Endangered, Threatened & Protected (ETP) Species

Risk Management Strategy

Southern IFCA Inshore Fisheries and Conservation Authority

DORSET WILDLIFE TRUST

Poole & District Fisherman's Association

noctiluca marine

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Endangered, Threatened & Protected (ETP) Species Risk Management Strategy

The Endangered, Threatened & Protected (ETP) Species Risk Management Strategy has been produced as part of the Poole Clam & Cockle Partnership Project between the Southern Inshore Fisheries and Conservation Authority, Dorset Wildlife Trust, The Poole & District Fisherman's Association and Noctiluca Marine funded by the Marine Stewardship Council's Ocean Stewardship Fund.

Report Authors: Birchenough, S. and Bateman, P., Southern Inshore Fisheries and Conservation Authority

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There are multiple processes, laws and institutions which seek to address the vulnerability of different species of flora and fauna. There are different terms used to refer to this group of species, however the aim of identifying these species is the same, to ensure that they can be protected from direct and indirect impacts.

The term Endangered, Threatened & Protected (ETP) Species is the term used by the Marine Stewardship Council and refers to those species which are protected under national legislation and international listings[1]. International listings classifying ETP species include the Convention on International Trade in Endangered Species (CITES)[2] and the Convention on the Conservation of Migratory Species of Wild Animals (CMS)[3]. More specific legislation detailing protected species and habitats for the UK and Europe includes Council Directive 92/43/EEC of 21 May 1992 on the Conservation of Natural Habitats and of Wild Fauna and Flora[4] and Directive 2009/147/EC of the European Parliament and of the Council of 20 November 2009 on the Conservation of Wild Birds[5], both of which are applied to the UK through The Conservation of Habitats and Species Regulations 2017[6] and The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019[7].

For this Risk Management Strategy, consideration is being given to ETP species in a marine context and the potential for interaction with fishing activity. The International Union of Conservation of Nature (IUCN) is in the process of assessing the global conservation status of 20,000 marine species and to date has identified that approximately 11% of all marine species assessed (over 14,000) have an elevated risk of extinction, being classified on the IUCN Red List of Threatened Species as Critically Endangered, Endangered or Vulnerable[8]. Protection of ETP species in the marine sector has become increasingly important, particularly with a move towards an Ecosystem-Based Management (EBM) approach for marine resources (Powles *et al.,* 2000, Lew, 2015). ETP species protection is also recognised through the process of ecolabelling, such as through the Marine Stewardship Council. Ecolabelling is becoming increasingly demanded by international markets and provides an independent certification of the sustainability of a particular fishery (Ruiz *et al.,* 2021). ETP species protection is incorporated into certification principals and standards for the assessment of fisheries to ensure that fisheries aiming to meet the requirements of certification are considering sustainability of the wider marine environment and are managed appropriately to minimise negative interactions and where appropriate, promote species recovery. The ability for a fishery to meet these requirements

[1] https://www.msc.org/what-we-are-doing/protecting-endangered-species
[2] https://cites.org/eng
[3] https://www.cms.int/en/species
[4] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:31992L0043
[5] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32009L0147
[6] https://www.legislation.gov.uk/uksi/2017/1012/contents/made
[7] https://www.legislation.gov.uk/ukdsi/2019/9780111176573
[8] https://sites.wp.odu.edu/GMSA/initiatives/gmsa/

requires a robust and systematic method of reporting and analysis with the ongoing audit of certified fisheries acting as an annual check ensuring that such processes are being adhered to (Ruiz *et al.,* 2021).

1.1 Fishing Activity and ETP Species

The EBM approach to management of marine resources has, in recent history, become a focus for fishing activity. EBM in the context of fisheries has been formalised since 2001 when 45 countries pledged to include consideration of the wider marine ecosystem in the process of developing fisheries management at the Reykjavik Conference on Sustainable Fisheries in the Marine Ecosystem (Bianchi, 2008). The main aim of EBM is to have a holistic approach to managing fishing activity, where the interplay between fishing and other ecosystem components can be identified, monitored and managed (Link, 2002; Pikitch *et al.,* 2004). Implementing EBM however is complex and there have been both benefits and challenges identified (Christie *et al.,* 2007; Armada *et al.,* 2009; Alsolami *et al.,* 2020; Karim *et al.,* 2020). Key considerations which have emerged include the ability to monitor successes and failures in the protection of the marine environment for individual fisheries, the need for quantified scientific evidence and a clear definition of fishery objectives that reflect biological, social, political, and economic considerations.

One of the key parameters identified as being a challenge to EBM in a fisheries context is the problem of interactions between fishing activity and non-target species which fall under the definition of ETP species (Lew, 2015; Gray and Kennelly, 2018). Interactions between fisheries and ETP species can occur where there is overlap between a fishing activity and the distribution of the ETP species (Mackay *et al.,* 2016). Interactions can occur through incidental capture, entanglement in fishing gear, collision with the fishing gear or vessel or alterations in behaviour such as feeding (Mackay *et al.,* 2016; Miller *et al.,* 2016). The consequences of the interaction depend on the type of fishing gear, the nature of the interaction and the species involved (Mackay *et al.,* 2016).

There is increasing recognition of the need for management bodies and authorities to be able to report on levels of interactions, the species concerned and the outcome (i.e., survival, injury, mortality) in order to be able to adequately assess the impact of various activities within the marine sector and develop suitable risk assessments (Beaudreau *et al.,* 2011; Gray and Kennelly, 2018). This type of data is key in determining how fisheries can operate sustainably but is often missed from many fisheries, especially those where the ETP species in question are not ones which are likely to stimulate large scale public concern, i.e., large marine mammals (Gray and Kennelly, 2018). There are additional challenges in collecting data on ETP species, the primary one being a lack of reporting by the fishing industry given the perception of negative outcomes to their activity resulting from any interactions taking place (Gray and Kennelly, 2018). This has led to the main body of data on ETP interactions coming from observer programs (Gray and Kennelly, 2018), however such programs are resource intensive and place a burden on fisheries managers. This resource burden can result in data being collected infrequently and at a scale which is not appropriate for the fishing activity being managed. Where the implementation of fisheries management has to be based on limited data, in the context of environmental protection management bodies are often required to be precautionary in their management. Where knowledge is insufficient to determine that there will be no impact from

fishing activity on the marine environment, robust and precautionary measures should be used which favour the achievement of ecosystem objectives (Pikitch *et al.,* 2004).

The use of precautionary management, necessitated by limited or absent data, can have a particularly large effect on small-scale fisheries (Auster, 2001). Small-scale, inshore fisheries are though to employ 90% of the world's fishers (Davies *et al.,* 2018), however management and data collection of these fisheries is often secondary to that of large-scale, offshore fleets where there is greater resource availability (Bald and Borja, 2002). It is recognised that the potential impact of poor regulation in small-scale fisheries can be serious due to their propensity to operate within important ecosystems such as estuaries (Kennish, 1986), however achieving sustainable management for these fisheries is often hampered by a lack of data specific to the particular operations of an individual activity (Honey *et al.,* 2010). In addition, the tools available to analyse data are often less sophisticated and detailed assessments of impacts between the fishery and the marine environment based on modelling approaches (Winship *et al.,* 2013) are often prohibitive for the small-scale, inshore sector (Honey *et al.,* 2010; Fujita, 2021). In order to ensure that small-scale, inshore fisheries can be assessed and managed sustainably, there is a need to consider methods of data collection which can provide data specific to the scale of operation of the fishery, can be quantitatively used to assess risk and which are within the resource capabilities of relevant management bodies.

1.2 Data Collection on ETP Species Interactions

There are some existing examples of how interactions between fishing activity and ETP species are managed in different types of fisheries around the world (Mackay *et al.,* 2016; Miller *et al.,* 2016).

Self-recording of interactions with ETP species by fishers is a common method used in management, where, if an interaction takes place, fishers are required to provide information on details relating to the interaction (Mackay *et al.,* 2016; Miller *et al.,* 2016). This information often includes geographical location, fishing gear used, and species involved as well as a description of the nature of the interaction. The observed status of the species is also recorded as well as the fate of the individual (Mackay *et al.,* 2016). This data is collected on a periodic basis (e.g., monthly) and can be linked to other data sources such as logbook returns for individual fishers (Mackay *et al.,* 2016; Miller *et al.,* 2016). Some fisheries, for example those in South Australia also have a process of quality assurance through which any missing information is identified by the management body and is followed up with the fisher (Mackay *et al.,* 2016).

Previous studies have identified however that there are challenges posed by fishery-dependent data which should be considered in the implementation of a reporting program. It is noted for example that an increase in reports may be indicative of both an actual increase in interactions but also an increase in reporting as a result of improved education and awareness on the part of the fishers (Mackay *et al.,* 2016). In contrast, low level reporting may be indicative of low numbers of interactions or may also be a result of an unwillingness to report, often stemming from a lack of understanding of why the data is required and how it will be used (Mackay *et al.,* 2016). It is therefore identified that a method of assessing fishers' inputs through fishery-independent data is beneficial in quality assuring fishery-dependent data, allowing for the collection of the latter with increased confidence that the results are

representative of the true situation. The Maldivian pole and line fishery is an example of a fishery which has initiated an observer program with a local scientific establishment to conduct bycatch sampling to help provide robust data to support that which is provided by fishers (Miller *et al.,* 2016). Additional benefits of the observer program were also identified, including the ability to get a greater understanding of fishing practice and locations and help improve relations with fishers and awareness of responsible fishing practices (Miller *et al.,* 2016).

Analysis of data on ETP interactions is often carried out in terms of calculating interaction rates as a number of interactions per fishing operation per specified time period (Mackay *et al.,* 2016). The data can then be compared as a time-series to identify any trends and geographical information can be used to indicate if trends in the data can be related to fishing in a specific area. It is identified that comparison of ETP interactions between different fisheries should not be carried out due to the difference in deployment of fishing gear and fishing method as well as differences in fishing effort (Mackay *et al.,* 2016). In addition, where very low interaction rates are observed, it has been suggested that data on interactions should be analysed at as fine a spatial scale as possible as extrapolation from rare interaction events to the wider fishing area would give an incorrect impression of the scale of impact from fishing activity (Miller *et al.,* 2016). This highlights the importance of developing monitoring, reporting and analysis methods for ETP species which are specific to an individual fishing activity and the site in which it operates. It has also been identified that data on ETP interactions is enhanced when other sources of data are available which can help indicate why particular trends are being seen. Catch data, fishing effort data and wider information on environmental change, are all supporting data sources which can be utilised to help identify factors resulting in trends in data.

