseline, and develop a counterfactual that future evaluations can test against. Future evaluations will then be able to use this framework and baseline to identify the impacts and trade-offs resulting from the new management interventions, so that social, economic and ecological impacts are understood and used to support future adaptive management and to identify any wider lessons learned that can be fed through to other comparable fisheries.

1.4 Structure of this report

This report sets out a description of the different parts of an impact evaluation (Section 2), provides a ToC (Section 3) and Evaluation Framework (Section 4). It describes what a ToC is, how it was designed, and how it helps to inform the evaluation framework. The report also provides the impact evaluation framework, setting out evaluation questions, sub-questions and data indicators that could be used to frame future impact evaluations. Section 5 provides the baseline of fishing in Lyme Bay, whilst Section 6 presents the counterfactual

2. Overview of the approach to the impact evaluation

2.1 Overview of impact evaluation

Impact evaluations focus on the changes caused by an intervention; measurable achievements that "either are themselves, or contribute to, the objectives of the intervention (HM Treasury, 2020)". These changes can be positive and negative, and intended and unintended. In the context of Lyme Bay, the intervention of interest is the new management measures, and the intended change is to deliver a more sustainable fishery in Lyme Bay, in social, economic and ecological terms.

There are a number of core parts of an impact evaluation, which are listed below:

- theory of change
- evaluation framework
- data collection (including engagement) and assessment of data gaps
- baseline assessment and counterfactual development
- implementation of the evaluation
- reporting.

This study's focus was to develop an impact evaluation framework and to undertake baseline data collection - it was ***not*** to undertake an impact evaluation against the associated evaluation questions.

2.2 Theories of Change

A ToC serves as a structured and evidence-based framework which outlines the rationale and expected outcomes of the implementation of an intervention, policy, or policy change. In essence, a ToC is focused on mapping out the 'missing middle' between what an intervention does, and how it leads to said intervention's goals being achieved (HM Treasury, 2020).

2.3 Evaluation Framework

An evaluation framework delineates a number of evaluation questions that a study seeks to answer, along with sub-questions that support the overarching questions, and a number of data indicators that will inform answers to the evaluation questions. These indicators guide the data needs for the evaluation. A framework helps to keep an evaluation focused and systematic, and keeps it aligned with the objectives of the intervention.

The evaluation questions are generally informed by the following:

- the stated purpose of the evaluation
- the questions identified by the Theory of Change (i.e. What are the areas of uncertainty, and what are the weaknesses in the evidence base?)
- the questions that stakeholders (i.e. the MMO) want answered

- whether the intervention can/will be adapted dependent on evidence and evaluation
- how the findings are expected to be used, considering short-term needs (such as benefits realisation) and long-term needs (such as answering, ‘what works?’ and ‘why?’ questions to inform future policy development).

2.4 Data collection (including engagement) and assessment of data gaps

This stage of an impact evaluation covers data collection activities, such as literature reviews and stakeholder engagement. Data collection is undertaken to provide an evidence base for the evaluation, and data gaps are identified where they arise.

This study received data directly from the MMO and other government bodies, such as Cefas and Seafish, which was systematically reviewed for evidence which could inform the baseline data assessment. Stakeholder engagement was beyond the scope of the study and did not factor into the development of the baseline. It is anticipated that stakeholder engagement would form part of a future evaluation.

2.5 Baseline assessment and counterfactual development

A baseline in policy evaluation provides a benchmark against which future changes and interventions can be measured. Establishing the baseline involves collecting data on key indicators before the intervention begins. Counterfactual development is essential for assessing the intervention's impact by comparing outcomes with what would have happened in the absence of the intervention.

2.6 Reporting

Reporting findings accurately and transparently is essential for communicating the evaluation results to clients and stakeholders and informing future decision-making. Reporting helps to provide key findings, conclusions and recommendations for future actions.

For this study, the report covered the baseline state-of-play in Lyme Bay prior to the implementation of the management measures, and on the counterfactual scenario (what would happen in Lyme Bay in the future if the management measures had not been introduced). This will help potential future impact evaluations assess whether the management measures have had the desired (or other unanticipated) effects. The conclusions section discusses recommendations on how to apply the framework and baseline in future evaluations, and notes limitations of the counterfactual.

3. Theory of Change for the newly introduced management measures for the Lyme Bay sole fishery

3.1 Overview

The ToC for Lyme Bay was developed to understand to understand how the new management measures for Lyme Bay will impact the area and the people within it, in economic, environmental and social terms. It identifies key inputs, activities, outputs, outcomes, impacts, and stakeholders for future evaluations. It also notes assumptions and external influences. The theory is presented in the form of a diagram showing the connections and causal pathways between the interventions and impacts. The ToC therefore demonstrates what should happen for the vision to be achieved, where this vision is that:

The newly introduced management measures will help to maintain and improve the livelihoods of fishers (both those based within Lyme Bay and nomadic fishers who come to the area to fish), will result in more sustainable fishing activity and reduced gear loss, and will help to create a stronger and more resilient local economy and community.

3.2 The aim of the ToC

The ToC aimed to set out all the steps that are expected to be involved in the process to achieve the desired impacts, together with the assumptions that have been made, and consideration of the wider contextual factors and external influencers. The ToC is, in short, developed as a description of how and why the objectives of the new management measures are expected to be achieved for whom, and under what circumstances.

3.3 The terms used in a ToC

The ToC is designed to show the causal pathways, i.e., what needs to happen for the vision to be delivered. The causal pathways required to deliver the vision are shown by the linkages (arrows) between impacts, outcomes, outputs, activities, and inputs, as well as assumptions and external influences. Each of these terms is defined below, with these definitions following those in the Magenta Book (HM Treasury, 2020), with the slight adaptation of having 'Activities' as a separate term (instead of being considered under 'Inputs') and the inclusion of the 'Vision' definition:

- Vision: the overall goal that is the intention of the intervention (the management measures).
- Impacts: the longer-term changes that ensure the vision is achieved often identified as the benefits of the intervention.
- Outcomes: the early or medium-term changes that arise from the outputs and which enable the longer-term impacts to be realised.

- Outputs: the things that the intervention is delivering or producing. These are often easily countable things such as the number of gear lost.
- Activities: the planned actions undertaken to deliver the intervention, often including services, methods, collaboration, and research.
- Inputs: the resources committed to the intervention including time, people, money, and existing knowledge.
- Assumptions: the causal connections, events and conditions that need to be realised for the intervention to work.
- External influences: covering risks, factors and events outside of the control of the body delivering the intervention that can have an impact on its success.

This way, the ToC shows what needs to happen for the vision to be achieved. If each step is successfully implemented, then the next level up shows what should be achieved, working up from the inputs at the bottom to the vision at the top. Inputs are required for activities to take place. The activities then deliver the outputs, delivery of the outputs enables the outcomes to be realised which over time will lead to the impacts. Achieving the impacts results in the vision being accomplished.

3.4 Development of the ToC

RPA developed an initial draft ToC was developed by RPA as a nominal starting point for comment by the MMO and revision. This initial draft ToC was guided by analysing the six documents received from the MMO at the beginning of the study, which are noted in Table 1 below. The draft ToC was then developed further through an internal team workshop and followed the guidance in the HM Treasury Magenta Book (HM Treasury, 2020). A workshop was then held with the MMO to discuss the draft ToC. Comments from this workshop were collated, and a finalised version of the ToC was then produced.

Table 1: Data reviewed to inform the draft ToC.

Source title
MMO (2023a). Management measures for Lyme Bay Sole Fishery, Decision Document. Available online at: https://assets.publishing.service.gov.uk/media/6500212e57e884000de128db/MMO_Management_measures_for_Lyme_Bay_sole_fishery_-_Decision_document.pdf
MMO (2023b). Management measures for Lyme Bay Sole Fishery – Summary. Available online at: https://assets.publishing.service.gov.uk/media/650021661886eb001397717d/MMO_Management_measures_for_Lyme_Bay_sole_fishery_-_summary.pdf
MMO (2023c). Management measures for Lyme Bay Sole Fishery – Consultation Results. Available online at: https://assets.publishing.service.gov.uk/media/6500218657e8840013e128f6/MMO_Management_measures_for_Lyme_Bay_sole_fishery_-Consultation_results.pdf
MMO (2023d). An evidence review of social, economic and environmental impacts in the Lyme Bay Dover Sole Fishery. Available online at:

https://assets.publishing.service.gov.uk/media/65005d9d57278000142519d4/MMO1337_Lyme_Bay_Dover_Sole_Fishery_Evidence_Summary.pdf
MMO (2023e). Lyme Bay sole fishery consultation. - Available online at: https://www.gov.uk/government/news/lyme-bay-sole-fishery-consultation, accessed on 20 February 2024.
Cefas (2023). Common sole (Solea solea) in Lyme Bay. Available online at: https://consult.defra.gov.uk/fisheries-management-team/formal-consultation-lyme-bay-potential-management/supporting_documents/Cefas%20report%20%20Common%20sole%20Solea%20solea%20in%20Lyme%20bay.pdf

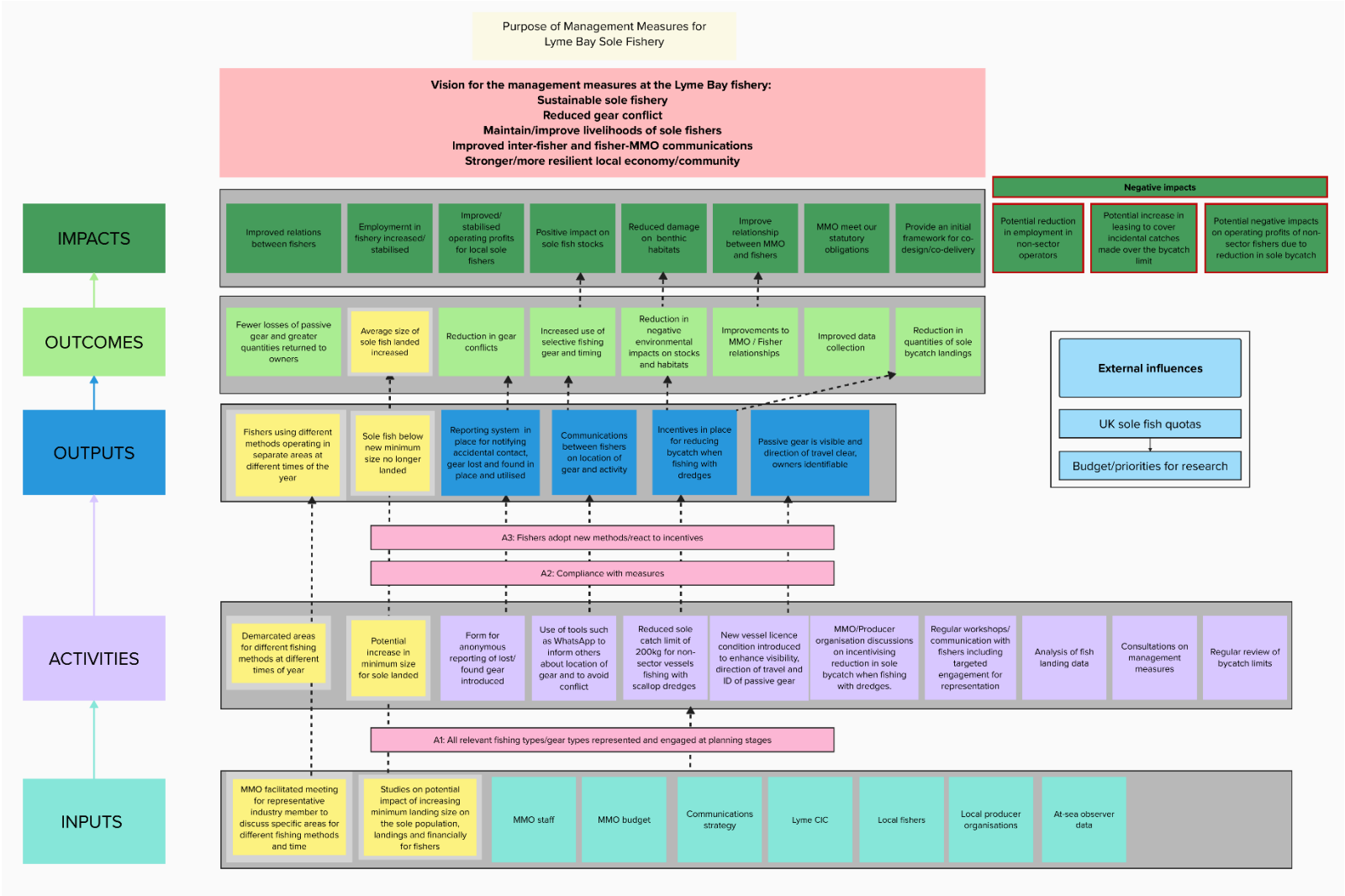
3.5 The ToC diagram

The ToC diagram is presented in Figure 1, which can be found overleaf[1]. The parts of the ToC that are shaded yellow relate to two potential future management measures (demarcating certain areas for use by certain fishers at certain parts of the year and increasing the minimum size of sole landed) that have not yet been implemented.

The sections below, from Section 3.6 onwards, provide the detail of each level of the ToC.

[1] The ToC is best viewed digitally owing to the large image size and amount of information contained within.

Figure 1: The ToC for Lyme Bay (with potential future measures in yellow).



3.6 Inputs

The key inputs to the ToC are the MMO's budget and staff, and the input and buy-in of other local groups such as the Lyme Bay Fishermen's Community Interest Company, local producer organisations and local commercial and recreational fishers. Without these, there would be no scope to design and implement new management measures, and no groups willing to feedback on said measures. The MMO's communication strategy is also considered an input, as that dictates how and with what regularity fishers will be consulted on potential changes and impacts of in-place measures.

Two inputs noted in the ToC, but which are yet to be realised and implemented, are an MMO-facilitated meeting with representative industry members to discuss the potential for designating specific areas spatially and/or temporally for different fishing methods (with a future potential management measure for this cascading up the ToC following this input), and studies on the potential impacts of increasing minimum landing size on the sole populations, on landings, and on the financial impacts for fishers. This has also yet to be conducted, but also cascades further up the ToC with a potential future management measure.

3.7 Activities

The management measures themselves are listed in the ToC as activities and are the key activities that will help to achieve the vision. The measures are below:

- marking of passive fishing gear (via licence condition) in rectangles 30E6 and 30E7 that requires the east and west ends of the gear to be differentiated to easily determine the direction of travel of the gear
- a monthly 200kg catch limit for sole when using scallop dredges in 7.e for non-sector vessels (set via licence condition)
- introduction of a form for anonymous reporting of lost/found gear
- encouraging use of tools such as WhatsApp to inform other fishers about location of gear, to reduce conflict.

Alongside these, there is also ongoing analysis of fish landing data, regular communications, consultations and workshops with fishers, including on management measures, and regular reviews of bycatch limits, all of which have in mind the goal of helping to ensure continuous appraisal of whether the management measures are generating the necessary outputs and outcomes.

3.8 Outputs

As a result of the management measures, the following outputs are expected: passive gear is visible, owners of gear are identifiable, there is a robust and functioning reporting system in place for notifying authorities of accidental contact or gear loss, and the gear lost and found system is working as intended. Fishers will be encouraged to communicate with one another on the location of gear and what

activity they are undertaking, and there will be incentives in place for reducing bycatch when fishing with dredges. Fishers will (if the measure is implemented in future) use different methods to operate in separate areas at different times of the year, and sole fish below a minimum size will not be landed (again, if the measure is implemented). This will all contribute to a healthier and more sustainable fishery.

3.9 Outcomes

If the activities (the management measures) are working as intended and the outputs are delivered then the Lyme Bay fishery will be a more sustainable area, in social, economic and ecological terms. Greater co-operation between fishers will ensure there will be fewer losses of passive gear, with owners receiving a greater quantity of any lost gear back, in tandem with reductions in gear conflicts and an increased use of selective fishing gear and timing. It is envisaged there will be improved MMO/fisher relationships and data collection, and a reduction in negative environmental impacts on stocks and habitats due to more ecological fishing practices. These factors will, in turn, enable the MMO to continue to meet its statutory duties, specifically those relating to fishing vessel licensing, fisheries management, monitoring and enforcement, and marine planning.

3.10 Impacts

In the long term, fishers will have improved relations with one another (through sharing of gear locations) and with the MMO. Employment in the Lyme Bay fishery and wider supply chain will have stabilised or increased. For instance, if fish stocks increase to their maximum sustainable yields, this will result in higher levels of fish landed over time as the stocks grow, providing direct jobs in the fishing and processing sector. It will also help to support indirect jobs in the wider economy, related to sectors such as food, retail and service. The Lyme Bay fishery will be a positive example of how the MMO, and fishers (both local and nomadic) can work together to ensure access to a sustainable, long-term fishery, with Lyme Bay acting as an example for further co-design and co-delivery of similar actions elsewhere, as required.

There are risks of negative impacts that could be ascribed to the management measures – a potential reduction in employment in non-sector fishing operators, a potential increase in leasing to cover incidental catches made over the bycatch limit, and a potential negative impact on the profits of non-sector fishers due to reductions in sole bycatch. These could all potentially apply to non-sector vessels fishing with dredges for scallops. These will have to be monitored accordingly to prevent the new management measures having negative effects.