From reviewing fisheries where methods of collecting data on ETP interactions with fishing activity have been trialled, there are a number of common areas which are highlighted as important to a successful management program. These include, validation of fishery-dependent reporting using fishery-independent observations, improving fishers' identification of ETP species, improving the detail of information required in interaction reports and identifying proximity of ETP species to fishing locations (Mackay *et al.,* 2016).

1.3 Applicable Principles of Fisheries Management

The management of fisheries has developed rapidly over the last decade, and there are several alternative approaches to traditional stock-based fisheries management which can be utilised in the development of a management framework for ETP species. EBM has been discussed above as being strongly linked to ETP species management in defining conservation objectives for a fishery, however achieving these objectives will require the adoption of principles from other management types such as adaptive management and co-management.

Adaptive management allows for management to be reactive to change in the system, allowing for emerging negative impacts to be addressed and for management to evolve in response to the marine environment and/or fishing practice (Pikitch *et al.,* 2004; Heltzel *et al.,* 2011). This approach requires the establishment of an explicit feedback loop between data and the management process and the

use of management measures which are able to be changed in response to changes in the system in a timely manner, i.e., the use of permit conditions rather than a stand-alone byelaw (Agardy, 1994; Pikitch *et al.,* 2004). A study of US groundfish fisheries identified that the absence of a suitable feedback loop created an evidence gap in the ability to evaluate the effectiveness of management measures designed to mitigate impacts from the fishery on ETP species (Heltzel *et al.,* 2011), thus the application of the principles of adaptive management can not only address change in the system but also identify management successes in a quantified way.

Utilising an adaptive management approach allows managers to better find the balance between precaution and being proportionate (Heltzel *et al.,* 2011) but also further emphasises the importance of good quality scientific data, as the knowledge of the system is integral to the ability of fisheries managers to identify changes and react appropriately. Recognising when changes to management are required relies on the ability to use the data collected to define reference/trigger points which initiate an action pathway (Hoggarth *et al.,* 2006). The issues faced by small-scale, inshore fisheries regarding limited data inputs often prevents trigger points being defined using modelling techniques. However, the ability to define empirical trigger points is feasible for the majority of small-scale fisheries, with other studies identifying this method as being appropriate when a fishery is data-limited (McDonald *et al.,* 2018). In this way, trigger points can be set using simple sources of data, for example a number of interactions with ETP species, ideally collected over at least a two-year period. Limited data collection does not therefore have to eliminate the ability for small-scale fisheries to use an adaptive management approach and allows for the utilisation of data sources and collection methods which are available to resource limited management bodies. The process can also be iterative, where improvements in data collection over time can allow for an increasingly sophisticated management response (Hobday *et al.,* 2011). The final stage in the adaptive management process is to identify appropriate management measures which could address any negative impacts and use these as control rules, the modification of which is linked to action pathways stemming from trigger points being reached. Common management measures utilised in the protection of species from fishing activity include temporal and spatial restrictions on fishing effort and restrictions on the type and use of fishing gear (Heltzel *et al.,* 2011).

The feedback aspect of an adaptive management approach also allows for stakeholder involvement in the process. Participation of stakeholders is becoming increasingly recognised as key in all fisheries management development, particularly with a move towards the implementation of co-management systems. Stakeholder participation in managing risk to a fishery, such as the risk of interactions with ETP species, is important in providing both quantitative and qualitative inputs (Hobday *et al.,* 2011), the latter providing contextual information to the former. Stakeholder input in the management process also increases the chance of positive uptake of management measures by the affected group which in turn increases the chance of achieving long-term compliance with regulations (Hobday *et al.,* 2011; Birchenough, 2019). In developing a management strategy, it is important that the process, data inputs and resulting discussions are transparent and easy to understand. Understanding how stakeholders perceive conservation aims for an activity is thought to be particularly important where the species being protected is not always visible or observable by the wider public and therefore the main conservation aims can only be achieved through willing participation by the stakeholders directly involved in the activity (Beaudreau *et al.,* 2011). Fishing is a good example of this, with accuracy of data provided to inform management dependent on the ability of fishers to recognise and identity the species that require management (Beaudreau *et al.,* 2011). In developing a risk-based framework for

Australian fisheries, it was determined that stakeholders may require repeated exposure to processes associated with management development and that multiple opportunities for participation should be provided in order to develop their understanding (Hobday *et al.,* 2011).

This risk management strategy for ETP species has been developed in consideration of delivering an adaptive management approach which incorporates significant stakeholder involvement and elements of co-management through the promotion of fishery-dependent data collection. The Poole Clam & Cockle Partnership Project provides a case study for the development of ETP species management in a Marine Stewardship Council (MSC) certified dredge fishery operating within a Marine Protected Area (MPA). The outcomes of this project are presented in this report, illustrating how the fishery utilised different elements such as education, monitoring and reporting through both fishery-dependent and fishing-independent methods and innovations that contribute to mitigation of impacts, to build a strategy for managing interactions between fishing activities and ETP species. This resulting risk management strategy aims to be applicable to other fisheries, particularly in the small-scale (<10m), inshore sector where fishing activity overlaps with conservation features to provide an adaptive method of management which can be used to quantitatively demonstrate how the fishery is working towards achieving conservation objectives. The resulting strategy also aims to provide guidance to fisheries in the process of or looking to start the process of becoming certified under an ecolabelling scheme such as MSC.

The production of this risk management strategy also aims to provide wider benefits. Management of fishing activity in the UK is in the process of undergoing a period of advancement with the introduction of The Fisheries Act 2020 ('The Act'), created in response to EU Exit. The Act sets out eight Fisheries Objectives for the UK's four national fisheries policy authorities to meet, the third of which is *Ecosystem – an-ecosystem based approach to management is used, and bycatch of sensitive species is minimised and, where possible, eliminated*. One of the aims therefore of the risk management strategy is to assist in the wider process of developing Fisheries Management Plans which are to be required for the fisheries in the UK, with the implementation of a similar strategy providing a robust method of illustrating how a fishery can minimise and potentially eliminate risks to ETP species, thus allowing fisheries to work towards meeting the Fisheries Objectives of The Act.

2. Poole Harbour Case Study

2.1 The Fishery

The Poole Harbour dredge fishery for shellfish uses a fishing method unique to Poole Harbour, the pump-scoop dredge, to harvest shellfish species from small (<10m), shallow-drafted vessels (Jensen *et al.,* 2005) (Figure 1a). The dredge consists of a toothed dredge basket which is towed through the seabed alongside the vessel, attached to the front end of the dredge are a series of water jets which direct a flow of water to the rear of the dredge basket (Jensen *et al.,* 2005) (Figure 1b). The water jets, powered by a hydraulic pump from the vessel, allow sediment to be moved through the dredge basket (Jensen *et al.,* 2005).

The fishing method involves towing the dredge in a circular motion with each tow lasting from 2-5 minutes depending on the nature of the seabed. After each tow, the dredge is lifted into the vessel and the contents emptied onto a metal frame with set bar spacing for sorting. Fishers must sort their catch immediately and return all shellfish under the set minimum conservation reference size (MCRS) to the sea.

The fishery is regulated through the Poole Harbour Dredge Permit Byelaw which creates a requirement for a permit in order for a fisher to use, retain on board, store or transport a pump-scoop dredge within Poole Harbour. The fishery is a limited entry permit system with 45 permits currently issued on an annual basis. Technical measures for the fishery are then delivered through permit conditions with measures specifying the construction and use of the fishing gear, spatial and temporal restrictions on dredging activity and a requirement to submit catch data. A copy of the permit detailing specific conditions can be viewed on the Southern IFCA website[9].

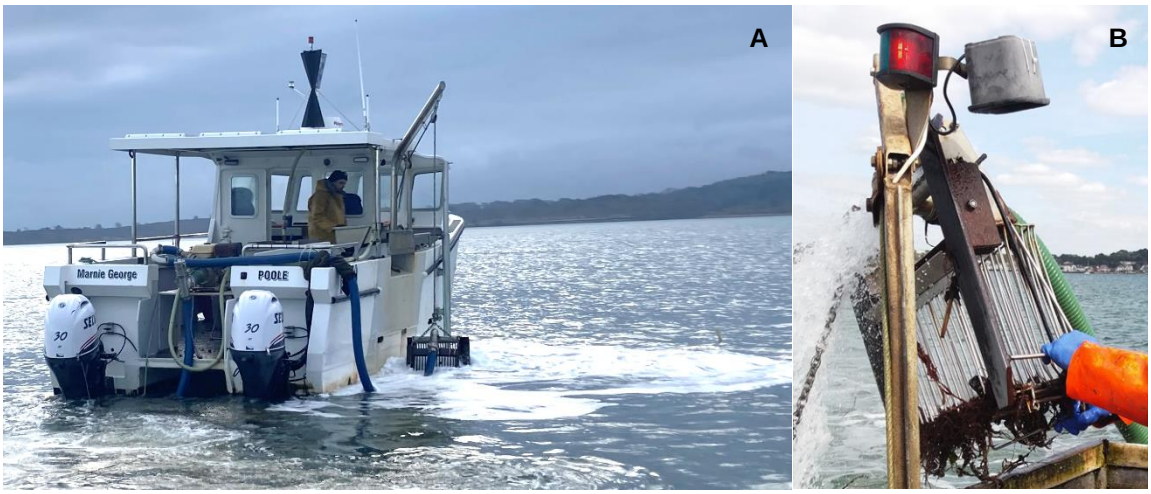


Figure 1: *a) a permitted vessel in the Poole Harbour dredge fishery operating a pump-scoop dredge, b) the pump-scoop dredge*

[9] https://secure.toolkitfiles.co.uk/clients/25364/sitedata/Redesign/Poole_Hrbr_D_Permit/Poole-Hrbr-D-Permit-Conditions.pdf

The fishery has been operating under the Byelaw since 2015 and data is collected for each fishing season based on the monthly catch returns which permitted fishers are required to submit. Data is collected on fishing effort (hours fished and catch per unit effort, as kg shellfish per hour) and quantities of shellfish caught to the spatial level of 11 fishing zones defined for the Harbour. Additional data is collected annual through the Poole Harbour Bivalve Stock Survey identifying population trends in commercially important bivalve species.

In 2018 the fishery achieved a global first by being the first fishery to be simultaneously certified under the Marine Stewardship Council certification and the Seafish Responsible Fishing Scheme.

2.2 Poole Harbour

Poole Harbour is located on the south coast of the UK in the county of Dorset and is one of the largest lowland estuaries in Europe (Humphreys and May, 2005). The Harbour has a large variety of different habitats which result from a combination of its size, estuarine characteristics and the mix of intertidal and subtidal zones (Humphreys and May, 2005). Approximately 80% of the total area of the Harbour is intertidal consisting of mudflats and sandflats with fringing saltmarsh and reedbed habitat (Gray, 1985). Seagrass habitat is also found in the intertidal and subtidal parts to the north-east of the Harbour (Humphreys and May, 2005). The diversity of habitat types creates a diverse infaunal community and a highly productive environment rich in suspension feeding, grazing and deposit feeding species (Dyrynda, 2005).

The diverse and productive marine ecosystem in the Harbour contribute to it being defined as an MPA. Poole Harbour is designated as a Special Protection Area (SPA) under the EU Birds Directive, a Site of Special Scientific interest (SSSI) under the Wildlife and Countryside Act (as amended) 1981 and a Ramsar Site under the Convention on Wetlands of International Importance. The SPA designation qualifies Poole Harbour as part of the UK National Site Network.

2.3 The Poole Clam & Cockle Fishery Partnership Project

The project was funded by the Marine Stewardship Council's Ocean Stewardship Fund and centred around progressing the condition placed on the fishery by the MSC certification relating to the management of fisheries with regard to ETP species. In working to achieve this condition, which was signed off in 2020, the Poole Harbour Clam & Cockle Fishery Group (consisting of Southern IFCA, the Poole and District Fishermen's Association and Dorset Wildlife Trust) saw that there were shared benefits in continuing the partnership in order to facilitate further improvements to the fishery. The project was designed to drive performance, promote further innovation in the fishery and enable this work to be communicated widely with others.

The aims of the project were to:

- Establish a co-management system to support fishers in minimising interactions with ETP species
- Widen knowledge of ETP species in Dorset

- Improve awareness of the positives of fishermen as sentinels
- Provide a blueprint and supporting information for other fisheries aiming for MSC certification

The project worked toward meeting these aims through four strands:

- Identification and Education
- Monitoring and Reporting
- Innovation in mitigation methods
- Developing a Risk Management Strategy

2.4 Project Results

2.4.1 Identification and Education

In order to increase reliability in fishery-dependent data collected on ETP interactions and in data collected from other sources such as officers of the management authority there was a need to improve understanding of what ETP species occurred in the site, how these are identified, areas where different species are likely to be found and how data collected on interactions would be used by the management authority.

Stage 1: What ETP Species are present?

The first stage in this process involved the identification of ETP species likely to be present in Poole Harbour and the wider coastal area.

Firstly, the project identified what was meant by an ETP species using the Joint Nature Conservation Council's (JNCC) designated species spreadsheet[10] and the Marine Recorder taxon list. This resulted in a list of 991 species which were included on one or more of the following lists:

- Bern Convention (Appendices 1, 2 and 3)
- Bonn Convention – Convention on the Conservation of Migratory Species (Appendices 1 and 2, AEWA, ASCOBANS, EUROBATS)
- Biodiversity Action Plan (BAP) UK priority species list
- Birds Directive (Annexes 1, 2.1 and 2.2)
- Birds of Conservation Concern (Red/Amber list and not based on IUCN criteria)
- Convention on Migratory Species
- EC CITES (Annexes A, B, C and D)
- Global Red list status
- Habitats Directive (Annexes 2, 4 and 5)
- Nationally Rare/Scarce (not based on IUCN criteria)
- Nationally Scarce and Nationally Rare Species (also with an IUCN status)
- National Red Lists (this includes red listings based on pre-1994, 1994 and 2001 IUCN guidelines)

[10] https://hub.jncc.gov.uk/assets/478f7160-967b-4366-acdf-8941fd33850b

- OSPAR
- Species of principal importance in England (NERC section 41 and 42 lists
- The Conservation of Habitats and Species Regulations 2010 (Schedule 2, 4 and 5)
- The Wildlife and Countryside Act 1981 (Schedule 1, 5 and 8)

This list was cross matched with species records on the Dorset Marine Biodiversity database which have been recorded in Poole Harbour, resulting in:

- 8 bird species which are designated features of the Poole Harbour Special Protection Area (SPA) and the additional species which form the waterbird assemblage which is cumulatively listed as a feature of the SPA (total 18 species)
- 78 non-bird species

The non-bird species list was then refined by removing non-native species, plants and algal species which occurred above the intertidal limit and therefore have no risk of interaction with fishing activity, species that appeared on the IUCN Red List classed as 'least concern' which appeared on no other list and were also commercially targeted species, and species where the location did not overlap with fishing activity and therefore there was no risk of interaction. This resulted in 10 species being identified for inclusion in the education and outreach work of the project. The bird and non-bird ETP species which were taken forward as part of the education and outreach phase of the project are listed below.

ETP Bird Species

- Avocet (*Recurvirostra avosetta*)
- Black-tailed godwith (*Limosa limosa islandica*)
- Common tern (*Sterna hirundo*)
- Cormorant (*Phalacrocorax carbo*)
- Curlew (*Numenius arquata*)
- Dark-bellied brent goose (*Branta bernicla*)
- Dunlin (*Calidris alpina*)
- Eurasian spoonbill (*Platalea leucorodia*)
- Goldeneye (*Bucephala calngula*)
- Greenshank (*Tringa nebularia*)
- Little egret (*Egretta garzetta*)
- Mediterranean gull (*Larus melanocephalus*)
- Pochard (*Aythya farina*)
- Red-breasted merganser (*Mergus serrator*)
- Sandwich tern (*Sterna sandvicensis*)
- Shelduck (*Tadorna tadorna*)
- Spotted redshank (*Tringa erythropus*)

ETP Non-Bird Species

- Atlantic salmon (*Salmo salar*)
- Common/European sturgeon
- European or common eel (*Anguilla anguilla*)
- Sea lamprey (*Petromyzon marinus*)
- Sea trout (*Salmo trutta*)
- Twaite shad (*Alosa fallax*)
- Allis shad (*Alosa alosa*)
- Common seal (*Phoca vitulina*)
- Grey seal (*Halichoerus grypus*)
- Long-snouted seahorse (*Hippocampus guttulatus*)
- Short-snouted seahorse (*Hippocampus hippocampus*)

Stage 2: Identification of proximity of ETP species to fishing activity

Following the identification and refinement of a list of ETP species on which to concentrate education and information dissemination, there was a need to identify where there is overlap or close proximity between ETP species and dredge fishing activity in order to identify areas where the risk of an interaction might be increased.

Data sources which would inform this assessment were combined and analysed visually. Figure 2 shows data collected by the management authority on locations of dredge fishing activity overlaid onto documented seal haul out locations and locations of key habitats for ETP bird and non-bird species. Habitat data for Poole Harbour is more readily available and more commonly collected than specific data on the location of individual species therefore it was determined that the location of habitats associated with ETP species would provide a suitable method of assessing where those species were likely to occur and thus the risk level for an interaction with fishing activity. Existing spatial management measures for the dredge fishery were also mapped, these include areas where dredging is prohibited at all times and areas which are closed seasonally to dredge fishing. These closure areas were defined based on knowledge of areas of the Harbour which are particularly sensitive for the bird features designated under the Poole Harbour SPA. Therefore, proximity of fishing activity to these areas also gives an indication of where there may be an increased risk of interaction between ETP bird species and fishing activity as although fishing activity has not been mapped to occur in breach of the regulations, proximity to these areas is likely to increase proximity to ETP bird species transiting to and from these areas or occupying nearby suitable habitat.

By analysing areas where there is overlap between locations where ETP species are likely to be found and fishing activity, further data collection of fishery-independent data, such as that collected in the observer program outlined in Section 2.4.2.2 below, was able to be orientated so that data would be collected from both high and low risk areas to assess if areas where ETP species are more likely to occur factors into an increase in the detection of interactions with fishing activity. In terms of utilising data collected on interactions into management of fishing activity, the ability to spatially define interaction risk allows for the development of spatial management which can achieve the aim of minimising interactions whilst not disproportionately affecting the fishing industry through large scale closures.

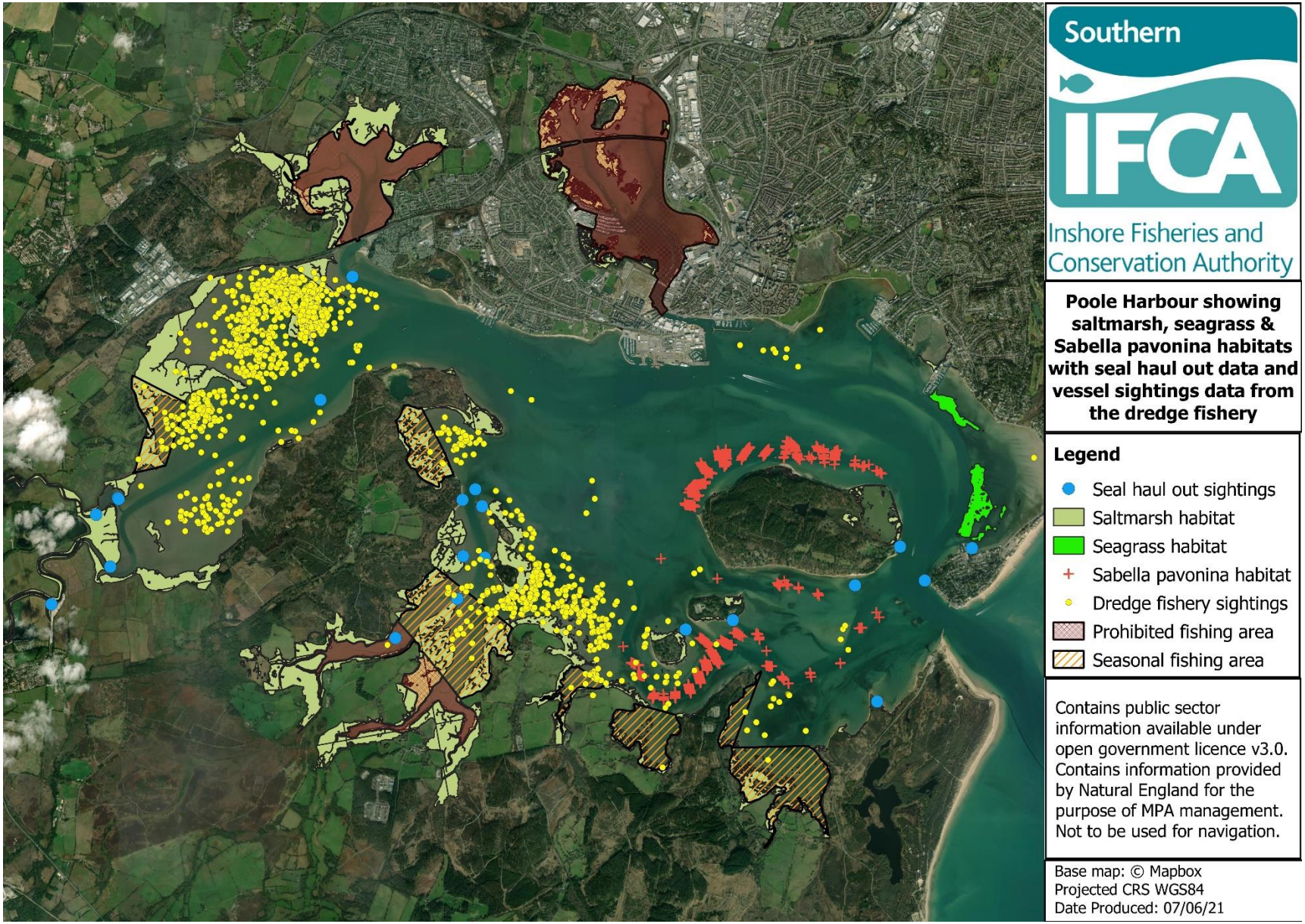


Figure 2: *Location of dredge fishing activity (yellow point) recorded by the management authority shown with seal haul out sightings data (blue point) and the location of saltmarsh (pale green), seagrass (bright green) and Sabella pavonina (red cross) habitat. Also shown are areas where year-round (red) and seasonal (orange hashed) closure areas exist for the fishery.*

Stage 3: Education

Following the identification of the ETP species to focus on, the education phase of the project was implemented utilising different methods and forms of media to deliver information to the fishing industry, fisheries managers and the wider public.