3.11 Assumptions

There are three key assumptions within the ToC; the first is linked to the activities and assumes that throughout the planning stages (of the future measures) that all relevant fishing and gear types are engaged and represented. The buy-in of all

fishers and industry representatives is essential to generate meaningful discussion or create adequate change, however necessary that change may be. The ToC also assumes that there will be compliance with rules-based measures (i.e. sole catch limits for vessels fishing with dredges) and that fishers will adopt the new methods and react positively to incentives.

3.12 External influences

Two key external influences outside of the MMO's control that have the potential to affect the management measures are UK sole fish quotas and national budgets and priorities for research. If sole fish quotas are increased, the currently experienced problems could be magnified to such an extent that the measures are no longer adequate, whilst if they are reduced, the measures might no longer be required. Meanwhile, if central government (or even the leadership of the MMO) decide to focus research on other priorities, then research and studies on aspects such as the potential impact of increasing the minimum landing size on the sole population, on landings and on livelihoods may not be able to be commissioned by the MMO, which in turn could lead to the future management measures not being introduced.

4. Evaluation Framework

4.1 Overview

This section presents the evaluation framework developed to support future evaluation of the impacts of the new management measures in Lyme Bay. It is designed to identify the impact and trade-offs resulting from the management interventions. The ToC in Section 3 above provides the foundation for the evaluation, and alongside the Magenta Book, was used as the starting point for developing the evaluation questions.

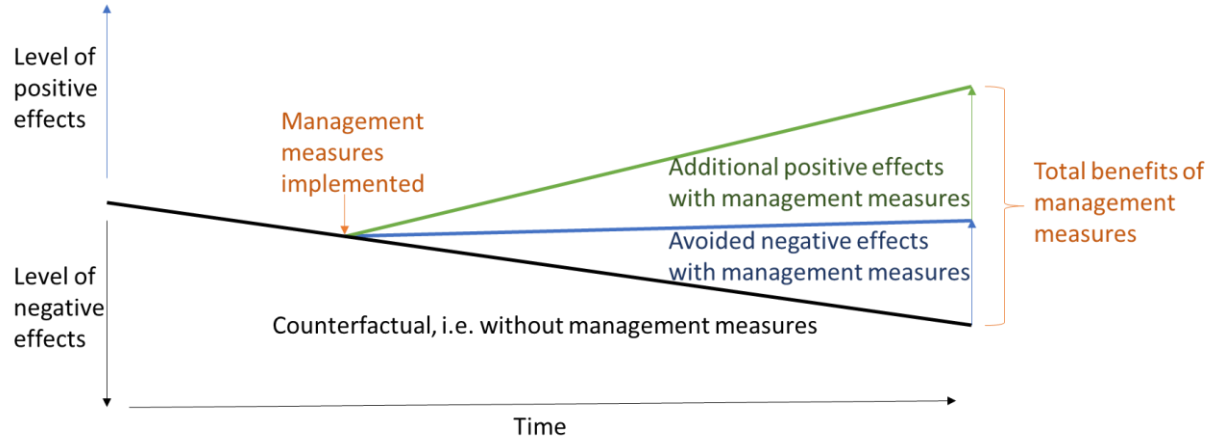
The evaluation questions set the scope for the evaluation and cover the changes caused by the intervention. These changes include observable, measurable achievements which either meet themselves, or contribute to, the objectives of the intervention. In this study, the impact evaluation questions focus on whether the management measures achieved the desired outcomes and impacts, and the extent to which these can be attributed to the measures versus other factors. Additionally, the questions also asked what can be learned to inform future evaluations by the MMO, and how different stakeholders have been impacted.

4.2 Approach

The proposal set out four objectives for this study to answer. These objectives, alongside the ToC, were used as a springboard to develop an initial set of questions for the impact evaluation. These draft evaluation questions were reviewed and refined internally within RPA. The MMO then provided feedback which was incorporated into the final evaluation questions. Where appropriate, sub-questions have been added to allow for deeper research and analysis, and to ensure the high-level questions do not become too numerous and burdensome to the evaluation.

Assessing the effects of the management measures against the counterfactual
In developing the evaluation framework, RPA identified that the counterfactual (i.e. the projected future situation without any management measures) was likely to result, over time, in an increasingly negative situation. Introduction of the management measures can both reduce these negative trends, and could lead to further positive effects. The evaluation framework approach was therefore designed to capture both the reduction in negative outcomes and impacts and the potential for additional positive effects. Figure 2 illustrates this approach using a simple graphic. Baseline data was used to inform the counterfactual and how it is expected to develop over time.

Figure 2: Illustration of the evaluation approach and counterfactual



Data sources and data collection plan

Data sources and indicators were identified that would provide satisfactory answers to the evaluation questions. The focus of this study was on secondary data, provided by the MMO. This included identification of additional data needed to fill baseline data gaps, which was provided by the MMO.

The set of evaluation questions proposed for the framework include some that cannot be answered (with respect to the baseline) without data collection from engagement with fishers and industry groups, which would need to be conducted in a future evaluation.

Evaluation framework

The evaluation questions (EQs) developed to guide a future impact evaluation are as follows below:

1. EQ1: Did the management measures achieve the expected outcomes and impacts?
    2. What was the extent of the problems that the management measures were introduced to address?
    3. To what extent have the management measures addressed these issues (expectation that management measures reduce negative results from baseline and provide additional positive benefits)
    4. Have the management measures resulted in any unintended outcomes? (concerns over potential issues with management measures)
5. EQ2: Did the management measures cause the difference?
    6. To what extent can the avoided negative effects/positive changes be attributed to the management measures? (are the management measures expected to reduce the impacts of the baseline)
    7. How confident can we be that the management measures resulted in the avoided negative effects/positive changes? (strength of evidence base, triangulation)
    8. How significant are external factors in causing baseline issues, in avoiding negative baseline issues and/or delivering positive effects? (fish quotas, budgets/priorities for research, weather)

9. Would some changes have happened to reduce baseline issues over time if MMO had not intervened? (would that delay outcomes and impacts, reduced magnitude of negative issues/positive effects)
10. EQ3: To what extent have different groups been impacted in different ways, how and why?
    11. MMO
    12. Lyme Bay Community Interest Group (Lyme Bay CIC)
    13. Local fishers (broken down by type of fisher, vessel size?)
    14. Fishers from outside Lyme Bay
    15. Gear type (fixed nets, otter trawls, beam trawls, scallop dredges)
    16. Recreational anglers
    17. Local producer organisations
18. EQ4: Is the intervention replicable elsewhere?
    19. What have we learned from application of the management measures in terms of how transferable they are? (what do we ***think/expect*** we will learn?)
20. EQ5: What lessons have we learned about impact?
21. What learning is there on potential for avoiding negative issues? (early intervention, quick wins)
22. What learning is there on potential for delivering additional positive effects? (reduction in gear loss etc)

Table 2: Evaluation Framework comprising evaluation questions, sub-questions, associated indicators and data availability.Table 2 provides the proposed evaluation framework, which sets out evaluation questions, sub-questions, associated indicators and data availability.

Indicators highlighted in red are those for which the study team requested data from the MMO for. Those indicators highlighted in orange are those that relate to the post-implementation period for the management measures, for which data is not currently available for (i.e. since they relate to future change) and will need to be collected for a future evaluation. Interrupted time series analysis was used to model and develop the counterfactual and map out the intended effects of the management measures, to generate estimates of the effects of said measures. Those indicators highlighted in yellow indicate where it is assumed that data can be gathered through limited engagement with the MMO and the Lyme Bay CIC. Indicators where data are available are shown in white. Full references for the data sources can be found in Section 8.

Table 2: Evaluation Framework comprising evaluation questions, sub-questions, associated indicators and data availability.

Evaluation Question	Sub-question	Indicator	Data availability	Data source
EQ1: Did the management measures achieve the expected outcomes and impacts?	• What was the extent of the problems that the management measures were introduced to address?	**Outcomes**		
		• Number of gear losses or volume of gear lost	**N**	**No data on number of gear losses or volume**
		• Total landings (tonnes)	**Y**	Cefas (2023) MMO (2023c) MMO (2023d) MMO (2023f)
		• Landings by season (tonnes)	**Y**	Cefas (2023) MMO (2023f)
		• Landings by type of fishing gear	**Y**	Cefas (2023) MMO (2023a) MMO (2023c); MMO (2023f)
		• Total landings from inside Lyme Bay	**Y**	Cefas (2023) MMO (2023c) MMO (2023f)
		• Total landings from outside Lyme Bay	**Y**	Cefas (2023) MMO (2023f)
		• Number of vessels fishing in Lyme Bay	**Y**	Cefas (2023) MMO (2023c) MMO (2023d) Seafish (2023)
		• Number of days at sea	**Y**	Cefas (2023) MMO (2023f)

Evaluation Question	Sub-question	Indicator	Data availability	Data source
		• Landings per unit effort (LPUE)	**Y**	Cefas (2023) MMO (2023a) MMO (2023c)
		• Average size of sole fish landed (inside Lyme Bay)	**Y**	Cefas (2023) MMO (2023a) MMO (2023c) MMO (2023f)
		• Average size of sole fish landed (outside Lyme Bay)	**Y**	Cefas (2023) MMO (2023a) MMO (2023c) MMO (2023f)
		• Number of incidents of gear conflict	**Y**	MMO (2023a) MMO (2023c) MMO (2023d)
		• Reported negative environmental impacts on stocks and habitats (or measures demonstrating reduction in environmental/ ecosystem extent or condition)	**Y**	MMO (2023a) MMO (2023c) MMO (2023d)
		• Number or frequency of negative issues or conflicts in MMO/fisher relationships	**N**	**Data gap as data on this is currently not recorded**
		• Level of sole bycatch landings	**Y (limited)**	MMO (2023f)

Evaluation Question	Sub-question	Indicator	Data availability	Data source
				Further data needed to enable question to be fully answered
		Impacts		
		• Number or frequency of negative issues or conflicts in fisher to fisher relations	**Y**	MMO (2023c)
		• Profit	**Y**	MMO (2023d)
		• Employment	**N**	**Data from Seafish on crew may be available; data on processing and other onshore employment not available**
		• Level of fish stocks	**N**	**Data from ICES may be able to fill all or some of this gap**
		• Number of incidents of damage to benthic habitats or record of monitoring of condition of benthic habitats	**N**	**Data on infringements in the MPA may be available, but no data on impacts outside the MPA**
		• Number of statutory requirements not met	**Y**	MMO (2023a)

Evaluation Question	Sub-question	Indicator	Data availability	Data source
	• To what extent have the management measures addressed these issues (***expectation*** that management measure reduce negative results from baseline and provide additional positive benefits)	**Outcomes**		
		Reduction in negatives:		
		• Change in number of gear losses of volume of gear lost loss of gear	**N**	No data as measures not in place for long enough for data to be generated; to be covered in future impact evaluation
		○ Change in total landings	**N**	No data as measures not in place for long enough for data to be generated; to be covered in future impact evaluation
		○ Change in landings by season	**N**	No data as measures not in place for long enough for data to be generated; to be covered in future impact evaluation
		○ Change in landings by gear type	**Y**	MMO (2023a)
		○ Change in landings from inside Lyme Bay	**N**	No data as measures not in place for long enough for data to be generated; to be

Evaluation Question	Sub-question	Indicator	Data availability	Data source
				covered in future impact evaluation
		○ Change in landings from outside Lyme Bay	**N**	No data as measures not in place for long enough for data to be generated; to be covered in future impact evaluation
		○ Change in number of vessels fishing in Lyme Bay	**N**	No data as measures not in place for long enough for data to be generated; to be covered in future impact evaluation
		○ Change in number of days at sea	**N**	No data as measures not in place for long enough for data to be generated; to be covered in future impact evaluation
		○ Change in landings per unit effort (LPUE)	**Y**	MMO (2023a)
		○ Change in average size of sole fish landed from inside Lyme Bay (if corresponding	**Y**	MMO (2023a)

Evaluation Question	Sub-question	Indicator	Data availability	Data source
		measure implemented)		
		○ Change in average size of sole fish landed from outside Lyme Bay (if corresponding measure implemented)	**Y**	MMO (2023a)
		○ Change in number of incidents of gear conflict	**Y**	MMO (2023a)
		○ Change in landings per unit effort (LPUE)	**N**	No data as measures not in place for long enough for data to be generated; to be covered in future impact evaluation
		○ Change in reported negative environmental impacts on stocks and habitats (or measures demonstrating reduction in environmental/	**N**	No data as measures not in place for long enough for data to be generated; to be covered in future impact evaluation

Evaluation Question	Sub-question	Indicator	Data availability	Data source
		ecosystem extent or condition)		
		○ Change in number or frequency of negative issues or conflicts in MMO/fisher relationships	**N**	No data as measures not in place for long enough for data to be generated; to be covered in future impact evaluation
		○ Change in level of sole bycatch landings	**N**	No data as measures not in place for long enough for data to be generated; to be covered in future impact evaluation
		Additional positives:		
		• Change in number of frequency of negative issues or conflicts in fisher to fisher relations	**N**	No data as measures not in place for long enough for data to be generated; to be covered in future impact evaluation
		• Amount of gear returned to owners	**N**	No data as measures not in place for long enough for data to be generated; to be covered in future impact evaluation

Evaluation Question	Sub-question	Indicator	Data availability	Data source
		• Increase in use of selective fishing gear and timing	**N**	No data as measures not in place for long enough for data to be generated; to be covered in future impact evaluation
		Impacts		
		Reduction in negatives:		
		• Change in number of frequency of negative issues or conflicts in fisher to fisher relations	**Y**	MMO (2023d)
		○ Avoided reduction in profit	**N**	No data as measures not in place for long enough for data to be generated; to be covered in future impact evaluation
		○ Avoided reduction in employment	**N**	No data as measures not in place for long enough for data to be generated; to be covered in future impact evaluation
		○ Maintained fish stocks	**N**	No data as measures not in place for long enough for

Evaluation Question	Sub-question	Indicator	Data availability	Data source
				data to be generated; to be covered in future impact evaluation
		• Reduction in number of incidents of damage to benthic habitats or record of monitoring of condition of benthic habitats	**N**	No data as measures not in place for long enough for data to be generated; to be covered in future impact evaluation
		○ MMO avoids not meeting statutory requirements	**N**	No data as measures not in place for long enough for data to be generated; to be covered in future impact evaluation
		Additional positives:		
		• Increase in Profit	**N**	No data as measures not in place for long enough for data to be generated; to be covered in future impact evaluation
		• Increase in levels of employment	**N**	No data as measures not in place for long enough for data to be generated; to be

Evaluation Question	Sub-question	Indicator	Data availability	Data source
				covered in future impact evaluation
		• Increase in level of fish stocks	**N**	No data as measures not in place for long enough for data to be generated; to be covered in future impact evaluation
	• Have the management measures resulted in any unintended outcomes? (***concerns*** over potential issues with management measures)	• Factors that may hinder the uptake of the management measures	**Y**	MMO (2023a) MMO (2023c)
		• Factors that may reduce the scale of the intended outcomes/impacts	**N**	No data as measures not in place for long enough for data to be generated; to be covered in future impact evaluation
EQ2: Did the management measures cause the difference?	• To what extent can the avoided negative effects/positive changes be attributed to the management measures? (are the management measures ***expected***	• Ratings of MMO/Lyme Bay CIC on the extent to which each measure has contributed/is expected to contribute to the relevant impact, and identification of reasons	**N**	Data would be gathered through engagement in any future impact evaluation

Evaluation Question	Sub-question	Indicator	Data availability	Data source
	to reduce the impacts of the baseline)			
	• How confident can we be that the management measures resulted in the avoided negative effects/positive changes? (strength of evidence base, triangulation)	• How confident are we that the baseline caused the issues?	**Y (limited)**	MMO (2023g) MMO (2023g)
		• How confident are we that the negative impacts are avoided with the management measures?	**Y (limited)**	MMO (2023g)
		• How confident are we that the additional positive are delivered by the management measures?	**Y (limited)**	MMO (2023g)
	• How significant are external factors in causing baseline issues, in avoiding negative baseline issues and/or delivering positive effects? (fish quotas,	• Effect of external factors (weather, resources to monitor activities, moving fish stocks) on fishing activities and effort	**N**	No data as measures not in place for long enough for data to be generated; to be covered in future impact evaluation

Evaluation Question	Sub-question	Indicator	Data availability	Data source
	budgets/priorities for research, weather)			
	• Would some changes have happened to reduce baseline issues over time if MMO had not intervened? (would that delay outcomes and impacts, reduced magnitude of negative issues/positive effects)	Potential for fishers to self-regulate over time or to work together to address issues such that future intervention may not have been required (or different interventions may have been required)	**Y**	MMO (2023a) MMO (2023c): Data would be gathered through engagement in any future impact evaluation
EQ3: To what extent have different groups been impacted in different ways, how and why?	MMO	Consideration of the indicators in EQ1 applied to the different groups to assess variability of effects under baseline (and then variability of outcomes and impacts they may see)	**N**	Data would be gathered through engagement in any future impact evaluation
	Lyme CIC		**Y (limited)**	MMO (2023d) Data would be gathered through engagement in any future impact evaluation

Evaluation Question	Sub-question	Indicator	Data availability	Data source
	Local fishers (broken down by type of fisher, vessel size?)		**Y**	Cefas (2023) MMO (2023c) Data would be gathered through engagement in any future impact evaluation
	Fishers from outside Lyme Bay		**N**	Data would be gathered through engagement in any future impact evaluation
	Gear type (fixed nets, otter trawls, beam trawls, scallop dredges)		**Y**	Cefas (2023)
	Recreational anglers		**Y**	MMO (2023c) MMO (2023d) MMO (2023g) Data would be gathered through engagement in any future impact evaluation
	Local producer organisations		**N**	Data would be gathered through engagement in any future impact evaluation

Evaluation Question	Sub-question	Indicator	Data availability	Data source
EQ4: Is the intervention replicable elsewhere?	What have we learned from application of the management measures in terms of how transferable they are? (what do we ***think/expect*** we will learn?)	Discussions with the MMO and CIC: • The extent to which the MMO and CIC view the results of the introduced measures as being replicable elsewhere, with reasons provided	**N**	Data would be gathered through engagement in any future impact evaluation
		Discussions with the MMO and CIC: • Measures identified as unlikely to be replicable elsewhere, with reasons	**N**	Data would be gathered through engagement in any future impact evaluation
EQ5: What lessons have we learned about impact?	What learning is there on potential for avoiding negative issues? (early intervention, quick wins)	Answers to be drawn from data used to answer other questions and discussions with the MMO and Lyme Bay CIC	**Y (limited)**	MMO (2023g) Data would be gathered through engagement in any future impact evaluation
	What learning is there on potential for delivering additional positive effects? (reduction in gear loss etc)	Answers to be drawn from data used to answer other questions and discussions with the MMO and Lyme Bay CIC	**Y (limited)**	MMO (2023g) Data would be gathered through engagement in any future impact evaluation

5. Baseline

A baseline provides a snapshot of the current conditions, trends and dynamics relating to issues that a policy would seek to address. In this case, the baseline seeks to establish the current state-of-play of fishing in Lyme Bay, with a particular focus on the fishing of Dover sole (Solea solea), and will provide a reference point against which the future impacts of a policy intervention can be assessed (alongside the counterfactual).