Waterproof guide for fishers (Figure 3)

12 species from the above lists were selected to be included on a waterproof, A5 information guide for fishers to use when fishing. These species are those most likely to be encountered by fishers in the dredge fishery. The guide provided clear photographs to help with identification of the species and a QR code which links to the website page detailed below.

Interpretation board (Figure 4)

Two interpretation boards were also created which included the same 12 species as the waterproof guide as well as background information about the fishery. The boards also have the same QR code as the waterproof guide which links to the website page detailed below. The interpretation boards have been installed at the main quay area where the majority of fishing vessels engaged in the dredge fishery are berthed and at a secondary berthing location which is also well used by the general public for recreation.

Dedicated ETP website page[11]

A website page dedicated to the ETP species of Poole Harbour was created for inclusion on the management authority's website. The website page provided detail of the project and ETP species in general with specific information provided on the 18 bird species and 10 non-bird species in the list above. This allows stakeholders to pursue further information sources if needed and allows the physical education materials (i.e., the waterproof guide) to be kept simple with a clear format, increasing the chance of it being actively used by those engaged in the fishery.

Social media outreach

Social media platforms for the project partners were utilised to provide information about the project to a wider audience aiming to ensure maximum reach of information relating to ETP species management with stakeholders. A dedicated ETP species week was held where two ETP species were highlighted per day with information provided on key characteristics for identification and interesting facts relating to these species within Poole Harbour.

In addition to these physical materials, a training session was also held with the employees of the management authority for the fishery. This training session provided information on the 18 bird species and 10 non-bird species including key characteristics for identification, known locations in the Harbour and what constitutes an interaction in relation to the fishery. Training was also undertaken with individual fishers as part of the observer program detailed in section 2.4.2.2 below. This training with fishers took place during fishing trips with information provided on identification, known locations of species and the information which would be required when reporting an interaction to the management authority.

[11] www.southern-ifca.gov.uk/etp-species

Figure 3: *Waterproof guide to ETP species most likely to be encountered by the dredge fishery in Poole. This guide was given to fishers to use on their vessels. A QR code is provided which links to further information on a dedicated webpage.*

Figure 4: *Interpretation board placed at strategic locations for use by fishers and the wider public. A QR is provided which links to further information on a dedicated webpage.*

2.4.2 Monitoring and Reporting

2.4.2.1 Fishery-Dependent Monitoring

Fishery-dependent monitoring of ETP species interactions in the Poole dredge fishery was developed following the initial MSC certification of the fishery in 2018 to address a certification condition. Permitted fishers within the Poole dredge fishery are required, as a condition of their permit, to provide monthly data on fishing effort and catch throughout the dredge season. In order to facilitate fisher led reporting of any interactions with ETP species in a way which would not disproportionately increasing the reporting requirement for fishers, reporting whether any interactions with ETP species had occurred was included on the monthly catch reporting form (Figure 5). This provided an initial indication, for each of the 45 permitted vessels in the fishery, whether an interaction had taken place in a given month and instructed fishers on the action to take should an interaction have taken place. This method also allowed for the collection of negative data in a quantified manner, thus providing an indication of whether existing management measures are successful which can be used to inform ongoing MSC certification requirements. The requirement to indicate no interaction also assists in showing that the fishers are actively participating in data collection. Whilst it is recognised that fishery-dependent data can be skewed by inaccurate reporting, the requirement for fishers in the Poole fishery to indicate yes or no to interactions each month serves as a reminder to consider ETP interactions in their fishing practice and reduces the likelihood that no interactions being reported is due to a lack of reporting as could be the case where only positive interactions are required to be reported on.

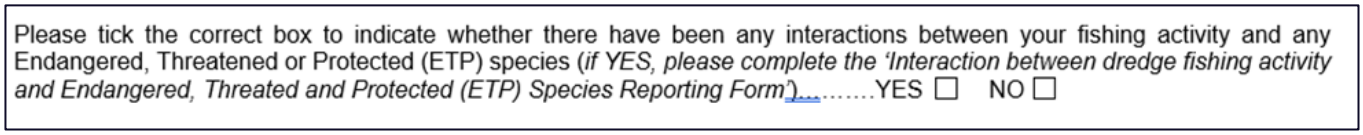

Please tick the correct box to indicate whether there have been any interactions between your fishing activity and any Endangered, Threatened or Protected (ETP) species (*if YES, please complete the 'Interaction between dredge fishing activity and Endangered, Threated and Protected (ETP) Species Reporting Form'*).....YES ☐ NO ☐

Figure 5: *Text included on the Poole Harbour Dredge Permit Fishery monthly catch return relating to interactions between the permitted vessel and ETP species. This information is submitted by permitted fishers in the fishery for each month of the fishing season.*

The second part of fishery-dependent monitoring is an 'Interaction between dredge fishing activity and Endangered, Threatened and Protected (ETP) Species Reporting Form' which fishers are required to complete if they have indicated that there has been an interaction with an ETP species during a particular fishing month. The completion of this form is a permit condition for the fishery, therefore failure to provide this information in the event that an ETP interaction occurs is a breach of the byelaw which regulates the fishery. By incorporating ETP reporting into the regulatory framework for the fishery, the management body can ensure that the information is received and utilise sanctions for failing to report. This form is shown in appendix 1 to this strategy. The form requires detailed information from the fisher on the nature of the interaction, including:

- Date, time, and GPS location
- The species involved in the interaction
- A description of the interaction
- Detail of any outcomes from the interaction, i.e., if mortality of the species occurred or if the species was able to be returned

- Any measures which the fisher is putting in place to reduce the likelihood of future interactions with that species
- Fishers are also encouraged to provide any media associated with the interaction i.e., photographs or video

The fishery-dependent information provided monthly is quality assured by the management body on a monthly basis with any fisher who has not provided the required information followed up with to ensure that the information is provided. In addition, for any fisher who indicates that an interaction has occurred on their monthly form, the management body follows up with that fisher to ensure that the more detailed interaction form is completed.

2.4.2.2 Fishery-Independent Data Collection

An observer program was developed as part of the Partnership Project and implemented in the fishery between July and October 2021 (Figure 6). This program involved on-board observations on permitted vessels within the dredge fishery documenting dredge hauls and any interactions with ETP species, as well as developing knowledge of the fishing method and providing education to fishers on recognising ETP species.

The primary aim of the observer program was to provide quality assurance to the fishery-dependent data. The Poole dredge fishery is a small-scale fishery with limited resources available to implement regular collection of fishery-independent data, therefore fishery-dependent data is a key source of quantified information to help inform management of the fishery. However, given the experience from other work on managing ETP interactions that fishery-dependent data can introduce an element of bias based on misreporting and a lack of understanding of how the data is to be used, it was identified that a method of quality assuring this data collection in Poole was required in order to provide confidence in the regularly submitted fishery-dependent data.

Figure 6: *Images from the fishery-independent observer program showing a fisher in the dredge fishery sorting shellfish whilst the dredge is fishing and the contents of a dredge haul.*

Methodology:

- On-board observations were carried out for 18 of the permitted vessels in the fishery covering 19 fishing trips. This represents 42% of the active fishery participants. This equated to a total of 37 hours of fishing activity during which 424 dredge hauls were observed.
  The number of vessels observed aimed to provide sufficient data to achieve the aim of quality assuring fishery-dependent data whilst recognising that resource limitations would not provide for observations on all vessels within the fishery.

- Observations on each vessel were conducted for a period of 3-4 hours
  This time period was used to allow observations to be carried out on more than one fishing vessel within the tidal window available each day. It is known from fishing effort data provided by fishers that a period of 3-4 hours is representative of a significant portion of a total daily fishing trip.

- The hauling of the dredge was observed and photographed on each occasion at the point where the dredge reached the sorting table.
  Observing the dredge as it is being hauled indicates if there are any ETP species which may have interacted with the dredge but fall out as the dredge is being hauled and indicates if there is any interaction between the dredge and an ETP species where the species has not been directly caught within the dredge.

- The contents of the dredge was observed for the presence of ETP species from the point of the dredge being recovered to it being returned to the sea.
  This provides an indication of any ETP species which may have been retained by the dredge and gives an opportunity for any species retained to be examined to determine condition and whether mortality has occurred, or the species is able to be successful returned.

- Each haul and associated photographs were assigned a GPS location using a hand-held GPS unit.
  This allows for any data on ETP interactions to be analysed spatially and allows for quantification of interactions in relation to areas where certain species are known to occur.

Results:

The results of the data collected through the observer program indicated that there were no interactions between the dredge fishery and any ETP species during any of the observed hauls. This agrees with the fishery-dependent data provided by the same permitted fishers during the same time period indicating that no ETP interactions had taken place.

Figure 7 shows the spatial distribution of observed dredges for the observer program alongside the data provided in Figure 2 on the location of seal haul out areas and habitats in the Harbour where other ETP species are likely to be found. Using the data on locations where ETP species are likely to be found allowed for the observer program to collect data in areas where the potential risk of an interaction is likely to be higher. The absence of any interactions during the observer program, even in areas where the risk is likely to be higher, indicates that the current management of the fishery through spatial and temporal restrictions as well as restrictions on the construction and use of the fishing gear is successful in minimising the risk of interaction between the fishery and ETP species.