The baseline in this report is noted as being the state-of-play as of the 1st January 2024. This date was chosen to enable full-year reporting for 2023 to factor into the baseline. The measures were introduced in late November 2023, and would not have had enough of an impact in December 2023 to justify removing the entire year of 2023 data from the baseline dataset. Furthermore, numerous data provided to the study team used annualised reporting, and so breaking this down to a month-to-month basis would not have been possible.

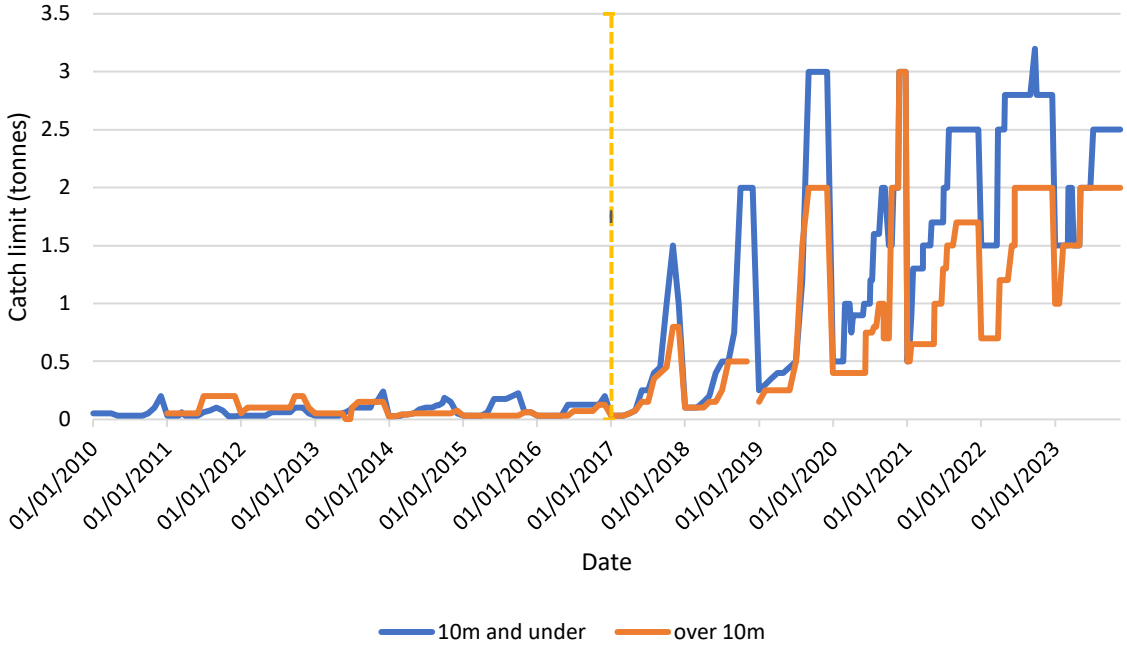
Where possible, data provided in this section is quantitative to provide objective measurements. Where this is not possible, qualitative data from the MMO has been used. The baseline assesses data relevant to EQ1 (did the management measures achieve the expected outcomes and impacts?) by setting out the problem definition, and in particular, sub-question 1.1 (What was the extent of the problems that the management measures were introduced to address?). The following baseline data is provided in this section:

- Indicator: Total landings (tonnes, all species)
- Indicator: Total landings (tonnes, sole)
- Indicator: Landings of sole by season
- Indicator: Total landings (sole in/outside Lyme Bay)
- Indicator: Landings of sole by type of fishing gear
- Indicator: Number of vessels fishing in Lyme Bay
- Indicator: Number of days at sea
- Indicator: Landings per unit effort (LPUE)
- Indicator: Total landings (value)
- Indicator: Profit
- Indicator: Average size of sole fish landed (in/outside Lyme Bay)
- Indicator: Gear loss and conflict
- Indicator: Reported negative environmental impacts
- Indicator: Negative issues in MMO-fisher relationships
- Indicator: Number of frequency of negative issues or conflicts in fisher to fisher relations.

As previously noted in this report, between 2015 and 2022, quota limits in ICES area 7.e for Dover sole approximately doubled. As a result, ICES rectangles 30E6 and 30E7 (Lyme Bay) saw a sharp increase in fishing effort, which in turn had associated negative impacts, such as increased competition for space, gear conflicts, and a reduction in the size of sole landed.

Figure 3 below provides an overview of how catch limits for the over and under-10m non-sector pools have risen since 2015. The 1st of January 2017 is when the sharp upturn in catch limits occurred (indicated by the yellow line in the figure) and when, more widely, fishing effort sharply increased in Lyme Bay. The measures were introduced at the end of this period, so they are not covered by this graph.

Figure 3: Increases in <10 and >10M non-sector pool catch limits – with yellow line indicating when uptake in catch limits announced (MMO, 2024a; MMO, 2024b).

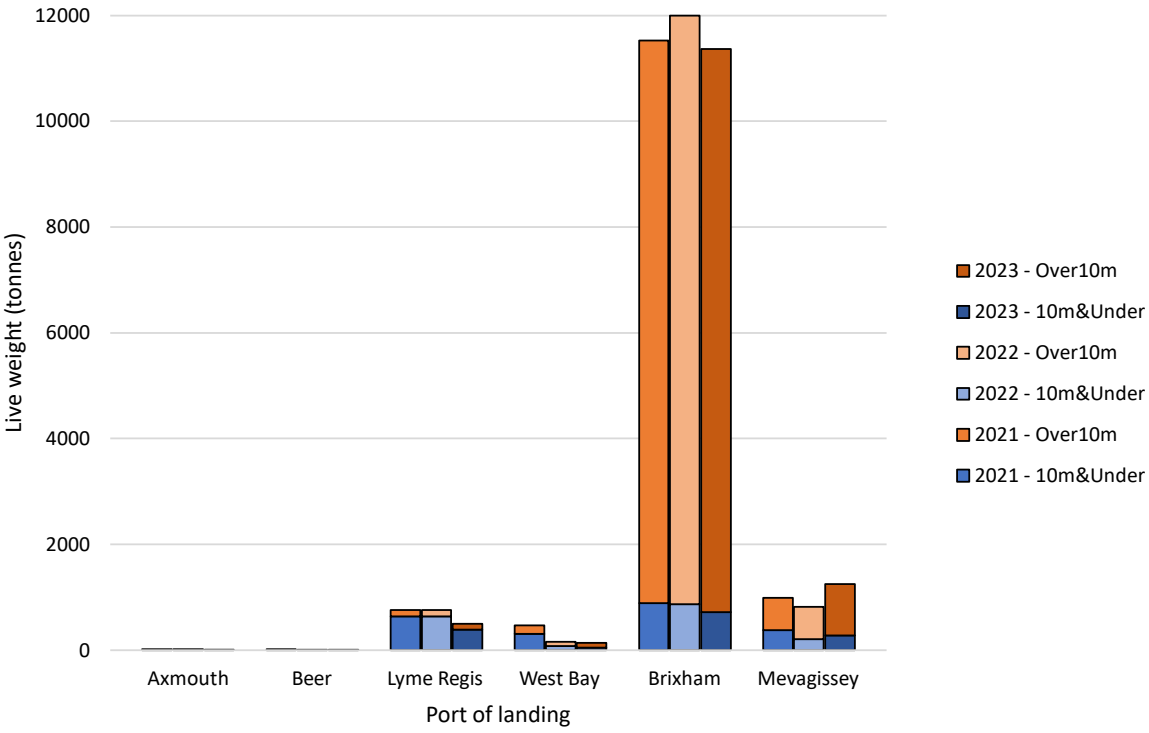


5.1 Total landings (all species, in tonnes)

Lyme Bay encompasses four ports: Axmouth, Beer, Lyme Regis and West Bay. Fishers from two ports outside of Lyme Bay (Brixham and Mevagissey) come to fish inside the sole fishery located within ICES rectangles 30E6 and 30E7 inside Lyme Bay. Figure 4 below shows the live weights of all species landed to each of these six ports in the years 2021-23. The data clearly indicates that Brixham lands more fish than all the others combined, with the latest data (2023) showing a total live weight landed of 11,368 tonnes at the port. The other five ports combined landed 1,904 tonnes. These figures are across all species, with scallops, cuttlefish, monks and anglers, whelks, sole and plaice making up the majority of tonnage landed.

Brixham, in terms of landing and total value, is often an outlier in the data as it is one of England's biggest fishing ports, and often tops rankings for quantity and value of landings, alongside Newlyn.

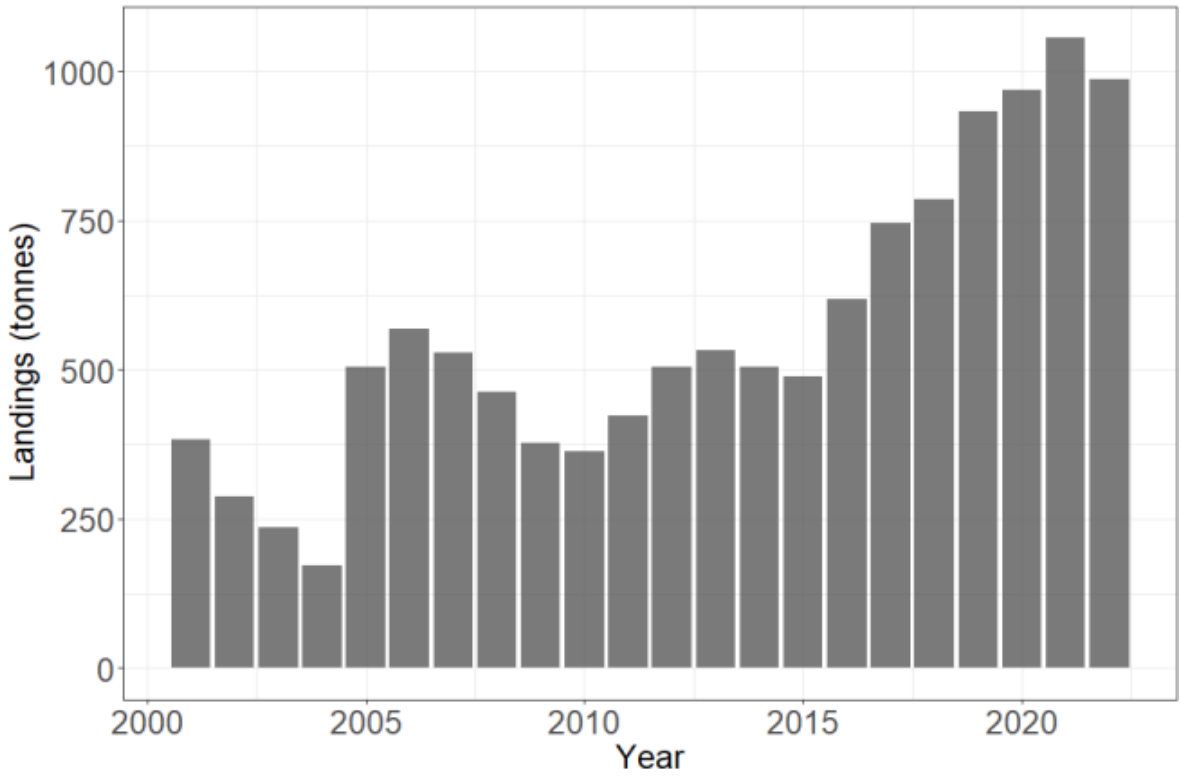
Figure 4: Total landings (live weight of all species, tonnes) to each port in the wider Lyme Bay area, for over 10m vessels and 10m and under vessels, 2021-23 (MMO, 2023f).



5.2 Total landings (sole)

Reported landings of sole in area 7.e have doubled (+102%) since 2015, resulting in a total of 985 tonnes landed across all of 7.e in 2022 (Cefas, 2023). As Cefas (2023) notes, the main increases in landings were reported in 2016, 2017 and 2019, with respectively +27%, +20% and +19% increase in landings in comparison with the previous year. For 2020 and 2021, the increases were smaller, with +4% and +9% respectively. In 2022, there was a decrease of -7% compared to 2021. Figure 5 below, reproduced from Cefas (2023), shows the increase in landings of sole per year in whole area ICES 7.e.

Figure 5: Landings per year of sole in tonnes in whole area ICES 7.e (Figure 1, reproduced from Cefas, 2023)



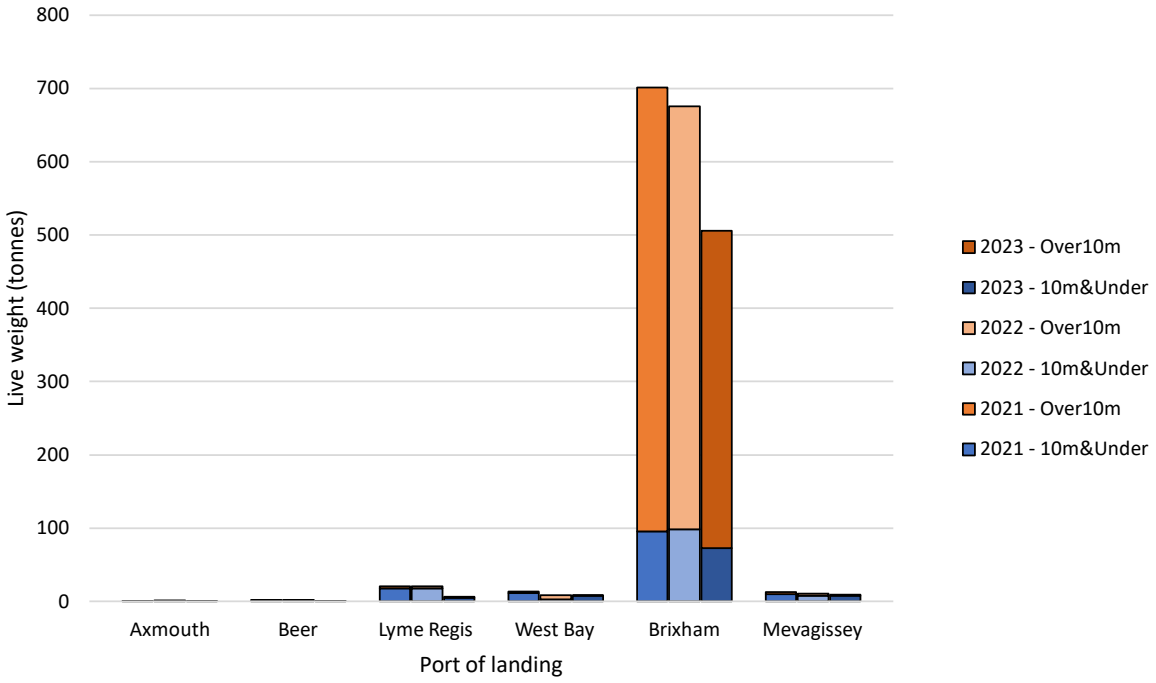
In 2022, of the 985 tonnes of sole landed in 7.e, 717.7 tonnes were landed in the six ports relevant to Lyme Bay, with 31.9 tonnes landed at the four CIC ports of Lyme Bay and 685.7 landed at Brixham and Mevagissey. This data can be seen in Table 2 below. This makes up a significant percentage of all the sole caught in 2022 in 7.e, at a rate of 73%.

Table 2: Total live weight (tonnes) of all species and of sole landed in 2021-23 to ports inside Lyme Bay, outside Lyme Bay, and in total

Year	Species	Inside Lyme Bay[1] (tonnes)	Outside Lyme Bay[2] (tonnes)	Total
2021	All species	2,600	37,131	**39,731**
	Sole	37	714	**751**
2022	All species	956	12,815	**13,771**
	Sole	32	686	**718**
2023	All species	658	12614	**13,272**
	Sole	17	515	**532**

Source: Fisheries Charts 2021-23 datasets (MMO, 2023f)
[1] Lyme Regis, West Bay, Axmouth and Beer ports
[2] Mevagissey and Brixham ports

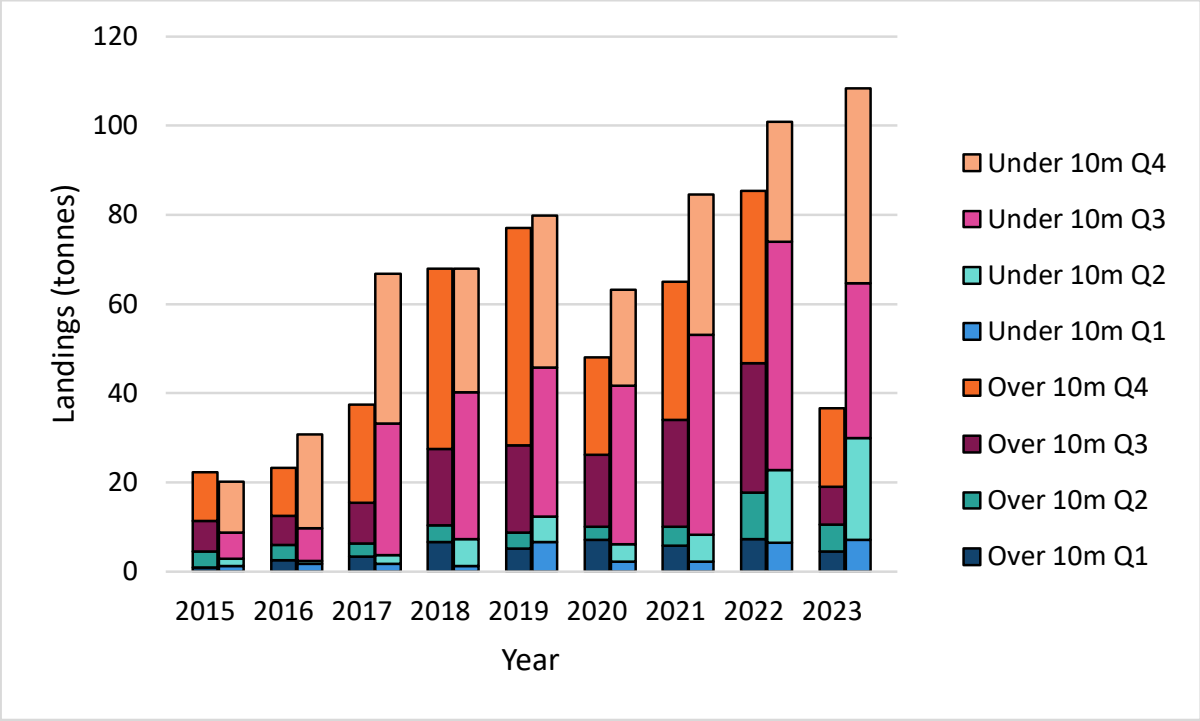
Figure 6: Total landings of sole (live weight, tonnes) to each port in the wider Lyme Bay area, for over 10m vessels and 10m and under vessels, 2021-23 (MMO, 2023f).



5.3 Landings of sole by season (tonnes)

There is a strong level of seasonality for sole fishing for landings caught inside Lyme Bay, with summer and autumn (Q3 and Q4) being the main seasons across all gear types (Cefas, 2023). In recent years, as the report by Cefas (2023) noted, there is an increasingly significant proportion of the otter trawl catch being caught in spring (Q2). These patterns are consistent across both <10 and >10 vessels. Figure 7 below provides a summary of landings of sole, in live weight, by season.

Figure 7: Landings of sole (live weight, tonnes) per quarter and per vessel length in Lyme Bay (ICES rectangles 30E6 and 30E7) (MMO, 2024c).



5.4 Total landings of sole in/outside Lyme Bay

There are disparities between the four CIC ports within Lyme Bay and the two external ports of Brixham and Mevagissey at which fishers also land fish caught in Lyme Bay. For sole landed in the four CIC ports, the vast majority is done so by local <10 fishers. For sole landed at Brixham and Mevagissey, the vast majority is caught by >10 fishers.

Figures 8 and 9 below provide snapshots of live weight landed (in tonnes) at the ports in and out of Lyme Bay respectively. Figure 8 shows a potentially concerning trend related to the landings of fishers within the CIC ports, where these are decreasing between 2021 and 2023 at a markedly faster rate than that of the fishers who land sole at ports outside Lyme Bay. This could have compounding negative effects on livelihoods if these trends were to continue.

Figure 8: Landings of sole (live weight, tonnes) to ports inside the Lyme Bay area by vessel length (MMO, 2023f).

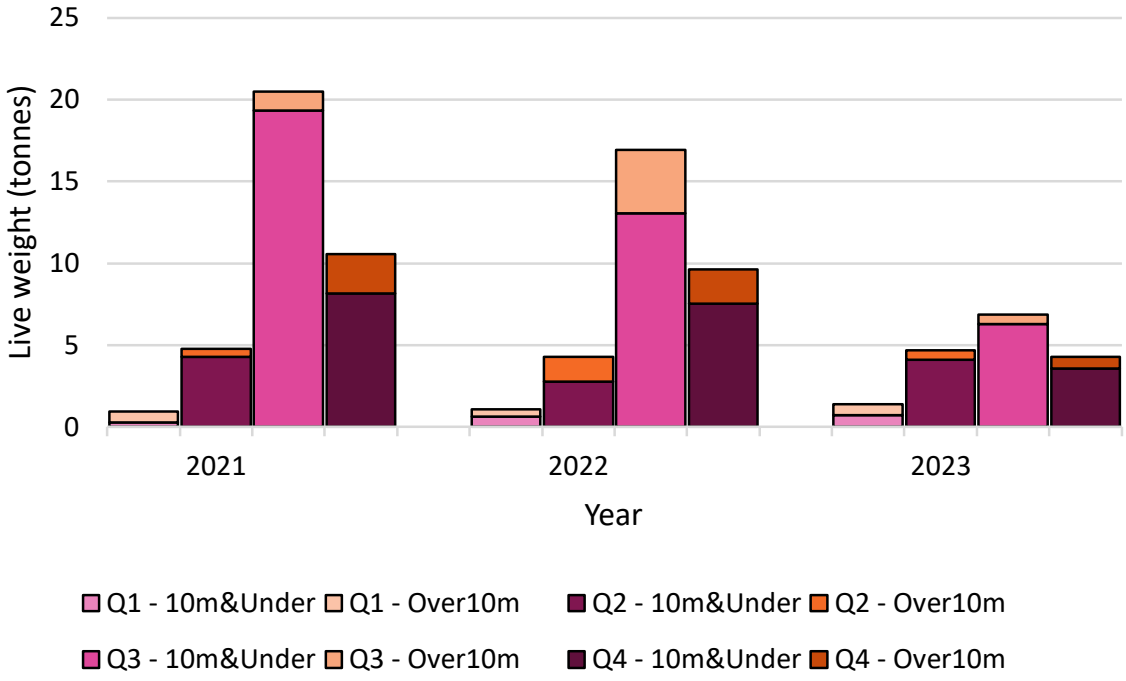
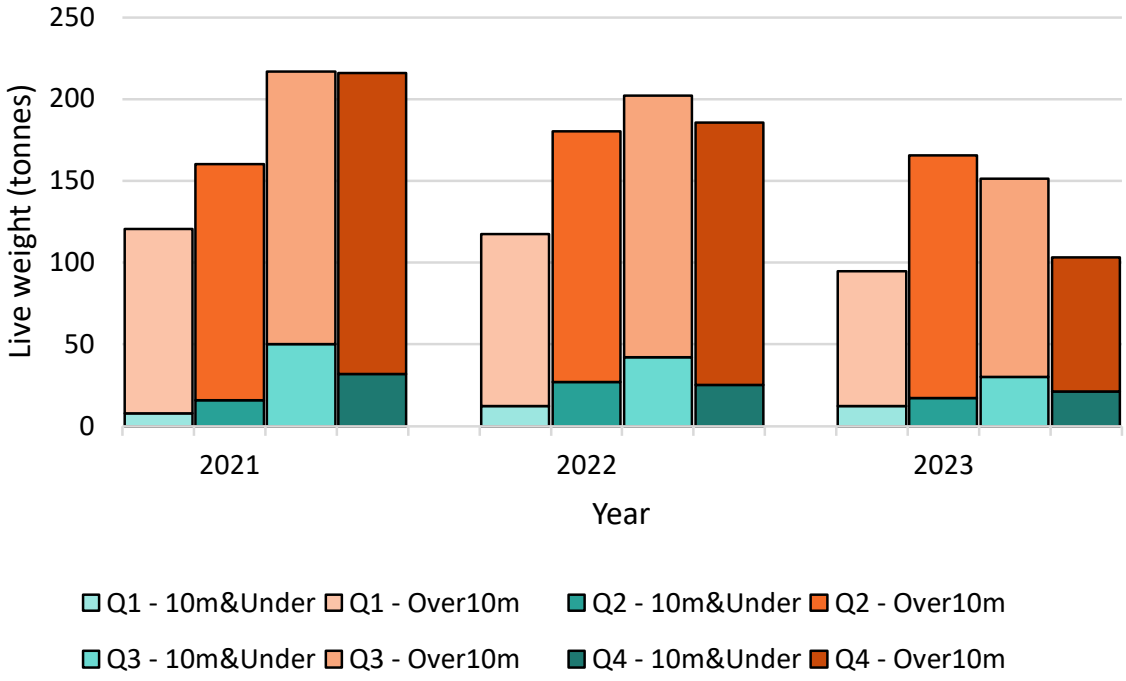


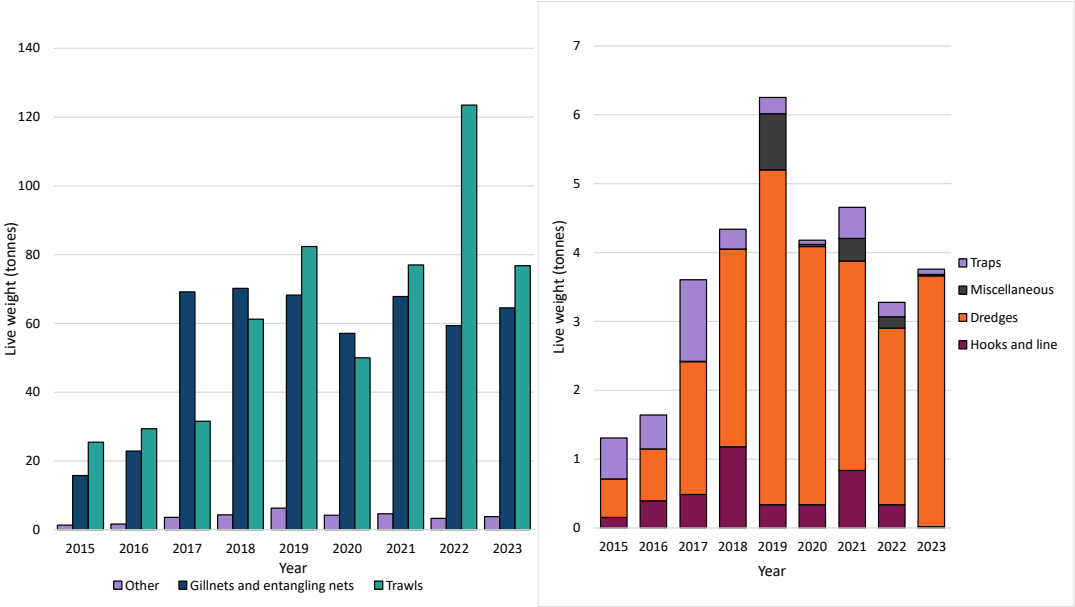
Figure 9: Landings of sole (live weight, tonnes) to ports outside the Lyme Bay area by vessel length (MMO, 2024d).



5.5 Landings of sole by type of fishing gear

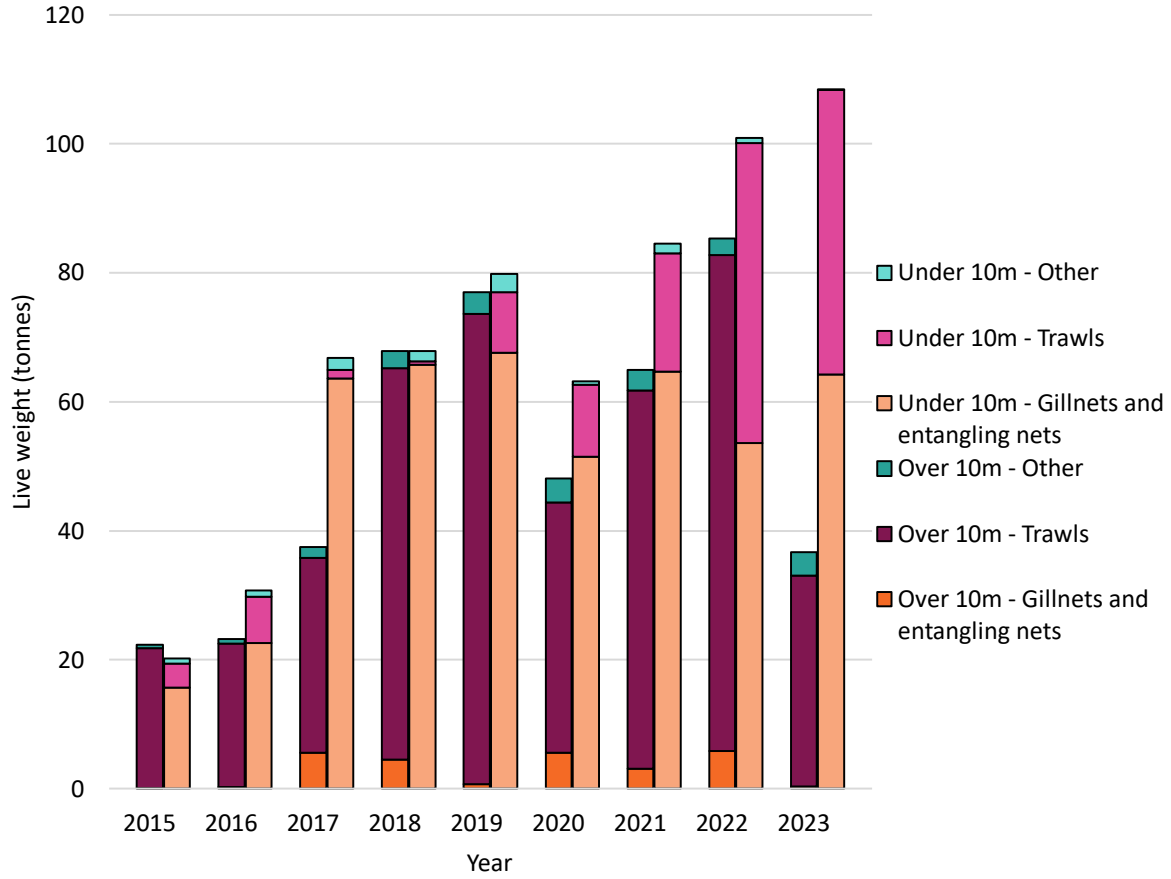
Since the quota increases in 2015, both netters and trawlers have seen marked increases in the amount of sole landed. Other gear types (such as traps and dredges) have experienced similar rises, but the total catch amount across all other gears combined is less than one tenth of either nets or trawlers, for any given year. Figure 10 below provides a breakdown of landings by gear between 2015 and 2023.

Figure 10: Landings of sole (live weight, tonnes) in Lyme Bay by gear type (ICES rectangles 30E6 and 30E7) (MMO, 2024c).
Second figure details the 'other' gear types in the first figure.



Most of the landings by netters come from <10 vessels, whilst the landings from trawlers are >10. However, in recent years there has been an increasing amount of <10 landings coming from trawlers, but netters are still the majority. As previously noted, the majority of <10 vessels are based in the four CIC ports, with >10 vessels coming from Brixham and Mevagissey. Figure 11 below breaks down the gear types in <10 and >10 categories.

Figure 11: Landings of sole (live weight, tonnes) by gear type and by vessel length in Lyme Bay (ICES rectangles 30E6 and 30E7) (MMO, 2024c).