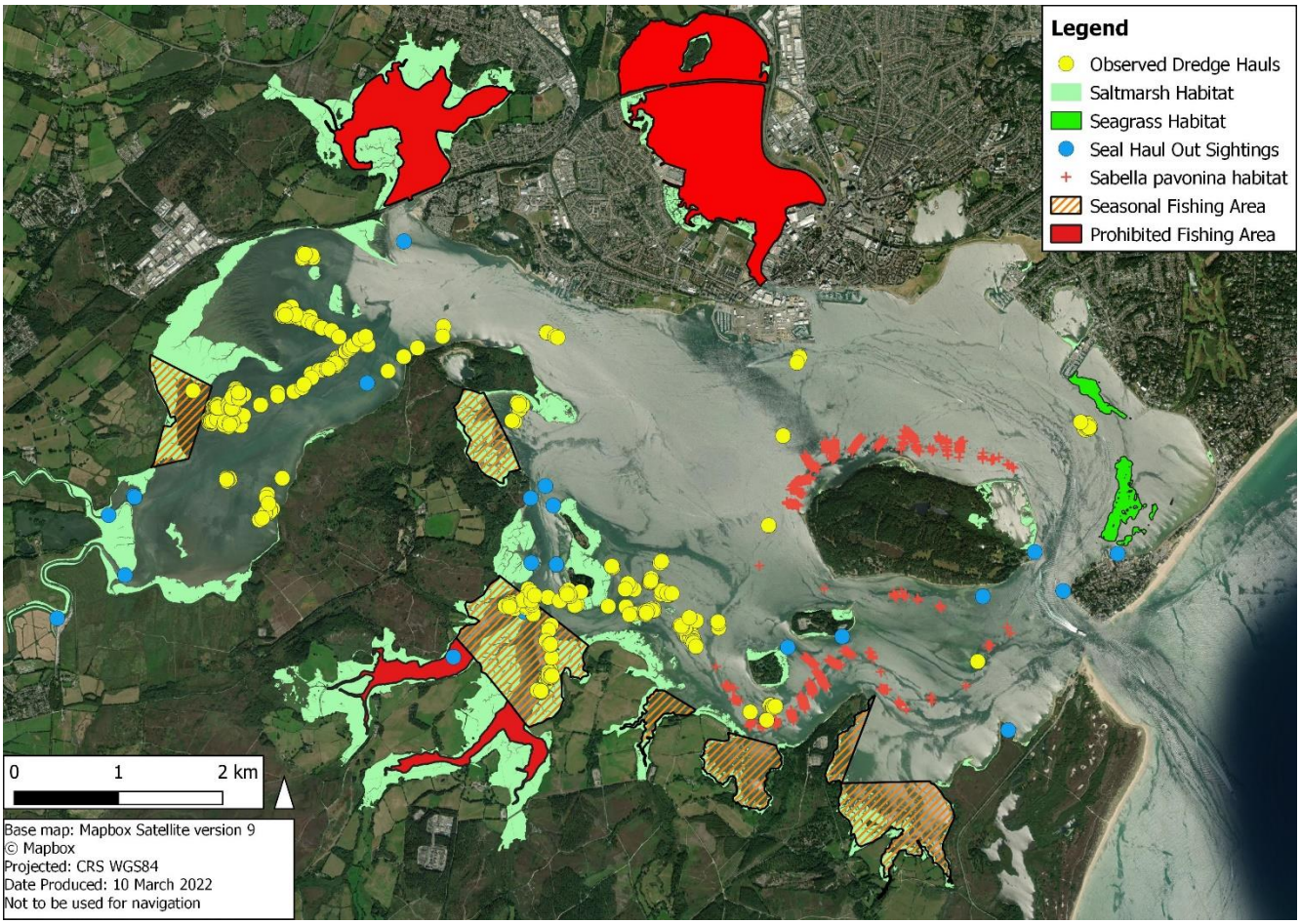


Figure 7: *GPS locations of observed dredge hauls as part of the fishery-independent data collection through the observer program (yellow points). The locations of observed hauls are shown alongside known seal haul out locations (blue points) and occurrence of seagrass (bright green), saltmarsh (pale green) and Sabella pavonina (red cross) habitats which are likely to be associated with ETP species. Also shown are areas where dredging is prohibited year-round (red) or seasonally (orange hashed) under the Poole Harbour Dredge Permit Byelaw permit conditions.*

The fishery-independent data collected as part of this project provided quality assurance to the fishery-dependent data collected by fishers in the dredge fishery and submitted to the management body on a monthly basis. This process of quality assurance allows the management body to use the fishery-dependent data as an empirical reference point for the fishery, using 'number of reported interactions' to define the reference point. Consideration will be required as to how a particular number of interactions are linked to a particular action pathway but initially it is suggested that the occurrence of interactions should initiate a review of supporting information and additional relevant evidence sources to identify the main causative factor behind the interaction occurring. Whilst this program of work is developed and understanding of the implications of interactions is furthered it is suggested that a review action pathway would be appropriate rather than an immediate management change, providing a proportionate response from the management body which addresses any potential issues without being overly precautionary for the fishing industry.

2.4.3 Innovation in mitigation methods

Since the implementation of the Poole Harbour Dredge Permit Byelaw in 2015, innovations have been made to fishing gear in the fishery which have been identified through this project as having added benefits in helping to mitigate potential impacts to ETP species. During the course of the project fishers have engaged with the management authority to discuss how these fishing gear innovations may aid in minimising or even eliminating the potential for interactions with ETP species and how these methods have also proved successful in optimising the fishing operation which increases the likelihood of similar innovations being adopted by other fishers thus furthering the benefits which are also seen for ETP species.

These innovations fall under three categories; developments to engines and water pumps, developments to fuelling mechanisms, developments to dredges and sorting equipment.

Developments to engines and water pumps

The method of fishing in the dredge fishery has evolved so that the dredge can be operated whilst the vessel is on tick-over rather than running in gear (Figure 8a). This has reduced the noise created by the engine whilst fishing is taking place which is in closer proximity to areas where ETP species would be likely to be disturbed by increased noise for example Bird Sensitive Areas. Noise reduction is also seen on larger catamaran style vessels which are being used in the fishery through the need to only use one of the twin engines, again on tick-over, during fishing practice.

Modifications to the water pumps, used to power the hydraulic aspect of the dredge equipment, have also resulted in a reduction in the noise produced from fishing activity. Water cooled exhausts are being used on water pumps which reduces the noise output (Figure 8b). In addition, the newer catamaran style vessels and some of the dory style vessels run the water pump using the inboard diesel engine (Figure 8c) which powers the vessel rather than a stand-alone generator which greatly reduces the noise previously created by requiring a secondary generator which would sit on the deck of the vessel.

Finally, water pumps that are run using a separate petrol generator have been modified to also drive the hydraulics that operate the dredge which has removed the need for a separate power source for the hydraulic system. This reduction in the number of power sources across all modifications has resulted in a reduction in noise in the dredge fishing process. As with engine modifications, the use of this equipment will occur when in fishing locations which are likely to be in closer proximity to areas where ETP species will be located, the reduction in noise will therefore greatly reduce the potential for disturbance impacts to these species both above and below water.

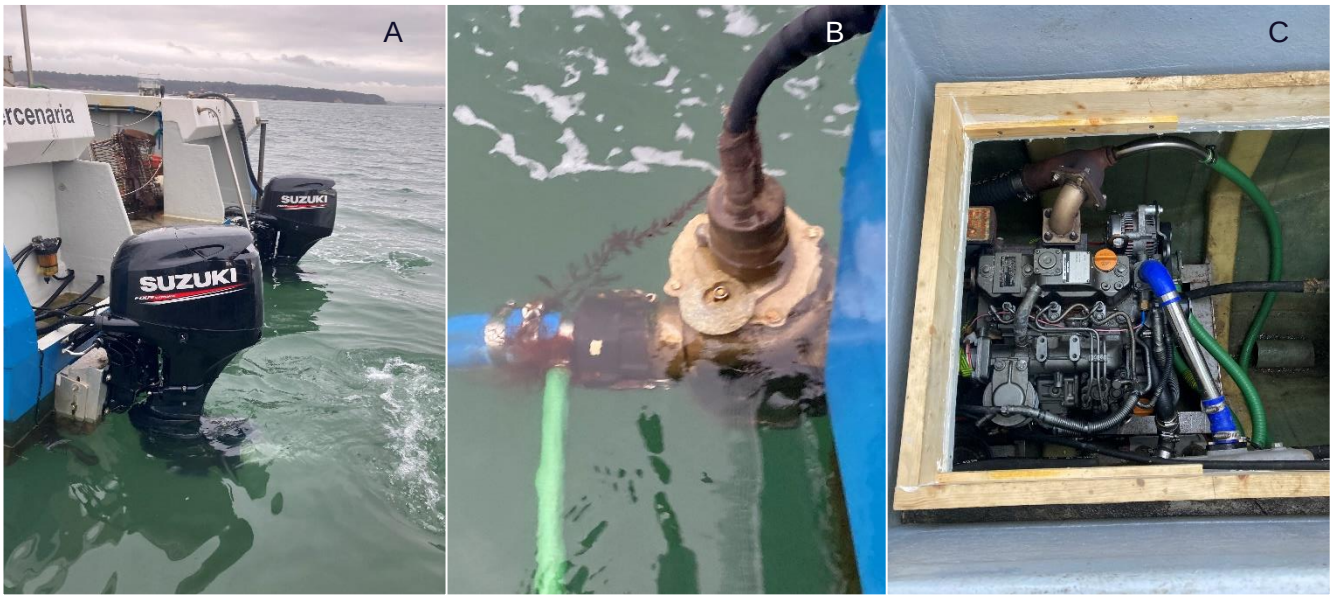


Figure 8: *Examples of developments to engines and water pumps in the Poole Harbour dredge fishery, a) a catamaran style dredge vessel using only one engine on tick-over during fishing, b) a water-cooled water pump, c) inboard diesel engine being used to power the water pump removing the need for a stand-alone generator.*

Developments to fuelling mechanisms

The installation of in-board auxiliary water pumps on the newer catamaran style vessels and some existing larger vessels in the permit fishery have resulted in the use of diesel as the fuel source rather than petrol which is less flammable and creates less of a risk of fire on-board vessels. Re-fuelling of the in-board pumps is also required less frequently removing the need to re-fuel in-situ during fishing activity and the location of the pump, in-board, makes the re-fuelling processes easier and, should a spill occur, it is much easier to contain the spill without any risk to the marine environment (Figure 9). All of these modifications reduce the risk of introducing a pollutant into the marine system which can have negative impacts on many ETP species (and the wider marine environment).