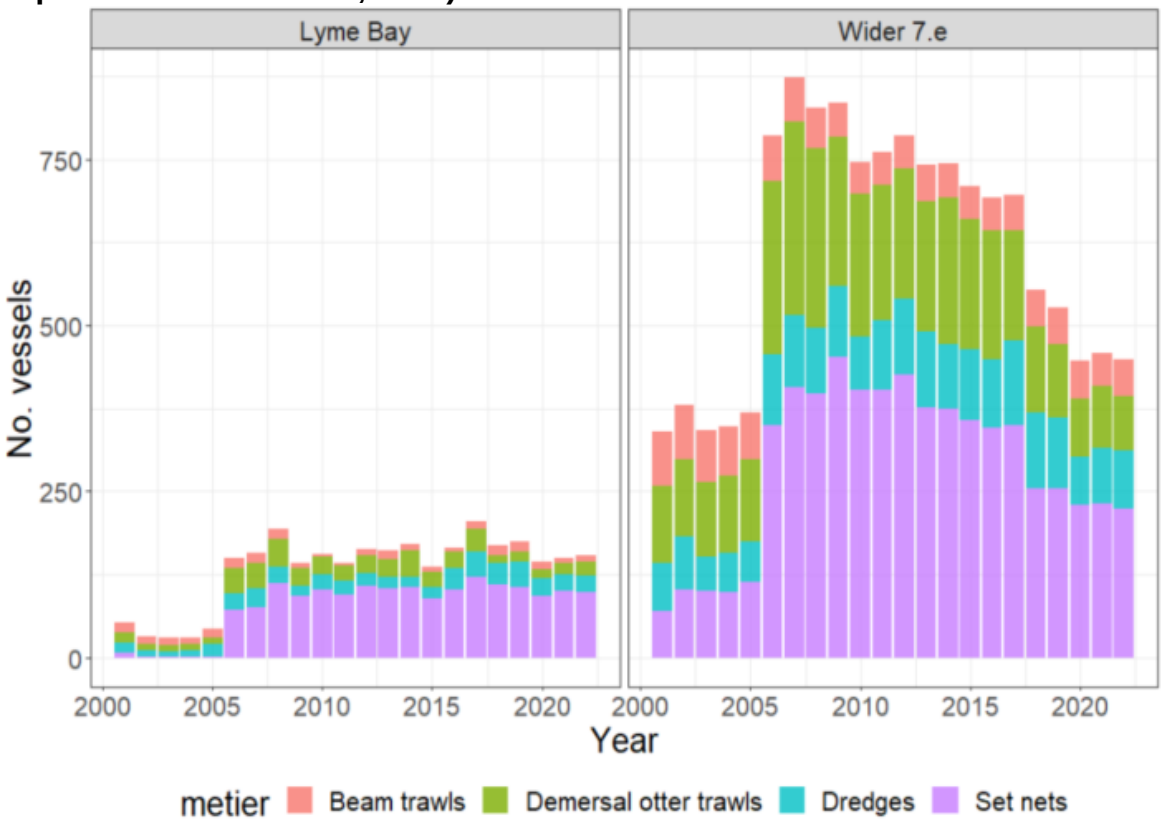
5.6 Number of vessels fishing in Lyme Bay

Cefas (2023) plotted the number of vessels fishing in Lyme Bay and across wider 7.e between 2000 to 2022. Cefas only looked at four main gear types (beam trawls, demersal otter trawls, dredges and set nets), as these are the most common ones used to catch sole. In total, in 2022 there were 954 vessels fishing across 7.e and 332 fishing in Lyme Bay, with 449 of the 954 vessels in 7.e being one of the four gear categories and 154 of the 332 in Lyme Bay being one of the four main gear types. The total number of vessels fishing in 7.e peaked in 2009 at 1597 vessels – so 954 in 2022 marks a considerable drop in numbers, indicating a consolidation of fishing activity among an ever-decreasing pool of vessels.

The data shows the number of vessels fishing in Lyme Bay (within the four CIC ports) remaining broadly consistent (but nonetheless still reducing from a peak in 205 in 2017 to 154 in 2022), whilst the number of vessels fishing across 7.e as a whole reaches a high in 2007 of 872 before gradually decreasing to 449 in 2022. This is despite landings increasing markedly in recent years, suggesting more and more fishing is being conducted by a smaller pool of (larger) vessels. Figure 12 below provides data on the number of vessels, per gear, in both Lyme Bay and wider 7.e. In Lyme Bay, set nets have always made up the majority of vessels at a roughly consistent percentage, whilst across 7.e, they remain the largest gear type, but the

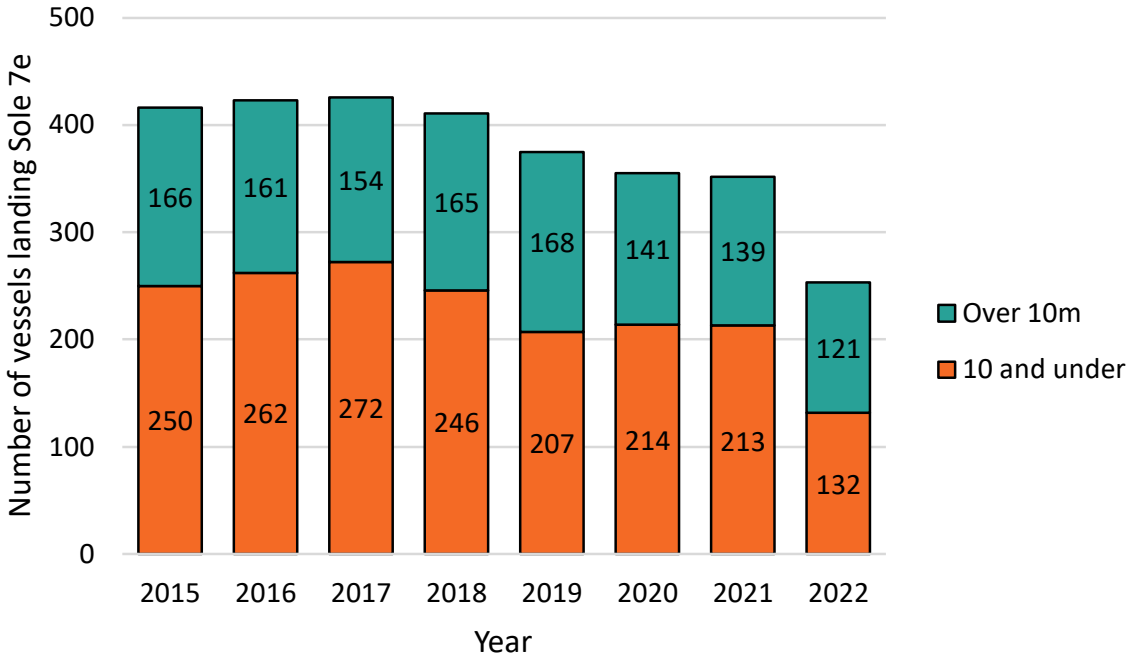
percentage they consist of the entire fleet is shrinking over time. This trend increases markedly from 2018 onwards.

Figure 12: Number of vessels per gear in and out of Lyme Bay (Figure 10, reproduced from Cefas, 2023).



Additionally, MMO (2022) has further segmented the 7.e fleet, filtering just to vessels that have landed sole from 2015 to 2022. This data has been graphed in Figure 13 below. It is important to note that whilst Figure 12 above provides data on gear categories, and indicates there are 710 vessels of the gear categories that typically catch sole fishing in 7.e (in 2015), only 416 actually landed sole in that year. The data reinforces the previously made suggestion that more and more fishing for sole in Lyme Bay (and 7.e as a whole) is being conducted by a smaller pool of vessels, among whom the >10 share is increasing year on year. In 2015, the >10 pool made up 40% of all vessels fishing sole in 7.e, whereas in 2022 that figure was 48%. In 2015, there were 416 vessels fishing for sole in 7.e, whereas in 2023 that figure stood at 253, meaning a 39% reduction in the number of vessels over an eight-year period.

Figure 13: Number of vessels landing sole 7e by vessel length, 2015-2022 (MMO, 2022).



5.7 Number of days at sea

Since 2005, effort expressed in days at sea has remained relatively stable within wider 7.e, with a small decrease in the years 2020-22 (Cefas 2023). Within Lyme Bay, days at sea has quadrupled in the same period, as can be seen in Figure 14 below. Within Lyme Bay, in 2022 set nets spent 2243 days at sea, whilst beam trawls, which have a significantly higher LPUE, spent only 288 days at sea, with demersal otter trawls spending 797 days at sea and dredges 716 days (Cefas, 2023).

When comparing the days at sea with the number of vessels above, this further reinforces the suggestion of greater amounts of fishing being done by a smaller number of vessels; with days at sea remaining relatively stable across 7.e whilst the number of vessels reduces dramatically.

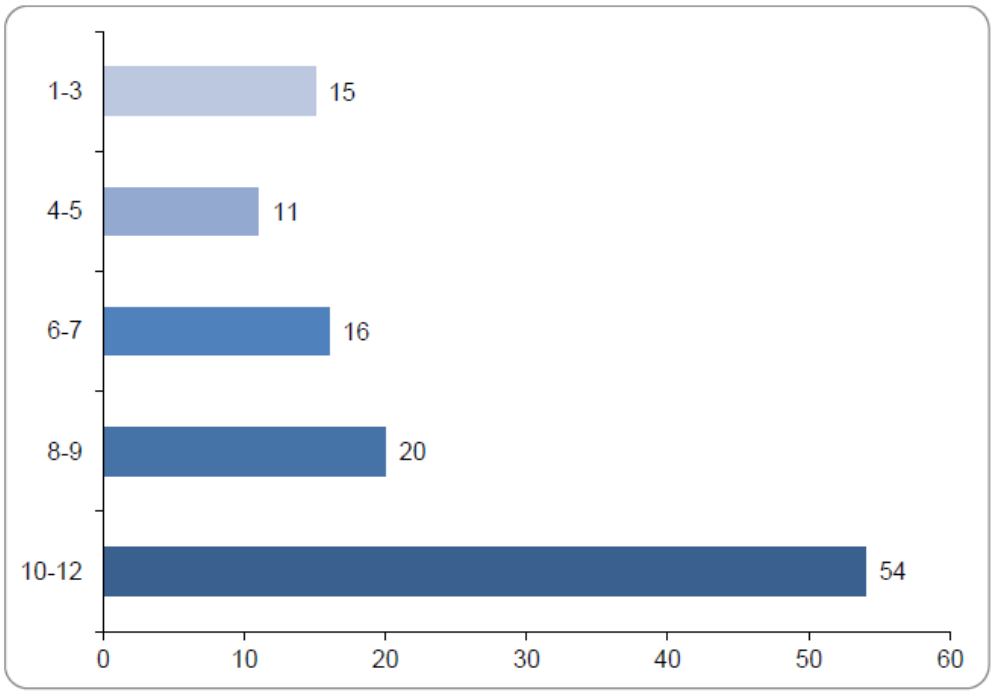
Figure 14: Days at sea per gear in and out of Lyme Bay (Figure 11, reproduced from Cefas, 2023).

As reported in MMO (2023i), days at sea for CIC netters have decreased by 20% since 2011 and 43% since 2017, a trend not observed in other categories where some even saw increases. CIC netters reported challenges in netting for sole due to increased catch limits and difficulties in finding safe spaces to shoot nets, leading to concerns about gear loss, ghost fishing, and stock impact. This reduction in days at sea was also seen across all CIC categories in 2021, possibly due to expensive gear loss and damage, while non-CIC fishers noted declining fishing grounds for sole, resulting in smaller catches, which may be a factor in the reduction of time spent at sea.

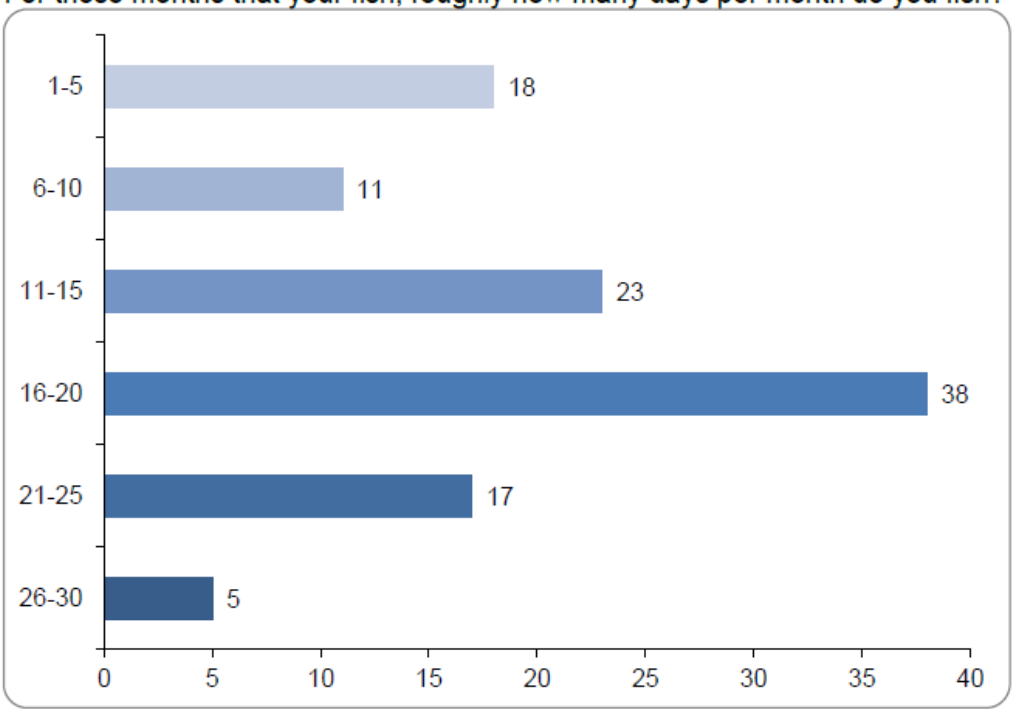
During the consultation conducted by the MMO in 2023, fishers were queried about their fishing frequency in Lyme Bay, with Figure 15 illustrating the results. The prevalent fishing duration reported ranged from ten to twelve months per year, with the most common number of days per month falling within the range of 16-20.

Figure 15: Consultation results for questions "How many months a year do you fish in Lyme Bay?" and "For those months that you fish, roughly how many days per month do you fish?" (section 2.8, reproduced from MMO, 2023c).

2.8. How many months a year do you fish in Lyme Bay? (Inside rectangles 30E6 and 30E7)



For those months that your fish, roughly how many days per month do you fish?



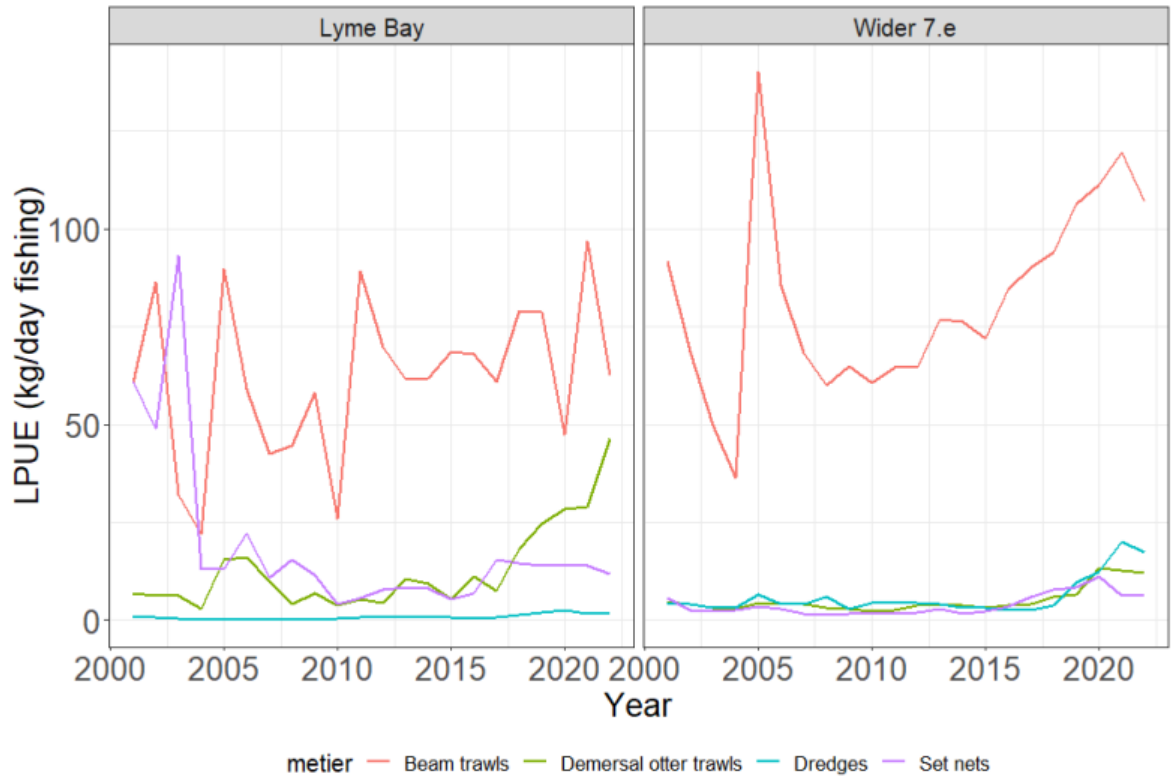
5.8 Landings per unit effort (LPUE) for sole

Cefas (2023) plotted sole landings per unit effort (LPUE) from 2000 to 2021 within Lyme Bay and the wider 7.e ICES rectangle. The original numbers behind the charts are not available, so the charts are instead reproduced from Cefas (2023). Figure 16 shows that beam trawls have the highest LPUE, although demersal otter trawl LPUE has increased significantly since 2017 in Lyme Bay. The chart, especially for wider 7.e shows the increase in LPUE since 2015 when the quota for sole was approximately doubled. There does also seem to be an increase in LPUE for set nets as well as demersal otter trawls in Lyme Bay over this period although this trend has not been maintained for set nets.

>10 vessels in Lyme Bay are overwhelmingly beam and/or demersal otter trawls, which have a much higher LPUE than netters. This supports the wider picture of the data, which suggests that since the quota uplifts began, <10 vessels are having to expend increasingly more effort for a smaller amount of sole, whilst >10 vessels' LPUE is trending significantly upwards over the same period.

Beam trawls fishing sole within Lyme Bay, which have the highest LPUE of any gear type, peaked at 96.9 kg/day in 2021, compared to 13.9 kg/day for set nets in the same year (Cefas 2023).

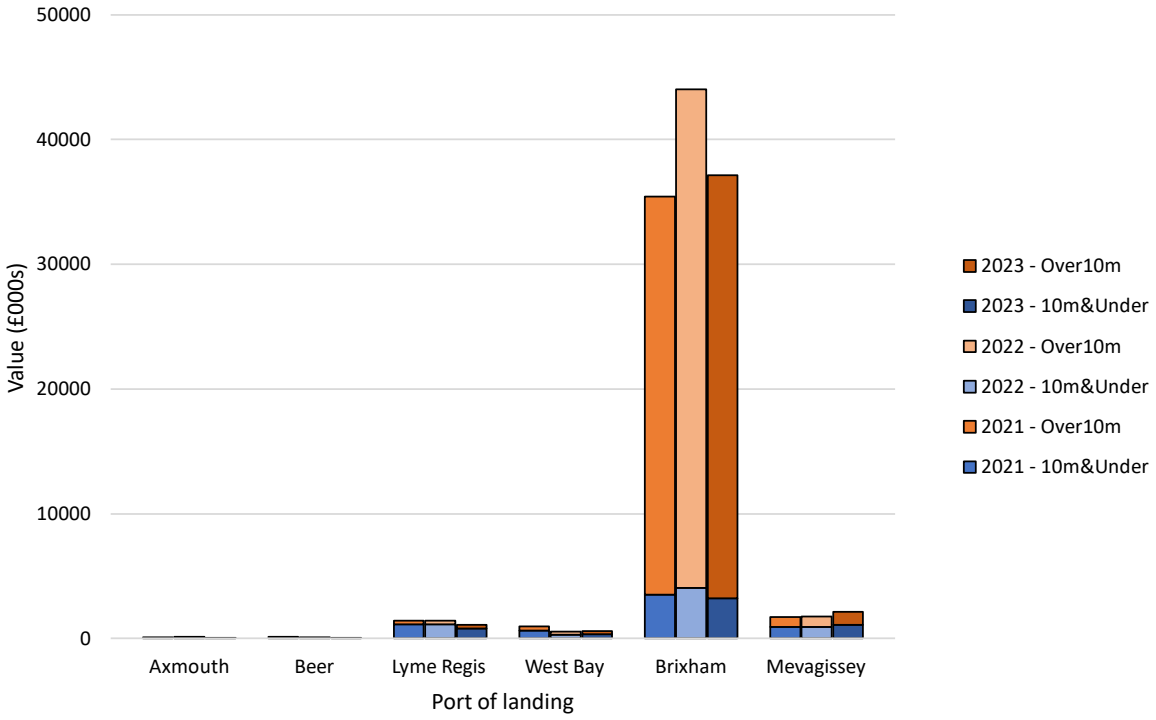
Figure 16: LPUE of sole per gear in and out of Lyme Bay (Figure 12, reproduced from Cefas, 2023).



5.9 Total landings (value) for all species

Considering total landings in terms of value provides a similar outlook to total landings of live tonnage, with Brixham once again providing the bulk of value landed. In 2023, £33,920,000 of fish was landed at Brixham, with the other five ports landing £3,967,000 of fish. The value of landings for 2021-23 can be seen in Figure 17 below.

Figure 17: Total landings (value, £000s) for all species to each port in the wider Lyme Bay area, for over 10m vessels and 10m and under vessels, 2021-23 (MMO, 2023f).



Since 2015, the average landed price of sole (in £ per tonne) has steadily increased. The average landed price differs depending on gear type, with fixed nets generally receiving a higher price for sole than bottom-towed gears. Figure 18 below shows how the price has increased over time.

Figure 18: Average landed price of sole (£ per tonne) for different gear types between 2015 and 2023 (MMO, 2023f; MMO, 2023i).

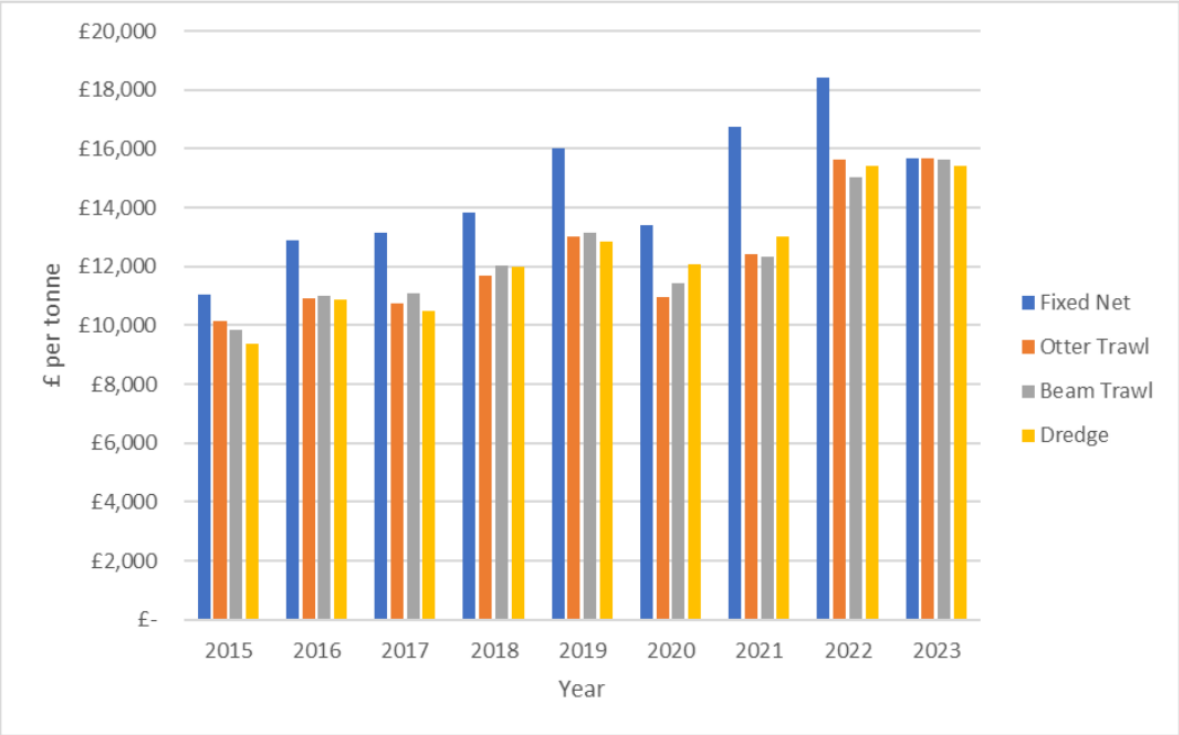


Table 2 below provides the total value, at first point of sale, of all species (and specifically sole) landed in 2021-23 to the six ports of interest. Whilst this data is not necessarily over a long enough period to draw distinct conclusions or identify major trends, it is noted that sole fishing within the four CIC ports provides less year on year value between 2021 and 2023. Potential reasons for this are discussed in the profit section below.

Table 3: Total value (£) at first point of sale of all species and of sole landed in 2021-23 to ports inside Lyme Bay, outside Lyme Bay, and in total.

Year	Species	Inside Lyme Bay[1]	Outside Lyme Bay[2]	Total
2021	All species	£2,600	£37,131	**£39,731**
	Sole	£609	£9,228	**£9,837**
2022	All species	£2,197	£45,798	**£47,996**
	Sole	£569	£10,655	**£11,224**
2023	All species	£1,849	£39,247	**£41,096**
	Sole	£328	£8,122	**£8,450**

Source: Fisheries Charts 2021-23 datasets (MMO, 2023f)
[1] Lyme Regis, West Bay, Axmouth and Beer ports
[2] Mevagissey and Brixham ports

5.10 Profit

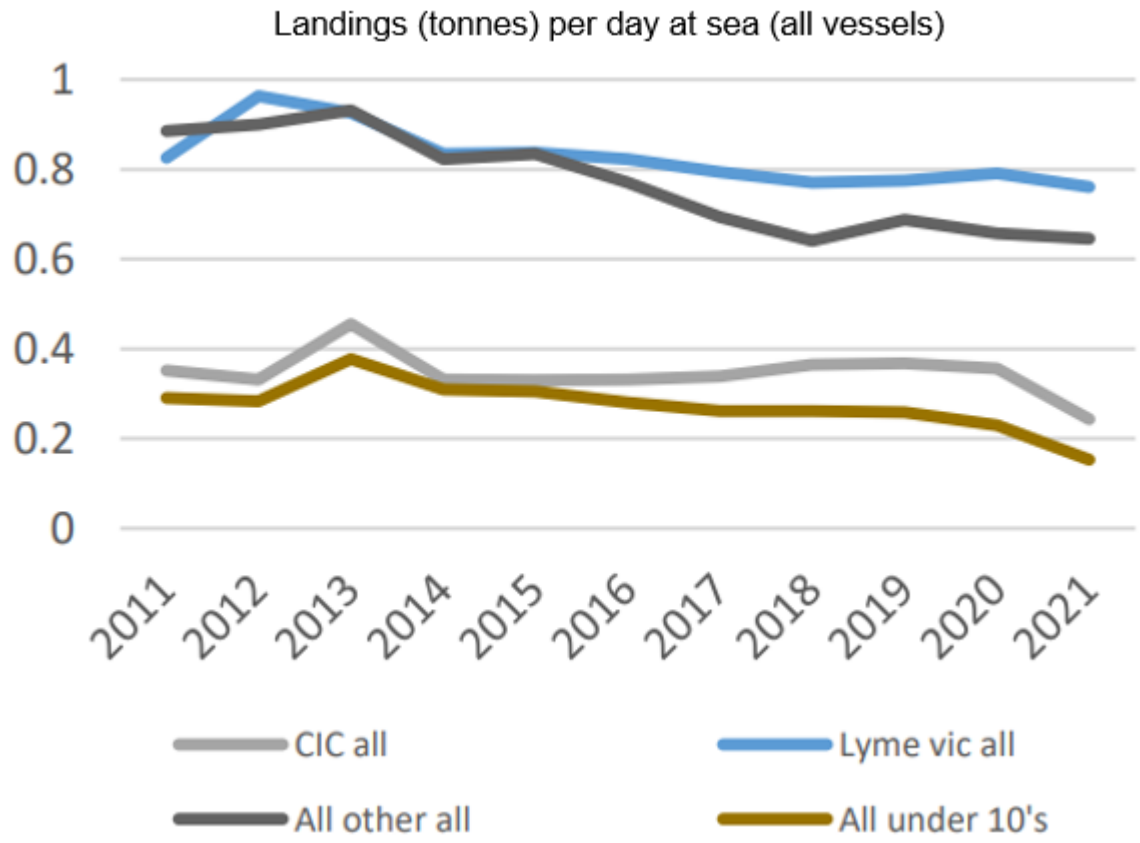
MMO (2023i) found that whilst all vessel groups showed a general increase in average annual operating profit between 2011 and 2017, they also showed a decrease between 2017 and 2020. It further stated that most vessel groups show an increase in annual operating profit in 2021, compared with 2020, but that vessels in the Lyme Bay CIC group (based at Axmouth, Beer, Lyme Regis and West Bay) continued to exhibit a decline in operating profit in 2021, and that their operating profit is now lower than it was in 2011. This is particularly apparent for vessels using fixed nets.

This reduction in profit is potentially related to four factors, according to the data:

- Increased operating costs for CIC netters, all other netters and all <10, who have all seen increases in costs compared to 2011 and 2017 (whilst every other category in Lyme Bay has seen a decrease compared to 2017)
- A reduction in days at sea among all CIC vessels
- Costs such as port fees and maintenance likely to be fixed regardless of the number of days at sea
- A reduction in landings per day at sea, with the data showing a significant decrease for all netters, all <10 and all CIC categories. This is in juxtaposition to some other categories, such as Lyme Bay vicinity beam trawlers, which are trending upwards.

Figure 19 reproduces a chart from MMO (2023i) and shows a downward trend in landings per day at sea across all vessels and for all under 10s in particular. This is accentuated somewhat by 2021 data for CIC all and all under 10s. In this figure there is no indication of an increase in landings per day at sea following an increase in the quota from 2015 (there may be a slight increase for CIC vessels from 2015 to 2020, before the reduction in 2021). However, MMO (2023i) also notes that there has been an increase in vessel power over time for all vessel categories, which could affect the landings per kW day at sea and so could mask some trends.

Figure 19: Landings (tonnes) per kW day at sea (all vessels) (Figure 5b, reproduced from MMO, 2023).



5.11 Average size of sole fish landed

Cefas (2023) plotted mean length of landed sole from 2012 to 2022 for within Lyme Bay and the wider 7.e ICES rectangle. Figure 20 shows that for demersal otter trawls and nets there has been a downward trend in average size of sole landed inside Lyme Bay. Figure 21 provides data for wider 7.e. There is no or limited data for dredges and beam trawls. Figure 21 shows that for all gear types, except nets on >10 vessels, there is a downwards trend in average size of sole.

The average size of a sole fish landed across the wider 7.e has decreased from 342.3mm in 2015 to 309.9mm in 2022 (Cefas 2023). A decreasing mean catch size over time suggests that negative impacts to the sole stocks in 7.e. are slowly occurring, and over time could reach a point of negative decline. Alternatively, it could be indicative of an increasing population of younger fish, and these are smaller, bringing the average size down.

During consultation with fishers (MMO, 2023a), the majority (81%) support an increase in minimum landing size for sole in 7.e to match the size at which 50% of sole are considered sexually mature, citing the belief that the measure would help to support the sole population. The 13% who disagreed considered the sole population to be healthy and need no support. A minority (7%) were unsure.