Figure 9: *Developments to fueling mechanisms in the Poole Harbour dredge fishery through the use of in-board pumps which allows the fuel source to be contained within the vessel making the re-fueling process safer and improving the ability to contain any accidental spills*

Developments to dredges and sorting equipment

Innovations in the fishery have also been seen in the pump-scoop dredge used to harvest shellfish. A fisher has been trialling a vibrating pump-scoop dredge which vibrates during the dredging process (Figure 10a). This assists in moving material through the dredge whilst it is in the water, meaning that the dredge does not become full of additional sediment and detritus as quickly therefore increasing the retention of the target species which can otherwise be blocked from entering the dredge and minimising the retention of target species under the minimum conservation reference size as they are able to pass more easily through the dredge bars during the fishing process.

Fishers in this fishery also use secondary sorting equipment in the form of a riddle, which is a table with spaced metal bars that aims to minimise retention of target species below the minimum conservation reference size. Fishers have voluntarily increased the bar spacing on both the riddle and the pump-scoop dredge to greater than that which is required by the Poole Harbour Dredge Permit of 18mm, to either 19mm or, in some cases, 20mm (Figure 10b). This increase in bar spacing ensures that material retained by the dredge which is not the target species can be returned more quickly to the seabed and any target species under the minimum conservation reference size can also be returned quickly to the seabed.

Further innovation in the sorting equipment is seen in the use of a mechanised riddle, operated by a computer system which has varying levels each set at a different bar spacing down to the required spacing of 18mm at the lowest level (Figure 10c). This improves fishing efficiency and helps to ensure the maximum amount of legal catch can be retained from a single dredge. This method also helps to minimise the quantity of target species under the minimum conservation reference size which would have to be hand gauged by the fisher as there is more opportunity for undersized individuals to pass through the riddle given the several different layers.

All of the modifications to dredges and sorting equipment are designed to reduce the amount of time that a fisher needs to spend gauging catch to ensure compliance with minimum conservation

reference size regulations. Whilst some gauging will still be required, the degree to which this is needed between dredges will be reduced. This gives fishers more time to be aware of the area they are fishing in and observe any potential ETP species which may be in the same area thus enabling them to take action to mitigate any potential interaction. In addition, the target species for the fishery are identified as food sources for many of the ETP bird species in the Harbour. By reducing the time that undersized individuals are removed from the sediment and minimising accidental retention there will be benefits to the target species populations which help to support certain ETP species as a food source.

Figure 10: *Examples of developments to dredges and sorting equipment in the Poole Harbour dredge fishery, a) a vibrating pump-scoop dredge, b) a sorting riddle with increased bar spacing, c) a mechanised riddle with multiple layers for sorting shellfish.*

2.4.4 Risk Management Strategy

A Risk Management Strategy has been developed based on the experience and knowledge gained from the Poole Clam & Cockle Partnership Project. This Strategy incorporates lessons learned from the work in Poole Harbour but is designed to be used by any fishery in implementing ETP species management. The Strategy is outlined in section 3.

3. Risk Management Strategy

Scientific literature highlights that in order for ETP Species protection to be achieved, appropriate management needs to be put in place informed by scientific data and delivered through a clear, transparent and understandable process. Methods of data collection, analysis and implementation of education on ETP species was explored through the Poole Clam & Cockle Partnership Project and the outcomes and lessons learnt from this project have been used to form a Risk Management Strategy. This Strategy is outlined below in four stages and visualised in Figure 11.

Stage 1 – Identification of existing fishery management and data sources

For fisheries which have not previously considered management of ETP species, the first stage in the process of developing a Risk Management Strategy is to identify information specific to the site in question. This includes:

- **What is the extent of the management area?**
  For example, does the management area match the boundaries of an MPA or an enclosed water body such as an estuary or is there a need to set boundaries specifically for ETP management within a wider area
- **What ETP species are present?**
  Utilising the different listings of ETP species what species are relevant to the management area identified above, can an initial list be narrowed down based on analysis of data collected locally, for example location data for particular species collected by nature conservation bodies or advisors, or based on local knowledge
  Consideration should also be given to having a set number of key species where the risk is identified as being increased or the potential for overlap with fishing activity is greater so that educational materials can focus on these species without becoming overly complicated for end users
- **What is the fishing activity that needs to be assessed?**
  Identify what fishing activities take place within the defined management area, identify if there is more than one fishery which may require management and how the different fisheries overlap
  Once the fisheries have been identified, information should be collated on the fishing gear used and the fishing method as well as collating any sources of data on the spatial and temporal distribution of fishing effort
- **Are there any existing management measures for the fishery?**
  Identify what management measures already exist for the fishery and the format that these take, for example is management regulatory or voluntary, for regulatory management is there a permit scheme or a stand-alone byelaw to manage the fishery, what is the potential for existing management to be adaptive, how are technical aspects of the fishery managed for example through permit conditions

- **Are there any existing reporting mechanisms for interactions between ETP species and fishing activity?**
  It is unlikely that fisheries which are starting out in the process of ETP management will have specific reporting mechanisms for interactions, however identification of any reporting requirements for fishers within the fishery can be helpful in determining how ETP interaction reporting can be incorporated into the fishery. For fishery-dependent reporting, if initial reporting can be incorporated into existing documents such as catch reporting then this reduces the burden on fishers and increases the likelihood of accurate data being received.
- **What is the resource availability for future data collection and analysis?**
  Consideration should be given to the resource availability of the management body and any other parties likely to be involved in data collection on ETP species. When determining the type and scope of any additional data collection such as fishery-independent data, it is important to identify what capabilities exist for collecting such data and whether funding or partnership projects need to be considered and, for analysis, what capabilities exist and the time/funding available for carrying out such analysis. The implementation of any data collection program should be based on a consideration of what the data needs to inform but needs to consider available resources so that the data can actually be used by management authorities.

In this initial stage of development, consideration should be given at each stage as to how stakeholders in the fishery and wider management area can be incorporated into the process. Some sources of data may be held by fishers, for example where quantified effort data for a fishery does not exist, fishers will be able to provide qualitative information on preferred fishing areas. Other data sources such as the location of particular ETP species may be held by local conservation groups. Encouraging participation of all interested parties at this initial stage will increase participation in subsequent stages and increase the likelihood of positive knowledge sharing and, following management implementation, compliance with management measures.

Stage 2 – Identification of Risk

Once initial information has been gathered on the management area under Stage 1, the next stage is to identify the potential risk to ETP species from fishing activity and determine if existing management is sufficient to meet the identified risk.

Methods of Assessing a Fishery

The identification of a defined list of ETP species will assist in ensuring that the assessment of risk in the fishery remains within the resource capabilities of the management body. Assessing the likelihood of an interaction between fishing activity and the ETP species can be achieved in different ways and the most appropriate method to be used will depend on the wider context in which the fishery sits. Utilising existing assessments for the fishery will help reduce the burden on management authorities and provides a set process, often independently verified, which adds confidence to the conclusions on risk levels.

Habitats Regulations Assessment Process

For management areas which sit within or adjacent to a site which forms part of the National Site Network in the UK (or sites which are classed as European Marine Sites in the EU), a Habitats Regulations Assessment (HRA) will most likely be required for fishing activity which takes place within the site and will be undertaken by a Competent Authority which includes fisheries management authorities. The HRA process can include reference to the protection of ETP species, the focus being on the species for which the site is legally protected, but the process of assessing risk and assessing the suitability of management measures is applicable to the ETP Risk Management Strategy as a whole. Through this process, an assessment is made of either a fishing activity in relation to the features of the site, identifying where management is required or of a particular management measure, referred to as a Plan or Project, where the assessment needs to demonstrate no adverse effect as a result of the implementation of that measure. The HRA process is carried out in consultation with statutory nature conservation advisors, which for England is Natural England, providing a third-party assessment of any risk assessment and management development.

Site of Special Scientific Interest Assessment Process

For management areas which sit within a Site of Special Scientific Interest (SSSI) a SSSI Assessment may be carried out for certain fishing activities. As above, the assessment can be expanded to include reference to ETP species management and, as with the HRA process, SSSI Assessments will also involve consultation with statutory nature conservation advisors providing independent verification of conclusions made on management.

Marine Stewardship Council Pre-Assessment and Full Assessment

One of the aims of this Risk Management Strategy is to assist fisheries looking to undertake MSC certification or in the process of addressing certification conditions. In identifying risk in relation to ETP species, the reports from both the pre-assessment of a fishery and, if applicable, the full assessment will provide an indication as to the areas which require improvement and where further evidence is required. The MSC Assessments also provide an independent assessment of the fishery and any existing management which, as with the assessments above, provides increased confidence in the risk level identified and/or the robustness of any management measures currently in place.

Inputs to an Assessment

Once a suitable assessment method has been identified, all the information gathered during Stage 1 of the process should be utilised in the identification of the level of risk between a fishery and ETP species. Examples of how this information can be presented are given in Section 2 of this document relating to the Poole Clam & Cockle Fishery. The ability to define risk requires an understanding of the level of overlap between the fishery and the location of ETP species therefore the ability to visualise fishing effort data with location data for particular species is a key component of identifying risk.

Setting a Risk Level

The identification of risk for interactions between ETP species and a particular fishing activity will be site and fishery specific. Once the conclusions of an appropriate assessment method have been obtained this will indicate whether existing management measures are deemed to be suitable to address that risk or whether additional management measures might be required. For fisheries

starting in this process there is the potential that management measures will not yet exist and the determination of risk will need to be based on a limited amount of data, however setting this initial risk level based on the fishery in its current state will allow managers to progress to Stages 3 and 4 which facilitate the introduction of additional data sources that will assist in increasing the robustness of risk assessments and start the process of developing a quantified database on which to determine future management decisions.

For a larger management area, consideration should also be given to how risk can be identified spatially. The concern for fishers is that a high risk level is identified for a particular ETP species or location is then applied to the wider fishery area disproportionately. To ensure that management can achieve the right level of protection whilst also being proportionate, identifying a way of being able to manage spatially, i.e., through the use of fishing zones or catch zones, can help focus risk assessments to that particular area.

Stage 3 – Implementation of data collection, reporting and increasing awareness

Stage 3 involves the implementation of data collection and reporting mechanisms to act on any data gaps identified during Stage 1 and provide data to support the monitoring of risks identified at Stage 2. The aim at the completion of Stage 3 is to be able to implement a Monitoring and Control Plan for ETP species management in the fishery which can be run continuously with all required data inputs to inform management with a strong element of fisher-led reporting.

The following data will be required at this stage to inform a Monitoring and Control Plan and also to help implement ETP species management in the fishery. The number of points that each fishery needs to address through this stage will be informed by the initial collection of data relating to the site and the fishery in Stage 1. The points outlined here are those that have been explored through the Poole Clam & Cockle Partnership Project and have been shown to be suitable in providing data to assist the development of a Monitoring and Control Plan for the fishery and in developing fishers understanding and involvement in ETP species management. For each point, the relevant section of the Poole Partnership Project is given.

Data on interactions between the fishery and ETP species
The key aspect to developing a monitoring plan for ETP species is the ability to quantify the number of interactions between fishing activity and those species identified for the site so as to create empirical reference points. Where reporting is to be fishery-dependent, i.e., direct reporting by fishery participants, a method of quality assuring that data through fishery-independent data collection should be implemented – **Section 2.4.2.2, p.19**

Ongoing reporting mechanism for interactions
Once fishery-dependent data has been quality assured, the ability to implement routine reporting is required so that data can be collected at a scale appropriate to management of the fishery. If no existing reporting mechanisms such as catch data are in place, a separate reporting mechanism for

ETP species interactions will be required to provide initial ‘yes’ ‘no’ data. Whether utilising existing reporting mechanisms or not, a separate reporting requirement to provide detail of an interaction will also be required – **Section 2.4.2.1, p.18**

Education program
Ahead of the implementation of fishery-dependent reporting, or to improve existing reporting, an education program should be developed for all those involved in collecting data on ETP species and interactions. Training should be provided which is tailored to the stakeholder group and outreach materials should be provided to help with ongoing data collection – **Section 2.4.3 Stage 3, p.16**

Development of other fisher-led initiatives
Although not integral to the development of management, consideration can be given at this stage to starting other fisher-led initiatives which may assist in mitigating against any interactions between the fishery and ETP species. The example provided in the Poole Partnership Project is the development of innovations to fishing gear. Whilst not directly connected to management at this stage, the development of such initiatives allows for mitigations which could be incorporated into management in the future, potentially helping to offset any identified increase in risk and thus potentially reducing the need for the implementation of more severe management measures such as spatial or temporal restrictions to fishing effort – **Section 2.4.3, p.22**

Stage 4 – Monitoring and Control Plan

The final stage in developing a Risk Management Strategy is the development and implementation of a Monitoring and Control plan. This serves as a robust method for monitoring future change utilising quantified data collected for the fishery. A monitoring and control plan can be implemented for all types of management, however the process works best when an adaptive management scheme is used as this allows for managers to be reactive to changes in the system and, if required, implement management changes in a timely manner. For data-limited fisheries, which is often the case for small-scale fisheries, fisheries managers have to test management measures in the real world to determine the effectiveness or impact to the marine environment. A monitoring and control plan creates a process to address any deficiencies identified in management without the fishery having to reach a point of being unsustainable where more extreme management intervention would be required to address impacts.

A monitoring and control plan also provides a transparent method of showing the process of management development and how data collected for the fishery will be used. The development of a monitoring and control plan, particularly the definition of reference points which initiate action pathways, should provide opportunities for stakeholder involvement to increase understanding and increase the likelihood of improved buy-in and compliance with management measures.

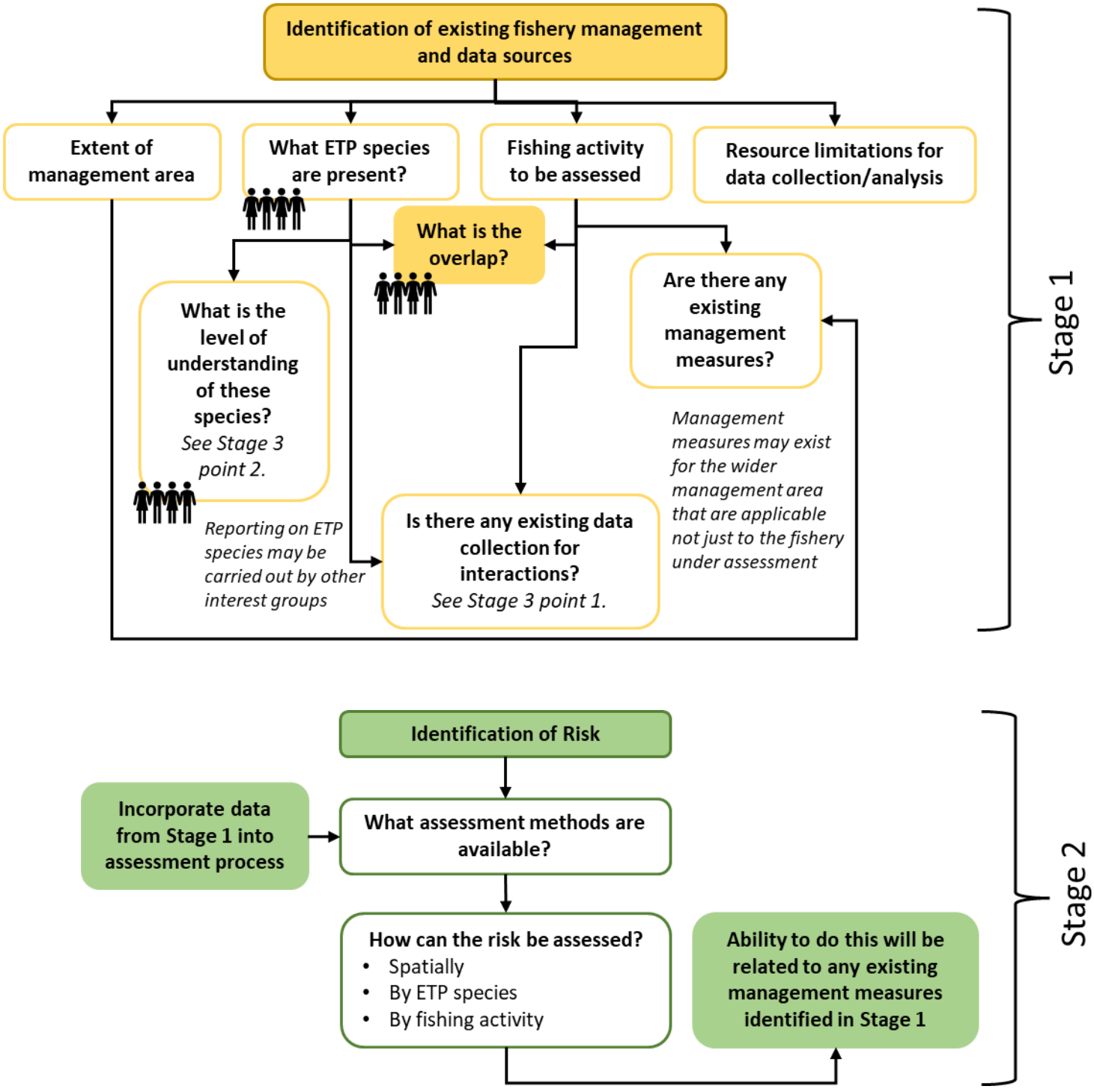
The Poole Clam & Cockle Partnership Project outputs in Section 2 illustrate how small-scale fisheries can develop data collection protocols which can be used to set empirical reference points without an unmanageable increase in the resource burden for fisheries managers. It is suggested that one

simple reference point be used against initially in the development of a Monitoring and Control Plan. This keeps data requirements at a manageable level and provides a method of linking data to management which is easily understandable. It is important to identify in a Monitoring and Control Plan where the feedback loops exist and the opportunities for stakeholder participation. This provides a clear template to all those involved in or interested in the fishery as to where data will be used and how they can feed into the process of management monitoring and, where needed, development. The other requirement of a robust Monitoring and Control Plan is to have a process for periodic review, even if reference points are not reached. This allows for 'negative' data, i.e., data of the reference points not being reached to be quantified which is important for demonstrating successes in management measures. In addition, a periodic review allows for the inclusion of up-to-date information and additional data and facilitates regular opportunities for interaction with stakeholders. The period over which the plan should be reviewed will be specific to the fishery in question and should align with appropriate time periods relative to that fishery, for example if permits are issued on an annual basis, an annual review of data may be appropriate. However, resource considerations should also be taken into consideration, and it may be appropriate in the first year after implementation to have an annual review and then, if reference points are not reached over multiple years, the period between reviews could be extended.