Figure 20: Mean length of landed sole per metier in Lyme Bay (Figure 13, reproduced from Cefas, 2023)

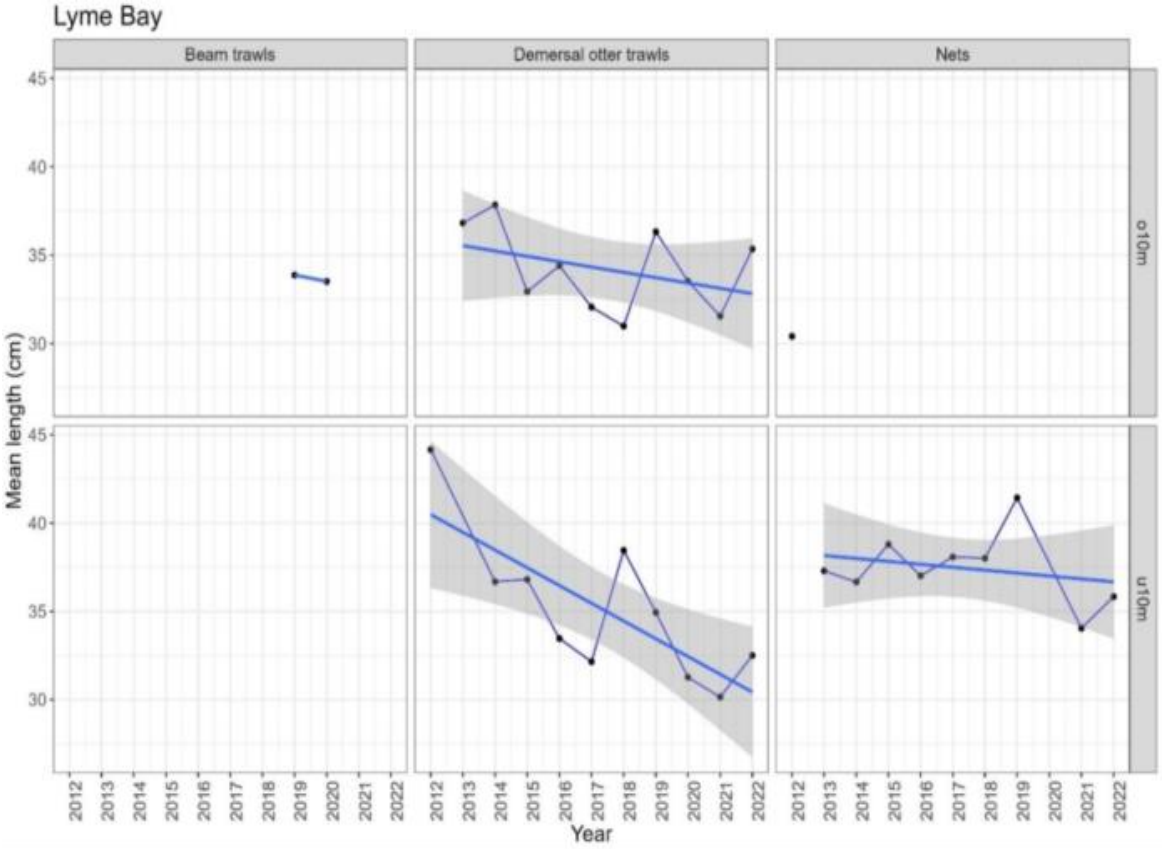
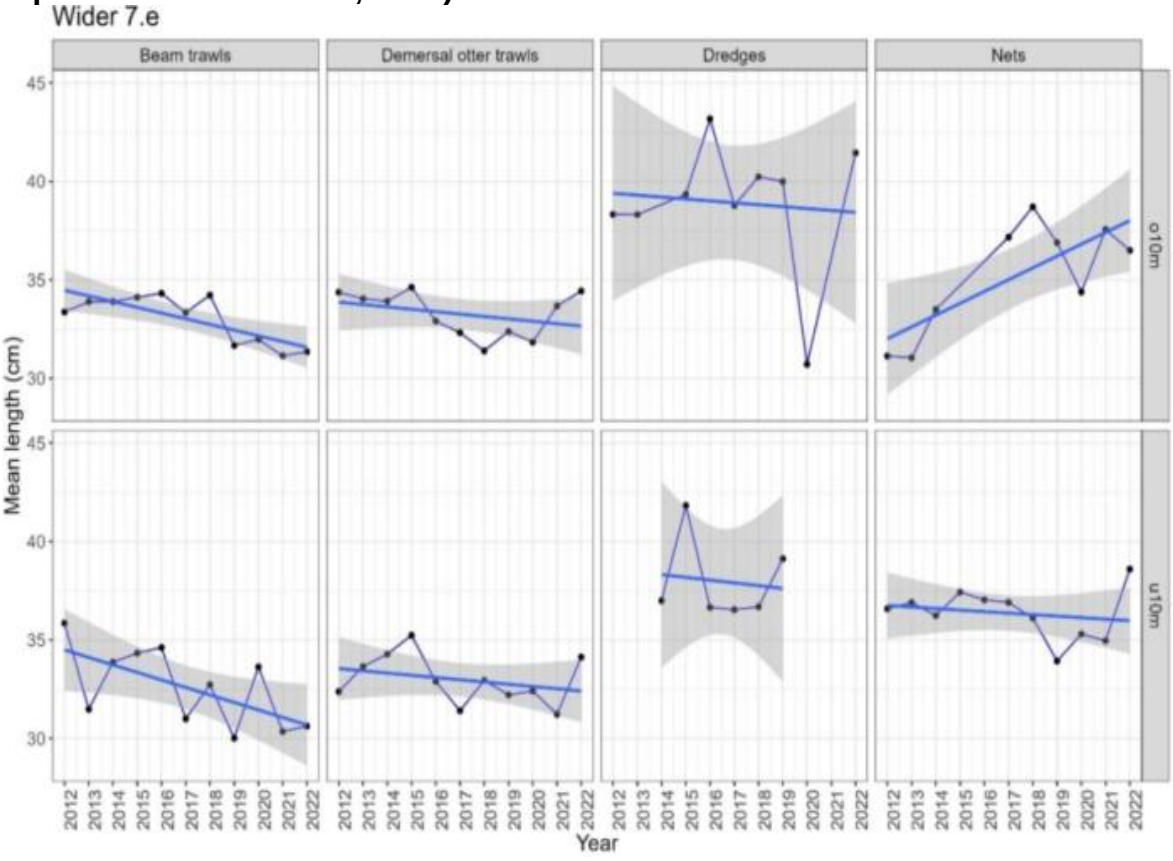
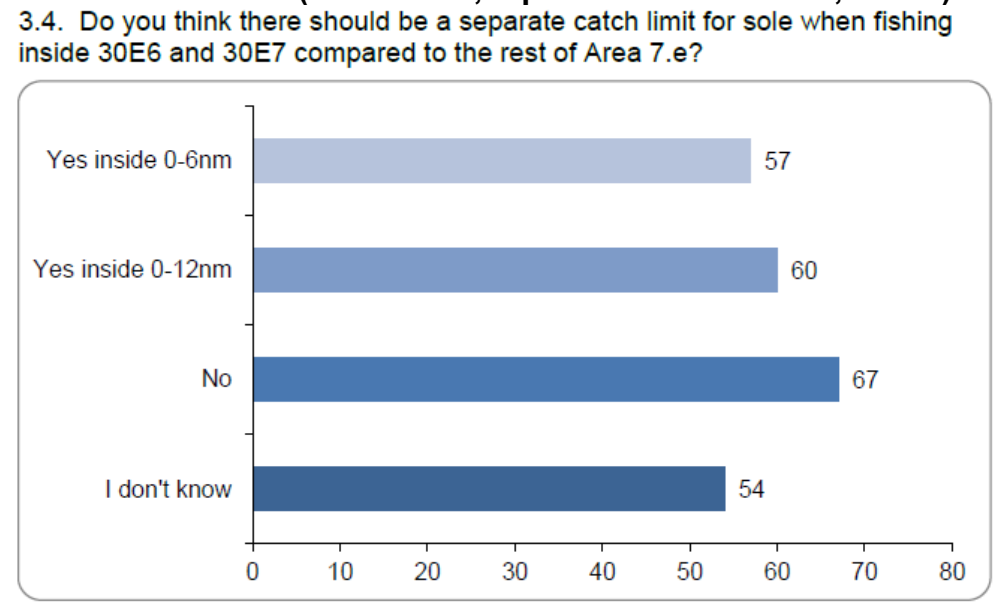


Figure 21: Mean length of landed sole per metier in wider area 7.e (Figure 14, reproduced from Cefas, 2023)



Those being consulted with were also asked their opinion on whether there should be a separate catch limit for sole inside 30E6 and 30E7 compared to the rest of area 7.e. Similar number of responses were given to each of the options of yes, within 0-6nm; yes, within 0-12nm; no; and don't know (see Figure 22). Responses to the question showed common themes: many advocated for fair and equal catch limits to simplify compliance, while others supported separate limits to address conflicts between vessel types and promote sustainable fishing. Some suggested giving more fishing opportunities to local fishers or smaller vessels over larger vessels.

Figure 22: Consultation results for question "Do you think there should be a separate catch limit for sole when fishing inside 30E6 and 30E7 compared to the rest Area 7.e?" (section 3.4, reproduced from MMO, 2023c)



5.12 Gear loss and conflict

MMO (2022) reported that 87% (15 of 17 fishers interviewed) reported having experienced gear conflict in 2022, with fixed net fishers losing the most gear. Where vessels are using long nets, it was reported that nets can be shot over other gear types leading to gear being lost or damaged. Smaller vessel skippers reported problems with 35% (6 of 17 fishers interviewed) having either directly experienced gear damage from trawlers on grounds where trawling was prohibited or had heard of incidents from other fishers.

Fishers from the local Lyme Bay ports (Lyme Regis, West Bay, Axmouth and Beer) reported that fishing was 'less enjoyable' and that netting for sole was 'stressful'. The result of this was that MMO (2022) reports that 24% (4 of the 17 fishers interviewed) had stopped netting for sole completely or were netting less frequently. In addition, MMO (2022) reports that smaller vessel skippers reported problems arising when larger visiting vessels began working in and around Lyme Bay, increasing the likelihood of gear conflict.

MMO (2023d) also noted that financial difficulties resulting from displacement and gear loss were resulting in local vessels from Lyme Bay stopping netting. Improper marking of gear was raising tensions between mobile and static gear fishers resulting in gear conflict and damage. This was also highlighted as a safety concern linked to gear conflict and interactions at sea (MMO, 2023d). However, reports of a meeting held in Lyme Bay by MMO (2024d) suggested that there was no strong consensus on whether gear conflict was occurring. This conflicts with discussion on the Marine Plan Trade-off Analysis (MaPTA) tool (University of Exeter, 2023), which stated that fixed netters had reported gear being damaged and lost due to long nets (>1000m), and that fixed and mobile gear fishers were often in conflict.

5.13 Reported negative environmental impacts on stocks and habitats

Negative environmental impacts include on fish stocks and seabed sediments. MMO (2023j) identifies the risks to habitats being greatest for rocky reefs, followed by mixed and coarse sediments. Rocky reef habitats in Lyme Bay are protected in a Marine Protected Area with bottom gears prohibited. There are still moderate risks from trap fishing and other set gears. Lyme Bay also comprises coarse sediment habitats, which have the highest levels of activity for bottom trawls by under 10m vessels, some activity in the over 12m category for dredging and bottom trawling and are also popular areas for other gear types. Bottom trawling and dredging have the highest risk of environmental damage in coarse sediment areas (MMO, 2023d).

Work undertaken by Natural England found that dredging has extreme adverse effects on marine ecosystems (University of Exeter, 2023). Areas of subtidal coarse sediment fished by bottom trawling and dredging are identified as a particular concern in Lyme Bay, especially due to damage caused by dredging for sole (as opposed to scallops). There are also concerns on the long-term sustainability of sole catches due to bycatch of sole when dredging for scallops, due to the limited selectivity of dredges (MMO, 2023a).

When asked about fishers' environmental concerns for Lyme Bay (MMO, 2023c) the most commonly identified concern (of fishers) was overfishing of sole stock (181, 73%, of 247 responses) followed by overfishing of other fish stock (162, 66%, of 247 responses), and habitat destruction (150, 61%, of 247 responses). Open responses included 21 mentions of dredging and trawling impacting seafloor habitats, with 5 noting the impact of scallop dredges on sole catches. There were also suggestions that there had been an increase in scallopers targeting sole (MMO, 2023c).

5.14 Negative issues in MMO-fisher relationships

MMO (2022) reported that the dissatisfaction rate among fishers was high, with 88% (15 out of 17 interviewed) expressing discontent over what they perceived as insufficient action from the MMO despite lodging complaints with multiple agencies. Only a minority of fishers surveyed, constituting 12% (2 out of 17), expressed satisfaction with the existing management measures. This group believed that although current catch limits were already high, there was room for further increases,

which they linked to the economic advantages associated with high catch limits. Conversely, 71% of the surveyed fishers (12 out of 17 from out of 253 vessels landed 7.e sole in 2022) believed that the quota was excessive and advocated for its reduction.

5.15 Number or frequency of negative issues or conflicts in fisher to fisher relations

Negative issues and conflicts occur between recreational and commercial fishers, and between commercial fishers using different types of gear. Recreational anglers feel commercial fishers are too close to the shoreline, restricting where they can fish but also reported issues around the size and abundance of fish (University of Exeter, 2023). Problems between commercial fishers are reported where larger vessels begin working in the area since they change each year, have large crew and large amounts of gear, and skippers that do not try to work with local vessels. There are fewer reported conflicts with local trawlers and netters as they tend to work together to give each other space to work their gear and to help avoid gear loss, including using a WhatsApp group to communicate with each other and clearly marking their gear (MMO, 2023h).

5.16 Summary of baseline

To summarise, current data clearly indicates trends that could be considered worrisome for CIC fishers, and <10 fishers more widely within Lyme Bay, and to a lesser extent, 7.e at large. The data suggests that since the quota uplifts began, <10 vessels (typically netters from CIC ports) are expending increasingly more effort for a decreasing amount of sole, whilst >10 vessels' (typically trawlers from Brixham and Mevagissey) LPUE is trending significantly upwards over the same period. The >10 pool is increasingly making up a larger percentage of a fishing fleet in 7.e that is shrinking over time, from 416 vessels fishing for sole in 2015 to 253 in 2023.

At the same time, CIC netters (typically <10) have reported challenges in netting for sole, due to the increased catch limits, and difficulties in finding safe spaces to shoot nets, leading to concerns about gear loss, ghost fishing, and stock impact.

It is in this set of circumstances that CIC fishers have seen their profits decrease continually year on year since 2017, and in 2021 their operating profits were lower than they were in 2011.

6. Counterfactual

The counterfactual is based on the baseline data with trends projected forwards for five years, up to 2028. This decision was informed by the varying lengths of the datasets used to create the counterfactual spanning from three to nine years. The aim was to avoid excessive extrapolation beyond the available data range, hence a five-year extrapolation to 2028 was selected. As per the baseline, the counterfactual assesses data relevant to EQ1 – "did the management measures achieve the expected outcomes and impacts?" – by setting out the problem definition and the anticipated future continuation of the problem definition. Future evaluations would then compare this counterfactual against future data to answer EQ2, 3, 4 and 5.

The projection forward of trends, assuming they would continue as seen in previous year's data (a noted caveat), provides the basis for the impact evaluation as the difference between the impacts (measured beyond the scope of this report) can then be compared against the counterfactual.

The counterfactual has used linear regression and exponential trendlines to project forward based on baseline data. This method allows for the estimation of a trendline based on the historical data, facilitating the projection of future values. This provides a straightforward way to model relationships between variables. However, a limitation is that the underlying relationships between variables and time in this sector/situation are subject to abrupt changes. Whilst it may not capture all complexities of a real-world scenario, use of regression and trendlines can serve as a baseline projection against which the interventions can be compared.

The description of the counterfactual is divided into the following sections, each of which draws on data from the various indicators as set out below:

- Gear conflict and loss:
    - Indicator: Gear loss and conflict
- Fish landings and vessel profitability:
    - Indicator: Total landings (tonnes, all species)
    - Indicator: Total landings (tonnes, sole)
    - Indicator: Landings of sole by season
    - Indicator: Total landings of sole in/outside of Lyme Bay
    - Indicator: Landings of sole by type of fishing gear
    - Indicator: Number of vessels fishing in Lyme Bay
    - Indicator: Landings per unit effort (LPUE)
    - Indicator: Total landings (value)
    - Indicator: Profit
    - Indicator: Number of days at sea
- Environmental impact:
    - Indicator: Reported negative environmental impacts
    - Indicator: Average size of sole fish landed (in/outside Lyme Bay)
- Fisher relationships:
    - Indicator: Negative issues in MMO-fisher relationships
    - Indicator: Number of frequency of negative issues or conflicts in fisher to fisher relations.

6.1 Counterfactual summary

The projected scenario in 2028 without management measures is described onwards from this point, within this section. This draws on trends and extrapolations from the baseline data to the extent possible. Some assumptions are then made as to how these trends would combine to present a narrative of the situation in 2028. These assumptions are footnoted in the relevant sections below. As such, this is a theoretical situation that could exist in 2028 without any management measures being implemented. This counterfactual can then be used as the basis for assessing actual impacts seen in Lyme Bay with the management measures in place such that an assessment of the benefits of the management measures can then be made.

6.2 Gear conflict and gear loss

Under the counterfactual, there will be continued gear conflict, especially with larger vessels continuing to access Lyme Bay, with this expected to result in increasing difficulties for smaller vessel skippers. Issues with local vessels continue to be managed through the WhatsApp group and communication between local vessels but issues with larger vessels become more common. Skippers of smaller vessels experience continued and increasing levels of stress, and increasing levels of damaged gear such that this increases operating costs associated with displacement of fishing activities and the need to repair or replace damaged or lost gear. This results in financial difficulties for smaller vessels such that more of them are expected to stop netting for sole by 2028, with this being based on trends identified in the baseline data.

6.3 Fish landings and vessel profitability

Total landings and total value of landings are expected to continue to increase to 2028 (within the scope of the available quota). It is expected that the landings will become dominated by over 10m vessels landing sole at Brixham and Mevagissey. Landings at the local Lyme Bay ports (Axmouth, Beer, Lyme Regis and West Bay) continue to decrease as skippers of the smaller under 10m vessels stop netting for sole. Over time, the number of vessels fishing in Lyme Bay decreases with this becoming increasingly dominated by larger (>10m) vessels. If the current trend in reducing number of vessels continues (416 vessels in 2015 to 253 vessels in 2022), then the number of vessels fishing in Lyme Bay by 2028 would be 122. The reduction in vessels fishing for sole is expected to be largely made up by a reduction in the under 10m vessels, with an estimated reduction of 34 over 10m vessels and 88-89 under 10m vessels[2]. This leaves 87 over 10m vessels and 44-45 under 10m vessels fishing for sole in 2028. This suggests an increase in the proportion of vessels made up by over 10m vessels to 66%.