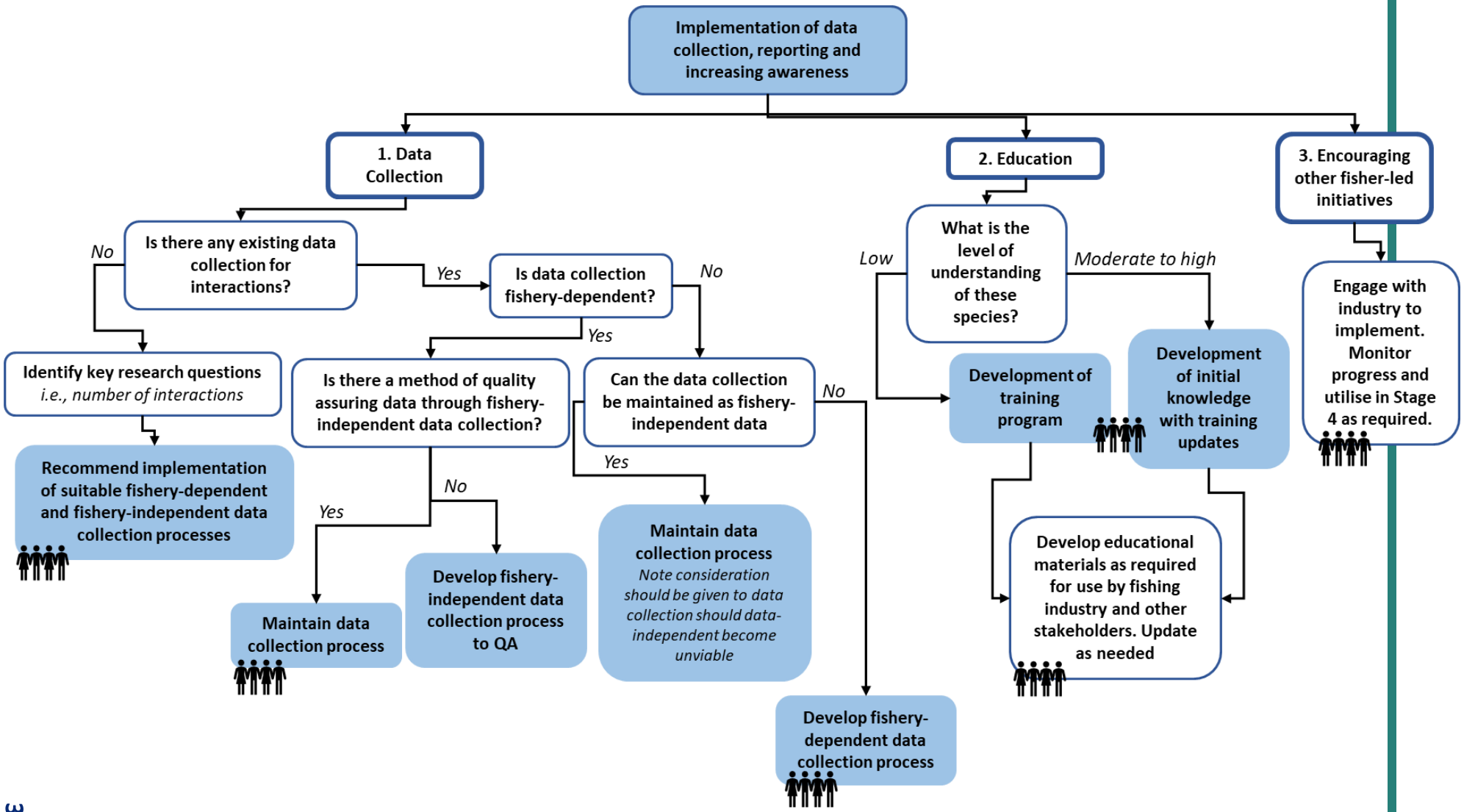
A Note on Management

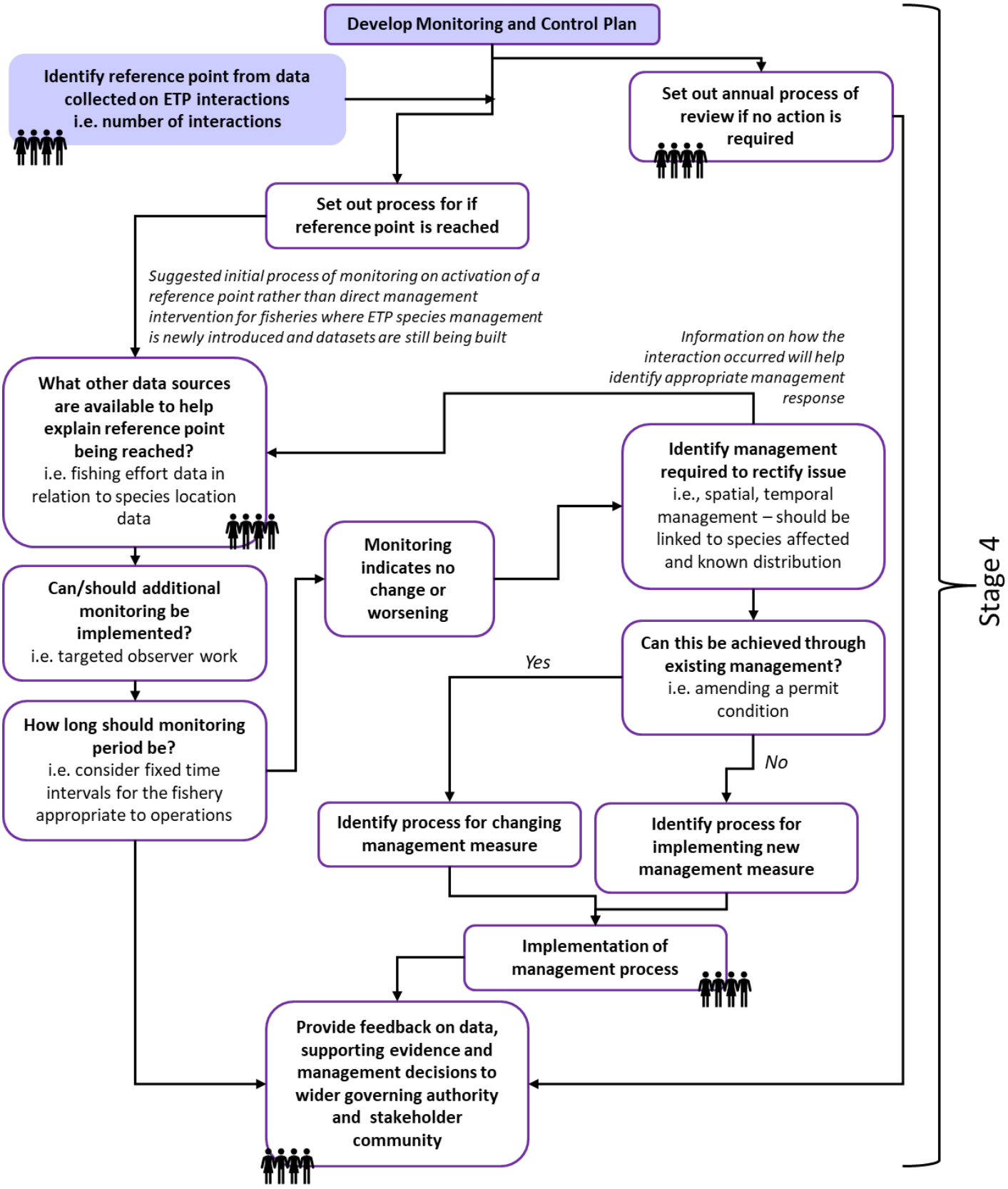
For fisheries which have not previously implemented management relating to ETP species and for fisheries with limited existing management for the fishery in general, it is likely that there will also be limited data on interactions between the fishery and ETP species. While these data sources are limited, it is difficult to determine the potential success or limitations of any particular management scheme. The final stage in this Risk Management Strategy may, in the case of limited data and limited management, be used to determine if management is required through monitoring the fishery as it currently operates rather than monitoring in relation to a particular management scheme. This will still provide quantified information as to whether additional management is required with the ability to quantify the success of a particular management measure being implemented later, should the requirement for further management intervention be identified.

Figure 11: *The following flow charts illustrated the four stages of developing a Risk Management Strategy for the management of ETP species in a fishery. More information on each stage is provided in Section 3 of this document. For each flow chart an icon showing a group of people is used to illustrate suggested points in the process for stakeholder involvement.*



Stage 3


Implementation of data collection, reporting and increasing awareness
1. Data Collection
2. Education
3. Encouraging other fisher-led initiatives
Is there any existing data collection for interactions?
No
Yes
Is data collection fishery-dependent?
No
Yes
Identify key research questions
i.e., number of interactions
Recommend implementation of suitable fishery-dependent and fishery-independent data collection processes
Is there a method of quality assuring data through fishery-independent data collection?
Can the data collection be maintained as fishery-independent data
No
Yes
Yes
No
Maintain data collection process
Develop fishery-independent data collection process to QA
Maintain data collection process
Note consideration should be given to data collection should data-independent become unviable
Develop fishery-dependent data collection process
What is the level of understanding of these species?
Low
Moderate to high
Development of training program
Development of initial knowledge with training updates
Develop educational materials as required for use by fishing industry and other stakeholders. Update as needed
Engage with industry to implement. Monitor progress and utilise in Stage 4 as required.


Develop Monitoring and Control Plan
Identify reference point from data collected on ETP interactions i.e. number of interactions
Set out annual process of review if no action is required
Set out process for if reference point is reached
Suggested initial process of monitoring on activation of a reference point rather than direct management intervention for fisheries where ETP species management is newly introduced and datasets are still being built
Information on how the interaction occurred will help identify appropriate management response
What other data sources are available to help explain reference point being reached? i.e. fishing effort data in relation to species location data
Identify management required to rectify issue i.e., spatial, temporal management – should be linked to species affected and known distribution
Monitoring indicates no change or worsening
Can/should additional monitoring be implemented? i.e. targeted observer work
Can this be achieved through existing management? i.e. amending a permit condition
Yes
No
How long should monitoring period be? i.e. consider fixed time intervals for the fishery appropriate to operations
Identify process for changing management measure
Identify process for implementing new management measure
Implementation of management process
Provide feedback on data, supporting evidence and management decisions to wider governing authority and stakeholder community
Stage 4

4. Conclusion

The program of work implemented in Poole and used to create a blueprint for other fisheries utilises and develops many of the requirements outlined in literature as being necessary for good ETP species management. The development of a fishery-independent observer program provides quality assurance to fishery-dependent data collection, therefore giving confidence to the use of a data collection protocol which provides quantified data to support management that can be continually collected to form a timeseries dataset with limited resource requirement from management authorities. This data collection creates the ability to set simple reference points based on interaction rates that can be compared temporally and spatially to ensure management intervention is appropriately delivered and monitored without the need to be disproportionately precautionary. The education program, as identified in other studies, has been shown to be a key component of maximising the quality of fishery-dependent data and an opportunity to encourage fishers to engage in the management of their own fishery, an important first step in moving towards a co-management system. This move towards co-management is furthered by the exploration of other fisher-led initiative and innovations which can be utilised going forward to increase the mitigation provided to ETP species and help to offset the use of more restrictive management measures that curtail fishing effort.

The benefits of adaptive management have also been identified through this process with the ability for fisheries managers to be reactive to changes in the system for ETP species management seen as a positive step towards achieving management which addresses conservation aims for the fishery whilst being proportionate and not unduly disregarding social and economic objectives of the industry. As the UK moves through the implementation of The Fisheries Act 2020 and the subsequent creation of Fisheries Management Plans, fisheries will be required to demonstrate how bycatch of sensitive species is minimised. This Risk Management Strategy document aims to provide a guide on how to achieve this with particular relevance to small-scale, data-limited fisheries which are more at risk of precautionary management in the absence of adequate data. In addition, this document can also be used to guide fisheries looking to start or in the process of achieving an ecolabelling certification. It has been identified that an independent verification of the sustainability of a fishery is becoming increasingly sought by the supply chain and therefore there is likely to be an increase in the number of fishers requiring specific ETP species management in order to meet and continue to meet the necessarily rigorous certification requirements of such schemes.

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Appendix 1: Interaction between dredge fishing activity and Endangered, Threatened and Protected (ETP) Species Reporting Form

Poole Harbour Dredge Permit Byelaw

Interaction between dredge fishing activity and Endangered, Threatened and Protected (ETP) Species Reporting Form

Name of Permit Holder:			
Fishing Vessel Name:		**Vessel PLN:**	
Details of Interaction			
Date:		**Time:**	
Location (Latitude/Longitude):			
Please list the species involved in the interaction from species list on reverse of this form:			
Please give a description of the interaction:			
Please detail any outcomes from the interaction i.e. mortality of the species occurred or species was able to be returned			

Please indicate any measures which you are putting in place to reduce the likelihood of future interactions with this species.			
Reported By			
Please Print Name:			
Signature:		**Date:**	
Receiving Officer at Southern IFCA (Internal Use Only)			
Name:			
Position:			
Signature		**Date:**	

If you have any photographs or other media associated with the interaction then please provide a copy of these when submitting this form.