[2] Based on a reduction from 166 to 121 over 10m vessels, i.e. 45 over 8 years or 5-6 per year extrapolated to 2028 to give a further reduction of 34 vessels to 87. For under 10m vessels, the change is 250 to 132, i.e. 118 over 8 years or 14-15 vessels per year, extrapolated to 2028 to give a further reduction of 88-89 vessels to 44-45.

The number of days at sea has also been decreasing for the CIC netters, by 20% since 2011, and 43% since 2017, suggested an accelerated decline over time. These decreases in number of days at sea will see days at sea reduced by 62% to 2028[3], linked to the issues raised above in relation to gear conflict, damage and loss. LPUE has increased within Lyme Bay for demersal otter trawls, remained roughly steady for beam trawls and dredges, but declined for set nets. In the wider 7.e rectangle, LPUE has increased for all gear type since 2015. The need for increased effort within Lyme Bay may disproportionately affect the under 10m vessels.

Cefas data finds that there has been a decline in catch per unit effort for set nets when fishing in Lyme Bay, while there has been an increase in catch per unit effort when fishing in wider 7.e (see Figures 23 and 24). There is also an increase in catch per unit effort for all other gears both inside and outside Lyme Bay. If this decline continues then by 2028 the catch per unit effort for set nets when fishing in Lyme Bay will have fallen by 67%. This compares with an increase in catch per unit effort for set nets when fishing in wider 7.e of 31%. If the timeline considered for this trend is shortened to 2017 to 2022, then projected to 2028 (to take account of the quota increase), then the decrease in catch per unit effort for set nets in Lyme Bay is 37%. This compares with an increase in catch per unit effort for set nets in wider 7.e of 21%.

[3] Based on 20% reduction over 6 years increasing to 43% over the following 6 years (+23%), so for a further 5 years the reduction would be another 19% (23% ÷ 6 x 5)

Figure 23: Catch per unit effort by gear type when fishing in Lyme Bay (produced using Cefas data), data from 2001 to 2022.

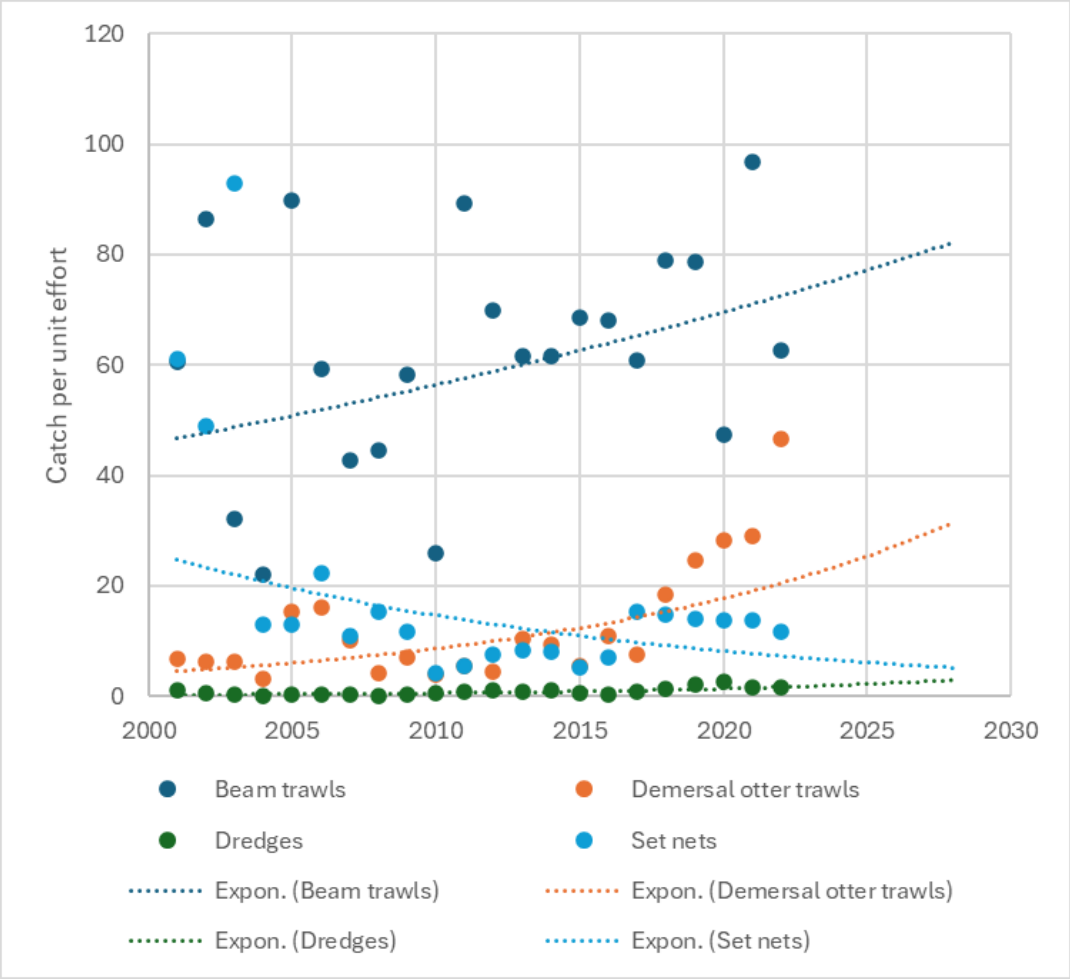
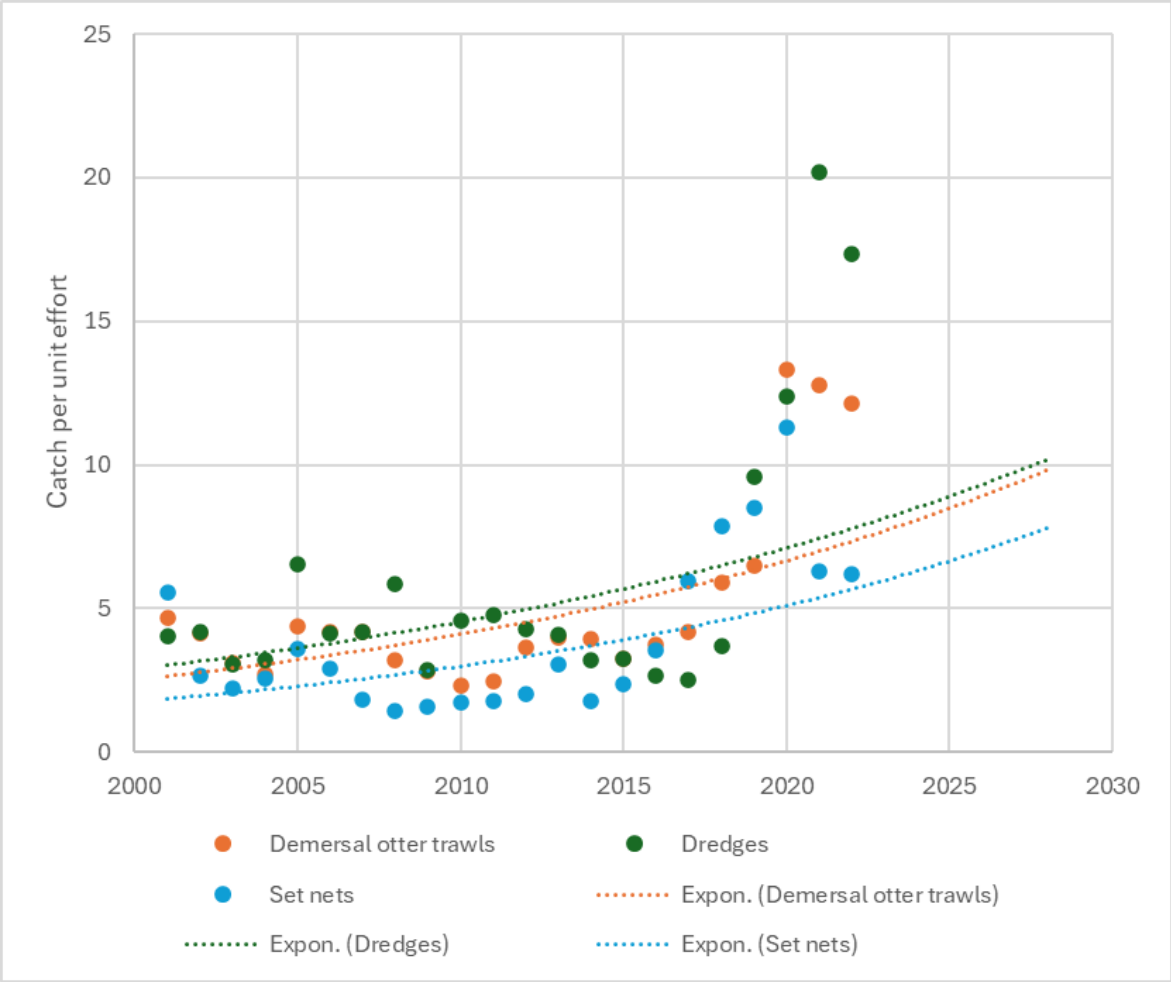


Figure 24: Catch per unit effort by gear type when fishing in wider 7.e (produced using Cefas data), excludes beam trawls to enable the increase in other gears to be more clearly seen, data from 2001 to 2022.



The impact of decreasing numbers of days at sea is expected to affect profitability for the smaller vessels and is one of the reasons for the number of smaller vessels that stop netting for sole. Reductions in profits have been seen for all vessels between 2017 and 2020 and increased conflicts, reduced number of days at sea and/or reduced landing per unit effort are expected to continue such that pressure on profitability is expected to increase. Vessels in the Lyme Bay CIC group showed a reduction in operating profit in 2021, with this being lower than in 2011. This trend is expected to continue with pressure on profitability being another reason behind the reduction in number of under 10m vessels fishing in Lyme Bay by 2028.

6.4 Environmental impact

Reduction in fishing activity by smaller vessels may reduce environmental impact to some degree, but this is likely to be offset by increased activity by larger vessels. Trawling continues to be the most efficient method to catch sole (as LPUE) so impacts on bottom habitats are expected to increase overall. There is an increased

risk that dredges continue to dredge for sole or increase bycatch from scallop dredges due to the limited selectivity of that gear. This is likely to increase conflicts with environmental groups and recreational anglers due to perceived impacts on fish stocks and bottom habitats.

The average size of sole fish landed is expected to continue to decrease, with this potentially leading to pressure on sole stocks (although this would need to be assessed as part of quota decisions). The reduction in size of sole is likely to result in a reduction in value of landings, although this could be offset by a continued increase in the price of sole. However, trends from 2015 to 2023 suggest this increase could be levelling off and so continued increase of sole price at the same rate as from 2015 to 2022 may not be seen through to 2028.

6.5 Fisher relationship

It is projected that under the counterfactual scenario, that there will be continued and increasing dissatisfaction with MMO due to impacts on smaller vessels associated with fish landings, profitability, and gear conflicts. In addition, there are more conflicts between commercial and recreational anglers due to perceived impacts on fish stocks, although larger vessels which will predominate as smaller vessels are forced out of the fishery, meaning there is less pressure nearer to shore. Fisher to fisher relationships amongst the skippers of smaller vessels are maintained and may be strengthened due to increase in stress that they face individually such that they are expected to continue to work together, including through Lyme Bay CIC to lobby MMO for measures to be imposed. This will result in increased costs to MMO in terms of engagement, at a time when relationships are degrading.

The MMO has separately conducted a process evaluation to capture lessons learned from the development of the Lyme Bay fisheries management measures, to support the MMO's future approach to collaborative fisheries management with fishers (see MMO1406 Final Report, forthcoming).

7. Conclusions and next steps

7.1 Conclusions

Evaluation framework
The evaluation framework and associated ToC for the study provide a basis for future impact evaluations to begin to consider the impacts of the new management measures introduced within Lyme Bay.

Baseline
The baseline provides a snapshot of the current state-of-play of sole fishing in Lyme Bay, and insight into the trends surrounding it. Future evaluations will be able to use the figures in the baseline section of this report to draw an immediate understanding of the issues at hand.

To surmise the baseline, the quota rises in ICES area 7.e have led to the identification of a number of trends that could be worrying for CIC fishers, and <10 fishers more widely, within Lyme Bay, and 7.e at large. Since the uplifts began, <10 vessel operators (typically netters), are increasingly expending more and more effort for an ever-decreasing amount of sole, whilst large, >10 vessels (typically trawlers from Brixham and Mevagissey) are increasing their landings per unit effort significantly over the same period.

The fishing fleet in 7.e is shrinking rapidly, reducing from 416 vessels fishing for sole in 2015 to 253 vessels in 2023; this is despite greater landings (in tonnes) than ever before, indicating that >10 vessels are rapidly increasing their share of landings of sole. Simultaneously, in addition to the challenge of having to contend with larger vessels fishing the same stocks, <10 CIC fishers have reported challenges in netting for sole, due to difficulties in finding safe spaces to shoot nets, leading to concerns about gear loss, ghost fishing, and stock impact. On the latter point, the average size of sole landed has shrunk year on year since the quota uplift, which over a longer period of time, could see impacts on the maximum sustainable yield of the stock and potential cause stock impact.

It is in this set of circumstances that CIC fishers have seen their profits decrease continually year on year since 2017, and in 2021 their operating profits were lower than they were in 2011. This is despite the total sole landings across the entire fleet rising 102% between 2015 and 2022, to 985 tonnes in 2022.

Counterfactual
The counterfactual projects forwards trends seen in the baseline data to 2028, with a five year extrapolation used (from 2023) to reflect the timeframe over which baseline data were available. The counterfactual provides a narrative of the situation in 2028 and represents a theoretical situation that could exist without any management measured being implemented. Key issues seen in the baseline data are expected to continue resulting in smaller vessel skippers (<10) experiencing increased levels of stress and operating costs due to gear conflict. This, alongside an estimated reduction in days at sea of 62% and reduction in catch per unit effort of 67%,

increases financial difficulties for smaller vessels and more of them are expected to stop netting for sole by 2028.

It is estimated that around 45 under 10m vessels would be fishing for sole in 2028, reduced from 250 under 10m vessels in 2015, and from 132 vessels in 2022. Landings at Axmouth, Beer, Lyme Regis and West Bay continue to decrease as a result. Landings of sole thus become dominated by the >10 vessels at Brixham and Mevagissey.

This combination of changes is expected to result in continued and increasing dissatisfaction with MMO due to impacts on smaller vessels, which may result in increased lobbying to MMO for measures to be imposed. This will increase engagement costs to MMO at a time when relationships are degrading.

It is important to note the counterfactual is based on limited data, both in terms of comprehensiveness of impacts, and timeframes. In addition, trends were not always clear, with the influence of recent external factors such as Brexit and Covid potentially affecting the datasets. Thus, the conclusions drawn look to combine qualitative narrative on impacts (e.g. from MMO consultation activities) as well as secondary datasets, to provide the counterfactual. Since the MMO consultation was only able to contact a subset of the affected population, there may be some views that are not represented. This, with the data coverage issues, means that counterfactual is uncertain and is presented as one potential theoretical scenario of the future without the management measures.

7.2 Recommendations and next steps

The study provides the basis for undertaking the impact evaluation of the new management measures. As the management measures become established and take effect, impacts can be compared against the counterfactual, to assess the benefits that have been delivered. This will require on-going data collection against the indicators for each evaluation question and some primary data collection through engagement with fishers to elicit their views on the measures and how these may be helping to address the pressures seen in the baseline and projected forwards in the counterfactual.

It is recommended that MMO begin to think, at the earliest possible point, about a future impact evaluation, so that data can be gathered in advance of going to tender and/or in advance of a contract award. This study experienced delays in data gathering which limited time allowed for analysis, which could be mitigated by earlier data gathering. Gathering data against the indicators proposed in this study and identifying where gaps in current data gathering exist, would be important to know in advance of a study. In addition, MMO should seek to engage with fishers, through Regional Fishing Groups (RFGs) and the Lyme Bay CIC, prior to the kick off of an evaluation, to ensure fishers know they will be asked to interview and to participate in a future study. For instance, a number of evaluation sub-questions will only be answerable through engagement, and getting fishers and other relevant stakeholders thinking about these questions in advance would be really beneficial to any future impact evaluation.

It is suggested that an impact evaluation is not commenced until January/February 2025. This will allow a full year of 2024 data to be undertaken (for comparisons against the baseline and counterfactual, and post implementation of the measures in November 2023) to be provided to MMO and/or a potential contractor. A significant amount of data provided for this study was on an annual basis, and as such it may not be feasible to conduct an impact evaluation beforehand. This evaluation would likely require the following (an indicative budget is provided):

- Inception meeting - £1,000
- Refreshing the ToC and Evaluation Framework - £2,000
- Secondary data collection and gap analysis - £6,000
- Engagement with fishers - £25,000
- Analysis - £10,000
- Reporting - £10,000
- Total: £50,000-£60,000.

These figures are estimates and should not be taken as an offer or as verified financial calculations. They depend on a multitude of factors, such as the agreed number of interviews, the geographical spread of them, whether slide packs are needed after, whether the ToC actually needs refreshing through a co-development workshop with MMO, to name but a few.

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9. Data underpinning the baseline and counterfactual

The datasets which provide the basis for the baseline and counterfactual have been provided to the MMO in a separate excel workbook.